OWNERS MANUAL

SHORT TUBE NEWTONIAN EQUATORIAL REFLECTOR TELESCOPE

D=150mm F=750mm & F=1400mm

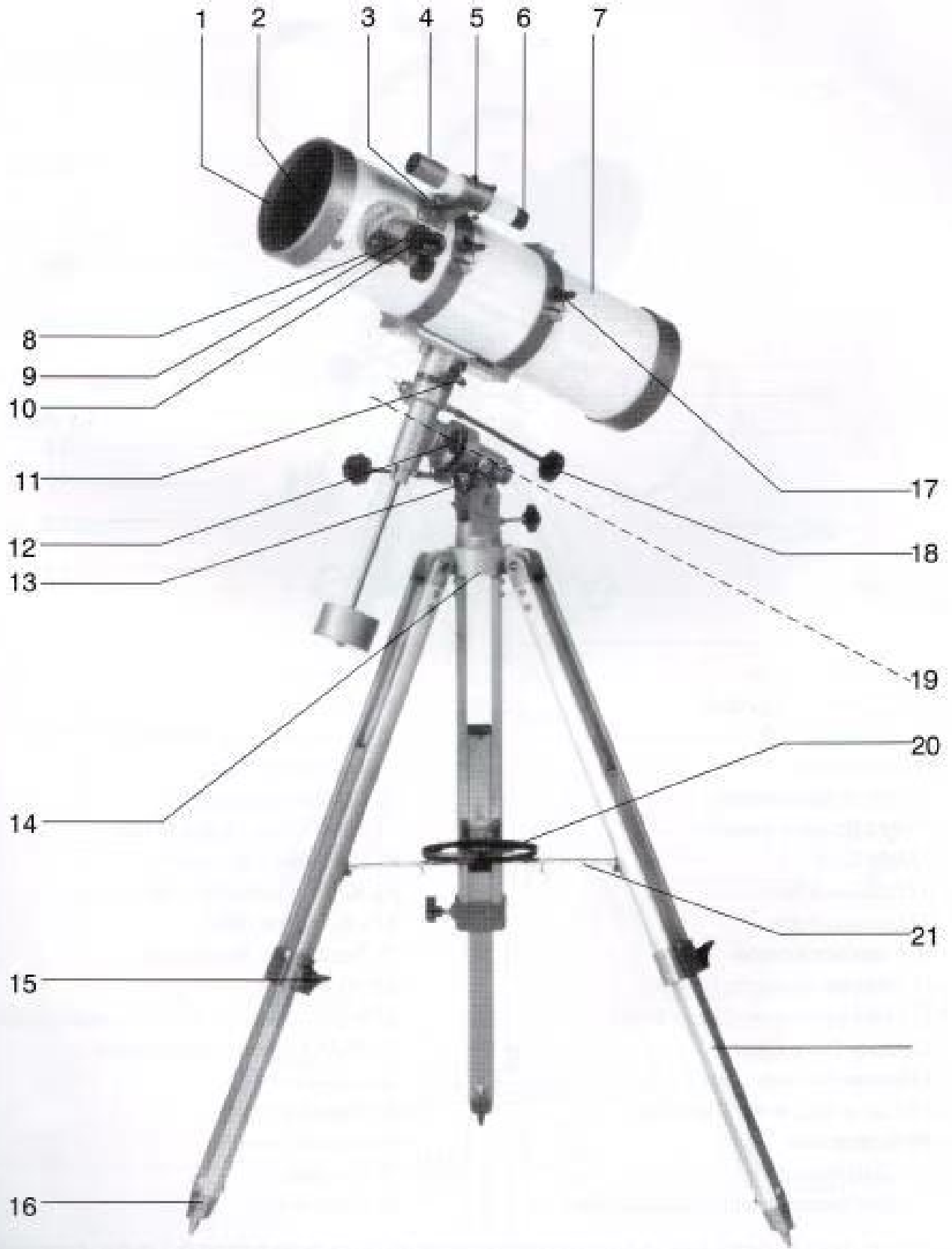
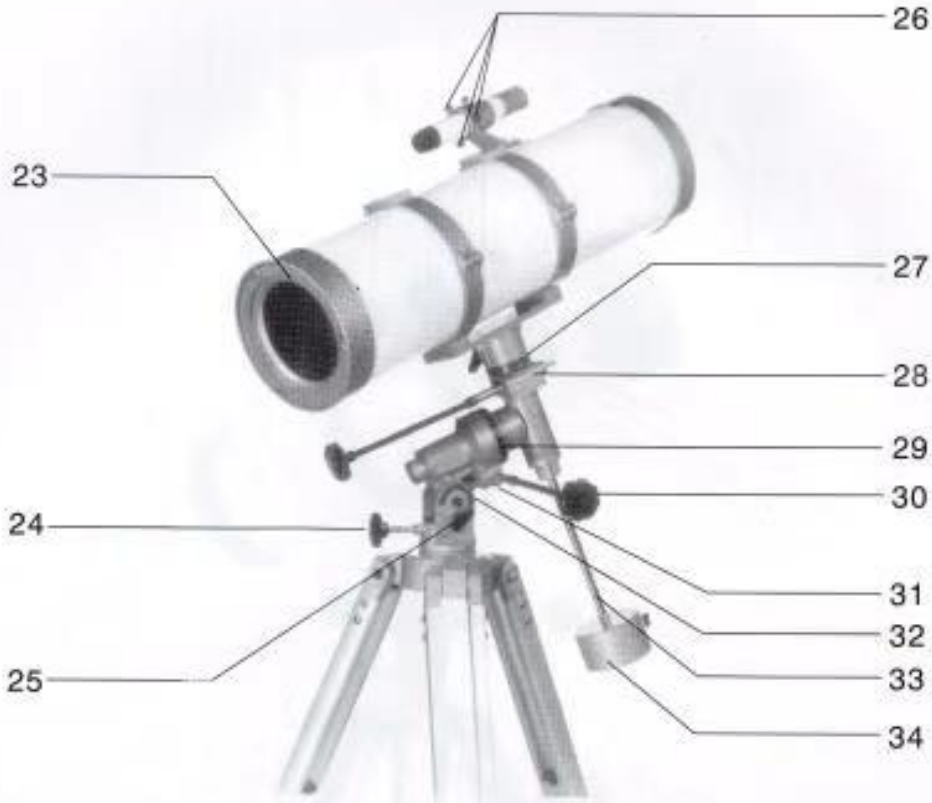


