

modern tests

newest cameras, lenses & important accessories

LEICAFLEX SL 2: IT'S REALLY NEW INSIDE

MANUFACTURER'S SPECIFICATIONS: Leicaflex SL 2 35mm eye-level single-lens reflex camera. **LENS:** 50mm f/2 Summicron-R in interchangeable bayonet mount, stops to f/16, focusing to 20 in. **SHUTTER:** Rubberized cloth focal-plane with speeds from 1 to 1/2000 sec. plus B, MX sync, self-timer. **VIEWING:** Non-interchangeable eye-level prism with central split-image rangefinder, microprism collar, full focusing Fresnel screen. **OTHER FEATURES:** CdS through-lens meter (with cell in camera bottom behind semi-silvered mirror) measures central 7mm of viewing area at full aperture for films ASA 12-3200; shutter speeds, apertures and battery check in finder; exposure-index illumination button; self-timer; hot shoe. **PRICE:** \$1,299 in black or silver chrome with 50mm f/2 Summicron lens.

Leicaflex fans expecting a brand new SLR from Leitz did not get their wish in the SL 2, but Leicaflex users with minor gripes about their present SL's will find most of them remedied in this latest model. In short, the Leicaflex SL 2 is the embodiment of Leitz's traditional policy of evolutionary development—that is to say, change for the sake of betterment, not for mere novelty.

Cradle the SL 2 in your hands and you'll notice it's slightly more comfortable than the SL; that's because the latter's markedly convex back has been replaced by a flatter, more conventional-looking casting. Likewise, the SL's long straight film-advance lever has been exchanged for an angled plastic-tipped lever which is less likely to poke you in the eye and which has a more secure thumb angle at the end of the stroke. Your index finger is also accorded a more secure and convenient perch on the more finely-knurled, 1 1/16-in.-in-diameter shutter-speed dial which now hangs a bit farther over the front edge of the camera top. The back now opens when you pull up sharply on the rewind knob after pushing the new spring-loaded safety lock just in front of it

film flatness and alignment, they also enabled Leitz to dispense with the SL's roller on the film-feed side. As always, the inside finish is superbly done, and the 1 1/2 x 2 1/2-in. spring-loaded pressure plate certainly qualifies as oversized. It is evident, in examining these small points, that the Leicaflex SL 2 is a redesigned camera down to the body castings, and, in typical Leitz fashion, the designers have done everything they possibly could to de-emphasize this fact.

Operationally, it's the same story. Nobody familiar with the SL

more sensitive, according to Leitz and as confirmed by our own laboratory tests. So when you're metering at or near the limit—1 sec. at f/2 on ASA 400 film—you just push a little spring-loaded button on the right side of the pentaprism housing, and the panel behind the meter needle and movable index mark lights up. The battery housing for this little lightbulb is on the camera front to the right of the lens. You say you're not a low-light type? O.K., then you've got an extra fresh PX625 meter battery stored there for emergencies—they

apertures begin, so now you've got both in the same place. We also thought this system was considerably more confusing than the Japanese system of shutter speeds on the bottom and apertures (usually) along the right side. But after using the camera for a few days, we had to agree that the finder's bottom is just as good a place as any for these vital digits to appear.

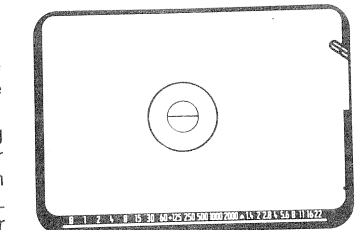
You might think that getting the apertures into the finder would be difficult to engineer without resorting to mirrors and other optical tricks. Not so, because Leitz had a cam up their sleeve—a cam dating back to the original non-through-lens-metering Leicaflex of 1964. This cam, present in all Leicaflex lenses, was used to program the apertures set on the lens into the metering system of your old Leicaflex. It now puts it into the viewfinder of your new SL 2. However, old Leicaflex lenses have only this one cam, while SL lenses have two; so you'll have to meter the former at stop-down aperture by pressing in the little preview button directly above the lens release lock.

As long as we're concentrating on lenses and mounts, let's clear up one grand bit of confusion here and now. All Leicaflex SL lenses will work properly on your SL 2 without any modifications, and all but three Leicaflex SL 2 lenses will do likewise on your present SL. Leitz has changed the mount a small bit on the SL 2, but the alteration consists solely of a slightly deeper flange to permit the mounting of a trio of Minolta-produced lenses which all have a slightly shorter back focus. The mounting flanges on these lenses are slightly wider, so they won't fit your Leicaflex SL unless you purposely machine the camera's lens mount to do so. The reason for this is quite simple—the SL's mirror would otherwise hit the rear of these lenses when they're focused at infinity—hardly a healthy state of affairs. So, if you're an enraged SL owner, you can either bite the bullet and buy a new SL 2 body so you can mount the 16mm f/2.8 Fisheye Elmarit-R, 24mm f/2.8 Elmarit-R, and 80-200mm f/4.5 Vario-Elmar-R, or you can machine your SL's lens mount and the leading edge of its mirror (if you can find someone adventurous enough to perform this delicate operation). In case you're wondering how Leitz avoided mirror crunch with these lenses without paring the mirror at all, let's just say the SL 2's mirror moves back a bit more before flipping upward than its immediate predecessor's mirror did.

