

LSRs: more reach than you think

By NORMAN ROTHSCHILD



An LSR (leaf shutter reflex camera) is one in which the shutter blades are between lens elements, or directly behind interchangeable lenses. It is a unique, versatile instrument. For example, LSRs are generally fully synchronized for flash—both conventional and electronic—at all speeds up to 1/500. By contrast, most focal-plane shutters are (with one or two exceptions) generally synched for electronic flash at speeds up to only 1/60.

With electronic flash and leaf shutters, there is the possibility of controlling the ratio of flash to existing light by varying the shutter speed alone, since exposure time for the electronic flash is controlled not by the shutter, but by the flash itself.

Another virtue of the leaf shutter is that it provides even exposure over the entire frame, thanks to its expanding-circle action. A focal plane shutter's slit, because of its acceleration and deceleration as it crosses in front of the film, can cause unevenness in exposure if the shutter is not properly adjusted.

In short, the leaf shutter reflex camera has many virtues. But, as the old saying goes, "You've got to take the bitter with the better." There are a number of drawbacks inherent in the LSR. Fortunately, you can easily overcome them; let's point out some LSR problems and how you can solve them.

First, let's explore the different kinds of LSRs. The most limited (whose great virtue is generally a surprisingly low price) is the one without lens interchangeability. Even so, it offers plenty of room for photographic expression and exploration, by means of close-up, mildly wide-angle, and telephoto attachments, prism monoculars, and even slide duplicators added to the camera.

More versatile is the LSR that has interchangeable front lens components. In these, the rear element stays behind the shutter, and the front section is interchanged to effect a change in focal length. Such cameras use the same type of accessories outlined for non-interchangeable lens LSRs.

The largest and most versatile group of LSRs have completely interchangeable lenses mounted in front of the shutter. These also accept attachments like those mentioned previously. But, in addition, focal length extenders are available for the Beseler Topcon Auto-100, Kodak Retina Reflex S, III and IV, Kodak Instamatic Reflex, and Voigtlander Bessamatic and Ultramatic.

In general, LSRs with fully interchangeable, front-of-the-shutter lenses cannot take the conventional extension tubes or bellows. However, a very short

extension is available for Kodak Instamatic and Retina Reflexes.

A problem shared by interchangeable-component and front-of-the-shutter, interchangeable-lens LSRs, is the inability of their lenses to focus really close. For example, the 85-mm lens for a well known LSR focuses to 6 ft.; a 135-mm lens for this same camera goes no closer than 16 ft. These distances may be fine for architectural, sports, and scenic shooting. But they won't allow you to make a frame-filling, head-and-shoulder portrait directly on the film.

The cause of this liability in interchangeable-front-component cameras is that the focusing mechanism is adequate only for the normal and wide angle combinations. It simply is not long enough, when tele combinations are used, to allow them to focus as close as you often want to. Any attempt to move the lens forward as a unit to get adequately short focusing distances can result in cutting off part of the image by the narrow shutter opening.

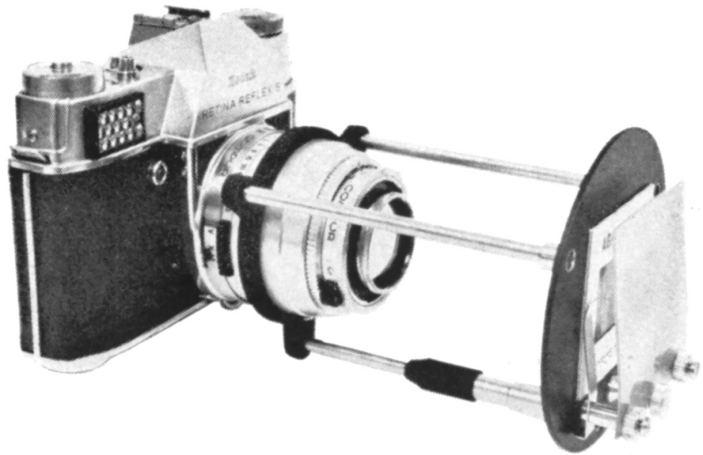
The Beseler Topcon Auto-100 and Kowa SETR and SER cameras, in which the front elements are moved for focusing (rather than the entire lens as a unit), offer a closer approach. In the Topcon, the 100-mm lens focuses to 5 ft. and the 135-mm to 5 1/2 ft. For the Kowa SER and SETR, the 100-mm lens focuses to 4 ft. and the 135-mm to 6 ft. But, although these figures are good, they don't compare with the close-focusing capabilities of focal-plane shutter SLRs, and you won't at present see macro lenses advertised for LSRs.

