ZEISS HISTORICA

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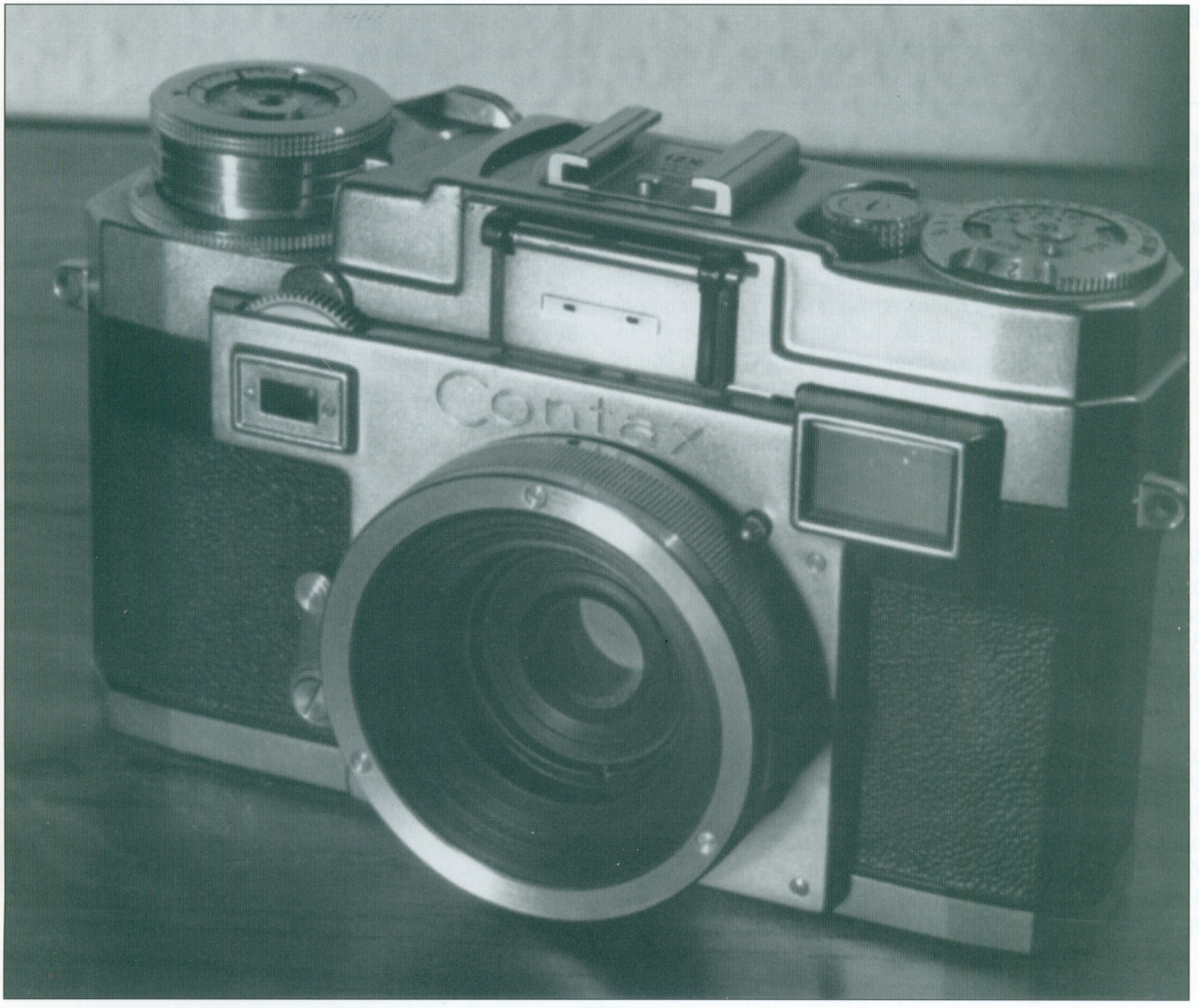

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The Zeiss Historica Society of America is an educational, non-profit organization dedicated to the exchange of information on the history of the Carl Zeiss optical company and its affiliates, people and products from 1846 to the present.

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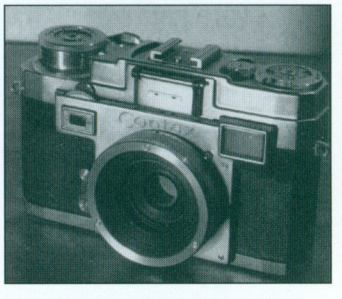
Material for the journal should go to the editor (see above) at 24 Valley Drive, Randolph, NJ, USA, 07869-1028. Please send all other correspondence to Zeiss Historica Society, 300 Waxwing Drive, Monroe Twp. NJ 08831, USA. Annual membership dues: $35 (USA), $45 elsewhere. Dues include subscription to Zeiss Historica, airmail postage overseas.

On The Covers



Front Cover: A VK21 from 1950. Wolf Wehran tells us on page 20 of this and other attempts to improve on the Contax IIIa. Note the rapid film advance lever. See page 21 for another view of this camera.

Back Cover: The 1934 range of Contax cameras and lenses, from the July 1934 issue of *Camera Craft*.

Other Credits

Pages 12-13: Photos from Wolfgang Wimmer, Archivist, Carl Zeiss Jena GmbH.

President's Letter

As the Christian world prepares to enter the year 2000, we are closing out our 20th. So this would be a good time for us to look at the state of the Society and its path to the future.

In round numbers, there are 500 of us, of whom 400 live in the USA. We are mostly male, and most of us relate closely to the name Zeiss in the field of photography, through the products of the lamented affiliate, Zeiss Ikon. Only a small group of members have declared an interest in the myriad other branches of the Zeiss enterprises through history — a curious inversion of the relative positions of photographic imaging devices versus everything else Zeiss makes now or has made over the past 153 years.

Our semi-annual Journal has become a well-respected source of knowledge about things Zeiss, although its circulation is still very limited. And our reprints of classic Zeiss brochures have attracted a wide following.

Our income approximates our expenses, and thanks to a thin cushion bequeathed to us by Tom Schreiner's estate we're about breaking even at 500 members. Nevertheless, we can always use more members; not only would we be able to spread the fixed administrative costs over a larger base, but we would also enlarge the pool of people willing to help run the society.

So in addition to the continued plea for volunteers, I would like to ask each of you to let us know if you are involved with a club, group, or professional association whose members might be interested in Zeiss Historica. I'm mainly thinking about people interested in microscopes, telescopes, planetaria, topographic and measuring equipment, binoculars, militaria — areas where Zeiss has played a major role.

We have been largely unsuccessful at probing the vast number of users of Zeiss lenses on other makers' equipment — Ihagee, Hasselblad, Rollei, Arriflex and now, Sony. If any of you has an inside track to the users' groups or historical-interest subsections of any relevant societies, please contact them and see if they would be interested in exchanging mailings. If so, have them contact Secretary Maurice Zubatkin for information by mail (note the new address) or via e-mail, or any of the officers.

I wish to thank those of you who took the time to write after my last message; your expressions of support and suggestions for improvement were very encouraging. Several items bear repeating here, keeping in mind that each of these dreams would require manpower to convert idea to reality. Many of you would like to see the Journal published more often. We need a swap and shop sheet, but that would clearly require a tremendous amount of work. (Any volunteers?) We need a Publicity Officer to help make the Society better known.

We also need a person or committee to plan and implement the Society's meetings. Plans are gelling for a meeting in March or April featuring some heavy hitters from Zeiss Oberkochen.

Please be diligent about including your e-mail contact address with your renewal, as this information could allow us to cut costs dramatically. And don't forget that dues have increased to $35 for US addresses and $45 for elsewhere, effective the year 2000. With this extra revenue we will be able to tackle some of the projects that have long been on our wishlist. We're on the verge of some major progress as we enter our third decade. Our most important task is to grow the membership and then stay responsive to its expressed wishes. Good luck to all as we cross the threshold into the year 2000.

Charlie Barringer

How Zeiss Binoculars made their London Début

Fred Watson, Coonabarabran, Australia 2357

If you had gone out to buy a pair of binoculars in London in 1895, what would you have come home with? Almost certainly, it would have been a trumpet-shaped Galilean field-glass—that is, one having convex objective lenses and concave eye-pieces joined by empty tubes (Figure 1). Though it would have had refinements such as extending ray-shades and multi-element lenses (each lens would have been a triplet in a top-of-the-line instrument), it would have used essentially the same optical system that Galileo had employed in his first telescope almost three centuries before.[1]

And you wouldn't have called it a pair of binoculars. It would either have been a "binocular" (shortened from "binocular field-glass") or its equivalent, a "pair of field-glasses." Only in the twentieth century have we merged these terms into the cumbersome and illogical "pair of binoculars" we speak of today.

If you had been very well-heeled, and sought a magnification of eight or more, you might have bought a binocular telescope—a pair of ordinary terrestrial telescopes mounted side-by-side to make an unwieldy "deer-stalking binocular" (Figure 2). But you would almost certainly never have heard of a curious French instrument that had appeared some thirty years earlier. Resembling a half-pear style Galilean binocular with oddly-shaped extensions, this first-ever prismatic binocular had been made by Luquin et L'Hermite in Paris and imported into Britain (probably in very small numbers) by the London firm of Negretti and Zambra

Figure 1. For much of the nineteenth century, binoculars looked like this. Their Galilean optical system had a very small field of view and seldom magnified more than 5x. The high-quality Steward instruments depicted in this 1899 advertisement had the same prestige in 19th-century Britain as Zeiss binoculars do today. Note the high premium paid for aluminum construction.