Fig.1



1.Open End of Tube
2.Diagonal Mirror(inside)
3.Nuts for Sight Scope Bracket
4.Sight Scope
5.Sight Scope Bracket
6.Sight Scope Eyepiece
7.Main Tube
8.Focusing Knob
9.Focusing Tube
10.Eyepiece Adapter
11.Declination Clamp Screw
12.Right Ascension Clamp Screw
13.Clock Drive Gear
14.Horizontal Axis Clamp Screw
15.Clamp Screw for Tripod Leg
16.Rubber Tips
17.Clamp Handle
18.Declination Flexible Cable Control
19.Polor Axis
20.Accessory Tray
21.Accessory Tray Brackets
22.Tripod Leg
23.Main Mirror(inside)
24.Polor Axis Auxiliary Screw
25.Polor Axis Clamp Screw
26.Aligning Screw for Sight Scope
27.Declination Circle
28.Declination Attachment
29.Hour Circle
30.Right Ascension Flexible Cable Control
31.Right Ascension Attachment
32.Latitude Scale
33.Balance Shaft
34.Balance Weight
35.Eyepiece
36.Moon filter

CAUTION:UNDER NO CIRCUMSTANCE SHOULD OBSERVER LOOK DIRECTLY AT THE SUN THROUGH THE FINDER SCOPE AS DIRECT OBSERVATION OF THE SUN WILL BE DANGEROUS TO YOUR EYES.