If you own a Voigtlander Bessamatic or Ultramatic camera, the 36→82-mm *f*/2.8 zoom lens is an answer to the close-focusing problem. This optic focuses to about four feet and even closer when used with Tiffen fractional diopter or Spiratone FocusXtender supplementary lens attachments.

Can you overcome the focusing limitations imposed by LSRs? Happily, yes. There are several ways to do so.

One of the simplest is to use "plus" (positive, or +) supplementary lenses. These fit onto your lens like a filter, and require no recalculation of exposure. You'll generally find them designated as +1/4, +1/2, +1, +2, +3, and so forth. The larger the number, the closer you can get and the larger the resulting image.

The plus number comes from the time when lenses of this type were chiefly bought from eyeglass makers. It is equal to the reciprocal of the focal length of the supplementary. Thus a +1/4 has a focal length of four meters,



Kodak 1:1 Copy Kit serves for ultra close-ups and slide copying. It consists of a short extension and close-up supplementary lens, fits Retina Reflex S, III, IV.



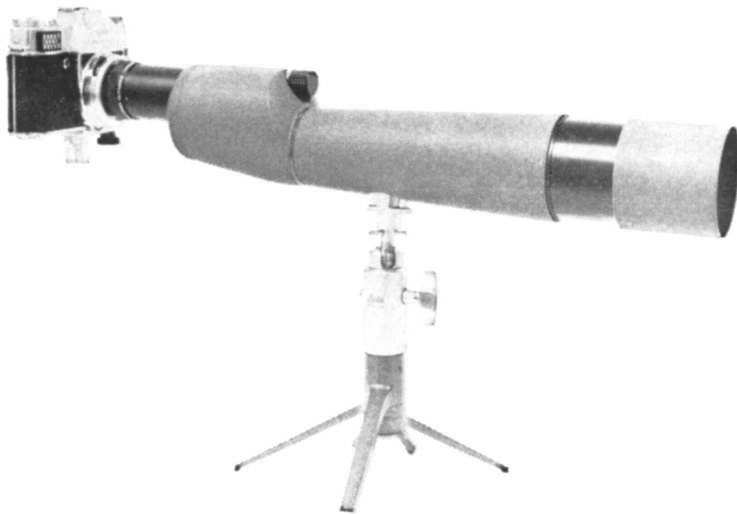
Slide copying is easy with Lectro duplicator (foreground), which has its own optics, or with a type that works with a +20 supplementary, as shown behind it.



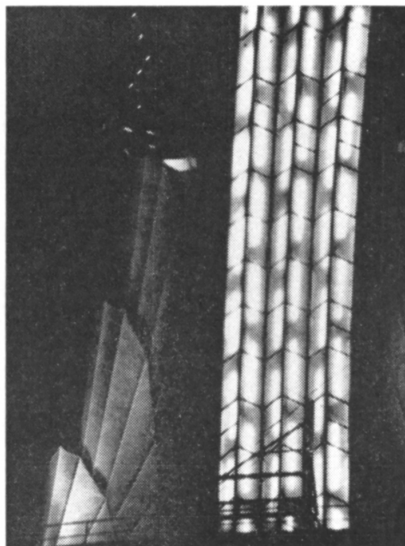
Life-size images may be made with Contaflex camera by switching front component of normal lens with Pro-Tessar M 1:1 Accessory. Metering is unaffected.



Telephoto and wide-angle shots can be made even with LSR's lacking interchangeable lens, by using supplementary attachments (foreground) or a photo monocular.



Extreme reach is possible with monoculars. The Bushnell Spacemaster takes the place of the camera's own lens, has a focal length range from 750- to 3000-mm.



Possibilities opened by monocular is dramatized by this comparison pair. Left photo was taken with a 50-mm lens, right one with Spacemaster set to 750-mm.

a +2 a focal length of a half meter, etc.

