Vixen

Instruction Manual for
AP Equatorial Mount / AP-SM Equatorial Mount / AP Photo Guider

PREFACE

Thank you for purchasing this product from the Vixen AP series of equatorial mounts and an AP equatorial platform. This instruction manual is prepared in common with the AP series of the equatorial mounts including the AP-SM equatorial mount and AP Photo Guider. You may occasionally find descriptions in the texts that are not concerned with your model. The manual mostly explains the usage of the AP-SM mount with STAR BOOK ONE as an example. Please read the instructions thoroughly to make you use the product correctly and safely.

This equipment has been tested and found to conform with the limits for a Class B digital device, according to Part 15 of the FCC rules.

SAFETY PRECAUTIONS

This instruction manual assists you in using the AP Mount correctly and safely. Before using the mount, carefully read the safety precautions described below.

Legend	
⚠ Warning	If misused, it can cause you severe injury or death.
⚠ Caution	Misuse can cause injury or damage to you or other property.
⃠ Important	You must complete all of the steps in this manual.
ⓘ Direction	You must follow the instructions in this manual.

⚠ WARNING!

⃠ Never look directly at the sun with your naked eyes or through your telescope and finder scope. Permanent and irreversible eye damage may result.

⃠ Do not leave the optical tube uncapped during the daytime. Sunlight passing through the telescope or finder scope may cause a fire.

⃠ Do not use the product in a wet environment. This could damage the mount and result in electrical shock or a fire.

⃠ Do not attempt to disassemble or alter any part of the equipment not expressly described in this manual. This could damage the mount, result in electrical shock, a fire, or lead to an injury.

ⓘ Keep small caps, plastic bags, or packing materials away from children. These may cause choking or suffocation.

ⓘ Stop operating the product immediately and unplug the power cord if it emits smoke or a strange smell. This could result in fire or electrical shock. Confirm that it is safe and consult your local Vixen dealer or distributor in your country.

ⓘ Do not allow liquids or foreign objects to enter the product. Unplug the power cord or switch the power off. This could result in fire or electrical shock.

ⓘ Do not damage, alter, or place a heavy item on the power cord. This could result in fire or electrical shock.

ⓘ The product includes heavy items such as the counterweight and the mount body. Be sure to handle these units carefully. Be careful not to drop the unit when handling it. This may cause damage or lead to injury.

ⓘ Be sure to ventilate the air while cleaning with a volatile or spray can-cleaner to avoid poisoning.

ⓘ Do not use the volatile cleaner or spray can-cleaner near fire. This could lead to catching fire.

⃠ CAUTION

⃠ Do not operate the product with wet hands. Plugging in and out the power cord, electricity connectors and operating the electronic parts with wet hands may cause damage to the equipment or resulting in electrical shock.

⃠ Do not use the product while traveling or walking, as injuries may arise from stumbling, falling or collision with objects.

⃠ Do not bundle the power cord and electricity wires during the operation. This may result in a short circuit and damage to the surroundings.

ⓘ Handle the power cord and electricity connectors properly. Do not pull the power cord by force when disconnecting. This may damage the cord and connectors, resulting in fire or electrical shock.

HANDLING AND STORAGE

⃠ Do not leave the product inside a car in bright sunshine or hot places. Keep any strong heat radiation sources away from the product.

⃠ When cleaning, do not use solvents such as paint thinners. It may cause deterioration.

⃠ Do not use the product in a wet environment. This may cause the product to malfunction or may result in fire or electrical shock.

ⓘ For storage do not expose it to direct sunlight and keep it in a dry place.

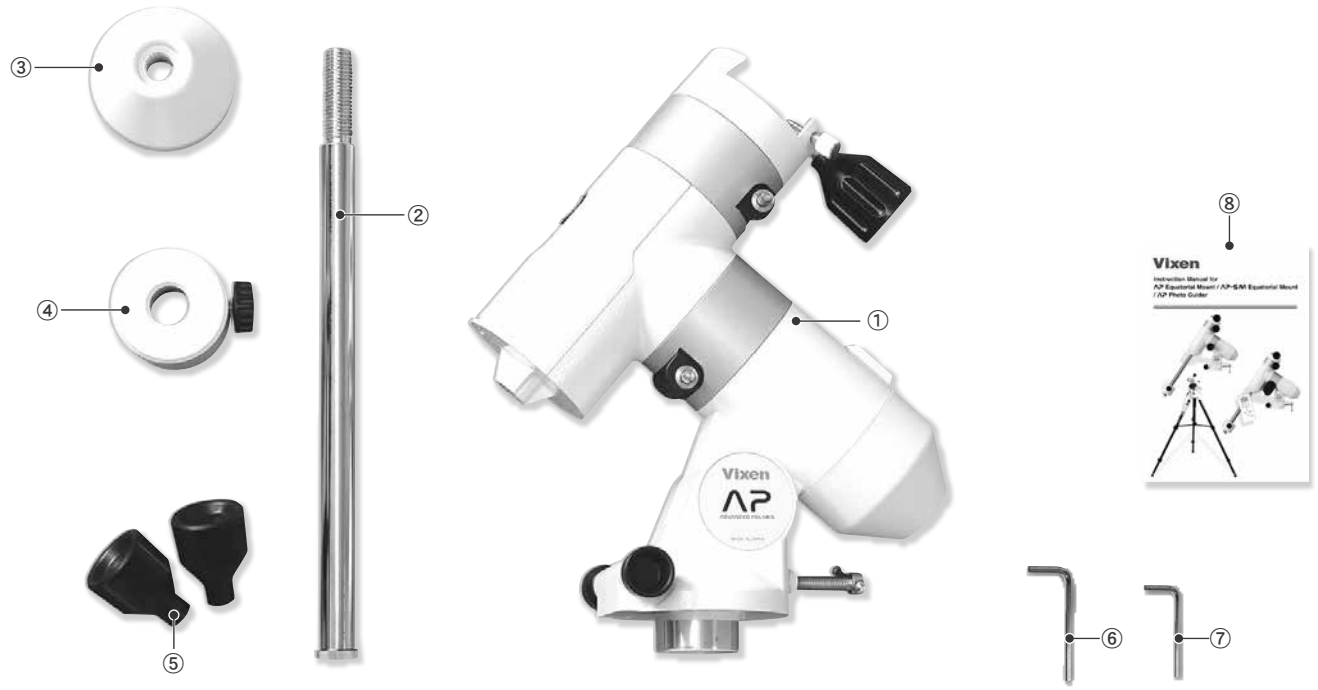
ⓘ Do not expose the product to rain, water drops, dirt, or sand. Gently wipe the product with a damp cloth for cleaning.

TABLE OF CONTENTS

BEFORE USE

Check the Package Contents — AP Mount

The AP equatorial mount contains the items listed below. Check if all the items are included.



Package consisting of:

① AP Equatorial Mount (Main body)	1
② Counterweight Bar	1
③ Vanity Ring for Counterweight Bar	1
④ Counterweight 1.0kg	1
⑤ Slow Motion Control Knob	2
⑥ Allen Wrench of 4mm on a side	1
⑦ Allen Wrench of 3mm on a side	1
⑧ AP Mount Instruction Manual (This book)	1

Note :
The contents of your AP mount package may differ when you purchase it as a complete AP telescope package.

Basics of the Equatorial Mounts

What is an Equatorial Mount?

In the northern hemisphere, stars appear to turn around the polar star (the north celestial pole) making approximately one rotation per day. This is called diurnal motion and occurs because the Earth turns on its axis once a day. The equatorial mount is a platform designed to rotate parallel to the Earth's rotational axis.

Basic Motion of the AP Equatorial Mount

The AP equatorial mount goes and stops with friction in the direction of right ascension (R.A) and declination (DEC). Slew the telescope by hand to change the telescope's pointing direction largely. The AP-SM mount comes equipped with a drive motor on the R.A. axis and a manual slow-motion control knob on the DEC axis.

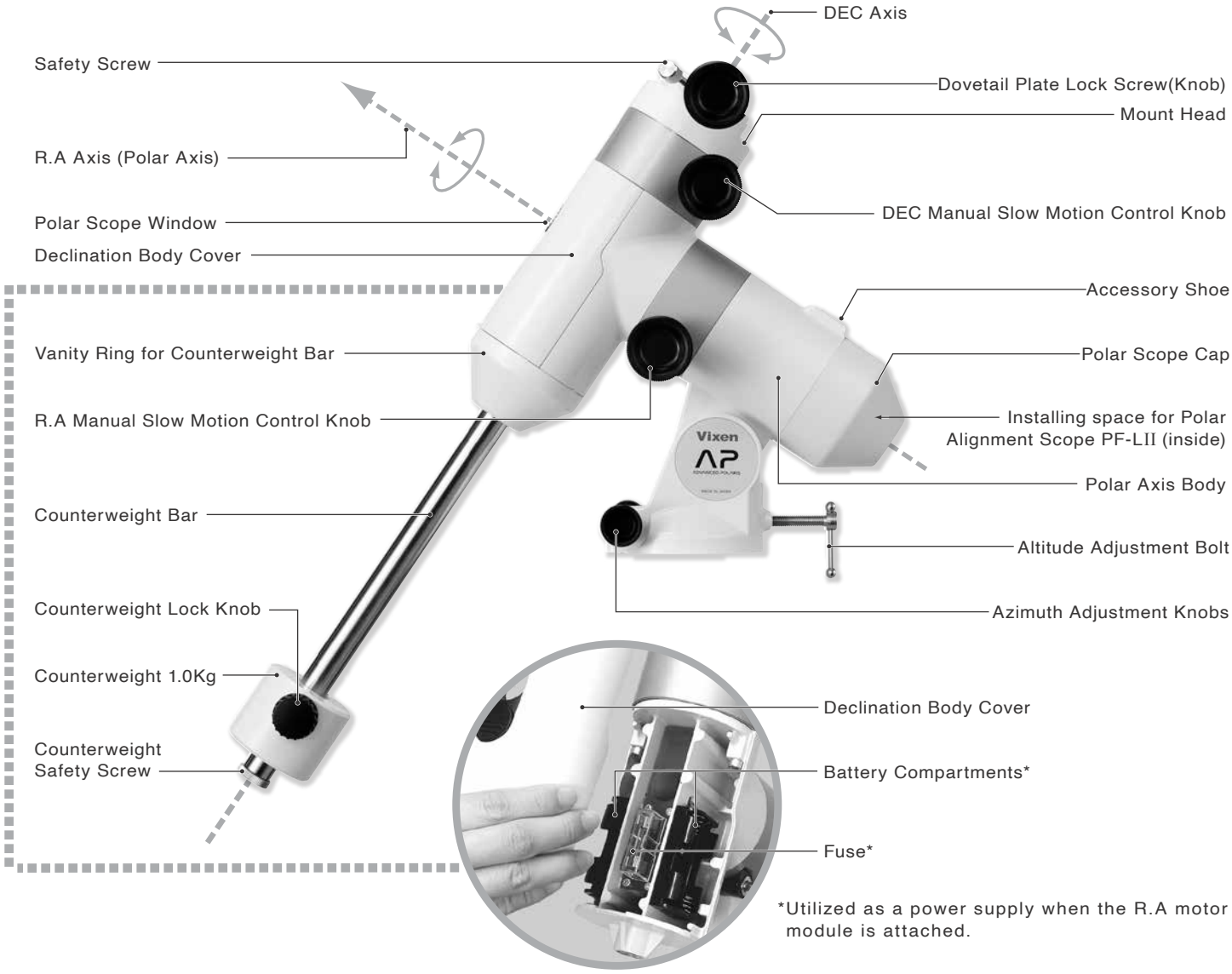
The AP-SM equatorial mount will achieve smooth movements once the rotational axes are balanced correctly on the mount.

An unbalanced equatorial mount may cause vibration and result in a slip of the friction stop mechanism. Ensure the telescope is well-balanced after your accessory has been attached to it.

Be careful not to bang any part of the mount against other objects. This could damage the gears and bearings.

BEFORE USE

Name of Each Component — AP Mount



*Utilized as a power supply when the R.A motor module is attached.

Mount Specifications

Mount	AP equatorial mount
Slow Motion Control	R.A: Wheel and worm gears full circle micro movement DEC: Wheel and worm gears full circle micro movement
Quick Slewing Motion	Friction stop motion (adjustable)
Wheel Gear	R.A: 73.5mm in diameter, 144-tooth wheel gear / DEC:58.4mm in diameter, 144-tooth wheel gear
Worm Gear	R.A :11.0mm in diameter, Brass / DEC:9.8mm in diameter, Brass
R.A Axis	59mm in diameter, Aluminum alloy, with friction stop mechanism
DEC Axis	59mm in diameter, Aluminum alloy, with friction stop mechanism
Number of Bearings	7 pieces
Counterweight Bar	20mm diameter, Steel
Polar Alignment Scope	Optional
Azimuth Adjustment	Fine adjustment range: +/- 6.5 degrees, 1.4 degrees per rotation, Twin adjustment screws with knobs
Altitude Adjustment	Latitude adjustment range: 0 degree to 65 degrees, Tangent screw with handle, 1.9 degrees per rotation
Maximum Loading Weight	6kg (13.2lbs)(150kg • cm torque load) at a point of 25cm from the fulcrum
Fuse	125V 1A Class B (PSE standard), 6mm dia x 30mm long
Dimensions	263 x 302 x 96mm (10.3” x 11” x 3.7”)
Weight	3.6kg (8 lbs) without counterweight
Counterweight	1.0kg (2.2 lbs)
Optional Accessories	R.A motor module and STAR BOOK ONE Set, DEC motor module, APP-TL130 tripod, Polar alignment scope PF-LII, Polar Meter

The specifications are subject to change without notice.

BEFORE USE

Check the Package Contents — AP Photo Guider

The AP Photo Guider package contains the items listed below. Check if all the items are included.

Package consisting of:

① AP Photo Guider Equatorial Platform	1
② Dovetail Slide Bar PG	1
③ STAR BOOK ONE Controller	1
④ STAR BOOK Cable (for SBT)	1
⑤ Strap for STAR BOOK ONE	1
⑥ APP-TL130 Tripod	1
⑦ Allen Wrench of 5mm on a side	1
⑧ Allen Wrench of 4mm on a side	1
⑨ Allen Wrench of 3mm on a side	1
⑩ AP Photo Guider Instruction Manual (This book)	1

Note 1: Power supply is not included.

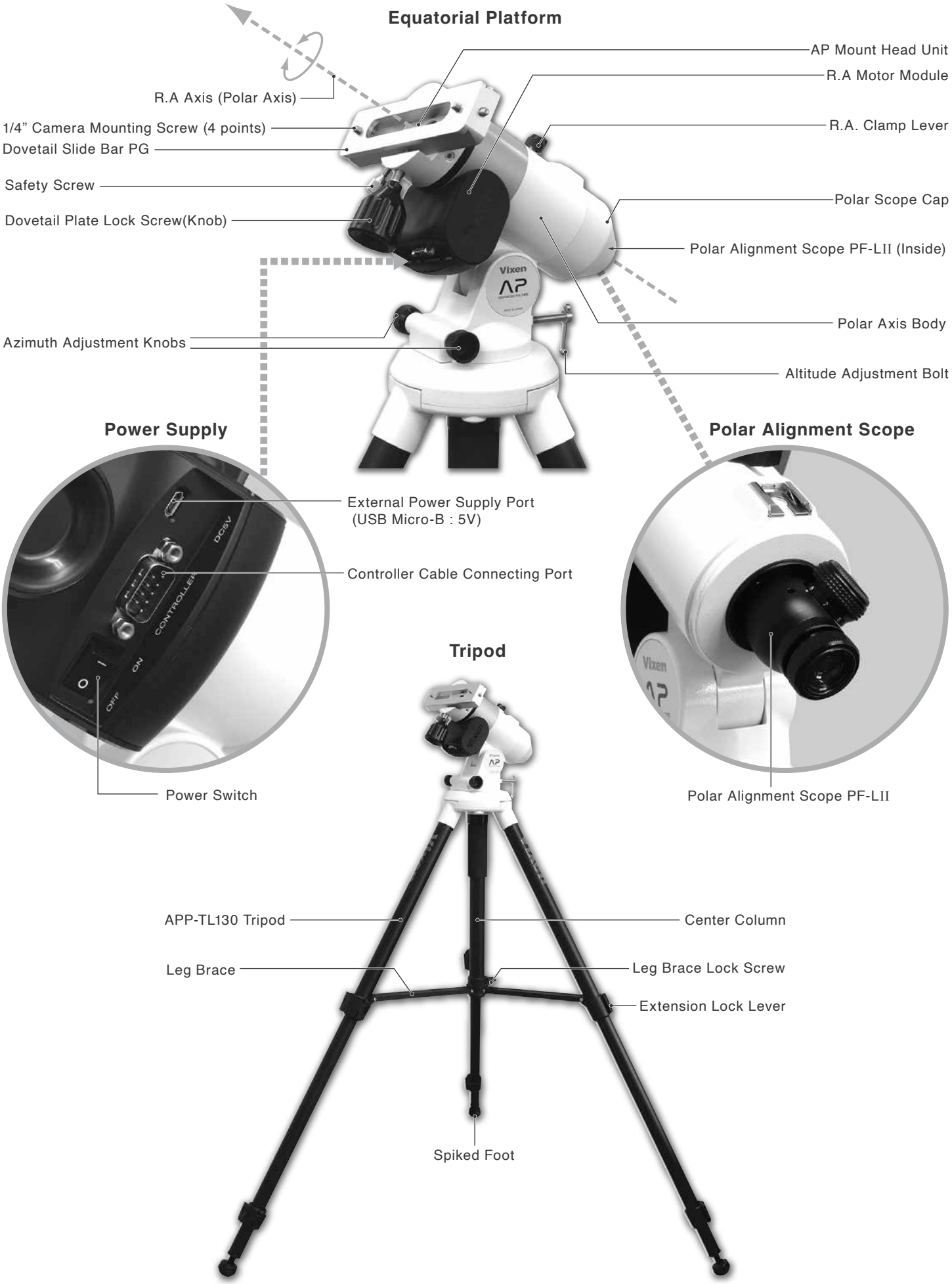
Note 2: Use a commercially available USB external power supply.

For AP Photo Guider with Single-axis drive unit (Standard): USB external battery of at least 0.5 ampere is required (applicable to USB Micro-B connector).

For AP Photo Guider with Dual-axis drive unit (Optional): USB external battery of at least 1.0 ampere is required (in conformity to DCP and applicable to USB Micro-B connector).

The DCP (Dedicated Charging Port) is a regulation of USB external power supply which is stipulated in USB Battery Charging Specification, Rev 1.1. It is used for USB batteries and USB AC Adapters.

Name of Each Component: AP Photo Guider



Mount Specifications — AP Photo Guider

Mount	AP Photo Guider mount
Slow Motion Control	R.A: Wheel and worm gears full circle micro movement
Quick Slewing Motion	Friction stop motion (adjustable)
Wheel Gear	R.A: 73.5mm in diameter, 144-tooth wheel gear
Worm Gear	R.A :11.0mm in diameter, Brass
R.A Axis	59mm in diameter, Aluminum alloy, with friction stop mechanism
Number of Bearings	4 pieces
Polar Alignment Scope	5x20mm (Field of view: 10 degrees), Self-light-off dark field illuminator (Brightness adjustable), Setting accuracy: 3 arc minutes or less, Reticle with scales for pointing 3 stars, Battery: CR2032
Azimuth Adjustment	Fine adjustment range: +/- 6.5 degrees, 1.4 degrees per rotation, Twin adjustment screws with knobs
Altitude Adjustment	Latitude adjustment range: 0 degree to 65 degrees, Tangent screw with handle, 1.9 degrees per rotation
Motor Drive	Pulse (Stepping) Motor
Tracking	High precision tracking with STAR BOOK ONE controller
Maximum Loading Weight	6kg (13.2 lbs) (150kg・cm torque load) at a point of 25cm from the fulcrum
Controller Cable Connecting Port	D-SUB 9PIN male plug
Power Supply Port	USB Micro-B (DC4.4 to 5.26V)
Power Supply	USB External battery pack (Not sold by Vixen)
Working Duration with Batteries	About 4 hours (at 20 degree C, with Alkaline batteries, 6kg loading weight), 2.5 hours if the DEC motor module is used together.
Electricity Consumption	DC5V・0.2～0.5A (1.0～2.5W) , 0.3～1.0A (1.5～5.0W) if the DEC motor module is used together.
Dimensions	222 x 221x 96mm (8.7” x 8.7” x 3.7”)
Weight	2.4kg (5.3 lbs) (5.4kg (12 lbs) complete with tripod)
Optional Accessories	Supplementary Counterweight Bar, Counterweight 1.0kg, Polar Meter

Controller Specifications

Controller	STAR BOOK ONE
CPU	32-bit CISC Processor 40MHz RX210
LCD Screen	2-line 8-chracter STN with backlight
Autoguider Port	6-pole 6-wired modular jack (for external autoguider)
Controller Cable Port	D-SUB 9PIN male plug
Power Supply	Supplied from the mount side
Operating Temperature	Between 0 degree C and 40 degree C (104 F)
Dimensions	137 x 65 x 21mm (5.4” x 2.5” x 1”)
Weight	110g (4 oz) (without cable)
Menus and Major Functions	Sidereal tracking rate (variable from 0.1X to 10X by step), Solar tracking, Lunar tracking and Kings rates, Backlash compensation, PEC, External autoguider connection, Adjustable LED backlight, Red LED Light

The specifications are subject to change without notice.

BEFORE USE

Check the Package Contents — AP-SM Mount

The AP-SM equatorial mount package contains the items listed below. Check if all the items are included.

Package consisting of:

① AP-SM Equatorial Mount (Main body)	1
② AP Counterweight Bar	1
③ Vanity Ring for Counterweight Bar	1
④ Counterweight 1.0kg	1
⑤ Slow Motion Control Knob	1
⑥ STAR BOOK ONE Controller	1
⑦ STAR BOOK Cable (for SBT)	1
⑧ Strap for STAR BOOK ONE	1
⑨ Allen Wrench of 4mm on a side	1
⑩ Allen Wrench of 3mm on a side	1
⑪ AP-SM Mount Instruction Manual (This book)	1

Note 1: The contents of your AP-SM mount package may differ when you purchase it as a complete AP-SM telescope package.

Note 2: The AP-SM packages do not contain an adapter for power supply. Use 4 x AA batteries (not included) or a commercially available USB external battery with USB Micro-B adapter.

Power Supply to AP-SM Mount:

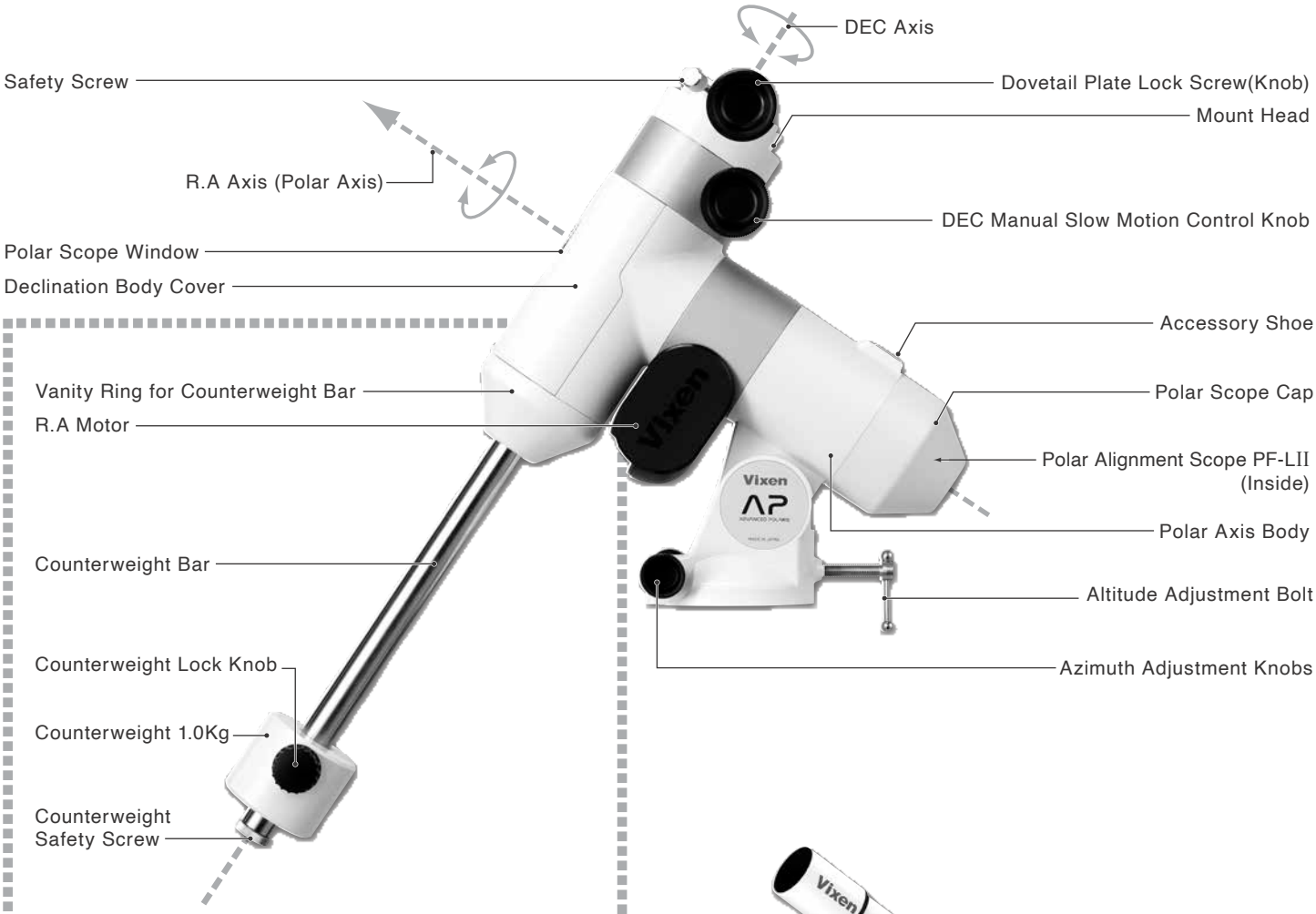
The USB external power supply battery of 0.5 amperes and more is needed.
A USB Micro-B adapter is required.

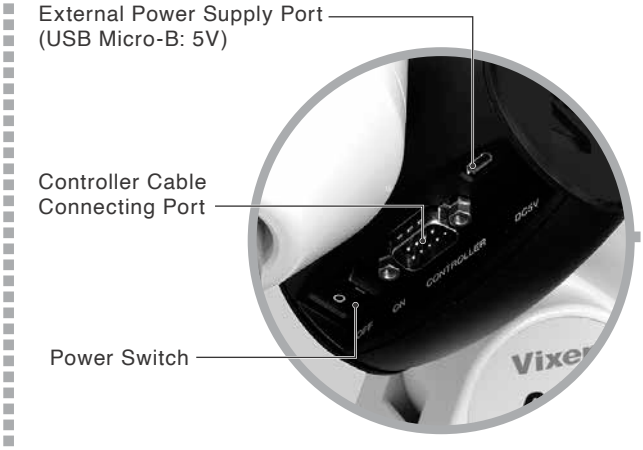
Power Supply to AP-SM Mount plus DEC Motor Module:

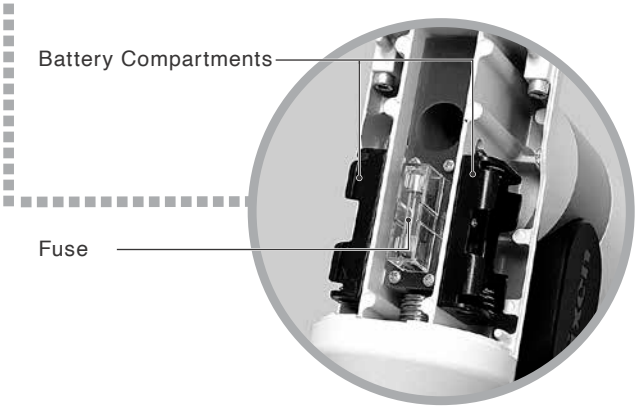
The USB external power supply battery of 1.0 ampere and more is needed.
A USB Micro-B adapter is required.
In the case of a power supply shortage, the DEC motor will stop with a blinking message that “Y motor stop”.

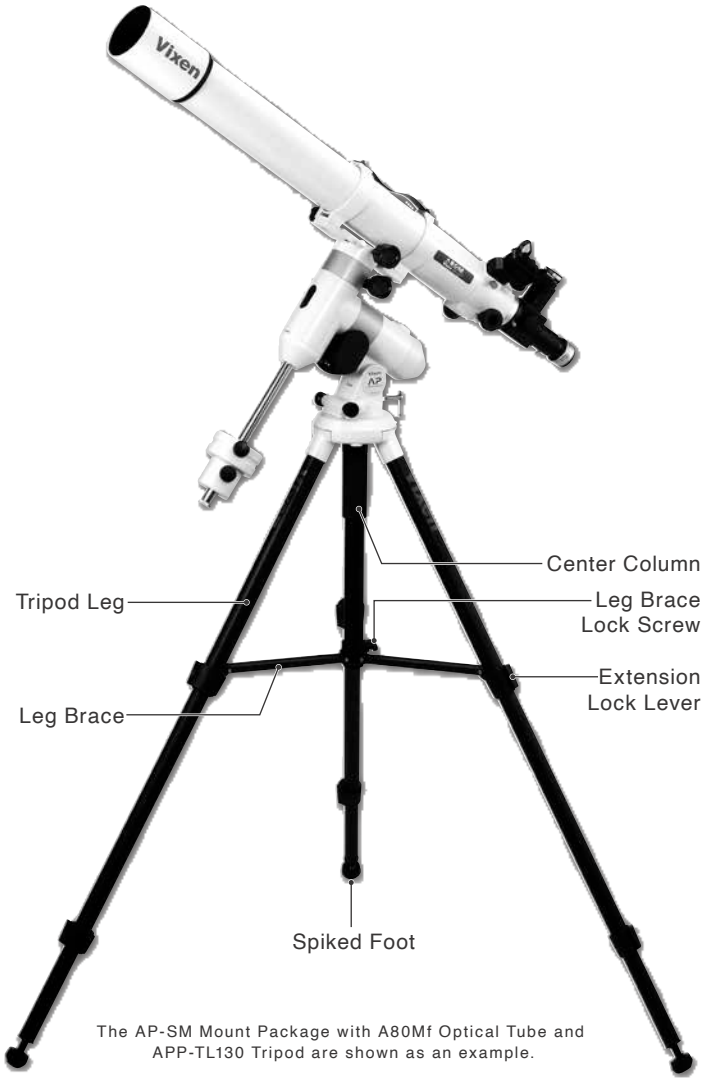
The USB external power supply battery in conformity to DCP (Dedicated Charging Port) of USB Battery Charging Specification, Rev 1.1 is necessary.

Name of Each Component: AP-SM Mount









The AP-SM Mount Package with A80Mf Optical Tube and APP-TL130 Tripod are shown as an example.

Mount Specifications — AP-SM Mount

Mount	AP-SM equatorial mount
Slow Motion Control	R.A: Wheel and worm gears full circle micro movement DEC: Wheel and worm gears full circle micro movement
Quick Slewing Motion	Friction stop motion (adjustable)
Wheel Gear	R.A: 73.5mm in diameter, 144-tooth wheel gear DEC:58.4mm in diameter, 144-tooth wheel gear
Worm Gear	R.A :11.0mm in diameter, Brass DEC:9.8mm in diameter, Brass
R.A Axis	59mm in diameter, Aluminum alloy, with friction stop mechanism
DEC Axis	59mm in diameter, Aluminum alloy, with friction stop mechanism
Number of Bearings	7 pieces
Counterweight Bar	20mm (8") diameter, Steel
Polar Alignment Scope	Optional
Azimuth Adjustment	Fine adjustment range: +/- 6.5 degrees, 1.4 degrees per rotation, Twin adjustment screws with knobs
Altitude Adjustment	Latitude adjustment range: 0 degree to 65 degrees, Tangent screw with handle, 1.9 degrees per rotation
Motor Drive	Pulse (Stepping) Motor
Tracking	High precision tracking with STAR BOOK ONE controller
Maximum Loading Weight	6kg (13.2 lbs) (150kg・cm torque load) at a point of 25cm from the fulcrum
Controller Cable Connecting Port	D-SUB 9PIN male plug
Power Supply Port	USB Micro-B (DC4.4 to 5.26V)
Power Supply	4 x AA batteries (Alkaline or Ni-MH, Ni-Cd rechargeable batteries), External USB battery pack (Not sold by Vixen)
Working Duration with Batteries	About 4 hours (at 20 degree C, with Alkaline batteries, 6kg loading weight), 2.5 hours if the DEC motor module is used together.
Electricity Consumption	DC5V・0.2～0.5A (1.0～2.5W) , 0.3～1.0A (1.5～5.0W) if the DEC motor module is used together.
Fuse	125V 1A Class B (PSE standard), 6mm dia x 30mm long
Dimensions	274 x 310 x 96mm (11" x 12" x 3.7")
Weight	3.9kg (8.5 lbs) without counterweight
Counterweight	1.0kg (2.2 lbs)
Optional Accessories	DEC motor module, APP-TL130 tripod, PG mount head unit, Polar alignment scope PF-LII, Polar Meter

Controller Specifications

Controller	STAR BOOK ONE
CPU	32-bit CISC Processor 40MHz RX210
LCD Screen	2-line 8-chracter STN with backlight
Autoguider Port	6-pole 6-wired modular jack (for external autoguider)
Controller Cable Port	D-SUB 9PIN male plug
Power Supply	Supplied from the mount side
Operating Temperature	Between 0 degree C and 40 degree C (104 F)
Dimensions	137 x 65 x 21mm (5.4" x 2.5" x 1")
Weight	110g (4 oz) (without cable)
Menus and Major Functions	Sidereal tracking rate (variable from 0.1X to 10X by step), Solar tracking, Lunar tracking and Kings rates, Backlash compensation, PEC, External autoguider connection, Adjustable LED backlight, Red LED Light

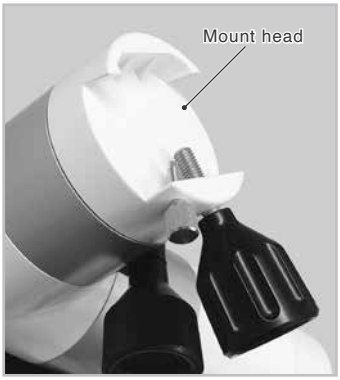
The specifications are subject to change without notice.

