COLEMAN® TELESCOPE

CDB804AZ3

INSTRUCTIONS & OWNER'S MANUAL

Please retain the packaging and instructions for further reference, as they contain important information.

Congratulations on your purchase of the precision crafted CDB804AZ3 COLEMAN telescope. With the proper care and handling of your telescope, you will enjoy years of viewing pleasure.

As an astronomical device, the CDB804AZ3 telescope has been designed for both a beginner and advanced star gazer. It provides views of the moon and planets, as well as dozens of galaxies, star clusters, and nebulae.

As a terrestrial (land) telescope, the CDB804AZ3 brings the world's natural wonders closer. It delivers superb scenic views and allows for observation of animals and landscapes from a distance. To obtain the best performance from your telescope, please carefully read this manual.

WARNING! DO NOT VIEW THE SUN THROUGH A TELESCOPE!
SERIOUS INJURY TO THE EYES MAY OCCUR

For use by an adult or under the supervision of an adult

PARTS LIST FOR CDB804AZ3 Telescope:

PARTS LIST

A. Dust Cap / Mask (Remove before Viewing)
B. Dew Cap/ Sun Shade
C. Objective Lens
D. Telescope Optical Tube
E. Red Dot Finder Assembly
F. Alignment screws
G. Focusing Tube
H. Eyepieces (K10, K25), Eyepiece cases (2)
I. 45° Erecting Image Diagonal
J. Focusing Knob

1. Azimuth Flexible Control Cable
2. Altitude Flexible Control Cable

a. Accessory Tray
b. Tripod Leg

WARNING!
CHOKING HAZARD
Small parts. Not suitable for children under 3 years.

8+ years

ASTM

CONFORMS TO EN71

0-3

Specifications, colors, packaging, and/or contents of this manual are subject to change without notice.

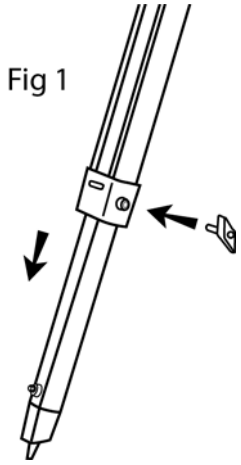
I. ASSEMBLY:

1) Carefully remove all parts from the cardboard cartons and lay them on a table, floor or other flat surface in order to take an inventory of all the pieces. Keep your box for storage or in case you ever need to ship your telescope.

2) Tripod Set Up:

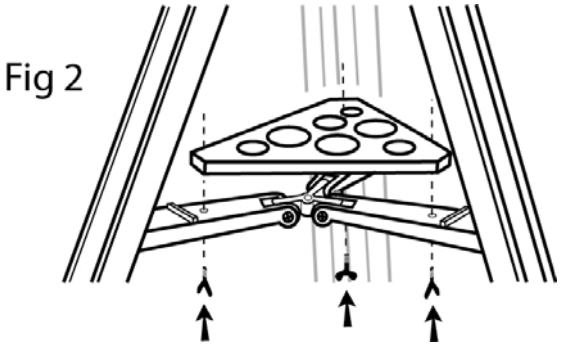
A. Adjusting the Tripod Legs (Fig.1)

1. Slowly loosen the height adjustment clamp and gently pull out the lower section of each tripod leg. Tighten the screws to hold the legs in place (see Fig 1).
2. Spread the tripod legs apart to stand the tripod upright.
3. Adjust the height of each tripod leg until the tripod head is properly leveled. Note that the tripod legs may not be at same length when the AZ3 mount is level.



B. ATTACHING THE ACCESSORY TRAY (Fig. 2)

1. Align the accessory tray with the bracket, and secure from underneath (see Fig 2).



3) Attaching the Telescope Main Body to the Tripod

Position the telescope main body (E) on top of the tripod head, aligning it to the fixing screws. Connect the telescope optical tube to the tripod head and secure it in place by tightening the fixing screws (see Figure 3). *DO NOT OVERTIGHTEN*.

