

TENAX

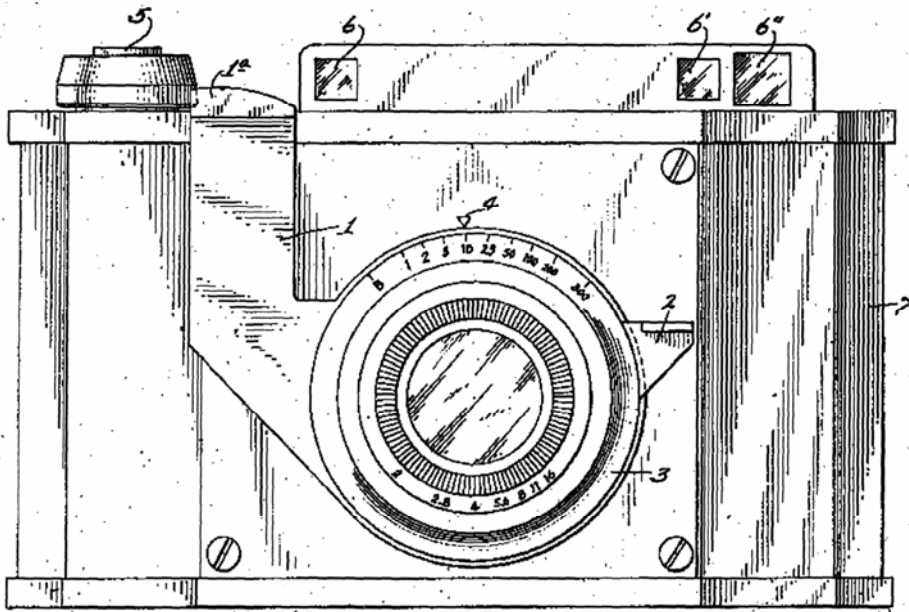
Peter Dechert

In 1935, after having worked for Zeiss Ikon AG for only three years, Hubert Nerwin was appointed to head the camera design team.

Nerwin, a relative youngster, had earlier worked in the late 1920s for the German office of IBM; there he took part in developing the mechanized punch-card machinery that has an ancestral relationship to today's computerized spreadsheets. Later he worked for Siemens in Berlin before joining Zeiss Ikon in 1932. As a new member of the design team he began by participating in improving the Contax I; he also took part in designing the Super Nettels, Contaflex, Nettax, and then the Contax II and III. All these cameras used the basic Contax vertical metal focal-plane shutter design.

But Nerwin also had a private dream. He wanted to create a 35mm camera using the Deckel Compur Rapid blade-type shutter, on whose development he may have worked a little earlier: it seemed to him to be the ideal basis for the instrument that he envisioned, a camera which would allow quick, convenient operation by the user coupled with expanded applicability by way of accessory lenses. Seen another way, if the Contaxes represented, on the "miniature camera" front, semi-universal professional and even scientific applicability for their time, Nerwin's camera would be a universally useful "snapshot" instrument, and of special appeal to many documentary photographers.

There were, of course, problems to overcome. First of all, in order to allow really rapid action it would be necessary to link together the shutter cocking and film advance of the new camera. This in turn meant that the Compur Rapid leaf shutter, which until then had been mounted within each lens that it was used with, would work best if it were integral to the camera body rather than to each one of the interchangeable lenses. But the shutter's internal diameter when fully open was only about 25mm. If lenses of several focal lengths were to be mounted to the camera, all, no matter what their back focus distances or apertures might be, had to provide full illumination to the film being exposed. The Leica-derived measure of 24x36mm for a 35mm film negative, which had become the de facto standard, was too wide for the images projected by many lenses, especially long-focus ones, to reach its edges after having passed through this 25mm circle.



Film advance itself was to be provided by an upright arm or lever, integral to the camera body, which in its rest position as seen from in front would stand vertically immediately to the left of and concentric with the internal shutter assembly. The lever would extend slightly above the plane of the body's top surface, and the user could activate it by pushing downward and slightly to the right through an arc covering about 40mm. Thus the photographer in action could hold the camera with his right forefinger on the shutter release and his right middle finger on the wind lever. Winding after each exposure would become a simple reflex plunger action, easily accomplished within a second at most, as compared with the several seconds it took to wind the advance knob of a Contax or Leica. This so-far "dream camera" would indeed be quickly responsive.

