Seben 203-1000
Newton Reflector Telescope
Instruction Manual

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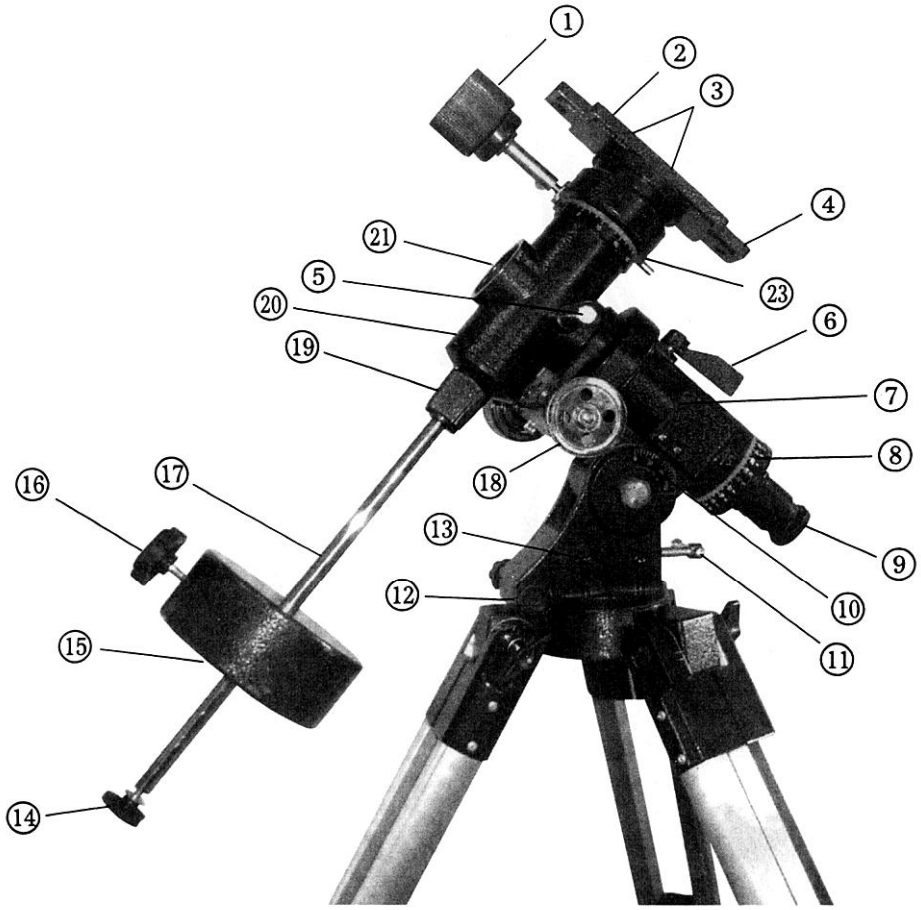
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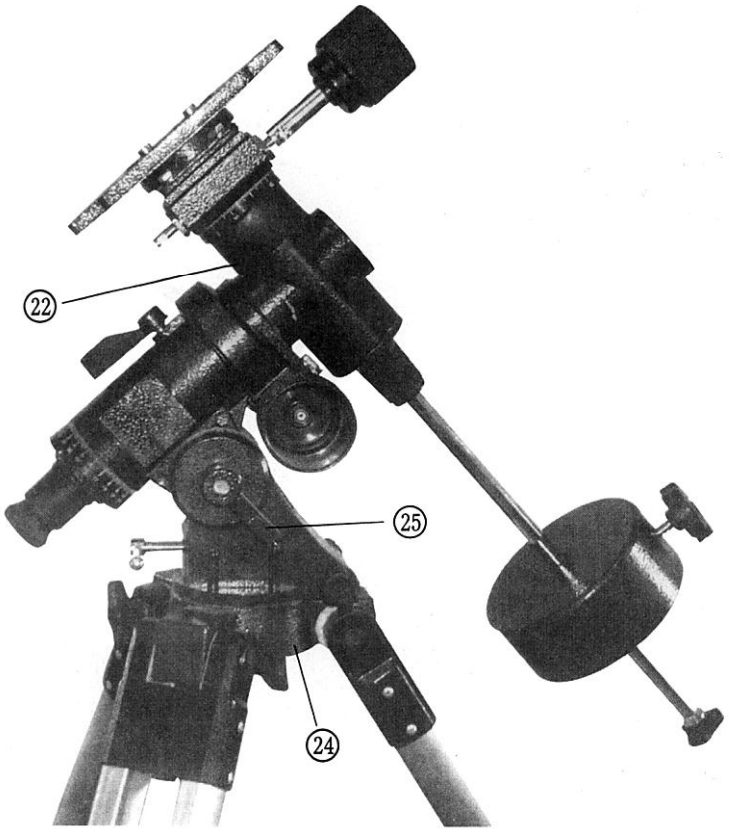
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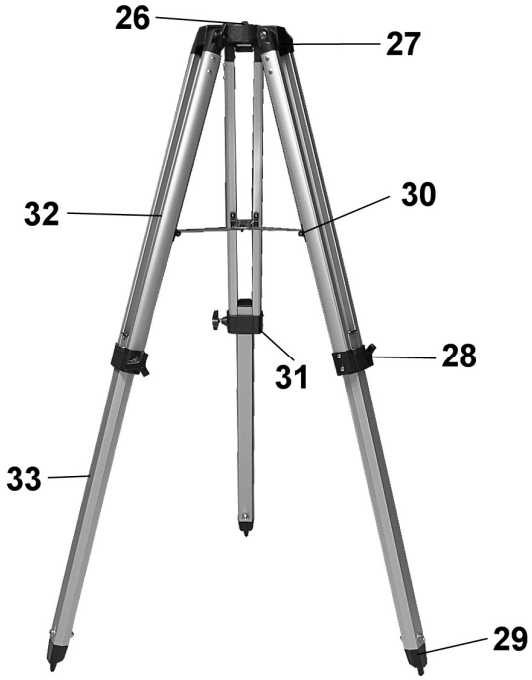
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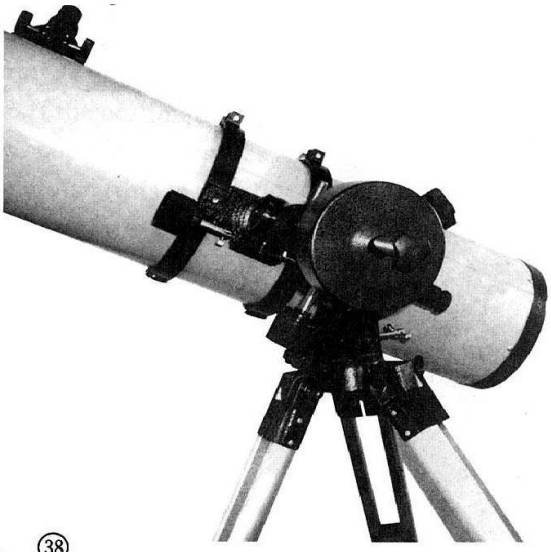

