INSTRUCTION MANUAL

# Orion StarSeeker™ IV GoTo Telescopes

#8272 StarSeeker IV 114mm Reflector — **#8275** StarSeeker IV 102mm Mak-Cass
#8273 StarSeeker IV 130mm Reflector — **#8276** StarSeeker IV 127mm Mak-Cass
#8274 StarSeeker IV 150mm Reflector — **#8278** StarSeeker IV 150mm Mak-Cass
#8277 StarSeeker IV GoTo Mount

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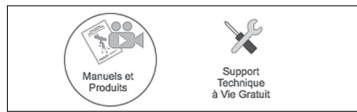
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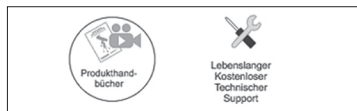
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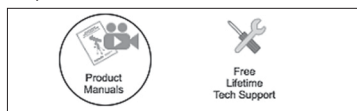
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Optical Tube

Meniscus lens

EZ Finder II

Altitude tensioning knob

Mount arm

1.25" Accessory Collar

Battery compartment

23mm Eyepiece

Dovetail mounting bar

Star diagonal

Focus knob

Compass

10mm eyepiece

Tripod

Collimation cap

Accessory tray
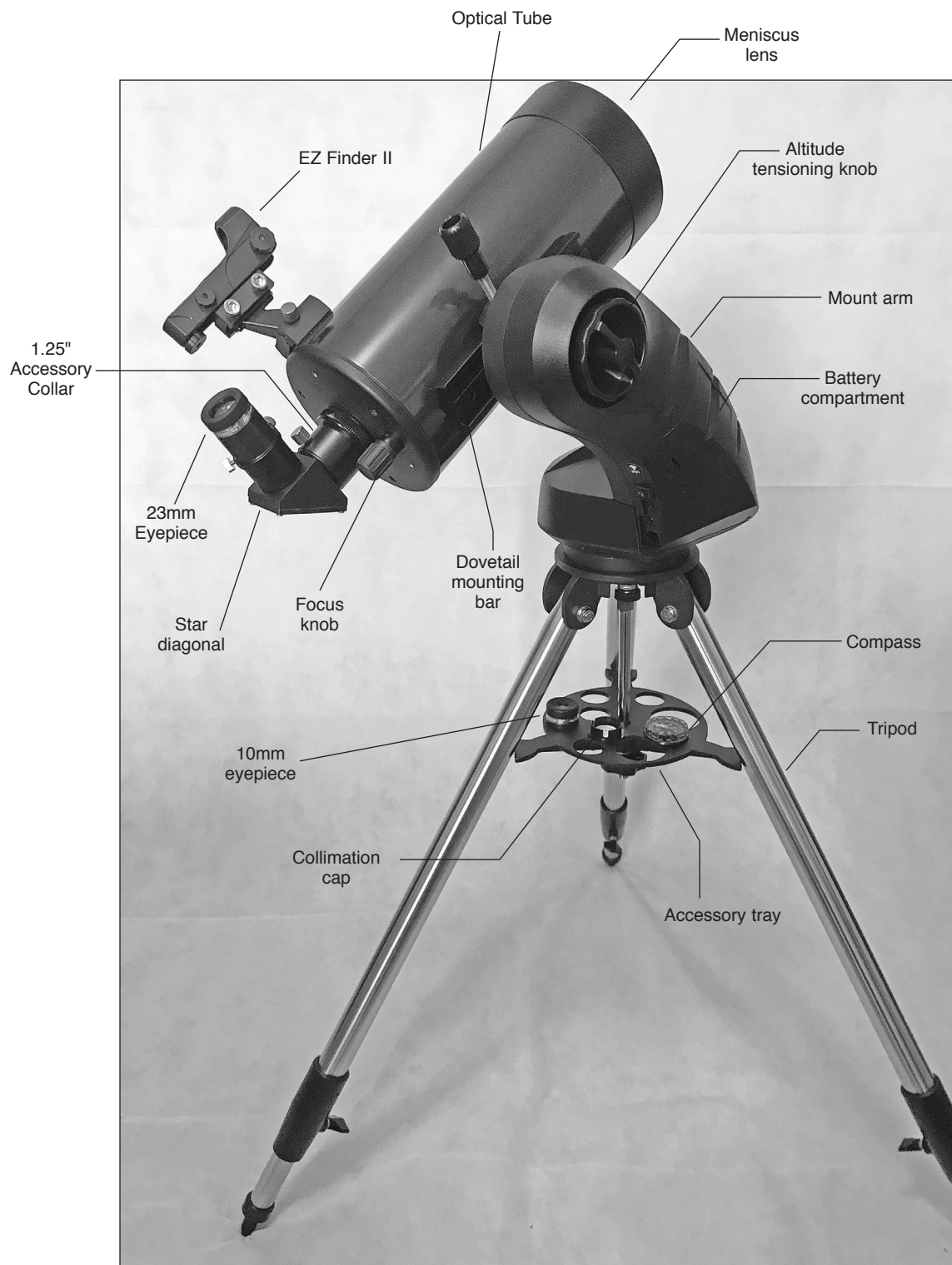
Figure 1. *Parts of the StarSeeker IV (127mm Maksutov-Cassegrain shown)*

Table of Contents

WARNING: *Never look directly at the Sun with the naked eye or with a telescope – unless you have a proper solar filter installed over the front of the telescope! Otherwise, permanent, irreversible eye damage may result.*

I. Introduction

Congratulations on your purchase of an Orion StarSeeker IV GoTo telescope or mount! Simple and friendly to use, the StarSeekers combine sharp optics with state-of-the-art GoTo pointing technology in a portable package that makes observing the night sky both remarkably easy and wonderfully rewarding.