Nerwin's earliest patent drawings and application in the United States, submitted on July 30, 1936 but based on the original German material from June 8, 1935, show that he had already settled on a square 24x24mm film format: the viewfinder is shown as a square. The first patent applications were filed primarily to establish his rights to the interlocking mechanism between shutter winding, film advance, and exposure counting. But they also covered a second interlock: that between the shutter release, centered within the film counter on top of the camera, and the winding arm: an interlock that without slowing down the rapid action of the camera made it impossible to make double exposures or blanks by mistake.

These earliest patent drawings of the camera that only later became the Tenax and eventually the Tenax II show a camera with separate viewfinder and rangefinder. The principal delay encountered by the user would have been shifting his eye between the two finder eyepieces if he needed to refocus. As then depicted, the camera had no rewind provision; presumably Nerwin planned on spool-to-spool or cassette-to-cassette film feed, another factor which would enhance rapidity of use. His actual drawings suggest the spool-to-spool solution: spools are shown at both ends of the camera body. He may have been thinking of loading the 35mm spool-wound films for the Contax, which in 1935 were quite widely available; they used paper leaders



and trailers rather than a cardboard or metal shell to protect the film from excessive light, and the exposed film remained on the take-up spool.

Since the Robot had already appeared in 1934 with rapid action, a 24x24mm format, and magazine-to-magazine film transport, the question arises: did Nerwin envision his camera as a competitor to the Robot? He always said not, and in fact the Robot was much more a specific-use camera than the one Nerwin envisioned. Its shutter was adapted from a design frequently used in motion-picture cameras: shutter and film transport were linked, but driven by a hand-wound spring motor. There was no provision for a rangefinder. It used unique cassettes which had to be loaded with 35mm film by the photographer. All in all, the Robot was very much a specialist camera designed for the one purpose of recording as many phases as possible of fast action. Nerwin, in 1935, seems to have had a much more general-purpose instrument in mind, judging from its inclusion of a rangefinder and standard film loads. In his design, the relatively quick winding mechanism was the result of his desire to reduce operational moves to a minimum: as his patent application stated one of his objectives was "to improve the readiness of the camera for taking pictures in rapid succession by arranging the operating member for tensioning the shutter and advancing the film strip at such a place that the operator need not remove the camera from its operative position". But his camera included amenities like the rangefinder which the Robot lacked: his concept of "rapid succession" included the photographer's input about when to make the photograph as well as how best to make it. Call it "rapid documentation".

The early Tenax drawings make no reference to coupling between the lens and the rangefinder: they simply show two square rangefinder windows. In fact, while the patent application mentions "a camera casing provided with an aperture adapted to receive a lens system", it does not show or specifically speak of lens interchangeability. The lens is only incidental to the camera features being patented and is not further discussed. The one drawn in has apertures from f/2 to f/16; focal



length is not specified, nor is the focusing mechanism illustrated. The name Tenax has yet to be mentioned. There obviously was a lot of work still to be done on its design in 1935 and 1936, but Nerwin was preoccupied with Zeiss management's principal goal at the time: putting final touches on the Contax II and III so that they could be marketed as fully realized instruments, which had not been the case four years earlier with the Contax I. The Super Nettel III, which became the Nettax between its introduction to the photographic press and its general availability, also was waiting completion.

In 1934 Zeiss designers had developed the double rotating wedge rangefinder, which was immediately incorporated into the Contax I design of the moment. More importantly, it was also adapted quickly for use with the Super Ikonta and Super Nettel cameras. Indeed, it may have been designed originally for use with folding cameras, and only inserted in the Contax I because was more accurate than the earlier swinging mirror system. The beauty of the double wedge method for the folding camera designs was that the rotating wedges did not need to be incorporated within the camera body: they needed only to be placed directly in front of the rangefinder window, and a reasonable remove was no problem. Thus, on a folding camera, the rotating wedges could be made part of the lens standard, achieving accurate rangefinding focusing without any direct mechanical coupling between lens and camera.

