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Astroscan® Millennium User's Guide



#7000000 **Astroscan® Millennium** Tabletop Telescope

Customer Support: 1-800-728-6999 • **E-mail:** info@scientificsonline.com
Web Site: www.ScientificsOnline.com • 532 Main Street, Tonawanda, NY 14150

ASTROSCAN® MILLENNIUM

CONGRATULATIONS ON PURCHASING THE ASTROSCAN® MILLENNIUM

The **ASTROSCAN®** is a Dobsonian telescope featuring a wide field of view that produces bright images that will astound – making it the perfect telescope for the serious beginner at any and every age. Plus, we're backing it with a limited 2-year warranty (see back page for details).

EASY-TO-USE

Your **ASTROSCAN®** Millennium is already preassembled in the box. All you have to do is install the red dot finder and the eyepiece tray and you're ready to start observing. The tube itself can be easily repositioned, allowing the eyepiece to be centered at the most comfortable viewing angle for you.

PORTABLE

The sturdy design of the **ASTROSCAN®** lends itself to ease of transportation. The carrying handle is well positioned so you can move the telescope single handedly. The three rubber feet provide balanced support and are skid-free, allowing you to place the telescope on any smooth, level surface.

POWERFUL

You'll immediately be able to take in breath-taking views of our Moon and the night sky. Using the correct eyepiece, with time and patience, you'll soon marvel at the majesty of several planets and many of their moons. Locating some deep sky objects, like the Orion Nebula, is also possible.

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ASTROSCAN® MILLENNIUM SPECS

Aperture	114mm / 4.5"
Primary Mirror Design	Parabolic
Focal Length	450mm
Limiting Magnitude	12.98
Focal Ratio	f/3.95
Eyepiece (Low Mag)	17mm Kellner (26.5x)
Eyepiece (High Mag)	10mm Kellner (45x)
Finderscope	Red Dot Finder
Mount Type	Tabletop Dobsonian
Mount Adjustments	Altitude & Azimuth
Base Materials	Wood, Melamine

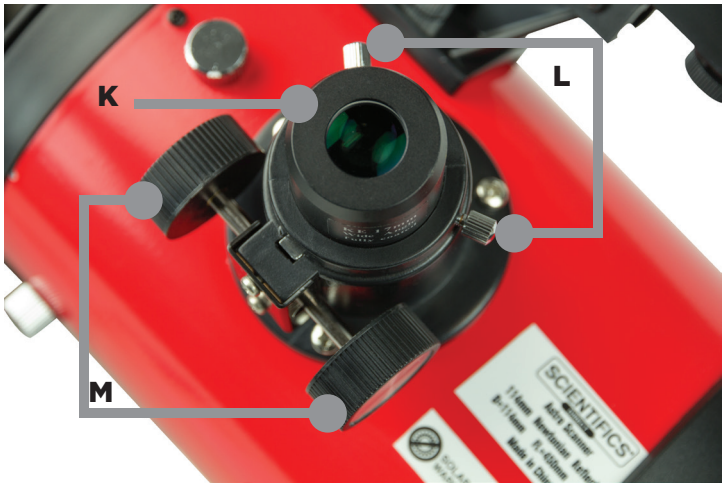
⚠ WARNINGS ⚠

- Do not use telescope or finderscope to look at the sun without an appropriate solar filter (sold separately). Doing so will cause permanent and irreversible eye damage.
- Never use an eyepiece filter as a solar filter. Only full aperture solar filters will completely cover the opening of the optical tube and provide proper eye protection.
- Make sure no screws are loose before using telescope.
- Do not drop or shake your telescope as doing so may damage the optics, or harm you or the people around you.

COMPONENTS

A. Finderscope
B. Focuser
C. Tube Clamp
D. Telescope Tube
E. Altitude Tension Knob
F. Primary Mirror Cell
G. Carrying Handle
H. Dobsonian Altazimuth Mount
I. Eyepiece Storage Rack
J. 10mm Eyepiece
K. 17mm Eyepiece
L. Eyepiece Set Screws
M. Focus Knobs
N. Base





LAUNCH YOUR ASTROSCAN® MILLENNIUM EXPERIENCE

Your **ASTROSCAN® Millennium** portable reflector comes preassembled in the box. All you have to do is install the red dot finderscope and the eyepiece tray and you're ready to observe.