Figure 3

4) Attaching the Red Dot Finder

Slide finderscope assembly/ red dot finder into the rectangular slot and tighten the thumbscrew to hold the bracket in place (see Figure 4).

Figure 4

5) Attaching the Diagonal and Eyepiece

A. Loosen the thumbscrew on the end of the focus tube.

B. Insert the diagonal into the focus tube and re-tighten the thumbscrew to hold the diagonal in place.

C. Loosen the thumbscrews on the diagonal.

D. Insert the desired eyepiece into the diagonal and secure by re-tightening the thumbscrews (see Figure 5).

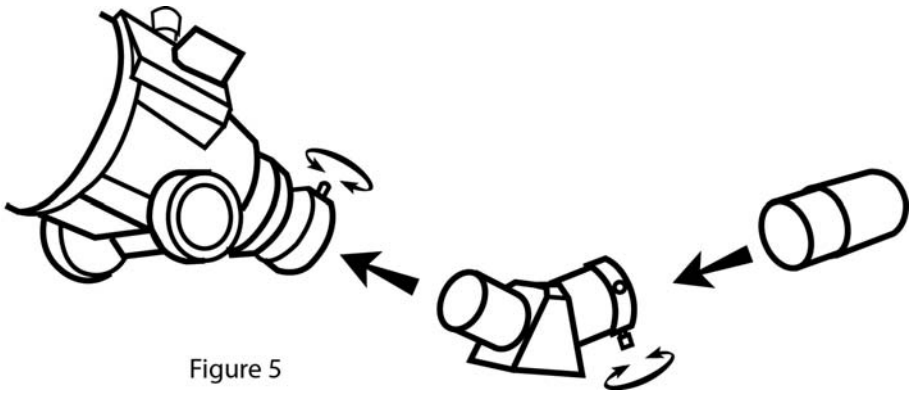


Figure 5

6) Installing the Control Cables

Install cables for fine adjustments of Altitude and Azimuth as shown in Figures 6 and 7).

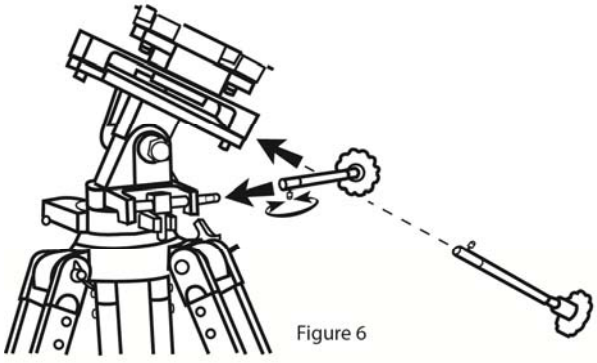


Figure 6

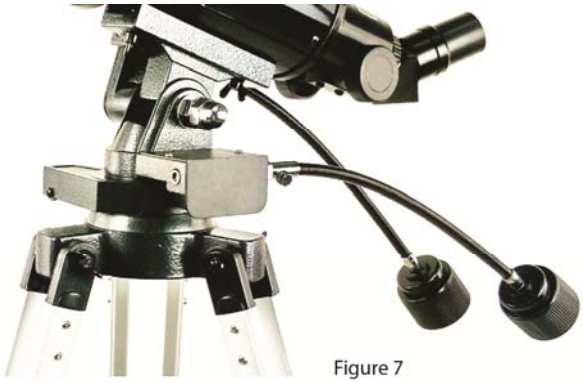
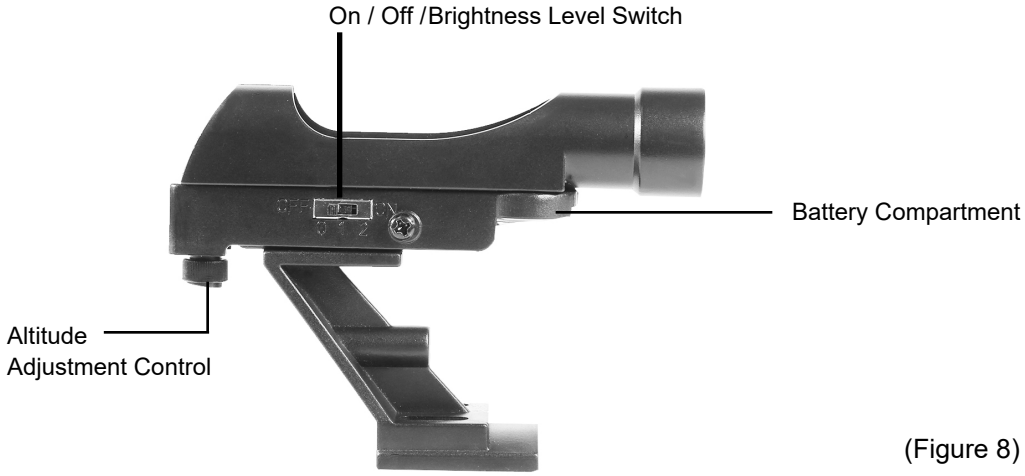


