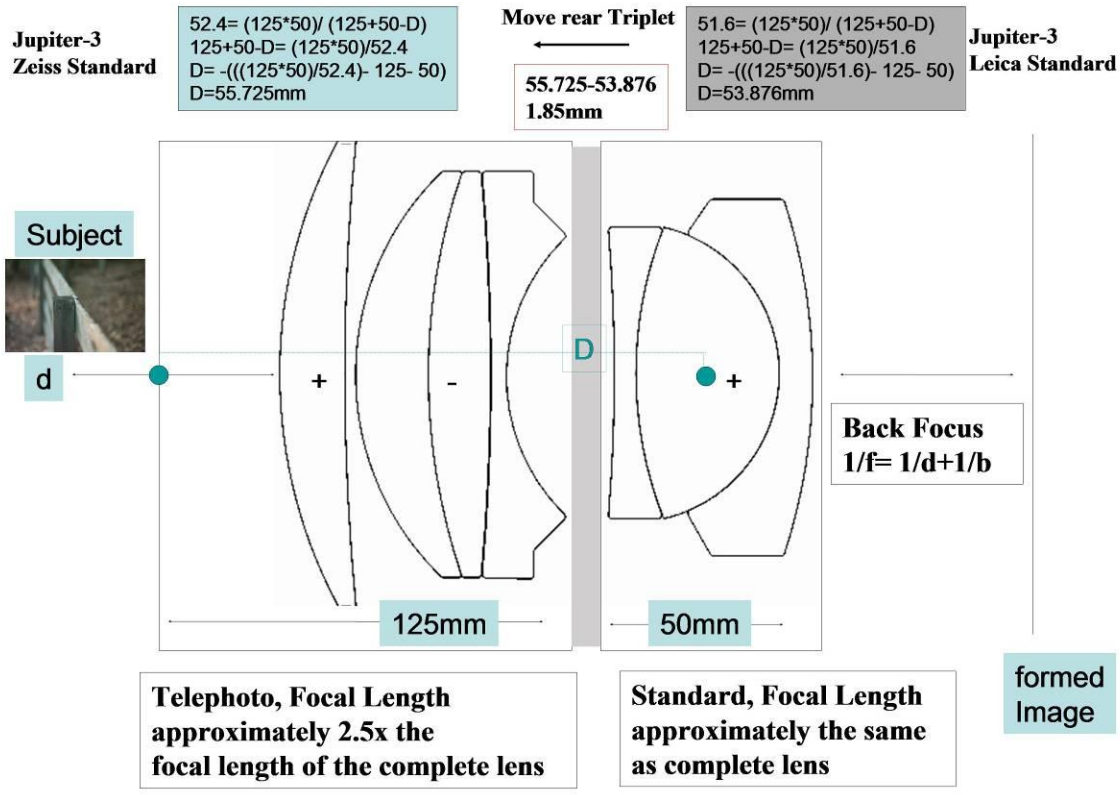
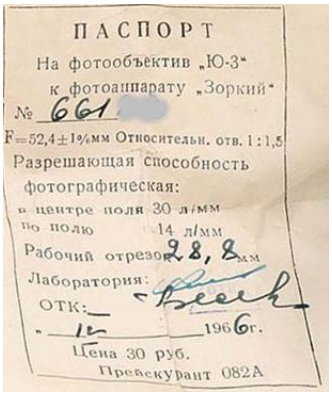
Jupiter-3 Focal Length Adjustment



Jupiter-3 Focal Length Adjustment. . These instructions apply to J-3s built before 1964; ones with a separate optical fixture for the rear triplet. The nominal 52.4mm focal length of the Contax mount Zeiss Sonnar was used for both the Kiev and 39mm thread mount versions of the Jupiter-3. The optical fixture of the Jupiter-3 screws directly into the inner helical of the focus mount. The inner helical is a solid piece of metal and also serves as the RF cam of the lens. The motion of the optics is 1:1 with the inner helical. When used on a Leica which is calibrated for a nominal 51.6mm, this will lead to focus errors. A simple adjustment to the main shim is usually all that is required to compensate for this difference. It is possible to adjust the Focal Length of Jupiter-3's built before 1964. The advantage is to improve focus for infinity after the lens has been optimized for close-up and wide-open use.

There are cases where Jupiter-3's work just fine on a Leica camera. Looking at a manufacturer's data sheet, it is easy to see why.


