

Orion Polar Axis Scope for HDX110 EQ-G GoTo Mount

#8684

The Polar Axis Scope for the Orion HDX110 EQ-G mount attaches externally to the front face of the mount head and allows quick, accurate polar alignment of the mount for visual or astrophotographic use. These instructions describe how to set up and use the Polar Axis Scope. Please read them carefully before proceeding.

Included Parts

| Qty | Item |
|-----|--|
| 1 | Polar axis scope with aluminum bracket |
| 2 | Socket head capscrews |
| 1 | 1.5mm hex key |
| 1 | 6mm hex key |

Attach the Polar Scope

Install the polar scope assembly on the HDX110 mount with the two socket head capscrews as shown in **Figure 1**. Use the supplied 6mm hex key to tighten the screws.

The Polar Scope Reticle

The reticle includes star patterns useable in both the Northern and Southern hemispheres (**Figure 2**). For the Northern Hemisphere it has representations of the Big Dipper and Cassiopeia; for the Southern Hemisphere it has four bright stars of the constellation Octans. The celestial pole for either hemisphere is marked by a cross. The large circle around the cross represents the offset of Polaris from the actual North Celestial Pole.

If the reticle image appears blurred, rotate the knurled ring of the polar scope's eyepiece to focus.

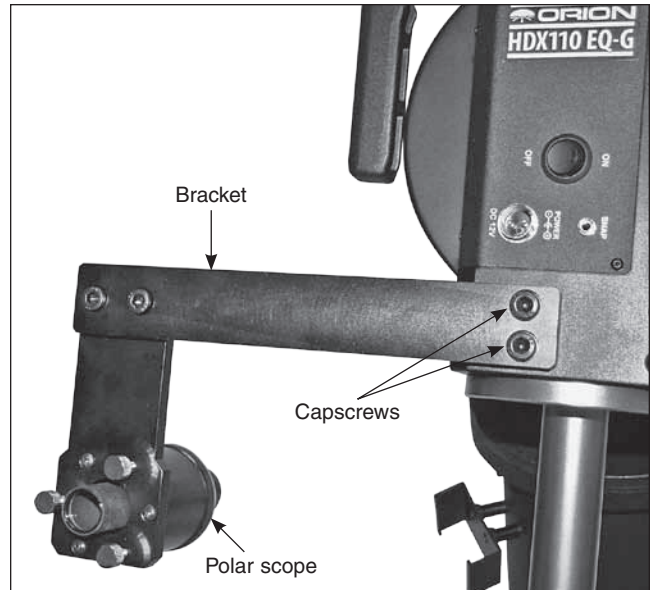


Figure 1. The polar scope attached to the HDX110 EQ-G mount.

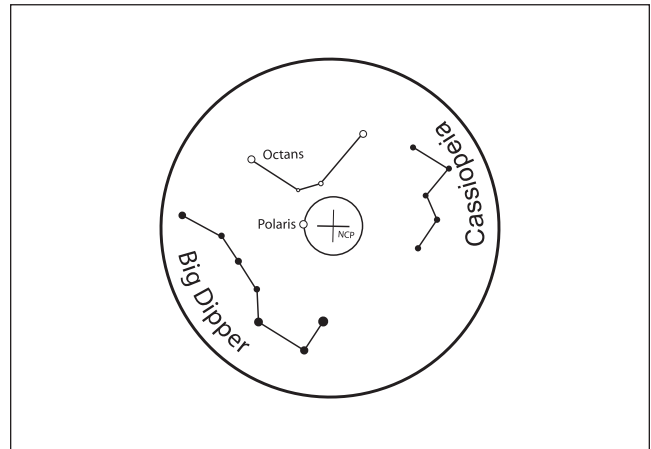


Figure 2. Reticle pattern of the polar scope allows polar alignment in both northern and southern hemispheres.

Align the Polar Scope

Before using the polar scope for polar alignment, it must be aligned to the mount's right ascension (R.A.) axis. There are actually two calibration routines that must be performed.

Calibration #1 - Align the reticle to the rotating axis of the polar scope

1. Choose a fixed object (Polaris at night, or a far-away object in daylight). By using the two azimuth adjustment knobs and the latitude jackscrew of the HDX110 mount, point the mount so that the object is centered on the cross in the center of the polar scope's reticle. Tighten the R.A. axis.
2. Now rotate the large knurled ring on the polar scope exactly half a turn (**Figure 3**).
3. If the object remains at the center of the reticle after the rotation, then the reticle plate is aligned with the polar scope's rotating axis and no adjustment is needed. If the object deviates from the cross, then use the supplied 1.5mm hex key to adjust the three small Allen setscrews on the polar scope (**Figure 3**) to move the object HALFWAY back toward the center of the cross (**Figure 4**).
4. Repeat steps 1-3 a few times until the object stays at the center of the reticle – on the cross – when rotating the polar scope.

