

Instructions Manual

zoomion®



Zoomion® Apollo 80

English version 7.2015 Rev A

The Zoomion® Apollo 80

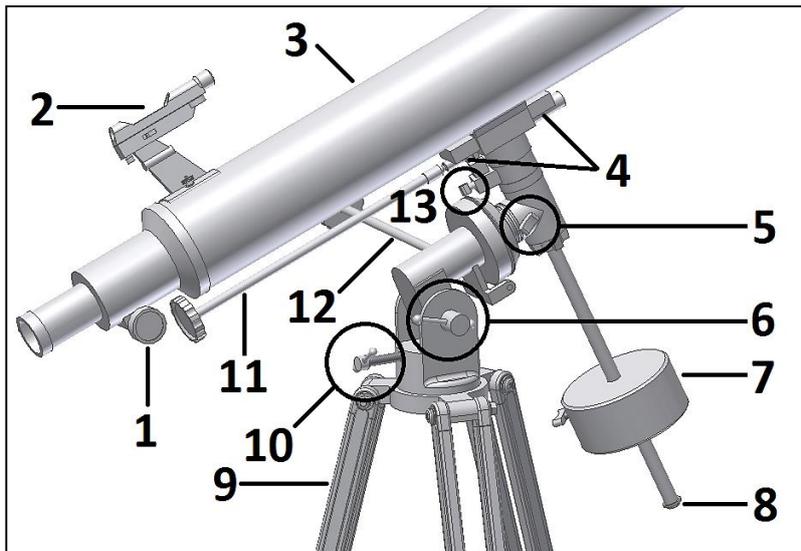


Figure 1. Parts description.

Congratulations on the purchase of the new Zoomion® Apollo 80. This telescope will give you hours of fun, with its optical glass lenses and light gathering capability, it is the ideal companion to start in the world of amateur astronomy. With this telescope you will be able to see the craters on the Moon, star clusters, some nebulae, the Jupiter's disc features and its Galilean moons and the rings of Saturn.

Included parts. Besides the complete telescope we have also included the following accessories: ***Eyepiece H12.5mm, Eyepiece H20mm, Barlow lens 2x, Red-dot finder scope;***

1. Knowing your telescope.

- | | |
|----------------------------|------------------------------------|
| 1- Focuser; | 8- Counterweight stop/foot saver; |
| 2- Red-dot finderscope; | 9- Tripod leg; |
| 3- Optical tube; | 10- Altitude adjuster; |
| 4- Tube studs; | 11- Declination adjustment handle; |
| 5- R.A. clutch; | 12- R.A. adjustment handle; |
| 6- Altitude side fix knob; | 13- Dec. clutch; |
| 7- Counterweight; | |

2. Getting Started. It is very simple to get started. Here is how the telescope works. The telescope should point to the object being observed. The lens at the front of the telescope's tube gathers the object's light and brings it to the eyepiece. The focuser is at the other end of the objective lens. The focuser's tube moves in and out to get a precise focused image. At the focuser one can use the supplied accessories. Different accessory combinations provide different results, such as different image magnifications or a correct image. But all this will be explained in detail in the next pages.

3. Assembly. Start by setting up the tripod as shown in figure 2. Use the supplied bolts and nuts. Next place the accessory tray and fix it using the wing nuts and small screws – fig. 3. After this, the tripod should be stable. Place the equatorial mount head on top of the tripods base, as shown in figure 4. Use the supplied hand-bolt to fix it. Thread the counter-weight shaft and slide the counter-weight (figure 5). Use the counter-weight's thumbscrew to avoid it from slipping. Place the control-handles as shown in figure 6. Now use the tube's nuts and fix the tube (figure 7). The mount's altitude axis can be adjusted as shown in figure 8. Use the side hand-knob to tighten or release the altitude's axis (fig. 9). Release the R.A. locking thumb-screw so that the R.A. axis is loose. Slide the counter-weight and adjust its position to balance the tube with the counterweight (figure 10). Balancing means the tube should be in balance with the counterweight and should not tip to one of the sides. Balancing is very important as it not only makes movements smoother but it allows the telescope not to wear the gears with its weight.



Figure 2. Tripod assembly.



Figure 3. Tray placement.

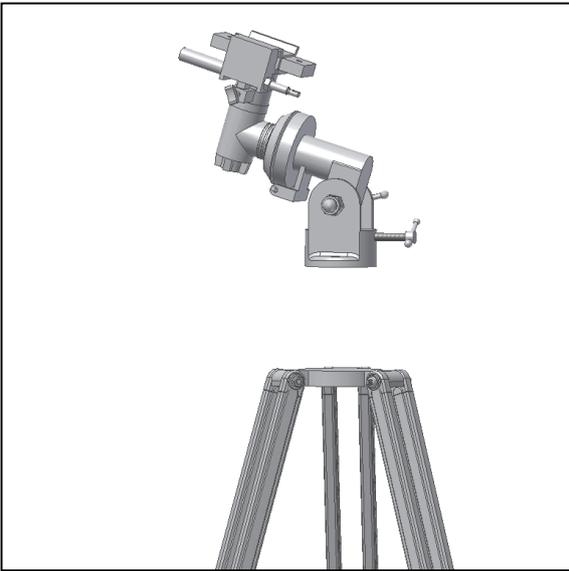


Figure 4. Place equatorial head on top of tripod.

