Konica Pearl II Service Guide

v0.1, last updated 10 February 2025

Introduction

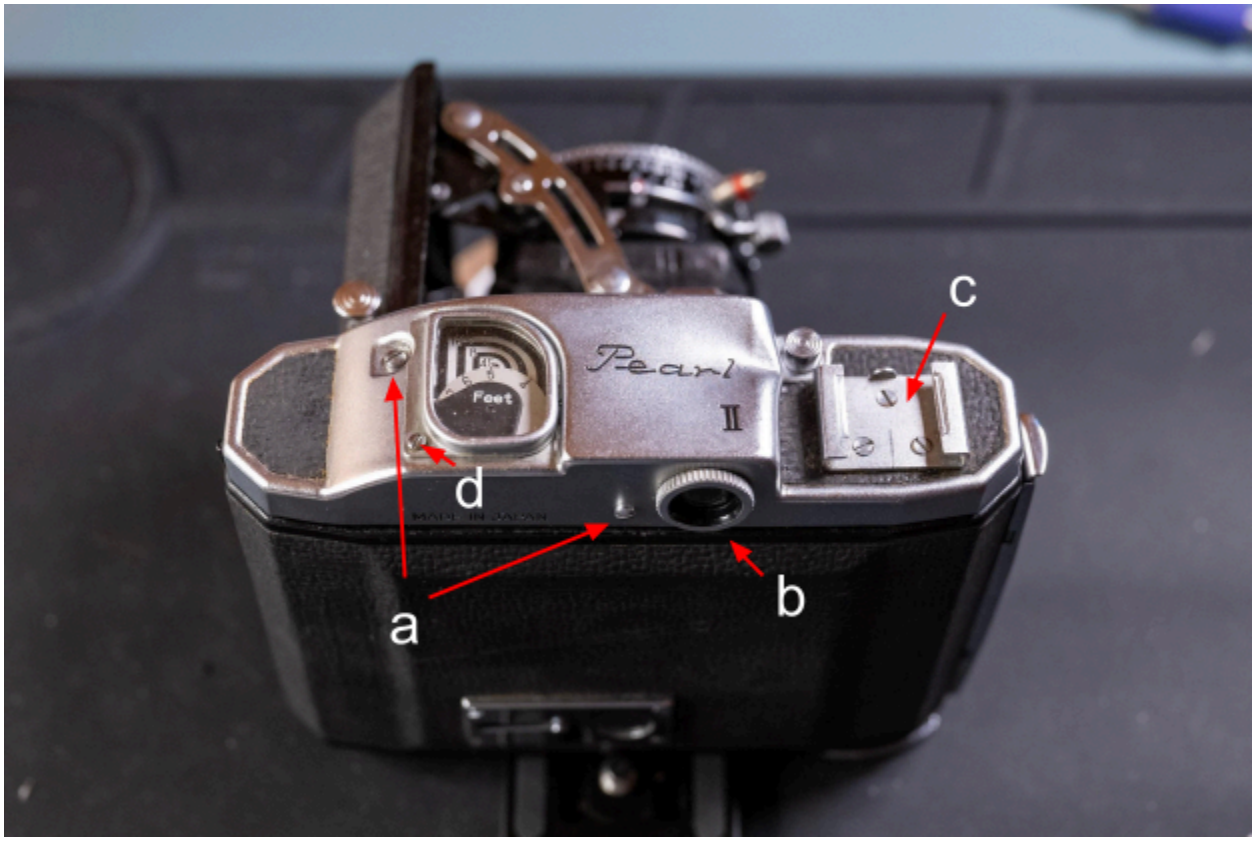
This document provides an overview of basic service procedures for the Konica Pearl II including basic disassembly, viewfinder/rangefinder cleaning & adjustment, bellows replacement, and shutter cleaning/adjustment, and more. Some of these details may also apply to the Pearl I & III cameras (but probably not the IV, which is a different beast).

Important Note: Proceed at your own risk! Be patient and stay organized. Carefully assess your skill level before attempting any of the procedures outlined here.

Viewfinder/Rangefinder Cleaning & Adjustment

Disassembly

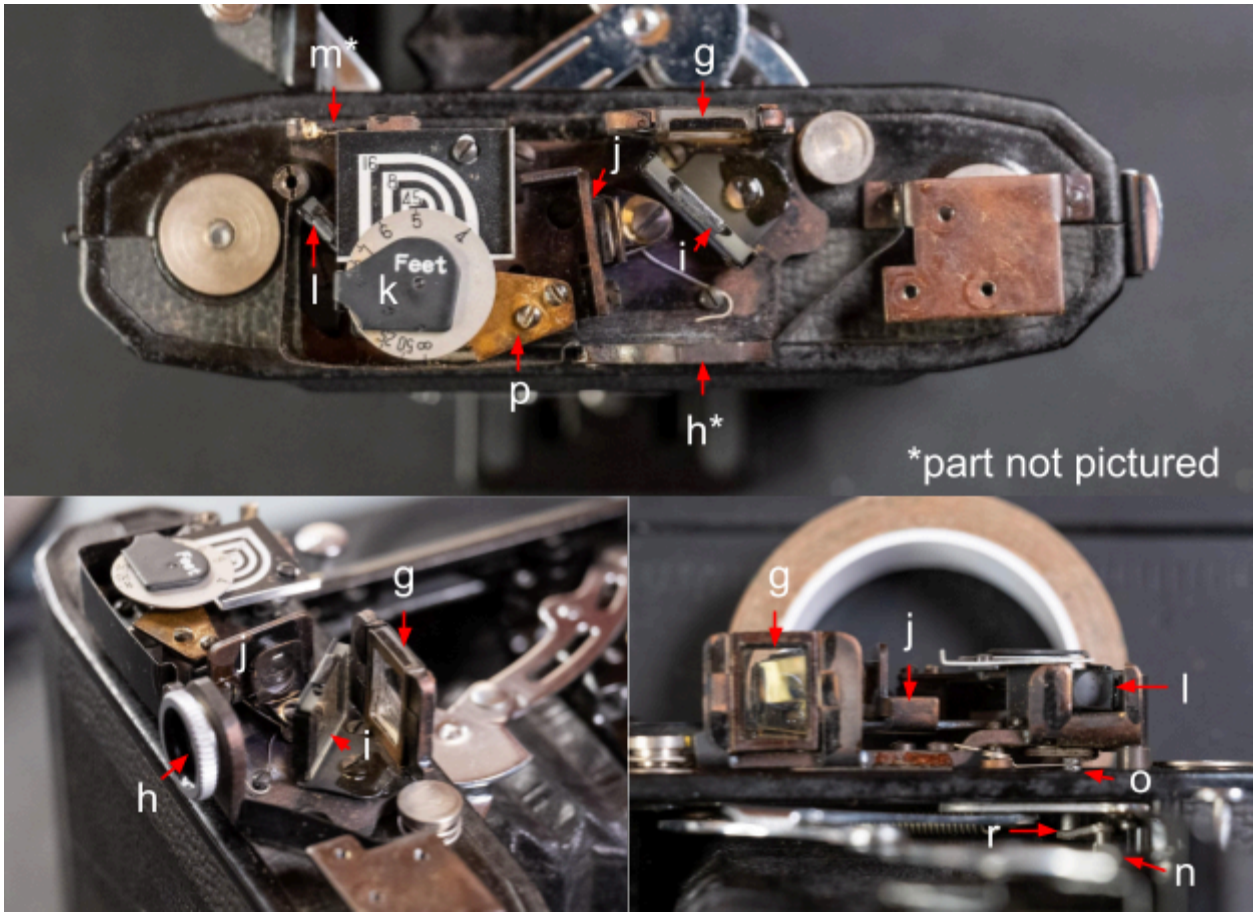
Gain access to the viewfinder assembly by removing the top cover. Remove the two flathead screws (a), the eyepiece (b), and the accessory shoe (c). Note that there is one additional flathead screw (d) securing the window of the focus/DOF scale; it's not necessary to remove this as it doesn't secure the top plate to the rest of the camera. The eyepiece is removed by turning anti-clockwise - if you can't remove it with your bare hands, use a flex clamp or a set of slip-joint pliers with something soft in the jaws to prevent it from marring the surface.



