

**New People And New Activities
At Carl Zeiss's
Camera Lens Division**

In 1997 the camera lens division continues to build up muscle for their ambitious activities. Among others, new people include:

Alexandra Klitsch, manager controlling and finance, reports to Ralf Coenen, vice president camera lens division. Alexandra is following a successful career with several Carl Zeiss divisions and worked for LEO Elektronenmikroskopie GmbH, a Zeiss joint-venture, before she joined the camera lens division.

Thomas Rittmann joined the camera lens division as mechanical design engineer with substantial experience in high class optical systems: He came from the Carl Zeiss semiconductor lens division where he contributed to the most demanding optical systems in production today. He reports to Dr. Winfried Scherle.

Also from the engineering staff of the Carl Zeiss semiconductor lens division came **Gabriele Kalmbach**. She manages several projects dealing with optical measuring systems for the camera lens division as well as the technical aspects for a key account. She reports to Dr. Winfried Scherle, product development manager.

Otto Hahnemann, an electronics engineer and experienced nature- and wildlife photographer was formerly with the Carl Zeiss electronic components department. He now takes care of photographic testing, applications and user support. He also represents the camera lens division at sales exhibitions and dealer events and reports to Kornelius Fleischer, manager marketing and applications.

Yvonne Maier, a young business administrator with a freshly earned degree specialising in customer service now handles much of the day-to-day communication work of the marketing department. Yvonne reports to Kornelius Fleischer.

New Products on the Market:

**Carl Zeiss Tele-Superachromat T*
350 mm f/5.6 CFE
for All Hasselblad Cameras**

The Carl Zeiss Tele-Superachromat T* 5,6/350 CFE is a high performance telephoto lens for the very demanding photographer. It can be used on any series 500 Hasselblad camera with central shutter (= C), series 200 camera with focal plane shutter (= F), even the electronic functions (= E) of the high end Hasselblads are catered for.

This exceptional new lens is extremely difficult to manufacture due to incredibly narrow tolerances and delicate materials. The Carl Zeiss Tele-Superachromat T* 5,6/350 CFE was designed to deliver its high image quality even wide open, the way many fashion photographers prefer to work these days. It incorporates special optical materials with anomalous partial dispersion to achieve a chromatic correction so good, that even for infrared photos no special index is needed. The Carl Zeiss Tele-Superachromat T* 5,6/350 CFE incorporates recent Carl Zeiss research findings about flare suppression and will impress photographers with outstanding contrast and color saturation.

The Carl Zeiss Tele-Superachromat T* 5,6/350 CFE is equipped with a very smooth internal focusing mechanism. Thus the outstanding sharpness of this lens can be directed with great ease and precision. The focusing mechanism is equipped with a lower and upper user-adjustable limiter. Sports and wildlife photographers will benefit from this new feature. The rear of the lens is equipped with the new Carl Zeiss heavy-duty camera bayonet with three-dimensional structure. Underneath the barrel the Hasselblad tripod quick mount is located right under the center of gravity of a combination of lens and camera.

The ergonomics have been greatly improved over the CF line, so scales are better legible and gloves may be used. The flash connector

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now has a positive lock. The new aperture stop-down button is protected against accidental damage by shear forces. Also the use of new materials extends the service life of the shutter. So the Carl Zeiss Tele-Superachromat T* 5,6/350 CFE will be an essential tool in the arsenal of the successful professional photographer.

CB Line – The New Basic set of Carl Zeiss T* Lenses for All Hasselblad Cameras

Hasselblad and Carl Zeiss jointly introduce the CB line, a new basic (that's what the B stands for) set of three lenses that should allow the professional photographer to successfully fulfill at least 90% of all the day-to-day assignments.

Every CB lens is equipped with a new Prontor central shutter (that's what the C stands for), so it can universally be used with all Hasselblad series 500 and series 200 cameras. And the best thing is: Hasselblad can offer this set at a very favourable price.

The CB line consists of the famous Carl Zeiss T* Planar 80 mm f/2.8, plus a high performance wide angle Distagon 60 mm f/3.5, and a telephoto Tessar 160 mm f/4.8. With these new lenses comes a wealth of improvements like higher image contrast, low-friction focusing, better legibility of scales, permanently black smooth-action front bayonet, heavy-duty rear bayonet with three-dimensional structure.