Despite this host of minor changes, the SL 2 is its same old self in most respects, and that includes a size and weight variously described as "substantial" or "excessive," depending on your point of view. Actually, the SL 2 weighs in at 2 lb. 6 oz. with

the 50mm f/2 Summicron lens, almost exactly 1 oz. more than the SL. It's also 1 1/16 in. taller and 1/16 in. smaller in length, since its external swing-back lock has been relocated inside the body proper. While a 5 1/4 x 1 5/16 x 3 9/16-in. camera can hardly be described as compact, it's not cumbersome either. The Leicaflex has always been a well-balanced machine and the SL 2's more "grippable" contours only enhance this quality.

If the SL 2 excels in any one area, it's handling in the field. Whether or not you're a central microprism fan, you'll agree that its finder is brighter and clearer than most others, and snaps in and out of focus quite decisively. Eyeglass wearers will also be able to see the entire viewing image, the metering index and all readouts below the finder, provided they center their eyes properly behind the eyepiece. The



View through SL 2 shows f/stops, shutter speeds along bottom. When you push button, area under needle lights up.

entire focusing operation is aided considerably by the ultra-smooth, backlash-free focusing of the 50mm Summicron, and the central split-image rangefinder even handled a 400mm f/6.3 without partially blacking out (though, admittedly, you have to keep your eye centered very precisely to achieve this). Incidentally, the viewing screen is at an apparent distance of 2 meters, and the finder shows 94 percent (vertically) and 95 percent (horizontally) of the actual picture area recorded on film.

Also contributing to our favorable overall field impressions is the superb performance of the SL 2's shutter release, a Leitz tradition. It's smooth, predictable and light, without being too light, and it's complemented by a magnificently effective mirror-damping system. Indeed, the Leicaflex not only feels silky smooth, it sounds quieter than many other SLR's until you remove the lens, revealing a very conventional-sounding mirror clunk. In our opinion, it's the heavy cast-alloy body, acting as a highly-effective sound damper with the lens in place, which minimizes the noise that ordinarily reaches your ears.

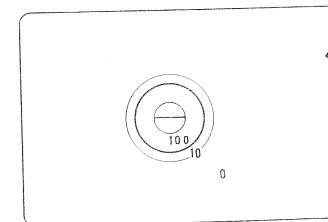
Incidentally, the carefully-thought-out shutter release and mirror design are not mere window dressing. We tried some "lots of luck" hand-held exposures at 1/15 and 1/4 sec., and

most of them showed very little, if any, camera shake. While this is possible with other SLR's, it's our considered opinion that the SL 2, by virtue of its fine balance and precision controls, is particularly suited to this delicate task.

As expected, the SL 2's shutter and metering systems were well up to the rest of the camera's high level of precision. The shutter was within 15 percent of absolute accuracy at all speeds including 1/2000 sec., a much better than average performance. The metering system provided virtually uniform underexposure of about 1/3 stop in high, medium and low-light ranges, leading to the slightly more saturated transparencies which we normally prefer. In any event, the low-light metering capability previously detailed borders on the spectacular—it is, in fact, unequalled by any other SLR not equipped with accessory low-light metering devices.

But even a camera as carefully designed and manufactured as the SL 2 isn't perfect. One feature we didn't like is out of place, we feel, on a camera of this price and caliber—a long-throw, non-ratcheted film-advance lever. While its shape has been improved, it still requires a 140° stroke to wind the film to the next frame after pulling the lever out 75° to operating position. And you can't accomplish the same thing in two or more shorter strokes as you can with many medium-priced SLR's. If the single stroke required were shorter, that would be one thing, but it isn't. It's one of the few necessary camera operations that verges on being clumsy.

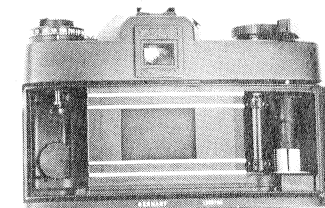
One feature that sparked some debate among our technical staff was the SL 2's system of focusing aids in the finder. Since it's a fixed pentaprism design, Leitz was faced with the standard dilemma of which combination and



Virtually all of SL 2's meter sensitivity is concentrated in central 7mm area of finder image.

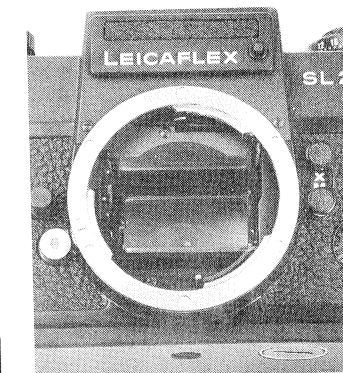
arrangement of rangefinders, microprisms, etc., would provide the best compromise. They chose a 2.8mm-diameter central split-image circle surrounded by a 2.1mm-wide microprism collar and a full-focusing Fresnel-lined screen. This should delight split-image fans without alienating microprism enthusiasts, who at least have an amply-dimensioned collar to focus with. However, the equal weight given to both focus-

ing systems may prove confusing at first to those reared on central microprisms, and that includes Leicaflex SL owners. One undebatable point was the superb craftsmanship built into Leitz's narrow-angle split-image prisms. As mentioned, they provide a viewable central rangefinder even with moderate-aperture lenses, but as a result they're physically thinner and must be ground with far greater precision.



