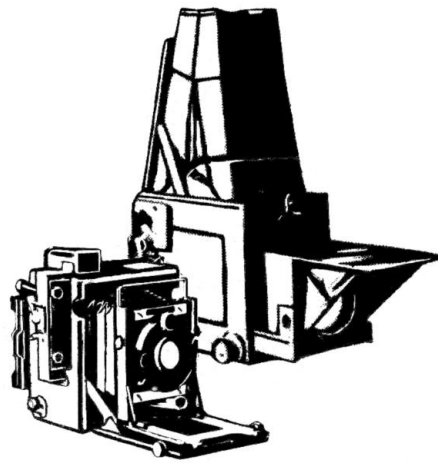


GRAFLEX HISTORIC QUARTERLY

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FEATURES

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The Early Graflex Focal Plane Shutter

By Thomas Evans

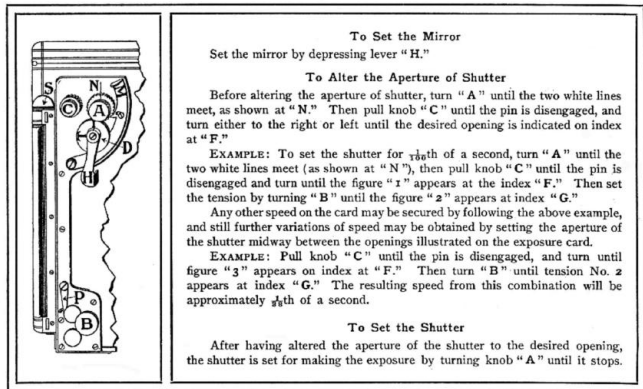


Figure 1. Circa 1903-1905 Graflex focal plane shutter operating instructions.

The early Graflex focal plane shutter, as introduced in the circa 1902 Graflex and Reversible Back Graflex (Figure 1) and used in the 1902 Tourist Graflex in a slightly simplified form (Figure 2), was comprised of two shutter curtains, each large enough to cover the film gate, which were linked together by two slender tapes ("D" in Figure 2) of shutter curtain material.

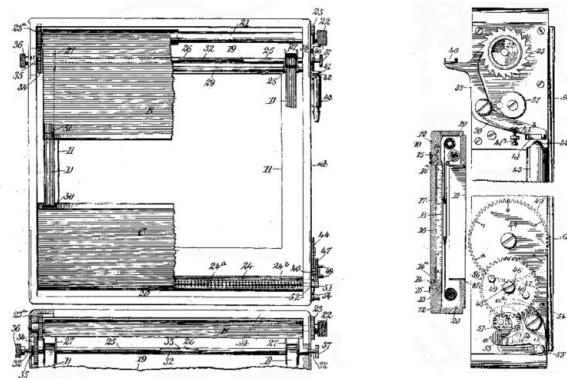


Figure 2. 1904 patent, number 763,173, for focal plane shutter "Model B."

I have examined an example of this early shutter "B" in a 5x7 Tourist Graflex, serial number 7504, which I believe dates from 1903-04, and Dick Loepp has generously provided information about his 4x5 Tourist Graflex. I would also like to thank Ken Metcalf for excellent detective work that contributed additional information.

By manipulating several knobs and buttons to tighten or loosen the tapes, it is possible to adjust the width of the space, or aperture, between the two curtains. In addition to the ground glass, which is set in the top of the camera, the Tourist Graflex was delivered with a detachable, graphic-style ground glass focusing panel at the rear of the camera. On the left side of this panel, through a gap between the edge of the ground glass and the edge of the panel frame (looking from the back of the camera), one can view the edge of the shutter curtain and a ruler marked in 1/8th inch gradations (the "graduated scale" referred to in the instructions below). The aperture of the shutter curtain can be measured with this built-in ruler as the setting is being made. (Figure 3)

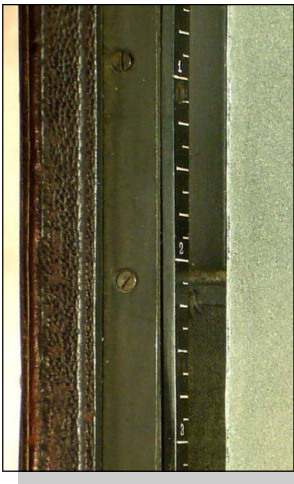


Figure 3. Tourist Graflex shutter curtain graduated scale.

