

## Carl Zeiss Biotar f2 58mm pre-set, M42 mount

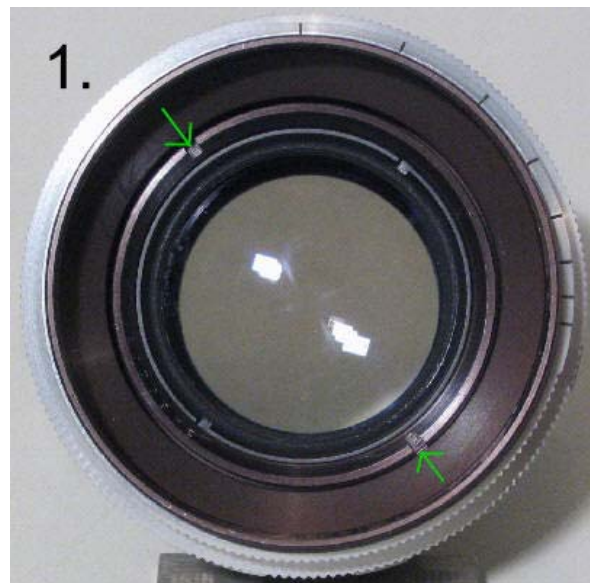


### Note:

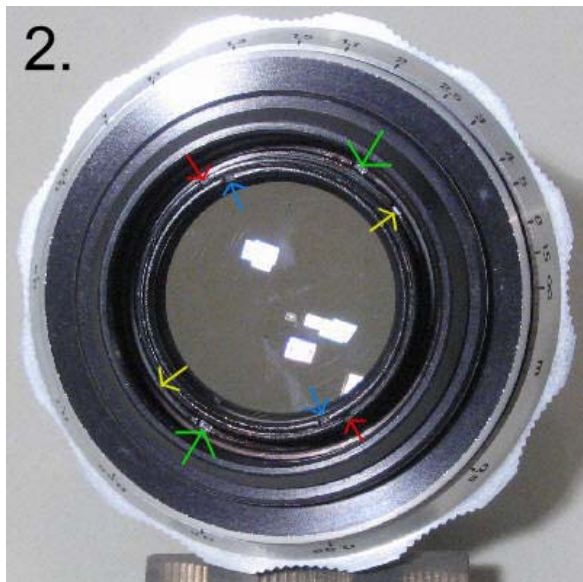
Before unscrewing anything, mark clearly with a scribe the relative positions of the various rings and spacers visible at the rear of the lens. Two of the components are machined eccentrically to provide a radial position adjustment for the rear element, and they should be reassembled in exactly the same position. I don't know what this adjustment corrects for, but Herr Zeiss obviously felt it was important enough to significantly increase the complication of the the construction and alignment, and hence the selling price, of his lenses! Also it is certainly a good idea to replace at least the rear lens element, and probably the others, in their original orientations. To do this, mark them near the edge before removal with an easily removed ink, aligned with a mark on the housing (scribed or "permanent marker"). Then, as soon as the glass element is removed, mark the outer diameter with a permanent marker (eg. CD-R marker pen) at the same position. If the rear element assembly has obviously been previously dismantled, but there is no sign of alignment marks, it is probably a good idea if the parts are reset on assembly to give zero offset. If the parts have been assembled at random by a previous repairer, the error could be quite large (up to .012" offset (0.3 mm) on my example).

### A. Removing optics and separating diaphragm from focus mount: -

1. Unscrew the front trim with a friction tool and remove the front element assembly using the outer slots as shown in Fig. 1. If either of these items is tight, leave this until the diaphragm barrel has been separated from the helical at step 4. The helical sliders are part of the focus mount, therefore aluminium, and rather delicate, so force should be avoided.



2. Set the focus to infinity to move the inner helical as far back as possible. Unscrew the retaining ring shown in Fig. 2 at the green arrows. This is the outermost of 4 visible slots. The others are the retaining ring for the 4th



element (blue), its mounting sleeve (red), and a spacer (yellow). The latter two are the eccentric parts referred to in the note at the top, and do not unscrew. The ring is deeply recessed and needs a tool 31mm across the tips, which should be 1mm or less thick. Remove the sleeve and spacer. They are a snug fit in position.

