

ASTRO-PHYSICS, INC.

POLAR ALIGNMENT TELESCOPE (PASILL3)

This is our current model which began shipping in August 2002.

It fits all 400, 600, 600E, 800, 900 and 1200 models (except the original black 1200s).

PARTS LIST

Polar Alignment Telescope with two covers

Battery pouch, including:

 Illuminator with cable

 Battery holder with cable and two AA batteries

0.9mm Allen wrench

27.5" Cable to power the reticle from your Astro-Physics mount (part # CABPAS3)

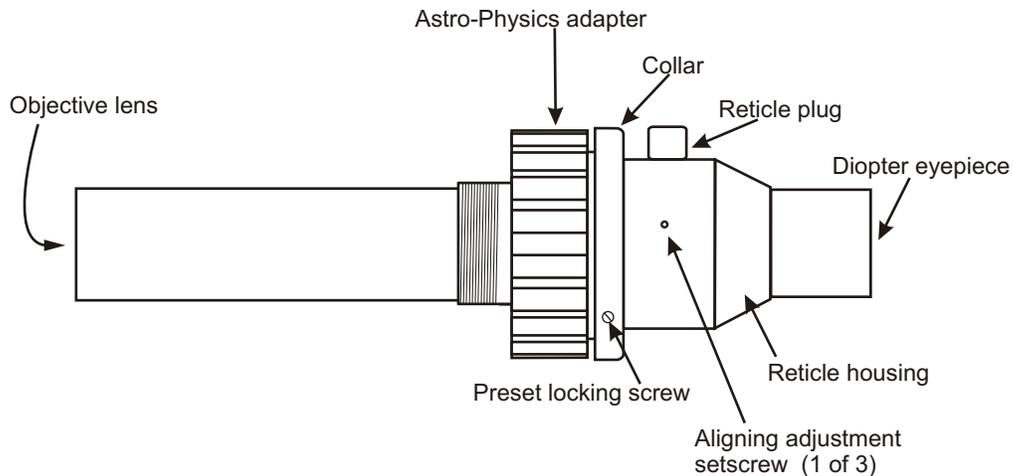
POLAR ALIGNMENT TELESCOPE

This polar alignment telescope (also called a polar axis telescope, polar finder or polar scope) will help you to align your mount with the Celestial Poles. When your mount is properly aligned, your telescope's drive will accurately track celestial objects as they pursue their daily motion across the sky. This will allow you to keep the object you are viewing in the center of your field-of-view, and eliminate the need for manual adjustments. This polar scope can be used in both the Northern and Southern Hemispheres.

Polar Axis Scope Specifications:

 Objective lens: 15 mm

 Field of View: 10°



ILLUMINATING THE RETICLE

The illuminator (stored in the battery pouch) contains a red LED to light the reticle lines in the polar axis telescope and a short cable. The reticle can be powered with either two AA batteries or with power from the mount.

Using Batteries

First, remove the reticle plug from the polar scope. Thread the illuminator with its short cable in place. Attach the battery unit with its cable. You can leave the battery unit in the case, if you wish. There is no on-off switch, so you should unplug the battery unit when you have completed your alignment to preserve the life of your batteries. If you remove the illuminator at the end of your alignment, be sure to replace the reticle plug in order to prevent dust particles from accumulating on the reticle.



There is no way to adjust the brightness of the reticle when using the batteries. It is either on or off. For this reason, we prefer powering the reticle from the mount as described below.

Notes:

We suggest that you remove the batteries from the battery compartment when not in use. It could be damaged if the batteries leak. Extreme cold may reduce the effectiveness of your batteries.

Using the CABPAS3 Cable with Your Astro-Physics Mount

Important: The male connector should only be plugged into the GTO control box (or mount). If you attempt to use it as an extension cable between the illuminator and the battery, the LED will not light up.

First, remove the reticle plug from the polar scope. Thread the illuminator with its short cable into place. Attach the female connector of the CABPAS3 cable to the illuminator cable and the male end to the reticle output jack on the GTO control box or, on non-GTO mounts, to the 3.5mm reticle output jack on the mount itself. If you remove the illuminator at the end of the alignment procedures, be sure to replace the reticle plug in order to prevent dust particles from accumulating on the reticle.



