INSTRUCTION MANUAL

Orion® SkyQuest™ XT Classic Dobsonians

XT6 #8944, XT8 #8945,
XT8 Limited Edition #8967, XT10 #8946

ORION® TELESCOPES & BINOCULARS
AN EMPLOYEE-OWNED COMPANY

Corporate Offices: 89 Hangar Way, Watsonville CA 95076 - USA
Toll Free USA & Canada: (800) 447-1001
International: +1(831) 763-7000
Customer Support: support@telescope.com

IN 676 Rev B 10/22

Welcome to an exciting new world of adventure! Your SkyQuest XT Classic Dobsonian is a high-quality optical instrument designed to bring you dazzling views of the outer reaches of our universe. Whether you are brand-new to amateur astronomy or a seasoned stargazer, get ready for many evenings of enjoyment and fascination. Before venturing into the night with your new telescope, we recommend that you read through this instruction manual.

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1. Unpacking

The telescope will arrive in two boxes, one containing the optical tube assembly and accessories, the other containing the unassembled Dobsonian base and hardware. Be careful unpacking the boxes. We recommend keeping the original shipping boxes and any internal materials. In the event that the telescope needs to be shipped to another location, or returned to Orion for warranty repair, having the proper shipping boxes and protective materials inside will help ensure that your telescope will survive the journey intact.

Make sure all the items in the Parts List below are present. Be sure to check boxes carefully, as some parts are small. If anything appears to be missing or broken, immediately call Orion Customer Support (800-676-1343) for assistance.

WARNING: ***Never look directly at the Sun with the naked eye or with a telescope – unless you have a proper solar filter installed over the front of the telescope! Otherwise, permanent, irreversible eye damage may result.***

Parts List

Part	Description
A	Front brace
B	Left panel
B	Right panel
C	Top baseplate (round)
D	Bottom baseplate (triangle)
E	Base assembly screw (x12)
F	Large hex-head bolt with two washers, T-nut and lock nut
G	Phillips-head machine screw (x2)
H	Spring post (x4)
I	Bolt with rosette knob (x2)
J	Spring coil (x2)
K	Handle
L	Hex nut (x2)
M	Socket-head cap screw (x2)
N	Washer (x2)
O	Pull loops
P	Hex key (6mm)
Q	Hex key (4mm)
R	Hex key (2mm)
S	14mm Crescent wrench
T	17mm Crescent wrench (x2)
U	25mm Plössl eyepiece, 1.25"
V	Red dot scope (with bracket)
W	Dust cover
X	Optical tube assembly
Y	Plastic bushing
Z	T-nut
AA	Bumper pad
BB	10mm Plossl, 1.25” (BB1), 25mm WA, 2” (BB2), 2x Barlow (BB3)
-	Orion MoonMap 260 (not pictured)
-	Orion DeepMap 600 (not pictured)
-	Smartphone Photo Adapter (not pictured)

2. Assembly

Now that you have unpacked the boxes and familiarized yourself with all the parts in front of you, it’s time to begin assembly. The optics of the telescope are already installed in the tube, so most of the required assembly concerns the Dobsonian base.

Assembly of the Dobsonian Base

Refer to **Figure 1A** and **1B** during base assembly. The base need only be assembled once, unless you disassemble it for long-term storage. The assembly process takes about 30 minutes and requires a Phillips screwdriver, the included crescent wrenches, and the included hex keys.

Note: When tightening the base assembly screws, tighten them until firm, but be careful not to strip the holes by over-

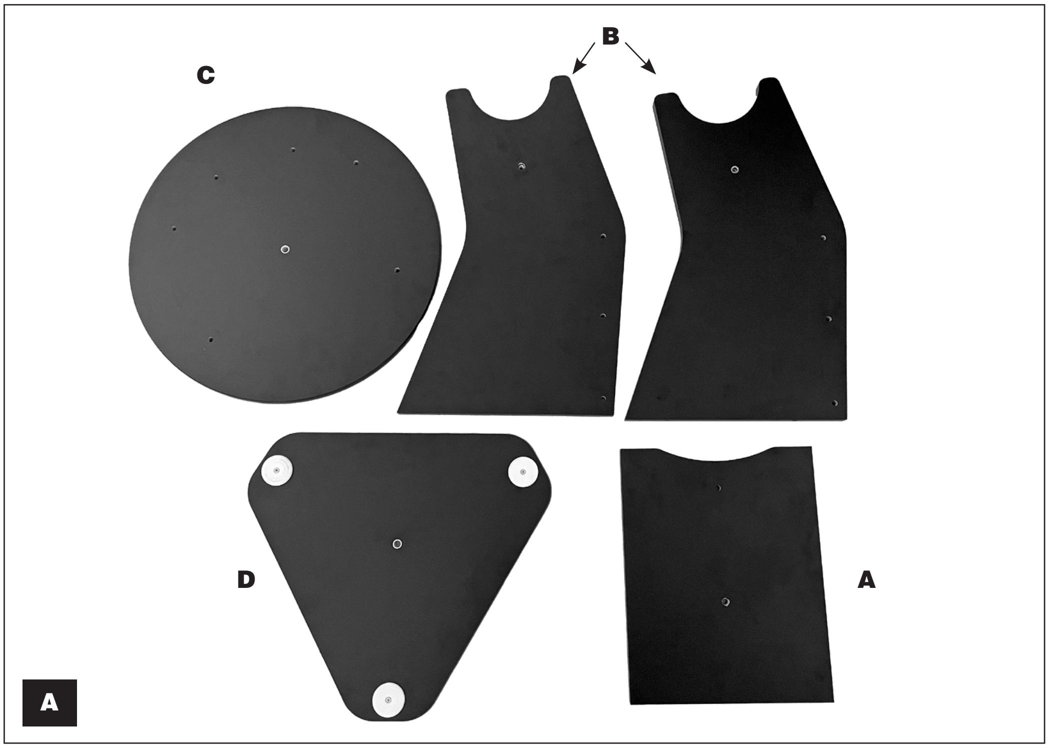

Figure 1. A) Main base components **B**) Parts of the SkyQuest XT Classic Dobsonian (XT8 pictured)

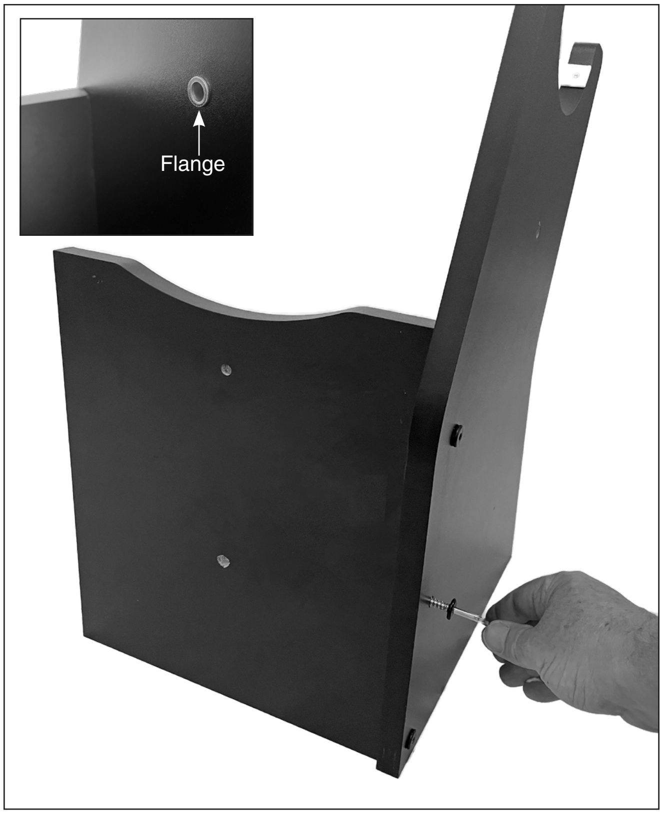

Figure 2. Attach the side panels to the front brace using six of the provided assembly wood screws and the 4mm hex key. INSET: Make sure the flange of the threaded insert on the side panels is facing inward.

Figure 3. Invert the base assembly you've built so far and attach the top baseplate using assembly wood screws and the 4mm hex key.

