



CELESTRON 90AZ-SR

SMARTPHONE READY REFRACTOR TELESCOPE

INSTRUCTION MANUAL

Model #22129



WHAT'S IN THE BOX

We recommend saving your telescope box so it can be used to store the telescope when it is not in use. Unpack the box carefully as some parts are small. Use the parts list below to verify that all parts and accessories are present.

PARTS LIST



1. Telescope Tube
2. StarPointer Red Dot Finderscope
3. Smartphone Adapter (Smartphone not included)
4. 20 mm Eyepiece
5. Erect Image Diagonal
6. Focus Knob
7. Panning Handle/Altitude Clutch Knob
8. Tripod
9. 10 mm Eyepiece
10. Accessory Tray
11. Altazimuth Mount
12. 3x Barlow



SOLAR WARNING

Never look directly at the Sun with the naked eye or with a telescope unless you have the proper solar filter. Permanent and irreversible eye damage may result. Never use your telescope to project an image of the Sun onto any surface. Internal heat build-up can damage the telescope and any accessories attached to it. Never use an eyepiece solar filter or a Herschel wedge. Internal heat build-up inside the telescope can cause these devices to crack or break, allowing unfiltered sunlight to pass through to the eye. Do not leave the telescope unsupervised, especially when children or adults unfamiliar with the correct operating procedures of your telescope are present.

ASSEMBLING YOUR TELESCOPE

THE MOUNT

The mount and tripod come fully assembled, so setting it up is easy.

1. Remove the tripod and mount from the box.
2. Loosen the knobs at the bottom of each leg and extend the inner section of the leg to the desired length. Tighten the knobs to secure the legs, being careful not to over tighten.
3. Stand the tripod upright and pull the tripod legs apart until the center brace snaps into place.
4. Place the threaded post on the bottom of the accessory tray over the hole in the middle of the leg support bracket and turn the entire tray clockwise until the tray sits firmly against the leg brace (Fig. 1). (see manual of SKU# 22105).
5. Make sure the leg hinge bolts are secure by tightening the thumbnuts at the top of each leg.



THE TELESCOPE TUBE

To attach the telescope tube to your tripod and mount:

1. Loosen the two tube mounting bolts on the side of the dovetail saddle on top of the mount.
2. Locate the dovetail bar on the bottom of the telescope tube and slide it into the saddle. The eyepiece end of the telescope tube should point in the same direction as the panning handle on the mount.
3. When the dovetail is centered in the saddle, tighten the two tube mounting bolts, starting with the larger one first. Finish by tightening the smaller one.
4. Remove the lens cap when you are ready to observe by simply pulling it off the lens shade.

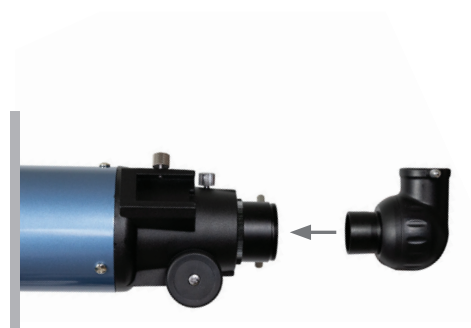


THE ERECT DIAGONAL

The 90AZ SR telescope comes with a 90° erect image diagonal. This accessory uses a prism to bend the light at a 90° angle, providing a more comfortable viewing position. It also gives you a 100% correctly oriented image allowing you to easily use this telescope for daytime terrestrial observing.

To install the erect image diagonal:

1. Remove the caps from both sides of the diagonal.
2. Loosen the setscrews on the back of the telescope focuser and pull out the small dust cap.
3. Insert the smaller tube on the diagonal into the back of the focuser and secure it by tightening the setscrews.



THE EYEPIECES

Your 90AZ telescope comes with two eyepieces, a low power (20 mm eyepiece) and a higher power eyepiece (10 mm eyepiece). Whenever you set up your telescope, always start with the 20 mm eyepiece. Once you have your target centered in the 20 mm eyepiece, you can switch to your higher power 10 mm eyepiece to increase magnification and get a more detailed view.

