

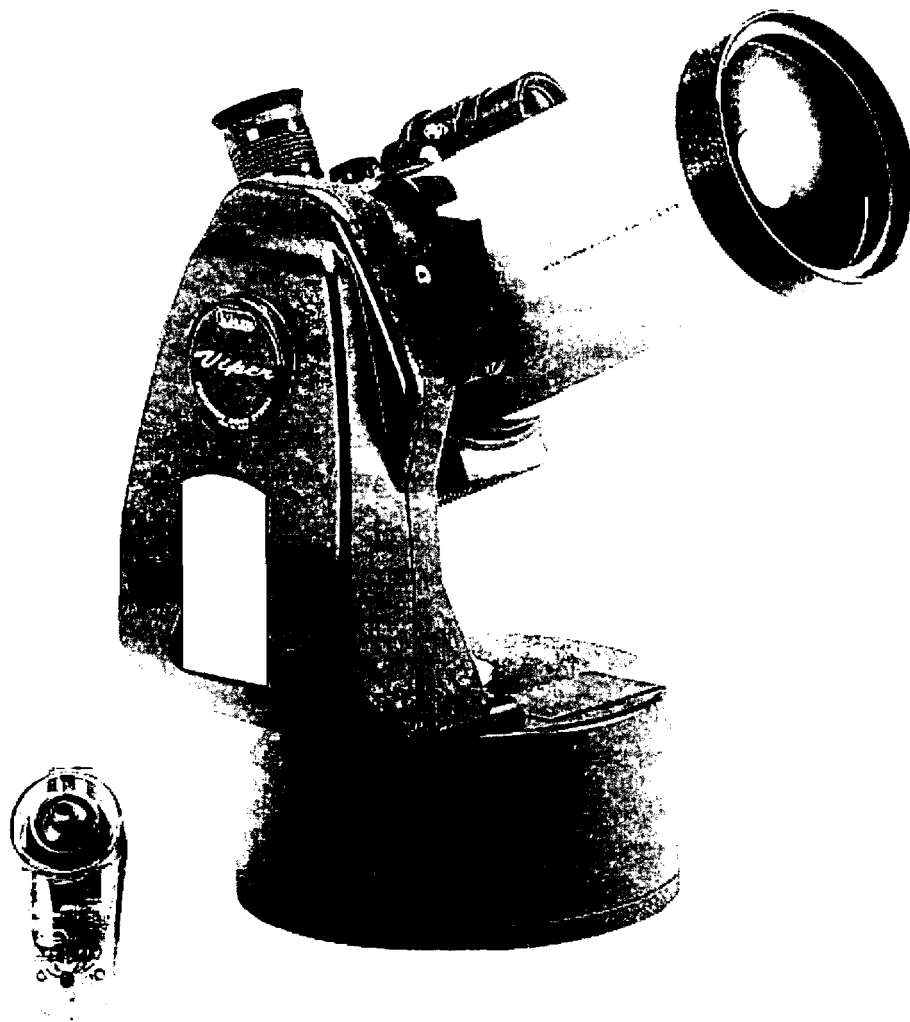
Vixen[®]

Instruction Manual

VIPER-MC90L

Preface

Thank you very much for your purchase of a Vixen VIPER astronomical telescope. VIPER is a new type of compact telescope, which offers easy access to the wonders of the night sky. Enjoy star observation from your window, veranda, or nearby park. It is also an ideal complement for outdoor activities since it is easily carried to the country or seaside for better viewing.



Please read the instructions carefully before use to ensure proper use of the instrument.

- Always keep this instruction manual near the telescope, even after reading.
- This instruction manual describes necessary precautions for the safe use of the telescope to prevent injuries to yourself and others as well as damage to property. Read the entire user manual prior to using of this product.

Warning!

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

Precautions

- Do not leave the instrument lens uncapped in the daytime. Telescopes may become heated and result in a fire.
- Do not use the product while traveling or walking. This may cause injuries from collision or falling.
- Keep caps, desiccant, or vinyl packing materials away from children, to eliminate danger from swallowing or suffocation.
- Do not use the product in a wet environment. Do not touch the product with wet hands which may result in an electrical shock.
- Never disassemble the product. This may cause an accident from fire, electrical shock, or failure. This will also void your warranty.

