REPORT ON THE MAMIYA RB67 PRO S
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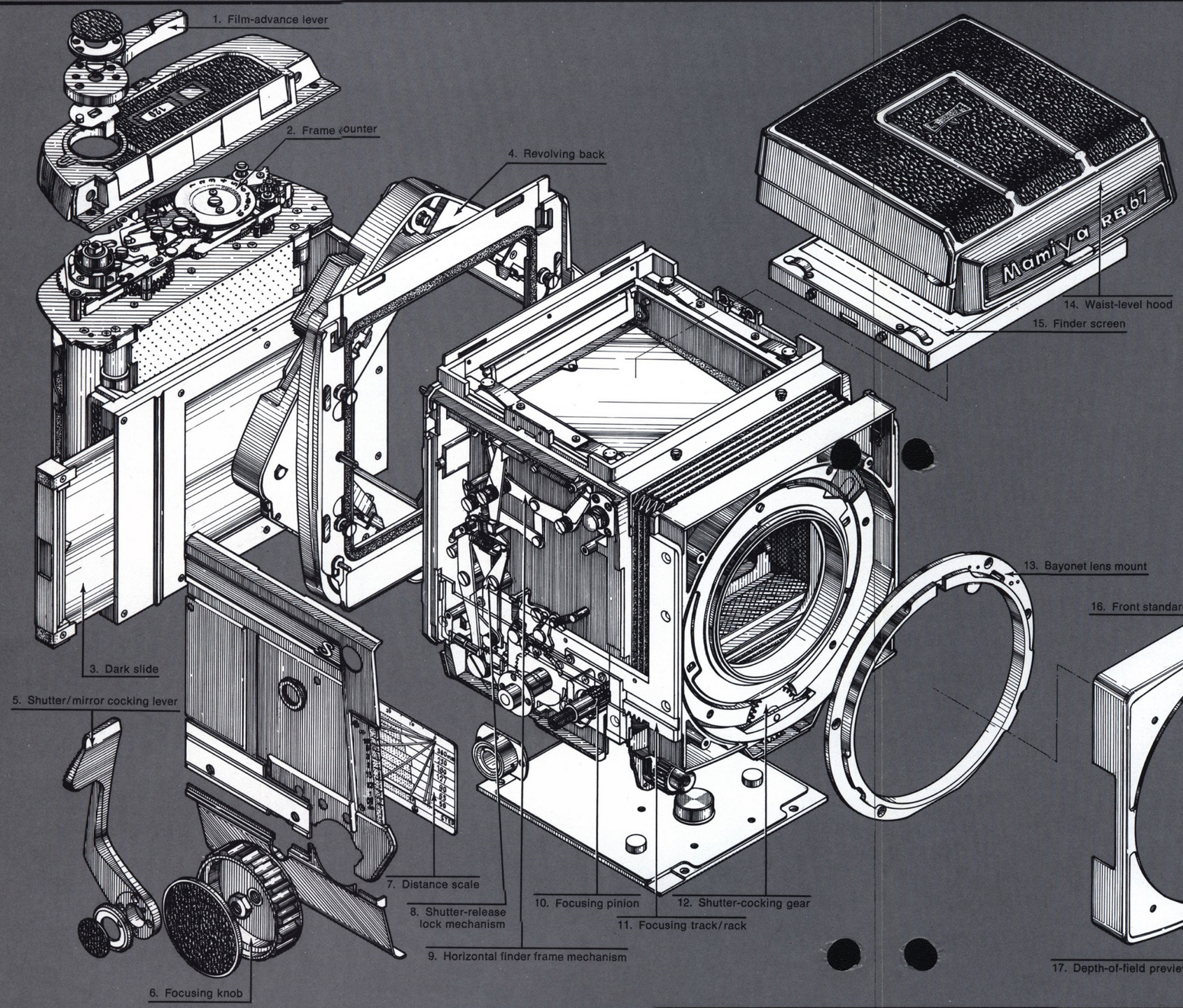

Mamiya started out with a sound basic concept and elaborated it into a complex but reliable medium-format SLR. In the process, they created one of today's best studio cameras.

Historically, the modern 35mm camera has evolved into its present shape along two major developmental lines—the general trend toward miniaturization and the single-lens reflex system of viewing and focusing. Traditionally, "miniature" or pocket cameras were best represented by folding and collapsible roll-film designs whose features were later incorporated into various vintage "pocket 35's"—precursors of the present Minoxes and Rolleis. But if any early camera typifies the SLR with its flipping-mirror mechanism and focal-plane shutter, surely it's that old prism-less large-format sheet-film camera, the Graflex—made right here in the U.S.A.