Also, the focal length of the supplementary is the working distance for any prime lens on which it is used, when that lens is set at infinity. Thus, a +1 supplementary requires a working distance of one meter or 39.37 inches, a +1/2 a working distance of two meters, or 78.74 inches, and so forth.

You may at this point be puzzled as to how strong a close-up lens to buy. In general, those designated +1/4 and +1/2 are too weak to have much effect on normal lenses. They are, however, very useful on tele lenses to make tightly cropped portrait heads or other small, close-in subjects.

For example with a +1/4-diopter attachment, focusing distances of 25, 15, 9 and 5 1/2 ft. become about 8 3/4, 6 3/4, 5 1/2, and 3 3/4 feet respectively. These low-power supplementaries are sold as FocusXtenders by Spiratone Inc., 135-06 Northern Blvd., Flushing, N.Y. 11354, and as Tiffen Fractional Diopter Closeup Lenses by Tiffen Optical Co., 71 Jane Street, Roslyn Heights, N.Y.

In more common use are close-up supplementary lenses ranging from +1 to about +6. Some companies offering these for their own cameras either have their own designations or mark them with a focal length instead of diopters.

You don't necessarily need to buy each power or strength separately. You can combine two and even three lenses to make up a more powerful unit. Adding a +1 to a +2 makes a +3, for example. For general work it's nice to have a set consisting of a +1, +2, and +3 lenses. With these you can make combinations up to +6. Lenses can be combined either by screwing custom fitted supplementaries together or by using appropriate series size retaining rings to hold them in place.

Elegant relatives of the supplementary close-up lenses are variable close-up lenses such as the Tiffen Vari-Close-up Lens, Spiratone Spiralite Proxivar, Sterling Howard Zoom Close-up lens, and others. These give a continuously variable diopter range from about +1 to +8, by changing the separation between the two elements of which these are generally composed. Variable close-up attachments will work best on the normal lenses of your LSR.

While a range of +1 to +6 seems adequate for most work, if you want to photograph extremely small objects, you may wish to get lenses as strong as +10 or even +20. There are not many who make these; the +10 is offered mainly by Tiffen and Spiratone, the +20 Mac-

rostigmat (a corrected two-element lens) is offered *only* by Spiratone. With a +10 supplementary mounted on a 50-mm lens set at infinity, image size is about half life-size.

The prospect of making 1:1 or full life-size images is even more exhilarating, promising, among other things, the possibility of slide duplication. The +20 Spiratone Macrostigmat allows the making of approximately life-size images when mounted on a 45- or 50-mm lens. Like other supplementary lenses, it fits your camera lens like a filter, requires no increase in exposure, and can be used with any 35-mm SLR.

If you own a Kodak Retina Reflex S, III or IV, you can use the Kodak 1:1 Copy Kit. This utilizes a short extension and a strong supplementary lens for close focusing. It comes complete with a slide copying attachment. For Zeiss Contaflex III, IV, Super, Super B and Super BC, there is the Zeiss Pro-Tessar "M", 1:1 that can be interchanged with the normal front lens element.

So far I've been mentioning only normal lenses in connection with close-up supplementaries. However, the longer the focal length of the prime lens, the larger the image magnification at a given working distance. And the working distance for a given supplementary remains substantially the same, regardless of the focal length lens on which it is placed. Thus a +2 supplementary on a 50-mm lens might produce an image 1/4 in. across at its 19.68 inch working distance. With a 100-mm lens, the same supplementary and working distance will produce an image size 1/2-inch across. You can see that image size remains proportional to the focal length of lens, even when a supplementary lens is used in the optical system.

Before leaving the close-up data, there's the Kodak Lens Spacer for use with the Kodak Instamatic Reflex Camera. This unit (which can also be used with Kodak Retina Reflexes II, IV, and S) is actually a short extension tube. It's usable in connection with various Retina and Instamatic Reflex lenses for image magnifications up to 1:1.6. When used with the Instamatic Reflex, exposure automation is maintained.

Now, a word about how to get the sharpest images when using supplementaries. It's no secret that they *do* reduce definition somewhat. Involved are the strength of the supplementary, the focal length of lens on which it is used, and the quality and type of both supplementary and original lenses.

Fractional (*continued on page 72*)



Telephoto extenders, available for some LSR's, fit between lens and its shutter housing. It doubles the lens's focal length, without altering its minimum focusing distance, thus permitting tighter framing. Model shown on left is the Samigon, the one on right, Accura. Similar units are also available from other suppliers.