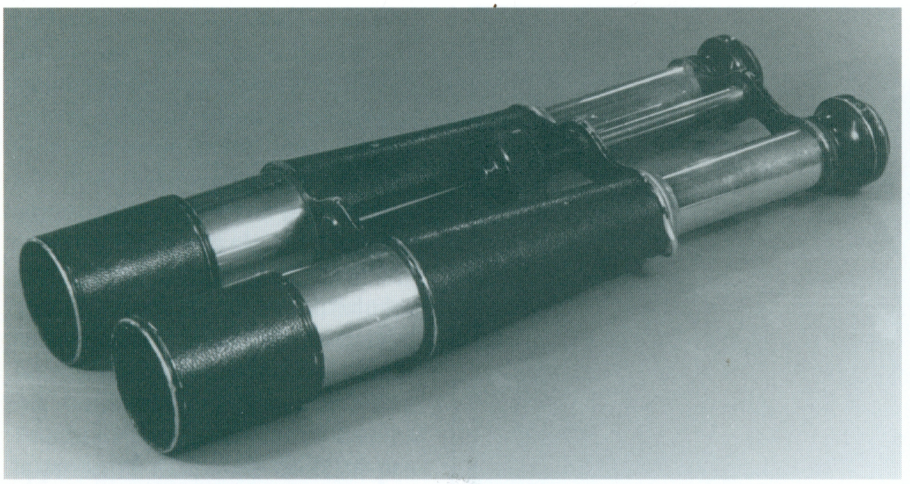


Figure 2. Large aluminum binocular telescope by the Frankfurt firm of Schlesicky-Ströhlein, circa 1890. It magnified 16 times, and essentially consisted of two draw-tube terrestrial telescopes mounted side-by-side.

(Figure 3).[2] Despite the ingenuity of its inventor, A. A. Boulanger, in applying Ignazio Porro's new telescope design to a binocular,[3] the glass technology of the time did not allow it to work effectively, and it was not a success.

It is also highly unlikely that in 1895 London you would have encountered the instrument that had finally vindicated the ideas of Porro and Boulanger—the new Zeiss prismatic field-glass, now beginning to be seen on the continent. If you were scientifically astute, you might have been familiar with Carl Zeiss as a manufacturer of microscopes;[4] otherwise, you would probably never have heard the name. But all that was about to change.

The first Zeiss binoculars

The events leading to the development and manufacture of Zeiss prismatic binoculars have been well-chronicled elsewhere.[5] Briefly, Ernst Abbe (who worked for both Carl Zeiss and Jena University) independently re-invented Porro's prisms in the 1870s. Building on investigations into the enhancement of stereoscopic perception, by Hermann von Helmholtz in the middle of the nineteenth century, he devised two types of binocular that used the prisms not only to provide upright images in inverting telescopes (as Porro had done), but also to increase the separation of the objectives over that of the eyepieces in accordance with Helmholtz's findings. These instruments were covered by a 15-year German imperial patent awarded in 1894 (but backdated to 1893), and went into production the same year using new glass-manufacturing techniques developed by Abbe himself and the chemist, Otto Schott.

The first type, the now-familiar prismatic binocular, was produced in three compact sizes (4×11, 6×15 and 8×20) and seems to have been an immediate success. Zeiss referred to it simply as the Feldstecher, or field-glass (Figure 4).

The second was the stereo telescope (or Relieffernrohr), which had very widely-separated objectives for extreme stereoscopic enhancement, and came in 8× and (a little later) 10× forms.

These cumbersome devices never found favor among the binocular-buying public, but eventually they became widely used as military instruments (Figure 5).

Zeiss were well aware of the export potential of their new instruments. With a view to securing the lucrative British market, they moved quickly to protect their design, and were awarded a British patent in 1894.[6] However, it appears that the new binoculars themselves were very slow to make their way across the English Channel.

Their progress can be charted through the pages of the British scientific journal *Nature*, first published in 1869 and still among the world's most prestigious research periodicals. At the turn of the century, binoculars were regarded as scientific instruments rather than merely accessories for tourism, natural history or sport as they are today. New developments were a matter of great scientific interest, and were assiduously reported both by the manufacturers and editorial contributors.

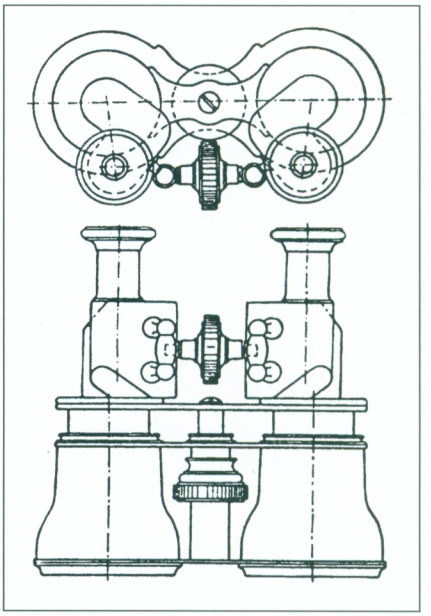


Figure 3. Line drawing of Boulanger's patent prismatic binocular of 1859. This tiny and delicate instrument pre-dated Zeiss prismatic binoculars by 35 years, but sank into obscurity because its design was far ahead of the manufacturing methods then in use.

Figure 4. The diminutive Zeiss Feldstecher, the world's first successful prismatic binocular. It succeeded where Boulanger's instrument had failed, primarily because of its high optical and mechanical quality. This 8x20 instrument (Serial No. 1634) is an early example of the largest of the three models available.

The 1896 Royal Society Conversazione

One of the features of London scientific life in the late 19th century was the conversazione. This was essentially a social event, hosted by a learned society, at which individuals or commercial organizations demonstrated their latest inventions, discoveries or products. In some societies, the tradition still prevails.

By all accounts, the conversazione hosted by the Royal Society on 6 May, 1896, was a particularly good one. According to *Nature*:

> Few conversaziones of the Royal Society have exceeded in interest the one held on Wednesday of last week. Many of the exhibits were very striking, while all of them presented novel features. Physical science predominated, and Roentgen photography attracted a large share of attention throughout the evening...[7]

Nature provided a lengthy account of the exhibits, and, among the descriptions of novel resistance boxes, objective-prism spectra of stars and Roentgen (X-ray) photographs of bones in the living body, we read:

> On behalf of Mr Carl Zeiss, new portable binocular field-glasses and stereo-telescopes were exhibited. The objects of the new types are (1) to obtain a considerably larger field than that possessed by a Galilean telescope of similar magnifying power: (2) to enhance the stereoscopic effect of the images formed, by placing the object-glasses further apart than the eye-pieces. These objects were attained by prisms and astronomical oculars. The rays passing from the object-glass to the eyepiece undergo four reflections at the surfaces of the prisms, and emerge from the last prism with undiminished intensity. The interposition of the prisms serves to erect the inverted image formed by the object-glass, and, at the same time, to displace the axis of the eyepiece with respect to that of the object-glass, the amount of this displacement being variable within wide limits.[8]

Thus were the revolutionary new prismatic binoculars introduced to the British scientific establishment. It is interesting to note the inference that they were the work of a living craftsman, whereas, in fact, they were the batch-produced output of a modern and efficient optical factory. Zeiss himself had died almost eight years earlier, and the firm had been owned by the Carl Zeiss Foundation since 1891. Likewise, with hindsight, the reference to light emerging "with undiminished intensity" rings rather

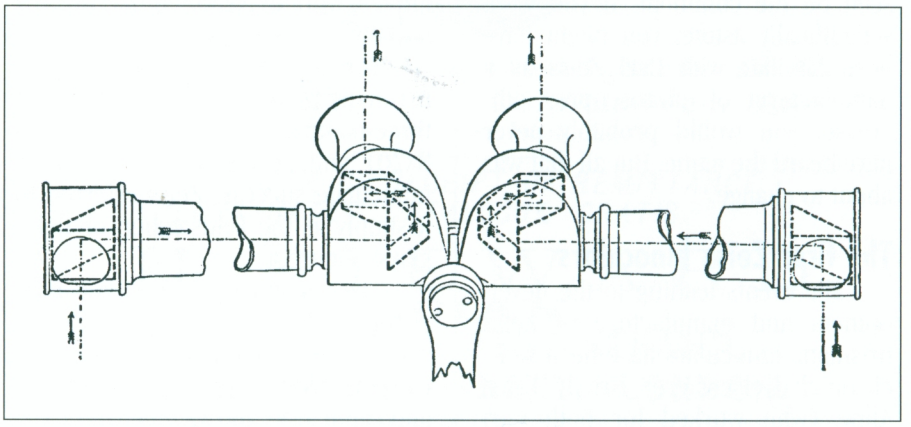


Figure 5. Schematic diagram of the Zeiss stereo-telescope, introduced at the same time as the prismatic binocular. The prism system is a modification of the second form of image-erecting prism invented by Porro; it allows the objective lenses to be placed much further apart than the eyepieces, giving greatly-enhanced depth perception.

hollow, given that the Fresnel (reflection) losses at the four refracting surfaces of the prisms were the Achilles' heel of prismatic binoculars for more than forty years.[9]

Nevertheless, it is hard for us to appreciate today what an improvement the new Zeiss glasses were over everything that had gone before. With their finely-engineered and compact construction, bending-bar interocular adjustment and individually focusing eyepieces, the three models of Feldstecher had a far more capable appearance than their Galilean predecessors.

Engraved on their prism-cases was not only the maker's name (often omitted on Galilean glasses), but also—for the first time on any binocular—the magnification. This, for the 6× and 8× models, at least, was greater than could be reasonably attained with a Galilean. And the apparent field of view of approximately 37 degrees (the same for all three models),[10] though pitifully small by modern standards, was more than twice that of a large Galilean such as the instrument shown in Figure 1.

Finally, the modest but quite palpable improvement in stereoscopic perception afforded by the increased objective separation gave a pleasing sensation of depth to the landscape within a few kilometers of the observer.[11] Small wonder that, in Britain as elsewhere, Zeiss's new product soon became established as the yardstick for binocular design.

Marketing the Feldstecher in Britain

It is not known exactly when the new binoculars first appeared in the shops in Britain. Though Zeiss had established a London office in 1895, it is possible that they had to wait quite some time for stocks to arrive. Surprisingly, the first published advertisement did not appear until 18

Figure 6. The earliest-known British advertisement for prismatic binoculars: Nature, 4 November 1897. The 6× model Feldstecher is depicted.