ПАСПОРТ
На фотообъектив „Ю-3"
к фотоаппарату „Зоркий"
№ 661
F=52,4±1%мм Относительн. отв. 1:1,5
Разрешающая способность
фотографическая:
в центре поля 30 л/мм
по полю 14 л/мм
Рабочий отрезок 28,8 мм
Лаборатория:
ОТК:
1966г.
Цена 30 руб.
Прейскурант 082А

The focal length is given as 52.4 +/- 1%. That gives a range of about 51.9mm to 52.9mm. Those on the short end of the range will work well on a Leica. The average will work well once the main shim is adjusted, and those on the upper end will require the focal length to be reduced and then the main shim to be adjusted.

This procedure is to change the focal length by moving the rear triplet. Moving the triplet towards the front group reduces the focal length; moving it away increases the focal length. Typically, the focal length is longer than the Leica standard and moving the triplet towards the front improves agreement with the RF. I have one Jupiter-3 which required the focal length be lengthened. That one was from 1950, and was originally held into the mount with sewing thread. It's much better now.

After adjusting the main shim of the J-3, test focus at infinity. If your focal length is longer than the Leica standard, actual focus at infinity with F1.5 will fall short. The F-stop required to bring infinity into sharp focus will give a good indication if this more complex procedure is required. If F4 was required to bring infinity into good focus, chances are the focal length of your J-3 is on the high end. Moving the rear triplet in will improve agreement with the RF across the focus range.

The Jupiter-3 does not use a secondary shim to control stand-off, as did the Jupiter-9 and Helios-103. This means you will have to polish down the optical fixture to move the rear triplet in towards the front.

Unscrew the optical fixture from the focus mount. All that work to get the main shim correct will need to be redone after this procedure. Unscrew the rear triplet from the main fixture.

You will want to remove the glass from the rear fixture. You will need an optical spanner to remove the retaining ring. The glass drops out. I use a lens cleaning paper to catch it. So now you have the exposed surfaces of the optical fixtures. You need to file/polish them down. Some of this will be trial and error. The "math" suggests that the average Jupiter-3 requires a reduction of about 1.85mm to bring to the Leica standard. You probably will not be able to get that much of a reduction. Moving the rear triplet towards the front moves it farther from the image plane. Any movement of the triplet will have to be reflected in the thickness of the main shim: if you move the rear triplet in 1mm, you will need to reduce the thickness of the main shim by 1mm.

It is best to remove the glass from the main fixture. A spanner is required to remove the name ring and the retaining ring for the front triplet. The front triplet fits in very snugly, and pushing from the back through the aperture might be required. I use lens cleaning paper against the glass.

I stuff a piece of paper towel into the back of the main module before polishing it down. You do not want to get filings into the aperture mechanism. With the glass out, you can flood clean the blades with lighter fluid or isopropyl alcohol after finishing. This can be a trial and error process. Polish down in small increments, test the lens. Chances are you cannot go too far, or grind it down enough to achieve the Leica standard. You are getting it closer, and that will improve focus at infinity. If you have calipers, use them. Go for 0.5mm ~1mm reduction.

Put the glass back into the fixtures. The front triplet usually requires a “big push”. It almost clicks into place. Reassemble the lens, and repeat adjustment procedures for the main shim.

Increasing focal length is simply a matter of unscrewing the rear and making a stand-off shim that fits around the back of the optical fixture. I start the process using a material that can be compressed, such as Teflon pipe fitting tape. Once you are satisfied with the new stand-off, use a feeler gauge to measure the separation. You can make a shim of that thickness, or just leave the Teflon in place. The rear triplet is now closer to the image plane, meaning you will have to increase the main shim. Reassemble, and use the procedure for adjusting the main shim.

All done; ready to test the lens for close-up:

And for infinity:

A good idea to test for flatness of field:

Remember that Sonnars are known for field curvature. Moving the rear triplet affects field curvature, in the case of my lens: the adjustment improved field flatness dramatically.

Was it worth it the trouble? A good, well-adjusted Jupiter-3 compares well with the wartime Zeiss 5cm f1.5 Sonnar “T”, Nikkor 5cm f1.4, and Canon 50/1.5. The Jupiter-3 is lighter as it uses more aluminum in the mount. The Jupiter-3 can usually be found for half the price of other Sonnars in Leica mount.