



# Instruction Manual for **SX(SPHINX)Equatorial Mount**

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The SX Equatorial Mount series employs not only automatic slewing of celestial objects on the large-sized liquid crystal display of the accessory controller "STAR BOOK", but also a variety of functions prepared to increase your enjoyment of star filled sky such as automatic tracking and graphic displays of celestial information. Enjoy star gazing on your veranda or patio at your home and garden, or under the dark skies of a remote location.

\*This manual is prepared in common with all SX Equatorial Mounts and telescope series. You may occasionally find descriptions in the text not relevant to your model, this depends on the model you bought. Be sure to refer to an instruction manual of the optical tube assembly unit in conjunction with this manual

## **Read carefully the instructions before use, and follows them precisely.**

Always keep the instruction manual near to your mount or telescope to enable any operational queries to be easily answered. This instruction manual describes necessary precautions for the safe use of the product by preventing yourself and others from possible injuries as well as damages to the equipment. Only use the mounting/telescope after you are completely satisfied you understand all the features.

 **Warning!** **Never look directly at the sun with your naked eyes or through any telescope or it's finder scope or guiding scope. Permanent and irreversible eye damage may result.**

⚠ **Never connect the cable of the STAR BOOK with other equipment such as a PC. This may cause a failure, heating, or electrical shock (Specifications of the cable of the STAR BOOK is not compatible with RS-232C).**

⚠ **This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.**

## **CAUTIONS**

- ⊗ Never disassemble the SX equatorial mount and STAR BOOK because of danger from electrical shock from internal high voltage sections. This could also void your warranty.
- ⊗ Do not try to restrain the movement when the equatorial mount in operation, which may lead to injuries to yourself or equipment damage.
- ⊗ Do not leave the optical tube uncapped in daytime. This may cause a fire from the objective lens or mirror of the optical tube or finder scope in case of sunlight passing through the telescope.
- ⊗ Do not use the product while travelling or walking, where injuries could arise from collision with objects or stumbling or falling.
- ⊗ Keep caps, desiccant, or vinyl packing materials away from children, where may cause danger from swallowing or suffocation.
- ⊗ Do not use the product in a wet environment.
- ⊗ When you connect the STAR BOOK or power supply to the equatorial mount, be sure to use the supplied cables with the ferrite core attached. If you do not do this, the STAR BOOK will not conform to mandatory FCC standards. (Refer to page 35 when you use a LAN cable.)

## **Caution on Handling and Storage**

- ⊗ Do not leave the mounting or telescope inside a car in bright sunshine or, in front of any heat sources, particularly radiators.
- ⊗ When cleaning, do not use organic solvents such as a paint thinners or similar.
- ⊗ Prevent products from being exposed to rain, water droplets, heavy dew, mud or sand.
- ⊗ Avoid touching any lens or mirror surface directly with hands. In case a lens or mirror becomes dirty with fingerprints or general smears, gently wipe it using commercially available lens cleaner and lens cleaning paper or consult your dealer.
- ⊗ Blow off dust on lens using commercially available blower brush.
- ⊗ For storage, keep in a dry place, where it is not exposed to direct sunlight.
- ⊗ Remove battery when storing for a long period.

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## ☉ Checking Contents

The SX Equatorial Mount box [SX and SXW Equatorial Mount] contains the parts listed below. Make sure which parts were supplied with your shipment. For contents other than the equatorial mount (instruments such as optical tube), refer to instructions attached respectively.

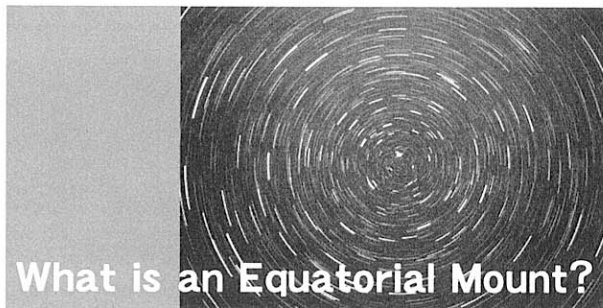


\*SX mount is not supplied with counterweight bar nor declination (Decl.) clamp.

### Contents of Sphinx Equatorial Mounts

SXW Equatorial Mount	SX Equatorial Mount
Counterweight 1.9kg	None
STAR BOOK Controller	
STAR BOOK Cable, Ferrite Core for LAN cable	
Battery Holder (using 8 pieces of D Size Alkaline Dry Cell: User supplied)	
Allen wrench (1 piece)	
+Screwdriver (1 piece)	
Instruction Manual (This book)	
Serial Number Labels	
CR2032 Battery for STAR BOOK Built-in Clock (1piece)	

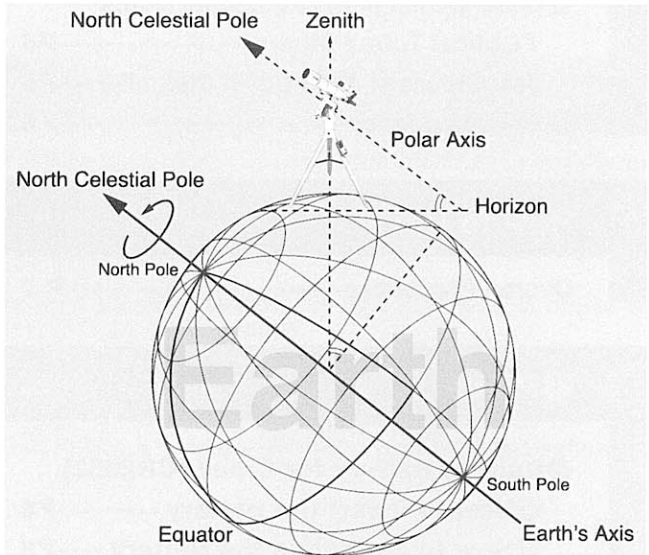
## ☉ Principle and Basic Operation of Equatorial Mounts



### What is an Equatorial Mount?

The stars appear to rotate around the polar star (North celestial pole to be exact) once a day. This is caused by the rotation of the Earth once a day around the Earth's axis, this motion is called star's diurnal movement.

The platform (to which the telescope attaches) that is designed to move a telescope along the diurnal movement is called an equatorial mount. The equatorial mount works by setting up its axis of rotation parallel to the earth's axis of rotation. (Refer to the figure)



## ☉ Basic Operation of the Equatorial Mount

The STAR BOOK Controller actuates all movement of the SX equatorial mount electrically. Furthermore, the equatorial mount will function accurately only when the mount and telescope are balanced properly in relation to each axis. Use of the mount without proper balance may disturb the smooth tracking of stars, cause the optical tube to slide out of place or cause the mount to breakdown. To avoid possible problems, ensure you balance the telescope correctly. For balancing procedures, please read the preparatory section (on Page 12).

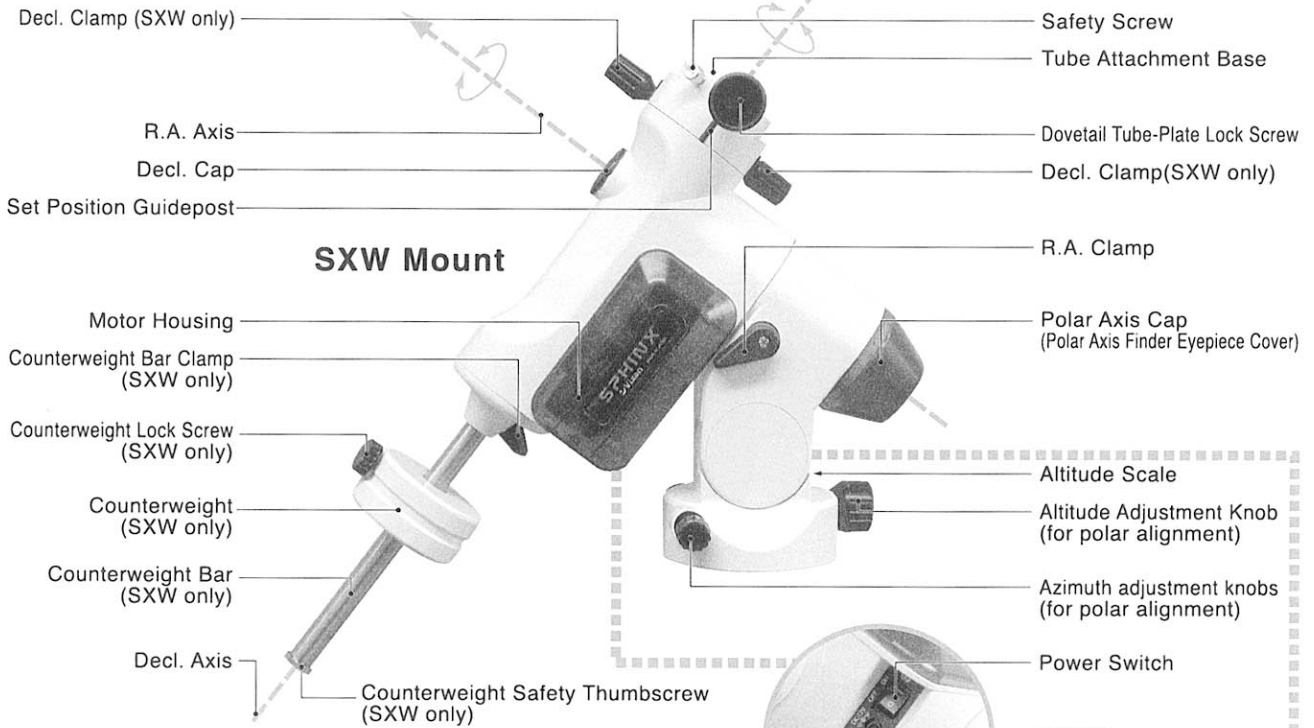
### ⊗ Caution 1 : Manual movement without release of the clamp will cause a breakdown.

The SXW equatorial mount is equipped with Decl. clamps in order to make it compact for storage. Lock the clamp when in use. Release the clamp when storing or during transportation.

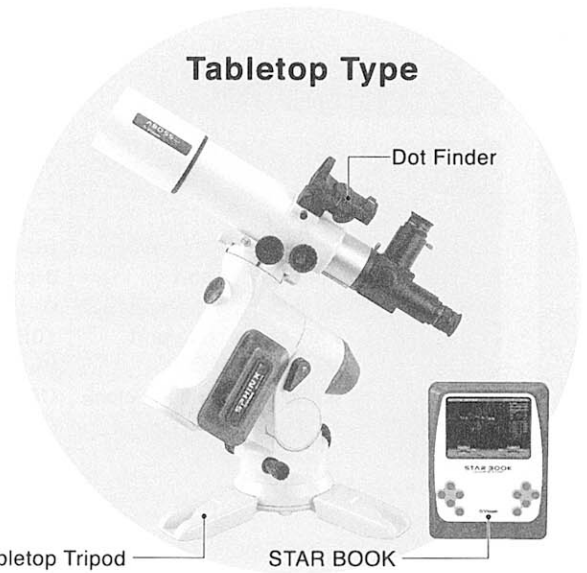
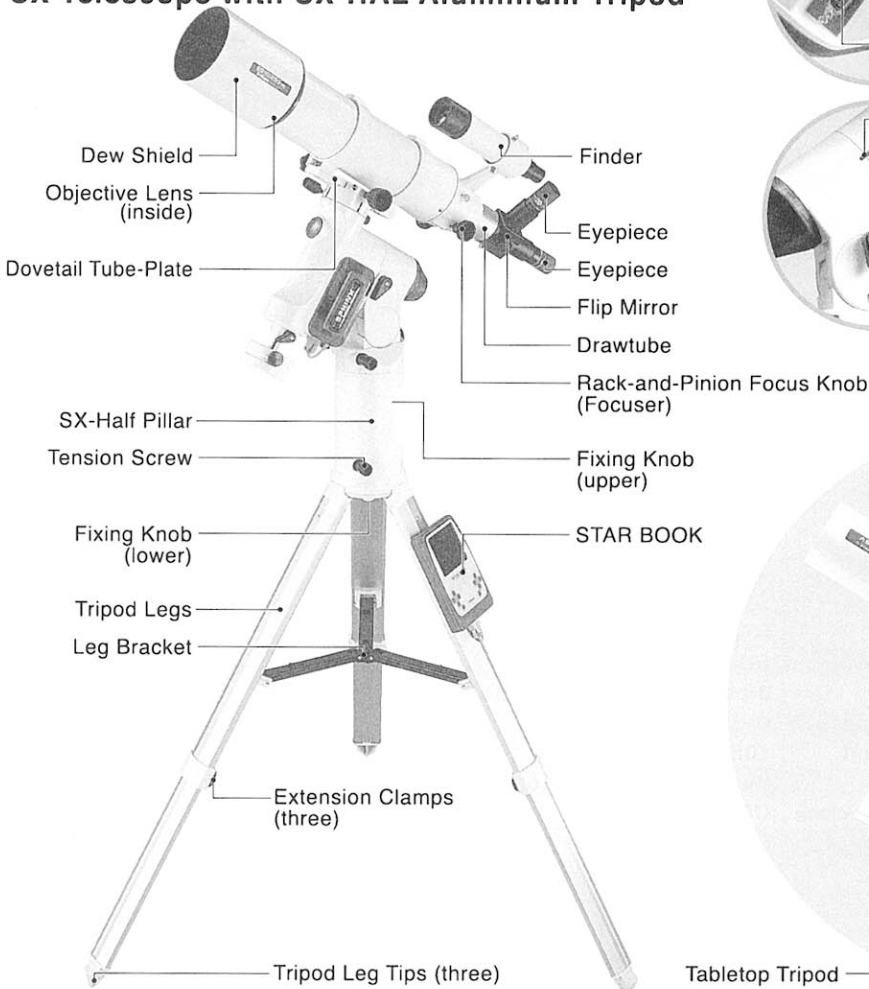
### ⊗ Caution 2 : Never connect the cable of the STAR BOOK with other equipment such as a PC.

If improperly connected to a PC, it may cause a failure, heating, or electrical shock (Specifications of the cable of the STAR BOOK are not compatible with RS-232C).

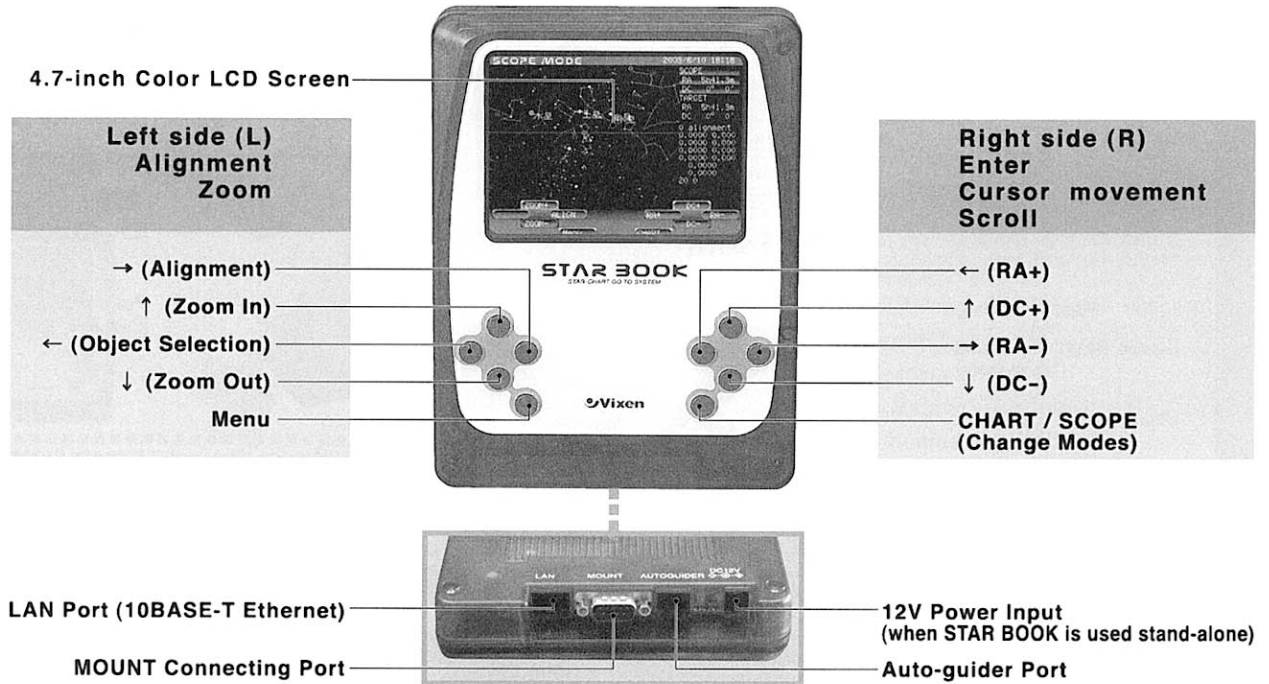
## © Descriptions of Equatorial Mount/Optical Tube/Others