INSTALLING THE RED DOT FINDERSCOPE

1. Remove the thumb nuts (shown in **Figure 1**) from the top of the optical tube assembly, just above the focuser.

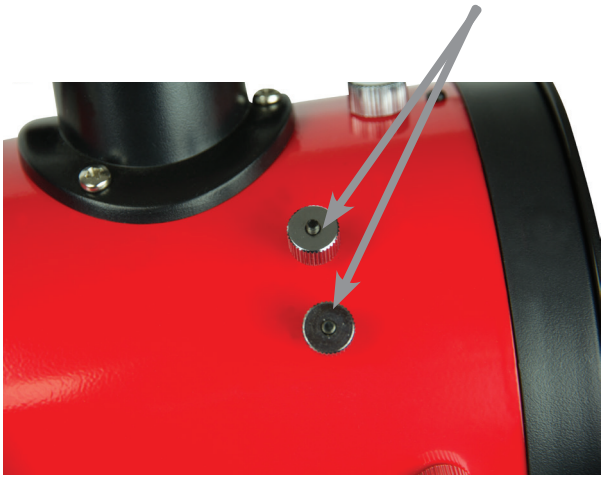


Figure 1

2. Place the finderscope (shown as A on page 3) over the threaded rods on the tube.
3. Reinstall the thumb nuts.
4. See page 6 for operating directions.

EYEPIECE TRAY INSTALLATION

1. Using a Phillips head screwdriver, loosen the two black screws located on the side of the base. Do not remove the screws, just loosen them about 1 turn.
2. Place the eyepiece tray (I) over the screws with the mounting holes facing downward.
3. Gently push the tray downward so the screws align with the narrow portion of the mounting holes.
4. Retighten the 2 screws. Do not over tighten; they should only be snug enough to hold the eyepiece tray.

TUBE ORIENTATION

The **ASTROSCAN® Millennium** has a tube clamp to allow the eyepiece to be positioned at the most comfortable viewing angle

1. To rotate the tube, loosen the thumbscrew on the tube clamp slightly.
2. Rotate the optical tube so the finderscope is at the top of the tube and the eyepiece is positioned around a 45º angle from the ground. This can be adjusted to best suit your preference.
3. Make sure the optical tube is forward enough in the tube rings so that you can point the telescope straight overhead without bumping into the base.

ASTROSCAN® BASICS

USING 1.25" EYEPIECES

1. The 1.25" is the most commonly used eyepiece format. The measurement of 1.25 inches is the diameter of the eyepiece barrel.
2. The eyepiece holder and focuser (B) come already attached to the optical tube, next to where the finderscope (A) is mounted.
3. Remove the plastic dust cover from the eyepiece holder.
4. Loosen the silver thumbscrews (L) on the focuser drawtube.
5. Take out your 17mm eyepiece (K). Remove the plastic covers.
6. Slide the chrome end of the eyepiece into the eyepiece holder.
7. Tighten the bottom thumbscrew (L) to hold eyepiece in place.
8. View through the eyepiece and focus as needed (See focusing section).
9. To remove the eyepiece, loosen the silver thumbscrew. To remove, loosen the thumbscrew and pull the eyepiece out of the focuser.
10. Use the plastic dust covers to protect the eyepiece and focuser during storage.

AIMING THE ASTROSCAN®

1. Your **ASTROSCAN® Millennium** is adjustable along two axes - altitude (up/down) and azimuth (left/right). You can adjust the telescope's position along one or both axes at the same time. **(Figure 2)**
2. Gently take hold of the end of the optical tube and move it either left or right (**Figure 3**) or up and down.
3. The telescope can be positioned to view anywhere in the night sky, but be sure to let it move naturally; never force your telescope to move.
4. To tighten the altitude motion, simply tighten the large altitude tension knob located on the mount (E). You can adjust the tension so that the telescope holds its position but still easily moves by hand.



Figure 2



Figure 3

FOCUSING THE IMAGE

1. Insert the 17mm eyepiece into the focuser.
2. Find a bright star and center it in the eyepiece. When the image is out of focus, the star looks like a doughnut. If focusing during the day, find an easily recognizable object like a sign or streetlight.
3. Turn the focus knobs (M) until the star focuses to a point of light. Bright stars will sometimes show a plus-shaped flare (called diffraction spikes) coming from the secondary mirror support at the front of the telescope.
4. Changing eyepieces typically requires readjusting the focus.