The brightness of the LED can be adjusted with your keypad (GTO mounts) or controller (non-GTO mounts).

GTO Keypad

Follow your normal startup procedure until you get to the Main Menu. Select Startup and go to the Setup-2 Menu. Press the 3 or 4 button of your keypad to increase and decrease the reticle brightness levels in increments from 0-9. This number will remain in the keypad memory for your next session, so you only need to set this level once.

8010 Controller, Quartz Drive and Quartz Micro-Drive Controllers

Turn the knob labeled LED to the desired brightness level.

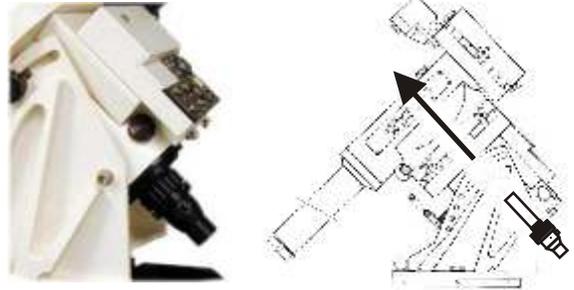
INITIAL ADJUSTMENTS

Adjusting the Focus

1. Focusing stars: This is easiest to check in the daytime by focusing on a distant object. It is unlikely that you will have to make any adjustment. If you do, simply loosen the preset locking screw and remove the Astro-Physics adapter. Then, loosen the focusing adjustment locking ring which is now visible. Turn the objective tube until distant objects are sharply focused. Tighten the focusing-adjustment locking ring.
2. Reticle focus: Turn the diopter eyepiece until the reticle is in focus.

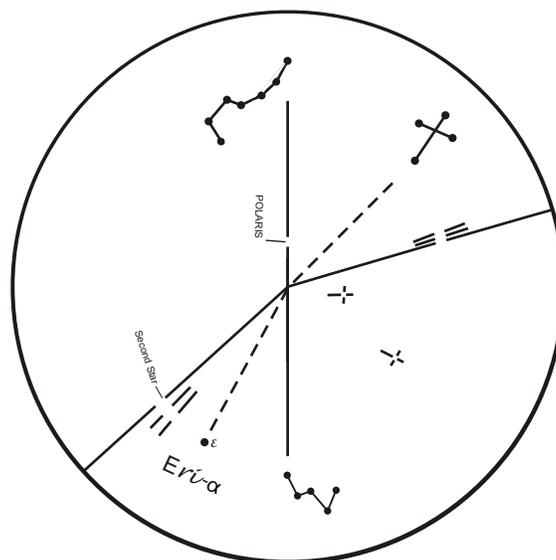
Installing the Polar Alignment Scope

1. Remove the polar axis front and rear caps.
2. Loosen the declination axis knobs.
3. Turn the declination axis until the hole in the axis is aligned with the polar axis holes. You will be able to look through the mount as shown in the diagram.
4. Tighten the declination axis knobs.
5. Carefully screw your polar alignment telescope into the rear of your mount's polar axis. If you find that the threaded hole in the base of your mount is too large, you are missing a piece of your mount. Call Astro-Physics to order part # M4037 (polar axis shaft plug).



Optically Centering the Reticle

To properly align the telescope's polar axis with the north celestial pole, the reticle in the polar alignment scope must be precisely centered within the polar axis. A mis-centered reticle will result in excessive tracking error. Since the polar scope was prealigned at the factory, it is unlikely that you will have to make any adjustments. However, you should check to be sure that it is properly aligned. These steps only need to be performed before your first use. We suggest that you follow this procedure during the daytime. The following is a diagram of the markings of the reticle. For this procedure, note the intersection of the lines.



