

## INSTRUCTION MANUAL

# Orion<sup>®</sup> Sirius<sup>™</sup> Pro AZ/EQ-G GoTo Telescope Mount

#10088



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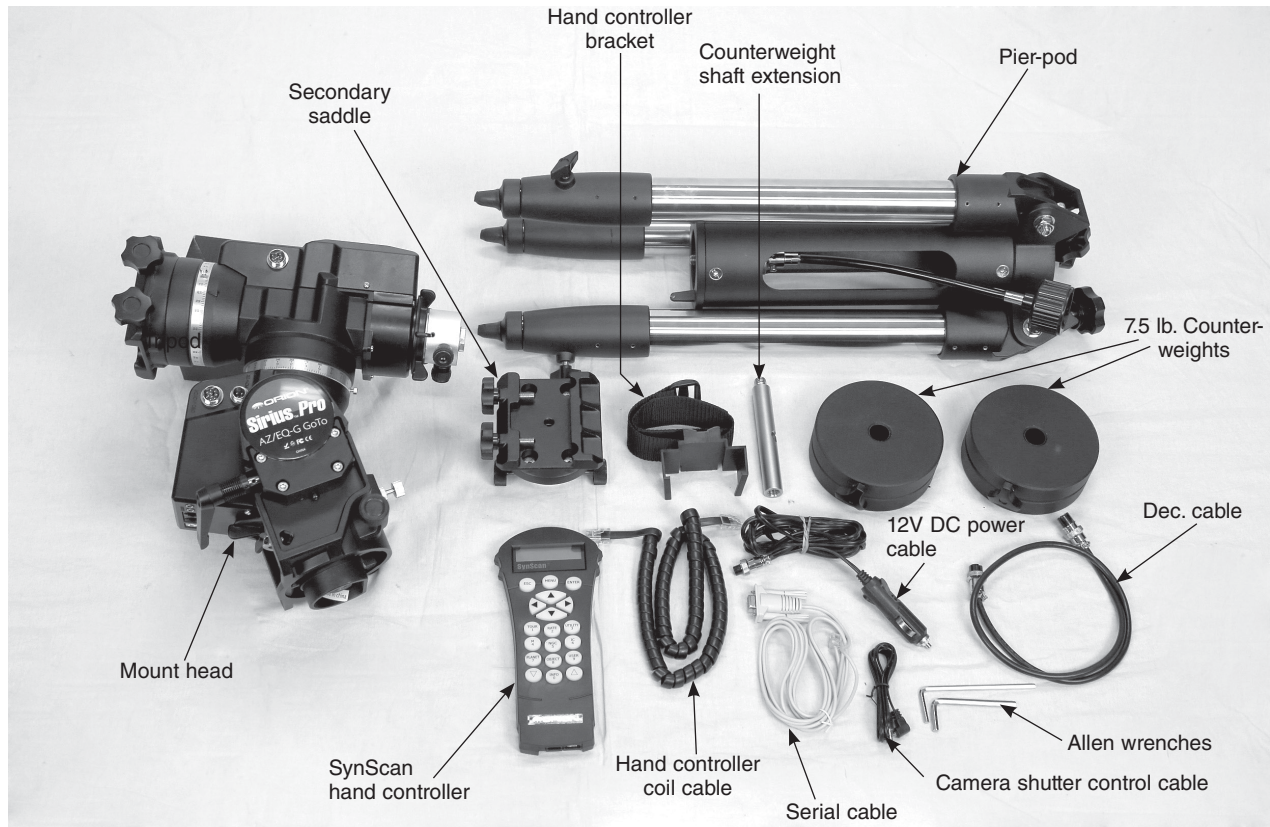
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**Figure 1.** The Sirius Pro AZ/EQ-G GoTo Telescope Mount

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**Figure 2.** Components included with the Sirius Pro

## Part 1: UNPACKING

### 1.1 Unpacking

The entire mount will arrive in two boxes, one containing the pier tripod (the “pier-pod”) and two counterweights, the other containing the mount head and hand controller. Be careful unpacking the boxes. We recommend keeping the boxes and original packaging. In the event that the mount needs to be shipped to another location, or returned to Orion for warranty repair, having the proper packaging will ensure that your mount will survive the journey intact.

#### **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.*
- *Never use your telescope to project an image of the Sun onto any surface. Internal heat build-up can damage the telescope and any accessories attached to it.*
- *Never use an eyepiece solar filter or a Herschel wedge. Internal heat build-up inside the telescope can cause these devices to crack or break, allowing unfiltered sunlight to pass through to the eye.*
- *Never leave the telescope unsupervised, either when children are present or adults who may not be familiar with the correct operating procedures of your telescope.*

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

### 1.2 Parts List

Qty.	Item
1	Sirius Pro mount equatorial head
1	Counterweight shaft extension, 120mm
1	Secondary saddle plate
1	SynScan hand controller with coil cable
1	Pier tripod
2	7.5-lb. counterweights
1	Bracket for SynScan controller
1	RS-232 serial cable
1	Shutter release cable (Canon)
1	12V DC power cable with auto lighter plug
1	Dec. cable
1	Set of Allen wrenches



**Figure 3.** Fold the tripod legs down and lock each one with the captive rosette knob.

## Part 2: ASSEMBLY

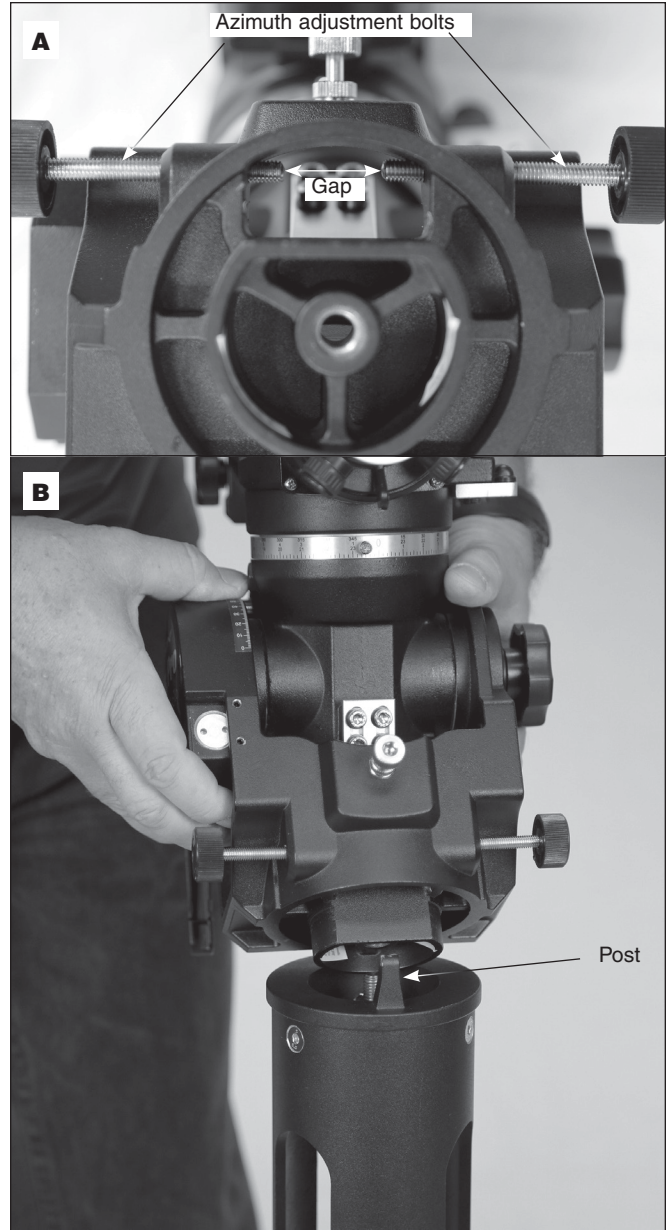
### 2.1 Setting Up the Pier Tripod (“Pier-Pod”)