Note:

- When adjusting the Allen screws, loosen one screw only $\frac{1}{4}$ of a turn, and then lightly tighten the other two.
- Do not over-tighten the Allen screws; it might damage the reticle plate in the polar scope.
- Do not loosen one screw completely or loosen more than one screw at a time; otherwise, the pattern plate in the polar scope will be disengaged and further adjustment is impossible.
- If the reticle plate does disengage, remove the polar scope's eyepiece by turning the knurled ring counterclockwise and then engage the reticle plate again.

Calibration #2 - Align the rotating axis of the polar scope to the R.A. axis of the mount

1. Release the R.A. clutch and level the counterweight shaft, orienting it parallel to the ground. Then lock the R.A. clutch again.
2. Choose a fixed object (Polaris at night, or a far-away object in daytime). By using the two azimuth adjustment knobs and the latitude jackscrew of the HDX110 mount, point the mount so that the object is centered on the cross in the center of the polar scope's reticle.
3. Rotate the mount on its R.A. axis exactly half a turn. Tighten the R.A. clutch after the rotation.
4. If the object remains at the center of the cross in the polar scope, then the polar scope's rotating axis is aligned to the R.A. axis and no adjustment is needed.

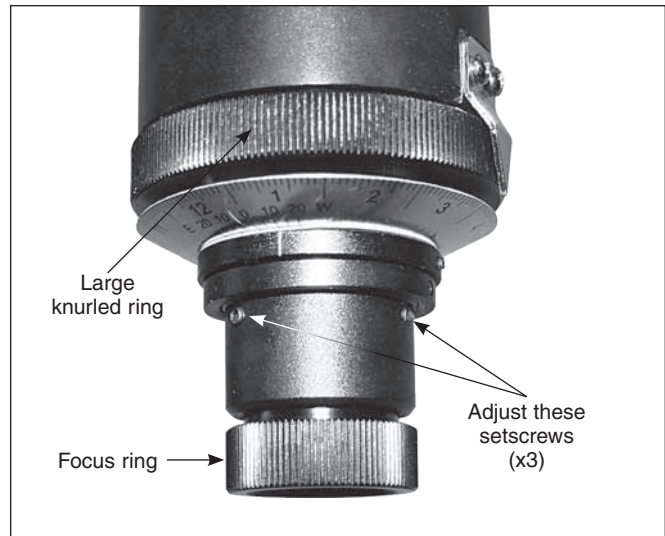


Figure 3. The large knurled ring provides convenient rotation of the reticle.

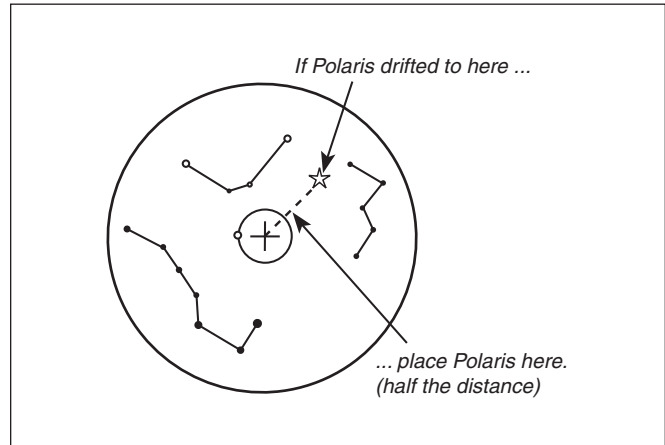


Figure 4. If Polaris doesn't stay centered when the R.A. axis is rotated 180 degrees, adjust the three small Allen setscrews to move it halfway back to center.

5. If the object deviates from the cross, then adjust the three thumbscrews shown in **Figure 5** to move the object HALFWAY back to the cross.

Note: When adjusting the thumbscrews, loosen one thumbscrew very slightly while looking through the polar scope, to see which direction the star moves. Then tighten one or both of the other thumbscrews to take up the slack. If the star didn't move in the desired direction, try loosening a different thumbscrew. Each time you loosen one thumbscrew, make sure to tighten one or both of the others.

6. Repeat steps 1-5 a few times until the object stays at the center of the reticle when rotating the mount on its R.A. axis.