Caution on Handling and Storage

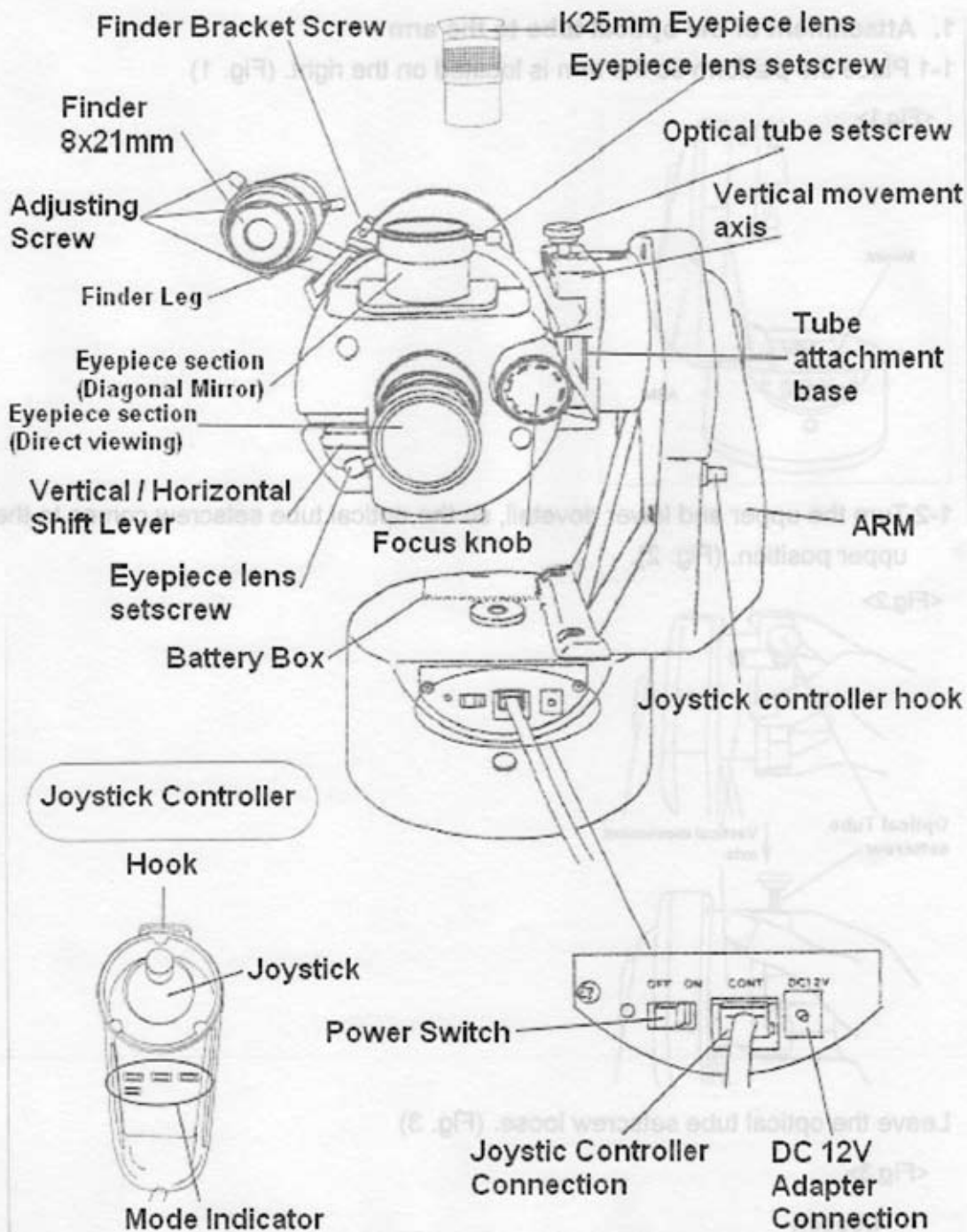
- Do not leave the product inside a car in bright sunshine or in front of any heat sources.
- When cleaning, do not use organic solvents such as alcohol.
- Keep the plastic packaging material away from small children to avoid injuries.
- Avoid exposing product to rain, water droplets, heavy dew, mud or sand.
- Avoid touching any lens or mirror surface directly with hands. In case lens becomes dirty, such as with fingerprints, gently wipe it using a commercially available lens cleaner and lens cleaning paper.
- Blow off dust on lens using a commercially available blower brush.
- For storage, keep in a dry and ventilated location.
- Remove battery when storing for a long period.

Checking Contents

First, make sure the following items are contained in the packing.

- An optical tube (Maksutov-Cassegrain type, 90 mm dia.)
- A platform (Fork-arm type altazimuth)
- A K25mm eyepiece (48x, 31.7mm dia.)
- An eyepiece adaptor for straight-through viewing (31.7mm dia.)
- A finder scope, 8x21mm (Erect-image)
- An intelligent joystick controller
- A battery holder for 8 pieces of size AA dry cells, 12V (equipped in the body).

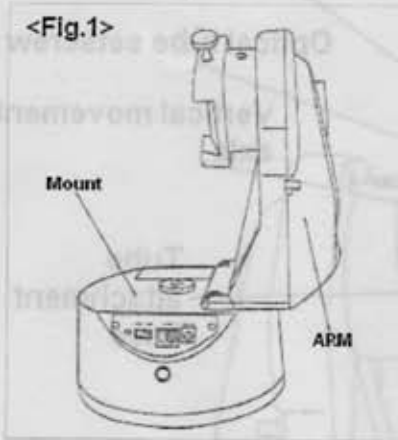
VIPER-MC90L



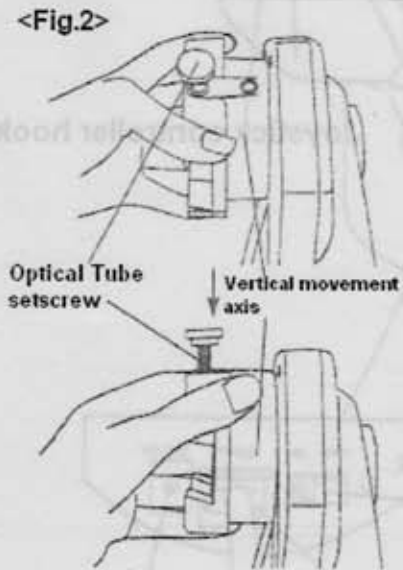
1) How to assemble

1. Attachment of the optical tube to the arm

1-1 Place the platform so the arm is located on the right. (Fig. 1)



1-2 Turn the upper and lower dovetail, so the optical tube setscrew comes to the upper position. (Fig. 2).