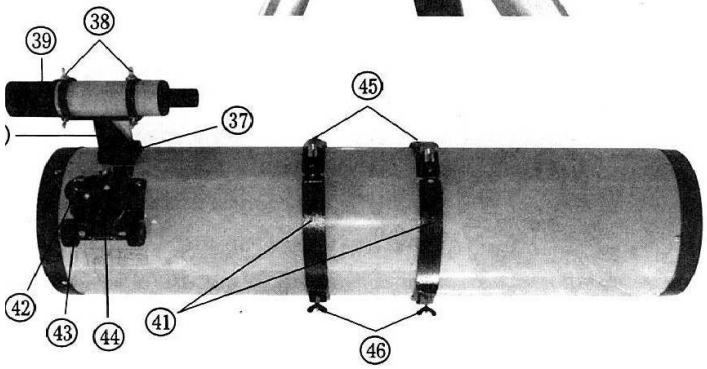
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1) Dec flexible Cable Control
2) Saddle
3) Saddle Fixing Screw
4) Craddle Ring Srew Holes
5) Motor Installation Drive
6) RA Lock
7) RA Tube
8) RA Dial
9) Polor Telescope
10) Latitude Dial
11) Latitude Adjustment Knob
12) RA Horizontal Adjustment Srew
13) Azmuth Base
14) Safety Washer Thumbsrew
15) Counterweight
16) Counterweight Lock
17) RA Flexible Cable
18) RA Flexible Control
19) Fixing Srew for Balancing Drive
20) Dec. Tube
21) Front Cover
22) Dec. Lock
23) Dec. Dial
24) Tripod Knob
25) Latitude Lock
26) Equatorial Base
27) Tripod Upper Metal Piece
28) Middle Tripod Fixing Srew
29) Tripod Tip
30) T-Shape-Base
31) Middle Tripod Metal Piece
32) Side Leg
33) Middle Leg
34) Not used
35) Not used
36) Not used
37) Viewfinder Bracket Mounting Bolts
38) Viewfinder Brackt Thumbsrews
39) Viewfinder
40) Viewfinder Bracket
41) Cradle Rings
42) Eyepiece
43) Focus Knob
44) Focuser
45) Cradle Ring Lock Knobs
46) Cradle Ring Attachment Knobs