To install an eyepiece:

1. Loosen the setscrews on the open end of the erect image diagonal.
2. Insert the silver barrel of the 20 mm eyepiece into the diagonal.
3. Tighten the setscrews to secure the eyepiece.
4. To see the sharpest image possible, you need to adjust the telescope's focus. Look through the eyepiece and slowly turn the focusing knobs until you see the sharpest image possible.

NOTE: You should always adjust focus whenever you change eyepieces or if another person views through the telescope as the focus may be different for each individual.



THE STARPOINTER RED DOT FINDERSCOPE

Your telescope comes with a StarPointer Red Dot Finderscope that you will use as a sighting tool when aiming the telescope at a target.

To install the finderscope:

1. Loosen the two Philips-head screws on the side of the finderscope and slide the clamp over the dovetail bracket near the telescope focuser. The large window.
2. Secure the finderscope in place by tightening the two Philips-head screws. Do not over tighten these screws. Just make the connection snug.
3. Remove the small plastic tab under the battery cover by pulling it straight out. This is installed to prevent the battery from accidentally discharging during transportation.

The StarPointer Red Dot Finderscope uses a CR-2032 button battery. To change the battery, turn the StarPointer over to locate the battery compartment. Use a coin in the slot on the cover to unscrew the cap counter-clockwise until the cap comes off. Insert the new battery with the Positive (+) side facing upward and screw the cover back on. If your StarPointer does not immediately turn on, open the battery compartment to remove the small plastic disk that lies between the battery and the battery cover. This is used to prevent the battery from accidentally discharging during shipment.

If you are going to store your telescope for a long period of time, it is best to remove the battery to prevent accidental corrosion.



MOVING THE TELESCOPE

The 90AZ SR altazimuth mount is simple to use. To move the scope left and right, loosen the azimuth tension knob at the base of the mount between two of the tripod legs. Grab the knob at the end of the panning handle and move the scope to the desired location. You can adjust the tension of the left and right motion by adjusting the azimuth tension knob.

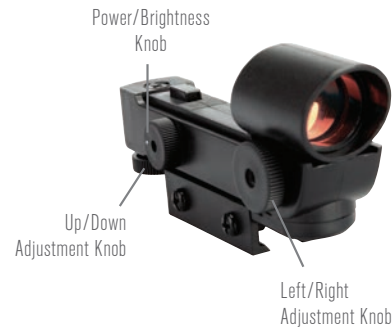
To move the scope up and down, loosen the altitude clutch by turning the knob at the end of the panning handle counter-clockwise. Move the handle up or down as required and turn the knob clockwise to lock the scope on target.



ALIGNING THE STARPOINTER RED DOT FINDERSCOPE

The StarPointer Red Dot Finderscope helps you aim your telescope by looking through its round glass window and covering your target with the red dot projected in the window. The first time you assemble your telescope, you will need to align the finderscope with the main optics of the telescope. Although this step can be done at night, it is significantly easier during the day. Once you have completed the finderscope alignment, you should not have to repeat this step unless the finderscope is bumped or the telescope is dropped.

1. Take the telescope outside during the day. Using your naked eye, find an easily recognizable object, such as a streetlight, car license plate, or tall tree. The object should be as far away as possible, but at least a quarter mile away.
2. Remove the main dust cover from the telescope and make sure your 20 mm eyepiece is installed.
3. Move the telescope left and right or up and down so that it is roughly pointing toward the object you chose in step 1.
4. Look through the telescope's eyepiece and manually move the telescope until the object you chose lies in the center of the view. If the image is blurry, gently turn the focus knobs until it comes into sharp focus.
5. Once the object is centered in your 20 mm eyepiece, turn on the finderscope by turning the power/brightness knob as far as it will go.
6. With your head positioned about a foot behind the finder, look through the round window and locate the red dot. It will probably be close to, but not on top of, the object you see when you are looking through the 20 mm eyepiece.
7. Without moving the telescope, use the two adjustment knobs on the side and underneath the finderscope. One controls the left-right motion of the red dot, while the other controls the up-down motion. Adjust both until the red dot appears over the same object you are observing in the 20 mm eyepiece.