As with later Graflex focal plane shutters, the shutter curtain take-up roller can be set to one of six numbered tensions, causing the curtain to travel at different set speeds. These settings of aperture and tension provide for the selection of one of 36 shutter speeds in the 5x7 Tourist Graflex:

EXPOSURES (in fractions of a second)

Tension No.	Aperture					
	1/8"	1/4"	1/2"	1"	2"	4"
6	1000	500	250	125	67	33
5	850	425	212	106	53	26
4	700	350	175	88	44	22
3	550	275	137	69	34	17
2	400	200	100	50	25	12
1	250	125	67	33	17	8

Since you can set the aperture at any width, it is possible to set the "shutter speed" to a time in between the speeds shown in the table. For example, setting the aperture to 1 1/2" would result in a shutter speed about midway between those of 1" and 2"; however, the 36 indicated shutter speeds more than likely represent a sufficient number of choices.

The 1904 patent also introduced an important change to the lower pawl "P," which caused it to catch the tensioned part of the lower roller, preventing the roller from completely unwinding upon release. This made changing tension settings quicker and more sure.

The wooden back of the rear ground glass panel, which folds down to reveal the ground glass, has printed instructions for operating the shutter pasted to it. (Figure 4)

Directions for Operating the 5x7 Tourist Graflex

For instantaneous exposures depress the disc indicated by "D" and turn to "I."

Before attempting to wind the curtain, set the mirror by depressing lever "H."

The aperture of the curtain may be altered by turning the knob "A" until the lower edge of the upper curtain is opposite Zero (0) on the scale at back of camera, then pull out and disengage "C," and by turning either to the right or left, the desired aperture can be measured by the graduated scale.

To set the shutter wind "A" as far as it will go.
The shutter is released by pressing button "E."

To increase the speed of shutter wind "B" until the tension number desired appears at index "G."

To decrease the speed of shutter release the tension by pressing back the pawl "P."

For time exposures depress disc indicated by "D" and turn to "T"; set the mirror by depressing lever "H"; wind "A" until the lower edge of the upper curtain is opposite Zero (0), pull out and disengage "C," and open curtain to 4 1/2-inch aperture.
The exposure is now made by releasing mirror at "E," and at the conclusion of the exposure pressing on lever "M," which will close the curtain.

Tension No.	APERTURE					
	1/8	1/4	1/2	1	2	4
6	1000	500	250	125	67	33
5	850	425	212	106	53	26
4	700	350	175	88	44	22
3	550	275	137	69	34	17
2	400	200	100	50	25	12
1	250	125	67	33	17	8

Figure 4. Directions for operating the 5x7 Tourist Graflex.

Directions for operating the 5x7 Tourist Graflex

For instantaneous exposures, depress the disc indicated by "D" and turn to "I." (This changes the setting from "Time" to "Instantaneous.")

Before attempting to wind the curtain, set the mirror by depressing lever "H."

The aperture of the curtain may be altered by turning the knob "A" until the lower edge of the upper curtain is opposite Zero (0) on the scale at back of camera (that is, after the shutter has been released, the upper curtain is wound around the lower roller, and winding it up to "zero" is about halfway to being fully wound), then pull out and disengage "C" (this disengages two meshed gears that hold the aperture setting by holding the lengths of the two tapes), and by turning either to the right or left, the desired aperture can be measured by the graduated scale. (Visible beside the rear ground glass, this adjustment winds or unwinds the two tapes around their own rod, changing the effective length of the tapes between the two shutter curtains, and thus changing the width of the aperture.)

To set the shutter, wind "A" as far as it will go. (This winds the lower part of the shutter curtain onto the upper roller, ready for release.)