The shutter's the same, but new receptacle holds cartridges in place more firmly. Guide rails are now "full length."

As you can see by perusing our lens test results, the 50mm f/2 Summicron proved to be a considerably better-than-average performer. While we can think of several lenses today of similar aperture and focal length which will equal its optical performance, few can match its ultra-smooth focusing which takes the lens to its closest focusing distance in a 270° turn of its 7/32-in.-wide knurled focusing collar.

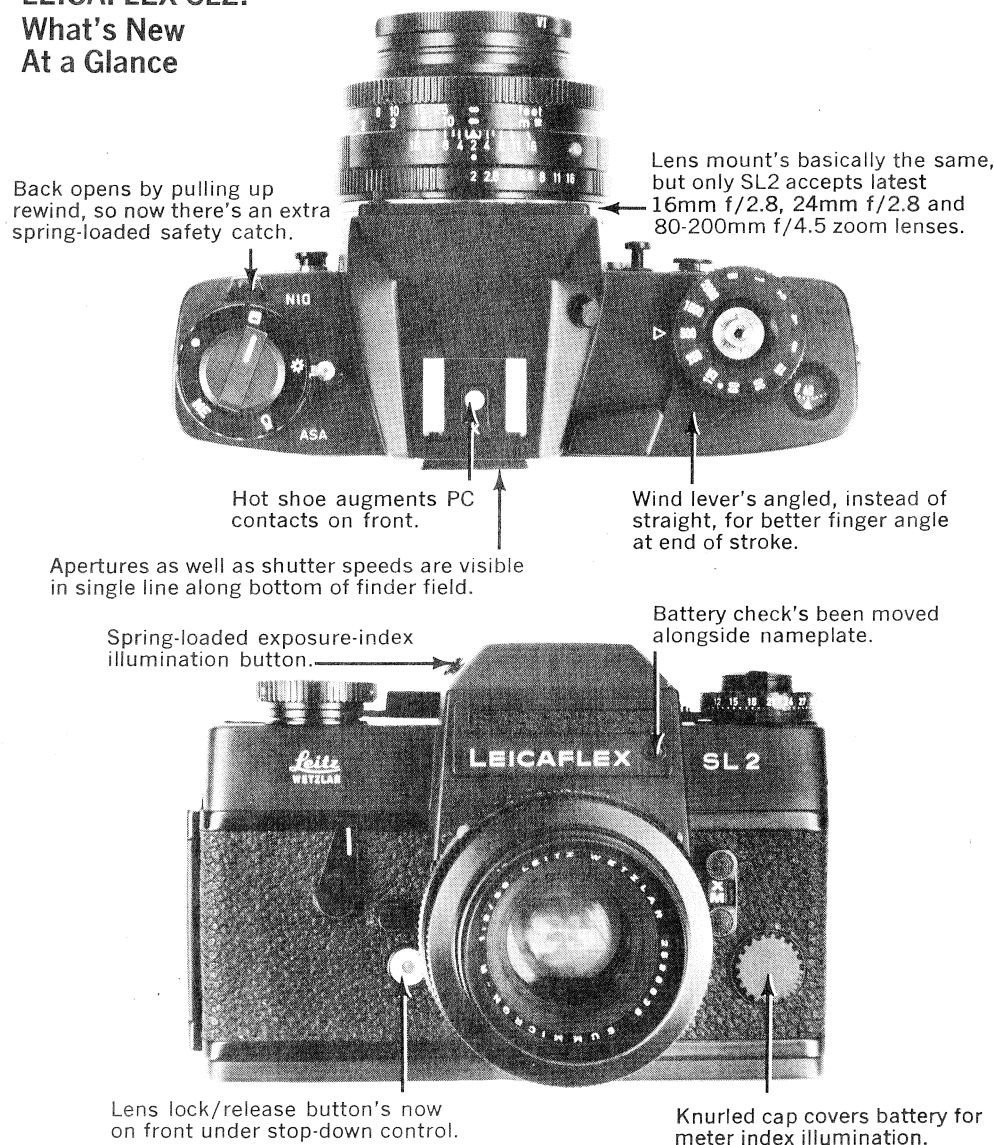


Basically unchanged, SL 2's body mount has wider flange to accept new Minolta-produced lens trio. Mirror flip also clears rear of these optics.

Also in a class by itself is the lens' beautifully machined nickel-chrome-on-brass lens mount. Our optical bench examination and test slide analysis revealed the following:

Central color fringing (causes image unsharpness with color fringing): On the optical bench we could see some reddish fringing at f/2, but the size of the pattern was quite small. The fringing was substantially reduced at f/2.8 and virtually gone at f/4. This excellent performance was confirmed in our test slides, which showed just a slight purplish fringing wide open and

LEICAFLEX SL2: What's New At a Glance



toward the right.

