

**GEO SAFARI®**

EI-5304  
Ages 8+  
Grades 3+

# Vega 360 Telescope



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RISQUE D'ÉTOUFFEMENT, Petites pièces.  
Interdit aux enfants en dessous de 3 ans.  
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für Kinder unter 3 Jahren.  
PELIGRO, No conveniente para niños menores de 3 años por  
ser susceptible de producir piezas pequeñas que pueden ser ingeridas.



**WARNING:**  
CHOKING HAZARD—Small parts.  
Not for children under three (3) years.

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## CAUTION:

Never look directly at the sun, with or without your telescope. Never aim your telescope at the sun, or anywhere near the sun. Instant and irreversible eye damage can occur, including blindness.

Do not let children use the telescope without adult supervision any time the sun is above the horizon.

## Introduction

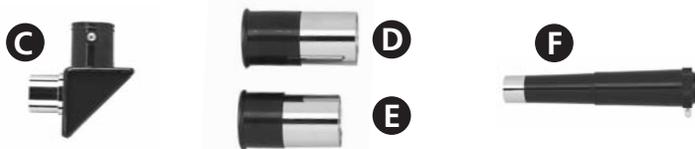
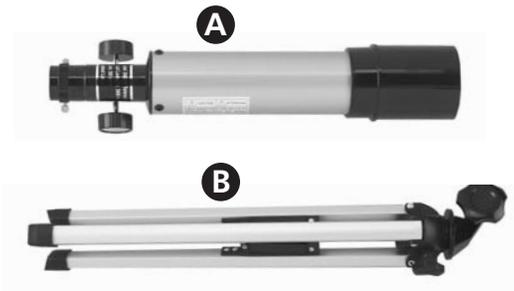
Your Vega 360 is a refractor telescope. Refractors were the first types of telescopes invented. A refractor telescope collects light through a large objective lens and directs it through the telescope to the eyepiece for magnification. Your telescope will enable you to see many interesting objects in the night sky as well as giving you an up-close view of remarkable things here on earth, from animals and landforms to sporting events. The information in this guide will help you get the most from your telescope.

## Getting Started

Remove all of the components from the box. Using the list and picture below, identify each of the parts of your telescope. It is recommended that you keep your telescope box for long-term storage, or should you ever need to return the telescope for service.

### Component parts:

- A. Optical tube with rack and pinion focuser (pre-assembled)
- B. Tripod with altazimuth mount
- C. Diagonal mirror
- D. 20mm eyepiece
- E. 9mm eyepiece
- F. 2x erecting eyepiece (image erector)