Attaching the Telescope

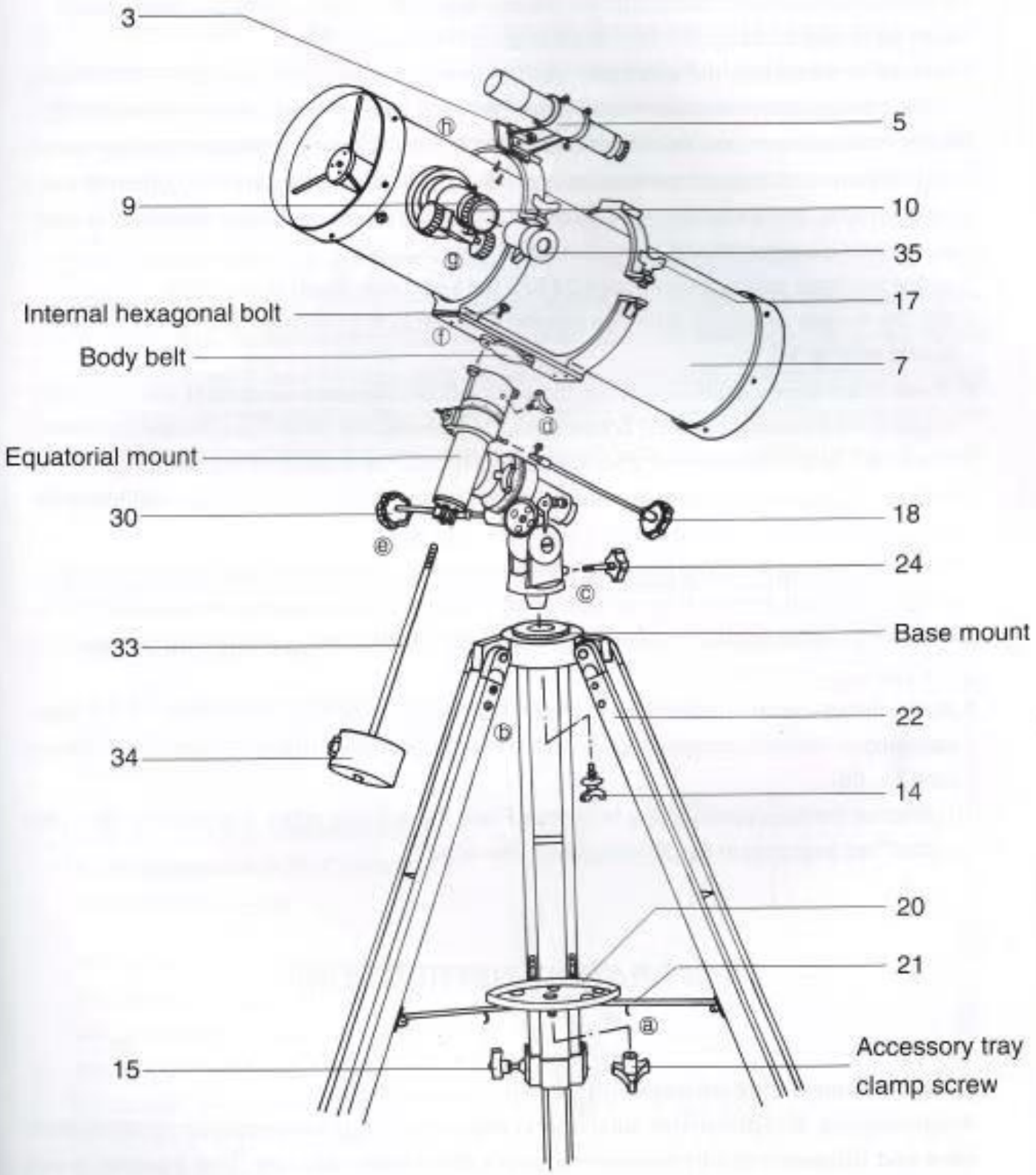


Fig.3

Attaching the aluminum tripod telescope(see Fig.3)

1.Remove the aluminum tripod(22)from the box,separately extend them to suitable length from up to down and tighten the thumb screws(15)for tripod legs.

2.Spread the tripod legs,put accessory tray(20)on the accessory tray bracket(21) and locate it with the accessory tray clamp screw which has been taken off from the bracket(see Fig.3a)

3.Remove equatorial mount from the box.Loosen the various locking mechanisms(clamp senws 11,12,24,and 25).Adjust equatorial mount to the position as shown in Fis.3,tighten all the clamp screws and insert the end part of the equatorial mount into the central hole of base mount with a horizontal axis clamp screw(14)(see Fig.3b).