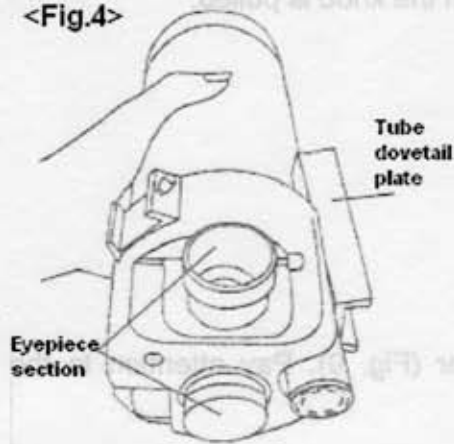


Leave the optical tube setscrew loose. (Fig. 3)



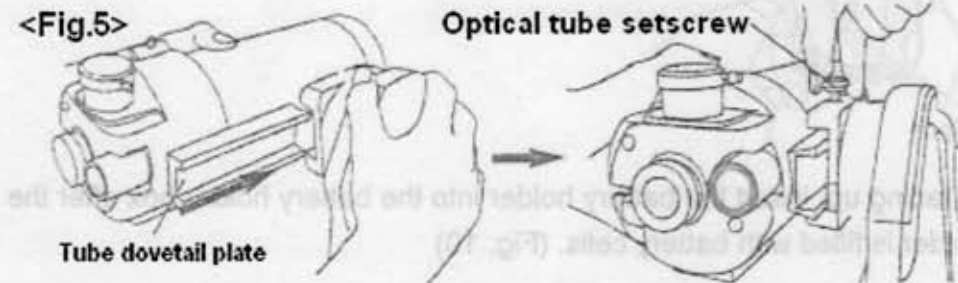
1-3 Hold the optical tube with the eyepiece section facing you and the optical tube dovetail plate is on the right. (Fig. 4)

<Fig.4>



1-4 Insert the optical tube dovetail plate onto the dovetail slide bar of the upper and lower revolving dovetail. Fasten the optical tube setscrew. (Fig. 5)

<Fig.5>



* Fix the optical tube very securely to avoid danger from unexpected detachment of the optical tube during use.

* When observing near the zenith, place the optical tube to be more toward the front.

2. Attaching finder scope

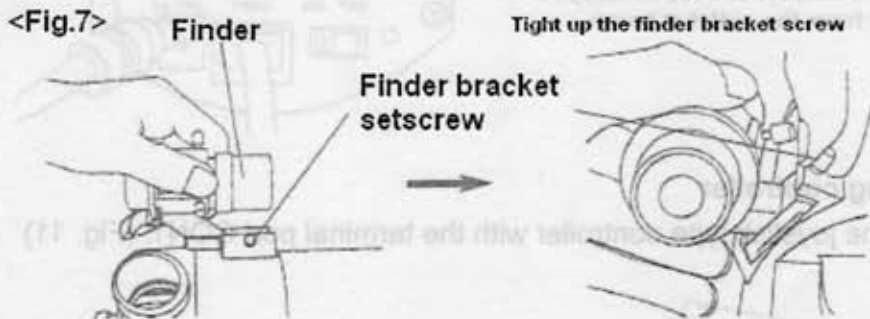
2-1 Loosen the finder bracket setscrew. Attach the finder scope in the correct direction (Fig. 6), and fix the screw. (Fig. 7)

<Fig.6> Pay attention to the direction of finder!

(Front) (Rear)



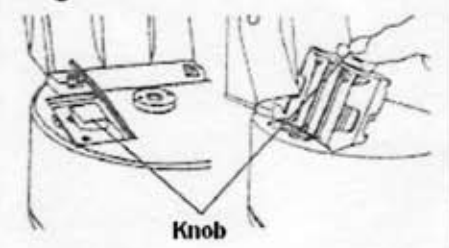
<Fig.7>



3. Inserting battery cells

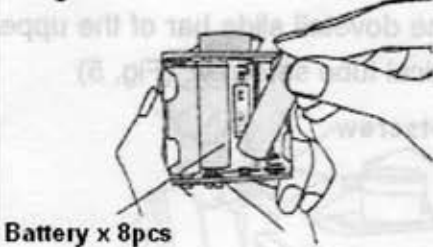
- 3-1 Open the cover of the battery holder box, and take out the battery holder (Fig. 8) * Battery holder can be easily taken out when the knob is pulled.

<Fig.8>



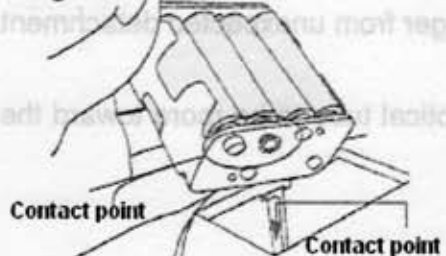
- 3-2 Insert battery cells into the battery holder (Fig. 9). Pay attention to the polarity.

<Fig.9>



- 3-3 While facing up, insert the battery holder into the battery holder box after the battery holder is filled with battery cells. (Fig. 10)

<Fig.10>



- * Insert the battery holder so its contact will match with that in the battery holder box.