The shutter is released by pressing button "E." (on the left side of the camera, which releases the reflex mirror, which in turn releases pawl "M" from dial "A," thus releasing the shutter)

To increase the speed of shutter, wind "B" until the tension number desired appears at index "G." ("B," on this example, does not have a knob or winding key, but instead has two short pegs for one's fingers to gain a purchase on – rather tough on the fingers.)

To decrease the speed of the shutter, release the tension by pressing back the pawl "P."

For time exposures, depress disc indicated by "D" and turn to "T" (for "Time"); set the mirror by depressing lever "H," wind "A" until the lower edge of the upper curtain is opposite Zero (0), pull out and disengage "C," and open curtain to 4 1/2-inch aperture. (That is, fully release the aperture setting so that the film gate is open.)

The exposure is now made by releasing mirror at "E," and at the conclusion of the exposure pressing on lever "M," which will close the curtain. (Releasing the mirror opens the light path so that the exposure is made, and pulling out the pawl "M" releases the upper curtain so that it closes the film gate.)

The shutter setting for the 4x5 Tourist Graflex differs from that of the 5x7 in that the largest aperture setting is 3 instead of 4 inches, with the resultant shutter speeds of 1/45, 1/36, 1/28, 1/22, 1/16 and 1/12 of a second, reading from tension 6 to 1. Another difference can be seen in the upper pawl "M" (Figure 5).

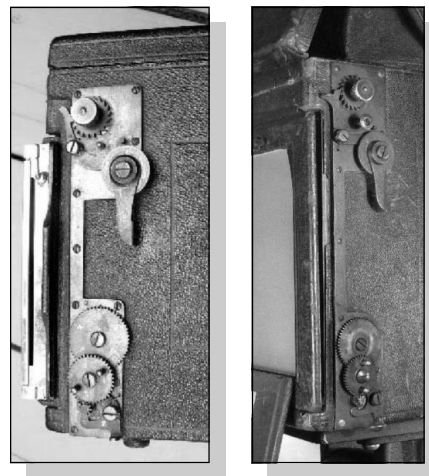


Figure 5. 4x5 Tourist Graflex on left and 5x7 Tourist Graflex on right.

In fact, you may have noticed that this pawl is also different in the instructions and in the patent. In the patent (Figure 2), the illustrated shutter release is pneumatic, which leads me to think that the 1904 patent

may have been primarily intended to upgrade the auxiliary “Graphic Focal Plane Shutter” (Figure 6) that was available to be fitted to such cameras as the R B Cycle Graphic, which had no built-in shutter.

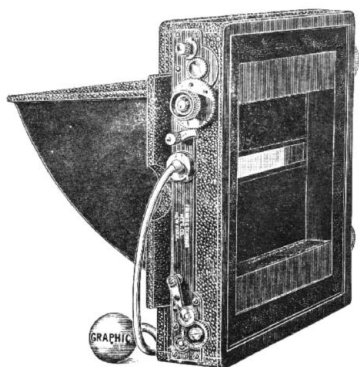


Figure 6. The Graphic Focal Plane Shutter from the 1904 Folmer & Schwing

Perhaps this apparent willingness and capacity of the Folmer & Schwing Mfg. Company to try new ideas of design as they occurred are a traits that contributed to their quick rise to the well-respected position of camera maker.

The 1904 Folmer & Schwing catalog said this about the Tourist Graflex focal plane shutter: “The shutter is released by pressing a release button on the left side of the camera. The shutter is a simplification of the well-known Graphic Focal Plane Shutter, and is known as model ‘B.’ It is an integral part of the Tourist Graflex. The aperture of the shutter diminishes as it passes across the plate, giving slightly greater exposure to the foreground than to the sky. No other shutter made operates so close to the sensitive surface of the plate, and only with this shutter is it possible to utilize the maximum ‘F’ value of a lens. All shutter adjustments are made from the outside. Time exposures of any duration may be made, and the change from time to instantaneous exposures effected instantly.”¹

The aperture diminishes in width because as the shutter curtain travels from upper to lower roller, the tape roller also turns, and takes up some of the tapes’ length, cinching up the two curtains closer together as they travel.

