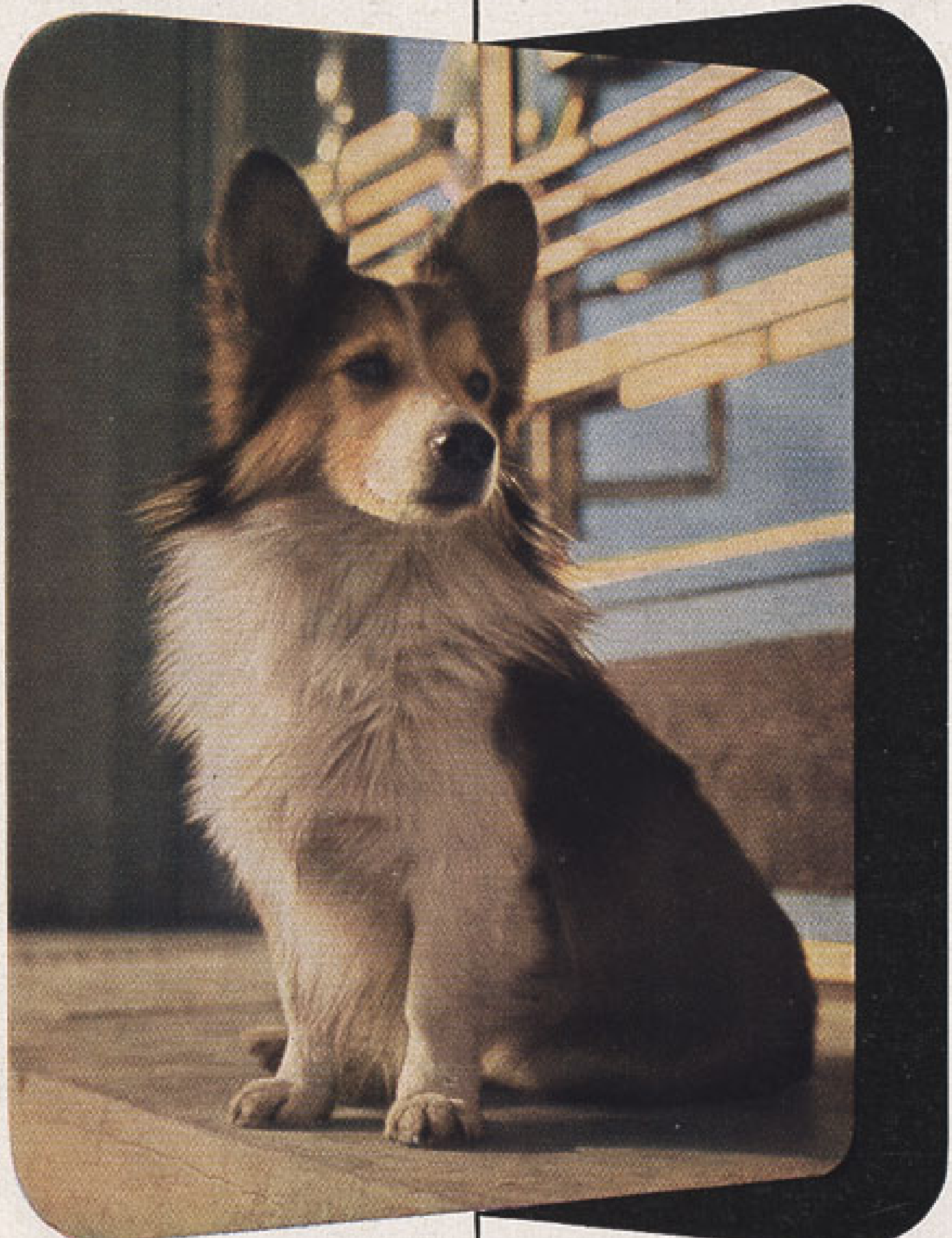
SCHNEIDER

XENOTAR



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SCHNEIDER-XENOTAR 1 : 2,8

The designer of high-speed lenses for the larger negative sizes 60×60 mm, 60×90 mm and 90×120 mm has at his disposal as a starting point the same type of lens as that used for the speed 1:3.5. Lenses constructed in this way with an aperture of 1:2.8, are basically a modification of the well-known Cooke-Triplet by H. D. Taylor, consisting of three single lenses. Photographic lenses of the Taylor type are characterised by a converging, almost plane-convex, front lens, a diverging bi-concave centre lens and another converging, almost plane-convex, rear cell. This simple design was modified by replacing either the front or rear lens or both by twin-lenses cemented together. This division of the front or the front and rear lenses into cemented components was one of the most important modifications of the Cooke-Triplet, as the slightly more complicated construction gave the designer greater liberty in correcting aberrations and in the choice of glasses. By using the modified Taylor type with four or five lenses it became possible, therefore, to reduce the residual aberrations sufficiently to produce a system with an aperture of 1:3.5.

