INSTRUCTION MANUAL

Orion Sirius EQ-G GoTo Equatorial Mount

#9995

ORION®
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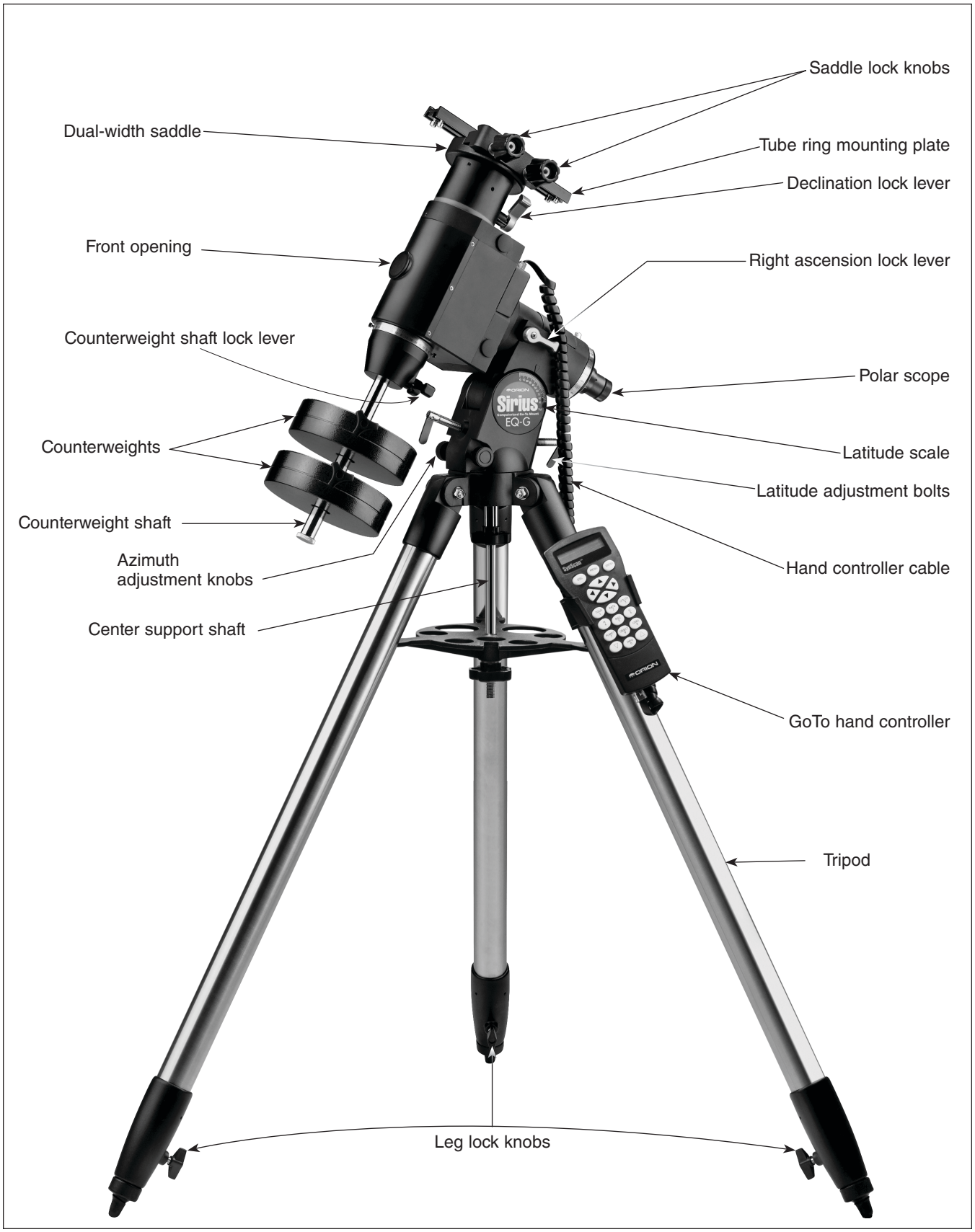

Figure 1. The Sirius EQ-G mount.

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1. Unpacking

Be careful unpacking the boxes. We recommend keeping the boxes and original packaging. In the event that the mount needs to be returned to Orion for warranty repair, having the proper packaging will ensure that your mount will survive the journey intact.

Make sure all the parts in the Parts List are present. Be sure to check the boxes carefully, as some parts are small. If anything appears to be missing or broken, immediately call Orion Customer Support (800-676-1343) or email support@telescope.com for assistance.

2. Parts List

Equatorial mount

- Tripod
- Counterweight, 11.5 lbs. (x2)
- Center support tray
- Tube ring mounting plate
- 12V DC Power cable
- SynScan GoTo hand controller
- Hand controller cable
- Hand controller bracket

3. Assembly

Refer to **Figure 1** as needed during the assembly process.

1. Stand the tripod legs upright and spread the legs out as far as they will go. Make certain that the leg lock levers are tightened. Adjust the legs to the desired length by loosening the leg lock levers and extending the lower leg section, then retighten the leg lock levers.

