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Mamiya 180mm lens Mamiya 250mm lens

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Mamiya TLR Interchangeable Lenses

by Dr. Robert Smith

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Introduction

Having been in photography one way or another since 1946, I have been exposed to many types of cameras and lens systems. It never occurred to me to research the physics of the optical lens. I merely took everything for granted – if it worked, or just ignored it if there were problems.

Lately, my interest in lens design has been restored. I think this is due to the rapid development in digital everything including cameras and the Internet. Reading the internet news groups dedicated to photography, I saw a very real ignorance in lens design and theory which rivaled my own. So I decided to do some latter day research to attain some degree of knowledge of lenses, at least for those I use.

This paper is restricted to the lenses made by Sekor for the Mamiya twin lens reflex cameras. I have chosen these as my experience has shown them to be quite excellent for my style of photography (Portrait, landscape, and sill life – please, no nature, sports, or other subject which move rapidly). I do not presume to endorse these products, they are simply available for me to explore. In fact I own lens systems that produce superior results.

A Brief Review of the Mamiya Lens Inventory

The Mamiya lenses were available in the following focal lengths; 55, 65, 80, 105, 135, 180, and 280. Table 1 contains the characteristics of each lens.

Table 1:

Lens	Composition	Picture	Minimum	Filter (mm)	Lens Hood (mm)	Shortest Distance	Subject Coverage
55mm f/4.5	9 elements 7 groups	70° 30'	f/22	46	48	9 1/2 in.	2-17/32" x 2-17/32"
65mm f/4.5	6 elements 5 groups	63°	f/32	49	50	10 11/16 in.	2-21/32" x 2-21/32"

80mm f/2.8	5 elements 3 groups	50° 40'	f/32	46	46	1 ft, 1-15/16 in. (35.4cm)	3-25/64" x 3-25/64" ((8.6cm x 8.6cm)
105mm f/3.5	5 elements 3 groups	41° 20'	f/32	46	46	1 ft. 11in. (58.4cm)	7-1/4" x 7-1/4" (18.4x18.4cm)
135mm f/4.5	4 elements 3 groups	33°	f/45	46	46	2 ft 11-1/2 in. (90.2cm)	7-1/4" x 7-1/4" (18.4x18.4cm)
180mm f/4.5	5 elements 3 groups	24° 30'	f/45	49	50	4 ft 2-3/4 in. (1m 29cm)	10-53/64" x 10-53/64" (27.5x27.5cm)
250mm f/6.3	6 elements 4 groups	18°	f/64	49	50	6 ft 8-3/4 in. (2m 5cm)	1 ft 1/4" x 1 ft.1/4" (31.1x31.1cm)

55mm f/4.5



Mamiya Sekor 55mm lens
(photo courtesy of "B")

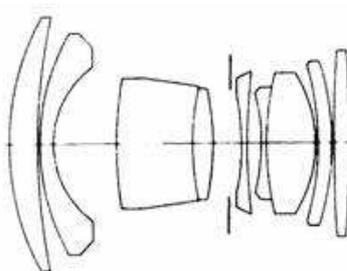


Figure 1 Sekor 55mm f/4.5

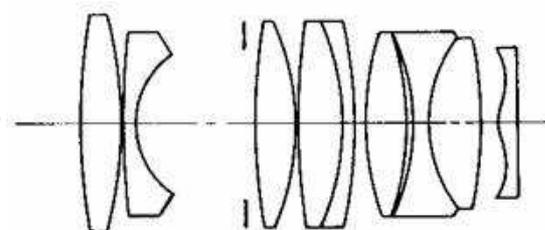


Figure 2 Golden Navitar

The Sekor 55mm, figure 1, is by far the most sophisticated of the group. It is virtually unique, as it does not fall easily under an established design. It looks very much like Elgeet “Golden Navitar” shown as reference in figure 2. The design of this lens is the reversed telephoto concept used to a great extent in wide-angle lenses. The differences are obvious in the two figures, the most significant one being the aspherical rear element in the Elgeet. Another is the position of the stop and the use of the thick, cemented magnifier in the Sekor.

65mm f/3.5



Mamiya 65mm
(Photo courtesy of Jim Greeley
jim@avana.net)

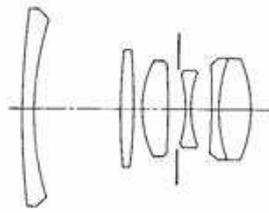


Figure 3 Sekor 65mm f/3.5

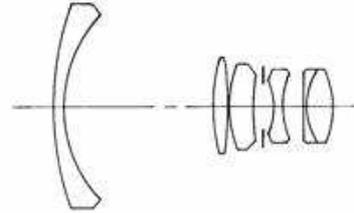


Figure 4 Angenieux 9.5mm f/2.2

The Sekor 65mm lens shown in figure 3 is also of the reversed telephoto design. It is almost a copy of the Angenieux Retrofocus 9.5mm f/2.2 shown in figure 4, developed for the 35mm cameras in 1950 France. As both lenses were produced about the same time, it is hard to say which was original. The Angenieux Company coined the term “Retrofocus” which has become an almost generic term for this lens design today. It is one of the more elegant of the TLR group.