Figure 7

II. OPERATING YOUR TELESCOPE:

1) Using the Red Dot Finder

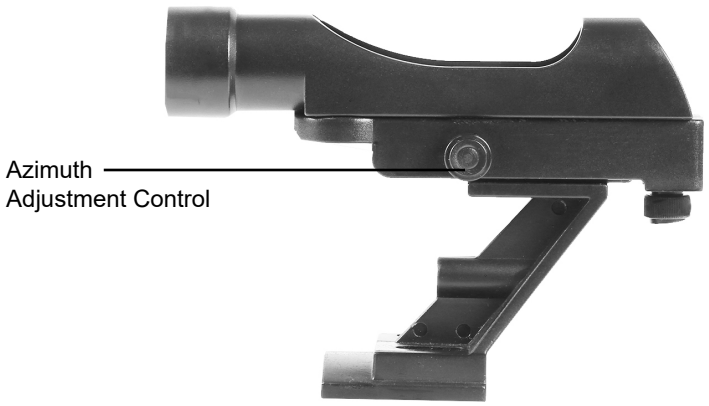
The Red Dot Finder is a zero magnification pointing tool that uses a coated glass window to super-impose the image of a small red dot onto the night sky. The Red Dot Finder is equipped with a variable brightness control, azimuth adjustment control, and altitude adjustment control. The Red Dot Finder is powered by a 3-volt lithium battery located underneath at the front. To use the Finder, simply look through the sight tube and move your telescope until the red dot merges with the object. Make sure to keep both eyes open when sighting (see Figure 8).



(Figure 8)

2) Aligning the Red Dot Finder

A. Remove the plastic spacer in order to allow contact with the battery.
B. Slide the Red Dot ON/OFF switch to Brightness Level 1 or 2. (Figure 8)
C. Insert a low power eyepiece into the telescope's focuser. Locate a bright object and position the telescope so that the object is in the center of the feild of view.
D. With both eyes open, look through the sight tube atthe object . If the red dot overlaps the object, your Red Dot Finder is perfectly aligned. If not , turn its atitude (Figure 8) and azimuth (Figure 9) adjestment controls until the red dot is merged with the object



(Figure 9)

2) Operating the AZ3 mount

This mount has controls for movement in altitude (up-down) and azimuth (left-right). Coarse azimuth movement is controlled by a locking knob located near the tripod head for left-right rotation. Loosen the knob to make large direction changes then lock it for fine adjustments. Coarse Altitude movement is controlled by a friction bolt. Use the micro-adjustment control cables to make small altitude and azimuth movements such as centering objects in view. The micro-adjustment controls have limited travel so it is best to center them on their threads before making a coarse adjustment.

