

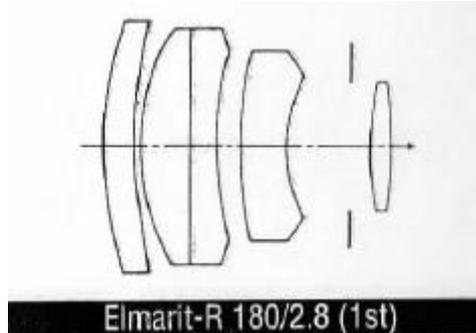
Elmarit-R 180mm f:2,8

Version 1

Version 1 differs significantly from the later Version 2 in both optical and mechanical aspect.

Lens is very heavy, weight is more than 1,3 kg.

Lens consists of 4 lenses in 4 groups, optical schema (after Sartorius) is



Four elements (2 single and 2 cemented) are located in front of iris with single element behind.

Lens used here for demonstration is prototype (SN 0000990), however I believe that at least from mechanical point of view it is identical to regular version 1.

Lens which I received was terribly attacked by fungus, one could see it on all elements, one could smell it as well. Usually such lens is a good candidate to scrap, I decided however to open it and try to remove fungus – prototype lens. At the end all fungus could be cleaned, there are no damages neither to coating nor glass, smell is away. I believe that it was not a regular glass fungus but something what developed in high humidity.

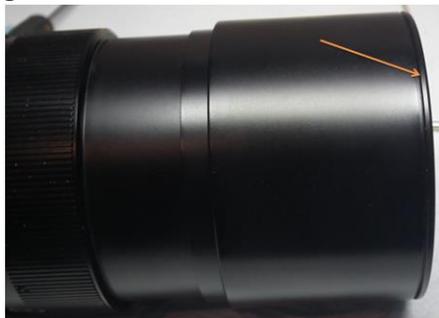
At the end of this document I will describe how I cleaned it.

In order to disassembly the lens the standard lens tools will be needed: flat screwdrivers (1mm, 1,5mm, 2mm), spanner wrench to remove rings, rubber gloves. Useful are as well rubber rings.

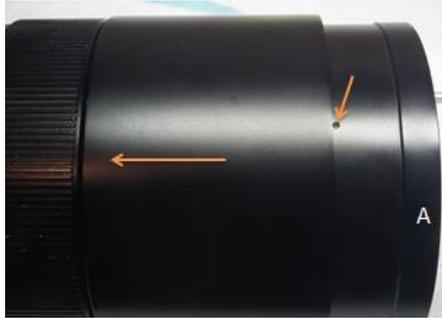
Before you start with disassembly mount the lens on the camera and check if the lens focuses properly at infinity, take the object which is far enough.

1. Removing front lens groups

- a. extent the lens, set focus to 2m and unscrew the front ring. Use rubber gloves or rubber sheet



- b. move the sun shield backward and locate the screw, remove it. Unscrew "A" (counterclockwise).



- c. In the similar way remove yet another tube which located beneath
d. Before you unscrew the lenses mark its position versus red dot on lens mount. Make a scratch, it will be useful when mounting the lens, but as well it will be used as orientation for optical elements. Unscrew the whole front optical part.



- e. Optical elements are fixed with retaining rings, use spanner wrench to remove them. Mark position of each lens before removing from the mount. I use paper tape and black marker, after removing each element I transfer the mark to the edge of each optical element. I assume that no one has autocollimator which could be used to position lenses in the mount when assembling, using markings on the mount and edge of glass you will be able to position them as they were. Remove paper tape with markings.



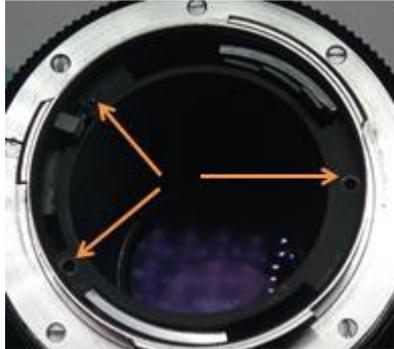
- f. proceed in the same way with remaining elements from the front part.
g. After cleaning optical elements proceed with assembly. As info – all front optical elements dismantled



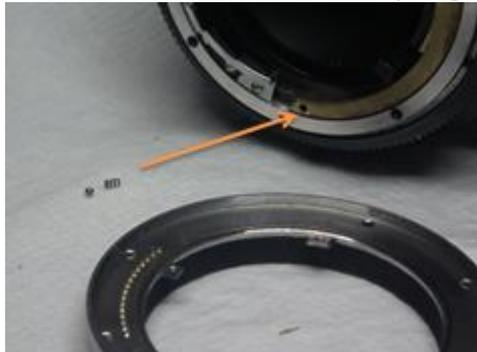
2. Accessing rear part.