4.Screw the polar axis auxiliary screw(24)into the spiral hole as shown in Fig.3c.

5.Aim the flexible cables(18,30)at the flat end of worm to fit them together and fasten the screw(see Fig.3d)

6.Thread the balance shaft(33)through the central hole of balance weight(34).With one hand hugging the balance weight,the balance shaft is screwed into the female receptacle located at the declination shaft by the other hand(see Fig.3e).The position of the weight can be changed by slipping it back and forth,making it possible to balance the telescope.Move the weight to suitable place and fasten it with the set screw.

7.Take off the body belt from the main tube(taking on a hugging look)and locate it on the equatorial mount with the internal hexagonal bolt by internal hexagonal wrench(see Fig.3f).

8.Unlock the clamp handle for body belt(17),place the main tube(7) in the body belt and lock it in place.

9.Screw the eyepiece adapter(10)into the rack and pinion focusing tube(9),take off the dust cap,remove the lower power eyepiece to the eyepiece adapter(10),tightening the set screws (see Fig.3g).

10.Unscrew the two nuts(3)on the telescope.Place the sighting scope bracket(5)on the main tube(7)as indicated in Fig.3h,then attach the nuts.

OPERATING INSTRUCTIONS

Read Carefully before Attempting Telescope Observations.

A telescope is an optical and mechanical instrument of great precision.Handled with care and respect,it will provide many years of excellent service .This booklet is designed to furnish you with information on this telescope's structure,specifications,and the use of proper operating techniques.

WHAT IS A TELESCOPE?

A telescope is an optical system designed to magnify distant objects.The telescope you have purchased is called a REFLECTOR TELESCOPE.It consists of an open tube with a curved mirror at the bottom.The open end of the tube is pointed at the object in the sky and the entering light rays strike the mirror at bottom.The rays,reflected from the mirror,strike a second mirror called a diagonal. As a result of the curvature of the main mirror,the light rays are bent to meet at a point.The mirror in a reflector telescope must be painstakingly ground to the proper curvature to achieve the correct focal point.The purpose of the diagonal mirror, which is located a short distance before the focal point,is to reflect the light rays toward the side of the tube where an eyepiece magnifies the image for you .This telescope has an equatorial mount. It is extremely versatile because it allows the telescope to move in all directions.Thus,it is possible for your telescope to track a star's movement across the sky in the same path that the star seems to take(called diurnal movement).It has flexible cable controls(18 and 30),which make it possible to move the telescope while you are looking through it.

FOCUSING THE TELESCOPE AND ALIGNING THE CROSSHAIR SIGHTING SCOPE

I .Focusing(see Fig.4)

Leave the telescope in the same position as when assembling (terrestrial position,Fig.3).

Loosen the two set screws attached to the eyepiece adaptor(10)on the main telescope tube.

Remove the lowest power eyepiece (PL25mm)and attach it to the eyepiece adapter, tightening the set screws.Aim the telescope at a distant object in the daytime...such as the comer of a building, telephone pole,etc.Rack the focusing knob(8) back and forth until the object is in sharp focus.