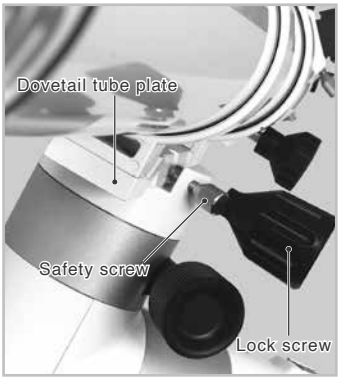
BEFORE USE

Mount Components Guide

Dovetail Mount Head

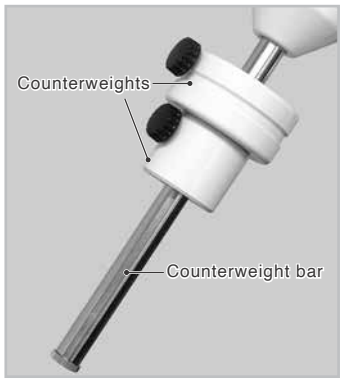
It is a mounting block with a recessed head to attach an optical tube with a dovetail tube plate (or dovetail slide bar). The optical tube can be fixed firmly with both the lock screw with a large grab knob and the safety screw. It allows for quick setting up and removing the optical tube.

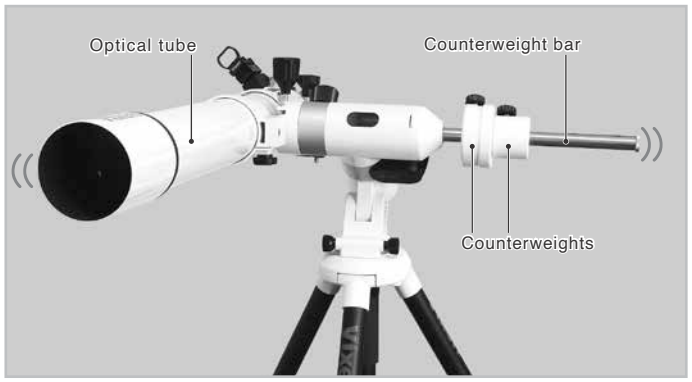




Counterweight Bar

The optical tube mounted on the equatorial mount has to be balanced with a counterweight to use the equatorial mount properly.



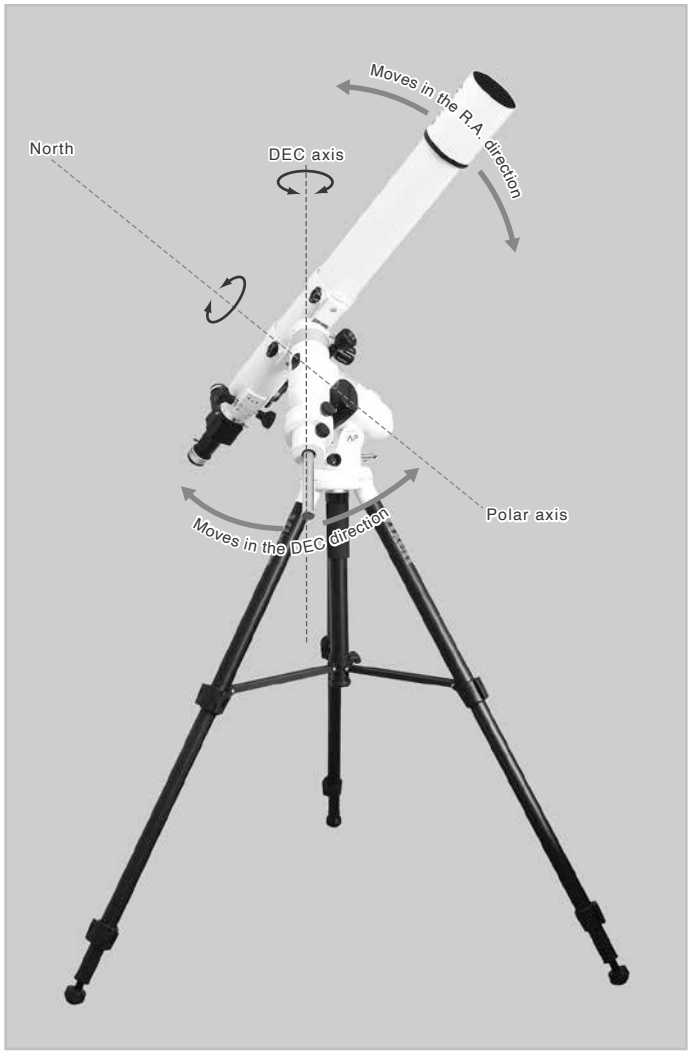


Right Ascension (R.A.)

If the AP mount is set to be aligned with one rotational axis parallel to the Earth's axis, the motion of R.A. will follow the motion of stars.

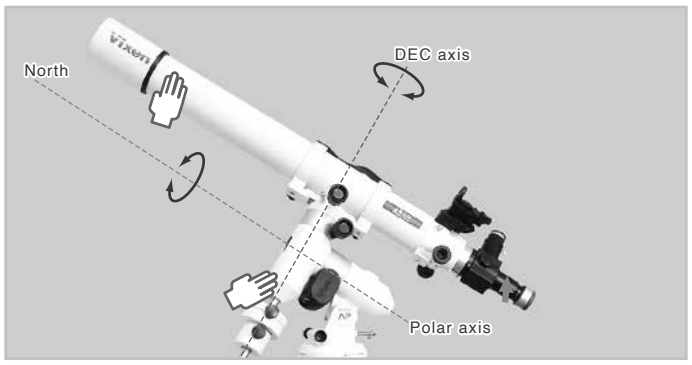
Declination(DEC)

When the AP mount is aligned with one rotational axis parallel to the earth's axis, the motion of DEC will be angled at 90 degrees from the motion of the R.A. You can point the telescope at a target in any direction in combination with the R.A. and DEC movements by unlocking the R.A. and DEC clamps.



Friction Stop Mechanism

The AP-WL mount employs a friction stop mechanism that makes you move the optical tube by hand to point it instantly to targeted celestial objects. The optical tube goes as you push it by hand and stops as you release the hand.



Altitude Adjustment Bolt (Used for Polar Alignment Only)

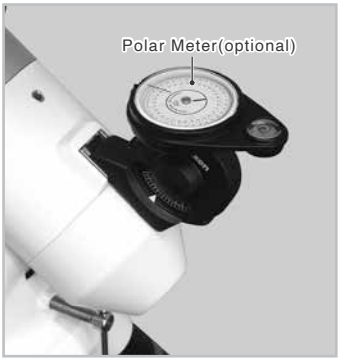
It is equipped to be used for polar alignment at the beginning of the setup for observation. It is to adjust the elevation of the polar axis so that the RA axis becomes parallel to the Earth's axis.

Azimuth Adjustment Knobs (Used for Polar Alignment Only)

It is for polar alignment at the beginning of the setup. It is to adjust the direction of the polar axis to be parallel to the Earth's axis. Unfastening one side of the azimuth adjustment knob will allow fastening the knob on the other side.

Accessory Shoe

It is used to attach a Polar Meter which is available optionally. It is possible to face the polar axis on your AP mount around the north direction even if Polaris is not visible by something hiding.

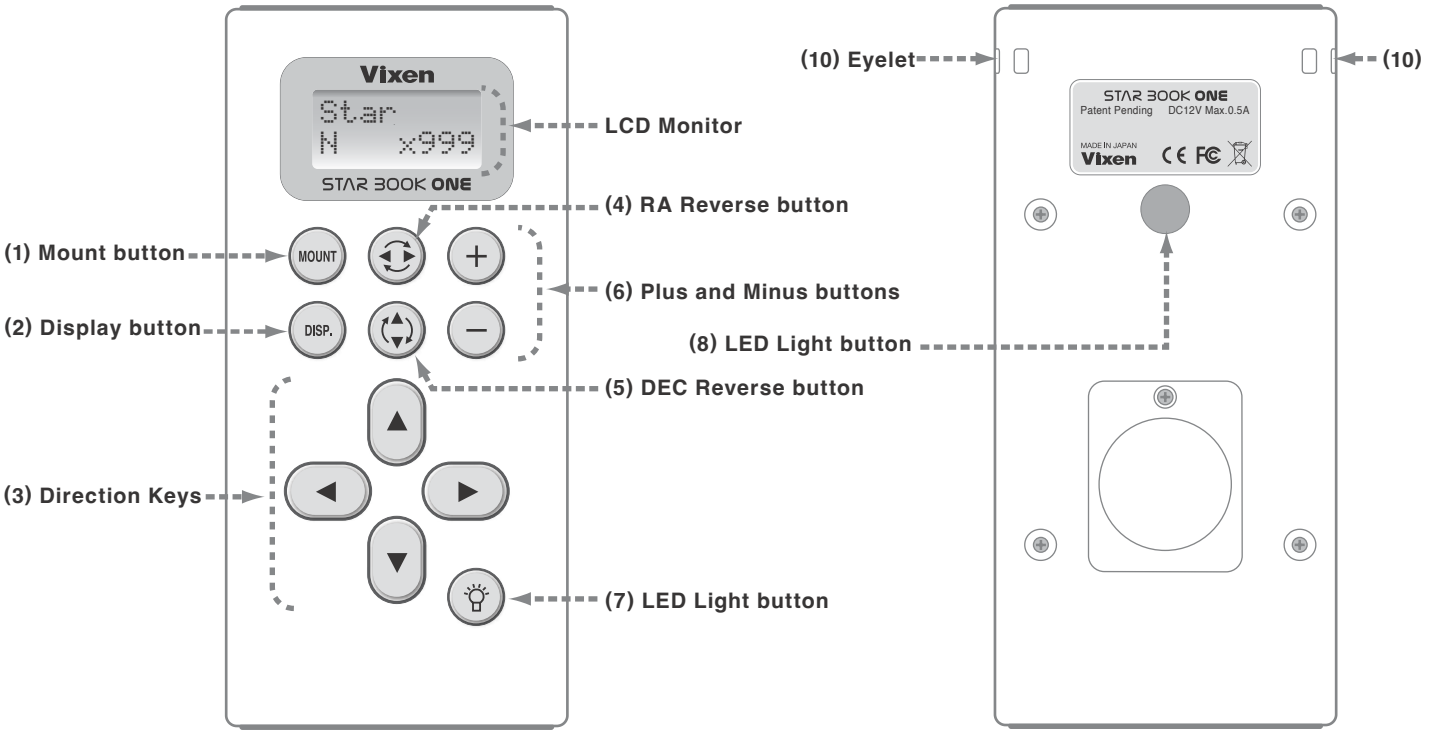


Power Supply Port

The AP-SM mount runs on self-contained four (4) AA–size batteries, or a USB external battery. A USB external battery with a USB micro-B adapter will be needed for long observing sessions.

STAR BOOK ONE Components Guide

Note: Usage of the STAR BOOK ONE is described as operating instructions for the AP-SM Mount here.



MOUNT	**(1) MOUNT button** Set up menus for the mount such as tracking mode and backlash compensation with the MOUNT button. Pressing the MOUNT button will turn up the brightness of the button itself and allow you to change the settings with the direction keys. Press the MOUNT button again to leave the menu and the brightness of the MOUNT button dims. The new setting is saved as you enter the new value. (Your recorded PEC data are for temporary use and not saved if you turn off the mount.)
DISP.	**(2) DISP. button** Set up menus for the controller such as language and backlight adjustments with the DISP. button. Pressing the DISP. button will turn up the brightness of the button itself and you are ready to change the settings with the direction keys. Press the DISP. button again to leave the menu and the brightness of the DISP. button dims. The new setting is saved as you enter the new value.
▲ ◀ ▶ ▼	**(3) Direction Keys** With these direction keys turn your telescope in the RA and DEC directions. Pressing any of the four direction keys will accelerate the motor speed toward the maximum value you selected. Then, that speed is maintained while the key is being pressed. The motor speed is decelerated if you stop pressing the key. The direction keys function for choosing menus and changing settings while the MOUNT or DISP. button lights brightly.
	(4) RA Reverse button Pressing the RA Reverse button will allow you to reverse the orientation of the right and left direction keys with the button brightening. Press the button again to return in the original direction and the button becomes dim.
	(5) DEC Reverse button Pressing the DEC Reverse button will allow you to reverse the orientation of the up and down direction keys with the button brightening. Press the button again to return in the original direction and the button becomes dim.

+ −	**(6) Plus (+) and Minus (-) buttons** Set up the maximum slewing speed of the telescope with these buttons when you use the direction keys. The Plus (+) and Minus (-) buttons function for choosing menus and changing settings while the MOUNT or DISP. button brightens.
	(7) LED Light button There is a built-in red LED light on the back of the STAR BOOK ONE. The red light is switched to ON or OFF alternatively each time the button is pressed shortly. The red light keeps brightness when you continue pressing the LED light button for more than one second and the light goes off as you release the button.

(8) LED Light button

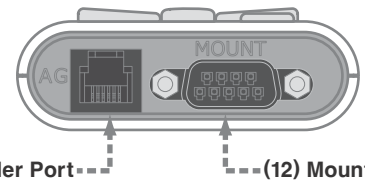
A 2-line (8 characters each line) information screen with an adjustable backlight.

(9) Red LED Light

The built-in red LED light on the back of the STAR BOOK ONE is useful to keep your eyes acclimated to darkness at an observation site when you want to avoid white light.

(10) Eyelet

The eyelet hole is for a strap. The eyelets are provided on either side of the controller.



(11) Autoguider Port

Compatible with the SBIG autoguider cable port. 6-pole 6-wired modular jack.

(12) Mount Connecting Port

A cable port to connect between the Mount and the STAR BOOK ONE. D-SUB9PIN.

PREPARATION

Assembling the Mount

Refer to the instruction manual of your telescope and accessory together with this manual when you attach the optical tube assembly to the mount.

There may be items listed that are not included in the case that you purchased the AP mount alone, or depending on the contents of your purchasing telescope set.

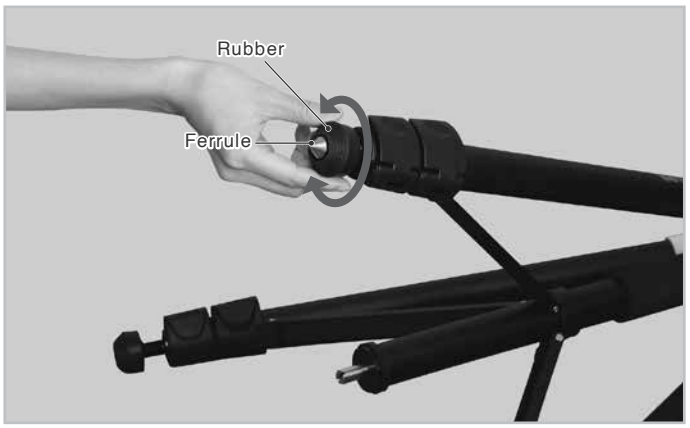
The unit includes heavy items. Be careful not to drop them when assembling as it could seriously damage the equipment or lead to injury.

Be careful not to pinch your finger with moveable pieces when setting up.

Setting up the Tripod

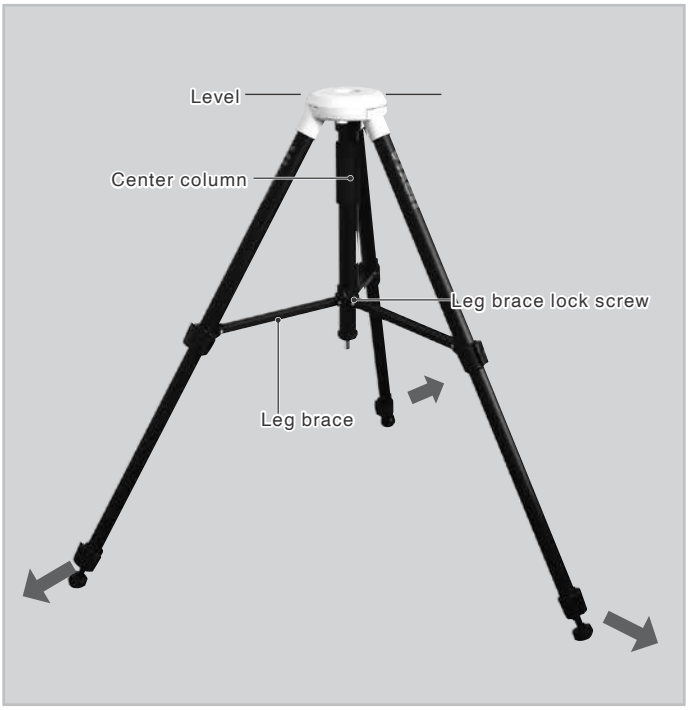
1 Place the tripod on level ground to keep the telescope stable during observation. There is a spike with rubber protection on the tip of each tripod leg. Turning the rubber protection will cover or uncover the spike. Use it according to the ground conditions where you will place the tripod.

2 Unfasten the extension lock levers on the tripod legs by pulling those out so that the tripod legs can be adjusted. To secure stability extend the upper section of the tripod legs first.



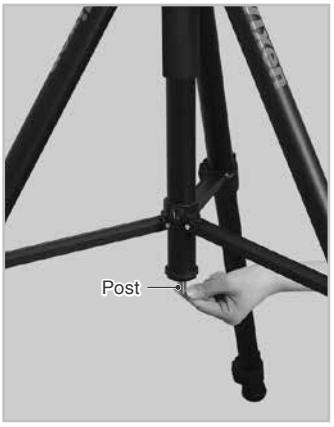
3 Pull out the tripod legs until each leg comes to your necessary length.

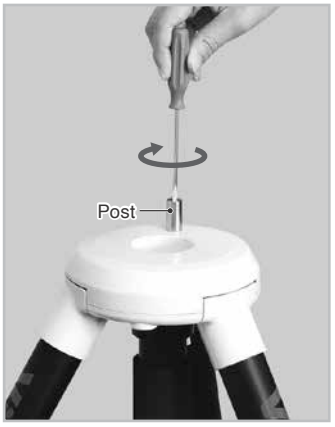
4 Loosen the stopper screw in the center of the leg bracket and pull apart the legs. Don't expand the leg bracket fully at this stage because you will turn the center column later.



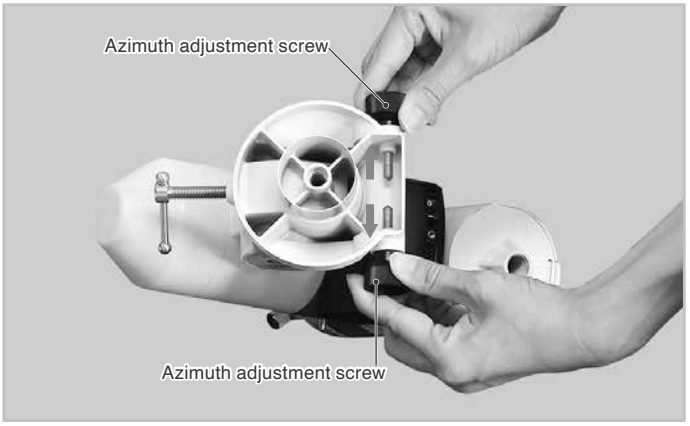
5 Attach the metal post on the tripod head. The metal post is underneath the center column. Be sure to screw down the metal post completely

.

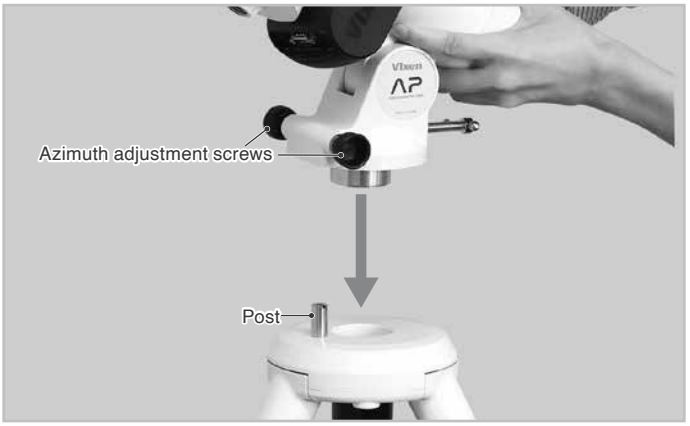




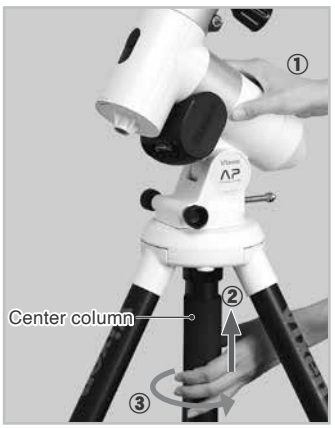
6 Loosen the azimuth adjustment screws in advance by turning the azimuth adjustment knobs on the mount base so that a space is opened for the metal post between the screws.



7 Position the mount so that the two azimuth adjustment screws come above the metal post. Place the mount on the tripod head so that the center projection on the bottom fits the center hollow on the tripod head.

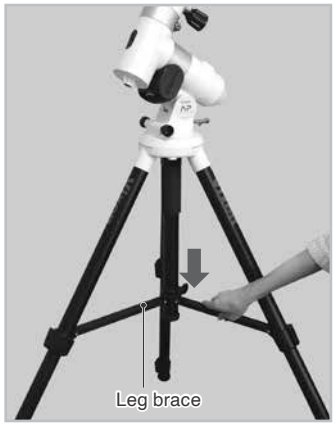


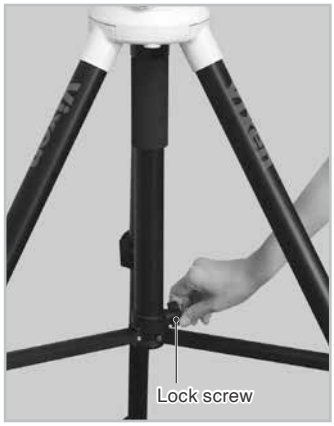
8 Hold the mount with one hand and raise the center column with another hand so that its top is screwed into the bottom of the mount. Turn the center column counter-clockwise to screw the top of the column into the mount's bottom until fastened to each other.



9 Tighten the azimuth adjustment knobs on the mount base so that the two knobs are set equally.

10 Push down the leg bracket until it clicks to enforce the tripod's stability. Tighten the leg brace lock screw securely.

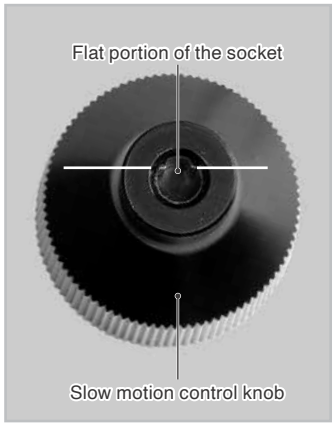


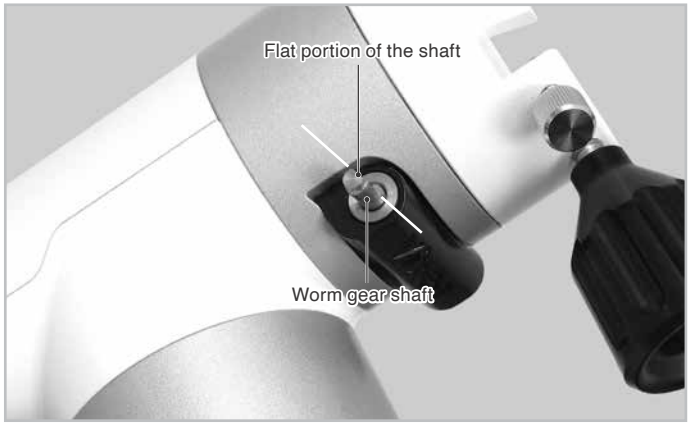


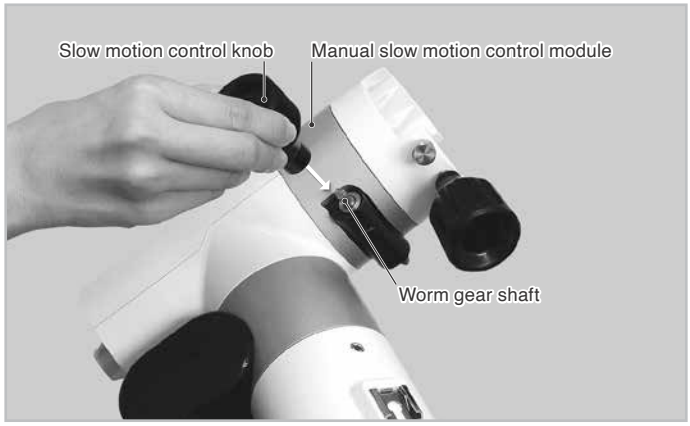
11 Repeat the above procedure when you change the tripod's height.

12 Attach the Slow Motion Control Knobs

The slow-motion control knob is attached to the worm screw by push fit. Place the manual slow motion control knob on the tip of the worm screw shaft so that the flat portion of the socket on the knob is joined with the flat portions of the tip on the shaft. For the AP-SM mount, attach the slow-motion control knob to the DEC worm screw shaft only.



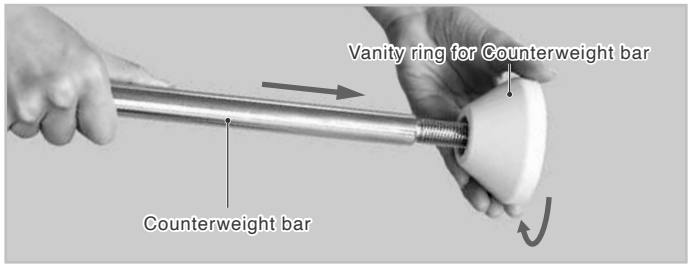




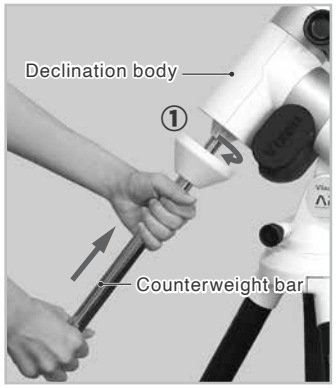
Attaching the Counterweight

ⓘ Be sure to attach the counterweight before you install the optical tube assembly on the mount.

1 Screw the counterweight bar into the vanity ring until it is snug. Then, turn it back by one roation.



2 Screw down the counterweight bar into the declination body fully and tighten the vanity ring securely.

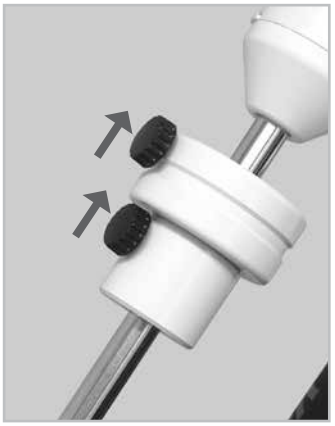


3 Remove the safety screw on the end of the counterweight bar.

4 Ensure the counterweight bar is at the lowest position and attach the counterweight. Loosen the lock screw on the counterweight and put it through the counterweight so that the lock knob is on the far side of the end of the counterweight bar. The lock screw must be tightened securely before you release your hand from the counterweight.

※At this stage, we recommend you set the counterweight close to the upper end of the counterweight bar to lower the center of the balance.

ⓘ Note: Confirm that the lock knob is tightened firmly before you release your hand from the counterweight.



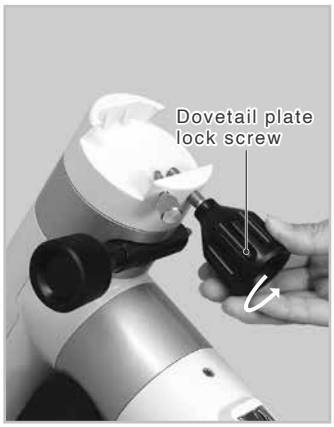
5 Replace the safety screw on the end of the counterweight bar and tighten it.

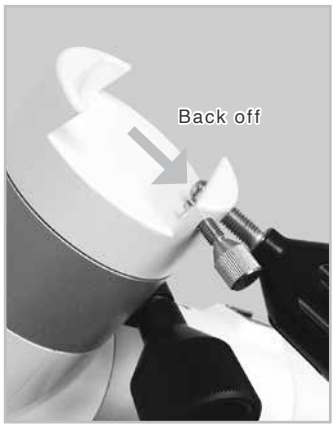
Attaching the Optical Tube Assembly

The telescope tube attaches to the AP mount via a dovetail tube plate.
The permissible loading weight of the mount is 6kg.

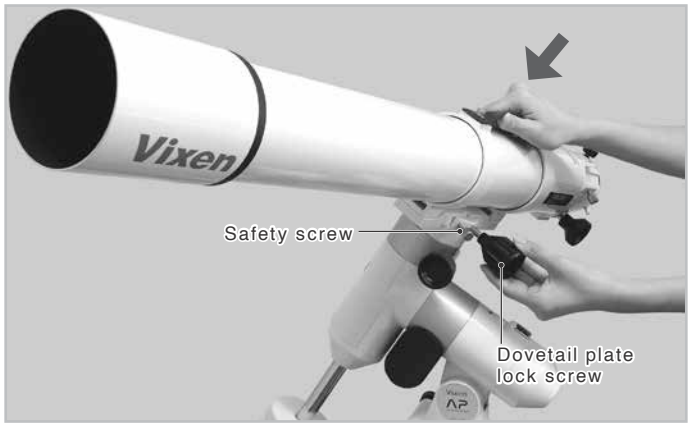
Caution: Be careful not to drop the telescope tube as it could result in serious damage.

1 Loosen the lock screw and safety screw fully on the mount head so that space is available to attach the dovetail tube plate.



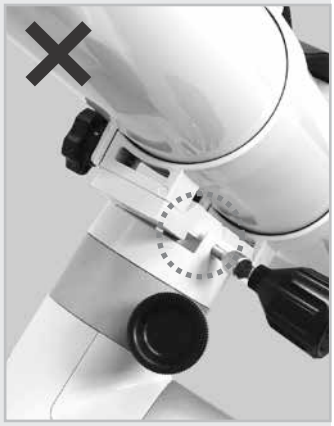


2 Attach the telescope tube to the mount head so that the dovetail tube plate fits the recessed part of the mount head neatly. Tighten the lock screw first to the centering notch on the dovetail tube plate until snug. Then, tighten the safety screw securely.



Note: Confirm that the dovetail tube plate is flat against the mount head.

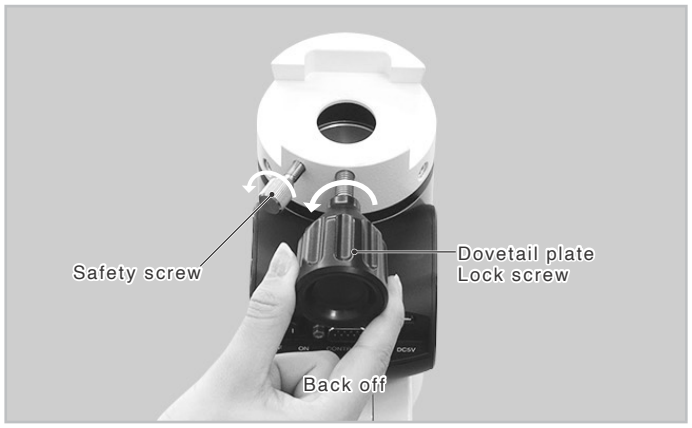
Tightening the dovetail plate lock screws with a gap between these parts may cause the telescope tube to fall.



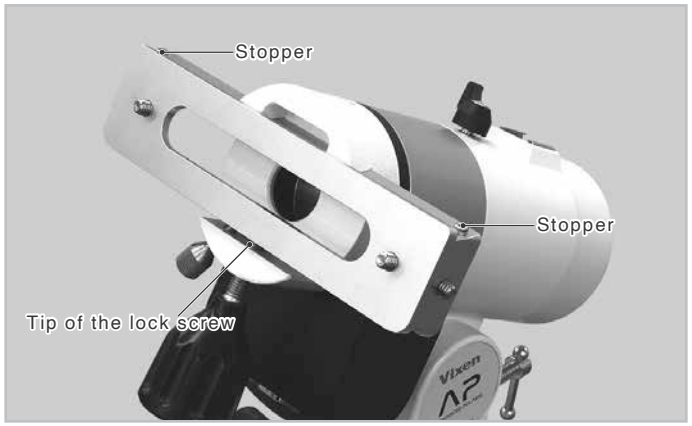
Attaching the Dovetail Slide Bar

AP Photo Guider

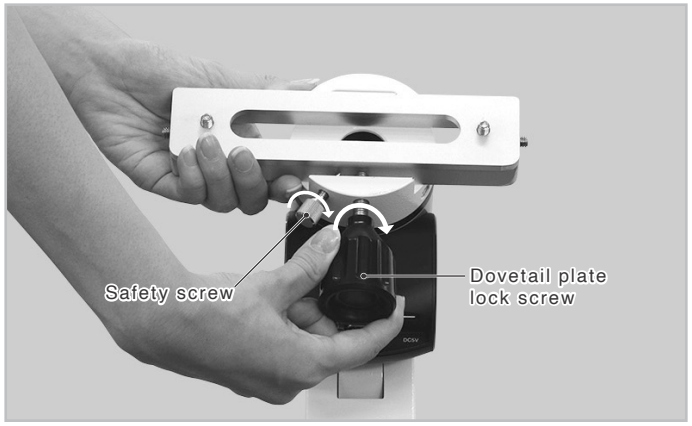
1 Loosen both the dovetail plate lock screw and safety screw on the mount head fully so that space is available for the dovetail slide bar.



2 Attach the dovetail slide bar to the mount head so that the dovetail slide bar fits securely into the recessed mount head. Orient the dovetail slide bar as shown in the figure to prevent the dovetail slide bar from falling. (The dovetail slide bar has stopper screws on the side of the dovetail rail.) Attach the dovetail slide bar so that the tip of the lock screw hits on the side of the dovetail rail with no stopper screws.

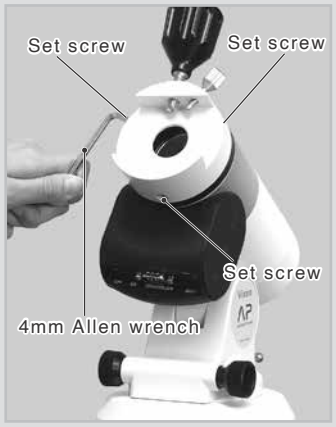


3 First tighten the lock screws onto the centering notch of the dovetail slide bar until it is snug. Then, securely tighten the safety screw.