This manual covers a variety of different StarSeeker IV telescope models as well as the StarSeeker IV Mount itself. Some sections may be specific to a particular model, but most apply generally to features and procedures common to all of the telescopes.

The StarSeeker IV GoTo Mount is now equipped with built-in Wi-Fi technology to allow wireless control via your smartphone or tablet (iOS or Android). All you need is to download the free SynScan Pro app from the App Store or Google Play. But note that the StarSeeker IV GoTo Mount and each of the StarSeeker IV GoTo telescopes is also available with the SynScan hand controller and cable included for a slightly higher price, if you prefer to explore the night sky with the dedicated handset instead of your phone or tablet. The model numbers listed at the top of this manual are sold *without* the SynScan hand controller. For these you would download the free SynScan Pro app for your smartphone or tablet. For the model numbers that include the SynScan hand controller, please visit our website, www.telescope.com.

Should you purchase a StarSeeker IV telescope or mount without the SynScan hand controller and at a later time decide you want it, you can purchase it separately (sku #7942).

Take time to read through this manual before embarking on your journey through the heavens. It may take a couple of observing sessions to become familiar with all of the StarSeeker's features. Use this manual in conjunction with the on-screen instructions of the SynScan Pro app or the printed instruction manual that comes with the optional SynScan hand controller.

II. Parts List

Qty.   *Description*

1   Optical tube assembly

1   Mount arm

1   Tripod

1   Accessory tray

1   EZ Finder II reflex sight

1   23mm wide field eyepiece

1   10mm wide field eyepiece

1   Star diagonal, 1.25" (Mak-Cass models only)

1   Quick-collimation cap

1   Objective dust cover

1   2mm Allen wrench (Reflector models only)

1   DC power cable

1   Compass

1   L-bracket (#8277 mount only)

1   Camera shutter control (SNAP) cable (not shown) (#8277 mount only)

1   DeepMap 600

1   MoonMap 260

Open the shipping box and, referring to the above Parts List and **Figure 2**, check that all the parts are present. Remove all of the accessories from their individual boxes and bags. Remember to save all of the original packaging in case the scope needs to be returned to Orion for warranty repair, or should you wish to return the scope under the 30-day return policy. Especially in the latter case, the original packaging is required. If anything is missing, contact Orion Customer Service at (800) 676-1343, or *support@telescope.com*.

III. Assembly

Setting Up the Tripod and Mount arm

1. Stand the tripod legs upright and spread the legs out as wide as they will go.

2. Remove the knob and washer from the bottom of the tripod's center support shaft. Slide the accessory tray up onto the shaft; the flat side of the accessory tray

Figure 2. *Included components of the StarSeeker IV GoTo telescope. (StarSeeker IV 127mm Mak-Cass shown)*

should be facing up. Make sure the "V" of each tray arm is against a tripod leg. Place the washer on the center support shaft against the tray, then thread the knob back onto the shaft until tight **(Figure 3)**. The accessory tray provides additional stability for the tripod, and has holes for eyepieces and other accessories.

3. Place the base of the mount arm onto the tripod's top plate, lining up the three holes in the bottom of the arm base with the three bolts in the top plate **(Figure 4)**. Turn the three knobs under the tripod top plate clockwise until tight **(Figure 4b)**.

4. To adjust the height of the tripod legs, loosen the tripod leg clamp knob located on the side of each leg **(Figure 5)**. Extend the inner portion of each leg to the desired length. Then tighten the tripod leg clamp knob to secure each leg in place.

Attaching the Telescope Tube to the Mount Arm

5. Unthread the tube lock knob until the bolt tip is not protruding into the saddle slot **(Figure 6)**. Slide the telescope's dovetail bar into the saddle on the mount arm as shown and secure it by tightening the tube lock knob. Note that the tube lock knob can be positioned either up or 180 degrees opposite in the down position, your choice.

Also notice the altitude axis tensioning knob near the top of the mount arm (refer to **Figure 1**). It is used to set the desired tension for rotation of the telescope by hand in altitude. Turn the knob clockwise to increase the tension; turn it counterclockwise to decrease the tension. There is no tensioning knob for azimuth rotation.

