Collimation instructions for APM APO-Bino 100-45°/90°

Version 1.3 from 19.08.2015, Joerg Kneip, Company Wellenform

The collimation of the APM APO-Bino 100-45°/90° is usually very stable and does not have to be corrected. The collimation tool is primarily intended to optimize the adjustment at high magnifications individually. This is necessary because the tolerances of an collimation for the general public, at magnifications greater than 100x, for the eyepieces employed as well as for the individual characteristics of the observer's eyes are too small. Then, the collimation can be adjusted optimal for your own eyes and eyepieces with the tool.

Note: Because you work close the lenses with the collimation tool, mindfulness is the top priority. The tool has been designed so that it can not damage the objective lenses when used as intended. Carelessness or act quickly damage to the lens is possible. Such scratches do not reduce the optical power of your binoculars but cause a drastic impairment of the optics. The Company Wellenform assumes no liability for such damage.

Tool: The tool (Figure 1) is used to loosen the retainer ring and for rotating the eccentrically lens mount during collimation. To do this, the sharpened edges of the stainless steel T-profile at the bottom of the tool (Figure 2) insert into the two notches at the front of the retainer ring (Figure 3) and into the two notches at the eccentrically lens mount (Figure 8).

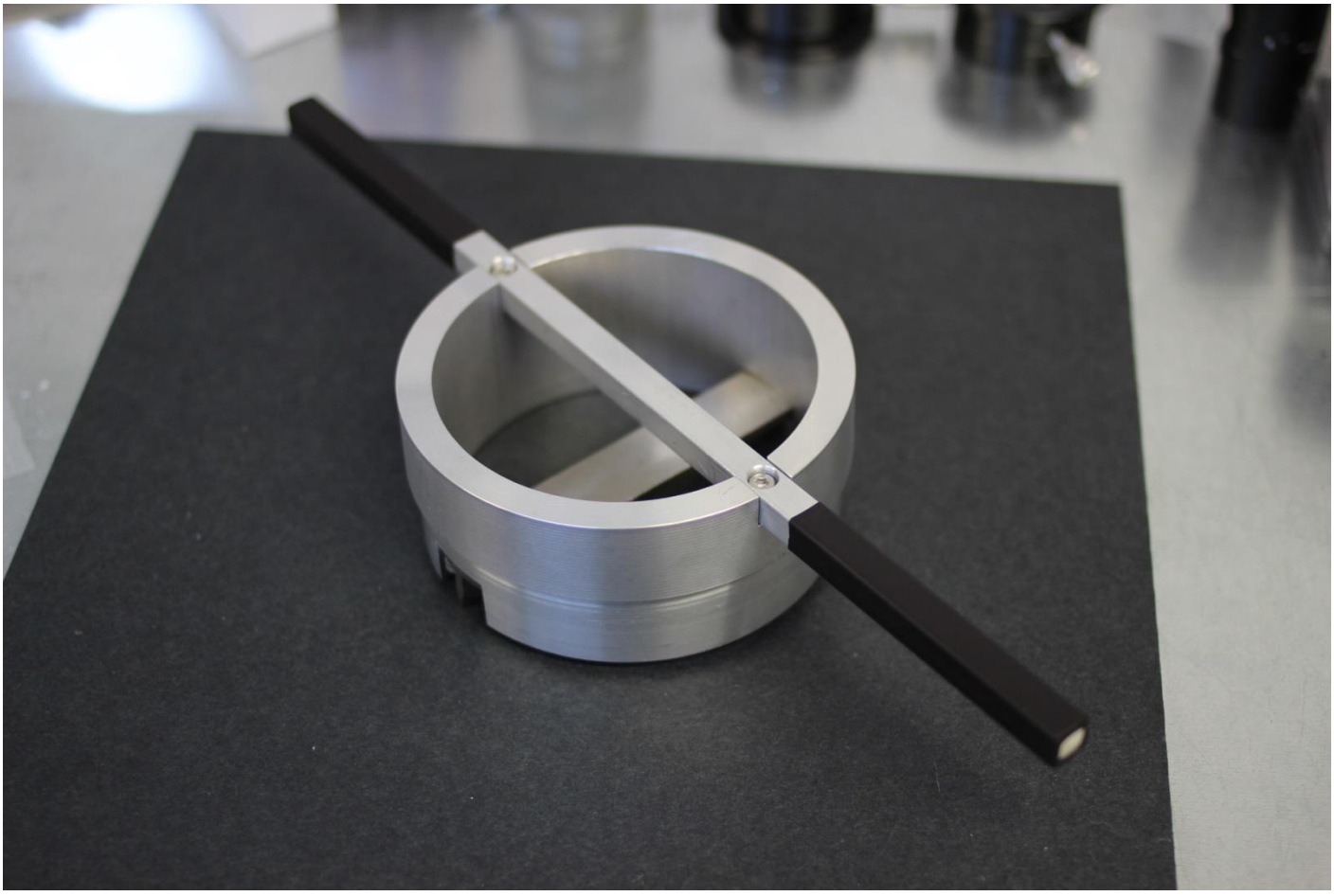

Fig. 1: Collimation tool

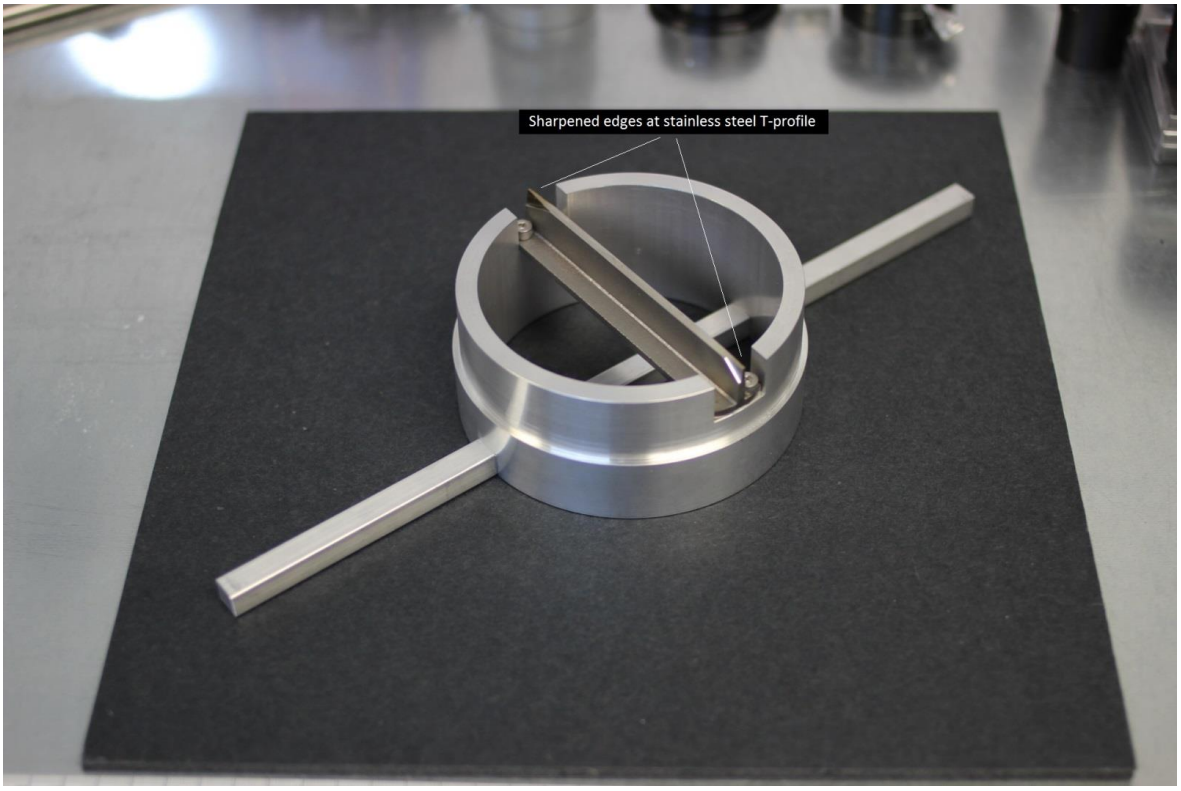

Fig. 2: The bottom of the collimation tool, stainless steel T-profile with sharpened edges