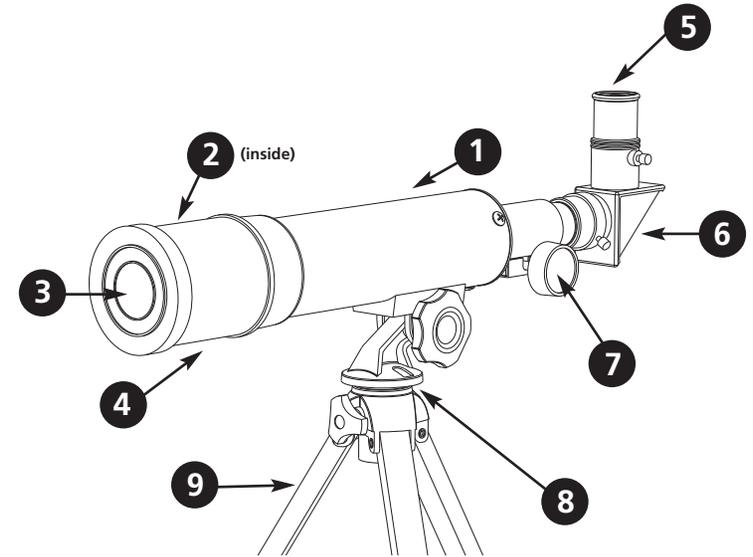


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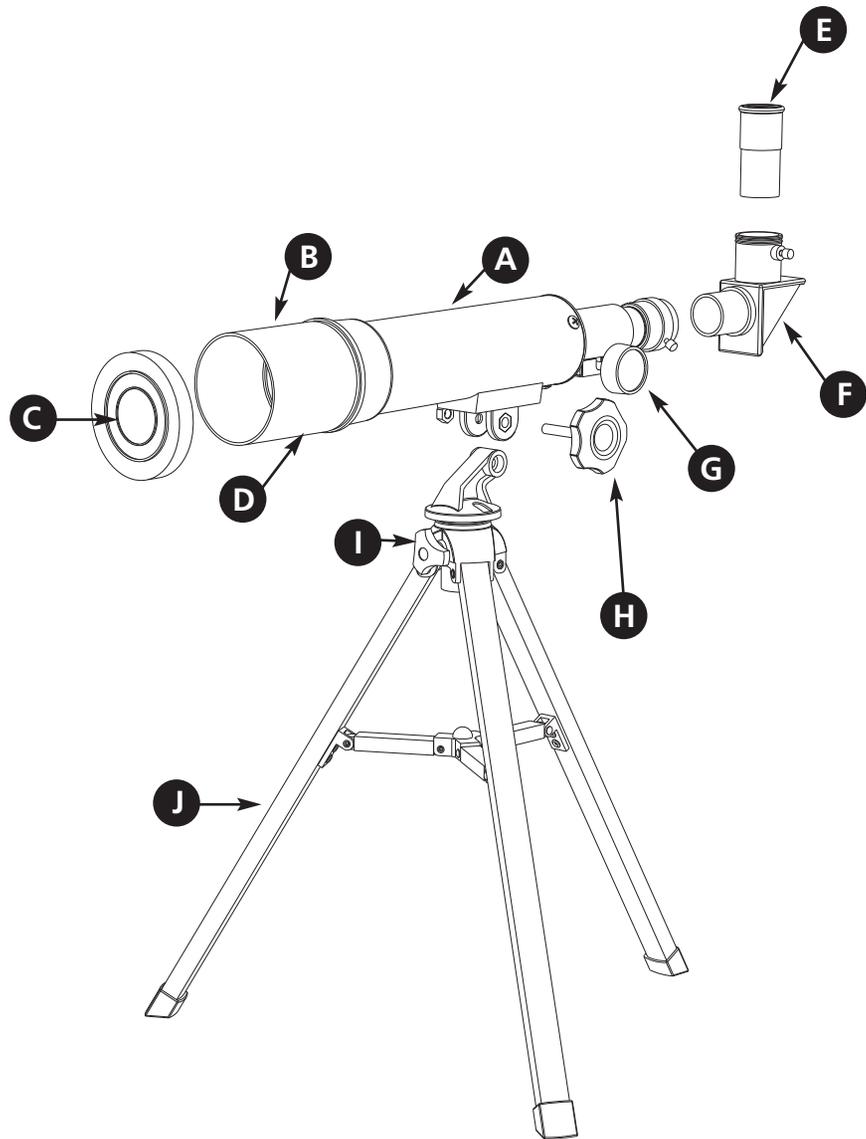
## Let's Look at Your Vega 360

Familiarize yourself with the parts of your telescope and their purpose.



1. **Optical tube:** Holds and protects the telescope's main, or objective, lens.
2. **Objective lens:** Gathers light from a distant object and brings that light, or image, to a point or focus.
3. **Dust cap:** Protects the objective lens from scratches and dirt.
4. **Dew shield:** Prevents dew from forming on the lens at night and acts as a sunshade to reduce reflections during the day.
5. **Eyepiece:** Brings the image from the telescope's objective lens to your eye. Your telescope comes with a low power eyepiece and a high power one, too.
6. **Diagonal mirror:** Orients the image from your telescope so that it is right-side up. It also makes it more comfortable to look at stars high in the sky without bending down low.
7. **Focuser:** Turn the focusing knob to make images clearer.
8. **Altazimuth mount:** Holds the optical tube and allows you to adjust the view up and down (altitude) and side-to-side (azimuth).
9. **Tripod:** Tabletop tripod supports the telescope and mount.

## Assembly Diagram



- |                            |                       |                      |
|----------------------------|-----------------------|----------------------|
| A. Optical tube            | E. Eyepiece           | I. Azimuth lock knob |
| B. Objective lens (inside) | F. Diagonal mirror    | J. Tripod legs       |
| C. Dust cap                | G. Focuser/Focus knob |                      |
| D. Dew shield              | H. Altitude lock knob |                      |

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## Assembling Your Telescope

Use the diagram on page 4 and the directions below to assemble your telescope.

1. Gently pull the aluminum tripod legs (J) apart as far as they will go. Press down on the center of the tripod supports until they lock flat into place in a horizontal position. (See Figure 1.)