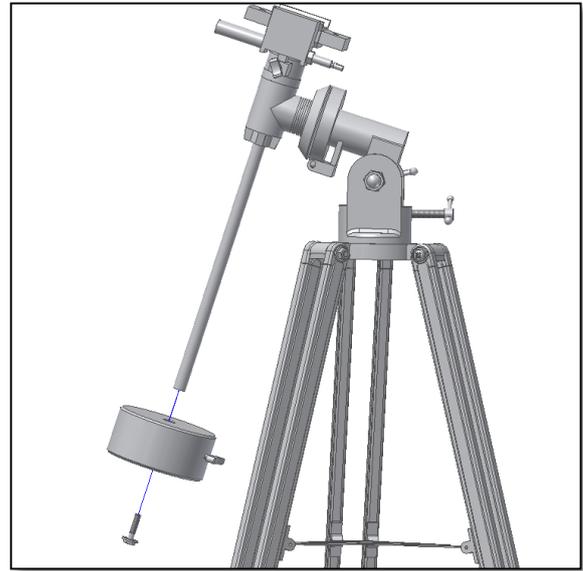


Figure 5. Thread the counter-weight shaft. Insert counterweight.



Figure 6. Fix Dec. and R.A. handles.

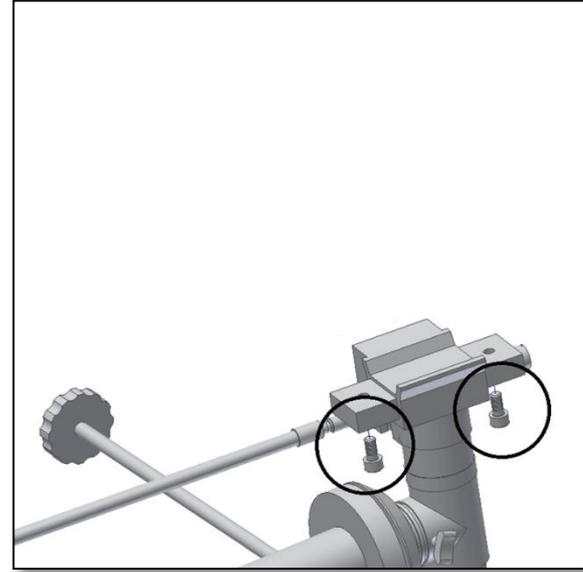


Figure 7. Fix the tube's ring.

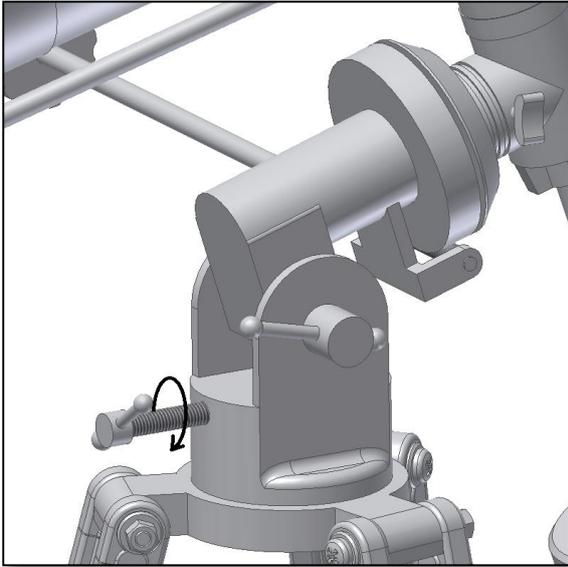


Figure 8. Adjust Dec. axis.

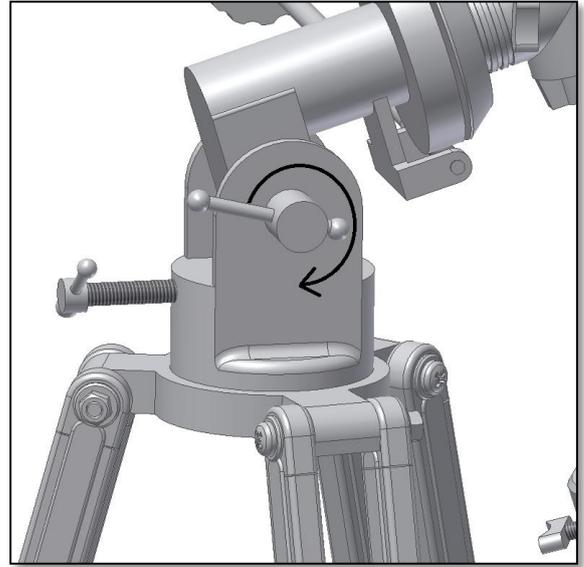


Figure 9. Tighten the side hand-knob.



