

Collimating the Next Generation Telescope

Collimation Instructions for the NGT-12.5 and NGT-18 Telescopes with Rotating Nose Assembly

The rotating nose assembly of the Next Generation Telescope introduces some complications into the collimation procedure. For the collimation to remain constant as the eyepiece holder is rotated, the optical axis of the primary must first be made coincident with the axis of rotation. The diagonal and focuser must then be made to conform to this axis. In a fast focal system (f/4.5) this is quite critical. Here are the steps to follow:

- 1) Use the sight-tube in the usual way to center the diagonal mirror in the eyepiece holder.
- 2) Bring the optical axis of the primary into coincidence with the axis of the rotation of the head of the nose assembly.
 - a) Using the Cheshire eyepiece, note the position of the center spot of the primary relative to the bright ring produced by the Cheshire. It is helpful to hang something on one of the spider vanes so that they are easily distinguished for various positions of the eyepiece holder.
 - b) Rotate the head through 180° and again note the position of the center spot of the primary.
 - c) Adjust the primary so that the center spot is halfway between these two positions.
 - d) Repeat steps a through c until the position of the center spot does not change with rotation through 180° .
 - e) Rotate the head through 90° and repeat steps a through d. A few iterations may be necessary but the goal is to have the center spot remain fixed with respect to the bright ring of the Cheshire eyepiece through a complete rotation of the head. It does not need to be centered at this stage — just stationary. When this has been achieved, the optical and rotation axes are coincident.
- 3) Adjust the tilt of the diagonal to center the spot on the primary in the bright ring of the Cheshire.
- 4) In bright illumination, if the optics are well-designed, the autocollimator should show the spot on the primary and one or more images nearby. If the image is not visible, try applying light pressure to the diagonal mirror or the eyepiece holder in order to locate them. Adjust the tilt of the diagonal to bring the center spot and its image into near coincidence. There is no point making the two align precisely as one is ultimately limited by errors in the autocollimator itself. To get an idea of these errors, rotate the autocollimator by 180° and watch the change in the separation of the center spot and its image.
- 5) Return the Cheshire eyepiece to the focuser. If step 4 causes significant de-centering of the spot on the primary in the bright ring of the Cheshire, the focuser will need adjustment. If this is the case, do the following:
 - a) Re-center the two by adjusting the tilt of the diagonal.
 - b) Using the autocollimator, bring the spot on the primary and its image into near coincidence by adjusting the angle of the focuser mount. Again, one should not align them more closely than the accuracy of the autocollimator warrants. Also, verify that the two do not change position as the focuser is racked in and out.
- 6) Repeat step 4 at several positions of the rotating head. It may be difficult to have the center spot and its images equally well-aligned at all positions of the head unit, in which case a balance should be struck.

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