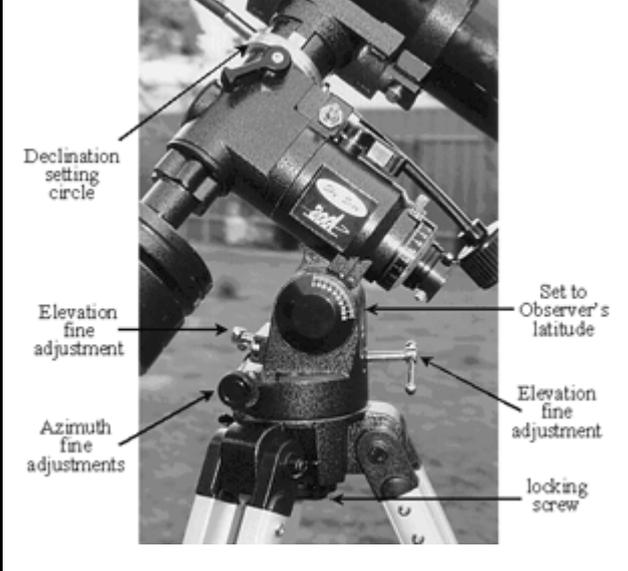


Aligning the Polar Axis of a Portable Telescope

While many of us have worked out suitable ways to store, transport, assemble and pack up our portable telescopes, we are all still presented with the problem of accurately pointing the polar axis of the telescope at the South Celestial Pole (SCP). Accurate alignment of the polar axis is necessary if you want the telescope to track celestial objects for protracted periods.

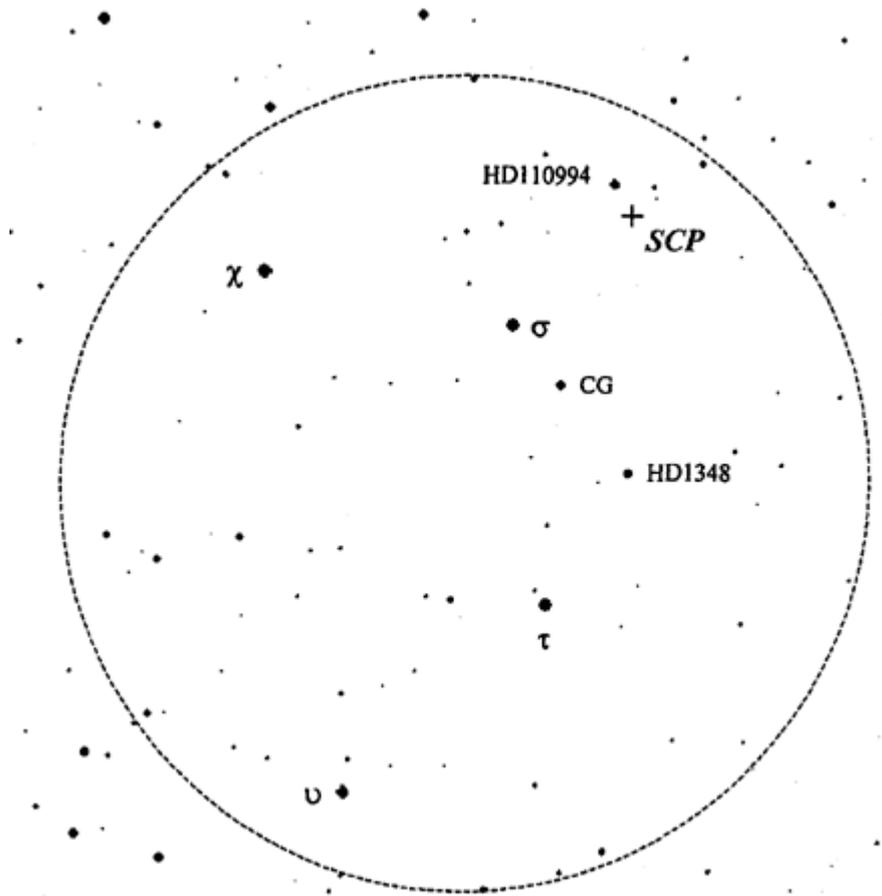
	<p>For portable telescopes the direction of misalignment of the polar axis can be determined by observing the drift in declination for stars in various parts of the sky.</p> <p>Adjustment is then a matter of 'trial and error'. This method works but it is a fiddly and time-consuming process.</p> <p>The method described below is relatively quick but involves making some careful initial settings to the telescope and learning to recognise the brighter stars within about 5° of the SCP.</p> <p>Like the diagram at left, the telescope equatorial mount head should have fine adjustments for azimuth and elevation.</p>
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Initial Set Up