The top cover should now separate from the camera. When you remove it, make sure not to lose the plunger and spring (e) that opens the camera and the small spacer plate (f) under the accessory shoe.

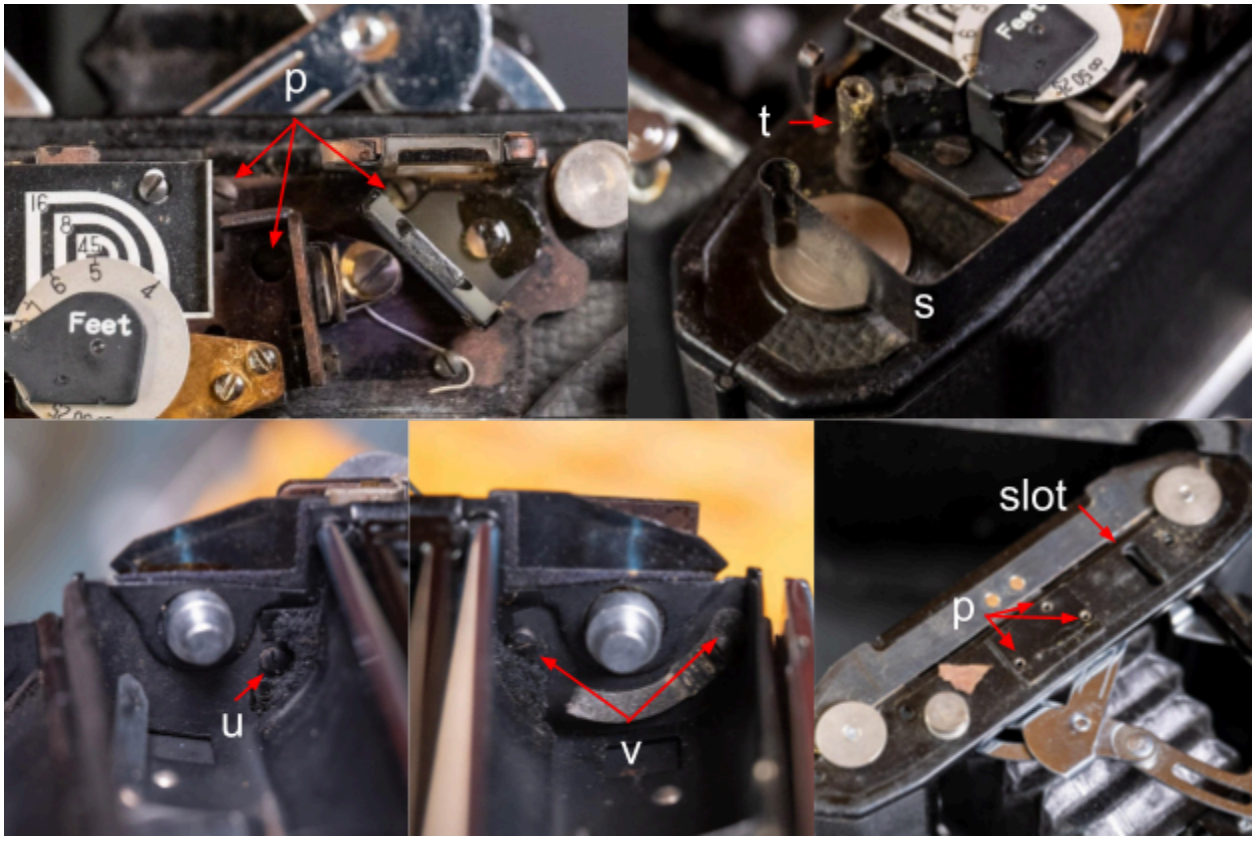
Now we have a good view of the viewfinder and rangefinder. The viewfinder is a reverse Galilean type consisting of a plano-concave lens (g) and a convex lens (h). Between these is a beam splitter* (i) which superimposes the rangefinder patch within the viewfinder. To the left is a swing arm holding a concave lens (j); the fore and aft motion of this lens causes the horizontal translation of the image in the rangefinder patch. Further left and partially obscured by the focus scale (k) is a stationary front-surface mirror (l) that diverts the optical path of the rangefinder patch. A small piece of flat glass (m) prevents debris from entering through the viewfinder window.

***Caution:** The reflective surface of the beamsplitter is very fragile and is easily damaged (even by wiping it with a swab). It's best not to touch it.



The rotation of the swing arm (j) is coupled via a linkage (n) to the fore-aft linear motion of the lens during focusing by a captive slider (o) at the bottom of the viewfinder assembly. As the swing arm rotates, its motion also rotates the focus scale via a gear arrangement (p).

The viewfinder assembly is secured to the camera body by three flathead screws (q). The entire assembly can be lifted off of the camera body, note that there is a protruding follower (r) that must fit through a slot in the camera body (it is a tight fit, so be gentle to avoid bending anything). To aid in the removal, you may also remove the baffle (s) and its post (t).The baffle slides off and the post can be unscrewed either from the top or by removing the screw on the interior (u). The mounting bracket for the accessory shoe can be removed via the screws in the interior (v).