A. Introducing the HELLOS EXPLORER

The EXPLORER is an easy-to-use, high performance 6"(153mm) reflecting telescope,intended for astronomical observing.Equipped with a deluxe equatorial mount and aluminum tripod,the telescope's motion is continuously adjustable for tracking celestial objects.Your telescope comes to you ready for adventure;it will be your companion in a universe of planets,galaxies,and stars.

1. This Manual

These instructions detail the set-up,operation,specifications,and optional accessories of your EXPLORER.In order thar you may achieve maximum enjoyment of the instrument,we urge that you take a few minutes to read all of this manual before making first observations though the telescope.As you read this manual,the jargon associated with telescope will be made clear.

2. Standard Equipment

(1) Complete optical tube assembly with a 6" (153mm) diameter primary mirror,viewfinder mounting bolts with mounting nuts and 1.25n rack and pinion focuser.Morror focal length=750mm:f/5

(2)Equatorial mount with pre-attached heavy duty,continuously adjustable,aluminum tripod and leg braces.

Accessories:25mm eyepiece & 10mm eyepiece， Cradle rings with lock knobs,6X30 viewfinder and bracket Counterweight with counterweight shaft

Flexible cable controls for both telescope axes,Accessory shelf with mounting knob Polar Telescope

B. Unpacking and Assembly

Your EXPLORER comes to you packaged almost entirely preassembled.You will find upon opening the giftbox that there are compartments within that contain the optical tube assembly,the tripod with equatorial mount,and the accessories described above:

1.Remove and identify the telescope's Standard Equipment listed in Section A.2,above.

2.Release the latitude lock of the equatorial mount,and tilt the polar axis of the telescope to roughly a 45 ° angle by turning the latitude adjustment knob(11).With the polar axis thus tilted,firmly re-tighten the latitude lock.

3.Loosen the lock knobs of the cradle rings and open the cradle rings to fit over the optical tube assembly.Turn the lock knobs a few turns to keep the cradle rings closed,but will still allow the cradle rings to slide freely up-and-down the main tube.

4. Remove the viewfinder bracket mounting nuts from the viewfinder bracket mounting bolts (37) that protrude from the optical tube,near the focuser.Place the viewfinder bracket's mounting holes (located at the base of the bracket) over the mounting bolts, so that the large objective lens of the viewfinder points in the direction of the focuser end of the tube as shown in Fig.3. Then replace the viewfinder bracket mounting nuts,and tighten to a firm feel.
5. Lay the optical tube of the telescope into the saddle (2),with the main tube lying roughly in the middle, then slide the cradle rings over the saddle of the mount.Tighten the cradle ring attachment knobs (46) to a firm feel when the cradle rings are in place over the telescope's saddle.Then tighten the cradle ring lock knobs to a firm fell;do not overtighten these knobs.Please note that you may want to change the rotational position of the optical tube to gain a more comfortable observing position of the focuser.This adjustment may be performed several times in one observing session,as desired.
6. Insert the 25mm eyepiece into the focuser,and tighten the focuser thumbscrew to secure the eyepiece.