Of course Carl Zeiss had cut costs somehow to make the favourable price possible in the first place. But the savings were not achieved at the expense of optical or mechanical quality. Rather Carl Zeiss left out the F-function from the shutter. So, a CB lens used with a focal plane shutter Hasselblad of the 200 series will work perfectly, but acts only in the C-mode which means: Upon tripping the shutter the viewfinder image will disappear until the photographer winds the film thus re-opening the shutter – just as with any central

shutter Hasselblad since 1957 – nothing to worry about at all.

The scales got the new and larger "Frutiger" type face. White color is used for all scales and marks, not white, red, orange, green and fluorescent red as on CF-lenses. The new heavy-duty rear bayonet with three-dimensional structure is built in. Although it took a high initial investment to produce complex parts like this, on the bottom line it saves considerably on assembly and logistics costs, because it replaces roughly 15 or more parts with a single one.

The smooth action front bayonet is injection molded from a permanently black material, which again needed a high initial investment for the mould but will generate savings over the CF-line's milled and black anodised part with increasing numbers of CB's produced. To a certain degree, the new front bayonet can even serve as bumper.

In spite of the savings, three important things remain unchanged:

- All the lens elements are made from carefully selected batches of highest quality optical glass. No plastic was used nor even considered!
- The shutter is still a Prontor precision mechanics masterpiece from the Black Forest (Prontor Works have been an essential part of Carl Zeiss for decades).
- The CB lenses are made by the dedicated workers of Carl Zeiss in Oberkochen along with the new Tele-Superachromat T* 5,6/350 CFE and all the CF lenses for Hasselblad.

Planar T* 80 mm f/2.8 CB

The legendary Carl Zeiss Planar T* 80 mm f/2.8 CB is a universal and fast high performance standard lens to be used with all current Hasselblad cameras. With its exceptionally flat field (hence the name „Planar“) it is suitable for virtually all fields of photography.

Recent progress in mathematics, optical design and new technology made it possible for Carl Zeiss, to achieve the famous medium format Planar level of performance with the

classical 6-element-design. At the same time flare suppression has been significantly improved.

Distagon T* 60 mm f/3.5 CB

The Carl Zeiss Distagon T* 60 mm f/3.5 CB is versatile wide angle lens to be used with all current Hasselblad cameras. The stunning optical performance recommends this lens for wealth of demanding tasks in commercial, advertising, and industrial photography, to name just a few.

Detailed interiors with people, groups in particular are a hallmark of this lens. In candid wedding photography the Distagon T* 60 mm f/3.5 CB is an indispensable tool that can be used wide open whenever ambient lighting conditions ask for it.

Tessar T* 160 mm f/4.8 CB

The Carl Zeiss Tessar T* 160 mm f/4.8 CB brings the classic Tessar type back to Carl Zeiss's line of lenses for Hasselblad cameras. The new 160 mm is a telephoto lens with a focal length very popular in portrait photography. Maybe it is the answer for photographers who couldn't decide between the 150 CF and 180 CF. The 160 CB is to be used with all current Hasselblad cameras.

The Tessar type enabled a more lightweight lens than a Sonnar approach would have generated. Many photographers consider this alone an important benefit, especially those who prefer to shoot hand-held. The Carl Zeiss Tessar T* 160 mm f/4.8 CB incorporates all recent Carl Zeiss research findings about flare suppression and will impress photographers with significantly increased contrast and color saturation. On top of that, it goes easy on the shoulder and on the budget.

Resolution of Camera Lenses Where are the limits – and why?

Some users of Zeiss lenses are so enthusiastic about these optics that they believe Carl Zeiss can do wonders. Well, this is not exactly true. The fact is: Carl Zeiss has to adhere to nature's laws just as anybody else



So far, Carl Zeiss's physicists have found no way around it.