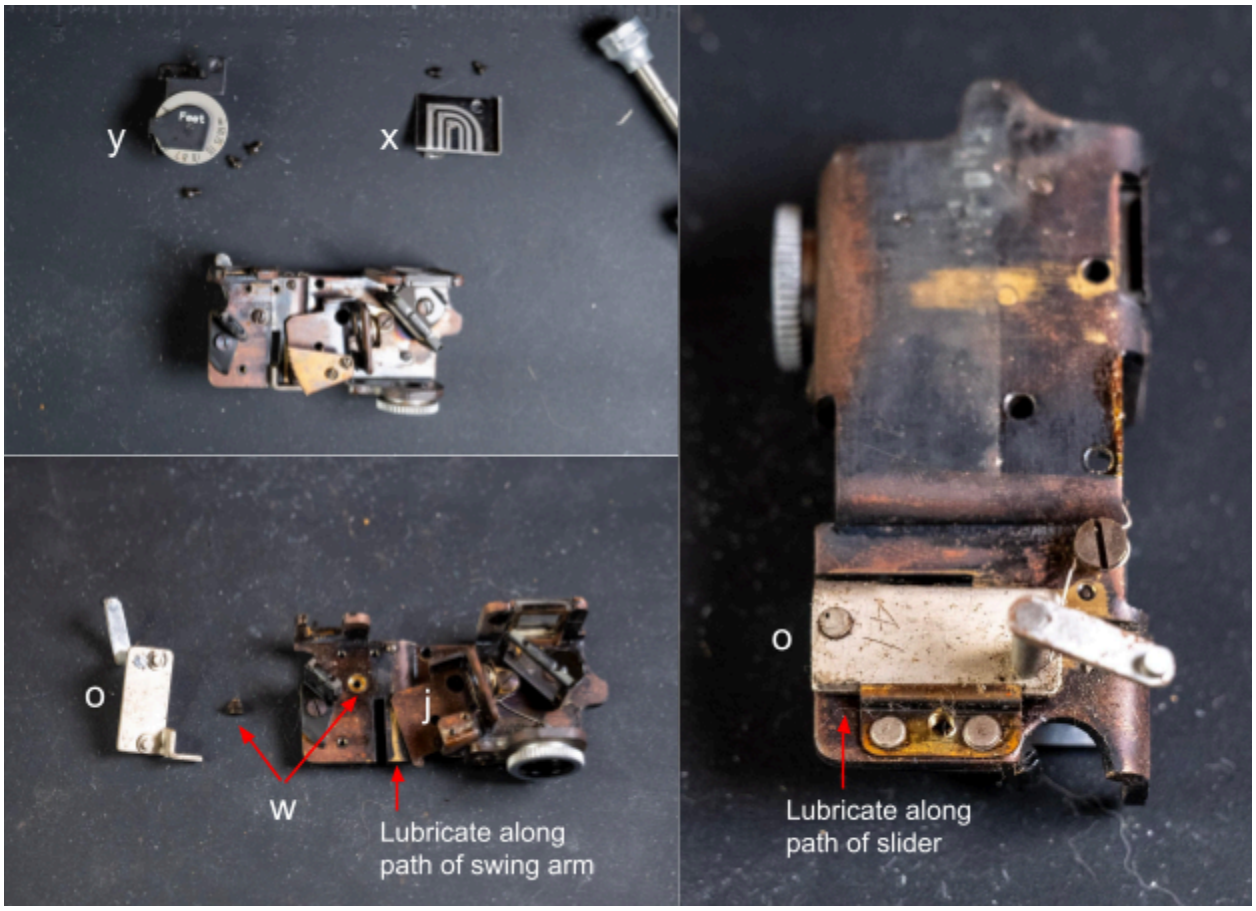
Cleaning

Clean both lenses of the viewfinder (g & h). Bursts of air from a blower, a soft brush, and high proof alcohol (e.g., 99% isopropyl alcohol) work well here. A bit of skin grease works surprisingly well to help release stubborn gunk. No need to worry about damaging coatings on these lenses (as far as I can tell, there is none). The glass of the rangefinder window (m) and concave lens on the swing arm (j) can be cleaned in the same way.

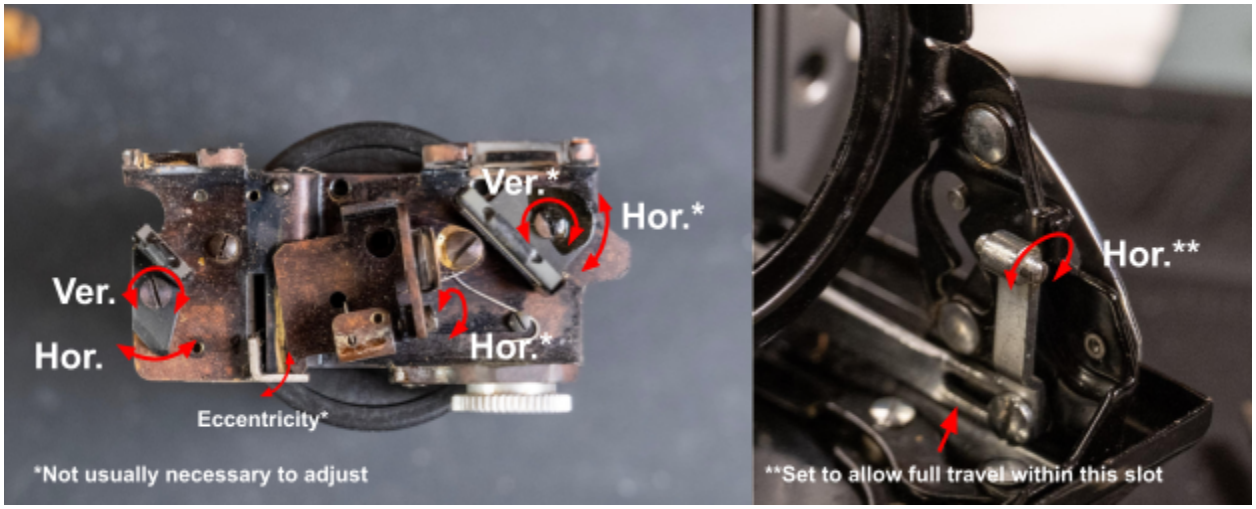
Cleaning the beam splitter (i) and mirror (l) is a trickier matter, as both are quite fragile. Gentle cleaning methods like air from a blower and a soft dry brush are generally OK. Avoid chemical and abrasive processes that could erode the surface coatings. You *can* freely clean the non-reflective face of the beam splitter using normal methods (the side facing (g)) but be careful that solvent doesn't seep over to the reflective side. I have been successful at cleaning the mirror by very *very* gently wiping it with a Kimwipe dampened with a tiny amount of 99% isopropyl alcohol.

The captive slider (o) at the bottom of the assembly tends to get gunked up over time, resulting in slow or sticky rangefinder action when shifting focus towards distant subjects. Remove and replace the old grease. The sliding surface of the swing arm (j) as indicated in the photo below should also be cleaned and re-greased*. If necessary, the captive slider (o) can be freed by removing a single screw (w) hiding under the focus scale (k). The focus scale itself comes off in two pieces, first the DOF scale (x) [two screws] and the dial indicator (y) [three screws].

***Note:** Use a high-quality grease like molybdenum disulfide paste. Do not use loose lubricants like oil or WD-40, as these will migrate and contaminate other parts of the camera.



Rangefinder Adjustment



Horizontal Alignment

There are several methods available:

- Adjust the angle of the mirror (i) by loosening its retaining screw and carefully adjusting its position. This also affects the vertical alignment. Best used to correct gross misalignment.
- Tighten or loosen the screw on the portion of the swing arm (j) on which the concave lens is mounted. Better for fine adjustment than fiddling with the mirror. Need to scrape off the lacquer applied at the factory.
- Rotate the grub screw on the lens end of the linkage (o). Also changes the position of the focus scale, which may or may not be desirable. Makes it possible to adjust horizontal alignment without having to open up the camera.

Vertical Alignment

- Tighten or loosen the retaining screw of the mirror (j). Accessible without having to open up the camera - just remove the frame and glass of the focus scale (secured by screw (d)).
- Tighten or loosen the retaining screw of the beam splitter (i). Also seems to affect horizontal alignment. Need to scrape off the lacquer applied at the factory. Not preferred.

Eccentricity Adjustment

In the case that the rangefinder is accurate for distant targets but not distant ones, or vice versa:

- The small tab/cam of the captive slider (o) can be bent fore or aft. This changes how it engages with the swing arm (j).

Focus Calibration Procedure

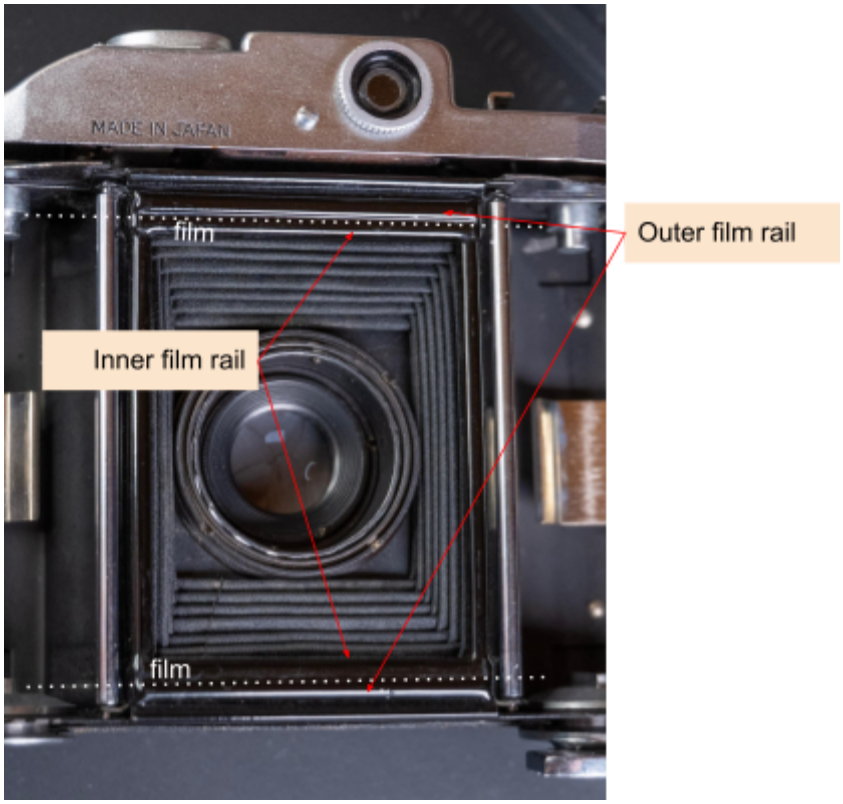
Starting from scratch? Here's a procedure to try:

1. Adjust the grub screw so that the screws securing the linkage (n) are positioned near to the end of their slots closest to the lens (see note in diagram above).
2. Focus the lens to infinity (check by observing the image formed at the film plane). [See procedure below.]
3. Adjust the vertical and horizontal alignment by adjusting the position of the mirror (horizontal) and tightness of the retaining screw (vertical). This is hard to do precisely, so try to get the vertical alignment right, and the horizontal alignment "pretty close." Then if needed, fine-tune the horizontal adjustment using the grub screw.
4. Re-focus such that the rangefinder image coincides at a nearby distance (1-2m) and compare to the image formed at the film plane. If the image formed at the film plane is not in focus, adjust the rangefinder eccentricity by slightly bending the small tab/cam of the captive slider fore or aft.
5. Repeat steps 2-4 until the near and far performance of the rangefinder are both acceptable.
6. Adjust the focus scale position as detailed above.
7. Fix the adjustment screws using a non-hazing adhesive*.