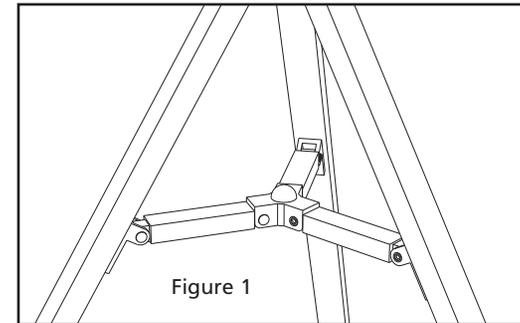


Figure 1

2. Place the optical tube (A) over the mount and lower it so that the plastic "tongue" on the mount slips into the bracket underneath the tube. (See Figure 2.) Line up the holes on the prongs with holes in the tongue.

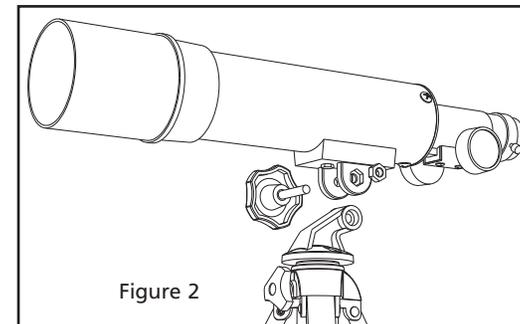


Figure 2

3. One of the prongs in the bracket has a hexagonal-shaped cutout around its opening. Place the nut from the altitude lock knob (H) in this cutout and hold it in place. Insert the bolt from the altitude lock knob through the bracket and tongue as shown. (See Figure 2.) Turn the altitude lock knob clockwise to screw it into place.
4. Tighten the altitude lock knob enough so that you can move the optical tube up or down and it will stay pointed at the angle you want. (You should be able to aim the tube almost vertically. If not, you must remove it and reverse its position in the mount. (See Figure 2.)

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5. Find the azimuth lock knob (I) and tighten it, if necessary, by turning it clockwise. The knob, when fully tightened, will lock your telescope's horizontal movement.
6. If the diagonal mirror has not come already inserted into the focuser, remove the protective plastic cap over the telescope's focuser (G) by loosening the two small screws. Remove the black plastic cap from the diagonal mirror (F) and insert the mirror into the focusing tube. Secure the mirror in place by tightening the two small screws. (See Figure 3.)

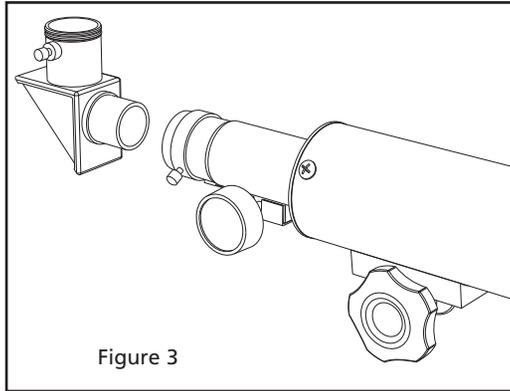


Figure 3

7. Loosen the protective plastic cap from the diagonal mirror by loosening the single screw. Locate the 20mm eyepiece, insert it into the diagonal mirror, and tighten the screw (See Figure 4).

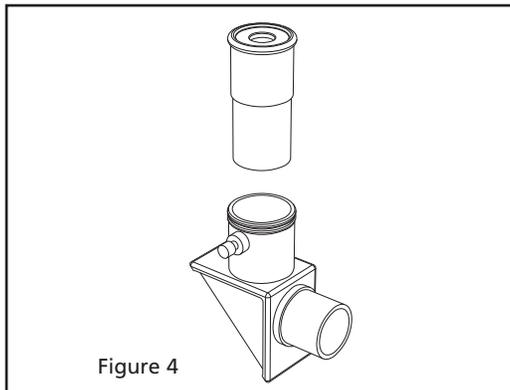


Figure 4

## Using Your Telescope

1. For best results, take your telescope outside. Do not aim it through a window which will cause distortions.
2. Let your telescope adjust to the outside temperature. Your telescope will perform much better if the lenses and the air inside the tube are all the same temperature as the outside air. In extreme temperatures, it may take up to 30 minutes to acclimate your telescope.
3. Start viewing with your low power (20mm) eyepiece in place because it gives you the widest angle and brightest, sharpest views.
4. Loosen the altitude and azimuth lock knobs and move the telescope in the direction of an object you wish to view. Look through the eyepiece and pan the telescope until the object appears centered in the telescope's field of view (the portion of the sky that you can view through a telescope). Once it is in your field of view, tighten the altitude and azimuth knobs.