About the orientation of the mount head unit

The mount head unit is attached to the head of the polar axis body assembly with three set screws that are equally put on its side. The set screws can be loosened with a 4mm Allen wrench to change the position of the mount head to point at your desired orientation.



PREPARATION

Balancing the Equatorial Mount

The Vixen AP is a German equatorial mount, in which the R.A. and DEC axes cross each other at a right angle. The axes are rotated by using the movement of both axes to get maximum stability and limit the stress on the gears. If the equatorial mount is unbalanced, it will increase stress on the gears and could increase electricity consumption or erratic operation.

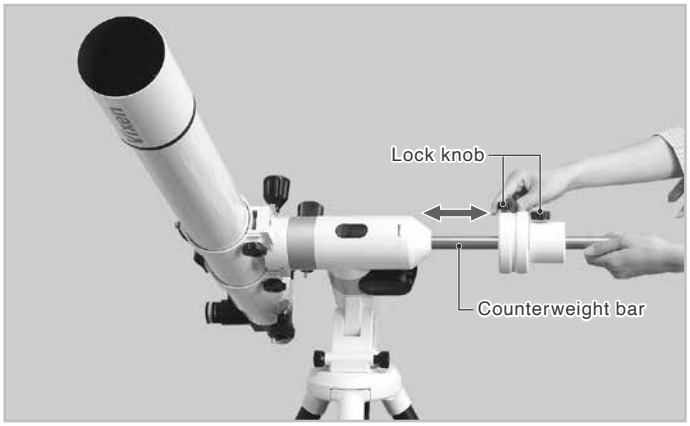
The AP mount employs the friction stop mechanism in the motion of the R.A. and DEC axes. It will tend to slip in the rotating motion if used in an unbalanced state. It is necessary to adjust the balance to bring the center of balance onto the R.A. and DEC axes respectively for comfortable operation of the telescope.

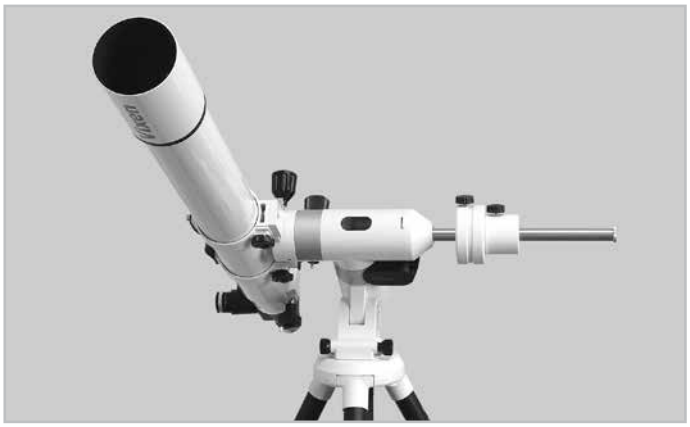
⚠Caution

Take care not to drop the optical tube assembly as it could seriously damage the equipment or lead to injury. Pay close attention to the security of the telescope tube and do not excessively loosen the lock knobs on the equipment.

First Step: Balancing the Mount in Right Ascension (R.A.)

1 While holding the counterweight bar, turn the declination body by hand until the counterweight bar is level.

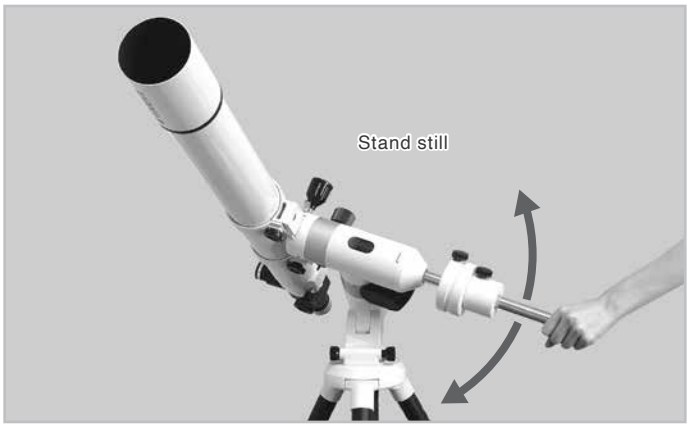




2 Release the counterweight bar gradually to see if the declination body stands still. If the declination body starts turning as you release the counterweight bar, you will shift the counterweight on the counterweight bar to make it balance.

3 Loosen the lock knob on the counterweight and slide it gradually to the point at which the declination body remains stationary. Tighten the lock knob on the counterweight to hold it in place.

Note: Do not slide the counterweight too much in balance. This could damage the telescope tube or lead to injury.

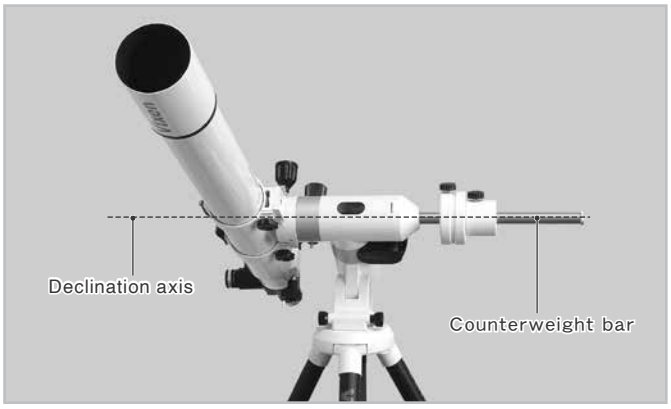


Second Step: Balancing the Mount in Declination (DEC)

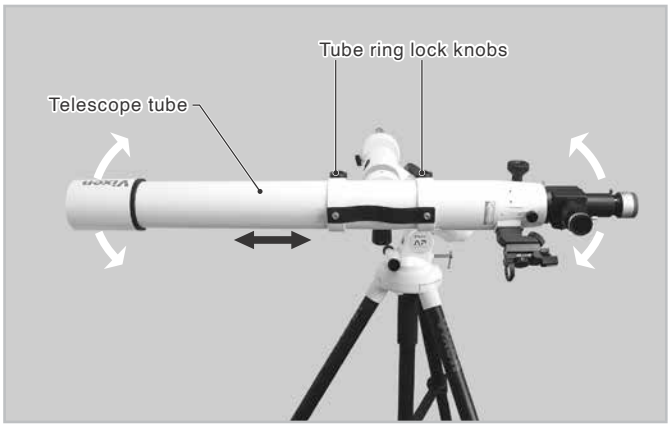
This should be doen after you finish balancing in the R.A.

In the case of a telescope tube with tube rings:

1 While holding the telescope tube, turn the counterweight bar (or telescope tube) by hand until the counterweight bar is level. The declination body keeps the position as it stands.

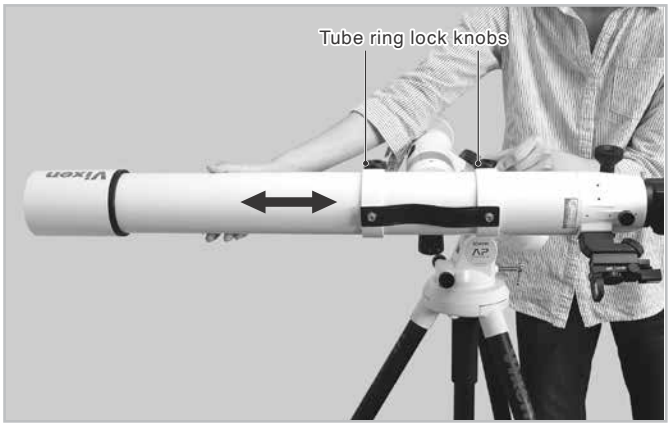


2 Release the telescope tube gradually to see if it stands still. If the telescope tube starts turning as you release it, you will need to shift the telescope tube in the direction of preserving the balance.



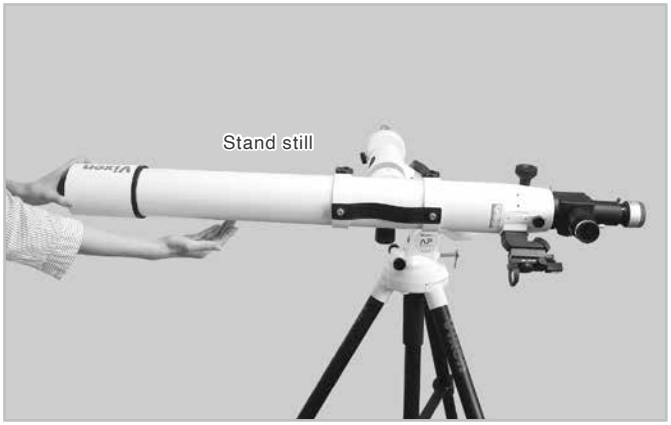
Note:

Do not loosen the tube ring lock knobs too much in balance. This could cause the telescope tube to fall and lead to injury.



3 Loosen the lock knobs on the tube rings that hold the telescope tube and slide the telescope tube either forward or backward until it remains stationary.

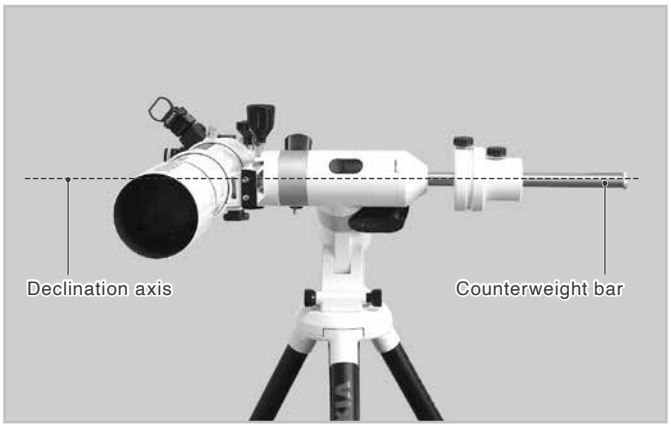
4 Tighten the tube ring lock knobs securely to hold the telescope tube in place.



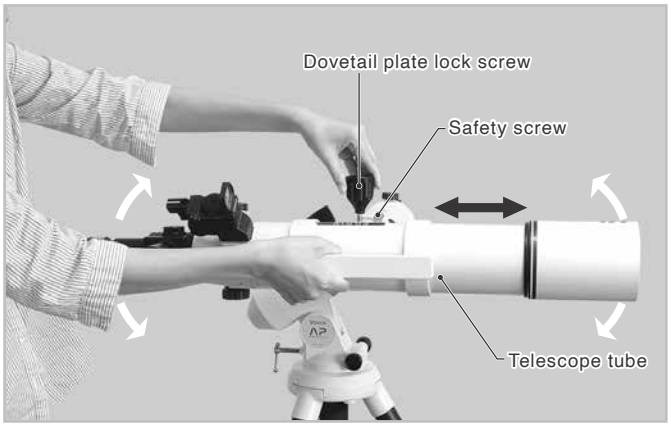
In the case of a telescope tube with a dovetail slide bar:

This should be done after you finish balancing in the R.A.

1 While holding the telescope tube, turn the counterweight bar (or telescope tube) by hand until the counterweight bar is level. The declination body keeps the position as it stands.



2 Release the telescope tube gradually to see if it stands still. If the telescope tube starts turning as you release it, you will need to shift the telescope tube in the direction of preserving the balance.

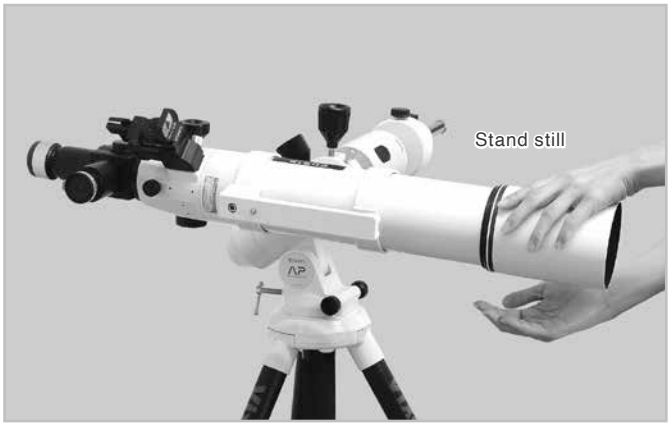


Note:

Do not loosen the dovetail lock knob and safety screw too much in balance. This could cause the telescope tube to fall and lead to injury.

3 Slightly loosen the dovetail lock screw and safety screw that hold the telescope tube on the dovetail slide rail, and slide the telescope tube either forward or backword until it remains stationary.

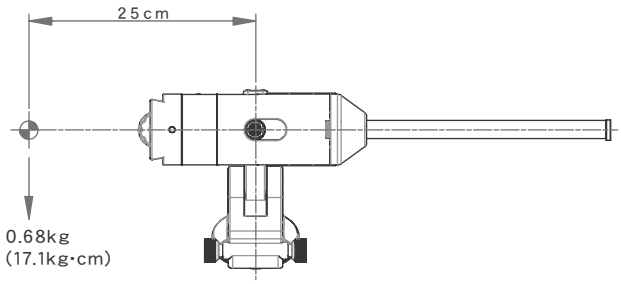
4 Tighten the dovetail lock screw and safety screw securely to hold the telescope tube in place.

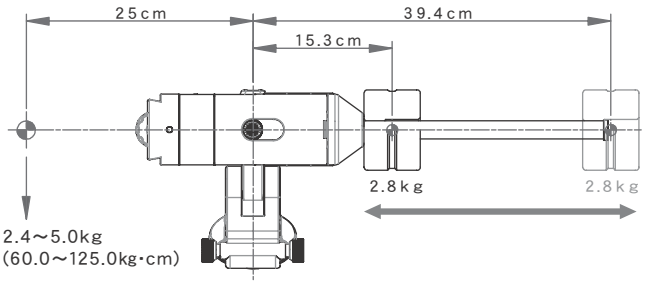


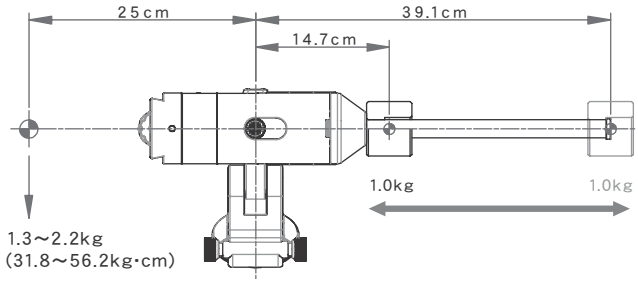
Tips on Proper Balancing

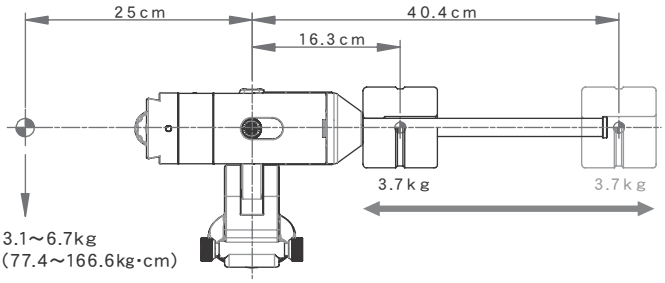
The balance arrangements below illustrate various possible settings on the length and weight of your optical tube. The Telescope's center of gravity is 25cm from the intersection of the R.A. and DEC axes as seen in the illustrations.

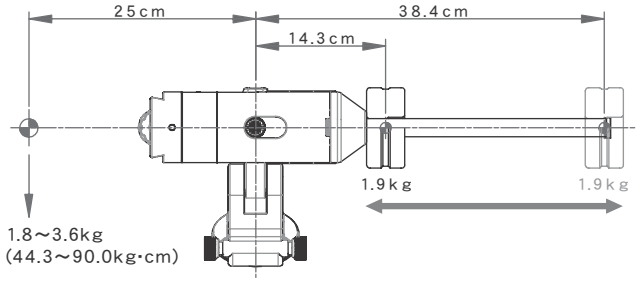
Guidance

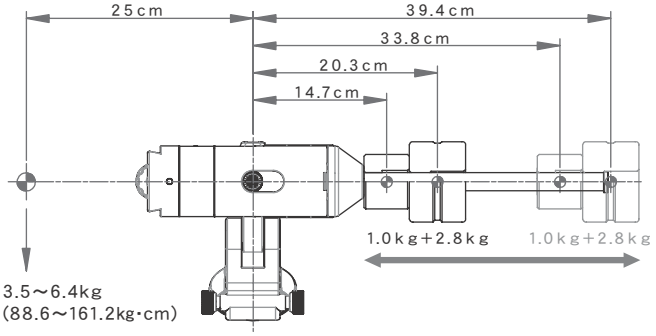








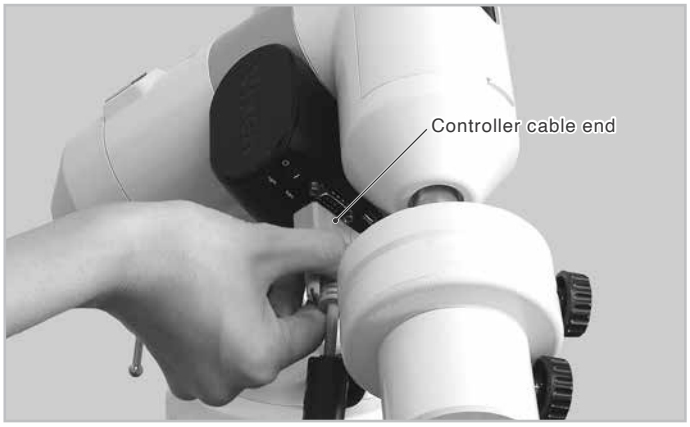




Connecting the STAR BOOK ONE

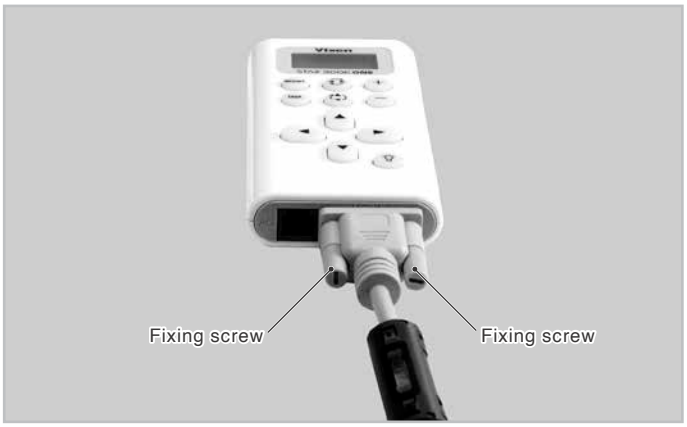
The AP-SM mount comes equipped with an R.A. motor module and a STAR BOOK ONE controller as standard accessories.

1 Plug one end of the STAR BOOK cable into the connection port on the mount for the controller cable.



2 Secure the connectors with the fixing screws.

3 Plug the other end of the STAR BOOK cable into the connection port on the STAR BOOK ONE.



4 Secure the connectors with the fixing screws.

Note 1: Hold the connector part of the STAR BOOK cable tightly and pull it straight when you unplug it. Unplugging by grabbing the cable part may cause a wire to break.

Note 2: Avoid pulling or bending a part of the cable adjacent to the connectors. It may cause a wire to snap.

Note 3: Never connect the STAR BOOK cable to other equipment such as a PC. It may cause failure, fire, or electrical shock. (The STAR BOOK cable does not meet the RS232C specifications.)

PREPARATION

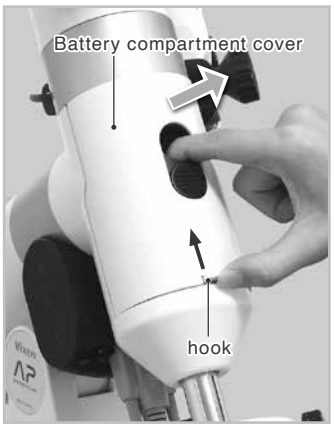
About Power Supply

The AP-SM mount runs on self-contained four (4) AA–size batteries, or a USB external battery. The AC Adapter 12V-3A for the SX mount is not usable with the AP-SM mount.

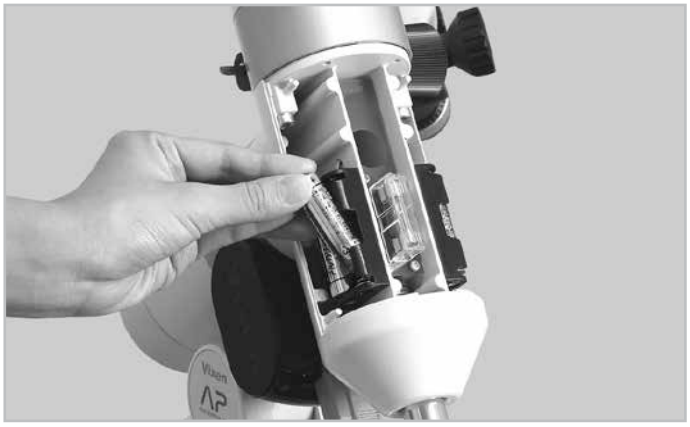
Installing AA-size Batteries

The AA-size alkaline batteries or Ni-MH or Ni-Cd AA rechargeable batteries are recommended.

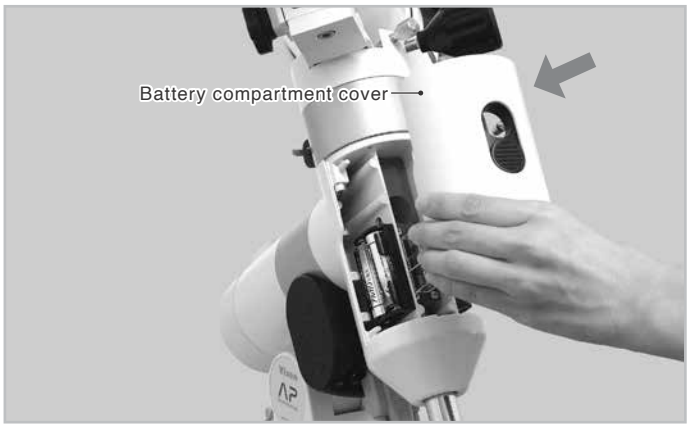
1 Open up the cover of the window hole for the polar alignment scope on the declination body. Push down on the hook on the body and pull out the declination body cover by pinching the hook and window hole with the fingers.



2 Insert four AA batteries into the battery compartment inside the declination body. Be sure to check the polarity of the batteries.



3 Replace the batteries compartment cover.



Note 1: If the batteries are exhausted (its voltage power is dropped), the screen on the STAR BOOK ONE begins blinking. If this happens, exchange the batteries for new ones (or fully recharged ones).

Note 2: Use AA batteries of the same rating. Do not mix new batteries and old batteries to use. This could cause leakage of battery fluids.

Using a USB External Power Supply

Use a commercially available USB external battery with a USB Micro-B connector.

Note 1: The USB external battery will take priority over the AA batteries if you turn on the power while the AA batteries remain in the battery compartment.

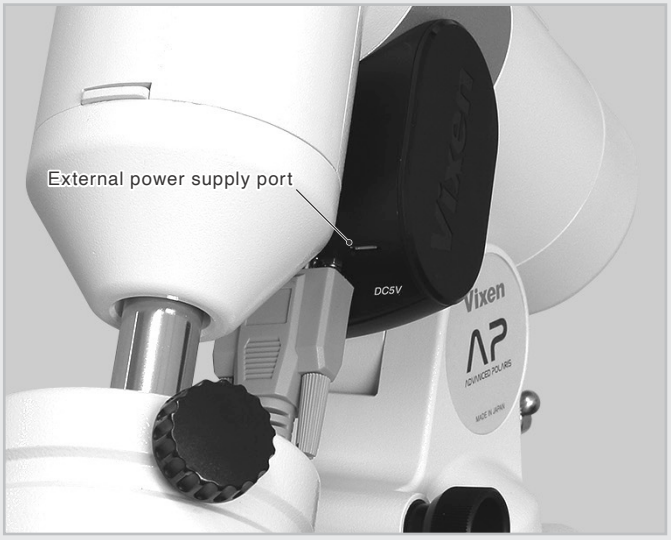
Note 2: Remember to turn off the power when you remove the USB external battery while the AA batteries remain in the battery compartment. Although this does not lead to damage, it may cause an operation error or initialize your settings on the STAR BOOK ONE.

Note 3: If the USB external battery is exhausted (its voltage power is dropped), the screen on STAR BOOK ONE begins blinking. If this happens, exchange the USB external battery for a new one (or fully recharged one).

Note 4: Hold the connector part and pull it straight if you unplug the power cable. Unplugging by grabbing the cable part may cause a wire to snap.

Note 5: Avoid pulling or bending a part of the power cable adjacent to the connectors. It may cause a wire to snap.

Note 6: Do not use the power cable in a folded and tied condition. It may cause electrical shock or fire.



INITIAL SETTING AND BASIC OPERATION

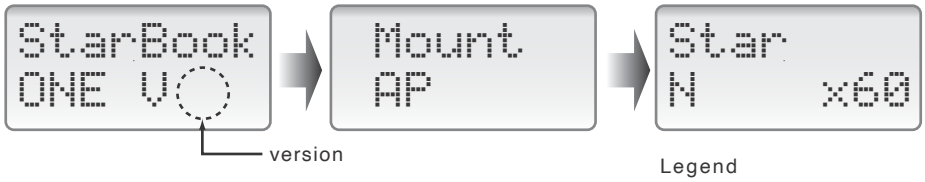
Turning ON the Power

1 The power switch is located on the bottom of the R.A. motor module if you use the AP-SM mount.

To turn on the power, press the side marked “I “on the switch, and to turn off the power, press the “O” side on the switch.

Note: The mount starts celestial tracking as soon as the power is ON although it seems to remain stationary.

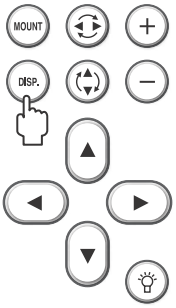
2 The initial screens below appear on the screen of the STAR BOOK ONE as you turn on the power switch.



Legend
[Star]: Sidereal tracking rate
[N]: Northern hemisphere
[x60]: Maximum speed of the direction key
(multiple proportions of sidereal rate)

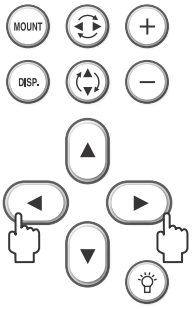
Setting Language

1 Pressing the Display button illuminates that button and the setting screen* is displayed.



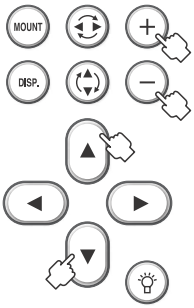
*The setting screen used in the last setting will appear if you press the button.
First, designate the language you use.

2 In the screen for settings, choose “Language” with the left or right direction key.



The setting is defaulted to “English”

3 You can choose the “Japanese” language with the up or down key (or plus or minus button).



INITIAL SETTING AND BASIC OPERATION

Basic Operation of the AP Equatorial Mount

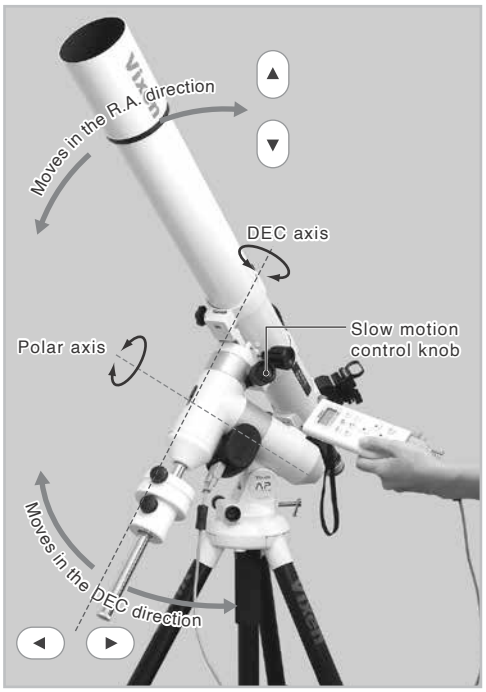
Moving the AP Mount

The AP Mount is designed to move and stop the rotational axes without a clamp system. The tracking and slow motion control are done with the manual slow motion control knobs.

Moving the AP-SM Mount or AP Photo Guider

The AP-SM Mount and AP Photo Guider come equipped with the R.A. motor module as a standard accessory. Tracking and slow-motion control in the direction of the R.A. are done with the supplied STAR BOOK ONE controller. Adding an optional DEC motor module will allow you to move the R.A. and DEC axes with the STAR BOOK ONE.

Note: Usage of the STAR BOOK ONE is described as operating instructions for the AP-SM Mount here. You may occasionally find wording not relevant to the AP Photo Guider.

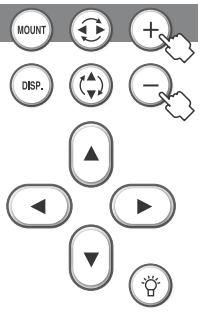


1 Turn the power switch ON to start tracking with the R.A motor module.

2 To change the telescope's pointing direction largely, move the mount by pushing the optical tube with your hand.

Note: The up and down keys are inoperative unless an optional DEC motor module is installed additionally on the AP-SM mount. Use the slow motion control knob to move the mount in the direction of the DEC slowly.

Changing Slewing Speed



MMove the mount at different speeds using the direction keys.

While both the Mount and Display buttons are inactive with no illumination, pressing the Plus button will accelerate the slewing speed, and pressing the Minus button will decelerate the slewing speed.

Default slewing speed: 60x of the sidereal rate at a maximum, and it can be slowed down to 8X, 1.0X, and 0.5X of the sidereal rate. The slewing speed can be changed between 0.1X and 60X of the sidereal rate.

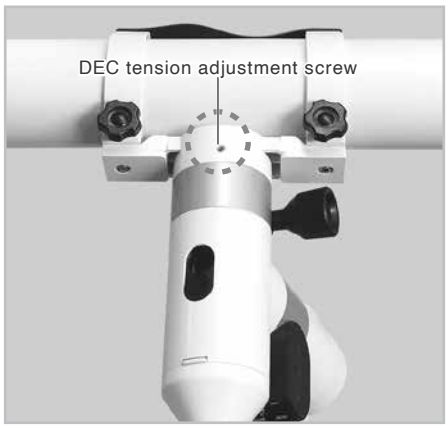
	**X60** Choose this option if you move the telescope quickly with the friction motion together.
	**X8** Choose this option when you bring your target object close to the crosshairs in the field of view of a finder scope. The mount moves slowly.
	**X1.0** Choose this option when you correct the position of an object in the field of view of the telescope as it makes you move the mount very slowly.
	**X0.5** Choose this option at high magnification if you want the planets to move slowly in the field of view.

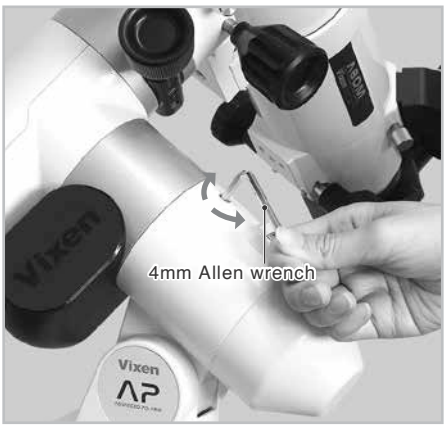
Changing Tension of the Friction Stop Motion

The tension of the friction stop motion can be adjusted in the R.A. and DEC axes as the need arises.
The position of each tension adjustment screw for the R.A. and DEC axes is shown in the figure.

Adjust the tension of the friction stop motion by loosening or tightening the tension adjustment screws with the supplied 4mm Allen wrench.

Remember to loosen the tension adjustment screw by holding the optical tube as it may break the balance quickly.





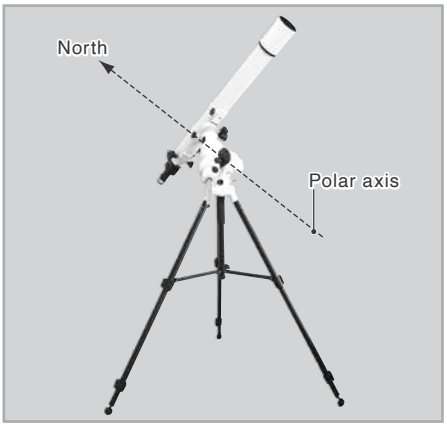
Approximate Polar Aligning with the Finder Scope

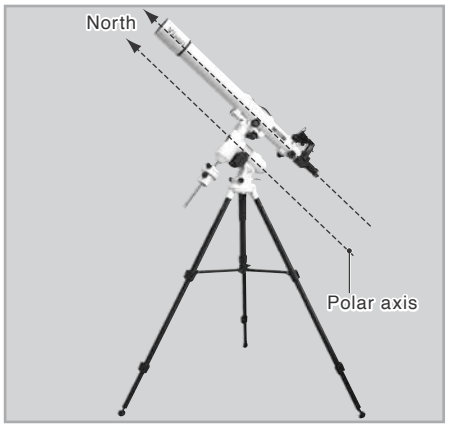
After setting up the telescope, locate the AP mount to point its R.A. axis toward the north celestial pole.

Here, an approximate Polar alignment using a finder scope is described for observers in the northern hemisphere. The finder scope on your telescope must be aligned accurately before you start aligning the mount. In the southern hemisphere, using an optional Polar alignment scope is recommended.

1 Point the mount toward the north celestial pole in the northern hemisphere as shown in the figure.

2 Position the telescope tube so that it points toward the north.

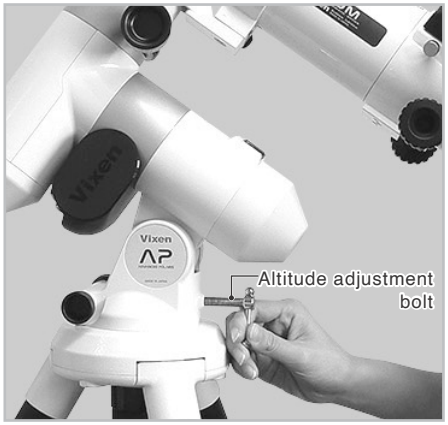


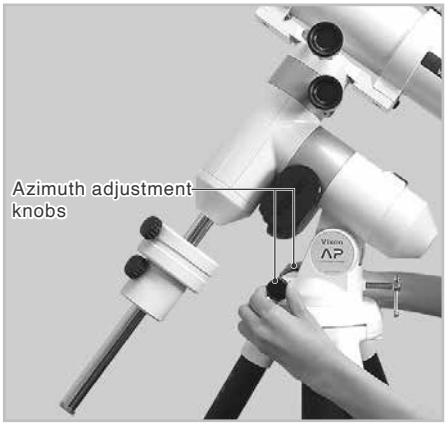


3 While looking for Polaris in the finder scope' s field of view, adjust the mount with the azimuth adjustment knobs and altitude adjustment bolt on the mount base so that Polaris comes to the center of the finder scope' s field of view (an intersection point of the crosshairs).