With the Polar Scope Installed in Your Mount

1. Using your mount's azimuth adjustment knobs and altitude fine adjustment, aim your polar axis scope at a distant object, placing the object in the center of the field where the reticle lines meet. Choose some discrete point, such as the top of a telephone pole. Be careful not to lower the altitude enough for the motor housing to hit the mount when turning the right ascension axis. Tighten the adjustment knobs.
2. Rotate the reticle housing within the collar. The object should remain centered at the crossed lines. If the object moves off the reticle lines and travels in a circle, your polar scope needs adjustment. Try to imagine where the center of that circle is.
3. Using the Allen wrench provided, adjust by gently loosening and tightening the three aligning-adjustment setscrews on the reticle housing until the point where the reticle lines meet reaches the center of the imagined circle described in the previous step. This process must be done very carefully so that the setscrews do not damage the reticle. Be sure all three setscrews are gently tightened when you are finished.
4. Repeat steps 2 and 3 until an object placed where the reticle lines meet remains stationary when the polar scope is rotated in the collar.
5. Don't forget to turn off the illuminator when you're finished. You're now ready for nighttime polar alignment.

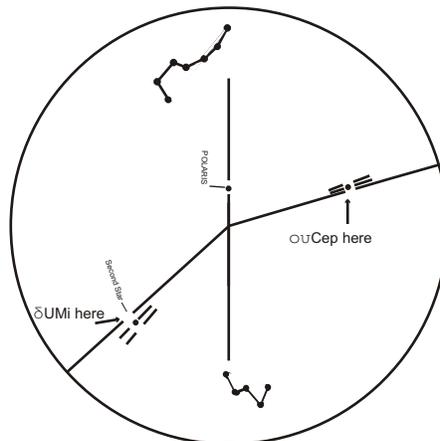
With a V-block or other holding device

You can also align the polar scope by supporting the Astro-Physics adapter and collar in a stationary position while rotating the reticle housing. This can be accomplished with a v-block or other holding device in the daytime prior to installation in your mount. Focus on a distant object and follow steps 2-5 from the previous section.

USING YOUR POLAR AXIS TELESCOPE

Northern Hemisphere

1. Set up your mount so that the polar axis is roughly aligned in azimuth toward Polaris.
2. Slightly loosen the bolt(s) that lock the polar axis of the mount in place. Adjust the elevation angle of the polar axis so that the polar axis is roughly pointed at Polaris in altitude. It is easier to adjust the polar axis if you turn the fine altitude knob with one hand while using the other hand to move the axis manually.
3. Adjust the declination axis so that you can look through the polar axis. (See Installing the Polar Alignment Scope.) Clamp the declination axis in place. Thread the polar scope into the polar axis.
4. Thread the illuminator into the polar scope and apply power, if not done already.



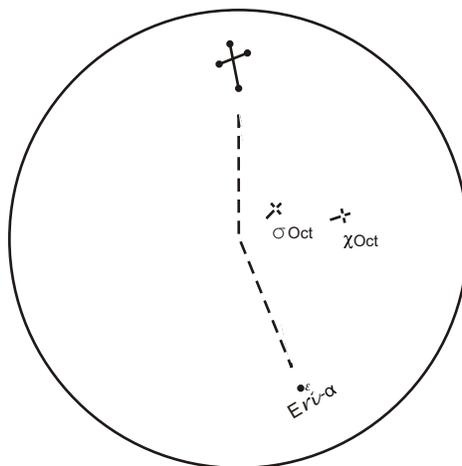
This diagram shows only the reticle lines used for Northern Hemisphere alignment.

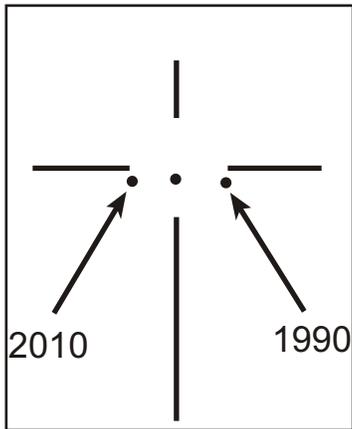
The 3 sets of lines for δ UMi and \omicron U Cep represent the Epochs 1990, 2000, and 2010. The gap in the longest line is for 1990, the gap in the middle segment is for 2000, and the remaining gap is for 2010. The stars are diagramed in their Epoch 2000 positions.