### CAUTION:

Never look directly at the sun, with or without your telescope. Never aim your telescope at the sun, or anywhere near the sun. Instant and irreversible eye damage can occur, including blindness.

5. Look through the eyepiece, turning the focus knob until the image is clear and sharp.

**Note:** When looking through the diagonal mirror, objects will appear right side up, but reversed, like a reflection in a mirror. This is normal for all astronomical telescopes. Your telescope is supplied with an erecting eyepiece, which properly orients images for terrestrial viewing. See page 8 for directions for using your erecting eyepiece.

## Choosing an Eyepiece for Viewing

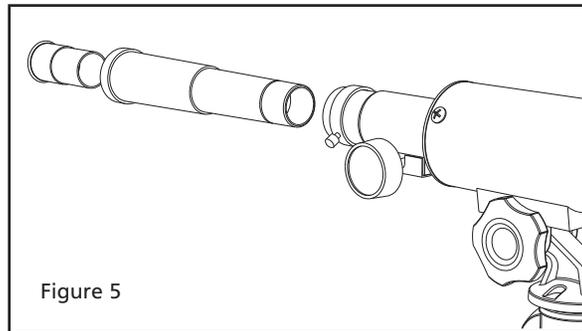
Your Vega 360 comes with two different eyepieces—a 20mm eyepiece and a 9mm eyepiece. The eyepieces offer you a range of viewing powers or magnifications. Eyepieces are measured and labeled in “mm” (millimeters). The low power eyepiece is the one with the higher number in mm (20mm). The high power eyepiece is the one with the lower number in mm (9mm).

As a rule, always start with the low power eyepiece, gradually switching to the high power eyepiece only after you have located an object.

## Using Your Telescope for Terrestrial Viewing

To view terrestrial (land) subjects, your telescope comes with an erecting eyepiece, or image erector. This special component orients objects so that you can view them as you would with your naked eye. Follow these directions to use the image erector:

1. Remove the diagonal mirror and eyepiece from the focusing tube.
2. Loosen the small screw in the focusing tube. Insert the image erector directly into the focusing tube. Tighten the screw to keep it in place. (See Figure 5.)



3. Loosen the small screw in the image erector and insert your chosen eyepiece into it. Tighten the screw to keep this eyepiece in place. (See Figure 5.)

The image erector provides a 2x magnification, which means that the 9mm eyepiece will magnify objects 80x when used with it.

## Tips for Telescope Use

Exploring the night sky with a telescope is exciting—and challenging! Learning to use a telescope takes practice and patience. Here are some tips to better viewing:

1. To locate objects, you must learn how the sky is laid out. Check books about astronomy to learn your way around the night sky. Consult one of the web sites on page 14 to check the location of interesting celestial sights. Local astronomy clubs are a good source of information, too.
2. No matter how much light surrounds you, more is always worse. Turn off any lights. Allow 15 minutes or more for your eyes to adapt to the darkness.
3. Cool your telescope to the outside temperature for about 30 minutes before observing. Cooling the telescope reduces air currents inside the tube that could produce fuzzy, blurry images.
4. Planetary viewing requires good “seeing” conditions—steady, dry atmosphere with little or no clouds. A good way to judge seeing conditions is to check the stars. If the stars appear to be twinkling, a phenomenon caused by a turbulent atmosphere, then conditions are poor for planet gazing.
5. Use slow, steady hand movements when using your telescope. This will minimize vibrations and make it easier to get a steady view.



## Frequently Asked Questions

### 1. Why is the image in my telescope eyepiece upside down and/or backwards?

If you have inserted your eyepiece directly into the telescope's focusing tube, you will see an image that is upside-down and backwards. If you have inserted the diagonal mirror into the focusing tube and then placed the eyepiece into the diagonal mirror, your image will be right-side up, but it will still appear backwards or reversed. This is normal for an astronomical telescope. After all, there's no up or down in space so it doesn't matter how the field is oriented. For terrestrial viewing, when you want images to be oriented properly (as seen with the naked eye), insert the erecting eyepiece according to the directions on page 8 of this guide.