80mm f/2.8



Mamiya 80mm lens
(photo courtesy of "B")

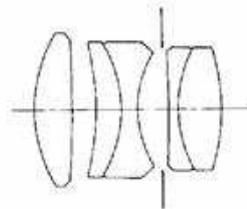


Figure 5 Sekor 80mm
f/2.8

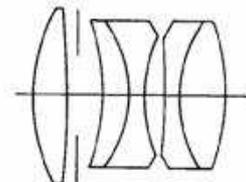


Figure 6 Elmarit 90mm
f/2.8 for Leica

The next three lenses seem to belong to a group known as Modified Cook Triplets. In the 1930s, Max Berek of Leitz, designed several lenses for use in Leica cameras, based on the Cook Triplet. The Sekor 80mm, figure 5, is one of these. The similarity to the “Elmarit”, shown in figure 6, is immediately evident. The “Elmarit” is a relatively new design, dating from 1958. The Sekor 80mm is considered to be the “normal” lens for the Mamiya 6x6 format and operates with excellent aberration correction and resolution. Mine seems to be a little subject to flare, which can easily be minimized by use of the proper hood.

105mm f/3.5

The Sekor 105, figure 7, is probably my favorite lens to work with in most situations be it landscapes or portraits. The element configuration is the same as the Leitz "Hektor", a Heliar type lens, shown in figure 8.

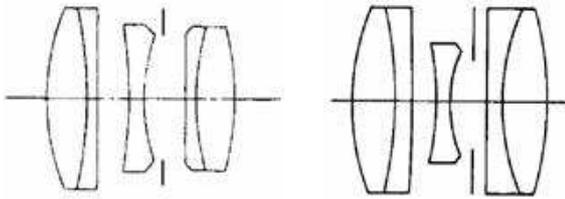


Figure 7 Sekor 105mm f/3.5

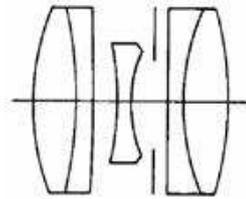


Figure 8 Leitz Hektor 28mm f/6.3

Hans Harting designed the Heliar in 1900 for Voigtlander as he tried to produce a symmetrical modification of the Cook Triplet. To improve the apparently poor performance of his original design, he later modified his original design with the cemented surfaces convex toward the stop. The modification shown in the Leitz design conforms to Harting's successful design. The Sekor design is a further modification.

135mm f/4



Mamiya 135mm f/4.5 lens
(photo courtesy of "B")

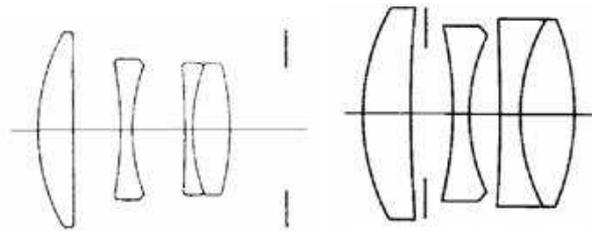


Figure 9 Sekor 135mm f/4.5

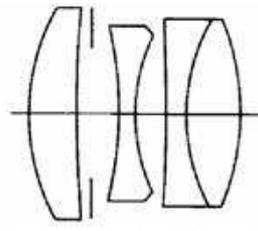


Figure 10 Leitz "Elmar"
135mm f/4.5

Yes, the 135mm, figure 9, is a straightforward "Tessar" type similar to one of many "Elmar" types used on Leica cameras since 1931. This has certainly been a most successful design and is being produced today in some configuration.

180mm f/4.5



Mamiya 180mm f/4.5
(Photo Courtesy of "B")

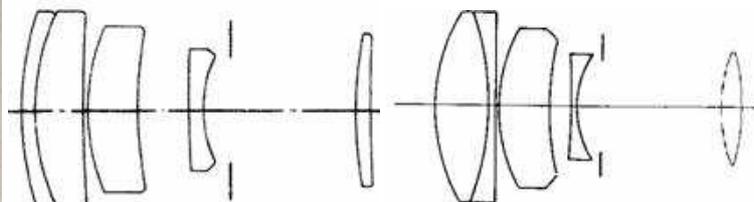


Figure 11 Sekor 180mm f/4.5

Figure 12 Ernostar f/2 by Bertele

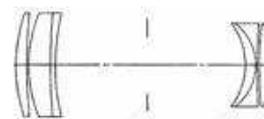
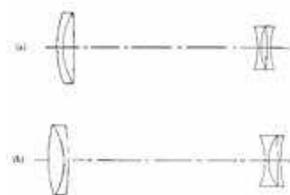
The 180mm Sekor, figure 11, is a unique design for which I have not found a good historically representative type. It is not a true telephoto lens but resembles the old 1920s Ernostars by Bertele. One of these, an f/2 from 1923 is shown in figure 12. But there are significant differences including: the cemented elements in the first group are reversed, the second element of the Ernostar is a cemented doublet, and the final element of the Sekor is a planar meniscus.

Bertele designed the Ernostars when working for the Ernemann Company. When the company was taken over by Zeiss Ikon, Bertele began work on an improved Ernostar design. Later still Bertele used the improved design as a basis for the famous Sonnars. So although the Sekor can trace a pedigree with the Sonnars, they have very little in common.

250mm f/6.3



250mm f/6.3 lens side view
(photo courtesy of "B")



Sekor 250mm f/6.3

Two telephoto lenses from 1891. (a) Dallmeyer (b) Miehle

The Sekor 250mm, figure 13, is a typical two-group telephoto design. It follows no classic design that I have found. Telephoto lenses are characterized by having a positive magnifying front group and a negative group at the rear. Sekor's 6-element lens has superior aberration correction and very little flare giving good contrast, resolution, and accuracy corner to corner with the Mamiya 6x6 format.

Reference.

Most of the historical data presented in this paper was found in the following:

Rudolf Kingslake, "A History of the Photographic Lens", Academic Press, Inc., San Diego, Ca. 1989