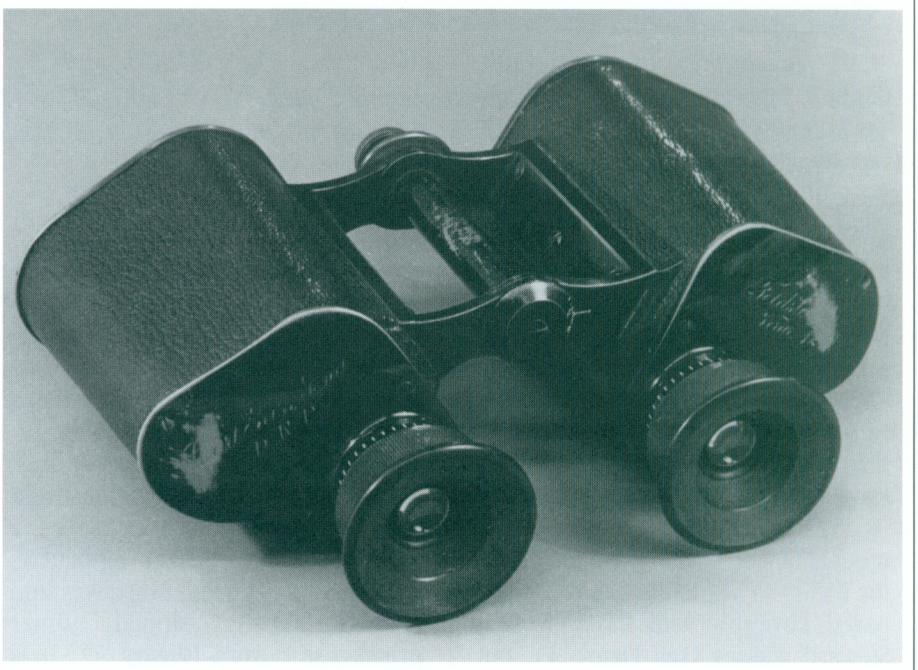


Figure 7. The 1896-model 12×25 "sloping-shoulder" Zeiss binocular was a much more substantial instrument than the original Feldstecher (compare Figure 4). This example is serial no. 9481, and was supplied by Finnigan's Ltd., of Liverpool, Manchester and London.

Figure 8. Sectioned engraving: Nature, 12 December, 1907. Again, the 6x model is depicted, but this time with detail improvements (in the eyecups, upper hinge boss, sling loops and objective cells) over the earliest models shown in Figures 4 and 6.

Figure 9. The 1907 body-shape set the pattern for decades to come, not only for Zeiss but for most binocular manufacturers. Nature, 7 May, 1908.

months after the Royal Society conversazione, again in *Nature*, on 4 November 1897 (Figure 6). It was probably timed to catch the Christmas trade. This advertisement ran virtually unchanged for more than five years, suggesting that Zeiss were satisfied with the results.

The prices quoted for the three models of Feldstecher (from £6. 10s. for the 4× to £8. 0s for the 8×) compared favorably with the very best Steward glasses (see Figure 1), but were two or three times higher than most Galilean binoculars. Perhaps because of this, the price of the 4× Feldstecher (the instrument most comparable in magnification with the Galilean type) was soon reduced to £6. 0s. Prices then remained stable for some five years.

All these early advertisements mentioned night and day models "for naval men and deerstalkers, &c," priced at £10 and £11 respectively. Since 1896, Zeiss had produced a family of large prismatic binoculars with 25mm diameter objectives and characteristically sloped upper prism-case covers (Figure 7). It is most likely that the night and day glasses were the 7.5×25 and 12×25 models from this range. No doubt the other models (5×25, 10×25, and the dual-eyepiece 5+10×25 *Marineglas mit Revolver*) were also available.

As the new century dawned, Britain found herself at war in southern Africa. The Boer War of 1899–1902 was the first major conflict in which prismatic binoculars were used. Unfortunately, the British army was equipped mainly with official-pattern Galilean glasses, while the enemy had supplies of Zeiss binoculars, and used them to their advantage. (After the war, military authorities in Britain heeded the complaints of their officers, eventually introducing official-pattern prismatic instruments.)[12] No doubt the

war contributed to sales of Zeiss binoculars in Britain, as both officers and civilians made private purchases for their own use in the field or at home.

In May, 1903, Zeiss announced:

> The large output of our Patent Prismatic Field Glasses, of which considerably over 50,000 have been sold, has resulted in so great an improvement in the appliances for their production that we are now able to offer the public some portion of the benefit, and very materially reduce the list prices.
>
> Our Prismatic Binocular, giving a magnification of 8 diameters, which is the one most suitable for tourists, military and general purposes, will in future cost £6 10s. instead of £8.
>
> Prismatic Binocular giving a magnification of 4 diameters, has an extraordinarily large field of view, and is specially useful for the requirements of Naturalists. It is also an excellent Theatre glass. Reduced to £5 10s. Other models reduced in proportion.[13]

Though not today couched in quite such picturesque terms (evidently translated from the German), the theme of this announcement will be familiar to anyone who buys computer or electronic equipment. Mass production means lower prices. Once again, the new prices remained stable for a long period (this time, for more than four years).

Zeiss were always keen to demonstrate the complex internal construction of their prismatic binoculars compared with the Galilean type. They produced wire-supported models of the optical train for display by retailers, which proved very popular. So it is not surprising that their advertising included sectioned diagrams of the binoculars (Figure 8). By the time this particular advertisement was published, newer models had appeared, but Zeiss clearly found the engraving too good to waste.

The new models were introduced late in 1907, and immediately became available in the UK. The improvements included refined optics with a wider field of view, better external sealing, and integrally cast bridge components and sling-loops. Refinement in body-design resulted in a new shape that remained essentially unchanged for half a century, and can still be found in binoculars made today (Figure 9). Larger objectives were introduced, the new models being 6×21, 6×30, 8×24 and 12×30 (the latter two replacing the "sloping-shoulder" models).[14] The marine revolver and the little 4× model were dropped.

The response of Zeiss's competitors

In Britain, as elsewhere, Zeiss soon faced strong competition from other optical companies.[15]

Almost without exception, competitors avoided infringement of Zeiss's patent by arranging the objectives of their binoculars to have the same separation as the eyepieces (if not slightly less). The "step" in the Porro-prism optical system was placed vertically instead of horizontally, raising the objectives above the axes of the eyepieces to give a small height advantage (Figure 10).

The one exception was Hensoldt who, in 1897, introduced roof-prism binoculars incorporating penta-prisms (similar to those used today in SLR cameras) which were arranged to increase the objective separation. Since the stereoscopic enhancement thus obtained did not rely on Porro prisms, there was no infringement of Zeiss's patent, and Hensoldt manufactured the binoculars under patents of their own.

The Braunschweig firm of Voigtländer was the first competitor to advertise Porro-prism binoculars in Britain, following hot on the heels of Zeiss on 9 December 1897. Their advertisement in *Nature* stressed that they were the "original makers of ...binocular field glasses," a reference to the fact that the firm had been responsible for the first commercially successful Galilean binocular (an opera glass) in 1823. No doubt they hoped thereby to steal a march on Zeiss.

Next came the Berlin–Friedenau firm of C. P. Goerz, also with a ploy to steal Zeiss's thunder. In a two-page announcement in a *Nature* Supplement of 6 April 1899, they explained why their new range of *Trieder* binoculars were "particularly suitable for observations of variable stars." Astronomical observations, of course, gain no advantage from enhanced stereoscopic perception, so clearly Goerz felt they could compete with Zeiss on an equal footing in this field.

The first British company to join the fray was Ross, who began advertising in Nature on 4 January 1900. Thereafter, numerous others, both manufacturers and suppliers, followed suit. The complete list of announcements of the introduction of prismatic binoculars in Britain, from 1897 to the expiry of Zeiss's patent in 1908, is as follows:[16]

November 1897	Zeiss
December 1897	Voigtländer
April 1899	Goerz
January 1900	Ross
March 1901	Watson
December 1902	Dallmeyer
August 1903	Aitchison
January 1904	Staley (supplier)
May 1907	Busch
May 1907	Stereoscopic Co. (supplier)
December 1907	Leitz
July 1908	Negretti and Zambra

A number of well known firms are absent from this list. The famous British firm of Wray did not produce prismatic binoculars until 1909; likewise, Barr and Stroud, despite their early interest, did not introduce them until 1919. While R. and J. Beck are thought to have produced or sold prismatic instruments during this period, there is little evidence in the literature.

Among continental firms, the most notable omission is Hensoldt. However, Watson marketed pentaprism models similar to the Wetzlar products, and it seems likely that they were either manufactured by Watson under license, or made by Hensoldt themselves for importation by Watson. The nature of the agreement between the two firms is the subject of continuing investigation.

Despite the competition, Zeiss maintained their position as market leader throughout the first decade of the century. There seems no question but that the enhanced stereoscopic effect of their glasses made them more desirable than those of other manufacturers. As soon as Zeiss's patent expired in 1908, most of their competitors adopted the Jena firm's "stereo-prism" pattern, resulting in a general uniformity of design that contrasted sharply with the early years and lasted for five decades or more.

Barely half a dozen years later, the relative merits of different binoculars ceased to be the exclusive province of scientists, naturalists and the well-to-do. Prismatic and Galilean types alike suddenly became optical munitions, and in high demand. Zeiss binoculars, now manufactured in London as well as in Jena, were swept into the maelstrom, and soon faced one another across the trenches.

Figure 10. In Britain, Zeiss faced strong competition from several firms, including Aitchison, who introduced "large-diameter" (35 mm) objectives in 1903, four years before Zeiss. Though larger and more robust, their binoculars used the same basic layout as the Boulanger type (Figure 3). They were unique in having variable iris diaphragms. Here, 12x and 16x models are seen.

Acknowledgments

I am deeply indebted to William Reid for his friendship and guidance over the years. In particular, it was Bill who drew my attention to the Science Museum's Boulanger binocular. It is also a pleasure to thank the staff of the Crawford Library of the Royal Observatory, Edinburgh, for access to the turn-of-the-century issue of *Nature*.

Dr Fred Watson is Astronomer-in-Charge of the Anglo-Australian Observatory at Coonabarabran in central New South Wales.