Figure 10. Balance the R.A. axis with counterweight.

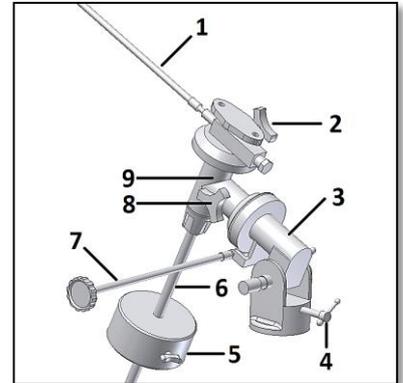


Figure 12. Detailed mount parts.

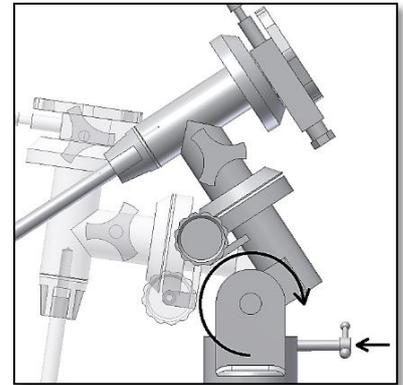


Figure 13. Adjusting latitude/altitude.

4. How to use the equatorial mount. The equatorial mount is a powerful tool for astronomical observation. The main purpose of an equatorial mount is to accurately point a telescope to a certain object. There are two axis in the equatorial mount. A R.A. axis and a Dec. axis. The telescope's tube sits on the Dec axis.

Equatorial mount parts description

1- Declination Handle

4- Latitude/altitude adjustment

7- R.A. Handle

2- Declination Fixing Knob

5- Counterweight

8- R.A. Fixing Knob

3- R.A. Axis

6- Counterweight shaft

9- Dec. Axis

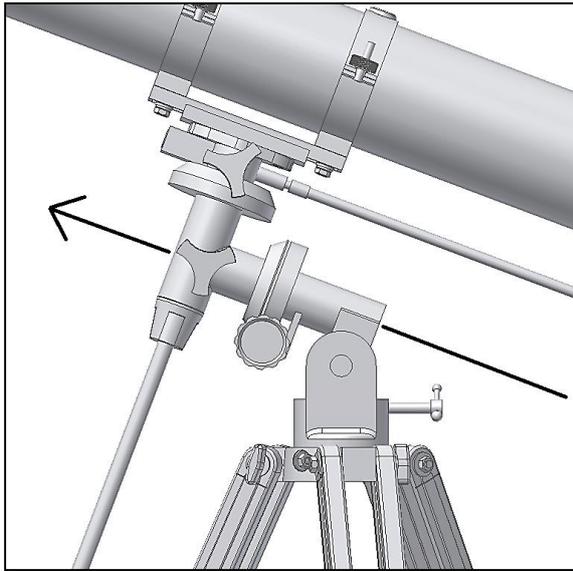


Figure 14. R.A. Axis.

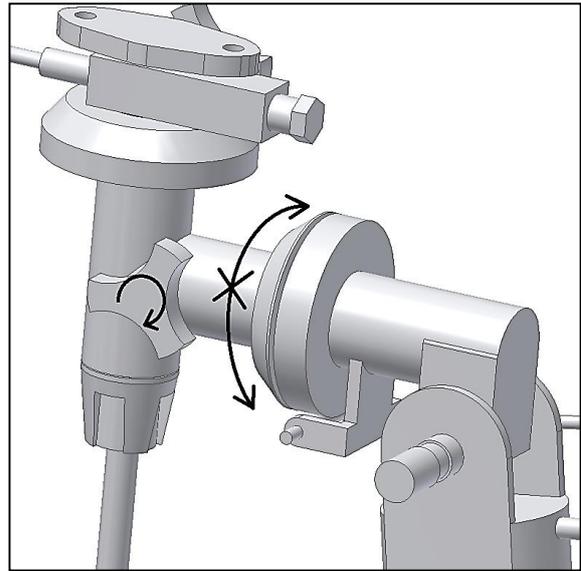


Figure 15. Locking the R.A. axis.

There are two axis in the eq. mount. One is the **R.A. (Right Ascension) axis** as shown in fig. 14. This means the telescope can rotate around this axis. The R.A. should point north to Polaris. Tracking (see what this is below) is made using the R.A. axis. Use the R.A. fixing knob (clutch) to lock the R.A. axis – figure 15. The second axis is the **Dec (Declination) axis** – fig. 16. To lock this axis use the Dec locking knob as shown in figure 17.