### SX Telescope with SX-HAL Aluminium Tripod



## © Descriptions of STAR BOOK Controller



## © Specifications (Specifications are subject to change without prior notice for improvement)

	Mount type	SXW Equatorial Mount	SX Equatorial Mount
Equatorial mount	R.A. slow motion	Full circle fine movement / 180-tooth worm gear	
	Decl. slow motion	Full circle fine movement / 180-tooth worm gear	
	R.A. graduations	Displayed in STAR BOOK / 0.1' increment	
	DEC graduations	Displayed in STAR BOOK / 1' increment	
	Polar axis finder (Optional)	PF-SX (for northern and southern hemisphere)	
	Polar axis tilt range	0° - 70° (fine adjustment ±15°, fine adjustment range is non-step movable)	
	Azimuth fine adjustment	Double-screw type, with fine adjustment knob	
	Altitude fine adjustment	Tangent screw type	
	Automatic slewing Unit	Standard-equipped with STAR BOOK controller/Max. slewing speed: 1200x (sidereal rate)	
	Power supply	DC12V, 0.4 ~ 1.7A	
	Dimensions	360L x 360W x 120T mm	
	Weight (not incl. Counterweight)	6.8 kg	5.9 kg
Counterweights	1.9 kg	None	
Optional accessories	Polar Axis Finder PF-SX, Additional, Counterweight		Polar Axis Finder PF-SX, Additional Counterweight, SX Counterweight Bar Unit, SX Decl. Clamp Unit

	Description	STAR BOOK
STAR BOOK Controller	CPU	32-bit RISC processor CS89712
	Display	STN 4.7-inch Color LCD Screen (320x240=76800pxl, 4096 colors)
	Power port	DC12V EIAJ RCF320A Class 4
	Auto-guider port	6-pole 4-wired modular jack
	Equatorial mount connecting port	D-SUB 9-PIN
	LAN connecting port	10BASE-T
	Power supply	Supplied from equatorial mount side (DC12V) during observation
	Battery for a built-in clock	CR2032
	Power consumption	Stand-alone use of STAR BOOK: Approx. 0.25W max.
	Dimensions	195L x 145W x 28T mm
	Weight	400g (excluding cables)
	Celestial objects stored	Total 22735(Fixed Stars:17635, Messier objects:110, NGC/IC:4980, 8 Planets, Moon and Sun)
	Functions / others	Upgradeable for update via LAN connection. Built-in speaker. Operating temperature from 0~40°C.

## ◎ Overall Procedure

Take the following steps to use the SX equatorial mount series.

<b>① Preparation</b>	<ul style="list-style-type: none"> <li>● <b>Set up, locate and balance the telescope.</b></li> </ul>	P 8 } P13
<b>② Initial Setting</b>	<ul style="list-style-type: none"> <li>● <b>Setting Language (at initial time only)</b> Set up display language of the STAR BOOK.</li> </ul>	P14 } P17
	<ul style="list-style-type: none"> <li>● <b>Setting Longitude and Latitude (at initial time)</b> Enter longitude and latitude of your observation site in the STAR BOOK.</li> </ul>	
	<ul style="list-style-type: none"> <li>● <b>Setting Local Time (at initial use only)</b> Turn on the power of the equatorial mount and set a local time in the STAR BOOK.</li> </ul>	
<b>③ Basic Operation</b>	<ul style="list-style-type: none"> <li>● <b>Learn Basic Operation of the Telescope</b></li> </ul>	P18 } P21
<b>④ Automatic GO TO</b>	<ul style="list-style-type: none"> <li>● <b>Positioning the Telescope Tube at the Initial Position.</b> Turn the telescope tube to the initial position by using directional keys on the STAR BOOK.</li> </ul>	P22 } P27
	<ul style="list-style-type: none"> <li>● <b>Aligning the Telescope</b> Set more than two reference points from the celestial objects registered in the STAR BOOK.</li> </ul>	
<b>⑤ Application Section</b>		P28 } P39

# 1 Preparation Battery for Built-in Clock (CR2032)

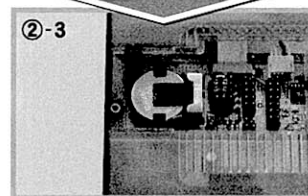
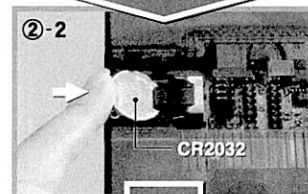
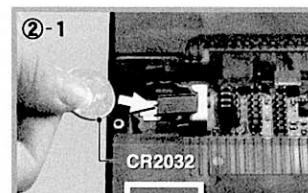
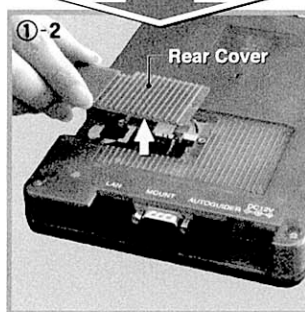
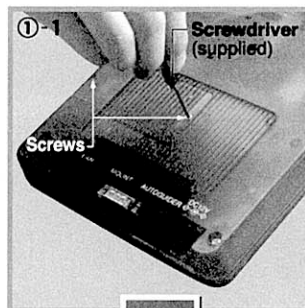
The STAR BOOK controller has a built-in clock, which operates with a battery (CR2032). Insert a battery inside the STAR BOOK, since it is not inserted when dispatched from our factory. Life of a new battery is estimated to last for about one year on insertion.

(You can use it without inserting the battery or low power battery is inserted, though you will need to adjust the clock every time when you use the equipment.)

## ◎ How to Insert the Battery

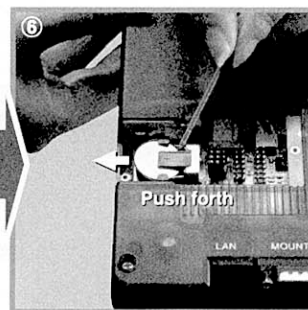
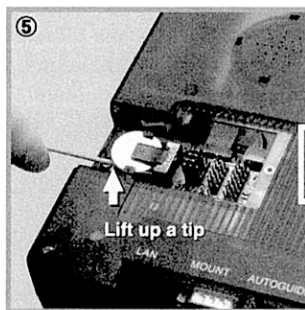
- ① Remove two screws as shown in the figure with the screwdriver supplied, and open the rear cover.
- ② Insert a new battery so as a positive polarity comes to the upper side as shown in the figure. Do not mix up the polarity as it may cause a failure.
- ③ Re-place the rear cover, and fix the screws at original position.

※ The attached battery is provided for the purpose of a functional check and may run out quicker.



## ◎ How to Replace the Battery

- ④ Remove the two screws with attached screwdrivers as shown in ①, and open the rear cover.
- ⑤ Lift up a tip of the battery using something like a toothpick.
- ⑥ Remove the battery by pushing up from behind as shown in the figure.
- ⑦ Place the battery in the same procedure for "How to insert a battery ②".
- ⑧ Re-place the rear cover, and fix the screws in original position.



## ⊗ Caution

When taking out the battery, use a stick to push it up. Be sure to use a stick which is not made of metal, as the use of a metal stick may create the danger of short-circuit, which leads to a cause of malfunction or irreparable damage to the STARBOOK.

When opening the cover, do not insert a finger or any conductive material such as metal or liquid. It could easily cause a failure or fire.



## ① Setting up the Tripod

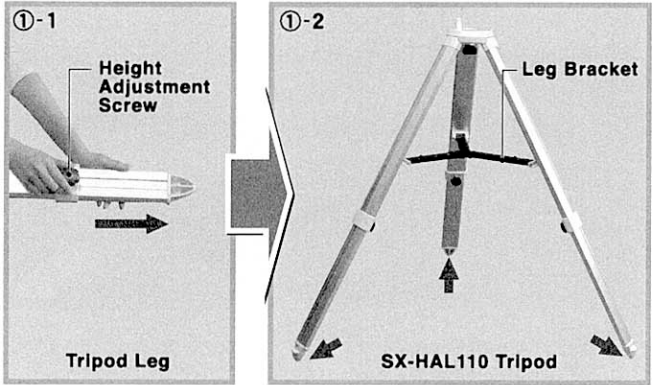
Proceed to next page in case of tabletop version.

Choose a leveled, firm and stable area for observation. Adjust the length of the tripod legs corresponding to the required convenient height.

Release of the extension clamps will allow you to adjust the length of the legs.

Tighten the extension clamps securely after setting.

Extend the tripod until the leg bracket will be fully extended.

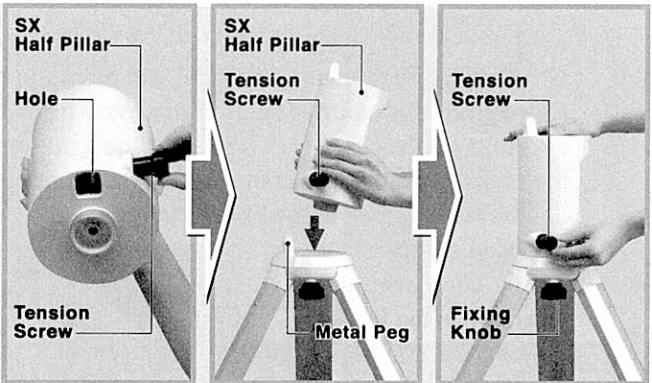


### ● In case of a model with half-pillar :

(Proceed to ② in cases of models without the half-pillar)

Hold the half-pillar over the tripod head. Loosen the tension screw in the lower part of the half-pillar in advance. Place the half-pillar on the tripod head and bring the position a hole at the bottom of the half-pillar to fit the metal peg of the tripod head.

Tighten the fixing knob on the underside of the tripod head, and then tighten the tension screw of the half-pillar firmly.



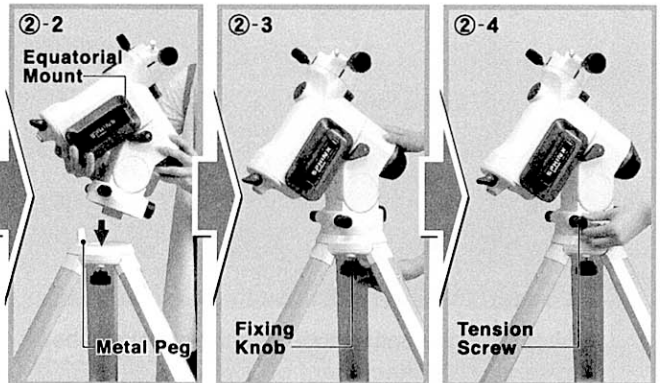
## ② Equatorial Mount Connection

Loosen the azimuth adjustment knobs of the equatorial mount in advance.



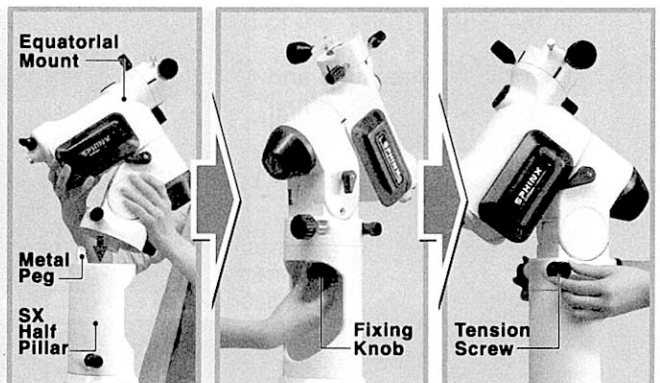
Place the equatorial mount on the tripod head as shown in the Figure, and fix it with the fixing knob from beneath.

When fixing, bring the position of the metal peg of the tripod head to match the figure shown. Finally, tighten the azimuth adjustment knobs.



### ● In case of a model with half-pillar :

Loosen the azimuth adjustment knobs of the equatorial mount in advance, and place the equatorial mount on the half-pillar as shown in the Figure, and fix it with the fixing knob from beneath. When fixing, bring the position of the metal peg of the half-pillar to match the figure shown. Finally, tighten the azimuth adjustment knobs.



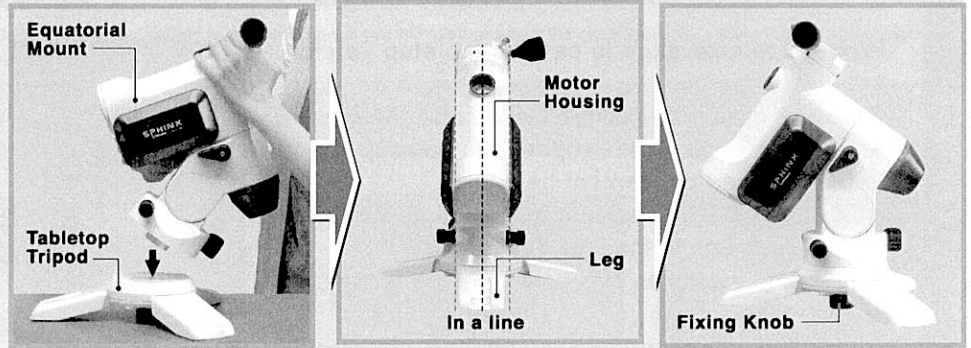
# 1 Preparation

## Setting up the Telescope

\* Read instructions accompanying the optical tube assembly unit also

### ● In case of tabletop version:

In this case, the equatorial mount will be placed on to the tabletop tripod. Fix the equatorial mount so that one of the legs of the tripod and the motor housing will be in line, as shown in the figure.

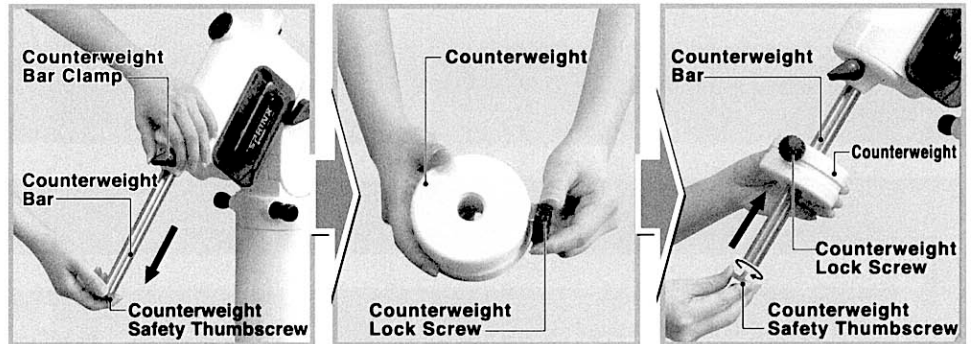


### ③ Attaching the Counterweight

(Proceed to ④ in cases of model without counterweight.)

Release of the counterweight bar clamp permits extension of the counterweight bar. Extend it completely by pulling it out and lock securely the counterweight bar clamp. Then, remove the counterweight safety thumbscrew on the end of the counterweight bar. Slide the counterweight onto the bar on loosening in advance the counterweight lock screw. When installing the counterweight, bring the counterweight lock screw to the back (the side away from the tip of the counterweight bar) as shown in the Figure.

Tighten the counterweight lock screw and replace the counterweight safety thumb-screw on the end of the counterweight bar.

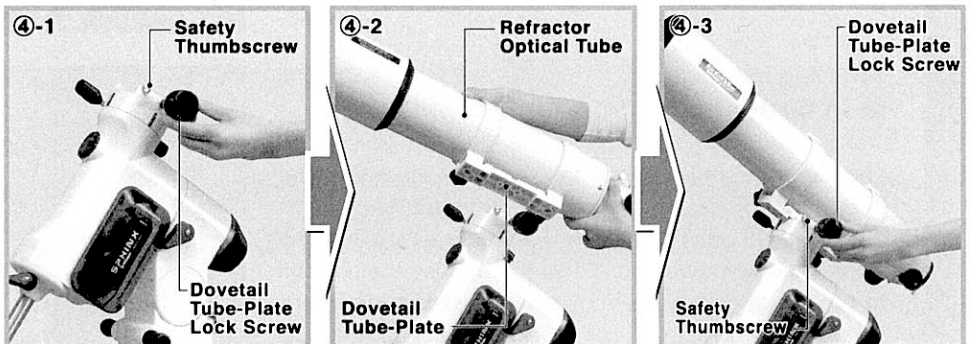


**⚠ Warning!** Be sure to handle the counterweight carefully as it is a very heavy item.

### ④ Attaching the Optical Tube

Loosen the dovetail tube-plate lock screw and the safety thumbscrew in advance as shown in the figure. Next, hold the optical tube with the dovetail tube-plate over the mount head so that the dovetail tube-plate is above the optical tube attachment of the mount head as shown in the Figure.