Inserting the Star Diagonal (Mak-Cass) and Eyepiece

A star diagonal is used with the Maksutov-Cassegrain models to divert the light at a right angle from the light path of the tele-
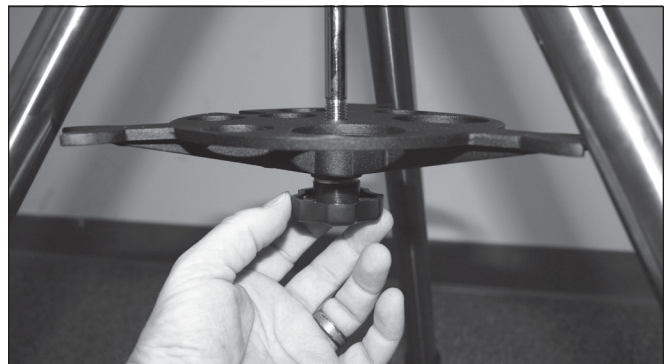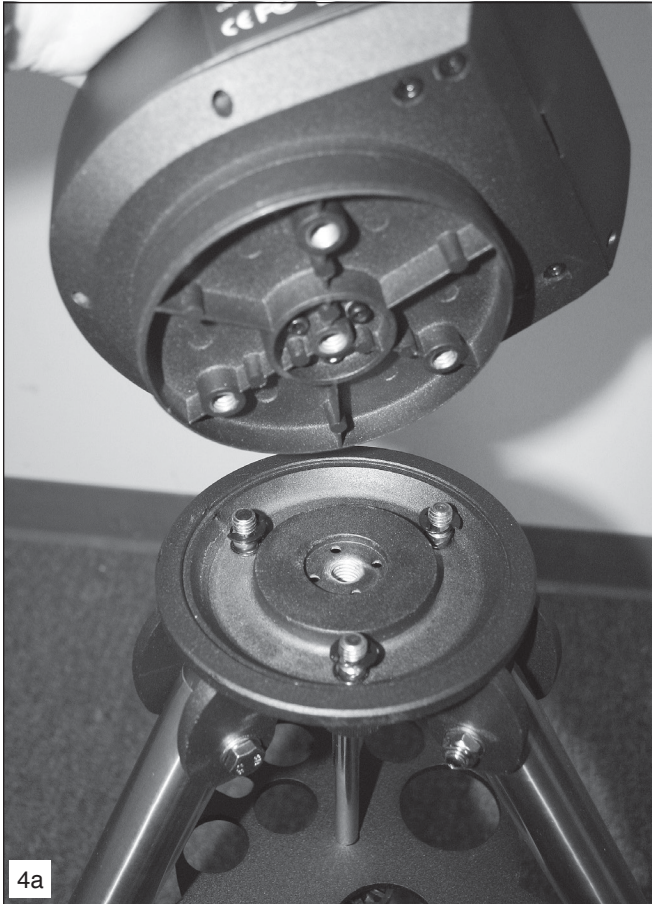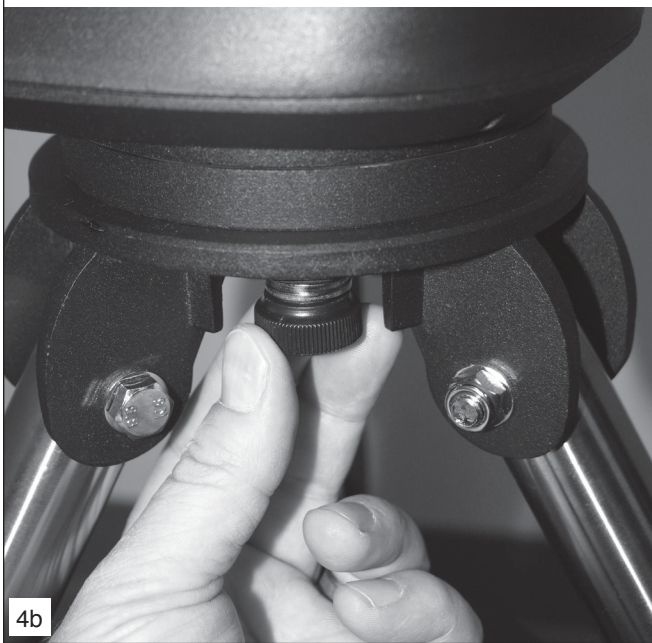

Figure 3. *Install the accessory tray/tripod spreader before attaching the mount arm.*

Figure 4. *The mount arm attaches to the tripod mounting platform with three captive bolts.* **a)** *Line up the bolts with the holes in the bottom of the arm base.* **b)** *Tighten the three knobs.*

scope. This allows you to observe in positions that are more comfortable than if you were to look straight through the telescope. A diagonal is not used with Newtonian reflectors; none is included with the StarSeeker reflector models.

To attach the star diagonal:

1. Remove the protective dust cap from the 1.25" accessory adapter. (2" adapter on the 150mm)

2. Loosen the two thumbscrews on the adapter and slide the chrome portion of the star diagonal into it (see **Figure 7**). Then retighten the thumbscrews to hold the star diagonal in place.

The eyepiece is the optical element that magnifies the image focused by the telescope. The eyepiece fits directly into the 1.25" focuser (on reflector models) or star diagonal. To install one of the included eyepieces:

1. Loosen the two thumbscrews on the focuser's 1.25" accessory collar or the star diagonal, then slide the chrome barrel of the eyepiece into it (**Figure 8**).

2. Tighten the thumbscrews to hold the eyepiece in place.

Installing the EZ Finder II
Before installing the EZ Finder II on the telescope, you will need to insert the included CR2032 3V lithium button cell battery in the EZ Finder II.

1. First open the battery compartment cover by lightly pressing the lock tab forward while lifting the tab **(Figure 9a)**. Remove the cover.

2. Place the CR2032 battery – positive (+) side up – under the metal retaining clip in the battery compartment **(Figure 9b)**.