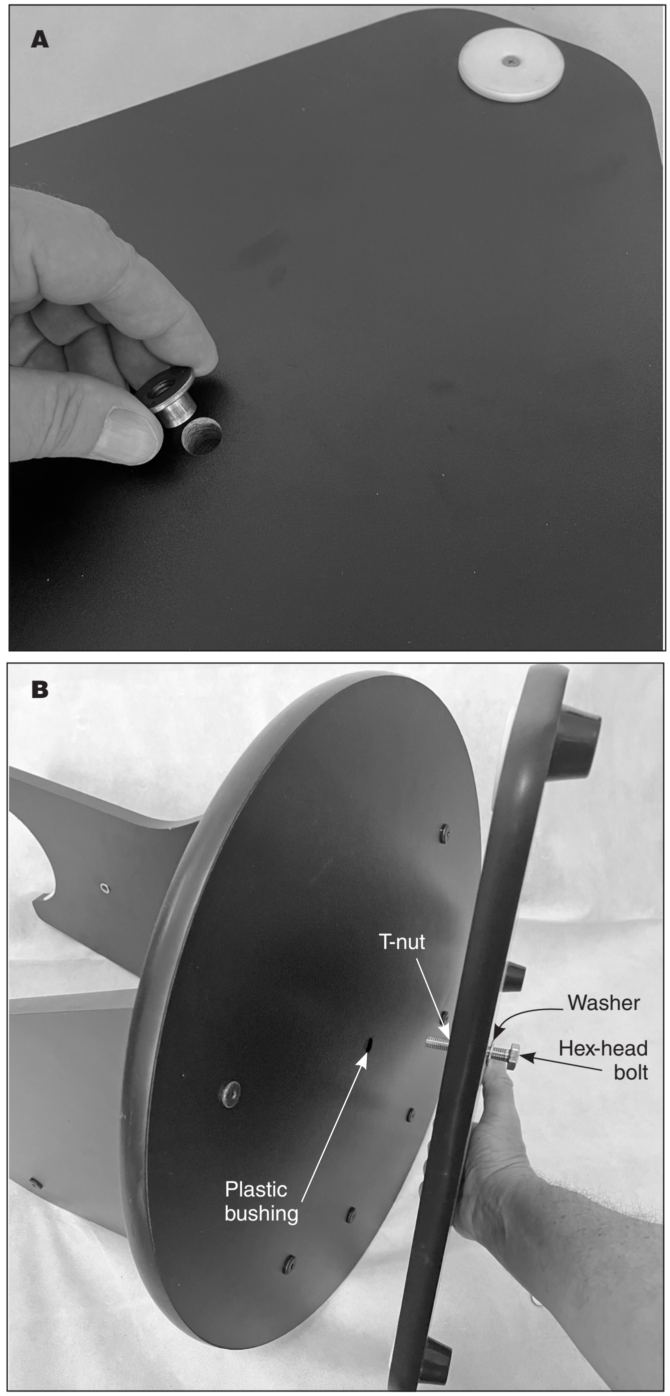

Figure 4. A) Insert the T-nut into the center hole of the bottom baseplate; insert it from the top of the baseplate as shown. **B**) With the hex-head bolt threaded into the T-nut, attach the bottom baseplate to the top baseplate.

tightening. If you use an electric screwdriver, do the final tightening with a standard screwdriver to avoid stripping.

1. Loosely attach the front brace (A) to the two side panels (B) with six of the base assembly screws (E) in the predrilled holes (**Figure 2**). Use the 4mm hex key (Q) to tighten the screws. The side panels should be oriented

Figure 5. Once the bolt is inserted through the groundplate and top baseplate, place the second washer on the bolt and then thread on the lock nut. Use the two 17mm crescent wrenches to lightly tighten the nut.

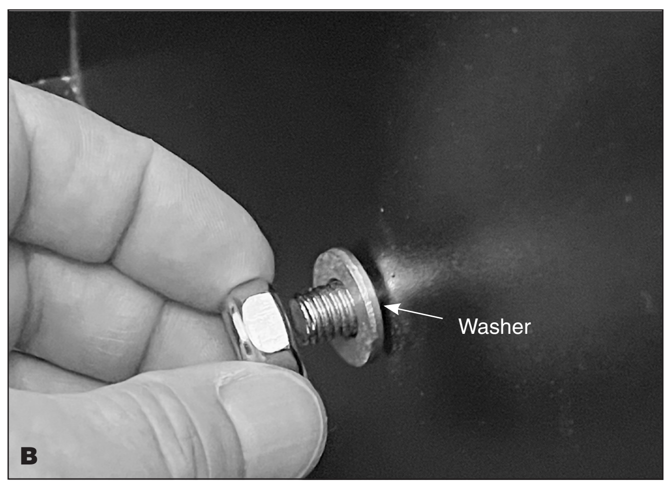

Figure 6. Attach the handle to the front brace of the base (**A**) with the two socket head cap screws, washers, and hex nuts as shown in (**B**). Use the 14mm crescent wrench and 6mm hex key to tighten the nuts.

so the flange of the threaded insert is facing inward (see **Figure 2** inset). And the front panel should be oriented so the felt pad at bottom is facing inward. Do not completely tighten the screws yet.

2. Now turn the side panel assembly upside-down and stand it up as shown in **Figure 3**. Attach the top baseplate (C) to the assembly with the remaining six base assembly screws in the predrilled holes. Tighten all six screws.
3. Tighten the six side panel screws installed earlier.
4. Place the T-nut (Z) into the center hole of the bottom (triangular) baseplate (D). Insert it from the top side, which is the side with the three white azimuth bearing pads. (**Figure 4A**).
5. Lay the base assembly on the floor as shown in **Figure 4B.** Next, insert the plastic bushing (Y) into the hole in the center of the top baseplate.
6. Thread the hex-head bolt (F) with a washer attached up through the bottom baseplate from below (the side with the feet), threading it into the T-nut all the way until tight. (Note that **4B** shows the bolt before it has been threaded in all the way.) Then align the bolt with the center hole in the top baseplate and insert the bolt through the hole. Thread the remaining washer and lock nut onto the end of the bolt. You won't be able to turn the lock nut very far with your fingers – you just want to get it started.
7. Next, use the two provided 17mm crescent wrenches (T) to lightly tighten the two baseplates together. Use one crescent wrench on the bolt's head (under the bottom baseplate) and one wrench on the lock nut, as shown in **Figure 5**. Tighten the lock nut with the wrench just until the white plastic pads on the bottom baseplate contact the top baseplate. The bottom baseplate should be able to freely rotate; if the lock nut is too tight the rotation becomes stiff or difficult. You may have to stand the base upright on its feet and try rotating it to gauge whether it rotates smoothly, without too much friction. If needed you

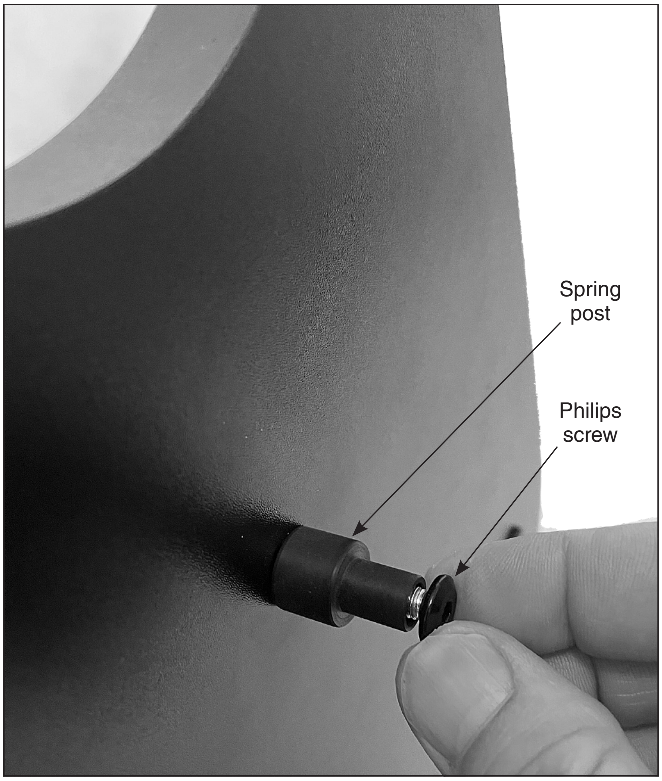

Figure 7. Attach one spring post on each side panel with the included truss head Phillips machine screw.

can lay the base on its side again and use the wrenches to adjust the lock nut further.

8. Attach the handle (K) to the front brace with the two socket-head cap screws (M). Insert the screws through the handle and into the predrilled holes in the front panel (**Figure 6A**). Place a washer (N) on the protruding end of each screw, then thread on a hex nut (L) (**Figure 6B**).