Place the optical tube and tighten the fixing knob first, and then tighten the safety screw.



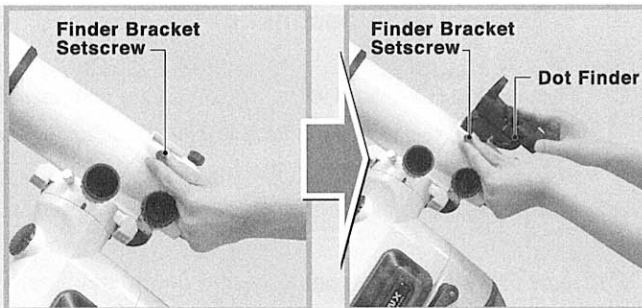
**⚠ Warning!** Optical tube assemblies are probably seriously damaged if dropped. Tighten the dovetail tube-plate lock screw securely. The safety thumbscrew should also be screwed in completely.

## ⑤ Attaching the Finder Scope (A finder scope included may vary from model to model)

### ● In case of dot finder :

Loosen the finder bracket setscrew in the finder bracket base beforehand as shown in the Figure.

Attach the dot finder with bracket to the bracket base and tighten the finder bracket setscrew in the bracket base.



### ● In case of 7x50mm finder scope :

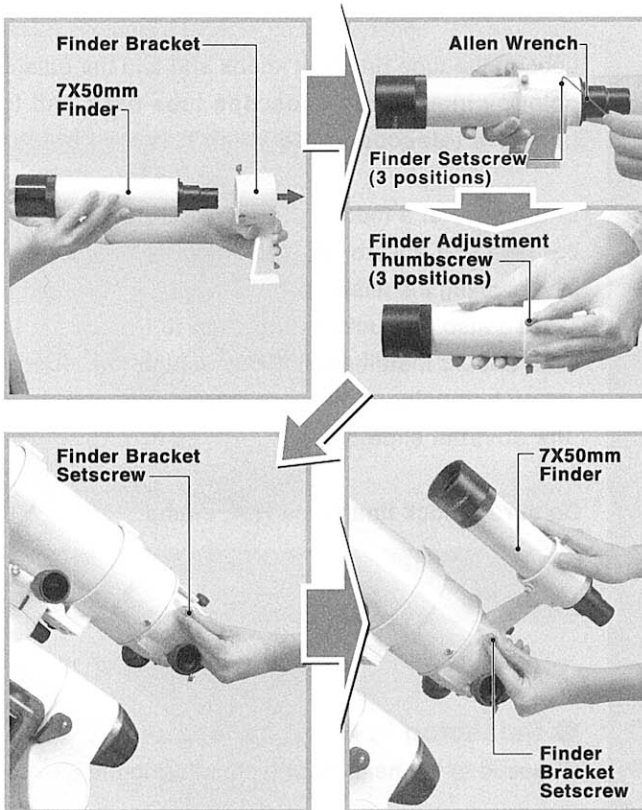
Loosen uniformly three setscrews in the finder bracket by using Allen wrench provided, and also loosen uniformly three finder adjustment thumbscrews by hand.

Slide the 7x50mm finder into the finder bracket as shown in the Figure, and tighten the three setscrews in the finder bracket with Allen wrench lightly and uniformly.

Screw lightly to an extent where the 7x50mm finder will not move, as screwing the setscrews to be much tight will not allow the finder to be adjusted afterward.

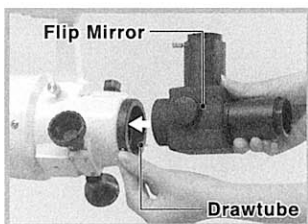
Then, tighten uniformly the three finder adjustment thumbscrews to hold the finder in place.

Loosen the finder bracket setscrew of the bracket base and install the 7x50mm finder with bracket to the bracket base. Then, tighten the finder bracket setscrew firmly.

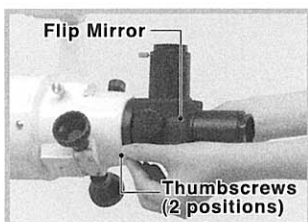


## ⑥ Attaching the Flip Mirror

Depending on the model, an eyepiece adapter could be supplied with -out the flip mirror.

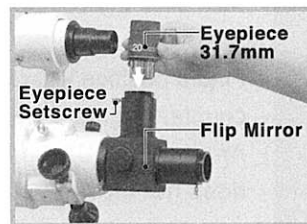


As shown in the Figure, attach the flip mirror by loosening the two setscrews in the edge ring of the drawtube. Tighten the screws firmly once it is attached.



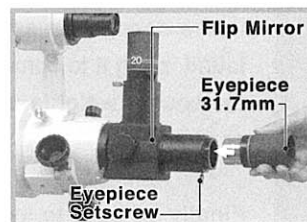
## ⑦ Attaching the Eyepiece

Depending on the model, the eyepiece will be attached to the eyepiece adapter instead of the flip mirror.



Insert the eyepiece as shown in the Figure. Tighten the eyepiece setscrew firmly once it is inserted.

\*A flip mirror permits attachment of an eye-piece at two positions. It also allows simultaneous use of one eyepiece and a SLR or CCD camera.



# 1 Preparation Balancing

\* No need for this preparation in cases of model without counterweight bar.

## ⑧ Weight Balancing in between the Optical Tube and Counterweight

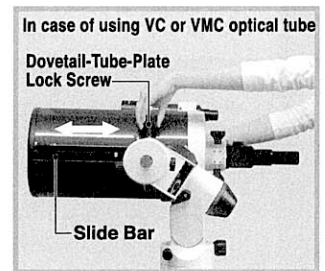
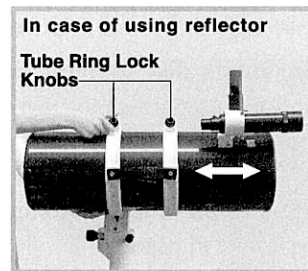
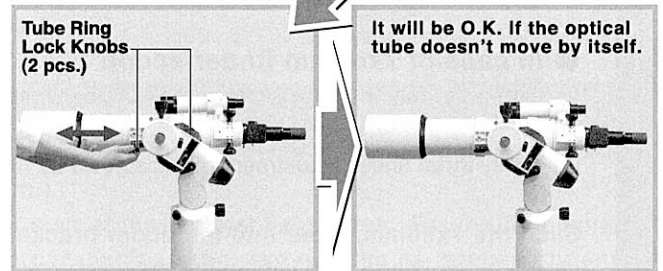
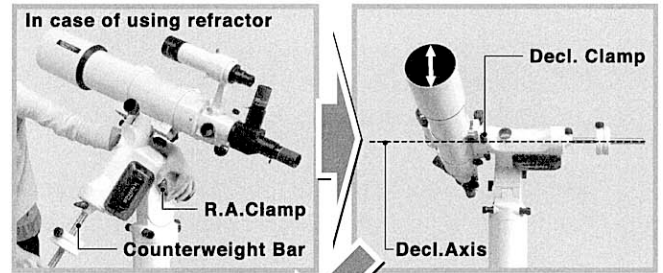
### ● Balancing in declination :

Release the R.A.clamp while supporting the counterweight bar, and turn the telescope tube until the Decl.axis comes to horizontal as shown in the figure, and lock the R.A. clamp tentatively. Then, release the Decl. clamp.

Now find a balancing point (centre of gravity) where the telescope tube remains and does not move itself. It should stay horizontal even when the clamp is released. Loosen the tube ring lock knobs and find the balancing point by moving the telescope tube back and forth. Lock the telescope tube when it is well balanced.

In the case of a model with an attached dovetail slide bar (like VMC200L or VC200L), find the balancing point by loosening the telescope and moving it back and forth. \* Read also instructions attached to the optical tube. (You should install the SX Decl. clamp unit (optional) when balancing optical tubes with the tube rings or the dovetail slide bar.)

Be sure to lock finally the R.A. clamp.



### ● Balancing in Right Ascension

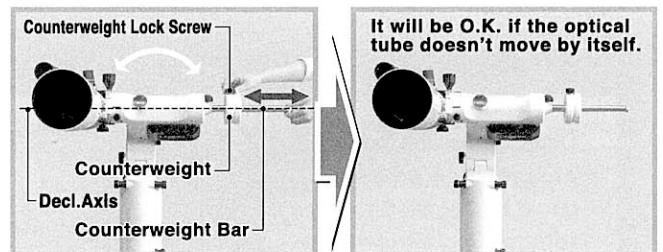
(Proceed to the next chapter those using the SX mount)

On releasing the R.A. clamp, rotate the Decl. axis until it comes horizontal as shown in the Figure. While releasing the R.A. clamp, loosen the counterweight lock screw, and then slide the counterweight onto the counterweight bar.

Find a position where the weight of the optical tube and counterweights are equally balanced, while sliding. An equally balanced position means the optical tube does not move by itself even when detaching hands.

In the case when an equilibrium of weight can not be found, bring it to come to balance by adding or removing the counterweights, as it is considered to be exceeded or shorted.

Finally be sure to lock the Decl. clamp.



## ⑨ Connecting the STAR BOOK Cable

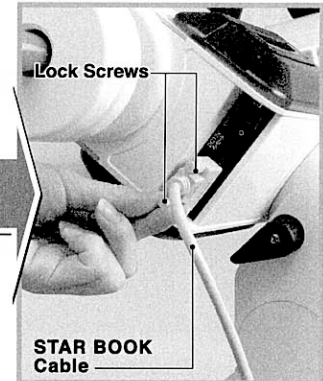
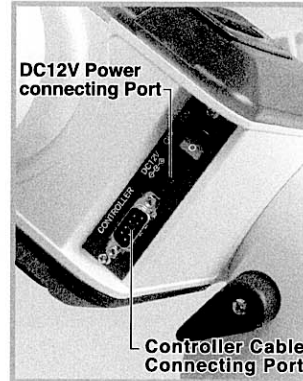
### ● Connect the STAR BOOK Cable with the Equatorial Mount

Insert completely the side of the cable without ferrite core in alignment with the plug-in shape, and fix them surely with locking screws.

#### ⚠ Warning!

Never connect the cable of the STAR BOOK with other instruments such as a PC. It may result in breakdown, heating or electrical shock.

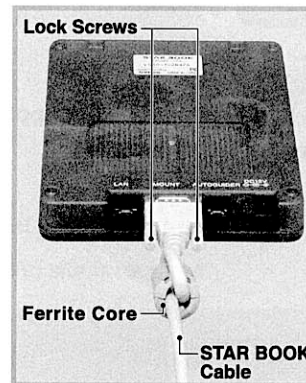
(Specification of the STAR BOOK cable does not comply with RS-232C.)



### ● Connect the STAR BOOK Cable with the STAR BOOK.

Connect another end (side where ferrite core is attached) of the cable with the STAR BOOK.

Fix the cable securely with locking screws.



## ⑩ Connecting the Power Cord

While ensuring the power switch is in OFF position (where the mark ○ is pushed down), connect the power supply (cord) with the equatorial mount.

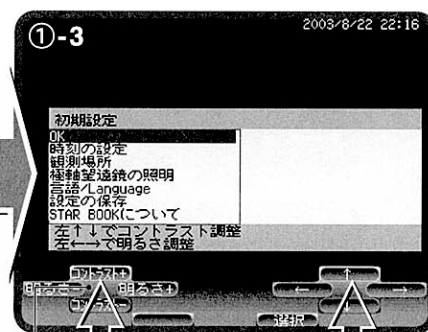
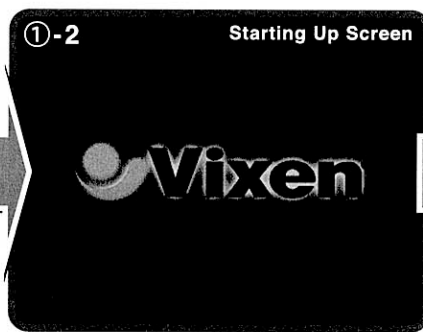
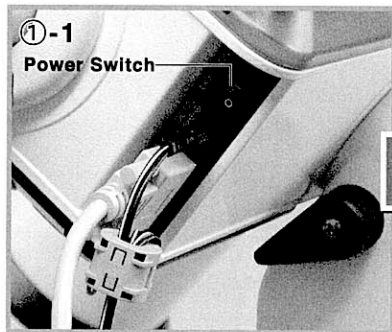
When using a battery case, pay attention to the direction and polarity where the battery cells are inserted.

(8 pieces of D-sized alkaline dry cells are used.)



# 2 Initial Setting Setting the STAR BOOK

## 1 Applying Power Supply



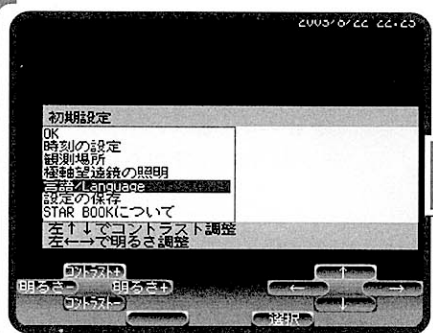
- ①-1 Power supply switch is located at the body of the equatorial mount.
- ①-2 Make sure that the STAR BOOK activates, when the power is switched on.
- ①-3 When power is applied, Figure ①-3 appears on the display.

\* When of the switch is pressed, power is applied, and when pressing , the power is disconnected.

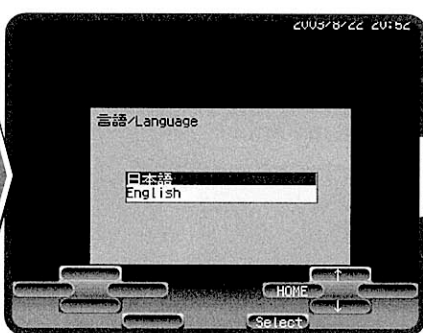
**Hint 1** → Refer to Page 17

## 2 Setting Language

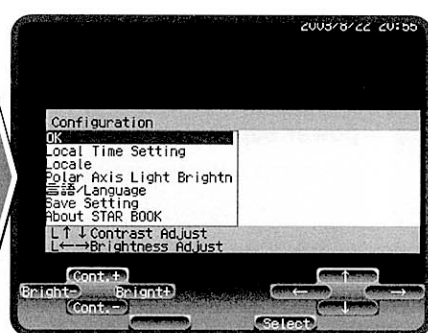
You can select your desired language for operating the STAR BOOK from Japanese and English. In the initial setting, Japanese is set.



Select **言語 / Language** using the key or , and press the key **Select**



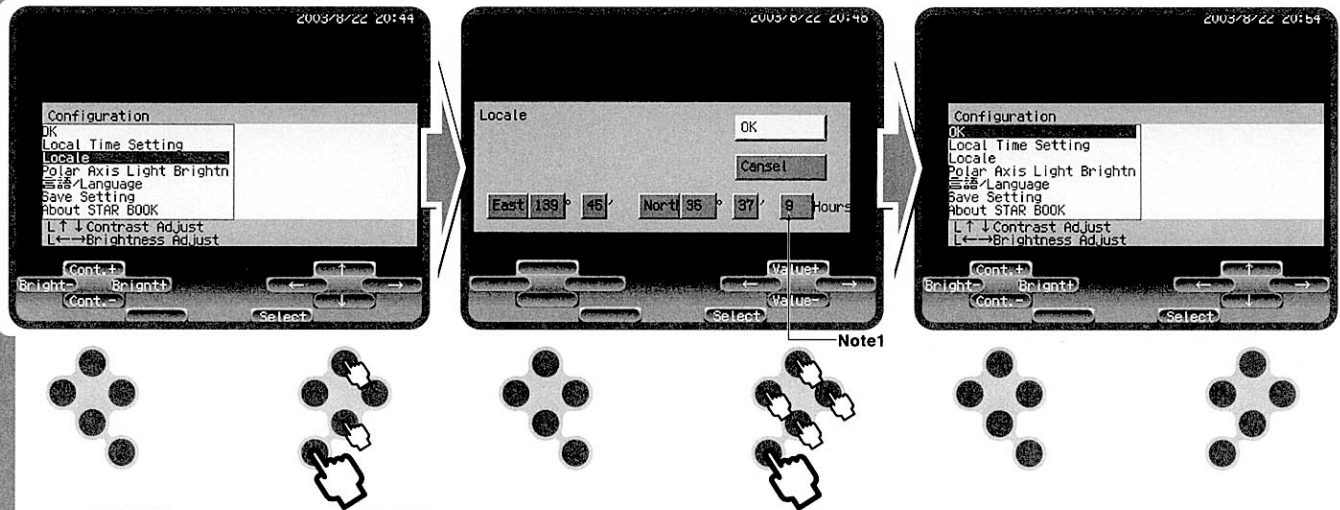
When proceeded to the next screen, select your preferred language using the key or , and press the key **Select** .