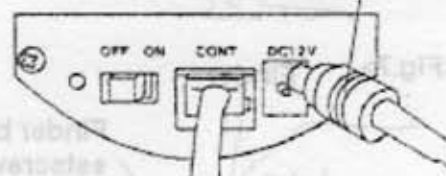
When taking power from outlet

You can power from a home outlet if you have an AC adapter 12V (optional).

<When taking power from outlet>

If you have an AC adapter 12V (Optional), you can take power from the outlet at home.

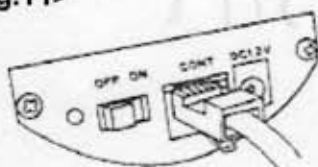
AC adapter 12V (Optional)



4. Connecting controller

- 4-1 Connect the joystick type controller with the terminal port CONT. (Fig. 11)

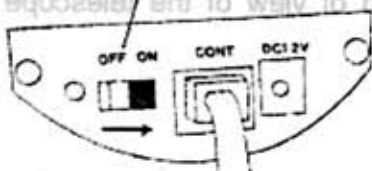
<Fig.11>



5. Applying power supply

5-1 Turn on the power supply. (Fig. 12)

<Fig.12> Power Switch



2) How to use

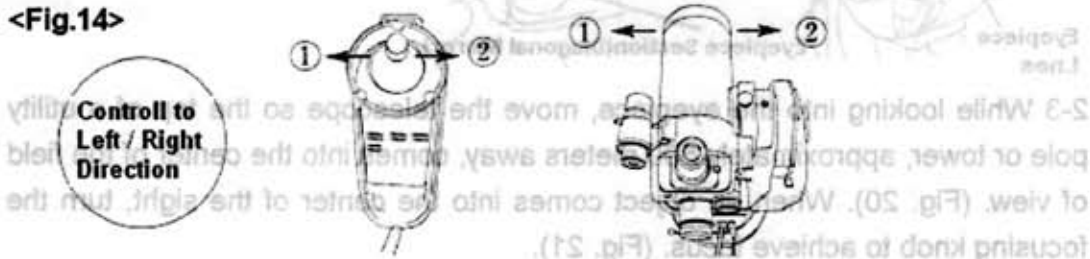
1. Moving the telescope

Move the telescope by using the joystick type controller, which is connected to the main body. Depending on the degree of inclination of the stick, the telescope can be moved at a sidereal rate speed of around 2x, 8x, 64x, 128x, 300x, 800x. For example, if the joystick is tilted to the right, the telescope will turn to move to the right (Fig. 14), if it is tilted forward, the telescope will turn to move downwards. (Fig. 15)

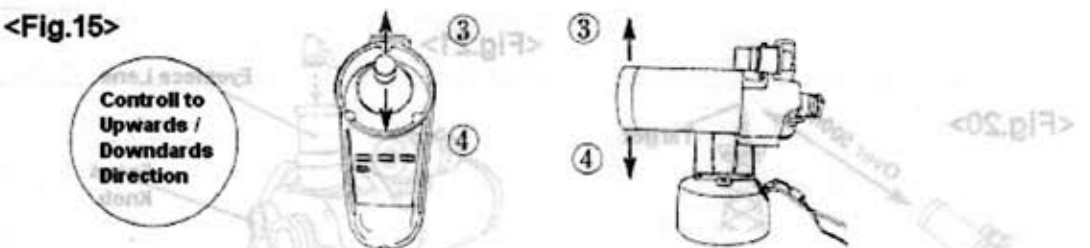
(In erect-image mode. By changing mode, movement can be changed. Refer to the later MODE CHANGE).

* Sidereal rate: A speed that stars moves.

<Fig.14>



<Fig.15>



Changing speed

Depending on a degree of inclination of the joystick, the telescope can be moved at approximately 2x, 8x, 64x, 128x, 300x, and 800x faster than a sidereal rate.

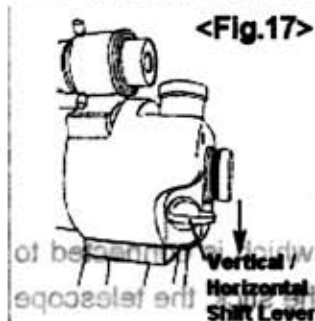


When moving at a low speed, move the joystick back and forth, rather than keeping a steady tilt of the joystick.

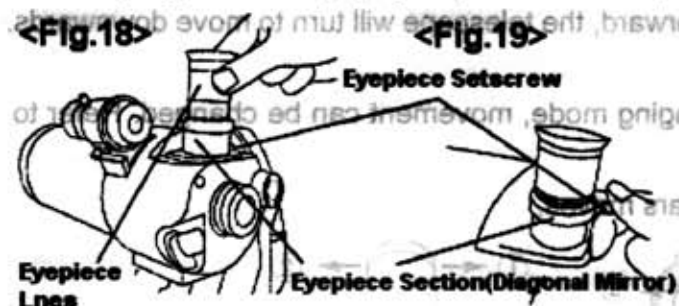
2. Adjusting finder scope

It is not easy to find a target star, since the telescope uses high magnification power. Therefore, to facilitate your search for a star, use the finder scope which has a lower magnification. Be sure that the field of view of the telescope is aligned with that of the finder scope.