### 2. Why can't I see anything when I look through my telescope?

If you see only white, gray, or black through the telescope you probably have inserted an eyepiece that is too powerful. To solve this problem, switch to the low power eyepiece. As a rule, always start with the lowest power eyepiece, gradually switching to higher power eyepieces only after you have located an object.

### 3. When I use my high power eyepiece, why does everything look darker?

As telescope magnification increases, brightness diminishes. Brightness increases when magnification is reduced. If an image appears dark or unclear, try using your low power eyepiece. It is easier to study small, bright views of celestial objects than large, dark, or blurry ones. You do not need very high powers to study most celestial objects.

### 4. Why do objects in the sky move out of view when I look through my telescope?

When you view a celestial object through a telescope, the rotation of the earth makes it appear as though objects are moving across the viewing area. You can lessen this effect and observe the largest area of the sky by using your low power lens.

## Observing the Night Sky

Your telescope can bring you the moon and stars—and some planets, too.

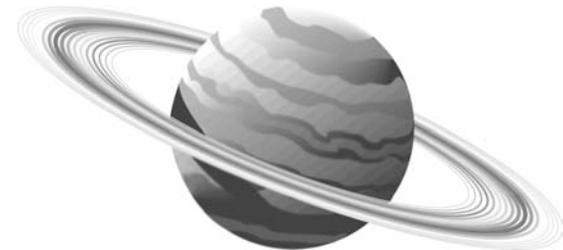
### Planets

The planets are our solar system companions. They range in size from Pluto, a rocky planet smaller than our moon, to Jupiter, a giant gas ball that could hold 1,000 Earths. Viewing the planets presents some challenges. As the planets in our solar system orbit the sun, their position in our night sky changes. To find out where to look for planets at a particular time, check an astronomy magazine, such as *Sky and Telescope*. You can also visit the magazine's web site, listed on page 14 in this guide.

Most people who have looked up at the night sky have probably seen some planets but did not realize it. A planet, when it is above the horizon, will not twinkle like a star. Planets are resolved by the eye as tiny balls, as opposed to stars, which are infinitely small points of light. The easiest planets to view, when they are visible, are the five "naked-eye" planets: Saturn, Jupiter, Mars, Venus, and Mercury. Mercury is the most difficult to see since it is usually below the horizon. Each of the planets has its own set of unique characteristics, making them a wonder to behold.

### Stars

The stars are so far away that when you look at one with your telescope, you won't see a disk as you do when you look at a planet. Even with a large, powerful telescope, a star is seen as a point of light. Some stars look larger than others, but what you are actually seeing is brighter points of light compared to dimmer points of light. The brighter stars aren't necessarily larger, but they appear that way to us.



## The Moon

The silvery moon is the best subject to view with your telescope. As Earth's nearest neighbor, it's about a quarter million miles (402,000 km) away. That may sound like a long distance, but it's close enough that your telescope will reveal a fascinating lunar landscape of craters, plains, and mountain peaks.

Here are a few interesting lunar features to look for:

### Mare Crisium

Mare Crisium ("Sea of Crises") is actually a huge plain formed when great lava flows cooled and hardened on the moon's surface.

### Crater Copernicus

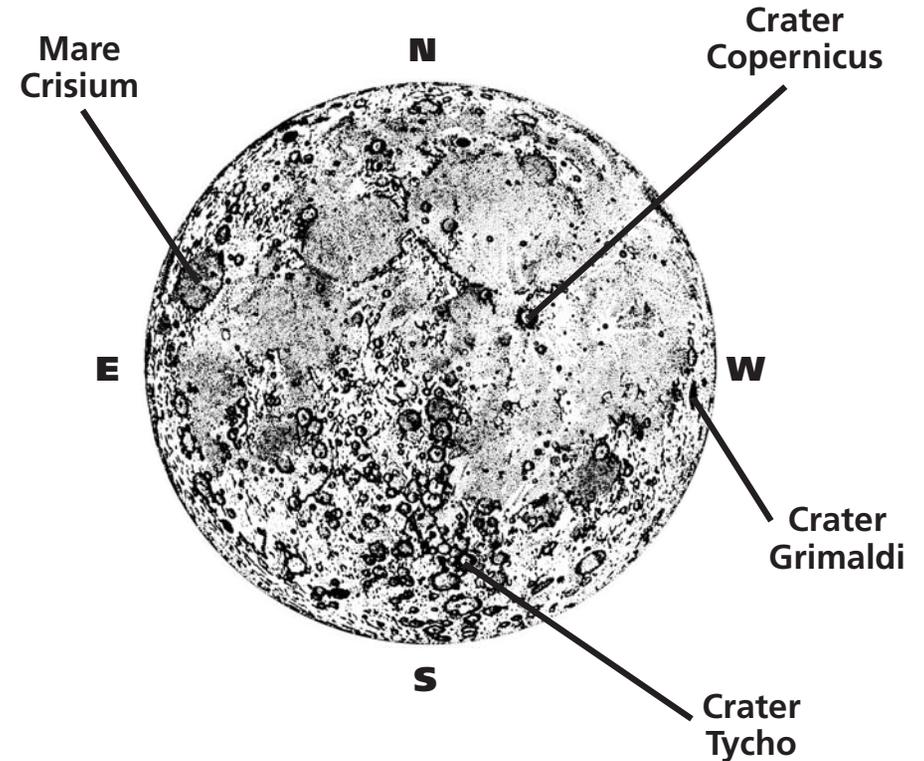
Crater Copernicus is a bright crater with a huge encircling ring of debris that was thrown out of the crater when it was formed by an impacting meteor more than 100 million years ago. It is 60 miles (97 km) across and more than 2 miles (12,600 feet, or 3,840 m) deep.

