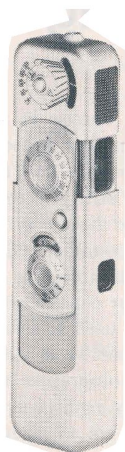
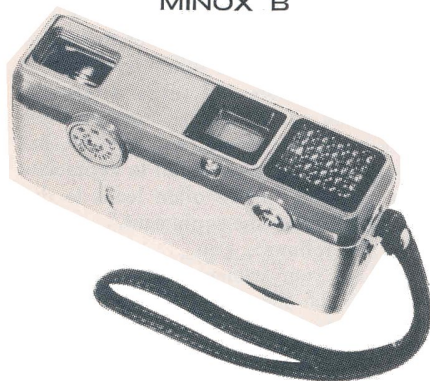


A roundup of cameras

Here's a list of subminiature cameras available in the United States. (Two new ones, the Edixa 16 and the Rollei 16, covered in POPULAR PHOTOGRAPHY's *photokina* report, June, 1963, were not yet on the market when this issue went to press.) The cameras are listed in alphabetical order. Actually, the most popular and most readily available through camera stores are the Minox, GaMi-16, Mamiya-16, and Minolta-16—in their various models. The Minolta-16 has three models currently on the market in the United States, and is said to be the largest selling subminiature in the country today. Source of supply is given for those cameras not easily obtained through camera stores.



MINOX B



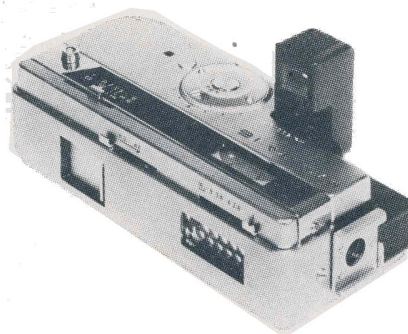
MINOLTA-16 EE



MINOLTA-16 P



MINOLTA-16 II



MAMIYA-16 ELECTRIC



GAMI-16

ECHO 8 (Camera Lighter): Built into a windproof-type lighter of standard appearance; uses 8-mm film for 20 exposures, frame size: 6x6-mm; 15-mm *f*/3.5 three-element coated lens with fixed focus, stops down to *f*/11; self-cocking shutter; one speed: 1/50 sec plus T and B, optical reflex viewer; automatic film stop; self-enclosing. Price, \$29.95. Accessories include screw-in filters for black-and-white and color film and infrared and UV filter. From: Silver Bells Ltd., P.O. Box 982, Carmel, Calif.

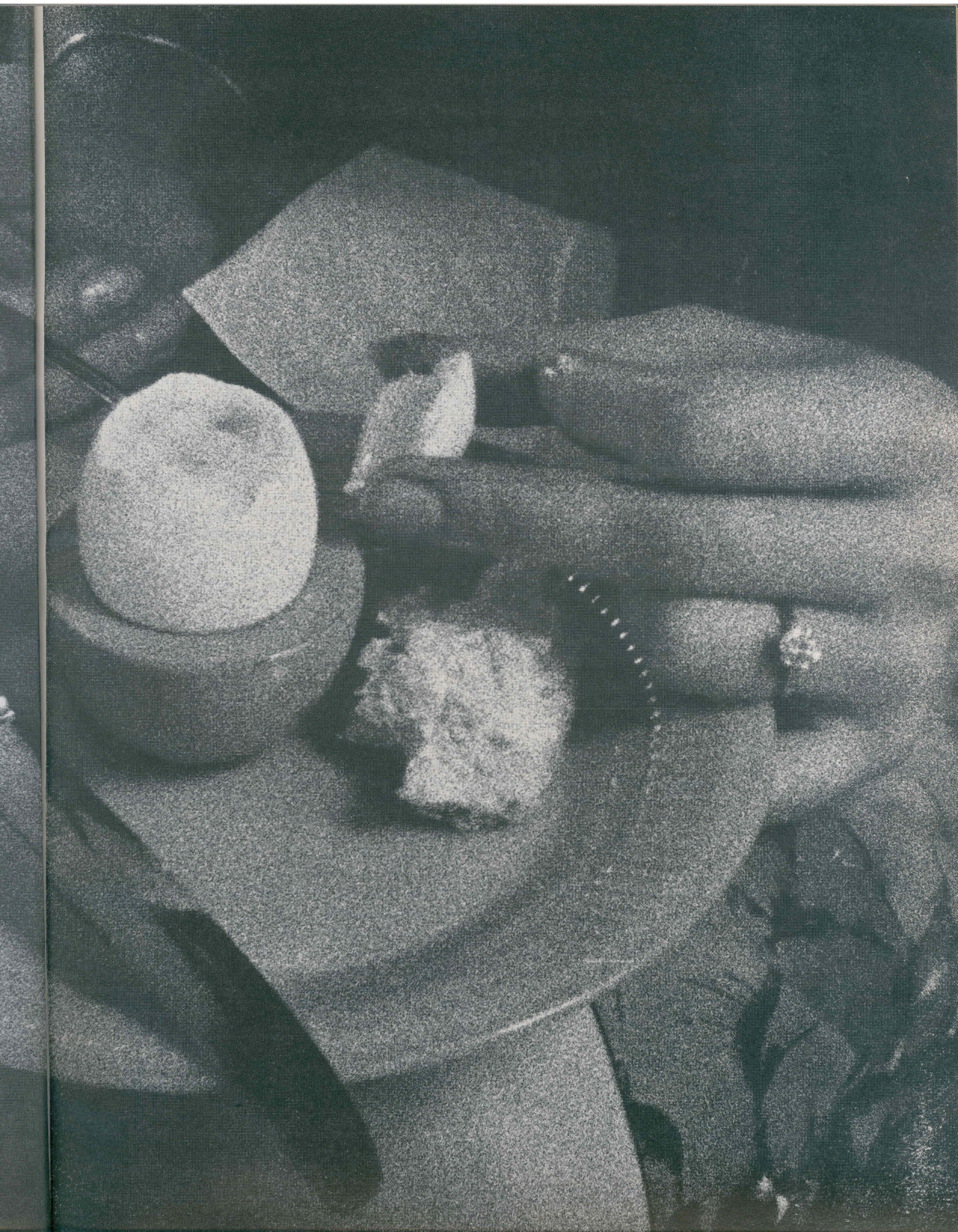
EDIXA 16: (*Coming*) Uses new standard film load, 21 exposures, 12x17-mm. Lens, 25-mm *f*/2.8 Schacht Travegar. Shutter automatically programmed 1/30 to 1/150 sec, light values 8 to 15. Rapid-wind lever and rewind. Size, 1x1½x3¾-in. Weight, 6 oz. Coupled exposure meter fits on end. Filters, accessories.

GAMI-16: Uses 16-mm GaMi 30-exposure cartridge film, 12.17-mm frame size; 25-mm Galileo Esamitar Anastigmat *f*/1.9 lens, stops down to *f*/11, minimum focusing distance: 20 in.; eye-level combined viewfinder-rangefinder with automatic parallax correction; built-in exposure meter with ASA film speeds 12 to 200 for black-and-white and 20 to 150 for

color; exposure control inside finder window; shutter speeds: ½ to 1/1,000 sec and B, EVS settings, combined film/shutter wind, X synchronization; film transport and shutter cocking automatic with camera handle-cover operation; single shots or sequence burst exposures. Price, including leather case, neck chain, and reusable film cartridge, \$299.50. Accessories include 4X and 8X telephoto lenses, copy lens, filters, copy stand, microscope adapter, film loader, film slitter, developing tank, viewer, enlarger.

MAMIYA DELUXE 16: Uses 16-mm film for 20 exposures, 10x14-mm frame size; 25-mm *f*/2.8 coated lens, minimum focusing distance: 1 ft; shutter speeds, ½ to 1/200 sec and B, X synchronization, automatic wind; built-in optical auto-finder with parallax correction; sliding lens cover prevents accidental exposure; built-in interchangeable yellow filter. Price, with case and strap, \$39.95. Accessories available: filters; choice of ten types of film.

MAMIYA ELECTRIC 16: Same features as Deluxe 16 model except with automatic-coupled, built-in exposure meter. Price, including case and wrist strap, \$69.95.



and accessories

MEC 16-SB: Uses 16-mm film; 20-mm *f*/2.8 lens, minimum focusing distance: 1 ft, automatic three-way snapshot settings; shutter speeds, 1/30 to 1/1,000 sec and B, X synchronization; automatic vertical and horizontal parallax correction; lever wind; automatic exposure counter; built-in filter channel. Price, \$84.50; with *f*/2 lens, \$99.50. Accessories include set of seven filters.

MIKROMA II: Uses 16-mm film; 20-mm Mirar *f*/3.5 lens, minimum focusing distance: 18 in., scale focusing; shutter speeds, 1/5 to 1/400 sec, M synchronization; eye-level viewfinder; combined single-stroke film/shutter wind; double-exposure prevention. Price, with case, \$39.50. Accessories include pouch case, developing tank, projector, film cutter, filters, copying system, viewer, enlarger, slide binders. From: Warren Processing Labs, 1924 Ave. U, Brooklyn 29, N. Y.

MINOLTA-16 II: Uses 16-mm film for 20 exposures, 10x14-mm frame size; fixed-focus 22-mm *f*/2.8 coated lens with two close-up lenses; speeds: 1/30 to 1/500 sec, X synchronization; push-pull body cover advances film, winds shutter, protects lens when closed for carrying; retracting film-pressure plate. Price, with case and UV filter, \$39.95. Accessories available include filter kit; filter file; accessory and tripod bracket; B-C 111 folding-type flashgun; enlarger; projector; two close-up sets: (1) with No. 1 and 2 lens, No. 0 distance lens, yellow filter; (2) lenses and 1A filter, 80A and 81B color conversion filter.

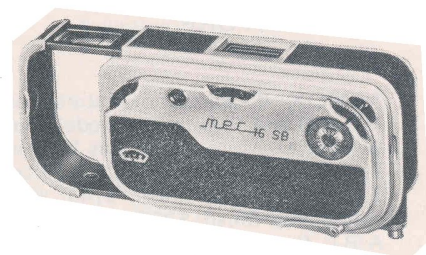
MINOLTA-16 E: Uses 16-mm film, 10x14-mm frame size; fixed-focus 25-mm *f*/2.8 lens, minimum focusing distance: 6 ft; shutter speeds: 1/30 to 1/500 sec, X synchronization;

fully automatic exposure control; single-stroke film transport; double-exposure prevention; automatic exposure counter. Price, with case, \$79.50. Accessories include close-up lenses; enlarger; filters for color and black-and-white film.

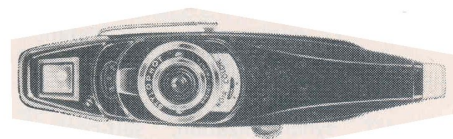
MINOLTA-16 P: Uses 16-mm film, 10x14-mm frame size; fixed-focus 25-mm *f*/3.5 lens (accessory lenses permit close-ups); shutter speed: 1/50 sec, X synchronization; thumb-knob single-stroke rapid film wind; double-exposure prevention; automatic exposure counter. Price, \$26.90. Accessories include flashgun; lenses; filters for color and black-and-white film; projector; enlarger.

MINOX B and PRIVATE EYE: Uses 9.5-mm film; 50 exposures on black-and-white film, 36 exposures on color; 8x11-mm frame size; 15-mm *f*/3.5 coated lens, fixed aperture, minimum focusing distance: 8 in.; shutter speeds, 1/2 to 1/1,000 sec and T, B, X synchronization; built-in exposure meter coupled to shutter; push-pull body cover advances film, winds shutter, protects lens and finder when closed for carrying; retracting film pressure plate; bright frame finder with automatic parallax correction; built-in 2X green, 10X neutral density filters; distance measuring chain for close-ups; satin chrome finish. Price, Minox, \$149; Private Eye, with black finish, \$174. Accessories include Model B B-C flash for AG-1 bulbs with retractable reflector, \$14.95; tripod; telephoto-binocular clamps; copying stand; reflex and right-angle finders; enlarger; developing kit and tank; film viewer-magnifier; transparency viewer-cutter; automatic projector; slide-binding kit; slide file.

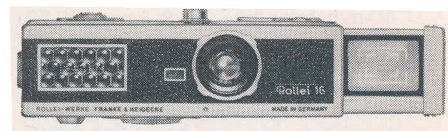
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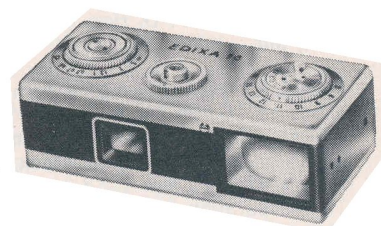
MEC-16 SB



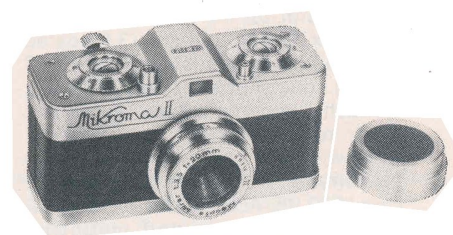
STYLOPHOT



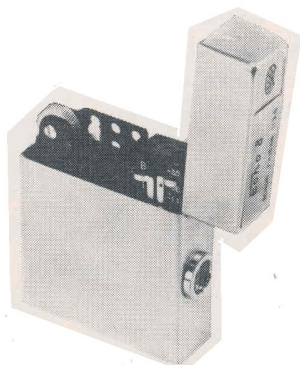
ROLLEI 16 (coming)



EDIXA 16 (coming)



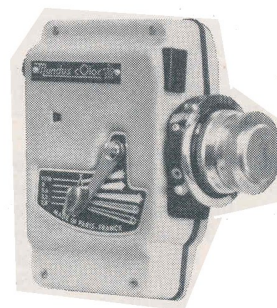
MIKROMA II



ECHO-8



VISCASIDE-16



MUNDUS

MINOX III-S: Same features as Minox B and Private Eye models but without exposure meter. Has built-in 2X green and 3X orange filters. Price, \$129; with black finish, \$144; with gold-plated finish, \$299. Uses Model A B-C flash for AG-1 bulbs with retractable reflector, price, \$14.95.

MUNDUS COLOR TR-8: Uses 16-mm film, 10x15-mm frame size; 25-mm Roussel f/3.5 lens, stops down to f/17, minimum focusing distance: 2 ft, interchangeable MC 22.5x50 lens mount; eye-level viewfinder; behind-lens shutter, speed: 1/30 sec, MX synchronization, self-cocking; single-stroke film transport lever with automatic stop and double-exposure prevention; automatic exposure counter. Price, including one roll Mundus Color film, \$86.95. Accessories include ready case, \$12; Roussel 40-mm telephoto f/2.8 lens, \$59.50; 50-mm f/3.5 telephoto lens, \$64.80; set of close-up rings, \$3.60; flash adapter, \$1.80; flash attachment, \$4.95; MC camera holder; hand strap, \$1.98; camera grip, \$1.95. TR-8 with 20-mm Som Berthiot f/2.8 lens, minimum focusing distance: 1 ft, scale focusing. Price, \$119.50. From: Mundus Color Co., P. O. Box 156, Riverdale, Md.

ROLLEI 16: (*Coming*) Automatic-exposure 16-mm subminiature, 1½x-1¾x4¼, 9 oz, covers 12x17-mm on single-perforated 16-mm stock. Focusing with 45-mm f/2.8 lens from 16 in., parallax corrected. Push-pull of finder end sets shutter, advances film. Manual operation possible. Film locks on last shot.

STYLOPHOT DELUXE: Uses 16-mm film for 12 exposures, frame size: 10x10-mm; 27-mm f/3.5 coated lens, minimum focusing distance: 2 ft, 8 in.; one shutter speed: 1/75 sec, X flash synchronization, automatic wind; ready indicator in viewfinder window; front controls; pocket clip for carrying. Price, with compartment case, \$32.95. Accessories include filters, slide mounts and mounting strips, magnifying table viewer.

STYLOPHOT STANDARD: Similar to Stylophot model but with fixed-focus f/6.3 lens; shutter speed: 1/50 sec. Price, with case, \$14.95. Accessories include filters, portrait lens, magnifying table viewer. From: The Kimac Co., Old Greenwich, Conn.; and Silver Bells Ltd.

VISCAWIDE ST-D: Takes ultra-wide-angle 120-degree shots with 16-mm film, frame size: 10x52-mm; 25-mm f/3.5 lens; focal-plane shutter. Price, with case, six rolls film, UV and infrared filter, \$39.95. Accessories include filters for black-and-white film, spare empty cartridges. From: Silver Bells Ltd.

The question of FILM...

The availability of film for these cameras is a variable thing. You can get standard Kodak black-and-white film for the more widely distributed cameras, such as Mamiya and Minolta. Anscochrome and Kodachrome II color film is supplied for these, as well, and Agfacolor CN-14, for negative color; is available for all three models of the Minolta. Film for both cameras comes in user-loadable cartridges. GaMi cartridges not only are loadable, but the company puts out a film splitter that lets you slice off a GaMi-size strip from a roll of 35-mm film, as well as a film winder to facilitate loading.

Minox discourages non-factory loading, but puts out a complete range of black-and-white film types (Adox KB14 and KB17, and Kodak Plus-X and Tri-X); plus Anscochrome and Agfachrome CT-18 for color transparencies, and Agfacolor CN-14, for negatives. There is, however, one private supplier of film for Minox cameras. O.B. Photo Products (Box 125, Ft. Hamilton Station, Brooklyn 9, N.Y.) has designed a plastic Minox cassette (the regular ones are metal), and has started loading a line of black-and-white and color film, similar to what Minox puts out. They're being distributed by Caprod, Inc., importers and distributors of Mamiya-16 cameras and accessories. O.B. Products makes and loads the Mamiya cassettes.

Incidentally, this company, which specializes in cutting and spooling odd film sizes (such as those used for the Telstar program) offers to cut and load any film emulsion for any out-of-date subminiature camera, provided the customer can come up with "at least one" empty cassette.

As with black-and-white films, the best results with color are obtained when the finest-grain materials are used. This is much more important as a criterion of selection than in the case of 35-mm color films, where one can worry less about grain and more about tonal characteristics. In portraiture, for example, flesh tones are more important than fineness of grain.

Actually, with close-up portraits, you need not be too preoccupied with fine definition, for you are still achieving over-all effects.

With subminiature films, however, you become much more preoccupied with smoothness of color tones. You don't want them to break apart, thereby coarsening the effect. For this reason, Kodachrome II appears to be a top choice. It is packaged pretty generally for 16-mm cameras, but it is not currently available for the Minox due to processing problems. For the Minox, excellent results can be obtained with Agfacolor CT-18.

So far as picture-taking techniques are concerned, those suggested for black-and-white films are equally valid here if not more so. To some extent, a strong play of color will make up for a loss of picture definition.

For print-making you need finer, sharper films than for screen viewing. Anscochrome is quite satisfactory, since the grain is less noticeable when projected.

*We asked the man
who owns ~~one~~ 4*

R. Stephen Vercoe's shooting tips

R. Stephen Vercoe is a documentary motion picture maker (producer, director, cameraman) who has had no professional experience with still photography. But for a long time he has been overwhelming *POPULAR PHOTOGRAPHY* editors with the quality of the subminiature pictures he has submitted for our consideration. Several of them have been used to illustrate this special section. Since he is such a consistent producer of photographs that exemplify the good quality results available to subminiature users, we asked him to set down the secrets of his success.

"There are no secrets or tricks," he told us. "But I can give you a list of the points that I think make the difference between ordinary snapshots and really acceptable results from a subminiature. Some of these points may seem simple and obvious, but many subminiature users fail to appreciate them, and this failure often leads to disappointment with the equipment."

His list follows:

1. Have your camera with you at all times. It's the one time you forget it when the greatest picture presents itself.
2. Move in close. Fill your frame. I prefer to get in as close as two feet for portraits.
3. Hold your camera steady. Follow the manufacturer's recommendations for how to hold your particular subminiature. Learn to squeeze the shutter release, thereby avoiding a common source of camera movement (jerking the lightweight apparatus at the moment of exposure).
4. Be careful how you determine exposure. Don't let the constant and easy accessibility of your camera interfere with your maintaining good habits in this regard.
5. Be careful how you read the built-in exposure meter. Usually it is a good quality one, but often you'll find that its angle of acceptance is a little too large.
6. Clean the camera interior every time you change film, if possible. Be especially conscientious about film pressure plate, where a speck of grit could scratch the entire roll of film. I suggest a baby ear syringe, available in pharmacies for about 50 cents, as a good dust blower. A few sweeps with a soft lens brush will help, too.
7. Watch your fingers. Keep them away from the front of the camera. After all the thousands of subminiature pictures I have shot, I still, on rare occasion, find I've

continued on page 84

Vercoe's always camera-ready to grab action shots, such as this Portuguese scene.

Developing and printing

Most picture-takers prefer to have their films processed for them by commercial finishing or custom services, although the real adventure in subminiature photography, as far as I'm concerned, is in doing your own. It is mostly about the latter that we'll be concerned here.

First, let's cover the commercial photofinishing services. At present, all films packaged for subminiature cameras include instructions and mailers which make it easy for you to send your exposed films directly to an approved finishing lab. Later, the situation may change as films become standardized for a variety of cameras. By then, we hope, lists of qualified finishing services will be compiled for the more discriminating subminiature fans. Better service should then also be available at your local photofinishing "pickup" counter.

But for the present, you're more likely to get good quality service if you take your films to a camera store instead of to the druggist's. In either case, make sure the finishing service to be used *specializes* in subminiature processing.

Also, there are labs that provide excellent mail order service for black-and-white and color, other than Kodachrome. You'll find some of these listed in the classified columns of *POPULAR PHOTOGRAPHY*. For Kodachrome (which you must load yourself, or have loaded for you by one of the people who specialize in this sort of thing, from double 8-mm or 16-mm spools of movie film) a dependable service is provided by Berkey Photo Service, 77 E. 13 St., New York 3. Price for developing and slide-mounting of a subminiature film is \$1.50. This is the only generally available 16-mm short-length Kodachrome processing service I know of, available through dealers or directly.

At least one custom lab catering to professionals (Motal Custom Darkrooms, 13 W. 46th St., New York 36), recognizing the popularity of subminiatures among both pros (as a second camera) and amateurs, has instituted a subminiature *developing and proofing* service that simplifies "finding out" what you've shot. Film is developed, fine-grain or compensating, for 80 cents a roll and same-size contact sheets cost 30 cents each. However, they'll enlarge an entire roll (or more than one, but the more negatives the smaller the individual pictures) at once to give you a fair-size blow-up version, so that each frame can be viewed with the naked eye. An 8x10 "enlarged contact" costs \$1.50; 11x14, \$2, and 16x20, \$4 per sheet, regardless of how many rolls of film are included on any one. Cut up, these make adequate wallet-size prints.

If you have an enlarger that will take a 4x5 negative carrier you can do this yourself. Simply sandwich the negatives between glass and insert in the negative carrier of the enlarger.

Developing subminiature film is basically like processing 35-mm film. The chief differences are in the tanks, loading the reels, and in the greater care that must be exercised

throughout the entire cycle of developing and enlarging in order to overcome the hazards of dust and scratches. The point to remember is that dust remains constant in size, as does a fingernail scratch; as the negatives get smaller and require more enlargement, the annoying spot that might squeak by with a larger film becomes devastatingly conspicuous.

The Minox film is most easily developed in a Minox daylight developing tank, although professionals who do a lot of work in Nikor tanks can obtain special Minox reels. For daylight loading of 16-mm reels, there is the GaMi 16 tank, and for a darkroom loading alternative, you can use the FR Special developing tank with a special flange that lets you develop two rolls at a time. Also, Nikor makes 16-mm reels; and they can be used with any of their tanks.

The same rules that govern choice of 35-mm developer hold good here. For slow films, a diluted compensating developer should be used, while any of several fine-grain developers can be used with the faster films. Slow films can be made "faster" with some developers, such as Acufine and Diafine, while retaining their fine grain and sharp edge qualities.

Developed films should be given a final rinse in an anti-static wetting solution, then hung up for quick drying. Dried films should be cut and filed in negative sleeves. Paper sleeves designed for 35-mm will do nicely if staples are put through the center of the sleeves, dividing them in half lengthwise. Warren Processing Labs, 1924 Avenue U, Brooklyn 29, N.Y., is a source for 16-mm filing wallets, at 12 cents each by mail. Minox film wallets are available from Minox camera dealers.

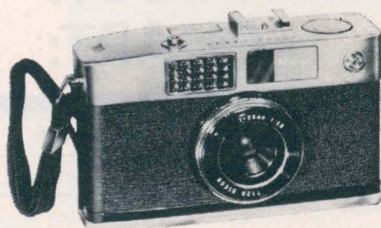
There are only two enlargers made specifically for subminiature negatives—Minox and GaMi 16, both of which are precision instruments with features designed for their small negative sizes. The Minox enlarger may be used also with 10x10-mm formats on 16-mm, thereby accommodating the Stylophot and the models of the Minicord still found in circulation. There are several enlargers that are accessory-interchangeable between 16-mm and larger sizes, by use of film carriers and masks, as well as shorter-focal-length lenses (and sometimes other condenser assemblies). These include the Axomat Ia, Beseler (all models), Bogen Sub II, Durst (several models), Minolta-16 (which doubles on 35-mm), and Omega A2.

Carlwen Industries, 18 Grandin Circle, Rockville, Md., makes scratch-proof, rapid-shift negative carriers for a number of different enlargers. There are 16-mm carriers available on order for some.

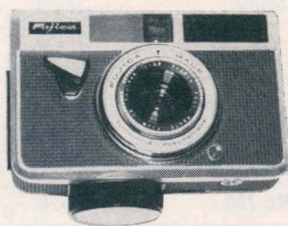
All work should be in a dust-free, draft-free darkroom area. Three important working tools are a camel's-hair brush, liquid film cleaner, and liquid scratch remover.

Any enlarging papers can be used, although the subminiaturist may prefer matte or silk finishes.

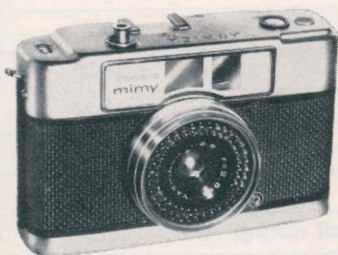
Ricoh Caddy



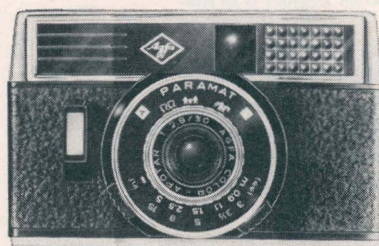
Fujica Duet



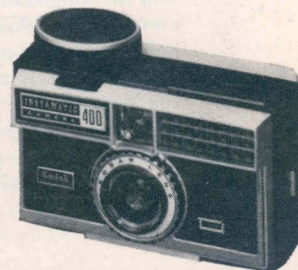
Yashica 72 Mimy



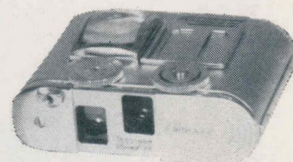
Agfa Paramat



Kodak Instamatic 400



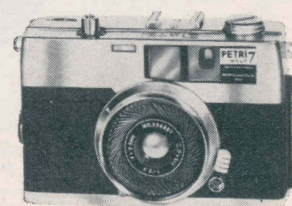
Tessina



Ricoh Auto Half



Petri Half 7



'New' format, 50 years old, comes back

You don't have to be very old to remember when every downtown city block had its roving photographer, with miniature camera and a handful of code-numbered tickets, offering candid shots "ready next day." Chances are his camera was a Univex Mercury—a popular sub-35 of the late 1930's which survived into and beyond the war years.

If you're an Air Force veteran, you may remember that when a disabled German plane was captured after a safe landing, the Allies' first concern wasn't the pilot, but the tiny Robot cameras set into the wings, which recorded in stereo whatever the plane had encountered in flight. Once more, the sub-35.

Do these sound like "early" applications of the less-than-standard 35-mm format? By no means; exactly 50 years ago, in 1913,

Herbert Huesgen of the New Ideas Manufacturing Company introduced something called the Multiple Tourist, which made 250 pictures, 18x24-mm, on a load. The idea of quantity took hold readily; soon there was the Simplex Multi Exposure, giving the user a choice between 800 half-frame and 400 full-frame shots to a load.

Two years later came the Minnigraph, providing 50 half-frames, sold with its own projector. In France in 1920, Jules Richard came forth with the Homeos, a stereo camera that made 26 pairs in the half-frame format. A further refinement was the Sept, designed by Andre Debrie, which offered the option of stills or motion pictures; it had a spring motor and a 17-foot magazine—pre-loaded—for 250 pictures. It too had its own projector.

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Today's hottest negative size:

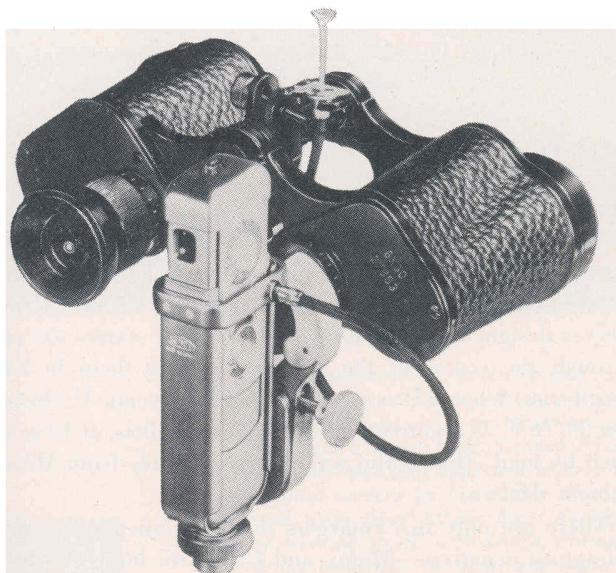
SUB-35

Resurgence of half-frame and similar formats offers useful compromise between 35-mm and subminiature

By WILL FORBES

...and ACCESSORIES...

Apart from the usual accessories, such as filters and flash units, subminiatures do not, as a rule, have very comprehensive accessory systems. (There are a couple of notable exceptions.) This is quite understandable, since every bit added detracts from the basic advantage of the small, lightweight idea. Since record making is one of the best appreciated functions of the subminiature, close-up and copying equipment are the key accessories. Minox focuses down to 8 inches, needs two supplementary lenses, but attachments are available for Minolta, Mikroma, GaMi, Stylophot, and Mundus. Copying stands are designed to correspond to cameras' distance settings. GaMi film splitter and spool winder let you use any 35-mm film to increase scope. Minox and GaMi offer right-angle viewfinders for very candid photography. Minox also has a waist-level finder, and a belt case.



At present there are only two sources of suitable slide projectors. One is the Minolta Mini-16, which takes standard 2x2 slide mounts with openings for Minox, 10x10-, 10x14-, and 12x17-mm film. The other is the Minox projectors, both automatic and manual, which take 30x30-mm glass slides.

With the growing popularity of subminiature cameras, however, one can expect new dual-purpose projectors. These will enable you to use the same machine for projecting 35-mm films as well as subminiature films. These will interchange projection lenses and condensers. They are among the new things to come, and should take 2x2 mounts.

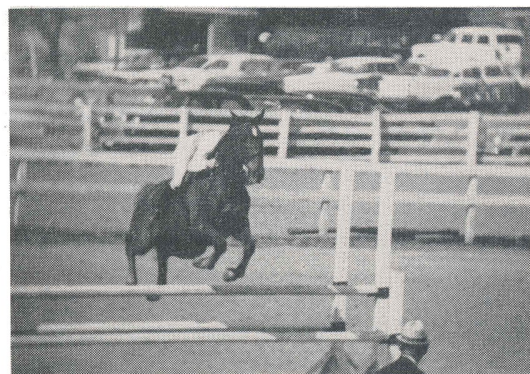
Subminiature screening and editing is aided by table viewers such as Burke and James' Teleramic, \$24.50, requiring \$3.95 adapter for 16-mm slides in 2x2 mounts.

...and to carry things further

A fascinating accessory for the subminiature is the binocular attachment. As shown here with a Minox, binocular becomes a powerful telephoto lens when attached with Minox binocular clamp. To use, attach with lens set at infinity. Focus through the other eyepiece, and shoot when binoculars are focused. You can, in most cases, retain original speed of camera lens. To compute new focal length, multiply the focal length of the camera lens (Minox's is 15-mm) by the power of the binocular. If this, for instance, is 6x, you have a 90-mm lens. To find your new *f*-value, you divide by the diameter of the binocular objective. That's the second part of the binocular designation. Thus, with a 6x25 binocular you would divide the 90 by 25, which gives you something close to *f*/3.5.



For subminiature close-ups, Cooper used Minox-mounted binoculars for center and right of these three photographs. Normal lens shot, at left, was made from same position as center one, which had aid of 7x50 Bushnell BinoFoto, as did flying horse.



UNIQUE FAMILY OF CAMERAS

Ever since the first sharp still pictures were made on 35-mm motion picture film, inquisitive photographers and designers have wondered whether good images could be made on still smaller negatives — and if so, how much smaller? One response, of course, has been the subminiature, discussed elsewhere in this issue. Another is sub-35.

Where did the term “sub-35” come from, suddenly? It’s your old friend “half-frame,” along with some close relatives. Sub-35 embraces the majority format of 18x24 mm, and the minority groups represented by Robot and Tessina, for example, which make different use of the standard full-width 35-mm film.

European and Japanese manufacturers have been taking tentative nibbles at sub-35 since early in the postwar camera boom. Now, from across both oceans, we’re getting whole lines of beautifully engineered, precision-built sub-35’s, and our own giant, Kodak, has recently entered the lists with the Instamatics, which go even further in “tampering” with old-fashioned 35: the width is still the same, but most of the perforations are gone, and the film with paper backing is sold in Kodapak cartridges designed for simplified loading in the camera.

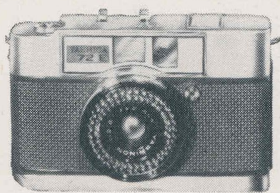
So we have a whole flourishing family of small-but-not-minuscule cameras that deserve special consideration: they’re neither overgrown subminiatures nor “big” cameras that happen to be smallish. These 13 pages help put sub-35 in its place.

What do professionals think of half-frame and its friends? Many logically reason that, if our film and developer technology is twice as good as it was 10 years ago, our half-size negatives today can have the quality of yesterday’s full-size ones.

On his extended Japanese assignment, W. Eugene Smith used an Olympus Pen regularly with confidence and satisfaction. This magazine’s contributing technical editor Bill Pierce, likes the way sub-35’s “incredible freedom” lets him “just point and push.” Slim Aarons, much-traveled contributor to *Holiday* and *Town & Country*, finds it an ideal auxiliary camera for color.

Whatever you think of sub-35 now, you’ll want to know about the cameras, their problems, and their triumphs. And maybe you’ll be a sub-35er soon yourself!

Yashica 72E



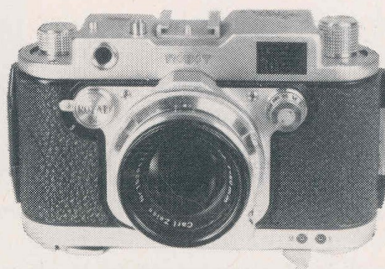
Robot Star II



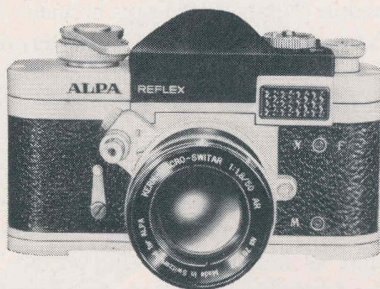
Canon Demi



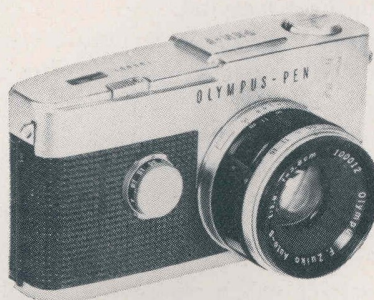
Robot Royal 24S



Alpa 6C



COMING: Olympus Pen F



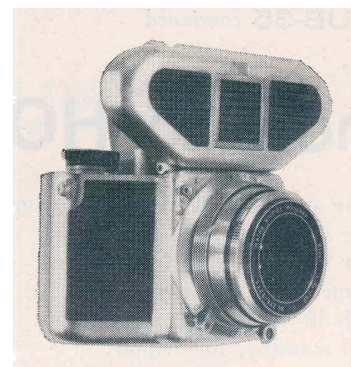
SUB-35 CAMERAS CURRENTLY AVAILABLE

Lens	Shutter	Focusing	Price
30-mm f/2.8	1/30-1/225	Zone	Not avail.
30-mm f/2.8	1/125 or 7 LVS	Zone	Not avail.
Interchangeable*	1-1/1,000	Scale	\$399 less lens
Interchangeable*	1-1/1,000	Scale	\$279 less lens
28-mm f/2.8	1/30-1/250	Zone	
28-mm f/2.8	1/30-1/300	Zone	\$69
43-mm f/11	1/90 and 1/40	Fixed	Under \$16
41-mm f/8	1/60 and 1/40	Fixed	Under \$45
41-mm f/8	1/60 and 1/40	Fixed	Under \$53
38-mm f/2.8	1/60, 1/125 and 1/250	Scale	Under \$110
Interchangeable*	1-1/1,000	Scale	Special order
28-mm f/3.5	1/25-1/200	Scale	\$34.40
32-mm f/1.9	1/8-1/500	Scale	\$69.95
30-mm f/2.8	1/8-1/250	Scale	\$44.50
28-mm f/3.5	1/40-1/250	Fixed	\$49.95
30-mm f/2.8	1/40-1/250	Zone	\$59.95
Interchangeable*	1-1/500	Scale	Not avail.
28-mm f/2.8	1/30-1/250	Zone	\$49
25-mm f/2.8	1/25 (auto.) 1/30 (manual)	Fixed	Under \$75
25-mm f/2.8	1/4-1/250	Zone	\$54.95
30-mm f/2.8	1/25-1/250	Scale	\$49.95
28-mm f/2.8	1/8-1/250	Fixed	\$45
28-mm f/2.8	1/60	Fixed	\$45
25-mm f/2.8	1/2-1/500	Scale	\$169
Interchangeable*	1/2-1/500	Scale	\$159 less lens
Interchangeable*	1/2-1/500	Scale	\$179 less lens
Interchangeable*	1/4-1/500	Scale	\$239 less lens
Interchangeable*	1/4-1/500	Scale	\$279 less lens

which has waist-level viewing and the Tessina which has both eye- and waist-level viewing.

*Additional or recommended lenses for cameras with interchangeable lens mounts.

Alpa 6C and Alpa 4B—	35-mm f/2.8 Curtagon	\$159
	50-mm f/1.8 Micro-Switar	\$209
Olympus Pen F—	38-mm f/1.8 Zuiko	
	40-mm f/1.4 Zuiko	
	50-mm—90-mm f/3.5 Zuiko Auto Zoom	
Robot Star II and Star II/D—	38-mm f/2.8 Schneider Xenar	\$ 79
	40-mm f/1.9 Schneider Xenon	\$ 99
Robot Royal 24S—	38-mm f/2.8 Xenar	\$109
	40-mm f/1.9 Xenon	\$149
	45-mm f/2.8 Xenar	\$ 99
Robot Royal 18 Sa—	38-mm f/2.8 Xenar	\$109
	30-mm f/3.5 Xenagon	\$129



MECAFLEX: the first Sub-35 Reflex

By Norman Rothschild

Who made the first 35-mm SLR taking pictures smaller than the standard 24x36-mm format? Laurels may well go to the Kilfitt MecaFlex pictured here (but no longer made).

This camera, first introduced around 1954 by Heinz Kilfitt of West Germany, makes a 24x24-mm or 1x1-inch negative on standard 35-mm film; also known as the "Robot" format. This size gives 50 exposures per standard 35-mm exposure roll of film. At this writing no lab we know of mounts this size transparency as a regular service.

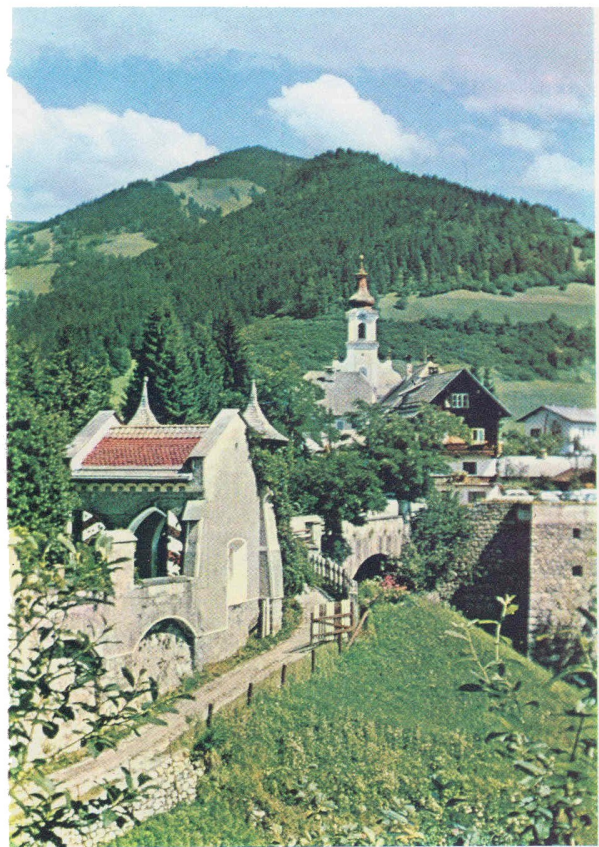
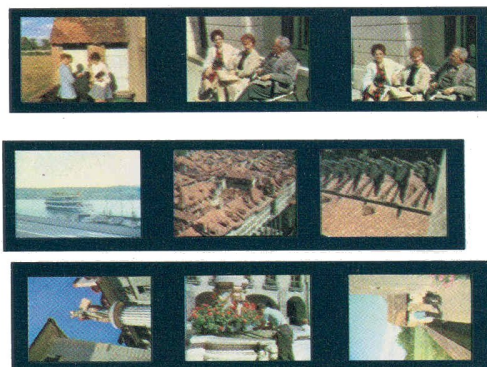
In addition to being probably the first sub-35 SLR, it claims some other firsts. It was the first 35-mm to be made with a leaf shutter and full lens interchangeability. In the MecaFlex the shutter is located behind the lens. In early leaf-shutter SLR's, such as the Contaflex and the first Retina Reflex, front-lens components only were interchanged. It was also the first leaf-shutter reflex to have a fully automatic diaphragm.

The camera shown here has a 40-mm f/3.5 Kilar lens; M-X synchronized Prontor shutter with speeds from 1 to 1/300 sec, and B. Interchangeable lenses include a special 40-mm Makro-Kilar and some telephotos. Other features include a groundglass with curved field lens, waist-level magnifier, rapid combined film transport and shutter cocking. With hood folded the MecaFlex measures 2½ inches high, 4 inches long and 2¾ inches from back to front with the 40-mm f/3.5 Kilar lens set at infinity.

Is this camera available? Reports have it that the MecaFlex never went into large-scale serial production. Why? Probably for lack of a slide-mounting service. They are sometimes found on the used-camera market.



Print or transparency, subminiature color keeps pace with the medium's development. Harbor scene, above, comes from an Agfacolor negative made with a Minox by R. Stephen Vercoe, a New Yorker who just happened to have his subminiature camera in his pocket when he happened upon these fishing boats during a Sunday morning stroll in Sesimbra, Portugal. The sleepy landscape, at right, was made on Kodachrome II, daylight type, with a GaMi-16 by author Cooper, who wouldn't venture anywhere without at least one subminiature on his person. Strips show actual size of GaMi-made transparencies (on Kodachrome II) by Cooper.



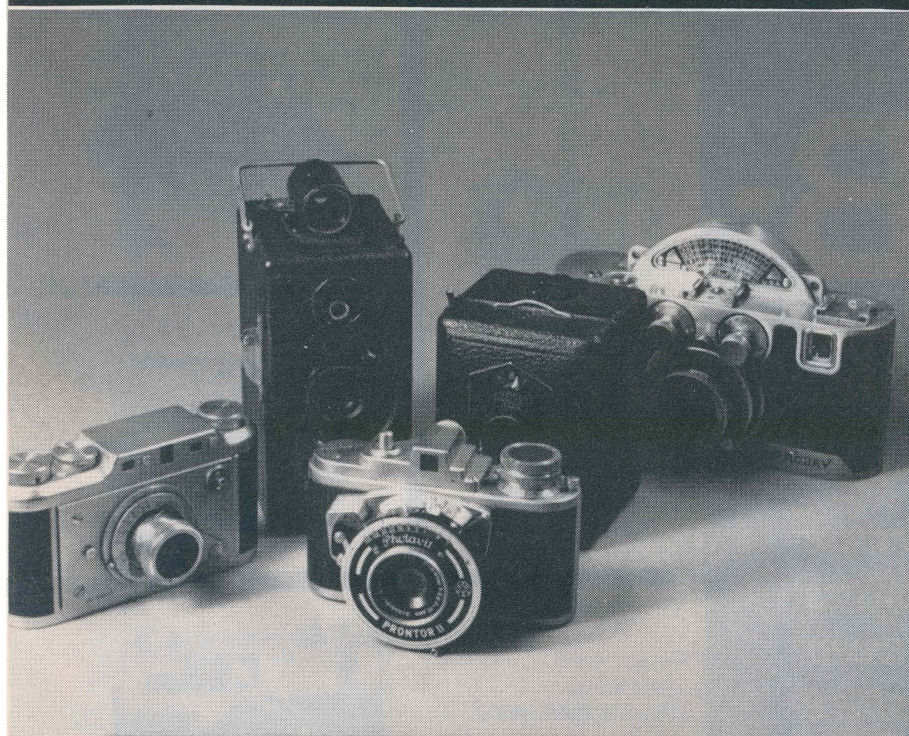
Back in the States in 1925, Ansco put the well-remembered Memo on the market. This was the first sub-35 to have a daylight-loading cartridge and a rapid-wind mechanism. Ansco also provided a complete system of processing, slide-making, and filmstrip preparation.

At the height of the Jazz Age, in 1928, we were presented with a "35-mm Still-Kamra" called the QRS, which made 40 shots to a roll.

It was 1938 when the Mercury arrived, made by the Universal Camera Company, which had previously put its name on a little nonstandard, 50-cent Bakelite "toy" camera. The Mercury was a serious piece of equipment, with a 35-mm *f*/3.5 lens that stopped down to *f*/22, shutter speeds to 1/1,000 second (with a unique rotary focal-plane shutter that accounted for the semicircular projection atop the body), and a focusing scale reading down to 18 inches. This paragon used standard 35-mm cartridges for 72 exposures, and sold for \$25.

A specialized model of the Leica, called the 72, was introduced in 1954, intended principally for making educational and commercial filmstrips. It had a certain popularity because of film economy and the long-load feature, but U.S. import was discontinued in 1957.

The big burst of activity in the sub-35 field came when Japanese manufacturers had begun to meet the demand for "regular" 35's and reached into new product areas. Half-frame photography caught the imagination of at least two continents—and that brings sub-35's history right up to date. —



Some veterans of sub-35 (all now deceased). From left: Ducati with 35-mm *f*/3.5; Ansco Memo (1920); Photavit; kissing-cousin Zeiss Box Tengor that used 1/2-127 film; Univex Mercury, an early leader with whirling disk shutter.

COMPARISON CHART:

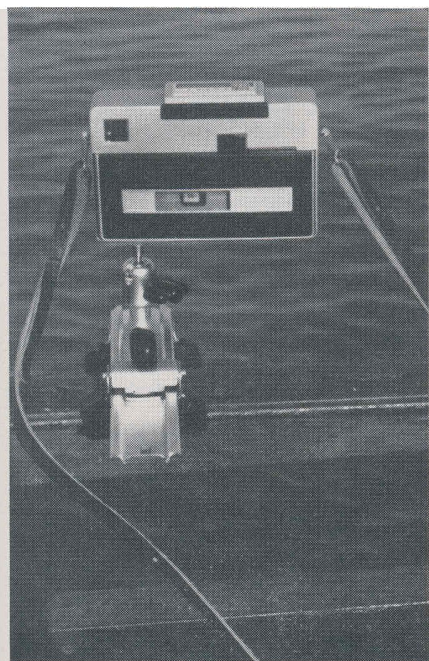
Camera	Format (in mm)
Agfa Parat I	18x24
Agfa Paramat	18x24
Alpa 6C	18x24
Alpa 4B	18x24
Canon Demi (Coming)	18x24
Fujica Duet	18x24
Kodak Instamatic 100	26x26
Kodak Instamatic 300	26x26
Kodak Instamatic 400	26x26
Kodak Instamatic 700	26x26
Nikon S3M	18x24
Olympus Pen	18x24
Olympus Pen D	18x24
Olympus Pen S	18x24
Olympus Pen EE	18x24
Olympus Pen EES	18x24
Olympus Pen F (Coming)	18x24
Petri Half 7	18x24
Ricoh Auto Half (Coming)	18x24
Ricoh Caddy	18x24
Taron Chic	18x24
Yashica 72E	18x24
Yashica 72 Mimy	18x24
Tessina	14x21
Robot Star II	18x24 (18 exp.), motor
Robot Star II/D	18x24 (50 exp.), motor
Robot Royal 24S	24x24
Robot Royal 18 Sa	18x24

All cameras have eye-level viewing except the Alpa 4B

HALF-FRAME LEICA?

Yes, there is a Leica that makes 72 exposures on a standard roll of 35-mm film. It is made by E. Leitz, Canada, but no longer imported by E. Leitz, New York. It is called the Leica 72X, and is listed in the current catalog of Burke and James, 321 S. Wabash Ave., Chicago 4. It is furnished with 50-mm *f*/2 lens at \$445; with 35-mm *f*/3.5 lens at \$495; and with 100-mm *f*/2 "speed telephoto" at \$545.

Gunstock offers firm bracing against shoulder, is convenient for carrying camera ready to shoot, on shoulder strap.



Clamp-It, by Accura, holds tightly by spring action to wide variety of supports. Here its ball-and-socket holds Instamatic.

Films for SUB-35

Obviously, any 35-mm film can be used in any sub-35 camera (with the unique exception of the Instamatics). It is also clear that with a film area half as large as full 35-mm, some films are going to work a lot better than others.

Chiefly, of course, it's a matter of grain and sharpness characteristics. And nobody has yet found a way to combine fine grain and high speed in a single emulsion, so it follows that the quality films for small-format photography will be the slow ones. You will, of course, be able to get increased film speed without sacrificing too much quality—depending on what you consider “too much.”

First of all, here's a rundown on currently available black-and-white films recommended for finest grain and best image quality:

	Daylight ASA	Tungsten ASA
Adox KB14	20	16
Adox KB17	40	32
Agfa Isopan FF	16	12
Agfa Isopan F	40	32
Ilford Pan-F	25	16
Kodak Panatomic-X	40	40

Among color films, those which will stand enlargement and projection best are:

Daylight	ASA
Dynachrome	10
Kodachrome II	25
Artificial light	
Dynachrome Type F	10
Kodachrome II, Pro Type A	10

Holding promise for the future in this category is new Agfa-color CN-14, a negative material with a speed of 20; it was not available for testing as this story was prepared.

Somewhat faster, and still fine-grain, black-and-white films:

	Daylight	Tungsten
Agfa Isopan ISS	100	80
Ilford FP3	125	100
Perutz Peromnia-21	100	100

The next-faster group of color films that also stand up well in projection and enlargement include:

Agfachrome CT-18	50
Ansochrome Daylight	32
Ektachrome-X	64
Kodachrome-X	64
Peruchrome	32
Agfacolor CN-17 (neg.)	40
FR Color (neg.)	40
Kodacolor-X (neg.)	64

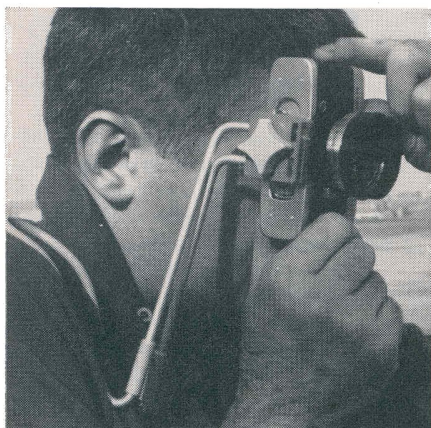
For Kodak's Instamatics, programmed to a speed of 64, there are Kodapak cartridges of the three color films already listed—Kodachrome-X, Ektachrome-X, and Kodacolor-X—and in addition the b&w Verichrome Pan.

If you've wished sometimes that half-frame loads weren't *quite* so long, you'll be grateful for the 12-exposure rolls now made available by Ansco and Agfa; they provide 24 sub-35 shots.

how to HOLD STEADY

The smaller and lighter the camera, the harder it is to hold firmly for sharp pictures. Here are some ways to 'anchor' the sub-35—and don't forget that old standby, the tripod!

Staticfix is the name of an ingenious pocket-size German "shoulder-pod" that weighs only 4½ oz. Importer is E. Leitz.