In his 1981 book, A Review of Graflex, Richard Paine wrote: “... the focal plane shutter introduced in the Graflex camera, 1901-1902... was considered inherently pictorial because of its tendency to underexpose the sky. However, it would prove troublesome and was replaced by the one-piece, multi-aperture curtain in the Auto Graflex shutter of 1906.”² Actually 1905.

The later style of Graflex focal plane shutter introduced in 1905 with the Auto Graflex camera remained the standard until the 3¼ x 4¼ Super D Graflex was discontinued in 1963 (really, until the 4x5 Pacemaker Speed Graphic was discontinued in 1970). With the new, relatively “automatic” shutter, the Auto Graflex was apparently something of a hit, with recommendations for it appearing in print for several years after its introduction.

In his 1908 book, The Way of the Woods, Edward Breck, in his chapter on photography, singled out the Auto Graflex as the best choice for the “not yet very expert amateur,” writing: “With this instrument in his hands the sportsman, looking into an aperture in the top, can distinctly see the movements of any animal or bird, while, by regulating the distance by a wheel operated in his right hand, the object is kept continuously in clear focus. The left hand

then presses a knob whenever it is desired to take the picture. This sureness of having the object in perfect focus makes all the difference in the world.”³

In his 1910 book, Practical Suggestions Regarding the Selection and Use of a Photographic Equipment, written from *actual experience*, Austin K. Hanks praised the Auto Graflex as deservedly being the most popular choice, as it was compact, light and relatively less costly than comparable cameras, and wrote: “The Graflex may be considered, more than any other camera, to be in a class all by itself... As a camera for pleasure, a camera for real solid recreation, one that will continue to keep you fascinated with photography the ‘Graflex’ is indeed the camera par excellence.” And “...for the person who buys a Graflex solely for their own amusement or pleasure the ‘Auto’ will, as a rule, entirely fill the bill.”

He also wrote about using the newer style focal plane shutter in the Auto Graflex: “The focal plane shutter is a part of the Graflex, it is built in. This type is perhaps the most efficient of any shutter made. The fact that the curtain drops across the plane of the plate only a fraction of an inch in front of it, and that the aperture... is constant insures an absolutely uniform exposure over the entire plate.” And, “The successful use of a Graflex is largely a complete mastery of its mechanical details. It is, indeed, more than any other camera to be used quickly, and for the securing of rapidly moving objects. It is a great outfit to have for one’s own pleasure. While it is neither complicated nor difficult to handle, it requires equally as much, if not a little more than any other, a reasonable amount of thought and careful attention. ...The mastery of its mechanical details is a matter of practice and experience. At a first glance one is inclined to think, ‘How complicated,’ but this opinion is quickly cast aside.

To look at the plate giving varying shutter exposures, one is apt to get a little bewildered. The focal plane shutter appears to be its most complex point. This need not be so. The present model of the Graflex focal plane shutter gives a total number of twenty-four variations, inasmuch as there are six tensions and four apertures for the different speeds or exposures, but in actual work, one requires only a few, perhaps not more than six or eight in all.”⁴

It would appear that this simple evolution in the design of the Graflex focal plane shutter to a one-piece, multi-aperture curtain proved to be a key development that was quickly recognized as efficient, dependable and not too complicated to use, and which played an important part in the company’s long success.

¹Folmer & Schwing catalog 1904. 1977 reprint. Graflex and Graphic Cameras 1904. Creative Publications, Las Vegas, Nevada, pp. 13 and 52.

²Paine, Richard. 1981. The All-American Cameras, a Review of Graflex. Alpha Publishing Company, Houston, Texas, p. 7.

³Breck, Edward. 1908. The Way of the Woods. G.P. Putnam’s Sons, New York and London, The Knickerbocker Press, p. 401.

⁴Hanks, Austin K. January 1910. Practical Suggestions Regarding the Selection and Use of a Photographic Equipment, written from actual experience Pub. Austin K. Hanks, East Orange, NJ, Post and Davis Co., New York, pp. 22 and 62.