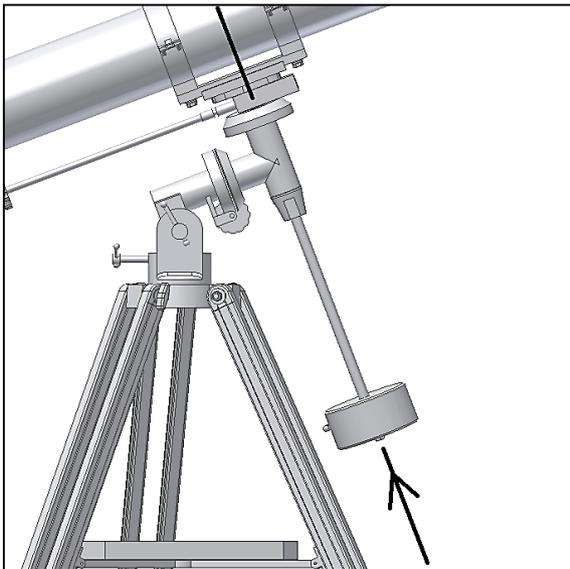


Figure 16. Dec. Axis.

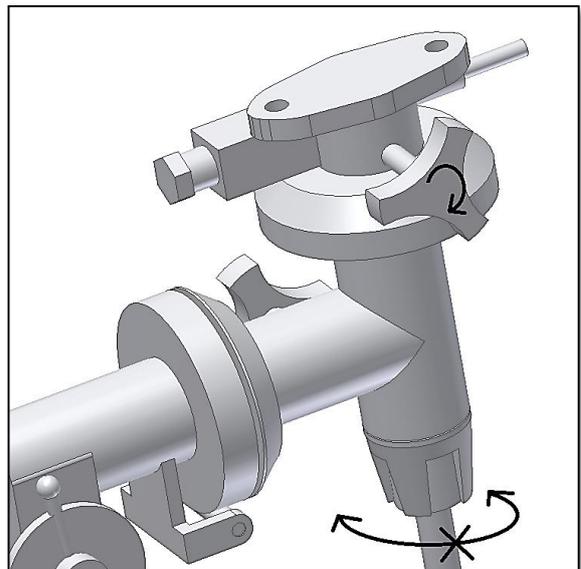


Figure 17. Locking the Dec. Axis.

4.1. What is tracking?

Star's positions rotate, slowly but surely, in the night sky. This is caused by the Earth's rotation. Every 24 hours Earth will make a complete turn. So does the night sky. This means that, when observing through a telescope, the stars will move away from the field of view after a few seconds. This is even more evident when using high power eyepieces. They go away quite easily from the field of view.

Use the Dec and R.A. handles to precise point the telescope. Make sure the axis are securely locked.

To keep a star in the centre of the field of view tracking is required. *Tracking can be done manually or by a motor.* Manual tracking can be done using the two Dec and R.A. handles. They allow small

corrections to be made in each axis. However this is not the recommend procedure to track an object. The mount should be placed in station i.e. aligned in such a way that only the R.A. is required to turn to track a Star. **4.2. How to set the mount in station.** Point the telescope's R.A. axis to

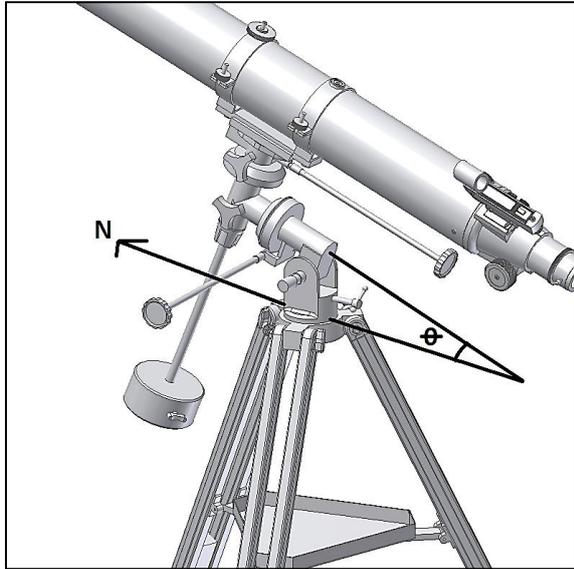


Figure 18. Mount points north.

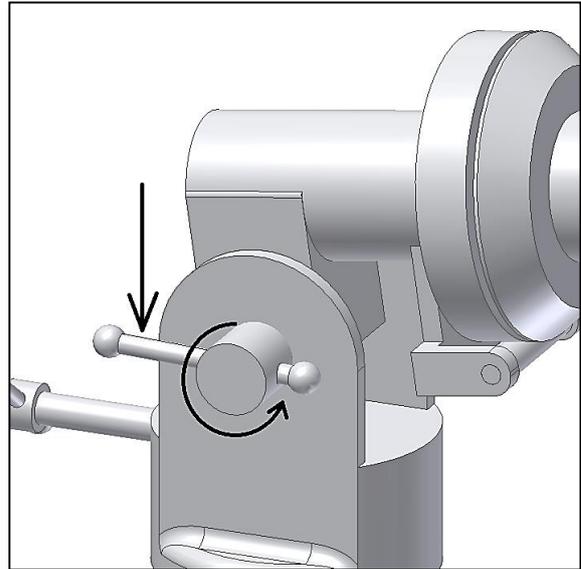


Figure 19. Release altitude break and adjust inclination.