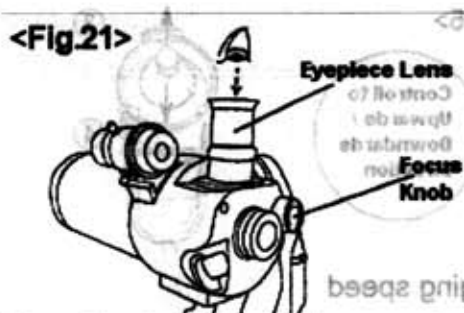
2-1 Pull down the mirror shift lever. (Fig. 17)



2-2 Loosen the eyepiece setscrew, and insert an eyepiece into the eyepiece section (diagonal mirror). (Fig. 18). Fasten the eyepiece setscrew. (Fig. 19)



2-3 While looking into the eyepiece, move the telescope so the top of a utility pole or tower, approximately 500 meters away, comes into the center of the field of view. (Fig. 20). When an object comes into the center of the sight, turn the focusing knob to achieve focus. (Fig. 21).

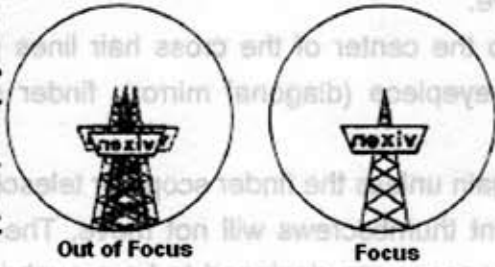


In this case, the image in the eyepiece (diagonal mirror) appears reversed side to side from that which is actually observed by the naked eye. When the mode of the joystick is in the Erect-Image Mode, an image that is reversed side to side from the tilt direction will move. (Refer to the page of Erect-Image Mode)

When moving at a low speed, move the joystick back and forth, rather than keeping a steady tilt of the joystick.

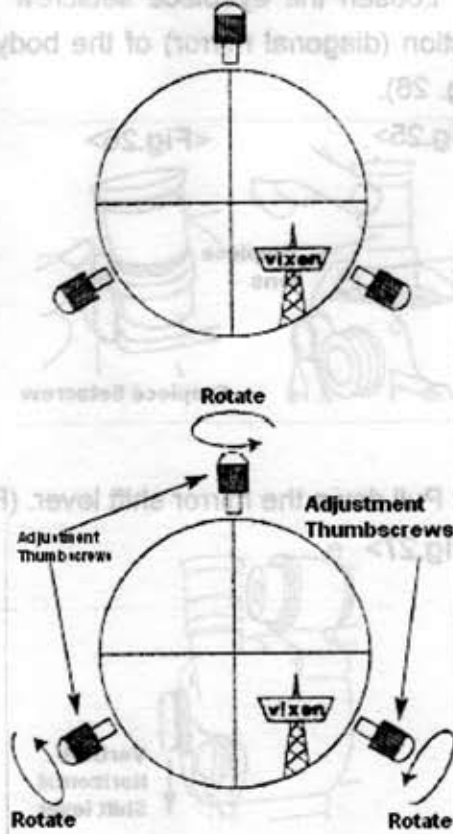
<Viewing image of eyepiece lens(diagonal mirror)>

In case of when a target is out of focus, the target will be seen like a shadow.



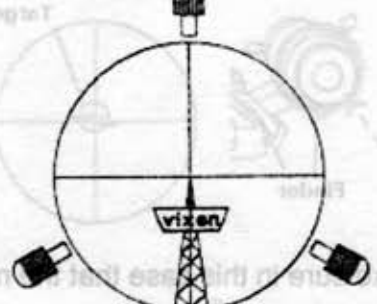
2-4 To align the field of view of the finder scope and eyepiece together, look into the finder scope steadying the telescope (Fig. 22). Adjust the finder scope by turning the three finder adjustment thumbscrews to bring a target object into the center of the cross hair line, which is viewed through the eyepiece (diagonal mirror). (Fig. 23)

<Fig.23> <Viewing image of Finder>



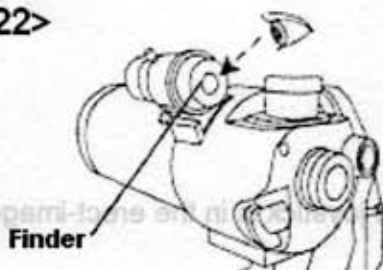
Rotate the adjustment thumbscrews

<Fig.24>



Bring the target to the center of finder

<Fig.22>



In this case, an image that is seen in the finder scope appears in the same orientation as is seen by the naked eye.

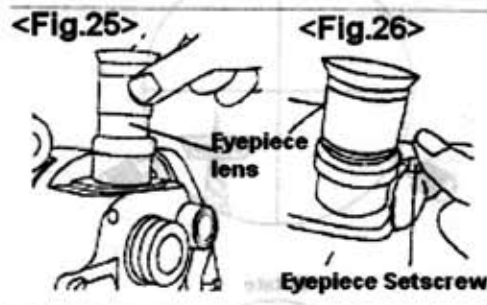
2-5 When a target object comes into the center of the cross hair lines in the finder scope while looking into the eyepiece (diagonal mirror), finder scope adjustment is complete.

This procedure will not be required again unless the finder scope or telescope is moved or the finder scope adjustment thumbscrews will not move. The three adjustment thumbscrews of the finder scope are designed to be a push-in and pull-up screw. Do not try to adjust them at the same time, but minutely adjust each screw individually.