Now choose some other distant targets to practice aiming your telescope. Look through the StarPointer Red Dot finderscope window and place the red dot over the target you are trying to view and verify that it appears in the eyepiece of the scope.

With your finderscope aligned, your telescope is fully assembled and you are ready to observe!

NOTE: Be sure to turn off the StarPointer Red Dot finderscope when not in use to conserve battery power.

YOUR FIRST ASTRONOMICAL OBSERVING SESSION

THE MOON

Now you are ready to take your telescope out at night and do some real observing!

Let's start with the Moon. The Moon takes about one month to go through a complete phase cycle, from new Moon to full Moon and back again. Try observing it at different points during this cycle.

While you can observe the Moon any time it is visible in the sky, the best time to view it is from two days after a New Moon up to a few days before a Full Moon. During this period, you will be able to see the most detail in craters and lunar mountain ranges. Consult a calendar or moon phase app to find out when the next new Moon will be.

1. With a clear view of the Moon, set up your telescope with the 20 mm eyepiece.
2. Turn on the finderscope and look through it to find the red dot.
3. Move the telescope until you can see the Moon through the finderscope's window and the red dot is centered on the Moon.
4. Look through the 20 mm eyepiece. Gently turn the focus knob to adjust the sharpness of the image.

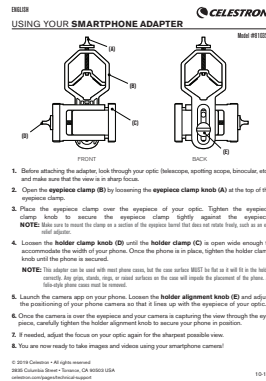
CONGRATULATIONS! YOU HAVE NOW OBSERVED YOUR FIRST CELESTIAL OBJECT!

To get a closer view of the Moon, replace the 20 mm eyepiece with the 10 mm eyepiece. It will give you more magnification, making the Moon appear much larger. You may need to adjust the focus knobs when you change eyepieces to ensure you are getting the sharpest image.

You can view many other celestial objects, such as planets, star clusters and nebulae using this same basic technique.

IMAGING WITH YOUR SMARTPHONE AND INCLUDED SMARTPHONE ADAPTER

Now that you have observed with your telescope, the next step is taking a picture of what you are seeing. The 90AZ SR Telescope includes a Smartphone adapter. To use this feature refer to the included smartphone adapter QSG (shown below).



IMAGING TIPS AND TRICKS

Camera Controls

The standard camera apps that come preinstalled with your smartphone offer very rudimentary controls and are designed to automatically adjust focus and exposure. This is not a problem for everyday photography such as landscapes or portraits, but can be a problem for imaging a planet or the Moon where you have a very bright object against a very black sky. The phone's camera tries to compensate for the imbalance of lighting by brightening up the dark areas, but this causes the bright areas to overexpose and blow-out the details. If your camera app settings do not allow you to manually select the focus point or have an option to disable the autofocus or auto-exposure, you may want to consider using a different camera app. You can find lots of aftermarket apps for iOS and Android that offer a greater amount of control for your camera. Many of these are free.

Vibration

To help eliminate any vibration induced when you touch the camera to snap the image, try using a shutter delay. Some apps offer a 2, 5, or 10 second delay before snapping the image. This will give the vibrations a chance to dissipate before actually taking the images.

Subjects to Shoot

Using this method, you should be able to take images of daytime terrestrial objects and nighttime astronomical images of the Moon and bright planets (Venus, Mars, Jupiter and Saturn). Unfortunately, smartphone camera sensors are not designed to work well in very low light, so it will not be possible to capture faint astronomical objects such as galaxies or nebulae in this manner.