As long as we've swung the back open, we may as well examine a second new body casting therein, which features a receptacle designed to hold cartridges more securely in the proper orientation and new "full length" emulsion and film-edge guide rails above and below the film aperture. These not only improve

will find that using the SL 2 poses much of an enigma, but any camera-design buff going over the picture-taking controls will agree that the "minor" revisions certainly justify the new model designation. For example, an exposure-index illumination panel might have been a useless frill on the SL. But the SL 2's revised metering system is three stops

thought of that, too.

Perhaps the biggest of all the little revisions that found their way into the SL 2 is manifested in the finder. Along the bottom of the finder, just outside the picture area, is a long row of numbers where a short row consisting of only shutter speeds used to be. Yes, that's right; after the delta the shutter speeds stop and the

modern tests

no observable fringing at smaller apertures.

Central spherical aberration (causes focus shift and flare): In the lab, we observed only slight flare wide open and it was almost gone at f/2.8. Focus shift was a safe 0.05mm. In actual picture taking, we found spherical aberration to be very well-corrected, just as our optical bench observations had indicated. In out-of-focus images, no double line effect was observed.

Resolution Power

50mm f/2 Summicron-R No. 2588838 At 1:50 Magnification				
f/no.	Center Lines/mm	Corner Lines/mm		
2	V/Good	56	V/Good	35
2.8	V/Good	63	Good	45
4	Exc.	80	Good	50
5.6	V/Good	70	V/Good	56
8	V/Good	70	V/Good	56
11	V/Good	63	Exc.	56
16	V/Good	63	V/Good	50

Actual Focal Length: 50.9mm

Image Contrast

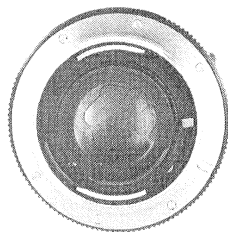
50mm f/2 Summicron-R No. 2588838 At 30 lines/mm				
f/no.	Center Percentage	Corner Percentage		
2	Low	47	Medium	32
2.8	Low	56	Low	36
4	Medium	68	High	61
5.6	Medium	77	High	66
8	Medium	70	High	65
11	High	68	High	58
16	Medium	61	High	53

Edge lateral color fringing (causes persistent image unsharpness, possible multiple colored images): On the optical bench, lateral color appeared very well controlled across the field, becoming noticeable only in the corners. Again, our analysis of test slides confirmed these observations. Only a very weak, thin red fringe was observed at the extreme corners.

Edge astigmatism (causes image streaks): Moderate astigmatism in the zonal area was observed on the optical bench at f/4 and at larger apertures. Towards the corners, astigmatism appeared rather well controlled at f/5.6, astigmatism was well under control across the entire field. Astigmatism was less prominent in our test slides, appearing only as a slight outward streak on distant subjects at the corners.

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matism was less prominent in our test slides, appearing only as a slight outward streak on distant subjects at the corners. **Edge coma** (causes flare): On the bench, we found moderate skew-ray flare wide open, but it was gone by f/4. Coma was quite slight at f/4, except in the extreme corners. The corners cleared up at f/5.6. In actual picture taking, we observed fairly strong flare wide open, but it disappeared by f/4.

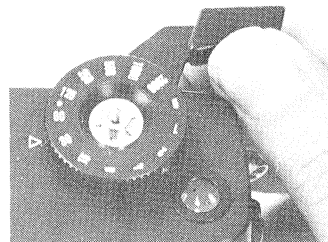


Top arc-shaped cam puts f/stop in finder; bottom one keys aperture into meter system.

Optical decentering (causes problems in all areas): The Summicron appeared to be perfectly centered.

Residual ghosts and flare: When shooting against a very bright light source, we found ghosting to be very slight. At f/2, flare was rather strong, but stopping down to f/4 virtually eliminated it.

Linear distortion: We measured about 1.0 percent barrel distortion—a normal amount for a lens of this focal length and speed.



Thumbs are less likely to slip off SL 2's new, angled film-advance lever.

Whatever your emotional reaction to the Leicaflex SL 2, you have to admit Leitz has done it again. They have created a supreme photographic instrument capable of the finest photographic performance—a durable

investment capable of a lifetime of picture taking under normal circumstances, or perhaps half a lifetime's worth of hard professional use. But the question persists: is it worth \$1,300?

Compared to the Leicaflex SL still listed in the Leitz catalogue at \$1,197 with the 50mm f/2 Summicron lens, we'd say unqualifiedly yes. But \$1,300 will still buy two mighty fine top-grade Japanese SLR's complete with normal lenses, or a creditably fine dark-room setup plus a good serviceable camera. There are some people, however, who must own the finest "because it's there," and others who'd sooner compromise design where necessary than give a millimeter in terms of ultimate mechanical precision. It is these uncompromising, well-heeled connoisseurs and professional photographers who will continue to comprise the bulk of Leicaflex owners.

135MM F/2.3 VIVITAR FOCUSES TO 3 FT.

MANUFACTURER'S SPECIFICATIONS: 135mm f/2.3 Vivitar Series 1 in mounts for Pentax, Canon, Nikon, Minolta, Olympus OM-1, Konica and similar cameras. **FEATURES:** Apertures to f/22, focusing to 3 ft., accepts 72mm accessories, built-in telescoping lens hood. **PRICE:** \$219.50.