To loosen the retainer ring: Fix the binoculars and place a clean microfiber cloth (Figure 4) under the enclosed cardboard disc (Figure 4) to protect the objective lenses (Figure 5+6). After that, insert the collimation tool into the two notches at the front of the retainer ring (Figure 3) and rotate the tool counterclockwise. If the retainer ring is loosen, you can turn it by hand. Between the retainer ring and the eccentrically lens mount is a narrow ring of steel (Figure 7), which has the function of a washer. This ring of steel can be easily removed after unscrewing the retainer ring. Please do the same on the second tube. Then put away the retainer ring and the ring of steel.

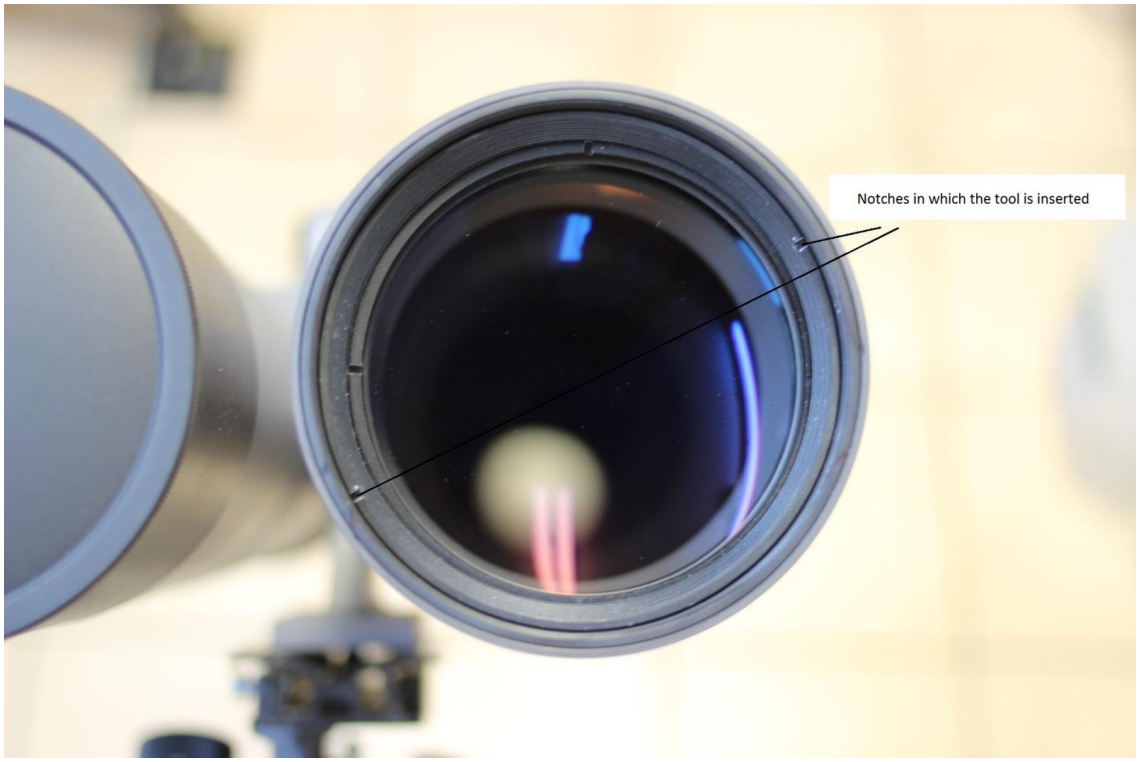

Fig. 3: Retainer ring to fix the lens mount, notches in which the tool is inserted