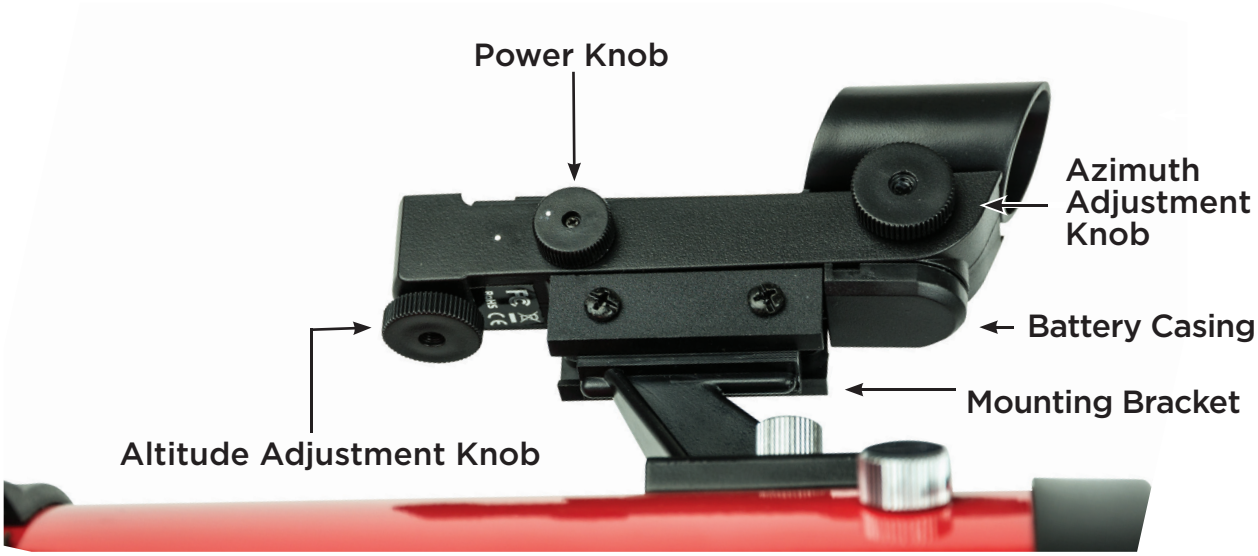


Figure 4

ALIGNING YOUR RED DOT FINDERSCOPE

You need to align your finderscope so you can easily find objects in the sky. The finder must be pointing at the same object as the optical tube. Follow these steps to properly set up and align your red dot finderscope **(Figure 4).**

1. Insert the lowest-power eyepiece into the focuser. Focus the eyepiece to view an easily recognizable, stationary distant object like a sign, license plate, or streetlight.
2. Turn on the red dot by turning the knob clockwise all the way until it stops. This is the brightest setting. The setting can be dimmed when viewing objects at night.
3. Adjust the altitude and azimuth knobs on the finder until the red dot is centered over the same object that is in your eyepiece. Be careful not to move the telescope during this process. **(Figure 5)**
4. Make sure you switch off the red dot finder when you are done using it to save the battery.



Figure 5

NOTE: Position your viewing angle so the red dot is in the center of the viewing plate

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PINPOINT THE SKY POSITION OF 500 STARS & THE PLANETS

To find the location of celestial objects you should refer to a night sky calendar, like our exclusive Scientifics Star & Planet Locator (***item# 3009227***), which shows the location of the stars, constellations and the five naked-eye planets (Mercury, Venus, Mars, Jupiter and Saturn) relative to the horizon for the exact hour and date that you determine.

Our 8 1/2" square star chart was plotted by the late astronomer and cartographer George Lovi. The reverse side of the locator is packed with additional data.

OBSERVATION TIPS FOR YOUR ASTROSCAN®

SELECTING A VIEWING SITE

The ideal site for using your ASTROSCAN® is in the middle of nowhere. Most users don't have access to the darkest of skies, however, so select a site that is both far from light pollution and practical for travel. Avoid street lights, yard lighting, rooftops, and chimneys, and never observe through an open window indoors. Be sure your site is out-of-town or very dark and has clear view of a large portion of the sky.