3. Observation

Gazing with eyepiece (diagonal mirror). * This is used for observing stars.

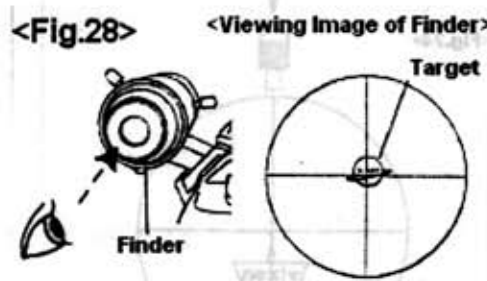
3-1 Loosen the eyepiece setscrew and insert an eyepiece into the eyepiece section (diagonal mirror) of the body. (Fig. 25). Fasten the eyepiece setscrew. (Fig. 26).



3-2 Pull down the mirror shift lever. (Fig. 27)



3-3 Slew an object into the center of the cross hairs by operating the joystick type controller while looking into the finder scope. (Fig. 28)



* Make sure in this case that the mode of the joystick is in the erect-image mode. (Refer to the mode change)

3-4 Adjust focusing upon turning the focusing knob while looking into the eyepiece (diagonal mirror). (Fig. 29 - 30)

<Fig.29>



Vertical
Horizontal
Shift lever

<Fig.30>

Viewing image of Eyepiece lens (Diagonal Mirror)

By rotating focus knob, adjust the focus.



Out of Focus
In case when target is seen through eyepiece lens (diagonal mirror), the target will be seen as opposite direction of side-to-side.

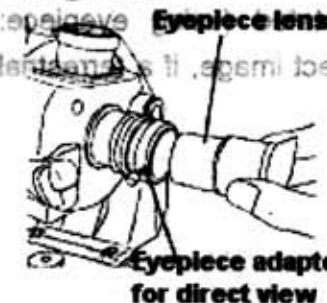
3-5 If necessary, operate the joystick corresponding to the diurnal movement (earth's rotation) of the star.

* In the case where the mode of the joystick is in the erect-image mode, an image that is seen in the eyepiece (diagonal mirror) will move to the opposite direction from where the joystick is tilted. (Refer to the page of Three Modes)

Gazing with eyepiece (Straight-through viewing). * This is used with stars at lower positions or when terrestrial landscape is observed.

3-6 Attach the eyepiece adapter for straight-through viewing with the eyepiece section (straight-through viewing) of the body. Loosen the eyepiece setscrew and insert the eyepiece to the end (Fig. 31). Fasten the eyepiece setscrew. (Fig. 32).

<Fig.31>



<Fig.32>



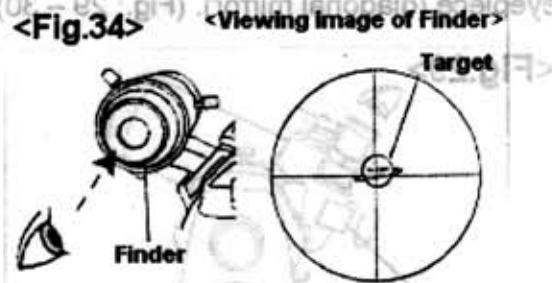
* Since observation of the universe may not require an erect image, images that can be seen with VIPER are reversed (side to side) using diagonal mirror (and upside down 180 degrees) eyepiece. It is possible to observe a normal erect image, if a special erect-image diagonal (optionally supplied) is used.

3-7 Pull up the mirror shift lever. (Fig. 33).

<Fig.33>



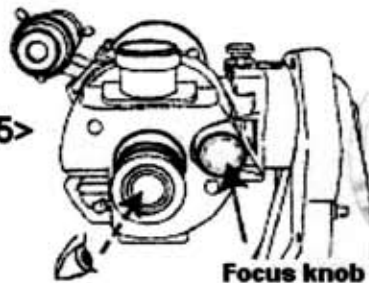
<Fig.34>



3-8 Bring an object into the center of the cross hairs by operating the joystick controller while looking into the finder scope.

3-9 Adjust focusing by turning the focusing knob. (Fig. 35 - 36)

<Fig.35>



<Field of view of eyepiece lens with diagonal mirror.>

<Fig.36>

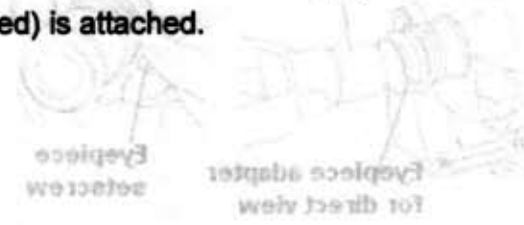


In case when target is seen with straight-through viewing, the target will be seen as upside-down.

3-10 If necessary, operate the joystick corresponding to the diurnal movement (earth's rotation) of the star.