1. Fold the tripod legs down until they stop, then screw the leg lock knob until tight (**Figure 3**).
2. Loosen the two azimuth adjustment knobs until there is  $\frac{1}{2}$ " or more of space between the two bolt ends (**Figure 4A**). Then place the mount on the tripod, aligning the metal post on the tripod with the gap between the two azimuth adjustment bolts (**Figure 4B**).
3. Once the mount is seated on the pier, slightly tighten the two azimuth adjustment knobs.
4. While supporting the mount head with one hand, turn the mount coupling knob (on the flexible cable) clockwise until tight; this firmly attaches the mount head to the pier (**Figure 5**).
5. Extend the tripod legs to the desired length (**Figure 6A**). Use the built-in bubble level (**Figure 6B**) to level the mount by adjusting the length of the tripod legs as needed.

### 2.2 Attaching the Counterweights

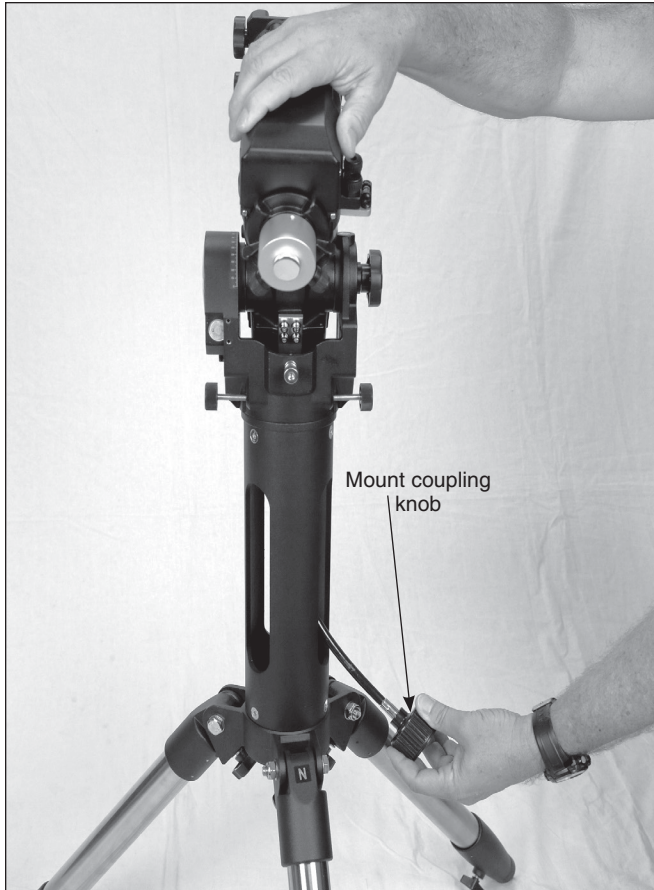
Always attach the counterweight(s) before installing your telescope on the mount!

1. Loosen the two counterweight shaft lock knobs (**Figure 7**) and fully extend the retractable shaft. Then re-tighten the two knobs to secure the shaft in place.



**Figure 4. A)** Loosen the azimuth adjustment bolts to create at least a  $\frac{1}{2}$ " gap. **B)** Orient the mount head so that the gap aligns with the metal post on the tripod.

2. Loosen the right ascension (R.A.) clutch wheel (**Figure 8**), and rotate the R.A. axis until the counterweight shaft is pointing downward, as shown.
3. Remove the knurled “toe saver” safety stop (**Figure 7**) from the end of the counterweight shaft.
4. The Sirius Pro mount comes with a 120mm counterweight shaft extension (**Figure 9**), which can be installed at this point if desired for balancing heavier payloads. Thread it into the end of the main counterweight shaft until tight.
5. Slide one or both of the 7.5-lb. counterweights onto the counterweight shaft, depending on the telescope's weight



**Figure 5.** Turn the large knob on the flex cable clockwise to attach the mount head to the pier-pod.

(**Figure 10**); first loosen the counterweight's lock knob to clear the center hole. Retighten the lock knob to secure the counterweight(s) on the shaft.

6. Replace the safety stop on the end of the counterweight shaft. The safety stop prevents the counterweights from falling on your foot if the lock knobs come loose.

### 2.3 Attach the Hand Controller Bracket

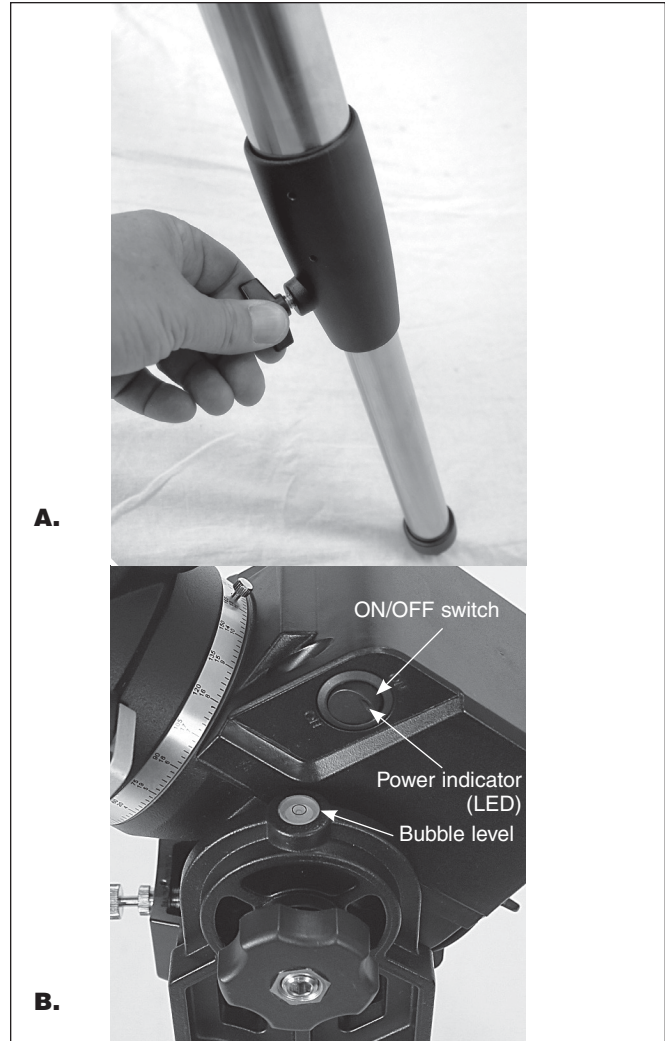
Attach the hand controller bracket to the pier by wrapping the strap around the pier and fastening it with the hook-and-loop closure (**Figure 11**).