Balancing the Telescope and Alignment of the Viewfinder

The telescope is now fully assembled.Before it can be properly used,however,the telescope must be balanced and the viewfinder aligned.

1. Balancing the Telescope

In order for the telescope to move on its mechanical axes,it must first be balanced about the 2 telescope axes:the polar axis and the declination axis.All motions of the polar aligned telescope (more on this later) take place by moving about these two axes,separately or simultaneously.To obtain a fine balance of the telescope,follow the method below:

* Loosen the R.A.lock and rotate the telescope so that the counterweight shaft is parallel to the ground (horizontal).
* Slide the counterweight along the counterweight shaft until the telescope remains in one position without tending to drift in either direction.Then tighten the counterweight lock knob,locking the counterweight in position as shown in Fig.2-2.
* Lock the R.A.lock,and unlock the Declination lock,but keep the counterweight shaft in its horizontal position.The telescope will now turn freely about the Declination axis.Loosen the cradle ring lock knobs so that the main tube in the cradle ring slides easily up-or-down in the cradle rings.Move the main tube in the cradle rings until it is balanced rotationally about the Declination axis.Re-lock the knobs.

The telescope is now properly balanced on both axes.

2. Alignment of the Viewfinder

The 6X30 Viewfinder and viewfinder bracket should be attached the telescope tube assembly as described above.In order for the viewfinder to be functional,however,it must be aligned to the main telescope,so that both the viewfinder and main telescope point at the same position in the sky.With this simple alignment performed,finding object is greatly facilitated,since you will first locate an object in the wide-field viewfinder,then you will look in the eyepiece of the main telescope for a detailed view.To align the viewfinder follow these steps:

* Remove the telescope front dust cover,and the dust covers of the viewfinder.
* Place the low-power (25mm) eyepiece into the focuser of the main telescope.
* Unlock the R.A.lock and the Dec.lock so that the telescope turns freely on both axes.Then point the main telescope at some well-defined land object (e.g.the top of a telescope pole) at least 200 yards distant,and re-lock the R.A.and Dec.axes.Turn the flexible cable controls to center the object in the telescope field.
* Looking through the viewfinder,loosen or tighten,as appropriate,one or more of the viewfinder bracket thumbscrew until the viewfinder's crosshairs are likewise centered in the object previously centered in the main telescope.
* Check this alignment on a celestial object,such as a bright star or the Moon,and make any refinements necessary,using the method outlined above.

With this alignment perfined,objects first located in the widefield viewfinder will also be centered in the main telescope's field of view.(Note:The viewfinder and telescope presents an image which is upside-down and reversed.)

C. Lining up with the Celestial Pole

Objects in the sky appear to revolve around the celestial pole.(Actually celestial objects are essentially "fixed" ,and their apparent motion is caused by the Earth's axial rotation).During any 24 hour period,stars make one complete revolution about the pole,making concentric circles with the pole at the center.By lining up the telescope's polar axis with the North Celestial Pole (or for observers located in Earth's Southern Hemisphere with the South Celestial Pole),astronomical objects may be followed,or tracked,simply by moving the telescope about one axis,the polar axis.

If the telescope is reasonably well aligned with the pole,therefore,very little use of the telescope's Declination flexible cable control is necessary-virtually all of the required telescope tracking will be in Right Ascension.(If the telescope were perfectly aligned with the pole,no Declination tracking of stellar objects would be required).For the purpose of casual visual telescopic observations,lining up the telescope's polar axis to within a degree or two of the pole is more than sufficient:with this level of pointing accuracy, the telescope can track accurately by slowly turning the telescope's R.A.flexible cable control and keep objects in the telescope field of view for perhaps 20 to 30 minutes.