Return to the initial setting screen.

### ③ Setting Observing Location

Input the longitude and latitude of your observing location. Once setting is stored by following the steps in the next chapter ⑤, this procedure will not be required unless the observing place is changed. Set it again when the observing venue is changed by more than 20 Kilometers (about 14 miles). Check the R.A. and Decl. of the observing site. You may be able to check them from the information on coordinates on a map or car navigation system.



Select **Local** using the key  or , and press the key .

When the change of longitude and latitude of the observing site is required\*, move the cursor using the key  or  until it reaches the appropriate item, and stop at the item where entry is needed.

Then, change numbers using the key  or .

To finish setting, move the cursor to **OK** using the key  or , and press the key .

Return to the initial setting screen.

Note1

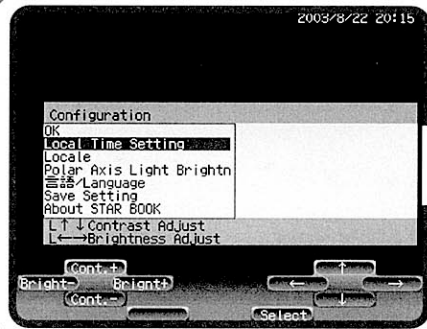
**\*In the initial setting at the time of delivery, longitude and latitude are set at Tokyo.**

**Note 1:**  
 The last item shows the time difference in hours between the local time and the Greenwich Mean Time (GMT). Enter your local time zone by the difference. (It does not compensate for daylight-saving time automatically.)

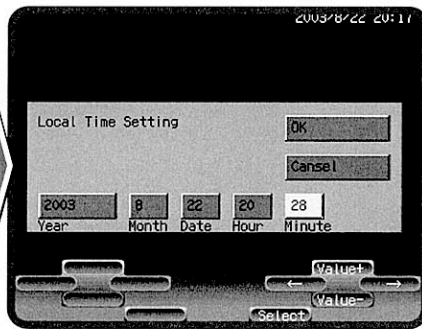
## ② Initial Setting **Setting the STAR BOOK**

### ④ **Setting Local Time** \* This Step is required at initial time only.

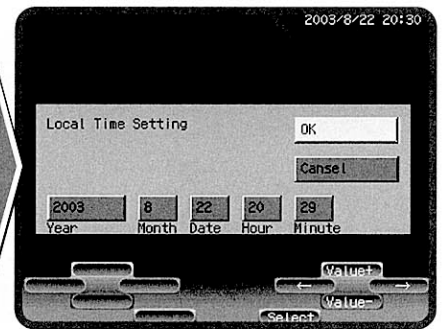
Enter date and time. This setting is required only at the initial time. You do not need to repeat setting when it is used at the same location afterwards. Set date and time again in case of use in a different time zone or internal battery is replaced. The built-in clock may have small error in time and verify the correct time before use. However, automatic slewing will not be normally influenced by an error of the clock of several minutes.



Select **Local Time Setting** using the key **↓** or **↑**, and press the key **Select**.



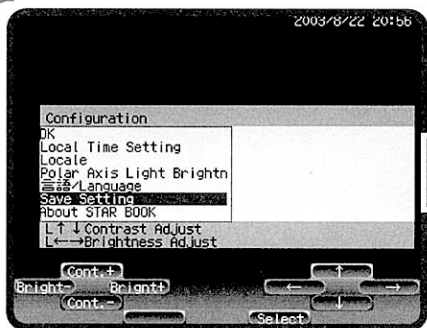
To change date and time, move a cursor using the key **←** or **→** until it reaches the appropriate item, and stop at the item where an entry is needed. Then, change the numbers using the key **↓** or **↑**.



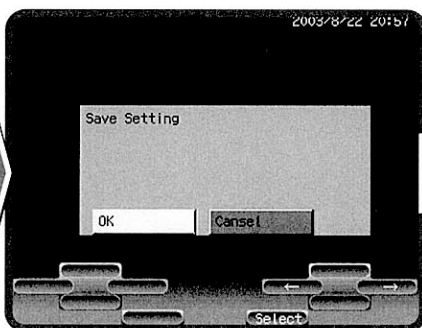
To finish setting, move the cursor until **OK** using the key **↓** or **↑**, and press the key **Select**.

### ⑤ **Storing the Settings**

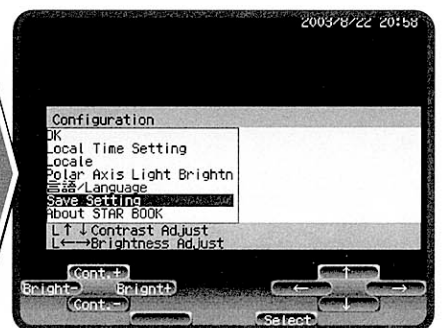
Save the data for observing site and language (Data for date and time are automatically saved at the time of completion of the local time setting). If the set data is not saved, you will need to repeat the setup procedure every time you use the STAR BOOK.



Select **Save Setting** using the key **↑** or **↓**, and press the key **Select**.



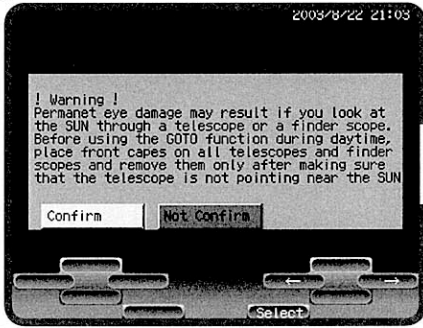
When next screen is displayed, select **OK** using the key **←** or **→**, and press the key **Select**.



After all the above settings are completed, select **OK** using the key **↑** **↓**, **←**, **→**, and press the key **Select**.



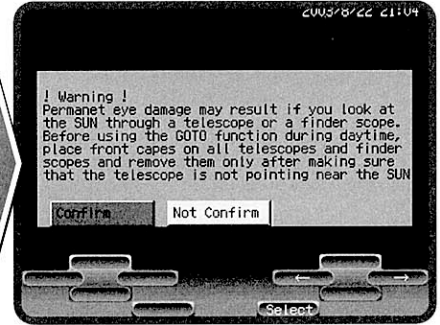
When selecting OK, warning on solar observation will be displayed.



After the reading, select Confirm using the key ← or → and press the key Select.



When selecting Confirm, the above screen appears. However, do not select OK here, and stay in this screen.



When electing Not Confirm, the warning is continued to be displayed.

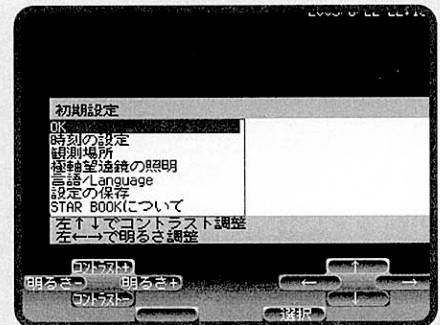
\* Once saved, repeat setting will not be required from next time.

### Adjusting the LCD Screen

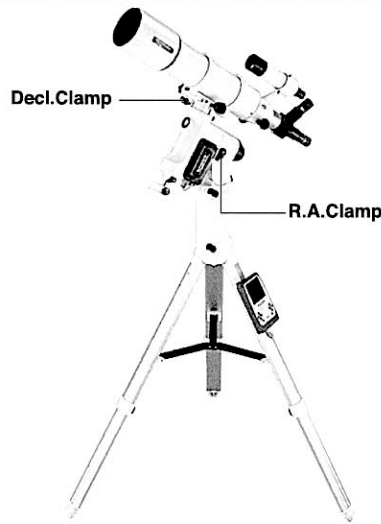
Brightness and contrast of the LCD screen can be adjusted by operating the keys Contrast +, Contrast -, Brightness +, Brightness - of the left side arrow keys at the initial setting. Adjust depending on the conditions of use.

Hint 1

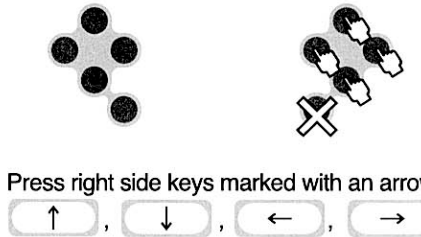
\* When the power supply is turned off, it returns to the initial setting.



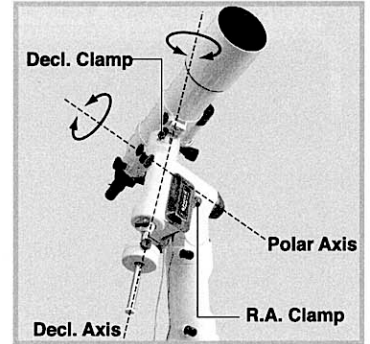
## ① Moving the Telescope in R.A. and Decl.



Make sure the R.A. and Decl. clamps of the telescope are locked.



Press right side keys marked with an arrow.



Telescope can be freely moved by pressing the keys , which moves right ascension, and pressing the key , which moves the declination.

\* Please note that the SX model is not supplied with the Decl. clamp.

\* At this stage, do not press the key **Select** located directly below.

## ② Viewing Terrestrial Landscape

Look into the telescope. The recommended way for a better use of the telescope is to practice with a daytime landscape. It is recommended to start viewing terrestrial scenery, since starting observation under a dark night's sky may be difficult before getting used to operating the telescope correctly.

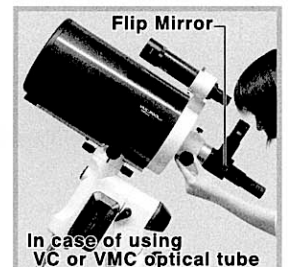
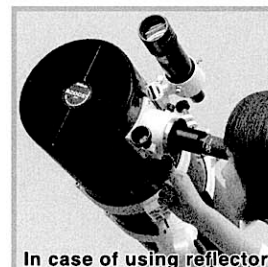
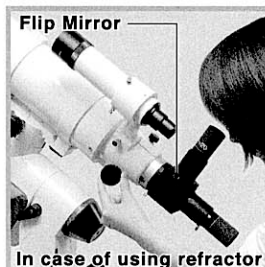
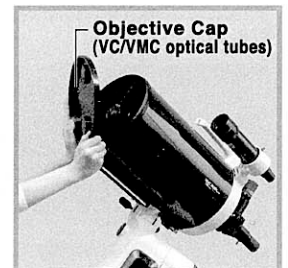
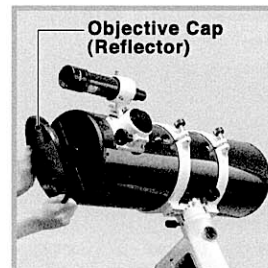
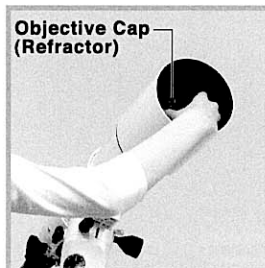
I. Place the telescope in an open area which ideally has a large view filed over minimum 200 meters or more can be viewed. Make sure that there are no visible obstacles for operation in the surroundings. It is impossible to achieve good results indoors by looking through an open window.

### Hint 2





**Images through a window are often viewed to be fuzzy or 'doubled'. When the temperature in between indoors and outdoors is different, you may not see clearly, as the image may be affected by turbulence of air flowing out from a window. (Although image may also be seen drifting in outdoor, it is considered to be very stable compared to that inside the room)**

II. Take off the objective lens cap and eyepiece cap. Location of the caps may differ from model to model.

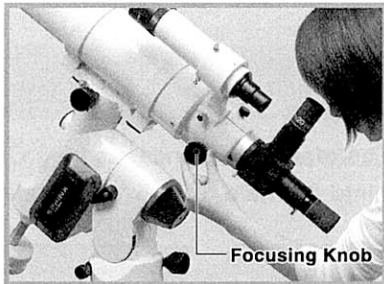
III. Make sure where the eyepiece is installed. Location of installation may differ from model to model. In case of the flip mirror, which allows the installation of an eyepiece at two different positions, use the eyepiece position most comfortable for viewing. Turn the knob of the flip mirror so that the light path comes into the eyepiece. (Refer to page 19).



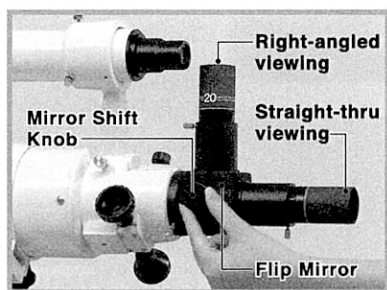
IV. Insert a long focal-length eyepiece into the eyepiece holder and fix the eyepiece setscrew securely.

V. Move the optical tube end of the telescope to point at the object which you intend to see (Object, which is located over 200 meters away, such as a building, antennas, tower, utility poles) by operating an arrow key     on the right side of the STAR BOOK.

VI. Look into the eyepiece. Since it may be initially out of focus, turn the focusing knobs slowly until a clear image appears as shown in the Figure.



When no image is seen in daytime, the light path of the flip mirror may not be on the side of the eyepiece in which you are looking. Turn the mirror shift knob in order to bring it into the field of view.



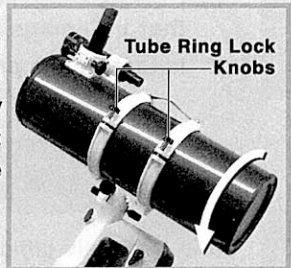
- If you still can not see clearly, try the following:
- VI-1. Nothing focuses at a very close range. Distance to an object requires to be a minimum of 200 meters. Point to a further object.
  - VI-2. Object may be out of view. Carefully point the telescope again at the object.
  - VI-3. When image is viewed totally white (light grey), telescope may be pointing to the sky. Point the telescope again so that the object is viewed.

**When using a short focal-length eyepiece, you may find it difficult to see an image, as it will be dim and the field of view will likely be narrower. Therefore, be sure to use an eyepiece with a lower magnification to begin with.**

**Hint 3 The magnification power of a telescope is arrived at by dividing the focal length of the telescope with the focal length of the eyepiece.**

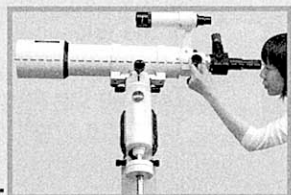
Example: In case of telescope with 800mm focal length (FL).  
 Eyepiece : FL of telescope / FL of eyepiece = Magnification power  
 LV20mm : 800 mm / 20 mm = 40 magnification power (x40)  
 LV 5mm : 800 mm / 5 mm = 160 magnification power (x160)

**In case of reflector type whose eyepiece viewing position is located on the tube side, you may sometimes find it difficult to view depending on the location of the eyepiece. In this case, loosen the fixing knob of the optical tube rings, and rotate the optical tube until it becomes easy to view. Remember to tighten the fixing knobs of the optical tube rings again after rotation.**



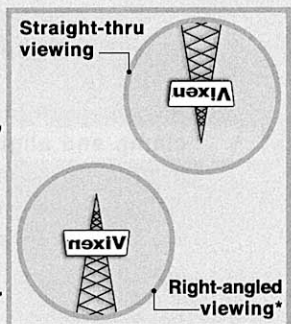
**Hint 4**

**When operating the telescope using keys marked arrows, place the optical tube horizontally as shown in the figure to start with.**



**Hint 5**

**The image in the eyepiece may appear upside down. Precisely speaking, the image will appear inverted (upside down) and reversed left to right when viewing directly (or straight thru).**



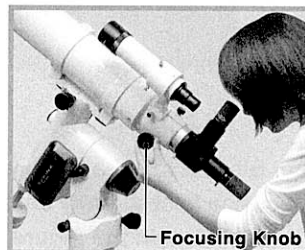
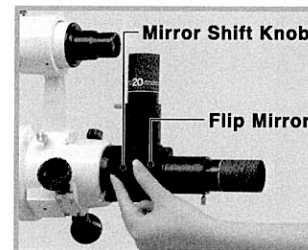
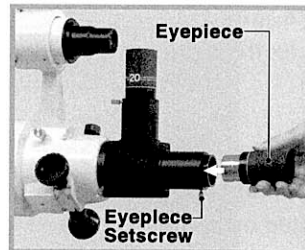
**Hint 6**

**When viewing at a right angle with a diagonal, the image will appear right side up and reversed left to right. An optional "correct image" eyepiece can match the image orientation through the telescope to the unaided viewing orientation.**

\* The illustration is when the eyepiece in right angle type is facing exactly upright. This may be different when it does not face upright.