3. Remove the 3rd element, complete with its housing, using the slots shown in Fig. 3. This element is thick, and an extremely tight fit in its housing. Unless there are pressing reasons to remove the glass (eg. rampant fungus) leave it in its housing and if necessary just remove its retaining ring to aid cleaning to the edge of the rear face.



4. Set the focus at minimum distance (ie. with the inner helical fully forward). The diaphragm barrel is fixed to the inner helical by a retaining ring which is about 4mm larger than the throat at the rear of the focus mount, and screws on to the outside of the rear of the diaphragm barrel. You can just about see the slots if they are not covered in helical grease (see Fig. 4). They are partly masked by the rear of the diaphragm barrel, just to make the job more interesting! The tool needs to be 36mm across the tips, and the tips 1mm thick. There may be a tool that will do this job, but I haven't seen one, so I made one - pretty crude but it did the job (see pictures). Once the ring is off, the diaphragm barrel assembly will slide out from the helical/focus-mount assembly. The focus setting spacer can be removed from the diaphragm barrel, or left in place if it is not loose.

### B. Disassembly of focus mount: -

1. With the focus set to infinity, measure accurately the distance from the rear of the focus mount to the front of the inner helical (x) as shown in Fig. 5. Also measure accurately the distance from the rear of the mount to the rear of the focus ring (y) and note how the rear edge of the ring lies relative to the index mark (ie. right at the point of the triangle).
2. Remove the focus stop screw and SLOWLY wind the focus ring anti-clockwise to move the inner helical forward while applying slight clockwise pressure on the inner helical. Stop at the exact point where the inner helical frees from the sliders. Note accurately the distance between the rear of the lens mount and the rear of the focus ring (z - measured as for "y"). Also note the position of the focus ring relative to its index.
3. Separate the 3 parts (and remove the loose diaphragm-barrel retaining ring) marking the point where the inner helical separates from the outer. My lens already had a cross scribed, aligned with the locating slot in the inner helical, probably at the factory, because I don't think it had been apart before.

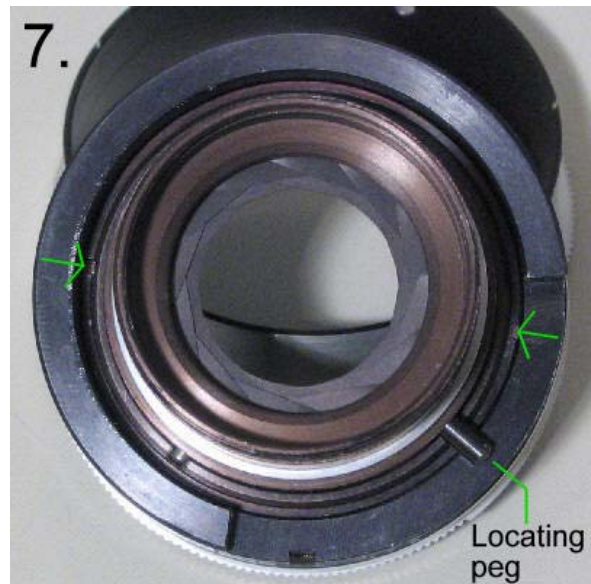


### C. Disassembly of diaphragm pre-set mech. and aperture ring: -

1. Mark the position of the outer sleeve relative to the index dot (a scribe mark on the rear edge, where it won't be seen) at the position shown in marker pen in Fig. 6. It looks perfectly symmetrical but won't be - remove its 2 screws and slide it off.