To line up the EXPLORER with the pole,follow this procedure:

(1) Release the Azimuth lock of the Azimuth base,so that the entire telescope-with-mounting may be rotate in a horizontal direction.Rotate the telescope until the polar axis points due North.Use a compass or locate Polaris Star,as an accurate reference for due North.

(2) Level the mount,if necessary,by adjusting the heights of the three tripod legs.

(3) Determine the latitude of your observing location by checking a road map or atlas.Release the latitude lock and tilt the telescope mount with the latitude adjustment knob so that the pointer indicates the correct latitude of your viewing location on the latitude dial.Re-tighten the latitude lock.

(4) If steps (1)-(3) above were performed with reasonable accuracy,your telescope is now sufficiently well-aligned to the North Celestial Pole for visual observations.

Once the mount has been polar-aligned as described above,the latitude angle need not be adjusted again,unless you move to different geographical location (i.e.a different latitude).The only polar alignment procedure that need be done each time you use the telescope is to point the polar axis due North,as described in step (1)above.

D. Using the Telescope

With the telescope assembled,balanced and polar aligned as described above,you are ready to begin observations.Decide on an easy-to-find object such as the Moon,if it is visible,or a bright star to become accustomed to the functions and operations of the telescope.For the best results during observations,follow the suggestions below:

* To center an object in the main telescope,loosen the telescope's R.A.lock and Dec.lock.The telescope can now turn freely on its axes.Use the aligned viewfinder's crosshairs,re-tighten the R.A.and Dec.locks.

If you have purchased an assortment of eyepieces,always start an observation with a low power eyepiece(e.g.the K25mm eyepiece);get the object well centered in the field of view and sharply focused.Then try the next step up in magnification.If the image starts to become fuzzy as you work into higher magnification,then back down to a lower power,the atmospheric steadiness is not sufficient to support high powers at the time you are observing.Keep in mind that a bright,clearly resolved but smaller image will show far more detail than a dimmer,poorly resolved larger image.The K25mm eyepiece included with the EXPLORERpresents a wide field of view,ideal for general astronomical observing of star fields,clusters of stars,nebulae,and galaxies,it is also probably the best eyepiece to use in the initial finding and centering of any object.

* Once centered,the object can be focused by turning one of the knobs of the focusing mechanism.You will notice that the astronomical object in the field of view will begin to slowly move across the eyepiece field.This motion is caused by the rotation of the Earth on its axis,although the planets and stars,are ,for practical purposes,fixed in their positions in the sky.The platform on which the telescope is sitting (the Earth) rotates once every 24 hours these objects to keep astronomical objects in the field of the polar aligned telescope,simply turn the R.A.flexible cable control.These objects will appear to move through the field more rapidly at higher powers.

Note that the Declination flexble cable control is used only for centering purpose,not for tracking.

* Avoid touching the eyepiece while looking through the telescope. Vibrations resulting from such contact will cause the image to move.
* You should allow a few minutes to allow your eyes to become "dark adapted" before attempting any serious astronomical observation.Use a red filtered flashlight to protect your night vision when reading star maps or inspecting the components of the telescope.
* Avoid setting up the telescope inside a room and observing through a window (or,worse yet,closed window).Images viewed in such a manner may appear blurred or distorted due to temperature difference between inside and outside air.

We repeat the warning stated at the outset of this manual:Never point the telescope directly at or near the sun at any time!Observing the Sun,even for the smallest fraction of a second,will result in instant and irreversible eye damage,as well as physical damage to the telescope itself.

The EXPLORERmay be used for a lifetime of rewarding astronomical observing,but basic to your enjoyment of the telescope is a good understanding of the instrument.Read the above instructions carefully until you understand all of the telescope's parts and functions.One or two observing sessions will serve to clarify these points forever in your mind.

