# GALILEOSCOPE™

# Assembly Instructions Getting Started

Remove the inner box. There are several layers of parts. Open the little plastic bag containing a sticker, a metal nut, and four rubber O-rings. Place these on a work table. Lift out the top piece of cardboard and set it aside. The box now looks something like this:

Remove the plastic bag containing multiple layers of white foam from the large tube. The foam separates into two blocks, one thick, the other thin. The thick block holds a large round lens wrapped in tissue. The thin, lighter block is secured by small pieces of transparent tape. Carefully cut the tape on one side to unfold the two foam layers, revealing six small lenses nestled inside. Taking care not to touch the big or small lenses, set both foam blocks on the table.

Next, carefully remove the layers of cardboard and the parts attached. Remove all the parts from the box and set them on the table in an arrangement similar to the one shown below. Set these instructions aside for quick parts reference.


## Parts List (in order of assembly)

**A** – Telescope main tube (2)
**B** – V-shaped bases/stands (2)
**C** – 50-mm glass objective lens
**D** – ¼-20 tripod nut
**E** – Focuser tube halves (2)
**F** – Small main-tube clamp ring
**G** – Small rubber O-rings (2)
**H** – Sun-warning sticker
**I** – Large lens shade/dew cap
**J** – Large rubber O-rings (2)
**K** – Main eyepiece barrel halves (2)
**L** – Auxiliary eyepiece barrel halves (2)
**M** – Small main eyepiece lenses (4)
**N** – Tiny, thin eyepiece ring/field stop
**O** – Large main eyepiece clamp ring
**P** – Small eyepiece clamp rings (2)
**Q** – Aux. eyepiece lens (2)
**R** – Barlow lens tube
**S** – Auxiliary eyepiece cap

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## ⚠ WARNING:

**SUN HAZARD** – Never look directly at the sun with this device.
**CHOKING HAZARD** – Small parts. Not for children under 3 years.
The lens contains lead that may be harmful. Wash hands after touching.

## ⚠ WARNING:

This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

## ⚠ IMPORTANT SAFETY INSTRUCTIONS

READ AND FOLLOW THE INSTRUCTIONS BEFORE USE.
KEEP THESE INSTRUCTIONS FOR LATER USE.

• **SUN WARNING: WARNING – NEVER ATTEMPT TO OBSERVE THE SUN WITH THIS DEVICE! OBSERVING THE SUN – EVEN FOR A MOMENT – WILL CAUSE INSTANT AND IRREVERSIBLE DAMAGE TO YOUR EYE OR EVEN BLINDNESS.** EYE DAMAGE IS OFTEN PAINLESS, SO THERE IS NO WARNING TO THE OBSERVER THAT THE DAMAGE HAS OCCURRED UNTIL IT IS TOO LATE. DO NOT POINT THE DEVICE AT OR NEAR THE SUN. DO NOT LOOK THROUGH THE DEVICE AS IT IS MOVING. CHILDREN SHOULD ALWAYS HAVE ADULT SUPERVISION WHILE OBSERVING.

• **RESPECT PRIVACY:** WHEN USING THIS DEVICE, RESPECT THE PRIVACY OF OTHER PEOPLE. FOR EXAMPLE, DO NOT USE IT TO LOOK INTO PEOPLE'S HOMES.


• **CHOKING HAZARD:** CHILDREN SHOULD ONLY USE DEVICE UNDER ADULT SUPERVISION. KEEP PACKAGING MATERIALS LIKE PLASTIC BAGS AND RUBBER BANDS OUT OF THE REACH OF CHILDREN AS THESE MATERIALS POSE A CHOKING HAZARD.

• **RISK OF BLINDNESS:** NEVER USE THIS DEVICE TO LOOK DIRECTLY AT THE SUN OR IN THE DIRECT PROXIMITY OF THE SUN. DOING SO MAY RESULT IN A PERMANENT LOSS OF VISION.

• **RISK OF FIRE:** DO NOT PLACE DEVICE, PARTICULARLY THE LENSES, IN DIRECT SUNLIGHT. THE CONCENTRATION OF LIGHT RAYS COULD CAUSE A FIRE.