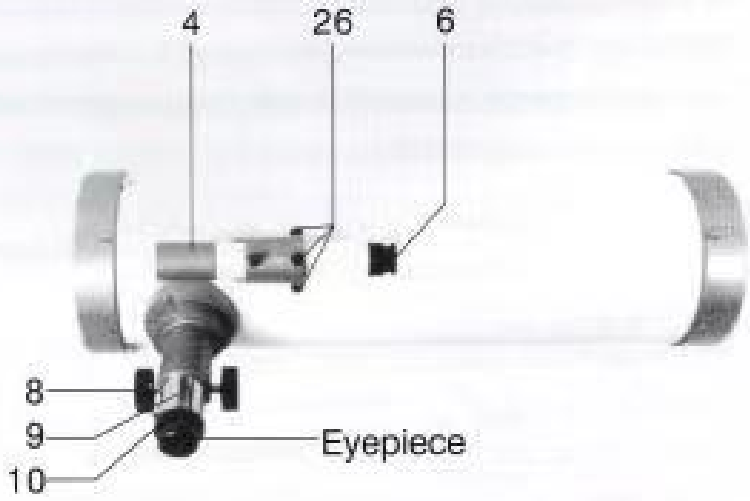


Fig.4

Ⅱ .ALIGNING THE CROSSHAIR SIGHTING SCOPE

With the telescope in sharp focus,look into the sighting scope(4).If the sighting scope(4)is not in focus,turn the eyepiece(6)around on its thread until the views is sharp and clear.If the object you see in the main telescope is not in the center of the sighting scope cross hairs, do the following:Tighten and loosen the three screws(26)in the bracket,causing the sighting scope to move up or down, side to side,or diagonally.When the objects is dead center in the cross hairs, your sighting scope is adjusted. Repeat this process by replacing the lower power eyepiece with the another higher eyepiece .Once the image centered under highest magnificalion in the telescope is also centered in the sighting scope,your sighting scope aligned.It may now be used for rapid location of the sky objects you want to study in the telescope. On rare occasions,the sighting scope might have to be readjusted.

Note 1:Whenever locating an objece,always use the finder scope first in finder scope position...as it has a wide field of the view and will speed up your roughly adjustment tremendously.
Note 2:Always start with the lowest power eyepiece in the telesccope tube and work up to the power you want...making the necessary focusing adjustment as you change eyepieces.
Note 3:Do not be disturbed that the image you see is upside down and from left to right.This is a normal situation with astronomical telescopes. By simply inserting the erecting prism(option),the image will straighten itself out for terrestrial use.

Eyepieces and Magnification

This telescope is supplied with two different eyepieces(PL6.5mm and PL25mm).The power of each particular eyepiece is directly related to the focal length of the telescope which is 750mm or 1400mm(when synthesized by the correcting lens).However,generally the power of each eyepiece is related to the focal length of the objective mirror of the telescope.
The formula is as follows:

$$\frac{\text{Focal length of the telescope}}{\text{Focal length of eyepiece}} = \text{Magnification}$$

As an example,your PL6.5mm eyepiece will show a magnification of:

$$\frac{750\text{mm}}{6.5\text{mm}} = 115\text{X Magnification}$$

or $$\frac{1400\text{mm}}{6.5\text{mm}} = 215\text{X Magnification}$$

USING YOUR TELESCOPE ASTRONOMICALLY

Before learning the technical details of this telescope,you will find that you can now enjoy observing the stars,the planets,the moon and the sun with your present knowledge.Loosen the declination axis clamp screw(11),the right ascension clamp screw(12),and the polar axis clamp screw(25).
Re-adjust your telescope so that it is in the poition as shown in fig.1.Loosen the horizontal clamp screw(14)so that you can swing the telescope in a circle.Attach the lower power eyepiece.

THE MOON AND THE STARS

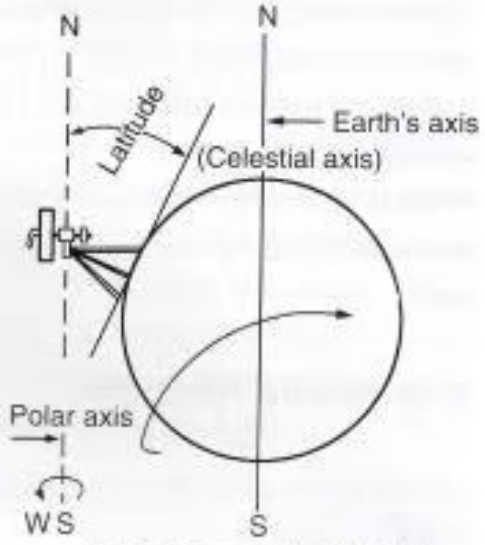
If you are viewing at night, you will get most fun out of looking at the moon and its surface.Aim the sighting scope so that the moon is in the center of the crosshairs.Tighten all clamp screws.The main telescope is now directly aimed at the moon.Focus the telescope as described previously.With your hands on the two flexible cable controls(18,30) you will find that you can move the telescope in any direction as you study the moon's surface.Try this with the moon filter screwed into the eyepiece and without the moon filter screwed in .The design of the two cable controls is such that the telescope can be swung a limited distance before the clamps must be loosened for further movement.Do not try to force the movement of the telescope past the automatic stops on the controls.To go past a stop position,loosen the necessary clamp screw and shift the telescope manually before re-tightening the clamp.The balance weight should be adjusted up or down depending upon the position the telescope is in.You will find that if the balance weight is correctly adjusted, the telescope will move on any axis(with the appropriate clamp screw loosened)with the slightest touch of the finger.