[Ed. *The Tourist’s Model B shutter was also used in their expensive Reversible Back Cycle Graphic Special.*]



U.S. Navy Photography

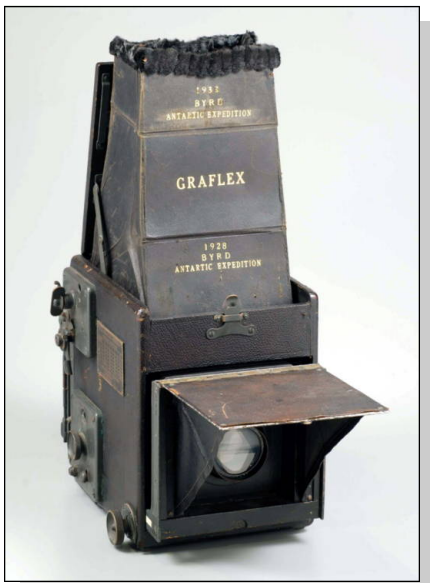
Part II

By Ken Metcalf with Art Giberson

A camera with an interesting history, but unfortunately unrecorded, is a 4x5 Revolving Back Auto Graflex of 1931 (s/n 178298). Engraved on the barrel of the Bausch & Lomb Tessar is "Material Lab. Navy Yard N.Y." Attached to the lens is an elaborate, but effective, semi-automatic diaphragm powered by a clock spring.



Admiral Byrd is credited by Graflex in their ads and catalogs for using six of their Graflex cameras on his 1928 and 1933 expeditions to Antarctica. One camera, a 3¼ x 4¼ Revolving Back Series D (serial number 159,743 - 1928), was presented to the George Eastman House by Graflex and is pictured below, courtesy of Todd Gustavson, their Curator of Technology.



(Note the misspelling of "Antarctic.")

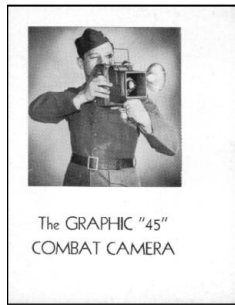
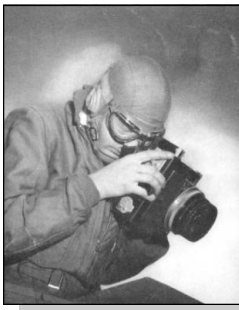
According to the George Carroll manuscript, in 1940, George was the first person to have Graflex convert their photo recording camera into a military identification camera. Tim Holden agrees with the essential information from the manuscript, although he remembers the details a little differently. It seems reasonable that the Navy Department was the initial customer, and the unit was widely used by the government and major private industries throughout the war.

Early in WWII, Kodak was involved in the development of a periscope camera by adapting their Medalist camera to a swing-around mount that could be quickly cleared from the submarine's periscope during an engagement with the enemy. Later, Graflex developed an adapter (KG4(1)) for their 70mm Combat Graphic (See [GHQ](#), Vol.9, Issue 1).



The 4x5 Graphic "45" Combat Camera (18-C-235).

The Navy (and/or the Marines) worked with Graflex to produce one of the most interesting Graflex cameras, and one of the few still cameras made especially for the Navy/Marines. Unfortunately, little primary source information has been found about the development of this camera. From serial numbers taken from actual cameras (both military and civilian version), at least 1,450 cameras were made. All sample cameras are fitted with a black finished 127mm Kodak Anastigmat Special lens in Kodak Supermatic shutter, and all have a manufacture date of 1944. This suggests that all were made in a single batch. Interestingly, the lens is focused with a milled wheel that rotates the front element of the lens forward and back. Anecdotal information suggests that a large number of the cameras were made, but that a large number were not used by the military and were later sold in several civilian configurations. A.H. Towne, a friend of reader Jim Chasse, remembers that he was trained on the camera at the Navy photographic school in Pensacola, Florida, in 1945, but never used it in the field. As with other Graflex cameras, the inspiration for this camera is elusive. In his book, Richard Paine suggests the front element focusing concept of the 3¼ x 4¼ Auto Graflex Jr. of 1906 may have been used in this camera. The basic form of the camera, which had no bellows, may have been inspired by the special order Ringside (Super-Sports) camera or the Fairchild K-20 aerial camera built under contract by Graflex.