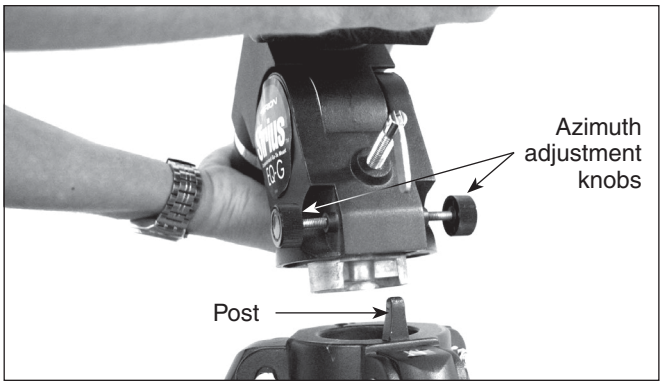


Figure 2. Orient the equatorial head so the post on the tripod lines up with the opening on the bottom of the mount.

Figure 3. Thread the center post into the mount by turning the mount attachment knob to the right until it is tight.

2. Level the tripod by placing a carpenter's level, torpedo level, or circular bubble level on the top surface of the tripod and adjust the leg lengths as needed.
3. Now place the base of the equatorial mount onto the tripod head. Orient the equatorial mount so that the post on the tripod lines up with the gap between the azimuth adjustment bolts in the equatorial mount (**Figure 2**).
4. Thread the central support shaft up through the tripod head and into the bottom of the equatorial mount until tight (**Figure 3**). Use the upper knob on the central support shaft to do this. The equatorial mount should now be firmly connected to the tripod.
5. Remove the knob and washer from the bottom of the center support shaft. Slide the tripod support tray up the shaft until the three tray arms are touching the legs of the tripod. The flat side of the support tray should be facing

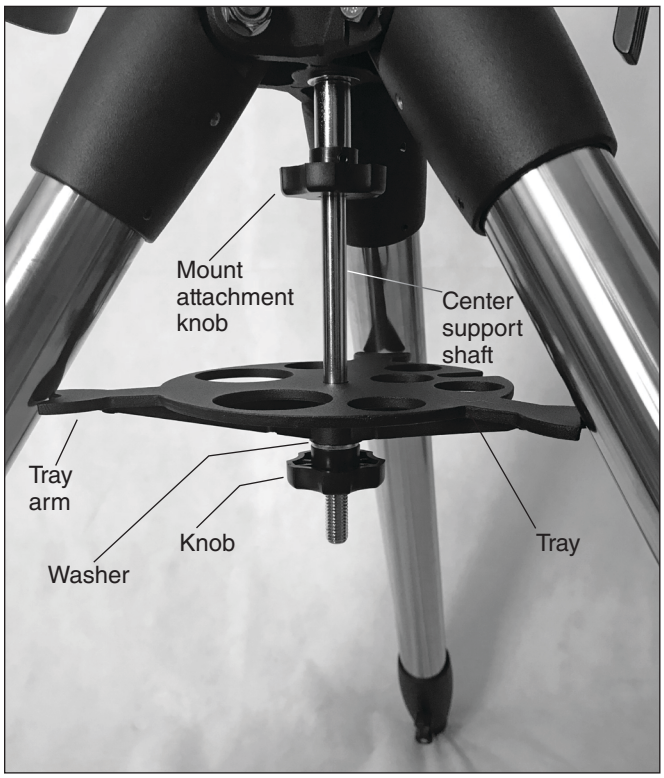


Figure 4. Install the accessory tray, flat side up, as shown. The three tray arms should press against the tripod legs.

up. Make sure the "V" of each tray arm is buttressed against a tripod leg (**Figure 4**). Place the washer on the center support shaft and follow it by threading the knob all the way up the shaft until the knob is tight against the tray. The tripod support tray provides additional stability for the tripod, and holds up to five 1.25" eyepieces and two 2" eyepieces.

6. Loosen the counterweight shaft lock lever and fully extend the counterweight shaft. Retighten the lock lever.
7. Remove the knurled "toe saver" retaining screw on the bottom of the counterweight shaft and slide one counterweight or both counterweights onto the shaft. Make sure the counterweight lock knob is adequately loosened to allow the counterweight shaft to pass through the hole. Position the counterweights about halfway up the shaft and tighten the lock knob. Replace the toe saver at the end of the bar. The toe saver prevents a counterweight from falling on your foot if the lock knob happens to come loose.
8. Fasten the hand controller bracket to one of the legs between the accessory tray and the upper casting of the tripod leg. Use the hook-and-loop strap to fasten the bracket snugly to the leg (**Figure 5**).

Your Sirius EQ-G mount is now fully assembled and should resemble **Figure 1** except for the hand controller, which will be installed later.

4. Attaching a Telescope

Figure 5. Wrap the hand controller bracket strap snugly around a tripod leg.