It is possible to remove rear part including iris and rear element without disassembly of bayonet mount and focus ring however assembling is much easier if you remove them first

- a. Remove 3 screws fixing plastic light shield and remove it



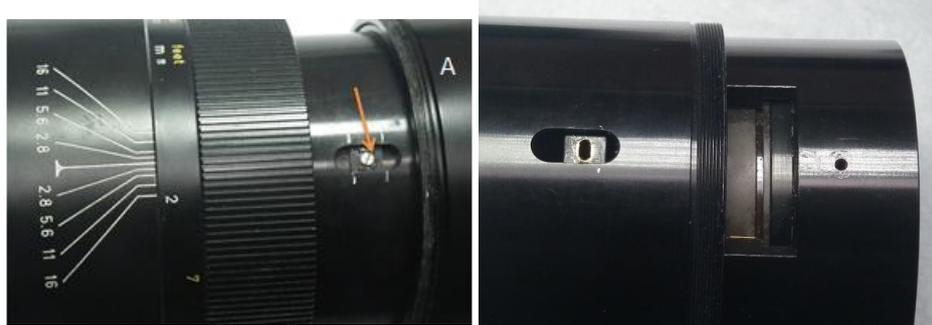
- b. Remove 6 screws fixing bayonet mount and remove the mount. Attention – mind a small steel ball and spring, not to lose them



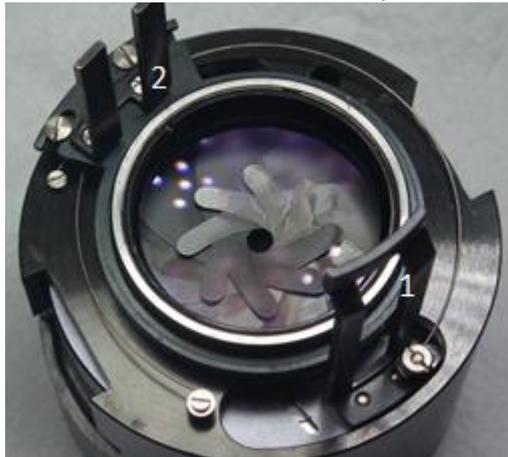
- c. Pull off the aperture setting ring A.-Clean and lubricate having it apart. 2 screws holding aperture ring B will be visible. You may remove them, pull off brass ring B, clean and lubricate.



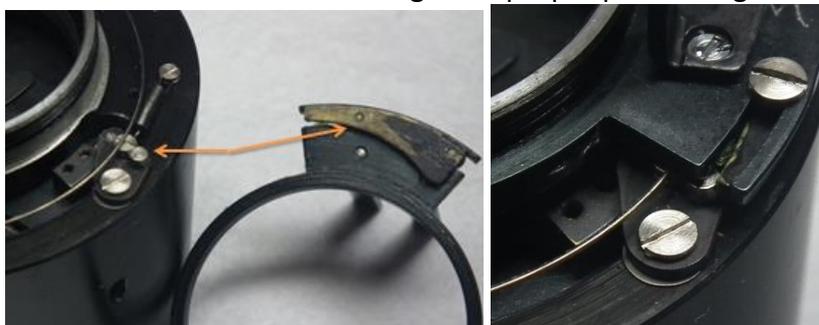
- d. We may proceed now to remove aperture mount together with the last optical element. Unscrew the tube A from focus ring and remove the screw (np need to do any markings) and pull out the mount, left photo shows mount partially extracted



- e. Photo below shows the rear part after removing light shield (unscrew it)



Observe two guide rails: rail 1 is connected to the aperture setting ring, rail 2 closes the iris to the preset value when releasing camera (or pressing DOF checking button)- You may want to remove rail 2 with the ring, clean and lubricate. When assembling mind proper positioning



3. Focus ring, helicoid

if the focus ring moves smoothly leave it as it is. Helicoid is multithreaded, it is not easy to screw it in correctly when assembling. Focus at infinity you may correct (if needed) without unscrewing helicoid completely. Below there is an explanation of parts involved and how the interrogate

- a. Focus ring is fixed with retaining ring. If focus is correct but focus scale does not show proper distance lose the ring and rotate distance scale accordingly, fix the retaining ring afterwards.