E. Calculating Power

The power,or magnification of the telescope depends on the two optical characteristics,the focal length of the main telescope and the focal length of the eyepiece used during a particular observing on.For example,the focal length of the EXPLORER telescope at 750mm.To calculate the power in use with a particular eyepiece,divide the focal length of the eyepiece into the focal length of the main telescope.For example,using the 25mm eyepiece supplied with the EXPLORER,the power is calculated as follows power=750-25=30X

Instruments manufactures several types of eyepiece designs that are available for your telescope.The type of eyepiece(whether "K" or "ploss" ,etc.) has no bearing on magnifying power but does affect such optical characterstics as field of views,flatness of field,eyerelief,and color correction.

The maximum practical magnification is determined by the nature of the object being observed and ,most importly,by the prevailing atmospheric condition.Under very steady atmospheric seeing,the EXPLORER may be used at powers up to about 250X on astronomical objects.Generally ,however,lower powers of perhaps 75X to 175X will be the maximum permissible,consistent with high image resolution.When unsteady air conditions prevail (as witnessed by rapid twinkling of the stars),extremely high-power eyepieces result in empty magnification,where the object detail observed is actually diminished by the excessive power.

Assorted eyepieces are available both to increase the operating eyepiece power of the telescope.If the EXPLORER is used on a regular basis,a selection of four to five eyepieces is recommended.For example,an eyepiece assortment of focal lengths K25mm(standard equipment),12.5mm,9mm,and 6mm yields a magnifying range of 30X,60X,83X,and 125X repectively.A high quality Barlow Lens serves to double the power of each of these eyepieces.To use the Barlow Lens,insert it into the telescope's focuser first,followed by an eyepiece,the power thus obtained is then double the power obtained when the eyepiece is used alone.

F. Maintenance

1. Cleaning

As with any quality instrument,lens or mirror surfaces should be cleaned as infrequently as possible.Front surface aluminized mirrors,in particular,should be cleaned only when absolutely necessary.In all cases avoid touching any mirror Surface.A little dust on the surface of a morror or lens causes negligible loss of performance and should not be considered reason to clean the surface.When lens or mirror learning does become necessary,use a camel's hair brush or compressed air gently to remove dust.If the telescope's dust cover is replaced after each observing session,cleaning of the optics will rarely be required.

2. Collimation (Alignment) of the Optics

All EXPLORER telescopes are optically aligned at the factory prior to shipment.It is unlikely that you will need to align,or collimate,the optics after receipt of the instrument.However,if the telescope received unusually rough handing in shipment,it is possible that the optics must be re-aligned for best optical performance.In any case this alignment procedure is simple,and requires only a few minutes the very first time the telescope is used.Take the time to familiarize yourself with the following collimation procedure,so that you will recognize a properly collimated instrument and can adjust the collimation youself,if necessary.

(a).Correct collimation

The properly collimated(aligned) mirror system in the EXPLORER assures the sharpest images possible.This occurs when the primary morror and diagonal mirror are tilted so that the focused image falls directly though the center of the focuser drawtube(see Fig.1) These mirror tilt adjustment are made with the diagonal assembly (Fig.5) and the primary mirror cell (Fig.6),and will be discussed later.

Fig.4:EXPLORER Newtonian Reflecting Telescope

To inspect the view of the mirror collimation,look down the focuser drawtube with the eyepiece removed.The edge of the focuser drawtube will frame the reflections of the primary mirror with the 3 mirror clips the diagonal mirror,the spider vanes,and your eyes.Properly aligned,all of these reflections will appear concentric (i.e.centered) as illustrated.Any deviation from the concentric reflections will require adjustments to the diagonal assembly (as shown),and /or the primary mirror cell (as shown).