The Sirius EQ-G equatorial mount is designed to hold telescope tubes weighing up to approximately 30 lbs. (including all accessories). For astronomical imaging an equipment load somewhat less than that weight is recommended to insure consistently steady images.

The mount has recently been upgraded to include a spring-loaded, dual-width dovetail saddle, which is capable of accommodating either a narrow Vixen-style dovetail mounting plate or a wide Losmandy-style dovetail plate (**Figure 6**). A telescope optical tube can be attached to the dovetail plate via tube rings (not included). A Vixen-style dovetail plate is included with the mount. Alternatively, a telescope with an integrated dovetail adapter or plate can be attached directly to the saddle in one of the two slots.

1. To install a telescope on the mount, first ensure that the counterweight is installed as in step 7 above, and that the RA lock lever is locked.
2. Loosen the Dec lock lever and orient the saddle so it runs side-to-side as shown in **Figure 7**. Then retighten the Dec lock lever.
3. Now loosen the two saddle lock knobs to widen the grooves sufficiently to accept the dovetail plate to be installed.
4. Place the dovetail mounting plate, with optical tube attached, in the saddle so that the plate is roughly centered lengthwise in the slot. While still holding the optical tube with one hand, re-tighten the saddle lock knobs with your other hand until the plate is secure.

5. Balancing the Telescope

To ensure smooth movement of a telescope on both axes of the equatorial mount, and to avoid putting undue stress on the motors, it is imperative that the optical tube be properly balanced on both axes.

We will first balance the telescope on the right ascension (RA) axis.

1. Unlock both the RA and Dec lock levers and rotate the telescope until both the telescope and the counterweight shaft are parallel to the ground.
2. Retighten the Dec lock lever.
3. Now loosen the counterweight lock knob and slide the weight along the shaft until it counterbalances the telescope. That's the point at which the shaft remains horizontal when released. If the telescope can't be

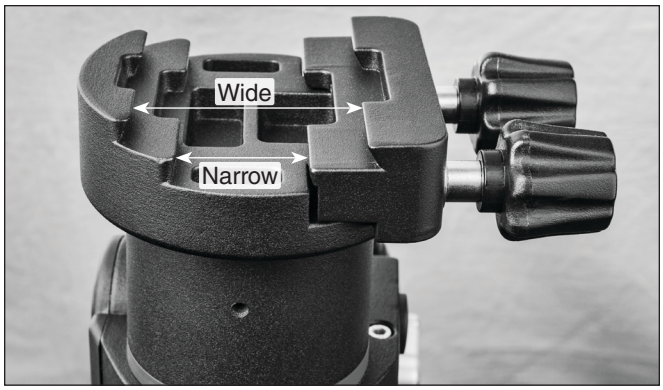


Figure 6. The dual-width saddle can accept either Vixen-style (narrow) or Losmandy-style (wide) dovetail plates.

balanced in this way then you have either too much or too little counterweight. Remove the counterweight, or add an additional counterweight if needed.

4. Retighten the counterweight lock knob.

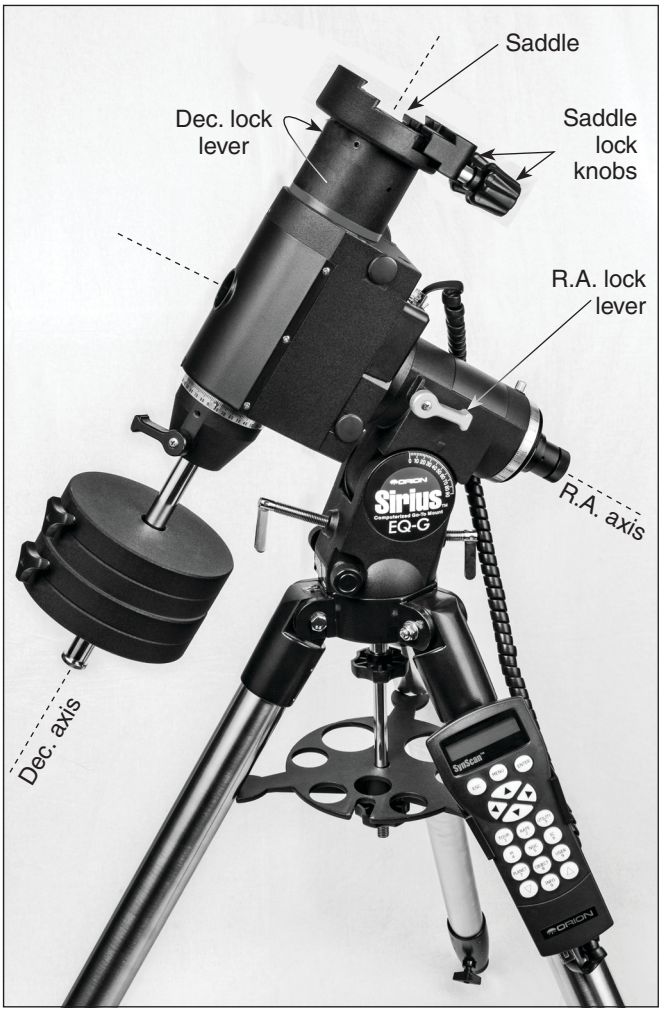


Figure 7. Before mounting a telescope, orient the saddle so the grooves run side to side, as shown here.