### Crater Tycho

Bright streaks or rays, best seen during a full moon, emanate from this crater. The rays indicate that this is a young crater. Over time, meteors constantly bombarding the crater's surface will cause the rays to disappear. Crater Tycho is 56 miles (90 km) across and almost 14,000 feet (4,267 m) deep.

### Crater Grimaldi

This large crater looks elliptical in shape, but it is actually circular. It appears to be elliptical because we see it on the western horizon of the moon, which is curving away from us. This effect is called foreshortening. Crater Grimaldi is about 140 miles (225 km) across and 10,500 feet (3,200 m) deep.



Note: This map, like your telescope, shows a mirror image of the moon.

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## Learn More About Astronomy

Visit these web sites to learn more about astronomy and the objects you see in the night sky:

- <http://www.nasa.gov>  
NASA's official web site.
- <http://www.nasa.gov/audience/forkids/home/index.html>  
NASA's link with information for students
- <http://www.nasm.si.edu>  
The web site of the National Air and Space Museum at the Smithsonian Institute
- <http://www.space.com>  
Astronomy web site with interesting links, including a sky calendar listing what's visible in the sky each night
- <http://skyandtelescope.com>  
Astronomy web site with useful information, including a customizable sky chart where you can type in your zip code for a map of the night sky
- <http://cosmobrain.com>  
Astronomy web site with excellent links, including an astronomical calendar listing what's visible in the night sky and an "astrolinks" section to many other outstanding sites

## Caring for Your Telescope

Take good care of your Vega 360 and it will provide you with many hours of viewing excitement.

### Storage

Your Vega 360's compact, easy-to-assemble design makes storing it in its box simple. If you wish to store your Vega 360 fully assembled, cover it with heavy plastic to protect it from moisture, and ensure that the dust cap and lens covers are on. Accessories should be stored separately in a box, with all their dust caps on.

## Optics

Optical components of a telescope will get dirty over time. However, a considerable amount of dirt or dust must be present on the optical surface before you will notice the effect visually. Follow these suggestions to maintain your telescope's optics in the best possible condition:

1. Keep the dust caps on during storage of the telescope to reduce the amount of dust collected.
2. After using the telescope there may be condensation on the optical surfaces. When the telescope is brought inside, remove the dust caps and allow the moisture to evaporate naturally. Point the optical tube downwards so as to minimize the collection of airborne dust. Once the moisture has evaporated, replace the dust caps.
3. A small amount of dust on optical surfaces, does not need to be removed. A build-up of dirt or dust collected onto a lens should only be removed with the utmost care. If you wish to remove a build-up of dust from the lenses, you should first try using a can of filtered compressed air. Remove the dust cap and the dew shield. Once you are able to freely blow across the surface of the optics, begin by first pointing the can away from the piece and gently expel some air. This will remove any condensate in the air can lines and clear off dust that may have accumulated on the discharge tube. Next, using short quick bursts of air carefully remove the dust particles. **Do not hold the trigger of the compressed air for too long as condensate might be blown out across the optical surface.**

The optics of your telescope should last a long time before they generally require major cleaning. By keeping the dust caps on and avoiding the temptation to handle the lenses, you will find that very little is needed in the way of optical maintenance.