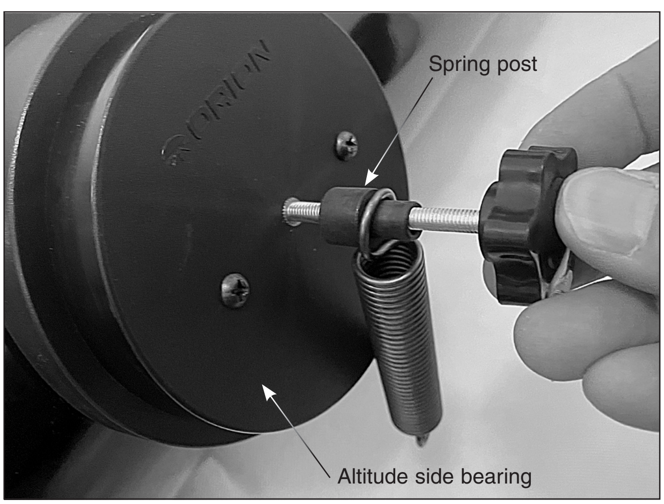

Figure 8. Slide a spring then a plastic spring post onto the long bolts with the rosette knobs on them. Make sure the narrow end of the spring post is closest to the rosette knob. Then thread the bolt into the center of the altitude bearing on the tube assembly.

Figure 9. Lift the tube assembly and place the side bearings into the "cradle" at the top of the base's side panels.

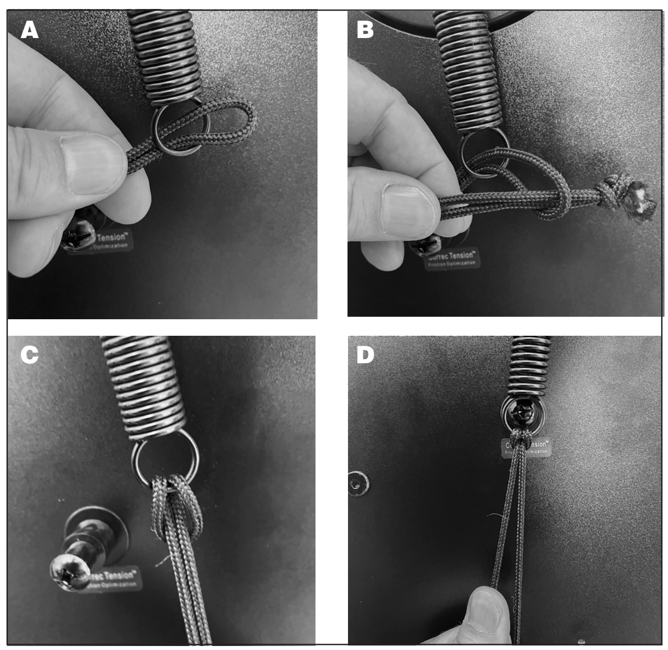

Figure 10. Attach a pull loop to the end ring of the springs as shown in **A** through **C**. Then grip the pull loop and pull down on the spring (**D**) until you can place the spring's end ring over the screw head and onto the narrow part of the spring post. Then release the pull loop.

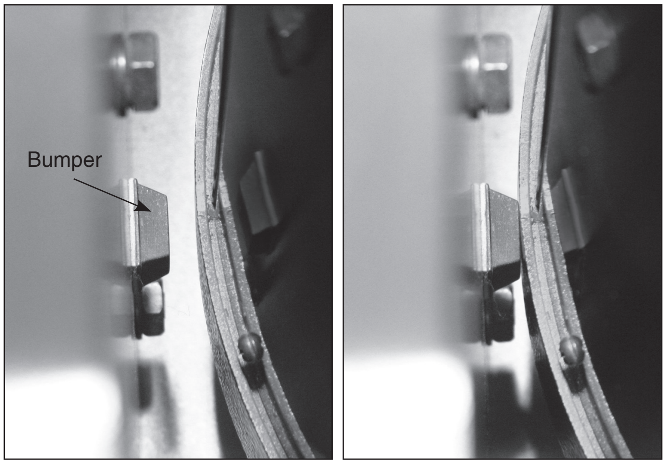

Figure 11. Remove the adhesive backing from the bumper pad and place it on the inside of the front brace where the bottom end of the optical tube makes contact. The bumper will cushion such contact when the telescope is in use.

Figure 12. Slide the red dot scope's bracket into the dovetail base, then secure it with the thumbscrew.

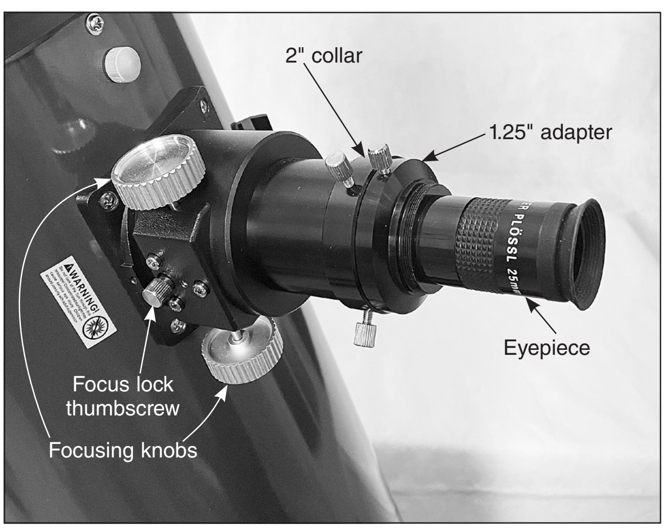

Figure 13. The 2" Crayford focuser of the SkyQuest XT Classic Dobsonian is shown with the 1.25" eyepiece installed.

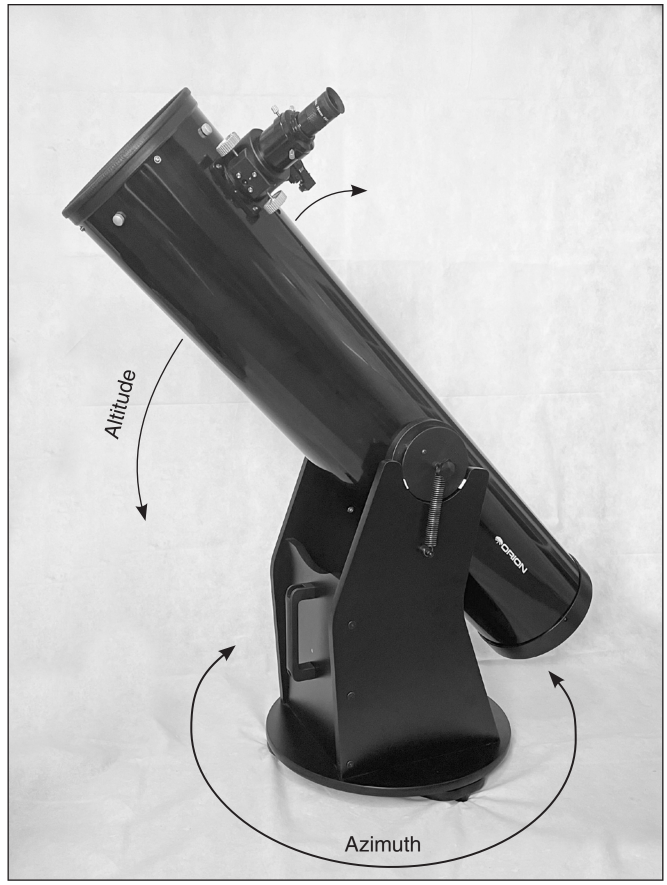

Figure 14. The SkyQuest XT Classic has two axes of motion: altitude (up/ down) and azimuth (left/right).

Tighten the nut with the provided 14mm crescent wrench (S) while holding the bolt stationary with the 6mm hex key (P).

9. On each of the base's side panels, install a plastic spring post (H) as shown (**Figure 7**). Thread the Philips-head screw (G) into the threaded metal insert in the hole and tighten. Make sure the thick part of the post is closest to the side panel, as shown.
10. Next, insert one of the long screws with a rosette knob attached through the end ring of one of the springs (J). Slip a spring post onto the screw. Orient the spring post so the narrow end is closest to the knob (I). Thread the entire assembly into the hole in the center of the telescope's altitude side bearing until tight (**Figure 8**). The end ring of the spring should seat onto the narrow end of the spacer. Repeat this procedure for the other altitude side bearing.
11. Now lift the optical tube (X) and set the altitude bearings on either side of the tube in the "cradles" of the side panels (**Figure 9**).
12. Attach a pull loop (O) to the free end of each spring. To do this, first feed the loop through the end ring (**Figure 10A**), then insert the opposite end of the pull loop through the loop (**10B**). Finally, pull it taught; it should look like **Figure 10C**.