* In the case where the mode of the joystick is in the erect-image mode, an image that is seen will move to an opposite direction of side-to-side and up and down from where the joystick is tilted. (Refer to the page of Three Modes)

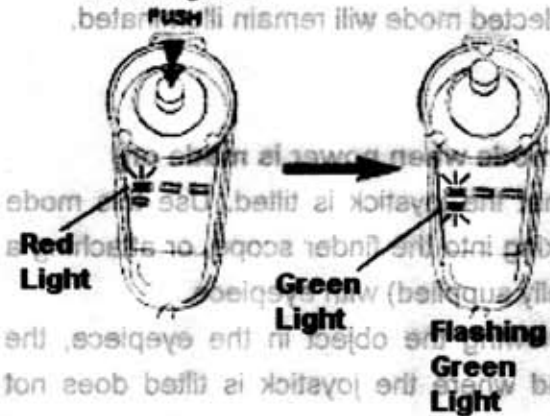
* Since observation of the universe may not require an erect image, images that can be seen with VIPER are reversed from side to side (using eyepiece: diagonal mirror) and upside down 180 degrees rotated (using eyepiece: straight-through). It is possible to observe a normal erect image, if a terrestrial erect-image diagonal (optionally supplied) is attached.



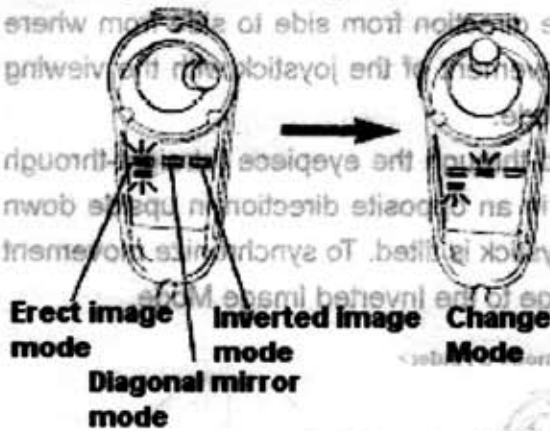
4. Mode Change

Joystick type controller offers three operational modes to change the movement of the telescope. Familiarize yourself with those movements by looking at terrestrial scenery before beginning stargazing.

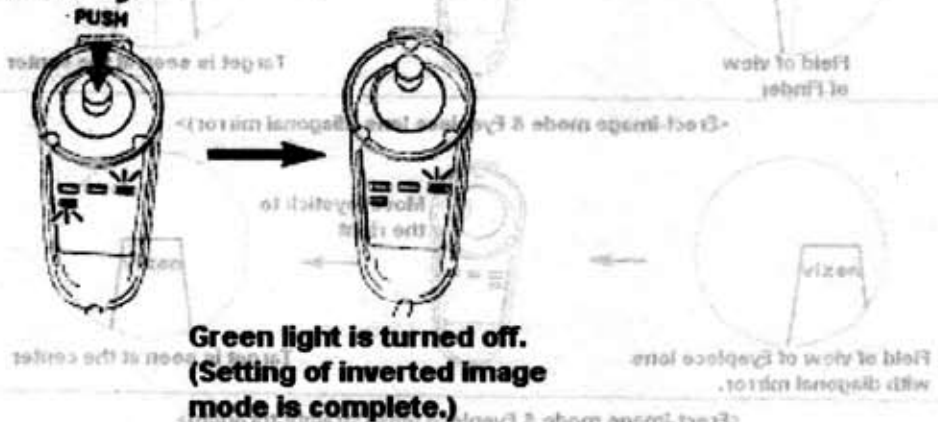
Push Joystick



Move Joystick to the Right



Push Joystick



How to change mode

4-1 Press the joystick of the controller in the center. A green light will illuminate to notify that it is in the setting mode. (Telescope cannot be moved during setting mode).

4-2 Upon tilting the joystick to the right, three red lights will illuminate subsequently.

From left;

Erect-Image Mode → Diagonal Mirror Mode → Inverted Image Mode

4-3 If the joystick is depressed when the light is illuminated at the desired mode, mode will be selected at that mode. And when the mode is selected, the green light will turn off and a red light at the selected mode will remain illuminated.

5. Three Modes

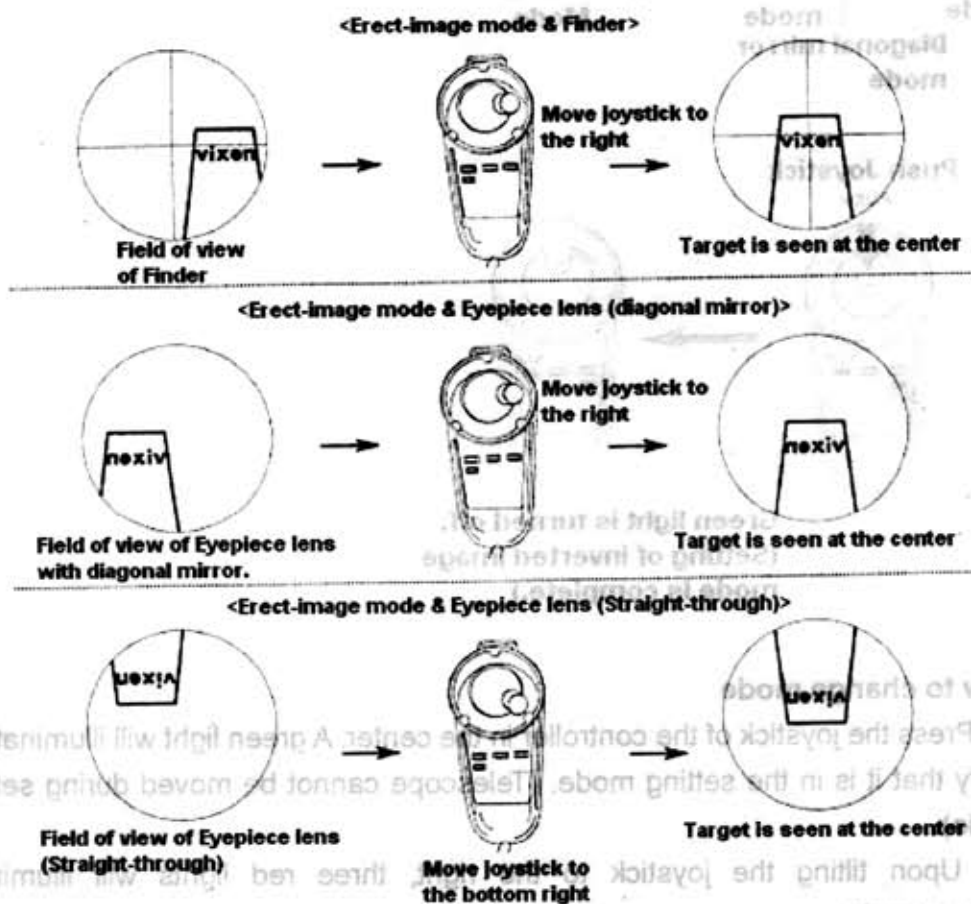
5-1 Erect-Image Mode (Initial setting mode when power is made on)

