

cusing ring, but few will miss this feature.

Optical Bench Analysis: On axis, we detected very slight coma with a touch of astigmatism, indicating a small amount of decentering of the optical elements. Wide open, the biggest problem was overcorrected spherical aberration accompanied by moderately strong zonal error, causing a noticeable focus shift (.14mm) when the lens was stopped down from f/1.7 to f/4. Off axis, coma and skew-ray flare were observable, but these aberrations diminished markedly when the lens was stopped down to f/5.6. Lateral color was also detected (red-green shift measured .025mm), but was within acceptable limits. Overall, this lens exhibited adequate performance for its type.

Field Test Pictures: Our test transparencies showed generally good image quality, but the slight focus shift we detected in our optical bench tests was noticeable. A slight haziness was evident in exposures made at maximum aperture and f/2.8. Overall image quality and crispness were much improved when the lens was stopped down to f/4 or f/5.6. The multi-coating of the lens elements was judged effective, as indicated by the absence of color flare and strong ghosts when shooting into the sun.

In conclusion, while the image quality exhibited by this lens is not on a par with the very best lenses of this speed and focal length, its performance is quite satisfactory.

RESOLUTION

55mm f/1.7 Chinon Macro #504017

at 1:48 magnification				
f/no.	Center Lines/mm	Corner Lines/mm		
1.7	Accept	43	Good	30
2	Accept	43	Accept	30
2.8	Accept	48	Accept	38
4	Accept	48	Good	48
5.6	Good	54	Good	48
8	Good	60	V. Good	54
11	V. Good	68	V. Good	54
16	Good	54	Good	48

CONTRAST

at 30 lines/mm				
f/no.	Center %	Corner %		
1.7	V. Low	25	Low	16
2	V. Low	28	Low	16
2.8	V. Low	40	V. Low	27
4	Low	44	Low	32
5.6	Low	47	Low	42
8	V. Low	48	Medium	50
11	V. Low	47	High	56
16	V. Low	40	High	56

COMPACT SPIRATONE 500mm f/8 MIRROR LENS

Mounts: T-thread with adapters for most SLRs.

Filter Size: 77mm screw-in for front.

Aperture: f/8, f/16 with ND filter

Min. Focus Dist.: 4 m (13 ft.)

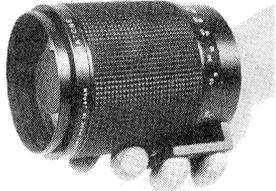
Features: Self-tripod mount, screw-in filters: haze no. 1, 4X neutral density, K-1 yellow

Serial No.: 5319799

Size: 87mm diam. (3.4 in.), 131mm long with adapter (5.2 in.).

Weight: 580 g. (21 oz.)

Price: \$300.00, including case and filters



Spiratone's new 500's a handier package, has built-in tripod platform with 1/4 in. socket.

After many years of selling the Sigma-Spiratone 500mm Ultratel, with its dual correcting lens, Spiratone is now offering this new, compact mirror lens with screw-in, rear-mounting filters, including a two-stop neutral density for outdoor shooting with fast films. Compared with its predecessor, the new lens is compact indeed—less than half as long as the Ultratel. It also weighs considerably less than the older lens—580 g. (21 oz.) against 860 g. (31 oz.).

Spiratone has long been a staunch supporter of the simple T-thread for adapting lenses, and this one is no exception with adapters available for almost every SLR. Of course, with no diaphragm or aperture keying to worry about in a mirror optic the T-thread is a logical choice.

This lens focuses beyond infinity, in keeping with the recognized need for extra focus adjustment to compensate for use in very hot or cold weather. The front thread is a standard 77mm diameter, so many familiar accessories can be mounted. But with a lens of this focal length, care must be taken to see that any accessories you choose be of very good quality so as not to undermine the fine image quality obtainable.

The tripod bracket is attached to the stationary part of the lens barrel, which makes it difficult to rotate the camera body for vertical pictures. This must be done by loosening the locking screws on the T-adapter. **Optical Bench Analysis:** Point light source images transmitted by our test lens were clean and well centered, even when we rotated the focusing barrel.

This procedure can reveal troubles but it didn't. There is a slight trace of undercorrected spherical aberration but almost no color visible on axis—a pleasant surprise, since there are four glass transmitting elements in this lens as well as two reflecting surfaces. Out-of-focus images show the typical donut-shaped patterns with dark centers. Off axis, there is no significant aberration to complain about. A trace of coma was seen, but no lateral color or astigmatism. All in all, we consider the point images to be excellent.