What happened to the Graflex? Unfortunately, as the quality of photographic film was improved, the necessity to use large-format cameras (with their attendant bulk and cost) to obtain "quality" pictures also decreased, and production was terminated. But, by the early 1970's, the dominant influence of photojournalism was also on the wane, as a significant portion of photographic activity shifted to artistic and commercial photography. Amidst this shift in the photographic current, medium and large-format cameras resurfaced as photographers again quested for better image quality.

In 1970, Mamiya, long an innovator in medium-format cameras, cleverly decided to capitalize on the emerging trend with—of all things—an updated roll-film version of the venerable Graflex, the Mamiya RB67. Could this resurrected, redesigned, miniaturized son of a 1907 RB Auto Graflex be a camera for contemporary photographers, most of whom were almost completely happy with and accustomed to their automatized 35mm SLR's?

Well, contrary to many photograpers' expectations, the Mamiya RB67 captured its illustrious ancestor's glory and quickly became one of the most successful cameras in Mamiya's history. So it came as no surprise that, in 1975, Mamiya announced an improved version of the five-year-old RB67, the Mamiya RB67 Pro-S. This advanced model incorporates a true double-exposure-prevention mechanism, as well as automatic vertical and horizontal frameline positioning in the finder when you revolve the roll-film back. Retained are the dual rack-and-pinion focusing tracks and large square bellows. If you know anything about camera design, you'll appreciate that these are giant steps for

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Disassembly and drawing by Tetsuo Koyama

INSIDE YOUR CAMERA

Continued

a camera of this type.

This month we'd like to study the mechanisms inside this landmark camera, concentrating particularly on those parts which made the camera unique. Significantly, the secret of the RB67's success is found in its bellows extension and revolving back. Ironically, the RB's most troublesome mechanical problems lie in these two areas also. Unlike their predecessors, Mamiya didn't choose to put a focal-plane shutter in their modern SLR. Following the lead of Hasselblad and others, an individual leaf shutter is built into each lens. This proved to be a wise decision in view of the camera's basic identity as a studio camera—it's not particularly suited to chasing after fast-moving subjects in the field. In a studio, most photographs are taken using a large strobe unit. And, obviously, a leaf shutter has significant flash-sync advantages over a slow-moving, large focal-plane shutter in this instance. So this part of the old Graflex concept was ditched. However, implementing this decision wasn't as easy as you might think. It's hard to imagine how complicated a mechanism is required.

Cocking the shutter

As you turn the focusing knob (6) clockwise, the focusing pinion (10), and focusing track/rack (11) push the bayonet lens mount (13) and front standard (16)—together with the shutter-cocking gear (12)—a maximum of 47mm forward. Irrespective of the amount of bellows extension, this shutter-cocking gear must be able to turn the shutter-cocking pins at the back of each bayonet-mount lens barrel.

Let's take a closer look at this mechanism using the simplified drawing on page 170.

In one sense, the RB67's shutter-cocking mechanism bears a resemblance to the Hasselblad's ("Inside Your Camera," June 1976, page 100). For instance, the RB's mirror-operating gear train is connected directly to the shutter-cocking crown gears, which change the direction of the motion 90°. The difference between the Hasselblad and RB67 mechanisms is the long extension of the shutter-cocking gear.

As you can see, the shutter-cocking gear turns at the end of a long square-section rod, which goes through the central hole of a crown gear (the one directly behind gear K). As you turn the shutter/mirror-cocking lever (5), a large geared sector (a) turns counterclockwise, transferring its rotary motion to crown gear (j) via the small gear (i). The set of mating crown gears is located below the bellows and operates gear (k) through the aforementioned long rod. Gear (k) then turns a large ring (l) which hooks onto the shutter-cocking pins at the rear of the lens barrel, thereby cocking the shutter. Since the rod moves back and forth (within the front-facing crown gear), the shutter can be cocked with lever (5) no matter what focusing distance you've selected.

When you press the shutter-release button (f), the entire gear train (including the shutter-cocking gears, ring and rod) turns in the opposite direction than it does when it cocks the shutter. This opposing movement allows the shutter to fire. The mechanical shutter synchronization between firing and mirror movement is taken care of by the shutter-cocking ring (l). The shutter can't fire until the ring turns completely because the ring constantly applies pressure to the shutter-cocking pins, preventing their operation until the gear-turning sequence has been completed.