DARK ADAPTING YOUR EYES

When you go out into the dark, your eyes need time to adjust. You will initially be able to see only a fraction of the stars and objects your eyes are capable of seeing. Remain in the dark (don't look at any lights or even cell phones) and your eyes should be around 80% of their full dark-adapted sensitivity. Every time bright light comes into your eye, the dark-adapting process will start over. When eyes are fully dark-adapted, you will probably still need to see what you're doing. Use a red-light flashlight to maneuver around the area. A regular flashlight covered in red cellophane will work, but red LED lights are best.

SEEING AND TRANSPARENCY

Atmospheric conditions are of the utmost importance when considering viewing conditions for your astronomical binoculars. These conditions are commonly referred to as "seeing." When seeing is good, star twinkling is minimal and objects appear steady in your lenses. Seeing is best overhead, worst at the horizon, and generally better after midnight. You can't see the stars without looking through the atmosphere, so the clearer the air and the higher your altitude, the better seeing conditions you will encounter.

TRACKING CELESTIAL OBJECTS

The Earth is always rotating about its polar axis, completing one full rotation every 24 hours. This is what defines our "day", and we see it in the apparent movement of sun and stars throughout each rotation. In the same way that the sun rises and sets each day, the stars in the sky rise and set each night. The motion translates to a rate of approximately .25° per minute, or 15 arc-seconds per second. This is commonly referred to as the sidereal rate.

As you observe any celestial object, remember that it is in motion. You will need to continuously update your telescope's position throughout a viewing session, which is where your telescope's fine altitude and azimuth adjustments become useful. As an object begins to leave your field of view, gently nudge the telescope tube in the correct direction and bring it back to center.

Remember, the higher the magnification at which you're viewing, the smaller your field of view. Objects will appear to move faster as you raise magnification, and more frequent positional adjustments will need to be made.

SELECTING AN EYEPIECE

By using eyepieces of different focal lengths, many different magnifications can be achieved with your telescope. The best place to start is with the included 10mm and 17mm eyepieces for higher and lower magnifications, respectively. Many astronomers own a large number of eyepieces in order to customize their equipment based on the object being viewed. To calculate the magnification of a telescope/ eyepiece combination, divide the focal length of the telescope by the focal length of the eyepiece.

No matter which eyepiece you intend to use, always start by using the lowest-power (longest focal length) eyepiece to locate and center the object. Lower magnification means a wider field of view, making it easier to find an object.

Once you've centered the desired object using your lowest-power eyepiece, go ahead and make the switch to a higher magnification. Make further centering adjustments, and continue to work up if desired. Higher magnifications are useful for small and bright objects like planets and double stars. Viewing the Moon with increased magnification also yields great results. Deep-sky objects, however, typically look best at medium and low magnifications. This is because they tend to be faint, yet have larger angular size.

Deep-sky objects often fall from view at higher magnifications, since the image becomes dimmer. This is not an unbreakable rule, since many galaxies are bright enough for high magnification, but works as a decent rule-of-thumb.

Regardless of the object, or what recommendations are made, the best way to become familiar with proper viewing magnifications is to experiment. Always start with low magnification and wide field of view and work your way up. If the view continues to improve, continue increasing power. If the image begins to degrade, back off the magnification and use a lower-power eyepiece.

THE MOON

The Moon is one of the easiest and most rewarding targets at which to point your telescope. Its rocky, cratered surface is close enough to be rendered in some detail, and allows for satisfying exploration. The best time for lunar viewing is during its partial phases, when shadows fall on the craters and canyon walls to give them definition. Even though the full moon may look like a tempting target, the light is too bright and the definition too low for optimal viewing.

When viewed through a telescope, even a partial phase moon is very, very bright. Using a Moon filter helps to dim the glare - these and other filters simply thread underneath the bottom of the telescope eyepiece.

THE STARS

Through your telescope, stars will appear much as they do to the naked eye - as tiny points of light against a dark sky. Even powerful telescopes cannot magnify stars to appear as anything more than these pinpoints. You can, however, enjoy the different colors of their glow and locate many beautiful double- and multiple-stars. Two popular targets are the "Double-Double" in the constellation Lyra and the two-color double star Albireo in Cygnus.