***Note:** Do not use cyanoacrylate, which can haze nearby optics. PVA, clear nail polish, and shellac are some examples of acceptable glues.

Confirming focus at the film plane

Use a translucent material (e.g. ground glass or matte cellophane tape) to view the image formed on the film plane. The film floats between the two "steps" of the film gate furthest from the lens (as shown in the diagram below), so its position is not precisely controlled. The outer film rail, minus the film and backing paper thickness (~0.2 mm) is a reasonable estimate of the film plane position. My preferred method is to use a piece of matte tape stretched taut across the outer film rails. Precision isn't super important here since the folding mechanism has some slop and the film plane will vary depending on film tension.



An effective method of setting the focus to infinity is to use another camera as a collimator. Place a translucent material at the film plane (as described above) and make a mark at the center. Set the focus of the collimating camera to infinity and point it at the lens of the camera to be calibrated. Adjust the focus of the camera to be calibrated; when the mark at the film plane is in sharp focus when viewed by the collimating camera, infinity focus has been achieved.

The lens should be focused at infinity when the focus lever is at its highest position (helicoid fully retracted). However, this may not always be the case since the folding mechanism can sometimes become deformed over 70+ years of existence (and mishandling). In this case, you can add shims behind the lens to achieve infinity focus at the desired focus lever position, but it's not strictly necessary.

Focus scale position

In the case that the distance indicated by the RF does not match that of the focus scale:

1. Focus the lens to infinity (confirm by observing the image formed at the film plane). [See note above.]
2. Disengage the focus scale gearing by loosening the two screws holding the curved rack gear on the swing arm (j). When disengaged, the dial will return to a neutral position as the tension in its spring is released.
3. Re-tension the spring by rotating the dial a couple of times, then hold the dial in the infinity position.
4. Re-engage the focus scale gearing and tighten the two screws.

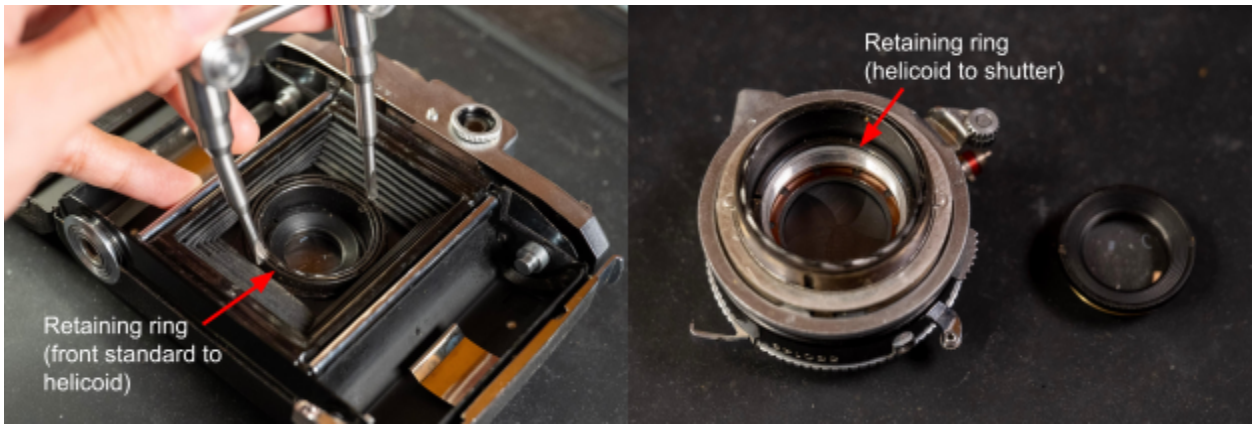
5. Check that the gearing doesn't bind by racking the focus back and forth. If it binds, loosen the screws, adjust, and try again. This is a rather fiddly process and it will take a few tries.
6. You can fine-tune by adjusting the position of the DOF scale (x). Loosen two screws (top and side), reposition the scale, and retighten.

Lens, Helicoid, and Shutter

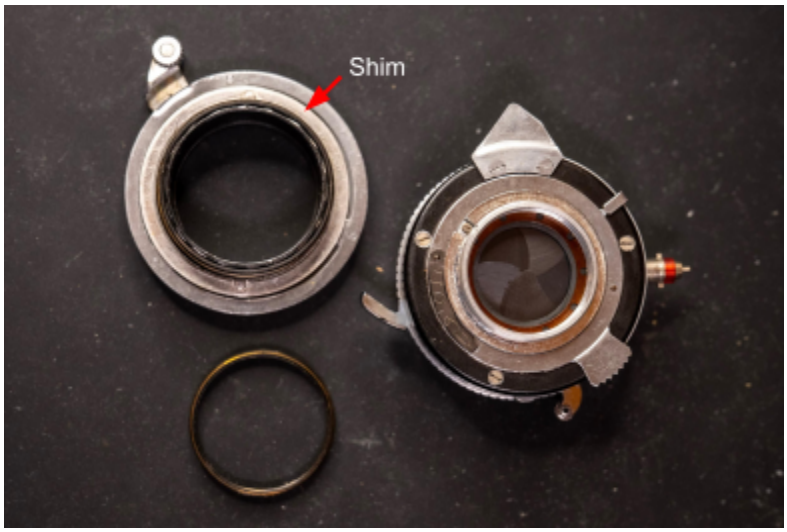
Disassembly

*Note that this section is written for cameras with the Konirapid-S shutter. These steps could look different for the other shutters that the Pearl came with (Durax, Seikosha, etc.).

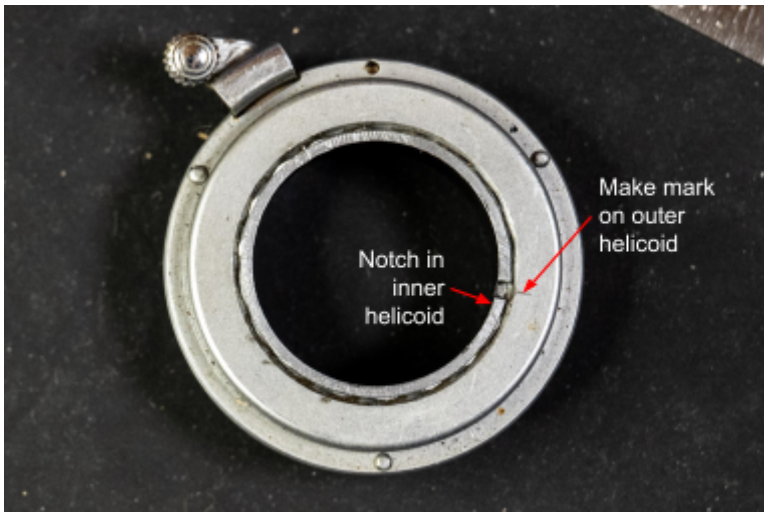
Remove the retaining ring securing the lens to the front standard. A lens spanner will do the trick. It's easier to start this with the lens in the collapsed position, and then open the camera to fully remove the retaining ring. Note how the flanged portion of the retaining ring sits beneath the last fold of the bellows, this will be important for reassembly. Remove the rear element using a lens spanner to help with the next step.