3. Then replace the cover and snap it closed.

4. Should the battery ever die, a replacement CR2032 battery is available from many retail outlets.

5. Then simply slide the mounting bracket's foot into the dovetail mounting shoe as shown in **Figure 10** and tighten the thumbscrew on the shoe to secure the mounting bracket.

6. The EZ Finder II should be oriented so that the sight tube is facing the front of the telescope, as shown in **Figure 10**. Tighten the thumbscrew on the dovetail shoe to secure the EZ Finder II in place.

IV. Learning to Use the EZ Finder, Eyepieces, and Focuser

The EZ Finder II
The EZ Finder II works by projecting a tiny red dot (it is not a laser beam) onto a lens mounted in the front of the unit. When you look through the EZ Finder II, the red dot will appear to float in space, helping you to pinpoint your target object (**Figure 11**). The red dot is produced by a light-emitting diode (LED)

near the rear of the sight. The 3V lithium battery provides the power for the diode.

For the EZ Finder II to work properly, it has to be aligned with the telescope. When the two are aligned, a celestial object that is centered on the EZ Finder II's red dot should also appear in the center of the telescope's eyepiece. Alignment of the EZ Finder II is easiest during daylight, before observing at night. Aim the telescope at a distant object such as a telephone pole or roof chimney and center it in the telescope's eyepiece. The object should be at least 1/4 mile away. Now turn on the EZ Finder II and look through it. Without moving the main tele-scope, use the EZ Finder II's azimuth (left/right) and altitude (up/down) adjustment knobs (see **Figure 12**) to position the red dot on the object in the eyepiece. When the red dot is cen-tered on the distant object, check to make sure that the object is still centered in the telescope eyepiece. If it isn't, re-center it and adjust the EZ Finder II's alignment again. When the object is centered in the eyepiece and on the EZ Finder's red dot, the EZ Finder II is properly aligned with the telescope. Once aligned, EZ Finder II will usually hold its alignment even after being removed and remounted. Otherwise, only minimal realignment will be needed.

Turn the ON/OFF knob (see **Figure 12**) clockwise until you hear the "click" indicating that power has been turned on. Look through the back of the reflex sight with both eyes open to see the red dot. Position your eye at a comfortable distance from the back of the sight. In daylight you may need to cover the front of the sight with your hand to be able to see the dot, which is purposefully quite dim. The intensity of the dot is adjusted by turning the ON/OFF knob. For best results when stargazing, use the dimmest possible setting that allows you to see the dot without difficulty. Typically a dimmer setting is used under dark skies and a brighter setting is needed under light-polluted skies or in daylight.

At the end of your observing session, be sure to turn off the ON/OFF knob on the EZ Finder II.

Eyepieces and Magnification

Your StarSeeker IV telescope comes with two special wide-field eyepieces, (**Figure 13**). Eyepieces are commonly referred to by their focal length and barrel diameter. The focal length of each eyepiece is typically printed on the eyepiece body. The two eyepieces included with your telescope have a 1.25" barrel diameter. One has a focal length of 23mm and the other, 10mm. The longer the focal length (i.e., the larger the number), the lower the eyepiece power or magnification; and the shorter the focal length (i.e., the smaller the number), the higher the magnification. Generally, low or moderate power will produce the sharpest images when viewing.

You can change the magnifying power of your telescope just by changing the eyepiece. To determine the magnification of your telescope, simply divide the focal length of the telescope by the focal length of the eyepiece used.
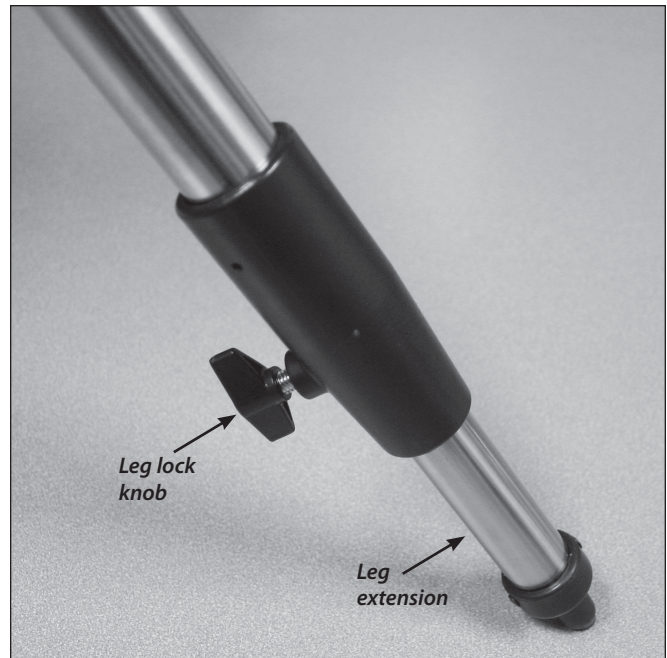