THE PLANETS

The planets are beautiful and popular targets for astronomers, but they can be more difficult to keep track of than the stars or moon. Our **Star & Planet Locator** will help you determine planetary position in the night sky. Sun and Moon aside, the brightest objects in the night sky are Venus, Mars, Jupiter, and Saturn. With practice, you will be able to render these in some detail. Generally, the apparent size of planets is quite small, and higher-power eyepieces are recommended for best results.

JUPITER

Jupiter is our solar system's largest planet. Through your scope, you can easily see the planet and observe the changing positions of its four largest moons: Io, Callisto, Europa, and Ganymede. With higher magnification eyepieces, you will be able to see cloud bands wrapped around the planet and the famous Great Red Spot.

SATURN

This infamously ringed planet can be a fantastic sight through your scope. The tilt-angle of the rings varies over a period of many years, so they may be seen edge-on (like a thin line) or broadside (like giant "ears" on each side of the planet). You will need a good steady atmosphere to achieve a worthwhile view of Saturn. If you look closely enough, you can see the Cassini division - a thin, dark gap in the rings. You can also often make out one or more of Saturn's moons, including the largest - Titan.

VENUS

At its brightest, Venus is the most luminous of all the planets - so bright that it is occasionally visible in full daylight. Venus appears as only a thin crescent at its brightest, and it is never found far from morning or evening horizon. No surface detail can be seen on Venus as it is surrounded by dense cloud cover.

MARS

Mars makes a close approach to our planet once every two years, which is the best time to observe it. With your telescope, you'll be able to see a salmon colored disk marked with dark patches and possible a whitish polar ice cap. Surface detail on Mars is only observable during prime conditions with a high-power eyepiece.

DEEP-SKY OBJECTS

With dark skies, ideal viewing conditions, and a large telescope, you can observe a huge number of amazing objects outside our solar system - commonly referred to as "deep-sky objects". These include star clusters, galaxies, gaseous nebulas, and more. Your Dobsonian is well equipped to gather the light necessary to view these objects, but you will need to find a viewing site well away from light pollution and give your eyes plenty of time to fully dark-adapt.

As you continue to view, your eyes will become trained, and more and more subtle details from these objects will become apparent. Don't expect to see color, however, as human eyes are not sensitive enough to distinguish color from faint light.

ASTRONOMY FORMULAS

MAGNIFICATION

To determine the magnification of a telescope and eyepiece combination, divide the telescope focal length be the eyepiece focal length.

$$\textbf{Magnification (x)} = \frac{\text{Telescope Focal Length (mm)}}{\text{Eyepiece Focal Length (mm)}}$$

Ex: 17mm Eyepiece with a 114x450mm telescope.
Magnification = 450/17mm
Magnification = 26.5x

FOCAL RATIO

To determine the focal ratio of a telescope, divide the focal length of the telescope by the aperture.

$$\textbf{Focal Ratio (f/x)} = \frac{\text{Telescope Focal Length (mm)}}{\text{Aperture (mm)}}$$

Ex: Focal Ratio of a 114x450mm telescope.
Focal Ratio (f/x)= 450/114mm
Focal Ratio (f/x)=f/3.95



To get the most out of your Astroscan® Millennium, visit **ScientificsOnline.com** today and sign up for our own monthly blog, SkyTalk! Written by James Mullaney, former assistant editor at Sky & Telescope magazine and author of eight books on stargazing, SkyTalk will keep you current on upcoming celestial events by providing you with early notification and insight on all the exciting happenings in our night sky.

Subscribe to our RSS feed or follow us on Facebook and Twitter. We'll publish all of our posts there as well!

OPTICAL ALIGNMENT (COLLIMATION)

You should occasionally check and adjust the optical alignment of your telescope. This procedure is called collimation, and is recommended for optimum ASTROSCAN® performance. To check the alignment of your telescope:

1. Remove the dust covers for the objective and focuser and look into the focuser drawtube.
2. Point the telescope at a lit wall indoors and look into the focuser drawtube. You should see the secondary mirror and a reflected image of the primary mirror.
3. Center your eye in the drawtube. You can reference the center mark on the primary mirror shown in the figure. The reflected image of the primary and secondary mirrors should be centered to one another, with your eye at the very center of the view, see figure. If the reflections do not look aligned, some adjustment will be needed (**Figure 6**).

This is a quick reference to collimating your telescope. Normally a technician would use a collimation eyepiece for best results, but this procedure is fast and effective without a collimation eyepiece.