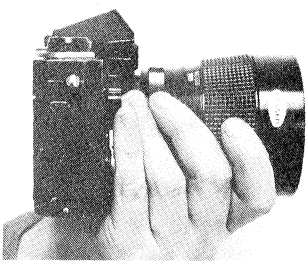
The chief claim to fame of the Vivitar Series 1, until now, has not been its optical excellence, but its scarcity. Announced in 1972 as the first trio of an entirely new, super lens series with super features, the now-famous first macrozoom 70-210mm f/3.5, the 135mm f/2.3 and the 200mm f/3 became conspicuous lenses because of their absence from the photo dealers' shelves. At last the 70-210mm made its appearance, and we're pleased now to announce the 135mm. To those made grumpy by the long wait, we can only say that this lens was worth the waiting.

It is perhaps the most convenient and versatile 135mm lens we have ever tested. What other similar lens weighing but 27 oz. (766 g) and measuring 4.7 in. (12 cm) in length provides an f/2.3 aperture and allows focusing close enough to move in for an eyes-only portrait?

The lens has an all-brilliant black finish, very large numerals, and a 2 1/2-in. diameter at the lens mount end. This flares 1 1/4 in. outwards to a maximum width of 3 1/2 in. The flaring part of the mount serves as the focusing ring, having a 1-in.-wide rubberized gripping band with a diamond-studded pattern grip. At the front of the lens is a 3/4-in.-wide, smooth working, built-in collapsible lens hood. As a fast-action, low-light or portrait lens, it would be very hard to fault. While the lens passed its practical use tests in our hands with flying

colors, let's see how well it did in the lab and in slide analysis. **Central color fringing** (causes image unsharpness with color fringing): A rather strong reddish fringing could be seen on the optical bench. It persisted to f/4, but was mostly gone by f/5.6. Although the fringing was bright, the size of the pattern was very small. Our pictures indicated the same fringing, but we felt the correction for it was good.

Central spherical aberration (causes focus shift and flare): A moderate amount of flare wide open was substantially gone by f/4. However, in our pictures we found flare stronger, and noted that it didn't disappear until f/5.6.



Large aperture, close-focusing Vivitar makes a compact, convenient handful.

Edge lateral color fringing (causes persistent image unsharpness, possible multiple colored images): On the bench, we noted a very slight greenish to purplish fringing from 3/4 of the way out to the corners. However, the fringe appeared to be very small—a fact borne out in our test pictures.

Edge astigmatism (causes image streaks): Very little astigmatism could be seen on the optical bench, even at maximum apertures. At the extreme corners, astigmatism was very slight at f/4 and almost all gone by f/5.6. From our slides we judged astigmatism to be very well-corrected.

Resolution Power

135mm f/2.3 Vivitar Series 1 No. 2822002 At 1:50 Magnification				
f/no.	Center Lines/mm	Corner Lines/mm		
2.3	Exc.	50	Exc.	35
2.8	Exc.	50	Exc.	40
4	V/Good	50	Exc.	45
5.6	Good	45	Exc.	40
8	V/Good	50	Exc.	40
11	Exc.	56	Exc.	45
16	Exc.	50	Exc.	45
22	V/Good	45	V/Good	35

Actual Focal Length: 133.7mm

Image Contrast

135mm f/2.3 Vivitar Series 1 No. 2822002 At 30 lines/mm				
f/no.	Center Percentage	Corner Percentage		
2.3	Low	38	Low	30
2.8	Low	44	Low	32
4	Low	49	Medium	49
5.6	Medium	57	High	50
8	Medium	63	Medium	49
11	Medium	58	Medium	48
16	Medium	56	Medium	43
22	Low	46	Low	38

matism to be very well-corrected. **Edge coma** (causes flare): Moderate skew-ray flare could be seen on the bench at f/2.3, but was mostly gone by f/3.5. Coma was well-controlled over the entire field—moderate at f/4 near the corners, and almost gone by f/5.6. Our test slides confirmed that coma was well corrected.

Optical decentering (causes problems in all areas): None observable.

Residual ghosts and flare: Only a normal amount present.

Linear distortion: We measured about one percent pincushion distortion—rather low for a lens of this focal length and speed.

With its fast handling and close-focusing capabilities, we found the new Vivitar to be an impressive performer.

ROKKOR-X WIDE ANGLES FOR MOST MINOLTA SLR'S

MANUFACTURER'S SPECIFICATIONS: 21mm f/2.8 MC W Rokkor-X for Minolta SR-T 100, 101, 102 and XK cameras. **FEATURES:** Apertures to f/16, focusing to 9 1/2 in., accepts 55mm accessories. **PRICE:** \$355.

28mm f/3.5 MC W Rokkor-X for cameras as above. FEATURES: Apertures to f/16, focusing to 2 ft., accepts 55mm accessories. **PRICE:** \$178.

28mm f/2.5 MC W Rokkor-X for cameras as above. FEATURES: Apertures to f/16, focusing to 21 in., accepts 55mm accessories. **PRICE:** \$239.