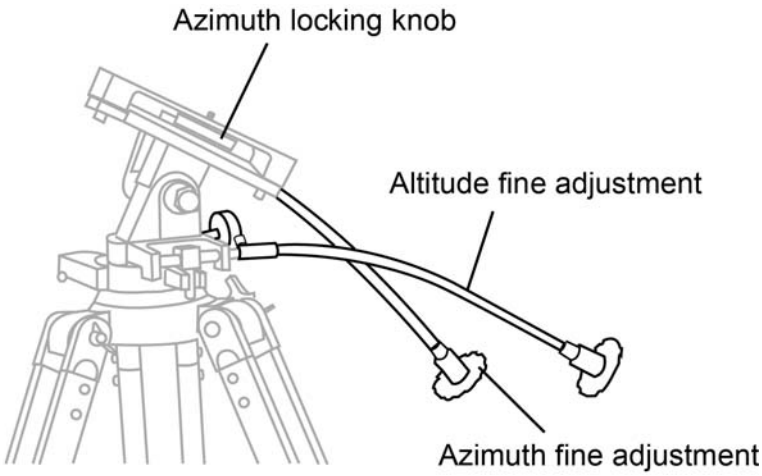


Figure 10

3) Focusing

Slowly turn the focus knobs, one way or the other, until the image in the eyepiece is sharp. The image usually has to be finely refocused over time, due to small variations caused by temperature changes, flexures, etc. This often happens with short focal ratio telescopes, particularly when they haven't yet reached outside temperature. Refocusing is almost always necessary when you change an eyepiece or adding or removing a Barlow lens (see Figure 11).

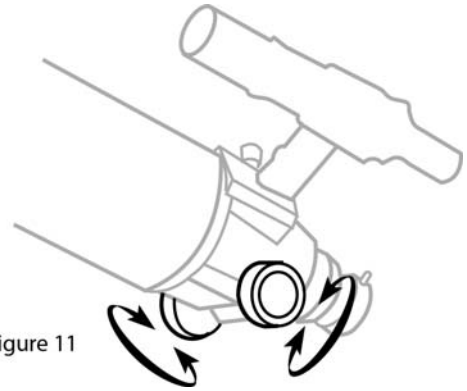
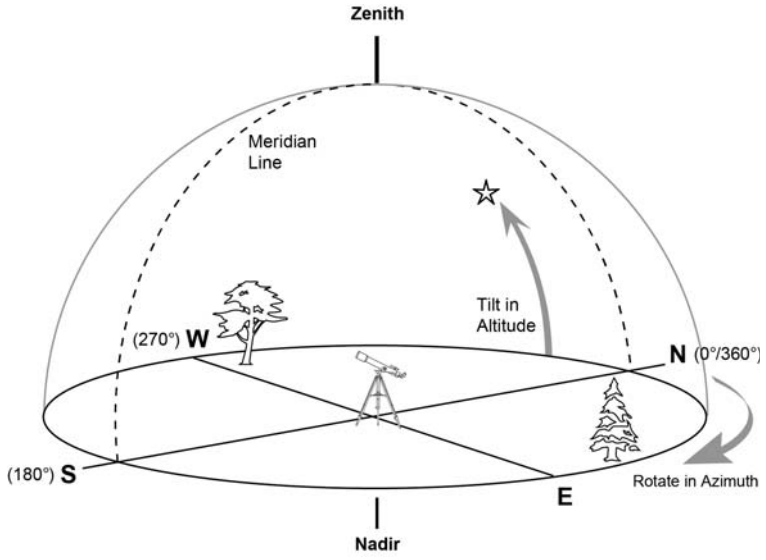


Figure 11

4) Pointing your telescope

Pointing an altitude-azimuth (alt-az) mounted telescope is relatively easy. With the mount level, you can swivel the telescope around on a plane parallel to your horizon and then tilt it up and down from there. You can think of it as turning your telescope in azimuth until it is facing the horizon below a celestial object and then tilting it up to the object's altitude. However, the Earth rotates and therefore the stars are constantly moving, so to track with this mount you need to constantly nudge the optical tube in both azimuth and altitude to keep the object in the field.