Cylindrical grip offers T-shaped handhold; its end cap unscrews to accept a filter and a handy spare roll of film.



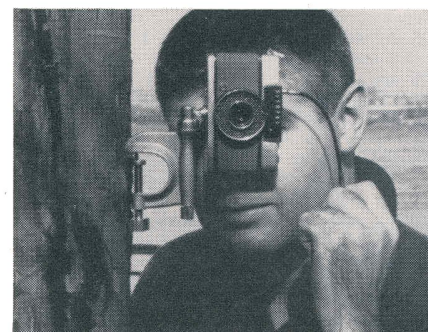
Cord loop can be improvised to suit user's height. Pulling firmly upward puts stop to up-and-down camera movement.



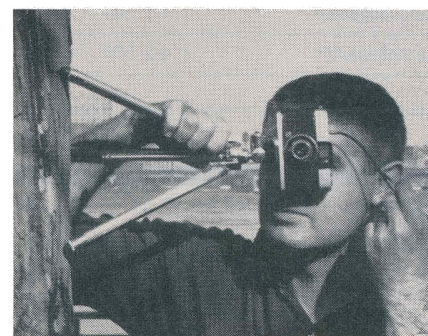
C-clamp plus ball-and-socket, from Rowi Stand kit, permits unusual yet solid mounting, as here on bicycle handlebar.



Unipod limits much camera motion. This one is ready-made, but substitute could be made with broomstick and tripod screw.



Tree provides complete immobility. Top, Rowi clamp is used with tree-screw; bottom, tripod is pushed firmly against trunk.



Test Report:

TESSINA—a unique SUB-35

Did you ever hold a camera in the palm of your hand which when clicked had a sound like a mouse's startled squeak? Or one so compact that members of our nation's security forces can hide it in hollowed cigarette packs for undercover work? Shooting with the Tessina, it becomes immediately apparent we are handling an extremely well-conceived and engineered camera.

Its high standard of precision is understandable when you realize that a watch manufacturing firm in Lugano, Switzerland is responsible for its construction. The Swiss watchmaker's discipline which is put into timepieces also becomes evident in the Tessina.

We found the Tessina to be essentially a twin-lens reflex, making pictures with a format of 14x21-mm on standard 35-mm film. The photographed image is reflected to the film plane by a front-surface mirror set at 45 degrees. This reflects the light rays downward, onto the film, which runs horizontally inside the base of the camera. Thus a vertical picture is formed across the film, but the negative is laterally reversed, i.e., left is right. In order to obtain a laterally correct print it is necessary to invert the negative in the enlarger—emulsion toward the light source. Likewise, color slides should be viewed through the emulsion side. Tests and examinations of both prints and negatives produced by this optical system showed no apparent deterioration of image quality from the mirror.

In shutter speeds the Tessina offers $\frac{1}{2}$ to 1/500 second, plus B. It has M, F, and X synch. The lens can be stopped down to f/22, which with the 25-mm f/2.8 Tessinon's short focal length gives amazing depth of field. The 25-mm focal length on the 14x21-mm format is roughly equivalent to a 43-mm lens on full-frame 35-mm. Thus it has slightly wide-angle coverage.

A spring-wound motor, which we found impossible to overwind, automatically cocks the shutter and moves the film forward. This allows you to get off from five to eight shots before rewinding. Film for the Tessina comes in special cassettes of 23 exposures for black-and-white on a 16 $\frac{1}{2}$ -inch strip of film and 18 exposures for color on a 14 $\frac{1}{2}$ -inch strip. In factory-pre-loaded cassettes of this type for the Tessina there are Adox KB14, KB17, and KB21, with exposure indexes of 20, 40, and 100 respectively. Soon color film of the same ratings will be available. For photographers who wish to use other types of

film there is an ingeniously designed daylight self-loader. This accepts a standard 35-mm cartridge and allows you to spool film from it into an empty Tessina cassette in daylight. A lever with an attached razor-edged protuberance quickly cuts and squares off the necessary footage once it has been cranked off.

Enlarging the negative is done just as with other 35-mm work, except it must be remembered that the negative is placed in the enlarger with the emulsion (dull side) side toward the light. Again, since you are dealing with a negative of only 14x21-mm, dust or a careless scratch becomes a more critical problem.

In mounting the color slides special cardboard slide-binding frames which fit ordinary projectors are available from the distributor. They come in boxes of 100, measure 2x2, and sell for \$3.95. Metal and glass binders are 25 for \$3.95.

We found the newest accessory viewer—the pentaprism—most practical. Working under available-light situations, or for critical focusing, the pentaprism neatly fitted the bill. It gave a large image which is upright and laterally unreversed at all times.

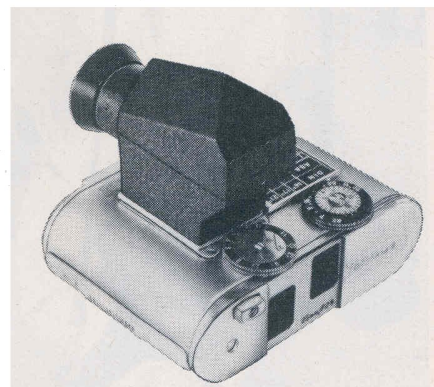
For quick panning with a subject, and sequence shooting, we found the sportsfinder best. For fast shooting we set the distance at ten feet and stopped down to f/5.6. Varying only the shutter speeds, according to our ASA rating and light conditions, we were able to get sharp images from infinity to seven feet.

Because of the small separation between the taking and viewing lenses, parallax in the Tessina is so small that it can generally be ignored. However, at the closer working distances, 11.8 inches and closer, ignore about 15 inches at the right and 10 inches at the left of the *subject*.

The Tessina handles very well. There need never be fear that the camera is too delicate for continual shooting. Even the most ham-fisted individual will have no trouble focusing and releasing the shutter. Lens hoods are not ordinarily necessary, as both taking and viewing lens are recessed. Accidental firing is prevented by a sliding cover plate which automatically locks the shutter until it is slid aside to uncover the lenses.

For a camera that can use any available 35-mm film, focuses down to nine inches, has a groundglass viewing screen, fantastic depth of field, weighs in at five ounces, and measures only 2 $\frac{1}{2}$ x2x1 inches, the Tessina has few competitors.

Half of half-frame shot with a Tessina was enlarged to 11x14. Considering animated movement of subject, sharpness is adequate. Arrow indicates chosen frame on the contact strip.



TECH DATA

FILM LOAD: Special 35-mm cassettes. Film may be spooled into empty Tessina cassettes from cartridges.

CAMERA TYPE: 35-mm motorized twin-lens reflex; sub 35-mm.

LENS: Viewing lens/taking lens: two Tessinon 25-mm f/2.8's with built-in haze filters, stopping down to f/22. Focusing: infinity to 9 inches.

SHUTTER: Rotary type. Linear speed range from $\frac{1}{2}$ to 1/500 second, plus B; M, F and X synch.

VIEWING-FOCUSING: Twin-lens reflex system with groundglass viewer. Removable self-erecting eye-level and waist-level sportsfinder. Pentaprism finder (6X), waist-level magnifier (8X), and snap-on field lens available as accessories.

AUTOMATION: Built-in spring-wind motor automatically cocks the shutter and exposure counter, transports the film and re-cocks the shutter. One winding gives five to eight shots.

OTHER FEATURES: Sliding lens guard prevents accidental exposure. Cable release socket. Film counter dial. Dimensions: 2 $\frac{1}{2}$ x2x1 inches. Weight: 5 ounces. Accessory shoe takes Metraphot or other small exposure meter.

PRICE: With chrome finish, Tessinon 25-mm f/2.8 lens and reflex sportsfinder, \$169; available in red, gold, or black finish at \$179; ready case, \$6.95; wrist strap, \$3.95; pentaprism finder, \$39.90; magnifier, price to be announced; field lens, \$3.95; exposure meter, \$19.95.

DISTRIBUTOR: Karl Heitz, Inc., 480 Lexington Ave., New York 17.

Ultra-fine-grain PROCESSING

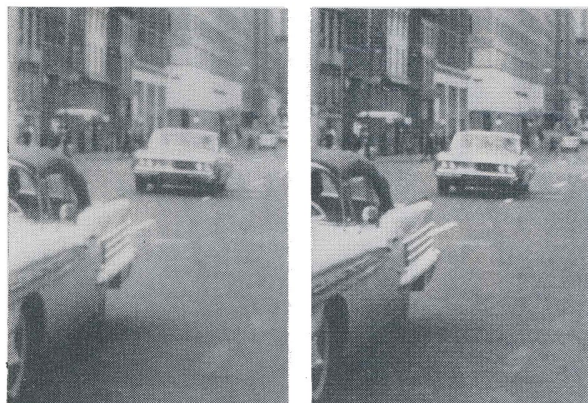
Grain and sharpness are exactly twice as important in sub-35 as in full-frame 35. Here's a roundup of techniques for getting best quality in small format

Grain has been a perennial problem of the photographer. Its importance has been somewhat minimized by some of today's exhibitors, editors, and art directors, who feel that grain is part of the photograph, so why subdue it? Still, many purists feel that a photograph must be sharp and grainless, or its point will be lost. Pro or con, the problem has occupied many a late hour in the research labs of leading photographic companies.

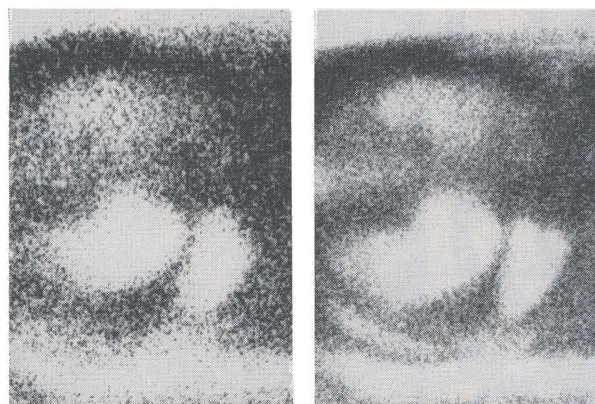
The resurgence of the single-frame (or sub-35) camera format once more raises the question of excessive grain. It is now more than obvious that correct development is of very great importance when dealing with the smaller negative. With careful and close checking on temperature, selection of developer, and method of developing, you will be able to obtain the best negative in the small format.

When working with the ultra-small half-frame format, temperature control becomes more important than ever. The effects of temperature change between solutions and wash water are well known. One of these is a deformation of the gelatin known as reticulation. In its extreme form it is easily recognized. However a very fine reticulation (sometimes called *incipient reticulation*) often passes for grain. Temperature changes can of course pro-

continued on page 71



Ultra-fine-grain development (right) results in tighter grain pattern, more sharpness than regular processing (left).



Extreme enlargement (50X) of auto headlights shows difference between ordinary (left) and careful processing.

DO IT / DON'T DO IT

Care is needed in all 35-mm handling and processing. The following are rules of good practice especially important when working with half-frame negatives.

DON'T

- store film in excessive heat, before or after use.
- load camera without cleaning the pressure plate.
- waste film simply because of large loads; use each frame thoughtfully.
- advance film in camera too rapidly. Static electricity can quickly build up, especially in dry weather.
- load film with slightly damp or perspiring hands.
- break a new Kodak cartridge open to obtain a test strip, as the construction of its new top makes re-assembly impossible.
- agitate the film with constant, consistent movement. Instead, rotate the film using $\frac{1}{4}$ turn per agitation cycle (once clockwise; next counter-clockwise).
- immerse film in rapid acid fixer without first using weak acetic acid, stop bath, or water bath.
- use dirty or contaminated sponges for wiping film.
- use exhausted wetting agent. The chemical is inexpensive enough to stock fresh.
- use ordinary brush for removal of dust or lint.
- slide negative in carrier without releasing the lock.

DO

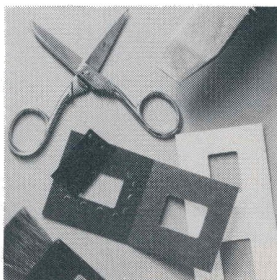
- allow for the fact that in developing, the smaller format negative will tend to appear thinner.
- use anti-static brush to remove dust, lint, and fine particles.
- use ear syringe to remove dust and coarse particles.
- if hands are completely dry, use side or leading edge of small finger to remove dust particles.
- ground your enlarger. This will help the dust-control problem by taking off the static charge.
- polish the inside surfaces of your negative carrier to remove rough spots that can cause abrasion to your negative.
- process film at earliest possible moment, or store in refrigerator.
- use film counter on your camera religiously.
- when exposure is in doubt, leave leader strip outside the exposed cartridge.
- check enlarger alignment. Negative plane, lens mounting, and easel base should all be parallel; otherwise you may get disturbing distortion.

You can mount SUB-35 yourself

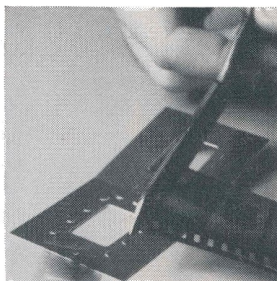
If your color comes back in uncut strips, here's what to do next

HEAT-SEAL MOUNTS

You need mounts, scissors, anti-static brush, sealing iron



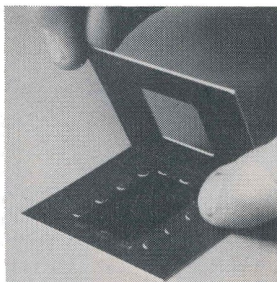
Cut single frame from color strip



Brush off dust with slide in place



Seat film under positioning tabs

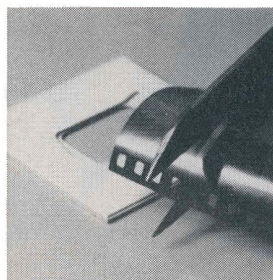


Heat-seal on three sides with special iron

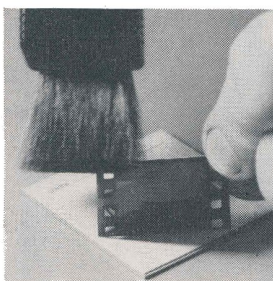


SLIP-IN MOUNTS

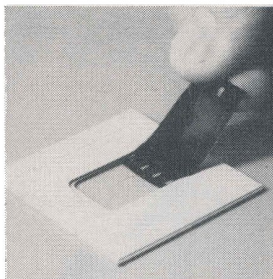
Snip off one frame carefully



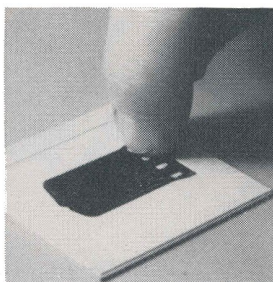
Remove loose dust with soft brush



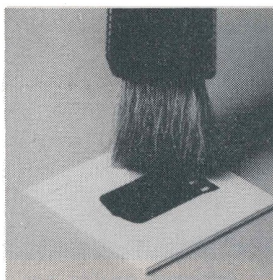
Insert frame in pre-cut mount



Slip trailing edge under lower border



Use brush again for cardboard lint



WHAT'S COMING?

The world of sub-35 is an expanding one. Half-frame and its brothers have earned the right to be taken seriously by all photographers; yet, in the words of a popular comedian, "the future lies ahead."

Before the end of this year the U.S. market should see at least three more sub-35 cameras: the Olympus Pen F, which will extend a highly regarded half-frame line into the realm of the single-lens reflex; the Canon Demi, which puts another of the world's top manufacturers into the small-format business; and the Ricoh Auto Half, a spring-motorized brother to the Ricoh Caddy.

The Pen F will be the first sub-35 to take a range of interchangeable lenses, adding immeasurably to its versatility. The Canon Demi has a 28-mm *f*/2.8 Canon lens, and a match-needle meter with a programmed shutter.

Not all the future developments will be

in cameras, by any means. An important straw in the wind is the industry's attitude toward mounting of sub-35 slides. Ansco's readiness to mount half-frame, for example, might be a hint that that company has plans for its own new camera in that format.

Dynacolor, another of the leaders in recognizing the trend, has followed up by reducing its processing and mounting charges substantially: from \$1.85 to \$1 for 40 exposures, and from \$3.05 to \$2 for 72 exposures. (These prices also apply to Kodak's films, if accompanied by a Dynacolor mailer.)

Kodak, committed to its Instamatic format and naturally doing all it can to promote it, has so far found "insufficient demand" to warrant mounting 18x24 slides. But rumors persist that they will offer this service, likely before year's end. (See Kodak's statement, page 30.)

For those who find the sub-35's large 72-exposure film load an advantage, an even greater capacity would be welcome news. Of course, a much thinner film would permit considerably more to be loaded into any cartridge—standard or not. Kodak is now making a film for space photography and other technical applications which is only 2 mils thick (compared to 5.8 mils for Plus-X). It is natural to suppose that this material (now called Eastar) or some variation of it will become available to the public in the future.

Accompanying these expected advances, we may look forward to the introduction of enlargers engineered solely for sub-35, and more projectors with lenses and condenser systems that don't have to make a gesture toward full-frame 35. At the same time, labs across the country should be recognizing a trend and offering really top-quality processing for people who don't have their own facilities.

But the most significant developments in the future of sub-35 will not be in "hardware." They will be in the evolution of small-format photography toward maturity, following the pattern of full-35 in the 1930's—but probably at a much faster pace. It is clear that perfection in sub-35 will come through patient and meticulous craftsmanship. There is no more room for the sloppy half-frame photographer today than there was for the careless full-frame user a decade ago.

Doubtless we will go through a period when poor technique is passed off as "creative blur" or "intentional graininess." Hopefully this period, like all phases in the coming evolution of sub-35, will be a short one.

If the next decade sees as much advance in film and processing technology as the last, sub-35 will be well on the way toward putting "big" 35 on the shelf. But that will take a lot of dedication—on the part of imaginative photographers as well as ingenious technicians. —



Sharpness, fine grain are demonstrated in Ted Runge's humorous shot of Army Rifle Team non-com. Runge used automated Olympus Pen EES with shutter speed of 1/200 second, Plus-X rated at 160, developed in UFG 5 min.

PROJECTORS and ENLARGER LENSES for SUB-35

When you've finished mounting those little semi-precious gems of sub-35 color—or picked them up from the processor—the next thought is about displaying them to your admiring but dubious audience. Will the old standby senior-35 projector do the job? Must you buy a new one?

The answers, respectively: yes and no. Your standard 35-mm projector will of course throw an image of your sub-35 picture on the screen, but you'll have to settle for smaller size, or back up with the projector into the next room to get your accustomed-size screen image.

The obvious solution: a lens of shorter focal length. Conventional 35-mm slides are usually projected with a lens of about four inches, or double the length of the taking lens. So a corresponding projector focal length for sub-35 would be about 55 mm. Many of the standard 35-mm projectors now sold have accessory short-focal-length lenses, for users who need large screen-image size with short throw. These are very good for sub-35.

Manufacturers have approached the small-format projector field with caution, usually hedging with a product that will project full-frame *and* sub-35. Olympus, quite understandably, has come forth with a projector designed specifically for the half-frame Pen's slides—and of course, all other sub-35's. (It, too, will take full-35, but this is more of an accommodation than a hedge.) Its 55-mm Zuiko *f*/2.8 lens will put a 31½x5-ft image on the screen at ten feet. With a fitted case, it's \$39.95 from Scopus, Inc., 257 Park Ave. S., New York 10, N.Y.; an automatic changer is

\$8.95, and a filmstrip adapter with vertical and horizontal masks is offered for \$6.95.

Accura provides a special device to adapt its compact portable projector for half-frame. The Doubl-it lens gives an image twice the size of that provided by the projector's 75-mm lens. The Accura itself is \$29.95; the Doubl-it attachment is \$5.95; the vinyl fitted case, \$3.95; and filmstrip carrier, \$4.95. It's from Accura, 708 Byron Ave., Franklin Square, N.Y.

Minolta attacks the problem from two directions. Its Mini 35 is primarily for full-frame, and its Mini 16 intended for sub-miniature; but both handle sub-35 quite nicely. The Mini 35 has a 75-mm Rokkor *f*/2.5 lens, and Airequipt adapter. With case, it's \$37.50. The Mini 16 has a 40-mm *f*/2.5 lens, and its price is the same. Shown in our illustration is the SV filmstrip carrier which fits the Mini 35, for pre-viewing color before mounting. It is an additional \$9.95. Source: Minolta Corp., 200 Park Ave. S., New York 3, N.Y.

The especially efficient Prado 500 projector made by Leitz, which normally uses a 90-mm or longer lens for full-frame projection, will take a 35-mm accessory lens for big pictures with short throw from sub-35 slides. The company will soon have a 50-mm lens available for its Pradolux, too. E. Leitz, 468 Park Ave. S., N. Y. 16.

A shorter lens is a distinct advantage in enlarging sub 35's. It provides a greater degree of enlargement, and can cut down exposure time if used with the proper condenser. It is also handy for blowing up cropped portions of full 35's.

Several lenses ideal for enlarging sub-35 are currently available. Here are some, with their sources:

A 30-mm *f*/3.5 lens, stopping down to *f*/11, with click stops and Leica thread. In satin chrome finish, \$13, from Bogen Photo Corp., 28 School St., Yonkers, N.Y.

A 28-mm Componon *f*/4 with click stops down to *f*/16. Two models: standard thread, \$53.50; Leica thread, \$58.45. From Burleigh Brooks Inc., 420 Grand Ave., Englewood, N.J.

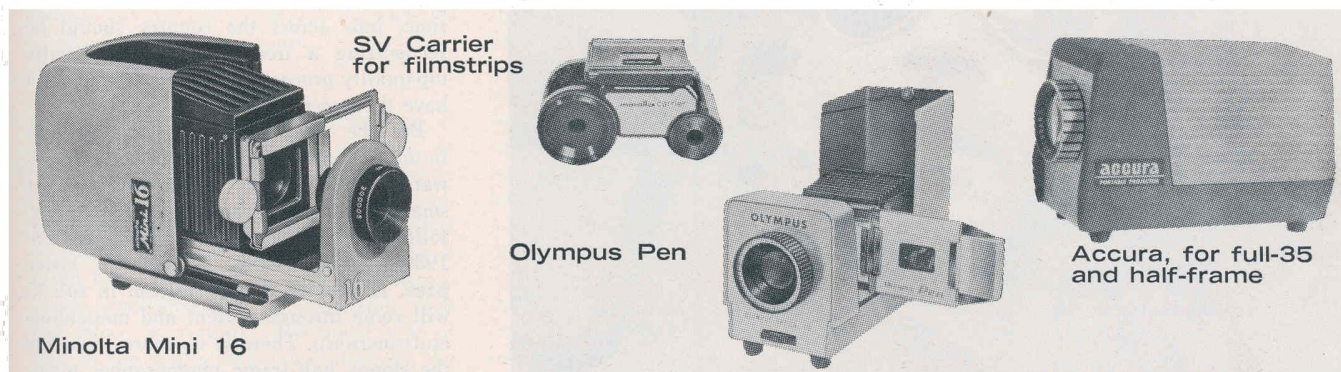
Two Leitz lenses primarily intended for photomacrography: the 24-mm Summar *f*/4.5, and the 35-mm Summar *f*/4.5. Both stop down to *f*/11 (no click stops), and both are \$68. From E. Leitz Inc., 468 Park Ave. S., New York 16.

Two models of a 35-mm *f*/3.5 Spiratone lens in recessed mount, with either Leica or "T" thread. Without diaphragm, \$7.95; with diaphragm click-stopping to *f*/16, \$13.95. From Spiratone Inc., 135-06 Northern Blvd., Flushing 54, N.Y.

A Wollensak 25-mm Raptar *f*/4.5 lens with click stops to *f*/22, Leica threading, and retaining ring. From Wollensak Corp., Rochester, N.Y. on special order only.

If your enlarger is an Omega, you'll be happy to know that Simmon-Omega makes a lens mount and matching condensers for that 25-mm Raptar. The set makes a sub-35 enlarger out of the models A2, B7, B8, B22, and D2. (The B22 doesn't need the condensers.)

For Axomat, Opemus, several other Meopta enlargers, there's a 35-mm *f*/3.5 Mirar lens. Price is about \$38.95. Consult E. Fischel Jr., 505 Fifth Ave., New York 17.



SPECIAL MOUNTS & WHERE TO BUY THEM

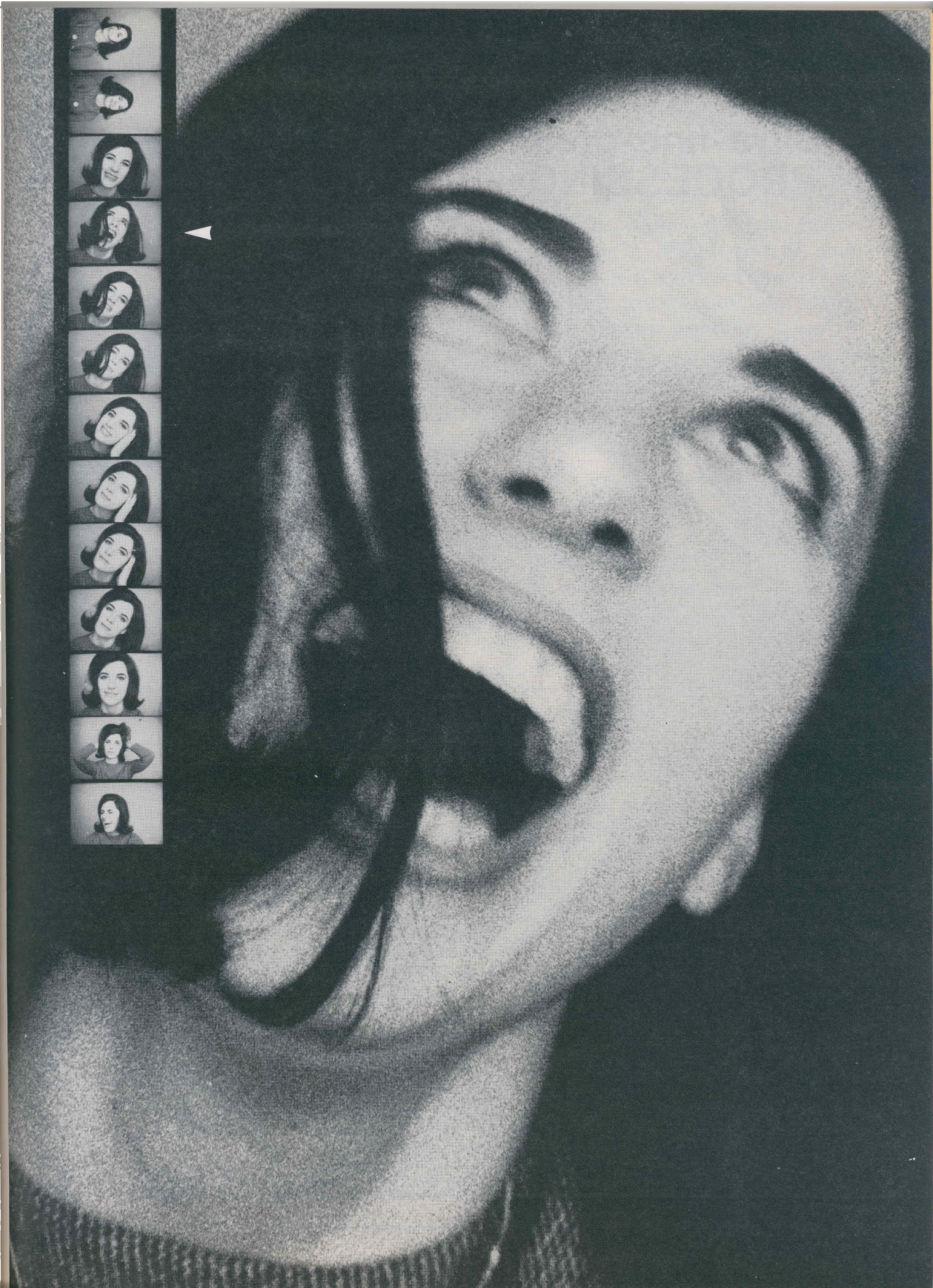
Scopus, Inc., importer of the Olympus cameras, is offering a free processing coupon with each Pen Camera. Valued at \$2.50, it entitles the buyer to developing and mounting of, for example, 40 half-frame color transparencies. Scopus, Inc. has available also "Pen-size" cardboard slide mounts (heat-sealed) in boxes of 50 for 75 cents and 100 at \$1.50, and the slip-in type at 100 for \$3.50. For information: Scopus, Inc. 257 Park Ave. S., New York 10, N.Y.

Karl Heitz, at 480 Lexington Ave., New York, N.Y., distributor for the Tessina, Robot and Alpa, offers metal mounts for the 24x24-mm format in packages of 25 for \$4.95. Tessina in cardboard mount packets of 100 for \$3.95, and 25 metal mounts for 95 cents are also available.

Slide mounting of the Tessina format is also supplied by GEMounts (26705 Curie Ave., Warren, Mich.) and Porter Mounts (Porter Manufacturing & Supply Co., 2836 Sunset Blvd., Los Angeles 26, Calif.). Both

supply along with cardboard mounts, excellent glass mounts, which obviously offer the best protection.

Burke & James, Inc., 321 S. Wabash Ave., Chicago 4, Ill. and Emde Products, Inc. (2040 Stoner Ave., Los Angeles 25, Calif.) offer both cardboard and glass mounts for the 18x24 format. Pegco, makers of the Easymounts, who are in Sherman Oaks, Calif.; and Spiratone, Inc., at 369 Seventh Ave., New York 1, N.Y. have available cardboard slides.





Optimum quality was obtained by Ted Runge, shooting under studio floods with Olympus Pen D, on Panatomic-X at ASA 50; 1/15 second, $f/8$, developed in UFG 5 min at 70 F.

Print spotting for Submin & Sub-35ers

*You can't keep all the dust
off those tiny negatives.
Here's what to do about it*

By PATRICIA MOTAL

Since subminiature and sub-35 printing often calls for extreme enlargement when anything larger than a wallet size print is desired, the subminiature user who does his own processing should give careful consideration to the techniques of print spotting. To master spotting to a reasonable extent, he must become adept at two things—keeping his brush pointed, and keeping excess water and color off it. For this reason, a small piece of damp sponge can be one of your most important tools.

You can use just about any water-soluble spotting material (we use Spotone at our lab), but don't work directly from the bottle. A plain white dish, or any other non-ab-

sorbent white surface, makes an efficient palette. Dab a brushful of color on the palette, diluting some of the dabs with various amounts of water, in order to get a variety of gray tones. Let them dry. Then dip your brush into clear water; touch it to the sponge to remove excess water; touch the damp brush to one of the dabs of dried color on the plate; and then back to the sponge, giving the brush a slight turn, in order to remove excess color and, at the same time, give the brush a point. Next apply the color to the spot in a series of small dots or strokes, building up color until the spot matches the tone around it.

Most people, at the start, apply too much

color to the spot, and find themselves having to etch some off the print with a razor blade or other sharp tool. Minimize, at first. It's easier to add color than to remove it.

Experiment with an old print, so that you can become familiar with the effect a particular dilution of color will have on the paper you use. Even while spotting a print, make tests as you go—either on an old print or on the border of the one you are spotting.

If you use a paper with other than pure black, expose a sheet to light and develop it, and use this as a guide to mixing colors.

Above all, use a good-quality brush. We find sable is best, and that sizes No. 2 and No. 3 will handle any spotting chore. —



Touching brush to sponge (cut to fit small can lid) helps point brush and remove excess liquid. This is author's spotting set up at custom processing service.

Ultra-Fine-Grain Processing for Sub-35 *continued from page 66*

duce actual graininess, because the particles of silver tend to clump more.

Water bath is useful

A question that sometimes comes up in the processing of miniature films, is whether to use a stop bath of dilute acetic acid or a water bath. For ordinary tank processing by time and temperature, a short stop bath is generally used. However a water bath is sometimes used by photographers processing film by inspection. You can place a partially developed roll of film in the water bath (thus stopping the greater part of the action) while you inspect another roll or rolls. Obviously you couldn't very well use an acid stop bath here since placing the films back into the developer (if this is deemed necessary) would neutralize and otherwise contaminate the solution. (By the way, a water bath used as described is called a "holding" bath, or area, by pros.)

Temperature control of all solutions may be accomplished most easily by the average worker by immersing all solution bottles, trays or tanks in a water jacket, containing water of the correct temperature. Naturally the larger the water jacket, the less tendency there is for radical temperature

changes to take place. Controlling the temperature of the wash water is not always possible, though. In cold weather it's simple to mix hot and cold water to get the result you want. In hot weather you can add ice cubes to the water jacket if the tap water isn't cold enough. But you can't very well lower the temperature of the tap water without some special, and often expensive, device. Here is a partial solution: Start washing in water that has been brought to the correct temperature. Into this let water from the tap run *very slowly* till the water in the tank or other vessel reaches that of the tap water. In climates where the tap water reaches temperatures in excess of 75 or 80 F, special hardeners may be necessary. This material is a bit beyond our scope here. Contact the maker of your film for details about tropical development.

Don't believe what you see

To get back to inspection development for a moment, here is a personal experience we'd like to pass on to you. Under the green safelight smaller negatives should be processed to less apparent density than negatives of larger format. There are several reasons for this. One is that small negatives tend to *look* darker under the

safelight than negatives of a larger size, even though both have been processed to the identical density. Another reason is that certain large-format films, especially sheet films, have a thicker emulsion. These then have to be processed to greater apparent density than thinner-emulsion films, since a greater amount of silver halide (contributing to visual density under the safelight) is lost in the fixing operation. Of course no hard and fast rules can be adopted in inspection development, our remarks being meant as a guide. Naturally much depends on personal judgment and experience.

Combine two methods

Inspection development is not the final answer. Photographers, both amateur and professional, who think that under the green light they can correct all their exposure errors, are living a short life. A blend of both time and inspection will bring about good working habits. Develop the film as if you were using time-and-temperature, and at the end inspect to check your work and adjust both controls as necessary.

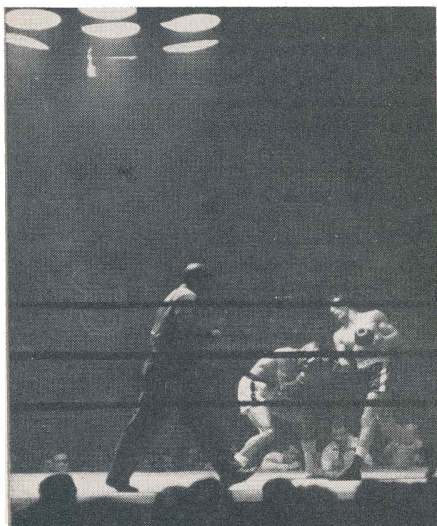
Arriving at a workable time for developing may lead you to another group of er-

rors. If time is too short (say 3 minutes) then the percentage of error is greatest. While a one-minute mistake out of ten minutes only amounts to a ten percent error in the total developing time, a one-minute error out of a 3-minute developing time would be a 33⅓ percent error. Again, too long a developing time can be tiresome, and with a limited amount of developing equipment, time-consuming in the bargain. Multi-temperature developers, i.e., Harvey's 777, UFC, Acufine, will allow you to choose the best working time.

Mistakes can multiply

Even though some developers—those with slightly longer processing times—do allow somewhat more sloppy or leisurely observance of timing, this doesn't mean that you should take advantage of the situation. For truly consistent results, employ precise timing and regular habits. It's well to remember that a few small errors can add up to a whopping big one.

So far we've said nothing about true fine-grain developers, such as Edwal 12 and 20, FR X-33B, Kodak Microdol-X, Agfa Atomal, and others. These depend either on the use of some special developing agent or on the use of a silver solvent. This latter supposedly dissolves some of the silver during processing and "plates" it onto the image. Such developers have been frowned on in recent years because they tend to destroy resolution and lose film speed. But in instances where you've used a grainy film inadvertently, or where you must enlarge to super proportions and have a grainless image, even at the expense of resolution, such developers may be the answer for you.—



First-prize-winning photograph in Volunteer Service Photographers Annual Student Contest was this available-light shot of a Sunnyside Gardens (L.I.) boxing match taken by John Broderick, a patient at Goldwater Memorial Hospital, Welfare Island, New York, who has been confined to a wheel chair since 1954 by polio. Picture was taken with a Minolta SR-3 camera and Tri-X film rated at 400. Exposure was 1/125 second at f/2.8.

PHOTO TIPS

SHORT CUTS TO BETTER PICTURES

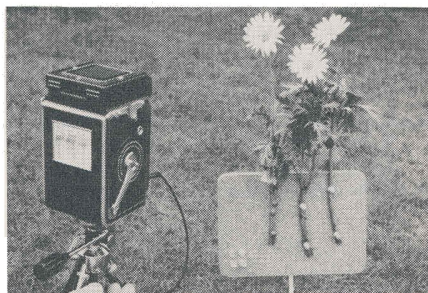
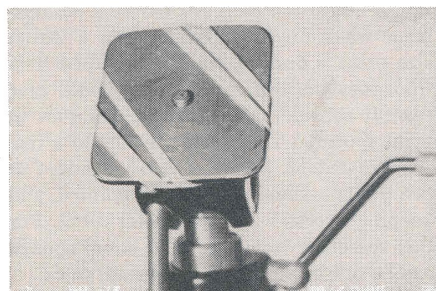


Binder screws simplify strap replacement

When it becomes necessary to replace leather straps on a gadget bag or lens or camera case, it can be done easily by using aluminum binder screws. Punch or drill holes in leather to accept these screws. Used to fasten manuscript pages in a binder, the screws are available in stationery supply stores.—Edward C. Johnson, Twentynine Palms, Calif.

Rubber band eliminates camera slippage on tripod

If your camera has a tendency to shift when fastened to panhead table of a tripod, an ordinary heavy rubber band solves the problem. Simply slip it across panhead table at a diagonal before placing the camera in position. After thumbscrew is tightened, the camera should remain solidly in position until thumbscrew is loosened.—Harold L. Althouse, Erie, Pa.



Portable holder for outdoor flower photography

To isolate flowers from cluttered backgrounds, cement a cork hot-pad to a piece of ¼-in. plywood. Attach an inside corner bracket to plywood with wood screws. Bracket should be threaded to accept a ¼-in. spiked rod. Long-stemmed flowers can be held in position with push pins and can be moved to a location with a plain background.—O. A. Nelson, Seattle, Wash.

Apply ferrotype polish with window-cleaner atomizer

An even coat of ferrotype solution can be applied very easily to the ferrotype tin if it is sprayed on with the kind of atomizer often used with household window cleaners. Most caps on window cleaners will fit ferrotype-solution bottles. Check to make sure. The atomizer can be purchased separately in supermarkets if desired.—Jim Middleton, Beaver Dam, Wis.

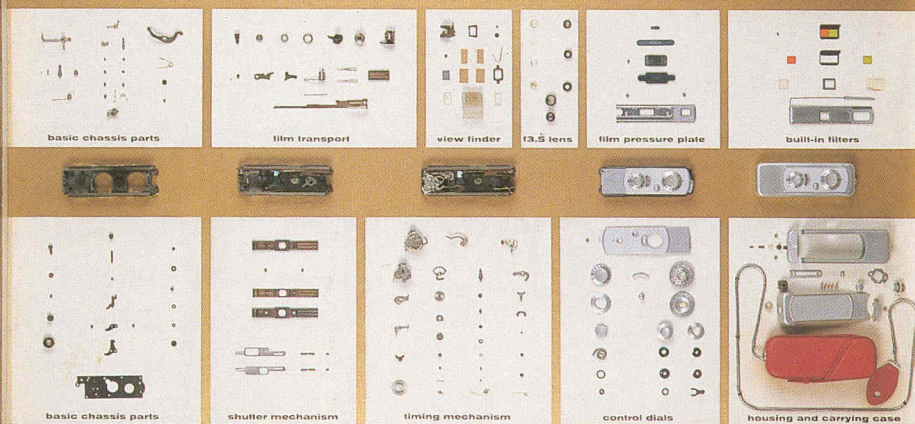


Focusing unit uses milk carton and portrait lens

A very handy focusing unit, providing a larger, brighter image for 2¼x2¼ reflex cameras can be made by cutting off bottom of a milk carton, painting it black, and cutting a hole in bottom center to accept a filter adapter ring. Glue ring in position and add No. 3 portrait lens. Invert, slip on reflex hood, add rubber lens hood.—Joseph B. Kozak, Binghamton, N.Y.

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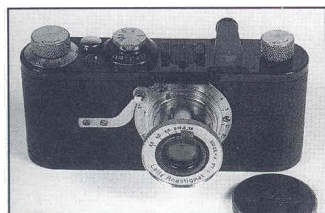
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In diesem Frühjahr blicken wir auf 15 Jahre CORNWALL, 25. Leitz-Jubiläums- und 48. Allgemeine Photographica-Auktion zurück.

Wir sind natürlich stolz auf die vielen – so erfolgreichen – durchgeführten Auktionen, aber wir wissen auch, daß sie ohne unsere zahlreichen treuen Kunden nicht so erfolgreich gewesen wären. Und wenn wir die Namen der Sammler national und international in unserer Kundenkartei lesen, sind viele dabei, die schon von der ersten Auktion an uns über 15 Jahre die Treue gehalten haben. An dieser Stelle möchten wir uns bei Ihnen, ob Sie nun langjähriger Kunde sind oder vor kurzem hinzugekommen, recht herzlich bedanken. Sie können versichert sein, daß wir auch in Zukunft bestrebt sein werden, Sie in jeder Weise zufriedenzustellen, ob vom abwechslungsreichen Angebot her oder vom Service.

Die aufgeführten Beispiele aus der letzten Ergebnisliste zeigen Ihnen, daß wir weitere Welthöchstpreise erzielt haben. Allein im Bereich der Miniatur-Kameras haben 11 Stück die 3.000,- DM-Grenze überschritten!



Leica IA DM 30.439,-



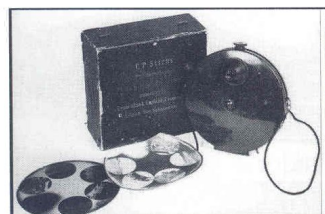
Voigtlander Bessa II DM 6.649,-



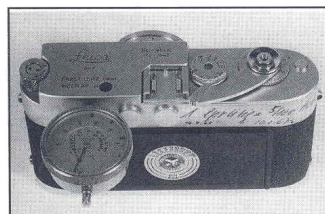
Kine-Exakta DM 6.710,-



Telomar 150 mm DM 2.952,-
Telomar 225 mm DM 6.710,-



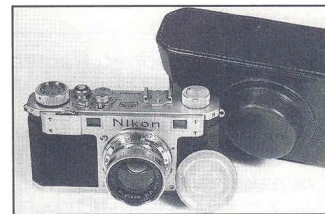
Stirn DM 4.880,-



Leica M2 DM 11.956,-



Mirotar 500 DM 9.994,-



Nikon M DM 12.810,-



Sola DM 7.320,-



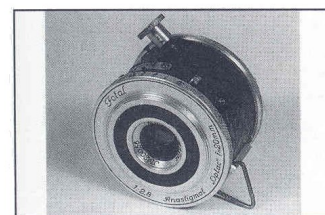
Minox A „Gold“ DM 11.089,-



Biflex 35 DM 3.245,-



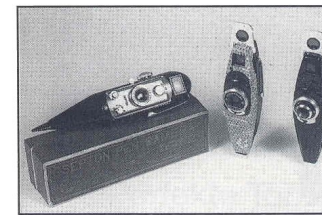
Petiux IV DM 3.086,-
Compass DM 4.428,-



Fotal DM 3.355,-



Sola DM 7.320,-



Septon Pen DM 3.538,-



Cambinox DM 3.220,-

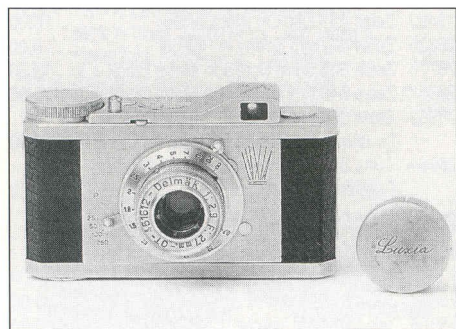
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22748	BPM Ikometer 2 for Super Ikonta	9.00
17750	Soligor T2 Mount for Icarex	9.00
20530	Zeiss 5cm Finder 2982	599.00
19151	Zeiss Albada Finder Black	19.00
26800	Zeiss Albada Finder 433/24	19.00
25773	Zeiss Albada Finder Chrome for 50 & 135mm 433/26	25.00
27996	Zeiss Albada Square Finder 433/16 in Box.	129.00
25190	Zeiss 49mm Stereo Beam Splitter f=50/2m-Infinity	499.00

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23019	16mm Prototype Camera	999.00
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Luxia II With 27mm f2.9 Delmak

28171	Canon 110ED 20 110 Camera with Data Back	39.00
27007	Coronet Vogue Brown Bakelite Camera. Takes Vogue V35 Film	129.00
28528	Darling 16 Subminiature Bakelite Camera 10x12mm Exposures. Takes 16mm Cassettes. "Cine" Styled with Original Maker's Box	799.00



Darling 16

20902	Expo Watch Camera with Cap Box & Instructions	349.00
21586	Ebony 35 35mm Miniature Bakelite Camera with Cap Strap, Tag & Original Makers Box. Made by Ohnishiya. Ltd.	129.00
26458	Fuji Pocket 250 110 Pan Focus Camera	15.00
26490	Fuji Pocket 350 Flash 110 Camera	19.00
26457	Fuji Pocket 450 Flash 110 Camera	19.00
24085	Goerz Minicord 16mm "Cine" Styled Camera with 2.5cm f2 Helgor	399.00
26312	Homer No1 14x14mm Grey Subminiature Camera New in Box	69.00

27867	Kiev 30 16mm Camera Black	39.00
27932	Kiev 303 16mm Camera Red in Original Maker's Box	49.00
27012	Kombi Miniature Patterned Box Type Camera/Viewer 1/8 x 1 1/8 Inch with Maker's Original Outer Box	375.00
15376	Konon 16 Automat	299.00
21084	Korelle-P 6x4.5 Miniature Plate Camera with 75mm f2.9 Xenar Lens	379.00
25559	Krauss Photo Revolver 18x35mm Camera with 4cm f4.5 Tessar & Magazine Back. Made by E Krauss Paris	2450.00
21082	Kunik Petie Vanity Camera Housed in Make-up Compact with Lipstick Holder. Blue. Complete in Case	975.00
28186	Mamiya 16 Automatic with 25mm f2.8	69.00
26838	Meopta Mikroma II Outfit Consisting of Body with 20mm f3.5 Mirar Lens, Cap, Case, Filter Set & Four Spare Cassettes	239.00
28190	Meopta Mikroma II 16mm Camera Green with 20mm f3.5 Mirar	89.00
20793	Micro 16 Subminiature Camera	29.00
19532	Mighty 16mm Camera Marked M I O J	59.00
19533	Mighty 16mm Camera Marked M I O J + Hood	89.00
26806	Olympus 16mm Endoscope Camera Body Only	499.00
21089	Photovit 35mm with Meyer 4cm f3.5 Primotar + Cassette	129.00
27444	Rubina Sixteen Model II with 25mm f3.5 Ruby Anastigmat Lens	169.00
23012	Secam Stereophot Stereo Pen Style Stylophot with f6.3 Lenses + Case & Instructions	1595.00
21729	Snappy Plastic Subminiature Camera	19.00
22461	Tessina 35 L Black 14x21mm Camera with 25mm f2.8 Tessinon	599.00
26308	Tessina 35 Black with Eye Level Prism & Waist Level Finder	899.00
16828	Yashica Y16 Rose Coloured 16mm	49.00

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22357	The Hit	29.00
22356	Minetta	29.00
22353	Mini Camera in Maker's Box	29.00
27017	Mycro IIIa with 20mm f4.5 Mycro Una Shutter Speeds of 1/25 1/50 1/100th + B. With Case & Instructions	69.00

Minolta

22564	Minolta 16 EE II Chrome	12.00
22618	Minolta 16EE Camera Complete in Box	19.00
22563	Minolta 16 Model P Chrome with 25mm f3.5 Rokkor	9.00
22191	Minolta 16 Model II Chrome	19.00
27341	Minolta 16 MG	19.00
28184	Minolta 16 MG Outfit Complete in Maker's Box	59.00
20888	Minolta 16 PS with Flash and Case	29.00

Pentax 110

27697	Pentax Auto 110 Outfit with 18mm f2.8, 24mm f2.8, 50mm f2.8, Winder & AF130P Flashgun	199.00
19029	Pentax 18mm f2.8 for 110	29.00
27698	Pentax 24mm f2.8 for A110	19.00
28199	Pentax 50mm f2.8 for A110	35.00
28201	Pentax AF100P Flash Gun for A110	29.00
25722	Pentax 110 Winder for Pentax 110	39.00

Accessories

22182	Gami 16 Tank Outfit in Box	99.00
22383	Gami 4X f4 Telephoto Lens in Case	595.00
19016	Meopta 16mm Filter Set of 8 Coloured/UV Filters in Case	19.00
22565	Minolta 16 Filter Set with 2 UVa & 1 Yellow	12.00
22194	Minolta Clamp 16 PS in Box	12.00
22193	Minolta Developing Tank for 16mm Film in Box	39.00

19311	Minolta MG-S Accessory Bulb Flash for Minolta 16QT	10.00
19851	Yashica 16 Subminiature Projector	49.00

HALF FRAME

27722	Bell & Howell Canon Dial 35 with 28mm f2.8	89.00
28170	Bell & Howell Canon Demi with 28mm f2.8	49.00
19726	Canon Demi S with 28mm f2.8 Canon-HS Lens + Case & Makers Original Box	35.00
21230	Korelle K 35mm Black Bakelite Camera with 3.5mm f3.5 Tessar Lens & Shutter from 1-1/300th	429.00
27004	Mercury II with Universal 35mm f2.7 Tricor	99.00
26652	Ricoh Caddy with 25mm f2.8 - Meter Not Working	39.00



Taron Chic and Ricoh Caddy

27545	Taron Chic with 30mm f2.8 Taronar	99.00
19928	Yashica 72-E HF with 2.8cm f2.8 Yashinon Lens	109.00
26498	Yashica Half 17 Rapid with 3.2cm f1.7 Yashinon	49.00

TWIN LENS REFLEXES

4x4 127 Cameras

26035	Halma 44 with 6cm f2.8 Zunow	399.00
21309	Laqon 44 Black with 6cm f3.5 Kinokkor Lens	169.00
26664	Yashica 44 Blue with 60mm f3.5 Yashikor	99.00
21308	Yashica 44 Grey with 60mm f3.5 Yashikor	79.00
18122	Yashica 44 Grey with 60mm f3.5 Yashikor in Original Box	109.00
21291	Yashica 44A Dark Grey with 60mm f3.5 Yashikor + Instructions & Makers Original Box	109.00
24848	Yashica 44LM Black & Grey with 60mm f3.5 Yashikor	99.00
27925	Yashica 44LM Blue & Grey with 60mm f3.5 Yashinon	89.00
16705	Yashica 44A Dark Grey with 60mm f3.5 Yashikor in Box	109.00

6x6 120 Cameras

25714	Aires Automat with 7.5cm f3.5 Nikkor QC	799.00
27629	Argoflex with 75mm f4.5 Anastigmat	15.00
27630	Argus Seventy-five with 75mm Lumar	10.00
27628	Atoflex Rex with 75mm f4.5 Angenieux	89.00
27006	Echoflex with 75mm f3.5 Echor Anastigmat	499.00
25203	Elioflex 2 with 75mm f6.3 Ferrania Anastigmat	59.00
28161	Halina A1 with 80mm f3.5 Anastigmat	19.00
28160	Halina Viceroy with Meniscus f8 Lens	15.00
28159	Ilford Craftman with Simple Lens & Art Deco Front	19.00
24833	Lubitel 166 Universal with 75mm f4.5	25.00
25025	Lubitel 2 with 75mm f4.5	15.00
25360	Lubitel 2 with 75mm f4.5 Lens + Case, Cable Release, Strap & Maker's Original Box	29.00
28158	Mamiyaflex Junior with 7.5cm f3.5 Neocon	199.00

SUBMINIATURE

CAMERAS

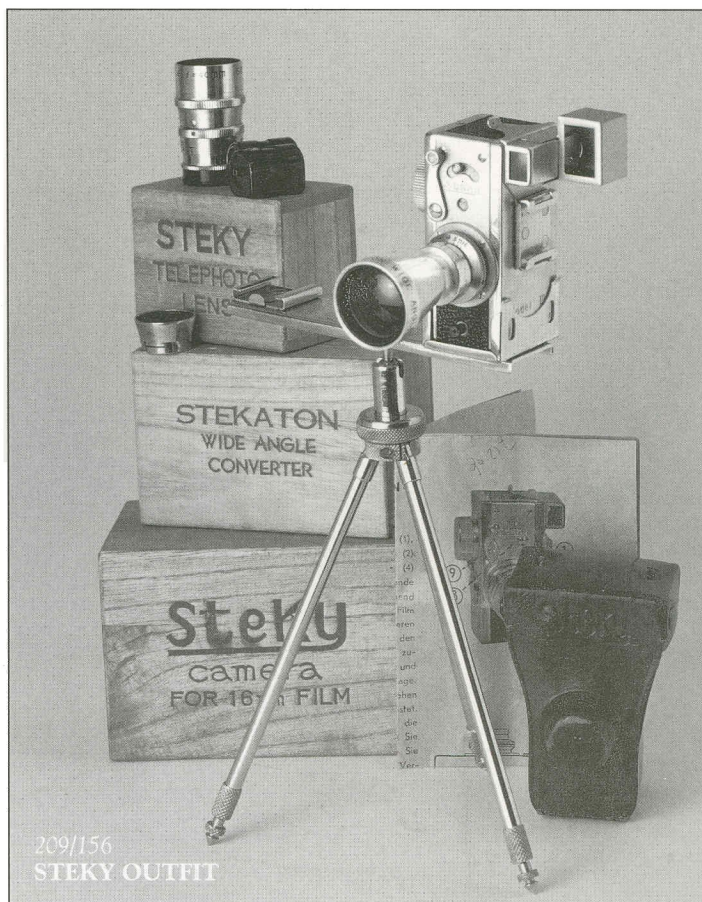
Ord.No.	Model	Type	Serial-number	Cond. (A-D)	Year	Export Price
10024	CANON	110 E	117336	A/B	—	£ 45.00
237/3	CORONET	MIDGET BROWN	—	B	—	£ 100.00
C 377/6	FOTOFEX	MINIFEX	—	B	1938	£ 600.00
	TRIOPLAN 2.5CM/3.5 COMPUR RAPID					
378/24	GALILEO	GAMI 16	339687	B	—	£ 450.00
	NICE CLEAN GAMI IN GOOD WORKING ORDER INC. CASSETTE					
209/14	GOERTZ	MINICORD BLACK	1007	B	—	£ 250.00
	CASE					
237/4	KUNIK	PETIE VANITY RED	—	B	—	£ 440.00
	RED ENAMEL FINISH IN LADIES COMPACT WITH LIPSTICK HOLDER					
205/1	MEC	MEC 16 GOLD	S158079	B	—	£ 70.00
	WITH CASE, CASSETTES AND FILM					
297/3	MEOPTA	MIKROMA I	4310648	A	—	£ 105.00
	BLACK LEATHER COVERING WITH CASE.					
3/5	MEOPTA	MIKROMA BLK.	—	C	—	£ 900.00
	EXTR. RARE! POLICE MICROMA					
292/11	MEOPTA	STEREO MIKROMA II	10823	A/B	—	£ 250.00
	CASE AND CAP.					