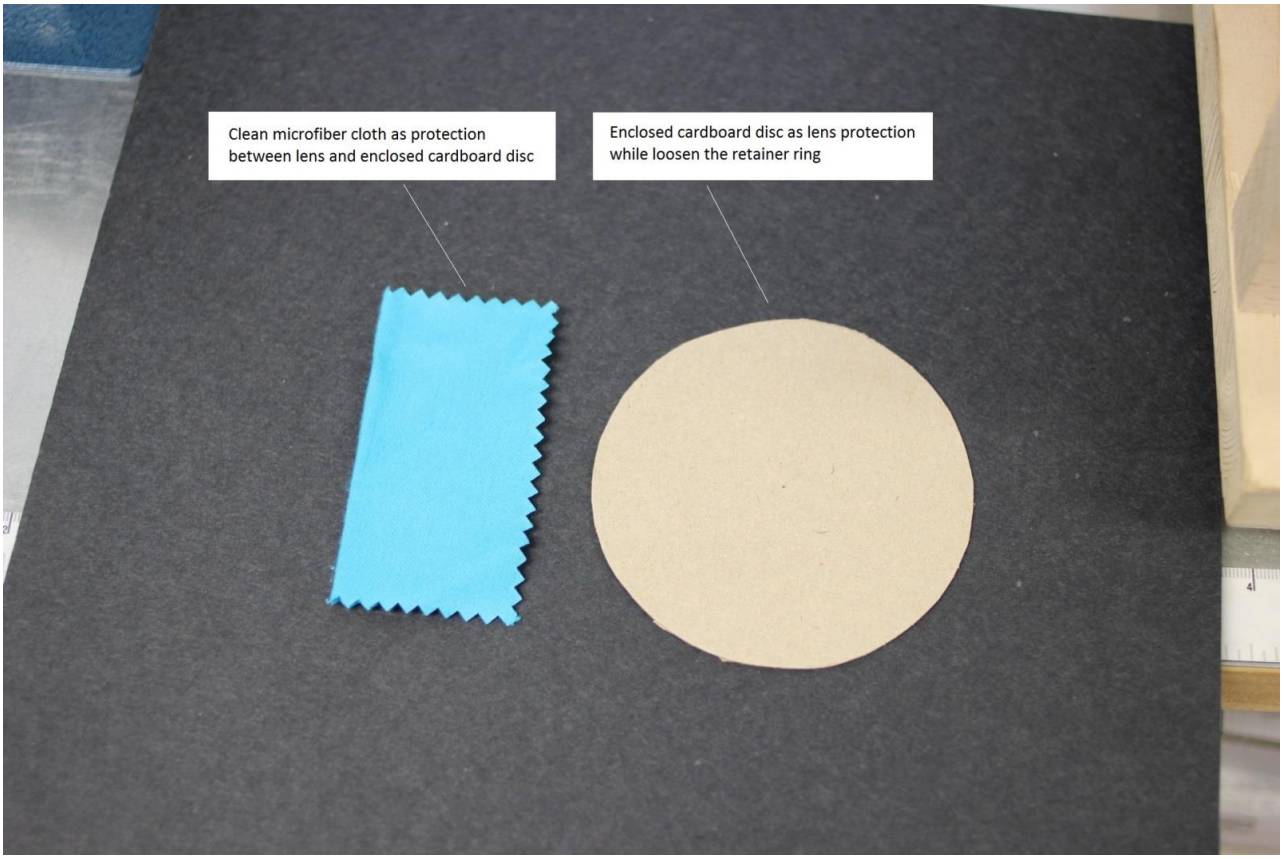

Fig. 4: Clean microfiber cloth and enclosed cardboard disk as lens protection

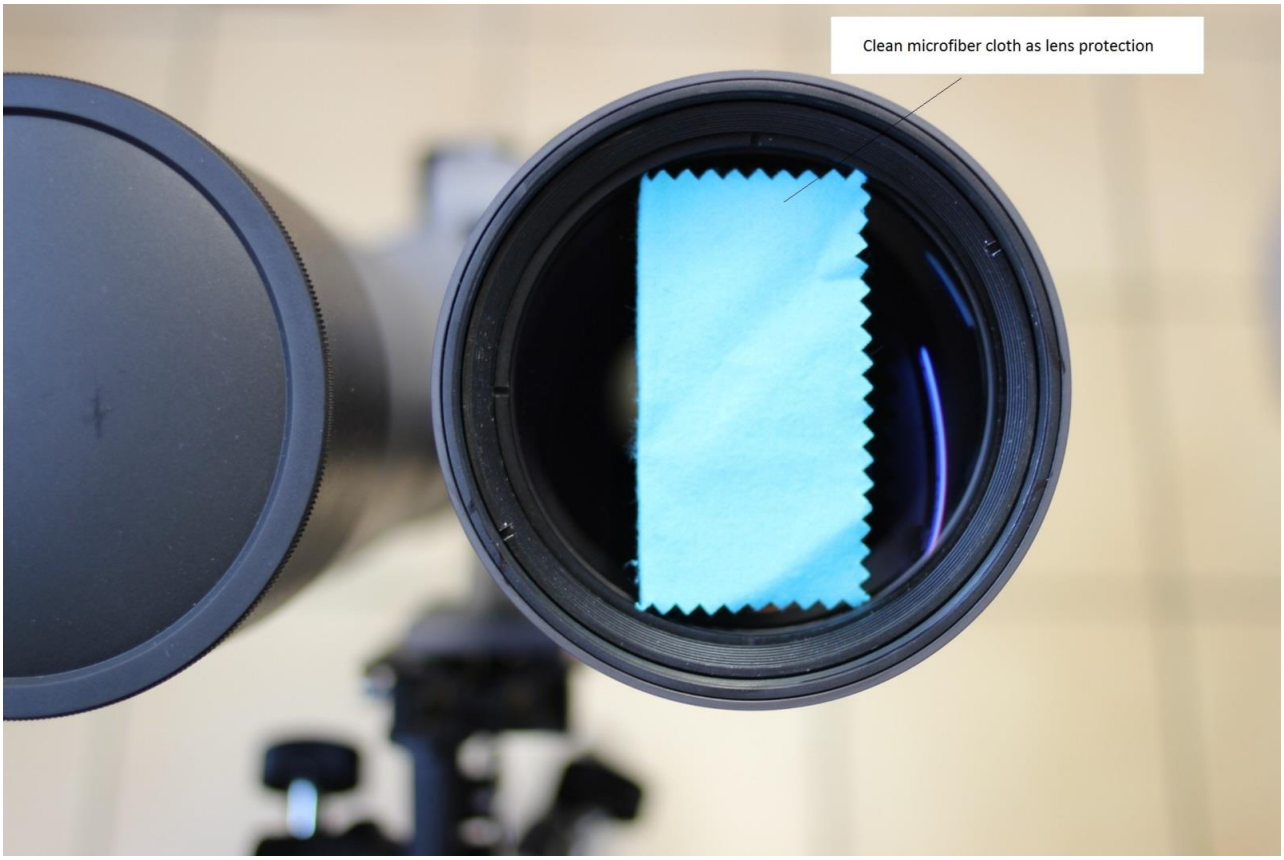

Fig. 5: Clean microfiber cloth in the center of the objective lens

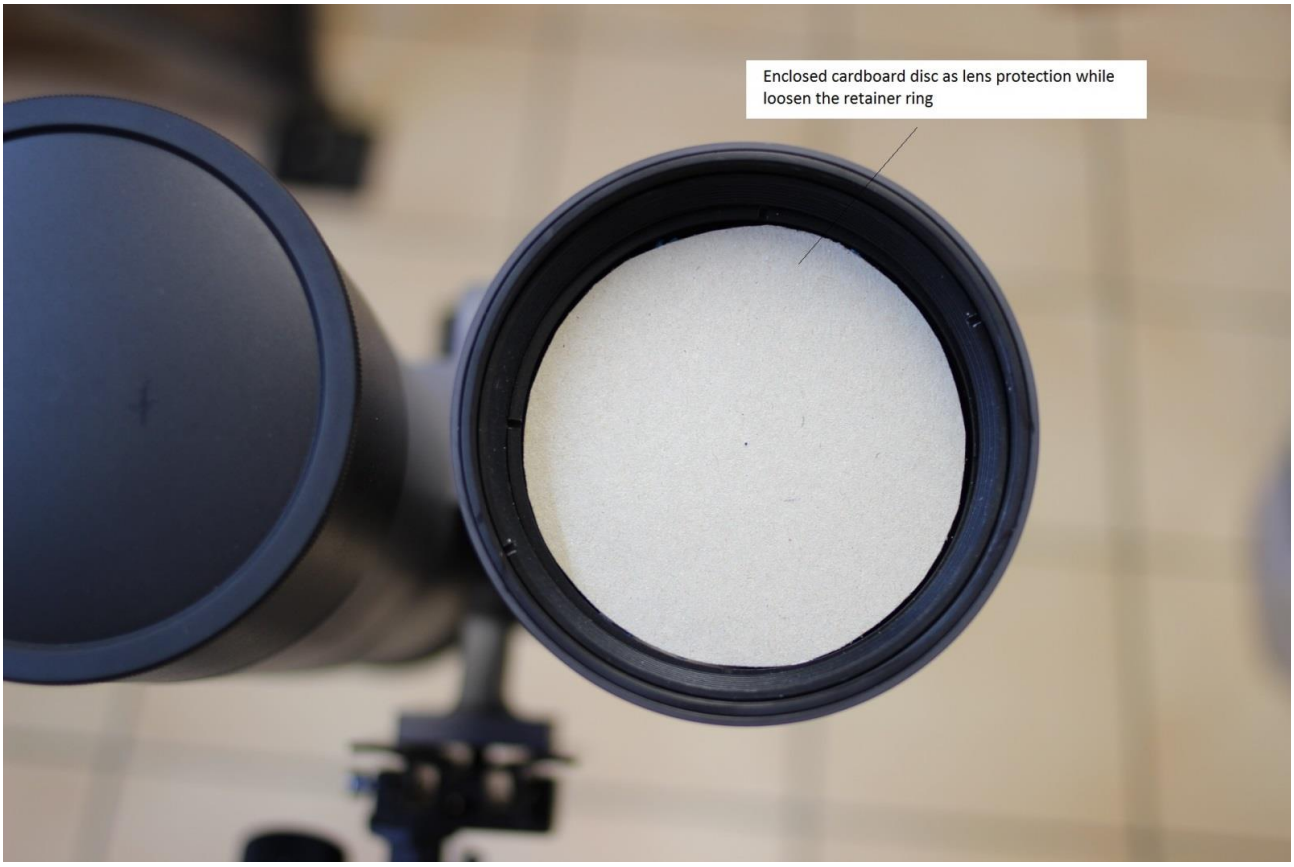

Fig. 6: Cardboard disc on the microfiber cloth while loosen the retainer ring

Fig. 7: Retainer ring with steel ring after removing

Collimate binoculars by turning the eccentrically lens mount:

A highly suitable star for carrying out the collimation in the night sky is polaris. Insert the tool into the two notches at the eccentrically lens mount (Figure 8) and turn the tool slightly (clockwise or counterclockwise) until the lens mount is loosen. Because the lens mounts can take out now, please do not turn down the binoculars. Collimation is carrying out on both tubes. The eccentrically lens mounts be rotated with the collimation tool in increments of approximately 5° clockwise or counterclockwise. After each rotation the collimation is verified at the star. Because the eccentrically lens mount can be loosen slightly by the rotation, please pressing the mount after each rotation (-> by pressing lightly on the collimation tool).

Target of the collimation: The focused stars in the two tubes should ideally be exactly next to each other horizontally. The distance of the star to each other should be doing as low as possible. The star of the left tube is to stand on the left side and the star of the right tube on the right side.

Principle of collimation with eccentrically lens mount: While turning the eccentrically lens mounts, the stars in the two tubes describe circles. These two focus-circles meet ideally in a point (Figure 9, Image 1), which then represents the optimum collimation state. Due to manufacturing tolerances for binoculars and the eyepieces, this condition is hardly ever achieved. Therefore, the tubes and the lens mounts are made so that the focus circles overlap and thereby intersect in two points (Figure 9, Image 2). The task during the collimation is therefore to find one of these two points.