5. Rotate the reticle housing of the polar scope so that the constellation reference line on the reticle approximately matches the current sky orientation of the Big Dipper and Cassiopeia. Note that these constellations will not actually be visible through the polar scope.
6. Use the mount's azimuth adjustment knobs and altitude fine-adjustment knob to move Polaris into the gap in the reticle line that points to the Big Dipper. Place Polaris approximately as shown in the diagram, not in the center of the gap.
7. Rotate the right ascension axis to put Delta (δ) Ursae Minoris somewhere along the appropriate line for the current Epoch.
8. Readjust the altitude and azimuth to bring Polaris back to the appropriate position in its gap.
9. Repeat steps 7 and 8 until Polaris and δ UMi appear properly positioned in their respective gaps. Both stars will be off-center in their gaps, as shown in the diagram.
10. You now have good polar alignment. If you can see a faint third star (OV Cephei) near the remaining set of gaps, you can fine-tune the alignment a little further. Initially, you might need to turn the illuminator off to spot this star. If OV Cephei lies anywhere along its line for the current Epoch, no further adjustment is necessary. If OV Cep is offset clockwise, place Polaris a little farther inward along the Polaris line. If OV Cep is offset counter clockwise, place Polaris a little farther outward along the Polaris line. Repeat steps 7 through 10 until all three stars lie along their respective lines.
11. Disconnect power from the illuminator, remove the polar axis scope, if you wish, and observe!

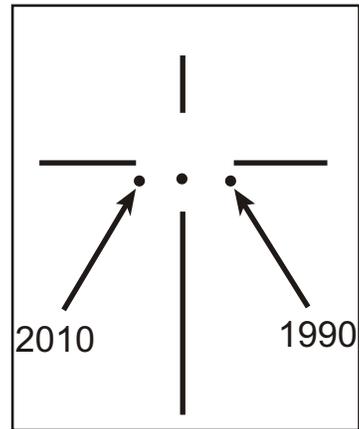
Southern Hemisphere

1. Set up your mount so that the polar axis is roughly aligned in azimuth toward the South Celestial Pole. Due to the lack of bright stars in the South Polar Region, you might prefer to do your initial rough alignment with the aid of a compass.
2. Slightly loosen the bolt(s) that lock the polar axis of the mount in place. Adjust the elevation angle of the polar axis so that the polar axis makes an angle above the horizon roughly equal to your latitude. (If you know the approximate position of the South Celestial Pole, you can just sight along the polar axis to see if you have the altitude about right.) It is easier to adjust the polar axis if you turn the fine altitude knob with one hand while using the other hand to move the axis manually.
3. Rotate the reticle housing of the polar scope so that the constellation reference line on the reticle approximately matches the current sky orientation of the Southern Cross and the star Alpha (α) Eridani. Note that the Southern Cross and Eridani will not actually be in the field of view of the polar telescope.
4. Adjust your mount's altitude and azimuth to place Sigma (σ) Octantis in its cross. The left-hand diagram below shows a close-up of an alignment cross with three star positions. The center position is for Epoch 2000. For Epochs 1990 and 2010, position the stars as labeled. Notice that the star positions are a little below the crossbar.





Approximate positions for σ Octantis



Approximate positions for χ Octantis

5. Rotate your right ascension axis to place χ Octantis somewhere along a radial line that would pass from the point where the dotted reticle lines meet through the appropriate star position for the current Epoch. χ Octantis should appear a little farther below its crossbar than σ Octantis did. (See the diagrams above.)
6. Readjust altitude and azimuth to bring σ Octantis back to the appropriate spot in its cross.
7. Repeat steps 5 and 6 until both stars lie at the appropriate spots for the current Epoch.
8. Disconnect power from the illuminator, remove the polar axis scope, if you wish, and observe!

For questions or comments, contact:

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