Left to right: Ringside camera from 1942 manual Commence Shooting!, Navy and Marine Corps manual covers, courtesy Les Newcomer, and K-20 aerial camera.

The 4x5 Speed Graphic (along with the K-20 aerial camera, probably some made by Graflex, and used as a ground camera) was used extensively on December 7, 1941, at Pearl Harbor and throughout the war.



WWII student photographer with Series D Graflex.

Although not receiving the attention of Joe Rosenthal's flag raising shot on Mt. Suribachi, Marine Corps photographer Robert Campbell, "who was also using a Speed Graphic but shooting from a different angle, captured the first flag coming down as the second flag went up."¹ "Norman Hatch believed his Marine Corps Photo Section had 'pretty close to 50 percent casualties, wounded or dead on Iwo Jima' "¹

standard – the 4x5 Speed Graphic – and similar cameras – with their slow lenses and limited film capacity were just too cumbersome to be used for the majority of modern day photographic assignments. Although the smaller, more versatile, cameras were now the standard, the 4x5 Speed and Crown Graphics were far from being tossed on the scrap heap. They would continue to play a part in naval photography, particularly at the School of Naval Photography in Pensacola, for many years to come. While their useful life as a Navy – or photographic – standard was over, the old photo workhorses were still the first 'professional' cameras future Navy and Marine Corps photographers would encounter when they reported for training. The cameras were used to teach composition and a variety of other skills the fledgling shutterbugs would later apply when using the smaller format cameras"²



Naval School of Photography student in 1992 using a Graphic View II.

This article is far from a complete discussion of Graflex Navy cameras. Readers are encouraged to send in additional information, which will be published in future issues of the Quarterly.

Graflex advertisements during the Second World War, according to Tim Holden, "were institutional rather than product promoting." However, catalogs were issued in 1941 through 1945. As an example of the institutional advertising, Graflex prepared three publications, Sea Beat (about the Coast Guard), Graflex Today and Tomorrow, and Great Moments of the War, with numerous Navy-made photographs. Unusually self-effacing, in Graflex Today and Tomorrow, they state that "The photographs made by [the various services] and published in this brochure [with credit], through the courtesy of these services, do not necessarily constitute an endorsement of GRAFLEX-made equipment."

Mr. Giberson has recently published a revised and updated edition of his book entitled The Crazy Ones Shot Film. It may be purchased by contacting Art GibBooks at 1001 E. Madison Dr., Pensacola, FL, 32505-4661. Also, a signed copy may be obtained from art.giberson@cox.net.

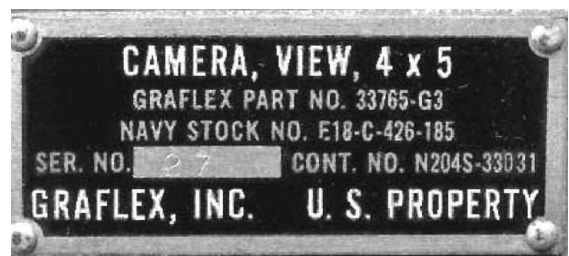
¹ Armed with Cameras, by Peter Maslowski, p. 233 & 302.

² Eyes of the Fleet, a History of Naval Photography, by Art Giberson.



Graflex cameras remained a staple of the Navy after the war, as the shot at left of a Navy diver and a Speed Graphic in use in 1946 for the Bikini atomic tests shows.

"To help the Navy keep up... [they] decided in the early 1960s that the old Navy





Alvin Towne

As Told to Jim Chasse

Alvin Towne was born in 1925 in Lawrence, Massachusetts, and enlisted in the Navy February 17, 1943, at the Lawrence post office with his pals. Although he still had not finished high school, his principal allowed him to receive his diploma upon successfully completing his midterm exams. After basic training at Lake Seneca, NY, he was given the rank of Seaman 2nd Class.