- b. Elements involved in focusing



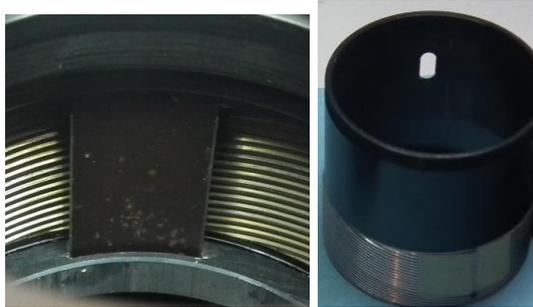
1 is part of lens mount which is fixed to the camera, does not rotate when focusing. 2 is a ring which delimits rotation at infinity and 2m. It is hidden under the distance scale and has a notch hidden within 1.. 3 is rotatable part of helicoid, with 2 screws it is fixed to focus ring (both not on the picture). When you rotate focus ring both 2 and 3 will rotate moving the whole optics mount in or out. Notice long cutout on brass part – this is adjustment for focus, best to do it on infinity. When 2 is set to infinity, after screws are lose you may rotate helicoid barrel 3 for optimal focus. For correction of focus at infinity it is not necessary to remove the screws and focus ring completely. It is enough to lose retaining ring of focus ring, lose the 2 screws on focusing ring and set the proper focus at infinity. Trick – extract the lens to 2m, rotate a bit more beyond 2m. the screws will be then located in the upper part of cutout as on picture above. Then focus back to infinity, check on a far object for optimal focus by slowly turning focus ring. When set, fix the 2 screws, adjust distance scale and fix retaining ring of the focus ring.

If you want however to CLA the helicoid you will need to remove both screws, focus ring, brass element and delimiting ring 2. But before you do it make marks which show position of helicoid tube against brass element, for example as shown by arrows.

- c. Removing helicoid

do steps described above. When unscrewing helicoid observe when the threads will separate and do markings. It will help you to find best position when screwing helicoid in. Warning – it might be a time taking exercise,

remove helicoid if really needed. Rotate tube 3 (photo above) until helicoid will be freed up from guide rails, then you can screw out helicoid tube.



d. After cleaning and lubricating assembly in reversed order.

4. **Cleaning fungus**

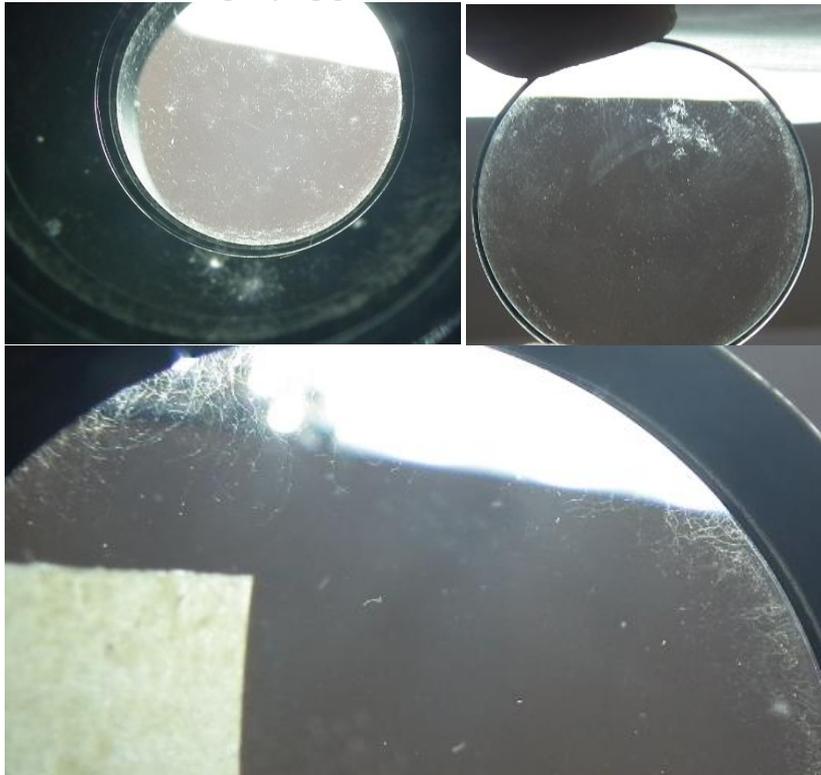
Care need to taken when working with lens affected by fungus not to "infect" other devices which are nearby. Use thin rubber gloves, discard cleaning material imediately after use.

First thing which I have done with this lens was to put it for 15 minutes under stronger UV light, turning the lens, so the UV light could reach inside as deep as possible. This killed at least fungus outside (if there was any).

Then I started to disassembly the lens. Parts which were dismounted went again under UV light, as well optical elements. Lens was disassembled almost completely, including helicoid, in order to kill as much fungus as possible.

All parts (exluding iris) went then for 15 minutes into hydrogen peroxide bath and then into 99% alcohol bath. At this point, I believe fungus was totally killed so could finally start to clean optical and mechanical elements. For cleaning optics I use fluid used in astronomy to clean optics and mirrors (non-residual).

Few pictures of optics with fungus on, it is clean now, no damages to coating visible under magnifying glas.



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