This modified Taylor type has now reached the limit of its efficiency and usefulness in compounds of larger focal lengths or apertures larger than 1:2.8. In these cases, the residual aberrations are too great to be able to compete with the stringent requirements demanded from modern high-speed lenses. Residual aberrations in the spherical deviation occur in the image centre and, in addition, aberrations are caused by the path of the astigmatic image-shell as well as by the marginal oblique rays.

The modified Taylor type, even with the variation of five components, no longer offers any possibility of reducing radically these residual aberrations, because the range of its refractive power does not allow a reduction of the zonal aberrations to the extent required. In view of the required angular field, residual amounts of astigmatic difference have to be taken into account.

With this knowledge, the lens designer has had to acknowledge the fact that the problem can be solved only abandoning the lens type hitherto used and turning to another one with less residual aberrations. The Gauss Double Lens is a system of this type.

Speed	Focal length	Angular field	Negative size	Size of shutter
1:2.8*)	80 mm	55°	60× 60	Compur MX/CRO
1:2.8	105 mm	55°	65× 90	Compur MXCI
1:2.8	150 mm	53°	90×120	Compur EX II 5/2

*) 80 mm for Rolleiflex 2.8 C only.

◀ *Photo: H. Schackert*

Photo: Rob. A. E. Bauer

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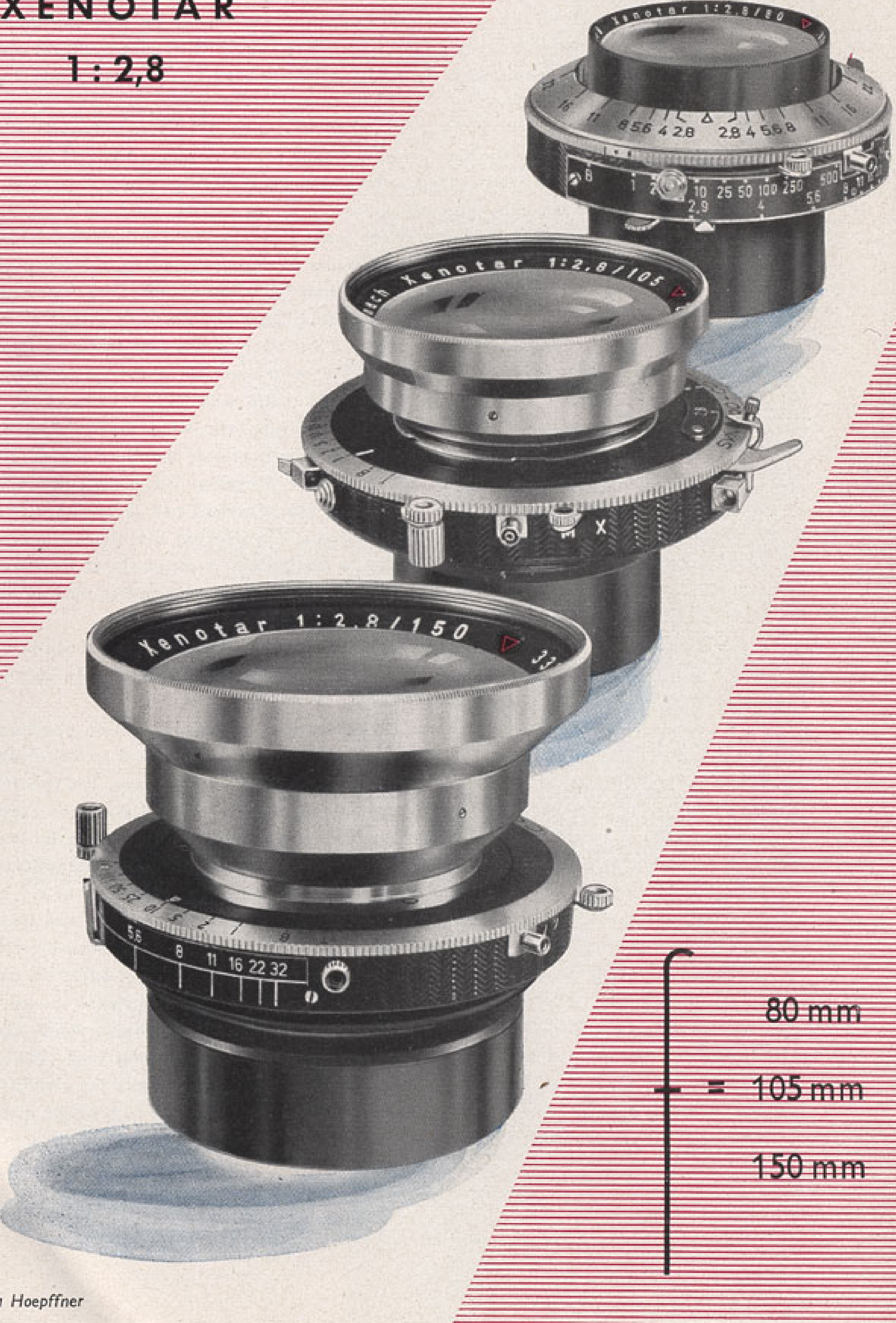