### 2.4 Installing a Telescope on the Mount

1. The Sirius Pro mount is designed to hold a telescope payload of up to 30 lbs. in EQ or single scope Altazimuth mode. In dual scope altazimuth mode it can hold up to two 30-lb. telescopes. For heavier telescopes, the mount may not provide sufficient stability for steady observing or imaging.

Before installing a telescope, be sure that:

- a. The counterweight shaft is pointing toward the ground.
- b. The counterweights are installed on the counterweight shaft and have been moved to the bottom end of the shaft.

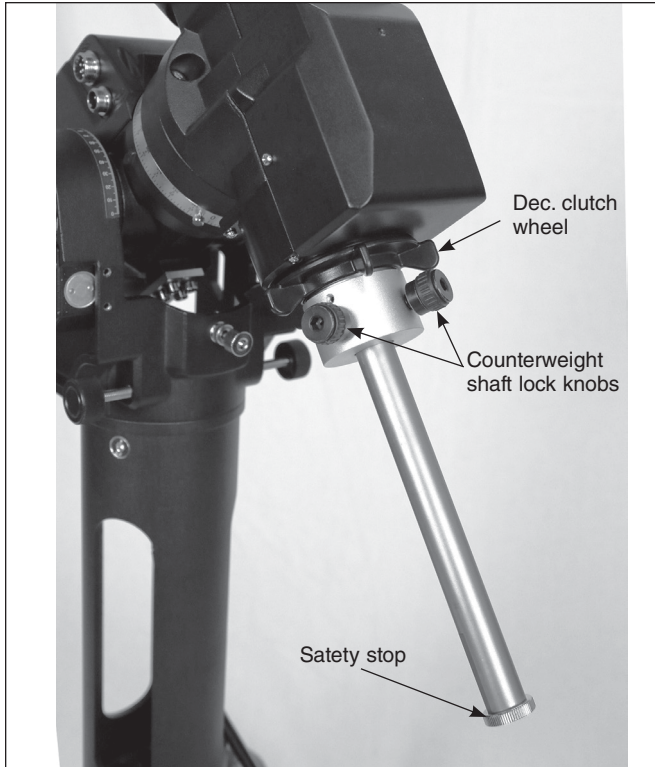


**Figure 6. A)** Use the leg extension knobs to adjust leg length. **B)** Level the mount using the bubble level and adjusting leg length as needed.

- c. The R.A. axis is secured by tightening the R.A. clutch.
2. Loosen the Dec. clutch wheel and rotate the saddle until the slot is oriented horizontally, as in **Figure 12A**. Then retighten the Dec. clutch wheel.
3. Loosen the two knobs on the saddle plate (**Figure 12B**) until the bolts are clear of the dovetail slot.
4. While holding the telescope, seat the dovetail bar of the telescope into the saddle. Then tighten the two knobs to secure the dovetail bar.

**NOTE:** The Sirius Pro saddle is designed to accept a “Vixen-style” dovetail plate, or bar.

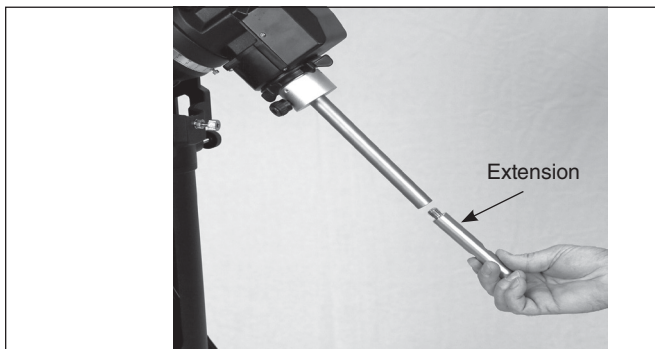
**Warning:** Keep supporting the telescope until the dovetail mounting bar is tightened down firmly in the saddle!



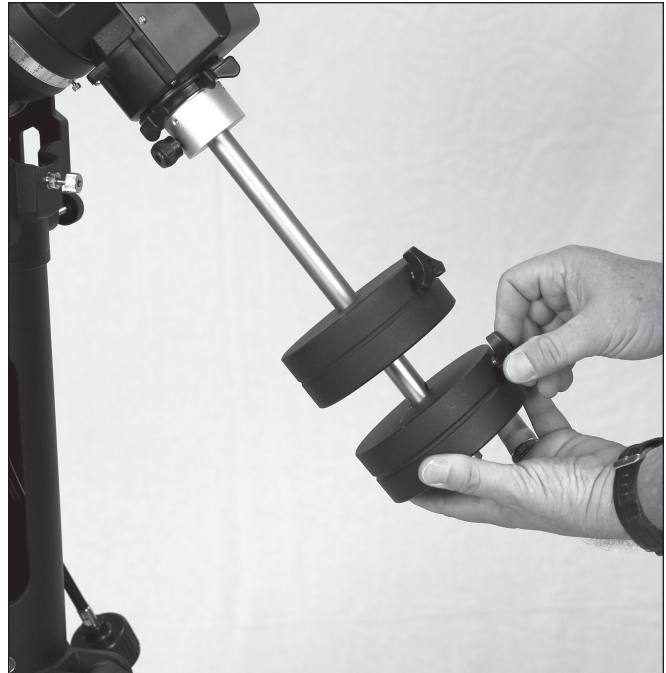
**Figure 7.** Loosen the two counterweight shaft lock knobs to extend or retract the counterweight shaft.



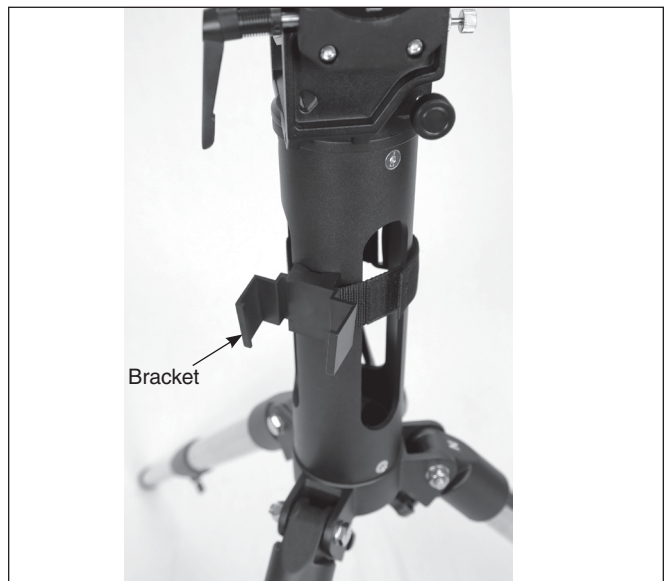
**Figure 8.** The R.A. clutch wheel.