References

1. Galileo didn't invent the telescope that bears his name, but became its most celebrated user as a result of his astronomical discoveries from 1609. The origins of the Galilean telescope are still uncertain. For the "traditional" view see H. C. King, *The History of the Telescope*, Griffin, London, 1955, Chapter II. See also C.A. Ronan, "The origins of the reflecting telescope", Jour. Brit. Astron. Assoc., **101**, 335, 1991 (and references therein) for a more recent appraisal.

2. A brief account of this instrument is given by, e.g., A. König and H. Köhler, *Die Fernrohre und Entfernungsmesser*, Springer, Berlin, 1959 (3rd edition), p. 452. The only surviving example known to the author is in the Blyth Road Store of the Science Museum, London (Inventory no. 1935–1; Location B/MT8/01/W). It is inscribed "Negretti and Zambra."

3. Porro is usually associated with the two image-erecting prism systems that bear his name, but it was for a complete prismatic telescope that his French and English patents were awarded in 1854. Boulanger's patent for the binocular version was awarded five years later (König and Köhler, op. cit., pp. 450–452).

4. See, e.g., W. Pfeiffer, "A brief history of the microscope," Zeiss Historica, 7(2), 1985, p. 6; *Anticipating the Future*, Carl Zeiss Jena GmbH, 1996.

5. See, e.g., H. Seeger, *Feldstecher: Ferngläser im Wandel der Zeit*, Bresser-Optik, Borken, 1989, Chapter 4; L. Gubas, "Zeiss Binoculars," Zeiss Historica, 12(1), 1990, p.5, and references therein; H.

Düllberg et al., *Milestones in the history of Zeiss Binoculars*, Dongowski & Simon GmbH, Stuttgart, 1994; F. Watson, *Binoculars, Opera Glasses and Field Glasses*, Shire Publications, Princes Risborough, 1995, p. 13.

6. Patent specification No. 7942, "Improvements in or connected with Telescopes," lodged 21 April 1894; accepted 30 June 1894. (Quoted in W. Reid, *Binoculars in the Army, Part I, 1856–1903*, Army Museum (Year-book of the National Army Museum, Chelsea), 1981, pp.10–23; and *Binoculars in the Army, Part II, 1904–19*, Ibid., 1982, pp. 15–30.)

7. Nature, 54(2), 14 May 1896, p.36.

8. Ibid., p. 37.

9. The low refractive-index glass used in the early models helped in this respect. Taking the value of $n = 1.518$ determined for the prisms of the early Feldstecher by John Gould ("Turn-of-the-century Zeiss binoculars in England," Zeiss Historica, 8(2), 1986, p.3), a total reflection loss of 16 percent due to the four air-to-glass surfaces is derived. (A fraction of this "lost" light was, in fact, scattered into the field of view as unwanted background illumination, diminishing the contrast of the image.)

10. The apparent field of view is determined by the design of the eyepiece, which was similar for all three models. The true field of view is equal to the apparent field divided by the magnification.

11. The radius of stereoscopic vision, beyond which stereopsis ceases altogether, is about 1 km for a sharp-eyed individual with no optical aid. The use of a binocular of magnification M and specific plastic R (the ratio of objective separation to eyepiece separation) increases this limit by a factor of MR. For the largest model Feldstecher, $M = 8$ and $R = 1.75$ (typically), so that the radius of stereoscopic vision is extended to about 14 km.

12. Reid (Part I, op. cit.) gives an account of officers' comments regarding binoculars from an official document entitled "Extracts from Reports by Officers Commanding Units in South Africa during 1899–1901." Gould (op. cit.) quotes extensively from Reid's article.

13. Nature, 68(1), 7 May, 1903, p. vii.

14. Seeger, Op. cit., p.103.

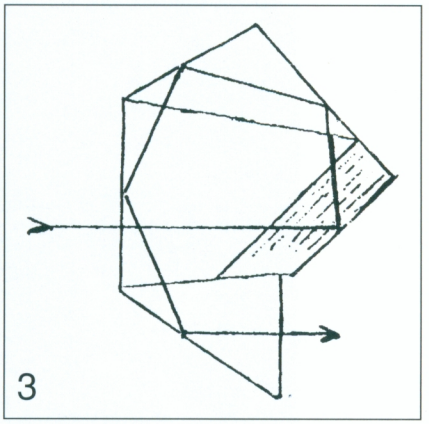
15. In fact, a British company might have almost beaten them to it. Barr and Stroud of Glasgow were in the process of drawing up patent specifications for a prismatic binocular when they heard of the Zeiss Feldstecher (M. Moss and I. Russell, *Range and Vision—The First 100 Years of Barr and Stroud*, Mainstream Publishing, Edinburgh, 1988, pp. 103–104).

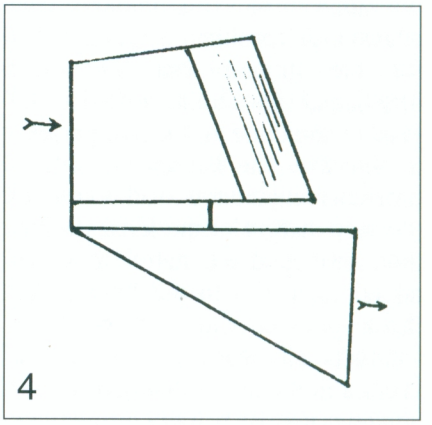
16. The list is based on the date of the earliest advertisement appearing in *Nature*, which clearly may not coincide exactly with the introduction of a given manufacturer's product. However, in the absence of other data, it provides a reasonable guide to the sequence of events. The date quoted for Aitchison is when reviews were published in *The English Mechanic* and *The Field*. The first *Nature* advertisement appeared five months later.

A Correction

Zeiss Historica vol. 21, #1, page 7, included a brief article on "Binocular Prism Systems." The six diagrams included two (#3 & #4) in which the light path was not correct. These paths are deduced from the configuration of the prism and two rules: angle of incidence equals angle of reflection, and light enters and exits a binocular prism of 90 degrees. Generally, an odd number of reflections gives an image that is inverted in one direction, and an even number of reflections is required for a correctly oriented image; the two roof planes (shaded) provide two reflections but appear as one 'plane' in the diagrams. Unfortunately, in complex prisms like these, the light path is not so easily deduced. Diagram #3, Moeller Tourox Prism, is corrected below.

The outlines of the prism in diagram #4, Telita I, were derived by tracing an actual prism. The thin glass insert is a complicating factor: depending on the refractive index of this glass and of the cement used in the two used in the two surfaces between insert and prisms, and also depending on the angle of incidence, these surfaces can transmit light or reflect it. However, after repeated attempts to trace a light path through this prism, using all imaginable combinations of reflectance and transmission, the correct light path remains a mystery.





Peter Abrahams

Zeiss Personalities

We continue our series of short biographies of Zeiss innovators. —LG

Moritz von Rohr (1868–1940)

Moritz von Rohr was one of the truly great optical scientists who came to Jena in the 1890s to work with Abbe and Schott. In addition to his assistance in developing designs and mathematical bases for optics in all of the then new mediums (photographic objectives, astronomical optics, microscope objectives and eyepieces), he worked with Nobel Laureate Allivar Gullstrand on developing new and unique products for ophthalmological devices. At Abbe's request, von Rohr devoted substantial efforts to develop spectacle glass optics to a higher level.

In 1911 his major contribution was the Punktal eyeglass lens, designed to give to the wearer undistorted vision at every angle. This was yet another new line of business for the Zeiss firm. This Punktal lens attacked the problem of astigmatism for the human that the Zeiss Anastigmat (later trademarked as the Protar) had done for the photographic objective. The wearer was able to have corrected vision to all powers to the very margin of the lens. He further developed the Katral lens that added capacities to the Punktal for those people who suffered from cataracts. His work also broke new ground in the area of colored lenses and their use. He worked further with Gullstrand on additional devices to measure and diagnose eye diseases and helped pioneer deep curved lenses.

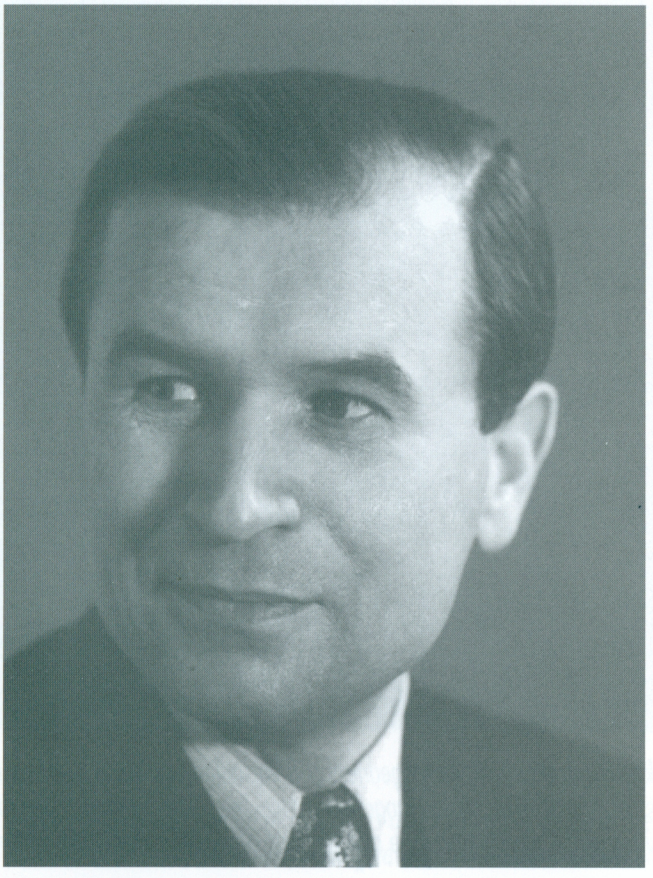
In addition, he was the great publisher of the Zeiss Works. In addition to his own work, he assembled papers on various optical topics from his associates. In association with August Köhler, he developed the Ultraviolet microscope. All in all for a man of poor health, he contributed mightily to the base of knowledge for the firm and retired in 1935.