In reference material for your local position, the altitude will be listed as ±degrees (minutes, seconds) above or below your horizon. Azimuth may be listed by the cardinal compass points such as N, SW, ENE, etc., but it is usually listed in 360 degree (minutes, seconds) steps clockwise from North (0°), with East, South and West being 90°, 180° and 270 °, respectively.



5) Calculating the magnification (Power)

The magnification produced by a telescope is determined by the focal length of the eyepiece that is used with it. To determine a magnification for your telescope, divide its focal length by the focal length of the eyepieces you are going to use. For example, a 10mm focal length eyepiece will give 80X magnification with an 800mm focal length telescope.

$$\text{magnification} = \frac{\text{Focal legth of the telescope}}{\text{Focal legth of the eyepiece}} = \frac{800\text{mm}}{10\text{mm}} = 80\text{x}$$

When you are looking at astronomical objects, you are looking through a column of air that reaches to the edge of space and that column seldom stays still. Similarly, when viewing over land you are often looking through heat waves radiating from the ground, house, buildings, etc. Your telescope may be able to give very high magnification but what you end up magnifying is all the turbulence between the telescope and the subject. A good rule of thumb is that the usable magnification of a telescope is about 2X per mm of aperture under good conditions

6) Calculating the field of View

The size of the view that you see through your telescope is called the true (or actual) field of view and it is determined by the design of the eyepiece. Every eyepiece has a value, called the apparent field of view, which is supplied by the manufacturer. Field of view is usually measured in degrees and/or arc-minutes (there are 60 arc-minutes in a degree). The true field of view produced by your telescope is calculated by dividing the eyepiece's apparent field of view by the magnification that you previously calculated for the combination. Using the figures in the previous magnification example, if your 10mm eyepiece has an apparent field of view of 52 degrees, then the true field of view is 0.65 degrees or 39 arc-minutes.

$$\text{True Field of View} = \frac{\text{Apparent Feild of View}}{\text{Magnification}} = \frac{52^{\circ}}{80x} = 0.65^{\circ}$$

To put this in perspective, the moon is about 0.5° or 30 arc-minutes in diameter, so this combination would be fine for viewing the whole moon with a little room to spare. Remember, too much magnification and too small a field of view can make it very hard to find things. It is usually best to start at a lower magnification with its wider field and then increase the magnification when you have found what you are looking for. First find the moon then look at the shadows in the craters!

7) Calculating the exit pupil

The Exit Pupil is the diameter (in mm) of the narrowest point of the cone of light leaving your telescope. Knowing this value for a telescope-eyepiece combination tells you whether your eye is receiving all of the light that your primary lens or mirror is providing. The average person has a fully dilated pupil diameter of about 7mm. This value varies a bit from person to person, is less until your eyes become fully dark adapted and decreases as you get older. To determine an exit pupil, you divide the diameter of the primary of your telescope (in mm) by the magnification.

$$\text{Exit Pupil} = \frac{\text{Diameter of Primary mirror in mm}}{\text{Magnification}}$$

For example, a 200mm f/5 telescope with a 40mm eyepiece produces a magnification of 25x and an exit pupil of 8mm. This combination can probably be used by a young person but would not be of much value to a senior citizen. The same telescope used with a 32mm eyepiece gives a magnification of about 31x and an exit pupil of 6.4mm which should be fine for most dark adapted eyes. In contrast, a 200mm f/10 telescope with the 40mm eyepiece gives a magnification of 50x and an exit pupil of 4mm, which is fine for everyone.

III. OBSERVING THE SKY

1) Sky Conditions

Sky conditions are usually defined by two atmospheric characteristics, seeing, or the steadiness of the air, and transparency, light scattering due to the amount of water vapour and particulate material in the air. When you observe the Moon and the planets, and they appear as though water is running over them, you probably have bad "seeing" because you are observing through turbulent air. In conditions of good "seeing", the stars appear steady, without twinkling, when you look at them with unassisted eyes (without a telescope). Ideal "transparency" is when the sky is inky black and the air is unpolluted.