In Argentia, Newfoundland, he was assigned to the aircraft carrier U.S.S. Ranger for convoy duty in the North Atlantic. His first duty on the carrier was pushing aircraft on the hangar deck. Six months later he took an opening in the photo lab as a striker (rookie) student. In addition to his lab duties, he photographed carrier flight landings for pilot training (although a lot of his aircraft pictures were taken with a motion picture camera) and K-20 aerial photos of the carrier. Mr. Towne used a 4x5 Speed Graphic with synced flashbulbs, a K-20 aerial camera and a Series D Graflex with a cut film magazine. The Navy also had an 8x10 view camera for group photos. He was not allowed to take personal pictures.

They were provisioned for the entire cruise with supplies, and his film (primarily 100-sheet boxes of Super XX) was kept in the meat locker. Interestingly, he distinctively remembers that the Marines were using the Combat Graphic for take-off and landing pictures of their planes.

While on duty in San Diego, he was assigned to a hospital photo lab run by a Marine sergeant, where his duties included taking photos with his Speed Graphic of Purple Heart recipients.

In 1945 Mr. Towne finally received five months formal training in the Service School at the Naval Air Station in Pensacola, Florida, where he was trained in motion picture, aerial and still photography. He was trained on the Combat Graphic, but never used it in the field.

He was discharged from active duty in 1946 with the rank of Photographer's Mate Third Class, with a total discharge payment of \$9.15.

During the Korean War in 1950, Mr. Towne was called up from the Navy Reserve and served in non-combat photo duties aboard the U.S.S. Siboney (CVE-112).

Mr. Towne used both the Anniversary and Pacemaker models and saw no practical differences for his type of work. He liked the cameras and used them when he was no longer in the service.



Photographer's Mate Towne, top right, and Pacemaker Speed Graphic flanked by hand-held aerial cameras aboard the U.S.S. Siboney .

Oops!

On page seven of our last issue we showed a picture of a camera we called a Graphic 35 Electric. The camera is actually a Century 35NE.

The camera that goes with Tim's story is a Graphic Electric, which was made in Germany by Iloca.

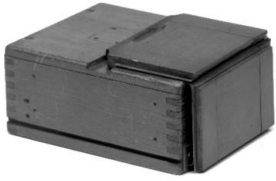


Bill Inman will be writing about these cameras in a future issue of the Quarterly.



Century 35A which sold for \$30 in 1959.

Letters to the editor...



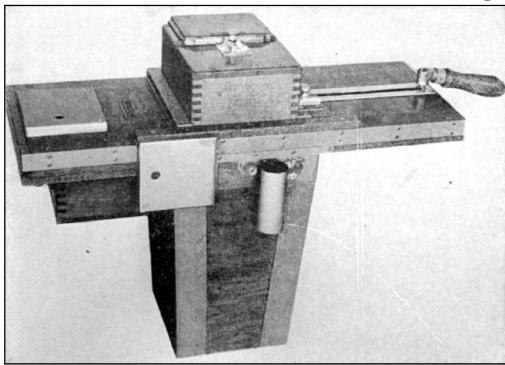
I am happy to report that the mystery of Bill Folmer's lunchbox has been solved. Several longtime subscribers have written me with the answer. One sent me a scan of Photographic Digest Vol. 9 Number 9 (September 1919). In there, Dr. A.K. Chapman writes about "Our War Time Development of Aerial Photography" and he states:

...there had been brought to this country by the representatives of the British Photographic Service, three types of cameras used by them on the front. It was thought best to make duplicates of two of these cameras...The Eastman Kodak Company was asked to duplicate exactly the Model C and Model E. These two cameras were made in some numbers and were used extensively for training purposes.

The essential principles involved are the same. The unexposed plates in metal septums are loaded into the top magazine from which they feed down on to the focal plane. After the shutter is fired, the exposed plate, through a motion of the operating handle, is pushed out of the focal plane and allowed to drop into the lower or receiving magazine.

It is with some embarrassment that others have cited our very own publication for the answer! Back in Vol. 4 Number 4, "A contributor" writes about early aerial cameras and cites Photographic Journal, Vol. 3 No 2, Spring 1986 but uses the same photographs.

Lastly, a longtime subscriber/contributor sent me this photo. While not an exact copy of the cameras in the article, it's close enough to suspect that this camera may be the British camera that the copies were made from. The former, with their square, wood cones, look



more like a product of Folmer & Schwing than this camera with a metal cone.