35mm f/2.8 MC W Rokkor-X for cameras as above. FEATURES: Apertures to f/16, focusing to 15 in., accepts 55mm accessories. **PRICE:** \$152.

35mm f/1.8 MC W Rokkor-X for cameras as above. FEATURES: Apertures to f/16, focusing to 12 in., accepts 55mm accessories. **PRICE:** \$233.

When Minolta announced "a family of 26 high-performance, computer-designed lenses bearing the Rokkor-X designation, for use with the new Minolta XK electronic single-lens-reflex," there was more than a little confusion among Minolta fans.

Were these brand new optical designs? Did the announcement mean, as it seemed to indicate, that the new lenses wouldn't fit and operate on old Minoltas? What is a Rokkor-X lens? And, new lenses or old, new mount or old, just how good were they?

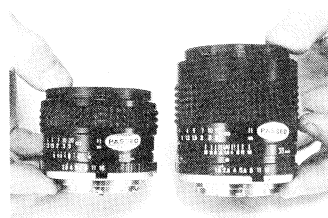
We promptly requested all the lenses for testing, and lo, they began to arrive in large batches.

First, some general observations. The new Rokkor-X line of lenses is basically the older MC Rokkor line with the same mount, fitting the same cameras and having the same optical makeup (except for new lenses added to the line). The older MC lenses will work perfectly on the new XK camera, and the Rokkor-X lenses

will work perfectly on older Minoltas this side of the SR-7. In other words, all lenses for the XK, 100, 101, 102, the overseas-designated 303 and Super (which are the same as the 102), and the forthcoming XE-7 automatic are interchangeable between camera bodies. Secondly, the new Rokkor-X lenses do not have any special additional features or characteristics which would make them infinitely superior to the MC lenses. All offer the same basic operation features. Why then the new X-designation? This stands primarily for exterior cosmetic changes. There are four: 1) The all-metal knurling of the focusing rings has been replaced with a much more convenient rubberized, diamond-pattern strip; 2) The lens-attaching lineup dot is now a raised hemisphere for easy fitting by touch; 3) Each lens has the focal length engraved in orange on the lens barrel near the mount for quick recognition; 4) The diaphragm-setting ring is now all black with highly legible white-on-black numerals—very easy to see in the finders of the SR-T 102 and XK cameras.

We have been testing Minolta Rokkor MC lenses in dribs and drabs, as they have become available, ever since the SR-T 101 cameras were introduced in 1966. Some of our tests go far back when our evaluations and procedures were much more primitive. We, therefore, now intend to catch up on Rokkoriana, X-style, by testing the entire line except for those lenses which we tested completely quite recently.

This will be wide-angle month. In ensuing months, we will tackle the moderate teles and long teles, plus some of the specialized lenses. A quick glance at the total list of Minolta lenses will reveal the Rokkor game plan. For the most popular focal lengths, two alternate lenses are offered: a high-speed, fairly bulky and somewhat expensive lens, and a



Can there really be much difference in the size of 35mm lenses? And how! See text as to why one is big and one is small.

moderate-speed, very compact, lower-priced lens. Hence we have two distinct 28mm lenses, with the nine-element f/2.5 running some 3 1/4 oz. heavier and a little over 1/2 in. longer than the seven-element f/3.5. The remarkably fast eight-element 35mm f/1.8 lens is some 6 oz.

heavier and nearly an inch longer than the seven-element f/2.8 version. The 12-element 21mm f/2.8 is very fast and on the larger side at 1 lb. 2 oz. and about 2 1/2 in., so we wouldn't at all be surprised at a 20 or 21mm f/4 (or so) lens joining the party in the future. (We have already tested the 24mm f/2.8 MC Rokkor in "Modern Tests," June 1974.) All lenses are extremely well finished in satin black, with large easy-to-see green and white numerals, click half-stop settings and smooth focusing mounts.

Let's take a look at the 21mm f/2.8 MC W Rokkor-X first.

Central color fringing (causes image unsharpness with color fringing): On the optical bench, some reddish to bluish fringing could be seen at full aperture, but was mostly gone by f/5.6. In actual picture taking, a slight purple fringe was visible, but it was less than the normal expected amount.

Resolution Power

21mm f/2.8 Rokkor-X No. 1615547 At 1:48 Magnification				
f/no.	Center Lines/mm	Corner Lines/mm		
2.8	Exc.	60	Good	30
4	Exc.	68	V/Good	34
5.6	Exc.	68	Exc.	38
8	Exc.	68	Exc.	38
11	Exc.	68	Exc.	43
16	Exc.	60	Exc.	43

Actual Focal Length: 21.5mm

Image Contrast

21mm f/2.8 Rokkor-X No. 1615547 At 30 lines/mm				
f/no.	Center Percentage	Corner Percentage		
2.8	Medium	53	High	56
4	High	66	High	59
5.6	High	75	High	72
8	High	76	High	78
11	High	70	High	75
16	High	65	High	73

Central spherical aberration (causes focus shift and flare): In the lab we could detect a very slight flare wide open that was gone by f/4—an excellent performance. In our slides the flare was not strong either.