**Figure 9.** The 120mm shaft extension threads into the counterweight shaft.



**Figure 10.** Install counterweight(s) before attaching your telescope to the mount!

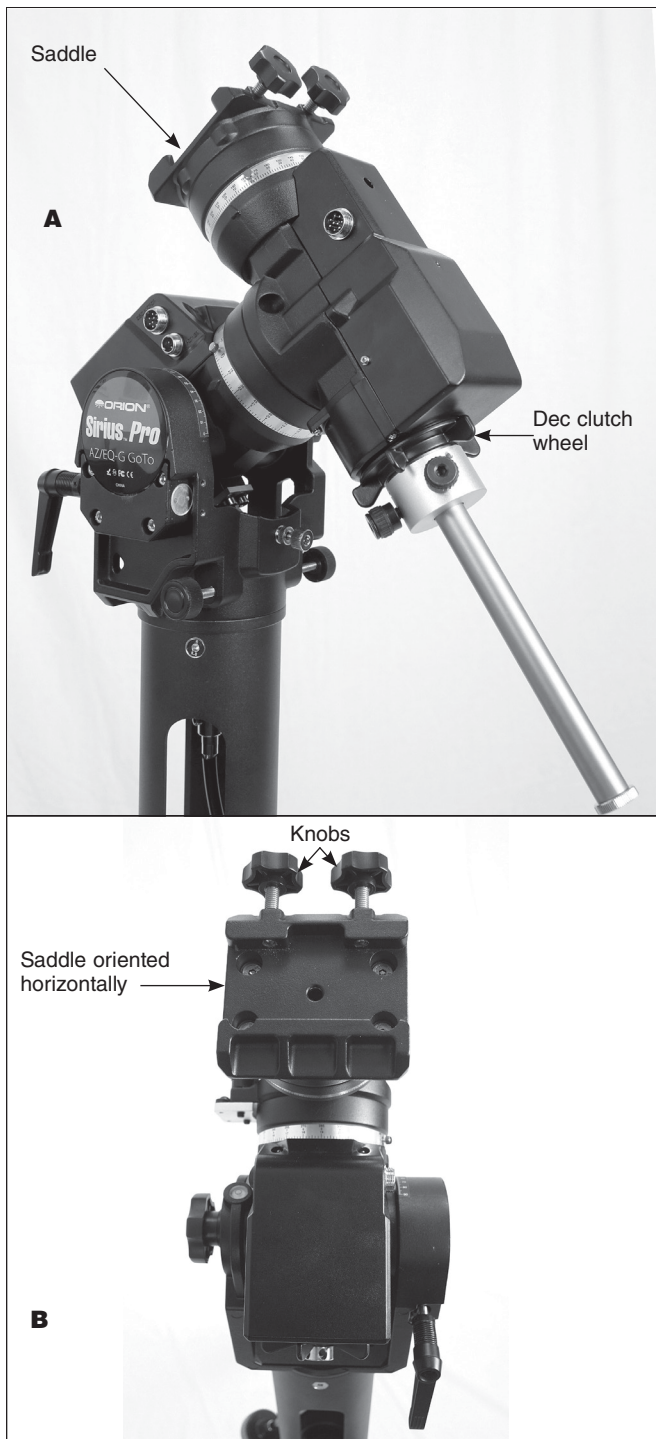


**Figure 11.** The hand controller bracket should be strapped around the pier-pod.

### 2.5 Balancing the Telescope

To minimize stress on the motor drive system and ensure smooth, accurate movement of your telescope on both axes, it is imperative that the optical tube be properly balanced. We will first balance the telescope with respect to the right ascension (R.A.) axis, then the declination (Dec.) axis, in the equatorial mode.

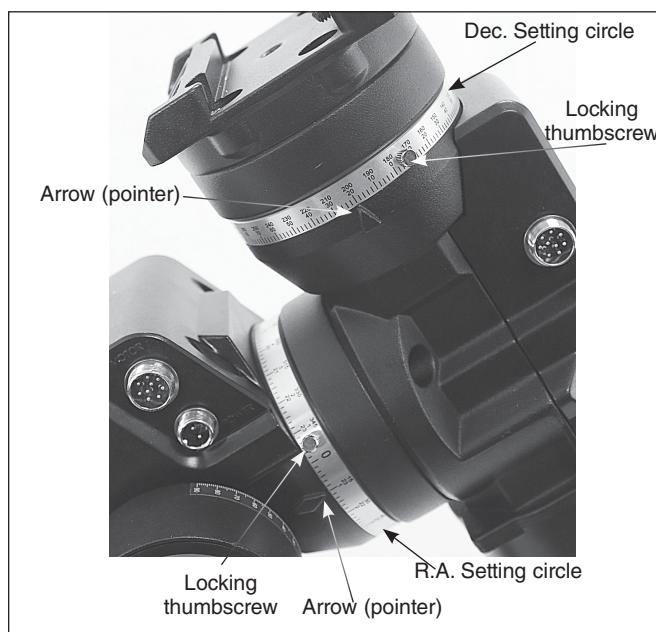
1. Keeping one hand on the telescope optical tube, loosen the R.A. clutch wheel. Make sure the Dec. clutch wheel is tightened, for now. The telescope should now be



**Figure 12. A)** Loosening the Dec. clutch wheel lets you rotate the dovetail saddle to a horizontal position. Be sure to tighten the clutch before installing your telescope! **B)** Tighten the two rosette knobs to secure your telescope in place.

able to rotate freely about the R.A. axis. Rotate it until the counterweight shaft is parallel to the ground (i.e., horizontal).

2. Now loosen the counterweight lock knob and slide the weight(s) along the shaft until it exactly counterbalances the telescope. That's the point at which the shaft remains horizontal even when you let go with both hands. Once balance is achieved, retighten the counterweight lock knobs.
3. To balance the telescope on the Dec. axis, first tighten the R.A. clutch, with the counterweight shaft still in the horizontal position. Then with one hand on the telescope optical tube, loosen the Dec. clutch and check for any spontaneous rotation. If there is some, adjust the telescope forward or back in the saddle or in its tube rings until it remains horizontal when you carefully let go of it. (It's best to return the telescope to an upright position before adjusting it forward to back in the saddle!)



**Figure 13.** R.A. and Dec setting circles can be used to locate objects “the old fashioned way.”

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

## PART 3: USING THE SIRIUS PRO AZ/EQ-G MOUNT

### 3.1 Manually Rotating the Mount

The mount can be moved manually by simply loosening the R.A. and Dec clutches and pointing the telescope to the

desired location. Both the R.A. and Dec. clutches should be tightened when driving the mount with the internal motors.