2) Selecting an observing site

Travel to the best site that is reasonably accessible. It should be away from city lights, and upwind from any source of air pollution. Always choose as high an elevation as possible; this will get you above some of the lights and pollution and will ensure that you aren't in any ground fog. Sometimes low fog banks help to block light pollution if you get above them. Try to have a dark, unobstructed view of the horizon, especially the southern horizon if you are in the Northern Hemisphere and vice versa. However, remember that the darkest sky is usually at the "Zenith", directly above your head. It is the shortest path through the atmosphere. Do not try to observe any object when the light path passes near any protrusion on the ground. Even extremely light winds can cause major air turbulence as they flow over the top of a building or wall. If you try to observe on any structure, or even a sidewalk, movements you make may cause the telescope to vibrate. Pavement and concrete can also radiate stored heat which will affect observing.

Observing through a window is not recommended because the window glass will distort images considerably. And an open window can be even worse, because warmer indoor air will escape out the window, causing turbulence which also affects images. Astronomy is an outdoor activity.

3) Choosing the best time to observe

The best conditions will have still air, and obviously, a clear view of the sky. It is not necessary that the sky be cloud-free. Often broken cloud conditions provide excellent seeing. Do not view immediately after sunset. After the sun goes down, the Earth is still cooling, causing air turbulence. As the night goes on, not only will seeing improve, but air pollution and ground lights will often diminish. Some of the best observing time is often in the early morning hours. Objects are best observed as they cross the meridian, which is an imaginary line that runs through the Zenith, due North-South. This is the point at which objects reach their highest points in the sky. Observing at this time reduces bad atmospheric effects. When observing near the horizon, you look through lots of atmosphere, complete with turbulence, dust particles and increased light pollution.

4) Adapting your eyes

Do not expose your eyes to anything except red light for 30 minutes prior to observing. This allows your pupils to expand to their maximum diameter and build up the levels of optical pigments, which are rapidly lost if exposed to bright light. It is important to observe with both eyes open. This avoids fatigue at the eyepiece. If you find this too distracting, cover the non-used eye with your hand or an eye patch. Use averted vision on faint objects: The center of your eye is the least sensitive to low light levels. When viewing a faint object, don't look directly at it. Instead, look slightly to the side, and the object will appear brighter.

IV. ABOUT YOUR REFRACTOR TELESCOPE:

Your telescope has a refractor type optical design. It uses lenses to gather and focus light. The combination of the front objective lens and eyepiece gathers more light than the human eye is able to collect on its own, focus it, and present the viewer with a brighter, clearer, and magnified virtual image. Light enters the open end of the telescope tube. The objective lens refracts or bends the light. This refraction causes parallel light rays to converge at a focal point, while those not parallel converge upon a focal plane. This results in a focused image which is enlarged for viewing through the eyepiece.

The primary front objective lens is a precision ground and polished component that is precisely positioned at one end of the optical tube, and is pre-aligned for maximum performance at the factory and should not need any adjustment. **Therefore, never tamper with or remove the lens at this end of the optical tube. Doing so will void your warranty and affect or damage the performance of your telescope.**

TECHNICAL SPECIFICATIONS:

Objective Lens Diameter: 80mm (3.15") *Focal Length: 800mm K*
Maxumum Magnification: 40x *Eyepieces: 10mm, 25mm*
Accessories: 45° Erecting Image Diagonal Prism, Red Dot Finder, Astronomy CD

V. USING YOUR TELESCOPE:

A. It is recommended to use your telescope outside or at times through open windows. Your view can be distorted by reflections in the glass of a closed window or at times by air currents of differing temperatures passing through an open window.

B. Let your telescope adjust to the outside temperature. Your telescope will perform much better if the temperature of the mirrors, eyepiece lenses, and the air inside the tube are the same as the outside temperature. It may take up to 30 minutes to equalize the temperatures when the difference in temperatures is extreme.