I do that by finding out how the two focus circles each are (Figure 9 Figure 2-5) and then selectively adjusting one of the two points by respective rotations to the eccentrically lens mounts. Here, the higher the magnification during the collimation, the better is the collimation. I start with a small to medium magnification (30-50x) until the collimation for this magnification is ready and then go to the maximum magnification to complete the collimation.

To find out how the two focus-circles are to each other, turning a lens mount clockwise and looks like the position of the star changes with each other. Then you turn the same lens mount anti-clockwise and then looks again like the position of stars has changed each other. Then you turn the lens mount back to the initial position and does the same thing with the other lens mount. Based on 6 star positions and the knowledge that the stars describe circles, one can determine the correct direction of rotation and the correct angle of rotation for the lens mount to find an intersection quickly.

Individually it may be easier for the individual observer during collimation to make the star of a tube slightly out of focus and then to position the focused star of the other tube in the center of the defocused star. For me this method was inaccurate at higher magnifications. At low magnifications, this method can simplify the collimation absolutely. I prefer for the higher magnifications to look at the two focused stars from a certain distance of the eyes from the eyepieces, to prevent fusion of the stars through the brain and so be able to assess each other accurately the positions of stars.

Alternatively, there is also the possibility to do the collimation with the "trial and error" method. Especially when both stars are already tight together, the adjustment can be carried out very quickly with this method. To do this, a lens mount is slightly turned and looked whether the stars are now closer to each other and are on the right side. If so, turn in this direction to the closest approach. If not, turn the same lens mount in the other direction. Then do the same with the other eccentrically lens mount.

After the collimation is done, reinsert the steel rings (Figure 7) into both tubes (-> on the eccentrically lens mount) and screw in the retainer rings clockwise by hand until it stops. The collimation tool is inserted in the two notches of the retainer ring (Figure 3) and tighten the retainer ring clockwise moderately. Excessive tightening of the retainer rings may cause tensions in optics, which are visible at high magnification in focus. If such tension are visible while observing, please loosen the retainer ring slightly.

Again the Note: Please do the work with caution!

For inquiries and comments: mail to info@wellenform.biz or just call at +496831-123141