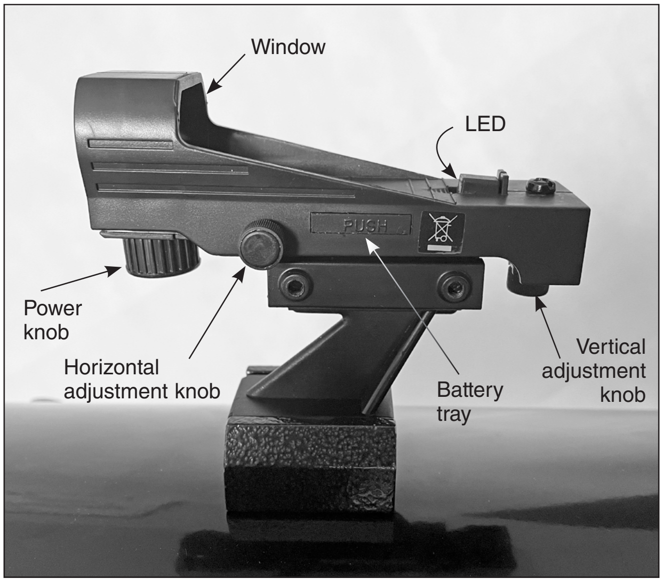

Figure 15. The red dot scope superimposes an adjustable-brightness red dot on the sky that shows exactly where the telescope is pointed.

13. Now, pull each spring down using the pull loop, and position the spring's end ring over the head of the Phillips screw (installed in Step 9) and onto the narrow part of the spring post, as shown in **Figure 10D**. You needn't attach both springs simultaneously; one at a time is fine.
14. Now apply the adhesive bumper pad (AA) to the inside surface of the front brace, right where the bottom end ring of the optical tube contacts the front brace (when the tube is rotated just past vertical orientation). (See **Figure 11**.) Peel the backing off the bumper pad to expose the adhesive.

The telescope is now mounted on the base and the CorrecTension spring system is engaged. If you wish to remove the telescope from the base, you will first need to unhook the springs from the spring posts on the Dobsonian base. The springs will remain captive on the altitude side bearings, so they will not get lost

Installing the Red Dot Scope

To install the red dot scope (V) simply slide its dovetail mounting bracket into the telescope's dovetail base, then tighten the thumbscrew on the base to secure the mounting bracket (**Figure 12**).

Remove the plastic tab sticking out from the battery compartment and discard it. This allows the electronic circuit of the red dot scope to receive power from the installed 3V battery.

Inserting an Eyepiece

The final step in the assembly process is to insert an eyepiece into the telescope's focuser. Take the cover cap off the end of the focuser drawtube. To insert the included 1.25" eyepiece (T or BB1), loosen the thumbscrew on the 1.25" adapter itself (it's the thumbscrew closest to the eyepiece). Insert the eyepiece into the adapter and secure it by tightening the thumbscrew (**Figure 13**).

The assembly of your SkyQuest XT Classic Dobsonian is now complete. The dust cover (W) on the front of the telescope should always remain in place when the telescope is not in use. It is also a good idea to store eyepieces in an eyepiece case and to replace the cap on the focuser when the telescope is idle.

3. Using Your Telescope

It is best to get a feel for the basic functions of the SkyQuest XT Classic Dobsonian during the day, before observing astronomical objects at night. This way you will not have to fumble around trying to orient yourself in the dark! Find a spot outdoors where you have plenty of room to move around the telescope, and where you have a clear view of some object or vista that is at least 1/4-mile away. It is not critical that the base be exactly level, but it should be placed on somewhat flat ground or pavement to ensure smooth movement of the telescope.

Remember, never point the telescope at or near the Sun without using a proper solar filter over the front aperture! Permanent eye damage could result.

Altitude and Azimuth Motions

The Dobsonian base of the SkyQuest XT Classic permits motion of the telescope along two axes: altitude (up/down) and azimuth (left/right) (**Figure 14**). Simply take hold of the top end of the tube and move it left or right so the base rotates about its central azimuth bolt, and move it up or down so the altitude side bearings rotate in the base's cradle. Both motions can be made simultaneously and in a continuous manner for easy aiming. Move the telescope gently—let it glide. In this way you can point the telescope to any position in the night sky, from horizon to horizon.

When you're observing an astronomical object, it will drift across the eyepiece's field of view over time due to the Earth's rotation. Before it drifts out of the field of view, just grasp the front of the telescope and give it a gentle pull or nudge to re-center the object in the eyepiece.

Focusing the Telescope

SkyQuest XT Classic Dobsonians come equipped with a 2" dual-speed Crayford focuser (**Figure 13**). The large 2" format focuser allows use of 2" or 1.25" eyepieces and the Crayford design prevents imaging shifting while focusing.

To insert a 1.25" eyepiece, first remove the cap from the 1.25" adapter. Loosen the thumbscrew on the 1.25" adapter, then insert the eyepiece into the adapter and secure it by tightening the thumbscrew.

To insert a 2" eyepiece, first loosen the three thumbscrews on the 2" accessory collar and remove the 1.25" adapter from the collar. Then insert the 2" eyepiece barrel into the 2" collar all the way. Retighten the three thumbscrews.

To focus, move the telescope so the front (open) end is pointing in the general direction of an object at least 1/4-mile away. Now, with your fingers, slowly rotate one of the focusing knobs (see **Figure 13**) until the object comes into sharp focus. Go a little bit beyond sharp focus until the image just starts to blur again, then reverse the rotation of the knob, just to make sure you've hit the exact focus point.

If you have trouble focusing, rotate the focuser knob so the drawtube is in as far as it will go. Now look through the eyepiece while slowly rotating the focus knob in the opposite direction. You should soon see the point at which focus is reached.

On the underside of the focuser is a large thumbscrew (see **Figure 13**). It can be tightened to lock the drawtube once you've achieved focus, if desired. This is not normally necessary, though, unless you're using an unusually heavy eyepiece with perhaps a Barlow lens and their weight causes the drawtube to slip downward. The locking thumbscrew could prevent any such slippage.

Note: *The image in your Dobsonian reflector will appear rotated, or upside down. This is normal for reflector telescopes and is why* ***reflectors are not recommended for daytime terrestrial viewing****.*

Aligning and Using the Red Dot Finder Scope

The red dot finder scope (**Figure 15**) makes pointing your telescope almost as easy as pointing your finger! It's a non-magnifying aiming device that superimposes a tiny LED red dot on the sky, showing exactly where the telescope is pointed. It permits easy object targeting prior to observation in the main telescope.

Before you can use the red dot finder scope, you must remove the plastic tab sticking out from the battery tray. Doing so will allow the pre-installed 3V CR-2032 button cell battery to make contact with the finder scope's electronic circuitry to power the finder's red LED illuminator. The tab can then be discarded.

To use the red dot finder scope properly, it must be aligned with the main telescope. This is easiest to do during daylight hours, before observing at night. Follow this procedure:

Aligning the Red Dot Finder Scope

1. Center a target that's at least ¼ mile away in the main telescope's eyepiece. It could be a house chimney or the top of a distant telephone pole, for example. Now turn on the red dot finder scope by rotating the power knob so that it clicks ON (refer to **Figure 15**). The dot increases in brightness as you rotate the knob. Typically a dimmer setting is used under dark skies and a brighter setting is used under light-polluted skies or in daylight. Position your eye at a comfortable distance from the rear of the red dot scope. Look through the rear of the finder scope with both eyes open to see the illuminated red dot. The target object should appear in the field of view somewhere near the red dot.
2. You'll want to center the target object on the red dot. To do so, without moving the telescope, use the finder scope's vertical and horizontal adjustment knobs (shown in **Figure 15**) to position the red dot on the object.
3. When the red dot is centered on the distant object, check to make sure the object is still centered in the telescope's eyepiece. If it isn't, re-center it then adjust the finder scope's alignment again. When the object is centered in the telescope eyepiece and on the finder scope's red dot, the finder scope is properly aligned with the telescope. The red dot finder scope's alignment should be checked before every observing session.

At the end of your observing session, be sure to turn the power knob on red dot finder scope OFF (hear the click) to preserve battery life.

Once aligned, the red dot scope will usually hold its alignment even after being removed and reattached. Otherwise, only minimal realignment will be needed.

Replacing the Battery

Should the red dot finder scope's battery ever die, replacement 3-volt CR2032 lithium batteries are available from many retail outlets. Push the battery tray out with your fingertip from the side labeled "PUSH," then pull it the rest of the way out from the other side. Remove the old battery and replace it with a fresh one, positive (+) side facing up. Then slide the battery tray back in by pushing the side of the tray labeled "BATTERY" into the slot.