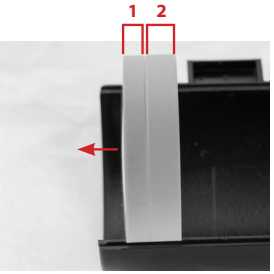
• **DO NOT DISASSEMBLE THIS DEVICE:** IN THE EVENT OF A DEFECT, PLEASE CONTACT YOUR DEALER. THE DEALER WILL CONTACT THE CUSTOMER SERVICE DEPARTMENT AND CAN SEND THE DEVICE IN TO BE REPAIRED IF NECESSARY.

• **DO NOT SUBJECT THE DEVICE TO TEMPERATURES EXCEEDING 60 °C (140 °F).**

• **DISPOSAL:** KEEP PACKAGING MATERIALS, LIKE PLASTIC BAGS AND RUBBER BANDS, AWAY FROM CHILDREN AS THEY POSE A RISK OF SUFFOCATION. DISPOSE OF PACKAGING MATERIALS AS LEGALLY REQUIRED. CONSULT THE LOCAL AUTHORITY ON THE MATTER IF NECESSARY AND RECYCLE MATERIALS WHEN POSSIBLE.

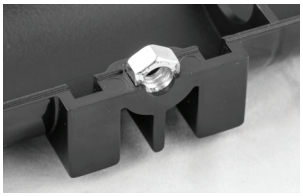
GALILEOSCOPE

# Assembly Instructions



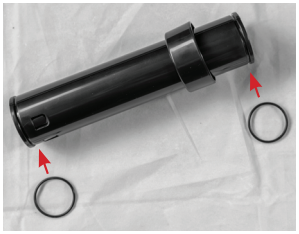

**Telescope Assembly**

**Step 1:** Lay the telescope main tube halves **(A)** on a table, curved side down; **OPTIONAL:** use the two V-shaped bases/stands **(B)** to support one of the main tube halves. Note that the 50-mm (2-inch) diameter objective lens **(C)** is actually two lenses cemented together. One lens is thinner, and the other is thicker. Being sure to handle the lens only by the edges, and using the included piece of tissue paper, insert the objective lens into the matching groove at the end of one telescope main tube half so that the thinner lens **(1)** points forward, out of the telescope, as shown at right.



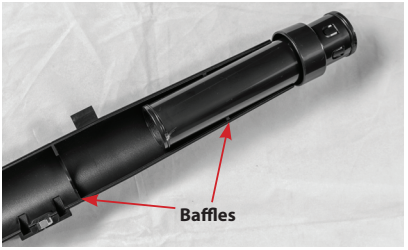
**Step 2:** Insert the ¼-20 tripod nut **(D)** into the slot in the telescope main tube half. To seat the nut securely, make sure it is oriented with one of its "points" (not one of its flat sides) facing up as shown at left.

**Step 3:** Lay the two focuser tube halves **(E)** on the table, oriented with their interiors facing up. Note that one end of each tube is rough on the inside, and the other end is smooth. On one tube half, the smooth end has two U-shaped cutouts; they're at top in the photo at right. Orient the tube halves so that the two smooth ends match and the two rough ends match, as shown in the photo.



**Steps 4 & 5:** Join the two focuser tube halves and hold them together. Slide the small main-tube clamp ring **(F)** onto the focuser tube, with the wider end of the ring facing away from the end of the tube with the two U-shaped cutouts. Secure the two ends of the focuser tube with the two small rubber O-rings **(G)**, which fit in grooves around each end of the tube. The O-rings look too small to fit, but they will stretch.

**Step 6:** Lay the completed focuser tube assembly into the back end of the main tube. Make sure that the end of the focuser tube with the two U-shaped cutouts is protruding out the back of the telescope main tube, along with the main-tube clamp ring. The other end of the focuser tube should lie between the two baffles at the back of the main telescope tube.