Magnification

When looking at the Moon or planets with a stationary telescope, you will notice that the object appears to drift across the field of view. This is actually caused by the Earth's rotation. If you were looking visually through your 20 mm eyepiece, a planet would take approximately 3.0 minutes to drift across the entire eyepiece's field of view. If you are using the 10 mm eyepiece, it would only take 1.5 minutes. The smartphone does not use the entire eyepiece's field of view and only uses the center of it, making the motion appear even faster. When centering an astronomical object in the phone's field of view, try leading the target. Try to point the scope ahead of the planet so that it is just entering the field of view. This will maximize the amount of time it takes to drift across the entire field, allowing you more time to take images before needing to re-aim the telescope. The 10 mm will have a narrower field of view and will need to be adjusted more often as a result. Working with the 20 mm eyepiece will be easier at the start. Once you are comfortable with it, try stepping up to the 10 mm eyepiece.

CELESTRON TWO YEAR LIMITED WARRANTY

- A.** Celestron warrants this product to be free from defects in materials and workmanship for two years. Celestron will repair or replace such product or part thereof which, upon inspection by Celestron, is found to be defective in materials or workmanship. As a condition to the obligation of Celestron to repair or replace such product, the product must be returned to Celestron together with proof-of-purchase satisfactory to Celestron.
- B.** The Proper Return Authorization Number must be obtained from Celestron in advance of return. Please submit your request to Celestron's online technical support center at <https://www.celestron.com/pages/technical-support> to receive the number to be displayed on the outside of your shipping container.

All returns must be accompanied by a written statement setting forth the name, address, and daytime telephone number of the owner, together with a brief description of any claimed defects. Parts or product for which replacement is made shall become the property of Celestron.

The customer shall be responsible for all costs of transportation and insurance, both to and from the factory of Celestron, and shall be required to prepay such costs.

Celestron shall use reasonable efforts to repair or replace any product covered by this warranty within thirty days of receipt. In the event repair or replacement shall require more than thirty days, Celestron shall notify the customer accordingly. Celestron reserves the right to replace any product which has been discontinued from its product line with a new product of comparable value and function.

This warranty shall be void and of no force of effect in the event a covered product has been modified in design or function, or subjected to abuse, misuse, mishandling or unauthorized repair. Further, product malfunction or deterioration due to normal wear is not covered by this warranty.

CELESTRON DISCLAIMS ANY WARRANTIES, EXPRESSED OR IMPLIED, WHETHER OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, EXCEPT AS EXPRESSLY SET FORTH HEREIN. THE SOLE OBLIGATION OF CELESTRON UNDER THIS LIMITED WARRANTY SHALL BE TO REPAIR OR REPLACE THE COVERED PRODUCT, IN ACCORDANCE WITH THE TERMS SET FORTH HEREIN. CELESTRON EXPRESSLY DISCLAIMS ANY LOST PROFITS, GENERAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM BREACH OF ANY WARRANTY, OR ARISING OUT OF THE USE OR INABILITY TO USE ANY CELESTRON PRODUCT. ANY WARRANTIES WHICH ARE IMPLIED AND WHICH CANNOT BE DISCLAIMED SHALL BE LIMITED IN DURATION TO A TERM OF TWO YEARS FROM THE DATE OF ORIGINAL RETAIL PURCHASE.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitation on how long an implied warranty lasts, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Celestron reserves the right to modify or discontinue, without prior notice to you, any model or style product. If warranty problems arise, or if you need assistance in using your product, please visit Celestron's online technical support center at <https://www.celestron.com/pages/technical-support>.

NOTE: This warranty is valid to U.S.A. and Canadian customers who have purchased this product from an authorized Celestron dealer in the U.S.A. or Canada. Warranty outside the U.S.A. and Canada is valid only to customers who purchased from a Celestron's International Distributor or Authorized Celestron Dealer in the specific country. Please contact them for any warranty service.

FCC NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Product design and specifications are subject to change without prior notification.
This product is designed and intended for use by those 14 years of age and older.

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