One of these laws defines the resolution limit of any optical system, any camera lens, even a perfect one with absolutely no lens errors. It is the law of diffraction. This law states that a sharp point in an object will not correspond to a sharp point in the image thus having a diameter of exactly zero, but rather to a small diffraction disc (physicists call it "Airy disc"). This disc has a certain diameter, which varies with the aperture of the imaging system. The smaller the aperture (e. g. f/22) the larger the disc. And the larger the disc, the lower the resolution!

So, even a perfect lens with no lens errors is limited in its resolution! (Such a perfect lens does not exist. Even the most sophisticated lenses on this planet, the Carl Zeiss S-Planar lenses for the semiconductor industry are only approximations to the perfect lens, although very close ones.) Thus the term "diffraction-limited" has become the synonym for lenses that are so good their only performance limit is the law of diffraction. According to this law no camera lens used in photography, still or motion, can produce resolutions higher than given in the following table (Approximate, rounded off values for white light spectrum of even energy distribution. In unevenly distributed spectra of gas discharge light sources somewhat higher resolutions may be achieved.)

<i>f</i> -no.	resolution (line pairs per millimeter)
45	35
32	50
22	70
16	100
11	140
8	200
5.6	280
4	400
2.8	560

In practical photography other limitations of resolution occur, too. The existing depth-of-field concepts, for example, lead to a limit at 30 line pairs per millimeter, simply because they assume that the image of a

sharp point may be considered sharp as long as the unsharp disc it actually is (called the "circle of confusion") grows no larger than 1/1000th of the focal length of the respective standard lens. In 35 mm photography only 1/1500th is allowed. 1/1500th of the 50 mm standard focal length equals 1/30th mm. So 30 fit into one mm, which means, we are talking 30 line pairs per millimeter (CLN 1 has more details in "Depth of Field – An Insider's Look Behind The Scenes", an article that meanwhile has been reprinted in many publications around the world). This is about the same limit set by diffraction for f/45 which was an aperture setting quite popular with 5 x 7 inch large format photography, producing images that can be viewed without any subsequent magnification.

Today's high quality color films do reach resolutions in the region of 140 line pairs per millimeter with Kodak Ektar 25 leading the field at 200! The full resolution potential of these films cannot be utilized with existing depth-of-field concepts nor f-settings of f/11 and beyond. On the other hand all real lenses on the market today are limited not only by diffraction, but by lens errors also. Some of them quite heavily.

Carl Zeiss has always strived to develop very elegant sets of lens error corrections and to deliver a high degree of lens performance, second to none. So, with normal Carl Zeiss lenses set at f/8 and f/5.6 resolutions at the very limits of the best color films have been reached.

Objects of 4 millimeter in size (approximately 1/6 of an inch) have been imaged from almost 400 meters distance (more than 1.000 feet) with a 100 mm Carl Zeiss Makro-Planar lens at f/5.6 and a Contax RTS III 35 mm SLR camera featuring the unique Contax vacuum pressure plate. Similar results were obtained with Contax AX 35 mm autofocus SLR, Contax RX 35 mm low noise SLR and Makro-Planar 60 mm, Planar 85 mm f/1.2, Planar 100 mm f/2, Aposonnar 200 mm f/2, Vario-Sonnar 28–85 mm and 35–70 mm zoom

lenses, even with moderate priced Planar 50 mm and Distagon 28 mm

Resolutions on the same level have been achieved with Carl Zeiss lenses in Hasselblad medium format cameras, proving that at Carl Zeiss, medium format lenses, contrary to popular belief, offer no lower resolution than the very best 35 mm lenses.

Other camera systems which achieve performances in the same premium class with their Carl Zeiss lenses include the medium format SLR cameras of Rollei fototechnic with the Rolleiflex 6008 integral as their latest top of the line product and the discontinued Rolleiflex 300: the only 35 mm SLR with interchangeable film backs since the demise of the Zeiss Ikon Contarex and Contaflex.

The most obvious limitation of resolution in everyday photography, however, is unwanted motion with handheld cameras. Even a seasoned photographer with a very "calm" camera will hardly find resolutions higher than 40 line pairs per millimeter in his photographs unless he uses an adequate tripod. CLN will detail on this topic in a later issue.

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