MINOX RIGA BODYSHELLS ~ 14000 A — £ 550.00
 WE CAN OFFER TO YOU A FEW NEW MINOX RIGA CAMERAS IN A SEMI-COMPLETED STATE. THESE CAMERAS WERE TAKEN FROM THE PRODUCTION LINE BY RUSSIAN TROOPS DURING THE SECOND WORLDWAR AND DISAPPEARED SINCE THEN. THEY ARE ALMOST FINISHED, NUMBERED AND ALSO IDEAL FOR RESTORATION.

3/10 MINOX RIGA OUTFIT

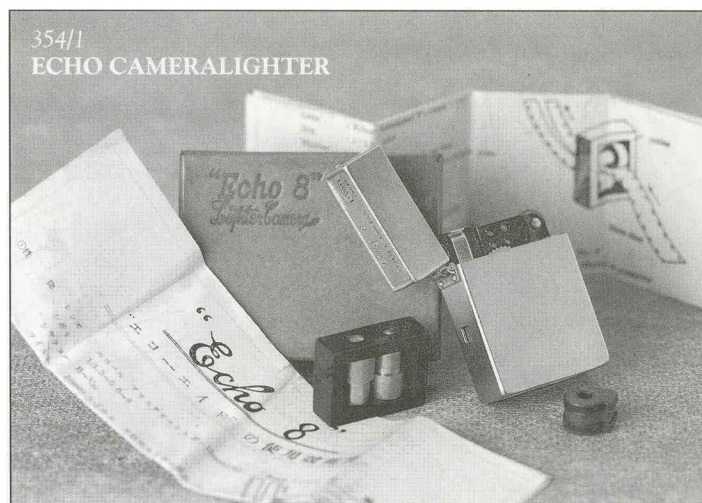


Ord.No.	Model	Type	Serial-number	Cond. (A-D)	Year	Export Price
238/6	PENTAX	O/F CASE 110	—	B	—	£ 45.00
96/1	PRINCE	16A	—	B	—	£ 250.00
	WITH ORIGINAL CASE					
106/1	RIKEN	STEKY II	7882	B	1950	£ 135.00
	CASE					
209/16	RIKEN	STEKY III B	—	B	—	£ 150.00
	CASE					



209/15	RIKEN	STEKY III B OUTFIT	—	A/B	—	£ 500.00
	WONDERFUL OUTFIT W. CAMERA, TELEPHOTO LENS, WIDE ANGLE CONV., TRIPOD, FILM CASE, CASE ALL IN WOODEN BOXES					
291/3	ROCKET	HIT TYPE	—	B	—	£ 150.00
	WITH CASE.					
237/1	SANWA	MYCRO IIIA	—	B	—	£ 40.00
	WITH CASE.					
109/9	SHOWA KOGAKU	GEMFLEX I	—	B	1949	£ 580.00
	MADE IN OCC. JAPAN!					

354/1 ECHO CAMERALIGHTER



354/1	SUZUKI	ECHO 8 CAMERALIGHT	—	A	—	£ 1500.00
	BOXED WITH INSTR. BOOK, FILM CUTTER AND SPARE CASSETTE					
317/1	TESSINA	AUTOMATIC CHR.	62451	B/A	—	£ 700.00
	INCREDIBLE OUTFIT WITH WATCHSTRAP, NECKCHAIN, CASE, CASSETTES, DAY-LOADER, INSTR. BOOK AND RARE INSTR. PLATE					
271/1	TESSINA	AUTOMATIC CHR.	63382	B	—	£ 350.00
	WITH CASE AND 2 CASSETTES.					
3/9	TEX	SINGLO	—	B	—	£ 100.00
	HELUR ANASTIGMAT, 3X4CM CAMERA					

Of course, the camera could be made no smaller since tinier plates would have been truly inconvenient and required amazing dexterity.

The development of dry celluloid film certainly made round cameras more convenient and smaller. Darkroom loading was still required, but the images could be enlarged. As an example, Herman Casler, who designed the Pocket Presto, and therefore understood the relationship between film size and camera size, also designed the Magic Photoret Watch Camera, produced by the Magic Photoret Watch Camera Company of New York City in 1893. The Photoret produced six 13x13mm square pictures with clipped corners, on a film disk 45mm in diameter. A round flat film disk was press into the holder in the back of the camera which was then screwed into place. Advancing to the next frame was as simple as holding the front and back of the camera and moving the watch stem to the side about half an inch which cocked the shutter and advanced the film. Structurally, the Photoret was a miniature Gray's (aka Stirn's) Vest Camera which used a single large plate for making several images. In turn, this was a smaller version of standard size glass plate view camera. The Stirn's camera was larger than the Photoret because it used a rotating glass plate where celluloid film made the Photoret a fraction of the original's size.

Like the Stirn's, the Photoret had no viewfinder. Instead, one simply pointed the Photoret's simple 12.5mm f/16 meniscus lens towards the object. Depressing what appears to be the watch stem tripped the simple single speed rotating shutter for a speed of 1/10 second. To make the camera more useful to enthusiastic amateurs, the Photoret's manufacturer supplied several accessories, including processing materials and an enlarger. And because it actually looked like a pocket watch, the Photoret permitted candid photography.

Small round cameras charmed the photographic public but the introduction of long strips of film wound in a cassette even further demonstrated the potential popularity of a very small convenient camera. In 1904 Magnus Neill, a Swede then living in New York, patented the Expo Watch-Pocket camera. The Expo was a marvel of design. It was 2 3/4 inches in diameter and about an inch wide. Rather than using flat round disks of film, the Expo used an easily loaded cassette containing a long strip of 17.5mm cine film, in lengths of 10, 20 or 25 exposures to produce a negative about 15 x 22 millimeters in size.

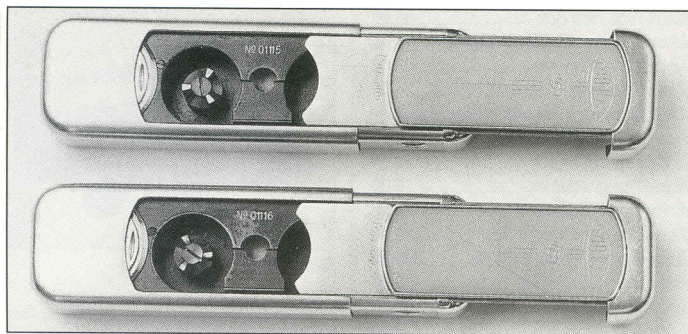
The Expo/Ticka was also easy to use. Remove the 'watch-stem' cap lens cover, point the stem neck--which housed the f/16 lens -- at the subject, and push the small

button to the right of the stem which tripped the simple shutter. Another small lever cocked the shutter and offered a choice of B and I, set at about 1/25 second, but was very small and did not detract from the camera's overall pocket-watch appearance. The engraved face of the camera could be removed for film loading by turning a small lever, quite like the one used to open cans of shoe polish, on the round bottom of the camera. Other models used a raised lip to help dislodge the top. Sealed cassettes easily fit into place. To wind the film, the user need only close the camera, turn it over and rotate the flat wind, -- as one would wind a watch, -- one half rotation for the next exposure to be in place. Only one thing could absolutely hamstring successful use of the camera. Replacing the 'watch-cap' (which fit over the lens barrel) after exposure was crucial. Failure to do so caused the user to expose that frame of film as he/she moved the shutter cocking lever into place. To avoid such disaster, the camera featured a cap permanently attached with a small chain and stern warnings in the manufacturer's instructions reminding the user to replace the cap immediately after each exposure.

Within two years this design was in production in three countries. In the United State, the Expo Camera Company began production in 1904. In that same year H. Meyer-Frey of Frankfurt-am-Main produced a German copy of the Expo: the Taschenuhr Camera. Houghtons, Ltd., Britain's largest manufacturer of photographic products, produced the Ticka in 1905. And, finally, in 1911, the Japanese Uyeda Company produced the Moment, a precise duplication of the Expo/Ticka. Despite small variations in construction and design, most examples, wherever they were produced were very similar. In all cases, the top surface of the camera was engraved with the camera's name, much as pocket watches traditionally bore the manufacturer's engraved logo or the owner's initials. This popular design would remain in production and listed in sales catalogues until 1939. Indeed, it was often a decorative art piece. The engraved Expo logo appeared in several variations and in addition to a shiny nickel exterior, Ticka and Expo cameras had colored enameled exteriors, while others were covered with colored leather. Very expensive sterling silver versions were presented to public notables. Queen Victoria, one famous recipient, boasted of her photographic prowess.

Other than being, conveniently small and portable, a pocket watch-like camera also allowed surreptitious candid picture taking. In order to make the camera seem even more watch-like, a second model, with a glass covered watch face replacing the engraved Ticka logo, was produced in 1908. The two watch hands, perma-

Leica - Leica copies - Minolta - Minox



Foca Multi Turret Finder for 28, 35, 50, 90 & 135mm	99.00
Forster Folding Sports Finder for 35, 50, 73, 85 & 90mm	25.00
Unnamed "RASUK" type Folding Sports Finder for 35 & 50mm	29.00
Diast 35mm Optical Bright Line Finder	59.00
Unnamed Optical Bright Line Finder for 105 & 135mm	49.00
Swallow 35mm Optical Finder with 50, 90 & 135mm Swivel Masks	59.00
Spiratone Universal Finder for Wide, 44mm and Tele	69.00
Wray Universal Turret Finder	49.00
Magna Rotating Right Angle Finder	39.00
Accurance Accessory Shoe	
Mounting Rangefinder	12.00
Akameter Accessory Shoe Mounting Rangefinder	19.00
Watameter Accessory Shoe Mounting Accessory Rangefinder	15.00

Accessories

BPM Close Up Filter/Rangefinder Attachment for Leica	19.00
Schneider 32mm Close Up Filter/Rangefinder Attachment	29.00
Unnamed Multi Zoom "FIKUS" Type Hood for 50, 90 & 135mm	25.00
Meopta Set of 5 30mm Clip on Filters	10.00
Reid Ever Ready Case	49.00

MINOLTA

Minolta A with 45mm f3.5 Rokkor	69.00
Minolta CLE with 40mm f2, 28mm f2.8, 90mm f4 Rokkors, CLE flash all in original Minolta boxes	2500.00
Minolta Super A + 5cm f2 & Meter	399.00
Minolta Super A Outfit with 50mm f2 3.5cm f3.5, Meter & Flashgun ...	499.00
Minolta Folding 6x4.5cm Semi-P with 75mm f3.5 Promar	119.00
Minolta Semi P Early Model M.I.O.J. with 75mm f3.5 Chiyoko	99.00
Minolta 35 Body	199.00
Minolta Early Eyepiece Magnifier for SLR	19.00
Minolta 110 Zoom MK 1	89.00
Minolta 16QT Black finish	45.00
Minolta 16 Model P	39.00
Minolta 16QT with flash, filters and box	75.00

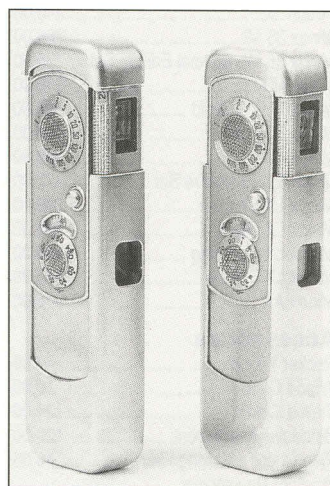
MINOX

Cameras

Minox Riga No: 04xxx	799.00
Minox Riga with Earliest Type Engraving Complete with Pouch & Box	1850.00
Minox Riga partially assembled. Mainly Complete Including Lens, Viewfinder Assembly Never Having Been Fitted. This Camera Casing is in New Condition and is Ideal for Repair & Restoration	499.00

(Illustrated bottom of next column)

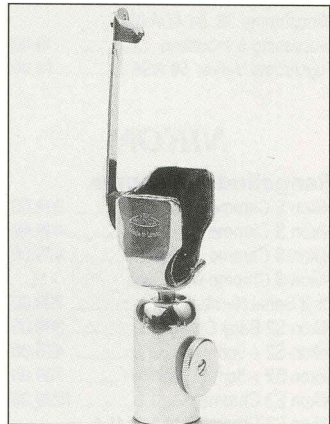
Minox Riga Cameras with Consecutive Serial Numbers With Earliest Type Engraving to Baseplate, as Illustrated (above and below). These Cameras Make a Unique Pair



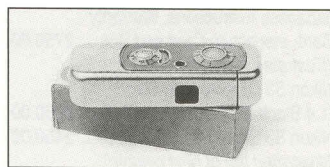
Minox B Chrome	119.00
Minox B Chrome + Chain & Case ..	129.00
Minox B Chrome in Box	279.00
Minox B Chrome + Chain, Case & Box	299.00
Minox C Chrome	199.00
Minox C Chrome + Chain & Case ..	249.00
Minox C Chrome in Box	299.00
Minox C Black	299.00
Minox EC Set in Box	89.00
Minox LX Black	399.00
Minox III Dummy Camera	299.00

Accessories

Minox Riga Tripod Adaptor	895.00
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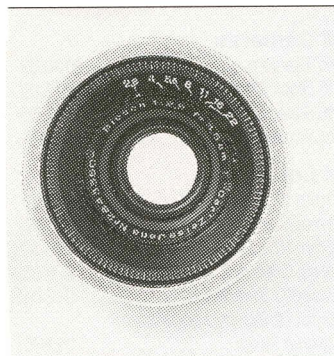
Minox Riga Tripod Adaptor



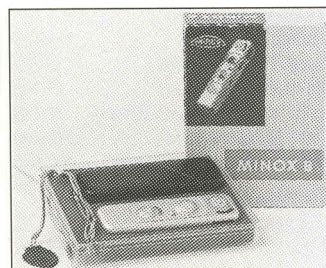
Partially assembled Minox Riga

Cameras

Minox Riga No: 04xxx	799.00
----------------------------	--------



Minox Riga with Earliest Type Engraving Complete with Pouch & Box	1850.00
Minox Riga Partially Assembled. Mainly Complete Including Lens, Viewfinder Assembly Never Having Been Fitted. This Camera Casing is in New Condition and is Ideal for Repair and Restoration	499.00
Minox Riga Cameras with Consecutive Serial Numbers with Earliest Type Engraving to Baseplate. These 2 Cameras Make a Unique Pair ..	5950.00
Minox B Chrome + Chain & Case ..	129.00
Minox B Chrome in Box	279.00
Minox B Chrome + Chain, Case & Box	299.00

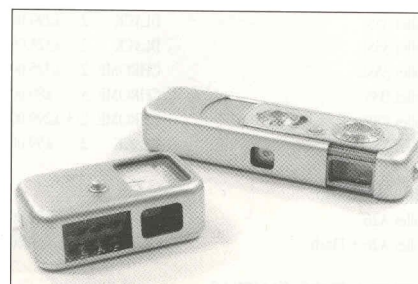


Minox B

Minox C Chrome	199.00
Minox C Chrome in Box	299.00
Minox C Black	299.00
Minox LX Black with Case and Chain	499.00
Minox III Dummy Camera	299.00

Accessories

Minox Riga Tripod Adapter	895.00
Minox Riga Film Negative Holder	69.00
Minox A Meter Chrome	79.00
Minox C Electronic Flash Adapter ...	49.00
Minox Bulb Flash Chrome	19.00
Minox Bulb Flash Chrome in Box	25.00
Minox Tripod Clamp/Cable Release Adapter in Box	25.00



Minox A complete with Meter

CHROME 1/2 £199.00

produced in 1948 but by the Sakura Seiki Company. To complicate matters, the Everax A, which had the overall shape of the Sakura Petal but featured lovely face engraving, was produced by the Petal Optical Company. Some exemplars even bore the name Petal Kogaku Company. One authority claims that Konishiroku (Konica) produced some, if not all, Petal models.

All Petal variations offered a 12mm fixed focus achromatic lens which is about as short a focal length as possible for a lens built between camera walls only 16mm apart inside. Maximum aperture was unstated and subsequent opinion has yet to determine if it was f/5.6 or f/6.3. Both models also provided a simple two speed shutter including B and I; 1/50 second on the round Petal and 1/25 second on the octagonal version. All models produced six round 5mm images on a 25mm film disk which fit into a round holder and then into the back of the camera. Advancing the film was as simple as rotating the entire back of the camera to the next exposure, conveniently numbered from one to six along the rim of the camera. All models also had a small round, tubelike viewfinder next to the shutter lever.

Though the Petal camera was not intentionally made to look like a watch, it was as small as a pocket watch type round film camera can be made. Almost any improvement at all, such as a better lens or shutter, would make spatial demands and result in a much larger camera. It was not necessary to create a very much larger camera, however, to produce the nearly perfect round film format design, such as the Brinkert Efbe.

The Brinkert Efbe, which came in several different configurations, were individually produced from 1974 by Frederick Brinkert, a West German engineer. While the Efbe is much larger than the Petal, it represents the logical development of the same round Photoret type camera design. Indeed, the Efbe is almost the perfect round film camera.

Efbe camera design and execution is pure and simple. The camera consists of three components. The camera body, or the primary part of the camera is a $2 \frac{5}{8} \times 11 \frac{15}{16} \times \frac{5}{16}$ inch rectangular disk with a small hole in one corner for a neck chain. This hole can also serve as a simple viewfinder. The lens, the same 20mm f/2.8 Munchen Color Ennit originally produced for the Goldeck 16 cameras, screwed into the front of this disk. Like the Goldeck 16, the Efbe disk also provided an additional D mount cine thread behind the normal lens thread thus enabling use of a great many cine lenses. There is no internal dark slide on so small a camera. Lenses had to be changed in the darkroom lest an exposure be lost.

Though the fixed focus lens was factory set at about

12 feet, changing aperture setting altered depth of field as was also the case for the Minolta 16 and other fixed focus cameras with aperture settings. Next to each setting, from f/2.8 through f/16, the lens lists the nearest focal point through infinity in sharp focus. Hence, at f/2.8, the lens would produced sharp images of all objects from 2.9 meters (9.5') to infinity. Each increasingly smaller aperture would increase the area of sharpness through f/16 when everything from .8 meters or 2 1/2 feet to infinity would be sharp. At f/11, everything from 1.2 meters, or 3 3/4 feet, would be acceptable sharp. To compensate for the use of lens apertures for setting distance, the user could set shutter speeds including 1/25, 1/50, 1/100 and B, on the bottom of the lens mount. The lever on the back of the camera cocked the mechanism while the small lever on the lens mount tripped the shutter.

On the back of the camera, a knurled round film disk fit over the film chamber. Engraved numbers on the film disk indicate direction and extent the knurled disk was to be turned. A small magnet embedded in the camera back kept the film disk in place as it was rotated. The Efbe produced six 10x12mm pictures on a film disk 46mm in diameter. Other versions of the camera produced 9x11mm images and yet another version produced 7.5mm negatives.

Because the present day user has the choice of so many really excellent, but languishing for lack of use, focusing D mount cine lenses, in apertures as wide as f/1.9 and even f/0.95, using the Efbe can be a great deal of fun. It is possible to connect the camera body to a tripod with a wall clamp with a tripod nib, the same type of device used to clamp lighting fixtures to walls or shelves. A photographer can use single pieces of cut film, securely held in place by the magnetic back, and thereby transform the Efbe into a single-shot subminiature view camera. No rising, or falling front, or perspective control, but ground glass focusing is possible at the B setting, before the film is loaded into the back. Commercially available round film would make the camera even more capable but, in fact, almost all round film format cameras can be used today almost as easily as they were many decades ago. But more about that next month when I also describe the ASR Fotodisk, the Steineck ABC Watch-camera, the Magnacam Wristmatic 30 and the Fotal, which represent other improvements upon subminiature use of a round film magazine and all of which make this month's offerings seem very humdrum indeed.

Jerry Friedman teaches European history at Kent State University and has served as a consultant to both foreign and domestic government agencies. © 1995 Jerry Friedman

ROUND SUBMINIATURE CAMERAS: PART I

By Jerry Friedman

The thought of round cameras should bring a tear to the eye of every subminiature enthusiast because so much small camera history has involved cameras of this shape. If you are given to using unusually large and ungainly cameras, that is, anything too big to fit in a small pocket, round may be the shape of your lens but certainly not the shape of a camera. Indeed, round cameras may even seem like an affectation, like the overly expensive round Olympus 0 Product. But for subminiaturists, round has meant... endless possibilities, and, unfortunately, endless frustrations.

Why, then, round cameras? At the turn of this century when cameras were very big and even bigger than that and used inconvenient plates, round cameras were a step towards miniaturization. Some designers attempted to use a circular concept to make glass plate cameras more convenient. The Lancaster Watch camera, for instance, was essentially a round view camera taking a very small plate. Its greatest virtue was that it could be snapped closed and put into a pocket. In 1899 the Springfield Union Camera went in a different direction. It had four 3 1/2" plates mounted on the sides of a cube. Rotating the cube within the square box camera advanced the film to the next exposure. Four exposures may not seem like too many, but it was better than loading individual plates. The Photo Quint, the Photake, the Ernemann Bob and the German Mephisto had a similar design but were round. The round exterior of the camera housed a five sided frame affixed to the base of the camera. Each section of the frame held a 4x5cm



Top left clockwise: Efbe, round Petal, Presto, Photoret, Expo

or 4.5x6cm film plate and turning the bottom of the camera rotated the frame and advanced the camera to the next exposure. In this instance, a round camera presented several advantages. First, one could use the camera bottom as a wind knob to rotate the film. Also, as the film hanger turned from one exposure to another, the distance between the lens and the film plane remained the same.

One could improve upon this early design by elongating that end of the circle housing the lens, thereby allowing for a longer focal length. Indeed, the Presto Camera of 1896 represented precisely this idea. At 3 1/4 x 2 1/4 x 1 1/2 inches, the Presto was as small as a dinner roll. Rather than turning the entire bottom of the camera, a large flat disk on the camera top rotated an inner frame holding four 28x28mm film plates. A disk with Waterhouse stops in front of the simple meniscus lens along with a single speed shutter controlled exposure. Unlike the cardboard Photo Quint, the metal Presto could withstand considerable abuse. Unfortunately, it took only four pictures, therefore requiring frequent trips to the darkroom to load additional film.

ELIMINATING KNOBS AND LEVERS: PART 1

By Jerry Friedman



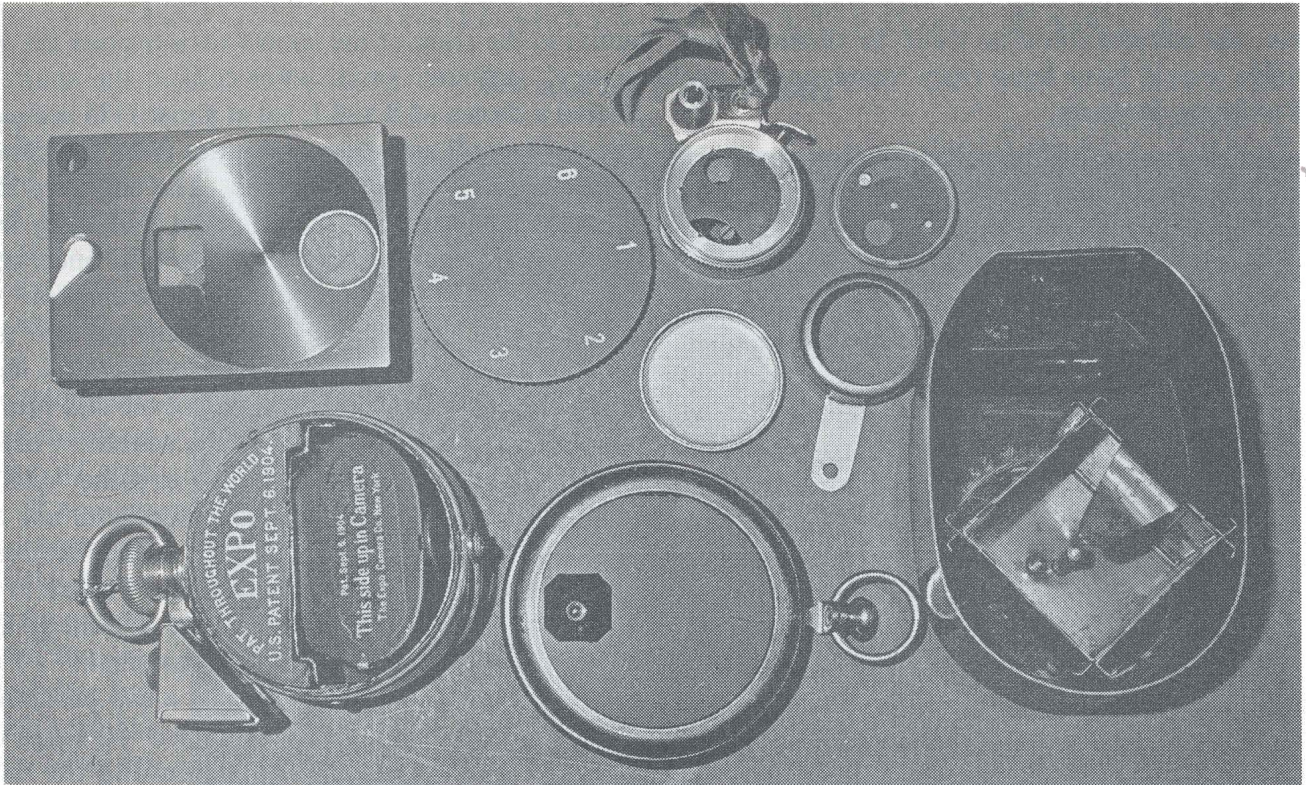
From left to right: TOP- Tessina, Scat, Vestkam, Mamiya 16; BOTTOM- Minolta 16, Acmel MD, Chadt.

Manufacturers seeking smoother, camera lines and a solution to problems with loading 35mm film have replaced wind and rewind knobs with very small electronic motors in most compact cameras. Even before the age of electronics, camera designers substituted rapid advance levers and pop-up folding rewind cranks for troublesome winding knobs. The Agfa/Ansco Rapid system, 110 and 126 film cassettes all bear witness to early attempts to solve film loading dilemmas. Subminiature camera designers were even more concerned with problems caused by knobs and levers. When very small, these components can not take abuse and quickly fail or even break off. Moreover, small knobs make the already difficult task of loading 16mm film even more complex.

Miniaturizing standard size camera features to subminiature size involves complex engineering and extremely expensive alloys. Imagine, for instance, building a Leica-type rangefinder on a "Hit" size camera. Imagine the complex gearing and cam precision on the reverse side of the lens. Imagine placing, and then keeping, the tiny mirrors at the correct angle and doing all this inexpensively. To be

successful, building small does not entail making everything smaller; it involves making everything more simple and efficient.

So....what to do with wind knobs on a camera specifically designed to be very small and streamlined? During the 1950s, the proliferation of Japanese and German cameras using 17.5mm paper-backed roll film accentuated the problem of easily broken knobs and levers. Many cameras, such as the Epochs/Vesta, Tone, and Myracle featured knobs that complemented overall design but were still fragile. Moreover, they also required a separate, and more easily damaged lever, to cock the shutter. Some companies tried to hide the knob. Consider the tiny Italian Scat produced in Rome in 1970. This minute camera has a sliding viewfinder to keep camera lines simple. It does have, however, a single knob sticking out of the bottom. When turned one way, the knob trips the shutter. Turned in the opposite direction, it winds the film. Since the knob was attached to the surface sustaining the heaviest abuse, it was easily damaged. Its functions and the photographer, then got confused. This accounts for the large



View of cameras with backs removed revealing circular film chambers

nently set at 10:07, indicated the picture taking angle of the lens. In all other respects, this model was the same as the earlier Ticka. In that same year, a vastly improved focal plane model also appeared. This most rare and expensive version offered a better quality 30mm triplet Cooke f/5.6 lens in fixed focused mount and a focal plane shutter with a choice of speeds including 1/75, 1/100, 1/150, 1/200, 1/400 of a second. Additional accessories made the camera even easier to use. The Expo Company produced several different size mirror waist level and direct optical finders, all of which clipped onto the stem neck.

In England, Houghtons also produced a tripod, developing kits, printing boxes, and even "printing box" enlarger which easily produced 2 1/4 x 3 1/4 inch pictures. Ticka advertisements boasted that the device "was so simple to use that these large prints can be produced just as easily as one would make contact prints from a negative in an ordinary printing frame." Casual photographers could put the loaded camera and at least two additional cassettes for a total of seventy five pictures in a single jacket pocket. Even better, photographers had all the equipment necessary to turn the small negatives into decent sized enlargements. The Ticka/Expo was surely the first and greatest subminiature camera of the day.

From a functional point of view little about the Expo Camera required a round shape and the cassette could sit just as easily in any shaped camera. Indeed,

the round Expo shape may have become a little too familiar for candid use! The same idea must have occurred to the people at Expo because from 1911 they produced the rectangular black Police Camera, roughly the size of a pack of playing cards and just about as visually innocuous. Almost a third of a century later this same shape would reappear as the Kodak Matchbox camera and thereafter in the Mamiya 16 and Minolta 16. Indeed, the Police Expo may have been the single most important design influence on subsequent subminiature camera construction. Rectangular cameras, however, are another story.

Subsequent technology enabled the creation of even smaller, and even better round cameras. The Petal Camera, between the size of a quarter and a half dollar, is one of the smallest cameras ever to go into commercial production. The entire camera is only 29mm (1 1/8") in diameter and 16mm, (5/8") thick. There are two different models; one with a round face and one with an octagonal front. Both use the same Photoret-type disk film in a round film chamber and back. It is not clear who produced the Petal. After World War II the Japanese camera industry was truly a cottage industry with most cameras produced by hand in limited number in small garage-sized workshops. Company names as well as camera features and appearance changed regularly. Hence, the original round Petal was produced in 1948 by the St. Peter's Optical Company. The octagonal model, called the Sakura Petal, was also

number of cosmetically beautiful Scats which barely function.

Some cameras such as the Concava Tessina which firsts appeared in 1960 and is still available from Karl Heitz in New York, stoically accepted the necessity of tiny knobs but in constructing them, emphasized quality alloys and precision machining. The Tessina's tiny wind knob is attached to a small clock-type spring mechanism which automatically advances the film for six to eight frames before additional use of the tiny wind knob is again necessary. The equally tiny rewind knob, fortunately, is used only once per roll. Both wind and rewind knobs are minuscule. They wobble when extended but are made of very expensive steel alloys and work every time. The result: brand new Tessina's are expensive.

Most subminiature cameras avoid knobs and levers by using one of two designs for transporting film and cocking the shutter. In large part, method selection depends upon whether the camera used sprocketed or unsprocketed film. The ratchet system is necessary for unsprocketed film. Several raised ratchets in the film chamber base turn a cylinder within the cassette and move unsprocketed film from one cassette to another. Since most subminiature film is either single or double perforated cine stock, however, many subminiatures opted a moving tooth or claw system. Typically, one or two teeth travelling along the film plane catch a sprocket hole and force film from one cassette to another.

Both systems work well but neither is problem-free. The ratchet system depends upon a more complex, and expensive, cassette with moving parts. Negative size with the sprocket system will vary depending upon whether the system used single, double or non-perforated film. In general, 16mm cameras opted for the moving tooth system while the Minox, which used non-perforated 9.5mm film, chose the ratchet system. Some companies, such as Minolta, used both systems. In this article I will describe the ratchet system and the various cameras that use it and why. Next month's article will be devoted to describing the more complex claw or tooth method and to determining which of the two system is superior.

It is fitting that we start our discussion with the Minox. For even the most casual photographer, Minox has come to mean small, efficient, and unobtrusive. Much of this reputation stems from the fact that soon after its creation in 1937, the Minox came to play an extremely important role in World War II espionage. By war's end in 1945, Minox's reputation

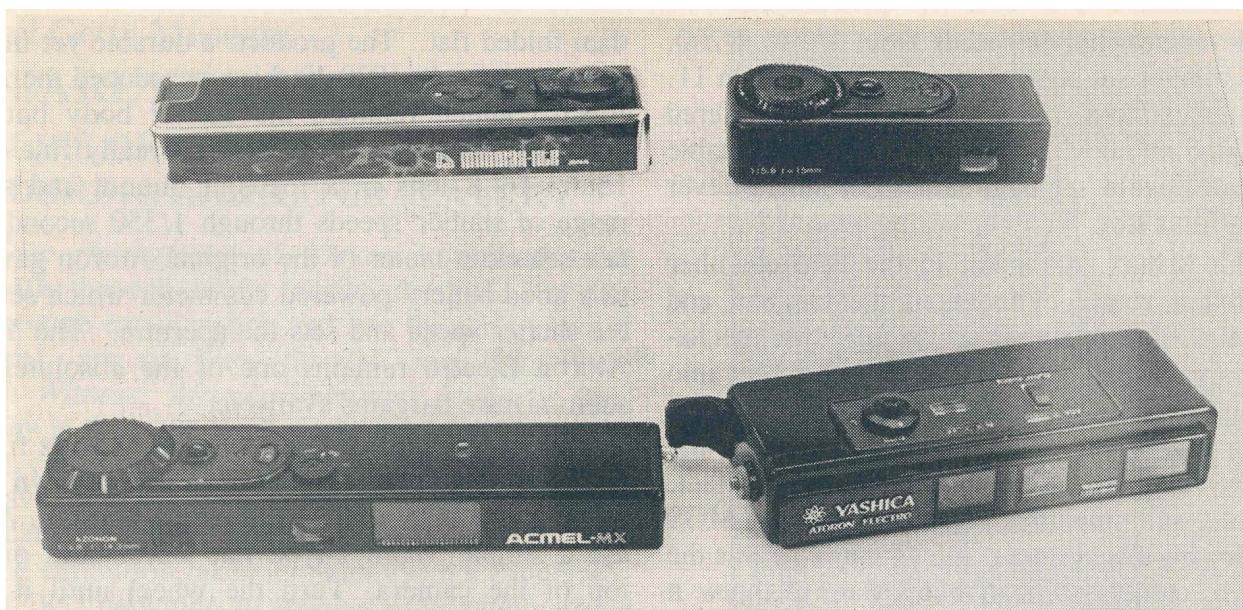
was established. The company expanded the line and created several financially successful civilian models, the most popular being the versatile model B.

The Minox demonstrated the potential for intelligent design minimalism by eliminating knobs and levers altogether. All early models, including the A, B, II, and III series are a tiny 3 1/4 x 1 1/8 x 5/8" in size. There are no aperture settings since the 15mm Minox lens remains permanently set at f/3.5. Turning a flat thumb wheel on the camera side adjusted the two piece focal plane shutter from 1/2 to 1/1000 second. Turning a second thumb-wheel set focus from a close 8' to infinite. With the lens set at 12 feet, everything from six feet to infinity would be in focus.

The ridged filter selection rod, which runs along side the front of the view finder also demonstrated the same simple logic. A thumbnail can raise or lower green, and orange filters (Minox III series) or green and a 4x neutral density filter (Minox B series). Later Minox cameras, the C and LX retained only the neutral density filter. The filters are easy to use, can never be lost and take up no space. The view finder is parallax adjusted throughout its entire range.

The Minox B is half an inch longer, to accommodate the excellent Gossen selenium light meter. Setting the meter involves properly aligning the flat shutter speed thumb wheel to film speeds. Models C and LX are somewhat larger but offer an electronic shutter and an excellent cds meter. The polycarbonate EC is about the size of the Minox III series but represent a departure in design. It has a fixed focus f/5.6 lens and the cds meter automatically sets the electronic shutter for speeds from 8 seconds to 1/500 second. Inch for inch, the B offers the most features in the least amount of space. It has been my camera of choice for general picture taking since it first appeared.

The most famous feature of the Minox is its method of film advance. This system was efficient in 1937 and remains so on new Minox cameras. A single up/down movement of the top half of the camera turned a multi-tooth ratchet in the base of the film chamber (which engaged matching indentations inside the film spool) and pulled the film from the first (holding pen or dumb) tape cartridge across the film plane to the second cartridge. Over the years, the number of teeth has varied from 12 to eight to the current three. The natural up/down hand motion delivers more than adequate power to move the film, yet, there was nothing to break. It is impossible to open or close a Minox too strenuously. Disassemble



Top left to right: Minimax Lite, Acme M. Bottom left to right: Acme MX, Yashica Atoron Electro.

a Minox and you discover engineering to last a century. I would wager that more Minox cameras from 1950 are in better working condition than an equal number of Leica or Contax cameras from the same period.

When the Minolta Camera Company bought the design rights to the Konan 16 and started making subminiature cameras in 1960 they chose the up/down Minox system. Since the Minolta 16 and 16II used 16mm rather than Minox size film, the camera was 3 1/8" x 1 2/3" x 1". When closed, the camera was impervious to abuse and yet demonstrated how inexpensively the same up down plus ratchet system could be produced. Simply remove the camera's outer jacket and work the single piece film advance mechanism. Little wheels in the top of the camera set shutter speed (1/25, 1/50, 1/200, sec.) as well as lens aperture (f/3.5, 4, 5.6, 8 and 11). The 25mm lens was a decent three element fixed focus (at 15 ft.) design. The model 16II extended shutter speeds to 1/500 second and offered a new four element f/2.8 lens. The view finder of both cameras is simple glass. Parallax adjustment depends upon the photographer's imagination. For all its simplicity, the Minolta 16, especially the model II, sold in the thousands and remains a terrific used camera bargain. It is still capable of amazing results for general picture taking and.... without a knob or lever in sight.

If the Minox/Minolta ratchet mechanism was simple, the cassette required to make the system work was not simple at all. Minox and Minolta cassettes, almost identical except for size, are two lobes joined by a connecting side bridge. One closed lobe holds unexposed film. The second has a rotating core, to which the film leader is attached, and which also has

ratchet indentations in its base which accommodate the camera's ratchet teeth. This system, unlike the subsequent 110 cartridge, permitted the camera's pressure plate to keep the film flat at exposure. Since the Minox film plane is not flat but curved, this feature is critical. Critical resolution at the corners, therefore, remains equal to that at the center of the negative. After the film is advanced, the pressure plate pushes the film to the proper angle. In the Minolta 16, a simple piece of flat polished metal leans against the film and keeps it there during exposure. The system works very well indeed, but there is a catch. If the moving cassette parts bind, the film will not advance and, even worse, can jam foul the inner mechanism. Hence, both companies discouraged amateur reloading of the cassettes. Reasonably, both Minolta and Minox designed their cassette for simple drop in/pop out use. Both companies also took a serious interest in the products of aftermarket cassette/film manufacturers and both companies provided a wide variety of films and film processing options as well as cassettes. The photographer was to take pictures and send the cassette to the film processor and buy additional film already loaded in a new cassette. Other companies, less adventurous or simply unwilling to provide this level of service, found it necessary to unravel film wind and cassette problems differently. They were not always successful.

The Mamiya 16, which appeared earlier than the Minolta 16, about 1950, was a very good small and solid camera with a Scat-like slide out viewfinder. Closed, the camera's dimensions were a petite 2 5/8" x 1 1/4" x 1 1/3", or, almost half an inch smaller than the Minolta. Yet, it offered many features. A

put the camera plus disk into any but the largest pocket. The camera's leather case, which could not accommodate a mounted film disk, went into another pocket. A smaller, lighter, and more sophisticated camera section mounted on a smaller three inch disk might have succeeded but, in the end, ASR decided to pin its hopes on the Gillette Blue Blade.

If the ASR Fotodisc was a modern but awkward version of a vest camera, the Steineck ABC camera, using the same rotating film disk idea, certainly was not. The Steineck ABC, designed by Dr. Rudolph Steineck and made by Steineck Kamerawerk of Tutzing Germany in 1948-49, was a well conceived wrist watch camera. To begin with, the 50x35mm dimensions of the camera case were those of a man's wrist watch and the fine leather strap enabled the owner to wear it without inconvenience. The fixed focus 12.5mm Steinheil f/2.5 lens protruded only slightly and the little button where the watch stem might have been, tripped the single speed, 1/125 second shutter. The tiny wheel in the center of the camera face altered the unspecified aperture setting from "wide," probably f/2.8, for overcast or indoor use, to "smaller," probably f5.6 or f/8, for outdoor use. The unit easily slid under a sleeve cuff and nothing about it attracted undue attention.

Using the Steineck was as easy as ABC. The viewfinder was a curved mirror at the six o'clock position, -- that part of the camera facing the user when the watch was worn on the right wrist. By placing one's wrist on the table, and pointing the camera towards the subject and looking down, the wearer could see everything from about two to ten feet reflected in the mirror. A very small needle sticking out into the middle of the mirror image helped frame the subject. By lining up the subject's image with the needle's head in the mirror, the photographer knew what the lens would photograph and could then trip the inobtrusive shutter. There was an additional viewfinder, a small hole in the very center of the face, which could be used when the camera was off of the wrist. The system was ingenious and very effective. Any photographer could easily take pictures of subjects sitting directly across the table without the subject realizing his popularity.

Loading film into the camera back was essentially similar to the procedures used for loading other cameras requiring the user to rotate the film back to

advance the film. Turning the back about a quarter of an inch counter clockwise and then returning it to its original position, as with the Photoret, advanced the film and cocked the shutter. This was easily accomplished when the camera was held in front of the user with the camera back in plain view. But when the camera was worn on the wrist, its wearer would have trouble rotating the film unless the camera wrist strap was kept one notch loose so that the left thumb and forefinger, forming a U under the bottom of the camera, could rotate the filmback. This also permitted angling the mirror viewfinder and the lens more effectively. It may *seem* awkward but the system works quite nicely. The camera then made eight 6mm exposures on a special 25mm round filmsheet. The Steineck could produce good pictures if taken outside or under other good lighting. Even so, it would have been even easier to use a Minox with a right angle finder or, better yet, a Tessina. Indeed, the latter even offered wrist strap mounting, a built-in motor to advance the film five to eight exposures, a huge viewfinder and produced the largest negative of any subminiature available. Of course, in 1949, the Steineck ABC was available while Concava introduced the Tessina only in 1961. Not coincidentally, the same Dr. Steineck who designed the ABC also owned the plans Concava would put into production.

The Wristmatic Model 30, made by the Magnacam Corporation in Oakland, New Jersey in 1981 was another wrist watch shaped camera which rotated a film disk behind a stationary lens. But if the Steineck actually looked like a wrist watch, the Wristmatic looked like.... a large multipurpose kitchen appliance inexplicably worn on the wrist. Bernard Seckendorf, the New York accountant who invented the camera as a novelty, believed that Magnacam, like Kodak, could make pots of money selling a cheap novel camera with a captive film market.

The Wristmatic provided a few amenities such as a small tubular viewfinder through which the user was supposed to frame the picture, and a novel goof-proof magnetic shutter. The shutter lever on the side of the camera, opened the shutter and internal magnets, using opposite attraction, closed it after precisely 1/100 of a second. Modest, but effective. The Wristmatic also had a simple 20mm f/11 meniscus lens and produced six 9mm circular images on a

Round Subminiature Cameras: Part 2

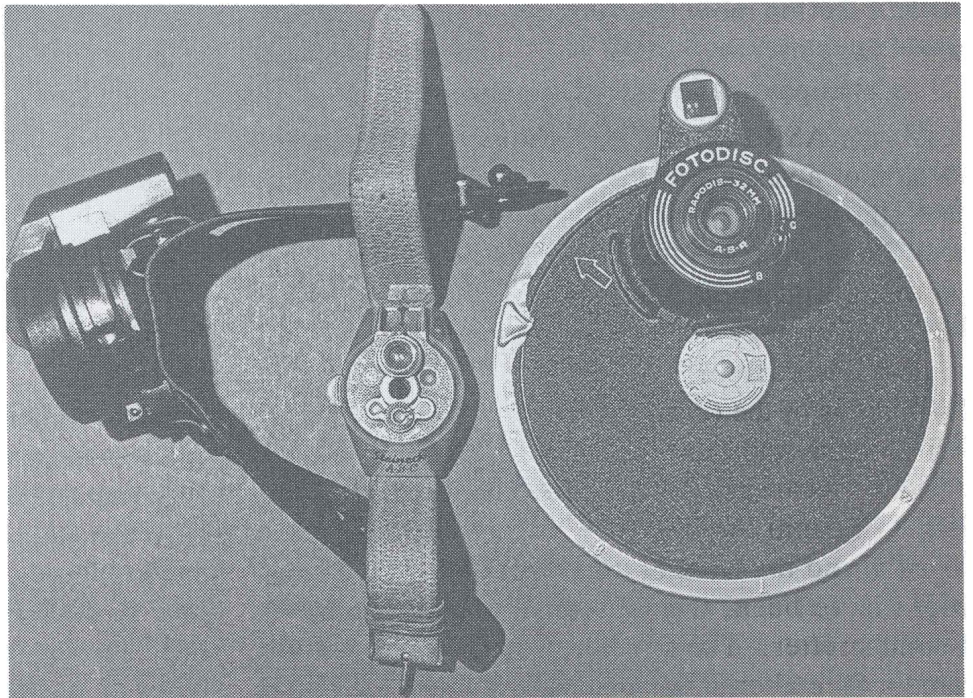
By Jerry Friedman

Last issue's article described the Ticka/Expo, the Photoret, Petal and Efbe cameras and explained the processes by which designers miniaturized early plate cameras by making them round or by using a round plate. This issue's column will describe several other curious subminiature cameras which further attempted to exploit the round camera design.

The American Safety Razor Company produced the first of these round anomalies, the ASR Fotodisc camera, in 1950. Like the Photoret discussed last month, and Gray's and Stirn's Vest Camera, the Fotodisc rotated a round film disk behind a stationary lens and shutter assembly located at one edge of the plate. Each late 19th century round design had its own logic. Vest cameras employed a single round plate to produce several serial images and was therefore more convenient to use than most contemporary cameras which demanded changing plates with each exposure. The Photoret used rollfilm rather than plates, a development which permitted the camera to be truly small and convenient.

In 1950, the ASR decided the world was ready for yet another incarnation of this same round film disk idea. They believed that, like Eastman Kodak, they too could market an inexpensive camera, only \$9.95, but make real money supplying film and processing. Unlike Kodak's easy to use small rollfilm cameras, however, round disk cameras were not user-friendly. Hence, Augustus Spellflug, the designer of the Fotodisc (as well as the Lynex stereoscopic subminiature camera) overcame these problems by making everything larger. The 2 1/2 x 1 1/2 x 1 1/2 inch camera was small but made of hefty cast iron. Below the simple view finder, the 32mm Rapodis-ASR f/7.7 lens offered only two aperture settings for cloudy (f/7.7) and bright (f/19). A small leather case accompanied the camera.

Spellflug also overcame predictable amateur



L to R: Wristmatic, Steineck ABC, and ASR Fotodisc

problems of loading a small round disk by supplying the four inch Fotodisc, which produced eight 22x24mm pictures, already factory loaded. The photographer had only to follow the curious markings on the disk face to snap the camera into place. After each exposure the photographer rotated the camera on the film disk within the outer metal disk-rim until the metal arrow pointed to the next frame number. Once all eight pictures were exposed, the photographer removed the camera from the disk and mailed the latter to the proprietary processing factory which returned eight 2 3/4"x 3 1/2" enlargements along with another loaded film disk.

Despite Spellflug's interesting improvements, the ASR Fotodisc was still awkward to use and inconvenient to carry. When the hefty camera section was attached to the film disk, the unit was top heavy and difficult to hold unless one grasped the disk in one hand and pressed the shutter lever with a finger from the other hand. Even worse, unless the photographer took all eight pictures at the same time, removing the disk resulted in lost pictures since there was no dark slide. Consequently, the same photographer who initially bought this camera because it was small and portable now found it impossible to

very flat lever set shutter speeds from 1/2 to 1/200. Another flat lever set aperture from f/3.5 through 11. Slightly later versions, such as the Model III, offered features found on no Minolta 16 such as an adjustable footage scale, again set by a small but strong lever and sliding filter slot.

Like the Minox, a ratchet in the film chamber base rotated a round cylinder in the cassette and advanced the film. Instead of an up/down mechanism, Mamiya built a thin ridged thumb wheel into the top rear corner of the camera. Turning the wheel moved the mechanism. This reliable, simple and cheap system worked exceptionally well. In fact, later Minolta subminiatures such as, the MG, MGS and QT adopted this system. The Mamiya 16 was the subminiature camera to beat, but...Mamiya threw it all away by designing a new and complex cassette of their own. At first, the Mamiya 16 used a double cassette system. One dumb cassette held the unexposed film while a second had a moving cylinder core which attached to the ratchet. This cassette looked like a small 35mm cartridge or very much like the Russian Narciss cartridge discussed two months ago. This system worked well but Mamiya found that many general photographers looking for a convenient camera had trouble loading such a tiny cartridge. This was especially galling when Minolta experienced enormous success with their Minox clone.

Rather than simply adopting the Minolta cassette, Mamiya designers created an even more complex version of the original Minox with even more moving parts. The result: the Mamiya double lobe cassette remained far more difficult to load than the rival Minolta produced cassette. However, unlike Minolta, Mamiya never offered extensive film service. The cassettes, which would be useful today, soon disappeared. So did buyers. To increase sales, Mamiya introduced new model after new model, each offering additional features in a larger and heavier camera. But, unwilling to provide serious processing back up support, or another redesigned cassette compatible with the Minolta double lobe, and having changed their cassette once, Mamiya felt they could not, or would not change their cassette again. Pride goeth before a fall and Minolta, not Mamiya, went to the bank with a lesser camera but with a better cassette and better service.

Other companies found slightly different answers. In 1965 Yashica introduced the Atoron which used Minox cassettes. Rather than copying the Minox/Minolta up/down mechanism the Atoron used a flat pull tab which pulled the mechanism along and

then folded flat. The product: a durable yet inexpensive camera. In 1970 Yashica introduced the Atoron Electro which retained the earlier body but made other improvements. It offered a really fine quality 18mm f/2.8 lens in a focusing mount and a good range of shutter speeds through 1/350 second. The fair selenium meter of the original Atoron gave way to a good battery powered cds meter which sets both the shutter speed and sets the aperture. The Yashica Atoron Electro remains one of the absolutely best subminiature bargains available.

Acmel Cameras of Japan, also use Minox film and the Minox cassette. Rather than an up/down movement or a comparable Yashica-type pull tab, Acme's use a simple Mamiya-type flat wheel built onto the top of the camera. Turn the wheel until it stops. Acme's minimalism extends to other features. The model M is just 2 3/4" x 1 1/16" x 3/4" and offers a fixed focus 15mm four element f/5.6 set aperture lens and a set shutter speed of 1/150 second; essentially, a Minox-sized box camera. The model MX is twice as long but has a built in electronic flash and aperture settings for f/3.8, 5.6, 8, 11. The shutter is set at 1/200 second. There is also a very rare infrared model of the MX with a red-light electronic flash. The most advanced model, the MD, competes with the Minox EC. It offers a 15mm f/5.6 focusing lens, exposure meter and, of course, wheel film wind in a package less than 3 3/4" x 1 1/3" wide. The separate electronic flash is even smaller.