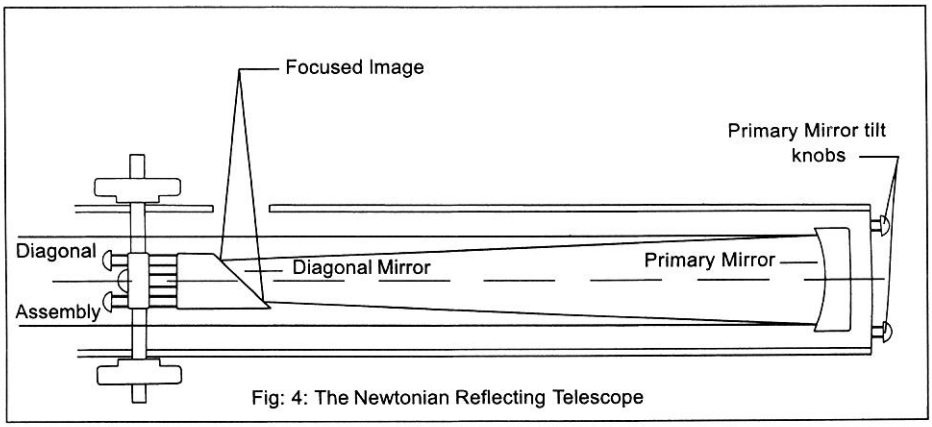
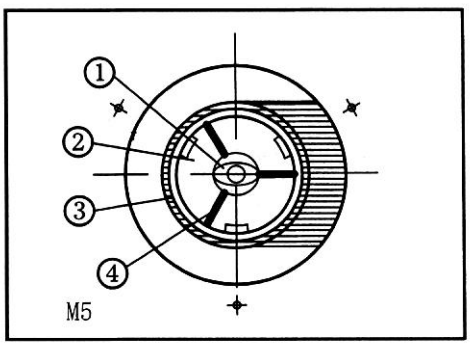


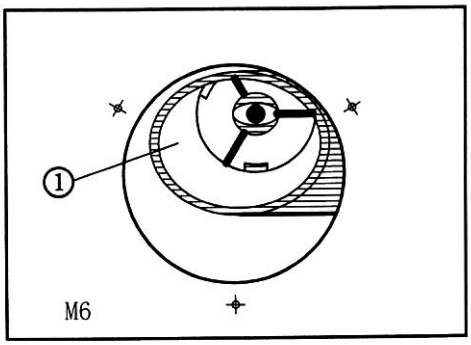
Fig: 4: The Newtonian Reflecting Telescope