### ③ Moving the Telescope in R.A. and Decl.

- I. Loosen the eyepiece setscrew, and exchange from an eyepiece with a large mm-number to that at a small mm-number (= high power).  
Be sure to tighten the eyepiece setscrew after exchange.
- II. Focus again. Since the range to focus will get narrower as the magnification increases, turn the focusing knobs as slow as possible.
- III. The object will appear larger as the magnification power increases. However, you will soon recognize that the image is dimmer compared to a lower magnification power.

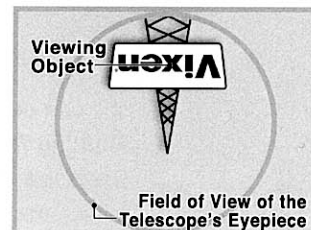
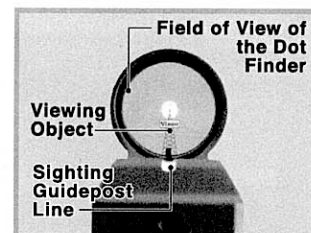
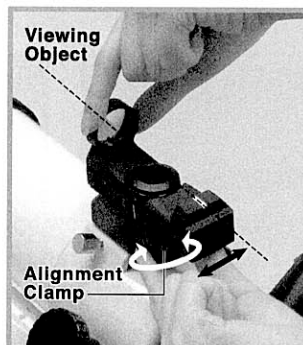
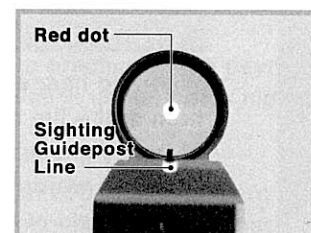
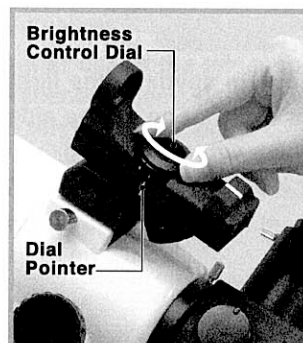


### ④ Adjusting the Finder Scope

It is relatively difficult to locate an object only with the telescope. Therefore use a finder scope. Once the finder scope is adjusted, you will be able to easily slew the object into the field of view of the telescope.

#### ● In case of using dot finder

- I. Place an object in the center of the field of view of the telescope in the same manner from ① to ②.
- II. Turn on the power supply (= dial) of the dot finder. Turn the brightness control dial to 11 as shown in the Figure. (Refer to page 38)
- III. You will see a red dot in the center of the finder viewing from behind. (Refer to the Figure). Keep both eyes open while looking through the dot finder.
- IV. As shown in the Figure, loosen the alignment clamp and align by holding the dot finder body in order to align the viewing dot from the finder with the viewing object that you see in the center of the telescope's eyepiece. Then, lock the alignment clamp.
- V. Be sure to turn off the power after use of the dot finder. Turn the dial to 0 to switch off.



#### Hint 7

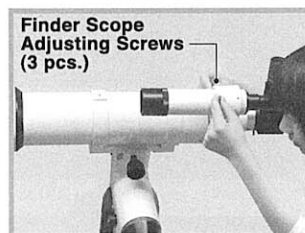
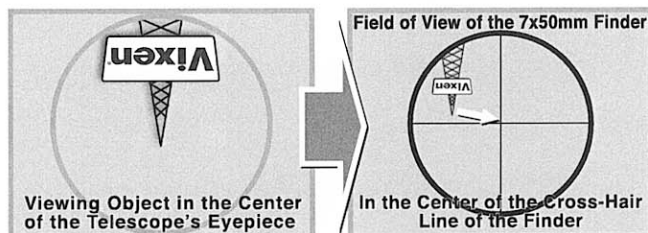
Use the dot finder in a position where a red dot appears in the centre. The dot finder can be used as a reference as far as the dot is visible even viewing slightly from the side. However viewing from the side may make it difficult to see the position of the red dot for a precise adjustment. In case the red dot is invisible, try to look from the sighting guidepost (white line) of the dot finder.

### ● In case of using 7x50mm finder scope

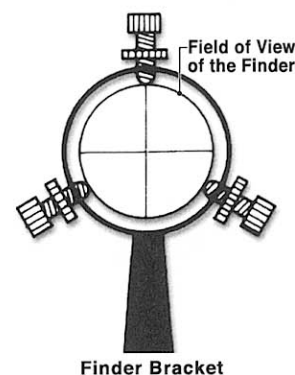
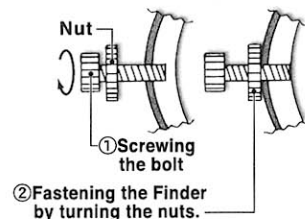
- I. Place an object in the center of the field of view of the telescope in the same manner from ① to ③.
- II. The finder scope has a cross-hair line. Object that can be seen in the field of view of the telescope is also to be seen in the finder scope.
- III. While looking into the finder scope, adjust the three finder scope adjusting screws so as the object caught by telescope can be seen in the center of the cross-hair line of the finder scope.

\* The finder scope adjusting screws are made up from three pieces per set. Once one of screws is loosened, the other two screws come to loose. If you loosen one screw and fasten other screws, direction of the finder scope will change. Proceed with adjustment using this manner.

\* Image in the finder scope will appear upside down.



Adjusting the finder scope adjusting screws in order of ①→②

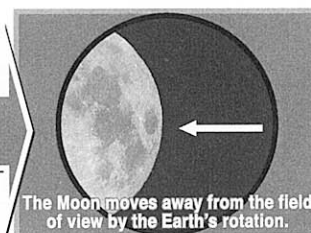
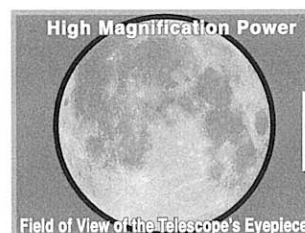
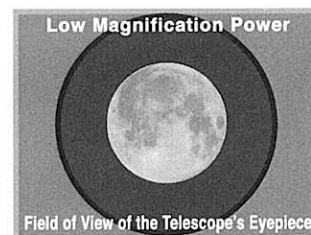
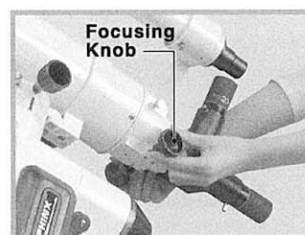
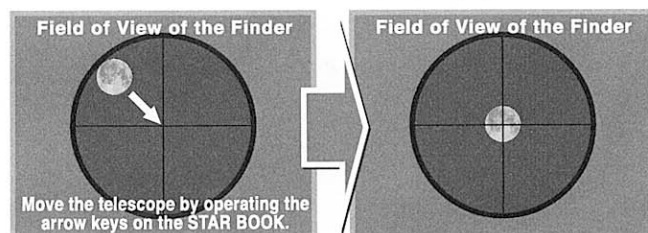


## ⑤ Observing Moon

From this chapter, let us point the telescope to the night sky. To begin, choose an easily visible celestial object first and then move to a dimmer celestial object as you become more comfortable with the equipment.

**Moon** → **Planet** → **Nebula / Star cluster**

- I. Move the telescope so that the moon is viewed near the cross-hair line of the finder scope (or near the red dot in case of the dot finder). Move by operating the arrow keys on the right side of the STAR BOOK.
- II. Focus using a lower magnification eyepiece in the telescope (= an eyepiece with a large mm-number)
- III. Change the magnification power by exchanging eyepieces depending on your personal preferences.
- IV. The Moon will move rapidly out of the field of view if you keep looking through the telescope (same as other celestial objects) and it disappears. The higher the magnification power, the faster the diurnal movement appears. Slew the telescope again and center the moon in the field of view by using the arrow keys on the right side of the STAR BOOK.

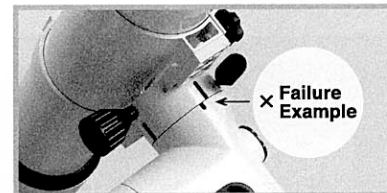
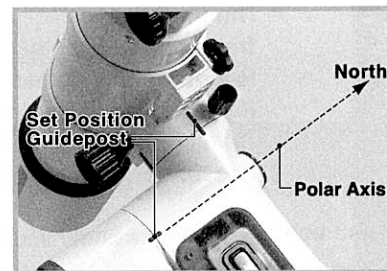
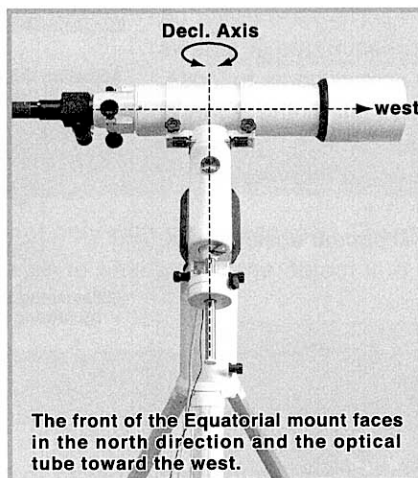
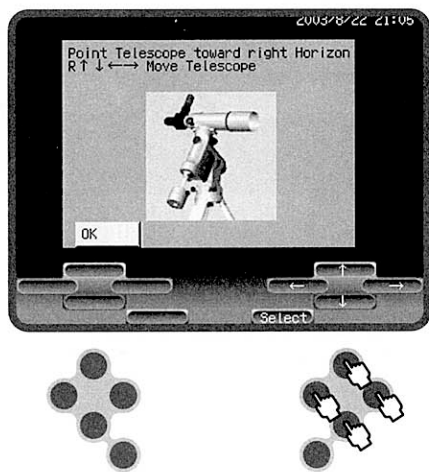


## ◎ Mechanism of the Automatic Slewing

Automatic celestial slewing represents a search for stars from storage of the fundamental positions of stars into the SX equatorial mount. Set up in the following procedure in order to perform automatic slewing.

- |   |   |
|---|---|
| ① <b>Setting the optical tube to the initial position</b> | Move the telescope to the set position (initial position of telescope / polar axis is orientated to north and optical tube is orientated to west) using the STAR BOOK controller.   |
| ② <b>Setting direction(Alignment)</b>                     | Select celestial objects registered in the STAR BOOK as reference points. Automatic slewing from the initial position would not be hit the object accurately and the real field of view of the telescope has to be matched with the virtual filed of view on the screen of the STAR BOOK. |
| ③ <b>Starting Automatic Slewing</b>                       | After setting direction (alignment) over two points, highly accurate automatic slewing to the objects becomes possible.   |

## ① Ensuring Set Position



After setting up the telescope, turn the power switch to ON at the equatorial mount, and complete the initial setting. (Refer to page 14 – 17). In this case, the STAR BOOK will display as shown.

First, move the equatorial mount by pressing the arrow keys on the right side of the STAR BOOK. Make sure the optical tube will move on demand.

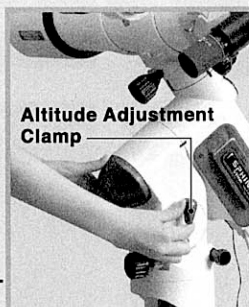
Next, set the direction of the polar axis of the equatorial mount to north as shown in the Figure, and adjust the optical tube to face west using the STAR BOOK. In this case, point as exact as possible to coordinate with the guidepost of the equatorial mount, as shown in the Figure.

### Hint 8

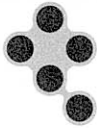
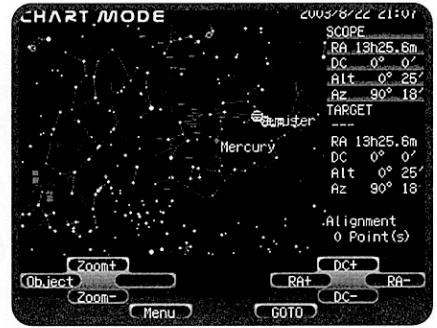
Although it is not always necessary to point the polar axis direction to north, pointing accuracy will increase when it is orientated to north. Locate the polar axis so as to face south when using in the southern hemisphere.

### Hint 9

To get the initial position you can move the optical tube after releasing the Decl. clamp if you have the model provided with both the Decl. clamp and the R.A. clamp. Approximately align the altitude angle of the equatorial mount to match the latitude of your observing location by adjusting the altitude adjustment knob. (Refer to page 15).



### ② Aligning the Telescope



I. After setting up the telescope in the section ① above and on pressing key **Select**, a star chart showing around west sky will be displayed on the STAR BOOK (East sky in the case of southern hemisphere). The R.A. motor start working at sidereal rate simultaneously.

II. Every time when pressing key **Select** and **GOTO**, SCOPE MODE and CHART MODE will be alternated.

- In order to enable automatic slewing, you need to set up more than two reference points out of the celestial objects registered in the STAR BOOK.

- Choose well known bright stars for reference stars.

- Repeat these procedures twice at the least.

When the background on the bottom of the screen is red in color it shows that SCOPE MODE is selected.

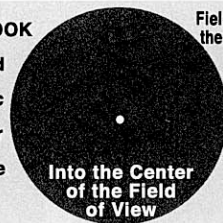
In the SCOPE MODE, the screen and direction of the telescope move together when the keys **DC +**, **DC -**, **RA +**, **RA -** are operated.

The color of the background on the bottom of the display in blue shows that CHART MODE is selected.

In the CHART MODE, only the screen is scrolled and not the telescope. When searching for celestial objects, be sure to operate in the CHART MODE.

#### Hint10

In order to make the targeted object on the screen of the STAR BOOK seen in the actual eyepiece, place it in the centre of the field of view as precisely as possible. This will enhance automatic pointing accuracy. It is recommended to use a cross-hair adapter such as the GA-4 (optional) or an illuminated guiding eyepiece (The GA-4 cannot be used on reflector type optical tube).



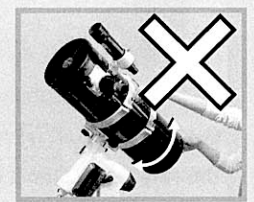
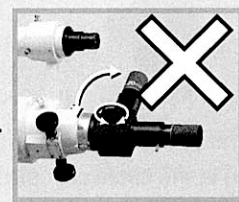
Field of View of the Telescope's Eyepiece



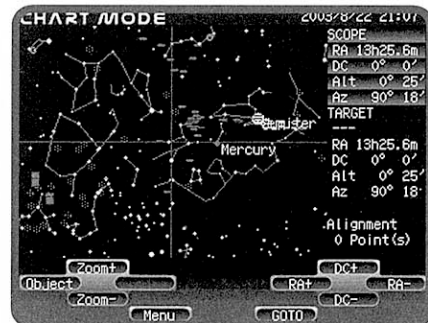
GA-4 (Optional)

#### Hint11

In case of using the flip mirror during alignment, do not rotate the flip mirror against eyepiece section. Do not shift the flip mirror, too. Rotating or shifting the flip mirror may cause a movement of the field of view and will reduce the pointing accuracy. Do not rotate the optical tube, either.



III. As the SCOPE MODE appears at the initial screen, press the chart key to switch to the CHART MODE. Make sure the background color on the bottom of the screen becomes blue. Bring a celestial object which is used for a reference point into the center of the display, by operating the keys **DC +** **DC -** **RA +** **RA -**, While zooming in and out on the display with the keys **Zoom +** **Zoom -**, bring the object into the center of the circle (or center of the cross-hair) on the screen of the STAR BOOK as close as possible by operating in combination with the keys **DC +** **DC -** **RA +** **RA -**.