### 3.2 Using the Setting Circles

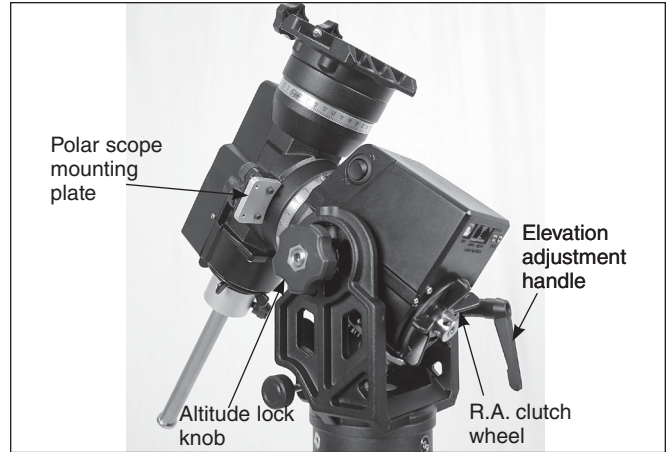
As indicated in **Figure 13**, the Sirius Pro features right ascension and declination setting circles. Most users of a GoTo telescope will not have a need to use setting circles, but if you should, here's how:

1. Before using the setting circles, they will need to be calibrated. Point the telescope toward a known object whose coordinates you have looked up (R.A.-Dec. coordinates or azimuth-altitude coordinates). Loosen the two locking thumbscrews on the setting circles and turn them so the coordinate values line up with the arrows, then retighten the locking screws.
2. Once the setting circles are calibrated, the mount can be moved either electronically or manually to specified coordinates by referring to the setting circle readings.
3. The R.A. setting circle features three different scales: the lower scale is used to indicate the right ascension in Equatorial mode when operating in the Southern Hemisphere; the middle scale is used to indicate the right ascension in Equatorial mode when operating in the Northern Hemisphere; the upper scale is used to indicate the azimuth angle when operating in Altazimuth mode.
4. The lower scale of the Dec. setting circle is divided into four quadrants of 90-degrees, used to indicate the declination (when mount is operating in Equatorial mode) or altitude angle (when operating in Altazimuth mode). Use the proper quadrant when calibrating the Dec. setting circle.

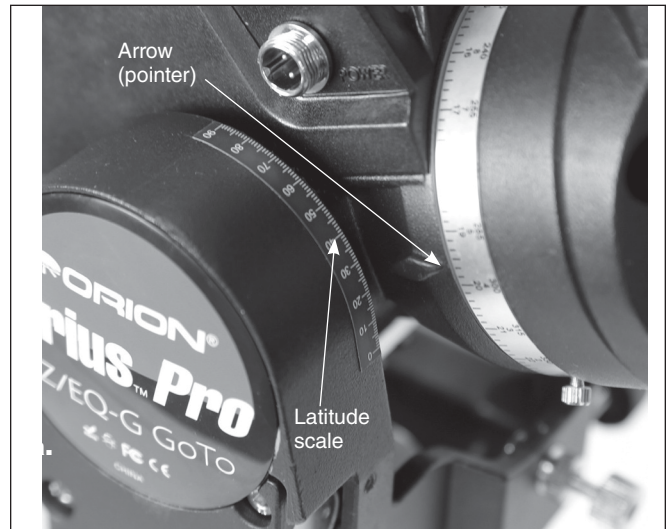
### 3.3 Adjusting the R.A. Axis Elevation (Latitude)

1. Loosen the altitude lock knob located on the left side of the mount (**Figure 14**) about a quarter turn.
2. Push the spring-loaded elevation adjustment handle to engage it, then turn it clockwise or counterclockwise to set the R.A. axis elevation to your location's latitude. When the handle reaches its limit of rotation, release it, then change its orientation and push it in to engage it again and continue turning it.
3. Refer to the latitude scale and pointer on the right side of the mount (**Figure 15**). (If you don't know your latitude, consult a geographical atlas or look it up on the internet.) For example, if your latitude is 35° North, set the pointer to 35. The latitude setting should not have to be adjusted again unless you move to a different viewing location some distance away.
4. Retighten the altitude lock knob.

**Note:** It is normal to have slight elevation play on the Sirius Pro AZ/EQ-G mount. The mount depends on the gravity of its payload and its own weight to stay firm. Because of this, it is recommended to end the elevation adjustment with an upward movement. Whenever there is an upward over-adjustment, lower the elevation first, and then crank the mount upward again.



**Figure 14.** Loosen the altitude lock knob before adjusting the mount's elevation angle.



**Figure 15.** In EQ mode, line up your latitude on the scale with the pointer (arrow).

### 3.4 Setting the Mount to Alt-azimuth Mode

1. Refer to Section 3.3 to adjust the R.A. axis's elevation.
2. Use caution when the latitude indicator gets close to 90 degrees. Do not turn the spring-loaded elevation adjustment handle further when you feel it is blocked, because it may mean that the R.A. axis has reached the factory-calibrated position for Altazimuth mode. **TURNING THE HANDLE FORCEFULLY WILL DAMAGE THE MOUNT.**
3. Tighten the Altazimuth mode lock knob to secure the R.A. axis in position for altaz mode operation (**Figure 16**). Use a 5mm Allen wrench to tighten the knob if necessary.
4. Also tighten the altitude lock knob on the left side.

**Figure 17** shows the mount set in Altazimuth mode, with one counterweight installed.





**Figure 16.** The altazimuth mode lock knob secures the mount in position for use in altazimuth mode.



**Figure 17.** All set for single scope use in altazimuth mode.

**Note:**

- In any case, **DO NOT TURN THE HANDLE FORCEFULLY.**
- In Altazimuth mode with one telescope mounted, the telescope should be positioned on the **right-hand** side of the mount when viewed from behind the mount. The counterweight shaft should be extended to the left.
- When switching between Altazimuth and Equatorial modes, be sure to remove the telescope (first) and all counterweights (after scope has been removed) from the mount to avoid damage to the mount's latitude adjustment mechanism.
- It may be more difficult to balance the R.A. (or Azimuth) axis in Altazimuth mode. Here are the balancing steps recommended for Altazimuth mode:
  - » **Balance** the payload and counterweights in equatorial mode and mark the position of the counterweights.
  - » **Unload** the payload and counterweights to set the mount in Altazimuth mode.
  - » **Re-load** the mount again by installing the counterweights at the marked position.

**3.5 Mounting a Second Telescope (Altazimuth mode only)**

A secondary telescope saddle is included with the Sirius Pro mount. It's designed to be installed on the end of the mount's counterweight shaft to hold a second telescope.

1. Slide the counterweight shaft out and rotate it so the flat strip at the end of the shaft is facing up, then lock the shaft with the two lock knobs (**Figure 18A**).
  2. Loosen the Allen screw on the secondary saddle's silver coupler ring and push the saddle onto the counterweight shaft, as shown in (**Figure 18B**). Align the Allen screw with the flat strip on the counterweight shaft.
  3. Use a 5mm Allen wrench to secure the saddle to the counterweight shaft with the Allen screw in the center of the saddle (**Figure 18C**). Also tighten the Allen screw on the coupler ring with the same wrench.
  4. Tighten the Dec. clutch wheel, and then install the second telescope on the secondary saddle. The second telescope and its saddle should be situated to the left of the mount when the telescope points forward.
  5. Loosen the counterweight shaft's lock knobs to test the balance of the second telescope. Adjust the positioning of the telescope in its tube rings or the dovetail bar's position in the groove of the saddle until the telescope is balanced. Then retighten the two counterweight shaft lock knobs.
  6. Loosen the Dec. clutch to check the balance of the telescope mounted on the primary saddle. Make any adjustments needed, then retighten the Dec. clutch wheel.
5. To restore the mount to Equatorial mode, loosen the altitude lock knob first, then **fully release** the Altaz mode lock knob. **DO NOT FORGET TO DO THIS!** Use the spring-loaded elevation adjustment handle to lower the mount to the desired elevation.