Aiming/Pointing the Telescope

Now that the red dot finder scope is aligned, the telescope can be quickly and accurately pointed at anything you wish to observe. It has a much wider field of view than the telescope's eyepiece, and therefore it is much easier to first center an object in the red dot finder scope. Then the object will also be centered in the telescope's field of view.

Start by once again moving the telescope until it is pointed in the general direction of the object you want to see. Some observers find it convenient to sight along the tube to do this. Now, look in the red dot scope. If your general aim is accurate, the object should appear somewhere in the red dot scope's field of view. Make small adjustments to the telescope's position until the object is centered on the red dot. Now, look in the telescope's eyepiece and enjoy the view!

Determining Magnification

Magnification, or power, is determined by the focal length of the telescope and the focal length of the eyepiece. By using eyepieces of different focal lengths, the resultant magnification can be varied.

Magnification is calculated as follows:

$$\frac{\textbf{Telescope Focal Length (mm)}}{\textbf{Eyepiece Focal Length (mm)}} = \textbf{Magnification}$$

For example, to calculate the magnification of the XT8 Classic Dobsonian with the supplied 25mm eyepiece, divide the focal length of 1219mm by 25mm:

$$\frac{\textbf{1219mm}}{\textbf{25mm}} = \textbf{48.8} \sim \textbf{49x}$$

Other 1.25" telescope eyepieces of different focal lengths can be purchased to achieve higher or lower powers. It is quite common for an observer to own five or more eyepieces to access a wide range of magnifications.

Once you've centered the object in the eyepiece, you can switch to higher magnification (using an optional shorter focal length eyepiece), if you wish. This is especially recommended for small and bright objects, like planets and double stars. The Moon also takes higher magnifications well.

Deep-sky objects, however, typically look better at medium or low magnifications. This is because many of them are quite faint, yet have some extent (apparent width). Deep-sky objects will often disappear at higher magnifications, since greater magnification inherently yields dimmer images. This is not the case for all deep-sky objects, however. Many galaxies are quite small, yet are somewhat bright, so higher power may show more detail.

The best rule of thumb with eyepiece selection is to start with a low power, wide field, and then work your way up in magnification. If the object looks better, try an even higher magnification. If the object looks worse, then back off the magnification a little by using a lower-power eyepiece.

Extra Accessories with the SkyQuest XT8 Limited Edition!

The #8967 SkyQuest XT8 Limited Edition Dobsonian comes with extra accessories that are not included with the standard SkyQuest XT Dobsonians:

- Instead of a 1.25” 25mm Plossl eyepiece, the Special Edition includes a 2” 25mm Wide-Angle (WA) eyepiece (BB2 in **Figure 1B**), which boasts a 70-degree field of view. Its barrel is threaded to accept Orion 2” filters.
- A 10mm Plossl eyepiece, 1.25” (BB1), for higher-power views. Its barrel is threaded to accept Orion 1.25” filters.
- A 2x Barlow lens, 1.25” (BB3), which doubles the magnifying power of any 1.25” eyepiece it is used with. The Barlow lens is inserted into the focuser, and the 1.25” eyepiece is then secured in the Barlow lens.

These terrific accessories will increase the versatility of your telescope, giving you more options for enhancing your observing experience!

Magnification Limits

Every telescope has a theoretical magnification limit of about 2x per millimeter of aperture. This comes to 410x for the SkyQuest XT8 Classic and 304x for the SkyQuest XT6 Classic for example. But maximum magnifications are achieved only under the most ideal viewing conditions at the best observing sites. Most of the time, the highest practical magnification will be 200x or less, regardless of aperture. This is because the Earth’s atmosphere distorts light as it passes through. On nights of good “seeing,” the atmosphere will be still and will yield the least amount of distortion. On nights of poor seeing, the atmosphere will be turbulent, which means different densities of air are rapidly mixing. This causes significant distortion of the incoming light, which prevents sharp views at high magnifications.

Some telescope manufacturers will use misleading claims of excess magnification, such as “See distant galaxies at 640X!” While such magnifications are technically possible, the actual image at that magnification would be an indistinct blur. Low and moderate magnifications are typically what give the best views. A small, but bright and detailed image is always better than a dim, unclear, over-magnified one.

Tube Balance

Dobsonians are designed to balance with standard supplied accessories, such as an eyepiece and red dot finder scope. But what if you want to use a larger finder scope or a heavier eyepiece? The telescope will no longer be properly balanced, and will not hold its position properly. This makes the telescope difficult to use, since it is critical that it hold its position (when not purposefully moved) to keep objects centered in the field of vision.

Traditional Dobsonian designs expect the user to compensate for heavier accessories by adding weight to the opposite end of the telescope tube. Such counterweighting systems can be expensive and unwieldy. The CorrecTension Friction Optimization system of the SkyQuest XT Classic Dobsonians, however, solves the finicky balance problem. The spring coils pull the tube down onto the base, thereby increasing the friction on the altitude bearing pads. With CorrecTension, the added weight of small front-end loads will not adversely affect the balance of the telescope.

If you install an array of heavier accessories onto your SkyQuest’s optical tube, you may need at some point to counterbalance the telescope with a counterweight system.

Carrying the Telescope

Because the springs of the CorrecTension system hold the optical tube captive on the base, the entire telescope can be carried as one unit. This requires some caution, however. If the telescope is lifted improperly, the front of the tube could swing down and hit the ground.

First, point the optical tube straight up (vertical). Grasp the handle on the front of the base with one hand while supporting the telescope tube vertically with the other. Now, lift the telescope from the handle. Once the telescope is in the horizontal position, you can carry the entire unit with one hand.

If you wish to carry the optical tube and base separately, simply disengage the CorrecTension springs by unhooking them from the posts on the base, using the pull loops. The springs remain captive on the telescope side bearings. Now the base and tube are disengaged and can be transported separately.

Note: The SkyQuest XT Classic may be too heavy for some users to lift and carry as one unit. Do not strain yourself! If the load seems too heavy, disengage the springs and carry the base and tube separately. Because of its bulk and weight, we do not recommend carrying the XT10 model as one unit. Remove the XT10 optical tube from the base and carry them separately.

When putting the telescope into a vehicle, common sense prevails. It is especially important that the optical tube does not knock around; this can cause the optics to become misaligned, and could dent the tube. We recommend transporting and storing the tube assembly in a padded case for proper protection.

4. Astronomical Observing

For many, this will be your first foray into the exciting world of amateur astronomy. The following information and observing tips will help get you started.

Choosing an Observing Site

When selecting a location for observing, get as far away as possible from direct artificial light such as street lights, porch lights, and automobile headlights. The glare from these lights will greatly impair your dark-adapted night vision. Set up on a grass or dirt surface, not asphalt, because asphalt radiates more heat. Heat disturbs the surrounding air and degrades the images seen through the telescope. Avoid viewing over rooftops and chimneys, as they often have warm air currents rising from them. Similarly, avoid observing from indoors through an open (or closed) window, because the temperature difference between the indoor and outdoor air will cause image blurring and distortion.

If at all possible, escape the light-polluted city sky and head for darker country skies. You'll be amazed at how many more stars and deep-sky objects are visible in a dark sky!

"Seeing" and Transparency

Atmospheric conditions vary significantly from night to night. "Seeing" refers to the steadiness of the Earth's atmosphere at a given time. In conditions of poor seeing, atmospheric turbulence causes objects viewed through the telescope to "boil." If you look up at the sky and stars are twinkling noticeably, the seeing is poor and you will be limited to viewing at lower magnifications. At higher magnifications, images will not focus clearly. Fine details on the planets and Moon will likely not be visible.

In conditions of good seeing, star twinkling is minimal and images appear steady in the eyepiece. Seeing is best overhead, worst at the horizon. Also, seeing generally gets better after midnight, when much of the heat absorbed by the Earth during the day has radiated off into space.

Especially important for observing faint objects is good "transparency"—air free of moisture, smoke, and dust. All tend to scatter light, which reduces an object's brightness. Transparency is judged by the magnitude of the faintest stars you can see with the unaided eye (5th or 6th magnitude is desirable).

Cooling the Telescope

All optical instruments need time to reach "thermal equilibrium." The bigger the instrument and the larger the temperature change, the more time is needed. Allow at least 30 minutes for your telescope to acclimate to the temperature outdoors before you start observing with it.

Let Your Eyes Dark-Adapt

Don't expect to go from a lighted house into the darkness of the outdoors at night and immediately see faint nebulas, galaxies, and star clusters—or even very many stars, for that matter. Your eyes take about 30 minutes to reach perhaps 80% of their full dark-adapted sensitivity. As your eyes become dark-adapted, more stars will glimmer into view and you'll be able to see fainter details in objects you view in your telescope.