f = 80 mm
105 mm
150 mm

◀ *Photo: Marta Hoepffner*

The basic principle of the Gauss lens, first suggested by Gauss for astronomical purposes, involves lenses with very little residual spherical aberrations and an almost inherent achromatism. This type of lens dominates the very high aperture lens design almost completely nowadays.

The Gauss lens consists of two components, each of two elements, and with synonymous curvatures, that is to say, they are meniscus lenses with alternating signs of refractive power. Two lenses of this type, when combined in such a way that their concave planes are grouped around a centre diaphragm, form a Gauss double low-speed lens. However, this type has several advantages which make it pre-eminent in the design of high-speed lenses. In order to achieve larger apertures the inner, diverging, meniscus lenses were cemented together, and thus the modern, modified Gauss Double Lens was created. The introduction of new, highly refractive, optical glasses and the "Red Triangle" coating of all surfaces made it possible to design a variation of this type of Gauss Double Lens, consisting of four cells and five lenses. This new variation of the Gauss type, designed by Schneider, is the Schneider XENOTAR 1:2.8 with focal lengths of 80, 105 and 150 mm. The front cell is a deeply curved converging lens in the characteristic shape of a meniscus followed by a cemented diverging lens, also of meniscus shape. These two cells together form the front component of the Schneider XENOTAR and are in front of the diaphragm. Behind the diaphragm are arranged one diverging and one converging lens, both likewise of meniscus shape. Considering the oblique rays, the general concavity of all surfaces towards the diaphragm is obviously of tremendous value in keeping angles of incidence and consequently the corresponding oblique aberrations of higher order down to a minimum.

From this comparison of the design of both the old and the new lens types it can be seen how much progress has been made by changing over to the Gauss Double Lens type and thereby to the Schneider XENOTAR.

With regard to the image centre, the change of type has resulted—at an aperture of 1:2.8 and a focal length of 80 mm—in a reduction of the longitudinal spherical aberration to $^{1}/_{4}$ of that found in the best designs of the modified Taylor type. The spherical-chromatic aberration has been improved simultaneously to at least the same degree, so that a very definite focusing for the image centre is possible. In the extra-axial image field, the designer has succeeded in achieving a reduction of the astigmatic difference by $^{1}/_{5}$ at half of the angular field of 14° and by $^{1}/_{3}$ at half the angular field of 21°, and its complete elimination at the corner of the image. At the same time the two image-shells have been flattened in such a way that the distance from the ideal focusing plane has been halved. In accordance with the reduction of the longitudinal spherical aberration, the spherical aberration of the oblique rays (Coma) has also been reduced.

With the Schneider XENOTAR 1:2.8 an optical system is now available which has—at the full aperture and even with longer focal lengths—an extremely high resolving power in both colour and black and white photography. At full aperture the XENOTAR produces a brilliant and even image over the entire field while optimum image quality is reached at the relatively large aperture of 1:4.

For all fields of photography:

Sports events

A. P. Riethausen

Stage

Robert A. E. Bauer

Fashion

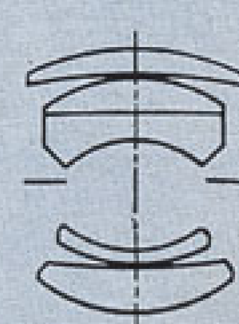
Robert A. E. Bauer

Press photography

H. Schackert

Photo: Dr. Otto Croy

Experienced and discriminating photographers are enthusiastic about the true-to-nature tone values rendered by the XENOTAR and its amazingly high resolution



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