The telescope is now balanced on the RA axis. To balance the telescope on the Dec axis,

5. First, tighten the RA lock lever, with the counterweight shaft still in the horizontal position.
6. With one hand on the telescope optical tube, loosen the Dec lock lever. The telescope should now be able to rotate freely about the declination axis. Determine which direction it tends to rotate.
7. Now, if the telescope is held in tube rings, loosen the tube ring clamps until you can slide the telescope tube forward and back inside the rings (this can be aided by using a slight twisting motion on the optical tube while you push or pull on it). Slide it until it is balanced.
8. If your telescope is not held by tube rings, you will need to slide the dovetail plate it is mounted on forward or backward in the saddle. To do that carefully loosen the saddle lock knobs while supporting the telescope with your other hand, then slide the plate as needed. Then retighten the lock knobs.

The telescope is now balanced on both axes. When you loosen the lock lever on one or both axes and manually point the telescope, it should move without resistance and should not drift from where you point it.

6. Powering the Sirius EQ-G

The Sirius EQ-G should be powered by a 12V DC power supply (tip positive) capable of producing continuous current with a minimum of 3 amps, such as the Orion Dynamo Pro Lithium 155Wh AC/DC/USB Lithium Power Supply. A 12V DC power cable is included with the mount; it has a male cigarette lighter plug on one end and a standard 12V DC power plug on the other end) to connect the battery to the 12V DC power jack on the drive panel of the mount.

7. The Sirius EQ-G Drive Panel

Review **Figure 8** to familiarize yourself with the components of the drive panel.

Drive Panel Components

POWER: The small end of the included 12V DC “cigarette lighter” power cable provided with the mount plugs into the power input jack.

HAND CONTROL: An RJ-45 8-pin jack is for connecting the coil cable of the SynScan hand controller.

AUTO GUIDE: The RJ-12 6-pin jack is for connecting an autoguider. It is compatible with any autoguider with an ST-4 type interface.

ON/OFF SWITCH: Turns on and off the power to the mount and hand controller.

POWER LED: The power LED next to the Auto Guide port serves as a power-on indicator and provides other status information:

- Steady on: Power voltage is normal.
- Slow flashing: Power voltage is low; continuing to operate the mount may damage the battery (if a 12V lead-acid battery is in use).
- Fast flashing: Power voltage is extremely low; continuing to operate the mount may damage the battery and the motor controller in the mount.

8. Polar Alignment

An equatorial mount is designed to compensate for the Earth's rotation, allowing your telescope to easily "track" the movement of stars and astronomical objects across the sky. Tracking keeps objects from drifting out of the telescope's field of view while you're observing or imaging. This is accomplished by the slow rotation of the mount on its RA axis, using the built-in RA motor drive. But first the RA axis must be aligned with the Earth's rotational (polar) axis—a process called polar alignment.

The Sirius EQ-G mount comes with a polar axis finder scope (**Figure 9a**) housed inside the RA housing of the mount. When properly aligned and used, it makes accurate polar alignment quick and easy to do.

If we extend Earth's rotational axis out into space it intersects an imaginary point called the Celestial Pole. In the northern hemisphere that point is called the North Celestial Pole, or NCP. In the southern hemisphere it is the South Celestial Pole, or SCP. Because the celestial poles are imaginary points, you can't see them. Fortunately, there are a couple of celestial "landmarks" close to the poles that help us pinpoint them. In the northern hemisphere that landmark is Polaris, the North Star. In the southern hemisphere it is the star Sigma Octantis.

WARNING: ***Never look directly at the Sun through your telescope—even for an instant—without a professionally made solar filter that completely covers the front of the instrument, or permanent eye damage could result. Young children should use this telescope only with adult supervision.***

Remove the cover at the rear of the mount's RA housing and the cap on the front opening of the mount to view through the polar axis finder scope.

With the telescope tube installed on the mount, turn on the power to the mount. An internal red LED light will illuminate the polar scope's reticle (**Figure 9b**), which should be visible in the field of view of the polar scope. If the reticle appears blurry, you can focus it by rotating the polar scope's knurled eyepiece. The intensity of the illumination can be adjusted using the SynScan hand controller. The reticle allows accurate polar alignment from either hemisphere.