Tools required:

- Phillips head screwdriver
- 2mm hex key (not included)

SECONDARY MIRROR ADJUSTMENT

If the center mark on the primary mirror does not appear to be in the center of your view:

Using a standard 2mm hex key wrench, make small adjustments to the three hex-head screws to change the tilt of the secondary mirror so that the primary mirror center mark is in the center of the view **(Figure 7)**.

Do not adjust the center Phillips head screw.

This holds the secondary mirror onto the telescope! This can be adjusted, taking caution not to rotate the secondary mirror, but we do not recommend making this adjustment. Consult a telescope expert to learn more about additional collimation methods.

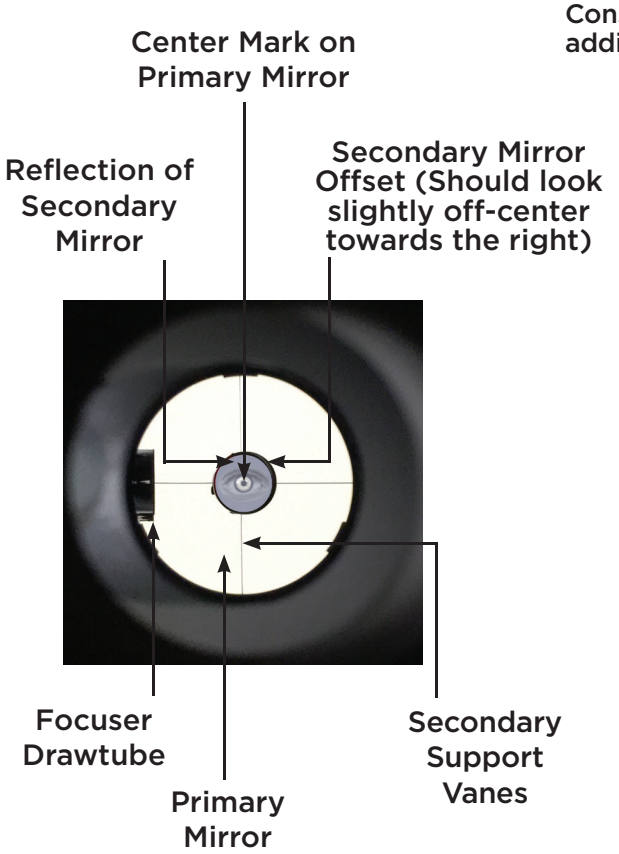


Figure 6

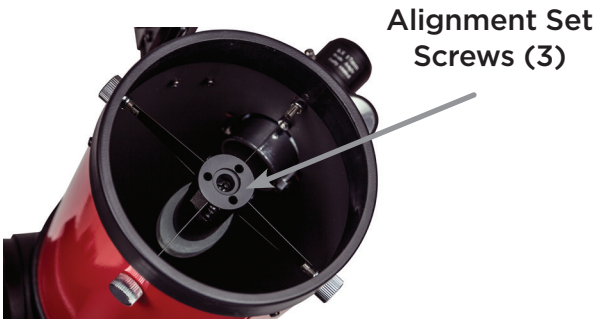


Figure 7

PRIMARY MIRROR ADJUSTMENT

If the reflection of the secondary mirror does not appear to be in the center of your view:

1. Loosen the 3 primary mirror lock screws a couple of turns each **(Figure 8)**.
2. Turn the 3 primary mirror adjustment screws until the reflection of the secondary mirror is centered in the view.
3. Gently tighten the locking screws. Your telescope is now collimated.

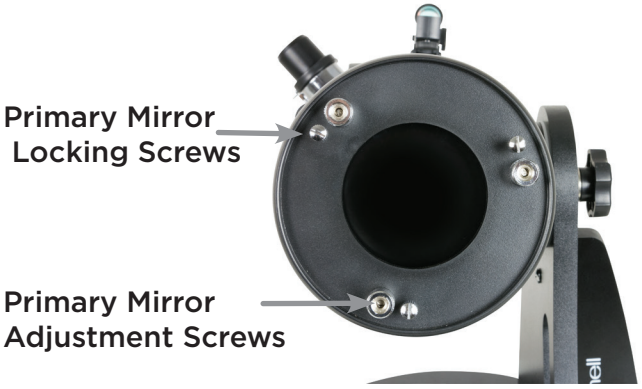


Figure 8

CLEANING AND MAINTENANCE

Cleaning should be done as little as possible and then only with mild soap solution and a soft, lint-free cloth. Do not rub elements when cleaning. Blot optical components gently and allow telescope to air-dry. Store telescope in its box or in a telescope case when not in use. Do not use pure alcohol or solvents to clean any parts of the telescope. Do not remove optical elements from the telescope as doing so may affect the alignment of optical components when reassembled. If the telescope needs realignment, contact us at 1-800-728-6999 for further direction