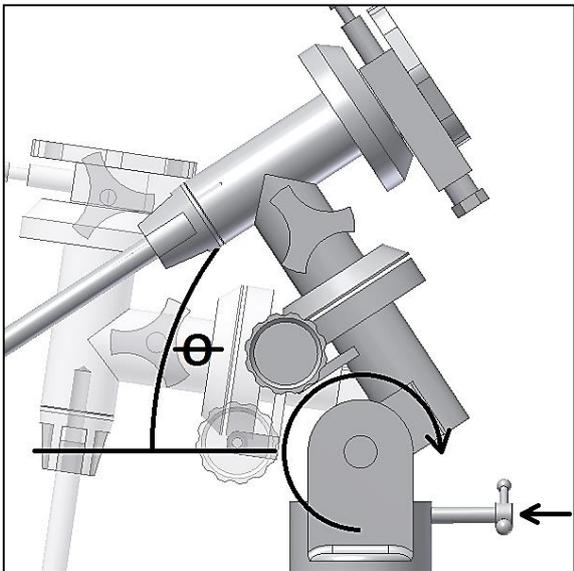


Figure 20. Adjust inclination to latitude.

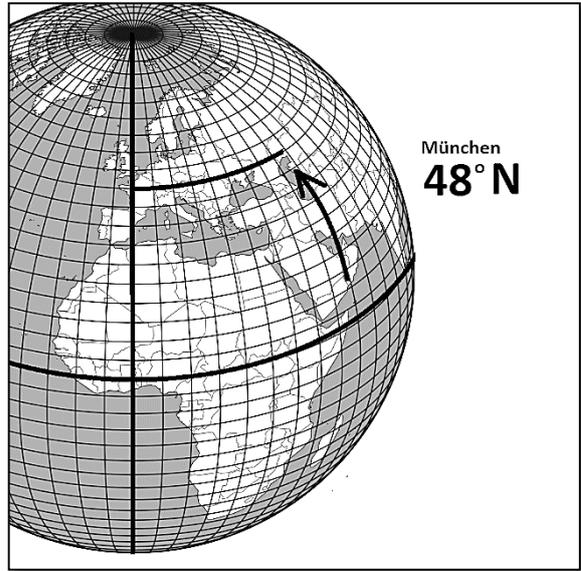


Figure 21. Check your latitude.

north – fig. 18. Release the altitude break - fig. 19- so that the R.A. inclination can be adjusted. Rotate the latitude adjustment so that the inclination of the mount is the same as the latitude of observers. For an observer in Munich the latitude is 48 degrees. The inclination angle (Θ) should be approximately 48 degrees. Make sure to re-tighten the altitude break. Now that the mount is pointing north and has the observer's location latitude your mount is set on station. This mean that the mount and tripod should not be moved during observation. The two R.A. and Dec. axis can be used to position and point the telescope to any part of the sky. Use the handles and clutches for this.

The altitude/latitude adjustment should NOT be used when observing. Continuous use can cause wear or even break the knob.

5. How to install and use the finder scope. The included LED finder scope is a powerful aid to point the telescope to a ground or sky objects. Install the finder scope as shown in figure 23. Make sure to tighten the two supplied finder scope nuts as shown . Make sure the finder scope is pointing to the same direction as the telescope’s aperture.

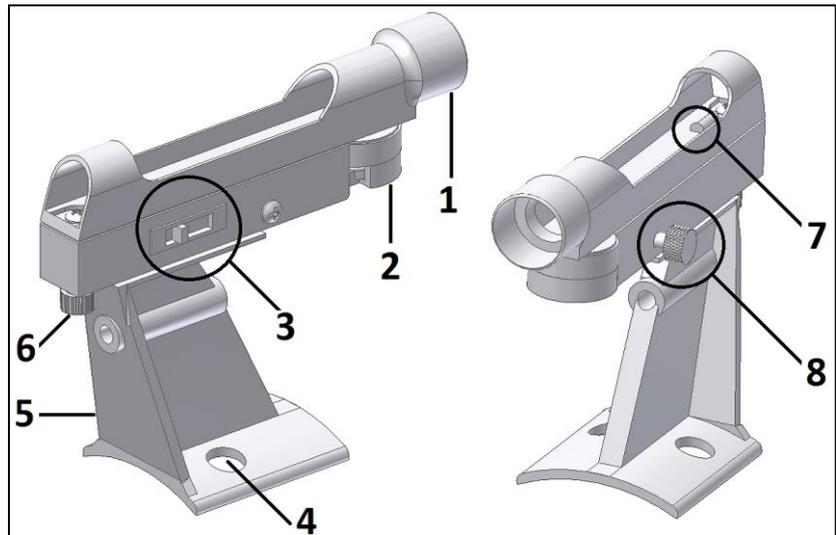


Figure 22. Red dot Finder scope main parts.