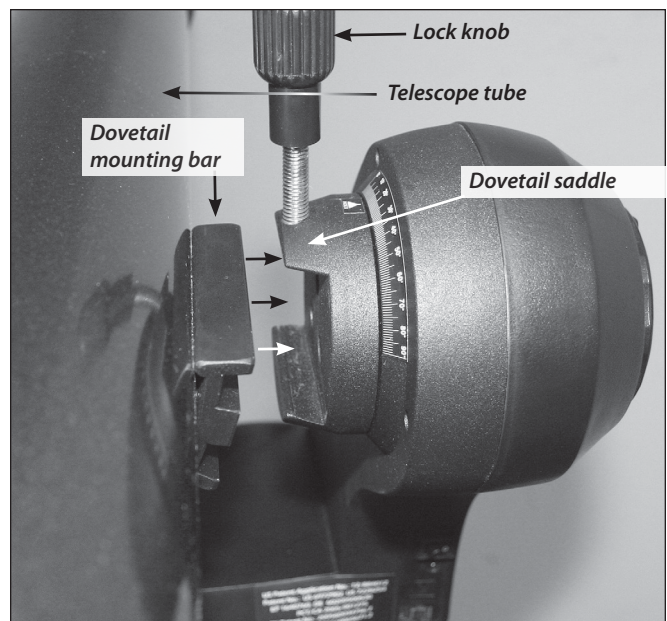**Figure 5.** *Loosen the leg clamp knob to adjust the length of the tripod legs.*

Figure 6. *The telescope tube can be attached and removed easily via the dovetail saddle on the mount arm.*

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

For example, the StarSeeker IV 114mm reflector has a focal length of 500mm, which when used with the supplied 23mm eyepiece yields 22x magnification:
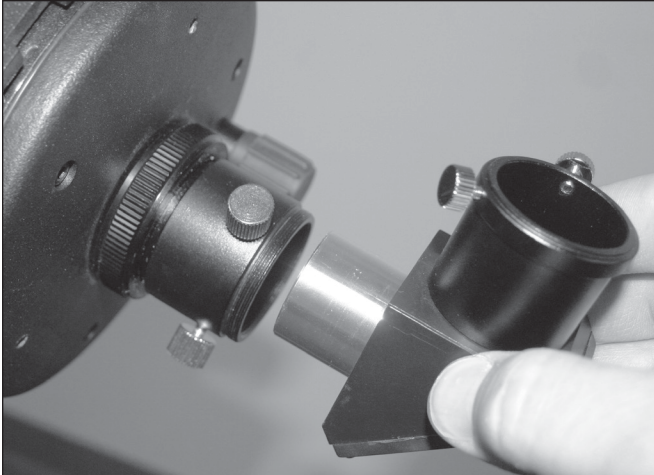
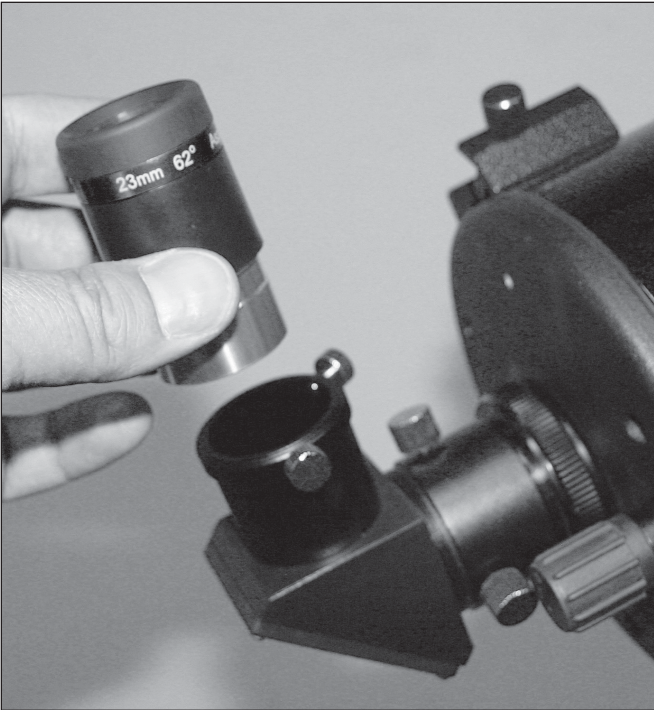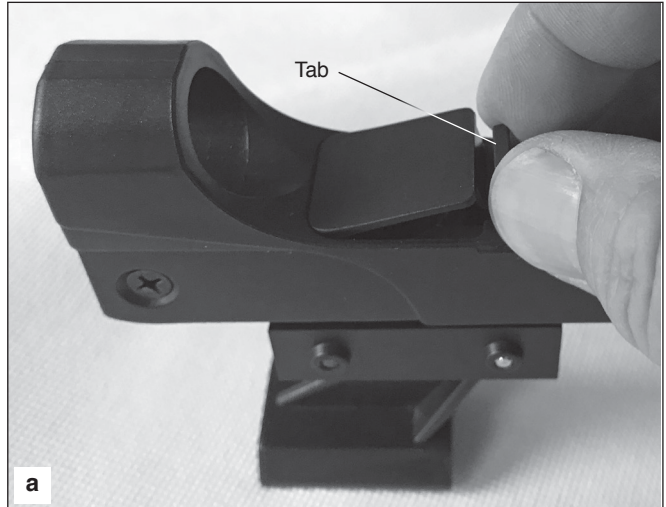**Figure 7.** *Attaching the star diagonal (Maksutov-Cassegrain models only).*
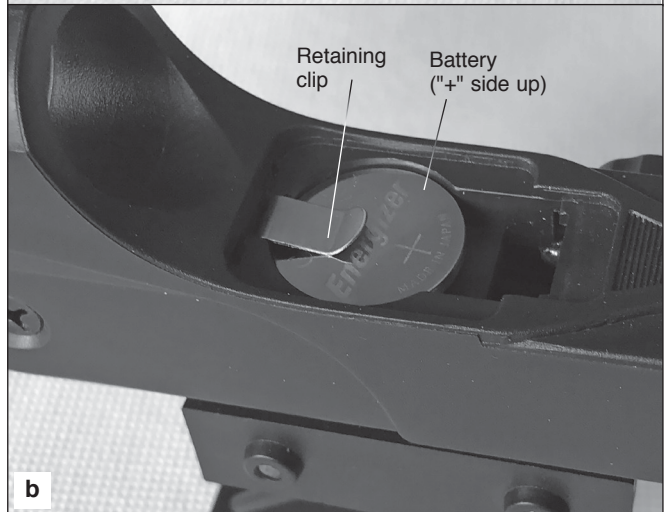