Remove another retaining ring that secures the shutter to the helicoid assembly. The shutter can now be separated from the helicoid assembly. Note that there is also a silver ring-shaped shim behind the helicoid. Don't lose this, as this part assures proper spacing between the lens and the film. Note how there are two embossed parts of the shim that facilitate alignment between the helicoid and the front standard.

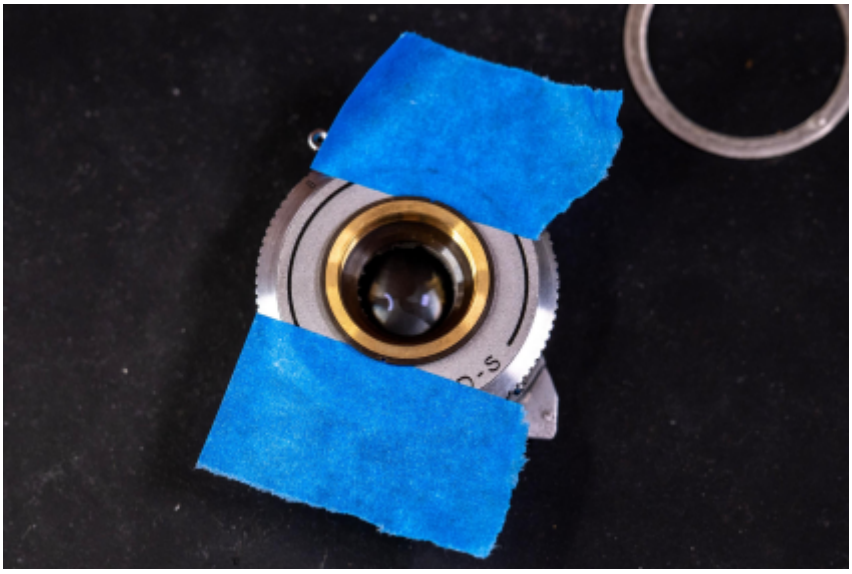


Before disassembling the helicoid, make a small mark on its top face to aid in reassembly. The inner helicoid has a notch to properly align the lens, so correct orientation of the helicoid components is important.



Remove the two retaining screws in the slots along the sides of the helicoid. These limit the fore-aft travel of the helicoid. The inner portion of the helicoid can now be removed. The tube that prevents rotation of the inner helicoid can be separated from the outer helicoid by aligning the three tabs and slots and gently pulling them apart.

The front lens elements are removed by unscrewing them from the shutter. There are actually two separate elements here that can be removed independently - the first element can be removed by hand, friction tool, or pliers with soft jaws. The second element lies almost flush to the shutter and can be removed with a lens spanner.

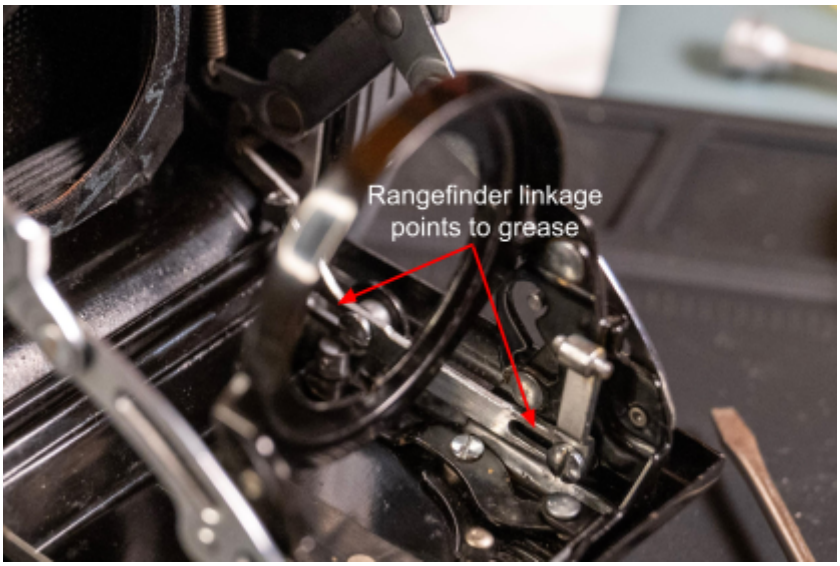


Cleaning/Lubrication

Strip off any old lubricant from the helicoid parts and then apply new grease. Iit is sufficient to grease only the outer helicoid, noting that the side of the inner helicoid opposite the lens doesn't

need lubrication. Some grease should also be applied to the surfaces where the outer helicoid and the tube contact each other.

At this point you can also grease the sliding parts of the rangefinder linkage (see diagram below). You can peel the bellows away from the front standard for easier access.



Clean the lens surfaces as needed. The coatings from this era are soft, so be careful with them. Note that the shutter-facing surface of the rear lens group often tends to fog. Sometimes the fog cleans right up (surface contamination), but other times it's terminal (etching). It *is* possible to remove the latter by polishing with cerium oxide, but this is not for the faint of heart!

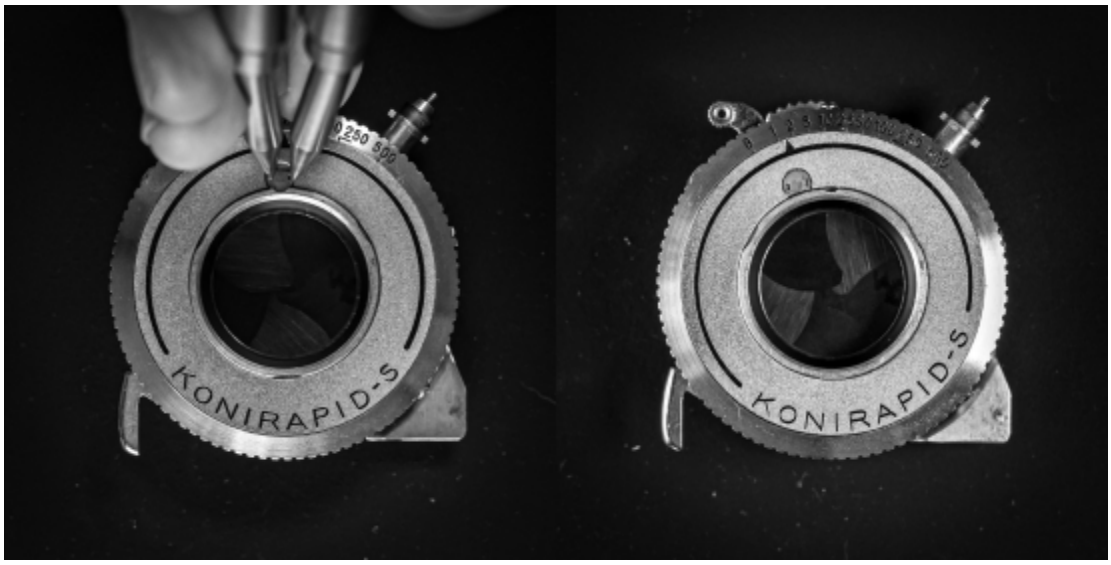
Lens Cleaning, Lubrication, and Adjustment (Konirapid-S)

The Konirapid-S is essentially a clone of the Compur-Rapid, which is a shutter for which many excellent repair guides exist! I highly recommend Chris Sherlock's guides on servicing the Compur-Rapid on YouTube (LINK to Part 1 of 3). I have also found this document (PDF) helpful for understanding this shutter's operation and speed adjustment. Compared to the Compur-Rapid, there are a couple of notable differences:

