

## *Howie Glatter's Uni-Blug Instructions*

The Uni-Blug is used together with a regular single beam laser collimator to adjust the angular alignment of the primary mirror of a Newtonian telescope. First however, the angular alignment of the secondary mirror is adjusted with the laser collimator alone. As usual, adjust the secondary so that the laser beam strikes the center of the primary mirror. The Uni-Blug is now placed in the inner end of the drawtube, inside the telescope tube or upper cage, in the end of the drawtube opposite the collimator. It is best to insert the laser collimator in the eyepiece end of the drawtube first, so that there is no danger of air pressure from the inserted collimator pushing the Uni-Blug out of the drawtube. With a truss tube scope, the Uni-Blug should be inserted with the shadow screen facing the back of the scope so that it will be visible from primary adjustment position. With a solid tube scope, insert the Uni-Blug so that the screen faces the front.

If the collimator has an aperture stop that was installed for the secondary adjustment, remove it first before using the Uni-Blug. If not, the Barlowed shadow will lack contrast and you may be confused by diffraction rings on the Uni-Blug screen.

Seat the shoulder of the Blug against the drawtube end. The Blug should fit snugly in the drawtube so that there is no danger of it falling on the mirrors. The inner end size of drawtubes from different focuser manufacturers can vary, although most are near eyepiece nominal size.

Feathertouch focusers with 52mm threads at the drawtube inner end can be fit by placing the supplied adapter O-ring on the Uni-Blug and sliding it up to the shoulder where the Uni-Blug seats against the drawtube. The adapter O-ring acts as a spacer between the Uni-Blug shoulder and the drawtube, so that the drawtube threads will engage the thick O-ring in the groove.

The laser beam is diverged by the lens in the Uni-Blug, then reflected by the secondary mirror to illuminate the central area of the primary mirror. The diverged beam impact on the primary may be irregular and not centered, but this does not matter. Upon reflection by the paraboloidal primary, the beam is collimated into all parallel rays, except that where the center of the mirror is covered by the collimation target the reflection is blocked, so the upward-traveling beam now contains the silhouette shadow of the collimation ring or mark within it.

The collimated beam is reflected by the secondary mirror to the screen on the Uni-Blug, where the shadow of the collimation mark is seen. The shadow's position is an accurate indication of the primary mirror optical axis location. The primary mirror is adjusted so that the shadow is centered on the screen's central aperture. Collimation is now complete.