C. Find a location far from glaring light. If you live in an urban area, your viewing will probably improve the farther you move away from the city's lights. The sky glow of a town or city can dramatically reduce the telescope's performance and viewing capabilities.

D. Remove the dust cap from the end of the telescope. The open end of the optical tube should be pointed toward the subject you wish to observe.

E. Begin your viewing session by using only the K25 eyepiece. It will give you the widest angle and the brightest, sharpest views. Adjust the angle and position of the telescope as outlined in the previous sections.

F. When possible, avoid sudden temperature changes, as the moisture in the air will condense on the mirrors and eyepiece lenses. Should this occur after bringing your telescope indoors, remove the dust caps and allow the moisture to evaporate naturally. Point the telescope downward to minimize the collection of airborne dust. Once all of the moisture has evaporated, replace the dust caps.

G. A NOTE ON TERRESTRIAL VIEWING:

When viewing through a standard telescope, you may notice that when you observe a terrestrial object on land or water, it appears upside down.

To correct this, the COLEMAN CDB804AZ3 is equipped with an Erecting Image Diagonal Prism (I). This accessory is inserted in the eyepiece holder of the telescope between the eyepiece and the telescope. With the Erecting Image Diagonal Prism, objects will appear in their proper orientation for terrestrial and land observation.

NOTE: The eyepieces must be used together with the Erecting Image Diagonal Prism.

H. CARE AND CLEANING OF THE OPTICS:

1. The optical components of a telescope will get dirty over time. Dirt or dust on a lens should be removed with the utmost care. A considerable amount of dirt or dust would have to accumulate on the optical surface before your view would be compromised.

2. Keeping dust caps on during storage and transport will reduce dust collection.

3. Condensation may collect on the optical surfaces when the telescope is not in use. Remove the dust caps and allow the moisture to evaporate naturally. Point the telescope downward to minimize the accumulation of airborne dust.

4. Once all moisture has evaporated, replace the dust caps.

5. Filtered, compressed air may be used to remove surface dust from lenses and mirrors. Remove the dust cap. Once removed, point the can away from the lens and gently expel some air and any condensation or dust that has accumulated on the discharge tube. Spray the lens with short bursts of air to carefully remove the dust particles. Clean eyepieces and optical surfaces with special lens paper only. Eyepieces should be handled with care. Avoid touching optical surfaces.

DO NOT HOLD THE TRIGGER OF THE COMPRESSED AIR CAN FOR EXTENDED PERIODS BECAUSE PROPELLANT MAY ESCAPE AND DAMAGE THE OPTICAL SURFACES.

If, after several attempts, you cannot remove the particles, take the telescope to an optical professional for cleaning.

If you keep the dust caps on your telescope when it is not in use and avoid handling the lenses or mirrors, only minimal optical maintenance of your telescope should be required. Extensive cleaning is usually only necessary every few years.

I. WHAT TO LOOK FOR IN THE NIGHT SKY:

There is a whole universe of objects you could view at night, so where do you start? We recommend starting with the most prominent objects first.

The Moon

The moon is the easiest target to find at night. When the moon is in full position, it bathes the night with a silvery light that washes the sky of all but the brightest objects. The best time to view the moon is not when it is full, but rather when it is less than half full. The dividing line between dark and light on the moon, called the terminator, shows the best detail in the craters and mountains.

The Planets

The planets, our solar system companions, range in size and substance from moon-size rocky bodies to giant gas balls, which could hold Earth 1,000 times over. To find the planets, you will need information about their times of visibility. The included Astronomical Software CD or an astronomy magazine will give you the locations of the planets as they change position from month to month. The Internet is also an excellent source of information, offering star charts, maps, and more!

The popular and more familiar constellations often provide the easiest landmarks to help find the planet's locations and paths of orbit. Most people have looked up at the sky at night and seen some of the planets without even realizing it. A planet looks like a bright star but does not twinkle like a star does; it looks like a tiny ball. Venus, Mars, Jupiter, and Saturn are the easiest planets to view. Mercury is dimmer, usually below the horizon, and more challenging to find.