1. Knowing your finderscope.

- 1- Aperture;
- 2- Battery compartment;
- 3- LED switch;
- 4- Finderscope to telescope connection;
- 5- Finder bracket;
- 6- Finder’s altitude adjust. thumbscrew;
- 7- LED beam exit;
- 8- Finder’s azimuth adjustment.thumbscrew;

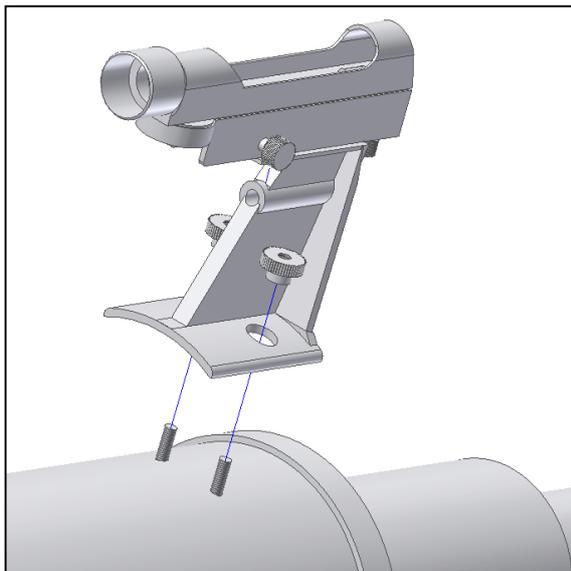


Figure 23. Place the finder scope.

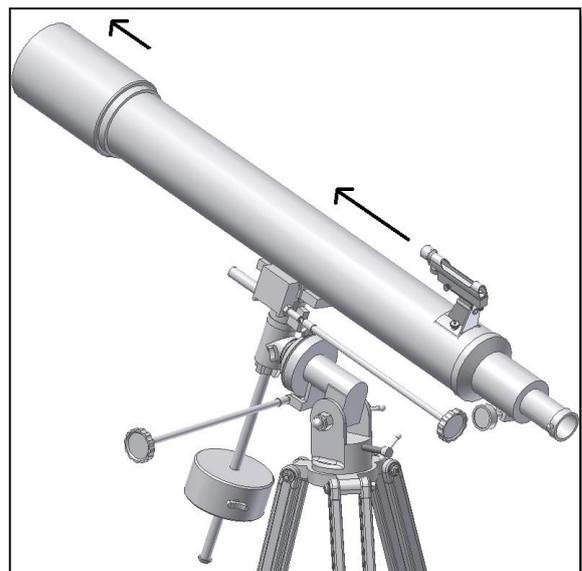


Figure 24. Point to the aperture’s direction.

The finder scope is used as an aiming device. It projects a tiny red dot on the transparent screen – figure 25. The finder should be aligned with the telescope. When pointing the led finder the area around the red point should match the one seen through the telescope’s eyepiece. Use the side switch to turn the led on/off or to increase its brightness. There are 3 positions: 0, 1, 2. Position 0 is off – the led is off. When not in use please switch it always to the off position to increase battery’s life. Position 1, led is on at its dimmest brightness. Position 2, led is on at its brightest position. Depending on the sky quality choose position 1 or 2 (more light pollution 1 is better than 2)

Make sure to always turn off the finder scope after use, this will increase battery’s life. If the LED starts to become too dim replace the supplied CR2032 battery.

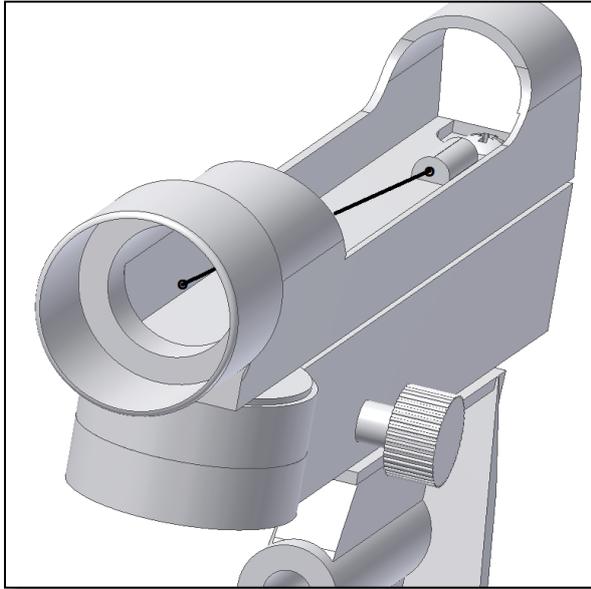


Figure 25. The led projects a bright red point.