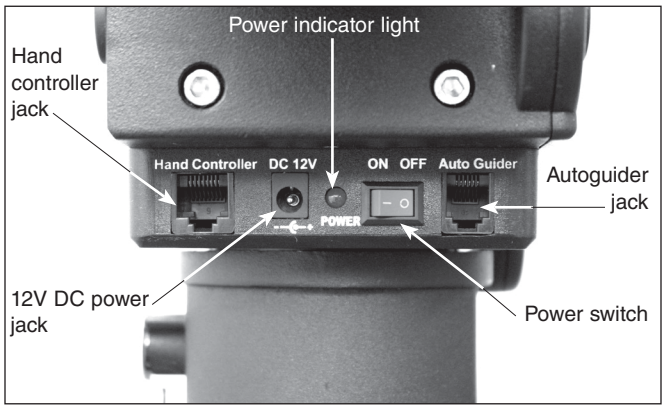


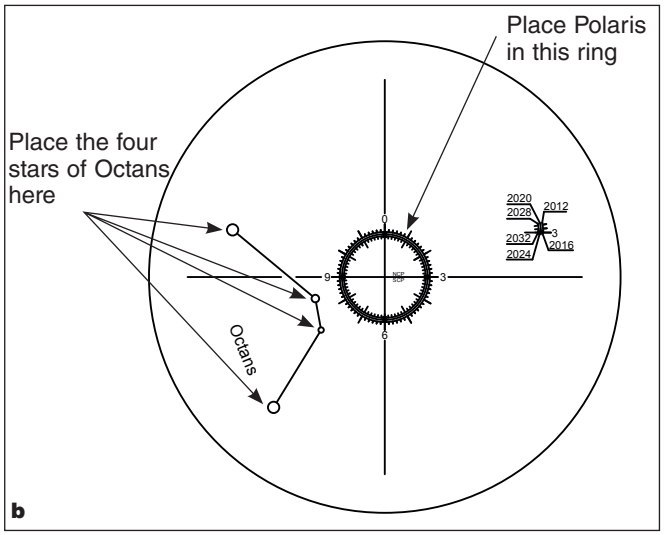
Figure 8. The Sirius EQ-G control panel

For observing in the Northern Hemisphere

1. Set the mount's latitude to the local latitude (Refer to "Adjusting the Mount's Latitude and Azimuth" in Section 9)
2. Find Polaris in the sky. Look north and locate the pattern of the Big Dipper (**Figure 10**). The two stars at the end of the "bowl" of the Big Dipper point right to Polaris. If you need help determining which direction is north, you could use your smartphone's compass feature or find a physical compass to point the way.
3. Now move the tripod so the mount's RA axis points roughly in the direction of Polaris.
4. Loosen the Dec lock lever and rotate the Dec axis until the hole in the Dec shaft is fully open (**Figure 11**), which will allow an unobstructed view of the sky through the polar scope. Then re-tighten the Dec lock lever.
5. Make sure that the polar scope is aligned with the RA Axis. If it is not, follow the procedure in the following section, "Aligning the Polar Scope."
6. Next, rotate the polar scope so that the "0" label on the reticle pattern is at the 12 o'clock position (i.e., at the top, as in **Figure 9b**). When positioned correctly the "3" will be seen at the right, "6" and the bottom and "9" to the left.
7. Use the altitude and azimuth adjustments on the mount to move it incrementally while viewing through the polar scope, until you can see Polaris in the field of view. It doesn't matter where it is in the field of view at this point; you will make fine adjustments to position Polaris where it needs to be in a moment.

Note: For the azimuth adjustment knobs, turn one clockwise and the other counterclockwise the same amount, or vice versa. For altitude adjustment, loosen one altitude adjustment T-bolt before tightening the other. Over-tightening can damage the bolts.

8. The circle with fine graduations in the center of the reticle is for polar alignment in the northern hemisphere. Find the star Polaris (the brightest star near the North Celestial Pole, or NCP) in the polar scope; then use the azimuth and altitude adjustments on the mount to move Polaris to the proper position in that graduated circle



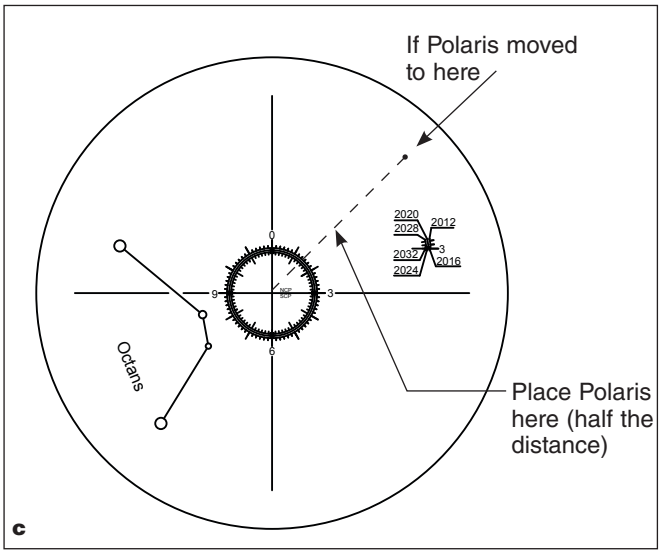


Figure 9 a) The polar scope is built into the right ascension housing. **b)**The polar scope's reticle, illuminated by an LED light inside the mount when it's powered on, should be visible when you look into the polar scope. **c)** If the target moved off the center of the reticle, use the calibration setscrews to move it halfway back toward the center.