The small Acme M design was easily combined with other useful objects. The Japanese Minimax Lite, for instance, combines the basic Acme model M with a butane gas cigarette lighter in a lovely faux-shell finish. The same camera has also been sold as the Slim-Max, and the Enica.

The Chadt Camera produced until very recently in Marienborn, Germany, also uses the Minox cassette and is very very small. Indeed, it fits onto a wrist band. The camera itself is 2" x 1 1/4" x 1/2". It has a set up plastic frame and offers a very good 14.3mm three element lens which can be set to f/4, 5.6 and 11 by turning a small front lever. Oh oh!! A lever! ...And the film is advanced by pushing another small side mounted lever 4 1/2 times. Oh oh!! Another lever! I think this is where I came in....

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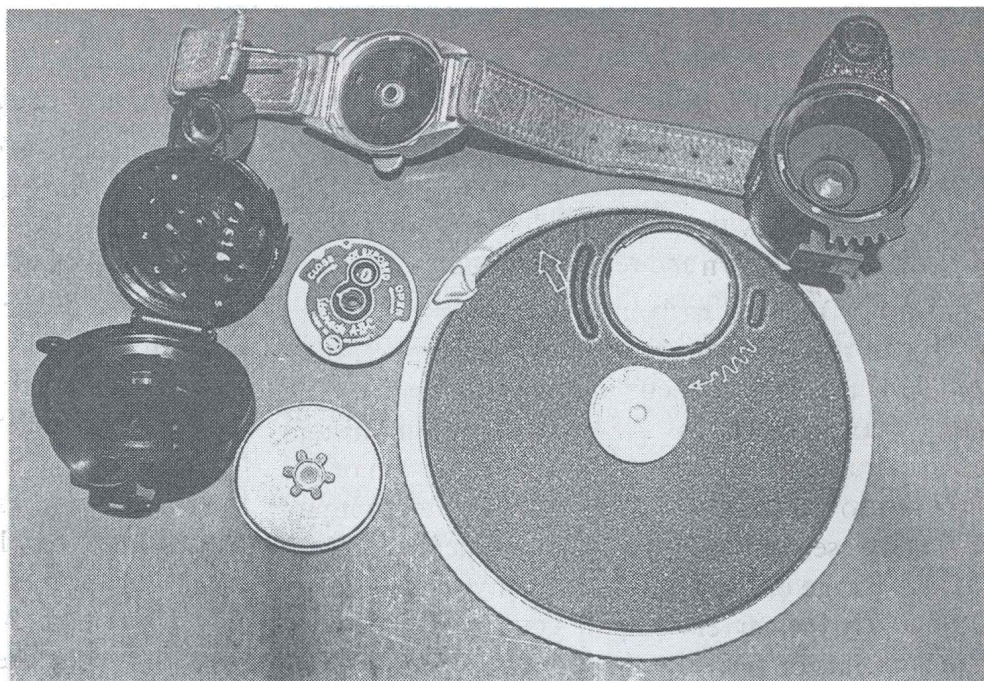
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round film disk 35mm in diameter.

If the Wristmatic's specifications seem skimpy, you should have seen the terrible 4 inch round pictures returned to the camera owner. Not too many people got as far as mailing the film disk back to the factory, however, because the film container was difficult to load into the camera. Other complained that when removing the plastic disk from the camera, all the pictures were exposed. Even normal use posed a challenge. The disk had to be fitted over an hexagonal shaped spindle, which kept the film rotating as the back of the camera was turned. Unfortunately, just a few turns of the film back often stripped the spindle's angles leaving the film permanently stuck in one position. If the spindle did not cause frustration, the film chamber case, which easily popped open, surely did. The bulky Wristmatic, when worn on the wrist, bumped into everything within reach. On the other hand, (no pun intended) attempting to undue the strange clasp and remove the Wristmatic from your wrist offered endless humorous possibilities.

Like so many other photographic novelties, the Wristmatic camera did not do well and the original kit complete with film, instruction book, and styrofoam packing are readily available. You might consider stocking up. Petal Cameras initially sold for about ten dollars and the Expo and Photoret sold for even less than that. As strange as it may seem, future collectors may prize their Wristmatics much as we enjoy Ticka, Petals and Photorets. If this thought does not teach camera collectors due humility, nothing will.

Despite its many peculiarities, one additional chapter remained in the round disk format book. Just a few years later, in 1982, Eastman Kodak introduced the disk camera with 24 individual 8x11mm size negatives turning on a daisy-wheel type rigid plastic core. Rather than making the cameras round and/or as small as the film disk, manufacturers chose to produce a more easily held very flat camera.



Backs removed
L to R: Wristmatic, Steineck ABC and ASR Fotodisc

Unfortunately, this most recent expression of the round film format did not catch on sufficiently for manufacturers to produce a truly fine quality subminiature design.

Despite a long history, the round film disk format failed. Subminiatures using film strips, such as the Expo/Ticka, were easier to use and succeeded. But if the round film magazine was a flop, the concept of a round camera still had appeal to subminiature designers. Indeed, a round subminiature camera using a film strip might be able to use the best of both design possibilities. Consider, for instance, the Fotal, which attempted to capitalize on the spacial efficiency of the round design while using rollfilm. Readers might wish to check the most recent McKeown [p. 191] for a good picture. As McKeown indicates, the Fotal was manufactured by the Fabrik Fotografische Apparate of Lubeck, Germany in 1950. It was only 32mm in length and 50mm in diameter, the size of the Steineck ABC, with the lens and shutter assembly on one end and a collapsible view finder along with a removable back for film loading on the other. The lens, an uncoated 20mm Optar Anastigmat triplet manufactured by E. Rau of Wetzlar, offered a full range of aperture settings from f/2.8 through f/11, set by a lever underneath the faceplate. The Compur Prontor II shutter offered a full selection of shutter speeds from 1 second to 1/250 second and B. Speeds appeared on

the outer face ring or front rim of the camera. A lever directly behind that outer rim adjusted them. Small as the Fotal was, it also offered 5.5 second self timer, single pole flash synchronization and a tripod socket. All of this came in a neat round package no larger than a fat wine cork, and covered in a choice of blue, brown, green and red leatherette.

Rather than using round sheet film, the Fotal produced ten 8x12mm images on the same 9.4mm size film the Minox used, but supplied as rollfilm rather than in cassettes. After loading film through the camera back, turning the small dial on top of the camera moved the film from one roller to another. Curiously, several examples of the camera produced a larger image on 16mm film. Actually, there was no reason why the camera innards could not accommodate this larger film size to produce a bigger, and better, negative.

The Fotal, represented an interesting concept and incorporated almost every desirable feature in a very small package. Alas, engineering and construction were flimsy, especially in the area of film loading and winding, and few Fotals work as they should. This is too bad because several Fotals, each loaded with a different emulsion to meet every conceivable need, could fit into one trouser pocket. Additionally, if ever there was a camera that might easily use binocular attachments, or simple supplementary lenses to advantage, it was the Fotal.

Using antique round film format camera today poses a challenge. Cutting panchromatic film into round circles for the Photoret, the Petal or the Steinbeck ABC and then loading this film into the back of a camera, all in total darkness, is almost impossible. But orthochromatic film is not red sensitive and can be handled quite safely under a red safelight. Moreover, commendably flat 4x5 orthochromatic sheet film is readily available and cutting it to specification is not difficult. You can make a plastic disk of the proper film format size, -- or have any plastic materials shop make one for you-- glue felt to one side, place it on the 4x5 film sheet and cut around it with an Exacto knife. If you do not make a perfect circle, use a small sharp, curved toenail scissor to finish the process.

The results are as expected. The Petal is strictly a better than average daylight camera which will produce decent wallet sized pictures, which is, after

all, what the camera was designed to do. The biggest problem with using the Petal has to do with loading the film into the film hanger before inserting it so that the camera back can then be screwed into place. Interested and determined parties can write to me for a complete description of the process. The Efbe remains as good a performer as any subminiature camera and because it takes interchangeable lenses, is even more versatile as a single-shot camera. Moreover, the film back disk is coated with a soft cork lining and the magnet in the camera body keeps the film nicely in place. If you want to see if your floodlights are casting too deep shadows, if your exposure with electronic flash is adequate or if depths of field is doing what it should, cut half an inch of any film, load it into your magnetic back Efbe in a closet, take the picture and process. Voila!

There are other round cameras we might discuss but most are round only by circumstance. The Pic, for instance, produced in England in 1950, was a round disk shaped 127 size rollfilm camera with a meniscus lens and a simple rotary shutter. If this seems rather mundane--like an ordinary box camera--you understand why the Pic's manufacturer sought to make the camera round to distinguish it from its competition. Similarly, in 1978 the Tizer Company of Japan produced a 110 camera in the shape of a can of Coke and in 1961 Keio Department Stores in Tokyo sold a round Potenza Tire camera, which also used 110 cartridges. In 1983 the Gakken Company of Tokyo produced a Soccer-Ball Camera and several other companies manufactured egg shaped cameras as well. All of these were essentially 110 bar-style box cameras built into an unusual shape as an advertising speciality. Thanks to wonderful modern film quality, every one of them will take pictures.

One additional category of round cameras, ring cameras, merits serious discussion. Ring cameras, however, are very very rare. Because they are also very esoteric and true-one-of-a-type spy cameras, a future column, written in Romanian, will describe them. Next month, however, we will traverse the chasm from the sublime to the ridiculous. Would you believe..... *square* cameras?

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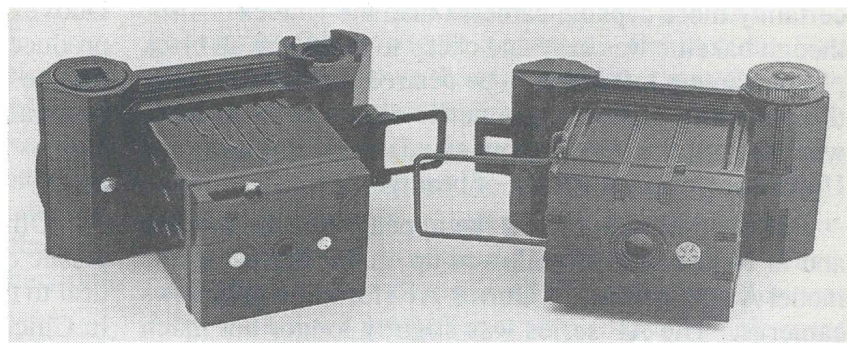
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Subminiatures: Early Bakelite Beauties by Jerry Friedman

Last issue I described several attempts to create subminiature folding bellows cameras such as the Ensign Midget. The bellows concept showed promise because a folding camera could be very very thin. This design also presented several design problems however, such as bent struts, which destroyed the optical to film plane alignment. Unfortunately, subsequent subminiature design completely abandoned the bellows design. One reason for this development was, in a word, bakelite. Bakelite construction was lightweight yet rigid, could overcome all the structural deficiencies of the bellows type strut camera and soon constituted a major category of post World War I subminiatures. Machine molded bakelite was cheap to mold, offered a wide variety of colors and promised to do away with expensive and/or labor intensive materials such as leather and wood. But more than any other single factor, bakelite was an instant success story because it was cheap, cheaper, cheapest.

The Universal/Norton Model A camera, which appeared in 1933, was the single most popular subminiature camera of the 1930s. The camera had been designed for the Universal Camera Corporation by the Norton Laboratory in 1932 but patent disputes led to both companies producing almost identical cameras. The Univex A was only 3 1/2 x 1 7/8 x 2 3/8 inches in size while the Norton was slightly larger. The camera was an instant success and within just a few months, Universal was manufacturing twenty thousand Univex A cameras a day. Sales for 1934 alone reached almost three million cameras.

The camera was simplicity itself. The two halves of the device pulled apart for loading film and then snapped



L-R: Norton and Univex A

together again. Rather than using a mirrored glass finder, the Univex A had a simple foldout wire viewfinder. The single speed everset shutter was inexpensive to build and most continue to function flawlessly over half a century later. The meniscus lens was only capable of taking pictures in bright sun light but few purchasers of the camera used it at any other time. In any event, the camera's low cost overcame most objections. The Univex A sold for an incredible 39 cents. The Norton model, which sold for fifty cents, was soon driven from the market.

The Univex A produced a 28x38mm negative on a rollfilm specially made for it by Geveart in Belgium and marketed only through the Universal Camera Corporation. Only Universal's Univex #00 film had a special v-shaped spool which fit into a v-shaped socket in the camera. Both Ultrachrome Orthochromatic film for ten cents and Ultrapan panchromatic film for fifteen cents were available in six exposure rolls. Universal also sold amateur film developing kits which contained all the chemicals necessary to process film at home.

Essentially, the Univex model A was a rigid bodied Ensign Midget #22 folding strut camera [discussed in last

L-R: Coronet Midget, Sida, and Scenex



issue] with the Midget's large negative benefit and none of its bellows-bred delicacy. The Midget was smaller when closed, of course, and models #33 and #55 were certainly more capable cameras than the Univex. Also, though bakelite was easy and cheap to mold, the all black plastic camera left much to be desired esthetically. The three slightly different geometric or sun burst patterns which adorn the simple front standard did not make the Universal Univex A a thing of beauty.

Universal understood the appeal of a thin camera and in 1935 and 1936 followed up on the success of the model A with a series of Univex AF [for folding] bellows cameras. The AF series was slightly longer but much thinner. It was 4 x 2 1/8 x 7/8 inches closed and only 2 5/8 inches deep when open. The bellows opened easily at the touch of a button and the front standard remained rigid since the lazy-tong struts were spring activated. To give the new folding camera little caché, the body was made from two lightweight stamped metal shells hinged together. In other ways, the folding version was a standard Univex A. It had the same lens and the same pull up wire finder though the shutter was also capable of time exposures. Most important of all, the enameled front standards were attractive. Indeed, the folding version proved so amazingly popular, that special editions soon appeared for the Girl Scouts and as sales promotions for a variety of large corporations. Most important of all, however, the Univex AF series did not suffer from dreaded bent-strut disease; it had spring activated scissor braces and most still work perfectly today. The combination of Houghtons Midget #55 features and Univex AF construction would have created a wonderful thin sub-miniature which also produced a very nice sized image!

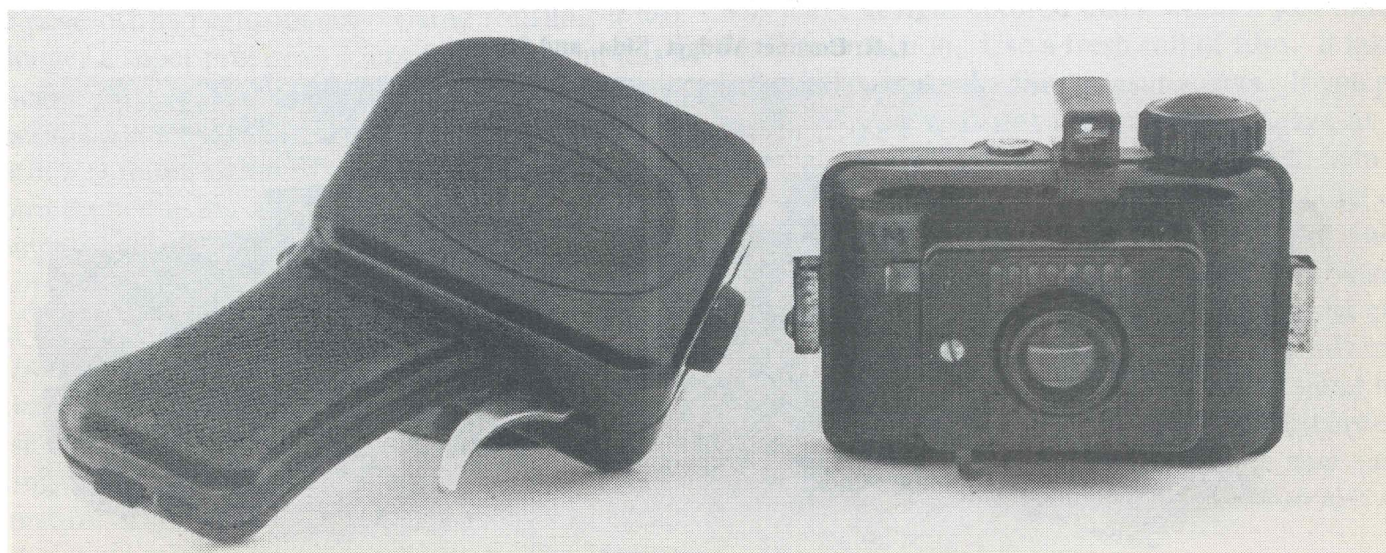
Univex sales figures indicated that 85% of the AF series were sold to women. The message was simple; make it thin, cute and capable. The Univex model A was

simple and the folding versions were that and esthetically pleasant as well. Further attempting to capitalize on the basic Univex A, in 1934 Universal introduced the Duovex, essentially two Univex A cameras aligned to produce a stereo effect. Universal then went on to market the least expensive and capable 8mm home movie camera available. At least one European version of the Univex A, the French Rower camera, appeared during these years.

Other companies also produced inexpensive small plastic cameras. The Scenex from Earl Products, identical to the Cub from American Advertising and Research in Chicago, used 828 film to produce 3x4cm images. These cameras, which cost only fifteen cents, were even less expensive than the Univex A and at 3 1/4 x 2 x 2 1/8 inches, were smaller too. Without seeming ridiculous, the fifteen cent Scenex did not feel quite as substantial as the thirty nine cent Univex A. But then, you get what you pay for.

Across the Atlantic, very small bakelite cameras also sold well. The French Rower camera, manufactured in 1936 by Société Fabrique d'Appareils Photographiques, was a slightly modified Univex A, and was also successful. In England, the Coronet Camera company introduced its own Midget camera in 1934. Compared with the Univex A, this Midget, 1 x 1 1/4 x 2 1/2 inches, was smaller and prettier, but, like the Univex, was essentially a box camera with a simple f/10 meniscus lens and single 1/30 second shutter speed. Indeed, turning the film advance knob and pressing the shutter were the photographer's only responsibilities. A sliding bar directly below the knob permitted locking the shutter lever in place, the Midget's only extra feature. The Midget was a third the Univex A's size, came in a variety of very pretty solid as well as hazy colors including black, blue, red, brown and green and had matching

L-R: Erac Pistol Camera and Maliutka



leather pouches. On the other hand, it cost \$2.50, considerably more than the Univex A's original \$.39, and it made a much smaller negative. Unlike Universal, however, Coronet chose paper backed 16mm film in six exposure strips. The image size was only 18x15mm compared with the Univex's much larger negative.

The Erac Mercury I Pistol Camera manufactured in 1938 by the E.R.A.C. Selling Co. of London placed a simple, if heavy, Merlin all metal camera within a pistol shaped bakelite shell. The camera had only an f/16 meniscus lens and a single shutter speed of 1/30 second. But where the Merlin had at least a viewfinder, the Erac Pistol did without even this basic amenity. But then, one must sacrifice for art

On the continent the Sida was the third example of a popular bakelite beauty. The original version was designed by Fritz Kaftansky in Berlin in 1936. Perhaps because of the commercial success of the metal Univex AF series, Kaftansky also produced an all metal Sida version; for the upscale market, of course. The plastic Sida camera was so successful that by 1940 manufacturers in almost every European country had been licensed to produce their own versions which differed only slightly in detail or color. Indeed, collecting Sida types has become a cottage industry. All Sida/Sidax models were 2 7/8 x 2 1/4 x 1 3/4 inches, had virtually the same single meniscus 35mm f/8 lens with a single 1/30 second everset shutter also capable of time exposures, the same small viewfinder and they all produced decent 25mm square pictures on paper backed rollfilm. The Soviets manufactured the nicest version of the Sida. From 1937 through 1940, the State Optical and Mechanical Factory in Leningrad, also known as GOMZ, turned out tens of thousands of these 'Lilliput Cameras.' Unlike other versions of this camera, which were inevitable black, this Soviet version had a 38mm f/9 lens and the body was, of course, red. The all black Maliutka, produced by the

same factory, was another very small Russian bakelite camera.

Like the Univex A, the Sida was purely utilitarian in shape, but it was far more attractive. Like the Midget, the Sida was easily placed in the pocket and little could go wrong with so simple a camera. Because the Sida made a larger negative than the Midget, it was capable of better pictures, while remaining very small.

Other bakelite cameras, also essentially simple box cameras, also appeared during the years immediately before the second World War. The Nori was manufactured in 1935 by Norisan Apparatebau, in Nurnberg, Germany, as was the very similar Hacon. The Nori was 3 1/4 x 2 1/2 x 1 3/4 inches in size. It had a single speed everset shutter also capable of time exposures and made a negative equal in size to that produced by the much smaller Sida. The Nori, because it was slightly taller, may have been easier to hold and also provided such upscale features as tripod and cable release sockets, and a metal bar running down the back of the camera which held the two piece bakelite body firmly together. The VP Twin, manufactured by Edbar International in England in 1938 was yet another simple bakelite camera which made 3x4cm images on paper backed 127 rollfilm. The camera was 3 1/2 x 2 1/2 x 2 1/4 inches and easily fit into the pocket. The everset shutter was capable of a single speed of about 1/50 second but the camera had many other valuable features. The camera took its twin name from the double ruby windows on the camera back which permitted the camera to make 16 pictures. More impressive, it had a 'Bloomed Bolco Lens' of undesignated speed. 'Optical blooming' was the name given to the same contrast heightening effect multicoating would produce on lenses manufactured after 1975. Blooming, unlike multicoating, however, was the result of repeated lens cleanings which eventually delivered a slight patina haze over the front lens surface which decreased optical flair. Perhaps this was Edbar International's way of indicating they made their lenses from used glass.

If you are beginning to think you now know just about all about subminiature bakelite subminiatures, you are *almost* correct. *Almost*, because bakelite reappeared after World War II, either as a reminder of all that came earlier [to keep us humble] or, as an indication of all that was about to come about [to keep us depressed]. Next month --- > More Bakelite Beauties! Everything *Else* You Wanted to Know about Plastic Subminiatures!

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L-R: Nori (Hacon) and V.P. Twin



By Doug Stewart

One shutterbug wears more than meets the eye

The world's greatest collector of cameras, Jack Naylor has a passion for rarities and a special flair for the clandestine

The young woman in the pink skirt sits alone on a park bench, eating her lunch and reading a book laid out beside her. Barely five feet away, a heavyset man in a blue blazer gazes intently at the facade of Boston's Faneuil Hall through an antique monocular. The woman looks up from her book, glances at the man and goes back to her book. She doesn't notice the tiny lens in the side of the monocular, nor does she hear the click of the shutter as the man captures her fork in midflight.

The man in the blazer is Thurman F. (Jack) Naylor, camera collector extraordinaire, and he's showing me some of his treasures in action. Though he owns everything from rare daguerreotype cameras to prototype Polaroids, today he's demonstrating a few items from his arsenal of concealable cameras. Our pockets are stuffed with them: a turn-of-the-century pocketwatch camera, a leather-bound-book camera, a cigarette-pack camera, even a wristwatch camera.

A passerby catches on to our caper, having noticed the large hole scooped out of the side of an enormous new telephoto lens dangling from Naylor's neck. "Excuse me, is that a right-angle lens?" asks the man, a businessman in his 40s. Naylor assures him that it is. The businessman is clearly intrigued. Naylor

reaches into his coat pocket and produces a pair of antique binoculars with *two* hidden lenses on one side. "Now this one," he tells the man, "takes right-angle pictures in 3-D." Naylor has brought along a copy of the original 1896 ad showing a Victorian beachgoer scanning the horizon for ships while snapping a pair of bathing beauties to his right. The businessman seems ready to offer him cash on the spot.

If there's one thing that Jack Naylor has learned in his explorations of the history of photography, it is that old ideas never die. Good or bad, they just keep turning up in camera catalogs. (The deceptive telephoto is available by mail order for \$34.95, and he knows an outfit in Germany that will sell you a finely crafted wristwatch camera, complete with quartz clockwork, for \$2,500.) And good or bad, old or new, if a camera interests him, he buys it. During the past 30 years, he's encountered cameras that interest him at a rate of four a week. The resulting accumulation is indisputably the most comprehensive collection of cameras in the world.

Naylor's collecting began humbly enough. As a young mechanical engineer and amateur photographer in the late 1940s, he started buying antique-camera patents for 50 cents apiece. "I wanted to see why some of the designs were so incredibly good and others so incredibly bad," he says. For the designs at either extreme, he took to acquiring the cameras themselves. Soon he was buying five or ten cameras a year.

In 1960, he and a partner took over the management of a struggling automotive- and aircraft-parts company. By the time he retired in 1985, the company had plants in 12 foreign countries. Naylor used to visit the major plants every year, the others every second or third year—"unless they were having a revolution." On each trip (including 33 to Japan) he used his spare time to hunt for cameras. He'd often leave Boston with one suitcase and return with two or three.

It looks like the world's largest camera shop

Naylor bought old cameras, new cameras, little cameras, big cameras—any camera anywhere that in his estimation had earned a niche in photographic history. The display area for his various finds grew from a few Sears, Roebuck metal shelves to a 4,000-square-foot, climate-controlled, electronically guarded, underground museum beneath the Naylor's home in a suburb west of Boston. The Naylor Museum of Photography (open by appointment only) holds close to 6,500 cameras along with thousands of rare photographs, photography books, letters and an assortment of related paraphernalia.

At first glance, the museum calls to mind the world's largest camera shop. Cameras of every description

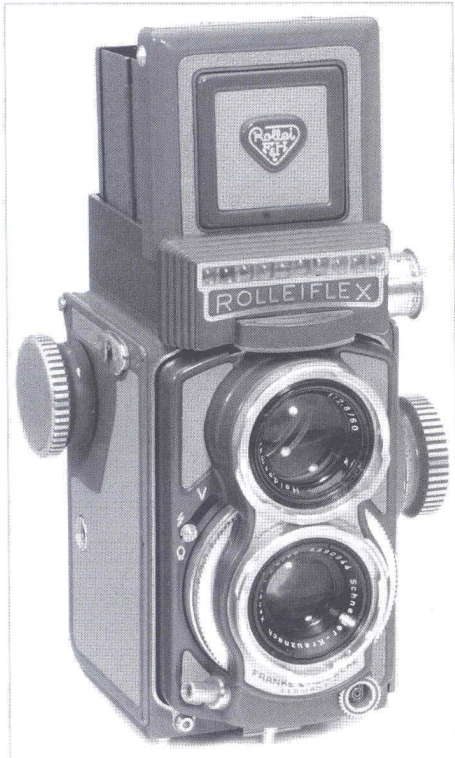
For portrait, Naylor donned 17 spy cameras, some in pockets, six visible; all appear on pages 118-19.

Color photographs by Richard Howard

Raritäten in Köln

Am 24.4.2004 führt das Auction Team Köln seine diesjährige Frühjahrsauktion durch. Das Interesse der Bieter wird sich nicht zuletzt auf Topangebote für die klassischen Sammelgebiete Leitz, Rollei und Kodak-Retina richten.

Wenn wir bei dieser wohl zumindest auch in preislicher Hinsicht gerechtfertigten Reihenfolge bleiben, muss zunächst die Leica 250 GG mit Motor genannt werden. Die

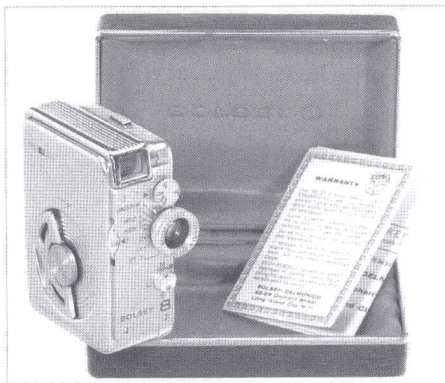


Rolleiflex 4x4 grau mit Belichtungsmesser, Prototyp

250er war übrigens die erste Leica mit Kugellagerung. Solche Feinheiten werden in der Begeisterung über die Spitzenpreise, die eine Leica 250 erreicht und bei der Seltenheit der Kamera schnell übersehen.

Schon mal von einer Leica M4-2 mit der Gravur 25 Jahre gehört? Wahrscheinlich nicht: Diese bisher absolut unpublizierte Kamera wurde aus Anlass des 25-jährigen Jubiläums von Ernst Leitz Canada gefertigt. Das angebotene Stück trägt keine Seriennummer, sondern nur eine Sondernummer (004). Wann hat es das zuletzt gegeben, dass irgend etwas bei oder von Leitz unentdeckt geblieben wäre?

Das Leitz-Angebot wird nach „unten“ abgerundet durch eine IIIa in grauer Lackierung, wie man hört, im sauberen Zustand und von geprüfter Herkunft. Überhaupt macht Breker bei der Kampagne gegen



Bolsey 8

Leica-Fälschungen an der Stelle weiter, an der er und sein Team schon seit einiger Zeit

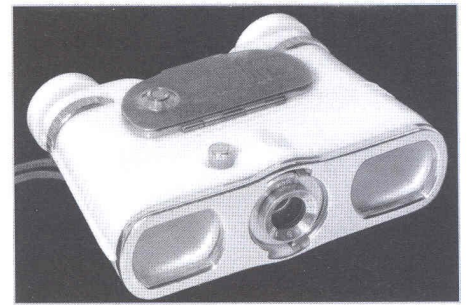


Leica 250 GG mit Motor

arbeiten und veröffentlicht wieder Nummern von Leicas, die ihm angeboten worden sind, die sich aber nach genauer Prüfung als Fälschungen herausgestellt haben.



Coronet Midget „Artic“



Binoca Picture Binocular

Das Rollei-Angebot wird einmal mehr von Prototypen dominiert. Eine Rolleiflex (man ist geneigt zu sagen 4x4) in Vorkriegsausführung im echten Kleinbildformat 24x36 mm, eine Nachkriegs-4x4 in grau mit Belichtungsmesser, eine Rollei 16 L (!) und eine Rolleicord als Farbmuster-Version für eine niemals realisierte Exportversion können sich sehen lassen.

Vom Seltenheitsgrad her braucht sich das Angebot von Stuttgarter-Kodak Prototypen absolut nicht zu verstecken. Eine Retina IIa (Nachkrieg) als Version mit eingespiegeltem Leuchtrahmen ist zunächst zu nennen.

Kodak hat nach dem Krieg die Entscheidung getroffen, in Stuttgart nur noch Kleinbildkameras der Typen Retina oder Retinette zu bauen. Ein Muster für eine 6x6 Klappkamera mit eingebautem Belichtungsmesser muss noch vor dieser Entscheidung gefertigt worden sein. Eine ganze Reihe weiterer Prototypen aus dem



Kodak 6x6 Klappkamera mit E-Messer Prototyp

Hause Kodak (u.a. eine weitere 6x6 Klappkamera, allerdings ohne E-Messer und einige Instamatic Modelle) runden das Angebot ab.

Abschließend noch erwähnenswert: mehr als 200 Kleinbildkameras sind außerdem im Angebot.





Charlie Tuna camera was for canned-tuna promotional campaign. Naylor has a matching lamp and radio.

during a camera show in Michigan. "The only 'dark-room' we could find was my bathroom at the hotel," he recalls. The developing chemicals—mercury and iodine—were not only corrosive but lethal. As the three of them worked, the room grew hot and increasingly fume-filled. Chemicals began to spill. Naylor broke the toilet seat while struggling to open a stuck window draped with a blanket. "We ruined the floor," he says, "and we had to buy a new toilet seat and replace the floor."

Some of the early "portable," wet-plate cameras, used by landscape and travel photographers in the mid-1800s, were little more than darkrooms on wheels; they resembled steamer trunks and were carted about the countryside on wheelbarrows. With the introduction of dry plates, processing could be delayed and cameras became smaller and tripod-free. By the 1880s, detective cameras were the rage. These were mostly compact, nondescript wooden boxes that were simple to operate and had neither cloth hood nor protruding lens. Detectives may have used them, according to Naylor, but the real market was well-to-do amateur photographers interested in snapping women on the street to whom they had not been granted an introduction.

Once the public caught on to the ruse, manufacturers offered more imaginative disguises, bringing out hat cameras, cravat cameras, even hot-water-bottle cameras. Naylor owns a rare 1886 vest camera with a lens that fits through a buttonhole. "The instructions tell you to expand your chest and pull in your gut when taking a picture, to avoid getting too much sky," he explains.

Variations on the detective camera continue to turn up, some more clever than others. Among the latter in Naylor's collection is the Doryu II, a Japanese make of the mid-1950s that looks remarkably like a Colt .38 automatic. The Doryu even packs a .38 clip in the



Tiny Coronet cameras of Bakelite came in British cereal boxes to mark Edward VIII's coronation in 1936.



Panoramic photograph of the Naylor Museum was taken with a Hulcherama—a modern, motor-driven

camera that is mounted on a tripod and revolves 360 degrees, recording the image on ordinary 120 film.

jam the immaculate glass shelves rising from floor to ceiling on all sides. Resting safely on the floor is one of probably the world's heaviest cameras (642 pounds), a huge Kodak reflex camera with three lenses, built to take multiple photographs—of the first H-bomb blast at Eniwetok. Nearby sits a camera from a U-2 spy plane—so sharp that from 13 miles up it records ground details four inches apart. Everywhere wooden cameras on carved tripods stare blankly at visitors. There are cameras used by photojournalist Margaret Bourke-White and strobe pioneer Harold Edgerton, rare prints by Ansel Adams and Julia Margaret Cameron, even George Eastman's suicide note.

Not all the items on display have so clear a place in camera history. Naylor leads me through the labyrinth to a multicolored row of tiny Coronet Midgets. "These came in cereal boxes for the British coronation in 1936," he says. Naylor has all five colors: rose, walnut, olive, blue and black. "Blue is always the hardest to find." Farther down the aisle, he points out a plastic Charlie Tuna camera next to a Charlie Tuna radio and a Charlie Tuna lamp. "It may be the only set in America," he says. He's laughing, but he still took the trouble to acquire it.

Among Naylor's strangest finds is his pigeon camera. Called the Doppel Sport, fewer than ten are known to have survived World War I. The camera is strapped to the underside of a homing pigeon that



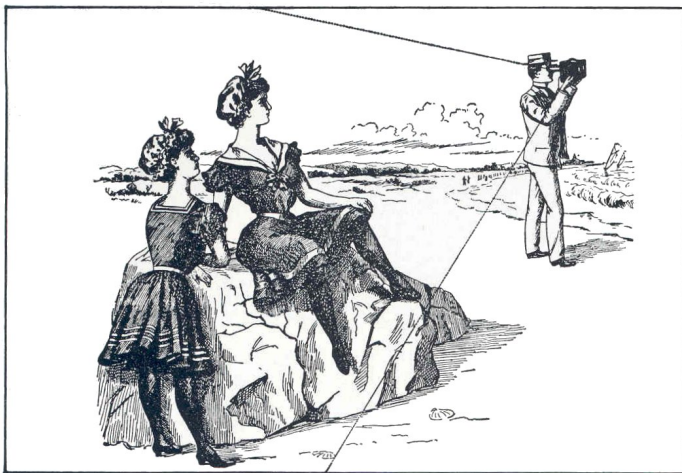
Yankee Multiplier, 1870, has nine lenses and device in back that moves a plate to take 525 tiny tintypes.

Smithsonian

October 1987

Eyes for spies

A cunning camera designed to be concealed in a garter is one gem in a unique photography museum (p. 108)



Deceptive Angle box camera of 1890s was advertised as a detective camera, but obviously had other uses.



In Boston market, Naylor uses Monocular Deceptive Angle Camera of 1869 to photograph seated woman.



Naylor's demonstration of right-angle camera made this picture of the woman above as she ate her lunch.

a picture. The box has room for two real cigarettes in case someone troubles you for a smoke. "The Russians made this in the early 1960s," says Naylor, demonstrating the proper one-handed shooting style. "It was used by their KGB agents working in England."

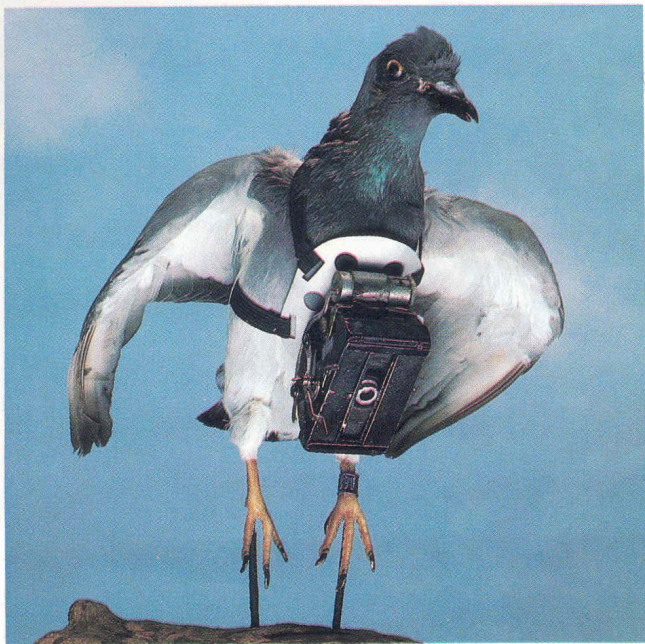
Apparently, no one in the West had ever noticed one until Naylor acquired this in early 1986. Last year, in what passes for a pawnshop in the Soviet Union, he met a well-dressed black marketer with a decidedly un-Bolshevik pompadour. The Russian took his request for rare Russian cameras under advisement. A few months later, a "mutual friend" called Naylor from Manhattan and asked if he'd be interested in a KGB spy camera. "From then on," says Naylor, "I answered every question with 'Yes.'"

The man suggested a rendezvous at a Third Avenue coffee shop. Naylor said fine, he'd be carrying a copy of *Shutterbug* under his arm. At the appointed hour, the two ordered coffee from adjoining stools at the lunch counter, then made their swap. The Russian left without opening his envelope (containing \$2,000 in cash) and Naylor left without opening his box. "Sure it was risky," he says now, "but it's a risk you have to take." He has no doubt it's a genuine spy camera. The Russians, he explains, do not make novelties.

Like offering some cheese to a mouse

Naylor's most thrilling find occurred only three miles from his home. A woman in Boston was living in a house that had belonged to her great-grandfather, a professional photographer from 1848 to 1862. His equipment was still piled in the attic and the woman was now selling the house. How much, she wondered, would Naylor charge her for an appraisal of the pile? "That was like offering a mouse some cheese outside the trap," he says. By the light of a single bare bulb, he made out a dusty stack of disassembled cameras nearly six feet high. He returned with lights, extension cords and work clothes, and spent the next three days cleaning, sorting and assembling around the clock. "It was like a jigsaw puzzle," he recalls. "All the parts were there." When he was through, he had pieced together nine complete daguerreotype cameras. The world total is barely 100. One of the cameras Naylor assembled, called a Mammoth Plate, turned out to be the largest Daguerrean camera in existence—"the size of a doghouse," as he puts it. He ended up buying seven of the nine, including the Mammoth Plate camera. "I feel like I've been in clover ever since," he says.

Like a proud grandfather, Naylor has added a snapshot of the Mammoth Plate to the stack he carries in his pocket. In fact, to show scale, his 10-week-old grandson appears in the same picture. The camera is by far the bigger of the two.



Doppel Sport Pigeon Camera has spring-loaded timer; Germans “flew” it in World War I to spy on French.



Hidden in makeup case, 1926 Photo Vanity camera came with accessories—powder puff, lipstick, rouge.

handle (for flash “bullets”). The picture-taking part is contained in a small attachment near the muzzle, which only makes the device appear more sinister, as though it were equipped with some kind of silencer or poison-gas dispenser. “No one bought the bloody thing,” Naylor tells me as I carefully squeeze the shutter-trigger without pointing it at my host. “Who’s going to stand still and let someone point *this* at them?” he asks. The merchandiser’s loss, of course, is the collector’s gain.

Naylor learned firsthand of the Doryu’s impracticality the day he bought it. An acquaintance in Iowa called to offer him the camera, provided he appeared immediately with \$1,200 in cash. Naylor grabbed an empty briefcase, stopped at the bank and caught the next flight to Des Moines. He was on his way home a few hours later with the Doryu in his briefcase when an airport security guard noticed the outline of the camera on the x-ray screen. “The young lady was screaming ‘Gun!’ I was saying ‘No, camera,’ but it was a waste of time,” Naylor recalls. Armed men converged from all sides. He was frisked, led away and interrogated for more than an hour by a succession of state policemen. Finally, thanks in part to the snapshots of his museum that he carries with him at all times, he was let go. But the police insisted that the camera travel to Boston in the custody of the pilot.

If the Doryu was impractical, a number of other undercover cameras were both ingenious and utilitarian. Visitors to the museum are invariably drawn to the case containing modern spy cameras. There is shelf after shelf of them—tiny, quiet cameras that often fit in the palm of one hand. On display is an original 1937 Minox, a still-popular camera barely bigger than a pack of chewing gum, used by both spies and self-conscious tourists. There are cameras disguised as matchboxes, cigarette lighters, fountain pens and rings. In a satin holster sewn to a black lace garter is a rare Japanese Petal camera from 1948 (see cover), said to have been worn by female Japanese spies. The *Guinness Book of World Records* deems it the world’s smallest marketed camera, but Naylor says undercover operatives today use smaller ones than this. I ask him how he knows. “I’ve seen them,” he whispers. More than that he prefers not to say.

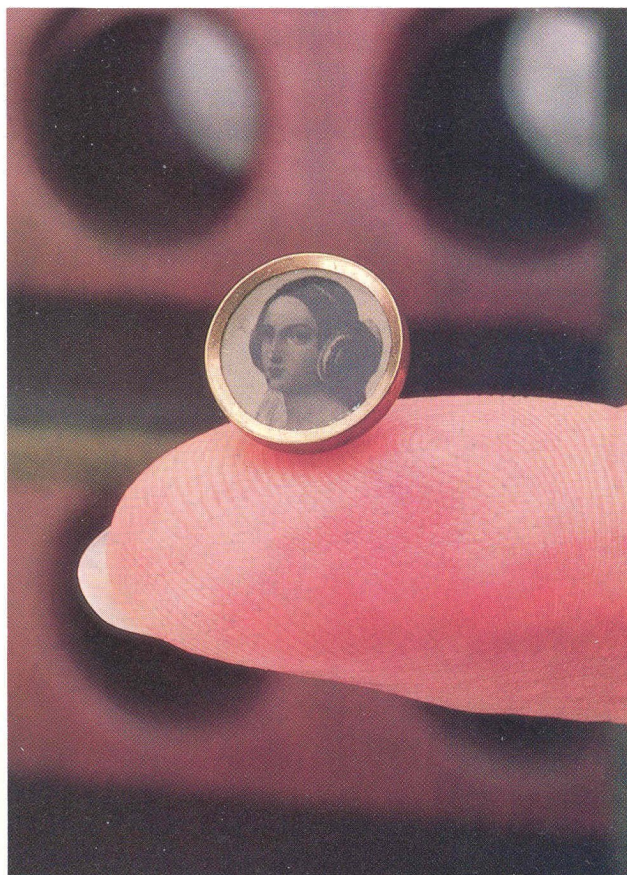
The prize of his spy collection is what appears to be a pack of 100mm, filtertip, John Player cigarettes. The box is black with gold lettering, an exact replica of the English brand, but the box is aluminum and so is the clump of cigarettes poking out from the top. Push down the clump and you wind the film. Press a tiny button on the side and the camera buried inside takes

Doug Stewart is a frequent contributor; he last wrote on the art of demolition in the December 1986 issue.



At far left is a case of the earliest photographic equipment; toward center is replica of 1860 studio

(with mannequin); right of center is room with first movie projectors; far right are miniature spy cameras.



Tintype taken by Yankee Multiplier is set into jewelry; another use of camera's product was on calling cards.

has been stuffed for exhibition. The German Army, much to the amusement of the French Army, tried to use these cameras for aerial surveillance. A spring-loaded timer triggered the lens, which swept from one side to the other to take a single panoramic shot of whatever lay below. "It took me 15 years to find one," he comments. "I think the others all crashed."

Naylor is clearly a man with a well-developed obsession. A courtly and prosperous 66-year-old, he abhors small talk unless the subject is photography. He used to constantly visit dealers, auctions, flea markets, antique shops, camera shows and private homes to fill gaps in his collection, gaps that to an outsider can seem narrow indeed. "Now I just wait for the phone to ring," he says. "There are about 30 to 40 more cameras that I'd like to get before I toss in the towel." But he admits that acquiring them is not very likely to dull his appetite for more. When he finds a camera on his must-have list, he usually gets it. Some of the biggest photographic auctions are in Germany, for instance. "I can't speak German," he says. "If I want something, I just raise my hand. I keep my hand up until I get it."

Naylor takes particular pride in his acquisitions from the earliest days of photography, when cameras were huge and taking pictures was an unwieldy enterprise. He and two fellow camera buffs once went so far as to shoot and develop a daguerreotype photograph



ABB. 2

- 2 Nach Ablauf einer Minute kippe man den Tank und bringe ihn wieder in die aufrechte Stellung zurück (siehe Abb. 2).
- 3 Während der Entwicklungszeit kippe man den Tank nach jeweils einer Minute erneut.

FIXIEREN

Nach der erforderlichen Entwicklungszeit nehme man die Kappe ab und gieße den Entwickler aus. Hierauf fülle man das Fixierbad ein und drehe die Spirale während des Fixierens mit dem Rührstab. Nach dem Fixieren ist der Film nicht mehr lichtempfindlich, und man kann den Deckel abnehmen.

WÄSSERN

Man nehme den Deckel ab und wässere den Film, indem man ihn unter einen Wasserhahn stellt, so daß das Wasser durch die Mittelsäule strömt. Ein wirksames Wässern erzielt man, wenn man den PATERSON-DRUCK-FILMWASSERER benutzt, der einen kräftigen Wasserstrom unter Druck vom Boden des Tanks nach oben gewährleistet. Man kann ihn mit oder ohne aufgesetzten Tankdeckel verwenden. Ein Doppel-Filmwässerer ist zum gleichzeitigen Wässern von zwei Tanks erhältlich.

HERAUSNEHMEN DES FILMS AUS DER SPIRALE

Um den Film aus der Spirale zu nehmen, wölbe man das Filmmende durch geringen Druck auf die beiden Ränder, ziehe leicht am freien Ende und lasse die Spirale auf der anderen Hand sich drehen, worauf die ganze Filmlänge bei der Drehbewegung leicht aus der Spirale läuft. Zum Trocknen sollte der Film dann mit Klammern oder Stiften aufgehängt werden.

ENTWICKELN VON FARBFILMEN

PATERSON-Tanks eignen sich besonders gut zum Entwickeln von Farbfilmen einschließlich der Umkehrfilme, die beim Entwickeln einer Zweitbelichtung ausgesetzt werden müssen. Sie kann durch die Flansche der Spirale erfolgen, ohne daß man den Film aus der Spirale zu nehmen braucht.

Da die Spirale aus einem wenig durchsichtigen Material besteht, empfiehlt es sich, die bei völlig durchsichtigen Spiralen vorgeschriebene Zweitbelichtungszeit zu verdoppeln z.B. je Seite 1 ganze statt $\frac{1}{2}$ Minute.

PFLGE UND LAGERUNG

Den Tank nach Gebrauch gründlich waschen. Man lasse Wasser von beiden Seiten durch den Deckel laufen, um etwaige Restchemikalien aus dem Lichtschleusensystem zu entfernen.

Man versichere sich, dass der Tank und die Spirale nach Gebrauch und vor Aufbewahrung vollkommen trocken sind.

Den Federkragen getrennt im Tank aufbewahren. Wird der Kragen bei der Aufbewahrung auf der Säule gelassen, so kann sich die Federwirkung vermindern.

SVILUPPATRICI PATERSON MULTI-UNIT

Queste sviluppatrici sono più lunghe per poter inserire più di una spirale e per consentire lo sviluppo simultaneo di un certo numero di pellicole. Poiché le spirali sono regolabili si possono sviluppare contemporaneamente tante combinazioni di pellicole di vario formato, a condizione che i tempi di sviluppo di queste pellicole siano simili. Vi sono tre sviluppatrici:

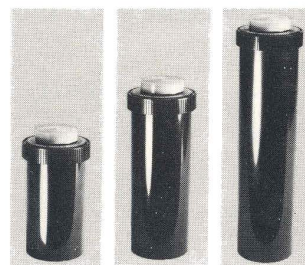
MULTI-UNIT:

Multi-unit 1 può contenere
fino a 3 pellicole 35mm o 126
o 2 pellicole 127
o 2 pellicole 120 o 220

Multi-unit 2 può contenere
fino a 5 pellicole 35mm o 126
o 4 pellicole 127
o 3 pellicole 120 o 220

Multi-unit 3 può contenere
fino a 8 pellicole 35mm o 126
o 6 pellicole 127
o 5 pellicole 120 o 220

Le sviluppatrici Multi-Unit vengono vendute senza spirali dato che il numero e tipo di spirale varia secondo le esigenze di ogni cliente. Le spirali e tutte le altre parti delle SVILUPPATRICI PATERSON SISTEM-4 sono intercambiabili ed acquistabili separatamente. Così, ogni sviluppatrice SISTEM-4 può essere trasformata in un altro modello acquistando semplicemente le parti necessarie. Si può, per esempio adoperare il coperchio e la spirale di un modello singolo e trasformarlo in una sviluppatrice Multi-Unit aggiungendo il corpo adatto e le spirali supplementari. Le spirali caricate vengono spinte nella colonna centrale nera.



MULTI-UNIT 1

2

3

Quando l'ultima spirale è stata sistemata sovrapporre il fermo a molla.

La quantità di soluzioni necessarie per ogni pellicola sono stampigliate sul fondo del corpo della sviluppatrice. Il volume totale di soluzione necessaria per ogni numero di pellicole (o per ogni combinazione di pellicole di formato diverso) è facilmente calcolabile addizionando le quantità necessarie per ogni pellicola singola. Per esempio, per 3 pellicole da 35mm., che necessitano di 10 ozs (283 cc.) ciascuna, un totale di 30 ozs (850 cc.). Se si sviluppano assieme 1 pellicola da 35mm., 1 da 127 ed 1 da 120, il volume totale necessario è di 10 ozs. (283 cc.) + 13 ozs. (368 cc.) + 17,5 ozs. (496 cc.) = 40,5 ozs. (1147 cc.).

Quando si usano un minor numero di spirali rispetto alla possibilità della sviluppatrice è sufficiente soluzione solo per quanto basti a coprire le pellicole da sviluppare.

PATERSON SYSTEEM 4 ONTWIKKELTANKS

SPECIALE ATTENTIE

Systeem 4 tankspiralen zijn gemaakt van acetiaal harsmateriaal, dat zeer goed bestand is tegen fotografische oplossingen en dat temperaturen tot 100°C. kan verdragen.

Alle andere zwarte delen van de tank zijn vervaardigd van polystyreen, dat zeer goed bestand is tegen fotografische chemicaliën maar nadelig beïnvloed kan worden door hitte of door organische oplosmiddelen zoals aether. Deze delen moeten dus niet gespoeld worden in water dat heter is dan de handen kunnen verdragen, en ook niet dicht bij vuur of radiatoren geplaatst worden.

GEBRUIKSAANWIJZING

VERSTELLEN VAN DE SPIRAAL

De spiralen zijn verstelbaar voor 3 filmbreedten: 35mm. en 126, 127, en 120/220.

Verwijder de spiraal uit de zwarte middenkolom en stel hem af op de maat van de gebruikte film. Om dit te bereiken, houd de spiraal met de insteekpunten van de film omhoog en naar U toe. Draai de rechter schijf stevig naar rechts totdat de tegenwerking van de grendelinrichting overkomen is. Men hoort een zachte klik als de schijven vrij zijn en van elkaar af bewogen kunnen worden. De instelling voor iedere filmbreedte wordt gecontroleerd door een grendelbaan op de middenkern. Als de schijven op de juiste afstand van elkaar af zijn, draai ze dan stevig in de tegengestelde richting om ze vast te zetten. Als de schijven helemaal uit elkaar genomen worden,

zorg ervoor dat de twee kerven samen vallen bij het weer in elkaar zetten.

LADEN VAN DE SPIRAAL

Dit moet in het donker geschieden. Knip bij 35mm. films de aanloopstrook af, tussen de perforaties, niet erdoorheen. Bij rolfilms is het 't beste de film af te rollen en geheel van het schutpapier te ontdoen alvorens hem op de spiraal te spoelen. Houd de spiraal in de linkerhand met de insteekpunten tegenover elkaar en naar U toe. Steek het einde van de film in de gleuven in de spiraal en duw het ongeveer een halve slag naar voren. De randen van de film zijn dan geklemd tussen het kogelmechanisme en de film kan niet uit de spiraal getrokken worden.

Houd nu de spiraal zoals afgebeeld op fig. 1 en draai de twee helften van de spiraal tegengesteld voor- en achterwaarts. Een blokkeerinrichting verhindert de spiralen, te ver door te draaien. De film wordt door het kogelmechanisme direct in de spiraal getrokken en de gehele lengte zal gemakkelijk naar binnen gaan. Draai de spiraal rustig en gelijkmatig. Let vooral op de houding van de duimen (fig. 1) die over de randen van spiraal en film heen liggen. Het plaatsen van de duimen in deze positie bevordert het gemakkelijk inspoelen van de film in de spiraal. Als de film blijft steken om een of andere reden, forceer dan niet, daar de film zou kunnen scheuren. Haal de film eenvoudig uit de spiraal (zoals hierna beschreven wordt) en begin opnieuw.