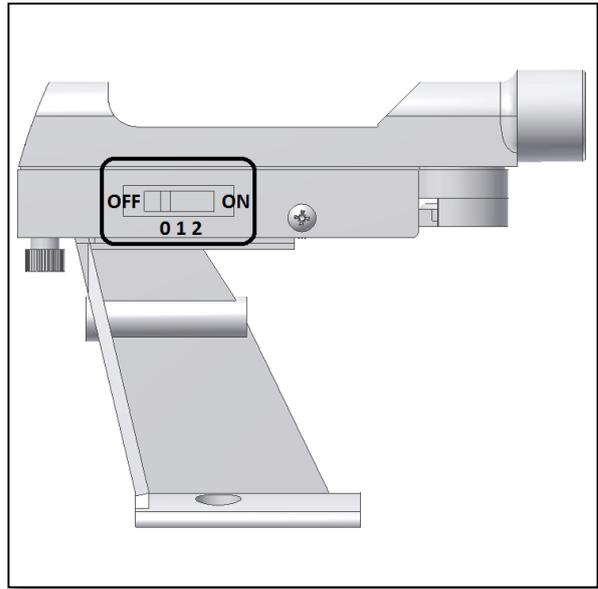


Figure 26. Selection brightness.

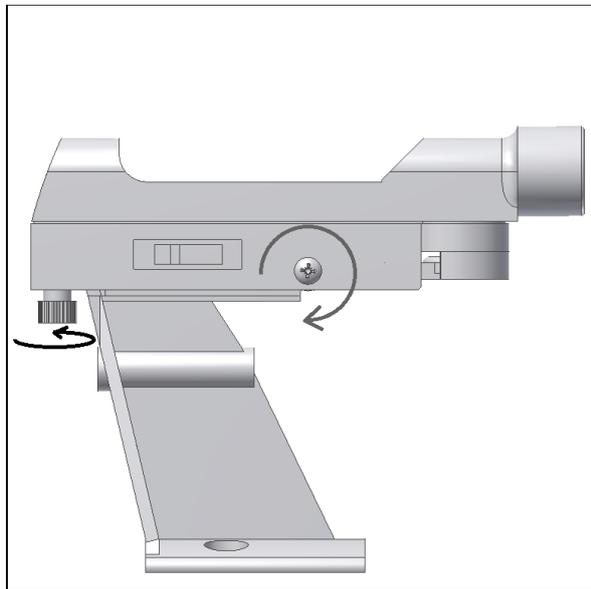


Figure 27. Use the altitude thumbscrew to adjust the finder.

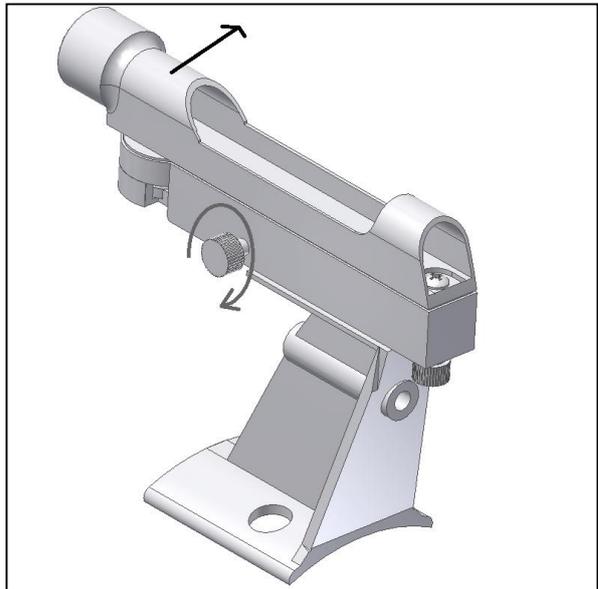


Figure 28. Use the altitude thumbscrew to adjust the finder.

The finder scope's pointing direction can be adjusted. This is important because the finder scope should always point in the same direction as the telescope – this is called aligning. Alignment can be done using the two adjustment screws (6 and 8 – figure 22). The altitude adjustment thumbscrew, when rotated clock wise, moves the led screen down around the pivot screw as shown in figure 27. The other adjustment (the azimuth thumbscrew) allows to adjust side wards the finder scope. Combine both thumbscrew movements to centre and overlap the led's red point with the object as shown in the following page.

Do not look at the Sun with the telescope! Children should be supervised when using a telescope during day time!

5. Aligning the Finder scope

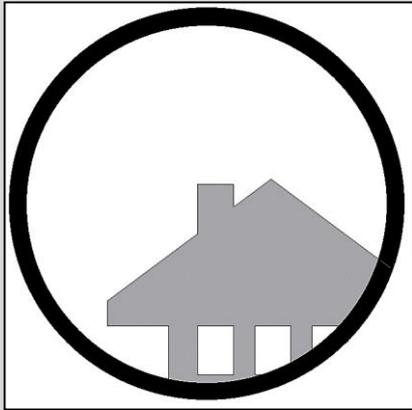


Figure A. A distant object is centered at the telescope's field of view. In this example we have a house with a chimney. The chimney is the reference point to place at the center of the field of view. We first look through the telescope with the lowest magnification possible, so we have the widest field of view.