2. Remove the peg (Fig. 7) which locates the assembly to the inner helical (it also acts as the stop for the preset).

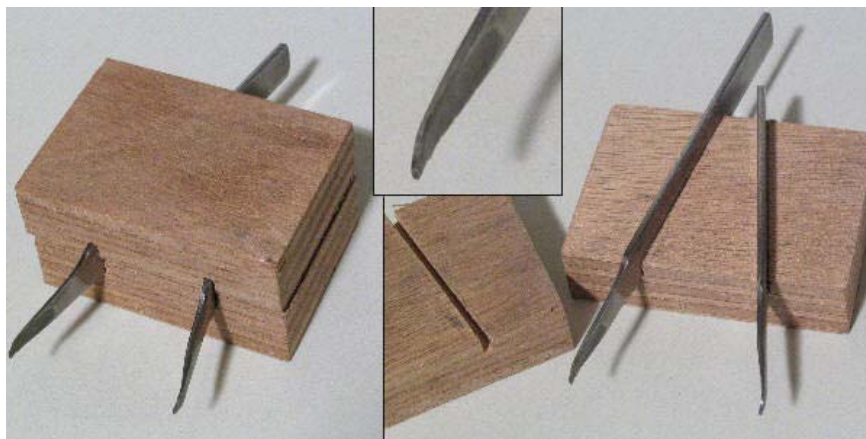
3. Remove the retaining ring from the rear of the assembly (arrowed in Fig. 7) (while holding on to the front aperture ring). It is not easy to get at and may be tight.



4. Slide off the preset index sleeve and the inner brass preset ring with its 4 springs.

5. Unscrew the diaphragm operating screw (arrowed in Fig. 8) and unscrew the aperture ring to the rear. If the diaphragm itself is not to be dismantled, replace the screw to prevent the diaphragm being accidentally operated beyond its normal limits while cleaning the mechanism.

6. If the diaphragm is to be dismantled, this can be done after removing the circlip visible at the front.



Tool for removing diaphragm-barrel/helical retaining ring.

Reassembly: -

A. Diaphragm pre-set mech. and aperture ring assembly: -

1. Remove the aperture setting screw from its position, where it was left in Disassembly C 5. Grease the thread, and fit the front diaphragm ring. Replace the pin.

2. Grease the inside of the index sleeve and insert the brass ring with its "lump" aligned with the index mark. Lift the ring enough to slide the springs into their slots. Grease the springs well to prevent noise as they are compressed. Temporarily fit the screws from the outer sleeve into their positions in the brass ring. This is to prevent the parts turning and coggling the springs. Check that the springs are straight and vertical in their slots, and check the brass ring moves freely when compressing the springs.

3. Grease the shoulder on the front aperture ring where the brass ring turns and engages. ALSO grease the step on the inside of the index sleeve where the retaining ring bears on it.
4. Fit the index assembly to the front aperture ring, engaged in any position.
5. Fit the retaining ring and tighten well. Fit the locating peg.
6. Lightly grease the inside of the outer sleeve and the outside of the index sleeve. Carefully remove the outer sleeve screws and slide the outer sleeve on in its correct position. **BE VERY CAREFUL NOT TO LET THE INDEX RING TURN RELATIVE TO THE BRASS RING OR THE SPRINGS MAY COGGLE!** Re-insert the 2 screws being careful not to let them get cross-threaded. This may be quite difficult as the brass ring may seem to be not quite far enough to the rear. Press the outer sleeve as far forward as it will go, make sure the screws look perfectly square, and stop if there is any significant resistance.

#### B. Focus mount and helical assembly: -

1. Grease the helical and the focus-mount thread thoroughly.
2. Insert the barrel retaining ring in the back of the focus mount and assemble the mount to the focus ring. Set to the position as noted during disassembly in B 2. (distance "z" and noted position on the focus scale).
3. Fit the inner helical to the outer at the position noted and wind it anti-clockwise to the point where it is about to engage with the sliders. Wind the focus ring clockwise so that the sliders engage, and continue to the point where the rear of the ring is correct with its index at the infinity mark. Check distance noted above (y). Set just below infinity and fit the focus stop screw. Set at infinity and check the distance noted at (x) above.

#### C. The rest: -

Make sure the focus setting spacer is in position (the ring with the aluminium face in Fig. 8), assemble the focus mount to the aperture assembly and tighten the slotted ring.

Reassembly of the optics is the reverse of the disassembly procedure.

Interestingly, there appear to have been 4 different types of grease used in this lens! The helical grease was a normal yellowish colour, the focus mount grease was a dark brown, the thread on the main, front diaphragm ring was orange, and the grease on the spring-loaded aperture preset ring was green. The last may have been due to the brass, but it did appear to be actually a green grease.