Als U niet gewend bent met spiralen te werken, verdient het aanbeveling te oefenen met een reserve film en uw ogen dicht. Als dit geen

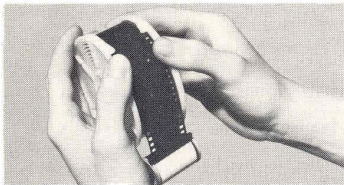


FIG. 1

impara a caricare una pellicola impressionata, al buio.

Nella maggioranza degli apparecchi fotografici moderni 35mm., la pellicola viene avvolta sulla bobina di trasporto nel senso contrario a quello della sua curva naturale. Ciò stira la pellicola causando difficoltà nel caricare gli ultimi 5 cm. della pellicola nella spirale, poiché la pellicola 'stirata' non si adatta tanto facilmente alle guide interne della spirale. Si evita questa difficoltà se la pellicola esposta viene riavvolta nel suo caricatore e lasciata così un paio di ore prima di caricare la spirale, in modo che riacquisti la sua curvatura naturale. Durante il caricamento bisogna conservare con cura la curvatura della pellicola tenendo il rotolo in mano o sul tavolo.

Dopo il caricamento, spingere la spirale completamente nella colonna centrale nera indi collocare il fermo a molla onde la spirale non muova quando si rovescia la sviluppatrice per l'agitazione, e ricollocare la spirale nella sviluppatrice. Assicurarsi che l'anello di guarnizione sia nella posizione giusta sul bordo della sviluppatrice ed avvitare il coperchio sulla sviluppatrice. La sviluppatrice è ora a tenuta di luce e tutte le altre operazioni possono esser eseguite in piena luce diurna.

SVILUPPO

Le quantità di soluzioni necessarie per ogni formato di pellicola sono stampigliate sul fondo di ogni sviluppatrice.

Versare la quantità necessaria di soluzione attraverso il foro centrale del coperchio. NON INCLINARE la sviluppatrice durante il riempimento. La sviluppatrice è costruita in modo da permettere un riempimento estremamente rapida quando è dritta e la soluzione ricopre uniformemente la pellicola dal basso in alto, evitando striature e sviluppo non uniforme.

AGITAZIONE

Il metodo consigliato per l'agitazione è il rovesciamento. Questo metodo è il più efficace per prevenire uno sviluppo non uniforme. Si consiglia di procedere nel modo seguente:

- 1 Dopo aver riempito di sviluppo, inserire la bacchetta agitatrice indi girare la spirale in avanti ed all'indietro, per alcuni secondi, per rimuovere le bollicine d'aria che possono formarsi sulla superficie della pellicola. Impartire moderati colpi, battendo il fondo della sviluppatrice contro il banco, per agevolare la rimozione della bolle d'aria. Mettere il piccolo cappuccio impermeabile sul coperchio ed attendere un minuto per far saturare la pellicola con la soluzione.

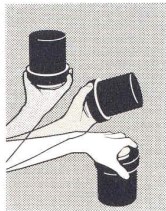


FIG. 2

- 2 Dopo un minuto rovesciare la sviluppatrice ed immediatamente raddrizzarla (vedi figura 2).
- 3 Rovesciare una volta ogni minuto durante il tempo di sviluppo.

FISSAGGIO

Dopo avere sviluppata la pellicola per il tempo necessario togliere il piccolo cappuccio e versar fuori lo sviluppo. Riempire con il fissaggio ed agitare periodicamente durante il tempo di fissaggio. Dopo il fissaggio la pellicola non è più sensibile alla luce e si può togliere il coperchio della sviluppatrice.

LAVAGGIO

Togliere il coperchio e lavare la pellicola mettendo la sviluppatrice sotto un rubinetto in modo che l'acqua scorra attraverso la colonna centrale. Si ottiene un lavaggio più efficace usando l'INIETTORE PATERSON PER LAVAGGIO che assicura un flusso efficiente di acqua sotto pressione dal fondo della sviluppatrice in giù. Quest'iniettore può esser usato con o senza coperchio sulla sviluppatrice.

PER TOGLIERE LA PELLICOLA DALLA SPIRALE

Per togliere la pellicola dalla spirale, incurvarla all'estremità libera piegando leggermente e contemporaneamente i due bordi. Tirare dolcemente l'estremità libera permettendo alla spirale di girare e l'intera lunghezza della pellicola scorrerà facilmente fuori della spirale mentre essa gira. La pellicola viene dopo agganciata con le pinze e messa ad asciugare.

SVILUPPO A COLORI

Le SVILUPPATRICI PATERSON sono adatte in modo particolare per lo sviluppo di pellicole a colori, quelle invertibili incluse, che necessitano della seconda esposizione alla luce durante lo sviluppo. Non è necessario togliere la pellicola dalla spirale per questa ri-esposizione, poiché questo si può effettuare attraverso le flange della spirale.

Poiché le spirali sono di materiale translucido il tempo di ri-esposizione alla luce consigliato per spirali trasparenti deve essere raddoppiato, cioè 1 minuto per lato invece di 30 sec.

MANUTENZIONE E CONSERVAZIONE

Lavare la sviluppatrice con cura dopo l'uso. Far scorrere l'acqua attraverso il coperchio, da ambo i lati, onde asportare gli eventuali prodotti chimici di residuo dagli elementi di chiusa luminosa.

Assicurarsi che la sviluppatrice e la spirale siano assolutamente asciutte dopo l'uso e prima di riporle.

Sistemare il fermo a molla a parte poiché, se viene lasciato nella colonna, l'elasticità della molla può venir pregiudicata.

PATERSON-MEHRFACH-TANKS

Diese Tanks haben besonders lange Körper, die mehr als eine Spirale aufnehmen und gestatten, gleichzeitig eine Anzahl Filme zu entwickeln. Da sich die Spiralen verstellen lassen, kann man Kombinationen verschiedener Filmformate gleichzeitig bearbeiten, vorausgesetzt, sie haben gleiche Entwicklungszeiten. Es sind folgende drei Mehrfach-Tanks erhältlich:

Mehrfach-Tank 1

faßt bis zu 3 Filme 24 x 36 oder Nr. 126
oder 2 Filme Nr. 127
oder 2 Filme Nr. 120 oder Nr. 220

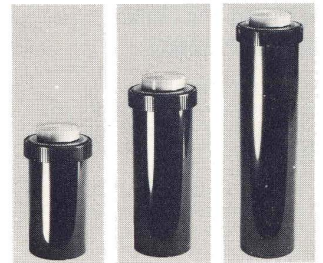
Mehrfach-Tank 2

faßt bis zu 5 Filme 24 x 36 oder Nr. 126
oder 4 Filme Nr. 127
oder 3 Filme Nr. 120 oder Nr. 220

Mehrfach-Tank 3

faßt bis zu 8 Filme 24 x 36 oder Nr. 126
oder 6 Filme Nr. 127
oder 5 Filme Nr. 120 oder Nr. 220

Mehrfach-Tanks werden ohne Spiralen verkauft, da Anzahl und Modell der Spiralen von den Anforderungen des individuellen Gebrauchs abhängen. Die Spiralen ebenso wie alle übrigen Bestandteile der PATERSON-System 4-Tanks sind gegenseitig austauschbar und einzeln erhältlich. Somit läßt sich jeder System-4-Tank durch Zukauf der Ersatzteile einfach in ein anderes Modell verwandeln. Beispielsweise kann man Deckel und Spirale des Einzeltank-Modells benutzen und es in einen Mehrfach-Tank verwandeln, indem man den geeigneten Körper und eine zusätzliche Spirale dazunimmt. Die geladenen Spiralen werden auf die schwarze



MEHRFACH-TANK 1 2 3

Mittelsäule geschoben. Man achte darauf, daß alle Spiralen ganz auf der Säule aufsitzen. Wenn die letzte Spirale auf ihrem Platz ist, drücke man den Kragen aus Federn von oben darauf. Die für jeden Film erforderlichen Lösungsmengen sind unten am Tankkörper eingraviert. Die Gesamtmenge an Lösung, die für jede Zahl von Filmen (oder für jede Kombination an Filmen unterschiedlicher Größe) benötigt wird, läßt sich leicht durch Zusammenzählen der für jeden einzelnen Film erforderlichen Menge berechnen, beispielsweise braucht man für drei Kleinbildfilme (24x36mm) je 284 ccm, zusammen also 850 ccm. Wird je ein Kleinbildfilm, ein Film Nr. 127 und ein Film Nr. 120 zusammen bearbeitet, dann beträgt die erforderliche Gesamtmenge 284 ccm + 369 ccm + 496 ccm = rd. 1150 ccm. Benutzt man weniger als die volle Zahl an Spiralen, dann genügt eine Lösungsmenge, die ausreicht, um die Zahl der zu bearbeitenden Filme zu bedecken.

SVILUPPATRICI PATERSON SISTEMA 4

NOTA SPECIALE

Le spirali della sviluppatrice Sistema 4 sono di resina acetaleide di elevatissima resistenza alle soluzioni fotografiche ed a temperature anche di 100°C.

Tutte le altre parti nere in Polistirene materiale maggiormente resistente alle soluzioni fotografiche e non al calore od a solventi organici come per es. etere. Dette parti si devono lavare con acqua tiepida e non tenerle nelle vicinanze di una fiamma o di un calorifero.

ISTRUZIONI PER L'USO

REGOLAZIONE DELLA SPIRALE

Le spirali sono regolabili per 3 larghezze diverse di pellicola: 35mm. e 126, 127 e 120/220. Togliere la spirale dalla colonna nera centrale e regolarla al formato della pellicola da adoperare. Trattenere la spirale con i punti di entrata della pellicola rivolti in alto, e verso chi compie l'operazione. Girare la flangia destra verso destra, fino a vincere la resistenza del bloccaggio. Quando si percepisce uno scatto è indizio che le flangie sono disinnestate e possono venir separate. La regolazione del formato di ciascuna pellicola è controllata da una cava per chiavetta sul nucleo centrale. Quando le flange sono state debitamente separate, girarle nel senso opposto e bloccarle. Se le flange vengono separate completamente, quando vengono nuovamente montate, far coincidere i due intagli situati sul nucleo.

CARICAMENTO DELLA SPIRALE

Questa operazione deve essere effettuata al buio. Per le pellicole 35mm., tagliare la parte iniziale a metà larghezza tra le perforazioni e non attraverso di esse. Per le pellicole più grandi (rollfilm) è meglio svolgere la pellicola e separarla completamente dalla carta di protezione prima del caricamento. Tenere la spirale con la mano sinistra con i punti d'ingresso corrispondenti tra di loro e rivolti verso di Voi. Inserire l'estremità della pellicola nei canaletti della spirale e spingerla in avanti per circa mezzo giro della spirale. I bordi della pellicola saranno in tal modo agganciati dal meccanismo a cuscinetti e la pellicola non può esser estratta dalla spirale.

Tenere la spirale come illustrato nella fig. 1 e far semplicemente oscillare le due metà della spirale in avanti ed indietro in direzioni CONTRARIE per l'entità del loro giuoco. Vi è inserito un dispositivo d'arresto per evitare che le spirali vengano fatte ruotare eccessivamente. La pellicola sarà trascinata direttamente e facilmente per tutta la sua lunghezza nella spirale dall'azione del cuscinetto a sfera; girare la spirale con movimento continuo. Notare in particolare la posizione dei pollici (fig. 1) che sovrastano i bordi della spirale e della pellicola. I pollici della mano, in questa posizione, aiutano a guidare la pellicola nella spirale.

Se la pellicola s'incepta, non forzarla, per nessun motivo poichè si potrebbe lacerare. Togliere semplicemente la pellicola (come descritto più avanti) e cominciare di nuovo.

Se non si è pratici a caricare la spirale, è consigliabile esercitarsi con una pellicola di ricambio, chiudendo gli occhi. In tal modo si



FIG. 1

moelijkheden meer oplevert, kunt U een belichte film in volslagen donker opspoelen. Bij het grootste aantal moderne 35mm. cameras is de film op de opneemspoel van de camera, in tegengestelde richting met zijn eigen krulling, opgespoeld. Dit maakt de film vlak en kan moeilijkheden veroorzaken bij het opspoelen van de laatste centimeters in de spiraal, daar de vlakke film zich niet zo gemakkelijk aan de binnenste gleuf van de spiraal aanpast. Deze moeilijkheid wordt vermeden wanneer de belichte film in de cassette teruggespoeld wordt en een paar uur blijft liggen vóór het opspoelen in de spiraal, zodat hij zijn normale krulling terugkrijgt. Gedurende het spoelen moet de krul van de film zorgvuldig behouden worden door de filmrol op de hand of op tafel te laten rusten. Druk na het opspoelen de spiraal geheel op de zwarte middenkolom, gevolgd door de aandrukking waardoor de spiraal niet kan bewegen tijdens het omdraaien. Plaats hem nu weer in de tank. Overtuig U ervan dat de afsluitring op zijn plaats is op de rand van de tank, en schroef het deksel erop. De tank is nu lichtdicht, en alle andere handelingen kunnen in vol daglicht worden uitgevoerd.

ONTWIKKELING

De hoeveelheid oplossingen die voor elk formaat film vereist is, staat op de onderzijde van de tank gegrift.

Giet de vereiste hoeveelheid oplossing door het middengat in het deksel. Houd de tank tijdens het vullen niet schuin! De tank is zo geconstrueerd, dat oplossingen er met grote snelheid in kunnen worden gegoten terwijl hij rechtop staat, en de oplossing komt gelijkmatig van onderaf aan, zodat strepen en ongelijke ontwikkeling vermeden worden.

BEWEGING

De aanbevolen methode van beweging is de kiep-methode. Deze methode is het meest effectief voor het vermijden van ongelijkmatige ontwikkeling van de filmen volgende handelwijze wordt aanbevolen:

- 1 Steek na het ingieten van de ontwikkelaar de draaier er in en draai de spiraal naar voren en achteren ter verwijdering van eventuele luchtbelletjes, die zich misschien op de oppervlakte van de film vormen. Voorzichtig tikken van de bodem van de tank op de werkbank helpt ook voor de verwijdering van luchtbelletjes. Plaats de waterdichte polytheekap op zijn plaats op het deksel en geef de film een minuut om met de oplossing verzadigd te worden.

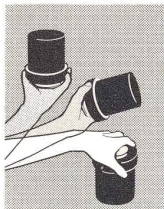


FIG. 2

- 2 Kiep de tank na een minuut, en draai hem meteen weer in rechtopstaande stand (zie fig. 2).
- 3 Kiep eenmaal per minuut gedurende de ontwikkeltijd.

FIXEREN

Verwijder na de vereiste ontwikkeltijd de kap en giet de ontwikkelaar eruit. Giet de fixeer erin en beweeg periodiek gedurende de fixeertijd. Na het fixeren is de film niet meer lichtgevoelig en het deksel kan van de tank afgenomen worden.

SPOELEN

Verwijder het deksel en spoel de film door de tank onder een kraan te plaatsen, zodat het water door de middenkolom naar beneden loopt. Een grondiger spoeling wordt verkregen door het gebruik van de speciale PATERSON FILMSPOELSLANG, die een gerichte watertoevoer onder druk vanaf de bodem van de tank naar boven garandeert. Deze kan gebruikt worden met of zonder deksel op de tank. Een dubbele filmspoelslang is ook verkrijgbaar voor gelijktijdig spoelen van twee tanks.

HET UITNEMEN VAN DE FILM UIT DE SPIRAAL

Om de film uit de spiraal te nemen moet het vrije einde gebogen worden door de randen enigszins naar elkaar toe te knijpen. Trek zachtjes aan het losse eind, laat de spiraal op de andere hand afrollen, en de gehele lengte van de film zal tijdens het draaien gemakkelijk uit de spiraal komen. De film moet dan in filmklemmen te drogen worden gehangen.

KLEURONTWIKKELING

De Paterson Tanks zijn speciaal geschikt voor het ontwikkelen van kleurenfilms, ook diafilms, die gedurende het ontwikkelen weer aan licht blootgesteld moeten worden. Het is niet nodig de film uit de spiraal te verwijderen voor deze belichting, daar dit door de schijven van de spiraal kan geschieden.

Daar de spiralen van doorzichtig materiaal gemaakt zijn, moet de tijd die aangegeven is voor transparante spiralen verdubbeld worden, d.w.z. 1 minuut per kant in plaats van 30 seconden.

ONDERHOUD EN OPSLAG

Was de tank zorgvuldig na gebruik. Laat van beide kanten water door het deksel stromen om eventuele achtergebleven chemicaliën uit het lichtvalsysteem weg te spoelen. Zorg ervoor dat de tank en de spiraal geheel droog zijn na het gebruik alvorens ze op te bergen. Bewaar de afsluitring apart in de tank. Als men de ring op de kolom houdt tijdens het opbergen is het mogelijk dat het veringsysteem minder effectief wordt.

PATERSON MULTI-UNIT TANKS

Deze tanks hebben extra lange tankbakken, die plaats geven aan meer dan één spiraal, en het mogelijk maken een aantal films tegelijk te ontwikkelen. Daar de spiralen verstelbaar zijn, kunnen combinaties van verschillende filmmaten samen ontwikkeld worden, vooropgesteld dat de ontwikkeltijden van deze films gelijk zijn. Drie Multi-Unit Tanks zijn verkrijgbaar, namelijk:

Multi-unit 1

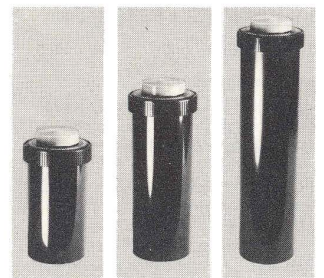
biedt plaats aan drie 35mm of 126 films
of: twee 127 films
of: twee 120 of 220 films

Multi-unit 2

biedt plaats aan vijf 35mm of 126 films
of: vier 127 films
of: drie 120 of 220 films

Multi-unit 3

biedt plaats aan acht 35mm of 126 films
of: zes 127 films
of: vijf 120 of 220 films
Multi-Unit tanks worden verkocht zonder spiralen omdat het aantal en type van de spiralen varieert met de vereisten van de individuele gebruiker. De spiralen en alle andere delen van Paterson Systeem 4 tanks zijn verwisselbaar en afzonderlijk te verkrijgen. Zodoende kan iedere Systeem 4 tank worden omgebouwd tot een ander model, door de vereiste aparte onderdelen te kopen. U kunt bijvoorbeeld het deksel en de spiraal van een enkelvoudig model tank gebruiken en deze veranderen in een Multi-Unit tank door de passende tankbak en extra spiralen erbij te voegen.



MULTI-UNIT 1 2 3

De geladen spiralen worden op de zwarte centrale kolom gezet. Zorg dat alle spiralen geheel tegen de kolom aan zitten. Als de laatste spiraal op zijn plaats is, drukt U de aandrukkring er bovenop. De hoeveelheden oplossing die voor elke film nodig zijn, staan op de onderzijde van de tank ingedrukt. De totale hoeveelheid vloeistof die nodig is voor een bepaald aantal films (of voor een combinatie van films van verschillende maten) kan gemakkelijk berekend worden door de hoeveelheden die vereist zijn voor iedere film apart, bij elkaar op te tellen. Bijvoorbeeld, voor drie 35mm. films is 280 cc. voor elke film nodig, een totaal van 840 cc. Als één 35mm. film, een 127 film en een 120 film samen ontwikkeld worden, is de totaal benodigde hoeveelheid 280 cc. + 370 cc. + 490 cc. = 1140 cc. Als men minder spiralen gebruikt dan het totale aantal, is het alleen nodig voldoende oplossing te gebruiken voor het aantal films dat wordt ontwikkeld.

Seventeen concealed cameras worn by one well-dressed 'spy' (p. 108)

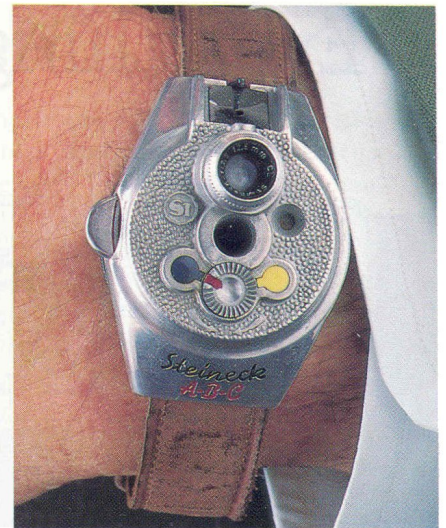


Minox, 1937, was used as spy camera by both sides in World War II.

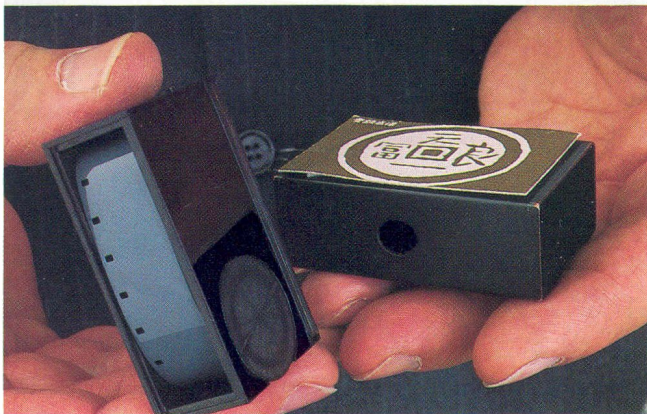
Ben Akiba walking-stick camera of 1902 holds film and lens in handle.



The Concealed Vest Detective Camera, 1886, worn under waistcoat, lens in buttonhole.

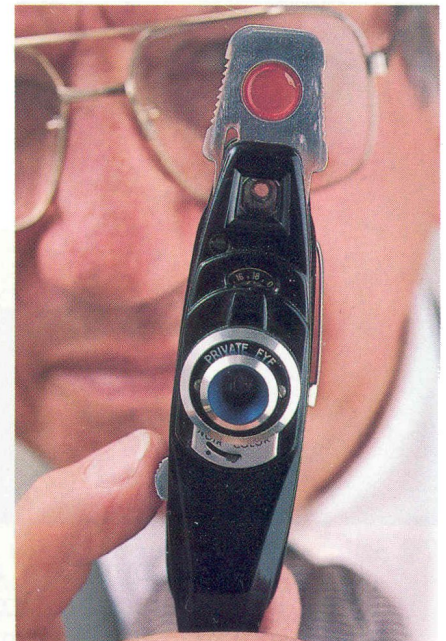
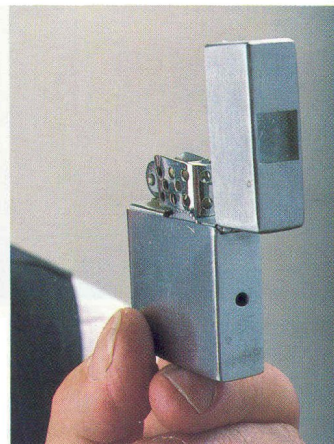


Steineck ABC wristband camera, a 1949 German design for amateurs, looks good, but pictures were poor.



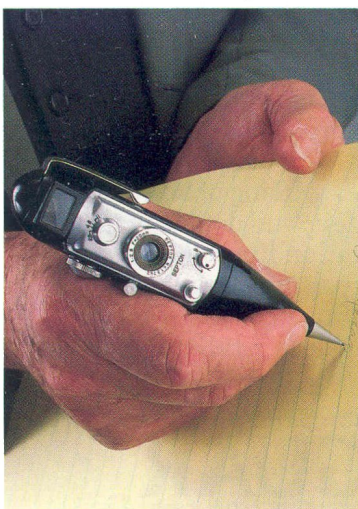
Camera X matchbox was made by Eastman Kodak in 1944 and used by American spies in World War II; cover was local matchbox, wherever spy operated.

Japanese spy camera of 1950 resembled popular Zippo cigarette lighter.



Private Eye 16mm pen camera was made in Paris in 1950; it takes 18 shots, clips into shirt pocket.

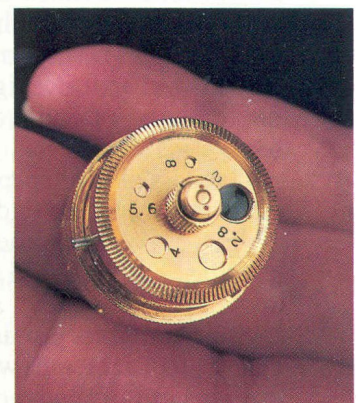
Japanese Pen Camera (really an automatic pencil) was made in 1953 to be a novelty item.



The Doryu II Flash Camera, another Japanese model for the novelty trade rather than the serious spy, has realistic clip that is loaded with flash "bullets."



Italian wedding-band camera made in 1981 with minute lens, is held in palm of hand.



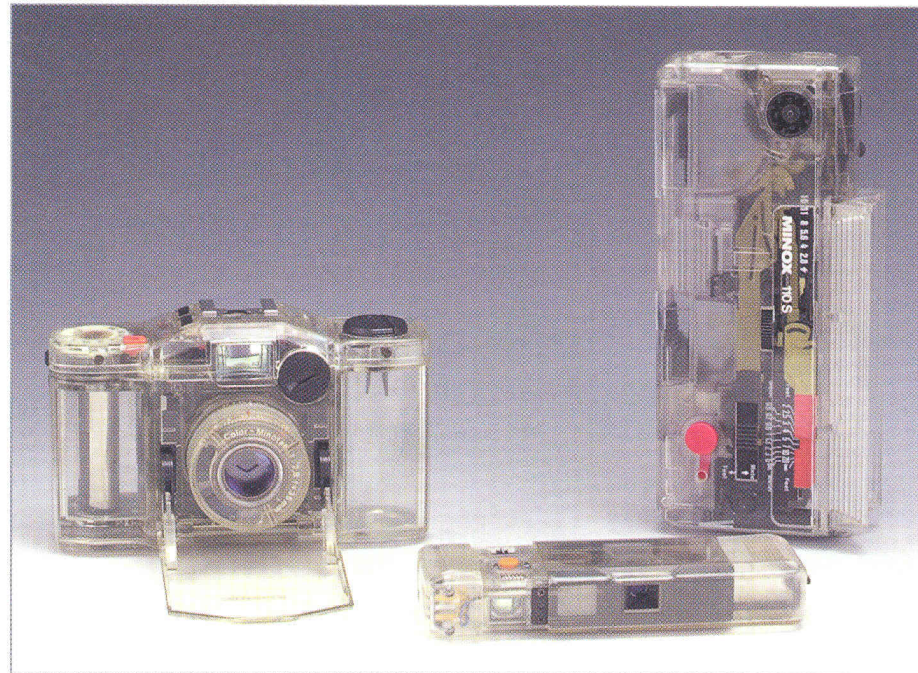
FASZINIERENDE INNENANSICHTEN

Transparente Minox-Raritäten in 8x11 und KB

Wenn Hersteller von Fotoapparaten oft mit großem Aufwand neben den bekannten Serienkameras wenige Exemplare davon (manchmal sogar nur Einzelstücke) mit einem durchsichtigen Gehäuse versehen, denn muss schon ein ganz besonderer Grund vorliegen. In den meisten Fällen soll den potentiellen Käufern gezeigt werden, dass die angestrebte Neuanschaffung auch innere Werte besitzt, die aber im Normalfall durch eine lichtundurchlässige Abdeckung verborgen bleiben. Hohe Verkaufspreise lassen sich so schon eher begründen, gerade wenn das Äußere manchmal nicht viel hergibt. Darüber hinaus kann jedoch ein anderes Motiv vorliegen, wie es nachfolgend beschrieben wird.



Die Klappe zum geschützten Versenken des Objektivs in das Gehäuse hat die Minox 35 weltberühmt gemacht und neben anderen Features für hohe Verkaufszahlen gesorgt.

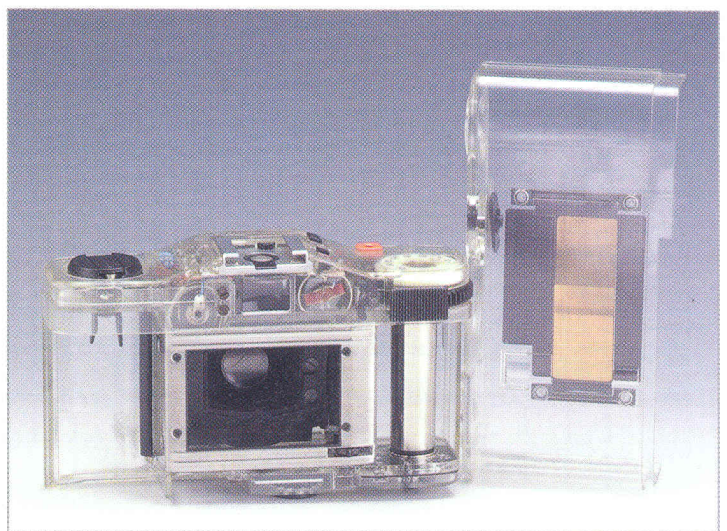


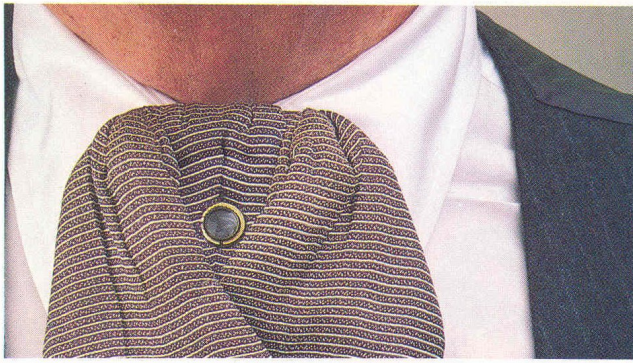
Minox-Raritäten, wie man sie nicht alle Tage sieht – schon gar nicht in dieser Ansammlung. Nur wenige Exemplare wurden für Demonstrationszwecke gefertigt, und noch weniger sind davon erhalten geblieben.

Davon hatten einige Kameras noch keine Blitzsynchronisation, die meisten wurden jedoch nach 1954 mit dem ab diesem Zeitpunkt üblichen Blitzanschluss ausgeliefert. Inzwischen zählt die durchsichtige MINOX A zu den gesuchtesten Sammlerobjekten, dementsprechend liegt ihr Preis heute schon an die 2.000 DM. Ausführungen mit dem zusätzlichen Gehäuseboden aus Plexiglas können diesen Wert um einige 100 DM leicht übersteigen, denn derartige Varianten sind gewiss noch weitaus schwerer zu finden. Wegen der extrem geringen Stückzahlen werden dagegen transparente MINOX 110 S, MINOX EC und MINOX 35 GL so

Bereits in den frühen 50er Jahren hatte sich die Firma MINOX in Wetzlar entschlossen, sogenannte Demonstrationsmodelle der MINOX A mit einer Deckpatte und in wenigen Fällen auch einem Gehäuseboden aus Plexiglas anzufertigen. Diese besonderen Kameras, die heute heiß begehrt sind, wurden den Händlern zur Verfügung gestellt, damit den wissbegierigen Kunden einzelne Funktionen der begehrten Kleinstapparate veranschaulicht werden konnten. Zudem wollte man insbesondere den immer wieder eingesandten unberechtigten Reklamationen vorbeugen, denn die Anwender vermuteten im Innern der MINOX ein defektes Teil, das

beim Schütteln der Kamera leise klapperte. Dabei handelt es sich lediglich um den frei beweglichen Filmausgleichshebel. Bei der MINOX GmbH sind insgesamt 125 Demoexemplare mit einer fortlaufenden Nummer und dem vorangestellten „P“ hergestellt worden.





French Photo Cravate, 1890, with hidden camera set into an ornamental tiepin, was triggered remotely by squeezing bulb in the trouser pocket.



Mechanism of cravat camera (left) has a tiny chain to rotate plates for six pictures.



Photoret Watch Camera, in the shape of a pocketwatch, was designed in 1893 by William Dickson, Edison's assistant.

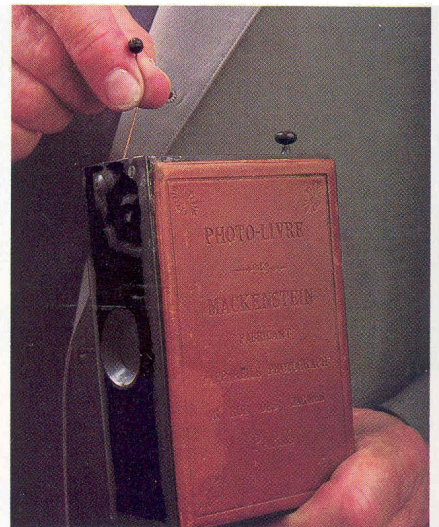
Jack Naylor attaches tripod to Stereo Photo Binocle Camera made in Germany in 1899, sold as a "detective camera."



Cigarette-pack camera, a Swiss Tessina 35mm twin-lens reflex, was designed about 1960 and used by "spies" in Watergate break-in.

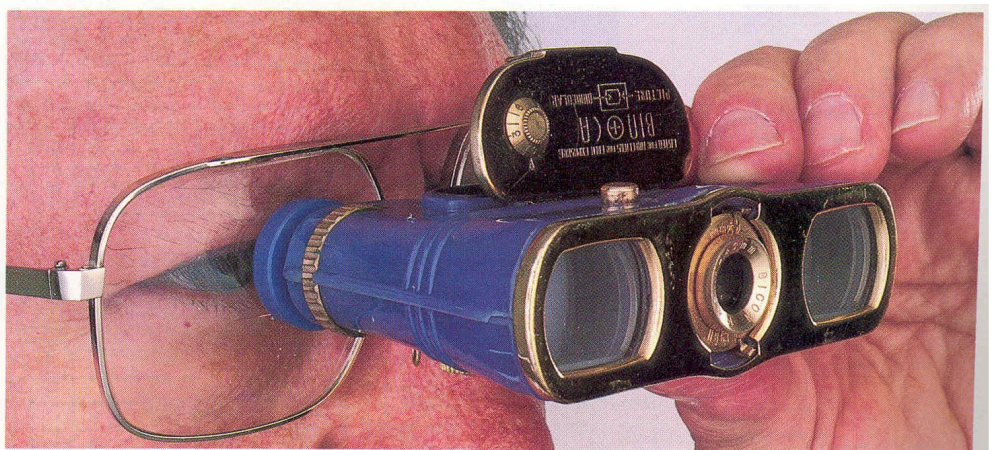


Sonocon Camera, by Minolta, 1962, unites 16mm camera, transistor radio in a nearly perfect disguise.

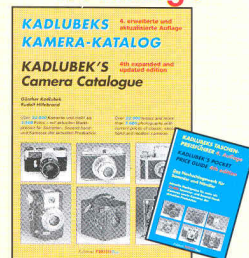


Mackenstein's Photo-Livre, made in Germany, 1888, has camera with 24 glass plates in a leather-bound book.

Binoca Opera Glass Camera, made in Japan in 1950, is a 16mm camera set between its two lenses; film fits into slot concealed by nameplate (propped up here).



Enorm erweitert
Kadlubeks Kamera-Katalog
4. Auflage

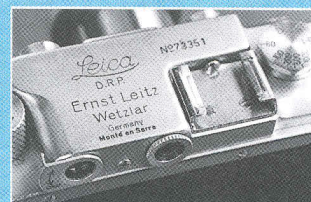


Photographica-, Second hand und Fotospezialitäten

Nickel und Chrom – Leicas und ihre Bedienungselemente



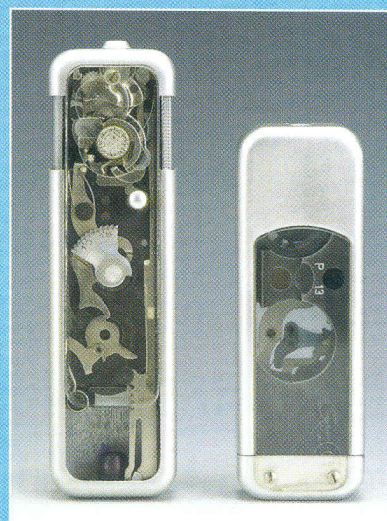
Walter Kluck – der Retter der M-Leica



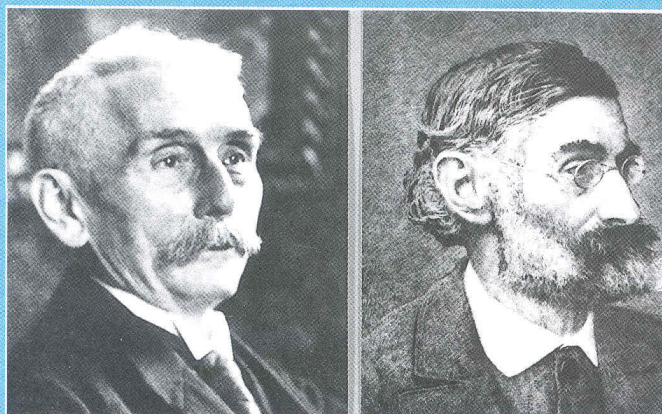
Vom Weitwinkel-Dagor zum Zeiss Biogon



Faszinieren- des Innen- leben: Minox- Raritäten aus Plexiglas



Optisches Glas – die Seele der Objektive



Minoltas Höhenflüge

XM, XE und die Cousine von Leitz



Introduction

The world of subminiature cameras has always been presented as one of excitement and intrigue. Who among us has not been thrilled by scenes in spy movies, or adventuresome television fare, in which the hero, armed only with a subminiature camera, photographs secret documents by the light of a single glowing candle, and thus saves a nation? Yet, despite the spy status stigma accorded these compact marvels of optical and mechanical precision, despite the drawbacks which used to be associated with such small format cameras, the singular fact remains that subminiature photography has finally come of respected age.

Today, thanks largely to incredible advances in optical quality, and, more specifically, advances in film manufacturing techniques, these tiny, jewel-like cameras are now capable of an extraordinary range of performance.

Subminiature photography is different. Subminiature photography is challenging. Yet, despite the difference and the challenge, subminiature photography has advanced to a point where the convenience, compactness and performance must be investigated

and understood. And so, with this in mind, the editors of Petersen's *PhotoGraphic Magazine* decided to call upon an expert in the field, Kalton C. Lahue, to prepare this working manual of photography with subminiature cameras.

In the following chapters, you'll find page after page of useful, pertinent information. You will learn about the long history of subminiature cameras; you will read and learn about the different cameras and camera systems currently available. Also, a detailed description of current films, both color and black-and-white, is provided—plus invaluable instruction on bulk-loading empty cassettes to increase the cameras' versatility and save money. Speaking of films, there is also a section devoted to basic dark-room techniques, plus advice on how to obtain maximum quality when making big enlargements from the tiny negatives. In addition, there is information on the various types of flash photography, and all phases of photographic usage are covered in full.

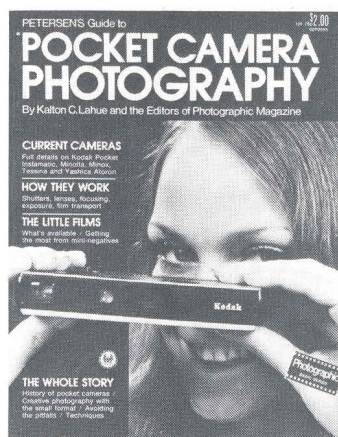
We feel this book is a significant attempt to bring the full advantages of the subminiature format to the attention of photographers.

Paul R. Farber / Editor
PhotoGraphic Magazine

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COVER

Jim Cornfield photographed model Mary Pat Bonney shooting with Kodak's Pocket Instamatic camera Model 50. The cover was designed by Robert I. Young.

PETERSEN'S GUIDE TO POCKET CAMERA PHOTOGRAPHY

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Time to snap up antique cameras

Prices are edging up at the moment, especially for popular Leicas and Rolleiflexes, writes **Donald Macgillivray**

Collectors are focusing on the big picture as prices for vintage cameras continue to climb.

They began to go up in value some 20 years ago. Before that, a relatively small band of aficionados bought and traded with each other through market stalls and the few shops dedicated to antique pieces.

Values remained steady — and, by today's standards, low.

In the past two decades prices have risen sharply, dipped, then edged back up. The Rolleiflex 2.8F, produced in the mid 60s, that sold for £300 in 1984 was valued at £900 in 1994. It is now worth about £600.

A Leica M3, made in the 50s, could be had for as little as a few hundred pounds in 1984. The same camera now sells for as much as £1,000.

The German-made Leica has long been considered the crème-de-la-camera. The company has been making photographic equipment since 1925 and is regarded by most collectors as the best bet for a good return on investment.

"With Leica you're buying photographic history. They invented the 35mm format," says Andy Riley, owner of The Classic Camera, in central London. "They lead all other collectible cameras by miles."

Each Leica has a serial number clearly stamped on the top plate. Company records tell when the camera was made, and how many of that model were produced in any given year. Collectors love extensive documentation like this.

Long before Leica, the first cameras designed for the hobby photographer hit shop shelves at the turn of the last century. George Eastman's Kodak Brownie, a simple cloth-covered box, was priced so low that everyone could afford the pleasure of taking their own pictures.

Today, these classics command little money because hundreds of thousands were sold and they were so well-built that many are still around. You can buy one of



Focused: The Queen using a Leica and the 'Kodak Girl' with a 1900 Brownie



What to look for

Past performance says Leica SLRs make a poor investment compared with the brand's more popular Rangefinder series. A 1964 vintage Leicaflex SLR, selling for about £200 in 1984, is now worth about £300. A modest 50% increase in 20 years. A 60s M3 Rangefinder, fetching about £250 in 1984, is currently valued close to £750.

McKeown's Price Guide is invaluable. The book's 800 pages are crammed with descriptions, pictures and the current values of 25,000 collectible cameras. This bible sells for around £90.

Many collectors think without the original packaging, even the classics are little more than old cameras. But with the box they are worth plenty. A Leica M4, produced in the early 70s, sans box, is lucky to fetch £800. With the original cardboard, the price increases to about £1,000. If

the guarantee card is enclosed, it jumps to £1,100.

Avoid cameras that depend on batteries. The early self-winding, self-focusing models are attractive but useless without a power source. No problem when you can pop down your local shop for a miniature battery but when they stop manufacturing them, as they certainly will, you are in trouble.

Before digital and video cameras started pouring out of shops by the millions, the only way to capture the moving moment was with a cine camera. They may be obsolete now but collectors are paying big money for the antiques and the further past their prime they are, the higher the price they command. The Lumiere 1896 was the first commercial movie camera. One of these in good nick will run as high as £20,000.

Donald Macgillivray

these Kodak Brownies for as little as £5 — and while they probably won't increase much, they should hold their value.

Values are a concern for collectors, these days. Prices could move up or drop down, says David Woodford, the co-owner of MW Classic Cameras.

"There's a period of uncertainty. People don't know which way it's going to go," he says. "It's much like the housing market. Would you buy a house now? It's hard to say."

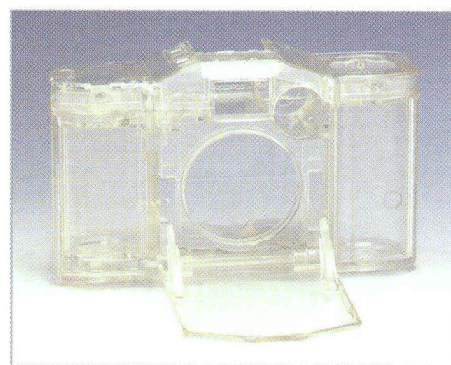
There are fewer dedicated collectors now compared with 10 years ago, but on the

other hand, with the profusion of highly automatic digital cameras flooding the market, many people are looking for something more romantic.

Pre-computer cameras are finding favour with snappers who prefer manual machines so they can set the focus, aperture and shutter speed themselves.

Hi-tech point and shoot cameras are boring, they claim. This back-to-basics trend may well add new collectors to the club and keep prices on the up and up.

The Classic Camera, tel: 020-7831 0777; MW Classic Cameras, tel 020-7354 3767.

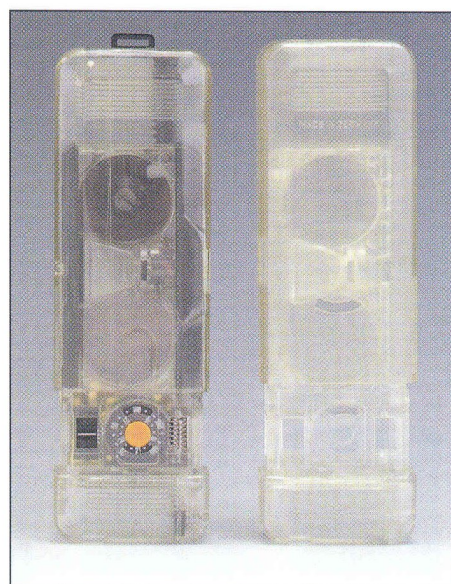
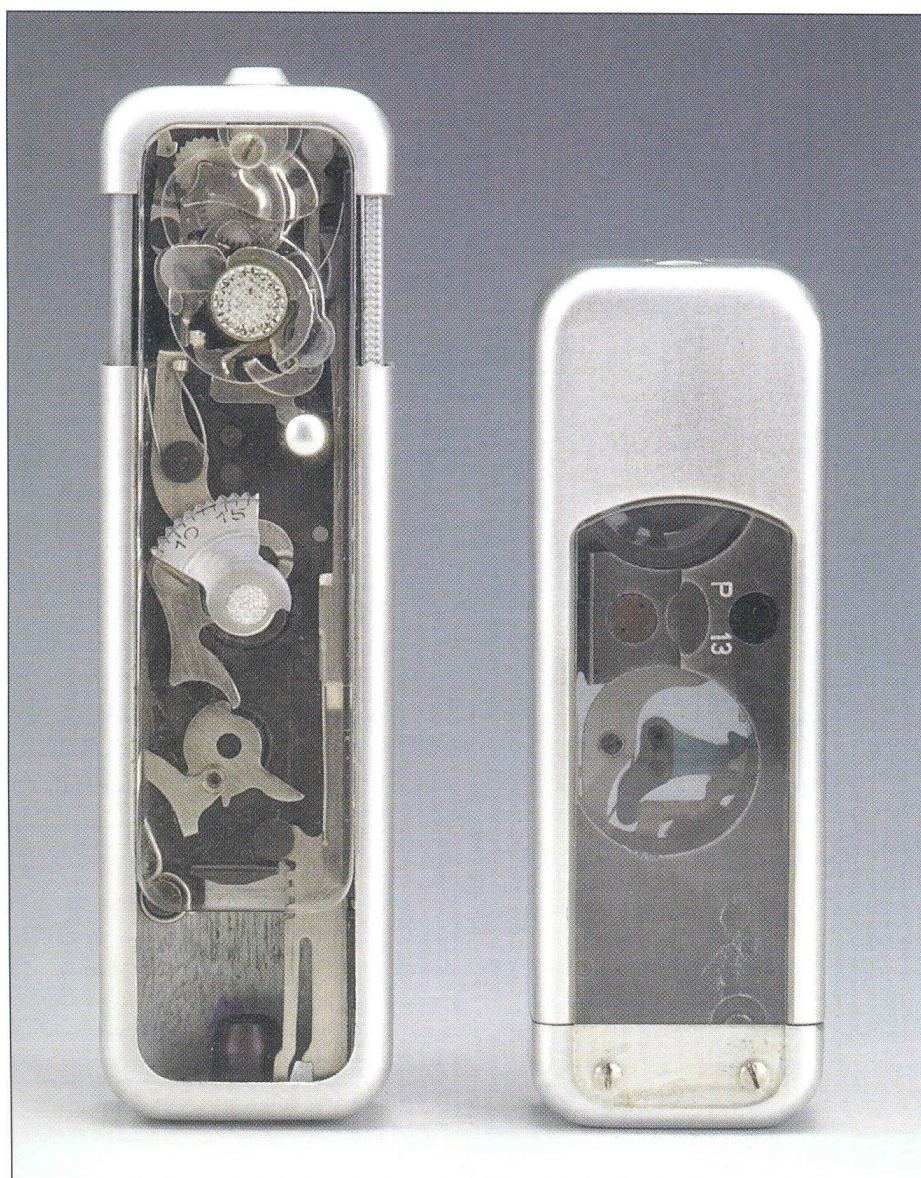


Noch seltener als die transparente Minox 35 sind die oben gezeigten Gehäuseschalen. Die Minox A (unten links) gab es in zwei Transparent-Versionen, einmal mit durchsichtigem Ober- und Unterteil, eine zweite mit lediglich transparenter Deckplatte.

gut wie gar nicht auf dem Sammlermarkt angeboten. Es wurden nur wenige Handstücke in aufwendiger Weise gegen Mitte der 70er bzw. Anfang der 80er Jahre zur Photokina in Köln gefertigt.

Extrem geringe Stückzahlen gefertigt

Alle drei Schaumodelle besitzen weitgehend Aussenteile aus Plexiglas, um die inneren Werte und technischen Abläufe bestmöglich sichtbar zu machen. Bei der GL ist sogar der vordere Objektivring aus durchsichtigem Material und wie bei der



Im Vergleich zu den 8x11-Modellen mit Metallgehäuse hat die Minox EC immer eine untergeordnete Rolle sowohl bei Anwendern als auch bei Sammlern gespielt. An einem der seltenen Transparentmodelle hätten allerdings wohl zahlreiche Sammler Ihr Vergnügen.

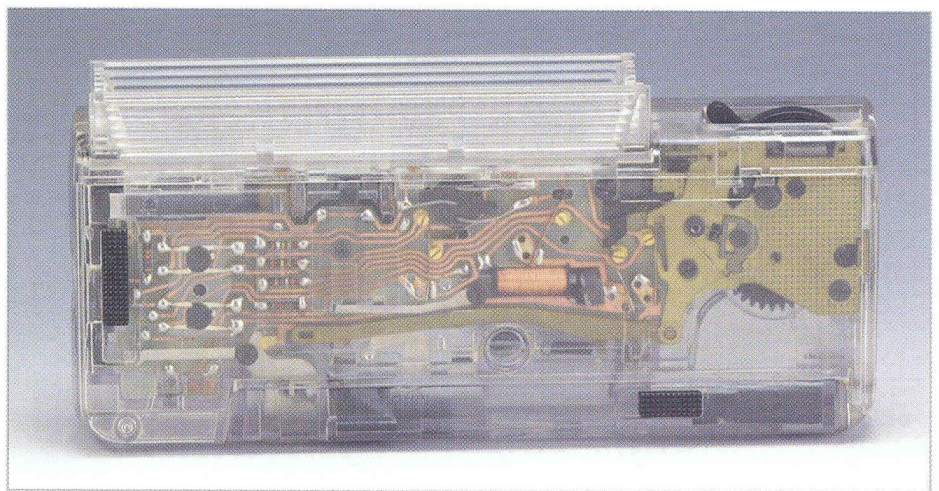
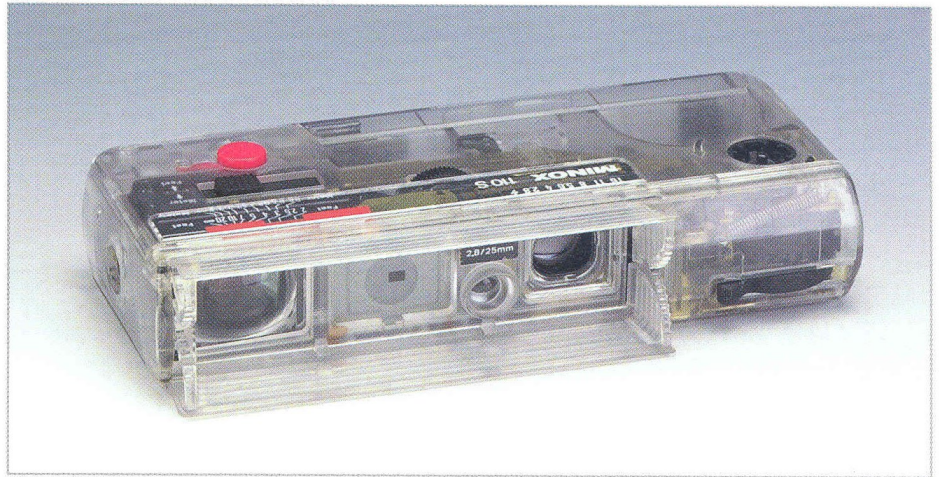


Eine Besonderheit und Rarität für sich stellt die oben abgebildete, stilisierte MINOX 35 dar, die ganz aus geschliffenem Glas gefertigt wurde. Blickfang neben dem roten Schriftzug ist der rote, aufgesetzte Auslöser. Nach Angaben des Herstellers wurden davon nur etwa 20 Stück von Auszubildenden in der Lehrwerkstatt gefertigt, sind also entsprechend begehrt. Ein Exemplar davon wechselte auf der Cornwall-Auktion im April 1999 für 503,24 DM inkl. Aufgeld den Besitzer.

normalen Serienkamera beschriftet. Die entsprechende MINOX EC verfügt nicht nur über eine transparente Aussenhaut, selbst der Kamerakörper ermöglicht einen ungehinderten Durchblick. Da muß man sich kaum wundern, dass derartige Objekte eigentlich so gut wie nie den stolzen Besitzer wechseln. Falls doch mal eine durchsichtige Pocketkamera MINOX 110 S, der beschriebene Kleinbildapparat MINOX EC oder das handliche Kleinbildmodell MINOX 35 GL angeboten wird, dann dürfte die Festlegung eines Verkaufspreises, der jener großen Seltenheit Rechnung trägt, nicht ganz einfach sein.