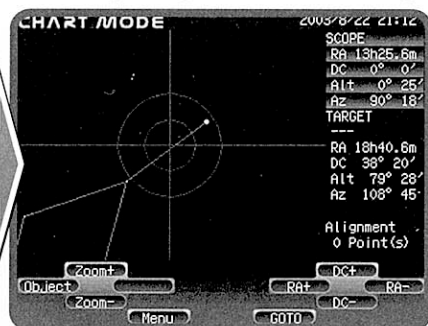
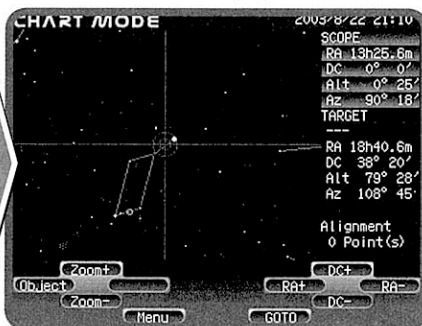
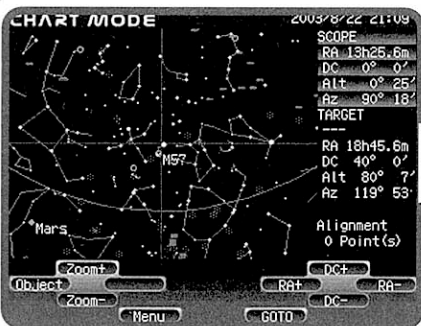


### Hint12

Zooming-in using the key **Zoom +** enables fine adjustment, and zooming -out by the key **Zoom -** makes scrolling possible in a broader range.



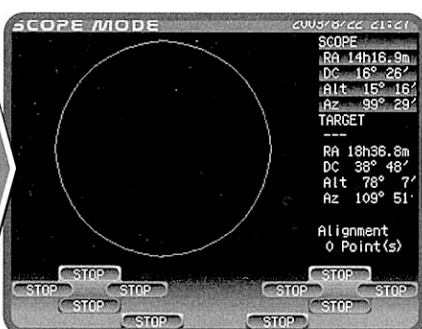
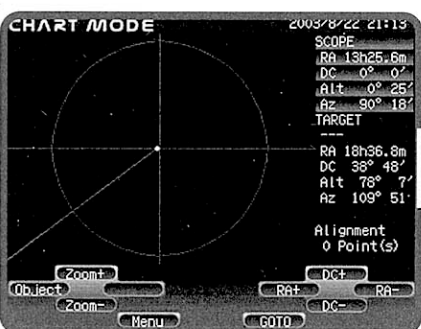
IV. Introduce a celestial object for a reference point into a circle displayed on the STAR BOOK. Example; Vega in the constellation Lyra.



Pressing the key **Zoom +** to zoom in on the star chart enables fine adjustment of the scrolling

Press again the key **Zoom +** to zoom in further.

Further pressing of the key **Zoom +** reaches the maximum zoom.



Press the key **GOTO** after slewing to the reference star (Lyra) in the circle on the screen of the STAR BOOK.

Automatic slewing will start. (When it starts, you enter SCOPE MODE.)

Automatic slewing is complete when a beep sounds for confirmation.



# Setting Direction (Alignment)

Setting more than 2 reference points out of the celestial objects registered.

## 4 Automatic Slewing to Celestial Objects

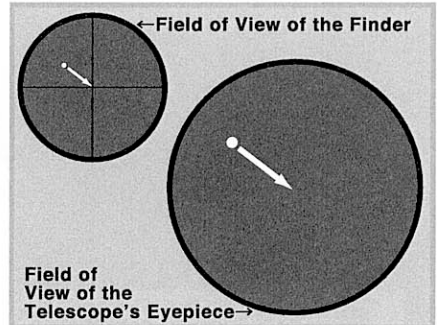
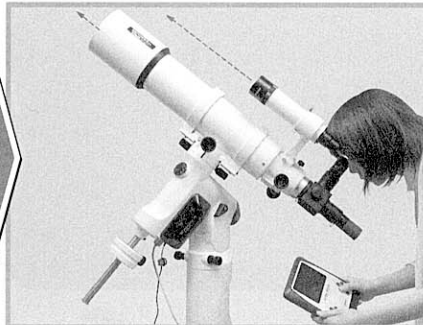
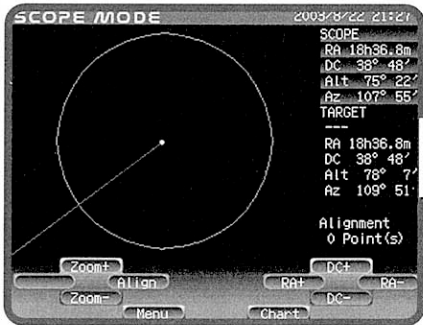
### ⊗ Caution 1

Star may not come exactly into the center of the circle on the screen. However, approximate positioning in the center will be permissible.

### ⊗ Caution 2

- Pay attention to the moving area of the telescope, as it moves suddenly when switching into the automatic slewing.
- During automatic slewing, you can stop movement by pressing any of the keys. When you need to stop it in emergency, press any available keys to stop. To resume operation after stop, start again from setting a target.

V. Make sure the movement of the telescope is stopped, and the background on the bottom part of the screen on the STAR BOOK has turned red. At this moment, the telescope points only at the approximate direction to Vega, and therefore you need to correct by the following procedures.



Place "Vega" in the field of view of the telescope's eyepiece by pressing the keys of **DC +** **DC -** **RA +** **RA -**.

Slew to "Vega" chosen for the reference point and place it in the field of view of the finder scope first, and then put it into the field of view of the telescope's eyepiece.

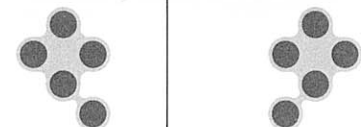
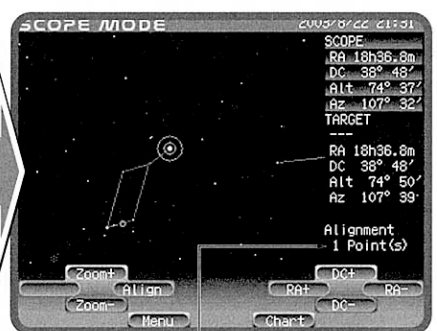
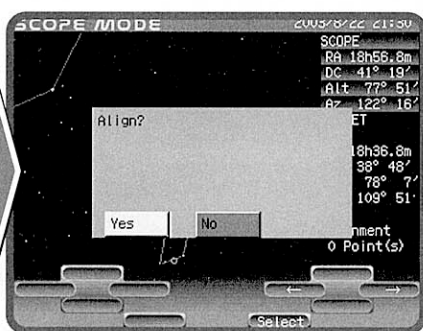
\* The targeted celestial object "Vega" on the screen of the STAR BOOK will go out of the center of the circle when moving the telescope, but please disregard it.

### Hint 13

The keys **Zoom +** and **Zoom -** are linked with the speed of the telescope. Zooming-in with the key **Zoom +** makes movement so minute that it allows fine correction. Conversely zooming-out with the key **Zoom -** enables larger movement of the telescope.

### Hint 14

Slew at a higher magnification power to place the object in the center of the field of view accurately, on exchanging an eyepiece. Fine adjustment can be made easier by zooming-out and in with the keys **Zoom +** and **Zoom -** which are linked with the motion speed.

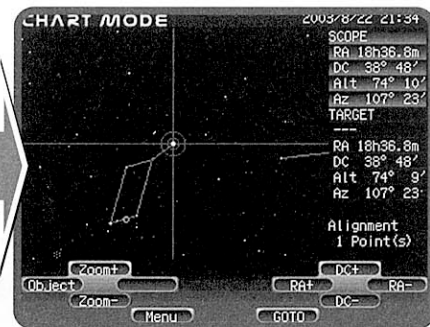
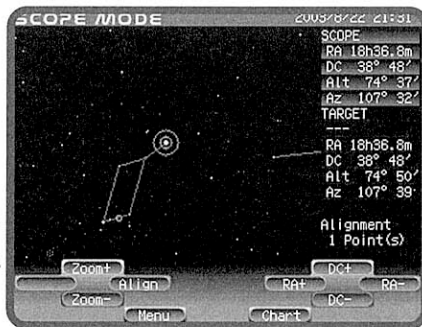


Slew to the target "Vega", center it and then press the key **Align** on the STAR BOOK.

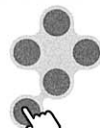
Choose **Yes** in dialogue press and the key **Select**, for confirmation of alignment.

Through this procedure, alignment of one point is completed. The targeted celestial object "Vega" will match with the cross-hair line as you can see on the display.

VI. In order to perform alignment for 2nd point, 3rd point ..., press key **Chart** once again to switch to the CHART MODE (Background color on the bottom of the screen will turn blue). Select a star to be used as the next alignment point. Repeat I to VI.



\* Perform next alignment after zooming out using the key **Zoom -**, so that a target celestial object can be searched for in a wider range.



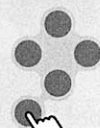
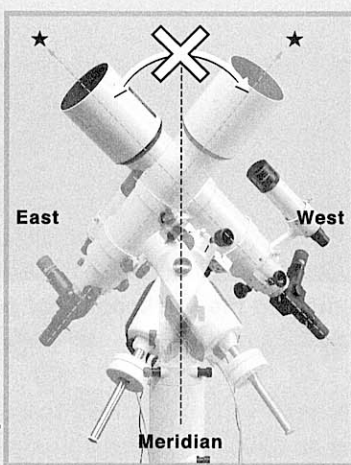
Pressing the **Chart** key once again turns the screen to the CHART MODE.

Select a celestial object to be used as the next alignment point.

### Hint 15

Selecting a star within the same area of the meridian will increase the slewing accuracy of the system.

When choosing two stars within 10 degrees of each other, notice will be displayed on the screen. Then you need to start over again by using wider separated two stars.



### Hint 16

In order to increase the slewing accuracy in an area over the meridian, make an alignment of more than two points first, and then another alignment of more than two points in an area on the other side of the meridian.

Basically two stars on one side of the sky and another two stars on the opposite side of the sky.

### Hint 17

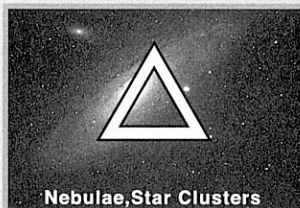
When making alignment over the meridian, be sure to make alignment of over two points in an area within the meridian at first, and then make alignment in an area over the meridian.

### Hint 18

Alignment based solely on an area over the meridian makes the slewing accuracy worse.

### Hint 19

For a reference point, a variety of celestial objects can be used such as moon, planets, or nebulae and star clusters. It is recommended however to use a reference star (fixed star), as nebulae or star clusters are widely spread objects and may create a slight error.



### Hint 20

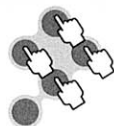
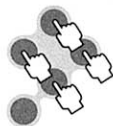
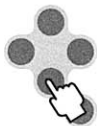
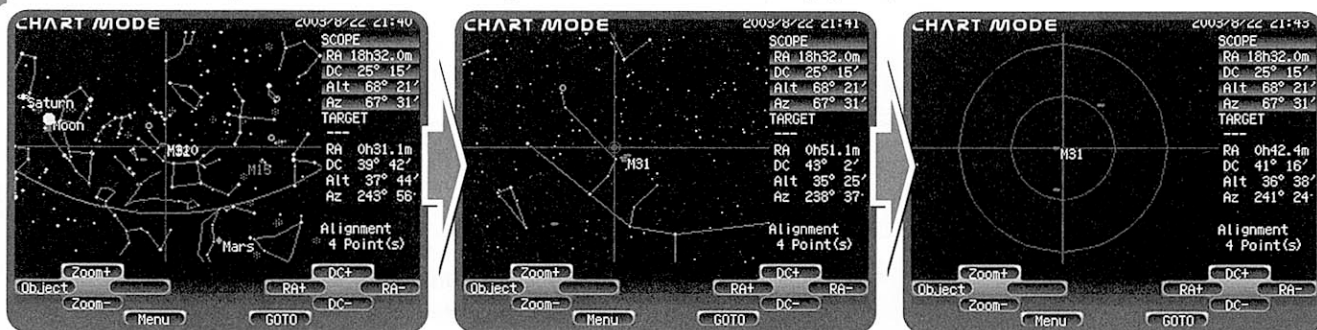
Choose celestial objects widely spaced on the sky (largely distant from each other) for alignment. A use of distantly located stars will increase pointing accuracy in the automatic slewing.

## ④ Starting Automatic Slewing

Automatic slewing is basically feasible right after a two-points alignment is performed. Once alignment is made, you can start automatic slewing to any celestial object displayed on the screen of the STAR BOOK.

**Hint21** Alignment can be made by up to 20 points in order to improve the slewing accuracy.

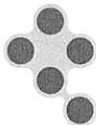
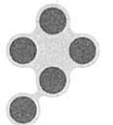
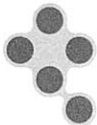
Here is an example for automatic slewing of the Andromeda Galaxy (M31)



Search for a target celestial object using the arrow keys on the right side in the CHART MODE. Look for the object by scrolling widely using the key **Zoom -**.

Place the target object in the center of the cross-hair line using the arrow keys on the right side while zooming in.

Continue to zoom in, placing the target object into the centre of the cross-hair line using the arrow keys on the right side, and press the key **GOTO**.



The display will change to the SCOPE MODE and starts automatic slewing. Then, automatic slewing will be complete.

Start viewing using an eyepiece in a low magnification power, place the celestial object in a centre of the field of view, by moving the telescope with the keys **DC +** **DC -** **RA +** **RA -**. Continue viewing upon exchanging eyepiece in a preferred magnification power. To view other celestial objects, press the key **Chart**.

Change to the CHART MODE. Search for a target celestial object by scrolling widely using the key **Zoom -**, and then press the key **GOTO**.

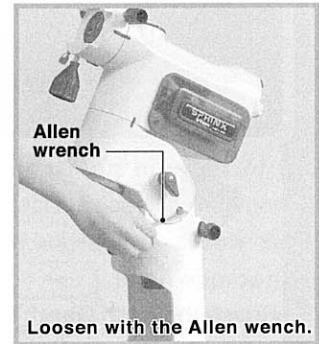
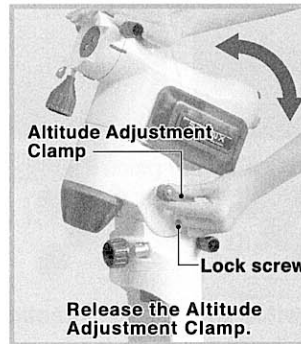
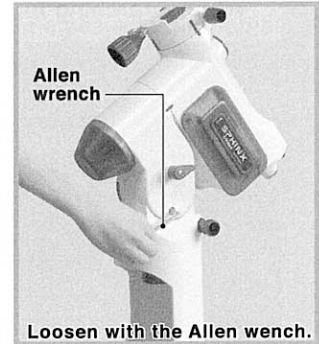
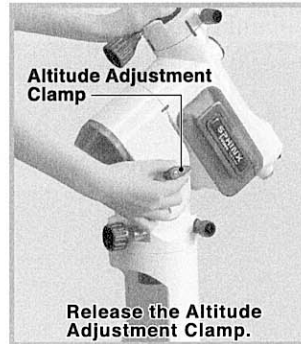


## (a) Altitude Adjustment

Altitude of the polar axis of the SX equatorial mount (SX and SXW equatorial mount) is set at a latitude of approximately 35 degrees north at the time of delivery. For this reason, an altitude adjustment is likely necessary to suite your particular location and can be done by releasing the altitude adjustment clamp and following the directions that follow.

- I. Release the altitude adjustment clamp.
- II. Loosen the lock screw located beneath the altitude adjustment clamp, by using the supplied Allen wrench.
- III. Once it is loosened, altitude can be changed. Move the position until it matches the altitude of the location in use and lock the altitude adjustment clamp and the lock screw using the Allen wrench.

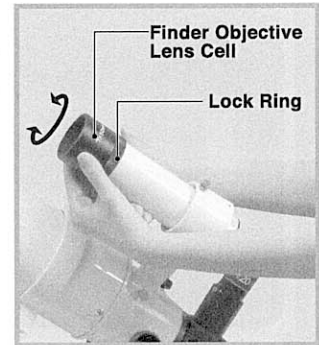
**Note : Polar axis at higher than 70 degrees north (or south, in case of southern hemisphere) can not be set.**



## (b) How to Adjust Focus of 7x50mm Finder Scope

The 7x50mm finder scope is adjusted to focus at infinity at the time of delivery from factory. However, it may not focus depending on individual eyesight. In this case, adjust focus according to the following procedure.

- I. Turn the finder scope objective lens cell manually (where objective lens is stored). Loosen the locking ring which is initially locked.
- II. Look for a focusing point by turning the finder scope objective frame.
- III. Fasten the lock ring at the point where the focus is made.