7. Loosen the counterweight shaft's lock knobs and rotate the second telescope until it points in the same direction as the main telescope. Retighten the lock knobs.
8. Aim the main telescope at a distant object, and then adjust the two vertical-adjustment knobs on the secondary saddle (**Figure 19**) to point the secondary telescope to the same vertical level.

**Figure 20** shows the mount in Altazimuth mode with the secondary saddle installed.

**Note:**

- Use the secondary saddle only when the Sirius Pro mount is set up in Altazimuth mode.
- There is no mechanism on both the primary saddle and the secondary saddle for aligning the two telescopes in the azimuth direction.
- The 120mm counterweight shaft extension cannot be used with the secondary saddle.

## PART 4: POLAR ALIGNMENT

When you look at the night sky, you no doubt have noticed that the stars appear to move slowly from east to west over time. That motion is actually caused by the Earth's rotation (from west to east). An equatorial mount is designed to compensate for that motion, allowing you to easily "track" the movement of astronomical objects, thereby keeping them from drifting out of your telescope's field of view while you're observing or imaging.

This "tracking" is accomplished by slowly rotating the telescope on its right ascension (R.A.) axis, using the built in motor drive. But first the R.A. axis of the mount must be aligned with the Earth's rotational (polar) axis—a process called polar alignment. The SynScan hand controller provides a highly accurate polar alignment routine after a 2-star or 3-star GoTo alignment is performed. Please refer to the SynScan manual for detailed instructions.

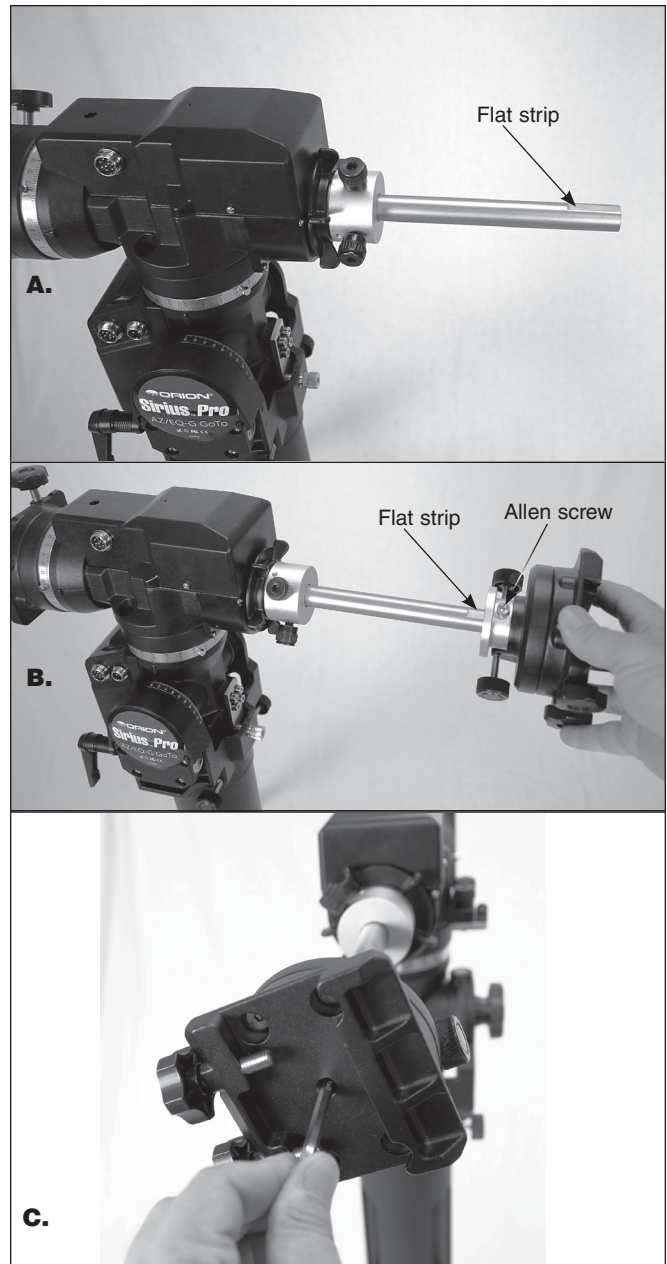
An optional, externally mounted polar axis finder scope (#7152) is available for the Sirius Pro mount. It can be used to accurately polar align the mount from both Northern and Southern Hemisphere locations. For detailed instructions on how to set up and use the polar scope, refer to the manual for that accessory.

## PART 5: DRIVE PANEL INTERFACE

### 5.1 Panel Interface Components:

**POWER INPUT JACK:** This is a threaded 12V DC power input jack on the right side of the mount head that provides a secure connection to the power source (**Figure 21**). The 12V DC "cigarette lighter" power cable provided with the mount has a matching threaded connector for the input jack.

Refer to **Figure 22** for the following ports:

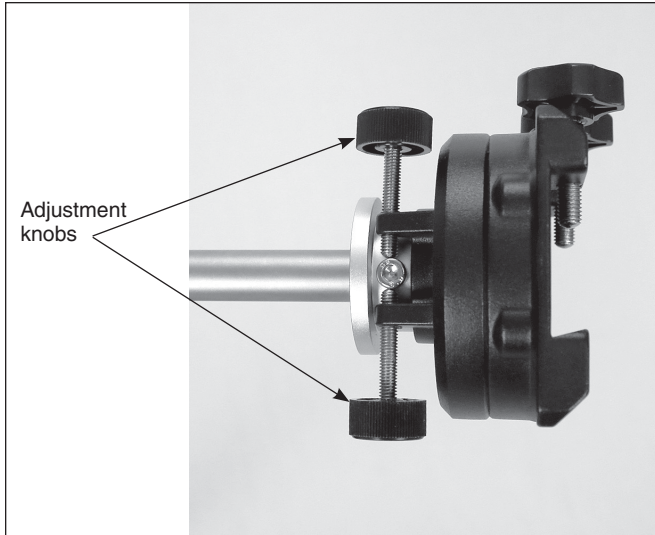


**Figure 18.** For mounting a second telescope in Altazimuth mode, **A)** first locate the flat strip at the end of the counterweight shaft. **B)** Then install the included secondary saddle on the shaft with the socket head screw over the flat strip. Finally, **C)** tighten the screw running through the center of the secondary saddle.