Each of the planets provides interesting views. Venus is covered with clouds so all that is visible is an extremely bright light, the brightest next to the moon. However, Venus, like the moon, goes through phases. As it travels around the sun, different areas of its surface are illuminated, producing crescent shapes of varying sizes. Mars is the red planet. When it is above the horizon, it is noticeably red and stands out like a beacon in the night sky. The apparent brightness of Mars varies as the planet orbits around the sun and throughout its period of visiblity, it will look brighter or dimmer depending on its distance from Earth.

Jupiter is the largest planet in our solar system and the second brightest next to Venus. Jupiter has many moons, four of which are often visible through your telescope when viewing conditions permit. As you watch them throughout the evening, you will see that they change position relative to each other and to Jupiter. It is possible with careful planning to actually see one of the moons disappear either in front of or behind Jupiter as it orbits around the planet. Another great feature of Jupiter is its cloud belt. Jupiter is alive with weather activity and its clouds have formed over time into belts visible through telescopes in the right atmospheric conditions.

Saturn, the second largest planet, is not as bright as Jupiter and so its moons are not as visible through small telescopes. The large rings that encircle Saturn are spectacular to observe, however. The planet and its rings appear pale yellow. The major division in the rings, the Cassini division, is possible to see if you keep the telescope firmly in position.

Uranus and Neptune are the last of the solar system's gas giants. They do not provide as spectacular a sight as Jupiter or Saturn, but are nonetheless rewarding to see.

Beyond our solar system there are many more objects to be found. Galaxies, nebulae, and star clusters abound!

J. ABOUT THE INCLUDED ASTRONOMY SOFTWARE CD:

Navigate the heavens like the professionals. TheSkyX First Light Edition makes an ideal companion to best enjoy your new telescope. Its intuitive user-interface always keeps you grounded while exploring the wonders of the night sky. Point and click to learn the names and coordinates of celestial objects. Quickly create observing lists of the interesting objects that are visible from your backyard with the What's Up? feature. Print finder charts to assist locating those faint, fuzzy objects in the eyepiece. Zoom in for up-close views of the planets, including the Moon, and Jupiter and Saturn's major moons. Watch animated tours demonstrating fascinating astronomical phenomena.

A descriptive digital user guide offers helpful tips, and in-depth descriptions on hundreds of celestial wonders offer hours of edutainment for you and your family.

K. FREQUENTLY ASKED QUESTIONS:

1) How far can I see?

If you stand outside and look up at the night sky on a clear evening, you can see hundreds of stars without the aid of your telescope. The telescope is a light-gathering instrument that magnifies the view—providing significantly more detail and unveiling more stars, nebulae, and celestial objects. With the aid of a telescope, you will be able to enjoy exciting views of Saturn's rings, Jupiter's major moons, the Orion Nebula, and much more.

2) Why can't I see anything through my telescope?

If you see only gray or black when looking through your telescope, even after searching for an object to view, it is very likely that you are using an eyepiece that is too powerful. To solve this problem always start with the lowest power eyepiece at first, and only insert the higher-power eyepiece after you have located an object.

3) When I use my high-power eyepiece, everything looks much darker. Why?

As magnification in a telescope increases, brightness diminishes. Conversely, brightness increases when magnification is reduced. If an image appears too dark or unclear, use a lower-powered eyepiece. Views of small, bright objects are superior to those of large, dark, or blurry ones! Atmospheric conditions, air currents, as well as light and air pollution also affect viewing quality.

4) As I look through my telescope, why do objects in the sky appear to move?

The constant rotation of the Earth makes things appear to move. Lower-power eyepieces will reduce this effect of movement considerably and allow you to observe an object for a longer duration before you have to readjust your telescope.

L. Whom do I contact for more information and product questions?

For any inquiries, parts, warranty or service information, please contact:

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