**Step 7 — IMPORTANT:** Peel the backing off the Sun-warning sticker **(H)** and affix the sticker to the second half of the telescope main tube **(A)**, about 25 mm (1 inch) from the narrow end, as shown in the photo.
**WARNING: DO NOT LOOK AT THE SUN THROUGH YOUR GALILEOSCOPE! SEVERE EYE DAMAGE WILL OCCUR.**

**Step 8:** Place the second half of the main tube over the first half (the one already on the table or in the V-blocks/stands). Make sure the objective lens and ¼-20 tripod nut fit securely into their slots in the top half of the tube.

**Step 9:** Secure the body together by sliding the main-tube clamp ring **(F)** onto the back.

Place the two large O-rings **(J)** around the telescope main tube in the channels provided for this purpose (arrowed at right). These will hold your Galileoscope together more securely, but make it harder to take apart. The O-rings look too small to fit, but they will stretch.

**Step 10:** Attach the large lens shade/dew cap **(I)** onto the front of the main tube.

**Eyepieces Assembly**

There are two eyepiece barrels. The wider eyepiece **(K)**, with the larger central opening, is the **main eyepiece**, with a magnification of 25x. The narrower eyepiece **(L)**, with the smaller central opening, is the **auxiliary eyepiece**; it serves two different purposes about which we'll say more below.

**Main Eyepiece – 25x Power**

**Step 11:** The four large main eyepiece lenses **(M)**, are about 17 mm (not quite ¾ inch) in diameter. Handle the lenses with the supplied tissue paper, or touch only the edges to avoid fingerprints. Two lenses are flat on one side and concave — curved inward — on the other. The other two lenses are convex — curved outward — on both sides. Take one of each type of lens and place them together as shown on the right. Repeat with the other two main eyepiece lenses.

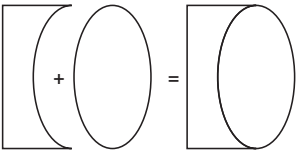
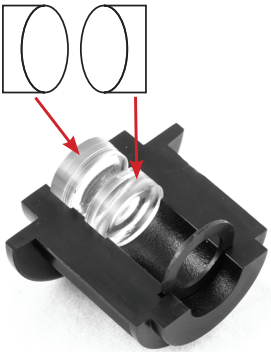



Fig. 1



**Step 12:** Take one half of the main eyepiece barrel **(K)**. Insert the two eyepiece lens pairs (from step 11) into the appropriately sized slots of the barrel. Be sure the flat sides of the lens pairs point away from each other (that is, toward the ends of the eyepiece barrel), **Fig. 1**. Viewed from the side, the thinner lenses are in the middle.

**Step 13:** Insert the tiny, thin eyepiece ring/field stop **(N)** into the thin slot in the main eyepiece barrel half. You should now have something that looks like the photo on the left. You are almost done with the main, 25-power eyepiece!

**Step 14:** Join the second half of the main eyepiece barrel **(K)** with the first half (the one you just assembled), taking care that the lenses and field-stop ring fit into the appropriate slots on the second half as you bring the halves together. Secure the halves with the large main eyepiece clamp ring **(O)**, which goes on the end closest to the lenses, and a small clamp ring **(P)**, which goes on the other end. All the parts of the main eyepiece described in steps 11 to 14 are shown on the right.

GALILEOSCOPE

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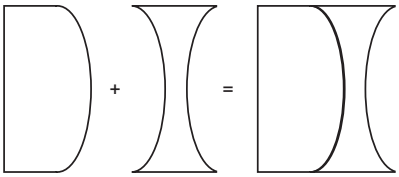
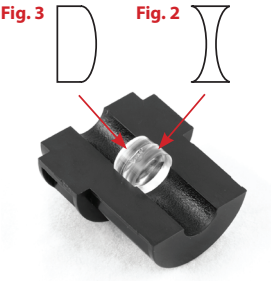


**Auxiliary Eyepiece – 17x Power**

**Step 15:** Find the two small lenses **(Q)**, with diameters of about 14 mm (a bit more than ½ inch). One is thinner in the middle — both sides are concave, (curved in). The other lens has one flat and one convex side (curved outward). Put them together as shown at right.