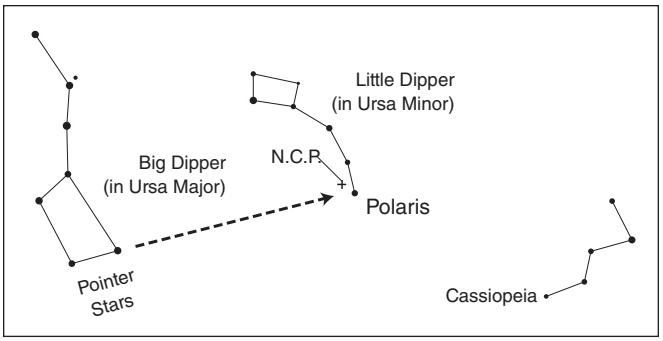


Figure 10. To find Polaris in the night sky, look north and find the Big Dipper. Extend an imaginary line from the two "Pointer Stars" in the bowl of the Big Dipper. Go about five times the distance between those stars and you'll reach Polaris, which lies within 1° of the north celestial pole (NCP).

(Refer to the upcoming section "The Orientation of Polaris in the Polar Scope").

For observing in the Southern Hemisphere

1. Set the mount's latitude to the local latitude (Refer to "Adjusting the Mount's Latitude and Azimuth" in Section 9)
2. Move the tripod so the mount's RA axis points roughly in the direction of the South Celestial Pole.
3. In the polar scope's field of view, locate the four dim stars (~ magnitude 5 - 6) of Octans that conform to the pattern shown on the reticle (**Figure 9b**). Use the altitude adjustment bolt and the two azimuth adjustment knobs on the mount to move those stars into the four small circles labeled "Octans" on the reticle.

Note: For the azimuth adjustment knobs, turn one clockwise and the other counterclockwise the same amount, or vice versa. For altitude adjustment, loosen one altitude adjustment bolt before tightening the other. Over-tightening can damage the bolts.

The Orientation of Polaris in the Polar Scope

Polaris is not located exactly at the North Celestial Pole; it is offset from it by less than 1 degree. The "Polaris circle" seen in

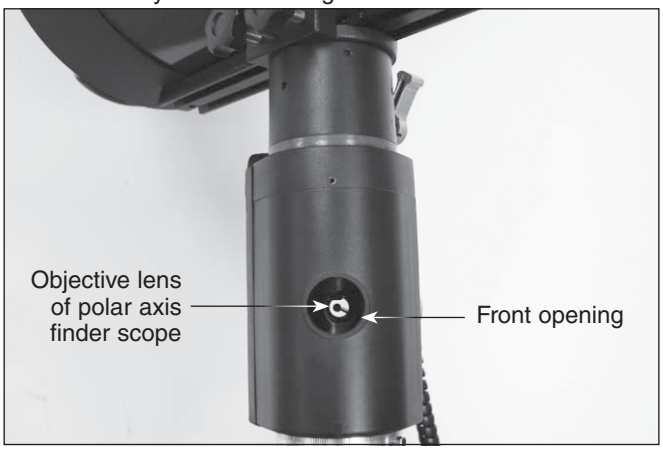


Figure 11. To view through the polar scope, you must rotate the Dec axis of the mount until the hole in the Dec shaft is fully open to transmit light to the polar scope.

Figure 9b is a representation of Polaris' orbit around the NCP. When polar aligning the Sirius mount, you'll need to determine where Polaris should be positioned around that circle, relative to the NCP, for the current time and date. That information is found during initialization of the SynScan hand controller at startup. After entering the proper local longitude, latitude, date, time, and Daylight Saving time, the SynScan hand controller will display the message: "Polaris Position in P.Scope=HH:MM". Imagine the graduated circle in **Figure 9b** as a clock's face with 12:00 at the top, and the current time pointing to the "HH:MM". The orientation of the hour hand (HH) of the clock represents the orientation of Polaris in the polar scope. Put Polaris in exactly the same orientation on the graduated circle to finish the polar alignment.

Polaris' position relative to the NCP changes slightly over the course of years. The polar scope reticle displays three circles to represent Polaris's "orbit" around the NCP in the year 2012, 2020, and 2028. There are also tiny hash marks at the 0, 3, 6, and 9 o'clock positions representing the years 2016, 2024, and 2032. Refer to the "key" to the right of the Polaris circle. When polar aligning in the Northern Hemisphere, you should place Polaris on the correct circle (or gap between them) corresponding to the present year.

Aligning the Polar Scope

Before using the polar scope for polar alignment, it must be aligned to the mount's RA axis. At the center of the reticle is a cross, which you'll use in the procedure below to align the polar scope.