To see what you're doing in the darkness, use a red-filtered flashlight rather than a white light. Red light does not spoil your eyes' dark adaptation like white light does. A flashlight with a red LED light is ideal. Beware, too, that nearby porch, streetlights, and car headlights will ruin your night vision.

What to Expect

So what will you see with your telescope? You should be able to see bands on Jupiter, the rings of Saturn, craters on the Moon, the waxing and waning of Venus, and many bright deep-sky objects. Do not expect to see color as you do in NASA photos, since those are taken with long-exposure cameras and have "false color" added. Our eyes are not sensitive enough to see color in deep-sky objects except in a few of the brightest ones. But as you become more experienced and your observing skills get sharper, you will be able to ferret out more and more subtle details and structure.

Objects to Observe

Now that you are all set up and ready to go, what is there to look at in the night sky?

A. The Moon

With its rocky surface, the Moon is one of the easiest and most interesting objects to view with your telescope. Lunar craters, maria, and even mountain ranges can all be clearly seen from a distance of 238,000 miles away! With its ever-changing phases, you'll get a new view of the Moon every night. The best time to observe our one and only natural satellite is during a partial phase, that is, when the Moon is not full. During partial phases, shadows are cast on the surface, which reveal more detail, especially right along the border between the dark and light portions of the disk (called the "terminator"). A full Moon is too bright and devoid of surface shadows to yield a pleasing view. Make sure to observe the Moon when it is well above the horizon to get the sharpest images.

Use an optional Moon filter to dim the Moon when it is very bright. It simply threads onto the bottom of the eyepieces (you must first remove the eyepiece from the focuser to attach a filter). You'll find that the Moon filter improves viewing comfort, and helps to bring out subtle features on the lunar surface.

B. The Planets

The planets don't stay put like the stars, so to find them you should refer to Sky Calendar at our website OrionTelescopes.com. Venus, Mars, Jupiter, and Saturn are the brightest objects in the sky after the Sun and the Moon. Your telescope is capable of showing you these planets in some detail. Other planets may be visible but will likely appear star-like. Because planets are quite small in apparent size, optional higher power eyepieces and a Barlow lens are recommended and often required for detailed observations. Not all the planets are usually visible at any one time.

Jupiter: The largest planet, Jupiter, is a great subject for observation. You can see the disk of the giant planet and watch the ever-changing positions of its four largest moons: Io, Callisto, Europa, and Ganymede. Higher power eyepieces should bring out the cloud bands on the planet's disk.

Saturn: The ringed planet is a breathtaking sight. The tilt angle of the rings varies over a period of many years; sometimes they are seen edge-on, while at other times they are broadside and look like giant "ears" on each side of Saturn's disk. A steady atmosphere (good seeing conditions) is necessary for a good view. Look closely and you may see the Cassini division, a thin, dark gap in the rings. You should also see one or more of Saturn's moons, which look like faint nearby stars. The brightest is the moon Titan.

Venus: At its brightest, Venus is the most luminous object in the sky, excluding the Sun and the Moon. It is so bright that sometimes it is visible to the naked eye during full daylight! Ironically, Venus appears as a thin crescent, not a full disk, when at its peak brightness. Because it is so close to the Sun, it never wanders too far from the morning or evening horizon. No surface markings can be seen on Venus, which is always shrouded in dense clouds.

Mars: The Red Planet makes a close approach to Earth every two years. Observing Mars is most favorable at these times. You should see a salmon-colored disk with some distinct dark patches, and you may be able to spot a whitish polar ice cap. To see surface detail on Mars, you will need a high power eyepiece and very steady air!

C. The Sun

You can change your nighttime telescope into a daytime Sun viewer by installing an optional full-aperture solar filter over the front opening of the telescope. The primary attraction is sunspots, which change shape, appearance, and location daily. Sunspots are directly related to magnetic activity in the Sun. Many observers like to make drawings of sunspots to monitor how the Sun is changing from day to day.

Important Note: Do not look at the Sun with any optical instrument without a professionally made solar filter placed over the front aperture of your telescope, or permanent eye damage could result.

D. The Stars

Stars will appear like twinkling points of light. Even powerful telescopes cannot magnify stars to appear as more than a point of light. You can, however, enjoy the different colors of the stars and locate many pretty double and multiple stars. The famous "Double-Double" in the constellation Lyra and the gorgeous two-color double star Albireo in Cygnus are favorites. Defocusing a star slightly can help bring out its color.

E. Deep-Sky Objects

Under dark skies, you can observe a wealth of fascinating deep-sky objects, including gaseous nebulas, open and globular star clusters, and different types of galaxies. Most deep-sky objects are very faint, so it is important you find an observing site well away from light pollution.

To find deep-sky objects with your telescope, you first need to become reasonably familiar with the night sky. Unless you know how to recognize the constellation Orion, for instance, you won't have much luck locating the Orion Nebula. A simple planisphere, or star wheel, can be a valuable tool for learning the constellations and seeing which ones are visible in the sky on a given night. Once you have identified a few constellations, a good star chart, atlas, or astronomy app will come in handy for helping locate interesting deep-sky objects to view within the constellations.

5. Collimation of the Optics

Collimation is the process of adjusting the optics of a telescope so they are precisely aligned with one another and with the telescope tube. For this Dobsonian telescope, the primary and secondary mirrors must be in precise alignment. Your telescope's optics were aligned at the factory, and should not need much adjustment unless the telescope is handled roughly. Accurate mirror alignment is important to ensure the sharpest possible images viewed through your telescope, so it should be checked occasionally. With practice, collimating is relatively easy to do and can be done in daylight.

It helps to perform the collimation procedure in a brightly lit room with the telescope pointed toward a bright surface, such as a light-colored wall. The telescope tube should be oriented horizontally (parallel to the ground). Placing a piece of white paper in the telescope tube opposite the focuser (i.e., on the other side of the secondary mirror from the focuser) will also be helpful (see **Figure 16**). You will need the included 2mm hex key (R) to perform the collimation.

To check your telescope's collimation, remove the eyepiece and look down the focuser. You should see the secondary mirror centered in the focuser, as well as the reflection of the primary mirror centered in the secondary mirror, and the reflection of the secondary mirror (and your eye) centered in the reflection of the primary mirror, as in **Figure 17A**. Got all that? Review it again carefully, and compare what you see to **Figure 17**. If anything is off-center, proceed with the following collimation procedure.

Figure 16. Before collimating the telescope, place a piece of white paper inside the tube opposite the focuser, and position the optical tube in the horizontal position as shown.

Note: Precise collimation is best achieved by using an optional collimating tool, such as a quick-collimation cap, a Cheshire eyepiece, or a laser collimator. Check our website for available collimating tools. **Figures 17B** ***through*** **17D** ***assume that you have an optional Cheshire eyepiece or collimation cap in the focuser.***

Primary Mirror Center Mark

You may have noticed that your SkyQuest XT Classic Dobsonian has a small adhesive ring in the center of the primary mirror. This "center mark" allows you to achieve a very precise collimation of the primary mirror; you don't have to guess where the center of the mirror is, which is important in the collimation process. This center mark is especially useful when using an optional collimating device.

Note: The adhesive dot should not be removed from the primary mirror. Because it lies directly in the shadow of the secondary mirror, its presence in no way adversely affects the optical performance of the telescope or the image quality. That might seem counter-intuitive, but it's true! Leave it in place.

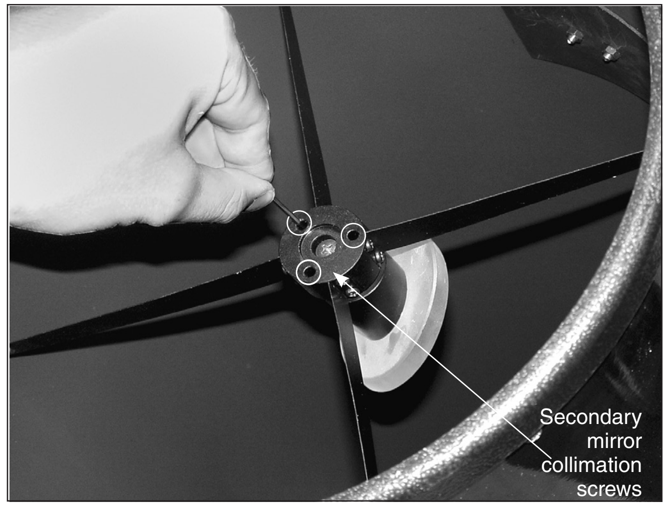

Figure 18. Secondary mirror collimation is performed using the three Phillips screws circled here on the secondary mirror holder.