## (c) Polar Axis Finder(Optional) \* Required for photography in a long time exposure.

The SX equatorial mount series is designed for automatic slewing of celestial objects upon easy setup. However, a higher precision setting is required for the photography of nebulae or star clusters where a long-time exposure is required. In this case, please use a SX polar axis finder which is available optionally.

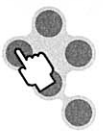
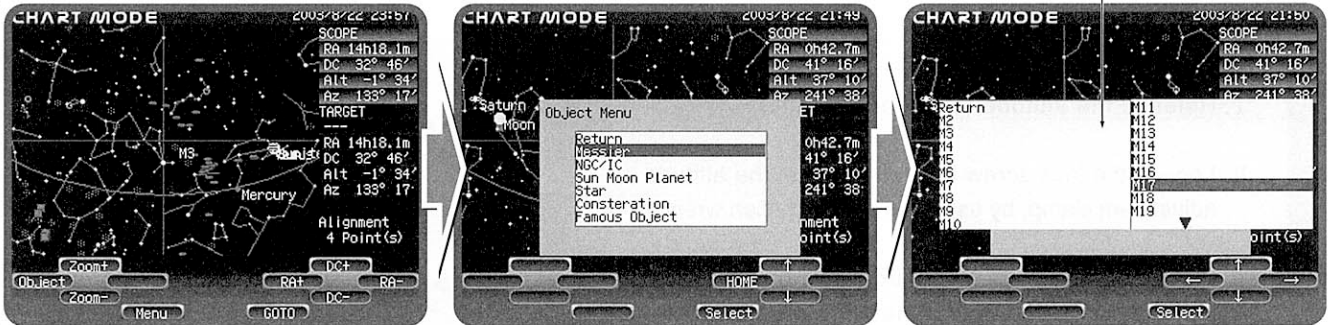
## (d) Selecting Celestial Objects from Object Menu

When searching for a target celestial object in the CHART MODE, select the target in the object menu using the key **Object**.

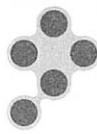
### Example 1 : Search for a Messier object.

\* Messier objects form one of the most famous astronomical catalogs containing 110 star-clusters, nebulae and galaxies.

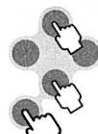
Note 1



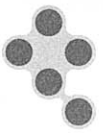
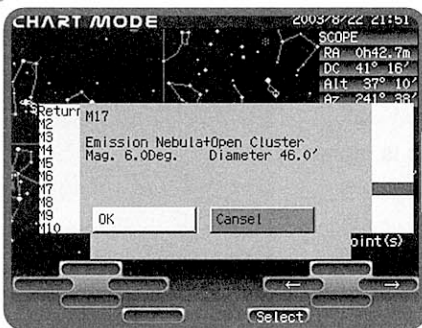
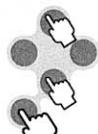
Press the key **Chart** to switch the display to the CHART MODE. Then press the key **Object**.



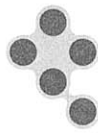
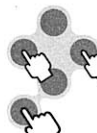
After selecting **Messier** by using the arrow keys **↑** **↓**, press the key **Select**.



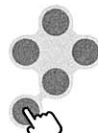
Messier objects will appear. Move the cursor using the arrow keys **↑** **↓** to a target messier object, and press the key **Select**.



Information on the selected celestial object will appear. If you continue targeting the selected object, press the key **OK**, and then press the key **Select**. If you want to select other celestial objects, press the key **Cancel**, and then press the key **Select**.



When you press the key **GOTO** here, automatic slewing of the celestial object will start (An example is M17.).

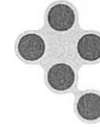
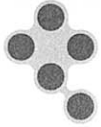
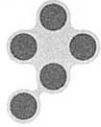
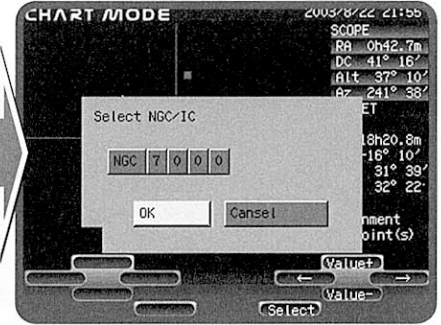
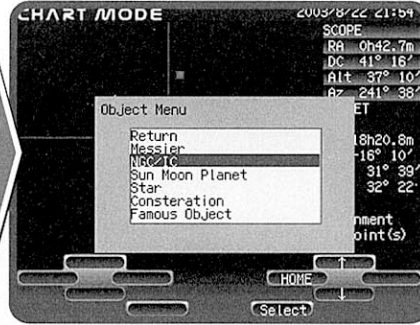
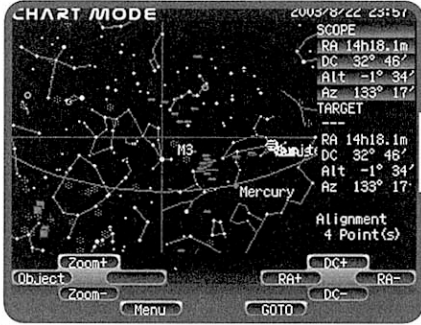


**Note 1**  
Only celestial objects that the telescope can slew at the time of observing will be shown in the display.

**Note 2**  
The name of the number of the targeted celestial object will appear in grey on the display.

## Example 2 : Search for NGC/IC celestial objects.

\* NGC and IC are additional astronomical catalogs that include a great number of galaxies and faint objects.

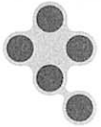
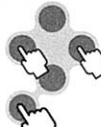
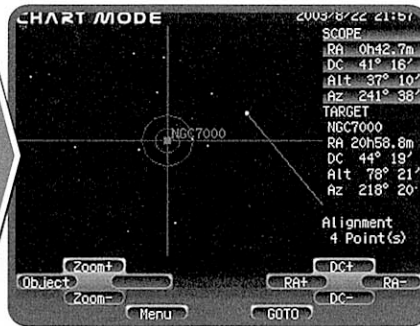


Press the key **Chart** to switch the display to the CHART MODE. Then press the key **Object**.

After selecting **NGC/IC** by using the arrow keys **↑** **↓**, press the key **Select**.

Enter the catalog number of the celestial object for slewing. After moving the cursor using the arrow keys **←** **→** to an appropriate item, enter the numerical value using key **Value+** **Value-**.

\* When selecting IC objects, move the cursor to the heading **NGC** and switch from **NGC** to **IC** by using the keys **Value+** **Value-**.



Information on the selected celestial object will appear. If you continue targeting the selected object, press the key **OK**, and then press the key **Select**. If you want to select other celestial objects, press the key **Cancel**, and then press the key **Select**.

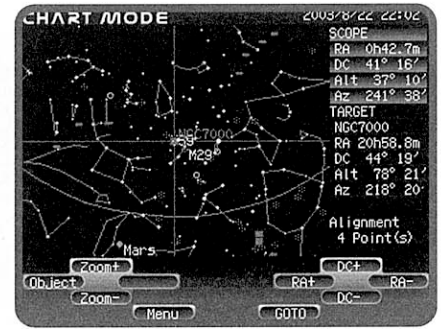
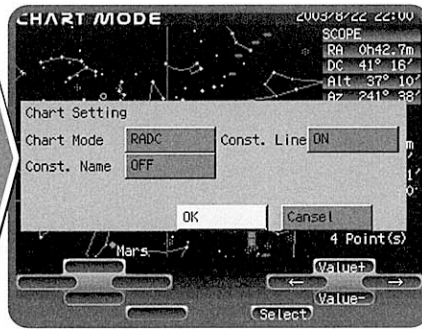
When you are here press the key **GOTO**, and automatic slewing of the celestial object will start (An example is NGC7000 here.).

The same procedures described this section are applied to a search for sun, moon, planets, fixed stars, constellation, and etc.

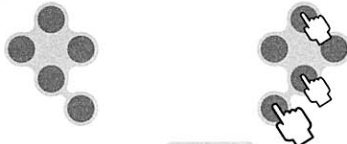
## (d) Selecting Celestial Objects from Object Menu

Use **Menu** key. You can select in either the CHART MODE or the SCOPE MODE.

### I. Chart Setting



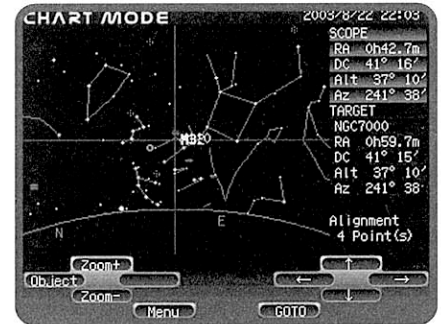
**Viewing in RADC**



Pressing the key **Menu** will display the system menu. Select **Chart Setting** using the arrow keys **↑** **↓**.



Move the cursor with the arrow keys **←** **→**, and set using the keys **Value +** **Value -**. Next press the key **OK** and then press the key **Select**.



**Viewing in AltAz**

**◎ Chart Mode**

Select **RADC** to display the regular CHART which is set initially. In order to display the images as viewed from terrestrial ground, select **AltAz**, and a horizon line is displayed.

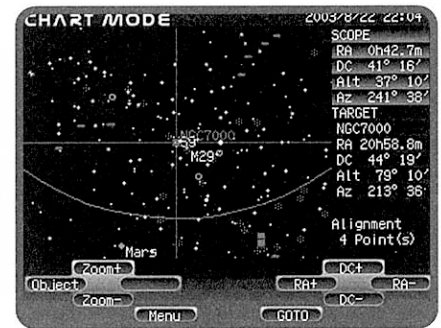
\* Even selecting an altitude azimuth, the telescope can be moved up and down, and left and right (similar to an altazimuth mount)

**◎ Constellation Lines**

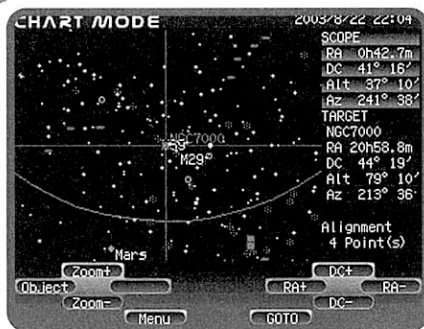
You can select **ON** and **OFF** for the optional display of constellation lines. In the initial setting, it is set to **ON**.

**◎ Name of Constellations**

You can select between **Short** and **OFF**, for the short form of constellation names to be displayed or no constellation names to be displayed. In the initial setting, it is set to **OFF**.



**Off constellation line**



**OFF constellation names**



**ON constellation names**

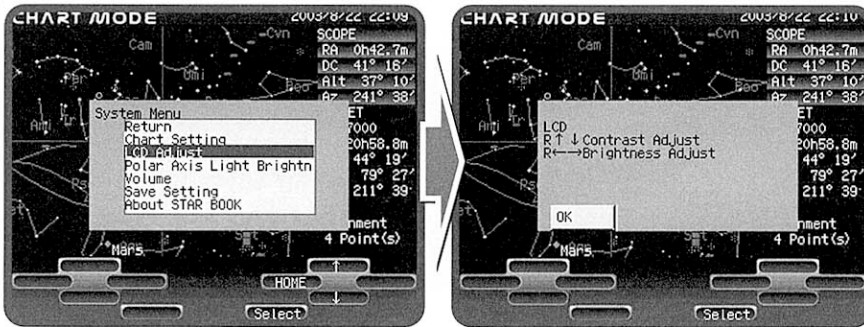


**ON constellation names by abbreviation**



## II. LCD Adjustment

When selecting the LCD adjustment, you can adjust brightness and contrast of the liquid crystal display.



**Note :**

This can be adjusted in the menu for initial setting right after starting up the STAR BOOK.

**Contrast adjustment :**

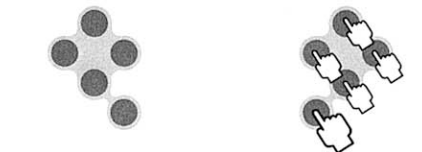
Cont. +      Cont. -

**Brightness adjustment :**

Bright +      Bright -



When the key **Menu** is pressed, the system menu will be displayed.

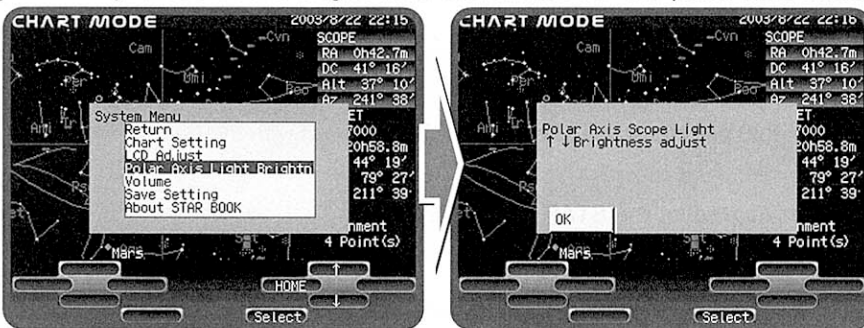


Adjust the LCD using the arrow keys ← → for contrast and ↑ ↓ for brightness, and press the key **OK** , then press the key **Select** .

Move the cursor with arrow keys ↑ ↓ , to **LCD Adjust** and press the key **Select** .

## III. Illumination of the Polar axis finder:

Brightness of the bright-field illuminator for the polar axis finder (optional) can be adjusted.



**Note 1 :**

There is the same menu for initial setting right after starting up the STAR BOOK, where it is possible to make adjustments shown on the left.

**Note 2 :**

Illumination cannot be turned off.



When the key **Menu** is pressed, the system menu will be displayed.

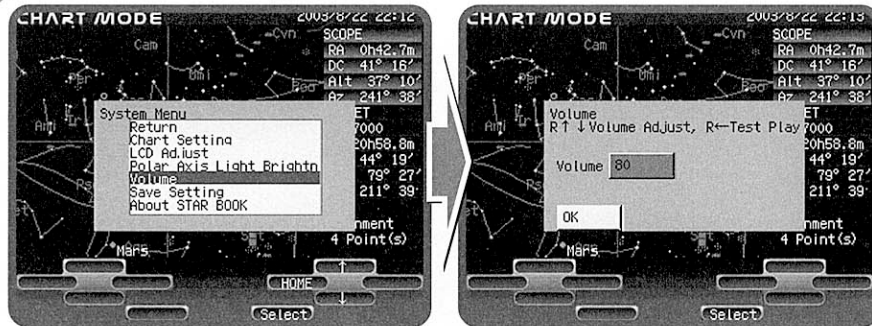


Adjust the brightness using the arrow keys ↑ ↓ , and press the key **OK** . Then press the key **Select** .

Move the cursor with the arrow keys ↑ ↓ , to **Polar Axis Light Brightn** and press the key **Select** .

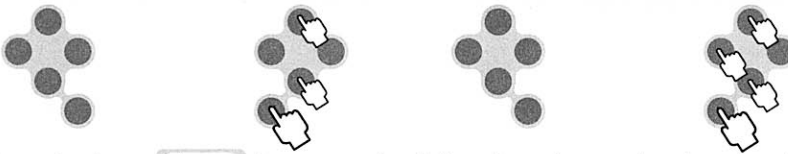
## IV Volume Adjustment

When selecting **Volume**, you can adjust the volume of the built-in speaker.



**Note 1 :**  
The volume is set initially at "80".

**Note 2 :**  
To check the selected volume during adjustment, press the arrow key **←** on the right side to actuate the current sound.



When the key **Menu** is pressed, system menu will be displayed. Move the cursor with the arrow keys **↑** **↓** to **Volume**, and press the key **Select**.

Adjust the volume using the arrow keys **↑** **↓**, and press the key **OK**. Then press the key **Select**.

## V. Storage of Settings

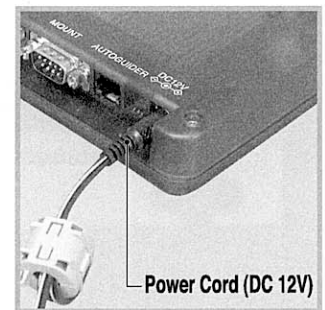
It is necessary to store data of the selected setting in the STAR BOOK's memory so that you can use the same settings at observation next time. Save the settings data by referring to Page 16.

## (f) Stand Alone Use of the STAR BOOK

STAR BOOK is equipped with a power port that permits stand alone use when powered with the battery case supplied.

This port is convenient when it is used for upgrading the STAR BOOK with new software version, down loading of comet data, or as star chart or a concise astronomy book.

Connect a power supply cable with the DC12V port as shown in the Figure. Connection of the power cord will apply the power. (There is no power switch).