Field Test Pictures: Our test exposures on Kodachrome II showed that the image quality this lens produces is very good to excellent, with almost no flare or loss of contrast in major details. In shooting long range pictures we found that this lens easily detects atmospheric haze and turbulence. This implies that its inherent image quality is sharp and crisp. We also found no hot spots, a problem with some mirror lenses. A slight amount of light falloff toward the corners of the picture field seemed unobjectionable when compared with the pictures we took with a companion 500mm refracting telephoto (for side-by-side comparison).

The filters which came with the sample lens tested were of good quality, and had no noticeable effect on image sharpness. The neutral density reduced the effective aperture to almost exactly f/16. The other filter, a yellow equivalent to a K-1, fell within typical transmission values for this type. A haze filter, sometimes supplied with mirror telephotos, is not in the standard set—but the clear filter has a good cutoff in the near-ultraviolet, so it serves as a haze filter. This lens itself is also characterized by a sharp cutoff in the ultraviolet end of the spectrum, giving it a kind of built-in haze filtration.

All in all, we can recommend this fine little mirror lens as a very good value.

PERFORMANCE

Our Standard	Tested
Focal length: ±5% (475-525mm)	505mm
Max. Aperture: ±5% (f/7.6-f/8.4)	8.28
Distortion: ±3%	less than 2%
Light falloff: less than 1 stop from theoretical limit (-1 stop)	-0.4 stop

RESOLUTION

AT 1:41 MAGNIFICATION				
f/no.	Center lines/mm	Corner lines/mm		
8	Excellent	44	Excellent	36

Would you like to test your own lens? Get MODERN's Lens Test Kit, \$4.95. Write to Lens Test Kit, MODERN PHOTOGRAPHY, 2160 Patterson Street, Cincinnati, Ohio 45214. Please allow 4-6 weeks for delivery.

CONTRAST

at 30 lines per millimeter				
f/no.	Center %	Corner %		
8	Med.	42	Med.	34

ULTRACOMPACT 500mm f/8 MINOLTA MIRROR LENS

Mounts: Minolta Bayonet MD and MC

Filter Size: 39.5mm screw-in at rear

Aperture: f/8 and f/16 with ND filter

Min. Foc. Dist.: 4m (13 ft.)

Features: Focus past inf., special filters include clear for f/8, 4X neutral density for f/16, Yellow 52, Orange 56, Red 60

Serial no.: 1203439

Size: 84mm diam. (3.3 in.), 123mm long (4.8 in.)

Weight: 630g. (23 oz.)

Price: \$551.00, including case and filters



Removable head adds a bit to Minolta 500's length, but it helps control skylight flare.

These days, it is hardly a surprise when a prominent camera and lens maker announces a compact mirror lens, but Minolta's newest arrival is more than just another small mirror lens. It is tiny enough to be hidden behind two outstretched hands. To achieve this extreme compactness, Minolta had to use a fast main mirror, with a speed approaching f/2, in order to get the final speed of f/8. In spite of this, the image quality is outstanding, as can be seen from the test data.

Focusing is accomplished with a single rotation of the main barrel which moves the correcting lens and second mirror forward. With this system, the slightest imperfection in centering or mechanical assembly will lead to image errors creeping in, particularly at close focusing distances. The Minolta lens tested showed no

modern tests

such problems in image quality as it was focused to its closest distance—about 13 ft.

The absence of a tripod mount on the lens barrel is something of an annoyance. Although the lens on a camera seems very easy to cradle in the hand, it can be seen quickly that camera shake is very difficult to avoid, and it is much better to shoot with the lens and camera on a sturdy tripod. Also, there is no provision on the lens for rotating the camera body to a vertical-format position.

A full set of five filters is supplied with the lens. Since they screw into the lens barrel, back at the camera body adapter, the filters themselves must be of very high optical quality and workmanship. We found that they were, and no noticeable effect on the image was detected with any of the filters in place. The color transmission of each was as expected, and the neutral density gave a measured aperture of $f/16$ accurately.

Optical Bench Analysis: On axis, the point image was round, and without any noticeable defect except for a trace of red color. The out-of-focus images were almost identical, both inside and outside the point of best focus—an additional clue that the zonal aberration is almost absent. Off-axis images showed a bit of coma and a barely noticeable trace of astigmatism. No lateral color or other image flare was seen. Overall, we judged image quality to be excellent, approaching astronomical quality.

Field Test Pictures: Color transparencies taken with this lens did exhibit the trace of the red fringing we expected, but it passes almost unnoticed. The off-axis image quality is, if anything, superior to that in the center of the image field. Pictures taken at 5 meters were excellent, with no change in image quality compared to the long-distance shots.

Except for the aforementioned handling problems, this little gem from Minolta earns our highest praise.

RESOLUTION

at 1:42 Magnification				
f/no.	Center lines/mm		Corner lines/mm	
8	excell.	48	excell.	42

CONTRAST

at 30 lines per millimeter				
f/no.	center %		corner %	
8	med.	44	med.	34