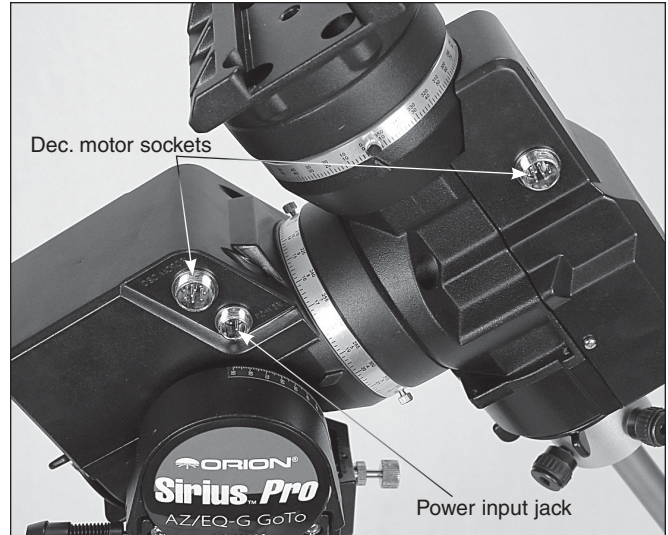
**HAND CONTROL:** This 8-pin RJ-45 jack is for connecting the coil cable of the SynScan hand controller.

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

**SNAP:** These two 2.5mm stereo jacks allow connection to two cameras' shutter control ports. The SynScan hand controller



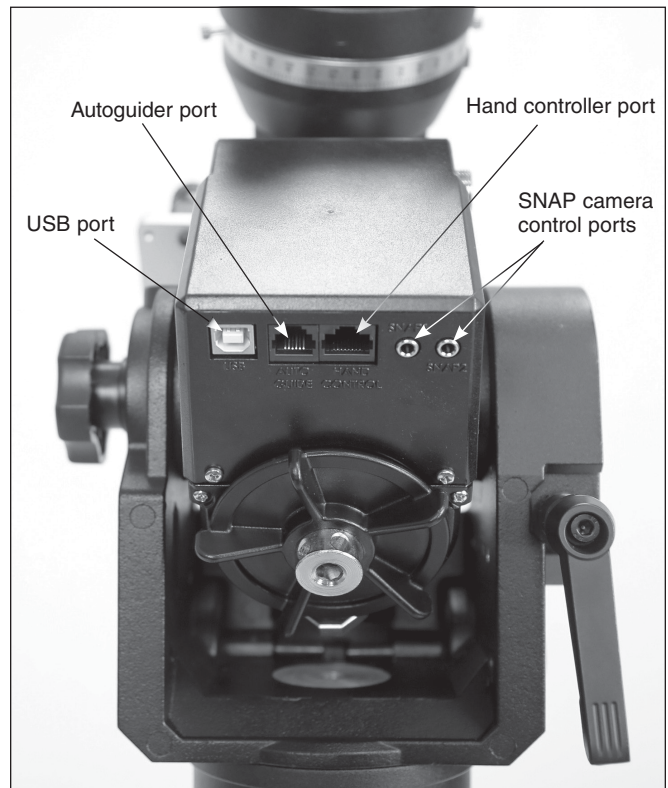
**Figure 19.** Use the vertical-adjustment knobs on the secondary saddle to point the secondary telescope to the same vertical level as the main telescope.



**Figure 21.** The power input jack and declination motor cable sockets are located on the right side of the mount head.



**Figure 20.** The mount is ready for installation of two telescopes.



**Figure 22.** The main drive panel interface.

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can control the cameras to take pictures automatically via this interface. The camera control cable included with the Sirius Pro mount is compatible with select Canon EOS series DSLR cameras. It has a right-angle 2.5mm stereo plug on one end for connection to the drive panel and a straight 2.5mm plug on the other end for connection to the camera. Cables for other cameras can be sourced optionally or custom made.

**USB Port:** The USB port connects to an internal USB-to-serial device (baud rate 115200 bps). It can be used to control the mount directly from a host PC, or to update the motor controller firmware.

**ON/OFF Switch:** Located on the left side of the mount head, this switch turns power to the mount and hand controller on and off (**Figure 6B**).

**Power LED:** The power LED on the ON/OFF switch 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.

**Intermittent single flash:** The PPEC training routine has been triggered, but the controller board in the mount has not received the worm index signal and the PE correction recording has not started yet.

**Intermittent double flash:** The PPEC training routine has been started and the controller board in the mount has received the worm index signal and started to record the PE correction. When the intermittent double flash stops, it means the PPEC training has finished.

**Intermittent triple flash:** Sidereal tracking with PEC is now enabled.

**Dec Motor Sockets:** These two sockets are used to connect, via included cable, the Dec. motor unit to the main drive housing (**Figure 21**).

## 5.2 Pinout of the Interfaces

Refer to **Figure 23** on the next page,

**Note:**

- The SNAP port provides two trigger signals to the stereo plug. For a camera that only needs a shutter-release signal, either trigger signal will work. For a camera that requires an extra “focus” signal, both signals should be connected properly.
- The camera control cable included with the Sirius Pro AZ/EQ-G mount is compatible with select Canon EOS series DSLR cameras. Cables for other cameras are optional and can be purchased separately from a dealer.

## 5.3 Attaching the SynScan GoTo Hand Controller

The coil cable for the SynScan hand controller has RJ-45 connectors on each end. Plug one connector into the Hand Control port of the drive panel and the other connector into the

RJ-45 port on the bottom of the SynScan controller. Push the connector into the port until it clicks into place.

The smaller modular port next to the RJ-45 port on the hand controller enables serial communication between the Sirius Pro mount and a computer running astronomy software such as Starry Night Pro. For that you will need the RS-232 computer interface cable that was included with the mount. If your computer does not have an RS-232 port, you will also need a USB-to-serial adapter. Check telescope.com for an available adapter.

As mentioned in Section 5.1, however, the mount also has an integrated USB port for direct connection of the mount head to a computer. If you use this method you would not connect the computer to the SynScan hand controller.

## 5.4 Power Supply Requirements

The Sirius Pro AZ/EQ-G should be powered by a 12V DC or AC-to-DC power supply with a **3-amp** or higher output current rating.

- Output Voltage: DC 11V (minimum) to DC 16V (maximum). Voltage not in this range could cause permanent damage to the motor controller board or the hand controller.
- Output Current: 3A for power supply with 11V output voltage, 2A for power supply with 16V output voltage.
- Do not use an unregulated AC-to-DC adapter. When choosing an AC adapter, it is recommended to use a switching power supply with 15V output voltage and at least 2A output current.
- If the power voltage is too low, the motor controller will automatically stop the motors.

# PART 6: OTHER SIRIUS PRO AZ/EQ-G FEATURES

## 6.1 Auxiliary Encoder Function

The Sirius Pro mount is equipped with auxiliary encoders on both the R.A. axis and Dec. axis. These enable the mount to continue tracking even when a user unlocks the clutches and manually rotates the mount in R.A. and Dec. With this feature, you can manually operate the mount any time without worrying about losing the mount’s GoTo alignment status. When you want to operate the mount with the SynScan hand controller again, no re-alignment is required; all that is needed is to re-lock the clutches. This feature can be enabled or disabled in the SynScan hand controller.