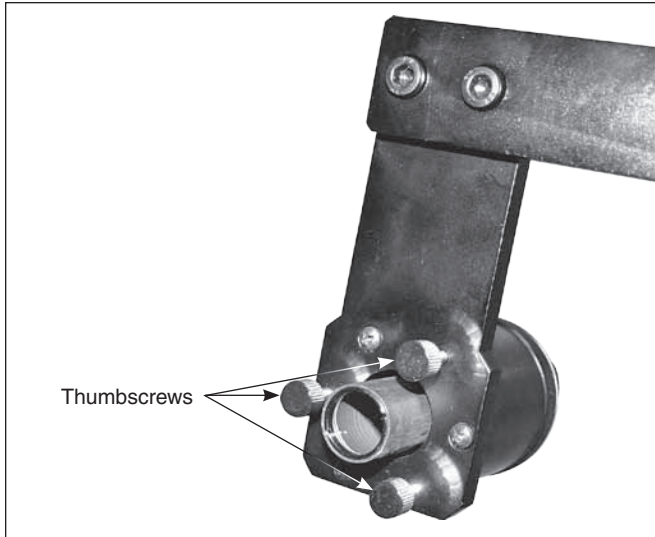


Figure 5. Polar alignment requires adjusting the three thumbscrews on the back plate of the polar scope.

Polar Alignment with the Polar Scope

The polar scope can be used in both the Northern and Southern hemispheres.

For Use in Northern Hemisphere: Rotate the reticle using the large knurled ring on the polar scope so that the orientation of the Big Dipper and Cassiopeia match their orientation in the sky. Locate Polaris (the brightest star near the North Celestial Pole, or NCP) by viewing through the polar scope, then use the altitude jackscrew and the two azimuth adjustment knobs to move Polaris to the proper position in the FOV of the polar scope. The proper position is the center of the small circle superimposed on the larger circle surrounding the cross (NCP).

For Use in Southern Hemisphere: In the polar scope's reticle, notice the string of four dim stars labeled "Octans" (refer to **Figure 2**), which represent corresponding stars in the southern constellation of that name. Rotate the large knurled ring of the polar scope assembly to orient the reticle graphic with the orientation of the four stars of Octans in the sky. Then use the mount's altitude jackscrew and the azimuth adjustment knobs to carefully move the four stars into the four small circles of the "Octans" graphic. When you've done that, your mount is polar aligned!

1. With the mount now polar aligned, you can now tighten the primary locking knob, and then tighten the azimuth adjustment knobs, the azimuth and altitude lock bolts, and the altitude lock knobs. (Refer to the manual for the HDX110 EQ-G.)
2. We recommend removing the altitude jackscrew handle once the polar-alignment has been done, to prevent unexpected changes to the polar-alignment from accidentally bumping it or catching a cable on it.

Another Method for Placing Polaris at the Correct Offset Position

Because Polaris is not located exactly at the NCP, it is necessary to determine the orientation of Polaris on the circle surrounding the NPC (cross) on the reticle. Another way to do this is to use the SynScan hand controller as follows:

At the end of the initialization of the SynScan hand controller (see the SynScan manual), after entering the proper local longitude, latitude, date, time, and daylight-saving time, the hand controller will display the message: "Polaris Position in P.Scope=HH:MM". Imagine the larger circle in **Figure 2** as a clock's face with 12:00 at the top, with the time indicated by "HH:MM", which stands for Hours and Minutes. You want to position Polaris on the circle where the HOUR HAND would be pointing at that time. So, for example, if the hand controller displayed, "Polaris Position in P.Scope=03:30," you would place Polaris on the large circle at the point where the hour hand of a clock would be at 3:30 a.m., i.e., halfway between the imaginary 3 and 4.

Note that with this method there's no need to rotate the polar scope's reticle to adjust the position of the small circle.

Tip: For this clock method to work, you have to be sure you know where the "top," or 12-o'clock point, of the large circle is. This can be tricky to determine if your head is cocked at a non-vertical angle when viewing through the polar scope. To find the top of the large circle in the polar scope's field of view, use the latitude jackscrew to move Polaris up and down in the field of view, and rotate the telescope in R.A. to orient the vertical line of the center cross to be parallel with the motion of Polaris. When they are parallel, the 12-o'clock position of the large circle is where Polaris intersects with the top of that circle (assuming your mount was level to start with).

WARNING: Do NOT look at the Sun without a professionally made solar filter on the telescope; serious eye damage may result if you look at the Sun with any unfiltered optical instrument. Do not leave the telescope unsupervised around children. Always cover the lenses when leaving the telescope in direct sunlight.

One-Year Limited Warranty

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