The lens standards of the new generation of Zeiss Ikonta folding cameras were designed not to be moved back and forth once they had been erected: this insured a much higher amount of structural stability and rigidity than was possible if the standards had to move back and forth on retractable beds. But a price had to be paid: front-element focusing. In a triplet or triplet-derived lens, focusing can be achieved simply by varying the distance between its first and second elements; lenses like the Triotar and the Novar are pure triplets, and the Tessar type is simply a triplet whose rearmost element is a cemented group of two optics. And it is fairly straightforward, once the proper ratios have been worked out, to create a system of gears that will link the circular movement of the front element of a triplet with the circular

movements of the rotating wedges of the rangefinder: wedges, gears, and front element can all be contained within the camera's front standard housing by using a pillar-shaped external lobe. Thus the rangefinder does not require any connection to the camera body in order to be effective. On the Super Ikonta A and C models, whose frontdoors opened from the side, the external lobe with the prisms had to be hinged so that it could be folded to a position directly on top of the shutter housing before the frontdoor was closed and then unfolded again when the frontdoor was reopened, but the Super Nettels had frontdoors which opened from the bottom: their finder lobes could be permanently mounted to their lens standards.

The Nettax was introduced in early 1936, concurrently with the Contax II and III. It is hard to understand to what market it was supposed to appeal. Be that as it may, work on the Nettax helped Nerwin find an easy way to exchange lenses on the Tenax, whose lensmount is quite clearly a further development of that on the Nettax. The Nettax mount is a simple bayonet attachment between lens and body. Nettax lenses have rangefinder lobes similar to the ones on the Super Nettels, but located toward the rear of the mount and coupled with the focusing mount of the lens itself: focusing is achieved by moving the entire lens, not just the front element, backward and forward, using a double helix to which the rotating wedges are coupled by a system of gears. This method permitted use of optics of different focal lengths on the Nettax without the need for any direct linkage between the lensmount and the rangefinder viewing assembly of the camera body. But the camera's finder system still comprised one eyepiece for viewfinding and another coupled to the camera's two-window multiple reflecting system which allowed the user to coordinate the rotating wedge view with an unmodified straight-ahead one.

Combining the new rangefinder with an appropriate viewfinder first happened in 1937 with the Super Ikonta B (532/16) and BX (533/16), which coincidentally also incorporated the square negative format shown in the early Tenax drawings. This finder innovation, almost surely Nerwin's, also gave him the viewing flexibility needed to finalize his fast-action dream camera.

The Zeiss Tenax (580/27) was marketed during 1938. Its film advance and shutter wind are coupled in the way first described in the 1935 patent literature, but provision for rewinding the film was added to the design because by 1938 the standard 35mm cassette had become the industry-wide film load. The Tenax lensmount allows exchange of lenses in much the way that the Nettax's had, though the Tenax mount, which also incorporates a double-wedge rangefinder lobe, might be considered more elegant. The lobe is snuggled next the lens assembly immediately next to the winding lever, which is located to the left of the assembly in exactly the 1935 position.

The bayoneted Tenax lens assembly can be removed from the body by depressing a short arm at the very top of the mount: the arm controls a locking lever which extends counterclockwise at the edge of the mount behind the rangefinder lobe and ends at a junction with a small locking post, marked on its top by a red dot, extending out from the camera body behind the mounted lens. The bayonet has three flanges, and is disengaged by a rotation of about thirty clockwise degrees once the unlocking arm has been pressed downward. At the junction of the rangefinder lobe and the circular lensmount is a small red dot which is aligned with the dot on the locking post when remounting the lens.

Shutter speeds are set by a small trapezoidal lever that runs up and down along the right side of the lensmount as seen from in front. This is essentially the same arrangement that was shown in 1935, but in the earlier drawing the shutter speed scale was part of a ring adjacent to the lens; on the finished Tenax the scale is a part of the larger lensmount and had to be engraved on every lens. Focusing the lens is accomplished by yet another lever situated at the bottom of the lensmount; this lever, unlike the shutter speed control, is a part of the mount, not the camera body. On the standard 40mm lenses, the focus adjusts between one meter and infinity within an arc of thirty degrees, and the focusing lever itself incorporates the basic scale for depth of field at f/5.6 and f/11 as well as a central index dot. It moves somewhat in the fashion of the pre-war Leica lens focusing levers, but through a much shorter path.



The receptacle for the lens is part of a rectangular chrome plate on the front of the body, and just outside its lower right corner is the lever, marked "Compur Rapid", that controls the delayed action of the shutter, whose blades are located about 15mm deep within the body. This depth is necessary to provide clearance for the rear elements of the high-speed and the wideangle lenses. Again viewing the camera from the front, the top cover plate has at its left end a manually reset counter for 50 exposures with the shutter release button inset into its center, next a small button which when depressed disengages the internal film sprocket roller and permits film rewinding, then an accessory shoe in which the camera's serial number is engraved, and finally at the right end the rewind control. The latter is the one part of the camera which slows it down in use: it consists of two D-shaped keys on a low knob. Either key can be swiveled upward and used as a handle to rewind the film, but even when raised the keys are low and not easy to grasp. Rewinding is a slow process, but Nerwin had to add it in order to make the photo industry's general-purpose 35mm cassettes usable: the Contax spool-wound film loads were fast being discontinued.