1. Loosen the Dec lock lever and rotate the optical tube about the Dec axis until you have a clear view through the polar axis finder scope. Then retighten the Dec lock.
2. Look through the polar scope at a distant object (during the day) or at Polaris (at night, in Northern Hemisphere) and center it on the cross in the middle of the reticle. You may need to turn the latitude adjustment lever and the azimuth adjustment knobs of the mount and even move the tripod itself to do this.
3. Rotate the mount 180° about the RA axis. It may be convenient to remove the optical tube and counterweight(s) before doing this. If the object remains centered on the cross after the rotation, then the polar scope is properly aligned to the RA axis and no adjustment is needed.
4. If the target deviated from the cross, then use the 1.5mm Allen wrench to adjust the three small Allen screws on the polar scope (**Figure 9a**) to move the target half the distance back to the cross (**Figure 9c**). Then you will re-center the object on the cross as in Step 2 using the mount's azimuth adjustment knobs and the latitude adjustment lever (without moving the tripod this time).
5. Repeat Steps 2 to 4 until the object stays centered on the cross of the reticle when rotating the mount on the RA axis.

NOTE:

- When adjusting the Allen screws, first loosen one screw only ¼ of a turn, and then tighten the other two.
- Do not over tighten the Allen screws as it might damage the reticle plate in the polar scope.
- Do not loosen one screw completely or loosen more than one screw at a time, or the reticle plate in the polar scope will be disengaged and further adjustment is impossible.
- If the reticle plate does disengage, remove the polar scope's eyepiece by turning it counterclockwise and engage the reticle plate again.

9. Operating the Sirius EQ-G

Moving the Mount Manually

The Sirius EQ-G mount can be moved manually in RA (east-west) or Dec (north-south) or can be moved electronically with the SynScan hand controller. *However, after an initial GoTo star alignment, moving the mount manually will void the star alignment, which will have to be performed again. After GoTo star alignment, move the telescope only electronically using the SynScan hand controller, to preserve the alignment!*

If moving the mount manually is desired, loosen one or both of the lock levers on the RA and Dec axes to rotate the mount. Both levers should be tightened for electronic operation of the mount via the SynScan hand controller.

Locating Objects Using the Setting Circles

With a computerized GoTo mount like the Sirius EQ-G, you do not need setting circles to locate objects. The SynScan computerized object locator will do that for you! But should you wish to find objects "the old fashioned way," or need to locate an object that is not in the SynScan database based on its celestial coordinates, you can use the RA and Dec setting circles to pinpoint the desired object (**Figure 12**).

First, you will need to calibrate the setting circles. Do this by simply pointing the telescope at a celestial object with known RA and Dec coordinates, which you can look up in a star atlas or on the internet. Then loosen the locking thumbscrew on each setting circle and turn the setting circles so the values for RA and Dec line up with the indicator arrow next to each setting circle. Then re-tighten the setting circle locking thumbscrews.

For the RA setting circle, note that there are two sets of numbers below the hash marks. The lower set of numbers applies to viewing in the Northern Hemisphere, while the numbers above them apply to viewing in the Southern Hemisphere. The Dec setting circle scale features four quadrants from 0 to 90-degrees each. Users should use the proper quadrant when calibrating the Dec setting circle.

Adjusting the Mount's Latitude and Azimuth

Setting the RA axis to the correct latitude is necessary for accurate polar alignment and tracking. Refer to the latitude scale while cranking the latitude adjustment bolt to achieve the proper tilt. Loosen one of the two bolts (first) while tightening the other. The latitude should be set to the same latitude at which you are located.

The two azimuth adjustment knobs allow fine movement of the mount in azimuth (side to side). This is useful in polar alignment for placing Polaris (or Sigma Octantis) in the correct position on the polar scope's reticle. Make sure the mount attachment knob (see **Figure 3**) is ever so slightly loosened to permit the mount to rotate when turning the azimuth adjustment knobs.

Attaching the SynScan Hand Controller

The SynScan hand controller cable for the Sirius EQ-G has modular connectors (RJ-45) on both ends. Plug the modular connector on one end of the cable into the corresponding port on the hand controller, and plug the modular connector on the other