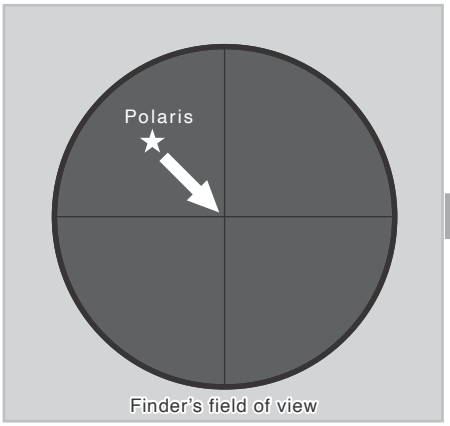
Turn the altitude adjustment bolt so that the elevation of the R.A. axis matches the latitude of your observing site.

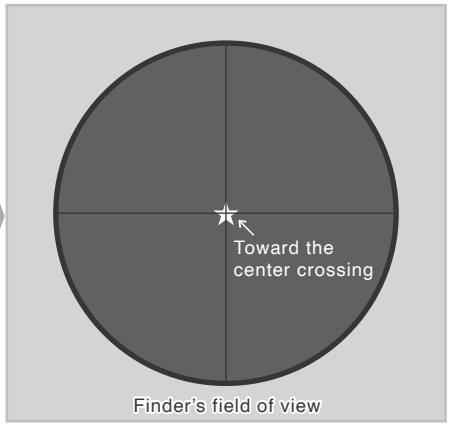
Turn the azimuth adjustment knobs so that Polaris comes to the center. Loosening the azimuth adjustment screw on one side will allow you to tighten the screw on the other side. Thus the direction of azimuth can be changed.





4 Bring Polaris into the center of the finder scope's field of view.

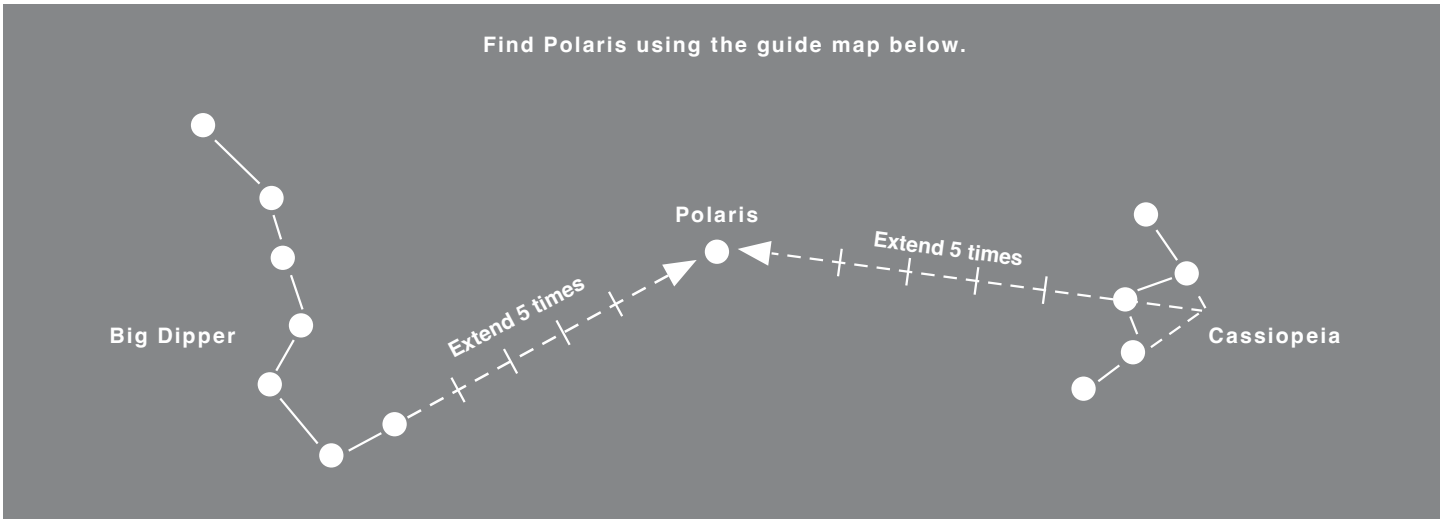




Find Polaris from Cassiopeia and the Big Dipper

A rough setting with a compass or pointing the polar axis of your telescope's mount at Polaris will work well for visual observation.

The constellations Cassiopeia and the Big Dipper (part of Ursa Major) are near Polaris. You will be able to find Polaris if you know the position of these groups of stars. Cassiopeia and the Big Dipper are autumn and spring constellations respectively. For most of the year either constellation is always above the eastern or western horizon.



Directions 1:

Locate the two stars that form the outer edge of the Big Dipper as shown in the above map. Draw an imaginary line straight through the two stars of the dipper edge. You will see Polaris equidistant between the constellations.

Directions 2:

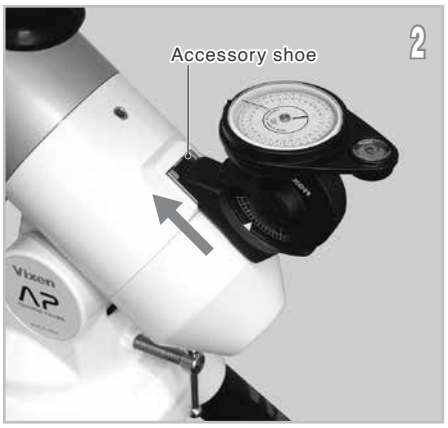
Cassiopeia looks like the letter "W" or the letter "M" depending on when you observe it. Draw imaginary lines from the stars that form the outer edges of the letter "W" so that the two lines intersect. Draw an imaginary line from the center of the "W" through the cross point of your first line. Extend it straight through by about 5 times to get to Polaris.

Approximate Polar Aligning with the Polar Meter

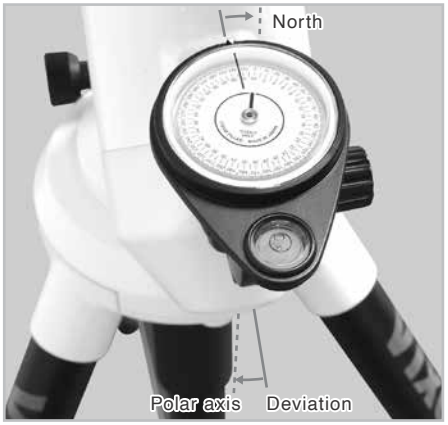
The Polar Meter is sold separately and not included in the AP Mount packages.

1 Loosen the angle lock knob of the Polar Meter and tilt it to an angle that is equal to the altitude of Polaris at your location. Then, tighten the angle lock knob.
The Polar Meter sets an angle indicated on the altitude scale by the pointer. The altitude is scaled in 5-degree increments.

2 Attach the Polar Meter to the accessory shoe on the AP mount as shown in the figure.

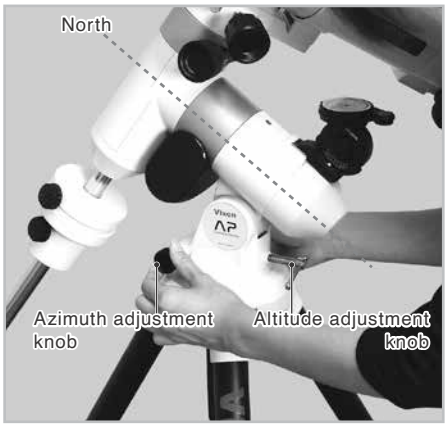


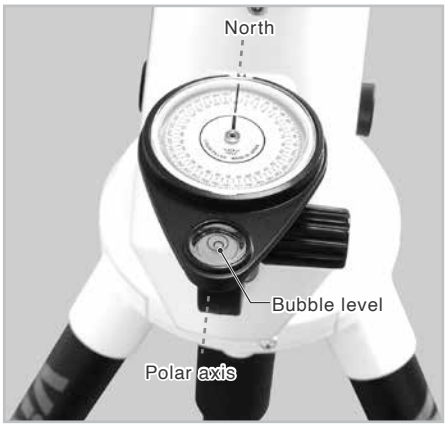
3 Change the direction of the AP mount so that the pointer on the Polar Meter compass points to the N sign on the compass dial.



4 Adjust the elevation of the AP mount with the altitude adjustment bolt so that the bubble in the bubble level on the Polar Meter comes to the center of the guide circle on the level.

Next, adjust the direction with the azimuth adjustment knobs so that the pointer on the compass falls on the N on the dial of the compass.

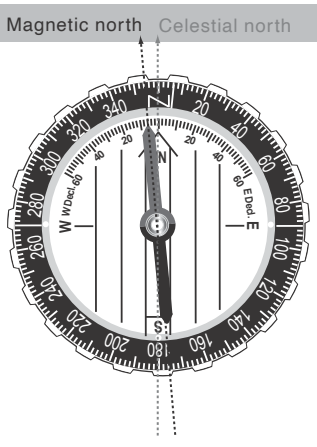




About Magnetic Declination of Compasses

The magnetic declination is a deviation from true north or celestial north which may affect the needle of your compass. It differs depending on the area of the earth. Typically the needle of the compasses points 3 to 9 degrees off to the west as you use the compass in Japan. You may obtain information on the magnetic declination of your location from the Geographical Survey Institute in your country.

Magnetic declination



APPLICATION

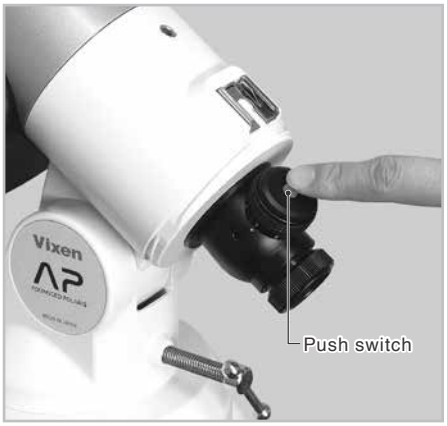
Polar Alignment Scope

If your intention is to take long exposure astrophotography, you must accurately align the polar axis (R.A) on the mount to the celestial pole. This requires the use of a polar alignment scope sold separately. The polar alignment scope can align the polar axis on the mount as accurately as 3 arc minutes or less.

Components Guide

Illumination ON and OFF

There is a push switch on the top of the brightness adjusting dial of the polar alignment scope. Pushing the switch will illuminate the polar alignment reticle in red light. The red light goes dimmer gradually after a certain interval in illumination (about one or two minutes) and turns off automatically.



Adjusting the Brightness

The brightness of the red light for the polar alignment reticle can be varied in 8 steps by turning the brightness adjustment on dial of the polar alignment scope.

Focusing on the Polar Algnment Reticle

You can focus on the polar alignment reticle by turning the eyepiece of the polar alignment scope. While holding the body of the polar alignment scope with one hand, turn the eyepiece part with the other.

APPLICATION

Replacing the Battery

1 While holding the brightness-adjusting dial by hand, remove the battery cover (the switch for the illuminator) on the top of the brightness-adjusting dial by turning it counterclockwise.

2 Turn the battery compartment on the polar alignment scope downward as shown in the figure so that the old battery can fall out of the battery compartment.

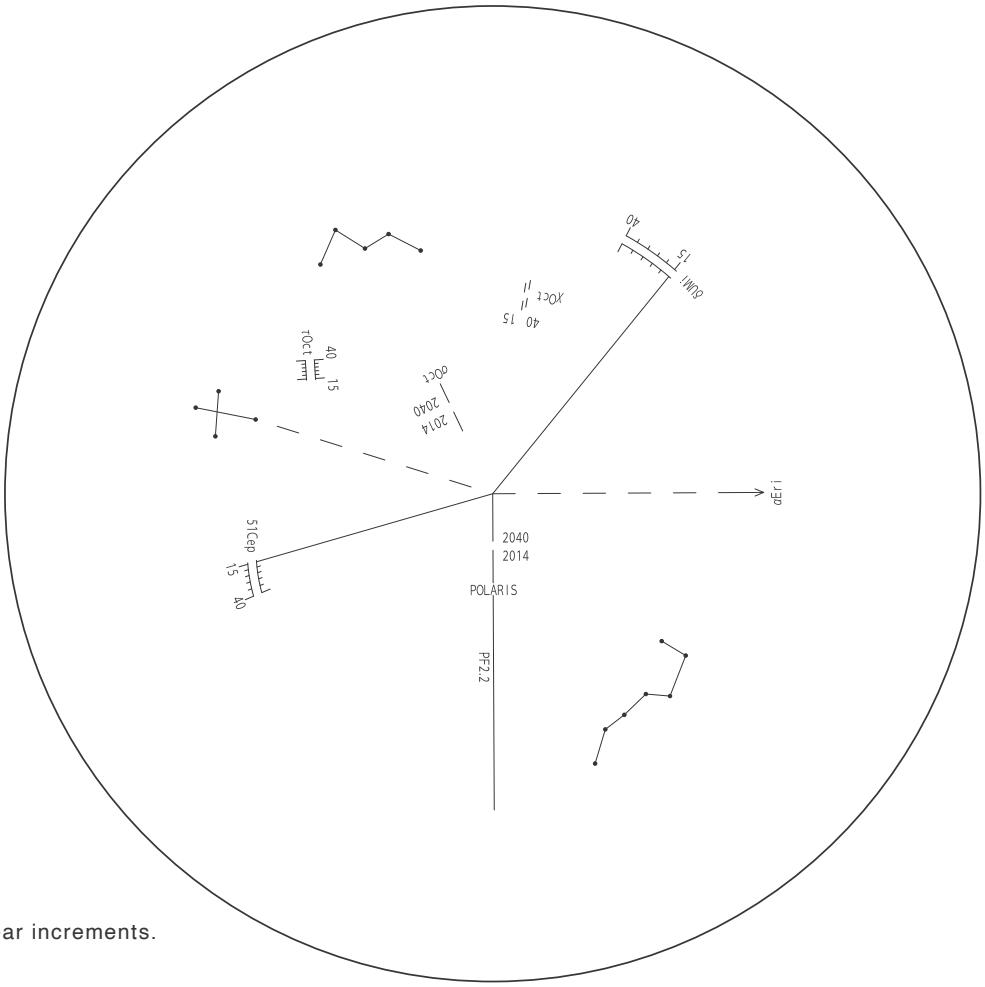
3 Turn the battery compartment upward and insert a fresh battery in the battery compartment. The bottom of the battery compartment is the plus side.

4 Replace the battery cover in place. Check if the dark field illuminator is lit as you turn ON the switch.

Reticle of the Polar Alignment Scope

Star Name	Constellation
Polaris	Little Bear
δUMi	Little Bear
51 Cep	Cepheus
σOct	Octans
τOct	Octans
χOct	Octans
αEri	Eridanus

Numbers
15 the year 2015
40 the year 2040

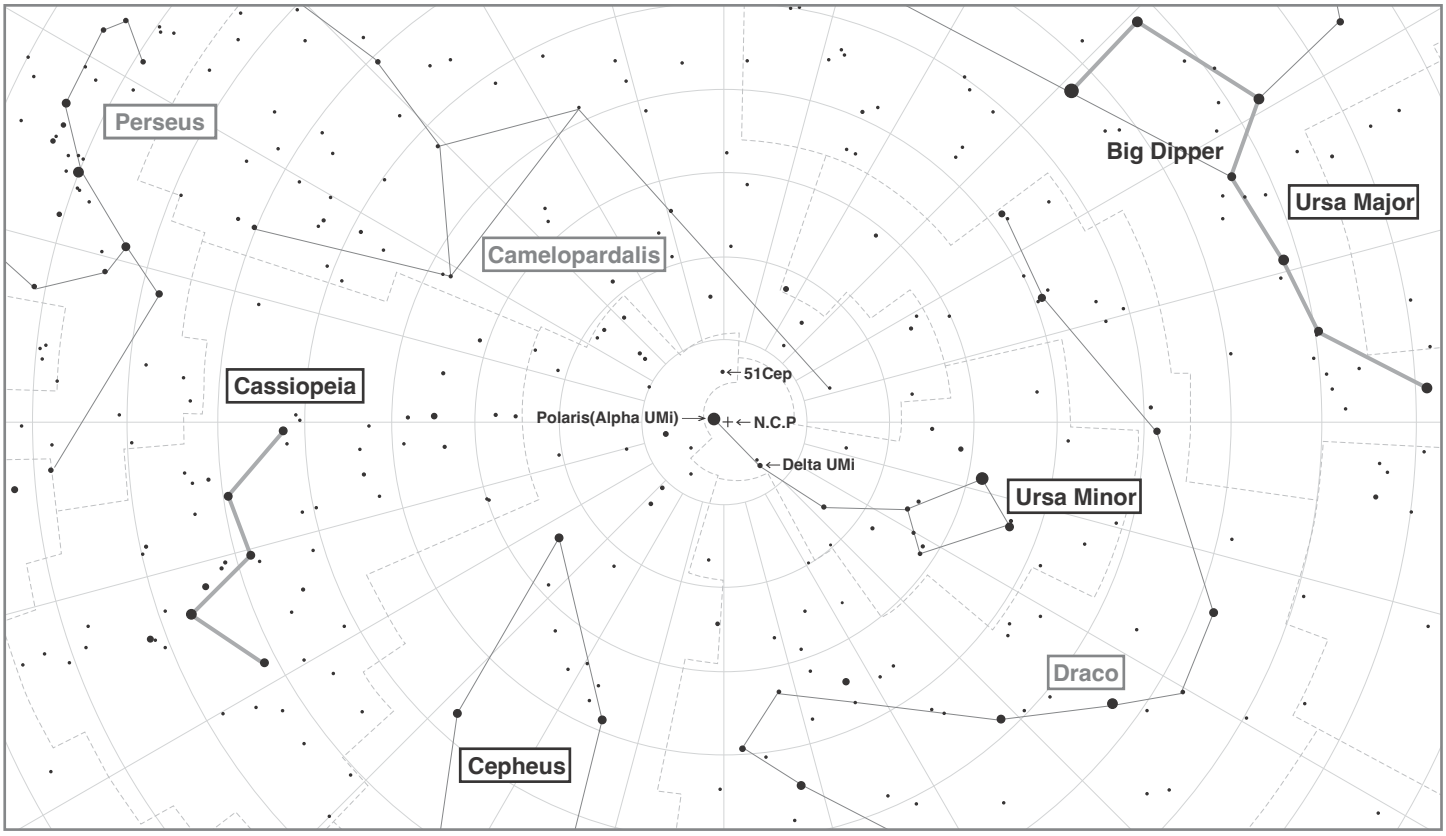


The position scales on the reticle are 5-year increments.

APPLICATION

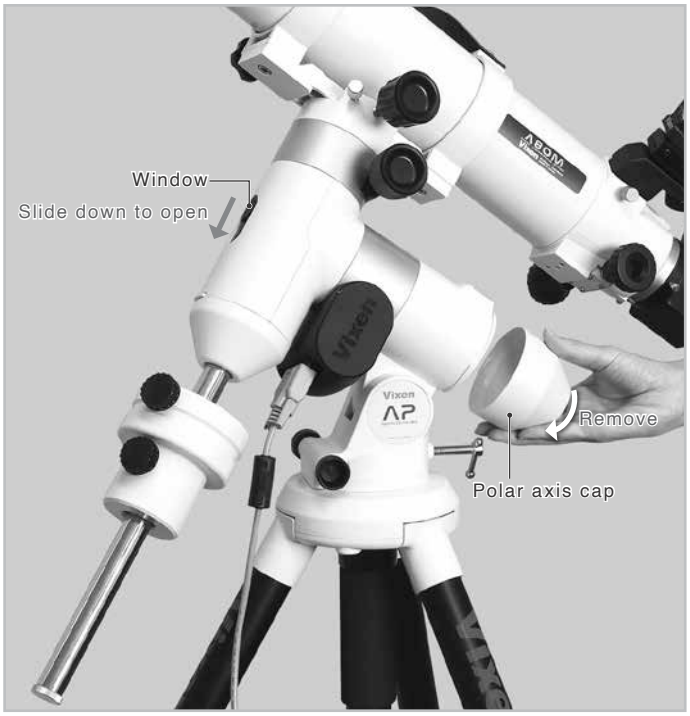
Polar Alignment in the Northern Hemisphere

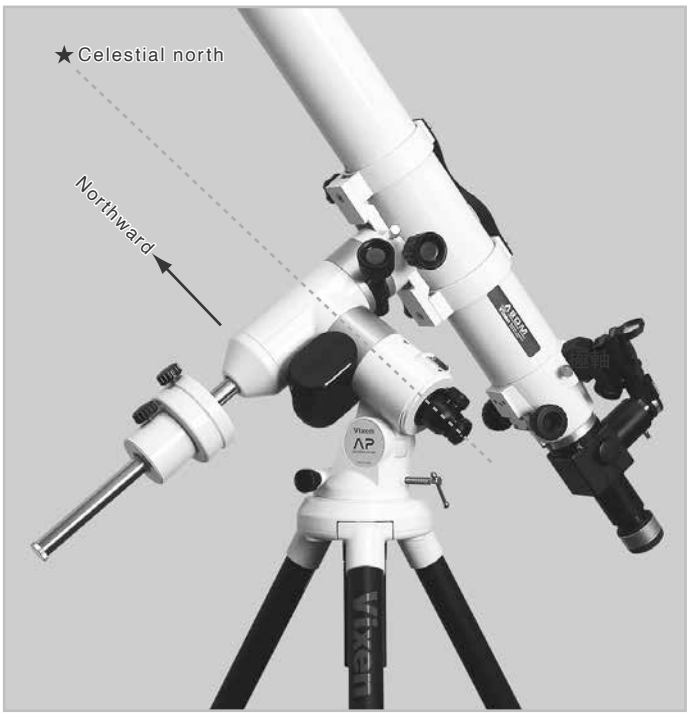
The polar axis of the AP equatorial mount is aligned to the North Celestial Pole in the northern hemisphere. The polar alignment scope utilizes 3 stars of Polaris, Delta UMi and 51 Cep near the North Pole. The positions of the above stars are plotted on the reticle of the polar alignment scope. To locate the N.C.P, you simply match the scale position on the reticle with the designated 3 stars seen in the polar alignment scope. Patterns of the Big Dipper and Cassiopeia are engraved on the reticle to serve as a guidepost for the North Celestial Pole.



1 Check your observing site with a compass, a GPS, or a map in advance to confirm that Polaris, the Big Dipper, and Cassiopeia can be seen from your observing location on the observation date.

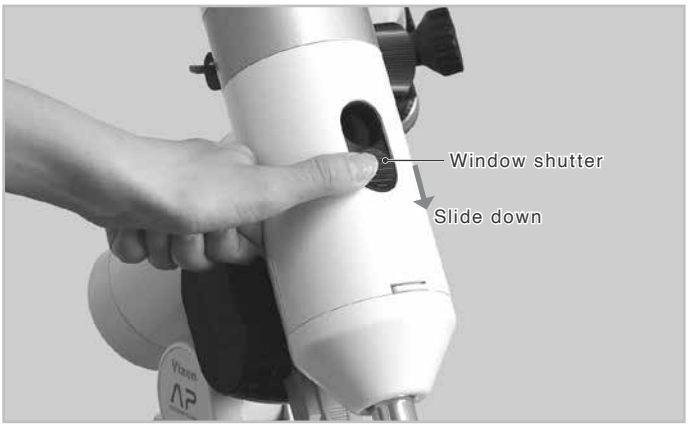
2 Set up the mount on flat and hard ground where you can see Polaris in the sky. Take off the polar axis cap. Point the polar axis on the mount to the south as shown in the figure. Adjust the tripod legs so that the tripod is as level as possible.

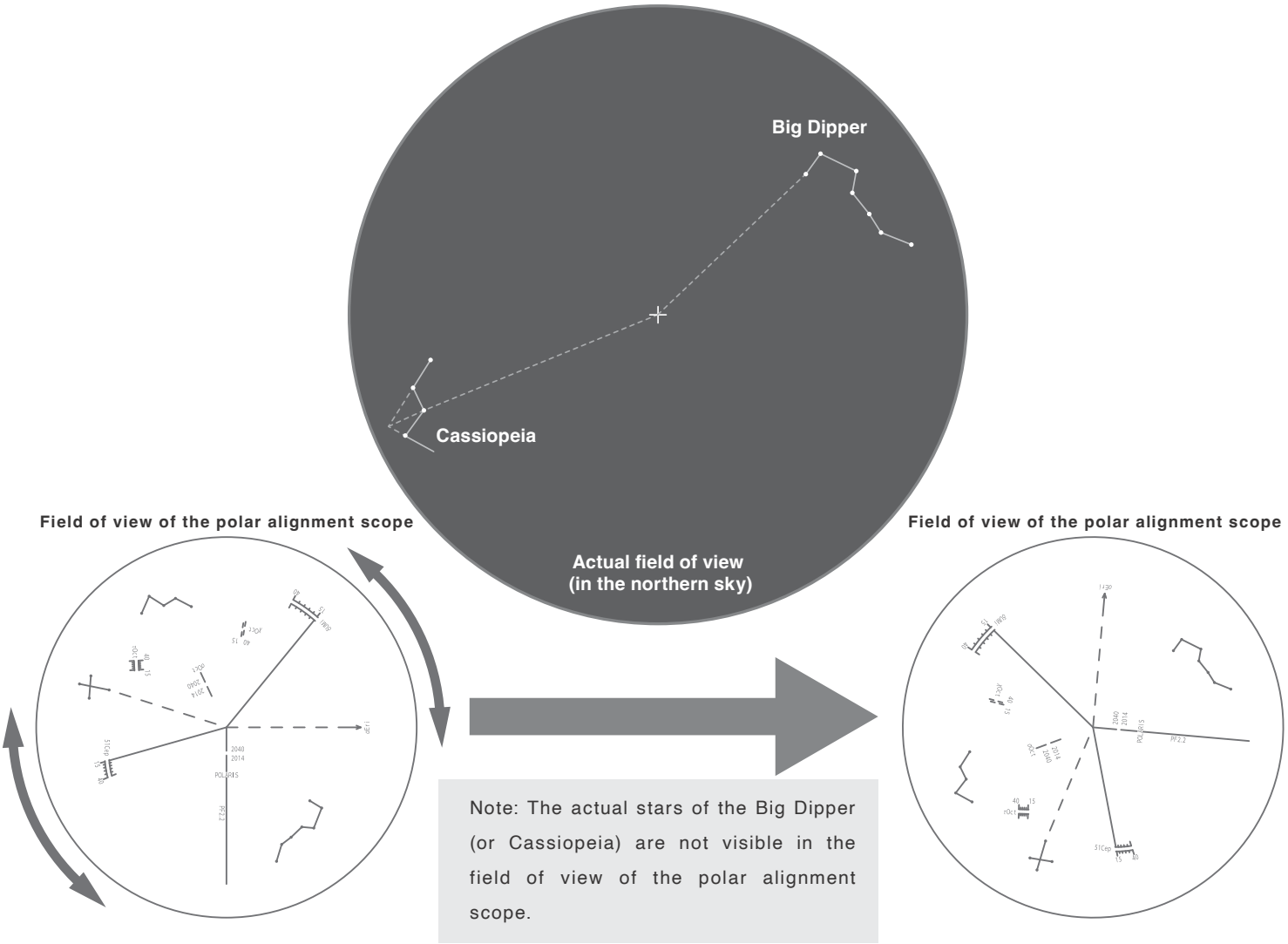




APPLICATION

3 Open the round polar window on the declination body by sliding down the window's shutter. While looking into the polar alignment scope, turn the polar alignment scope body so that the engraved Big Dipper (or Cassiopeia) on the reticle matches the Big Dipper (or Cassiopeia) in the actual sky.





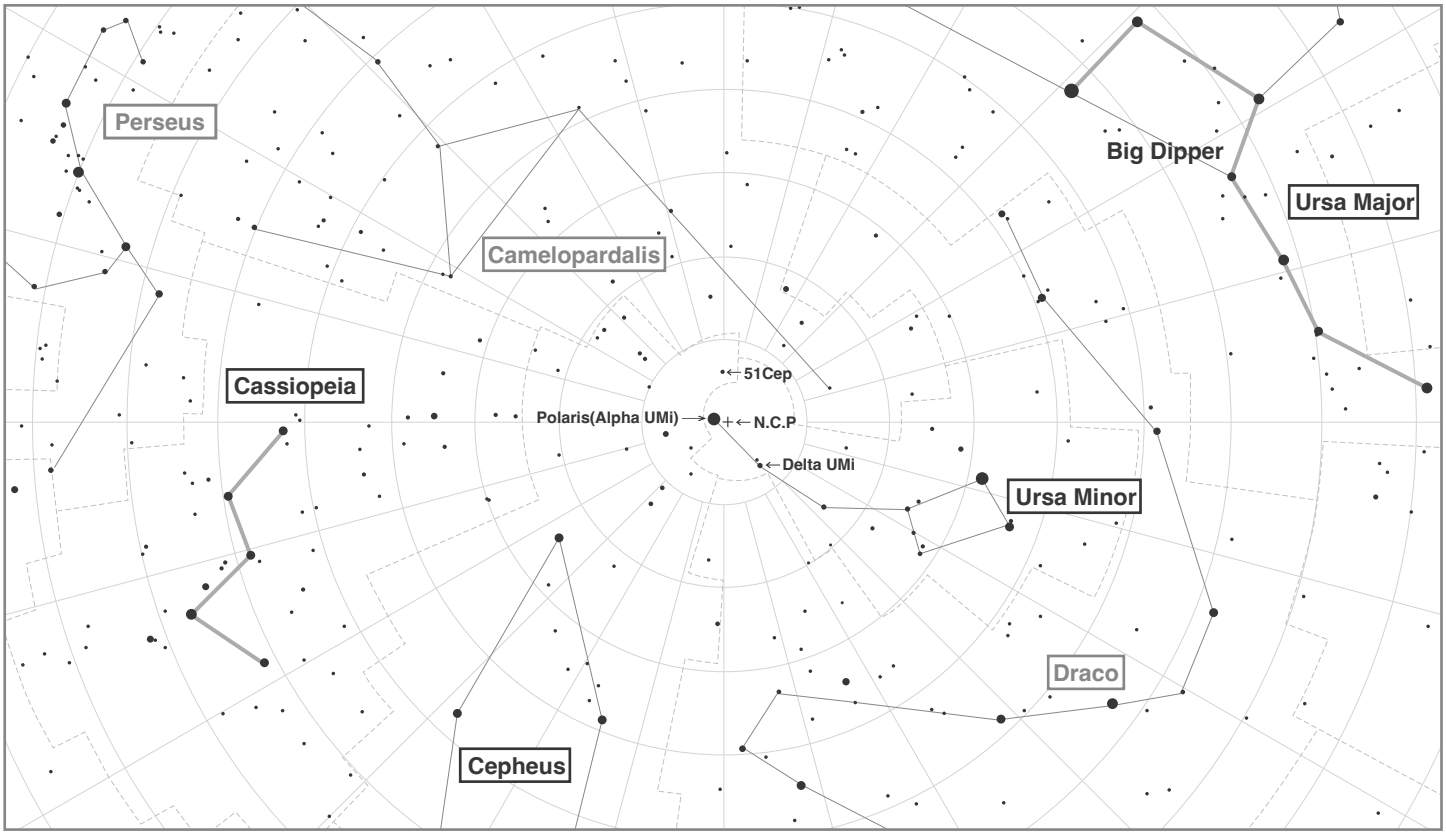
Note: The actual stars of the Big Dipper (or Cassiopeia) are not visible in the field of view of the polar alignment scope.

The patterns of the Big Dipper and Cassiopeia on the reticle are positioned to correspond to the actual sky. They are used as a guidepost to know the turning direction of the polar alignment scope's reticle. The locations of the Big Dipper and Cassiopeia on the scale do not correlate with the positions of Polaris, Delta UMi, and 51 Cep in the actual sky.

APPLICATION

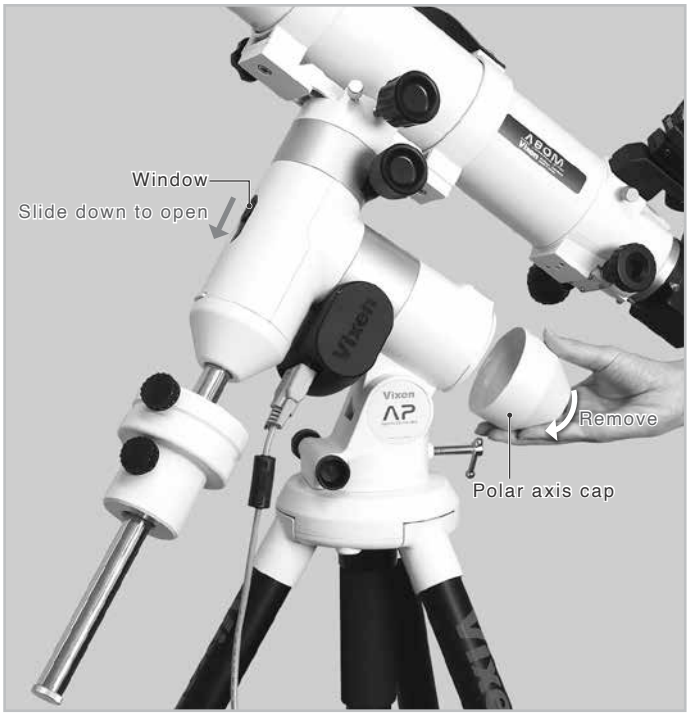
Polar Alignment in the Northern Hemisphere

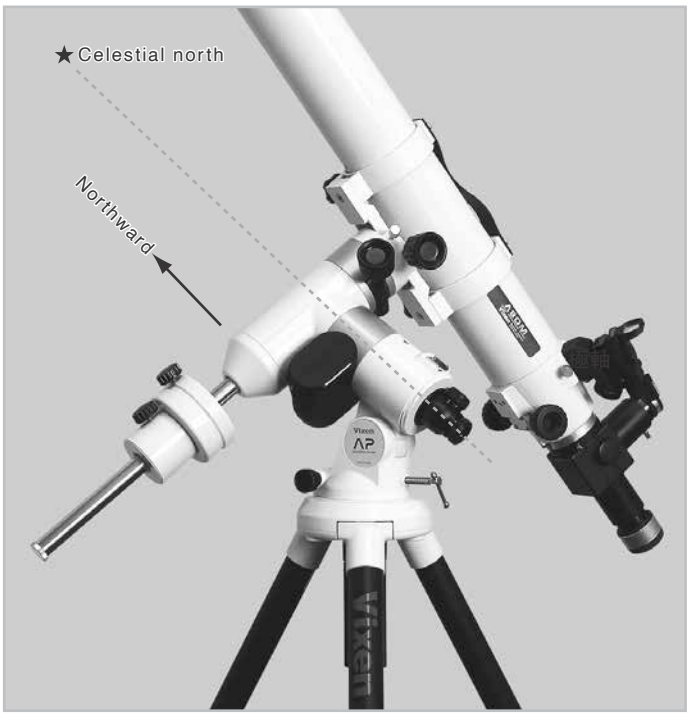
The polar axis of the AP equatorial mount is aligned to the North Celestial Pole in the northern hemisphere. The polar alignment scope utilizes 3 stars of Polaris, Delta UMi and 51 Cep near the North Pole. The positions of the above stars are plotted on the reticle of the polar alignment scope. To locate the N.C.P, you simply match the scale position on the reticle with the designated 3 stars seen in the polar alignment scope. Also, the patterns of the Big Dipper and Cassiopeia are engraved on the reticle for use as a guidepost for the North Pole.