Interchangeable front components for Rolleiflex SL26 range from 28- to 80-mm. Shown left to right are the 80-mm f/4, 28-mm f/2.8, and 40-mm f/2.8, also on camera.

ROTHSCHILD'S LSR GUIDE

	WITH FULLY INTER-CHANGEABLE LENSES	WITH INTER-CHANGEABLE COMPONENTS	WITH NON-INTER-CHANGEABLE LENSES
35-mm	Retina Reflex S, III, IV Instamatic Reflex Voigtländer Bessamatic and Ultramatic Edixa Electronica Beseler Topcon Auto-100 Kowa SER and SETR Pentina Reflex Braun Paxette Agfalex IV and V Agfa Selectaflex	Retina Reflex (earliest model) Contaflex Fujicorex Fujicorex II	Mamiya Autolux Cavalier Reflex Kowa and Kowa H Nikkorex 35/2 Nikkorex Auto-35 Agfalex I, II, III Mamiya/Sekor 528TL Contaflex (early) Mamiya Family
126	Instamatic Reflex Ricoh Contaflex 160*	Rollei SL26	Keystone 1020
127			Komaflex S
Special Types			Nikkorex Zoom (has 43-85-mm f/3.5 zoom lens built in.)

* (This is not a leaf-shutter reflex, but is included because its longer lenses can benefit from the use of +1/2 and +3/4 supplementary lenses.)

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diopter, or FocusXtender supplementaries up to +1/2 generally require no more than closing down one-half to one stop for definition to be restored. With supplementaries from +3/4 to about +3, one to two stops below maximum should do the trick; in the range from +4 to about +6, stopping down at least three stops is generally mandatory.

Stronger supplementaries to +10 will require using the smallest *f*-stop to get good definition. And, of course, when you need maximum depth of field, even with weaker supplementaries, you will have to close down to the smallest aperture, even though the definition may be less than optimum. These aperture suggestions should be used only as a guide, since the definition you get will depend to some extent on the quality of the lens you are using.

Keep in mind, however, that it's best not to use a simple supplementary on a prime lens whose focal length is more than half that of the supplementary. Thus, +10 supplementary, whose focal length is about 100-mm, should be used on a lens no longer than 50-mm. With the +20 Macrostigmat, a compound lens, this rule does not apply so strictly.

The Spiratone Macrostigmat or the Lectro Slide Duplicator (Electron Development Co., Indianapolis, Ind.) make 1:1 duplicates of 35-mm originals possible with your LSR. You can also make them if you use a Pro-Tessar "M" 1:1 on the Contaflex, or if you have a Kodak 1:1 Copying Kit for your Retina Reflex.

In the case of the Pro-tessar M, 1:1, or when Macrostigmat is used without further accessories, you'll

need to provide both a slide holder and a light source. This can be either a home-made lightbox or a commercially made slide holder and light source such as the Aimes-Hershey Slide Copier. The latter has holders for 35-mm or 2 1/4-inch square mounted slides and low power, cool focusing lights; you can use either a flood or electronic flash with it as the exposing light. Data on this unit may be obtained from Aimes-Hershey, Box 73, Lockport, Ill. 60441.

One good plan, when using the +20 Spiratone Macrostigmat, is to use a Spiratone MM, Argraph/Samigon, or Miranda Slide Duplicator with it. These devices hold a 2x2 slide, incorporate a diffusion plate to help provide even light, and allow you to move the slide back and forth on the optical axis for greatest sharpness. All you do is to provide a light source. For daylight-type films, this can be an electronic flash unit. Do not, however use daylight itself. For slide duping, its color is too variable. Also usable are 3400 and 3200 K lamps with Type A and Type B tungsten films, respectively.

Control image with attachments

As a further means of image control mild telephoto and wide angle attachments have been available for LSRs for a long time. In some cases, the maker of the camera himself sells these in a configuration specially designed for his own equipment. And there are, of course, a number of independent suppliers of wide-angle and tele-attachments.

Wide-angle and tele sets from the independent manufacturers are generally offered as Series 6, 7, or 8 to fit filter adapters of those sizes. It's a good idea, when you must choose between two adapter-ring sizes, to choose the larger. Too small an attachment can lead to vignetting or darkening of the picture corners.