Telescope will move in the direction that the joystick is tilted. Use this mode when searching for an object while looking into the finder scope, or attaching a terrestrial erect-image diagonal (optionally supplied) with eyepiece.

* Although this can be used during viewing the object in the eyepiece, the direction between the field of view and where the joystick is tilted does not match.

* In the case where an object is viewed in the eyepiece (diagonal mirror): Viewing image will move in an opposite direction from side to side from where the joystick is tilted. To synchronize movement of the joystick with the viewing object, change to the Diagonal Mirror Mode.

* In the case where an object is viewed through the eyepiece (straight-through viewing): The viewed image will move in an opposite direction in upside down and from side to side from where the joystick is tilted. To synchronize movement of the joystick with viewing object, change to the Inverted Image Mode.



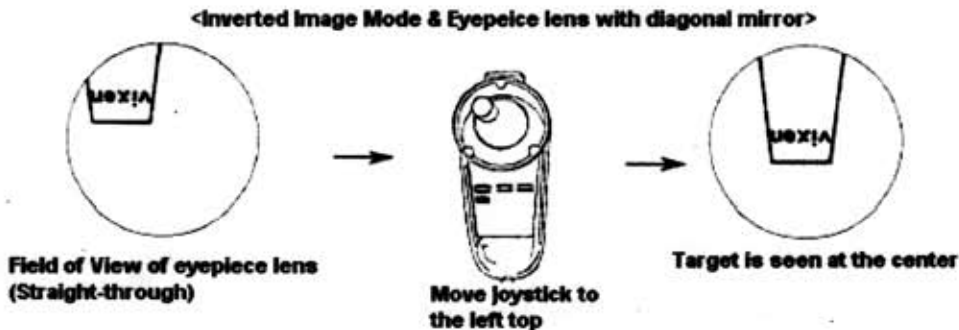
5-2 Diagonal Mirror Mode (corresponding mode with eyepiece (diagonal mirror))

Telescope will move in the same up and down direction where the joystick is tilted, however, it will move reversely to the side-to-side direction from the joystick. When looking into the eyepiece (diagonal mirror), a viewing object appears reverse side-to-side. In the Diagonal Mirror Mode, the actual image and that in the eyepiece (diagonal mirror) move in the same direction as the joystick movement.



5-3 Inverted Image Mode (corresponding mode with eyepiece (direct view))

Telescope will move in the reverse direction from both up and down and side to side direction from where joystick is tilted. When looking into the eyepiece (direct view), image of viewing object appears reversed (180 degrees) in the up and down direction from the actual image. In this Inverted Image Mode, images that can be seen in the eyepiece and the movement of the joystick correspond in the same direction.



Erect-Image Mode	Use this mode when tracking a target object by finder scope, or observing terrestrial objects when using terrestrial erect-image diagonal (optional).
Diagonal Mirror Mode	Use this mode while looking into an eyepiece (diagonal mirror).
Inverted Image Mode	Use this mode while looking into an eyepiece (direct view)

Specifications of VIPER-MC90L

Optical Tube: Maksutov-Cassegrain type, with straight-through and angled viewing mirror shift lever

Objective effective diameter: 90mm (3.5 in), multi-coated

Focal length (F ratio): 1200mm (47 in) (F/13.3)

Dimensions: Approx. 300mm (11.8 in) (L) x 112mm (4.5 in) (Max O.D.),

Weight: Approx. 1.6kg (3.5 lbs)

Finder scope: 8x, dia. 21mm (.8 in) (erect-image)

Platform: Folk-arm type altazimuth mount

Drive: High speed two-axis motor, with joystick type controller

Dimensions: Approx. 280(H)mm (11 in), Diameter of the platform approx. 160mm (6.3 in)

Weight: Approx. 1.3kg (2.9 lbs)

Power supply: Size AA dry cell x 8 pieces used (optional)

Accessories: Eyepiece K25mm (magnification 48x, real field of view 56', 31.7mm dia. (1.3 in)), straight-through eyepiece adaptor (Dia. 31.7mm, (1.3 in))