1 Check your observing site with a compass, a GPS, or a map in advance to confirm that Polaris, the Big Dipper, and Cassiopeia can be seen from your observing location on the observation date.

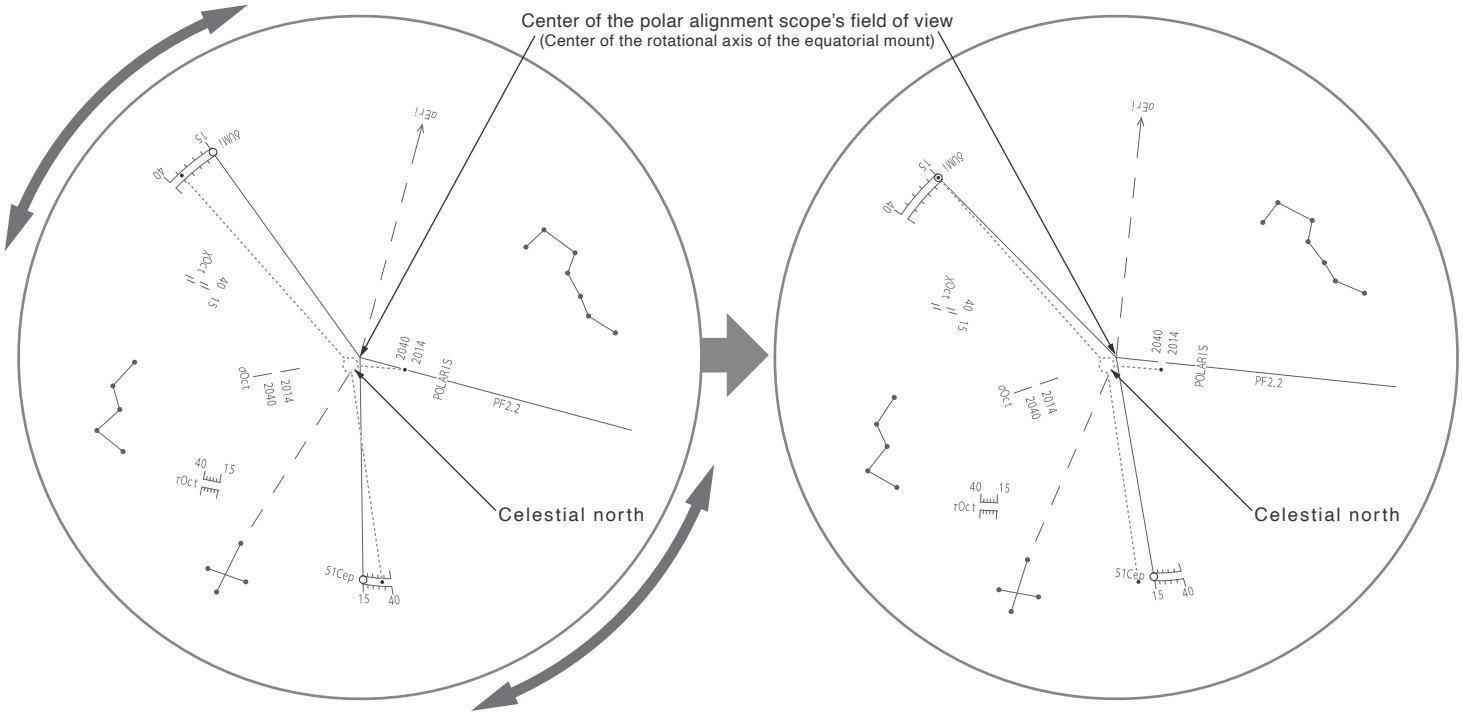
2 Set up the mount on flat and hard ground where you can see Polaris in the sky. Take off the polar axis cap. Point the polar axis on the mount to the south as shown in the figure. Adjust the tripod legs so that the tripod is as level as possible.





APPLICATION

Polaris is out of place from the designated position. This is part of the process.



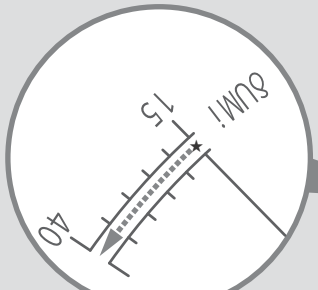
Since no mark points at the North Celestial Pole, you need to match the polar axis of your AP equatorial mount with the N.C.P. using the conspicuous polar star and two stars in the same area in the sky. This is called polar alignment.

As an illustration here, Polaris is set to the edge of the line on the side of 2014, and both Delta UMi and 51 Cep are set to the middle of the curved lines of the position scale at the protruded edge on the side of 15 respectively. (In the case of the year 2014)

Turn the polar alignment scope body so that Delta UMi comes near the location of the year 2014 on the scale. And then, Polaris will get out of position from the gap between the lines.

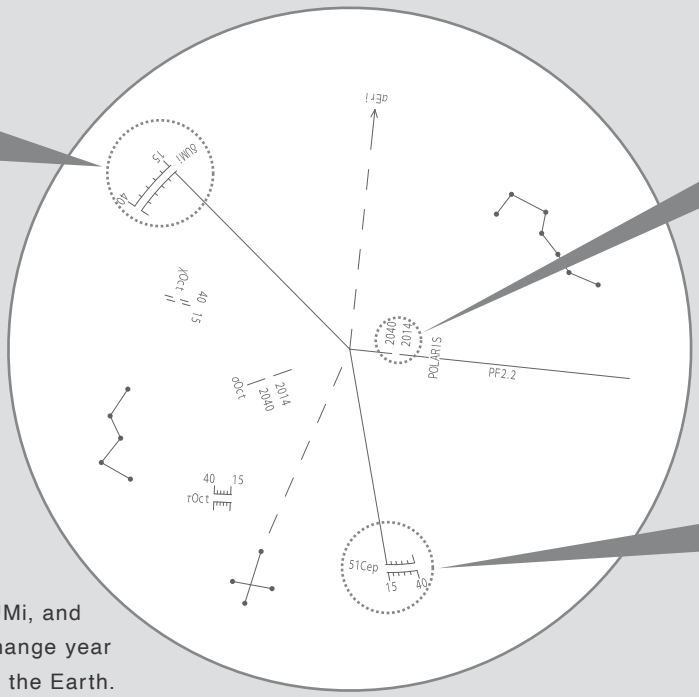
Adjust the red light illumination to be dimmer if the reticle is too bright to see the 4th magnitude Delta UMi.

IIf the 5th magnitude 51 Cep is hard to see in the polar alignment scope's field of view, at least surely set Delta UMi to the position scale on the reticle.



The movement of Delta UMi from 2014 to 2040 by precession

The movement of Polaris from 2014 to 2040 by precession

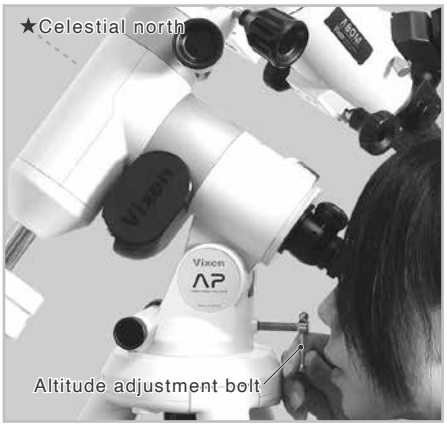


The movement of 51 Cep from 2014 to 2040 by precession

The locations of Polaris, Delta UMi, and 51 Cep on the position scales change year by year due to the precession of the Earth. You need to compensate the locations of the 3 stars on the position scales yearly.

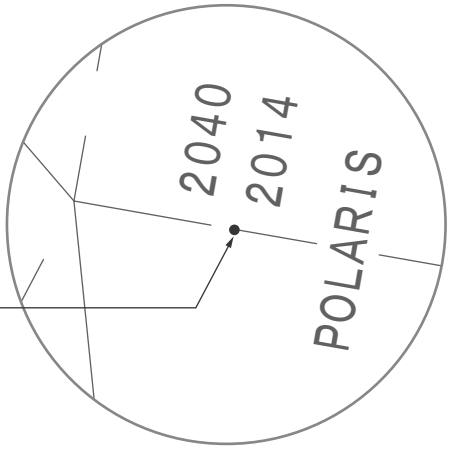
APPLICATION

6 While looking into the eyepiece of the polar alignment scope, turn the altitude adjustment bolt and azimuth adjustment knobs so that Polaris comes to the gap between the two segments of the lines marked 2014 and 2040.



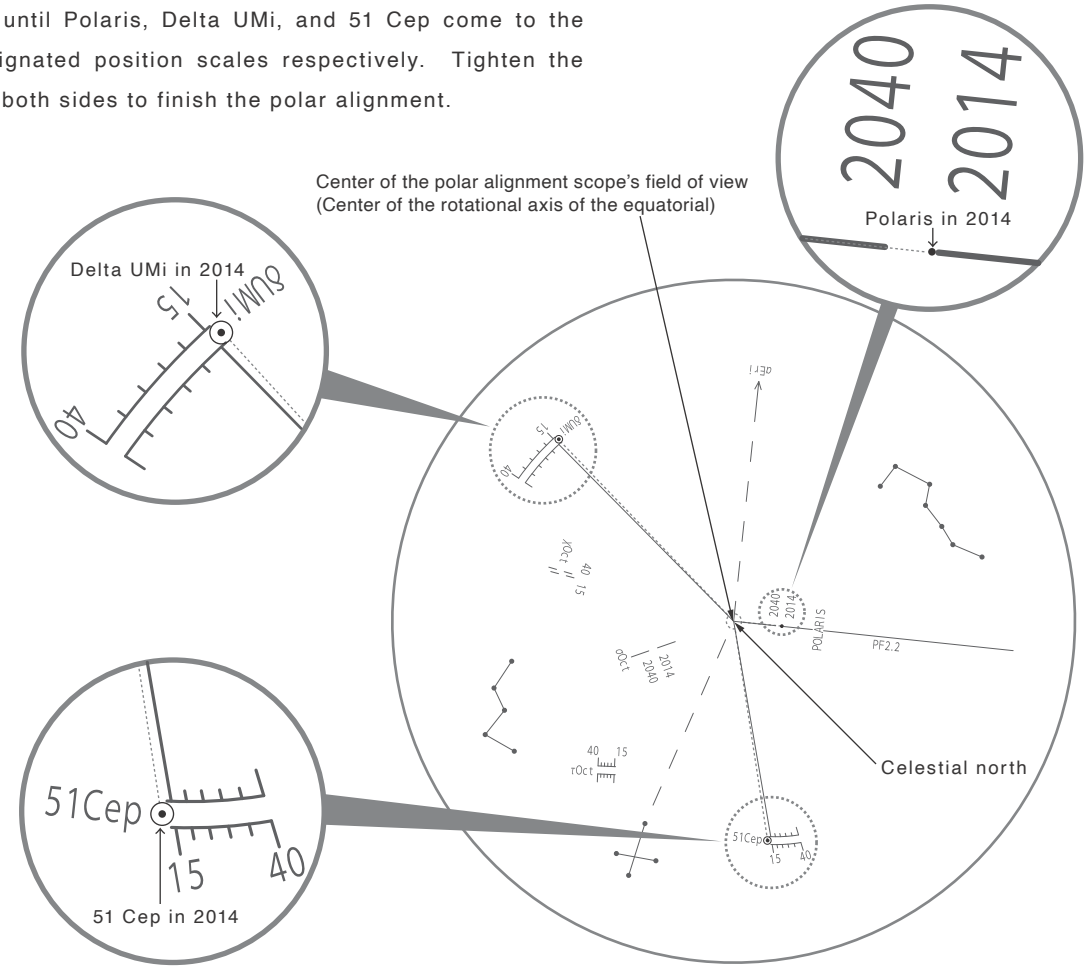
Correcting the position of Polaris with the altitude adjustment bolt and azimuth adjustment knobs

Correcting the position of Delta UMi and 51 Cep with a rotation of the polar alignment scope



Set Polaris to an approximate position corresponding to the year of your observation.

7 Repeat procedures 5 and 6 until Polaris, Delta UMi, and 51 Cep come to the proper locations on the designated position scales respectively. Tighten the azimuth adjustment knobs at both sides to finish the polar alignment.

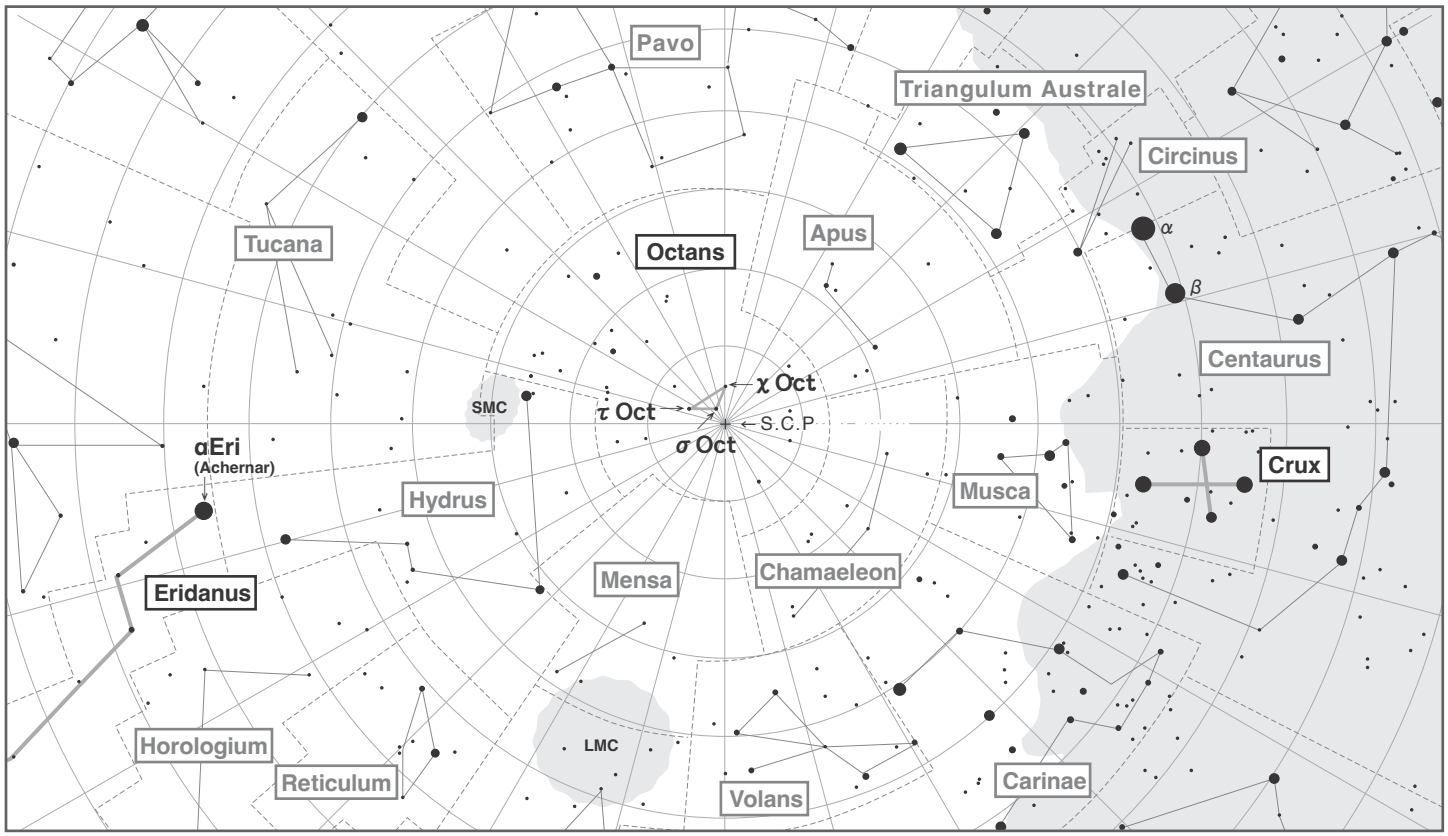


As an illustration here, Polaris is set to the edge of the line on the side of 2014, and both Delta UMI and 51 Cep are set to the middle of the curved lines of the position scale at the protruded edge on the side of 15 respectively. (In the case of the year 2014)

APPLICATION

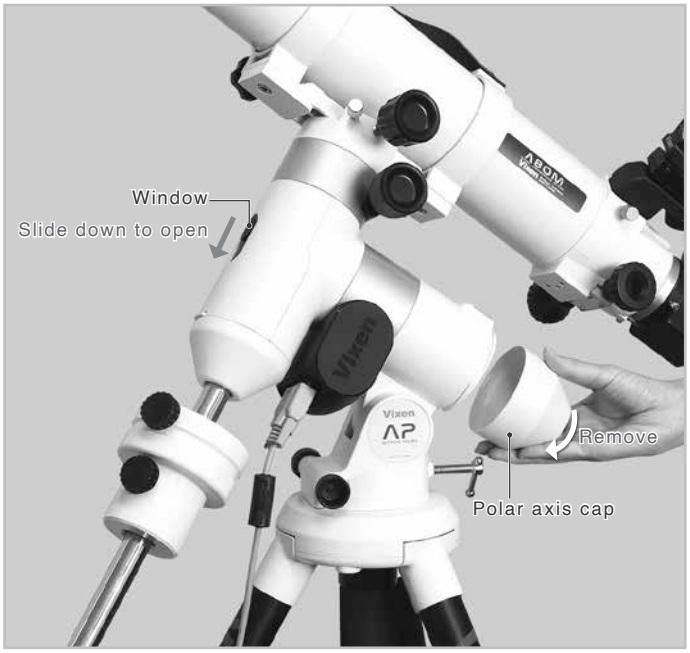
Polar Alignment in the Southern Hemisphere

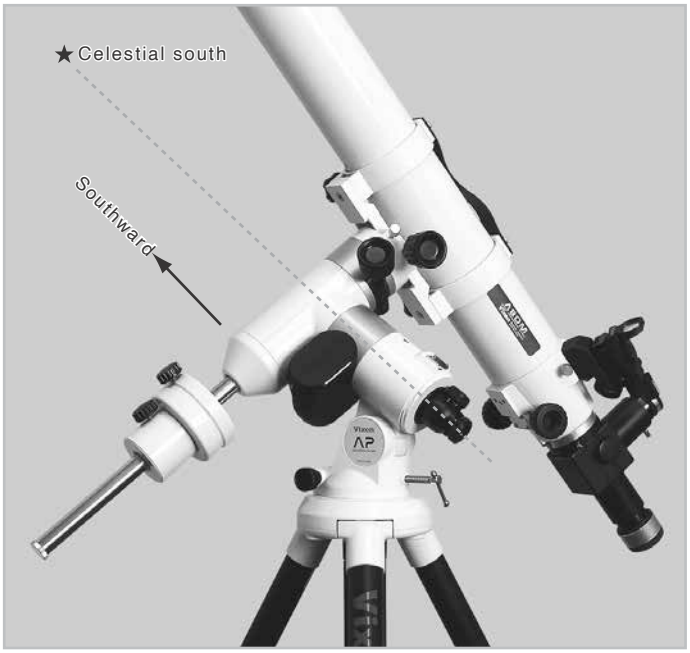
The polar axis of the AP equatorial mount is aligned to the South Celestial Pole in the southern hemisphere. The polar alignment scope utilizes 3 stars of Sigma Octantis, Tau Octantis, and Chi Octantis near the South Pole. The positions of these stars are plotted on the reticle of the polar alignment scope. To locate the S.C.P., you match the scale positions on the reticle with the designated 3 stars caught by the polar alignment scope. Patterns of the Southern Cross and Alpha Eridani are engraved on the reticle to serve as a guidepost for the South Celestial Pole.



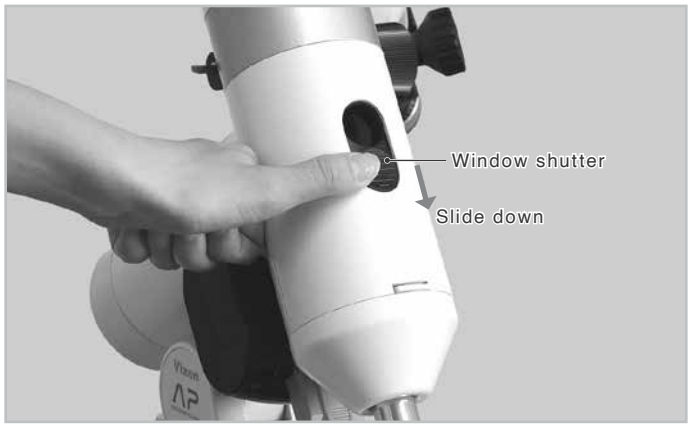
1 Check your observing site with a compass, a GPS, or a map in advance to confirm that Octans, the Southern Cross, and Alpha Eridani can be seen from your observation location on the observation date.

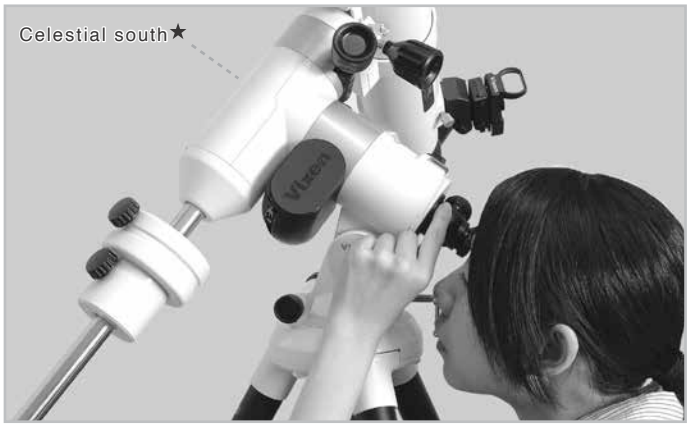
2 Set up the mount on flat, hard ground where you can see Octans in the sky. Take off the polar axis cap. Point the polar axis on the mount to the north as shown in the figure. Adjust the tripod legs so that the tripod is as level as possible.

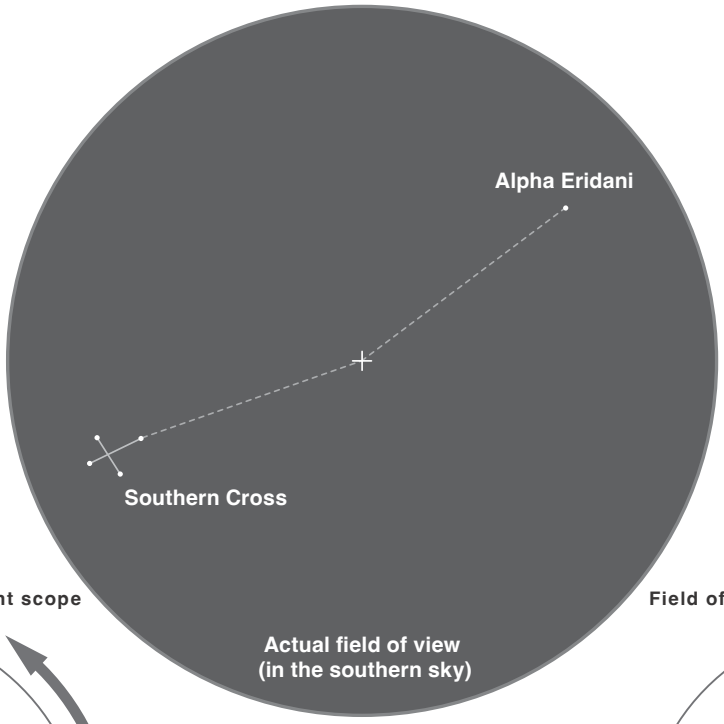




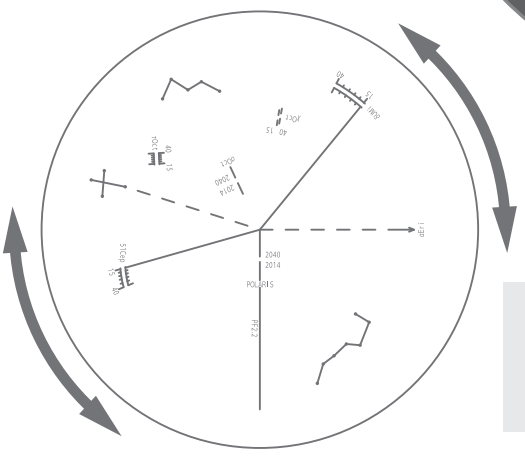
3 Open the round polar window on the declination body by sliding down the window's shutter. While looking into the polar alignment scope, turn the polar alignment scope body so that the engraved Southern Cross (or Alpha Eridani) on the reticle directs the Southern Cross (or Alpha Eridani) in the real sky.





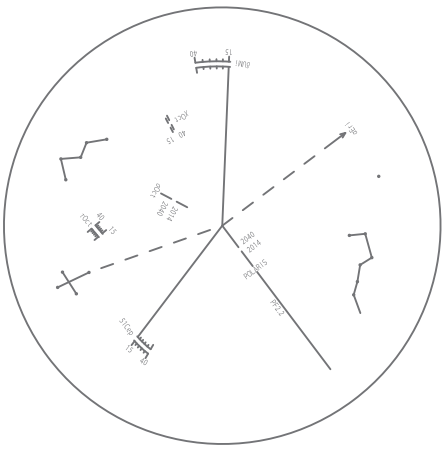


Field of view of the polar alignment scope



Note: The actual stars of the Southern Cross (or Alpha Eridani) are not visible in the field of view of the polar alignment scope.

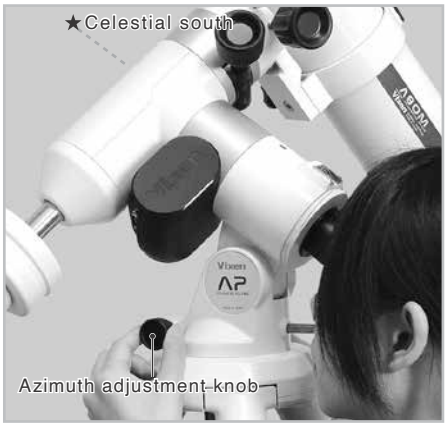
Field of view of the polar alignment scope

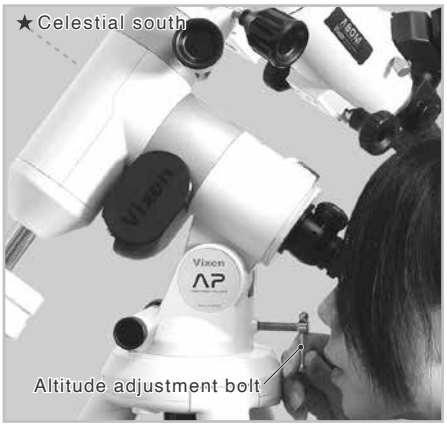


The Southern Cross and Alpha Eridani on the reticle are positioned to correspond to the actual sky. They are used as a guidepost to know the turning direction of the polar alignment scope's reticle. The locations of the Southern Cross and Alpha Eridani on the reticle have no relation to the locations of the Octantis stars on the reticle.

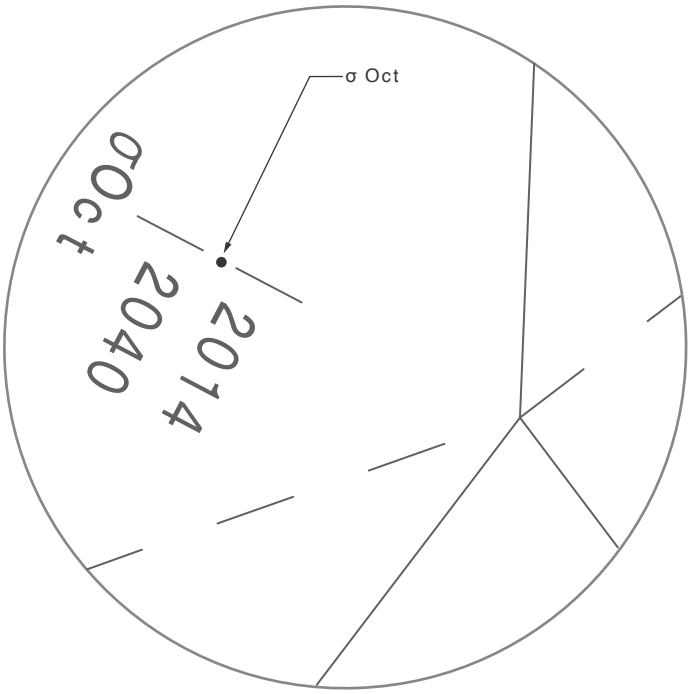
APPLICATION

4 While looking into the eyepiece of the polar alignment scope, adjust the direction of the mount by turning the altitude adjustment bolt and azimuth adjustment knobs so that Sigma Octantis comes as close as possible to the designated position on the reticle.



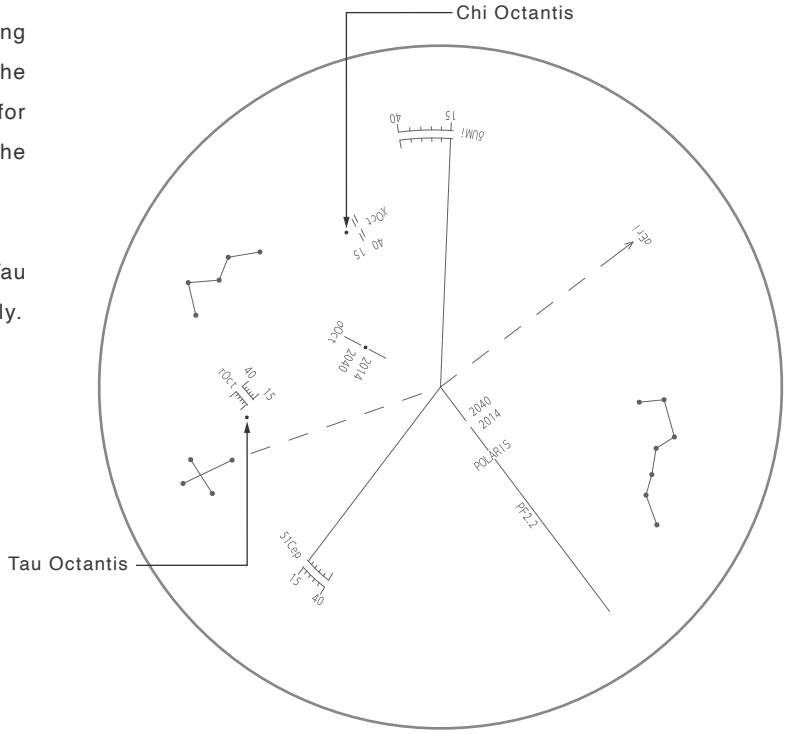


Set Sigma Octantis to the gap between the two segments of the lines marked 2014 and 2040 adjacent to a mark “σ Oct” as shown in the figure.



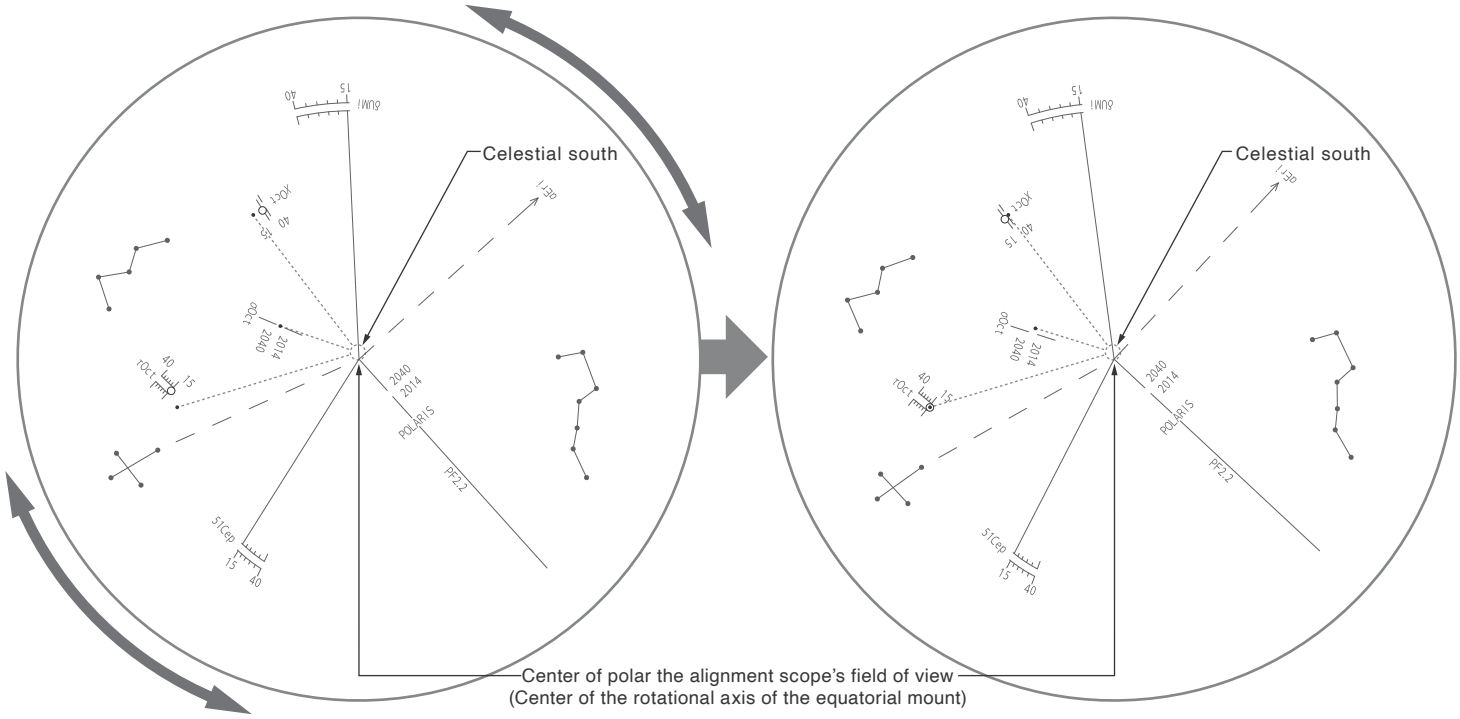
5 As Sigma Octantis shifts to the designated position on the reticle, both Tau Octantis and Chi Octantis come close to their designated position scales respectively. While looking into the eyepiece of the polar alignment scope, turn the polar alignment scope body so that the position scales for Tau Octantis and Chi Octantis come to the closest to the actual Tau Octantis and Chi Octantis respectively.