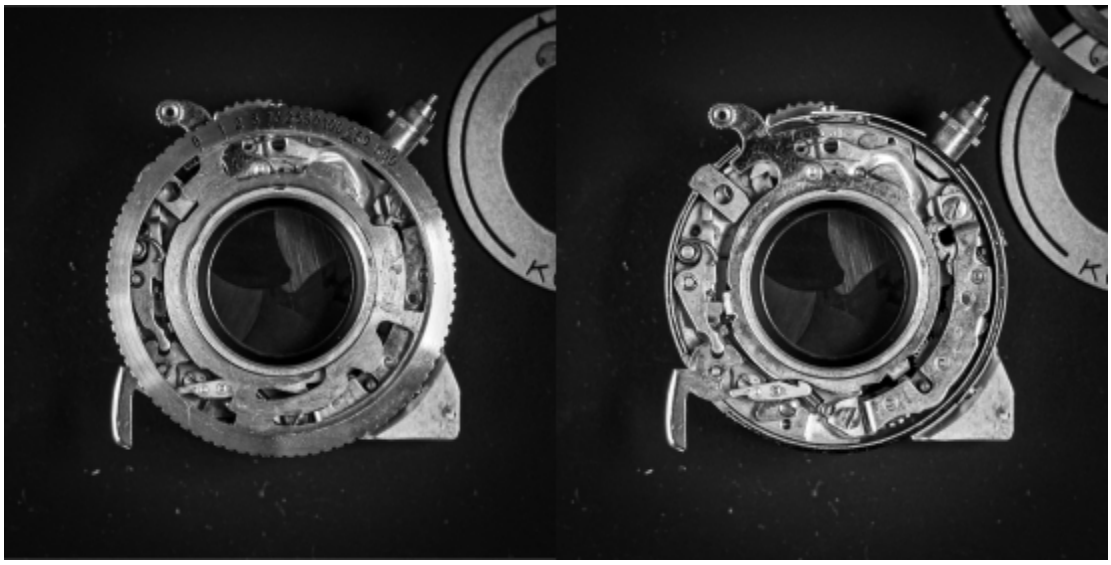
A. The flash sync must be removed in order to gain access to the shutter and aperture blades. A special tool should be used to unscrew the flash sync connector from the shutter casing, after which the trapezoidal nut, copper shim, and insulator can be removed from inside the shutter. The flash contact is simply press-fit into its channel and can be lifted out with tweezers.
B. There are six shutter blades instead of the usual five. The first and sixth shutter blades are simply placed on the same post. This seems to "sandwich" the blades together to prevent stray light from sneaking in between the blades.

Here are my notes on disassembling the Konirapid-S:

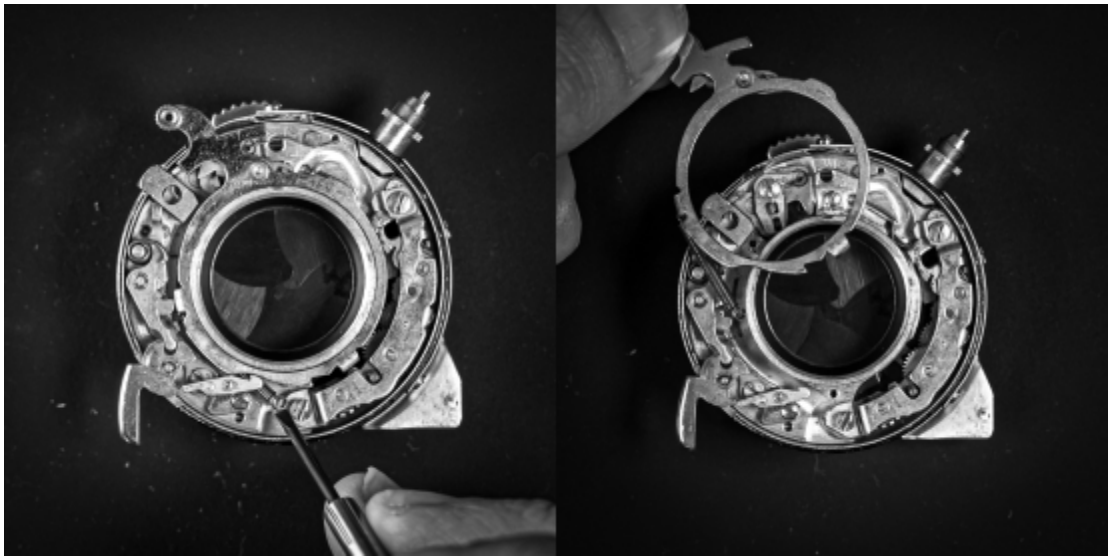
1. Remove the nameplate. Turn the retaining cam 180 degrees using tweezers or a lens spanner. Rotate the nameplate counter-clockwise and lift off.



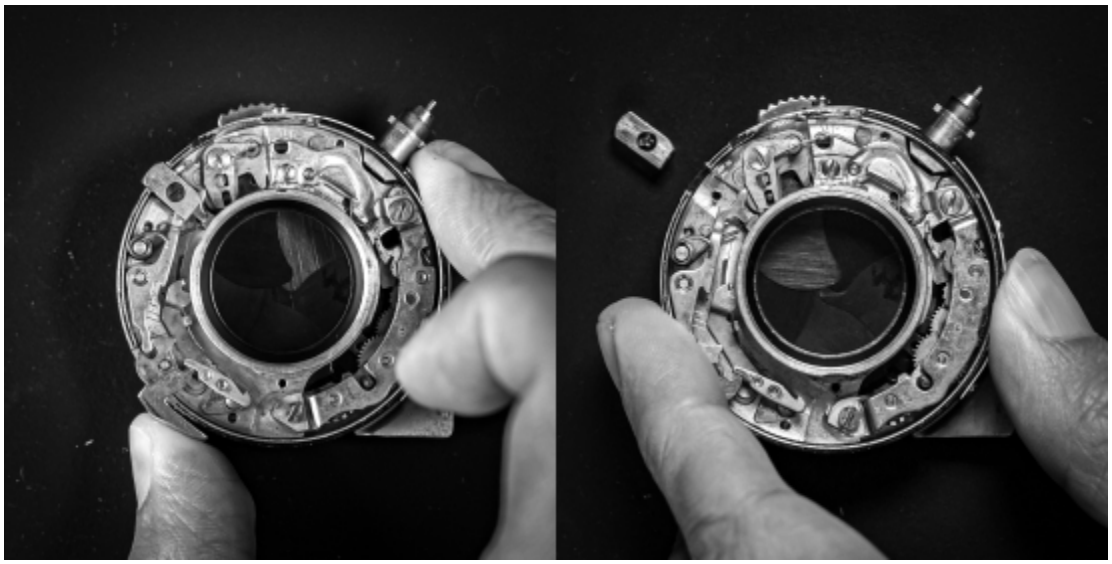
2. Lift off the speed cam.



3. Unhook the main spring and the main lever.



4. Depress the shutter release lever to reveal the screw securing the cable release socket, then remove it.



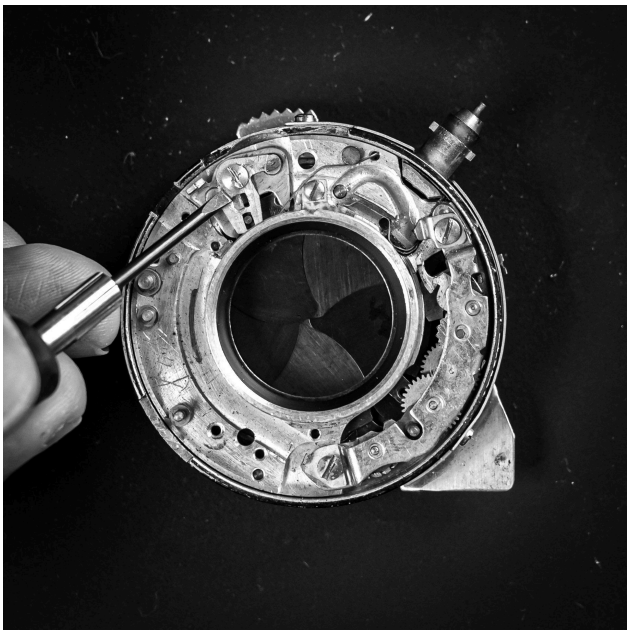
5. Remove the inner release lever. Note how its spring tensions the bulb lever.