Edge lateral color fringing (causes persistent image unsharpness, possible multiple colored images): Examination in our lab showed very well-controlled lateral color which, however, did manifest itself in actual pictures as a rather strong purple fringe. However, it wasn't so strong as to produce blurred or double images, which are rather common with extremely short wide-angle lenses of this type.

Edge coma (causes flare): A relatively small skew-ray flare could be seen in the lab at full aperture. However, coma was moderate across the field and well under control by f/5.6. Our color slides duplicated almost exactly what we had seen in our lab tests.

Edge astigmatism (causes image

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streaks): While there appeared to be substantial astigmatism visible on the optical bench from about halfway out to the corners, it was well under control by f/8 and, in pictures, appeared to be extremely low throughout.

Optical decentering (causes problems in all areas): Only a very slight, virtually insignificant amount was detected in the lab. **Residual ghosts and flare:** We found these to be very low.

Linear distortion: Pincushion-type distortion was measured as 1.5 percent, certainly acceptable in a true wide angle of such a short focal length.

Now let's take a look at the two 28mm lenses. At the outset, you might conclude that the faster f/2.5 is automatically a superior optic to the f/3.5. However, in our opinion, this might not hold true in the general run of the lenses. The particular f/3.5 which we tested had greater decentering problems than would normally be expected, which, we felt, was the reason its performance was inferior to the f/2.5. Let's look at the f/3.5 we examined:

Resolution Power

28mm f/3.5 Rokkor-X No. 1716532 At 1:51 Magnification				
f/no.	Center Lines/mm	Corner Lines/mm		
3.5	Exc.	57	Accept.	26
5.6	Exc.	57	Accept.	26
8	V/Good	57	Good	32
11	Exc.	57	V/Good	36
16	V/Good	51	V/Good	36

Actual Focal Length: 28.3mm

Image Contrast

28mm f/3.5 Rokkor-X No. 1716532 At 30 lines/mm				
f/no.	Center Percentage	Corner Percentage		
3.5	Low	44	High	53
5.6	Medium	59	High	58
8	Low	61	High	58
11	Medium	58	High	52
16	Low	48	High	46

Central color fringing: On the optical bench the fringe pattern was seen to be rather small, but the image lacked a sharp central core at full aperture (due, we think, to astigmatism caused by decentering, as already mentioned). The fringing was almost gone by f/5.6. The fringing was also visible in our slides but, again, disappeared by f/5.6. **Central spherical aberration:** Moderate flare was observed in the lab and slides at large apertures, disappearing by f/5.6. **Edge lateral color fringing:** This appeared to be moderate halfway

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to the corners, but became substantial beyond this. In our slides we could detect fairly strong red and green fringing at the picture corners.

Edge coma: Some skew-ray flare could be seen wide open. At $f/5.6$ the comatic pattern was relatively small, but the "wings" were fairly bright. Coma was under control by $f/8$ except in the extreme corners, which required $f/11$. Luckily, this gloomy picture was not borne out in our slides, in which flare was well-controlled.

Edge astigmatism: Moderate to large astigmatism could be seen on the optical bench across the entire field, requiring $f/11$ to bring it under control in the outer one-third of the picture area. While our slides did not show this up, we did feel that, in specific picture-taking situations, this astigmatism, again due to decentering, might indeed prove to be a problem.

Optical decentering: Substantial decentering was seen, as already described.

Residual ghosts and flare: Very well-controlled across the field.

Linear distortion: Quite low, only 0.5 percent, and of barrel type.

Now we turn to the 28mm $f/2.5$, a superior lens.

Central color fringing: Bright, but very compact, reddish fringing could be seen on the optical bench at full aperture. This was reduced at $f/4$ and gone by $f/5.6$. We were quite pleased with the correction in our actual slides.

Central spherical aberration: A slight flare could be seen wide open, but it was almost gone by $f/4$. We judged the amount in our pictures to be normal for a wide-angle lens of this speed.

Edge lateral color fringing: Although on the optical bench this seemed well-controlled, in our slides this appeared to be rather large

Resolution Power

28mm $f/2.5$ Rokkor-X No. 1716578 At 1:50 Magnification				
f/no.	Center Lines/mm		Corner Lines/mm	
2.5	Exc.	63	V/Good	35
4	Exc.	70	Exc.	40
5.6	Exc.	70	Exc.	50
8	Exc.	70	Exc.	50
11	Exc.	63	Exc.	50
16	Exc.	63	Exc.	50
Actual Focal Length: 28.6mm				

Image Contrast

28mm $f/2.5$ Rokkor-X No. 1716578 At 30 lines/mm				
f/no.	Center Percentage		Corner Percentage	
2.5	Low	50	High	47
4	Medium	62	High	54
5.6	Medium	66	High	65
8	Medium	65	High	68
11	High	64	High	66
16	Medium	57	High	59

with inner purple and outer blue fringing, both of which can affect image sharpness.

Edge coma: The skew-ray flare was quite well-controlled at $f/2.5$; the comatic pattern was quite small; and the image had a sharp central core across the field. In our pictures, the skew-ray flare was visible wide open, but the amount was quite small.

Edge astigmatism: It became moderate

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halfway to the corners and then persisted. On the bench it appeared mostly under control by $f/8$, but required $f/11$ in the extreme corners. In our pictures there was little evidence of this.