The numbers 15 and 40 on the position scales for Tau Octantis and Chi Octantis show 2014 and 2040 respectively.



APPLICATION

Now, Sigma Octantis gets out of place from the designated positions, but there is no need to correct it, at this stage.

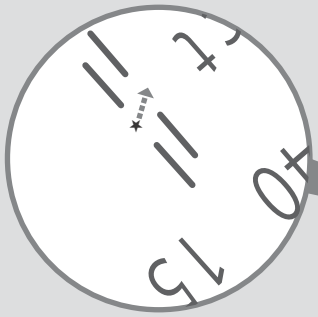


Since no marks point at the South Celestial Pole, you need to match the polar axis of your AP equatorial mount with the S.C.P. using the relatively dim Octantis stars in the neighborhood. This is called polar alignment.

As an illustration here, Sigma Octantis is set to the edge of the line on the side of 2014, and both Tau Octantis and Chi Octantis are set to the middle of the curved lines of the position scale at the protruded edge on the side of 15 respectively. (In the case of the year 2014)

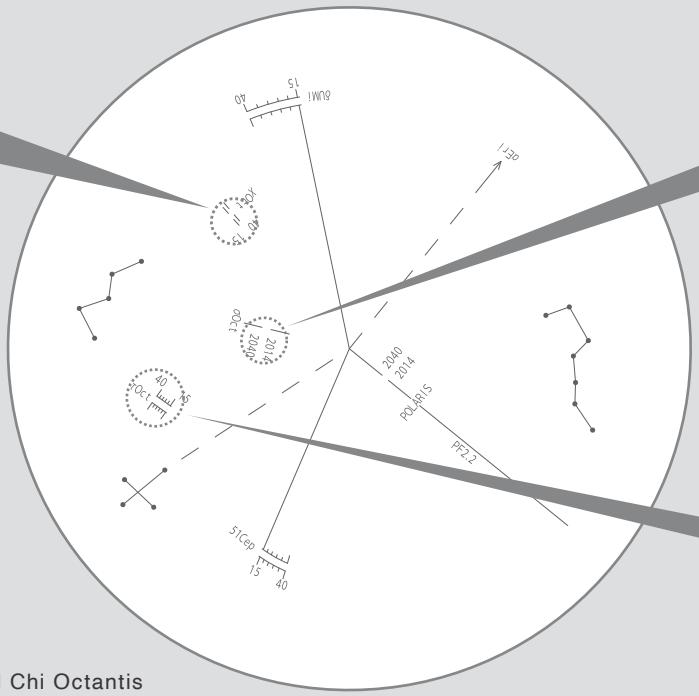
Turn the polar alignment scope body so that Tau Octantis comes near the location of the year 2014 on the scale. And then, Sigma Octantis will get out of position from the gap between the lines.

Adjust the red light illumination to be dimmer if the reticle is too bright to see the 5th magnitude Tau Octantis.



The movement of Chi Octantis
from 2014 to 2040 by precession

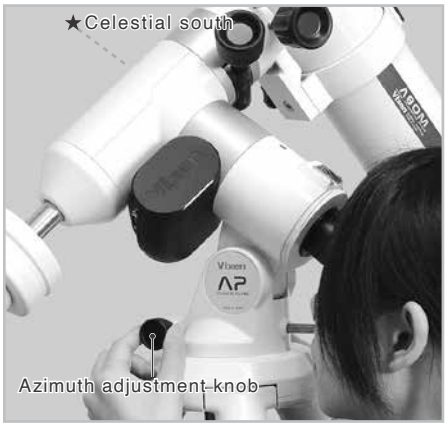
The movement of Sigma Octantis
from 2014 to 2040 by precession

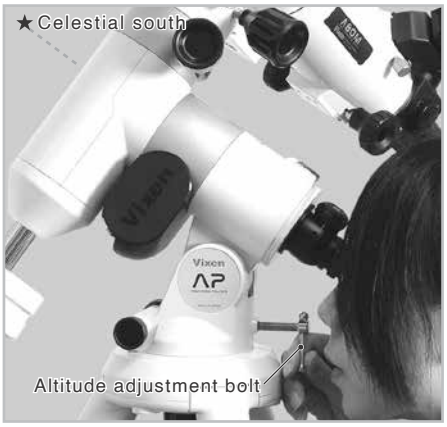


The movement of Tau Octantis
from 2014 to 2040 by precession

The locations of Sigma, Tau, and Chi Octantis
on the position scales change year by year due to the precession of the Earth.
You need to compensate the locations of the 3 stars on the position scales yearly.

6 While looking into the eyepiece of the polar alignment scope, turn the altitude adjustment bolt and azimuth adjustment knobs so that Sigma Octantis comes to the gap between the two segments of the lines marked 2014 and 2040

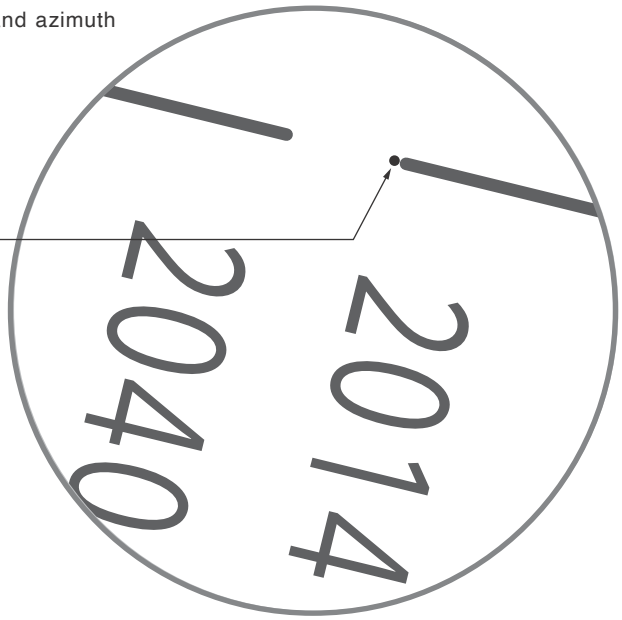




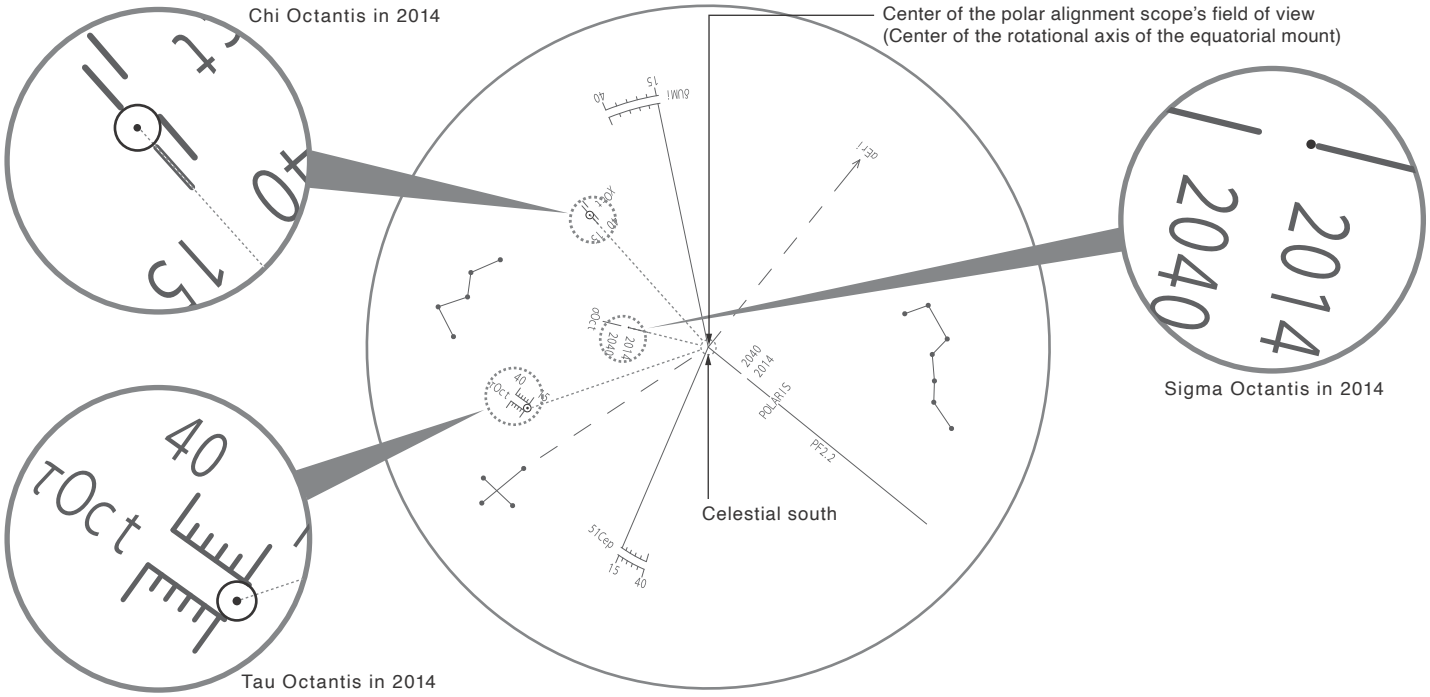
Correcting the position of Sigma Octantis with the altitude adjustment bolt and azimuth adjustment knobs

Correcting the position of Tau and Chi Octantis with a rotation of the polar alignment scope.

Set Sigma Octantis to an approximate position corresponding to the year of your observation.



7 Repeat procedures 5 and 6 until Sigma, Tau, and Chi Octantis come to the proper locations on the designated position scales respectively. Tighten the azimuth adjustment knobs at both sides to finish the polar alignment.

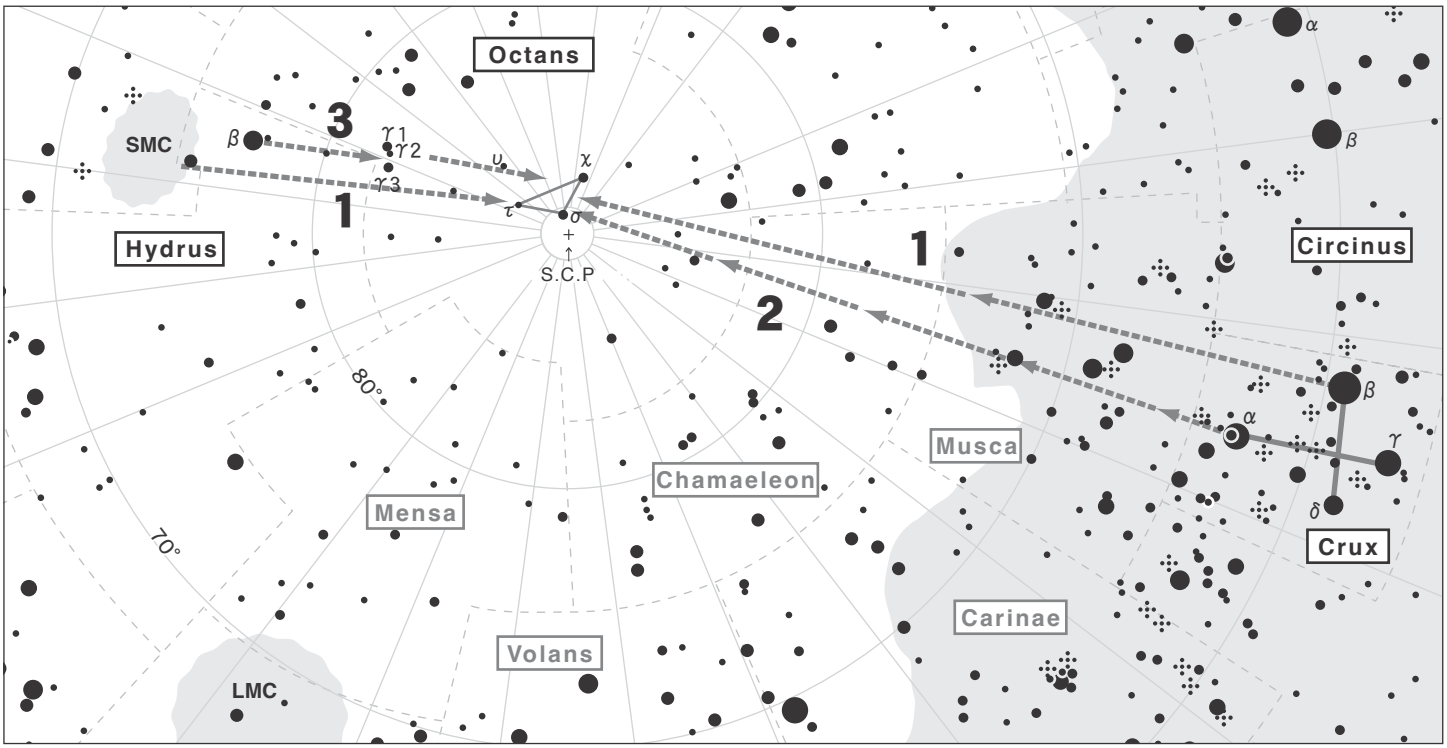


As an illustration here, Sigma Octantis is set to the edge of the line on the side of 2014, and both Tau and Chi Octantis are set to the middle of the curved lines of the position scale at the protruded edge on the side of 15 respectively. (In the case of the year 2014)

APPLICATION

Tips on Finding Octans

The constellation Octans is made up of dark stars about 5th magnitude on average. The nearest star to the south celestial pole is Sigma Octantis, one of four stars forming a trapezoid in Octans, visible at 5.5th magnitude. There are a few methods to locate inconspicuous Octans using the surrounding stars.



Note: The orientation of Octans changes depending on the season of year.

1. Directing to Octans using Small Magellanic Cloud and the Southern Cross (Crux) as pointers

Draw an imaginary line between the center of Small Magellanic Cloud and Beta Crux, and divide it at a ratio of one to two. You will find the four stars of Octans at the divide.

2. Directing to Octans using the arrangement of stars in the Southern Cross (Crux) as pointers

Draw an imaginary line straight through the two stars (Alpha and Beta Crux) of the Southern Cross making the vertical line of the cross toward Small Magellanic Cloud. You will find the four stars of Octans at a place about 4.5 times extended from the span of the two stars.

3. Directing to Octans using Small Magellanic Cloud, Beta Hydrus, and Gamma Octantis as pointers

If you cast your eyes toward Crux from the Small Magellanic Cloud, you will see Beta Hydrus. Going southward from Beta Hydrus you will find Gamma Octans, which consists of a row of three stars. Continue with your eye by the same distance toward the Southern Cross and you will find the four stars of Octans.

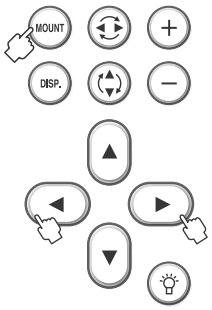
APPLICATION

Change Settings on the Mount / Controller

STAR BOOK ONE controller menus allow you to change your desired settings on the mount (and controller)

Mount Menu

Pressing the MOUNT button will turn up the brightness of the button itself and you are ready to access various Mount menus using the direction keys. At the same time, the direction keys for slewing the mount are disabled except for adjustments in the duration of a PEC recording. Press the MOUNT button again to return to slewing with the direction keys. The brightness of the MOUNT button dims. The new settings are saved to the flash memory.



Your settings are not saved in the following condition:

* Turn OFF the power without completing saving.
* Recorded PEC data are not saved if you shut off the power.

Tracking Speed

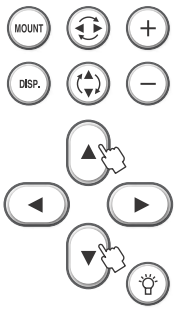
This allows for changing the tracking speed. The setting is defaulted to “Star”.

Procedure:

Pressing the MOUNT button will turn up the brightness of that button, and you are ready to access subsidiary menus. The subsidiary menu will appear on the screen anytime you press the left or right direction key. Display the “TrackSpd” to save the tracking speed setting.

Press the up or down direction key to choose your desired tracking speed other than the sidereal rate (“Star). The new tracking speed is saved as indicated.

The following tracking speeds are available.



Sidereal rate:

Kings rate (mean sidereal time):
Atmospheric refraction is compensated in the Kings rate.

Lunar rate (mean lunar time):

Solar rate (mean solar time):

Different tracking speeds:

You can accelerate the tracking speed from the sidereal rate. The moving speed varies from 0.1 to 10 times the sidereal rate. Variable tracking speeds are available in three ranges, and you can choose your desired steps of speed with the plus or minus button. The setting is defaulted to “X1.0”.

Available tracking speeds and steps:

From X0.1 to X2.0 at 0.1 increments
From X2.0 to X5.0 at 0.5 increments
From X5 to X10 at 1 increment

Stop Tracking:

You can stop tracking when using the telescope to view terrestrial objects in the daytime. Choosing “TrackSpd Stop” with the up or down key will halt the tracking motion.

APPLICATION

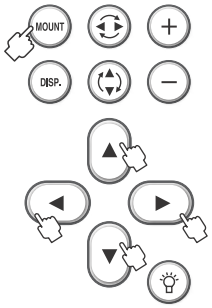
Tracking Direction

The slewing direction of a telescope differs in the northern and southern hemispheres. This allows for changing the rotation of the motors to slew the telescope correctly in your observing site. The default setting is motion in the northern hemisphere “TrackDir N Hemis”.

Procedure:

Pressing the MOUNT button will turn up that button brightly and you are ready to choose subsidiary menus. The subsidiary menu will appear as you press the left or right direction key. Display the “TrackDir N Hemis” if your observation site is in the northern hemisphere.

If you use the AP mount in the southern hemisphere, you need to revise the rotation of the motor. Display the “TrackDir S Hemis” on the screen with the up or down direction key and choose it.



Setting in the Northern Hemisphere:

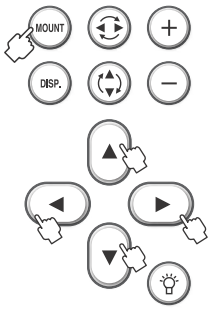
Setting in the Southern Hemisphere:

Different Slewing Speeds

Change slewing speed using the plus or minus button. The slewing speed can be chosen from a preset 4-speed range or different speed ranges from the listed slewing speeds. The setting is defaulted to “Slew 4-Speed”.

Procedure:

Pressing the MOUNT button will turn up that button brightly and you are ready to choose subsidiary menus. The subsidiary menu will appear as you press the left or right direction key. Display the “Slew 4-Speed” and save the slewing speed setting.



The slewing speed can be chosen between the preset “Slew 4-Speed” and choosing “Slew VariSpd” each time you press the up or down direction key (or the plus or minus button). A new slewing speed as indicated is saved.

Slewing at four defined speeds:

X0.5, X1.0, X8 and X60 of sidereal rate

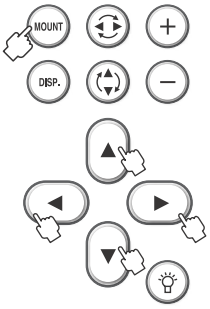
Slewing at your preferred speed variation from the following ranges:

X0.5 to X2.0	at 0.1 increments
X2.0 to X5.0	at 0.5 increments
X5 to X10	at 1 increment
X10 to X30	at 5 increments
X30 to X60	at 10 increments

APPLICATION

Backlash Compensation

Backlash is a momentary stoppage of the tracking motion of the mount that occurs when the motor gears reverse their rotation. The backlash does not generate while the mount continues tracking at a constant speed as the gears keep in contact with each other. However, it may occur when the telescope is slewed at different speeds.



The backlash compensation minimizes time lag at the point of reversed motion where the gears lose contact. That provides a smoother rotation of the gears on the mount.

Too much tight engagement of the gears will halt the rotation. Make sure that there is slight play.

Note:

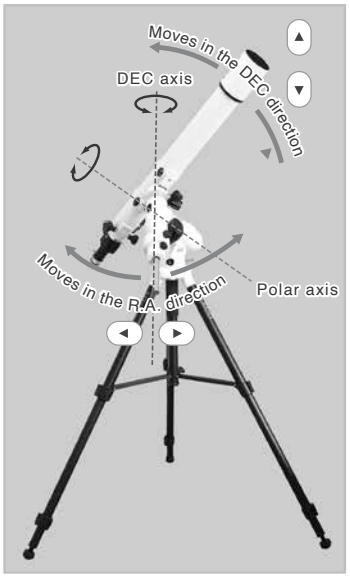
* Backlash compensation is not compatible with an autoguider in most cases. Cancel using this option when you use an autoguider.

First, Checking the Backlash

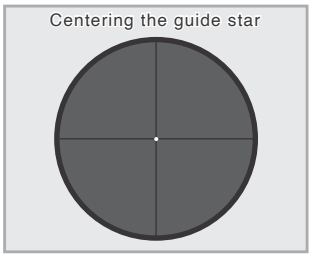
Using a bright 1st magnitude star is convenient and easier to check the backlash amount for compensation.

Procedure:

1 Precisely polar align the mount.



2 Center a bright 1st or 2nd magnitude star in the field of view of your eyepiece.



3 Press the MOUNT button and call up “Slewing Speed” in the Mount menu to choose the “Slew VariSpd”.

4 Press the MOUNT button to make the direction keys available. Set up the slewing speed between X1.2 and X4.0 with a plus or minus button.

5 Pressing the MOUNT button will turn up that button brightly and you are ready to choose subsidiary menus. The subsidiary menu will appear as you press the left or right direction key. Display the “Backlash X or Y” (X = RA and Y = DEC)” with the left or right direction key. The settings are done individually. The settings for backlash compensation are defaulted to “X: 0, Y: 0”. This manual describes the setting of RA first, but you can start from either direction, RA or DEC.

Pressing the up or down key will increase or decrease the value by 10 increments and pressing the plus or minus button will increase or decrease by one increment. The values for the backlash compensation are available between 0 and 99 in RA and DEC.

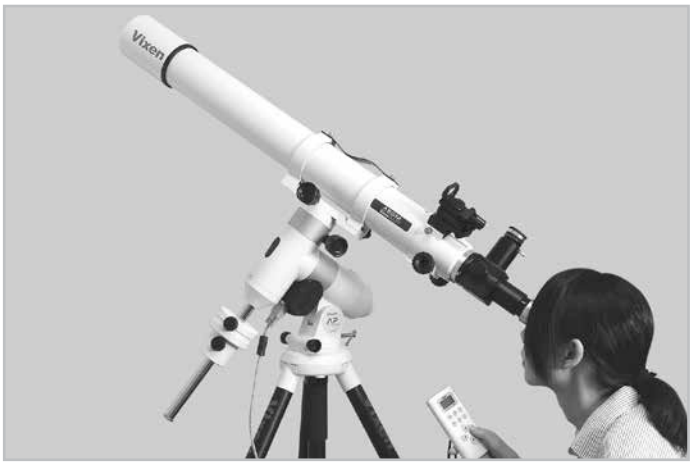
6 Press the MOUNT button to make the direction keys available. Confirm the amount of backlash in the direction of RA.

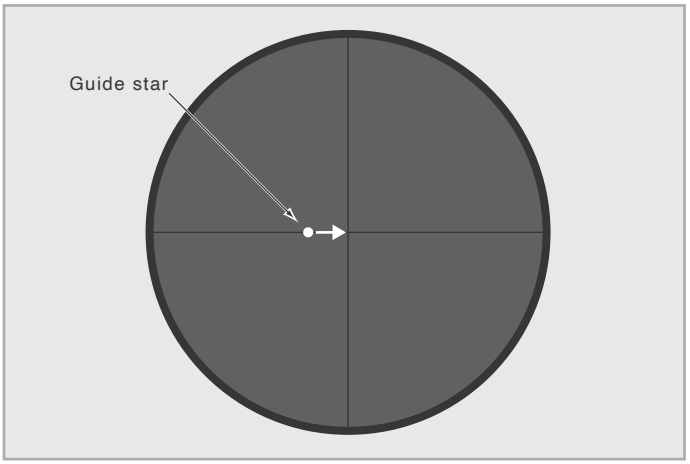
Center the star in the field of view of your eyepiece and watch how the star moves while pressing the left direction key. Keep pressing the direction key until the star begins to move.

Next, press the right direction key to watch how the star moves in the field of view.

If there is a time lag and the star does not begin to move instantly toward the direction you press, the value for the backlash compensation is too small (weak).

On the contrary, if the star begins to move quickly and largely at the same time you press, the value for the backlash compensation is too big (strong).





7 Confirm the amount of backlash in the direction of DEC in the same way using the left and right keys.

Tips on Backlash Compensation Settings

Watch how the telescope moves when you increase the value. Start with setting an initial reference value (10 for example), and double this value after checking the telescope movement with the initial value. If the second value (= 20) is too small to compensate for the backlash, enter the number doubled (= 40) as the second value. Likewise, increase the number by doubling the value if necessary.

Example: Enter 20 for the backlash compensation.
If this value is too small for the compensation, increase the value to 40. If it generates too much compensation, decrease the value halfway between 20 and 40. If the value of 30 is still somewhat bigger for compensation, depress the value to 25. On the contrary, if 30 is smaller, increase to 35. In this manner, you can adjust the mount for the most effective backlash compensation.

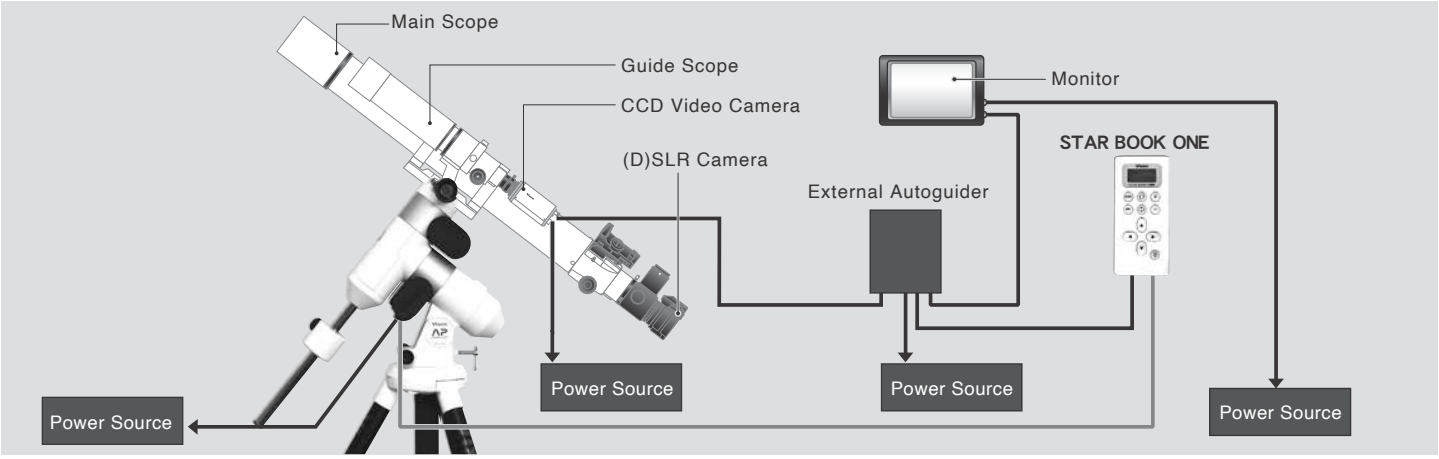
Backlash compensation is not compatible with an autoguider in most cases. Set the values to “0” in RA and DEC when you use the autoguider.

APPLICATION

Settings for Autoguider

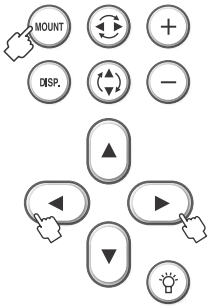
The STAR BOOK ONE can be used for auto-guiding combined with an external autoguiding system compatible with the SBIG autoguiders. Available setting rates for compensating guide errors are described here.

Auto-guiding allows you to automatically guide a telescope on an equatorial mount using an autoguider, which translates signals from a CCD video camera mounted on a guide scope, to achieve uniform and precise tracking speed with the mount. The advantages of the autoguider are most apparent during long exposure astrophotography.



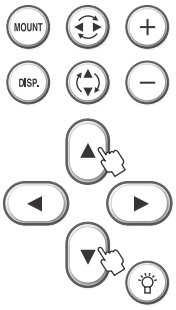
Procedure:

1 Pressing the MOUNT button will turn up that button brightly and you are ready to choose subsidiary menus. The subsidiary menu will appear as you press the left or right direction key. Display the "A. Guide X or Y" (X = RA and Y = DEC)" with the left or right direction key. The settings are done individually. The settings to the autoguider are defaulted to "X: 10, Y: 10". This manual describes the setting of RA first, but you can start from either direction, RA or DEC.



2 Pressing the up or down key will increase or decrease the value by 10 increments and pressing the plus or minus button will increase or decrease by one increment. The values for the autoguider are available between 0 and 99 in RA and DEC. New values as indicated are saved.

It is not recommended for use with backlash compensation. It may cause interference with tracking.



Setting Rates for Compensation

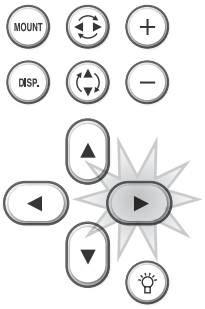
The values for compensation can be set between 0 and 99 in one increment both in RA and DEC (0.1X of sidereal rate). Enter a smaller value if you move slower to make a small compensation, or enter a larger value if you move faster to make a large compensation.

0 : Keep sidereal rate (No compensation is made.)
1 : ±0.1X of sidereal rate
2 : ±0.2X of sidereal rate
3: ±0.3X of sidereal rate
≀ ≀ ≀ ≀ ≀
99: ±9.9X of sidereal rate

The optimum value for the compensation may vary according to the equipment used. Choose the most effective rate to make your autoguiding smoothest.

The direction keys are available to move the mount while this position is used.

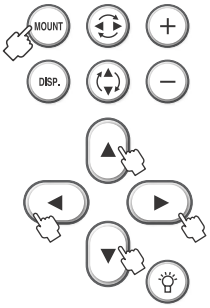
If autoguiding signals are detected, the direction key corresponding to the input signal will light to inform the status of the operation visually.



APPLICATION

PEC (Periodic Error Correction)

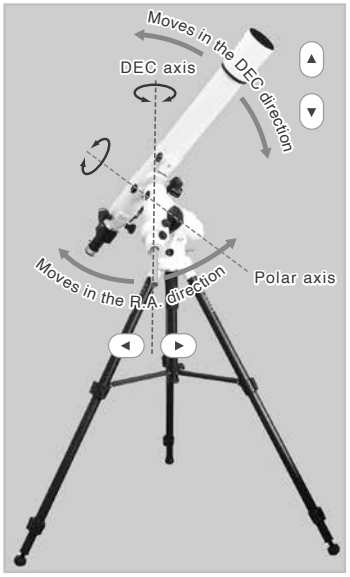
Equatorial mounts with drive motors are to follow the motion of celestial objects correctly. With the use of a telescope mounted on the equatorial mount, you may notice that stars in the field of view of the telescope at high magnification are drifting back and forth very slowly over a certain period (e.g. 600 seconds with the AP mount) in the direction of R.A. This is caused by the motion of the tracking gear wheels incorporated in the equatorial mounts. The PEC (periodic error correction) rectifies this phenomenon on the equatorial mount and records the correction electronically.



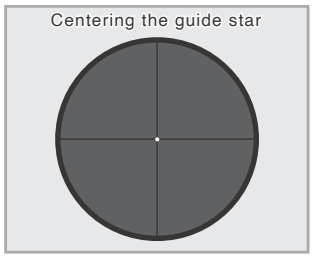
Tracking accuracy varies in irregular motion and must be corrected as precisely as possible.

Starting the PEC Recording

1 Precisely polar align the mount.



2 Prepare an eyepiece with crosshairs. Center a moderate star in the field of view of the eyepiece. Put high magnification as high as 200X and more.

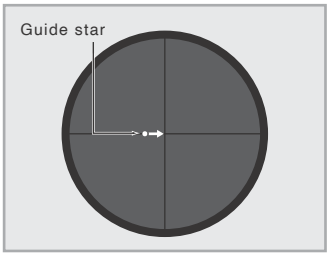


3 Pressing the MOUNT button will turn up that button brightly and you are ready to choose subsidiary menus. The subsidiary menu will appear as you press the left or right direction key. Display "PEC No Data" with the left or right direction key.

4 Pressing the up or down key will advance the display to "PEC StrtRec?" and the plus and minus buttons will blink.

5 Press the + button to start a PEC recording. The time for the PEC recording is 10 minutes (600 seconds). On commencing the PEC recording, the counter starts from 600 (599), counts down every second to 0, and repeats. The speed of corrections with the left or right direction key is fixed at 0.5 times the sidereal rate. To cancel the menu, press the minus button.

6 As you monitor the star in the field of view, it begins to shift away from the center of the crosshairs in the direction of the RA tracking. At the point of time where the deviation is apparent, bring the star back to the center of the crosshairs with the left or right direction key for correction.



7 A cycle of the PEC recording ends as the 600 seconds have elapsed, but the duration of the recording lasts until you stop it. The old recording data is overridden by new ones.

Note: Be sure to continue for 10 minutes or more to complete one cycle of the PEC recording.

APPLICATION

Stopping the PEC Recording

1 Press the MOUNT or DISPLAY button to stop the PEC recording. The dialogue “PEC StopRec” appears on the display and press the + button to stop. Pressing the minus button will cancel the dialogue and continue the PEC recording.