Figure 8. *Inserting an eyepiece into the diagonal of a Maksutov-Cassegrain. For reflector models the eyepiece is installed directly in the focuser's accessory collar.*

Tab

a

Retaining clip

Battery ("+" side up)

b

Figure 9. a) *Open the battery compartment by lifting the tab.* **b)** *Place the battery under the retaining clip with positive "+" side up.*

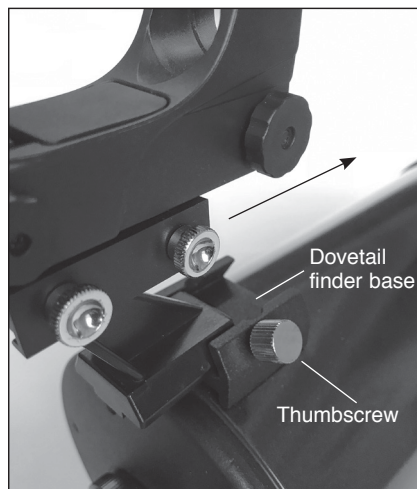Dovetail finder base

Thumbscrew

Figure 10. *Slide the bracket into the telescope's dovetail finder scope base and secure it with the thumbscrew.*

$$\frac{500mm}{23mm} = 22x$$

The magnification provided by the 10mm eyepiece is:

$$\frac{500mm}{10mm} = 50x$$

Although the power can be varied, each instrument under average skies has a limit to the highest useful magnification that can be achieved. The general rule is 2x per millimeter of aperture is as high as you can reasonably go (with optional eyepiece and possibly a Barlow lens). For example, the StarSeeker IV 114mm reflector has a primary mirror that's 114mm in diameter. So 114mm times 2x per millimeter = 114 x 2 = 228. Thus, 228x is the highest useful magnification one can normally achieve under ideal seeing conditions with this telescope. (Trying to go higher would likely just result in dim, blurry images.) Although this is the maximum useful magnification, most observing will yield best results at lower powers.

Focusing

To focus, if you have a StarSeeker IV Newtonian reflector telescope, simply turn either of the two focus wheels on the focuser until the image looks sharp. For the Maksutov-Cassegrain models, the focus knob resides to the right of the visual back, or accessory adapter. Make sure you're aimed at something far off in the distance. If you don't see an image at first, keep turning the focus knob in one direction while looking through the eyepiece; if you reach the end of the focuser travel start turning the focus knob in the other direction. Eventually, you should see the object you're aimed at come into view. After going just past the focus point in one direction, and then in the other direction, you will then be able to home in on the exact focus point using progressively smaller turns of the focus knobs.
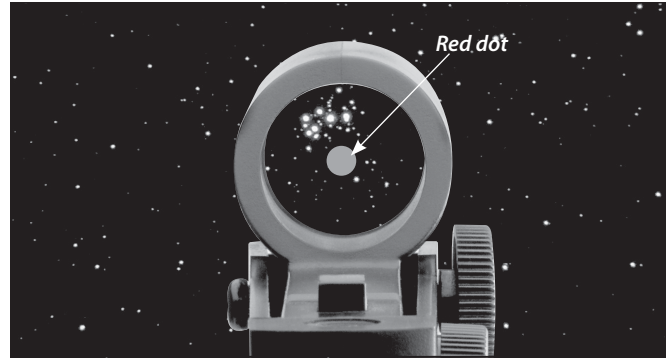

Figure 11. *The EZ Finder II superimposes a tiny red dot on the sky, showing right where the telescope is aimed.*

Image Orientation

For astronomical telescopes, the image orientation in the eyepiece will usually be different from the orientation you would see with the naked eye. Refractor and Maksutov-Cassegrain telescopes used with a standard 90-degree "star diagonal" will provide a right-side-up but backwards (mirror-reversed) image. For reflector telescopes the image in the eyepiece will appear upside down or rotated to some degree. This is normal! For astronomical viewing image orientation is not critical because, after all, there's no "right side up" in space. But if you're planning to use your telescope also for terrestrial viewing, you may want to purchase a "correct-image" diagonal, which will produce a correctly oriented, right-side-up view. Reflector telescopes are not recommended for terrestrial viewing.
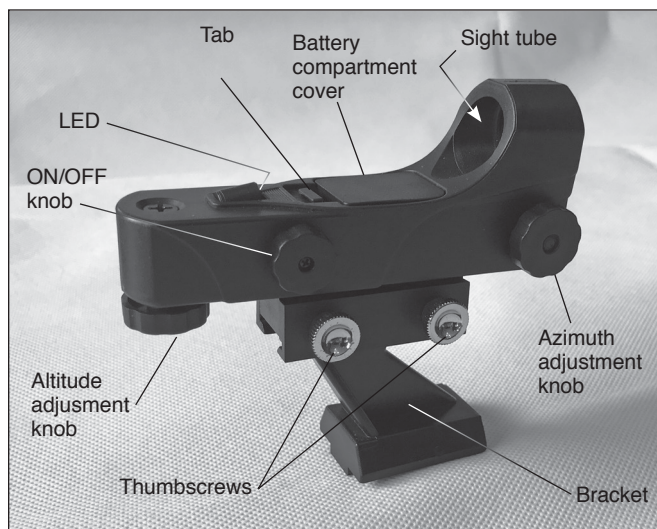