Blickfang für die Vitrine

Bei Unkenntnis der geringen Stückzahl könnte den potentiellen Interessenten ein Wertansatz jenseits der 500 DM möglicherweise schon zu hoch sein, wie das bei einer vor wenigen Monaten auf verschiedenen Fotobörsen angebotenen transparenten MINOX 35 GL offensicht-



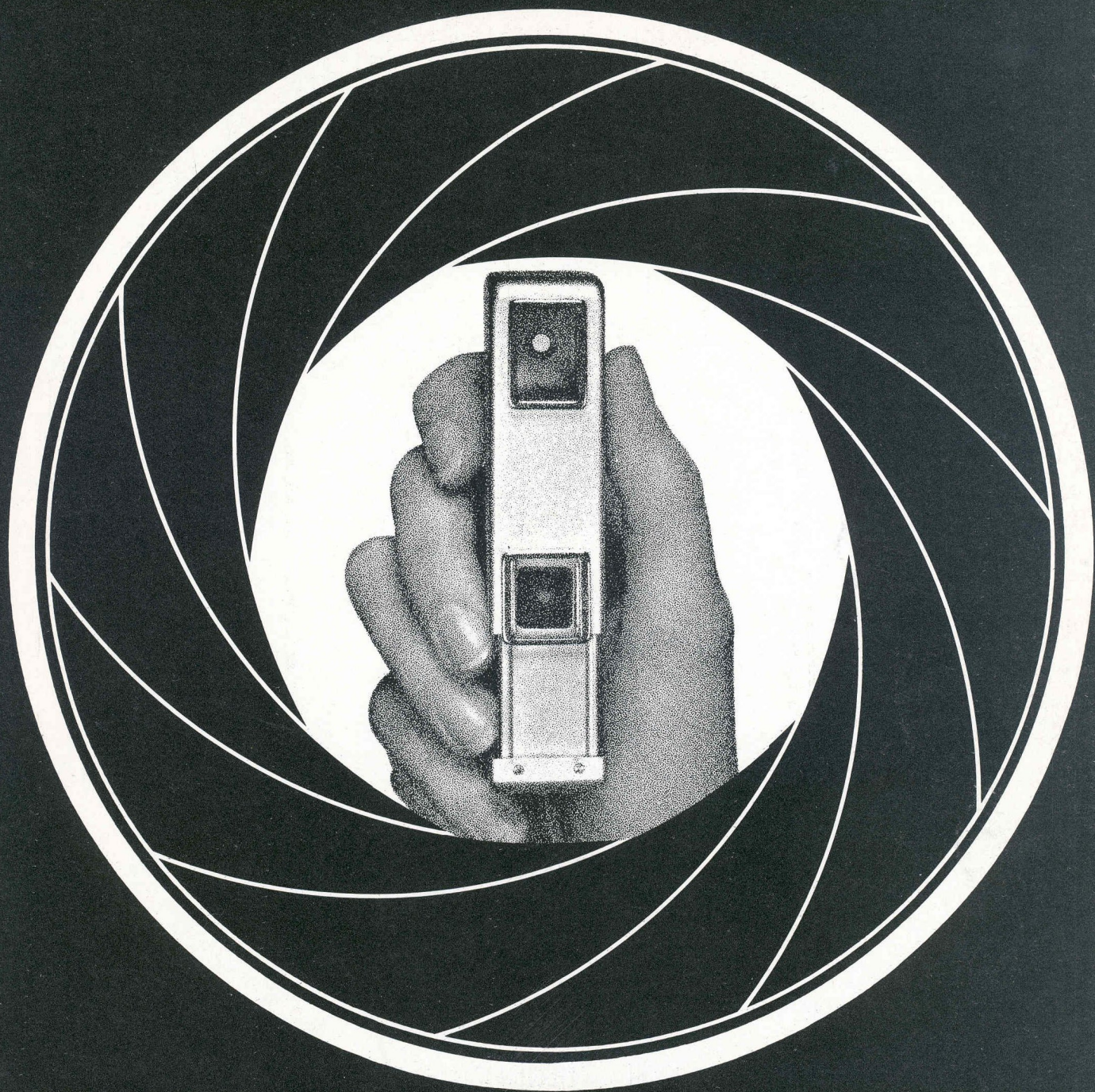
Die Minox 110 S, hergestellt von Balda in Bünde, gehört zu den besonders hochwertigen Kameras für den 110er Pocketfilm. Sie besitzt als eine der wenigen Kameras dieses Typs einen Mischbildentfernungsmesser. Auch das restliche Innenleben ist sichtbar aufwendig.

lich der Fall war. Dabei wäre ein Preis über 1.000 DM durchaus angemessen. Schließlich hatte sich doch ein Käufer gefunden, dem wahrscheinlich erst beim Lesen dieses Artikels bewusst wird, welch besonderes Stück er da für seine Sammlung erwerben konnte. In der Vitrine

dürfte die durchsichtige MINOX bei dezentler Beleuchtung sicherlich zu einem wahren Highlight werden, das garantiert so manchen begehrtlichen Blick auf sich ziehen kann und andere Ausstellungsobjekte ganz klar in den Schatten stellt.

Hubert E. Heckmann





POCKET CAMERA PHOTOGRAPHY

Choosing Your Pocket Camera



The question asked most frequently of any photographic author or magazine editor seems to be, "Which camera is the best?" My answer to this elementary plea for help is invariably, "What do you plan to use it for?" And without exception, the conversation dies when my friend emerges from deep thought with the reply, "To take good pictures." So if you're considering the purchase of a pocket camera and are slightly at sea as to which one is for you, try on the following selection process for size.

Start off by listing the range of pictures you intend to take—snapshots around the house and occasional flash pictures of the family? For this type of work, you can probably get by with a less expensive camera like a Kodak Pocket Instamatic 20 cam-

era, a GAF 220 or Minolta 16 Ps. But perhaps you'll want to work under a wide range of lighting conditions with and without flash, in black-and-white or color. If so, consider a Tessina or Minolta 16 II. And if you want to remove all of the headaches of taking correctly exposed pictures from your new venture in photography, there's the fully automatic Pocket Instamatic camera in four models, the Minox C, Minolta's 16 MG-S and the Yashica Aton Electro.

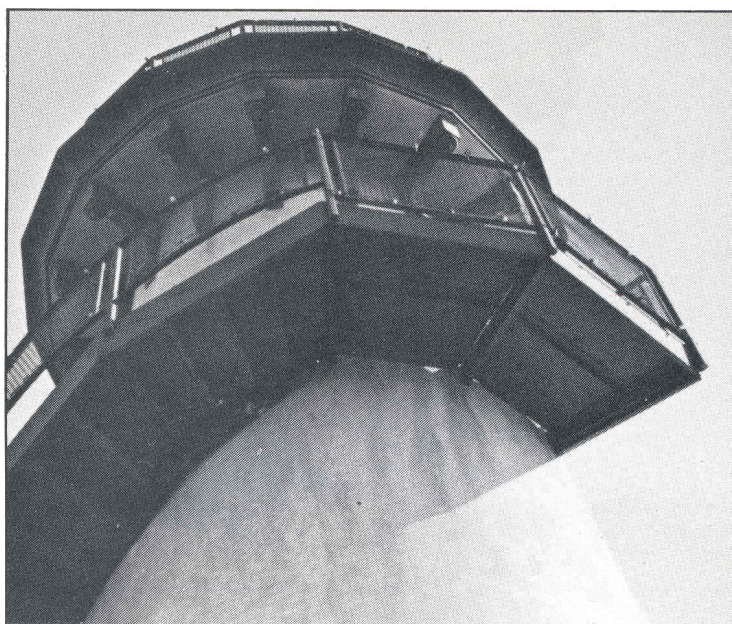
Will a pocket camera be your only one, or are you buying it as a second camera to take along when you don't want to be burdened with the larger one? Will you expect it to function in specialized areas like copy work? If so, you will require one of the highly precise, expensive pocket cameras

like the Minox BL that gives you wide manual control over exposure. Or if you're fascinated with the "spy camera" potential of a pocket camera, you'll want one like the Tessina that lets you take pictures easily without attracting attention. In any case, be sure to give a great deal of scrutiny to any specialized demands that you expect to place on a pocket camera; you may find it more practical to use a larger camera for such work, restricting your use of the pocket camera to a more general nature.

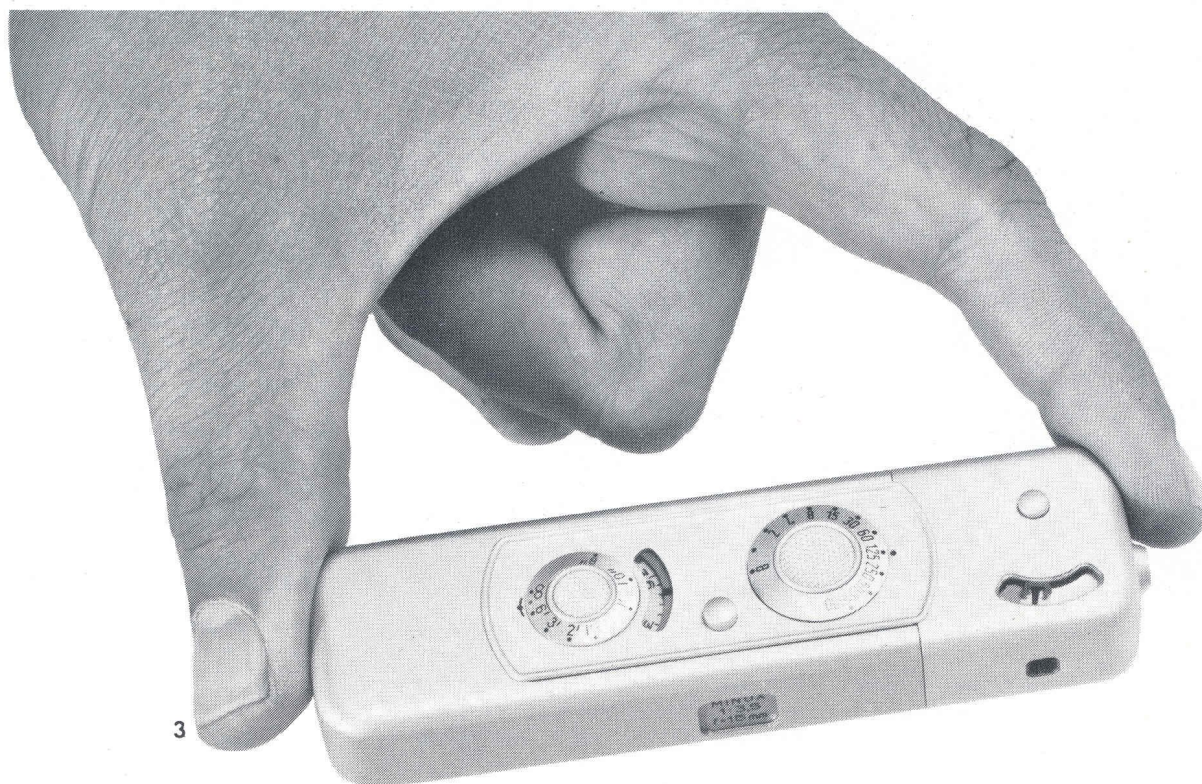
Will album-sized (3 1/2 x 4 1/2 inches) prints satisfy your needs or are you anticipating salon-quality pictures? For large, sharp blow-ups, you'll need the finest focusing lens system available, or at least the largest negative size. You'll also need to



1



2



3

Choosing Your Camera

pect to invest should you decide to go the entire route over a period of time. In a comparison of this nature, remember that many accessories can often be purchased secondhand in good condition for a lesser price.

And this brings up a tender point—what about a used pocket camera? There's nothing wrong with buying a previously owned camera if it's been well treated by its former owner(s).

But if you are thinking about acquiring a more versatile camera than you could otherwise afford at present over-the-counter prices, stick with current models, or previous models from manufacturers like Minox that have a lengthy track record and are not likely to fold up shop overnight, leaving you with a camera for which film and repairs are no longer obtainable. Sadly, there are many such used pocket cameras available in good condition but for which film and accessories are no longer provided.

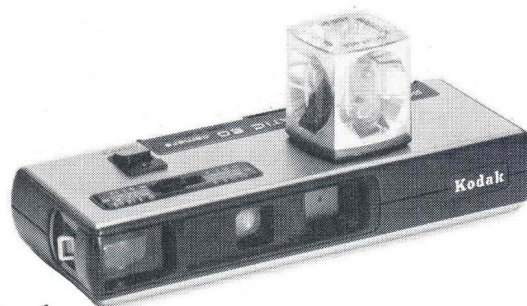
1. If specialized photographic interests like copying fascinate you, consider a pocket camera system with a full range of accessories like that of the Minox.

2. Pictorial, abstract or candid photos—all fall within the province of the pocket camera. This lighthouse was photographed with a Minolta 16 QT and yellow filter on ASA 100 film. Exposure was 1/250 at f/5.6.

3. The "spy camera" potential of pocket cameras is best realized with one like the new Minox BL. It's one-third the size of a pack of filter cigarettes and weighs only 2 ¾ ounces.



5



6



7

1. Weigh the relative merits of each pocket camera against the kind of pictures you intend to use it for before settling on a particular one.

2. Typical of the inexpensive pocket cameras, the instant-load GAF 220 will take excellent pictures if used within its limitations.

3. Keep the pocket camera handy for off-the-cuff photos like this one of two Halloween visitors who arrived at the door a day early.

4. With its clockwork precision, wide range of accessories and use of standard 35mm film in special cartridges, the Tessina's versatility appeals to the serious pocket camera enthusiast.

5. Carrying a pocket camera with you at all times means you're always ready for the unexpected. There's both drama and humor in this futile attempt to extinguish a blazing car fire.

6. The Kodak Pocket Instamatic 50 camera combines all the traditional pocket camera features with an electronic shutter for correct exposures under any conditions. Leaving exposure determination to the camera lets you concentrate on the picture content.

7. Fast lens and film let the pocket camera enthusiast record almost anything of interest. The bemused onlookers at this auto show were caught with Minolta 16 MG-S and a hand-held exposure of 1/30 at f/2.8 on ASA 320 film.

consider the types and speed of films available for the particular camera you have in mind; an f/2.7 focusing lens will do you little good in available light situations if no fast film is packaged for the camera.

How portable is portable? As the pocket cameras range in size and weight from the slender 5/8x1 1/8x3 15/16-inch, three-ounce Minox BL to the 2 9/32x1x5 25/32-inch, nine-ounce Pocket Instamatic 60 camera, this may be a deciding factor. Do you really want to carry the camera in a pocket, or would a protective case that snaps onto your belt be more convenient? It may be a pocket camera, but what about the film cartridges? Are they equally portable or will you find yourself carrying a camera in your pocket and a bag of extra

film over your shoulder? Do you mind dragging flashcubes along in addition to extra film, or would you prefer to work with electronic flash or even available light? This single question alone can prove a major stumbling block in pocket camera selection. Think it over carefully, because unlike larger format camera systems for which you can buy many accessories provided by independent manufacturers, you'll be completely locked into the accessory system provided by the pocket camera manufacturer.

And what does your pocketbook say about sharing its position in life (and your pocket) with a camera—how much can you afford? Investigate the accessory systems (flash, filters, close-up attachments, copying stands, etc.) available for the pocket

cameras under consideration, adding their total cost to the basic camera. Although this is not exactly a fair factor to use in determining which pocket camera to buy (the Minox line with its comparatively wide range of accessories comes out a poor second by this criterion to the Kodak Pocket Instamatic cameras, for which only three accessories are available), it does give you a good idea not only of the camera's versatility but of how much money you can ultimately ex-

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What Makes It Tick?

The majority of pocket cameras currently available are excellent precision photographic instruments incorporating the latest advances in photo technology. As all will produce fine results within the limitations of their design and intelligent use by their owners, let us examine the various approaches selected by their manufacturers with an eye toward making you aware of what's available and what to look for.

FILM SIZE AND TRANSPORT

While most pocket cameras take 12x17mm negatives on single-perforated 16mm movie film, there are a few exceptions. The Kodak Pocket Instamatic cameras produce 13x17mm negatives on specially perforated, prefogged 16mm film stock; the Minox and Atoron models provide an 8x11mm negative on imperforate 9.5mm film, while the Minolta 16 II and 16 Ps give a 10x14mm negative on the same Minolta 16mm film load that fits other models of the line. The Tessina uses a special load of 35mm film to give a 14x21mm negative, the largest of all. With the high degree of optical and mechanical precision of today's pocket cameras, negative size is not really a critical determining factor in camera selection unless you plan on doing your own processing and printing. The 8x11mm Minox negative, however, will present a greater problem in the darkroom for the average enthusiast than will the 14x21mm negative of the Tessina.

Unfortunately, there is little standardization in pocket camera film loads, although the situation today has improved from what it has been in the past. In fact, the Atoron and Minox cameras can use the same film load. But with the entry of Kodak into the pocket camera field, we can expect that future designs will incorporate the 110 film cartridge, eventually eliminating the variety of cassettes, magazines and cartridges used today. As things stand presently, it's more difficult to obtain film for your pocket camera than for a 35mm camera, but Kodak's wide distribution of the 110 film cartridge for its Pocket Instamatic cameras makes this size easy to find at any corner drugstore or supermarket. Except in the case of Pocket Instamatic cameras and the Minox series (whose cartridges cannot be reloaded), you can even buy bulk film and reload your own film cartridges.

Film is transported, or advanced, in all current pocket cameras (except the Minox) by pushing or pulling a film advance slide/tab or turning a knurled wheel. The Minox is unique in that to use it, you must first pull the camera open and this telescopic movement advances the film to the next exposure.

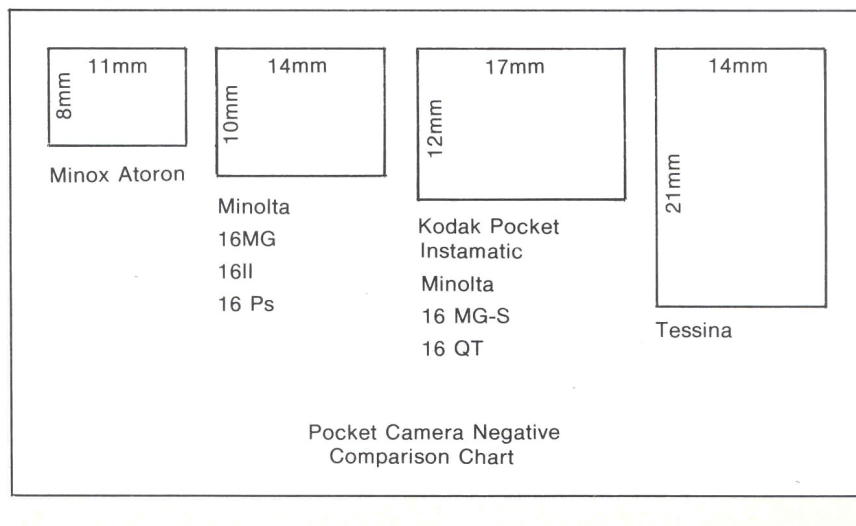
EXPOSURE CONTROL

When you receive your pictures back from the processor, their quality

will depend upon how much light was allowed to strike each frame of film that you exposed. There are four factors to consider here—the size of the lens opening (f/stop), the length of time the shutter remains open (shutter speed), brightness of the subject (how much light it reflects) and film speed (its sensitivity to light). With many cameras regardless of size, you must first determine the amount of light present, and how much of it your film requires, before you can se-



1



lect a combination of the other two factors that will give you a correctly exposed picture. This is done either by estimation or with a light meter made especially for the purpose.

Most pocket cameras contain a built-in light meter coupled to the lens or shutter, or to both. The semiautomatic Minox BL, Yashica Atoron and Minolta 16 MG-S use a meter coupled to a mechanical shutter, while the Minox C, Atoron Electro and Kodak Pocket Instamatic cameras models, 30, 40, 50, and 60 couple the meter to an electronic shutter. With the Minolta 16 MG-S, you first set the camera's meter to correspond with the film speed, then select the desired shutter speed to automatically give you the correct lens opening for proper exposure. With the Atoron, the

camera selects the proper combination of lens opening, and shutter speed for the subject when you align a needle on the camera's top housing. As the Minox BL uses a single lens opening of f/3.5 at all times, you simply set the film speed and then press the meter button, release and turn the shutter-speed dial until an indicator lines up with the meter needle.

With the fully automatic pocket cameras like the Atoron Electro, Kodak Pocket Instamatic cameras or Minox C, you need only to point the camera and trip the shutter. The meter's electric eye reads the light reflected from your subject and varies the shutter speed and/or lens opening to achieve a correct exposure. Again, the Minox C uses a fixed lens opening, so the only variable is the

shutter speed. While these cameras lack the creative control that the user can exercise by setting his own lens/shutter combination (the Minox C does have a manual override), they do offer accurate point-and-shoot photography as an alternative. With less sophisticated pocket cameras like the Minolta 16 Ps and 16 II that lack a built-in meter, you either guess at the correct combination or use a separate light meter.

POCKET CAMERA LENSES

Try holding a magnifying glass to a window in a dimly lighted room. Now move a piece of tissue paper back and forth between the glass and your eye. At some point, you'll find a place where a fairly sharp image of the landscape beyond the window is pro-



MINOLTA 16MM FILM

For Minolta 16MM Cameras Producing 18 or 20 Exp.

IMPORTANT: Load and Unload Film in subdued light

DAYLIGHT PICTURES

Exposures for Cameras not using a built-in meter.

SHUTTER SPEED:

1/125 Sec. unless otherwise noted.

FILM	Bright Sun**	Hazy Sun	Cloudy Bright	Cloudy Dull*
ASA 100 B&W Dark Blue Tape General Film	F/16	F/11	F/8	F/5.6
ASA 320 B&W Light Blue Tape Low Light Film	F/16	F/16	F/11	F/8
ASA 50 Color Slide Red Tape Outdoor-General	F/11	F/8	F/5.6	F/4
ASA 160 Color Slide Orange Tape Low Light Film (1/250 sec)	between F/16- F/11	between F/16- F/11	between F/11- F/8	between F/8- F/5.6
ASA 80*** Color Print Green Tape General Film	F/16	F/11	F/8	F/5.6

*Also for subjects in open shade.

**Close down one stop for scenes of sand or snow.

***Do not expose at less than 1/30 Sec.

Use BLUE flashbulbs or electronic flash. On those cameras with marked speeds, set the shutter to 1/30 Sec.—Other cameras are set on F.

1. If you wear eyeglasses, make sure that you can see entire viewfinder area with your glasses on before you buy a particular pocket camera.

2. Since most separate photoelectric light meters (left) are as large as average pocket camera, if exposure automation is a feature that concerns you, consider a pocket camera with built-in meter, like Minolta 16 MG-S (right).

3. The four types of pocket camera cartridges in use today (from left): Kodak 110, Tessina, Minolta, Minox/Atoron.

4. Minolta furnishes exposure table like this with each cartridge of film, for cameras not using built-in meter.



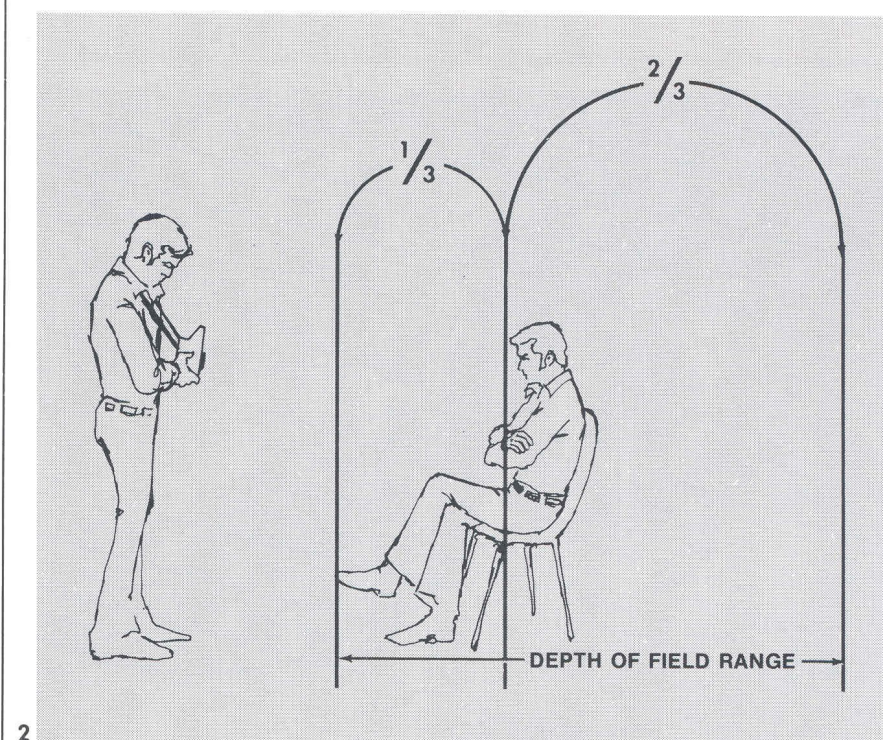
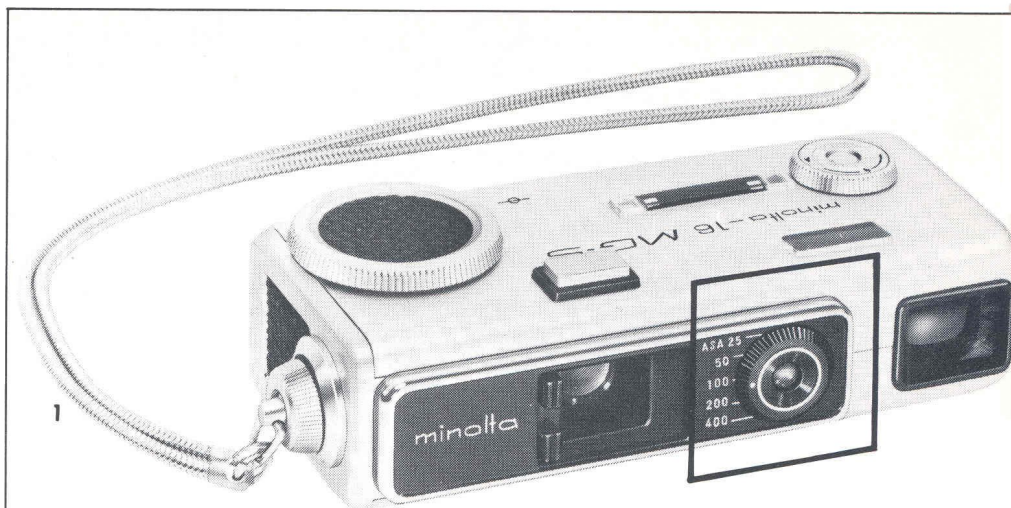
What Makes It Tick?

jected upside-down on the paper. If you were to place a piece of film in the same position as the tissue paper and then enclose both film and magnifying glass in a light-tight box, you would find that you have a crude but working camera.

When the lens is focused at a point of infinity (a theoretical distance that is for all practical purposes beyond 100 feet), the lens-to-film-image distance is called its focal length and is measured in inches or millimeters; the shorter the focal length, the smaller the image. This is why the pocket camera can reproduce exactly the same scene as a larger camera (when both are placed at the same distance from the subject) despite its much smaller size. Pocket camera focal lengths range from the 15mm Minox Complan to the Pocket Instamatic camera 50-60's 26mm Ektar. But as the lens fitted to any pocket camera is about equal in focal length to the diagonal of its negative, which is the usual measurement for a so-called "normal" lens, the pocket camera will give you virtually the same picture area as a 35mm camera when equipped with its "normal" 50-52mm lens.

While you could take pictures with our magnifying glass camera, they wouldn't be very good ones. A simple lens system such as this has many inherent imperfections and that's the reason why pictures made with many inexpensive cameras are often sharper in the center than at the edges. So optical designers have to take these imperfections into account and find ways to overcome them. This is usually done by combining several different lenses into one—a multielement lens—in which the different single lenses are used to cancel out each other's defects. The resulting objective or lens system is then said to be "corrected." The better your lens is designed, the more light that passes through it to the film, the sharper your pictures and the more expensive the lens is to produce.

Most pocket camera lenses use a three-element design with a speed of $f/3.5$. Some of the faster lenses like the $f/2.8$ Minolta Rokkor, the $f/2.7$ Kodak Ektar and even the $f/3.5$ Minox Complan contain four elements and are capable of excellent optical performance. While the number of elements is not necessarily a true guide to lens quality, in the case of current pocket camera lenses the best do have four elements. None of the pocket cameras presently available have lens interchangeability.

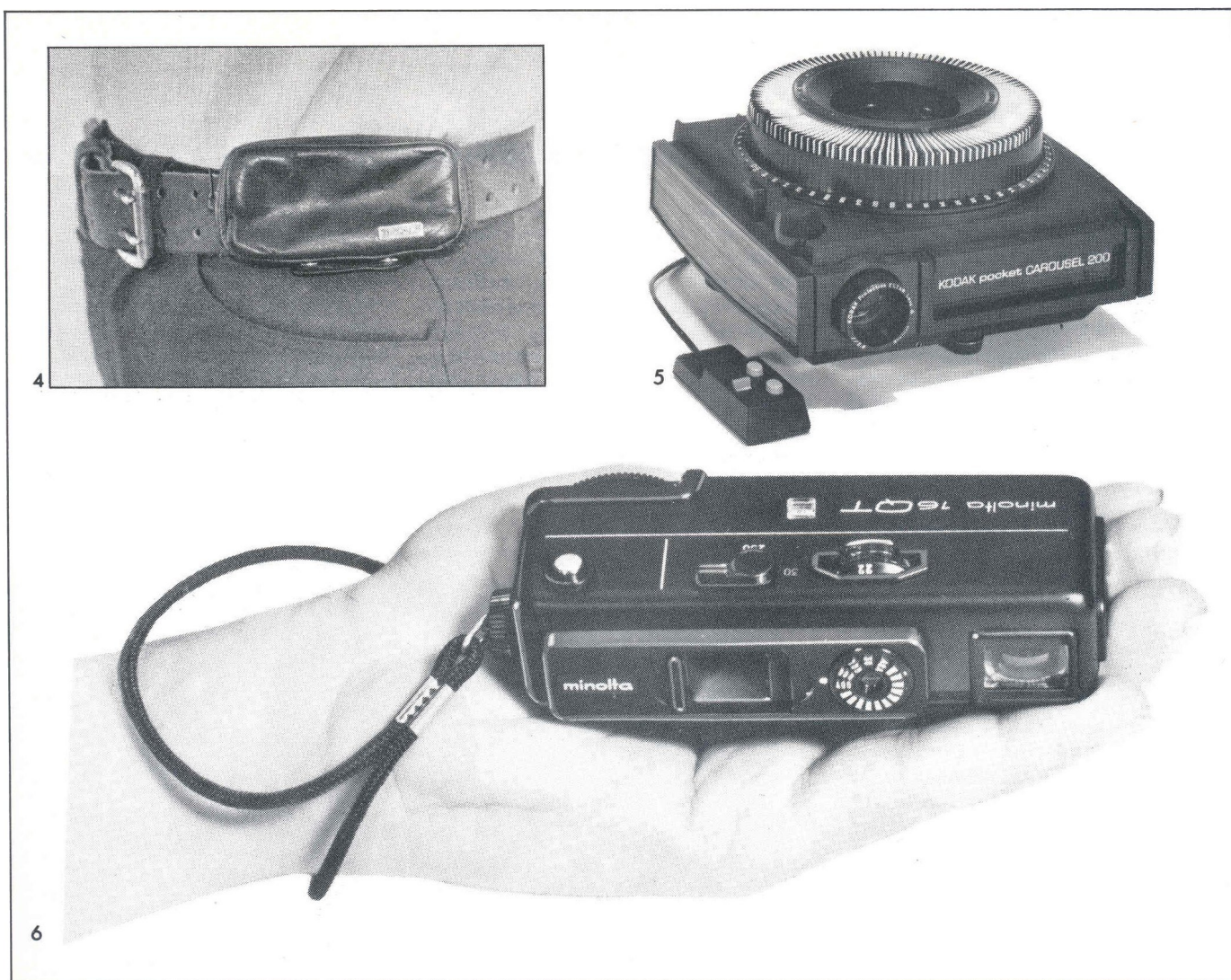


Some pocket cameras have a movable distance scale used to focus the lens. When you adjust this scale to a particular setting, everything at that point will be sharp in the finished picture. Objects in front of and behind that point will appear in varying degrees of unsharpness. But within a certain range in front of and behind the focused distance, the degree of sharpness diminishes so slightly that under normal viewing conditions the human eye cannot detect it; we accept this entire range as being sharp, calling it the lens's depth of field.

The shorter the focal length, the greater the depth of field or range of apparent sharpness in front of and behind the subject at any given distance. This explains the reason for limited or no focus requirements with many of the pocket cameras. The

closer the subject on which you focus, the shallower the range of apparent sharpness; the farther away the subject is, the deeper this range. Depth of field is also dependent upon the size of the camera's lens opening. The larger the opening, the more light it will admit but the shallower the range of apparent sharpness; the smaller the opening, the less light it will admit and the deeper this range. Thus, you'll have to focus more accurately when opening the lens to $f/2.7$ than when it's closed down to $f/16$.

As depth of field does increase with shorter focal lengths, it stands to reason that if the negative size is the same, a 22mm lens will give a greater range of apparent sharpness than that provided by a 26mm lens. But for all practical purposes, you won't be able to tell the difference between



If you do seriously consider a used pocket camera, it's a wise idea to return it to the manufacturer for a complete check-up and, if necessary, reconditioning—and be sure to count this cost as part of your purchase price. If the manufacturer is no longer in business, avoid the camera; this is especially true in the case of pocket cameras made abroad and imported into this country. The importer may still be around but no longer interested in dealing with a product he has stopped distributing.

A second aspect of cost to consider is whether or not you can afford to use the camera once you've bought it. You'll find that generally speaking, film and processing charges exceed what you're accustomed to paying for 126 or 35mm. And if you're a color slide bug, you'll either need an adapter for your present projector (if such is made) or a new one; this can add another \$25 to \$200 to your costs.

At the same time you're considering all these factors, don't overlook specific camera features in terms of construction and durability (some are mostly metal; others mainly plastic), ease of operation, general feel and

handling and legibility of dials, scales and markings. I'll tell you what to look for in the next section. All this has a distinct bearing on just how pleased you'll be once you've lived with the pocket camera as a constant companion for awhile. For example, if the shutter button proves awkward for you to release smoothly, or if you find the camera difficult to hold without covering the lens or electric eye with your finger, think twice about it before parting with the cash.

After narrowing the field to two or three cameras that seem suitable, the best bet is to find a few friends who'll let you use theirs for several days. Such a field test should be the clincher, but if it isn't possible, visit a reputable camera dealer in person and ask to look at and compare those in which you're interested. Don't waste the salesman's time but do handle each one sufficiently to get a basic idea of its characteristics. Above all, don't buy a pocket camera by mail order unless you're absolutely convinced that it's exactly what you want; returning your purchase for a refund if you don't like it might prove to be a greater hassle than it's worth.

The best advice I can give you at this point is to keep on reading. The recommendations and evaluations you'll find further on are based entirely on months and years (depending upon the camera's availability) of active use, and while I don't presume that all of my impressions are going to be the same as yours, they do represent a collective and, I hope, reasonably objective approach to the growing array of pocket cameras available today. Somewhere among the selection, you'll find that special one you're looking for.

4. You'll find a pocket camera belt case to be much more functional than actually trying to carry the camera in a pocket.

5. If you're a color slide fan, plan on buying a projector especially designed for pocket camera slides like this Pocket Carousel 200. Its cost should be considered when determining how much you can afford to spend.

6. While this Minolta 16 QT will meet with approval from many pocket camera users, some will find it awkward to use; thus the general feel and handling of any pocket camera is an important consideration before actually buying.

DEPTH OF FIELD FOR 25MM LENSES

DIST.	LENS OPENING					
	f/2.8	f/3.5	f/5.6	f/8	f/11	f/16
INF.	30'-Inf.	24'-Inf.	15'-Inf.	10½'-Inf.	7½'-Inf.	5¼'-Inf.
50'	18'-Inf.	16'-Inf.	11½'-Inf.	8½'-Inf.	6½'-Inf.	4¾'-Inf.
25'	14'-Inf.	12'-Inf.	9½'-Inf.	7½'-Inf.	6'-Inf.	4½'-Inf.
15'	10'-30'	9'-40'	7½'-Inf.	6'-Inf.	5'-Inf.	4'-Inf.
10'	7½'-15'	7'-17'	6'-30'	5'-Inf.	4½'-Inf.	3½'-Inf.
8'	6½'-11'	6'-12'	5'-17'	4½'-33½'	4'-Inf.	3¼'-Inf.
6'	5'-7½'	4¾'-8'	4'-10'	4'-14'	3⅓'-28½'	2¾'-Inf.
4'	3½'-4½'	3½'-4¾'	3⅓'-5½'	3'-6½'	2½'-8½'	2¼'-17'
3'	2¾'-3¼'	2¾'-3⅓'	2½'-3¾'	2⅓'-4½'	2⅓'-5'	2'-7'

Shaded line indicates approximate depth of field for fixed focus lenses.

1. Pocket cameras with built-in meters have ASA index selection dial that must be set according to film in use to key the meter correctly.

2. Depth of field is that distance in front of and behind subject focused upon that appears sharp to the eye in the finished picture.

3. Depth of field for various lens openings and distances can be determined by using this chart. Approximate depth of field for fixed-focus cameras is indicated by shaded line.

4. The Tessina focusing wheel has a built-in depth-of-field scale. With camera set on 8 feet, everything from 3 feet to infinity is in focus at f/11. At f/4 and the same focus setting, depth of field is limited to that range between 4 and 10 feet.



the two, especially if both are fixed focus. With focusing lenses, you'll have to learn to estimate distances accurately; the Kodak Pocket Instamatic camera Model 60 solves the problem of sharp focusing with its combined coupled rangefinder/viewfinder that allows you to focus on the subject as you compose the picture.

POCKET CAMERA SHUTTERS

While a shutter-speed range of 1/30 to 1/200 second is quite adequate for most situations, the really serious pocket camera bug will appreciate a greater range of speeds, such as that provided by the Minox C (7 seconds—1/1000 second), the Atoron Electro (8 seconds—1/350 second) or Kodak Pocket Instamatic camera models 50 and 60 (5 seconds—1/250 second).

Although all pocket cameras are synchronized for flash, each is designed to use an accessory flash unit made only by the camera's manufacturer, except for the Kodak Pocket Instamatic camera series, which has a Magicube socket built-in. Some, like the Minolta, offer the flash unit in two versions to accept either AG-1 flash bulbs or cubes, but Minox also makes an electronic flash available. If the use of electronic flash interests you, check the type of flash contact used on the camera under consideration. It may be possible to fit one anyway as several cameras use a standard PC flash connector.

You'll find a great deal of difference in the amount of noise in shutter operation. The Minox and Minolta shutters are barely audible but the Kodak Pocket Instamatic camera's is

What Makes It Tick?

loud enough to startle your subject if he isn't aware that you're taking his picture. If candid photos are your primary interest, this is a definite point to consider carefully; if you can hear the shutter trip in an average room situation, so can he.

The shutter should also operate with a minimum of vibration; the pocket camera's small size and light weight make it difficult to hold steady without the shutter adding to your problem. There's also a wide difference in shutter button operation between pocket cameras, from the smooth Minox and hair-trigger Minolta MG-S to the quite stiff Pocket Instamatic camera model 60. Generally speaking, the softer the button's action, the easier it will be to take pictures without moving the camera.

VIEWFINDERS

Practically every current pocket camera model uses a simple optical viewfinder equipped with a luminous or bright frame to indicate the limit of the picture area as seen by the lens. Several finders also include parallax correction marks to guide the user in composing close-up pictures. Because of the difference in position of the finder and lens, the picture as seen in the finder is not exactly the same as that taken by the lens. At distances beyond 3 1/2 feet parallax is of no great concern, but for head-and-shoulder or closer shots, correcting for parallax can mean the difference between a well-composed picture or one with the top of the subject's head cut off. As the tiny pocket camera negative has to be enlarged five or six times just to produce an album-size photo, it's important to carefully arrange the picture elements to appear just as you want them in the final print. The bright frame finder and parallax correction marks are both useful and highly desirable features in helping you compose your pictures correctly.

For candid photography, some pocket cameras like the Minox, Minolta and Atoron series can be fitted with an accessory right angle finder; the Minox even has a clip-on waist-level reflex finder, adding greatly to the camera's versatility in this area. The use of either allows you to point the camera away from the subject while taking his picture.

SPECIAL FEATURES

If the pocket camera that interests you has shutter speeds slower than 1/30 second, does it also have provision for use on a tripod? Does it have a cable release socket? These are both important if you're going to

make use of the camera's potential, as hand-held pictures below this shutter speed are impractical—you can't hold the camera steady enough to get a sharp image.

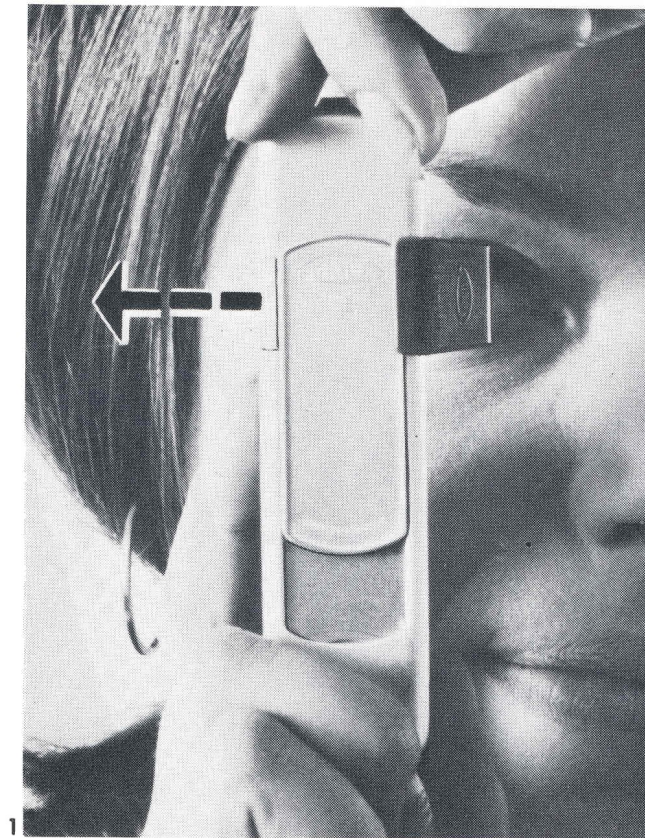
With fixed-focus lenses, does the manufacturer make close-up attachments available? Head-and-shoulder shots five to six feet from the camera are impossible and at any closer range you can't rely upon depth of field for sharpness. If you are pictorially minded, can filters be attached to

give you tonal control over your subjects? Is there a lens cover to prevent scratching as you carry the camera?

Does the shutter have a lock or signal light to indicate that the light is insufficient? Look for each of the various special features and evaluate it carefully—do you expect to need this or is it more likely to be just a frill that you won't use?

EASE OF OPERATION

This is probably the most important



Wave of the Future

Have you lost that sense of excitement with which you approach photography these days? Has the ol' SLR (single lens reflex) become just too much of a burden to carry around constantly? Ever wish you had room to take a camera with you on a business trip? Is your gadget bag so overburdened with accessories that while you're deciding on the right combination, you lose the picture opportunity? Do you look wistfully at your bulky, cumbersome box with a yen to return to those simpler days when you could sling a camera over your shoulder without an aching back at day's end? I could go on forever with such questions, but if I've struck any kind of responsive chord in your soul at this point, rejoice—and return with us right now to the good old days of photography—courtesy of the pocket camera!

When 35mm was a youngster some 40 years ago, photography in America as a hobby held forth a sense of real adventure—available light and candid photography were new forms of self-expression with a camera, and for almost a decade, the casual, informal picture held sway as photo-conscious Americans explored the world around them with delight and perception. But somewhere along the road to maturity, the magic faded and the so-called "miniature" 35mm cameras began to grow into today's oversized, automated beasts of burden. Now, there's no doubt that the current crop of cameras is probably the best we've ever enjoyed, but much of the spontaneity of the hobby has disappeared for all but those casual snapshooters carrying around today's equivalent of yesterday's Brownie—the easy-loading cartridge camera.

But thanks to significant advances in lens and shutter design, film coating technology and the art of miniaturization in the last few years, the pendulum is now swinging in the other direction. While tiny cameras have been with us almost from the beginning of photography, as we'll see, the combination of factors needed to make a small camera truly popular was lacking until now. In the past, we've commonly referred to these cameras as "subminiatures" or "ultraminatures," but Kodak's recent introduction of a series of small cameras called Pocket Instamatics gave

rise to the concept of a "pocket camera," a term that has captured the imagination of the camera-conscious American public with astounding success. There's little doubt that the pocket camera is where it's happening today for all but the die-hard amateur, but even he will be affected by this revolution in camera design before it's over.

Photography with the pocket cam-

era is basically the same as with any other camera, but because of the very small negative and camera, there are special problems in pocket camera photography that you'll not encounter with larger formats. For those who have used a tiny camera before, this will come as no great revelation, but as millions of Americans will soon receive their initiation to photography via a pocket camera,



The Kodak Pocket Instamatic Camera



Introduced in March 1972, the Kodak Pocket Instamatic camera series brought a new life to pocket camera photography with its tremendous popularity. Produced in five versions from a simple snapshot camera to a highly precise one fully capable of excellent pictures under a wide range of conditions, the Pocket Instamatic camera is very simple to use, regardless of which model you own. The first most important thing to do is to thoroughly familiarize yourself with its various parts and their capabilities. You'll find that all five have many features in common.

MODELS 20 AND 30

These Pocket Instamatic cameras use the same three-element or triplet acrylic lens with a nonadjustable opening of $f/9.5$. Ultraviolet rays found in sunlight often cause deterioration in an acrylic lens but all three elements have been corrected by Kodak to prevent this from happening. As a result, the lens does not transmit the UV rays to the film; and since sunlight on hazy days contains a

great deal of these rays, this "filtering" action by the lens helps you get sharper pictures.

MODEL 40

This is equipped with a combination acrylic-glass triplet lens with a nonadjustable opening of $f/8$. As it is a bit faster and better corrected than the $f/9.5$ triplet used in the 20 and 30, this lens will give a slightly sharper picture. In addition, it has the haze penetration quality provided by the acrylic elements.

MODELS 50 AND 60

Both use an all-glass, four-element Tessar-type lens that carries the Ektar trademark, Kodak's signature of its very best quality. This lens has a maximum speed of $f/2.7$ and variable openings to $f/17$, making both cameras considerably more versatile than other Pocket Instamatic camera models. Haze penetration is afforded by the use of a recessed glass plate that also serves as protection for the lens when carrying the camera.

LENS FOCUS

Models 20 and 30/ The lens used in both the 20 and 30 is prefocused at the factory for a distance of 12 feet, on the assumption that both cameras would be used mainly for medium-close pictures. Because of the depth of field factor, any object from five feet to infinity will be acceptably sharp. While you can photograph distant landscapes or scenery with either camera, subjects beyond 25 feet begin to lose their apparent sharpness, so it's best to include a person or object in the foreground to give both depth and a sharp focal point on which the eye will be able to concentrate.

Model 40/ Like the 20 and 30, the lens is also preset to a distance of 12 feet, but in addition it has been equipped with a limited form of zone focusing by means of an adjustment that lets you take pictures in a three- to six-foot range from the camera, giving the 40 a head-and-shoulders capability lacking in the other two. To take pictures in this closer range,

this book has been created to help all get the most from their hobby.

For those of you still wondering if you should take the plunge, there's a complete section on all cameras fitting the pocket camera definition to help you decide exactly which one is your cup of tea. I've created a basic primer on holding and using the various pocket cameras, as well as pointing out pitfalls peculiar to the format that can be avoided to give you better results. A section on improving your photo technique with the small cameras will let you take fuller advantage of their complete portability. And for the do-it-yourself fan, I've delved into basic pocket camera darkroom

and film reloading techniques. There's even a touch of nostalgia provided for those who might wonder where it all began.

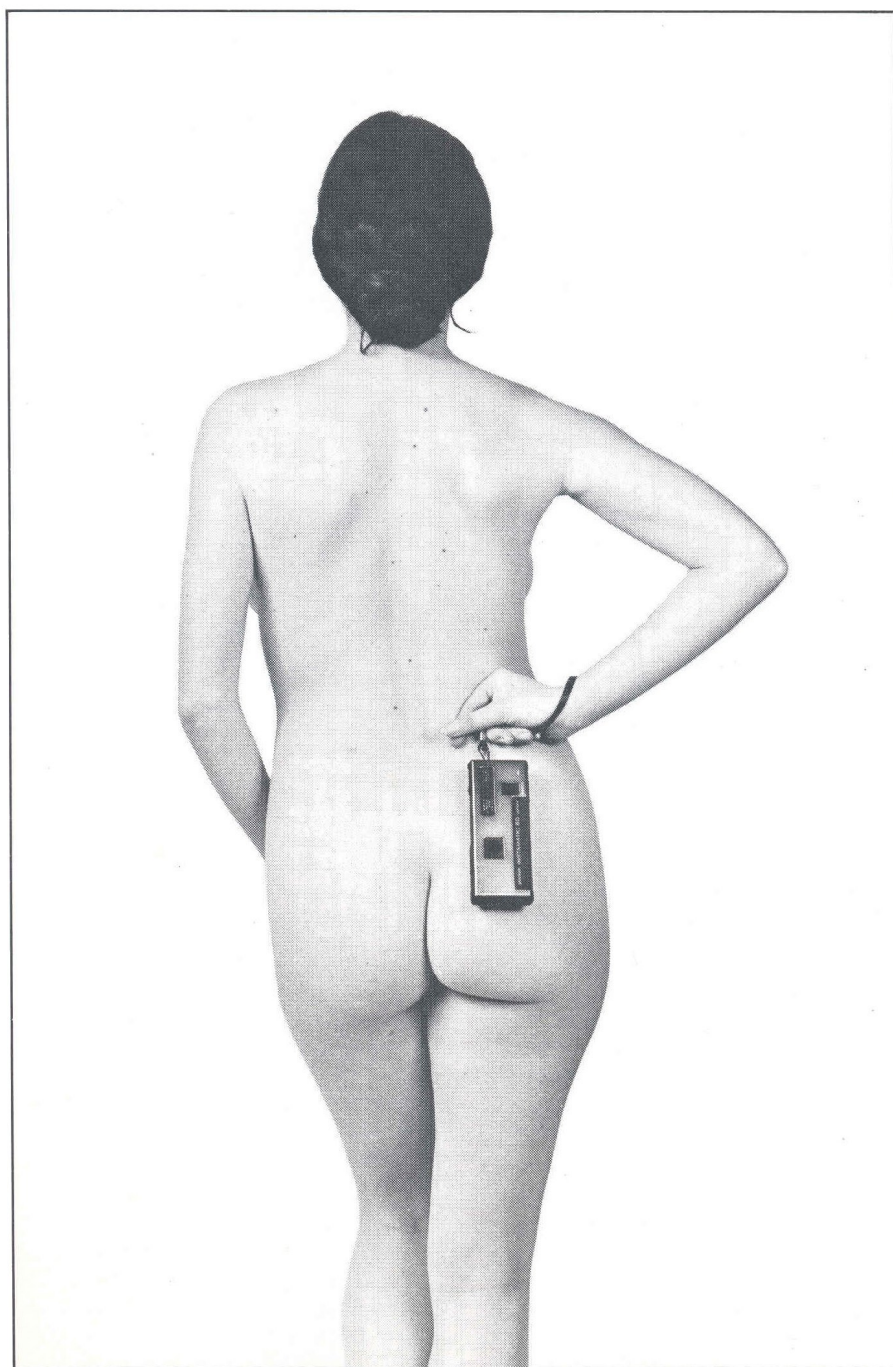
All of the pocket cameras presently available are quality photographic instruments capable of providing you with any size picture you could reasonably want, from the standard album-size to 5x7-inch or even 8x10-inch enlargements. And when you show friends the camera you used, they won't believe it. While the size of the finished print will depend upon what you want to do with it, the quality of your pictures can be improved by understanding and practicing those techniques that let you use a

pocket camera's unique capabilities to the fullest. The following pages are aimed at helping you achieve professional results, regardless of which pocket camera you call your own.

We at *PhotoGraphic Magazine* firmly believe that pocket camera photography is the wave of the future, so everything you might want to know about buying, using and enjoying a pocket camera is here, along with a guarantee that once you've given the pocket camera concept a try, you'll agree that it goes a long way toward restoring that sense of immediacy and excitement that first brought you to photography as a hobby. And if you're a newcomer to the game and a pocket camera is your first experience, welcome aboard!



The photos show the obvious advantages of portability and convenience to pocket camera users. Ready to use at a moment's notice, no special paraphernalia is required for instant picture-taking under a great variety of conditions and almost any circumstances.