1. Brush telescope optics with camelhair brush or blow off dust with an ear syringe (can be purchased at any pharmacy). Do not use a commercial photographic lens cleaner.
2. Remove organic materials (e.g. fingerprints) with short gentle strokes using soft white tissue paper and a solution of three parts distilled water and one part isopropyl alcohol. You may also add one drop of biodegradable dish soap to one pint of the homemade solution. Do not use lotioned or scented tissues as they could damage the optics of your telescope.
3. Wipe down the outside of your telescope with a dry cloth or let air dry inside to remove condensation prior to packing up your telescope. Do not wipe any of the optical surfaces. Instead, allow the optics to dry naturally in warm indoor air prior to packing up your telescope.
4. Protect your telescope from excessive heat. For example, do not store your telescope in a sealed car on a warm day. Excessive storage temperatures can damage your telescope.

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- Over **200** items on sale daily at closeout prices
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- **Gift-Wrapping Service** available
- **Same-day shipping** on orders placed by 3pm EST
- 30-day **Satisfaction Guarantee**

The Astroscan® Millennium is solely produced for Scientifics Direct by Celestron and is covered by Celestron's 2-year limited warranty.

2-YEAR LIMITED WARRANTY

A. Celestron warrants your product to be free from defects in materials and workmanship for two years. Celestron will repair or replace such product or part thereof which, upon inspection by Celestron, is found to be defective in materials or workmanship. As a condition to the obligation of Celestron to repair or replace such product, the product must be returned to Celestron together with proof-of-purchase satisfactory to Celestron.

B. The Proper Return Authorization Number must be obtained from Celestron in advance of return. Call Celestron at 310-328-9560 to receive the number, and display it on the outside of your shipping container.

All returns must be accompanied by a written statement setting forth the name, address, and daytime telephone number of the owner, together with a brief description of any claimed defects. Parts or product for which replacement is made shall become the property of Celestron.

The customer shall be responsible for all costs of transportation and insurance, both to and from the factory of Celestron, and shall be required to prepay such costs.

Celestron shall use reasonable efforts to repair or replace any product covered by this warranty within thirty days of receipt. In the event repair or replacement shall require more than thirty days, Celestron shall notify the customer accordingly. Celestron reserves the right to replace any product which has been discontinued from its product line with a new product of comparable value and function.

This warranty shall be void and of no force of effect in the event a covered product has been modified in design or function, or subjected to abuse, misuse, mishandling or unauthorized repair. Further, product malfunction or deterioration due to normal wear is not covered by this warranty.

CELESTRON DISCLAIMS ANY WARRANTIES, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, EXCEPT AS EXPRESSLY SET FORTH HEREIN. THE SOLE OBLIGATION OF CELESTRON UNDER THIS LIMITED WARRANTY SHALL BE TO REPAIR OR REPLACE THE COVERED PRODUCT, IN ACCORDANCE WITH THE TERMS SET FORTH HEREIN. CELESTRON EXPRESSLY DISCLAIMS ANY LOST PROFITS, GENERAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM BREACH OF ANY WARRANTY, OR ARISING OUT OF THE USE OR INABILITY TO USE ANY CELESTRON PRODUCT. ANY WARRANTIES WHICH ARE IMPLIED AND WHICH CANNOT BE DISCLAIMED SHALL BE LIMITED IN DURATION TO A TERM OF TWO YEARS FROM THE DATE OF ORIGINAL RETAIL PURCHASE.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitation on how long an implied warranty lasts, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

To determine the magnification of a telescope and eyepiece combination, divide the telescope focal length be the eyepiece.

Celestron reserves the right to modify or discontinue, without prior notice to you, any model or style of your product.

If warranty problems arise, or if you need assistance in using your product, contact:

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