Figure 12. *Familiarize yourself with the parts of the EZ Finder II.*

Figure 13. *StarSeeker IV telescopes come with 23mm and 10mm wide-field eyepieces.*
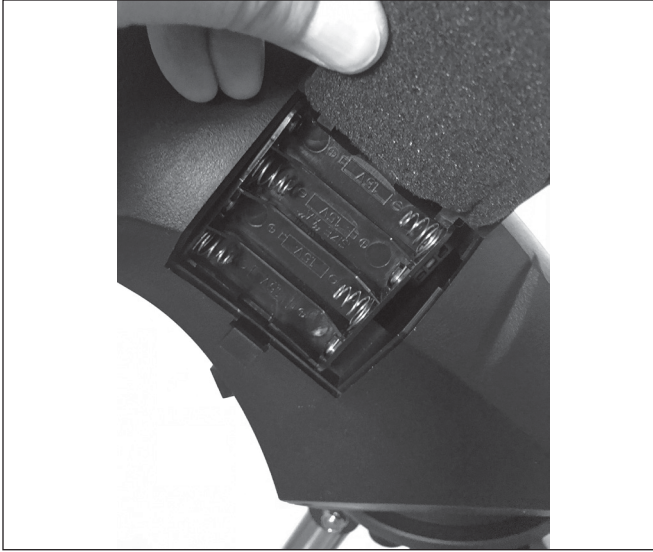
Figure 14. *The StarSeeker IV mount is powered by eight user-supplied AA batteries, which are installed in the mount arm.*

V. Powering the StarSeeker IV Mount

Your StarSeeker IV mount can be powered by 8 user-supplied AA alkaline batteries inserted into the battery compartment located in the mount arm (see **Figure 14.**). (Note that the battery holder must be removed from the compartment to install four AA batteries on the back side). Alternatively, you can run the mount with an optional AC-to-DC adapter or a 12V DC field battery such as the Orion Dynamo Pro. A DC car-lighter style cable is provided with your telescope to connect a 12V field battery to your mount. Insert the plug of the DC cable into the "Power" jack located on the mount arm (**Figure 15**).

Toggle the power switch to the ON (—) position. To turn the StarSeeker IV mount off, toggle the power switch to OFF (O).

VI. Controlling the StarSeeker IV

You can control your StarSeeker IV GoTo Mount or StarSeeker IV GoTo Telescope either from your smartphone or tablet using the free SynScan Pro app (iOS or Android), or with the optional SynScan V5 Hand Controller (#7942) (Figure 16). Thanks to the mount's built-in Wi-Fi, when you use your smartphone or tablet to control it, the connection will be wireless. When using the optional SynScan V5 hand controller, a cable is provided (required) to connect the controller with the mount.

The optional SynScan V5 hand controller comes with a detailed Instruction Manual that explains all its features and functionality. Even if you're planning to use the SynScan Pro app to control your StarSeeker, you might still want to download and review the manual for the SynScan V5, as most of the same functions it describes apply to the app as well. You can download the SynScan V5 manual from the SynScan V5 product page on our website, then click on the link to Product Manuals & Video. The SynScan Pro app does have an extensive Help section (Settings > Help), which contains much of the same information that is contained in the SynScan V5 hand controller's instruction manual.

Connecting to the SynScan Pro App on Your Smartphone

1. Download the free "SynScan Pro" app from the App Store (for iOS devices) or Google Play (for Android devices) onto your smartphone.

2. Turn on the power to the StarSeeker IV mount.

3. Go to the Wi-Fi settings of your smartphone or tablet and choose "SynScan Wi-Fi_####" in the list of Wi-Fi networks within range. You may have to wait up to 1 minute for the Wi-Fi icon to appear in the smartphone's notification bar.

4. Open the SynScan Pro app on your smartphone.

5. Tap on the "Connect" button at the top **(Figure 16a)**. This will establish a Wi-Fi connection between our smart device and the StarSeeker IV mount.