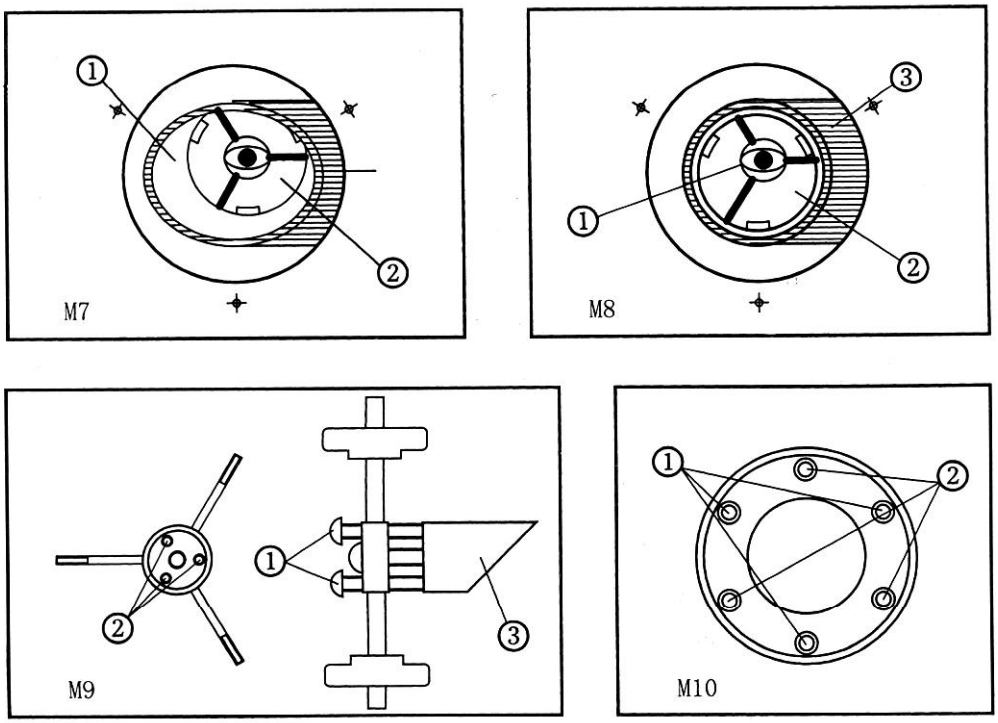
(B).Spider vane adjustments

If the diagonal mirror is left or right of center within the drawtube (Fig.6),loosen the spider cane adjustment lock knobs located on the outside surface of the main tube and slide the entire diagonal assembly up or down the tube along the slotted holes,until the diagonal mirror is centered in the drawtube.

If the diagonal mirror is above or below of center within the drawtube,thread in one of the spider vane adjustment/lock knobs while unthreading the other. Only make adjustments to 2 knobs at a time until the diagonal mirror is in the drawtube.When the spider vane is correctly positioned,it will look like Fig.7







(c)Diagonal hoider adjustments

If the diagonal mirror is centered in the drawtube,but the primary mirror is only partially visible in the reflection (Fig.7),the 3,Phillips-head diagonal tilt screws (Fig.9-2) must be unthreaded slightly to the point of where you can rotate the diagonal holder,(Fid.9-3) from side-to side by grasping the diagonal holder with your hand and rotating until you see the primary mirror become as centered in the reflection of the diagonal mirror as possible.Once you are at the best position,thead in the 3Phillips-head diagonal tilt screws to lock the rotational position.Then,if necessary,make adjustments to these 3 Phillips-screws to refine the tilt-angle of the diagonal mirror until the entire primary can be seen centered within the diagonal mirror reflection.When the diagonal mirror is correctly aligned,it will look like Fig.8.

(d).Primary mirror adjustments

If the diagonal mirror and the reflection of the primary mirror appear centered within the drawtube,but the reflection of your eye and the reflection of the diagonal mirror appear off-center (Fig.8),you will need to adjust the primary mirror tilt knobs of the primary mirror cell (Fig.10-1).These primary tilt knobs are located behind the primary mirror,at the lower end of the main tube,see Fig.4.

To adjust the primary mirror tilt knobs,first unscrew several turns (Fig.10-2),the 3Phillips-head primary mirror cell locking screws that are next to each primary mirror tilt knob.Then by trial-anderror,turn the primary mirror tilt knobs until you develop a feel for which way to turn each knob to center the reflection of your eye.Once centered,as in Fig.5,turn the 3Philips-head primary mirror cell locking screws to relock the tilt-angle adjustment (Fig.10-2).

(e).Star testing the collimation

With the collimation performed,you will want to test the accuracy of the alignment on a star.Use the 25mm eyepiece and point the telescope at a moderately bright (second or third magnitude) star,then center the star image in the telescope's field-of-view.With the star centerd follow the method below:

* Bring the star image slowly out of focus until one or more rings are visible around the central disc.If the collimation was performed correctly,the central star disc and rings will be concentric circles,with a dark spot dead center within the out-of-focus star disc (this is the shadow of the secondary mirror).(An improperly aligned telescope will reveal elongated circles with an off-center dark shadow).
* If the out-of-focus star disc appears alongated,you will need to adjust the primary mirror titl knobs of the primary mirror cell.
* To adjust the primary mirror tilt knobs,first unscrew several turns the 3Phillips-head primary mirror cell locking screws to allow free turning movement of the tilt knobs
* Using the flexible cable control,move the telescope until the star image is at the edge of the field-of-view in the eyepiece.
* As you make adjustments to the primary mirror tilt knobs,you will notice that the out-of-focus star disc image will move across the eyepiece field.Choose one of the 3 primary mirror tilt knobs that will move the star disc image to the center of the eyepiece field.
* Repeat this process as many time as necessary until the out-of-focus star disc image is in the center of the eyepiece field.
* With the star testing of the collimation complete,tighten the 3Phillips-head primary mirror locking screws.

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