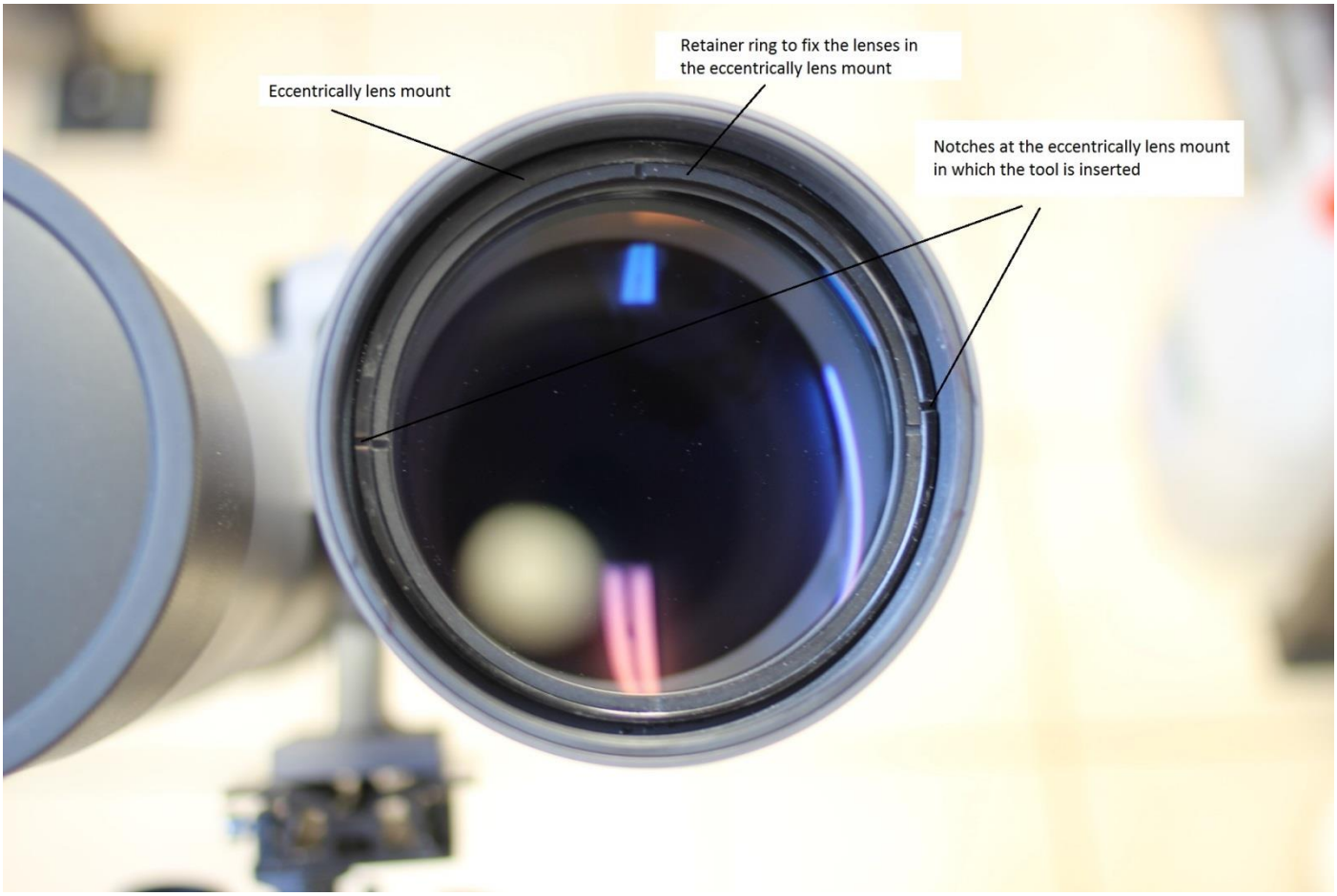

Bild 8: Eccentrically lens mount after loosening and removing the retainer ring, notches in which the tool is inserted during collimation.

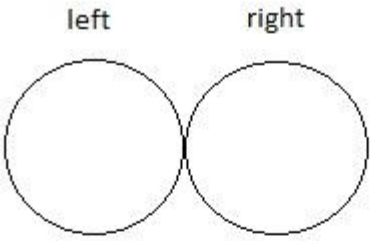

Image 1: ideal case, both focus-circles touch at one point.

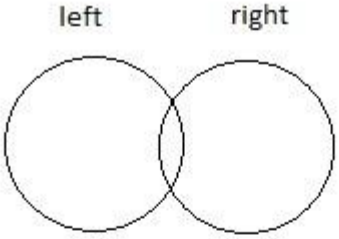

Image 2: normal case, the focus circles touch at two points.

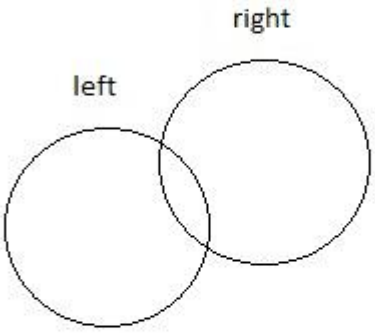

Image 3: special case, the focus-circles have a horizontal offset

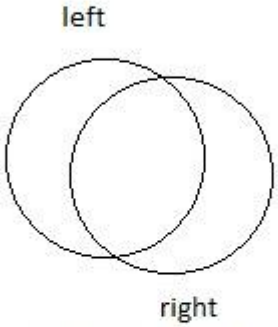

Image 4: special case, the focus-circles have a horizontal and a vertical offset.

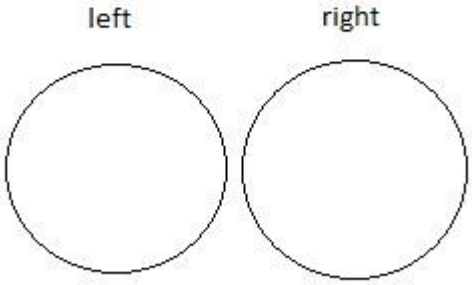

Image 5: special case, the focus- circles do not touch. An adjustment of the prisms is necessary.

Bild 9: Possible focus-circles while turning the eccentrically lens mount