STEP 1

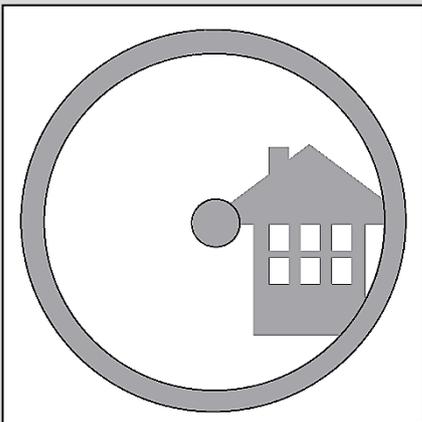


Figure B. Looking through the finderscope (it should be powered ON) we see the same building, but in this case the red dot and chimney are not centered. We adjust the finderscope using the two altitude and azimuth knobs so that the finderscope red point moves slightly until it matches the chimney. This is enough to correct the objects position in the finderscope. Trial and error is required to get a satisfactory result.

STEP 2

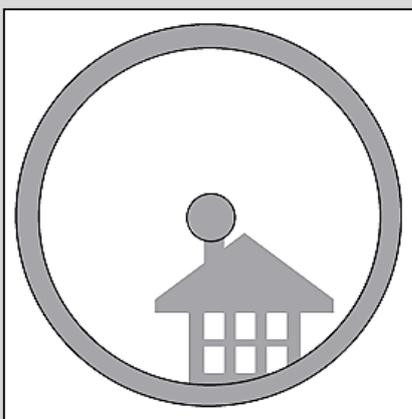


Figure C. After playing with the two finderscope thumbscrews and some trial and error, we get the finderscope red dot close to the center (in this case the chimney). The finderscope is now ready to use!

STEP 3

6. What can be seen with this telescope?

Below you will find some examples of what you can expect to see when using this telescope.



6.1. The Moon is one of the most spectacular objects to be seen through a telescope. Even a small telescope will reveal high detail of the Moon's surface. You will be able to see the craters on the Moon's surface and other features like the Mare. The moon is a very bright object. It is better to observe it when the Moon is not full. Try the crescent Moon and look for features along the terminator (between illuminated and dark surfaces).



6.2. Jupiter is the biggest planet of our solar system. It is also one of the favorite targets for beginners. Galileo was able to discover that the four tiny dots that turn around the planet were in fact part of Jupiter's system of moons. With this telescope you will not only be able to see Jupiter's planet disc with its two major discernible bands, but also its biggest moons, Io, Europa, Ganymedes and Callisto.



6.3. The "lord of the rings" of the night skies, Saturn is by far the most popular target for small telescopes. Saturn's rings are discernible even at 60x magnification. In a very good night you will be able to see the Cassini's division (the darker band on the Saturn's rings).

7. Using the accessories, a bit of math to understand how all it works.

Using the accessories is easy and fun. To change magnification simply swap eyepieces. To get more magnification simply use the barlow lens. But how does all of this work?

7.1. Power (magnification)

Your telescope has a focal length of 900mm. This is approximately the distance between the telescope lens and its focal point (very similar to the distance between the focus point of a loupe and the loupe lens). This is a very important feature, that allows to determine several interesting facts such as magnification.

The magnification is determined by the telescope’s focal length and the used eyepiece. You probably noticed that the two supplied eyepieces are H20mm and H12.5mm. This means that the H20mm is a 20mm focal length eyepiece while the H12.5mm is a 12.5mm focal length eyepiece.

To determine the magnification just divide the telescope’s focal length by the eyepiece’s focal length. Let’s give an example for our telescope and the supplied eyepieces:

Telescope’s focal length is 500mm.
H20 eyepiece’s focal length is 20mm.

$$\frac{900mm}{20mm} = 45 \text{ power}$$

This means that the H20mm eyepiece provides a 45x power (magnification). This seems low, but when you try it, you will see a bright image with some (very good) details.

7.2. Barlow Lens

The barlow lens is a very interesting device. It is a negative lens, that multiplies the telescope’s focal length. So a 2x Barlow multiplies the original focal length by 2x, in this case $900mm \times 2 = 1800mm$.

A 3x Barlow lens multiplies by 3x.

Your telescope is supplied with a 2x Barlow lens. When used with the H20mm eyepiece you get 2x the power obtained before

$$45 \text{ power} \times 2x \text{ Barlow} = 90 \text{ power}$$

7.3. Erecting lens (not included)

The erecting lens gets you an upright image view with the telescope. It also adds some power like the barlow lens. The Erecting Lens provides an extra 1.5x power.

Some possible accessory combinations

	Terrestrial View	Moon	Deep Sky	Jupiter and Saturn
Barlow Lens 2x				Yes
H20mm Eyepiece			Yes	Yes
H12.5mm Eyepiece		Yes		
Power	<i>Does not apply</i>	40x	25x	50x