His major published works are the basis for the science of optics and included subjects as diverse as the construction of the human eye, design and principles of spectacles, binocular instruments and photography. His truly major work covered photography and was published in association with Dr. Alfred Hay of Vienna. In nine volumes, they covered all aspects of photography as it was in 1930. There are separate volumes on each major subject such the camera itself and others on the lenses, film and emulsions, etc. The volume on camera design shows the coming change from the large format camera to the miniature. The illustrations on camera design are incredible. He also wrote on the history of optics and the people who changed it. He had major works on Frauenhofer, the Voigtländer firm, the history of Zeiss up to the death of Abbe and a biography on Abbe himself. He documented the science and innovations of optics over a significant period of development.

Alexandar Smakula (1900–1983)

As a symbol of his varied life to come, Alexandar Smakular was born in Dobrowody, Austria, which was given to Poland as part of the settlement of World War I and, in 1945, ceded to Ukraine, where it is now known as Dobromil. He received his Ph D in physics at the University of Göttingen in 1927, became an instructor there and performed research on photochemical processes in crystals. He left for the Kaiser Wilhelm Institute for Medical Research in Heidelberg in 1930. There he was the head of the department of Optics in the Institute for Physics. He studied the optical properties of organic compounds and metals and left to become the head of a research lab at Carl Zeiss in 1934. He developed new optical crystals such as lithium fluoride, sodium fluoride and thallium halides, which found a broad application in optics.

His most famous discovery was the Zeiss non-reflecting lens coating systems (German Patent 685 767 issued November 1, 1935). This invention eliminated much of the internal reflections and flaring with complex photographic lens designs and permitted binoculars and other military equipment to be designed for much more rewarding results.



While this was his most significantly publicized achievement, he also developed new lubricants for optical instruments that could increase effectiveness in very cold and very hot temperatures. This, of course, was a major process that was heavily used by the German military in World War II.

At the end of the war and after eleven years with Zeiss, he was evacuated by the US Army to work at Fort Belvoir, Virginia from 1946 to 1951. He had waited nearly a year in Heidenheim for Zeiss to be able to restart in the western zone in Germany .

Based on the referral of a former colleague in Göttingen, Arthur von Hippel , he first became a professor and later the dean of the new Crystal Physics Labs at Massachusetts Institute of Technology, Cambridge MA. The Army had secured an immigration visa for him in 1948, and he became an American citizen in 1954. He returned to Germany in 1966 to receive an award by the German Society for Photography for his lifetime contributions.

Although he is most famous for his lens coating process, he also was responsible for advances in organic compounds, links in chemistry which led to the discovery of vitamins A, B2 and D, and ground breaking work for infrared windows and prisms. His coating process was at first held secret for military use but was released in 1940 for use on Sonnar and Biotar photographic lenses.

He retired at age 74 but remained affiliated with the Institute until his death at 82.

Exclusively Zeiss Ikon

Joseph K. Brown, San Antonio Texas and
John D. Baca, Mathiston MS

No other photographic manufacturer had anything that even came close. It was a product that emerged in 1935 with an impressive set of specifications and lasted in the marketplace until 1960. It featured an *f*/2.88cm Zeiss Tessar; a uniquely devised coupled rangefinder; automatic film metering; a body-mounted shutter release, all housed in a specially styled body that was as characteristically Zeiss Ikon as was that of its sibling, the Contax. It was, as *Zeiss Historica* readers already will have guessed, the Zeiss Ikon Super Ikonta B.

This 6×6cm format roll film camera was first seen by many potential owners as part of a double-page advertising spread by Zeiss Ikon in the initial (1935) volume of *U.S. Camera*, an influential and long-lived photo annual founded by editor Tom Maloney as an American counterpart to the then fashionable and prolific pictorial books from Germany, Switzerland, Italy and Britain. In *U.S. Camera*, the Super B and its counterpart Super Ikontas, A, C, and D, were named Super Ikomats, the name by which they were known here for about a year before being renamed Super Ikonta, the name by which they were known in Europe and the United Kingdom.

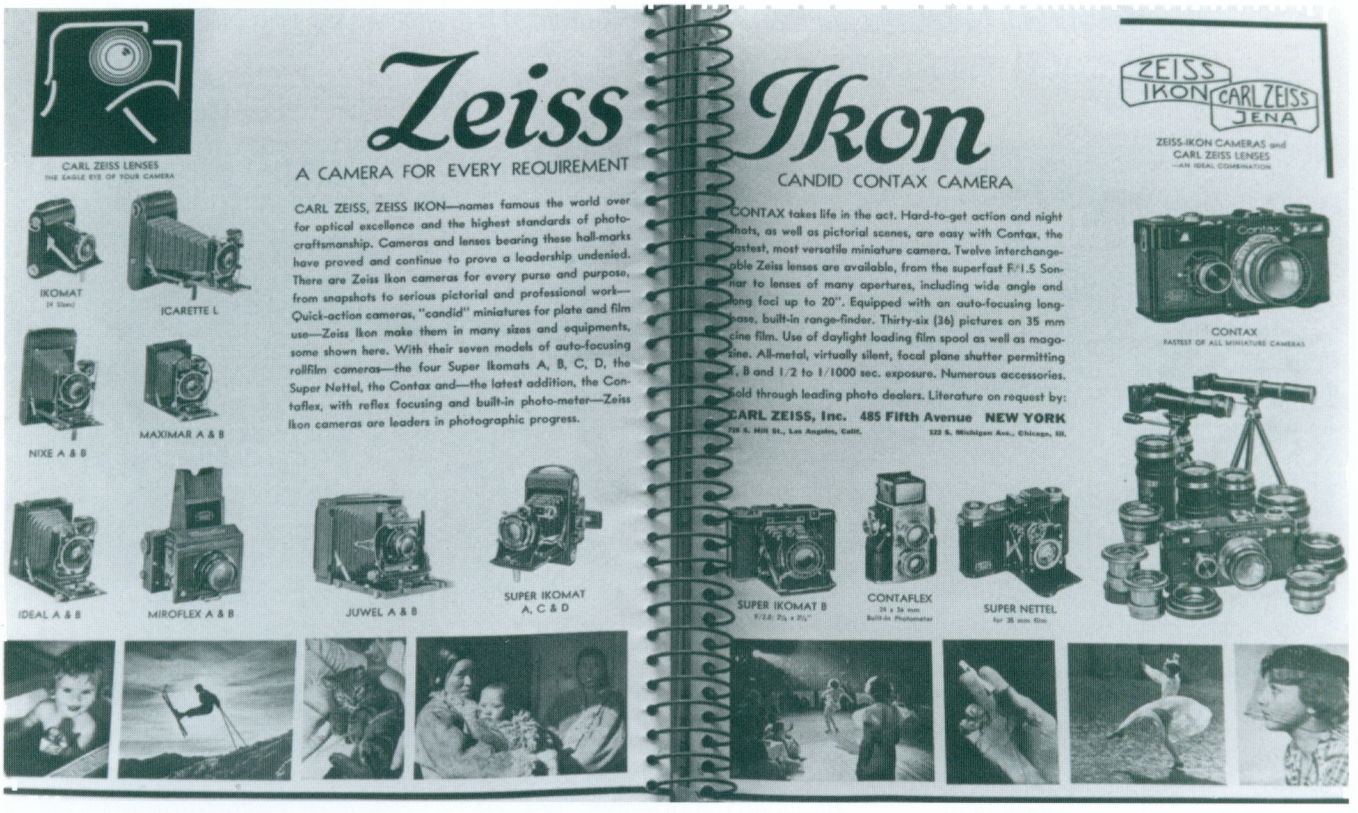
Much of the early advertising for the Super Ikonta B concentrated on its features and ease of operation. The ad copy pointed out its relationship in concept to the then new 35mm cameras like the Leica and, of course particularly, the Contax, Zeiss Ikon's high tech flagship, "the precision miniatures" as they were once

The Zeiss Ikon Super Ikonta B. Its ruggedness and versatility combined with features such as its big Zeiss Tessar lens and coupled rangefinder gave Zeiss Ikon a product that could without hesitation be called theirs alone and the best of all eye-level rollfilm cameras.

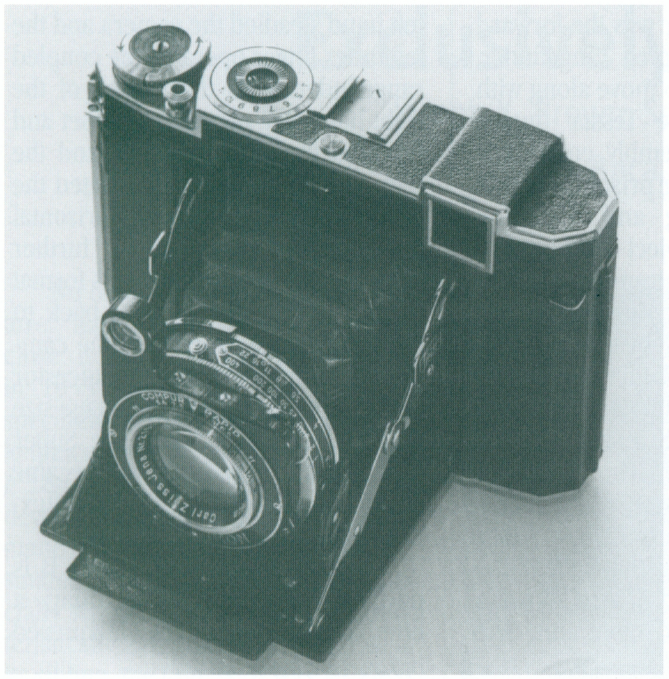
called. The Super B stood out in another way as well due to its careful integration of components within a rigid yet foldable body. Whereas the other Super Ikontas were obviously just regular (not "Super") Ikonta cameras with features like the rangefinders added on, the Super B was designed as a unit that emerged visually as a purposeful, somewhat chunky package, which opened to catch the eye with its wide aperture Tessar, an *f*/2.8 lens of 8cm focal length giving a front element diameter of slightly more than an inch, and making the optic, surrounded by identifying graphics, the center of interest of the camera's frontal aspect.