Aligning the Secondary Mirror

Align the secondary mirror first. Look down the focuser at the secondary (diagonal) mirror. If the entire primary mirror reflection is not visible in the secondary mirror, as in **Figure 17B**, you will need to adjust the tilt of the secondary mirror. This is done by alternately loosening one of the three secondary mirror alignment screws then lightly tightening the other two (**Figure 18**), using the included 2mm hex key. Be sure to loosen a setscrew as the first step, followed by light tightening of the other(s). And turn the setscrews by only 1/8 turn or less at a given time as you make adjustments. The goal is to center the primary mirror reflection in the secondary mirror, as in **Figure 17C**. Don't worry that the reflection of the secondary mirror (the smallest circle) is off-center. You will fix that in the next step. It will take some trial and error to determine which screws to loosen and tighten to move the reflection of

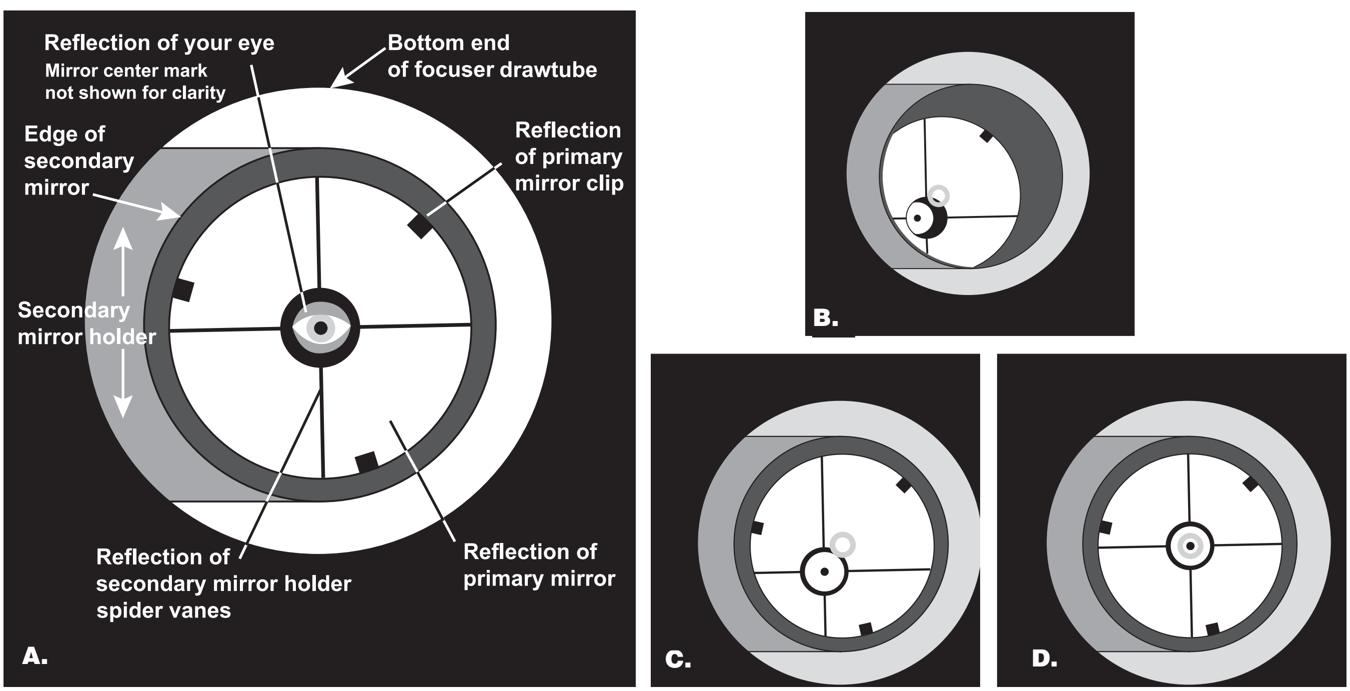

Figure 17. Collimating the optics. (**A**) When the mirrors are properly aligned, the view down the focuser drawtube should look like this. (**B**) Here, only part of the primary mirror is visible in the secondary mirror, so the secondary mirror needs to be adjusted (tilted). (**C**) Here the secondary mirror is correctly aligned because the entire primary mirror is visible in it. But the reflection of the secondary mirror is off-center. So the primary mirror still needs adjustment. (**D**) Now the primary mirror is correctly aligned, so the secondary mirror is centered.

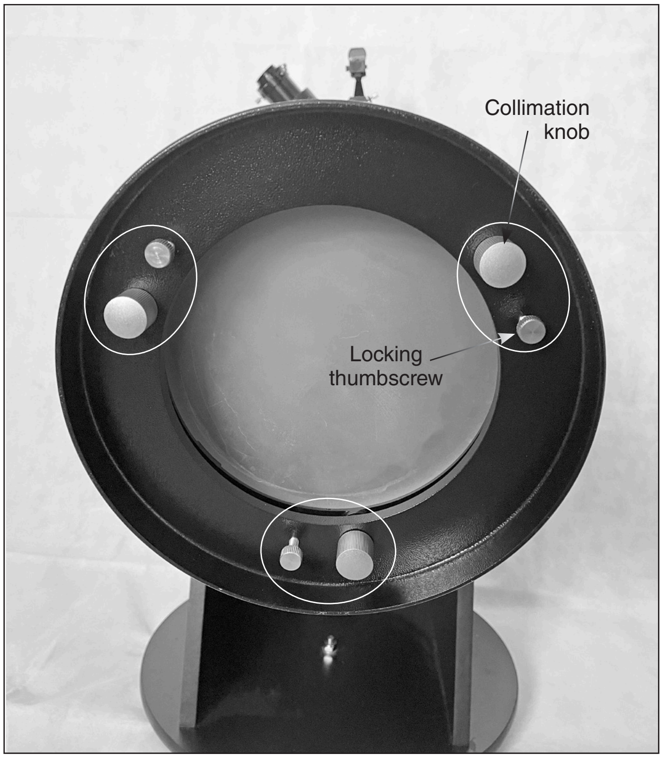

Figure 19. The optical tube's rear cell has three pairs of collimation screws. The large knobs are the spring-loaded collimation knobs while the smaller thumbscrews are the locking screws.

the primary mirror to the center of the secondary mirror. But be patient and you'll get it.

Aligning the Primary Mirror

The final adjustment is made to the primary mirror. It will need adjustment if, as in **Figure 17C**, the reflection of the primary mirror is centered in the secondary mirror, but the small reflection of the secondary mirror is off-center. The tilt of the primary mirror is adjusted using three spring-loaded collimation knobs and three smaller locking thumbscrews on the back end of the optical tube (**Figure 19**). First loosen the three locking thumbscrews a turn or so. Then tighten one of the collimation knobs about a quarter turn and see if the secondary mirror reflection has moved closer to the center of the primary. If it moved farther away then try loosening the same collimation knob a bit. Repeat this process on the other two sets of collimation screws, if necessary, adjusting them one way or the other and seeing if the secondary mirror reflection moves closer to the center of the primary mirror reflection. It will take a little trial and error to get a feel for how to tilt the mirror in this way. When the center hole in your collimating tool is centered as much as possible on the reflection of the adhesive dot on the primary mirror, your primary mirror is collimated. The view through the collimation cap should resemble **Figure 17D**. Then, very lightly tighten the three locking thumbscrews so that the primary mirror stays in that position. A simple star test will tell you whether the optics are accurately collimated.

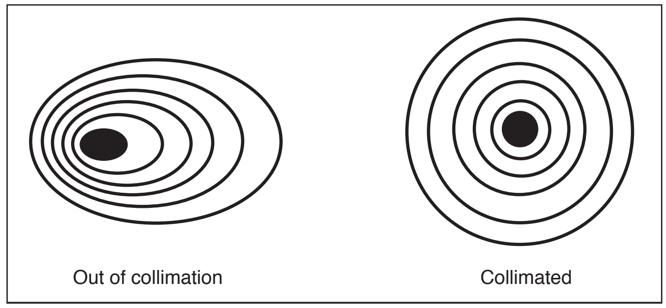

Figure 20. A star test will determine if the telescope's optics are properly collimated.