Although units vary according to the manufacturer, on the average tele attachments convert a 45-mm lens to about 70-mm and a 50-mm lens to about 75-mm. Wide-angle attachments convert a 45-mm lens to about 37-mm and a 50-mm lens to about 40-mm.

But mildly wide-angle and tele attachments are not the limit of control for noninterchangeable lens LSRs. Focal lengths of 350-mm and better can be yours with one of the prism photo monoculars offered by Zeiss Ikon Voigtlander, Spiratone, Bushnell, Argraph/Samigon, and others. The Zeiss Ikon monocular screws directly into the 50-mm Tessar *f*/2.8 of the Contaflex camera for which it

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was designed. It's an 8X unit, converting the Tessar into a 400-mm $f/16$ optic.

The Spiratone and Samigon photo monoculars are 7X units, converting a 50-mm lens to about 350-mm. Maximum apertures are about $f/16$. All these units, being fairly long and not too fast, require a tripod for really sharp results.

For LSRs that have interchangeable front lenses or components, lenses from 28-mm to 200-mm (depending on the camera) are available. There is even a 350-mm lens for Voigtlander Bessamatic and Ultramatic cameras. Fortunately, the problem mentioned earlier—the inability of long lenses for such cameras to focus close enough—can be solved in most cases by the use of fractional diopter or FocusXtender supplementaries.

But with some interchangeable lens LSRs, there is another way of making the image larger, without having to move closer to the subject. This is to use converters such as the Samigon Auto Tele Plus or Spiratone TeleXtender that double the focal length. At this time, these are available in models to fit Kodak Retina Reflexes S, III and IV; Kodak Instamatic Reflex; Voigtlander Bessamatic and Ultramatic and Topcon Auto-100 cameras.

Experiment with converters

Let me give you some examples of what these can do. With the Retina Reflex, the 85-mm $f/4$ lens that focuses to 6 feet becomes a 170-mm $f/8$ lens focusing to 6 ft. For the Topcon Auto-100, the 100-mm $f/4$ lens that focuses to 5 ft is converted to a 200-mm $f/8$ lens focusing to 5 ft.

While focal-length converters are generally recommended for use with tele objectives, you might try them *experimentally* with normal or even wide angle objectives.

Super telephoto effects are obtainable if you mount a Bushnell Spacemaster or its equivalent on your camera. Its focal length range is from a long 750-mm $f/12.7$ to an astounding 3000-mm $f/50$. In addition to focal plane shutter reflexes, the Spacemaster will also fit the Retina Reflex, Bessamatic, Ultramatic, Braun Paxette, and the Topcon Auto-100 with the proper adapter.

The Spacemaster is a prism monocular specially corrected for photographic use. It mounts in place of the camera lens, acting as a prime lens and not as a supplementary.

As you can see, there are more ways than one to extend the performance of an LSR and fit it for more creative photography. But real experi-

mentation will never be carried out by a single technique, but combining two or more techniques can give you a fresh look at things. For example, we know that you can get a 1:1 copy using a +20 Macrostigmat on a 50-mm lens. It's possible, however, to obtain a 2:1 image magnification by placing a focal-length converter on your Retina, Instamatic, Bessamatic, Ultramatic or Topcon Auto-100 reflex camera, *in addition to* the Macrostigmat device.

When using the Retina 1:1 Copying Kit a 2:1 image magnification is also obtainable, by adding the Samigon or Spiratone focal-length converter. In both cases, however, I found that a very small stop was needed to get good definition. It's also possible to use a focal length converter in addition to close-up supplementaries to get big images on film with an LSR. One caution here: combining supplementaries and focal length converters in the same operation can lead to serious definition loss.

More power, less sharpness

I've found that when employing tele converters this way, supplementaries not stronger than about +3 should be used. Even then, you may get sharp pictures only at the smallest aperture. So, pursue all oddball techniques whether outlined here or elsewhere in the spirit of exploration and fun. They may give you failure, but may also give you a smash success and a new way of seeing.

Finally, let's not forget that LSRs also give top-drawer performance with more usual devices such as filters and polarizers—not to mention such things as multiple-image prisms, diffraction gratings and even fish-eye attachments.

By now I hope you've become convinced that, properly armed, your LSR can give the focal-plane SLRs real competition.—