**Step 16:** Place the lens pair from step 15 into the slot in one half of the auxiliary eyepiece barrel **(L)**. The lens that is thin in the middle (the right one in the diagram) faces the narrow/bottom of the barrel, **Fig. 2**. The flat lens side of the pair of lenses goes toward the top of the "T" shape of the barrel. The left lens in the drawing is just a little bit thinner than the other (seen from the side after you assemble the pair in the slot). The flat side of the lens pair goes towards the fat side of the housing (the top of the "T"), **Fig. 3**, which goes toward the front of the telescope, when you use the Barlow lens.




**Steps 17-18:** Join the second half of the auxiliary eyepiece barrel to the first half, taking care that the lenses fit into the slot on the second half as you bring the two halves together, and secure the wide/top end of the barrel with the second small eyepiece clamp ring **(P)**. All parts of the auxiliary eyepiece are shown on the right.

**Step 19 – The Barlow Lens:** Insert the narrow/bottom end of the auxiliary barrel **Fig. 4** all the way into the narrow end of the Barlow tube **(R)**. You'll have an assembly that looks like the one on the right.



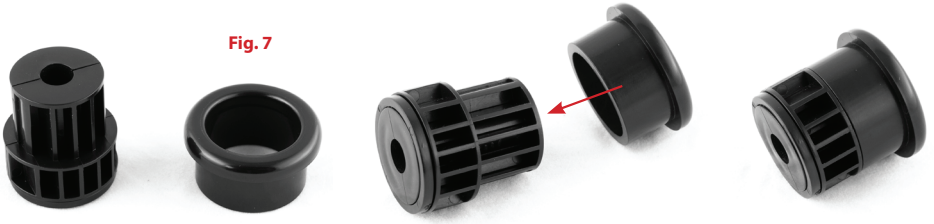
**Step 20:** Insert the main eyepiece, **Fig. 5**, as far into the wide end of the Barlow tube as it will go. You'll now have an assembly that looks like the one shown on the left, **Fig. 6**.

**Step 21:** Insert the Barlow-lens-and-main-eyepiece assembly into the focuser of your Galileoscope to enjoy a view with a magnification of 50x, enough power to show the rings of Saturn clearly!

**The Galilean Eyepiece**
**Step 22:** Remove the auxiliary eyepiece barrel **(L)** from the narrow end of the Barlow tube **(R)** and set the Barlow tube (and the main eyepiece) aside.

**Step 23:** Place the auxiliary eyepiece cap **(S)**, shown on the far left photo below, **Fig. 7**, over the narrow end of the auxiliary eyepiece barrel. You now have a Galilean eyepiece, as shown on the far right.

Fig. 7



**Step 24:** Insert an eyepiece fully into the end of the focuser tube, as shown in the following sequence of photos below:

Your Galileoscope can be used in multiple configurations. With this main eyepiece, it yields a magnification of 25x and a true field of about 1½°, the width of three full Moons. The auxiliary (narrower) eyepiece serves two roles. It can act as a 2x Barlow lens, doubling the magnification to 50x but showing a smaller field of view. Or it can be configured as a Galilean eyepiece with 17x. The main eyepiece always yields an upside-down image. The Galilean eyepiece produces a right-side-up image but a VERY narrow field of view. You may find it difficult to observe with the Galilean eyepiece, but it will let you appreciate what Galileo saw through his telescopes 400 years ago!

**Aiming the Galileoscope:** Sight along the top of the tube to aim your Galileoscope. Your observing target should line up with the tip of the rear (single) post and the tips of the front (V-notched, double) post, as indicated at right, where the target is simulated by the dot above the sights.

Visit **http://galileoscope.org** for information on how to choose a tripod for your Galileoscope.

**Focusing the Galileoscope:** Start observing with the main eyepiece (the one with four lenses) until you are a veteran observer. To focus the Galileoscope, slide the focuser tube forward or back while looking into the eyepiece. Fine focus adjustments are easier to make if you twist the focuser tube slightly as you slide it forward or back. If the tube gets stuck, one of the O-rings may have become dislodged and needs to be reseated. Note that looking at very near/far objects requires that the focusing tube be more fully extended/pushed inward.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