Star-Testing the Telescope

When it is dark, point the telescope at a bright star and accurately center it in the eyepiece's field of view. Slowly de-focus the image with the focusing knob. If the telescope is correctly collimated, the expanding disk should be a perfect circle (**Figure 20**). If the image is unsymmetrical, the scope is out of collimation. The dark shadow cast by the secondary mirror should appear in the very center of the out-of-focus circle, like the hole in a donut. If the "hole" appears off-center, the telescope is out of collimation. If you try the star test and the bright star you have selected is not accurately centered in the eyepiece, the optics will always appear out of collimation, even though they may be perfectly aligned. It is critical to keep the star centered, so over time you will need to make slight corrections to the telescope's position in order to account for the sky's apparent motion.

6. Care and Maintenance

If you give your telescope reasonable care, it will last a lifetime. Store it in a clean, dry, dust free place, safe from rapid changes in temperature and humidity. Do not store the telescope outdoors, although storage in a garage or shed is OK. Small components like eyepieces and other accessories should be kept in a protective box or storage case. Keep the caps on the front of the scope and on the focuser when it is not in use. For maximum protection during storage, we recommend placing the telescope in a case to prevent any dust and moisture from accumulating on exposed surfaces.

The telescope requires very little mechanical maintenance. The optical tube is made of steel and has a smooth painted finish that is fairly scratch-resistant. If a scratch does appear on the tube, it will not harm the telescope. If you wish, you may apply some auto touch-up paint to the scratch. Smudges on the tube can be wiped off with a soft cloth and a household cleaner.

Cleaning Lenses

Any quality optical lens cleaning tissue and optical lens cleaning fluid specifically designed for multi-coated optics can be used to clean the exposed lenses of your eyepieces. Never use regular glass cleaner or cleaning fluid designed for eyeglasses

Before cleaning with fluid and tissue, blow any loose particles off the lens with a blower bulb or compressed air. Then apply some cleaning fluid to a tissue, never directly on the optics. Wipe the lens gently in a circular motion, then remove any excess fluid with a fresh lens tissue. Oily fingerprints and smudges may be removed using this method. Use caution; rubbing too hard may scratch the lens. On larger lenses, clean only a small area at a time, using a fresh lens tissue on each area. Never reuse tissues.

Cleaning Mirrors

You should not have to clean the telescope's mirrors very often, if ever. Covering the telescope with the dust cover when it is not in use will help prevent dust from accumulating on the mirrors. Improper cleaning can scratch mirror coatings, so the fewer times you have to clean the mirrors, the better. Small specks of dust or flecks of paint have virtually no effect on the visual performance of the telescope.

The large primary mirror and the elliptical secondary mirror of your telescope are front-surface aluminized and overcoated with hard silicon dioxide, which prevents the aluminum from oxidizing.

To clean the secondary mirror, it must be removed from the telescope. Do this by holding the secondary mirror holder stationary with your fingers (don't touch the mirror itself) while unthreading the Phillips head screw in the center hub of the 4-vaned spider. Completely unthread the screw from the holder, and the holder will come loose in your fingers. Be careful not to lose the spring on the Phillips head screw.

Handle the mirror and its holder carefully. You do not need to remove the secondary mirror from its holder for cleaning. To clean the secondary mirror, follow the procedure described below for cleaning the primary mirror.

To clean the primary mirror, carefully remove the mirror cell from the telescope. To do this, you must remove the screws that connect the entire mirror cell to the steel tube. These screws are located on the outer edge of the mirror cell.

Now, remove the mirror from the mirror cell by removing the three mirror clips that secure the mirror in its cell. Use a Phillips head screwdriver to unthread the mirror clip anchor screws. Next, hold the mirror by its edge, and remove it from the mirror cell. Be careful not to touch the aluminized surface of the mirror with your fingers. Set the mirror on a clean, soft towel. Fill a clean sink, free of abrasive cleanser, with room-temperature water, a few drops of liquid dishwashing detergent, and if possible, a capful of rubbing alcohol. Submerge the mirror (aluminized face up) in the water and let it soak for several minutes (or hours if it is a very dirty mirror). Wipe the mirror underwater with clean cotton balls, using extremely light pressure and stroking in straight lines across the surface. Use one ball for each wipe across the mirror. Then rinse the mirror under a stream of lukewarm water. Any particles on the surface can be swabbed gently with a series of clean cotton balls, each used just one time. Dry the mirror in a stream of air (a "blower bulb" works great), or remove any stray drops of water with the corner of a paper towel. Water will run off a clean surface. Dry the bottom and the edges with a towel (not the mirror surface!). Cover the mirror surface with tissue, and leave the entire assembly in a warm area until it is completely dry before reassembling the telescope.

7. Specifications

SkyQuest XT6 Classic

Focal length:	1178mm
Aperture:	152mm
Focal ratio:	f/7.7
Focuser:	2" Crayford, with 1.25" adapter
Optical tube material:	Rolled steel
Mirror figure:	Paraboloid
Mirror coatings:	90% reflectivity, with SiO2 overcoat
Minor axis of secondary mirror:	37.5mm
Eyepiece:	25mm Plössl, fully multi-coated, 1.25"
Magnification with supplied eyepiece:	47x
Finder scope:	Red dot scope (LED)
Base handle:	Yes
Eyepiece height at zenith:	44.5"
Optical tube weight:	11 lbs., 14.3 oz.
Base weight:	19 lbs., 6 oz.
Tube length:	44.1"
Tube outer diameter:	7.3"

SkyQuest XT8 Classic

Focal length:	1219mm
Aperture:	205mm
Focal Ratio:	f/5.9
Focuser:	2" Crayford, with 1.25" adapter
Optical tube material:	Rolled steel
Mirror figure:	Paraboloid
Mirror coatings:	90% reflectivity, with SiO2 overcoat
Minor axis of secondary mirror:	46mm
Eyepiece:	25mm Plössl, fully multi-coated, 1.25"
Magnification with supplied eyepiece:	49x
Finder scope:	Red dot scope (LED)
Base handle:	Yes
Eyepiece height at zenith:	44.5"
Optical tube weight:	19 lbs., 15.5 oz.
Base weight:	18 lbs., 11 oz.
Tube length:	45.5"
Tube outer diameter:	10"

SkyQuest XT8 Classic, Limited Edition

Focal length:	1219mm
Aperture:	205mm
Focal ratio:	f/5.9
Focuser:	2” Crayford, with 1.25" adapter
Optical tube material:	Rolled steel
Mirror figure:	Paraboloid
Mirror coatings:	90% reflectivity, with SiO2 overcoat
Minor axis of secondary mirror:	46mm
Eyepieces:	25mm Wide-Angle 70-degrees, fully multi-coated, 2" 10mm Plössl, fully coated, 1.25"
Magnification with supplied eyepieces:	49x (25mm); 122x (10mm)
Finder scope:	Red dot scope (LED)
Barlow lens:	Short 2x Barlow lens, 1.25”
Base handle:	Yes
Eyepiece height at zenith:	44.5"
Optical tube weight:	19 lbs., 15.5 oz.
Base weight:	18 lbs., 11 oz.
Tube length:	45.5"
Tube outer diameter:	10"

SkyQuest XT10 Classic

Focal length:	1270mm
Aperture:	251mm
Focal ratio:	f/5.1
Focuser:	2" Crayford, with 1.25" adapter
Optical tube material:	Rolled steel
Mirror figure:	Paraboloid
Mirror coatings:	90% reflectivity, with SiO2 overcoat
Minor axis of secondary mirror:	64mm
Eyepiece:	25mm Plössl, fully multi-coated, 1.25"
Magnification with supplied eyepiece:	56x
Finder scope:	Red dot scope (LED)
Base handle:	Yes
Eyepiece height at zenith:	48.0"
Optical tube weight:	24 lbs., 3 oz.
Base weight:	21 lbs., 8 oz.
Tube length:	46.75"
Tube outer diameter:	11.9"

One-Year Limited Warranty

This Orion product is warranted against defects in materials or workmanship for a period of one year from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty period Orion Telescopes & Binoculars will repair or replace, at Orion’s option, any warranted instrument that proves to be defective, provided it is returned postage paid. Proof of purchase (such as a copy of the original receipt) is required. This warranty is only valid in the country of purchase.

This warranty does not apply if, in Orion’s judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear. This warranty gives you specific legal rights. It is not intended to remove or restrict your other legal rights under applicable local consumer law; your state or national statutory consumer rights governing the sale of consumer goods remain fully applicable.

For further warranty information, please visit ***www.OrionTelescopes.com/warranty.***

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TELESCOPES & BINOCULARS
AN EMPLOYEE-OWNED COMPANY

Corporate Offices: 89 Hangar Way, Watsonville CA 95076 - USA
Toll Free USA & Canada: (800) 447-1001
International: +1(831) 763-7000
Customer Support: support@telescope.com