It's clear that my lunch box is a plate magazine for either a Model C or Model E aerial camera.

LN



A Camera Outfit

At least as early as 1902 (see Thomas Evans' article in this issue for one accessory), Graflex wanted to sell their customers outfits, consisting of a camera, along with a focal plane shutter, special film holders, a case, extra lenses, filters and a tripod. As an example of their cooperativeness, a 5x7 Revolving Back Cycle Graphic c. 1912-14 was sold with a case custom fitted for the focal plane shutter back, which was sold as an accessory with the camera.



In some cases, Graflex sold accessories of other manufacturers for their outfits. These included lenses, range-finders, filters, light meters and flash guns. This and the following article will feature the 3/4 x 4/4 Speed Graphic (s/n 185513) outfit of 1934.

In this issue, we will introduce the Instoscope extinction light meter made by the Austrian company Drem. (You sight through it toward your subject and note the dimmest letter you can read through the little eyepiece.) Most were produced showing Schneider (ISO 100 equals Schneider 31), Weston or DIN film speed systems, but they also made a Schneider version for Graflex (but not for the National), which allowed for direct shutter readings. It was listed and illustrated in Graflex catalog Pricing Supplements for 1934 and 1935 for \$6.50 to \$8.00, including a leather case.

To illustrate the basic procedure, the meter shows (based on the dimmest letter of "B") there are various *f* numbers and shutter setting combinations available. One is *f*4.5 with a tension of "1" and a curtain opening of 3/4-inch. KM



TENSION NO.	1/8	1/4	1/2	1
1	350	110	40	10
2	440	135	50	15
3	550	160	65	20
4	680	195	75	25
5	825	235	80	30
6	1000	295	90	35

THE FOLMER GRAFLEX CORPORATION
ROCHESTER, N.Y., U.S.A.

WILLOUGHBY'S

THE NEW EXPOSURE METER

INSTOSCOPE FOR GRAFLEX

EVER-READY INSTANT ONE-HANDED

AND

READING DIRECTLY GRAFLEX SHUTTER SETTING



		A	M	P	X	D	R	F	H	B	K	V	S	G	N	L	Z
20	10	5	3	2	1 1/2	1	3/4	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/12	1/15	1/20
30	15	8	4	2 1/2	1 1/2	1	3/4	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/12	1/15	1/20
45	20	10	6	3 1/2	2	1 1/2	1	3/4	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/12	1/15
60	30	15	10	5	3	2	1 1/2	1	3/4	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/12
80	40	20	12	6	4	3	2	1 1/2	1	3/4	1/2	1/3	1/4	1/5	1/6	1/8	1/10
100	50	25	15	8	5	4	3	2	1 1/2	1	3/4	1/2	1/3	1/4	1/5	1/6	1/8
150	75	38	22	12	7	5	4	3	2	1 1/2	1	3/4	1/2	1/3	1/4	1/5	1/6
200	100	50	30	15	10	7	5	4	3	2	1 1/2	1	3/4	1/2	1/3	1/4	1/5
300	150	75	45	22	15	10	7	5	4	3	2	1 1/2	1	3/4	1/2	1/3	1/4
400	200	100	60	30	20	12	10	7	5	4	3	2	1 1/2	1	3/4	1/2	1/3
500	250	125	75	40	25	15	12	10	7	5	4	3	2	1 1/2	1	3/4	1/2
600	300	150	90	45	30	18	15	12	10	7	5	4	3	2	1 1/2	1	3/4
800	400	200	120	60	40	24	20	15	12	10	7	5	4	3	2	1 1/2	1
1000	500	250	150	75	50	30	25	20	15	12	10	7	5	4	3	2	1 1/2

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Camera Craft June 1935, courtesy Bob Lansdale.

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Photographer's Mate 3rd Class, T.E. Collins. Under salvage of USS Oklahoma, Pearl Harbor, 18 Jan 1943. Image 18-G-276601 courtesy National Historical Center Photographic Services. Anniversary Speed Graphic fitted with Mendelsohn flash.

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