6. Remove the release lever.

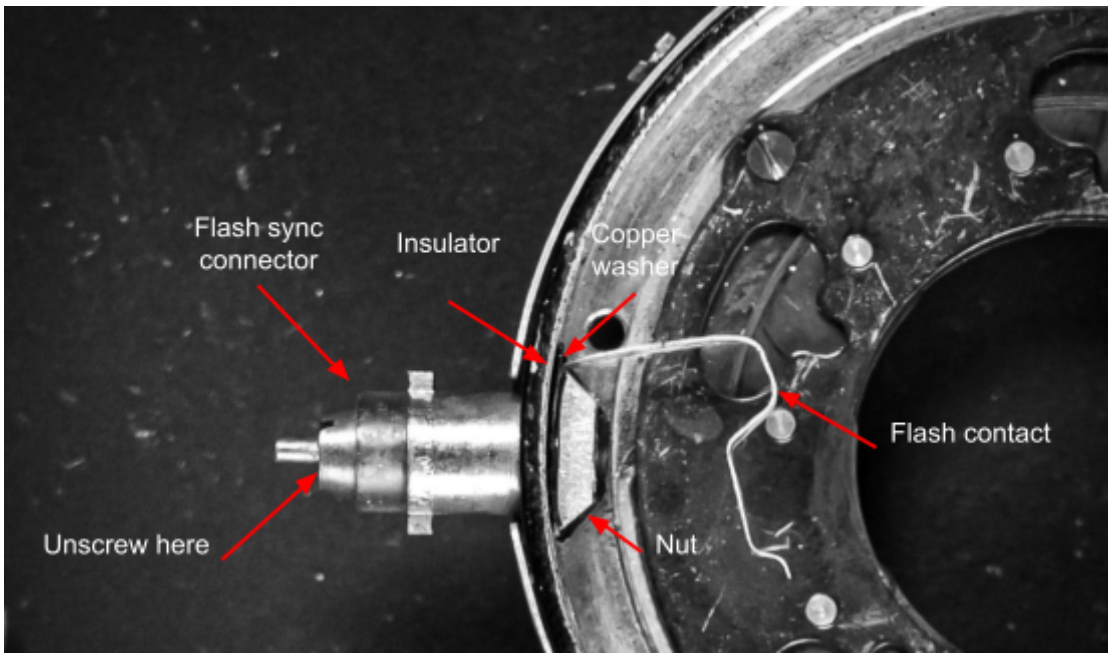
7. Remove the cable release lever and high-speed spring.

8. Remove the bulb lever.

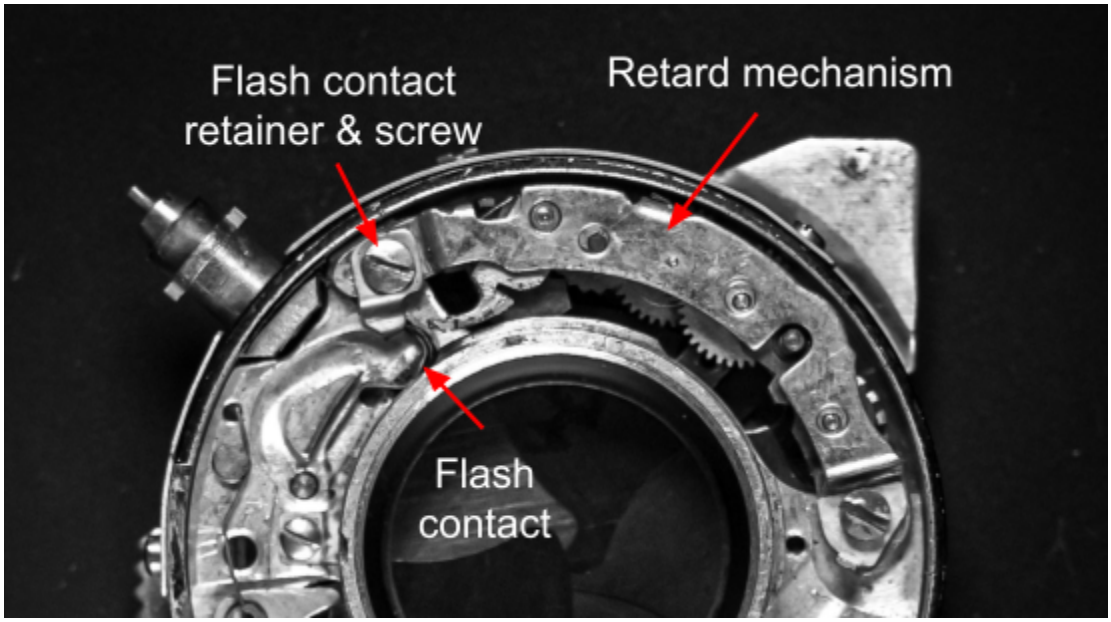
9. Remove the leaf lever.



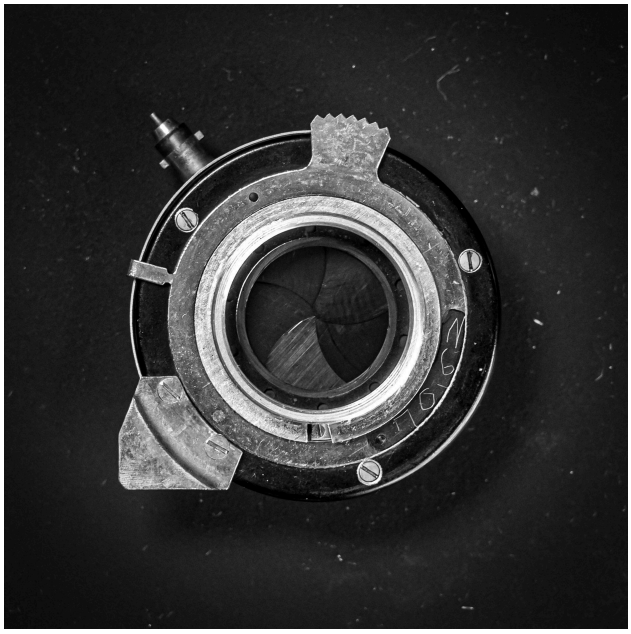
10. Unscrew the flash sync connector. Lift out its trapezoidal retaining nut and the small copper washer. (Note: image below is for illustrative purposes, in a different state of disassembly.)



11. Remove the screw on the pallet end of the retard mechanism and remove the retainer for the flash contact. Lift out the flash contact, then lift out the insulator. Reattach the retainer and its retaining screw. (Note: image below is for illustrative purposes, in a different state of disassembly.)



12. Flip the shutter over and remove the three screws that hold the shutter housing to the mechanism plate.



13. Carefully lift off the shutter housing to reveal the delicate shutter blades, which can be removed from their posts. (To do: add a photo of this. I forgot to take one!)
14. Remove three screws holding on the blade operating ring cover plate. Remove the blade operating ring. Compur-Rapid shutters *usually* have two short screws and one long screw attaching the cover plate, but I think all of mine were the same length (see p.19 of the PDF above).

At this point, you could also disassemble the diaphragm (aperture) assembly. However, I would only attempt this if it were *really* necessary. Reassembling the diaphragm is a pain - refer to Chris Sherlock's videos.

All of the moving parts should be gently cleaned with a solvent of your choice (lighter fluid and isopropyl alcohol are commonly used).

If you followed the steps above, the retard mechanism will still be attached to the mechanism plate. The positioning of the retard mechanism controls the shutter timing, and it's very fiddly to adjust it - so I *don't* recommend removing it, if you can help it. You can clean it "in place" with a solvent of your choosing (and place it in an ultrasonic cleaner, as I do). A *tiny* dab of oil (sewing machine oil, gun oil, watch oil - pick your poison) on each of the shafts should be all that's needed to lubricate the mechanism. Less is more here.