1. The inclination of the polar axis on the telescope mount should first be set to the latitude of the observer. For Sydney this is close to 34° and the mount can be left set to this value if you are only observing in and around this region.
2. Next the telescope mount (usually a tripod) should be set down so that the polar axis is pointing approximately at the SCP. A popular way of locating the approximate position of the SCP is to draw an imaginary line through the long axis of the Southern Cross (Crux) and a second line bisecting, and at right angles, to the line joining the two pointers (Alpha and Beta Centauri). These two lines meet at a point close to the SCP. Care should be taken during this stage to ensure that the azimuth and elevation fine adjustments are in the middle of their ranges and that the equatorial head is level.
3. Using a bright star, the finderscope should be adjusted so that it points accurately to where the telescope is looking. Again, you can transport the telescope with the finderscope attached and already accurately aligned.

Alignment to the South Celestial Pole (SCP)

1. First set the declination setting circle to -90°
2. Next back off the azimuth fine adjustment screws and loosen the screw underneath the equatorial head so that it can rotate in azimuth. Pan a bit east and west until you recognise the stars in the region shown below.



Stars near the SCP presented in a field of view of about 5°

The four stars, χ , σ , τ and υ Oct, are just visible to the naked eye and form a quadrilateral that fits in a 5° field of view. CG Oct and HD 1348 are seventh magnitude stars forming a line with τ Oct. This pattern is quite distinct. The seventh magnitude star HD 110994 is about a degree away from σ Oct and currently close to the SCP.

- Now use the fine adjustments controls in elevation and azimuth to adjust the equatorial mount until the finderscope is pointing to the position marked on the chart above and tighten up the screw underneath the equatorial head.

This method depends upon the declination axis being at right angles to the right ascension axis and the declination scale being accurately attached.

Fine Adjustment for Aligning the SCP – The Drift Method

Using this method, azimuth and altitude are adjusted separately until the effects of star drift are eliminated.

✍ Azimuth adjustment

Select a star on the celestial equator and meridian (i.e., Hour Angle = 0° and Dec. = 0°).

- ✍ If, over time, the star drifts **South** in the eyepiece then the southern end of the polar axis is pointing **East** of the SCP.
- ✍ If the star drifts **North** then the southern end of the polar axis is pointing **West** of the SCP.

✍ Altitude adjustment

Select a star in the East (and/or in the West) low on the horizon and in the southern hemisphere of the sky (i.e., ~ Hour Angle = 4° to 5° and Dec. ~ -45°).

- ✍ If the star in the **East** drifts **North** the elevation is too low.
- ✍ If the star in the **East** drifts **South** the elevation is too high.
- ✍ If the star in the **West** drifts **North** the elevation is too high.
- ✍ If the star in the **West** drifts **South** the elevation is too low.

You can see from the above that the altitude adjustments are reversed from East to West.

- ✍ Details of these methods are available on request.
- ✍ The popular EQ series of equatorial mounts have such adjustments (see Figure 1).
- ✍ Most German Equatorial Mounts (GEMs) have a bubble level built into them. Otherwise you can buy a bubble level from a local hardware store for a few dollars.
- ✍ The finder-scope should have reasonable optics yielding roughly 5 degree of sky.