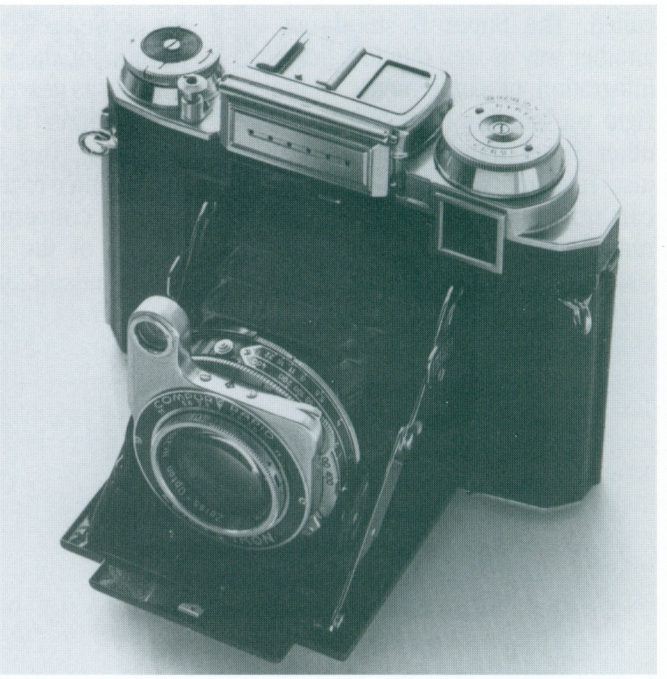
A secondary optical element rising above the Tessar was the forward portion of the coupled rangefinder, which was geared to move along with the rotation of the Tessar during focussing. This assembly comprised two counter-rotating prism discs that caught converging and diverging images of the subject to be photographed and then transmitted them to the photographer viewing through the finder eyepiece. In the first version of the Super B there were two separate eyepieces for range and view finding, but in 1938 a single ocular window was used. This redesign made the camera even easier to use, a virtue that built on early Super Ikonta B advertising that touted the camera's ergonomic design allowing smooth, two-handed operation. The left hand steadied the camera and the left index finger operated the coupled rangefinder. With the fingers of the right hand, the photographer set and released the shutter and wound the film. The square format obviated the need to pause and choose horizontal or vertical composition, a further timesaver when shooting. This format for eye level cameras went back to the ICA Icarette A of 1912, the camera that some consider the ancestor of the Super B. The 6×6cm image size was relatively new when the Super Ikonta B was introduced but became popular thanks to the Ikoflex, Rolleiflex, Superb and their kin.

Styling of the Super Ikonta B is particularly elegant even today: a combination of edges lacquered

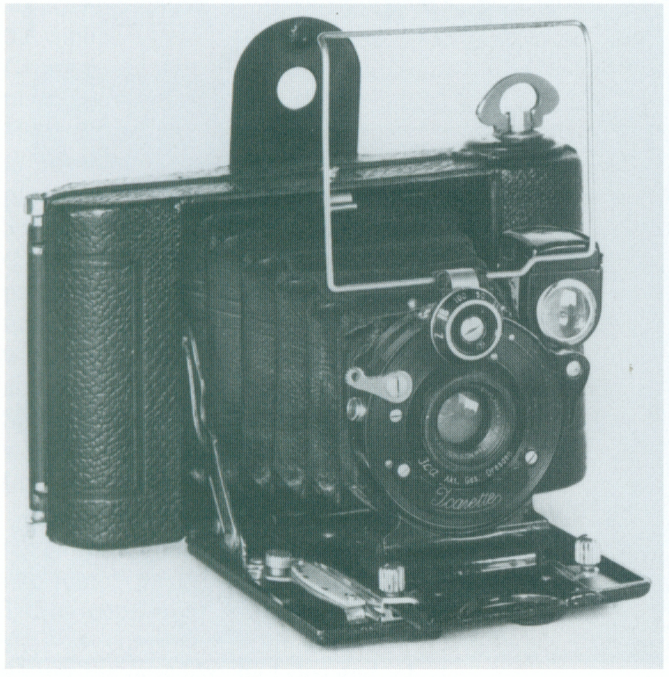


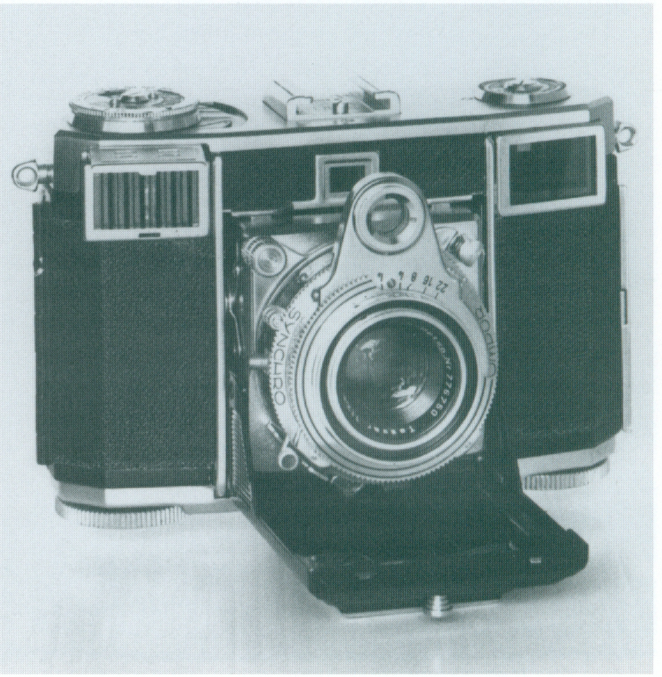
Zeiss Ikon's lineup of mid- and upmarket models as of 1935 as presented in the U.S.Camera Annual. Note that the Ikomat nomenclature is used. This would give way to the more usual Ikonta name in following years.



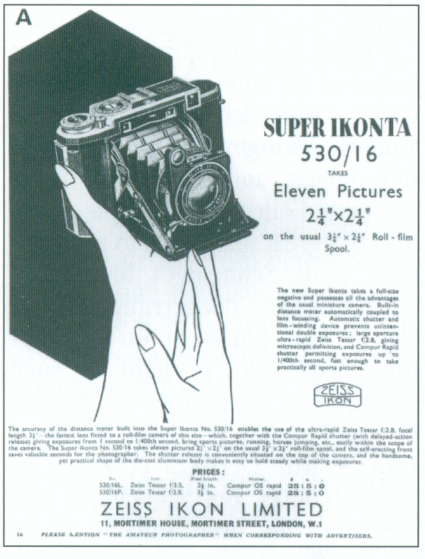


The Super Ikonta B and its late prewar-era high-tech colleague, the Super Ikonta BX. The latter's built-in selenium uncoupled exposure meter and extra chrome trim gave it a somewhat overstyled, overweight look compared to its enameled and rather understated companion.





In the Super Ikonta B tradition: The World War I-era Ica Icarette (left) was a 6×6 cm eye-level folding camera that was functionally a precursor of the Super B. The 35mm Contessa (right) carried the Super B's basic styling and appearance into the postwar world of the 1950s.



Quartet of early Super Ikonta B advertisements includes (A) an introduction to the camera from 1935; (B) praise for the rangefinder from 1936 with dialogue straight from Bertie Wooster; (C) a pixilated 1936 invitation to take the camera to the party; and (D) a chaste 1935 Dutch ad explaining that the Super B combines minicam features with large 6×6cm format. These four ads are from the Baca Archive of Zeiss Ikon literature.

MY IKONTA AND I WERE NEVER PARTED

(A British forces combat photographer recalls working with a Super Ikonta B)

"A half century ago and more I had that camera hanging round my neck for the best part of five years...almost day and night.

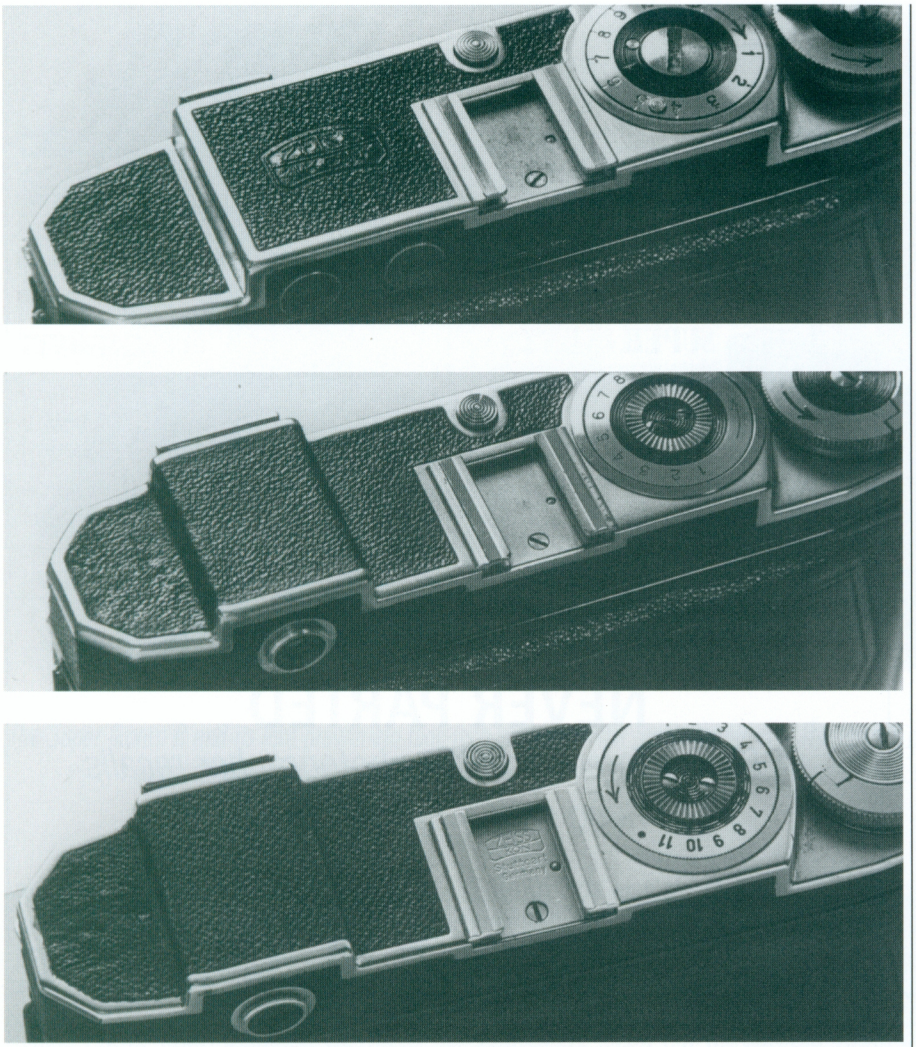
In the early days of the Army Film and Photo Unit we were all professionally experienced ... earning our living with 9x12 plate cameras ... when they issued us Super Ikontas I just couldn't believe it.