For reassembly, simply follow the steps above in reverse order. The first shutter blade should go on the posts closest to the leaf lever. Subsequent shutter blades will be positioned counter-clockwise from there. The sixth and last shutter blade will overlap the first one. Sliding/rotating components other than the shutter and diaphragm blades can be lubricated with a *tiny* smear of grease (again, less is more).

Bellows Replacement

First off, I would only recommend replacing the bellows if they're too far gone and can't be easily patched. The bellows were not designed as a serviceable component - they are

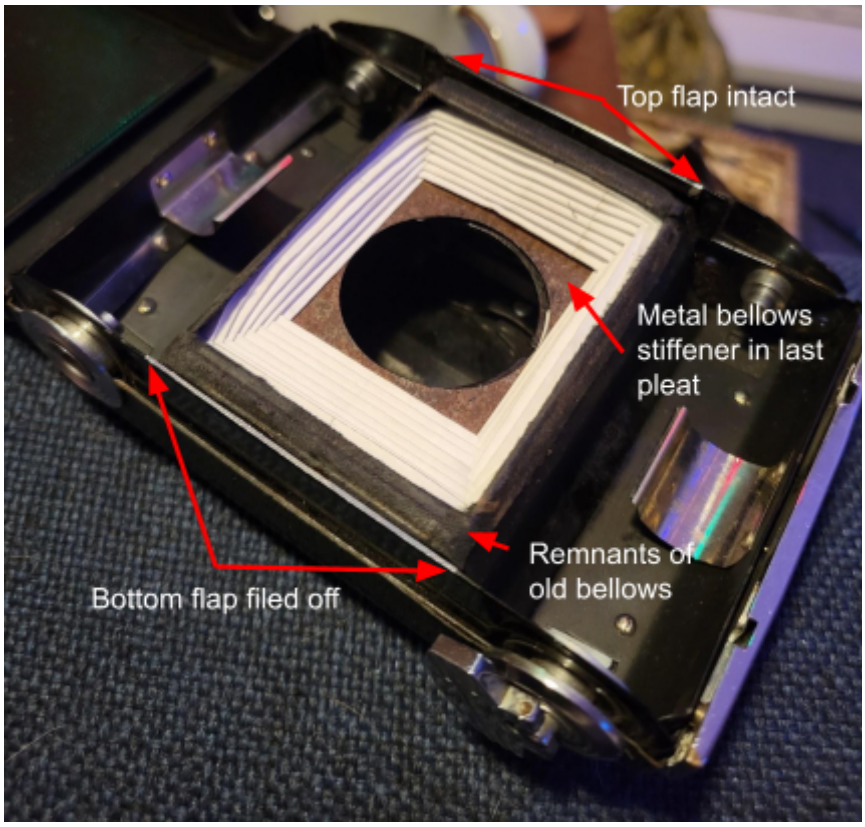
semi-permanently attached and you have to either cut or bend parts of the camera to get them out.

Removing the old bellows

Follow the steps in the above sections to remove the helicoid/shutter assembly from the front standard. The end of the bellows closest to the lens can be removed by peeling it away from the front standard. There is a metal plate inside of the first pleat of the bellows, take care not to damage it too much, as you'll need to reuse it.

The end of the bellows nearest to the film gate is the tricky part, because the bellows is sandwiched between the film gate and the rest of the camera. There are two metal flaps at the top and bottom of the camera that secure the film gate. You must free one side (the bottom is easier) to remove the film gate. One option is to unbend the metal flap, but my attempts at this have not been successful. It's almost impossible to do this without the paint flaking off and marring the film gate. Even if you manage to do this successfully, the metal here is very brittle and it's likely to break when you try to bend it back into place.

My preferred method is to use a file to remove the lower metal flap. It's destructive but not much more so than the above method of bending (and in the process, breaking) the flap. Once the lower flap is removed, the film gate lifts right off and you can peel off the bellows. You will need to reattach the film gate using glue or some other means (like screws). I just used a couple of dabs of epoxy along the cut edge, which should make removal easier in the future, if needed.



Making the new bellows

I have seen replacement bellows for sale (on eBay, AliExpress, etc.) but cannot vouch for their quality. Making bellows yourself is straightforward, if a bit fiddly. I like to use a two-layer bellows:

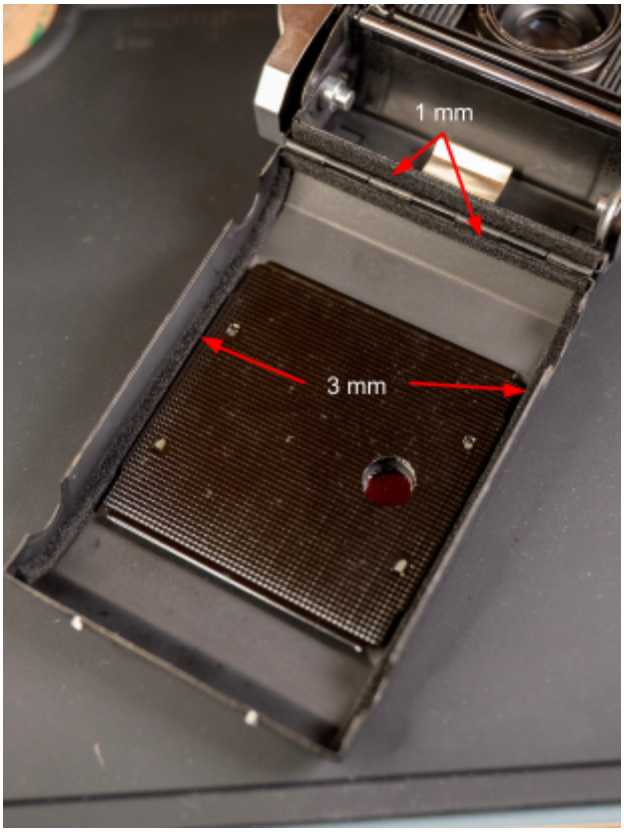
- **Outer layer:** Polyurethane-coated nylon fabric, optionally with a blackout coating. This layer provides light-tightness and strength. I use this 1.9 oz (before coating) ripstop nylon from Seattle Fabrics (LINK).
- **Inner layer:** Black paper or Tyvek. This layer gives the bellows its shape. The paper needs to be thin, about the same weight as copy paper (no thicker than 24 lb/90 gsm). Tyvek is even better since it's more resilient than paper.

The bellows materials must be as thin as possible so they can fit inside the camera - so selecting the right starting materials is paramount. (To do: illustrate this process.)

1. Download and print the bellows template (PDF). Regular printer paper is sufficient. Be sure to print it at 100% and do not scale to fit the page. (To do: improve the bellows template.)
2. Cut out the template and tape it to the inner layer.
3. Score along the crease lines of the template. I like to put the material on a soft surface (like a piece of cardstock or a magazine) and score using the metal point of a mechanical pencil. The ensures that the score lines are transferred through the printed template and into the inner layer.
4. Cut out the inner layer and discard the template.
5. Bond the scored inner layer to the outer layer (I like to use a spray adhesive like 3M 77). Trim the excess outer layer material.
6. Join the ends of the bellows with a strong, pliable contact adhesive (e.g., Weldwood, Pliobond).
7. Slowly and carefully fold the bellows.
8. Insert the metal plate extracted from the old bellows and secure using adhesive. It should be bonded on the side of the plate facing the front standard.
9. Insert the other end of the bellows into the camera and secure using adhesive.

Light Seals

There are three strips of textile material that seal the back of the camera. These don't disintegrate over time like foam, but they can still become compressed to the point that they don't seal as well. I replaced them with four strips of foam light seals - two on either side of the hinge (1 mm thick) and two on the top and bottom of the back (3 mm thick).



The red window also tends to fade and fog over time but is easy to replace. Any red plastic thinner than about 0.3 mm will work. Remove the cover (4 screws) and pop out the old red window by pushing from inside the camera, then glue in the new red window (PVA or contact adhesive).