Optical decentering: There was a slight amount detected.

Residual ghosts and flare: Well-controlled.

Linear distortion: We found one percent of the barrel type—well within limits.

In the 35mm focal length, let's look at the slower $f/2.8$ first.

Central color fringing: Reddish to greenish fringing was visible on the optical bench at $f/2.8$, with rather bright fringes having a small pattern. Fringing was still bright at $f/4$ but gone by $f/5.6$. We were, however, very pleased with our slides in terms of absence from annoying visible fringing.

Central spherical aberration: Slight flare which could be seen at $f/2.8$, was almost gone by $f/4$. We could see it rather well in our slides, but it did disappear by $f/4$.

Edge lateral color fringing: On the optical bench it appeared very well-controlled across the field right to the corners. In our pictures we could see only a slight purple fringe at the extreme corners.

Edge coma: Substantial skew-ray flare was visible wide open, but was mostly gone by $f/$

Resolution Power

35mm $f/2.8$ Rokkor-X No. 4700746 At 1:50 Magnification				
f/no.	Center Lines/mm		Corner Lines/mm	
2.8	Exc.	63	V/Good	35
4	Exc.	70	V/Good	35
5.6	Exc.	63	Exc.	45
8	Exc.	70	Exc.	50
11	Exc.	63	Exc.	56
16	Exc.	56	Exc.	50
Actual Focal Length: 34.2mm				

Image Contrast

35mm $f/2.8$ Rokkor-X No. 4700746 At 30 lines/mm				
f/no.	Center Percentage		Corner Percentage	
2.8	Low	49	Low	28
4	Medium	63	High	40
5.6	Medium	70	Medium	49
8	Medium	69	High	62
11	High	62	High	60
16	Medium	58	High	50

4. The comatic pattern was moderate near the corners at $f/4$, and the coma was basically gone at $f/5.6$. We definitely could see the coma results in our pictures at large apertures, but this was not seen below $f/5.6$.

Edge astigmatism: This was well-controlled across the entire field, both in the lab and in the slides we shot. Any that was present disappeared by $f/5.6$.

Optical decentering: None observable.

Residual ghosts and flare: Well-controlled.

Linear distortion: Acceptable amount of barrel type (about 1.5 percent).

Now we come to the 35mm $f/1.8$.

Central color fringing: Compact (but bright) reddish fringing at $f/1.8$ was visible on the optical bench. This was reduced by $f/4$ and gone by $f/5.6$. From our actual picture-taking results we judged central fringing to be very well-controlled.

Central spherical aberration: Moderate

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flare could be seen wide open, but this was substantially reduced by $f/2.8$ and gone by $f/4$. In our pictures the flare was rather on the strong side, but mostly disappeared by $f/4$ and was absent at smaller apertures.

Edge lateral color fringing: This was very well-controlled across the entire field, both in the lab tests and in our practical examination of field test results.

Edge coma: Moderate skew-ray flare could be detected wide open. At $f/2.8$, the size of the comatic pattern was small, but the image didn't seem to have a sharp central core. At $f/4$ the image had a sharp core, and coma was minimal. In picture taking the flare appeared strong at $f/1.8$, but was almost completely gone by $f/4$.

Edge astigmatism: Moderate astigmatism, which was observable wide open but was reduced by $f/2.8$ and gone by $f/4$, appeared well-controlled in our pictures.

Optical decentering: None was observable. However, we judged wide-open flare (which appeared asymmetrical and disappeared by $f/2.8$) to be caused by defective polishing of an edge in one or more ele-

Resolution Power

35mm f/1.8 Rokkor-X No. 1615558 At 1:50 Magnification				
f/no.	Center Lines/mm		Corner Lines/mm	
1.8	Exc.	50	Exc.	35
2.8	Exc.	56	Exc.	40
4	Good	50	Exc.	45
5.6	Good	50	Exc.	50
8	Exc.	63	Exc.	50
11	Exc.	63	Exc.	50
16	Exc.	63	Exc.	45
Actual Focal Length: 34.9mm				

Image Contrast

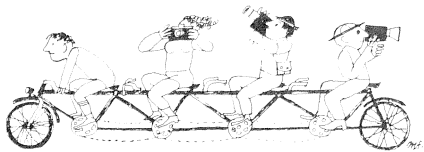
35mm f/1.8 Rokkor-X No. 1615558 At 30 lines/mm				
f/no.	Center Percentage		Corner Percentage	
1.8	Low	32	Medium	30
2.8	Medium	53	High	39
4	Medium	71	High	62
5.6	High	76	High	65
8	High	78	High	63
11	High	69	High	58
16	High	66	High	55

ments, resulting in a nonspherical surface. This caused the slight image softness wide open, but produced no problems when the lens was closed down a bit.

Residual ghosts and flare: Well-controlled.

Linear distortion: Quite low at 0.5 percent (of barrel type).

As a professional-quality group of lenses, the Rokkor-X's stand high. We will be looking forward to the rest.—THE END



1974 Index Available

A condensed version of MODERN's 1974 index is available to those who send in a stamped, legal-size, self-addressed envelope to Index Editor, Modern Photography, 130 East 59th St., New York, N.Y. 10022.