We hardened pros slung the little rollfilm folding keen amateur holiday cameras round our necks. We tried wearing them under our battle dress so nobody would see us. So much flashy chromium, and the fragile looking little bellows... "Won't last five minutes," was the general opinion.

Having said all this, the much derided Super Ikonta did a wonderful job under foul conditions ... desert sand got into the hinges of the baseboard; it abraded the viewfinder and rangefinder; it trickled into the Compur shutter. The camera, 'waterproofed' only with sticky tape was dumped into the sea, covered with frozen mud in Italy and mildew in Baghdad ... my Ikonta and I were never parted.

So I take my hat off to the Super Ikonta B. I look at all the equipment I now use and reflect ... to think that in the old days we did everything with just a Super Ikonta round our necks and a few rolls of film in our pockets. My recommendation to any collector is to snap up any such piece of history on offer; and if you find one that grinds a bit abrasively when you open it, don't worry, it's probably one of ours."

John Rooke
(Adapted and condensed from the British Journal of Photography)



Three top decks show easy recognition of basic variants of the Super Ikonta B. Top: Early 'two-window' model with the incised Zeiss Ikon trademark over the finder housing. Middle: 1938 single-eyepiece model with no logo in top covering. Bottom: Early postwar camera with "Stuttgart" marking in its accessory shoe and small red dot on the film counter scale.

black, or given a dull chrome finish; a satin chrome panel under the winding knob (an area subject to wear) and the flat surfaces of the cast metal body covered in morocco leather. Bright chrome stabilizing struts bore the Zeiss Ikon trade mark. The entire 21b. 2oz. camera evoked the feeling of a solid, durable instrument on which the prestigious Zeiss name was right at home.

Durability was indeed perceived to be a virtue of the Super B and perception many times became reality. Although the camera was aimed at the advanced amateur segment of the market and, implicitly, to owners of lesser equipment perhaps wishing to upgrade, a number of professional photographers who had once viewed it with skepticism found themselves admiring this most professional of Zeiss Ikon's roll film cameras.

In 1979 the Zeiss Historica Society was in foundation, and coincidentally this was when a three-part series on the Super Ikontas appeared under Jason Schneider's byline in *Modern Photography*, the issues of July, August and September. These "Camera Collector" columns introduced a great many fans to the cameras. Jason Schneider's breezy and (in retrospect) not terribly accurate articles have not worn too well over time, especially in light of such authoritative expositions as the one by Larry Gubas in *Zeiss Historica* (Vol. 4, No. 2, 1982) covering the Super Ikontas. But Schneider's articles were the best available at the time and probably influenced many early ZHS members to join the Society then forming. His articles praised some aspects of the Super B but only faintly. However, Ivor Matanle in his 1986 book *Collecting and Using Classic Cameras* (Thames and Hudson) is much more perceptive when he gives this advice to collectors: "Probably the best range of folding cameras from the thirties to give prospects of reliable use some fifty years (and more) after they were made are the Zeiss Super Ikontas which can still deliver crisp, medium-contrast pictures that are very satisfying."

Although it was never listed as a landmark camera, surely it is now time for the Super Ikonta B to be re-evaluated by those interested in such things. It brought minicam convenience to the 120 roll film camera, and its well integrated design and styling was marketable for over twenty years. The elegance of the rotating-wedge coupled-rangefinder design stands far above the complexity of the lever linkages employed on derivative cameras. In short, the Super Ikonta B exemplifies the best of Zeiss Ikon's qualitative traditions of innovation, robustness, fine finish, functionality and appeal.

Hensoldt 7×56 Military Binoculars

Frank Paca, Alexandria, VA

The firm of Hensoldt patented their Dialyt roof prism binoculars in 1905. During the many years since then, there have been many binoculars in this series from 6×30 to 8×56. In the Hensoldt catalog of 1933[1] both a 7×56 and a 8×56 were listed with center wheel focusing. Production of the 7×56 ended in 1948[1]. The series, as of 1956, was shown in *Zeiss Historica*[2]. The 7×56 had been replaced with a 7×50. During WW II many armed forces wanted "7×50" binoculars. The 7×56 was converted into a military version. It did not carry the name Hensoldt, but was stamped "bmj" (the three-letter German source code for Hensoldt). This military version has individually focussed eyepieces instead of the center wheel focusing. Figure 1 shows the overall view of the 7×56 military version (foreground) and an earlier 8×56 (background). Figure 2 shows the detail of the markings on the hinge points.

In many of the past issues of *Zeiss Historica* military binoculars were discussed. Most used individual eyepiece focusing instead of center wheel focusing. There appear to be several sound reasons for this:

1. The individual-focusing arrangement provides a stronger eyepiece support and will maintain a better alignment of the optical axis when used by troops in a rough military environment.
2. There is less chance for dust and moisture to enter the binoculars through the threaded eyepiece.
3. There are fewer parts, thus lower cost and higher reliability.
4. The troops who use the binoculars will primarily focus them on objects at a great distance. There should be little or no need to change the focus to close-up objects (such as would be required for bird watching, sports events or other typical civilian use).

If other people use the binoculars all they have to do is to rotate the eyepieces to their own "diopter" settings.

The 7×56 binoculars have an exit pupil of 8 mm diameter and thus a light transmission factor of 64 (compared with 49 for the 8×56). I do not know of another production binocular that has an exit pupil of 8 mm diameter and a transmission factor of 64. (In 1953 Leitz claimed that their 8×60 Marocitit binoculars had the highest light transmission factor of 56.25. This was after the 1948 deletion of the 7×56 from the Hensoldt inventory.)

The 7×56 are exceptionally light, probably a magnesium alloy. They weigh only 710 grams, compared with the 1030 grams for a Zeiss Military 7×50 of the same vintage (and also with individual eyepiece focusing).

They are a very good companion on a long walk because the short carrying strap positions them comfortably under the armpit. In fact, on both the 7×56 and the 8×56, the carrying strap is quite short (24 inches) and apparently was not intended for carrying the binoculars around your neck as is generally the case.

References

1. e-mail from Lawrence Gubas (editor, Zeiss Historica)
2. Zeiss Historica, Volume 15, No 1, Spring 1993.

Figure 1

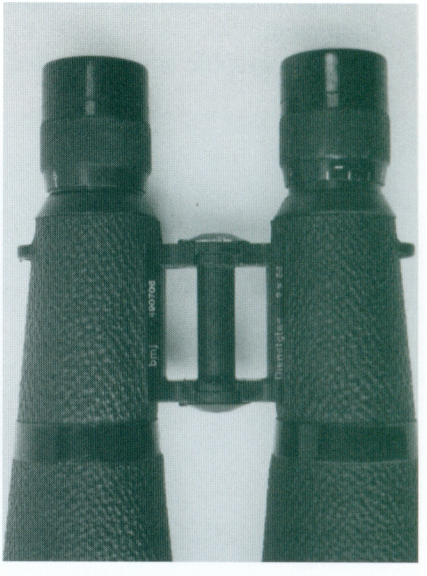


Figure 2

In search of the Contax IV

Wolf Wehran (as told to Larry Gubas)

Collectors of Zeiss Ikon cameras know that prototype or experimental cameras (in German, Versuchs-kamera) are a very difficult area. A number of such cameras can be found in European locations. However, in the rest of the world these are nearly impossible to find unless they are offered at a large-scale European auction. It has been my experience that pre-war Versuchs items are extremely rare, due to the tumult of World War II. There are reasons for this:

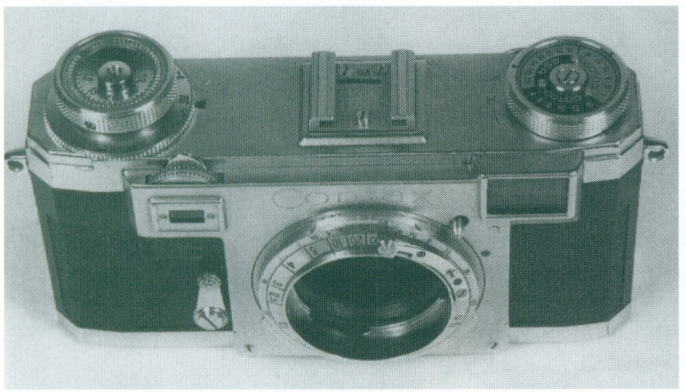
1. The major locations of Zeiss Ikon (Dresden, Berlin and Stuttgart) were the conscious targets of Allied bombing since they were part of the war-materials apparatus of Nazi Germany.
2. Two of the locations (Dresden and Berlin) were nearly completely stripped of plans, materials and manufacturing dies and equipment.
3. Any photographic equipment that was available right after the war was sold or adapted for the quickest sale.
4. The soldiers of all Allied Forces were able to liberate anything that the military brass did not find a use for, and these items have disappeared into the attics and estate sales of the past 50 years.

However, in a number of instances prototype post-war cameras and lenses have been found and made available for sale in Europe. This was possible with regard to Zeiss Ikon and Voigtländer after the closing of the firms in the early 1970's. There was no need for the materials to be held for the firm, since their doors were being closed and the equipment and factories sold. The employees who helped to clean out the factories had opportunities to liberate everything. There were some who saw opportunities with the then-growing hobby of camera collecting. Following are some examples of those that have made their way to the Cornwall Auction in Cologne, and some photographs provided by Wolf Wehran who was the press-relations head for Zeiss Ikon.