The Tenax's bottom plate has a centrally-located tripod screw, slightly offset from the lens axis, and two Contax-like unlocking keys which allow removal of the



backdoor and its integral bottom cover. Each of these keys will also control a Zeiss-proprietary Contax bulk-film cassette, and once the Tenax backdoor has been removed one sees that the film wells at each end of the body have been notched to fit the locating studs of these cassettes. Thus, as Nerwin seems originally to have intended in 1935, the Tenax can be used without rewinding if the photographer has a supply of cassettes and the patience to load film into all but one, which would become the take-up magazine. Thus the inadequacy of the rewind keys is obviated.

Looking from the inside, the shutter can be seen to be about equidistantly installed between the lensmount and the film plane. It is speeded between 1 second and 1/400 plus Bulb; I can find no method of providing a Time exposure except by using a locking cable release with the Bulb setting.

The combined view-rangefinder is unquestionably the best to appear on a 35mm camera before the advent of the Leica M3 seventeen years later. It gives a superbly clear image that is essentially life-sized. The rear finder window has very little eye relief, however: users who absolutely must wear glasses cannot readily see the full image frame, which is delineated only by the edges of the finder assembly. Despite the relatively short travel of the focusing lever, the rangefinder is easy to use and has a base that exceeds that of Leica bottom-loading cameras. On all the lenses I have examined the distance scale is calibrated in meters, though it is entirely possible that some lenses designated for export were marked in feet.

The Tenax is a joy to use. It was delivered with either a 4cm Sonnar f/2.0 or a 4cm Tessar f/2.8 lens. The only long focal length lens supplied was a 7.5cm Sonnar f/4.0, and the sole wideangle was a 2.7cm Orthometar f/4.5. These latter lenses were and still are rarely encountered: there was little time for development of the system.

Apparently at least two batches of the Nerwin Tenax were made. Most of those I have seen have serials in the second half of the H-sequence (H74xxx through H88xxx), but I also own a Tenax with a number more than 100,000 units later, J909xx. The letter "I" was not used in the original Zeiss numbering system, but we

can be certain that nothing like 125,000 Tenaxes were produced, thus that there were probably at least two groups made maybe six months apart during 1938-39. Neither the H-Group nor the J-Group were engraved "Tenax II": the simple name "Tenax" appeared on the lower left edge of the body's front chrome lensmount plate.

"Tenax II" was a catalog-only designation given Nerwin's Tenax after the 1939 introduction of a model which Zeiss described as "Tenax I (570/27)" despite the fact that the "I" was never engraved on it. "II" apparently indicated design superiority for the earlier camera. The only attribute the completely different Tenax I shared with Nerwin's Tenax, apart from small size, was the use of a similarly activated winding lever, but on the Tenax I this lever was operated by the left hand, not the right. Tenax I had a simple folding frame optical viewfinder, a Compur speeded only to 1/300, and no rangefinder; its non-interchangeable pre-war lens was a three-element Novar f/3.5. Production of the Tenax I may have been moved from Dresden to Jena before the 1943 fire-bombing: parts and the dies to make more such cameras were still available after World War Two, and production was resumed very early on. Different lenses were mounted, including an oddly-designated 3 3/4cm Tessar f/3.5, and after the pre-war supply of Compur shutters ran out others were used. Some postwar Tenax I's even incorporated a flash synchronization outlet. Their essential design, modified and modestly improved, lasted for at least another ten years.



But the war spelled the end for Nerwin's Tenax. System development and production was suspended, and never renewed. As Larry Gubas wrote in an earlier article in *Zeiss Historica*, some of the final bodies were assembled without finders as X-ray cameras. The Tenax I was a useful but essentially pedestrian camera which did not fully deserve its longevity; the classic Nerwin Tenax was an achievement which did not deserve its rapid demise.

2007 NOTE: This article first appeared in *Zeiss Historica*, the Journal of the Zeiss Historica Society of America, in the Spring 2006 issue, Volume 28, No. 1. I want to thank Dr. Robert A. Helm for his cooperative assistance many years ago when I was still a Zeiss neophyte, and especially Larry Gubas for his generosity in sharing with me some of his deep fund of Zeiss knowledge.