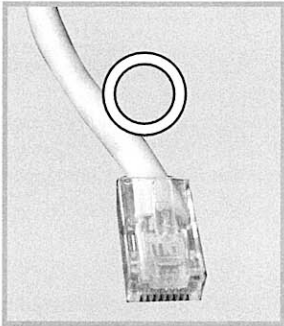
## (g) Connecting an optional LAN Cable

The STARBOOK is designed to connect to a PC with a LAN cable so that data or application programs can be downloaded via website for upgrading.

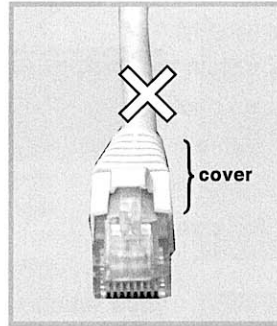
For information on availability of new version for the STAR BOOK, access to Vixen's website at [www.vixen.co.jp](http://www.vixen.co.jp) occasionally.

<http://www.vixen.co.jp/>

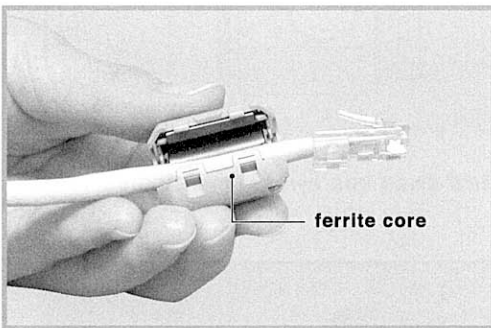
Use commercially available LAN cables for connection to the STAR BOOK. There are some LAN cables that do not fit the LAN connecting port of the STRA BOOK due to variations of the LAN cables. Please specify the 10BASE-T LAN cable for connection.



○ Use a LAN cable without cover as shown on the above.

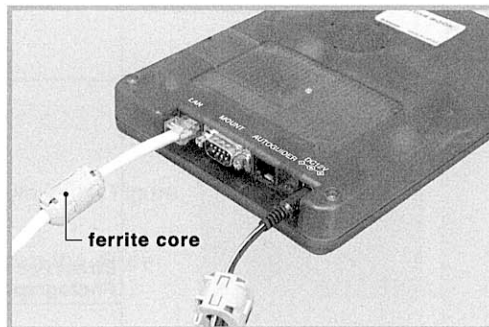
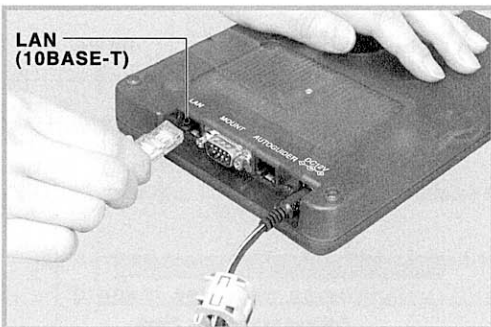


× A LAN cable with cover as shown on the above does not fit.



Be sure to use the the supplied ferrite core for the LAN cable so as to prevent from unintended radio frequency emission. Attach the ferrite core on one end that is the side to be connected to the LAN connector port of STAR BOOK as shown in the Figure.

When you connect the STAR BOOK and a PC with the LAN cable, always connect to the STAR BOOK with the side where the ferrite core is attached.



## (h) How to Use the Flip Mirror

The flip mirror diagonal is standard-supplied with the refractors as well as VC and VMC optical tubes of the SX equatorial mount series.

In order to use it with other optical tubes from Vixen, adaptors may be required separately.

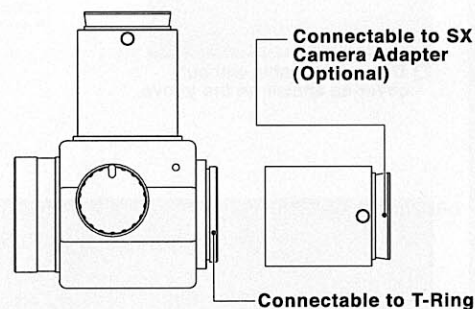
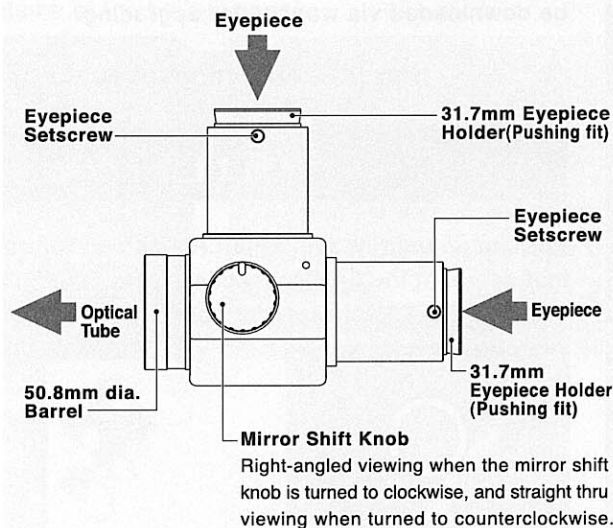
The flip mirror permits using two eyepieces with 31.7 mm diameter simultaneously.

The provided structure to shift the light path upon switching mirror is convenient especially when centring and focusing and object during photography.

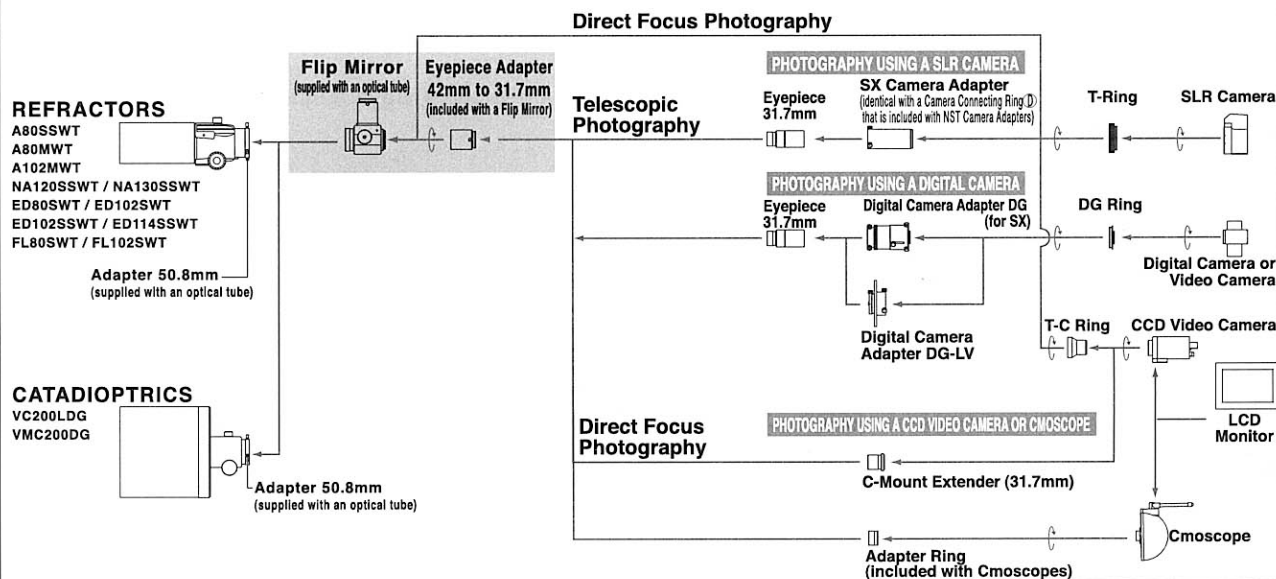
In case of astrophotography with a 35mm camera, an optional T-Ring can be equipped to start photography while performing visual observation simultaneously.

\* Refer to the eyepiece chart below for a variety of connection options.

Diagram of Flip Mirror



### Photographic Accessory Chart

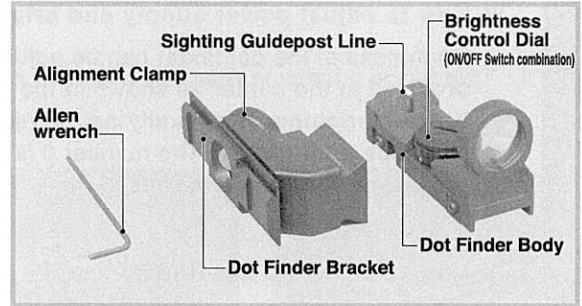


Application Section

## (i) Details of Dot Finder

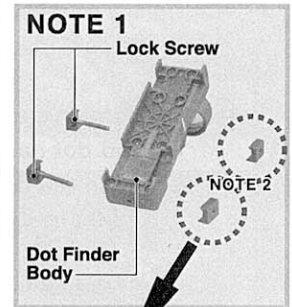
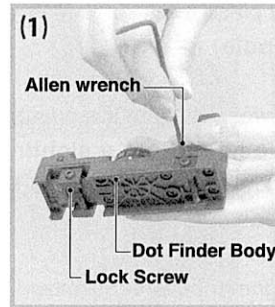
### I. How to assemble the dot finder

Proceed to Section II if your dot finder set is assembled already.

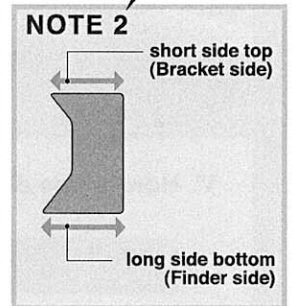
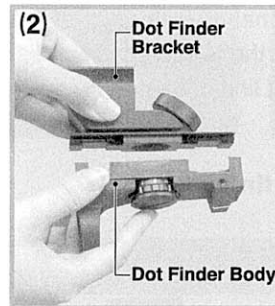


- (1) Remove the two screws on the dot finder body with Allen wrench supplied, as shown in the Figure.

**Note 1:**  
Make sure to notice where the small parts are removed from.

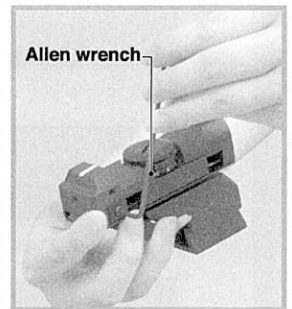
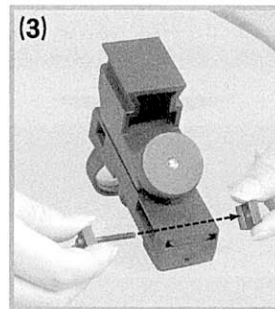


- (2) Attach the Dot finder bracket on the dot finder body as shown in the Figure.



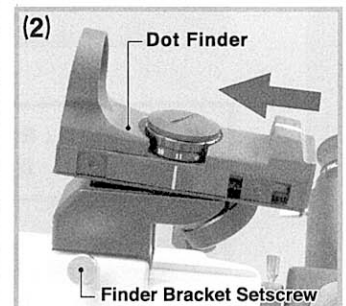
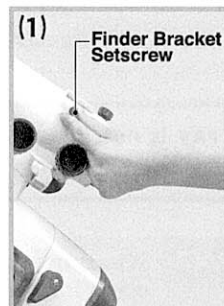
- (3) Assemble the screws and parts which are removed in step (1).

**Note 2:**  
The small parts have a direction whose comparatively extruded side comes to the finder side. Do not fix it upside down.



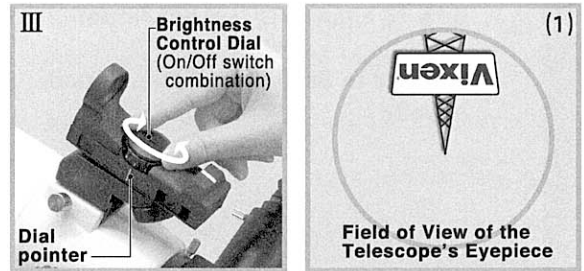
### II. How to attach to the telescope

- (1) Loosen the finder bracket setscrew as shown in the Figure.
- (2) Apply as shown in the Figure and tighten the finder bracket setscrew securely.



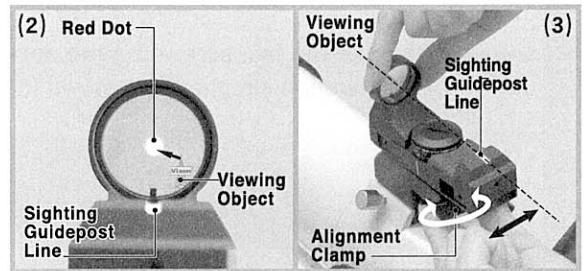
### III. How to adjust power supply and brightness

Brightness of the dot finder can be adjusted with the dial provided in the center as shown in the Figure. It gains brightness gradually as the number of the dial proceeds from 1 to 11. The number 0 is a position where the power supply is turned OFF.



### IV. How to align the Dot finder

- (1) Install an eyepiece with a low-power magnification in the telescope, and place the distant object (such as building, tower, utility pole) in the center of the field of view.
- (2) Turn on the power supply of the dot finder, and ensure a red dot can be seen from a sighting guidepost line. Turn the dial between 1 and 11 to get brightness suitable for viewing.
- (3) Loosen the alignment clamp as shown in the Figure, and adjust direction while viewing by holding the top of dot finder. Consequently, adjust it so that the object in the view of the telescope is centered with the red dot seen in the dot finder. Fasten firmly the alignment clamp.



### V. How to use dot finder

Turn the brightness control dial to a value between 1 and 11.

Install an eyepiece of a low-power magnification into the eyepiece holder of the telescope.

Move the telescope while viewing into the finder scope, and move it until the red dot is centered on what you would like to observe.

View through the telescope.

Turn the brightness control dial to the position of 0 after use.

Note : Red ray is not a laser and it does not harm your eyes.

#### Hint 22

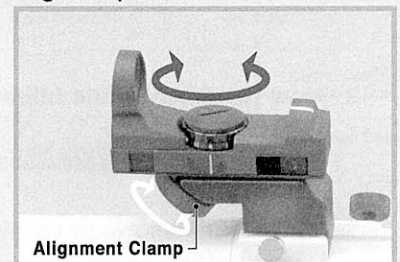
You do not need to fix a viewpoint, since the red dot can be used for sighting without regard to a position of view, whenever it is seen. The red dot may not be seen when you stand aside from the dot finder at a large angle. View again from the area nearer to the sighting guidepost line (white line) when you can not find the red dot.

#### Hint 23

The red dot can be seen even viewing away from the finder scope, where you do not need to come closer to the finder scope.

#### Hint 24

Other than the aforementioned process, the dot finders can be set up as shown in the Figure. Release of the alignment clamp of the dot finder allows turning in the direction shown in the figure. You may change the position on the conditions.

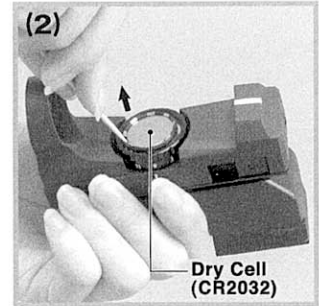
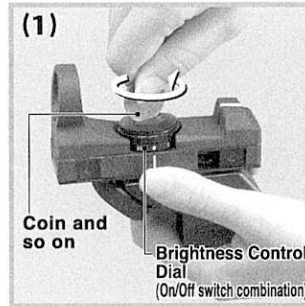


For spectacle users: When making adjustment, wear your glasses since the red dot may be seen larger without glasses.

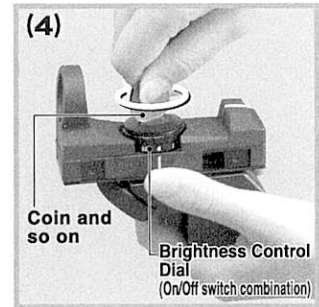
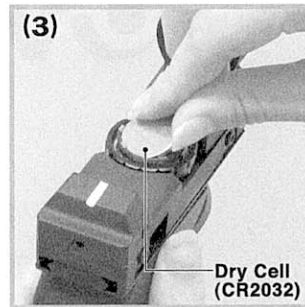
## VI. How to replace the battery

The dot finder is supplied with a dry cell (CR2032) installed. Replace the battery when it is run out.

- (1). Remove the cover using a coin while suppressing the brightness control dial by hand.
- (2). Lift up one end of the dry cell using something like a toothpick.  
The battery will come out when the scope is tilted.



- (3). Install a new battery.
- (4). Fix the cover in place.





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Chester, NY 10918**

**Or call 9 a.m. - 5 p.m. ET, Mon - Fri:  
845-469-8660**

**Outside North America use the contact information below.**

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