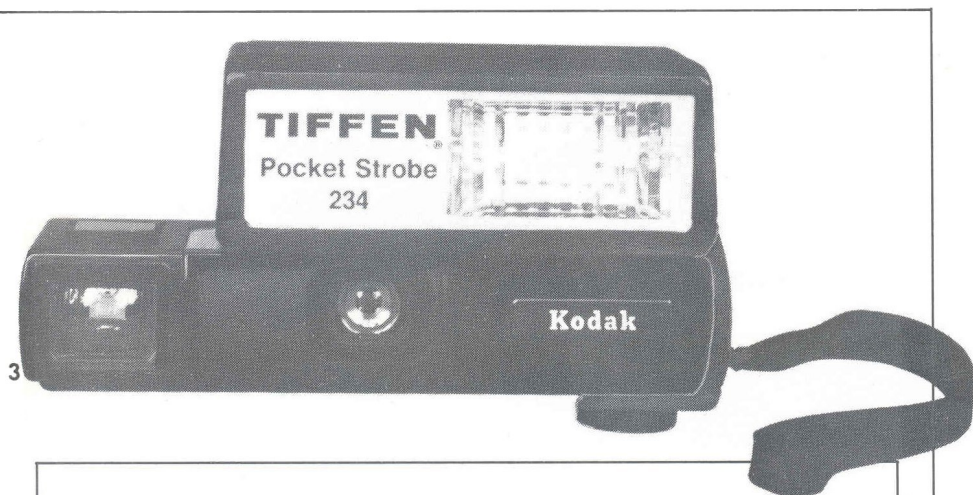


factor to consider; if you're not comfortable using your pocket camera, you'll gradually retire it to a desk drawer regardless of all the super features it has. The controls should fall naturally under your fingers, with plenty of room for their operation. They should operate smoothly and once set, stay in place. There's nothing more annoying than to focus the camera and take the picture only to discover that as you brought the camera into a picture-taking position,

you accidentally moved the focusing lever or slide to another setting.

IN SUMMARY

Look them all over with care and compare what each pocket camera has to offer before you buy. If you go into pocket camera photography with your eyes open, you'll be expanding your photographic horizons—make sure you take the right camera with you. With a little forethought, it's a decision you'll never regret.



3



4



5

1. Right-angle finder attached to your camera lets you look in one direction while taking a picture in another, and helps you capture those candid shots without the subject's awareness.

2. All pocket cameras use separate flash gun except new 110 models like this Kodak Pocket Instamatic 40 camera. The 110 models all have built-in Magicube flash sockets.

3. Tiffen offers Pocket Strobe 234, an accessory electronic flash unit for Kodak Pocket Instamatic 20, 30 and 40 camera flash work.

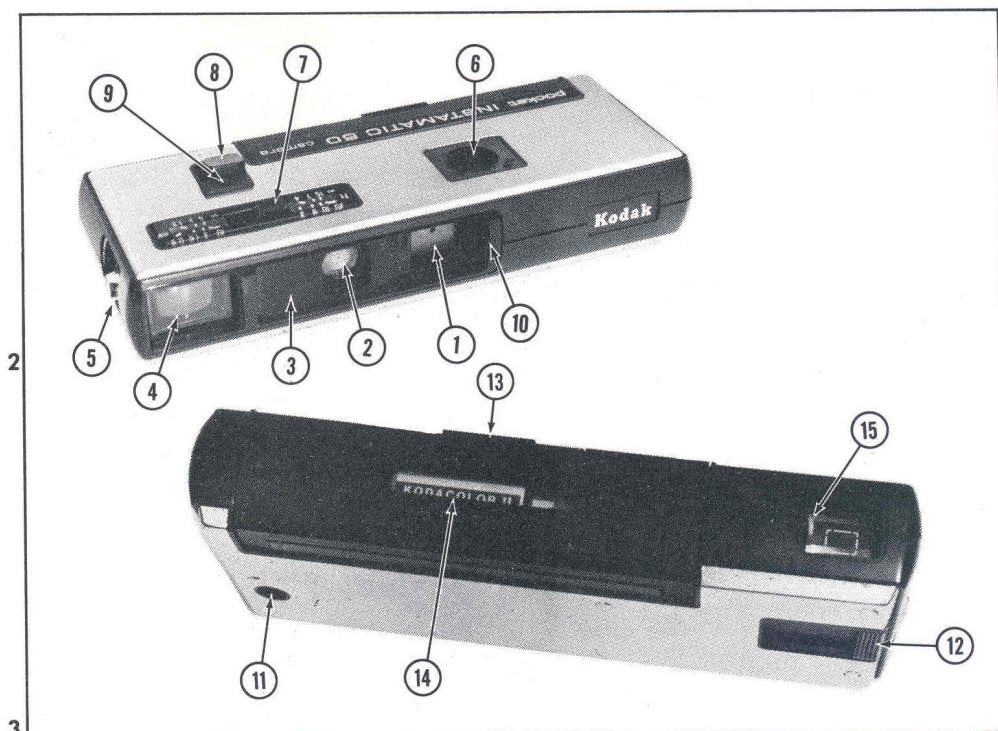
4. Once this new Minox computer unit has provided sufficient light for a correct exposure, it automatically quenches itself.

5. This is the result when close-up pictures are taken with no correction for parallax. At left is what you see in viewfinder; at right is what the camera lens sees. A bright frame in the viewfinder with parallax correction marks lets you avoid such errors in your close-up photos.

1. The Kodak Pocket Instamatic family offers a wide variety of features and capabilities to amateur photographers.

2. Kodak Pocket Instamatic features lens (1), electric eye (except 20) (2), rangefinder (60 only) (3), viewfinder (4), wrist strap eyelet (5), Magicube socket (6), focusing lever (7), shutter button (8), cable release socket (except 20) (9), sliding lens cover (20, 30 and 40 only) (10).

3. Tripod socket (11), film advance slide (12), back cover latch (13), film type/exposure indicator window (14), viewfinder indicator lights (except 20) (15).



SPECIFICATIONS

KODAK POCKET INSTAMATIC CAMERAS MODELS 50 and 60

LENS:	Kodak Ektar 26mm f/2.7 in continuous focusing mount from 3 feet to infinity. Model 50 has scale focusing. Model 60 uses rangefinder combined with viewfinder.
SHUTTER:	Electronic with speed range of 1/250 to 5 seconds; X flash sync; coupled to lens by electric eye
FILM/FRAME SIZE:	Instamatic 110 cartridge, 12 or 20 exposures; 13x17mm
VIEWFINDER:	Bright frame with parallax correction marks; contains used bulb and low-light, long-exposure signals
EXPOSURE METER:	CdS cell provides fully automatic exposure control; uses size K battery
MEASURING RANGE:	Accepts ASA 64 to 125 only
FILM ADVANCE:	Two-stroke thumb advance slide automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Cable release socket, tripod socket, battery check, focus-linked flash exposure range, wrist strap
SIZE/WEIGHT:	5 25/32x2 9/32x1 inch; 9.0 ounces

KODAK POCKET INSTAMATIC CAMERA MODEL 40

LENS:	Kodak 25mm f/8 in two-position zone focus mount; 3 to 6 feet, 6 feet to infinity
SHUTTER:	Electronic with speed range of 1/225 to 5 seconds; X flash sync; coupled to lens by electric eye
FILM/FRAME SIZE:	Instamatic 110 cartridge, 12 or 20 exposures; 13x17mm
VIEWFINDER:	Bright frame with parallax correction marks; contains used bulb, closed lens cover and low-light, long-exposure signals
EXPOSURE METER:	CdS cell provides fully automatic exposure control; uses size K battery
MEASURING RANGE:	Accepts ASA 64 to 125 only
FILM ADVANCE:	Two-stroke thumb advance slide automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Cable release socket, tripod socket, bat-

tery check, focus-linked flash exposure range, wrist strap
5 1/8x2 7/8x1 inch; 6.3 ounces

SIZE/WEIGHT:

KODAK POCKET INSTAMATIC CAMERA MODEL 30

LENS:	Kodak 25mm f/9.5 in fixed focus mount; 5 feet to infinity
SHUTTER:	Electronic with speed range of 1/160 to 5 seconds; X flash sync; coupled to lens by electric eye
FILM/FRAME SIZE:	Instamatic 110 cartridge, 12 or 20 exposures; 13x17mm
VIEWFINDER:	Bright frame with parallax correction marks; contains used bulb, closed lens cover and low-light, long-exposure signals
EXPOSURE METER:	CdS cell provides fully automatic exposure control; uses size K battery
MEASURING RANGE:	Accepts ASA 64 to 125 only
FILM ADVANCE:	Two-stroke thumb advance slide automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Cable release socket, tripod socket, battery check, focus-linked flash exposure range, wrist strap
SIZE/WEIGHT:	5 1/8x2 3/8x1 inch; 6.2 ounces

KODAK POCKET INSTAMATIC CAMERA MODEL 20

LENS:	Kodak 25mm f/9.5 in fixed focus mount; 5 feet to infinity
SHUTTER:	Mechanical with speeds of 1/40 and 1/100 second; X flash sync
FILM/FRAME SIZE:	Instamatic 110 cartridge, 12 or 20 exposures; 13x17mm
VIEWFINDER:	Bright frame with parallax correction marks; contains used bulb and closed lens cover signals
EXPOSURE METER:	None
MEASURING RANGE:	None
FILM ADVANCE:	Two-stroke thumb advance slide automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Tripod socket, wrist strap
SIZE/WEIGHT:	5 1/8x3 3/8x1 inch; 5.6 ounces

Pocket Instamatic

slide the spring-loaded lever placed in front of the cable release socket to the right until it locks. When you advance the film after taking the picture, this focusing slide will return to its normal position marked "Beyond 6 feet." If you decide not to take the picture, or wish to change the focus setting before taking the picture, a slight leftward push with your fingernail will reposition it.

Models 50 and 60/ Both have continuous scale focusing calibrated in both feet and meters from three feet to infinity. With the 50, you estimate the distance between where you're standing and the subject, then slide the distance lever, positioned in front of the shutter button, to its corresponding number—3, 4, 5, 7, 10, 15, 30 feet or infinity. For extra focusing convenience and accuracy, the 60 contains a coupled superimposed rangefinder. To set its lens at the correct distance, you simply look through the finder window. A central spot contains the rangefinder and sliding the distance lever back and forth until both images of the object on which you're focusing combine into one sets the lens for the proper distance. While it's true that the range of sharpness, or depth of field, gets larger as the camera's lens opening is reduced from $f/2.7$ to $f/17$, there's no way you can control or even determine which lens setting the automatic exposure control (see following) will select; under very dim light conditions it will remain at $f/2.7$, or under very bright light like a beach scene it will stay closed to $f/17$. So you must learn to judge distances accurately to set the 50 by scale. And as the small lines indicating each distance setting are very close to each other, use care in setting the camera. With the 60, just use the rangefinder at all times. There is one problem with the slide method of focusing used on the 50. If you set it on infinity and then put the camera in your pocket, there's a reasonable probability that in handling and carrying the camera, the slide will move to another setting. This is not as likely to happen with the 60, as the rangefinder components put a slight drag on the focusing slide that the 50 doesn't have. Just to make certain that it's right on the button, *always* check your focus setting before taking a picture with the 50.

SHUTTER AND EXPOSURE

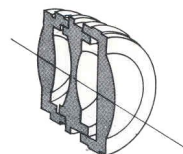
Model 20/ The mechanical shutter in the 20 operates exactly like that of any other camera you might have owned or used. The shutter is

factory-set to provide a 1/100-second speed for daylight pictures, but inserting a Magicube in its socket automatically reduces the speed to 1/40 second for flash pictures. By taking advantage of this fact, you can increase the useful picture-taking ability of your Pocket Instamatic 20 camera. Carry a used Magicube with you on dull days and insert it before taking outdoor pictures. This lets you use the 20 on days that would otherwise be too dark to get a decent exposure. Although the negatives may still be somewhat underexposed, the automatic printing equipment used by processing labs can compensate for this to a degree. Just remember that using a slower shutter speed means that you must hold the camera very steady and cannot take pictures of rapidly moving objects without getting some blurring in the final print.

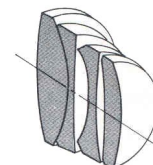
Models 30, 40, 50, 60/ The 30 uses an electronic shutter very similar to that found in the 40, 50 and 60, but its daylight speed range is not quite as great. The top shutter speed for the 30 is 1/160 second, compared to 1/250 second for the other three

KODAK POCKET INSTAMATIC CAMERA LENSES

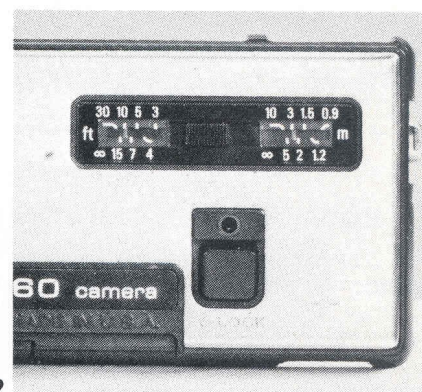
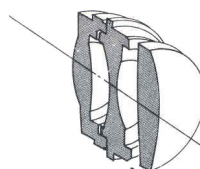
**3 ELEMENT
25mm f9.5**



4 ELEMENT 26mm f2.7



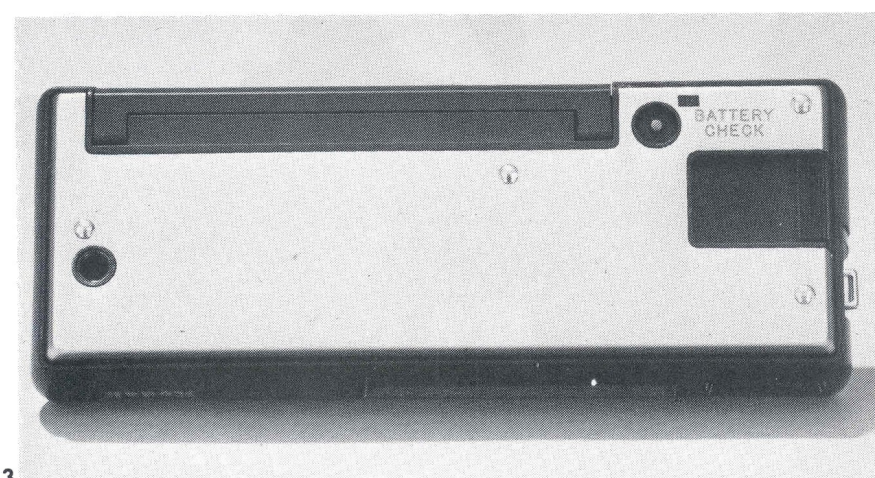
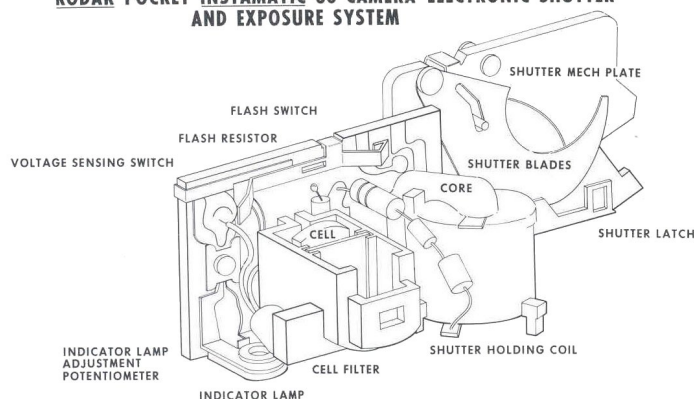
3 ELEMENT 25mm f/8



Pocket Instamatic cameras. All four of these electronic shutters will stay open up to five seconds. While this has a definite advantage in some instances, you never know exactly what shutter speed the camera's brain has selected (just as you never know exactly what lens opening the 50 and 60 will use). And as no one can hand-hold a camera for five seconds and expect to get a sharp picture (nor will very many subjects remain motionless for that long), your Pocket Instamatic camera (except the 20) has a low-level, long-exposure signal light in the viewfinder; red in the 30 and 40, amber in the 50 and 60.

As you depress the shutter button, the signal light will come on if the shutter speed selected by the camera is below 1/30 second. With the models 50 and 60, it's important to remember that the shutter speed remains at 1/250 second, with exposure compensation provided by increasing the size of the lens opening until it reaches the maximum $f/2.7$ setting. At that time, the shutter speed is then automatically lowered accordingly to give the correct exposure combination.

KODAK POCKET INSTAMATIC 30 CAMERA ELECTRONIC SHUTTER AND EXPOSURE SYSTEM



1. Although its focus is preset to 12 feet, the Pocket Instamatic 40 has a two-position zone focus adjustment lever for pictures as close as 3 feet.

2. The more versatile models 50 and 60 use a sliding scale focus from three feet to infinity. As the adjustment is very fine between marked distances, set it carefully for sharpest results when using the non-rangefinder model 50.

3. Newest Pocket Instamatic 50 and 60 cameras have a battery-check button. Fully depress button, located near the film advance. If battery is live, light next to the button lights up.

What does this all mean in terms of getting good pictures with your Pocket Instamatic camera? Simply that you *must* hold the camera as steady as possible at all times, obey the warning signal light when it comes on, stay six feet or more from your subject with the 20 and 30, and focus as accurately as possible with the 40, 50 and 60. Don't try to photograph children running or other fast-moving objects like cars, planes, boats, bicycles, etc. with the 20 or 30 on dark days or after 5:00 p.m., as the shutter speed will be far too slow to prevent blurring of the subject.

FLASH AND THE POCKET INSTAMATIC

Over the past few years, photographic manufacturers have made dedicated efforts toward making flash pictures as simple and foolproof as possible for the amateur. The development of the compact flashcube and more recently the Magicube have been steps in this direction, but even with the convenience offered by a small cube containing four premeasured quantities of artificial light, flash photography by most amateurs who

attempt it has continued to leave something to be desired.

Users of more advanced, adjustable cameras have had to fuss with a guide number specified by the cube manufacturer for each film, dividing this number by the distance between flash and subject to determine the correct lens opening and then setting their camera according to this calculation. While this technique is more likely to give you a correctly exposed flash picture, variations in subject placement, room lighting and an overabundance of light or dark colored objects in the picture often combine to throw this "theoretical" correct exposure off base, giving a picture as unsatisfactory as those taken with less expensive, nonadjustable cameras.

But four of the Pocket Instamatic cameras have a built-in answer to these common causes of poor flash pictures—the electric shutter. While the 20, with its mechanical shutter and single speed, has a recommended flash exposure range of 5 to 10 feet (within which you'll get adequately exposed pictures), the other Pocket Instamatic cameras, equipped with the electric eye, "read" the

amount of light from the Magicube that is reflected from the subject back to the camera and so control the length of time it stays open. This provides an exposure that's right "on the button" every time, regardless of subject or its surroundings.

FOCUS-LINKED EXPOSURE CONTROL

The 40, 50 and 60 have an additional feature to guarantee correctly exposed flash pictures—a focus-linked exposure control. For example, the flash exposure range of the 50 and 60 is between 4 and 30 feet. When you fit a Magicube into the camera's cube socket, focus-linking takes over. As you focus the lens, it automatically adjusts for the correct flash exposure at that distance. This also reduces the shutter-speed range for flash pictures to between 1/30-1/250 second (from 5 seconds to 1/250 second for outdoor use). Depending upon subject distance and lens opening, the correct shutter speed is selected by the camera's electric eye.

Although its flash exposure range is more limited (4 to 12 feet), the 40

Pocket Instamatic

camera back. Again, if there's a cartridge of film in the camera at the time, be sure to hold it down while removing and replacing the battery; after closing the back, advance the film one frame to avoid the possibility of light having spoiled that picture.

PICTURE TAKING

If you've used a regular Instamatic camera, you'll recall that its square negative allowed you to take pictures without turning the camera. While the square format has its advantages, many amateurs prefer the rectangular negative like that used in the Pocket Instamatic camera. But now you'll have to decide whether the picture is best suited to a horizontal or vertical format and then hold the camera accordingly before releasing the shutter. You can usually tell which is most appropriate just by looking at your subject, but if there's any doubt, look through the viewfinder while holding the camera both ways and use the bright frame lines in the finder window to help you decide which is best.

When using the Pocket Instamatic camera, keep in mind two important rules and you'll avoid the two most common mistakes made by pocket camera users:

1. Place your fingers only on the top and bottom of the camera. A careless finger on the front can partially obscure either the lens or electric eye and ruin your picture.

2. Hold the Pocket Instamatic camera securely and firmly when pressing the shutter button. The pressure of your "trigger finger" should not move the camera at all or you'll get blurred pictures.

Both are easy to forget unless you practice holding the camera correctly. The arrows in the photo show you a trick in holding the Pocket Instamatic camera tightly to prevent camera movement. With your left hand, combine downward pressure of the fingers with upward thumb pressure. This reduces the possibility of camera shake when you squeeze the shutter button. As you slowly depress the button, tighten the pressure with that thumb by pressing up on the bottom of the camera.

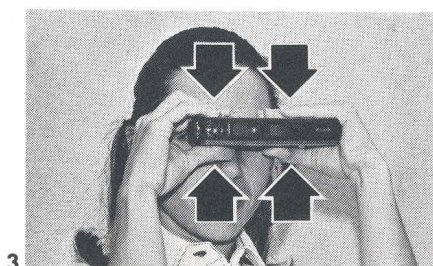
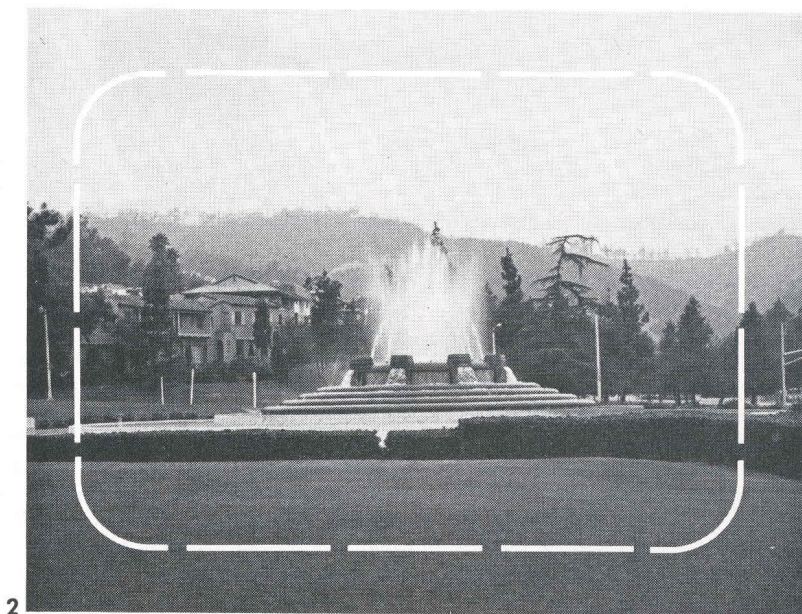
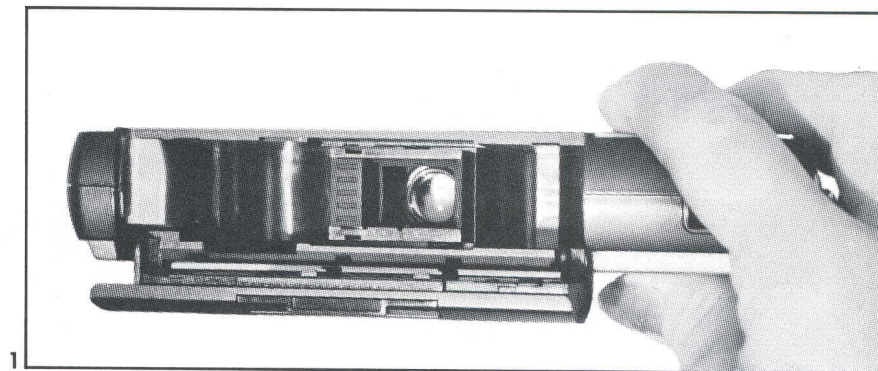
The index finger of your right hand should rest directly on top of the shutter button, not beside it. The habit of rolling your finger onto the button and down to trip the shutter is a bad one to acquire. Pocket Instamatic cameras require sufficient pressure to trip the shutter so that you need not worry about accidentally taking the picture. There are times when you might want to use the Pocket In-

stamatic camera upside down (especially if you're left-handed). Those who are more accustomed to sighting with their left eye will find this position more convenient. The same technique of holding the camera applies, except that now primary pressure is exerted with the right hand and the left thumb trips the shutter button. With a bit of practice, you'll find this as good a position as the other.

As you prepare to shoot the picture, brace your left hand and the camera's back tightly against your face and pull your elbows into your chest as shown in the photo, allowing your body to serve as a tripod. For vertical pictures, you can either hold the Pocket Instamatic camera tightly against the forehead or pressed into your cheekbone. Using the forehead

position allows you to bring both arms together and in toward the chest, and should make it easier to hold the camera steady. Breathe out slowly as you gently squeeze the shutter button and take the picture.

In all but the model 20, you'll notice a pressure point in the button's downward travel. When the light level is too low for a correct exposure while hand-holding these Pocket Instamatic cameras, a red or amber indicator light comes on in the viewfinder. If the indicator light comes on when taking indoor pictures, place the camera on the edge of a solid, flat support like a table or chair back, or use a Magicube. For outdoor photos, brace it against a tree or wall, use the optional Kodak compact camera stand or attach the camera



Pocket Instamatic

is also focus-linked, but in a slightly different way. With the camera set at "Beyond 6 feet," the shutter speeds available to the electric eye are reduced to a range between 1/10-1/225 second. But sliding the focus adjustment to the three- to six-foot position reduces this range to between 1/60-1/225 second, making it impossible for the shutter to allow too much light to reach the film. Variations in subject, lighting and room colors are read by the electric eye, which then closes the shutter when the exact amount of light necessary for a correct exposure has been received by the film. Thus, two of the most common causes of poor flash pictures by the amateur photographer have been corrected in the Pocket Instamatic camera.

If you own a 20 and are not satisfied with the results of your flash photographs, I'd suggest that you try to stay in the middle of the cube manufacturer's specified range for every shot—about 10 feet for black-and-white and 7 feet for color pictures. While this does restrict the type of pictures you can take, it also increases the possibility of getting a correctly exposed shot and will result in better pictures.

CAMERA OPERATION FOR FLASH

Preparing the Pocket Instamatic camera for use with flash is easy—just fit a Magicube into the socket on the top of the camera and you're all set to shoot. With the 20, this reduces the shutter speed from 1/100 second to 1/40 second; with the other four Pocket Instamatic cameras, it brings the focus-linked flash exposure control into play. The Magicube will allow you to take four pictures in sequence before it has to be replaced; advancing the film rotates the cube one-quarter turn, bringing a fresh bulb into position. All Pocket Instamatic cameras have a used flash-cube signal that appears in the viewfinder to remind you to advance the film or change the cube. In the 20, 30 and 40, it's a red line that appears diagonally across the viewfinder; the 50 and 60 have a tiny red light that illuminates a small sign inside the viewfinder reading "used bulb." Since the Magicube is ignited mechanically by the camera when you press the shutter button, there's no chance of flash failure because of poor batteries or bad battery contact.

110 FILM CARTRIDGE

The Pocket Instamatic camera 110 film cartridge offers easy, automatic and instant loading, and protects the film before, during and after exposure. The cartridge is so shaped that

it can only fit into the camera in the correct way. Film identification and number of pictures taken are provided by the paper sticker on its back, which remains visible through a window in the camera's back cover.

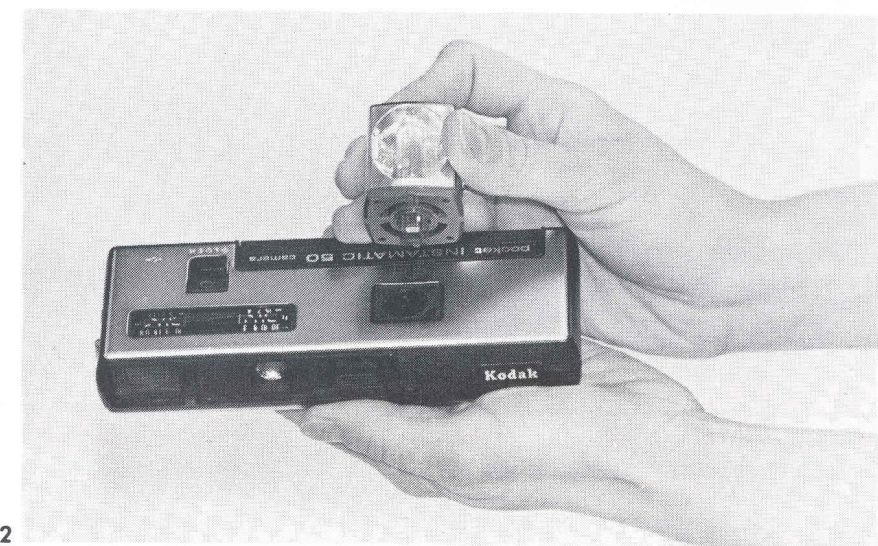
Like 126 film cartridges, the 110 film cartridge system uses a notch in the cartridge to key the electric eye to the correct film speed. The Pocket Instamatic cameras can only operate between an ASA range of 64 to 125. While current 110 film cartridges fall into this range, other manufacturers will also make their more popular emulsions available in 110 film cartridges in the future. If you should use other than Kodak films with your Pocket Instamatic camera, be certain that their speed is within this ASA range for correctly exposed pictures. While the 20 has no electric eye, it's not a good idea to use films outside this ASA range as the camera's lens and shutter are not capable of adjust-

ment for extra slow or fast emulsions.

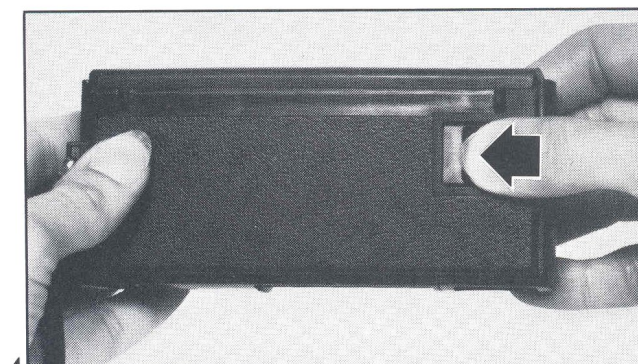
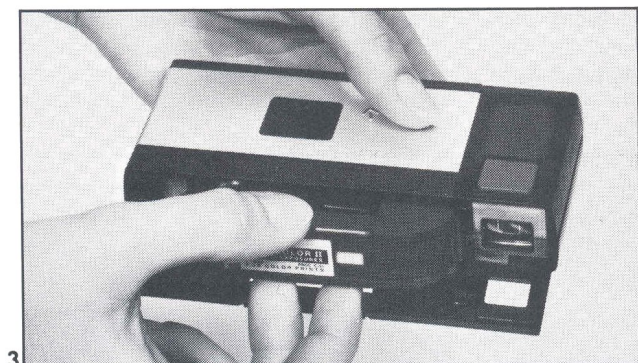
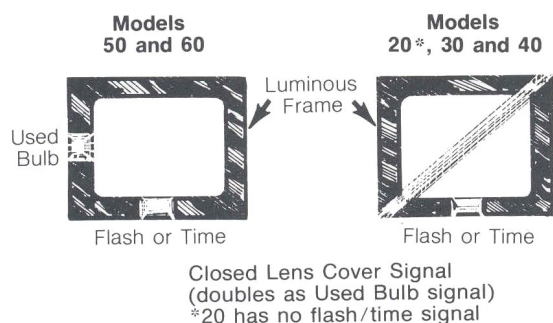
To load the Pocket Instamatic camera with a film cartridge simply pull back and down on the cover latch, then drop the cartridge in place. Close the cover and position the film for use by pushing the advance slide all the way to the left until it locks. This will take several strokes to reach the first exposure, but only 1 1/2 between each picture. When the last exposure has been taken, slide the advance lever back and forth until it locks before opening the back cover to remove the film cartridge.

BATTERY CONDITION AND REPLACEMENT

The electronic shutter used in all but the 20 is powered by a size-K battery. This should be replaced every year. Keep an extra battery on hand and set a particular time each year for battery replacement, whether it seems to need it or not. Just before



KODAK POCKET INSTAMATIC VIEWFINDER SIGNALS



Christmas is a good time and will insure that you don't miss those once-in-a-lifetime shots we all take over the holidays. Battery condition should be checked after periods of nonuse in the following manner:

1. Advance the film lever just as if there was a film cartridge in the camera. This cocks the shutter.

2. Close the camera's lens cover. If you have a 50 or 60, press it tightly against your left wrist to prevent light from reaching the electric eye.

3. Hold the camera's back cover open and look at the shutter as you press and hold the shutter button down for five seconds. With a good battery, the shutter will remain open until you release the button. But if the shutter opens and closes immediately (you can see and hear it), then it's time for a new battery.

Failure of the red or amber indicator light to come on when you are taking pictures under adverse lighting

conditions is also a sign that a new battery is needed. To change batteries with film in the camera, open the back cover and hold the film cartridge securely in place as you push the battery down and to the center of the camera. As this frees it from the battery retainer, you can lift the old one out and insert the new battery by snapping it in place. Then close the camera back and advance the film to the next picture just in case some light leaked around the cartridge and fogged the frame of film.

If you have recently replaced the battery but have not used the camera for some time, the failure of the indicator light to work as it should can often be traced to a dirty battery or to poor battery contact. Open the camera back and remove the battery for cleaning with a rough cloth or pencil eraser. Replace it, using the diagram stamped inside the back cover if necessary, and close the

1. The Pocket Instamatic's electronic shutter is amazingly accurate, even in backlighting situations like this, but don't expect miracles every time.

2. The built-in Magicube socket does away with the necessity of the traditional separate flash gun, adding to the camera's convenience.

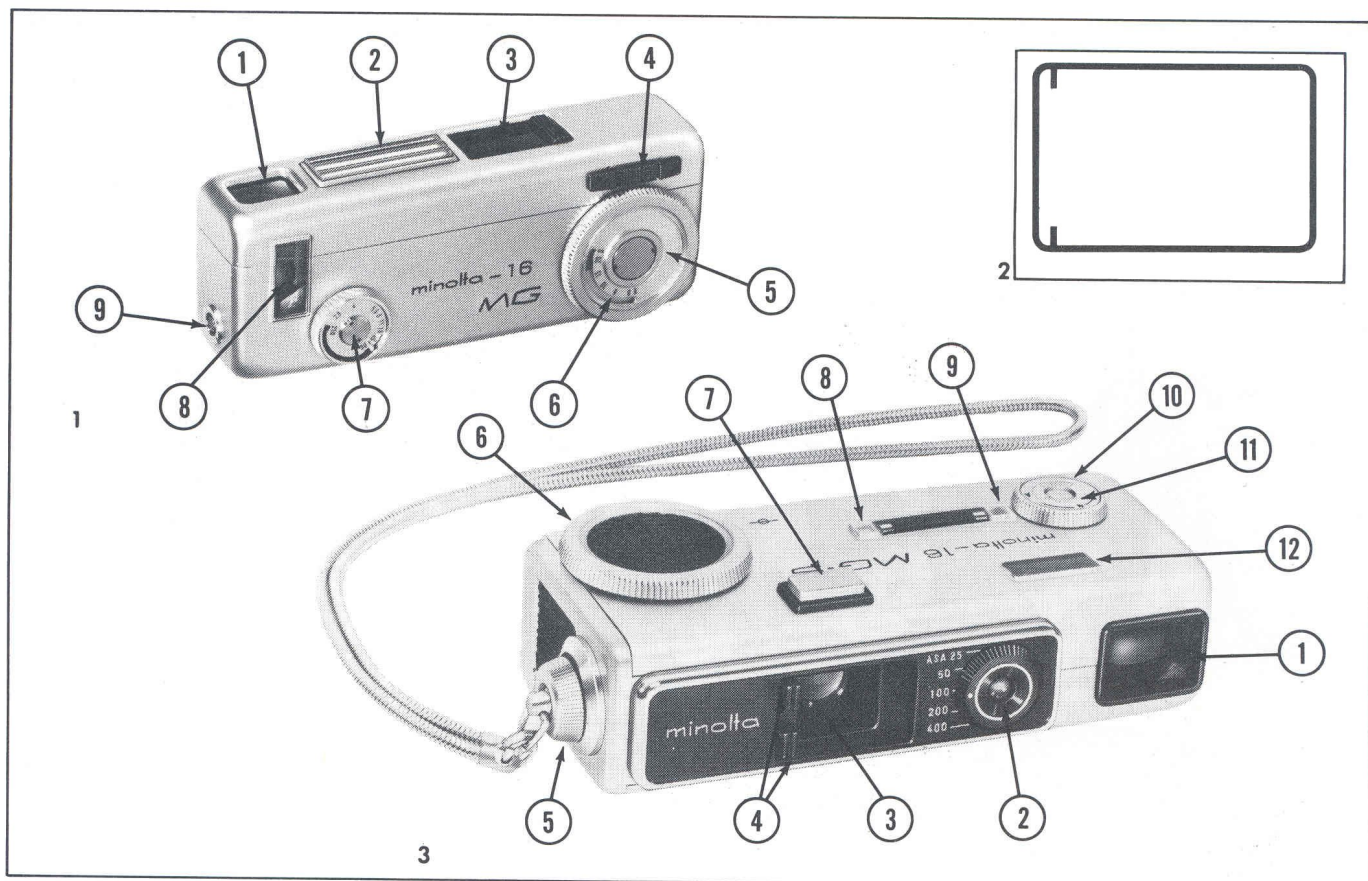
3. The Pocket Instamatic is loaded with film by opening the back cover and slipping the cartridge into place.

4. Film is transported by pushing the advance slide to the left until it locks.

5. Available in four different emulsions, the 110 cartridge has all the advantages of the larger 126 cartridge: instant loading, film protection at all times, one-way insertion into the camera and identification of film type and exposure number through a window in the camera's back cover.

6. Kodak Pocket Instamatic cameras with electronic shutters use a size K battery that is located inside the back cover. Replace it yearly.

The Minolta Pocket Camera System



With more than two decades of experience in the manufacture of photographic equipment, Minolta qualifies as one of the outstanding names in pocket cameras. I first came across the Minolta 16 some 20 years ago while a combat photographer with the U.S. Army during the Korean Conflict. The American GIs discovered the diminutive pocket camera at about the same time David Douglas Duncan and other pros covering the war were learning of the superior quality of Japanese optics. While Duncan and company were busy covering the fighting, GIs on R and R in Japan were finding the Minolta 16 ideal for photographing nude chorus lines in Japanese burlesque theaters—but Minolta has come a long way since then.

The basic design of the original Minolta 16 was retained until 1972, a tribute to the camera's proven quality, but the company's current pocket camera line has kept pace with the

latest advances in photography. While other large Japanese manufacturers like Mamiya gave up on pocket cameras and discontinued their lines several years ago, Minolta's continuing success in the small camera business can be attributed to its forward thinking and a firm conviction that pocket cameras are not toys, but precision photographic instruments. From the outset, a full range of versatile accessories has been provided by the company to make the cameras a full-fledged photographic system.

THE 16 MG SERIES

While there have been several different pocket cameras in the Minolta family, the MG series has remained its top-of-the-line in recent years. Only one model is currently manufactured—the 16 MG-S—but as the 16 QT is also based extensively on the same body design and the recently discontinued 16 MG is still to be found in ample quantities on dealer shelves, it

is appropriate to consider all three cameras here.

MINOLTA POCKET CAMERA LENSES

Minolta fits its pocket camera line with modern Rokkor lenses of the same optical glass as those used in the more expensive Minolta 35mm cameras. These lenses are designed to provide corner-to-corner brightness, superb color reproduction and sharp contrast. The 16 MG uses a 20mm f/2.8 Rokkor, the 16 MG-S a 23mm f/2.8 Rokkor and the 16 QT a 23mm f/3.5 Rokkor. The f/2.8 lenses use four elements in three groups while the f/3.5 in the 16 QT contains three elements in three groups. The 16 MG's shorter focal length is explained by the camera's smaller picture area, 10x14mm as compared to the now-standard 12x17mm frame size of the 16 QT and MG-S. The f/2.8 Rokkors are prefocused at a distance of 11 1/2 feet for maximum

to a regular photographic tripod using the built-in tripod socket. Screw a cable release into its socket in front of the shutter button and hold the camera securely if you are bracing it. Then press and hold the cable release (or shutter button if you don't have the release with you) until the indicator light goes out. If you can't see the light, don't worry as shutter operation is audible enough to tell you when the exposure begins and ends. Hold everything steady until the second click is heard.

After you've taken the picture, advance the film by pushing the slide with your right thumb about 1 1/2 full strokes, or until it locks. This is important as you won't be able to trip the shutter until the film is properly positioned for the next exposure; double ex-

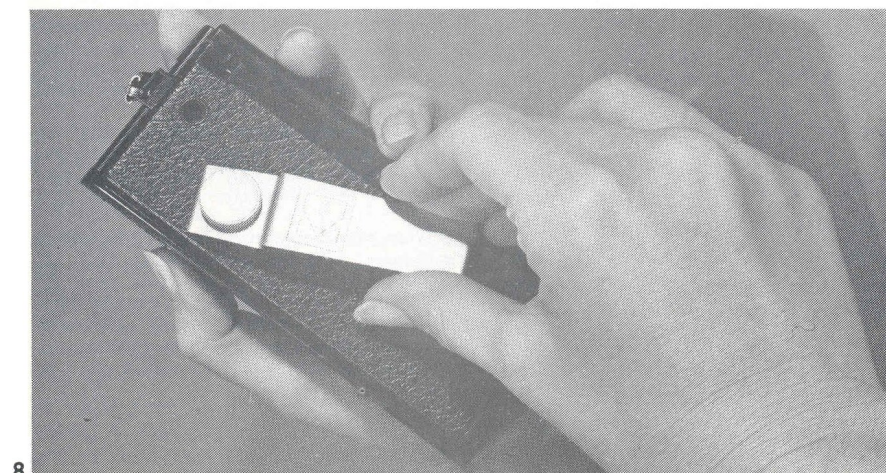
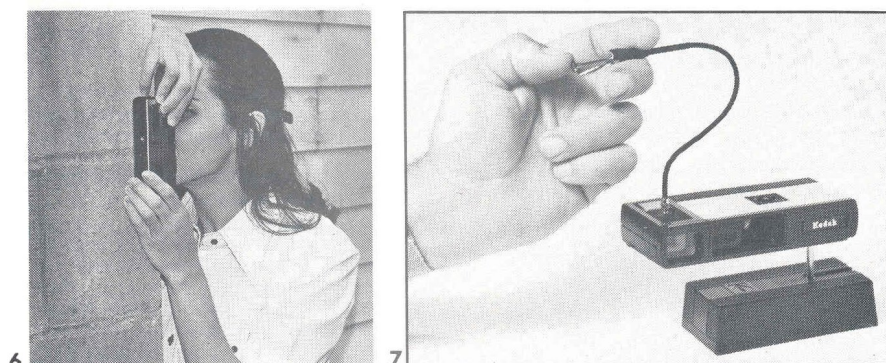
posures are impossible. Neglecting to fully advance the film could cause you to miss the next picture you want to take. Film can also be advanced with the camera at eye level if you want to take a series of photos, but don't hold the shutter button down while moving the film.

You've probably heard this dozens of times, but it still holds true—before you shoot your first cartridge of film with the Pocket Instamatic camera, practice holding the camera and releasing the shutter button until you can do it correctly without thinking. If you hold the camera properly, your pictures will be sharp and contain exactly what you saw in the bright frame of the finder. Once you've acquired the correct techniques of holding and using the Pocket Instamatic camera, you'll be able to get

just the pictures you want when you want them.

ACCESSORIES

With their built-in Magicube sockets, the Pocket Instamatic cameras are self-contained units for all-weather photography. The present list of accessories offered by Kodak for these cameras is small—a carrying case, compact camera stand, Magicube extender. While it is unlikely that other accessories will be offered by Kodak at this time, it is possible that independent manufacturers will produce a set of snap-on filters and perhaps close-up lenses in the near future. Currently, the only non-Kodak accessory is an electronic flash unit for use with the 20, 30, and 40 models of the camera, and manufactured by Tiffen and Kalimar.



1. Check battery condition by resting the meter cell on your arm and tripping the shutter. If the shutter does not stay open, replace the battery.

2. The bright frame lines inside the Pocket Instamatic viewfinder indicate the picture area, but there are no parallax correction marks for close-ups.

3. When holding the Pocket Instamatic for horizontal pictures, combine downward pressure of the fingers with upward thumb pressure to help keep the camera steady.

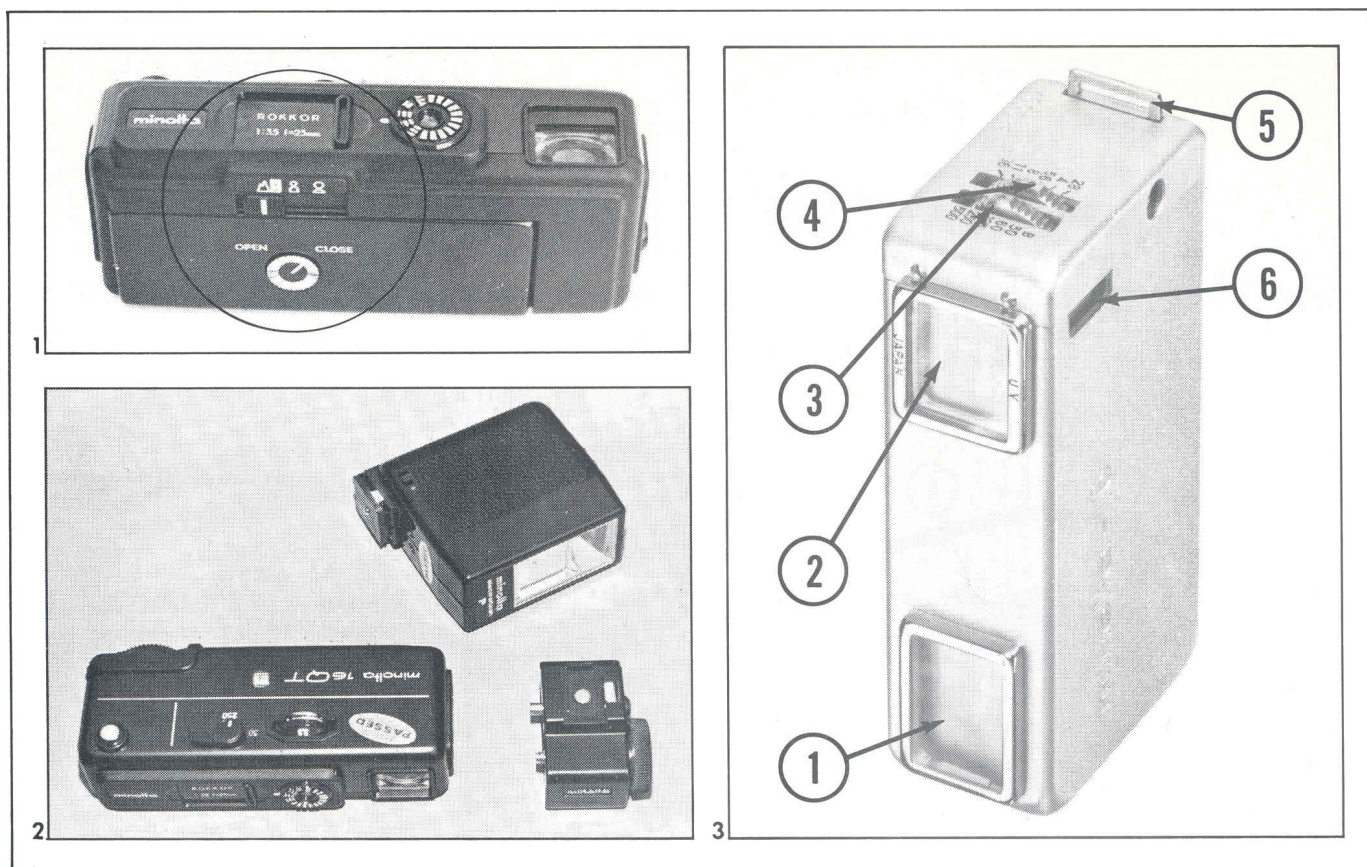
4. Some may find it easier to view with the left eye, holding the camera upside down to allow bracing against the face.

5. There are two ways to hold a Pocket Instamatic for vertical pictures. One method uses the forehead as a brace (left) and the other uses the cheekbone and nose to steady the camera (right). Use whichever method feels most comfortable for you.

6. When the red or amber indicator light in the viewfinder comes on, brace the camera against a wall or other solid object to hold it steady.

7. Sold complete with cable release, the Kodak Compact Camera Stand is a handy and portable accessory for sharp pictures under low light conditions.

8. This chrome-plated brass camera clip secures all Pocket Instamatic camera models to belt, pocket or shoulder strap.



Minolta Camera System

correct exposure and the shutter button automatically locks, bringing a red warning signal into the viewfinder at its bottom. Set the camera to a lower shutter speed or use flash. When the needle stays in the red zone at the left, there's too much light for a correct exposure and you'll need a higher shutter speed.

OTHER MG-S FEATURES

A built-in close-up lens is located behind the lens cover for use at the four-foot range. This auxiliary lens is positioned by sliding the bottom half of the split knob all the way across the recessed lens mount. When the close-up lens is in use, a red signal appears at the left in the viewfinder, reminding the user not to take pictures beyond four feet from the camera. For parallax correction with the auxiliary lens in place, frame the subject within the area marked off by the two partial vertical lines at the left side of the bright frame. If you're holding the MG-S correctly, this corresponds with the edge of the red warning signal. When the close-up lens is not completely in or out of position, the shutter locks and will not work until correct positioning is achieved.

Sliding the lens cover in place across the lens serves three purposes; it protects the lens from dam-

age, automatically shuts off the meter circuit to conserve battery energy, and locks the shutter button to prevent accidental release of the shutter that would waste a picture. Like the close-up lens, if the lens cover is not completely open, the shutter will stay locked and unusable.

Flash synchronization is provided at 1/30 second with flash bulbs or flashcubes, or at any speed with electronic flash and the accessory Minolta Strobe Adaptor. The MG-S flash gun is available in either AG-1 or flashcube models and attaches to the camera end by matching the male plug and screw on the gun to the camera's two receptacles, then securing them tightly by turning the screw on the gun.

THE 16 QT

This impressive looking little performer is the newest Minolta 16 and features a unique "Flashing OK" exposure system that's not only ingenious but quite up-to-date. With only two speeds, shutter selection is simplified: for outdoor daylight photos, the shutter is set at 1/250 second; for overcast days or flash, use the 1/30 second position.

To operate the 16 QT, you must first set the film-speed selector on the camera's face for the ASA rating of your film. Then turn the shutter speed selector index on the camera's top to its correct position (30 or 250) and look through the viewfinder where

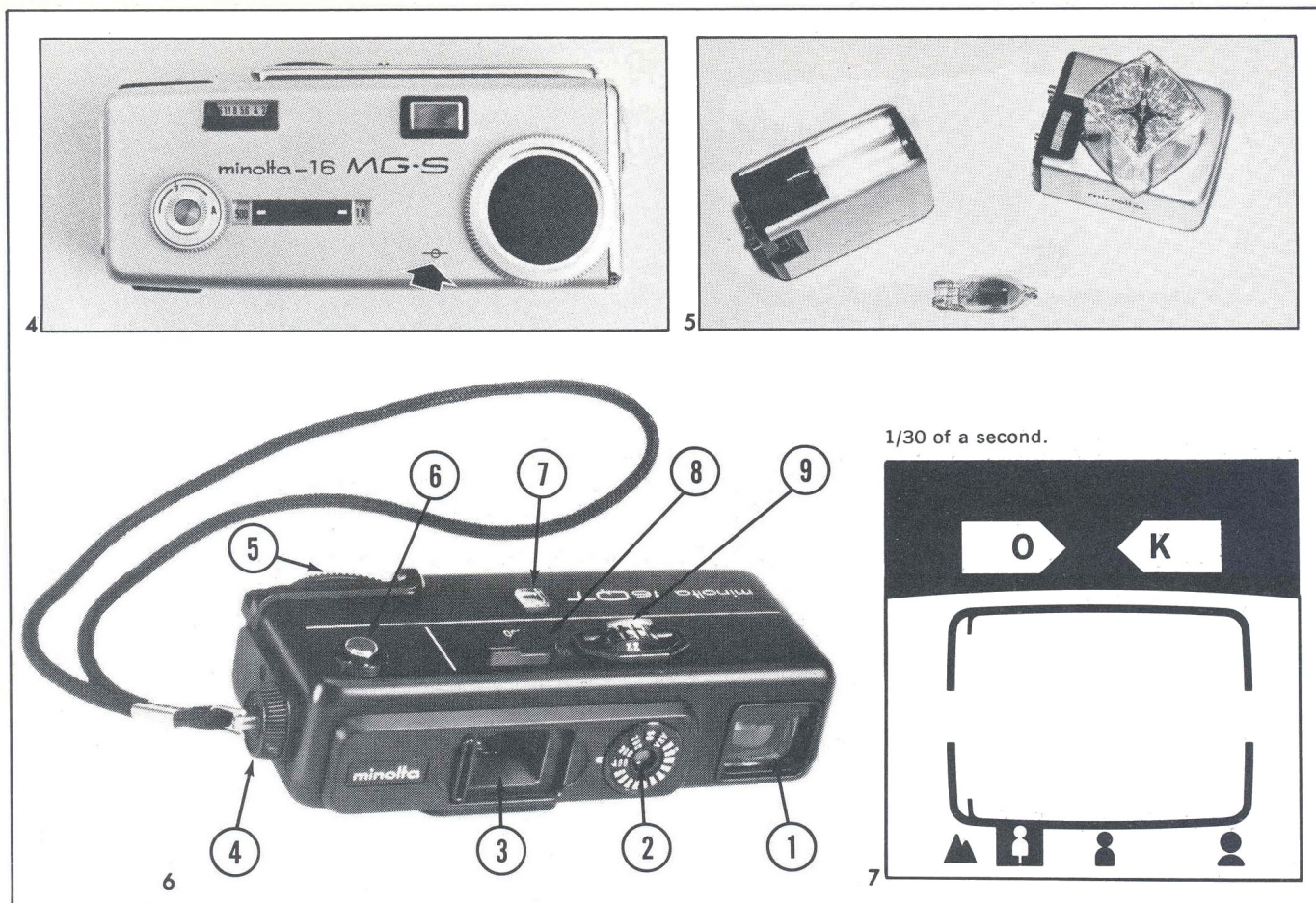
1. QT's focusing lever is underneath the lens on the camera bottom. Moving lever also moves a red indicator in the "Control Center" viewfinder that shows you the exact focus setting without the need of removing your eye from the finder window.