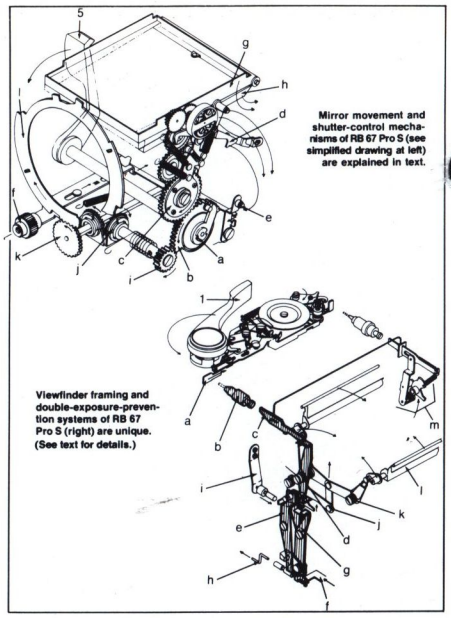
Another difference between the Hasselblad and the Mamiya RB67 Pro-S is the respective baffling systems for their film magazines. In the Hasselblad, the baffles are operated directly by means of shutter-release button movement, but in the RB67's case, the light baffle is connected to the mirror-operating mechanism. As you move the shutter/ mirror-cocking lever (5) forward, the complex gear train directly above gear (c) swings arm (d) clockwise until its hook is trapped by pin (e). When the gear train rotates, it first hooks up with light baffle (h), lowering it. Immediately afterwards, it lowers the mirror into viewing position. The movement of the gear train also times the return sequence.

Preventing double exposures

Another innovation in the RB67 Pro-S is its double-exposure-prevention mechanism designed to work in conjunction with the revolving back. Unless you advance the film, the shutter won't fire. And you can't advance the film until you fire the shutter (i.e., it prevents blank exposures). For people brought up on 35mm SLR's, the RB's separate shutter-cocking and film-advance mechanisms and double-exposure prevention system may seem primitive. But to studio pros who value revolving backs, the idea of one with double-exposure prevention built in is almost revolutionary.

In the simplified drawing on page 170, the Mamiya's double-exposure prevention mechanism is indicated by the shaded areas in the bottom drawing. As you press the shutter-release button, lever (f) moves backward, turning levers (e) and (g) clockwise. This movement is then transferred to lever (d) which turns counterclockwise, pushing plate (c) to the rear. Sliding plate (c) now impinges upon the central pin of plunger (b), which is built into the film magazine. If the film has already been advanced by turning the wind lever (l), a little flag (a) moves toward the right, allowing the plunger's pin to be pushed in. Consequently, the shutter-release lever (f) is able to move back to fire the shutter. Mamiya incorporated another plunger-stopper flag mechanism on the other side of the camera body, which is visible on the right of the simplified drawing. Both of these mechanisms are connected by a thin rod; the latter functions when the film magazine is in a vertical position. Here's how it works: in the vertical position, the magazine's vertical plunger (b) and flag (a) are located at the bottom left-hand corner of the revolving back, where they can be pushed by the crank-shaped pin (h). This pin is built into the revolving back adapter and is pushed directly by the shutter-release lever (f). Therefore, unless you advance the film and the flag (a) moves back out of the way, you can't push in the shutter-release button. In this vertical position, the right-hand plunger indirectly contacts the sliding bar (c) which works in conjunction with levers (d, e and g), preventing double exposures in the same manner as for the horizontal mode.

Essentially, the function of the crank-shaped pin (h) is to prevent shutter operation when the dark slide is in position in the film magazine. When the magazine is horizontal, pin (h) works only with the dark slide, but when the magazine is turned to the vertical position, pin (h) works with both the dark slide and the double-exposure-prevention mechanism.



The final mechanism we'll detail is the horizontal-frameline indicator in the finder. As you might imagine, one problem with revolving backs is that you tend to forget which way you've set the film magazine. With the RB67 Pro-S, as you position the film magazine horizontally, two red lines appear at the top and bottom of the finder screen, indicating the horizontal picture area. Two blue dotted lines are imprinted vertically on both sides of the screen and remain there regardless of the magazine's orientation. However, when those horizontal red bars appear, the strong color contrast seldom fails to clue you in as to which position you've selected. As you turn the film magazine to the vertical position, a tapered steel plate, built into the revolving plate, pushes a pin forward. This pin pushes into the back end of lever (j), and lever (j) then moves upward, pushing the crank-lever assembly (k) which, in turn, releases the bar assembly (l) [permitting bar (l) to turn inward in the direction of the arrows by means of spring tension].

When you turn the magazine to the vertical position, a pin disengages from the steel plate (i) and the pivoted lever (j) pulls down the lever assembly (k) above it. Its force is also derived from a built-in spring.

As you can see from the above-mentioned mechanical sequences, it's certainly not necessary to devise an electronic marvel in order to come up with a complex camera. But in tackling and solving the age-old problems of finder masking and double-exposure prevention in a bellows-focusing medium-format SLR, Mamiya has not only created a complex yet reliable mechine, they've devised one of the most successful professional studio cameras in recent years.—THE END

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