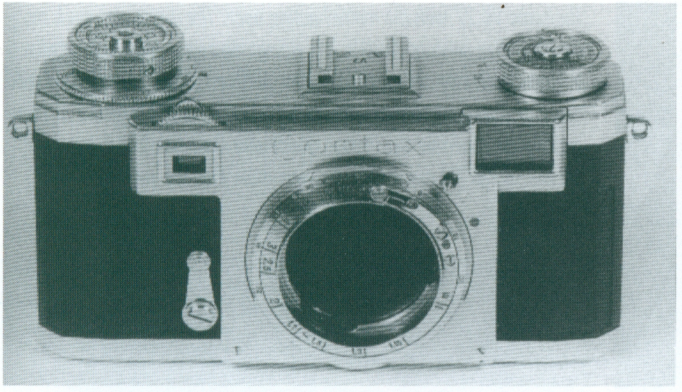
There are obviously no records existing that state what prototypes were made and which model they became. Some became cameras and some became nice experiments that never came to market.

Other things disappeared with the demise of Zeiss Ikon; for example, the dispersal of the extensive Zeiss Ikon photographic library. There were Carl Zeiss lenses for the rangefinder Contax that came to final design and testing but never made it to market. Heinz Küppenbender made the decision not to proceed with a 50 mm *f*/1.4 Sonnar, a 25 mm *f*/2 Biogon and an 85 mm *f*/1.4 Planar. Just think of what a stir these lenses could have made in the mid-1950's with photographers of all backgrounds.

It was Küppenbender who had masterminded the design of the original Contax in the early years of Zeiss Ikon and had built it into a brand name. He was convinced that the Contarex, which was already on the drawing boards in the late 1940's, would make the Contax thoroughly obsolete, and that the movement to produce these new lenses would not be a good business decision. So, all real design work on the Contax stopped in the early 1950's and the camera was already in the phase-out period after 1955. There would be nothing new in leading-edge 35 mm Zeiss design until the Contarex.



Contax V6. This Contax IIa is an early version of that camera made for stress testing and use by the quality-control staff of Zeiss Ikon to ensure that the changes from the pre-war models were effective. If you look closely, you will find a white/gray painted Zeiss Ikon logo on the leather just under the small range-finder window. The designation of V6 appears in the accessory shoe on the top of the camera.



Contax V7. This Contax IIa has no external/visible changes from the V6. Probably, the differences between this and the prior model were based on the experiences with the V6 and the changes that were occurring in the flash synchronization at that time within the industry. In ***Auf den Spuren der Contax*** *Kuc shows yet another Contax IIa prototype marked V 9 T in the accessory shoe.*

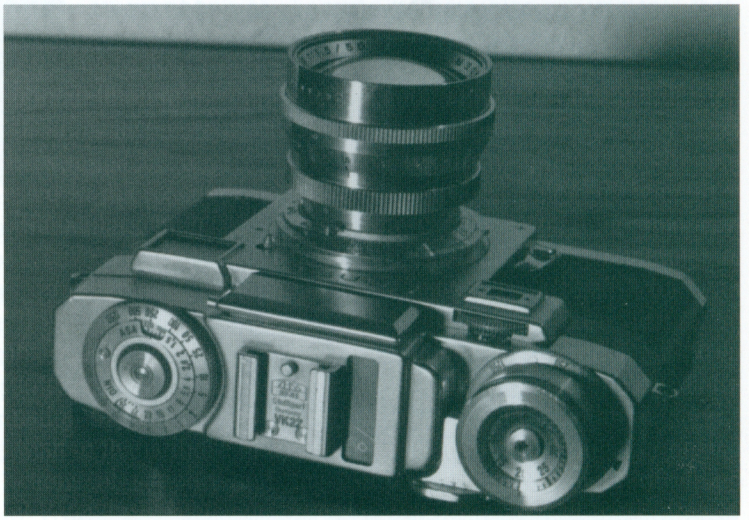
In the Eastern part of Germany, the pre-war Contax was reproduced in Jena as the camera on the left. No improvements or changes were incorporated into this camera. The only markings could be found in the accessory shoe, with the standard Carl Zeiss Jena in the lens cell engraving along with a serial number. The later, nameless, Contax on the right has most of the characteristics of the original Contax II, but lacks the usual Zeiss Ikon markings on the leather and the name on the front standard. This camera came with a new camera back, more like the Contax IIa rather than the II. There was a flash synch plug under the viewfinder window. Neither camera ever had an thumb-actuated rapid film advance lever.

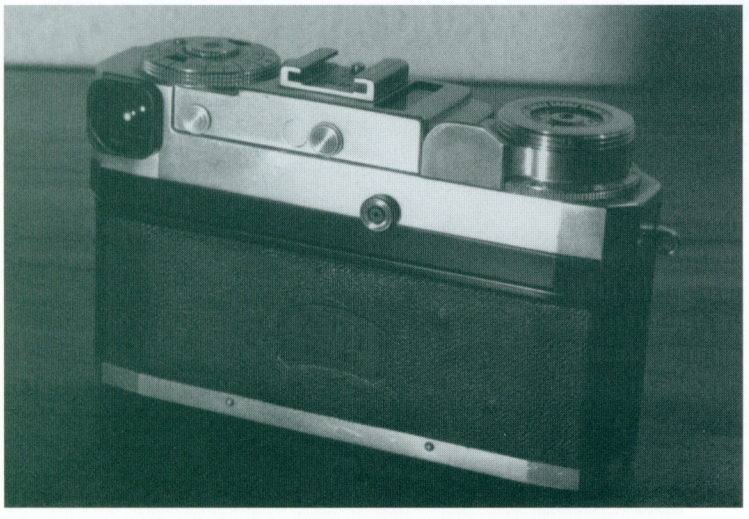
The top of the VK 21 featured on the front cover of this issue. Note that the rewind knob was made smaller and moved toward the center, while its place was taken by the meter control knob. The light-value scale appears to the right of accessory shoe where the logos and VK 21 had been engraved. The lens shown on this camera was a special pinhole model internal to the company. The big feature for this camera was the built in multi-frame finder that showed 50 mm, 85 mm and 135 mm coverage. All in all, this is quite a nice camera for 1950 when the Contax IIa and IIIa had not yet appeared on the market.

In 1955–6, the VK 27 was yet another attempt by the designers to fashion a more modern Contax. This, too, never came to production. It was fairly similar to the VK21 with the exception of the rewind knob, which was placed back into the meter setting ring, and a meter housing more reminiscent of the Contax III.

The same VK 27 with the meter housing open. The meter was much more sensitive than previous models. The strange element in this picture is the Voigtländer Nokton 50 mm f/1.5 lens. Although this was about the time that Carl Zeiss was acquiring the Voigtländer firm, a small number of these lenses were made for the Contax mount with Zeiss Ikon's blessing. After all, the Sonnar 50 mm f/1.5 was now more than 20 years old.

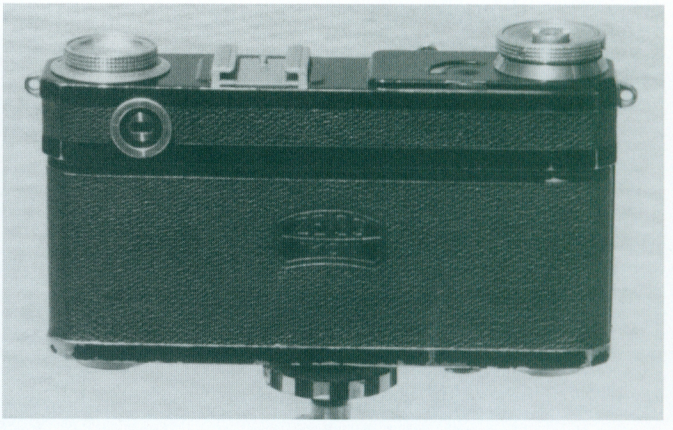
The top shows that the meter scale is now just a match-needle version without a scale, and the meter scale/setting element moved to where the rewind button was on the VK 21. Otherwise the camera was little changed from the 1951 version and still had the multi-frame viewfinder, which had by now been placed on the Leica cameras of the period.





The rear view was identical to the other VK cameras. Both show a larger viewfinder to facilitate the multi-finder feature and was moved all the way to the extreme left when compared with the IIa and IIIa. The flash contact was placed on the rear in a location similar to the production cameras.

Letters



A Black Contax II

I was intrigued by a listing of prior *Zeiss Historica* Journals that included a reference to the black Contax II in Autumn, 1995. This Journal article by Dr. Stefan Baumgartner and his accompanying photographs suggests his examples are less like the regular Contax I than mine is. As my enclosed photographs indicate, mine is similar to the regular models in appearance and in fabrication.

I have owned my black Contax II (serial number B 50485) for more than 20 years along with a yellow filter and Proxar in their pre-war bakelite cases. I purchased the items from a Dr. Bingham, a respected southern California collector who subsequently donated a large collection to the Museum at the University of California at Irvine. The camera came with a 5 cm *f*/2 Sonnar (2137623) with an approximate manufacture date of 1937.

I would like to add that the top plate and upper front cover appear to be made of copper and then painted. The letter B is a bit higher than the numbers in the serial number, but all are the same size and filled with white paint. Dr. Bingham told me in a letter that he had been in touch with the Zeiss Ikon firm and was told that the factory had experimented with a very small number of black models, but that none had resulted in a production run. Despite its obvious signs of use, my camera operates very well even today.

Don Mahler
Arcata, California

The editor has seen some obviously non-factory black Contax II cameras over the years but the pedigree of Dr. Bingham's collection and knowledge is a very high one. If this camera is a fraud, it is a very good one by comparison in quality to any others that have been examined. However, as we are becoming more and more aware, any ability to track down records and first hand knowledge has disappeared with the passage of time. We are happy that Don has obviously enjoyed his black Contax. Anyone with a similar camera and close serial numbers, please alert us to it. LG

Back Cover:

Advertising for the 1934 range of Contax cameras and lenses, taken from the July 1934 issue of *Camera Craft*, the "Official Organ of the Pacific International Photographers Association," published in San Francisco CA.

Zeiss Ikon Contax

Its inherent constructional features and wide range of 12 interchangeable Zeiss Lenses make this the most versatile of all cameras. Removable back. - Automatic focusing and film transport. Metal focal plane shutter. - Long base range finder.

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