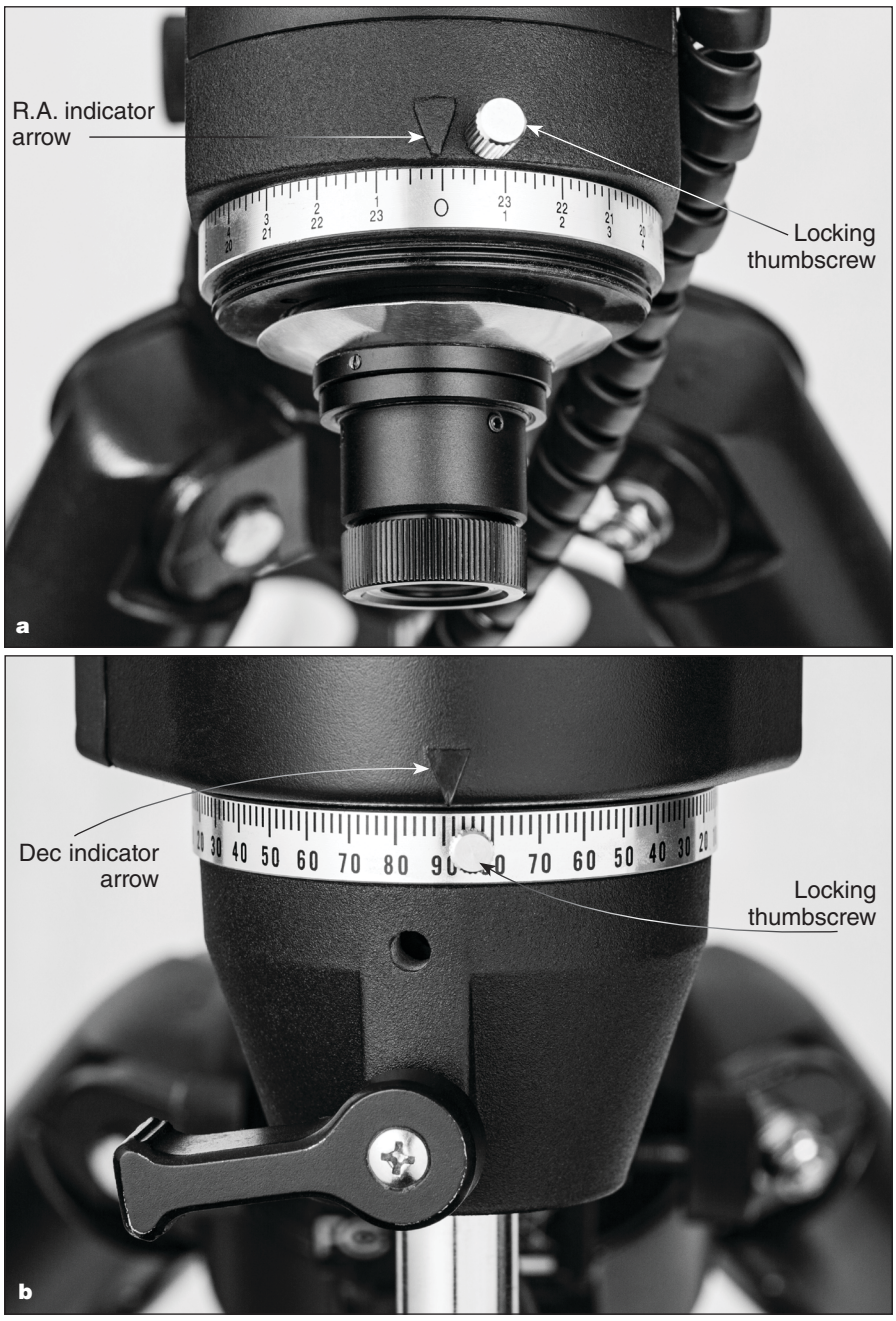


Figure 12. The RA and Dec setting circles (**a** and **b**, respectively) can be used to locate objects manually by their coordinates, if desired.

end of the cable into the Hand Controller port on the mount's drive panel (**Figure 8**). Push the connectors into the ports until they click into place.

More information about the features and functionality of the SynScan Hand controller can be found in its separate user manual.

10. Specifications

Mount Type	German Equatorial
Payload (counterweights excluded)	30 lbs. (13.6 kg)
Mount Weight (tripod excluded)	22.3 lbs. (10.1 kg)
Tripod	1.75" stainless steel
Tripod Weight	11.2 lbs. (5.1 kg)
Saddle	Width: 44mm, 75-degree angle
	Width: 75mm, 60-degree angle
Counterweight	11.3 lbs. (5.1 kg) each
Counterweight Shaft	Diameter 18mm, Length 215mm
Dovetail Bar	Vixen style, 8" length
Power Requirement	DC 11-15V, 3A
Gear Ratio	705
Resolution	0.144 arc sec (or 9,024,000 steps/rev)
RA & Dec Worm Gear	135 teeth
RA & Dec Spindles	Diameter 30mm, steel with high-precision bearing
Motors	Stepper motor, 1.8 degree step angle, 64 micro-steps driven
Maximum Slewing Speed	3.4 degrees/sec
Tracking Rates	Sidereal, solar, lunar
Tracking Mode	Equatorial
Auto-guider Interface	ST-4
Auto-guiding Speeds	0.25x, 0.5x, 0.75x, 1x
Periodic Error Correction	Yes
Hand Controller	SynScan Database >42000 Objects and Stars
Celestial Object Catalogs	Messier, NGC, IC, SAO, Caldwell, Double Star, Variable Star, Named Star, Planets
Pointing Accuracy	Up to 1 arc-minute

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.

For further warranty information, please visit **www.OrionTelescopes.com/warranty.**

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