Note that you do not need an internet connection to establish the Wi-Fi connection. A local Wi-Fi connection is established between your phone and the mount.
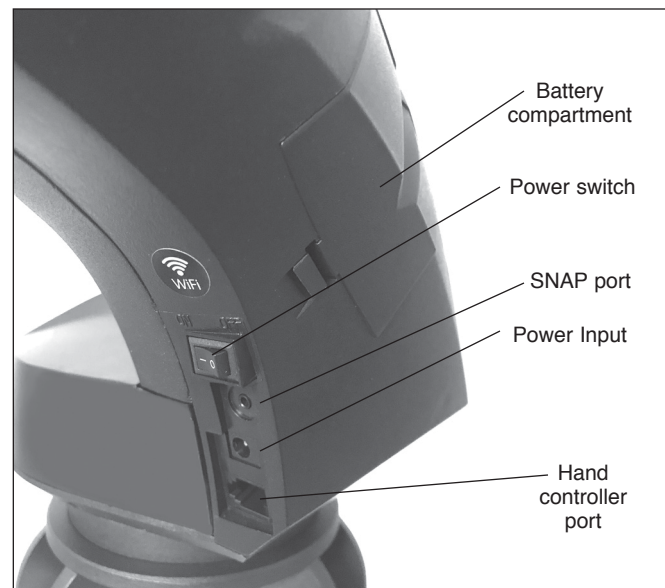

Figure 15. *The power switch and electronic ports for the SNAP cable, optional hand controller, and an optional 12V DC battery are located at the base of the mount arm*

Connecting to the SynScan Pro App

In the SynScan Pro app, tap Settings > Wi-Fi Setting.

• Check "Modify Access Point" to

- Enable/Disable the Access Point Mode

- Change the SSID (Name of the access point)

- Add or remove password for accessing the adapter's

- Wi-Fi access point.

• Check "Modify Station" to

- Enable/Disable the Station Mode

- Enter the SSID of the Wi-Fi access point (router) to which the adapter will connect.

- Enter the password for the designated Wi-Fi access point (router).

- Enter a static IP. (This is not recommended for general users; using DHCP is preferred.)

Tap "Apply" to confirm the setting. You may need to restart the mount and/or re-connect to the correct Wi-Fi network on your smartphone.

Important: *In most cases, users should use either "Access Point Mode" or "Station Mode"; do not enable both of them.*

Factory Reset

If you forget the password of the adapter's access point, the adapter will need to be reset to the factory default for accessing.

The adapter can be reset to factory default after it's powered on and not accessed for 1 hour.

Using Access Point Mode or Station Mode

• Access Point Mode is easier to use.

• Station Mode needs extra configuration, but it:

- Allows a smartphone to access the internet while controlling the telescope mount

- Consumes less power

VII. Collimation

Collimation is the process of adjusting the telescope's optical elements so they are aligned with one another and with the optical tube. Well collimated optics are critical for achieving the sharpest possible images with your telescope. Precise collimation of StarSeeker IV telescopes is done at the factory, and for the StarSeeker IV Maksutov-Cassegrain telescopes, it may not need any further adjustment. For reflectors, on the other hand, occasional collimation of the mirrors may be necessary.

Because the procedure for collimation is different for different StarSeeker IV telescopes, we will not cover it here. But you are encouraged to visit the Product Manuals & Video link for your particular StarSeeker IV model on our website (www.OrionTelescopes.com) and select the instruction manual on collimation for a step-by-step procedure.

Note that the StarSeeker IV telescopes come with a "quick collimation cap" (shown in **Figure 2**), which is used in the collimation procedure. Also, you'll notice that the primary mirror of the StarSeeker IV reflectors and the secondary mirror of the Maksutov-Cassegrains have a tiny ring (sticker) marking the center. This "center mark" allows you to achieve a very precise collimation; you don't have to guess where the exact center of the mirror is.

NOTE: *The center ring sticker need not ever be removed from the mirror. Its presence in no way adversely affects the optical performance of the telescope or the image quality. That might seem counter-intuitive, but it's true!*
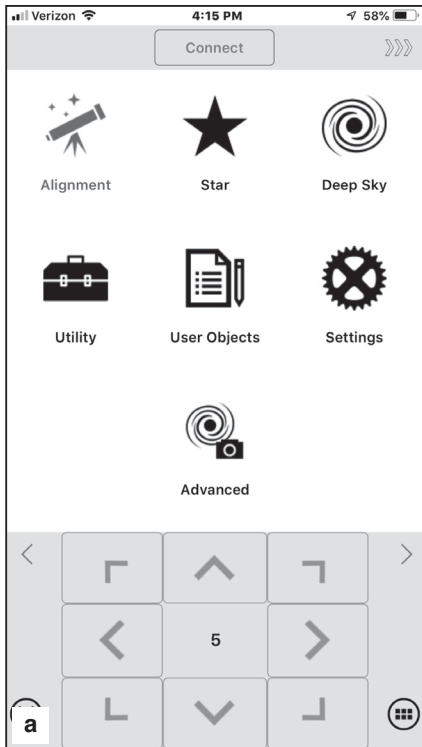
Figure 16. a) *The Free SynScan Pro app lets you control the StarSSeeker IV mount from your iOS or Android phone or tablet.* **b)** *An optional SynScan hand controller can be purchased to control the mount, if desired.*

One-Year Limited Warranty

This Orion product is warranted against defects in materials or workmanship for a period of one year from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty period Orion Telescopes & Binoculars will repair or replace, at Orion's option, any warranted instrument that proves to be defective, provided it is returned postage paid. Proof of purchase (such as a copy of the original receipt) is required. This warranty is only valid in the country of purchase.

This warranty does not apply if, in Orion's judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear. This warranty gives you specific legal rights. It is not intended to remove or restrict your other legal rights under applicable local consumer law; your state or national statutory consumer rights governing the sale of consumer goods remain fully applicable.

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