2 If the PEC recording is stopped, only the ongoing record of the current cycle is cleared.

If the PEC recording goes more than one cycle before you stop, playback will start at the same time you stop it and the numbers will be counted down every second.

3 Pressing the MOUNT button will allow you to adjust the mount with the direction keys while the PEC recording is played back. The countdown remains displayed as it is.

4 If less than one cycle is recorded before you stop, the PEC recording is cleared and not saved for play back.

Resuming in the Playback Status

Resuming the PEC recording or stopping the playback.

1 Display “PEC ●●● Play” during the playback status of the PEC (The MOUNT button is turned up brightly.). ●●●are arbitrary numbers.

2 The “PEC StopPly?” or “PEC StrtRec?” appears in the menu alternately as you press the up （or down） direction key each time.

Choose “PEC StrtRec?” and press the + button to resume the recording of the PEC. To stop the PEC playback, choose “StopPly?” and press the + button.

To cancel the menu, press the minus button.

Resuming in the Stop Status

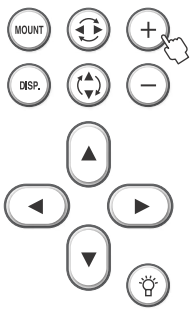
Resume the playback/erasing/recording/ of the PEC.

1 Display “PEC StopPlay?” while stopping the PEC (The MOUNT button is brightened stronger.).

2 The “PEC StrtPlay?” or “PEC StrtRec?” or “PEC Delete?” appears in a cycle in the menu as you press the up （or minus） direction key each time.

3 Choose “PEC StrtPlay?” and press the + button to resume playback of the PEC. Choose “PEC StrtRec?” and press the + button to resume recording the PEC. Choose “PEC Delete?” and press the + button to resume erasing the PEC. (Turning off the power will erase the recorded PEC, too.)

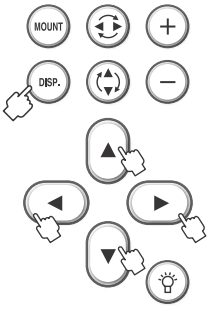
To cancel the menu, press the minus button.



APPLICATION

DISPLAY Menu

Pressing the DISP. button will turn it up brightly and you are ready to access various DISPLAY menus for setting with the direction keys. At the same time, it disables the direction keys from slewing the mount. Press the DISP. button again to return to slewing with the direction keys. The brightness of the DISP. button dims. A new setting is saved to the flash memory.



Contrast Adjustment

This allows for adjusting the contrast of the LCD screen of the STAR BOOK ONE controller. The contrast is adjustable between 1 (low) and 10 (high). The setting is defaulted to “07”.

Procedure:

1 Pressing the DISP. button will turn up the brightness of that button and you are ready to choose subsidiary menus. The subsidiary menus appear as you press the left or right direction key. Display “Contrast LCD” to confirm the contrast adjustment setting.

2 Pressing the up or down direction key will increase or decrease the value to set and adjust to your desired contrast setting. A new setting as indicated is saved.

Brightness Adjustment

This allows you to adjust the brightness of the LCD screen on the STR BOOK ONE controller. The brightness is adjustable between 1 (low) and 10 (high). The setting is defaulted to “07”.

Procedure:

1 Pressing the DISP. button will turn up that button brightly and you are ready to choose a subsidiary menu from the Display menu. The subsidiary menus appear as you press the left or right direction key. Display “Bright LCD” to save the brightness adjustment setting.

2 Pressing the up or down direction key will increase or decrease the value to set and adjust to your desired brightness setting. The new setting is saved as indicated.

Backlight Adjustment

This allows for adjusting the backlight of the keys and buttons on the controller. The backlight is adjustable between 1 (low) and 10 (high). The setting is defaulted to “07”.

Procedure:

1 Pressing the DISP. button will turn up the brightness of that button and enable you to choose a subsidiary menu from the DISPLAY menu. The subsidiary menus appear as you press the left or right direction key. Display “Bright Key” to save the backlight adjustment setting.

2 Pressing the up or down direction key will increase or decrease the value to set and adjust to your desired backlight setting. The new setting is saved as indicated.

APPLICATION

Red LED Light Adjustment

This allows you to adjust the brightness of the red LED light on the back of the STAR BOOK ONE controller. The brightness is adjustable between 1 (low) and 10 (high). The setting is defaulted to “07”.

Procedure:

1 Pressing the LED light button will turn up that button brightly and turn ON the red LED light.

2 Pressing the DISP. button will turn up that button brightly and you are ready to choose a subsidiary menu from the Display menu. The subsidiary menus appear as you press the left or right direction key. Display “Bright Lamp” to save the red LED light adjustment setting.

3 Pressing the up or down direction key will increase or decrease the value to set and adjust to your desired brightness setting. The new setting is saved as indicated.

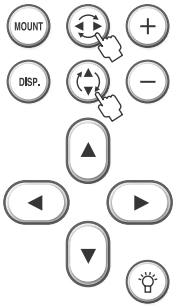
Other Functions

Field of View Orientation

When you try to put your target celestial object in the center of the eyepiece’s field of view on your telescope at high magnification, you may occasionally move the telescope to an opposite direction due to a misleading orientation in the eyepiece’s field of view when you use a mirror diagonal, for example. This feature allows you to reverse the direction of the direction keys instantly.

Pressing the RA Reverse button will turn up the brightness of the button itself and you are ready to reverse the direction of the RA so that you can change the tracking orientation in the field of view to an opposite direction. Press the RA Reverse button again, to return the tracking to the original direction.

Pressing the DEC Reverse button will turn up the button itself brightly and you are ready to reverse the direction of the DEC so that you can change the tracking orientation in the field of view to an opposite direction. Press the DEC Reverse button again, to return the tracking to the original direction.



Reset

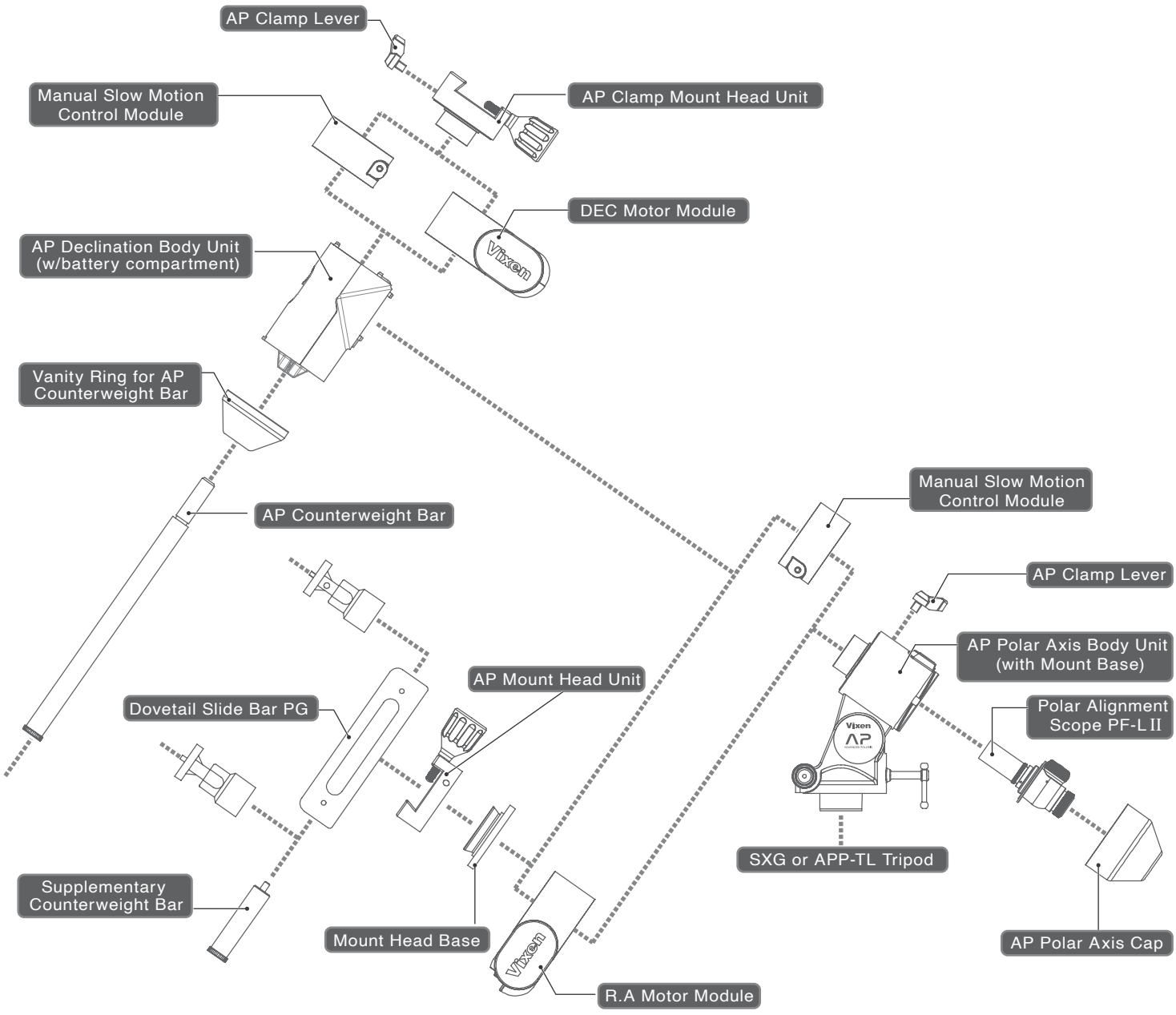
All settings for the AP mount and STAR BOOK ONE controller can be initialized to default settings entered at the Vixen factory. Turning ON the power while pressing the plus and red LED light buttons simultaneously for more than one second will reset the setting values. Preserve your necessary setting values, before you proceed to initialization.

APPLICATION

Modules for the AP Mount

The AP mount is composed of sectional modules and parts. It can be easily rearranged or upgraded to your specific needs.

AP Mount Composition Chart



The polar axis body unit, R.A. motor, and DEC motor modules are designed with internal joint electrical contacts. These modules are ready to connect to your power source when connected.

The R.A. motor module has a controller-connecting and an external power supply ports (USB Micro-B). The R.A. motor module is essential when you use the external power supply.

The AP declination body has a built-in battery compartment as a power source.

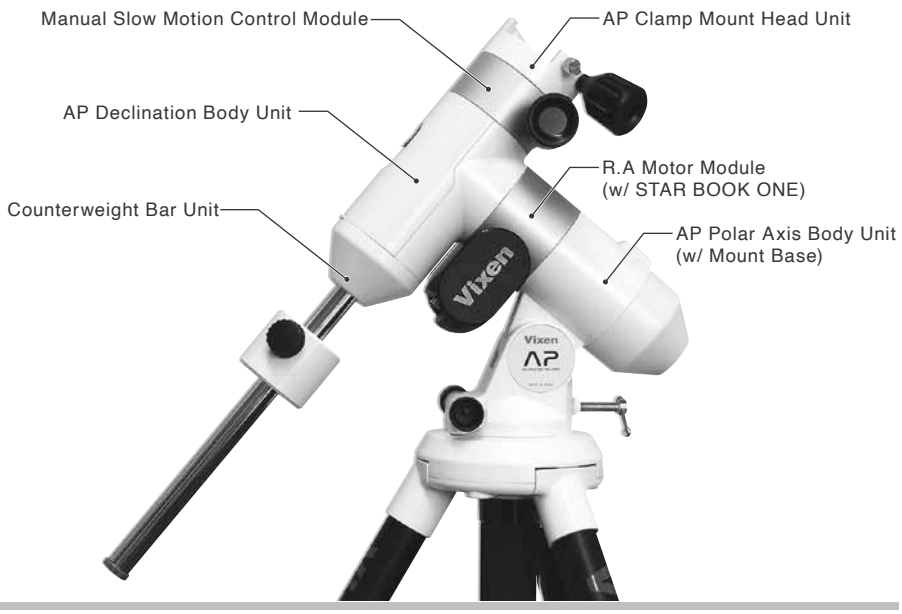
APPLICATION

Variations on the AP Mount

AP Mount with Single-Axis Motor Drive

Composed of:

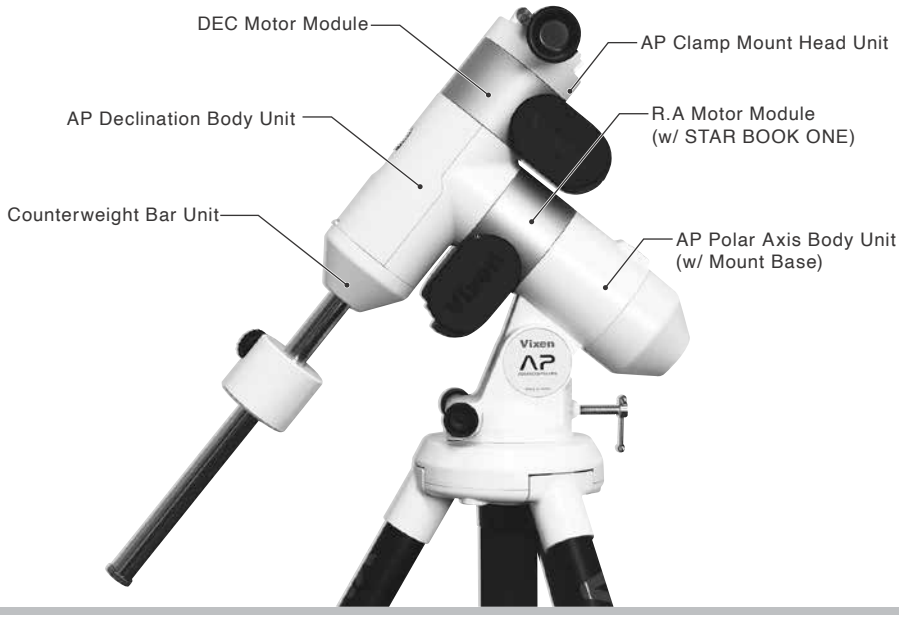
- AP Clamp Mount Head Unit
- \+
- Manual Slow-Motion Control Unit
- \+
- AP Declination Body Unit
- \+
- Counterweight Bar Unit
- \+
- R.A. Motor Module (w/ STAR BOOK ONE)
- \+
- AP Polar Axis Body Unit (w/ Mount Base)



AP Mount with Dual-Axis Motor Drive

Composed of:

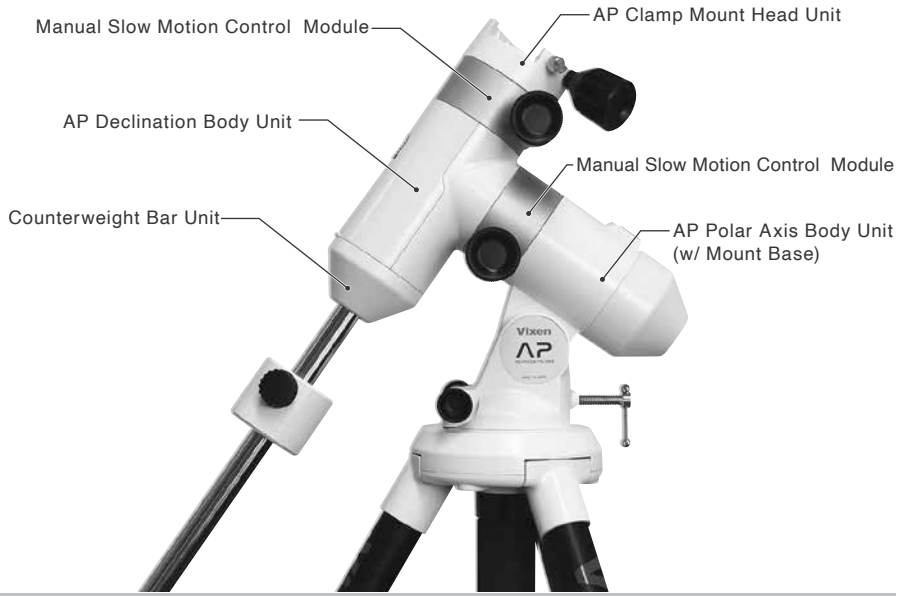
- AP Clamp Mount Head Unit
- \+
- DEC Motor Module
- \+
- AP Declination Body Unit
- \+
- Counterweight Bar Unit
- \+
- R.A. Motor Module (w/ STAR BOOK ONE)
- \+
- AP Polar Axis Body Unit (w/ Mount Base)



AP Mount with Manual Slow Motion Controls

Composed of:

- AP Clamp Mount Head Unit
- \+
- Manual Slow Motion Control Module (x 2)
- \+
- AP Declination Body Unit
- \+
- Counterweight Bar Unit
- \+
- AP Polar Axis Body Unit (w/ Mount Base)



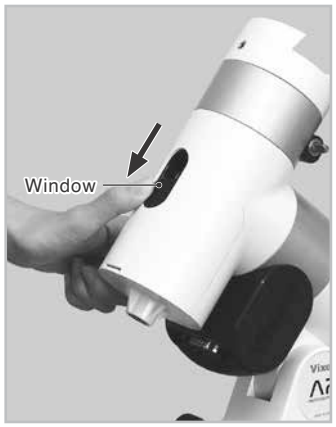
APPLICATION

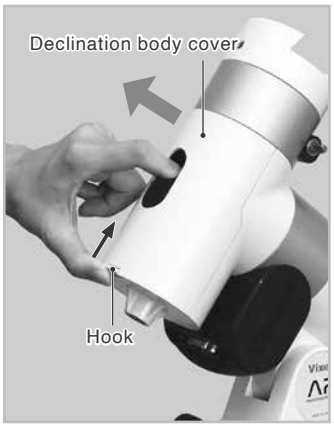
How to Exchange the Modules

Remove the optical tube, counterweight bar, and controller before changing the modules. Take out the batteries from the battery compartment and disconnect the external power supply if it is used.

Example 1: Exchanging the R.A. Motor Module for the Manual Slow-Motion Control Unit

1 Remove the declination body cover.
Open the polar scope window on the declination body by sliding down the shutter. While pushing down on the hook on the bottom of the declination body, pull out the declination body cover by pinching the hook and window hole with your fingers.



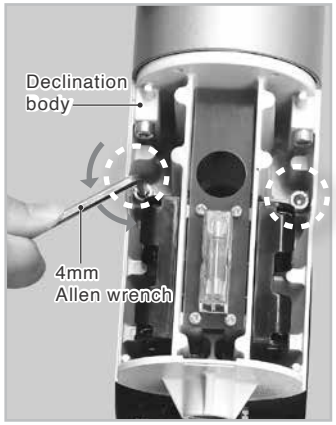


2 Take off the batteries from the declination body. Do not disassemble the mount without removing the batteries. This may cause damage.

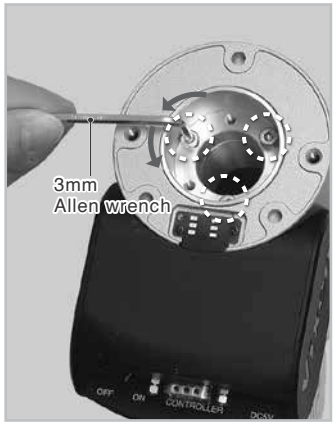
3 Loosen the two socket head cap screws on the declination body as shown in the figure with a 4mm Allen wrench. Remove the declination body assembly. Be sure to hold the declination body securely while loosening the screws.

⚠ Caution:

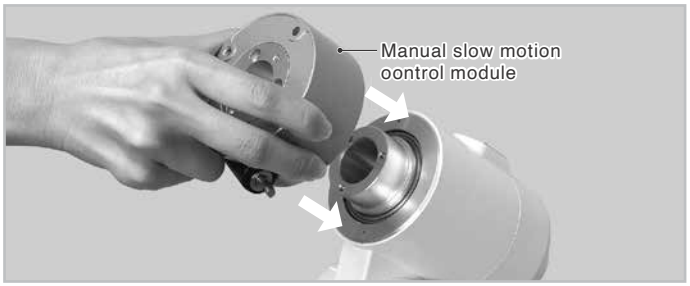
The internal joint electrical contact of the declination body is very delicate. Be careful not to touch it with your fingers or other objects.



4 Loosen the three socket head cap screws on the R.A motor module as shown in the figure with a 3mm Allen wrench. Remove the R.A motor module. Be sure to hold the R.A motor module securely while loosening the screws.

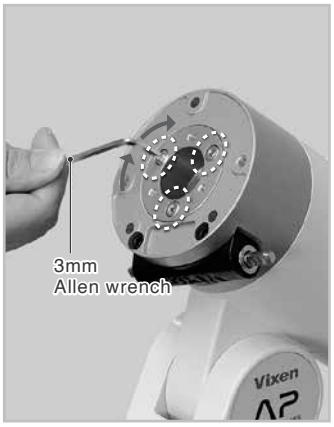


5 Attach the manual slow motion control module onto the polar axis body as shown in the figure so that the center hollow (larger side) of the manual slow motion control module fits snugly onto the center protruded portion of the polar axis body.

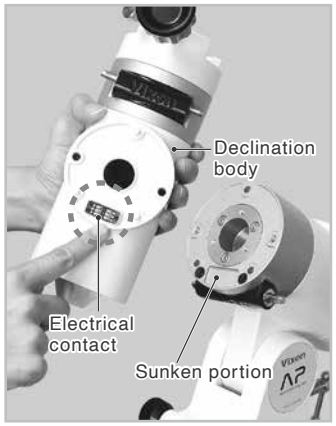


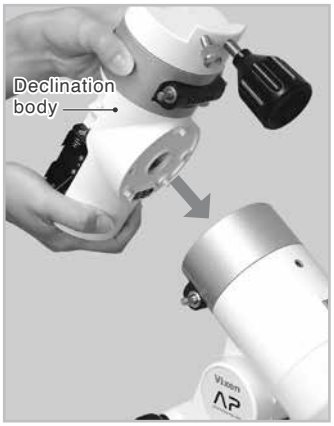
6 Turn the manual slow-motion control unit so that the screw holes (larger holes with no thread) are aligned in tandem. Replace the three socket head cap screws in place.

Tighten the screws with the 3mm Allen wrench securely.

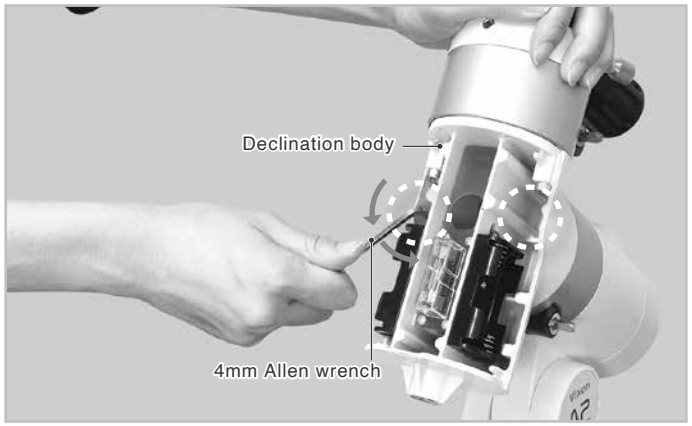


7 Attach the declination body assembly onto the polar axis body assembly so that the electrical contact on the declination body fits the recessed part of the manual slow-motion control unit as shown in the figure.

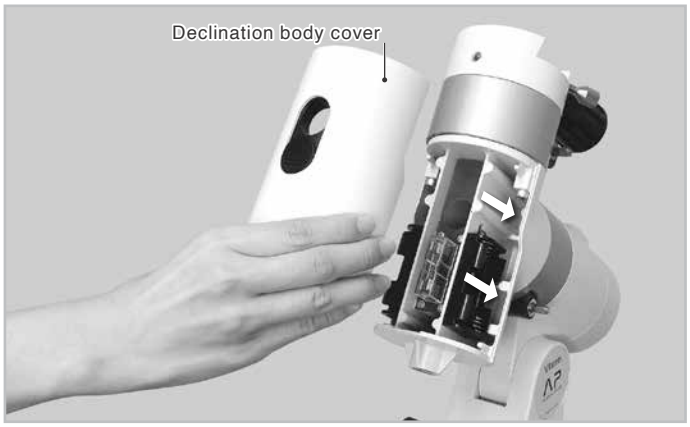




8 Replace the two socket head cap screws that were removed in step 2 above while holding the declination body. Install the batteries, if necessary. Tighten the screws with the 4mm Allen wrench securely.

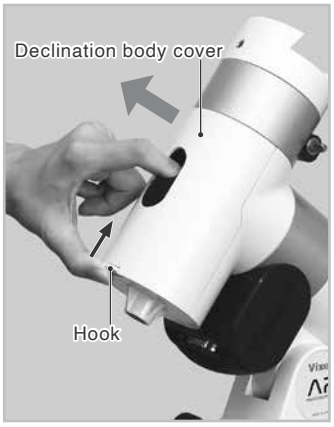


9 Replace the declination body cover (battery compartment cover) with attention to the direction of the hook on the cover.



Example 2: Exchanging the Manual Slow-Motion Control Unit for the DEC. Motor Module

1 Remove the declination body cover.
Open the polar scope window on the declination body by sliding down the shutter. While pushing down on the hook on the bottom of the declination body, pull out the declination body cover by pinching the hook and window hole with your fingers.

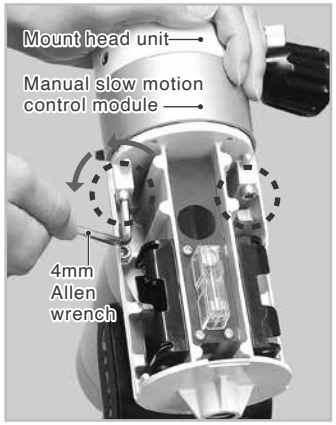


2 Remove the batteries from the declination body. Do not disassemble the mount without removing the batteries. This may cause damage.

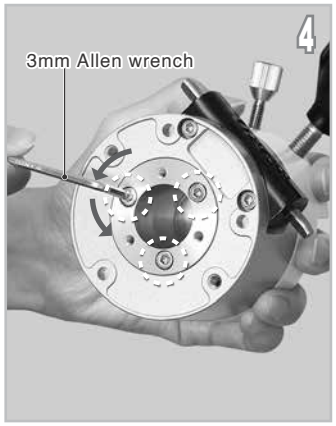
3 Loosen the two socket head cap screws on the top of the declination body as shown in the figure with a 4mm Allen wrench. Remove the manual slow-motion control unit assembly. Be sure to hold the manual slow-motion control unit assembly firmly in hand while loosening the screws.

Caution:

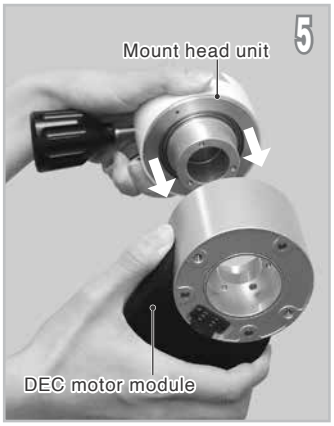
The internal joint electrical contact of the declination body is very delicate. Be careful not to touch it with your fingers or other objects.



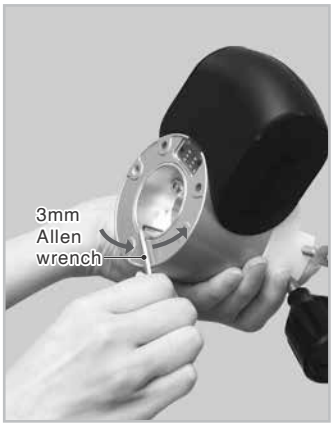
4 Separate the manual slow motion control unit from the mount head unit. Loosen the three socket head cap screws on the manual slow-motion control unit as shown in the figure with a 3mm Allen wrench.



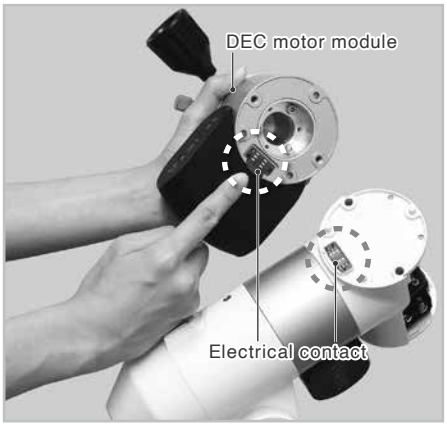
5 Attach the DEC motor module onto the mount head unit so that the recessed part on the DEC motor module (opposite side of the electrical contact) fits snugly on the protruding part of the mount head unit as shown in the figure.



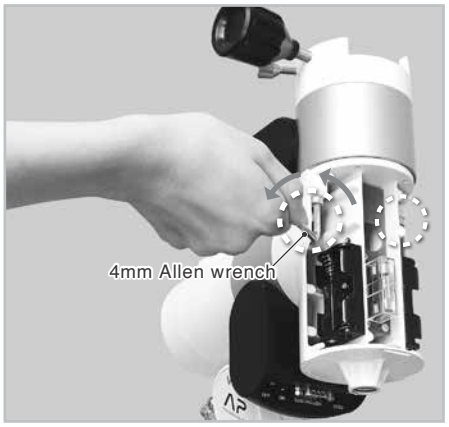
6 Turn the DEC motor module to change the orientation so that the screw holes (larger holes with no thread) are aligned in tandem. Replace the three socket head cap screws in place and tighten the screws securely with the 3mm Allen wrench.



7 Attach the declination body assembly onto the polar axis body assembly so that the electrical contact on the declination body fits snugly on the recessed part of the manual slow motion control unit as shown in the figure.



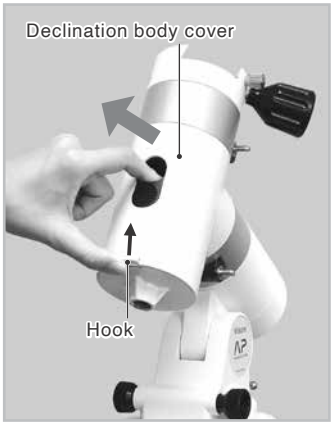
8 Replace the two socket head cap screws that were removed in step 3 above while holding the DEC motor module. Install the batteries, if necessary. Tighten the screws with the 4mm Allen wrench.



9 Replace the declination body with attention to the direction of the hook on the cover.

Example 3: Exchanging the Manual Slow-Motion Control Module for the R.A. Motor Module

1 Remove the declination body cover.
Open the polar scope window on the declination body by sliding down the shutter. While pushing down on the hook on the bottom of the declination body, pull out the declination body cover by pinching the hook and window hole as shown in the figure.

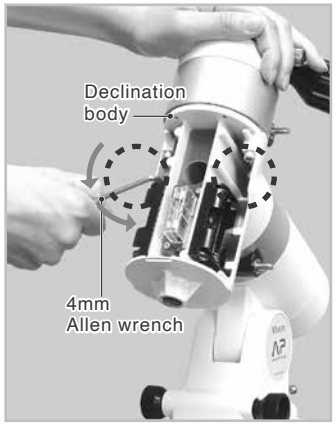


2 Remove the batteries from the declination body. Do not disassemble the mount without removing the batteries. This may cause damage.

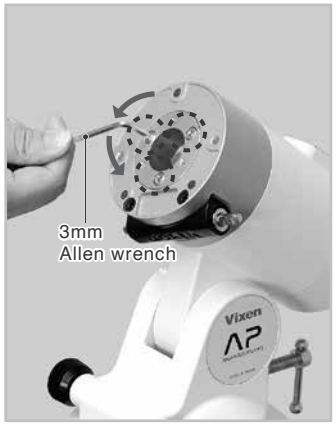
3 Loosen the two socket head cap screws on the declination body as shown in the figure with the 4mm Allen wrench. Remove the declination body. Be sure to hold the declination body in hand securely while loosening the screws.

Caution:

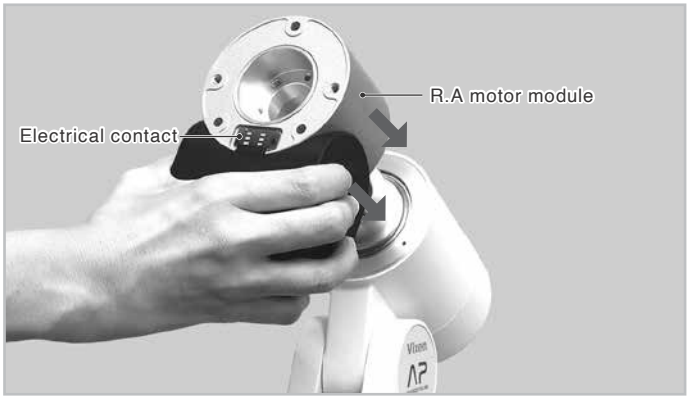
The internal joint electrical contact of the declination body is very delicate. Be careful not to touch it with your fingers or other objects.



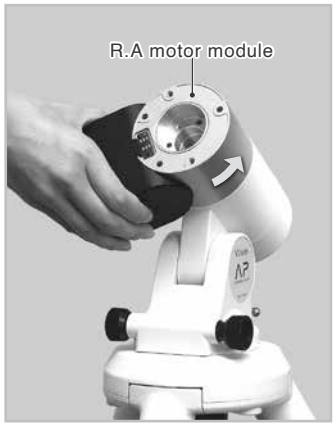
4 Loosen the three socket head cap screws on the manual slow-motion control unit with a 3mm Allen wrench. Remove the manual slow-motion control unit.

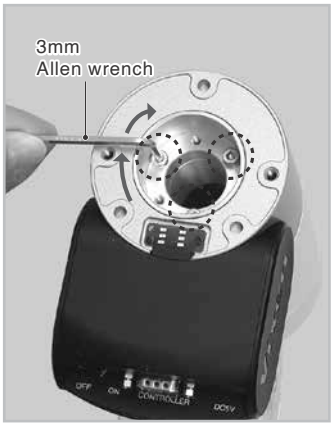


5 Attach the R.A. motor module onto the polar axis body so that the electrical contact faces the outside as shown in the figure.

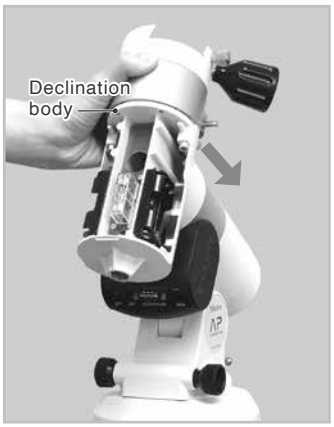


6 Turn the R.A. motor module to change the orientation so that the screw holes (larger holes with no thread) are aligned in tandem. Replace the three socket head cap screws in place and tighten the screws securely with the 3mm Allen wrench.