## 6.2 Permanent Periodic Error Correction

The Sirius Pro mount is equipped with an index on its R.A. worm, thus the motor controller can keep tracking the current position of the worm. After a proper PEC training routine, in which the training data is stored in the motor controller permanently, a user can start the periodic error correction (PEC) at any time to improve the tracking performance for astrophotography. A training process is not required in the next observing session (assuming that the polar alignment is always accu-

rate), thus this is a Permanent Period Error Correction (PPEC). A user can train the mount by guiding either manually or electronically with autoguiding. For detailed instructions, please refer to the relevant section in the SynScan hand controller instruction manual.

### 6.3 Batch Exposure Function

The Sirius Pro mount is equipped with two SNAP ports that can control the shutter of two DSLR cameras (see Figure 22). Working with the SynScan hand controller's "Camera Control" function, you can set the number of exposures, exposure duration, and time between exposures for up to eight different sets of exposures. For detailed information, refer to the SynScan hand controller instruction manual.

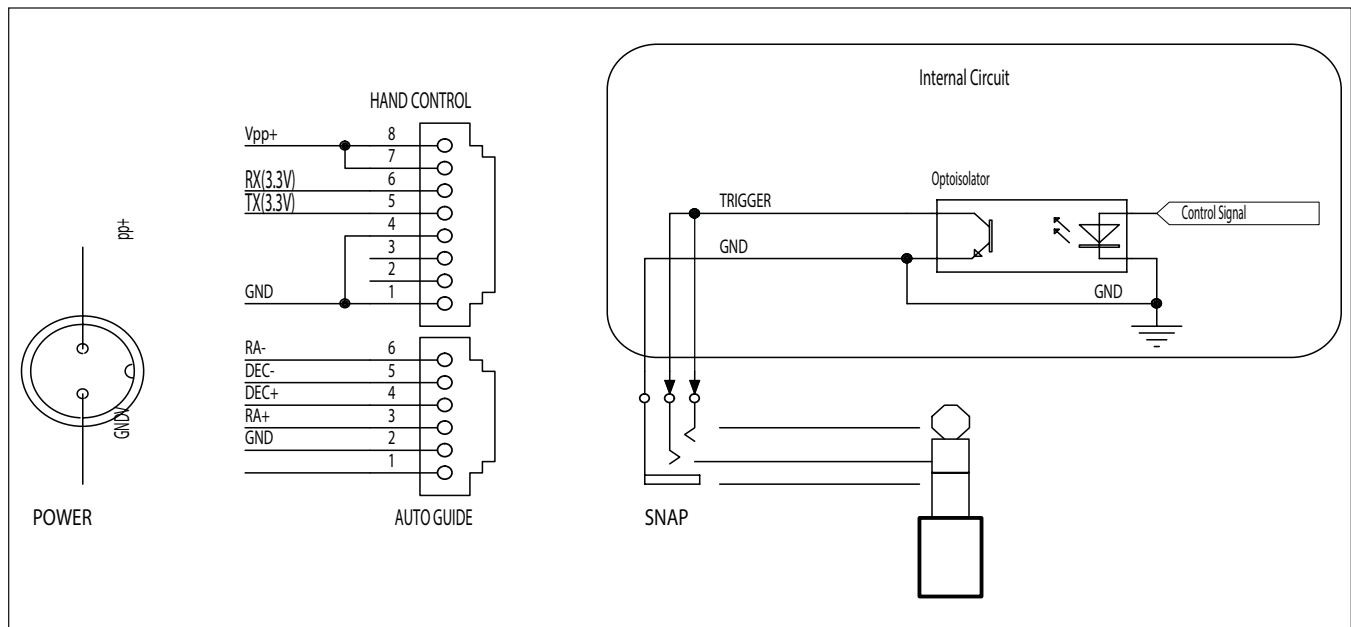
## SUGGESTED ACCESSORIES

We also suggest these optional accessories (sold separately):

**Pier Extension:** Ideal for use with long-tube refractor telescopes and some Cassegrains -- and for tall people! -- the optional 6.3" Pier Extension is a must-have. It raises the focuser and eyepiece of attached telescopes to a more convenient height for some configurations. Instructions and hardware included.



**Polar Scope:** For optimal tracking and GoTo performance the Sirius Pro AZ/EQ-G can be polar-aligned with a software-assisted polar alignment routine that doesn't require a polar alignment scope. But for those who prefer using a polar scope, the optional Orion Illuminated Polar Scope for Sirius Pro Mount is available. It's an externally mounted, "dual-hemisphere" polar scope, meaning it can be used for polar alignment in both northern and southern hemispheres. Instructions included.



**Figure 23.** Schematic diagram of the drive panel port circuitry.

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## SPECIFICATIONS

Product name	Sirius Pro AZ/EQ-G Mount
Mount type	German equatorial / altazimuth dual mode
Payload (Counterwts. excl.)	33 lbs. (15kg) (66 lbs. in two-telescope altaz mode)
Saddle type	Vixen style, dual bolt clamps
Latitude adjustment range	0 - 90°
Azimuth adjustment range	About ±15°
Counterweight	7.5 lbs. (~3.5kg) each (x2)
Pier Tripod	1.75-inch stainless steel legs, 12.8 lbs. (5.8kg)
Counterweight shaft	18mm Diameter, length 165mm (retractable) + 120mm extension
Power requirement	DC11~16V 3A
Motors	1.8° Hybrid stepper motor
Transmission	135:1 Worm drive + 72:12 timing belt drive + 32 micro-step/1.8° stepper motor drive
Gear ratio	810
Resolution	5,184,000 Counts/rev., 0.25 arc-second
Maximum slewing speed	4.2 degrees/second
Tracking rates	Sidereal, solar, lunar
Tracking modes	Altazimuth or Equatorial mode
Autoguiding speeds	0.125X, 0.25X, 0.5X, 0.75X, 1X
PEC	1200 segments permanent PEC
Hand controller	SynScan
Database	42,000+ objects
Celestial object catalogs	Messier, NGC, IC, SAO, Caldwell, Double Star, Variable star, Named stars, Planets
Pointing accuracy	Up to 5 arc-minutes (RMS)
Resolution of aux. R.A./Dec. axis encoders	5144 Counts/rev., approx. 4.2 arc-minutes
Bubble level	Built-in to mount
Weight (Tripod excluded)	17 lbs. (7.7kg)
Weight, fully assembled	44.5 lbs. (20.2kg) (EQ mode, two counterweights)
Saddle height range	41" to 48.7"
Length of pier-pod, collapsed	
- with AZ/EQ head	28"
- w/o AZ/EQ head	25"
Pier extension	Optional (6.3" height)
Polar scope	Optional, external mount, worldwide use



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## **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](http://www.OrionTelescopes.com/warranty).

### **Orion® Telescopes & Binoculars**

Corporate Offices: 89 Hanger Way, Watsonville CA 95076 - USA

Customer Support: [www.OrionTelescopes.com/contactus](http://www.OrionTelescopes.com/contactus)

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