At this point,try the more powerful eyepieces in your observation the details of the moon.After looking at the moon,you will probably want to look at some of the more well known constellations(like the big dipper).The stars will appear like flickering dots of light.This is the case with even the more powerful telescopes.

Your daily paper will probably tell you the location of the planets and the times that they are in your area on any particulay day. See if you can find one of these planets.Try Venus first,as it is the brightest object in the heavens(discounting the moon and sun) at most times of the year.The planets will tend to appear like flat discs through your telescope and you will probably be quite surprised by the rapidity with which they move across the sky. If you aim your telescope at a planet and walk away for five or ten minutes, you are likely to find that the planet has moved out of the telecope's field when you get back.

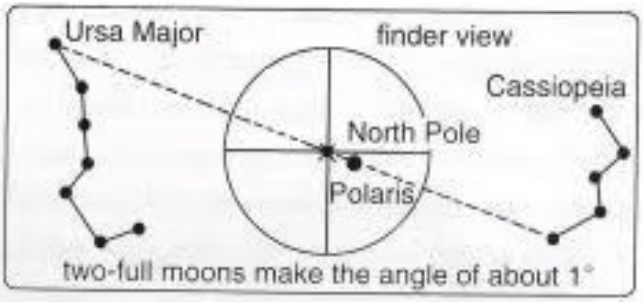
USING THE SETTING CIRCLES TO LOCATE STARS

Since this equatorial telescope is designed to move in any direction,it can be set to track the apparent movements of celestial bodies across the sky.This movement of celestial bodies is in the direction opposite to that of the earth's rotation and is around the earth's axis or celestial axis (Fig.5). By simply aiming the telescope polar axis (19) at celestial North, you will automatically place the telescope in parallel with the earth's axis and thus be able to locate stars in the sky based on information in star charts and star atlases. In simple language you aim your telescope dead center in the celestial sphere...that point in the sky that is like the hub of a wheel and does not appear to move. The angle of declination is simply 90° minus the angle away from this hub.Celestial North is 90° . If you were at the North Pole,you would point your telescope straight up to aim at celestial North. To compensate for your position on the round earth, the polar axis(19) is set in one of two simple ways.(see Fig.6)



Polar Axis and Earth's Axis

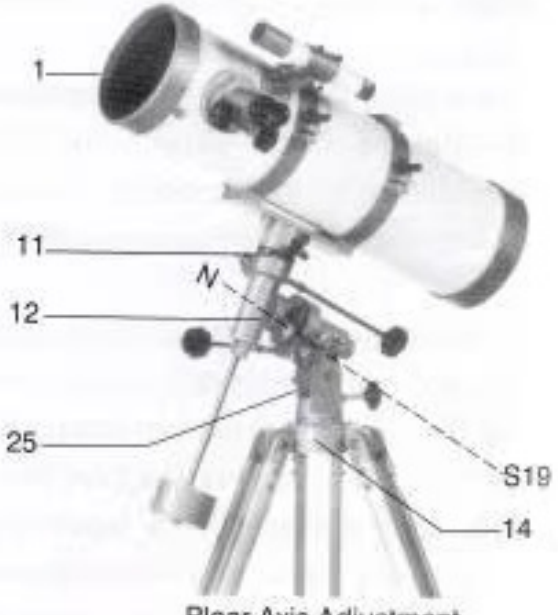
Fig.5



1)Set up the telescope at night.Loosen the declination axis clamp screw(11)and turn the telescope around until the arrow points at 90° on the declination scale. Tighten the declination clamp lever. The telescope is now in parallel with the polar axis.

2)Loosen the horizontal screw(14)and turn the telescope until the open end faces due North. This can be done by an approximate sighting on the Pole Star(Polaris)or by the use of a compass to find magnetic north.

True North is then found by directing the telescope at the Pole Star, as magnetic North is slightly away from the true North.



Ploar Axis Adjustment

Fig.6