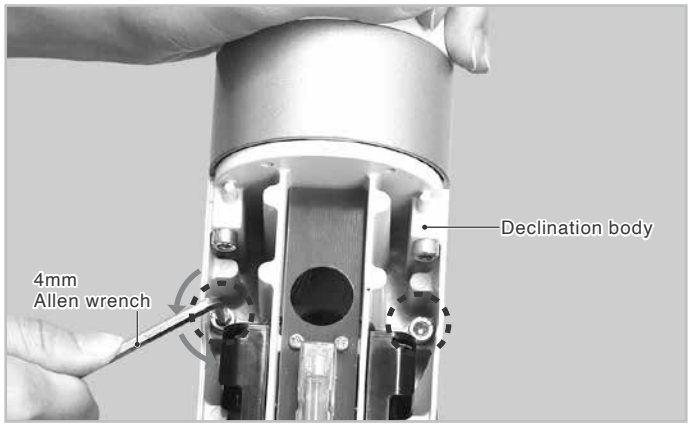




7 Attach the declination body onto the polar axis body assembly so that the electrical contact on the declination body fits the counterpart of the R.A. motor module as shown in the figure.



8 Replace the two socket head cap screws that were removed in step 3 above while holding the declination body. Install the batteries, if necessary. Tighten the screws with the Allen wrench of 4mm on a side securely.



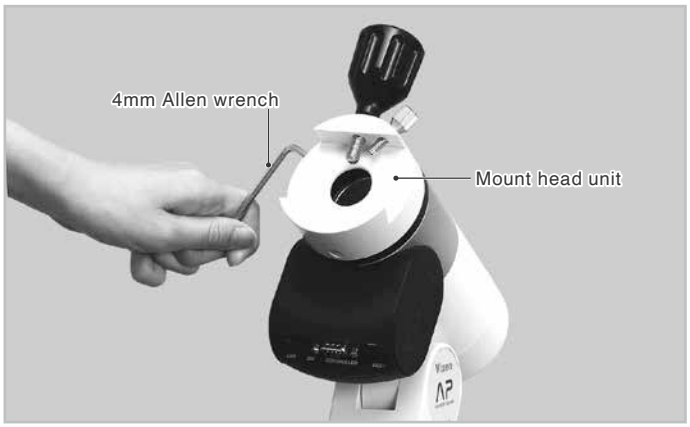
9 Replace the declination body cover in place noting the direction of the hook on the cover.

APPLICATION

Upgrading the AP Photo Guider to the AP Mount with Dual-axis Motor Drive

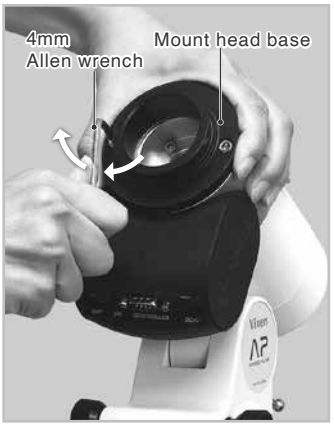
Necessary Parts (Optional)

- **AP Clamp Mount Head Unit**
- **DEC Motor Module**
- **AP Declination Body Unit**
- **Counterweight Bar Unit**
- **Counterweight**



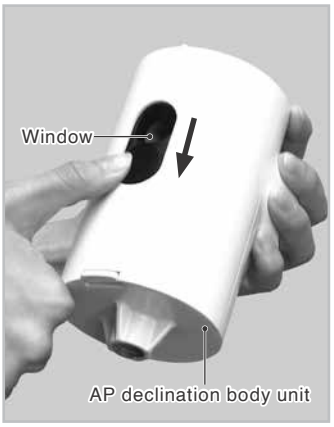
1 Loosen the 3 set screws on the side of the mount head with a 4mm Allen wrench. Remove the mount head. The mount head base (black) is exposed.

2 Loosen the two screws on the mount head base with the 4mm Allen wrench and remove the mount head base.



3 Attach the AP declination body onto the exposed R.A. motor module.

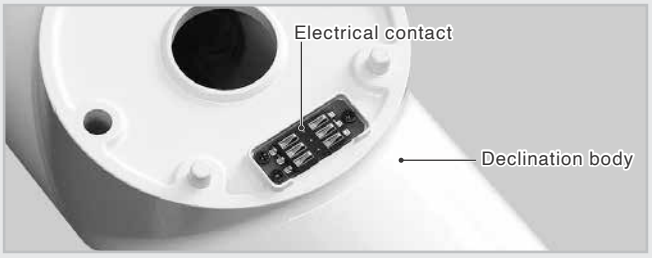
To remove the declination body cover, open the polar scope window on the declination body by sliding down the shutter. While pushing down on the hook on the bottom of the declination body, pull out the declination body cover by pinching the hook and window hole as shown in the figure.

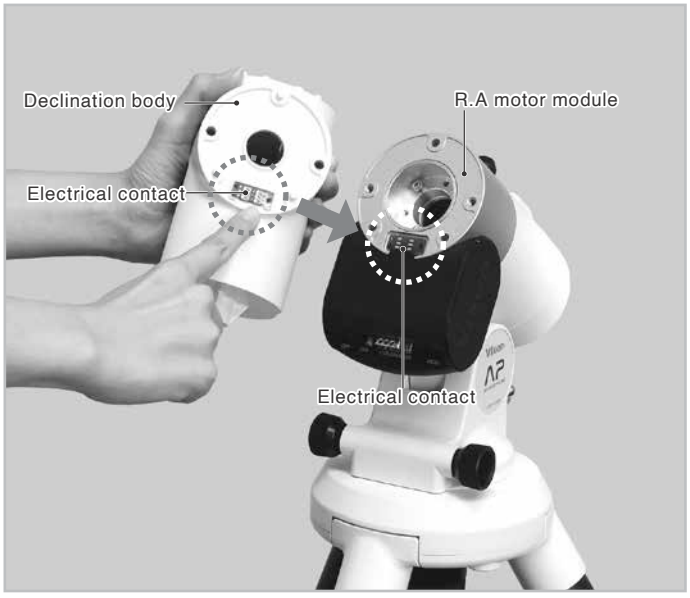


4 Attach the declination body onto the R.A. motor module so that the electrical contact on the declination body fits snugly onto the counterpart on the R.A. motor module as shown in the figure.

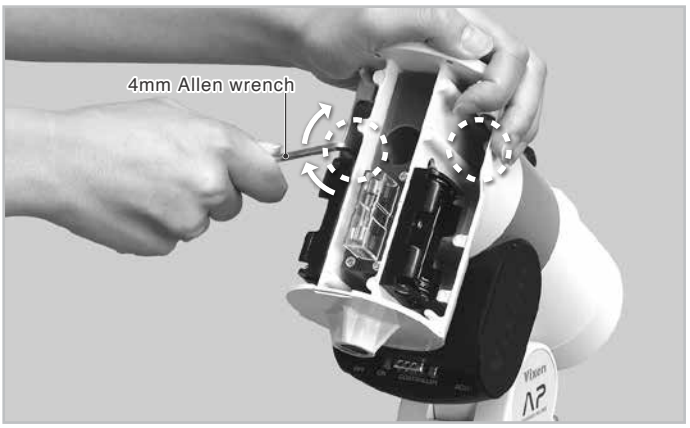
Caution:

The internal joint electrical contact of the declination body is very delicate. Be careful not to touch it with your fingers or other objects.

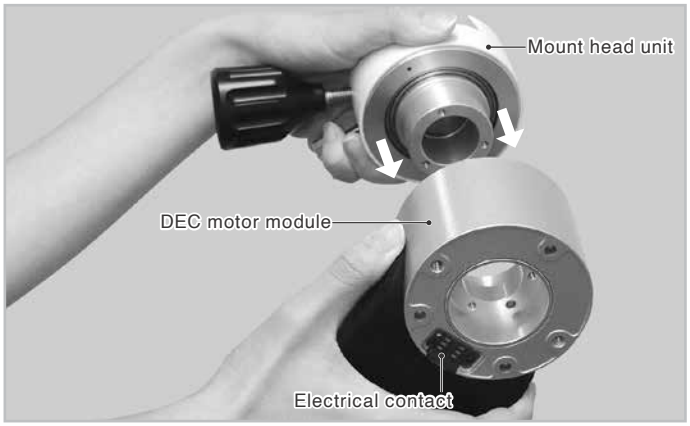




5 While holding the declination body, attach the declination body securely with the two supplied M5-25mm long screws using the 4mm Allen wrench.

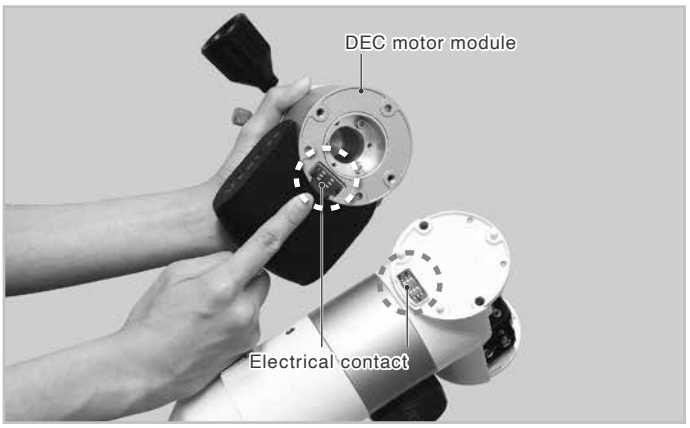


6 Attach the AP clamp mount head unit onto the DEC motor module with the electrical contact on the outside so that the central protruding part of the AP clamp mount head fits snugly onto the central hollow portion of the DEC motor module as shown in the figure.



7 Turn the DEC motor module to change the orientation so that the screw holes (larger holes with no thread) are aligned in tandem. Attach the DEC motor module with the three supplied socket head cap screws securely using the 4mm Allen wrench.

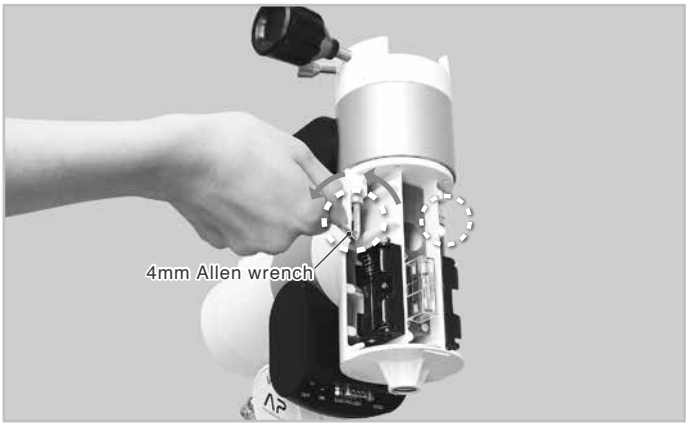
8 Attach the DEC motor module assembly onto the declination body so that the electrical contact on the DEC motor module fits snugly onto the counterpart on the declination body as shown in the figure.



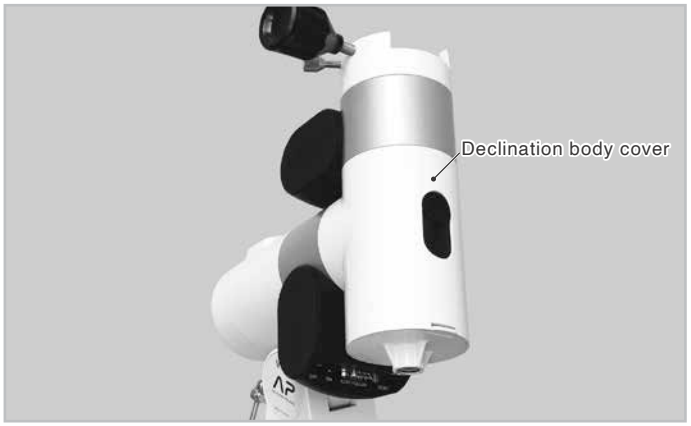
Caution:

The internal joint electrical contact of the declination body is very delicate. Be careful not to touch it with your fingers or other objects.

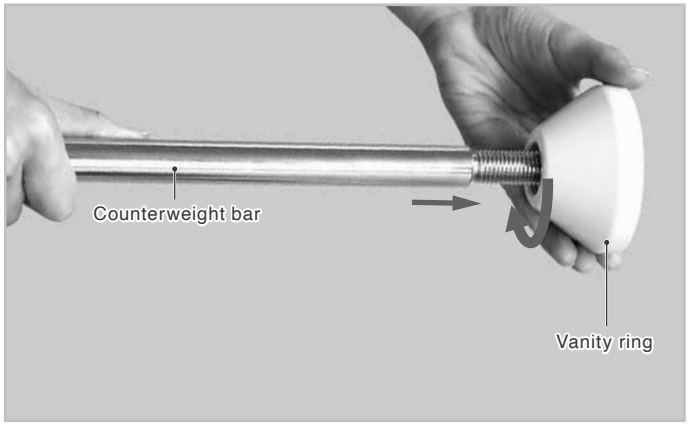
9 While holding the DEC motor module, fix the declination body securely with the two supplied M5-25mm long screws using the 4mm Allen wrench. Install the batteries, if necessary.



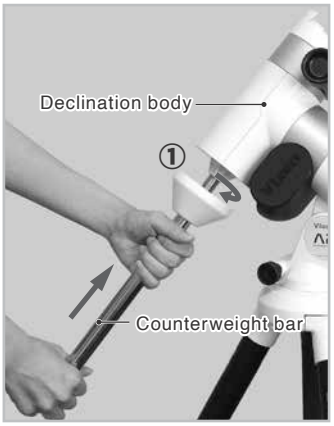
10 Replace the declination body cover with attention to the direction of the hook on the cover.

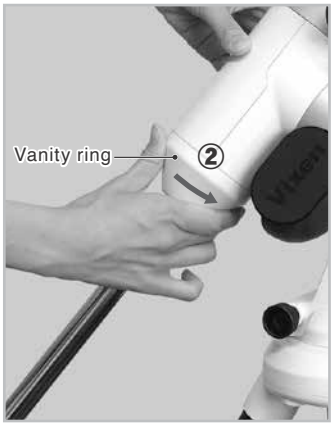


11 Screw the threaded end of the counterweight bar into the threaded hole on the vanity ring. After fully tightening the vanity ring, unscrew the counterweight bar by one rotation.



12 Screw the threaded end of the counterweight bar into the declination body. Attach the declination body fully and securely tighten up the vanity ring.





APPLICATION

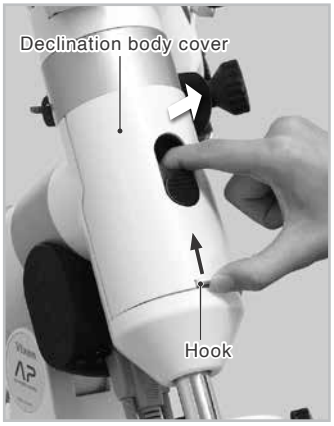
About a Fuse Box

In the AP mount the electrical circuit board is protected by a fuse. Generally, the fuse is rarely cut off while using the mount. But if it happens, you need to replace the fuse with a fresh one.

Specifications:
125V 1A Class-B (PES standard)
6mm dia. x 30mm

Replacing the Fuse

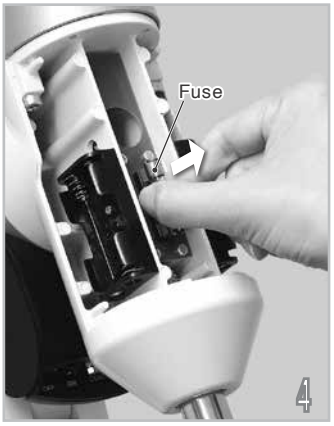
1 Remove the declination body cover.
Open the polar scope window on the declination body by sliding down the shutter. While pushing down on the hook on the bottom of the declination body, pull out the declination body cover by pinching the hook and window hole with your fingers.



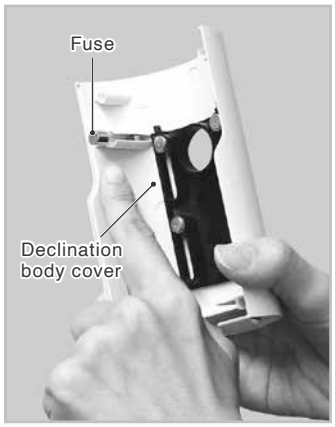
2 Remove the batteries from the declination body. Do not disassemble the mount without removing the batteries. This may cause damage.

3 Remove the cover of the fuse box.

4 Pull out the fuse.

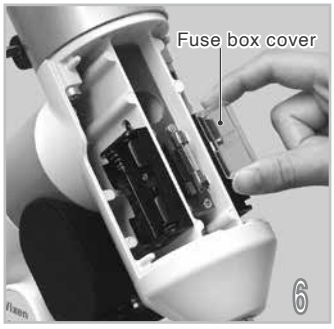


5 Push a new fuse into the fuse box to set.



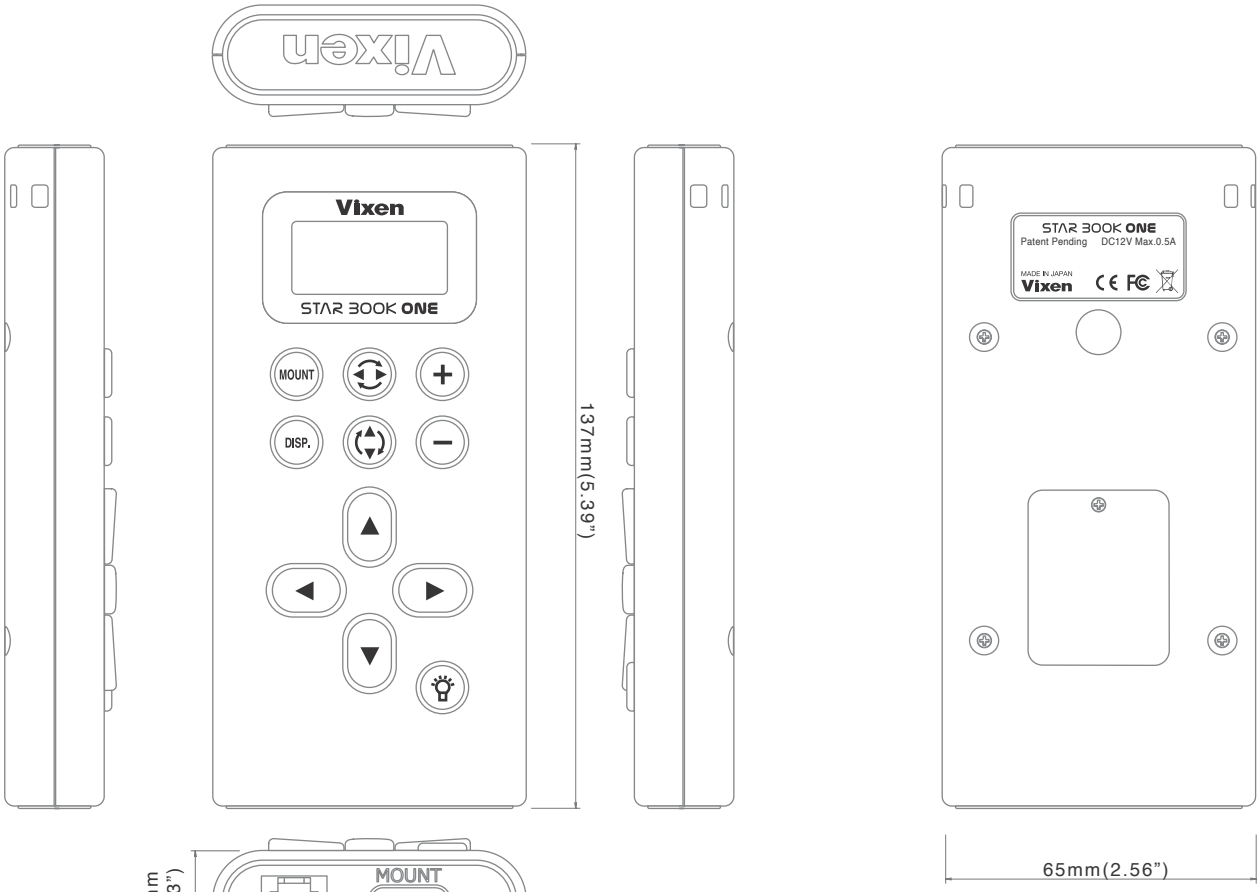
6 Attach the cover on the fuse box and install the batteries, if necessary.

7 Replace the declination body cover with attention to the direction of the hook on the cover.



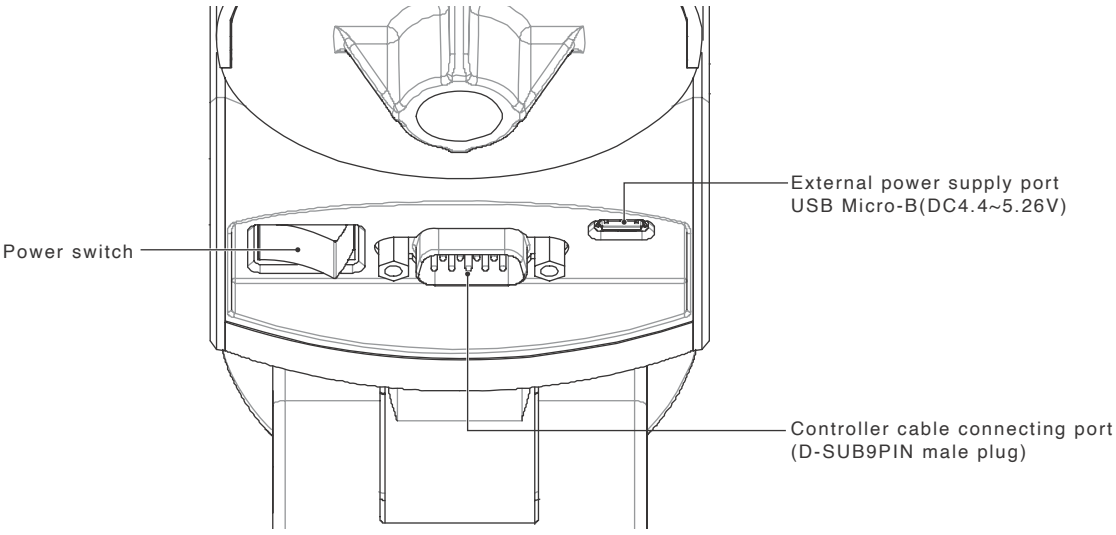
SPECIFICATIONS

Connectors on the STAR BOOK ONE



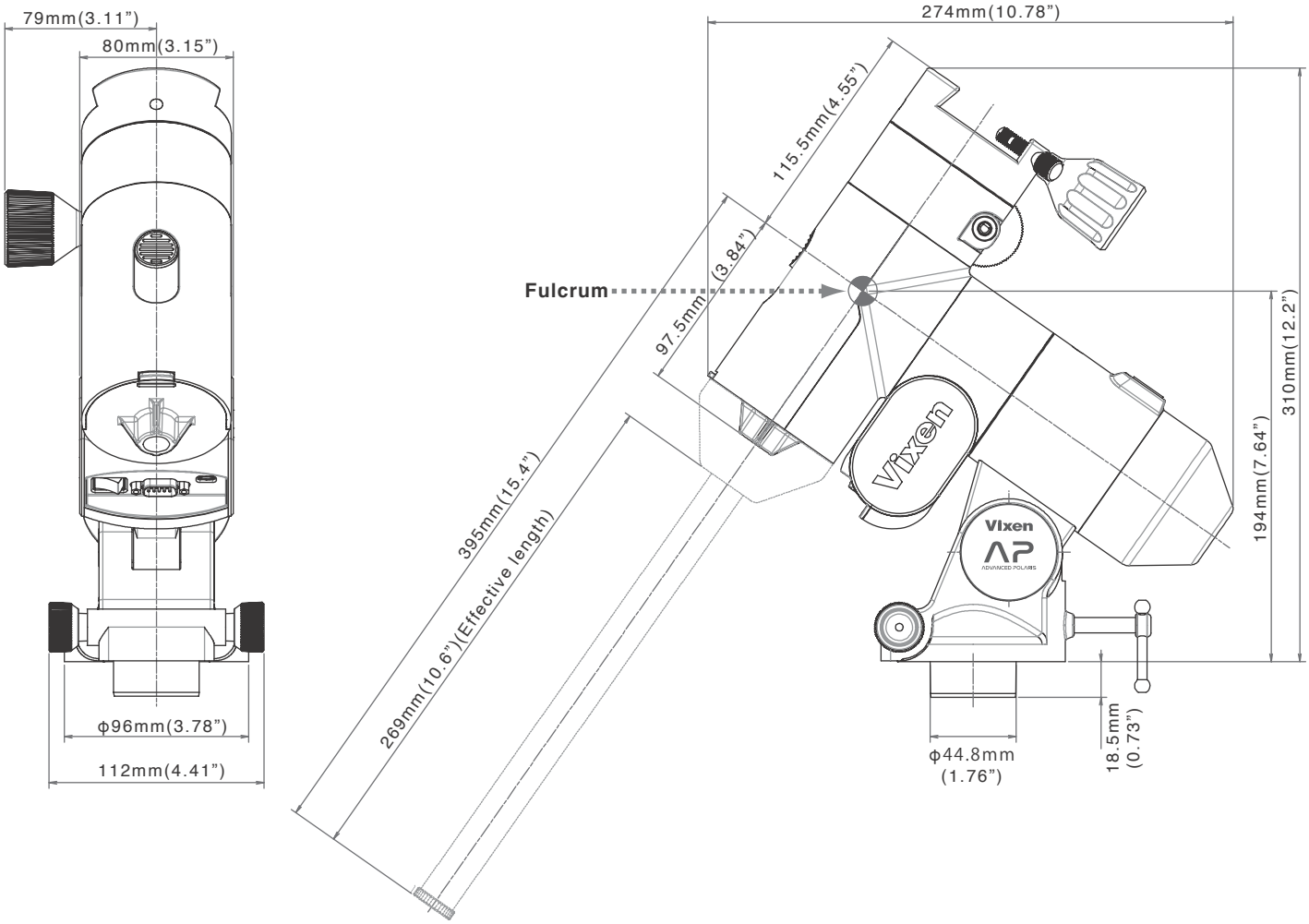
Autoguider port Pin Layout

R.A motor module power supply port

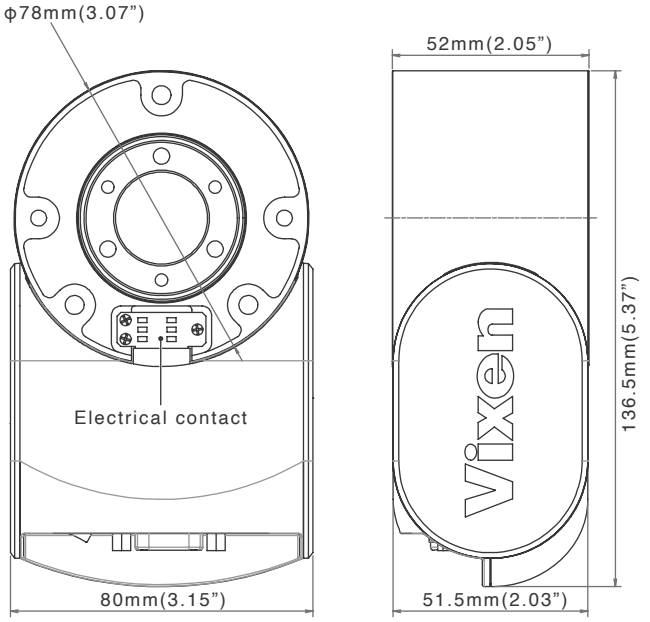


SPECIFICATIONS

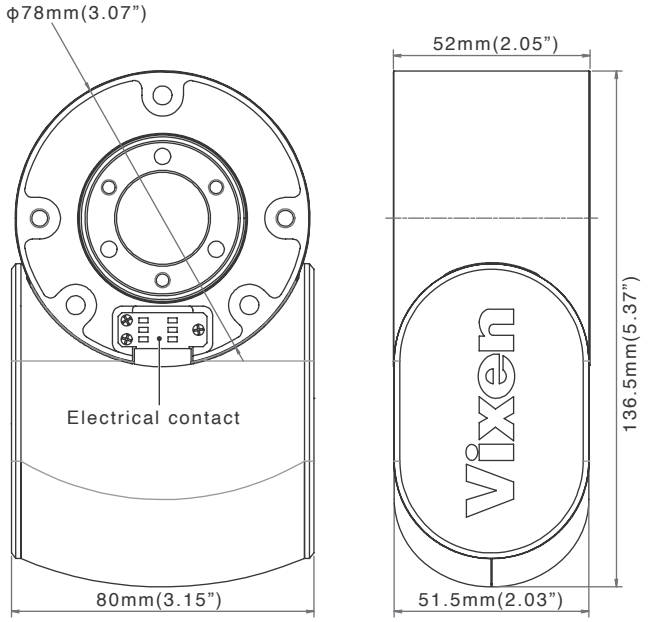
AP Mount Dimensions

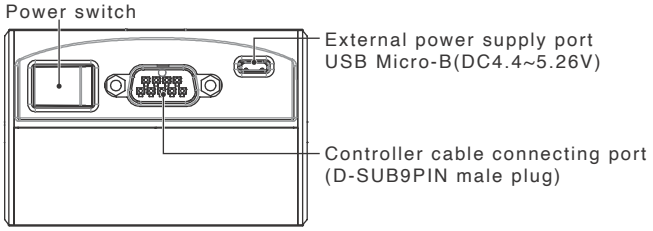


R.A Motor Module Dimensions



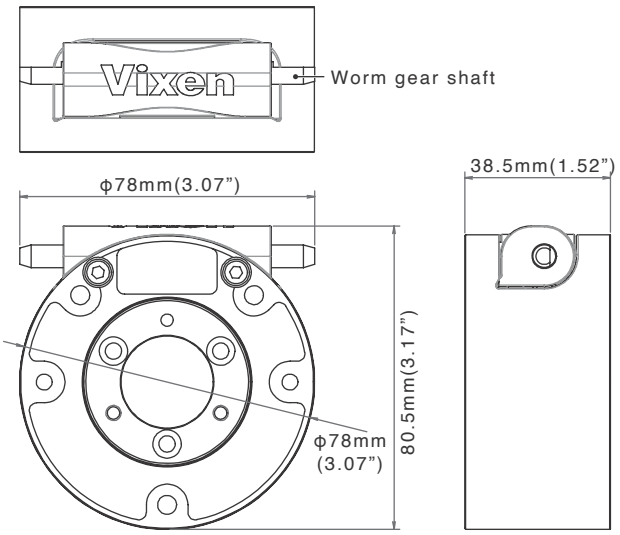
DEC Motor Module Dimensions



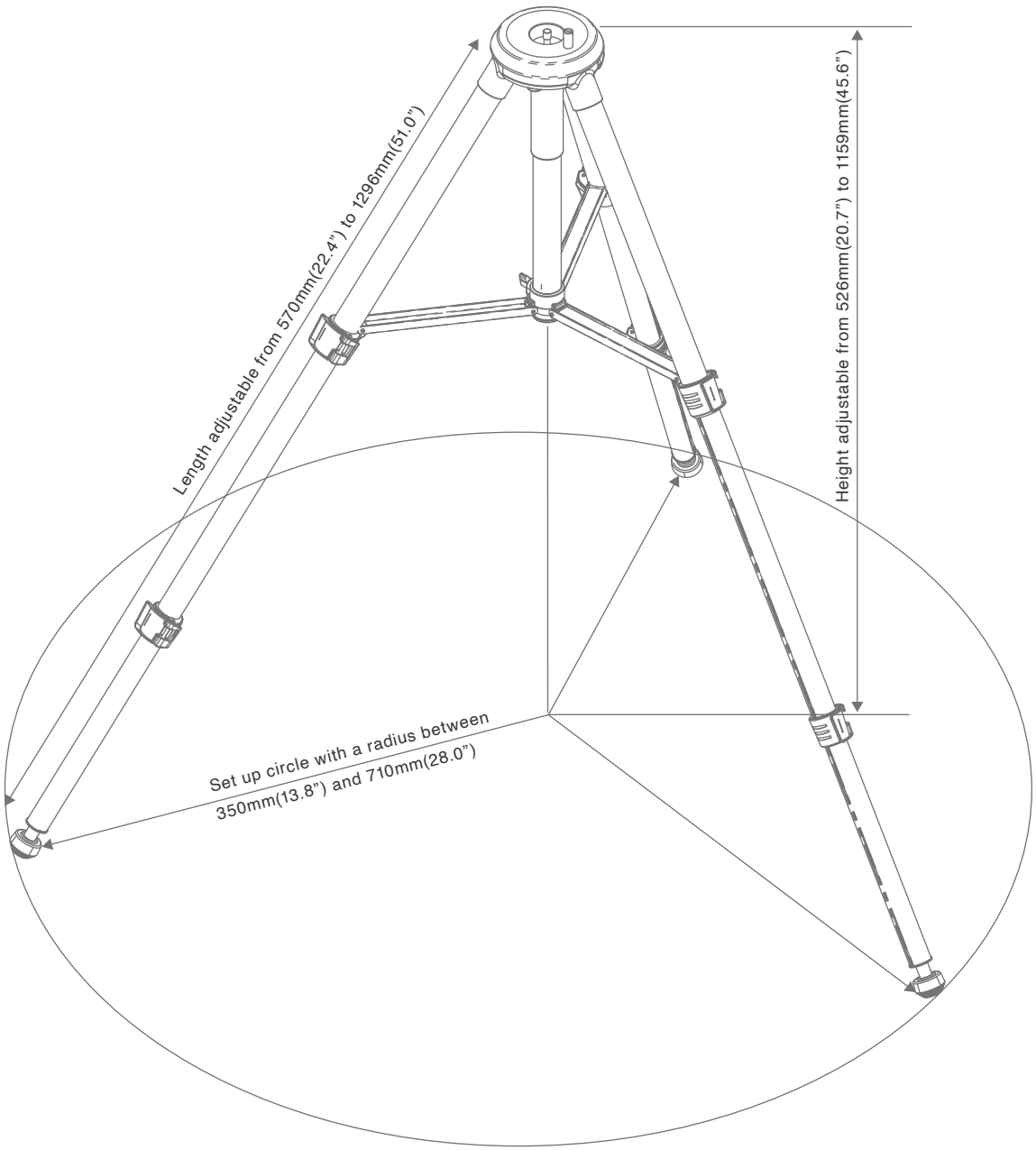


SPECIFICATIONS

Manual Slow Motion Control Module Dimensions



APP-TL130 Tripod Dimensions



Memo

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