2. Minolta Electroflash-P makes an ideal companion for the QT when used with the Strobe Adaptor. This electronic flash unit also fits MG-S and provides a GN of 45 with ASA 100 film. Power is two replaceable AA batteries.

3. Minolta 16 II features viewfinder (1), lens (2), shutter speed wheel (3), lens opening wheel (4), wrist strap eyelet (5), shutter button (6).

4. MG-S filters also fit QT model. Circular window fits over CdS cell, so exposure compensation for filter is automatic operation.

5. Close-up lenses for MG-S and QT are shown with measuring chain.



1. Minolta 16 MG features viewfinder (1), selenium meter cell (2), lens and lens cover (3), shutter button (4), film advance wheel (5), exposure counter (6), exposure control ring (7), match needle window (8), flash contact (9).

2. The 16 MG and MG-S use bright frame viewfinder complete with parallax correction marks at left side.

3. Minolta 16 MG-S features viewfinder (1), CdS cell window and ASA index dial (2), lens (3), lens cover and close-up lens (4), tripod/wrist strap socket (5), film advance wheel (6), shutter button (7), exposure counter (8), shutter speed window (9), shutter speed ring (10), auto/flash selection dial (11), lens opening scale (12).

4. With all controls visible from above, operation of MG-S is quick and certain. Small circle with line through it to left of film advance wheel indicates exact plane of the film.

5. Flash capability for Minolta is provided in the form of two flash guns, one using regular AG-1 flash bulbs and one using flashcubes.

6. Minolta 16 QT features viewfinder (1), CdS cell window and ASA index dial (2), lens and lens cover (3), tripod/wrist strap socket (4), film advance wheel (5), shutter button (6), exposure counter (7), shutter speed selector index (8), meter switch, f/stop dial (9).

7. The QT "Control Center" viewfinder contains a bright frame with parallax marks, four zone focusing symbols and two orange arrows that flash O.K. when the correct exposure is set.

sharpness at any lens opening, while the f/3.5 in the QT uses a four-position zone focus.

THE 16 MG

Now discontinued but still available new in photo stores, the 16 MG uses a programmed mechanical shutter with a four-speed range of 1/30 to 1/250 second, cross-coupled to a built-in selenium meter for correct exposures with no calculation by the user. Precise exposure measurement is determined by turning the exposure control ring (which contains the ASA film-speed window, lens and shutter-speed index) located beside the meter window. When the red match needle is aligned in the center of the silver indicator, the MG is set for a correct exposure. For flash photos, a synchro contact select button lets you disconnect the exposure meter from operation. A cordless X-sync flash contact accepts the Minolta MG flash gun and flash bulbs at 1/30 second. By aligning the lens opening number on the exposure control ring with a red index dot on the camera body, you can select any desired lens opening from f/3.5 to f/16.

A sliding close-up lens that lets you take pictures as close as 26 inches is provided in the camera body, as well as a sliding lens cover and a built-in signal that warns when one or both are in front of the recessed lens. The

bright frame viewfinder also contains parallax correction marks.

THE 16 MG-S

This semiautomatic model recently superseded the 16 MG and is equipped with a CdS cell coupled to the shutter and film-speed index. After setting the ASA index dial positioned beside the lens to the film speed you're using, select the desired shutter speed by turning the ring around the outside of the Auto/Flash selection dial. For automatic diaphragm control with the CdS electric eye, the A on the inner selection dial should line up with the shutter speed window. When using flash, press down on the milled center of the inner dial and turn until the red line is opposite the window. This returns control of the lens opening to the user. Revolving the inner dial in the direction of the line allows you to set the lens at any desired opening between f/2.8 and f/16; these are visible in the lens opening scale.

The scale is contained in a horizontal window placed on the camera top just above the viewfinder. The scale also contains a red zone at each end. If the exposure needle stays in the red zone at the right end of the scale when the camera is set on automatic and pointed at the subject, there's insufficient light for a

Minolta Camera System

in a choice of attractive and durable finishes: soft-luster chrome or gold for the MG, a soft-luster silver or a professional-looking all-black exterior for both the MG-S and QT. Until 1972, Minolta also offered two other pocket cameras, the 16 Ps and 16 II. We'll discuss both models here, as the recently discontinued 16 II is still available new in many camera stores, often at an attractive price.

THE 16 II

The most compact pocket camera Minolta has ever produced, this is the original Minolta 16 design. Completely manual in operation, the 16 II is equipped with a fixed-focus 22mm f/2.8 Rokkor lens and five-speed shutter, with a B setting for long exposures. Negative size is the older 10x14mm format. For carrying, the 16 II telescopes into its own metal case somewhat as does the Minox series. To use, you must first pull the camera out of its case as far as it will go. This extends the body length to a comfortable size for easy handling and exposes both the viewfinder and shutter button. After estimating the correct exposure, the lens and shutter are set by revolving the two milled wheels at the camera's right end. The viewfinder is a standard optical type, lacking the bright frame of the M series. After taking the picture, the film is advanced by pushing the camera back into its case as far as it will go and pulling it out again. This push-pull action also cocks the shutter for the next picture and moves the film counter one notch.

Synchronized for flash at 1/30 second, the 16 II uses the tiny Duofit-S flash gun. A wraparound flash/tripod adapter clamp is provided as an accessory. This carries a shoe on top for the flash and a tripod socket on the bottom. Three color filters (80A, 81B, 1A), two black-and-white filters (UV and Y48) and two close-up lenses complete the basic 16 II outfit.

THE 16 PS

Minolta's aim-and-shoot pocket camera is an excellent choice for those new to pocket camera photography. Like the 16 II and MG, the Ps takes 10x14mm pictures with its 25mm f/3.5 lens and two-speed (1/30, 1/100) shutter. The longer focal length of the Ps lens will give you a larger image than the other Minolta pocket cameras. Operation of the Ps is also completely manual, but the unique Weather Mark exposure system simplifies pocket camera photography for the user. After loading the camera and positioning the film for the first picture via the knurled wind dial at the back (similar to that of the

M series), the user sets the film-speed-indicator dial to the ASA rating of the film.

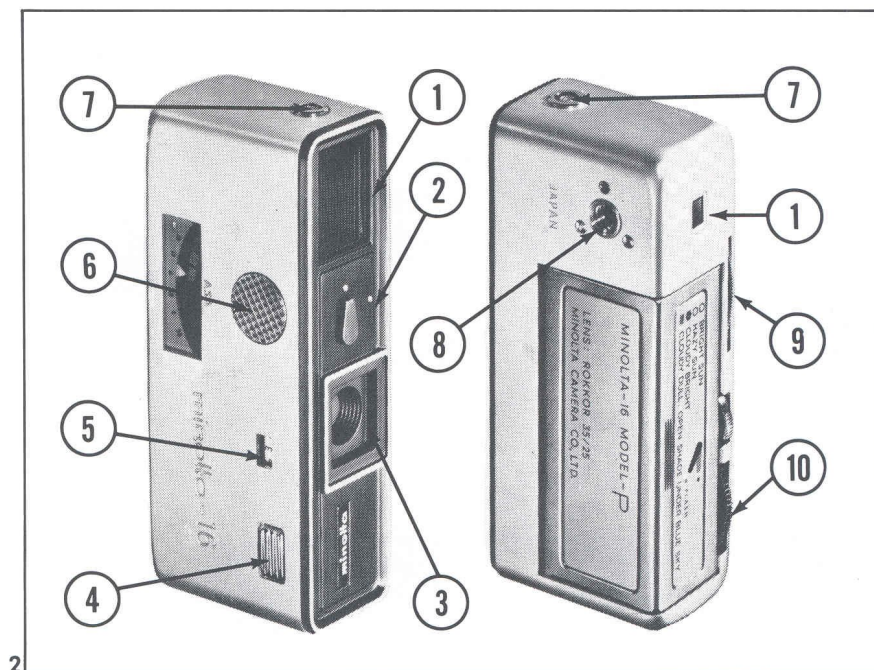
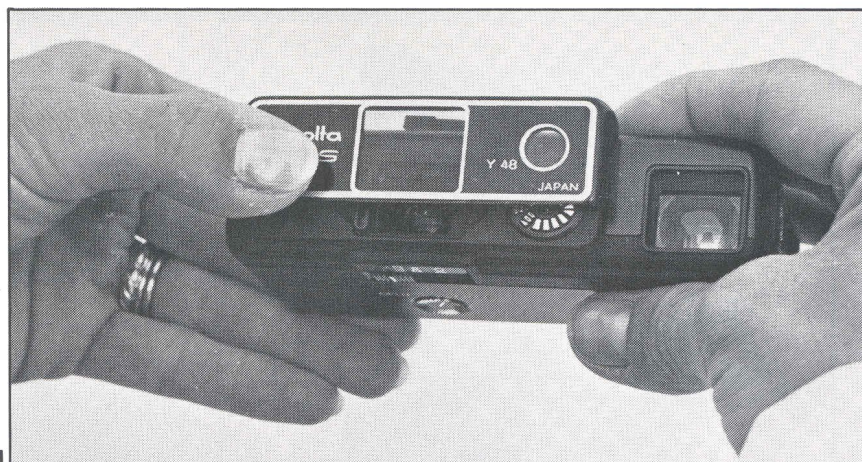
The lens is then adjusted according to one of four symbols that represent lighting conditions—bright sun, hazy sun, cloudy bright or cloudy dull—or if a separate light meter is used, at any lens opening between f/3.5 and f/16. Compose the picture in the life-sized enclosed optical finder and depress the shutter button. The shutter speed is then selected by positioning the flash-switch lever at the white dot (1/100 second) for daylight or red dot (1/30 second) for flash photography. All accessories for the 16 II are provided to fit the 16 Ps.

TAKING FLASH PICTURES

Designed for the novice as well as advanced amateurs, the Minolta pocket camera line offers something for everyone and sufficient accessories are available to extend its versatility beyond the camera's basic capa-

bility. If you've used other adjustable cameras before, you'll find nothing different about flash with the Minolta pocket cameras. All are equipped for flash photography and are used in essentially the same way. Those models with built-in meters are disconnected from the electric eye for flash photography and the user then selects the correct lens opening for a proper exposure. This is accomplished by a series of "guide numbers" (GN) assigned to each film for use with flash bulbs or flashcubes. You'll find this number on the instruction sheet packaged with the film or on the bulb/cube carton.

To find the correct exposure, divide the GN by the distance in feet between flash and subject. Thus if you're taking a picture 10 feet from the subject and the film has a GN of 80, the lens must be set at f/8. While not as convenient as the electronic shutter and focus-linked exposure control on the Kodak Pocket In-



same flash guns and same method of attachment.

THE SYSTEMS APPROACH

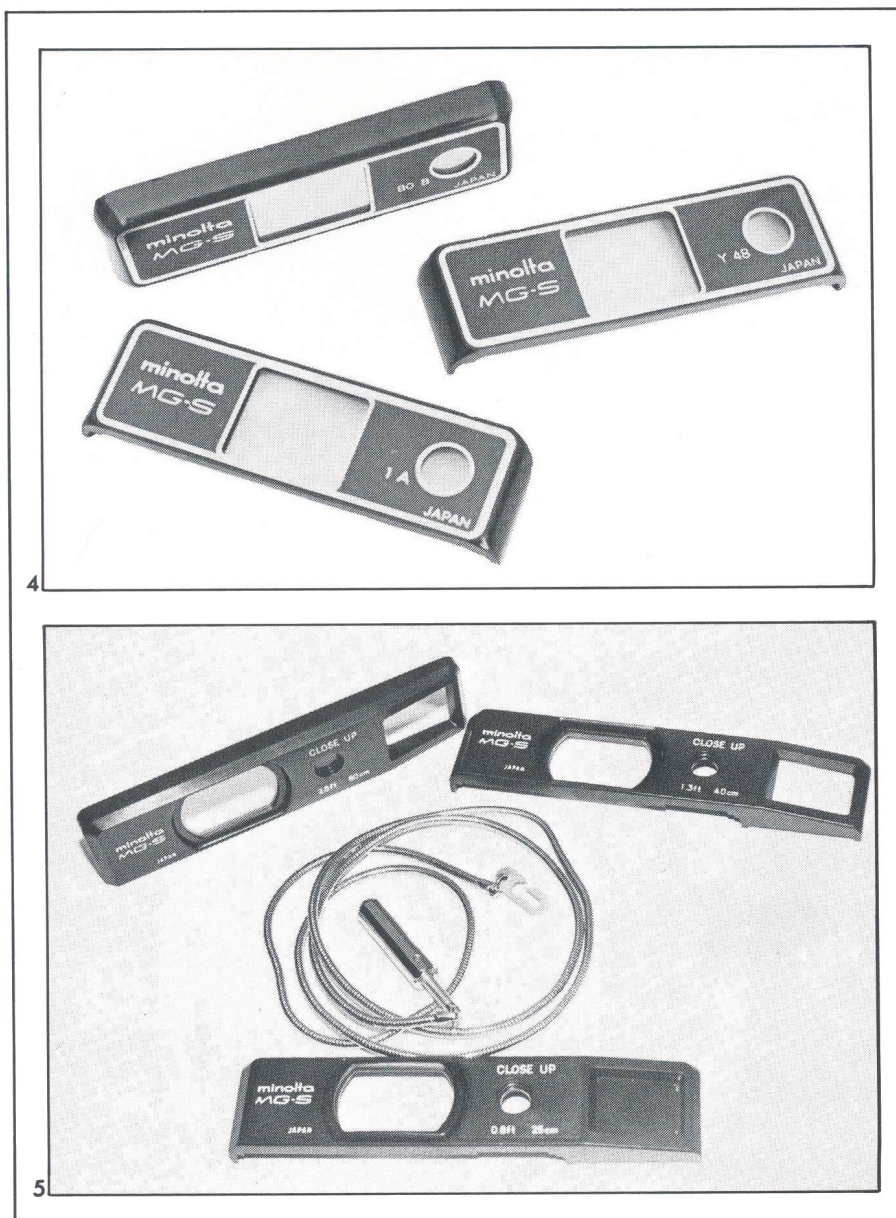
The Minolta pocket camera system is enhanced by the availability of filters and additional close-up lenses beyond those built into the camera. For the 16 MG, Ultraviolet (UV) and Y48 filters are available but exposure correction must be made manually by halving the ASA setting when using the Y48. Although these filters do not fit other Minolta pocket cameras, three others are provided for the MG-S and QT. Each attaches by slide-locking over the camera face and each contains a special filter window to cover the electric eye. As this window filters the light reaching the CdS cell, no exposure compensation or correction is necessary when using a filter.

The clear 1A skylight filter reduces haze and is recommended for use with either color or black-and-white film, especially when photographing distant landscapes, seaside or beach scenes where there's a high percentage of UV rays in the light. The blue 80B filter lets you use outdoor color film inside under artificial lighting while the Y48 yellow filter increases contrast and brightens natural skin tones when used with black-and-white films.

Two accessory close-up lenses, which allow camera use at 2.6 and 1.3 feet, are also provided in addition to the MG-S and QT close-focusing position; there are none for the MG. Both lenses slide-lock over the camera face in the same manner as do the filters, and a corresponding scale chain is used for correct distance measurement from lens to subject. When used on the 16 QT, the camera must be focused at the click-stop medium distance setting.

Two other close-up lenses are available for use with the 16 MG-S and the Minolta copy stand. These let you photograph documents and other small objects at distances of 16 and 10 inches. The two-position copy stand extends automatically to the proper distance for use with each accessory lens—no measurement is necessary when copying. The copy stand has a special head containing a tripod screw to hold the camera and a cable release unit that slips over the shutter button. The versatility of the Minolta pocket camera system is greatly extended by the practical reality of close-up and extreme close-up photography, and other accessories, such as the unique Spy Finder attachment that permits candid shooting from a variety of positions.

Manufactured with a sturdy metal body that fits easily and comfortably in hand, this Minolta 16 series comes



you'll find the control center in operation. There's the bright frame that outlines the lens's field of view, a pair of parallax correction marks at the left side of the bright frame for use when taking portraits and close-ups, four zone focusing symbols, the two "Flashing OK" exposure pointers, and a red slow-shutter warning mark that appears when the 1/30 second speed is in use, reminding you that you must hold the camera steady.

Controlled by an integrated circuit, the "Flashing OK" system uses two pointers that glow a bright orange to show you the correct direction in which to turn the lens setting dial on the camera's top. Push the metal circuit switch on the camera top down and revolve the plastic lens setting dial in front of it. Once the CdS cell determines that a proper exposure has been found, the integrated circuit activates both pointers which then begin to blink, flashing a signal that reads "OK."

Unlike the more expensive MG-S, the 16 QT has a four-position zone focus: infinity (33 feet), medium distance (11 1/2 feet), portrait (6 1/2 feet) and close-up (4 feet). The focusing slide on the bottom of the QT body click-stops at the medium distance setting, but slides continuously between this and the other three positions. As a coupled indicator needle moves to the zone symbol you select at the bottom of the bright frame, you can focus the QT while looking through the viewfinder.

Because of the close-up position in the zone focus range, there's no need for a built-in supplementary lens, as used with the 16 MG-S for head-and-shoulder shots. But the QT does have a sliding lens cover, similar to that of the MG-S, that locks the shutter and shuts off the meter circuit. Like the MG-S, the QT is fully equipped for flash photography, with standard flash bulbs, four-shot flash-cubes or electronic flash, using the

ashlike coating when in use, it's a good idea to periodically remove them for cleaning with a soft dry cloth to restore perfect contact when in operation.

All Minolta flash guns use the standard 15-volt Mallory M-504 battery or equivalent. While it's a good idea to replace it at the same time as the camera's battery, this really depends upon how much you use the flash. To check its battery condition, connect the unit to the camera and insert a bulb or cube. Press the flash test button on the back of the gun; if bulb and battery are O.K., the orange test lamp will light up. If you encounter problems with the flash, check to make sure you've inserted the battery properly, with the + side of the battery against the + contact of the gun. Like the meter battery, it's a good idea to remove and store the flash gun battery if you're not going to use the unit for a month or more.

PICTURE TAKING

Taking sharp pictures with your Minolta is easy, provided you hold the camera correctly. For horizontal pictures, I've found that sighting through the viewfinder with the left eye and bracing the camera across the bridge of the nose offers the most support in holding the camera steady. It's also considerably more convenient than the method suggested in the Minolta owner's manual supplied with each camera. For vertical pictures, the left eye is again used. Hold your camera as shown and push it firmly against the nose with the left hand.

Regardless of how you choose to hold the Minolta, remember these important points. As the camera is very compact, you must be careful not to cover the lens or CdS cell with your fingers while taking a picture. Unlike the Kodak Pocket Instamatics, the shutter button on all Minoltas requires only a light touch to release; squeeze

it very gently with your index finger, particularly when the camera is set at the 1/30 second speed. Using ASA 320 film, you can take pictures under available light without flash. But to do so, you'll have to use a camera setting of 1/30 or 1/60 second at f/2.8, so pick your subjects carefully, as depth of field is limited when the lens is opened to its maximum speed.

To get the best results with your Minolta pocket camera, I suggest that you practice holding the camera, manipulating the controls and releasing the shutter button until you feel completely comfortable with it before loading that first film cartridge. This first and most important step on the path to good pocket camera photography gives you an opportunity to correct bad habits that would otherwise ruin your pictures, and it helps to insure many enjoyable years with a faithful, constant companion that's always by your side

SPECIFICATIONS

MINOLTA 16 QT

LENS:	Minolta Rokkor 23mm f/3.5 in 4-position zone focus mount; 4 feet to infinity
SHUTTER:	Mechanical with speeds of 1/30 and 1/250 second; X flash sync; semi-automatic diaphragm control by CdS electric eye
FILM/FRAME SIZE:	Minolta 16 cartridge, 18 exposures; 12x17mm
VIEWFINDER:	Bright frame with parallax correction marks; IC over-/underexposure lamps; "Flashing OK" exposure signal; focus setting and red slow-shutter warning are all visible in viewfinder
EXPOSURE METER:	CdS cell coupled to shutter and film-speed setting
MEASURING RANGE:	EV8.5 to EV17 with films speeds ASA 25 to 400
FILM ADVANCE:	Knurled wheel automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Built-in lens cap turns off meter switch; automatic resetting film counter; 4-zone focusing symbols from 4 feet to infinity; click-stop for fixed focus at 11 1/2 feet; tripod socket; wrist strap
SIZE/WEIGHT:	4 1/4x1 1/8x1 3/4 inch; 5.25 ounces

MINOLTA 16 MG

LENS:	Minolta Rokkor 20mm f/2.8 in fixed focus mount; 5 feet to infinity
SHUTTER:	Mechanical with speed range of 1/30 to 1/250 second; X flash sync; built-in exposure meter cross-coupled to lens diaphragm by match needle
FILM/FRAME SIZE:	Minolta 16 cartridge, 20 exposures; 10x14mm
VIEWFINDER:	Bright frame with parallax correction marks
EXPOSURE METER:	Selenium cell cross-coupled to programmed shutter
MEASURING RANGE:	EV8 to EV16 with film speeds ASA 25 to 400
FILM ADVANCE:	Knurled wheel automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Built-in lens cap and close-up lens with warning signal; automatic resetting film counter; cordless flash gun contact; tripod socket; wrist chain
SIZE/WEIGHT:	4 1/8x1 1/8x2 5/8 inch; 5.6 ounces

MINOLTA 16 II

LENS:	Minolta Rokkor 22mm f/2.8 in fixed focus mount; 6.6 feet to infinity
SHUTTER:	Mechanical with speed range of 1/30 to 1/500 second; X flash sync
FILM/FRAME SIZE:	Minolta 16 cartridge, 20 exposures; 10x14mm
VIEWFINDER:	Enclosed optical glass
EXPOSURE METER:	None
MEASURING RANGE:	None
FILM ADVANCE:	Push-pull action automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Self-contained in metal carrying case; automatic film counter; wrist-strap eyelet
SIZE/WEIGHT:	3 1/8x15/16x1 3/8 inch; 5.3 ounces

MINOLTA 16 Ps

LENS:	Minolta Rokkor 25mm f/3.5 in fixed focus mount; 4.7 feet to infinity
SHUTTER:	Mechanical with speeds of 1/30 and 1/100 second; M flash sync
FILM/FRAME SIZE:	Minolta 16 cartridge, 20 exposures; 10x14mm
VIEWFINDER:	Enclosed optical glass
EXPOSURE METER:	None
MEASURING RANGE:	None
FILM ADVANCE:	Knurled dial automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Automatic film counter; tripod socket; wrist-strap eyelet
SIZE/WEIGHT:	4 1/16x1 1/16x1 5/8 inch; 4.2 ounces

MINOLTA 16 MG-S

LENS:	Minolta Rokkor 23mm f/2.8 in fixed focus mount; 5 feet to infinity
SHUTTER:	Mechanical with speed range of 1/30 to 1/500 second; X-flash sync; locks automatically at over- or underexposure
FILM/FRAME SIZE:	Minolta 16 cartridge, 18 exposures; 12x17mm
VIEWFINDER:	Bright frame with parallax correction marks; over- or underexposure warning signal visible in finder
EXPOSURE METER:	CdS cell coupled to shutter and film-speed setting
MEASURING RANGE:	EV8 to EV17 with film speeds ASA 25 to 400
FILM ADVANCE:	Knurled wheel automatically cocks shutter; double exposure prevention
OTHER FEATURES:	Built-in lens cap turns off meter switch; automatic resetting film counter; f-number scale on top of camera; tripod socket; wrist strap
SIZE/WEIGHT:	4 1/4x1 1/16x1 3/4 inch; 7.4 ounces



1. Fitting a filter or close-up lens to Minolta pocket cameras is quick and simple — just slide into place as shown.

2. Minolta 16 Ps features viewfinder (1), flash switch lever (2), lens (3), shutter button (4), exposure counter (5), ASA index dial (6), flash contact (7), tripod socket (8), weather mark exposure dial (9), film advance (10).

3. Ideal for medium-close photos, the 16 QT with Electroflash-P was used here. Note even light distribution throughout picture area.

4. Available in five emulsions, Minolta film cartridges are packaged in plastic boxes for protection. Load and unload in subdued light to prevent fogging.



stamatic cameras, this system does allow the user a degree of creative control lacking in the fully automatic flash system.

In addition to the use of bulbs and cubes, Minolta offers a Strobe Adaptor to mount its tiny Electroflash-P to the MG-S and QT cameras. Ideal for pocket camera use because of its small size, this inexpensive electronic flash delivers about one-half the amount of light provided by a flash-cube and lets you take head-and-shoulder pictures without overexposing the subject. Using the Minolta color print film (ASA 80) with a flash-cube at a distance of four feet, the correct lens opening is $f/25$, but as the camera lens only stops down to $f/16$ this means a gross overexposure—too much light will reach the film and wash out highlights. But with the handy Electroflash-P instead of the cube, the proper lens opening is $f/11$, well within the camera's capability.

Another advantage of the electronic flash is its short ($1/2000$ second) duration that will stop any action in the picture where use of a cube at $1/30$ second might result in a blurred subject. If you shoot many flash pictures, this diminutive electronic unit can save you considerable money in a short time, since its total cost is less than that of 24 packages of cubes.

MINOLTA 16 FILM CARTRIDGES

Cartridges of Minolta film are conveniently packaged in small plastic containers for easy carrying and are used in all Minolta pocket cameras regardless of whether they take the older 10×14 mm or the now-universal 12×17 mm pictures. The boxes in which the film is sold are color-coded according to film type and contain an exposure recommendation sheet.

To load all Minoltas, open the film chamber cover and simply drop the cartridge in place. Like the 100 Pocket Instamatic cartridge, one end of

the Minolta cartridge is oversize so there can be no mistake in loading—it will only fit in one way. If the cartridge does not slip completely into place, press it down while turning the film advance slightly to let the advance mechanism engage the cartridge. It will then drop the rest of the way into place. Close or replace the film chamber door (depending upon camera model) and set the camera's film speed dial to correctly program the meter (not necessary with the 16 II). Advance the film and release the shutter three times or until the exposure counter reads 18 (20 with the 16 II and Ps). Each time you take a picture and wind the film, the counter will decrease by one number, indicating the remaining number of pictures to be taken.

One word of caution here: all Minolta loads customarily make no provision for a trailer after the final exposure. If the processing lab splices your film to another for developing in

The Mighty Mite

THE MINOX SYSTEM

No discussion of pocket camera photography would be complete without consideration of the Minox; after all, this is the granddaddy of the modern pocket camera and dates back some three and one-half decades to its origin in Riga, Latvia. Unlike other cameras with such a lengthy lineage, the present Minox cameras retain virtually all those features that made their predecessors a favorite of such diverse interests as businessmen, scientists and sports fans, as well as camera buffs. Currently, there are two models in production, the electronic automatic Minox C and the semiautomatic match-needle Minox BL, which recently replaced the older Minox B.

MINOX C

The first transistorized pocket camera with electronic exposure automation, the Minox C is fitted with the same critically corrected focusing four-element 15mm f/3.5 Minox Complan lens used on other recent Minox cameras, and like them, the Complan on the Minox C is permanently set at its f/3.5 opening. The camera's only exposure variable is the choice of shutter speed. While its very short focal length has a great depth of field, the Complan can be accurately focused down to eight inches, making the camera suitable for a wide variety of photographic situations, including microcopy work.

The Complan is unique in that absolute overall sharpness is obtained by the use of a concave film plane. While most other cameras try to reproduce the image on a flat surface, the Minox film lies in a curved plane where the sharpest image is formed. By only partially correcting the "curvature error" in the lens itself, other problems in lens design have been solved by Minox with a high degree of success. Obviously, trying to enlarge Minox negatives with a conventional enlarger lens will not be completely successful; for best results, you'll need the Minox Enlarger Model II, whose negative carrier duplicates the concave film plane for maximum sharpness in the projected image.

AUTOMATIC EXPOSURE CONTROL

Equipped with a tiny solid state computer, guided by an ultrasensitive

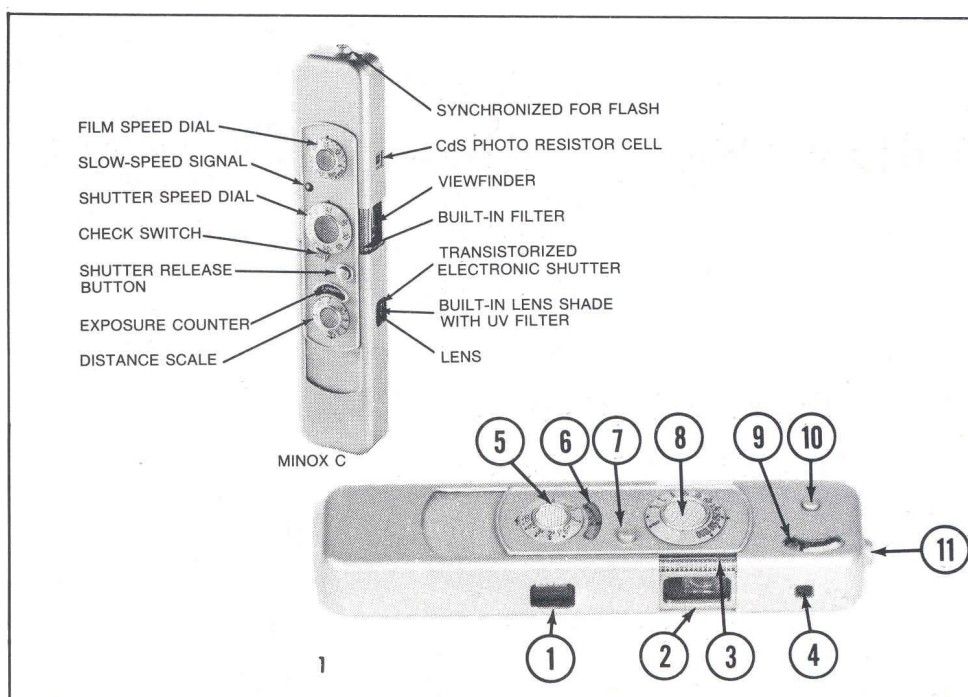
CdS photo resistor cell and aided by diodes, minute electromagnets and condensers, the metallic sliding blade shutter mechanism automatically times correct exposures from 1/1000 to seven seconds. After setting the ASA index dial for the speed of film in use, you need only aim the Minox C at the subject—electronics do the rest. When the shutter button is depressed, the shutter opens and the computer goes to work instantaneously; the CdS cell measures the brightness of the scene and as soon as sufficient light has reached the film, the solid state circuitry closes the shutter.

For flash pictures and other unusual situations (such as back-lighted subjects), you can override the automation system and manually set your own shutter speeds between 1/15 and 1/1000 second. When the camera is used on the A or automatic position, the shutter has an infinite speed range—the speed selected by the camera may be 1/67, 1/278 or 1/365 second—but no intermediate speeds are available when used on manual. You can only choose one of the seven marked speeds.

A slow speed check switch should be used before taking pictures under

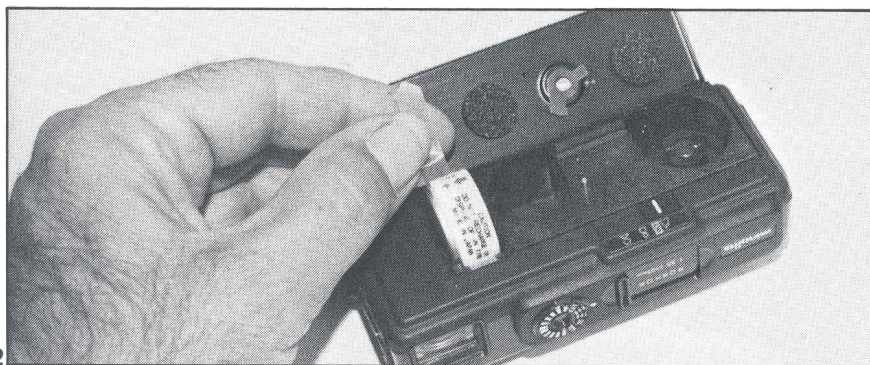
poor light conditions since the Minox C gives no indication of the shutter speed selected. If the light signal goes on when you activate the switch, use a tripod or other firm support before taking the picture, as the required shutter speed is 1/30 second or less.

Under extremely bright lighting conditions (like beach or snow scenes) or when using faster films, the top speed of 1/1000 second may not be great enough to give a correct exposure with the f/3.5 lens. In such cases, a built-in neutral density (ND) filter can be positioned in front of the lens. By increasing the required exposure four to six times, the ND filter brings the scene within control of the automatic exposure range of the electronic shutter. In addition to the sliding ND filter, the Minox C also contains a built-in ultraviolet (UV) filter that serves as a protective lens window. Three slip-on filters are provided as accessories for use with the Minox C—Green for black-and-white work, Skylight (R3) for taking color pictures under a blue noonday sun and Color Correcting (R6) for taking color pictures in the shade. Each automatically corrects the electronic exposure system to compensate for its respective factors.

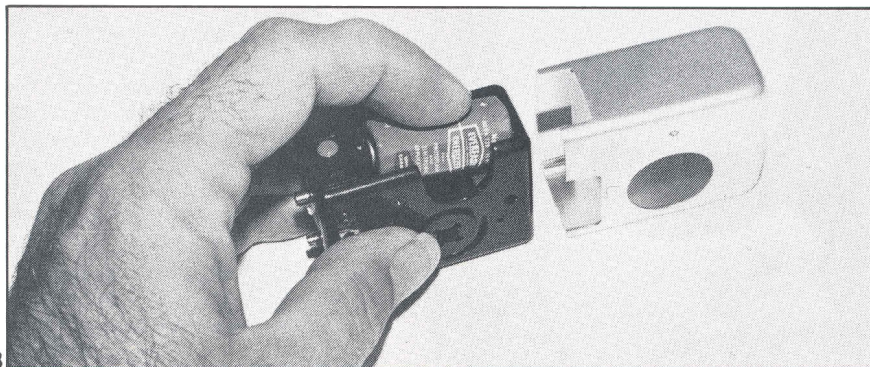




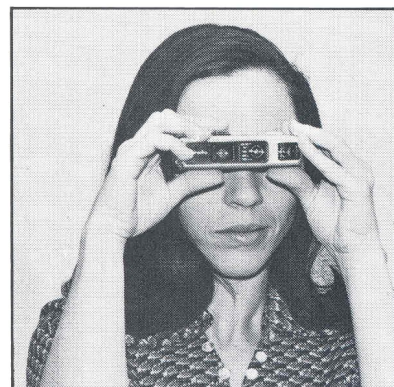
1



2



3



4



5

Minolta Camera System

a continuous processing machine, it will spoil that last picture. I've found that you can safely take pictures after advancing the film only two frames. This places the exposure counter at one dot beyond 18. When the counter reads 1, you will have taken 18 pictures; don't take that 19th and you'll have almost a full inch of film at the end to protect the final picture against that happening, while still getting the full number of pictures.

Easily reloaded with single-perforated 16mm film, Minolta cartridges give their owners the option of using a number of more exotic emulsions, such as infrared for special effects (you'll have to improvise a red filter), high-contrast copy film or color emulsions not generally available to the pocket camera user. Investigate the various film possibilities with your

dealer and in another section, I'll show you how to reload your own.

BATTERY CONDITION AND REPLACEMENT

As the MG is equipped with a selenium meter, it needs no battery power to operate the exposure control system. The QT requires a 3-volt Mallory alkaline PX-30 or equivalent; the MG-S uses a much smaller 1.3-volt PX-675 mercury battery. Both are positioned inside and to the right of the film chamber and, since there is no provision for checking battery strength, should be replaced every year. If you remember to slide the lens cover into position each time you finish taking pictures, either battery will easily last a year. If you do not use the camera for extended periods, such as a month or more, remove the battery and store it in a cool dry place to prevent corrosion from injuring the terminal contacts. As these batteries generally exude an

1. Cartridge drops in place for instant loading. Like 110 cartridge, it cannot be inserted incorrectly.

2. Battery replacement for 16 QT should be done once a year as standard practice as there is no battery check on camera.

3. AG-1 and cube flash guns both use 15-volt battery. Replace as shown when you renew the camera battery.

4. MG-S (top) must be held differently than QT, as shown. Brace against nose bridge and sight with left eye. Pull elbows into your side to further steady the camera. Looks awkward, but you'll find it's really quite comfortable.

5. For vertical pictures, brace camera against nose and press in on cheekbone. Adopt a position that is comfortable for you, but make certain that the lens and CdS cell for meter are not covered by your fingers.

The Mighty Mite Minox

As the Minox BL has an infinite speed range from 1/2 to 1/1000 second, the shutter speed dial will often come to rest between the engraved numbers. The speed being selected by the camera will be somewhere between the two numbers and while you won't be able to tell exactly what it is, it'll be precise for the subject at hand.

When the black needle is in the meter's gray zone at the right side of the window, the Minox BL is telling you that the light is too intense for even the 1/1000-second speed—the ND filter must be positioned in front of the lens and a new reading taken. If bracketing the needle results in a marked shutter speed of 1/30 second or less, use a tripod or other firm support to avoid blurring the picture; when indoors, use flash. If the pincer and needle intersect at the dot between 1/2 and B on the speed dial, the required exposure is one full second. Use the B setting and hold the shutter button down for one second. When the needle reaches B before the pincer brackets it, the exposure required is longer than one second and cannot be read by the meter.

The CdS meter in the Minox BL is powered by a Mallory PX-675 (or equivalent) battery with a normal life span of one year. To check battery condition, turn the shutter speed dial until a small black check mark can be seen at the edge of the meter field. Then push the ridged sliding lever that positions the ND filter toward the meter cell while holding the meter button down. If the black indicator needle does not move into or to the right of the check mark, the battery needs to be replaced.

This is done by opening the camera as you would for film loading. Pull up the red end of the flexible strip in the battery chamber to remove the old battery. When sliding the new one into place onto the red strip, make sure that the position of the + and - poles corresponds to the symbols on the inside of the camera cover.

FLASH PICTURES

The Minox C and Minox BL are both synchronized for use with flash bulbs or cubes at 1/30 second and below, or with electronic flash at speeds of 1/250 second and slower. As the Minox flash contact is a standard PC terminal positioned at the left end of the camera (or top, depending upon how the camera is held), you can use any flash unit with a PC connector; but Minox provides a variety of highly efficient, compact units that match the cameras in styling while connecting automatically.

A B/C (battery capacitor) unit is available for use with AG-1 bulbs and the Cube Flasher C 4 accommodates four-shot flashcubes, but the cube must be positioned manually after each picture. The ME-1 electronic flash consists of a tiny flash head and a small power pack with built-in nicad batteries that hold up to 160 flashes on one charging. A thin flexible power cable connects the two.

An even more compact unit, the ME-2 is a self-contained computerized unit that adjusts the flash duration to the brightness and distance of the subject. Just match the ASA dial of the ME-2 to that of the film in use and the flash does the rest. By switching off the ME-2's automation system, the unit then operates as a normal electronic flash with a guide number of 36 (ASA 25).

Unlike cameras with a variable diaphragm, you cannot control flash exposure with the Minox by adjusting the lens opening. With the B/C or C 4 units, Minox users are restricted to a flash "zone" as shown in Table 1. Good results can be obtained if you follow the zone recommendations. If you are using a Minox C for flash pictures, be certain to move the shutter speed dial off the A position and to a speed of 1/250 or below.

Both Minox electronic flash units offer more control over exposure than do flashcubes. With its flash range switch that controls both light output and intensity, the ME-1 lets you reduce power to move closer to the subject. A scale connected to the switch reads the proper distance in feet from flash to camera. The newest and most convenient, the ME-2's computer control lets you flash away without worrying whether or not you're in the right "zone" by automatically varying the duration of the flash according to the subject and its distance from the camera.

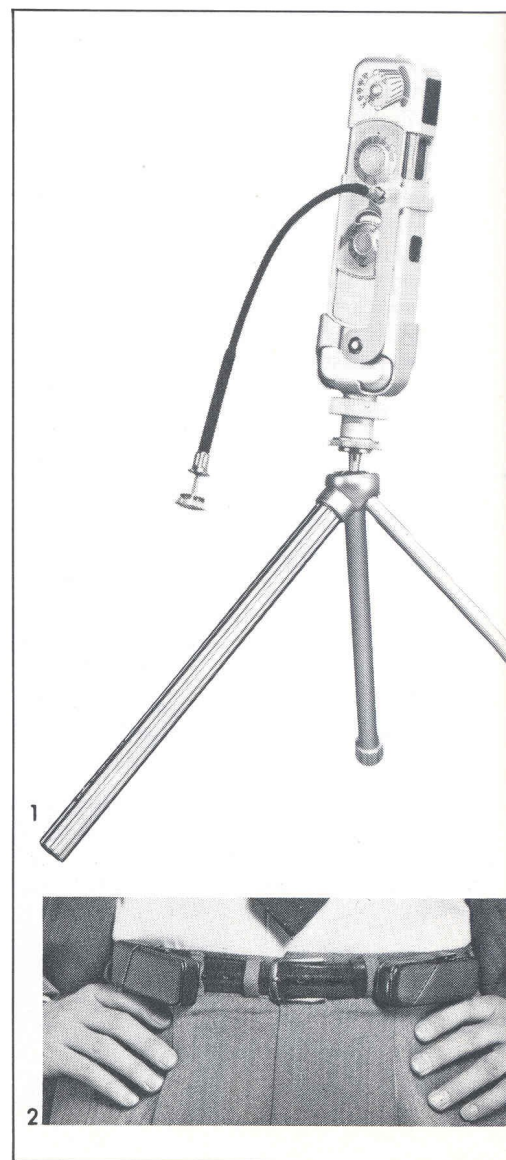
PICTURE TAKING

Like any other pocket camera, you must hold the Minox firmly and very steady when taking pictures. Place both thumbs on the bottom of the camera and your fingers on its top. This assures that the lens, viewfinder and meter cell remain unobstructed. Inadvertently covering the lens results

in a partial or complete shadow across the picture area, while obstructing the meter cell leads to an incorrect exposure. Sighting through the viewfinder with your left eye, steady the camera across the bridge of your nose and press inward to brace the camera firmly while taking the picture. This brings your hands against the cheek and forehead, adding to the stability of the camera during exposure.

A normal tendency when using any pocket camera is to spread your arms and elbows outward. Because of its very small size, this is especially true of the Minox. But practice holding your arms so that the elbows are braced against your chest. While this position may seem a bit awkward at first, you'll soon find it both natural and a great help in holding the camera steady. Remember, camera movement is bad enough with a 12x17mm negative, but you can't afford even a tiny jiggle with the 8x11mm Minox negative.

Once you've brought the Minox



1. Minox pocket tripod with adapter unit can be used for close-up photography or simply to hold camera steady under low-light conditions.

2. Minox belt case protects little camera while carrying.

3. Film speed dial is on bottom of BL.

4. Versatility of Minox accessory system is demonstrated by telephoto/binocular clamp, giving Minox owners the capability of long-distance photography.

into position correctly, frame your picture in the viewfinder's bright frame rectangle and gently squeeze the shutter button downward. As the button requires a very light pressure to trip the shutter, it's best to place your index finger close to the button while composing the picture. Then when you're ready to shoot, take a deep breath and hold it while you roll your finger onto the shutter button. Keep the camera to your eye until you've heard the soft click of the shutter, indicating that the exposure has been completed.

THE MINOX SYSTEM

Just as "clothes make the man," so accessories make the camera, and no pocket camera has a greater number available for its use than the Minox, making it a true pocket camera system instead of just another small camera. If you want to do copy work, there's the Minox pocket tripod, camera clamp and copy stand. Distant subjects can be brought right into your backyard with the Minox binocu-

lar attachment and a good pair of glasses. Candid photos are easy with the right-angle mirror attachment.

For color photography, Minox provides 30x30mm slide mounts, slide files, slide magazines for use with its Minotact and HP24 projectors and a transparency viewer/magnifier with film cutter. Home darkroom fans will appreciate the Model II enlarger, daylight developing tank, premeasured vials of ultrafine grain developer concentrate and negative wallets.

While my consideration of the Mi-

nox line has been restricted to the current models and is greatly condensed because of space requirements, there are several good books available dealing solely with the Minox and its applications. For further information in greater depth, I suggest you refer to *Small Minox—Big Pictures* by Rolf Kasemeier, or to the current edition of Joseph D. Cooper's *The Minox Manual*. Both are highly readable and practical in their approach to fully utilizing the potential of the Mighty Mite.

TABLE 1

MINOX ZONE FLASH TABLE
(Set camera at 1/30 second shutter speed)

	ASA 25	ASA 50	B&W PLUS-X	ASA 20	COLOR ASA 80
Number of feet Without filter	3-15	4-17	20-26	5-10	7-12
Number of feet With ND filter	1-3	2-6	10-15	2-4	4-7

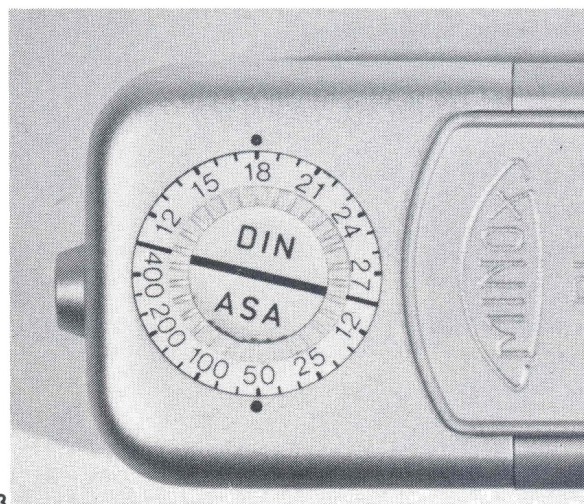
SPECIFICATIONS

MINOX C

- LENS:** Minox Complan 15mm f/3.5 in continuous focusing mount from eight inches to infinity
- SHUTTER:** Electronic with speed range of 1/1000 to seven seconds; X flash sync; coupled to lens by electric eye
- FILM/FRAME SIZE:** Minox cartridge, 15 or 36 exposures; 8x11mm
- VIEWFINDER:** Bright frame with automatic parallax correction
- EXPOSURE METER:** CdS cell provides fully automatic exposure control; uses PX-27 battery
- MEASURING RANGE:** ASA 6 to 400
- FILM ADVANCE:** Telescopic body action cocks shutter and transports film; double exposure prevention
- OTHER FEATURES:** Manual override of CdS cell, slow speed check switch, built-in neutral density and UV filters, subtractive exposure counter

MINOX BL

- LENS:** Minox Complan 15mm f/3.5 in continuous focusing mount from eight inches to infinity
- SHUTTER:** Infinitely variable with speed range of 1/1000 to 1/2 second; X flash sync; coupled to CdS meter
- FILM/FRAME SIZE:** Minox cartridge, 15 or 36 exposures; 8x11mm
- VIEWFINDER:** Bright frame with automatic parallax correction
- EXPOSURE METER:** CdS cell match-needle meter for semiautomatic exposure control; uses PX-675 battery
- MEASURING RANGE:** ASA 12 to 400
- FILM ADVANCE:** Telescopic body action cocks shutter and transports film; double exposure prevention
- OTHER FEATURES:** Battery test circuit, built-in neutral density and UV filters, full manual shutter control possible, subtractive exposure counter
- SIZE/WEIGHT:** Minox C—1 1/8x4 3/4x5/8 inches; 4 ounces Minox BL—1 1/8x3 15/16x5/8 inches; 2 3/4 ounces.



FILM ADVANCE

The Minox film advance is a telescopic push-pull action. Grasp the camera at each end and pull it open to expose the lens and viewfinder. This action cocks the shutter and advances the film one frame. With earlier Minox models, if you decided not to take a picture and closed the camera by pushing both ends toward the center, that picture was wasted, as reopening the camera transported a new frame of film into position. But a freewheeling clutch has been incorporated into the push-pull film advance of the Minox C. This disengages the advance gear train unless the shutter button has been depressed. With the Minox C, it is now possible to open the camera and close it without taking a picture and losing that frame of film. Those who are familiar with Minox cameras will especially appreciate this feature—no more running a whole cartridge of film through the camera without taking a picture, and no more taking pictures just to prevent wasting film.

Previous Minox cameras used an additive exposure counter numbered to 50 and films were packaged in both 36 and 50-exposure loads. If you switched back and forth between the two lengths, there was always the possibility of forgetting whether you should stop at 36 or go on to 50, but a new exposure counter on the Minox C eliminates any uncertainty about the film length or the number of unexposed frames still left in the camera. The redesigned subtractive counter is preset for 15 or 36 exposures when loading the film and as each picture is taken, the counter

subtracts until it reaches 0, indicating that the final exposure has been taken. By using the 36-exposure cartridges only, the counter remains automatically set for the new cartridge when the exposed load is removed.

FILM LOADING

Film loading is much the same as with previous models, but it has been simplified in the Minox C. With older Minox cameras, it was necessary to open the camera film chamber and then push the two ends of the camera together about 1/8-inch to manually open the film gate before inserting or removing a film cartridge. But once the Minox C is opened all the way for loading, the film gate opens automatically to release the exposed cartridge and accept the fresh one. If the new cartridge doesn't drop flush into the camera, the take-up core of the cartridge is probably resting on the film transport teeth. Just lift the cartridge out and turn the three-toothed wheel in the film compartment slightly, then reinsert the film.

THE MINOX VIEWFINDER

The bright frame inside the viewfinder window shows you the exact picture area and automatically corrects for parallax at all distances. When working extremely close-up (8-10 inches), the film image in the camera is smaller than that shown by the viewfinder image by about one frame line on all four sides.

BATTERY CHECK AND REPLACEMENT

To operate the automatic exposure control system, the Minox C uses a Mallory PX-27 (or equivalent) battery. This is housed inside the top of the

camera above the ASA index dial. To check battery condition, set the shutter speed dial manually to 1/1000 second and press the shutter button. If the small circle in the lens window does not disappear, the shutter is not working and the battery must be replaced. Be sure to use the 1/1000 second setting, as a nearly exhausted battery may be sufficiently strong to operate the camera at slower speeds. To replace the battery, open the camera as for film loading and pull up on the flexible strip in the battery chamber. Make sure that the + and - poles of the fresh battery match up with the positions indicated on the flexible strip.

MINOX BL

Essentially the same as the older Minox B, the Minox BL uses a built-in CdS cell coupled to an infinitely variable shutter instead of the selenium meter and mechanical shutter of the Minox B. As the Minox BL is similar to the Minox C in all respects other than the exposure control system, I'll avoid duplication by describing only those operations that differ from the Minox C or the earlier models.

The ASA index dial is positioned on the underside of the camera and should be set to correspond with the speed of the film in use. To use the Minox BL, sight through the viewfinder and hold the meter button down for two or three seconds, taking care not to cover the meter window. As the meter is of the center-weighted variety, aim the center of the viewfinder at the most important portion of the subject to take the reading, even if you plan on composing the picture differently when actually making the exposure.

Release the button to lock the meter needle in its position, then lower the camera from your eye. Turn the shutter speed dial until the red pincer in the meter window brackets the black meter needle. This sets the shutter speed for correct exposure.

1. Minox BL features CdS meter cell window (1), viewfinder (2), filter/battery test lever (3), lens (4), distance scale (5), exposure counter (6), shutter button (7), speed dial (8), meter field and button (9 & 10), flash post (11).

2. Top view of Minox BL shows slim lines of pocket camera.

3. Minox BL battery chamber is behind meter (left); Minox C battery chamber is much more accessible (right).

4. Minox B/C flash gun fits older Minox B (left) as well as newer BL and C models. Similar Cube Flasher C4 is also available.

5. Right-angle finder attaches to Minox for candid photos "around the corner." Mirrors for the older B (shown here) and IIS do not fit BL and C cameras.

