

# modern tests



Average in size with built-in shade extended, Canon's mirror 500 is one of the lightest, best balanced of its type.

frame. The built-in sun shade is not overly long, so the compact look and feel of this lens is retained even with the shade in position.

Focusing is accomplished by rotating the entire front part of the lens barrel which is covered by a neat, unobtrusive diamond-patterned finger grip of ample dimensions. Rotating this grip about 270° focuses the lens from infinity to about 13 ft. (4 m), its minimum focusing distance. As expected in a modern long-focus optic, the lens can be set a short distance beyond the infinity mark to correct for temperature effects.

The focusing scale is marked in feet and meters, but the linear depth-of-field scale opposite the focusing scale is missing. This is not an oversight on Canon's part. Mirror lenses have a notoriously shallow depth of field, due to the rapid loss of sharpness caused by the doughnut-shaped light beam focused on the film plane when images are out of focus. This characteristic also makes focusing more critical and touchy with most mirror lenses.

With mirror lenses, we expect (and usually find) that the true f/ number might be a half stop (or more) slower than the one marked on the lens. This is not due to any dishonesty on the part of lens manufacturers—it results from reflection losses at the two mirrors, and the blocking of light rays by the second mirror which is always in front of the main or first mirror. Canon engineers overcame this discrepancy by making the full aperture (diameter) of the lens actually faster (wider) than its rated value, and by using the very best reflecting coating available for the mirrors. As a result, we found that the actual effective speed of this Canon lens is only about 1/4 stop slower than the rated value. With today's automatic cameras, this loss is negligible, and is well

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within tolerance in any case.

Focusing is critical with this long tele. Although it is easy to see when the image is out of focus by critically examining the camera's viewing screen, it takes but a slight movement of the lens-barrel focus control to get a noticeable change. It might be better if the focusing helical were a bit tighter so that, when released, there would be no chance to make a slight misadjustment in focus before making the exposure.

The three-position tripod mounting bracket has click stops which locate the camera body horizontally or vertically, as desired. The two vertical positions offer the user a choice, so that the controls may be on the left or right. The filter slot is part of the barrel which holds the tripod bracket. As a result, the filters are always removed from the top with respect to the tripod. However, this poses no problems since the filter is almost an inch forward of the camera body. However, each filter bracket has its own small lock to prevent the filter from dropping out if the camera and lens were turned over. The lock is released by pressing a small button on the top of the bracket. The filter is then removed by tugging at it with fingernails touching the ends of the top of the filter bracket. The procedure is not as convenient as one would wish—but, we must admit, the filter is secure once it's inserted into the lens.

**Optical Bench Results:** The images produced by this lens are sharp, almost diffraction limited (the ideal limit) with a slight green-purple flare, due to a residual secondary color aberration. Off-axis, there is a slight amount of coma, but no lateral color. We expected the on-film images to be very sharp and with good contrast.

**Field Test Slides:** The color transparencies produced by this lens are very sharp, but they exhibit a very slight loss of contrast when compared to the object with a shorter reflective (non-mirror) tele, stopped down to f/8. The slight falloff of exposure toward the corners is gradual with no noticeable hot-spotting or central haze. Close-in objects are imaged with just about the same high image quality. The multilayer anti-reflection coatings on the glass surfaces of this lens are commendably effective, since we found no strong ghosts or flare when shooting toward the sun.

Our overall impression is that the new Canon 500mm f/8 mirror lens sets a very high standard in image quality and general handling. And while the filter removal problem is a minor annoyance, the lens can be highly recommended for all Canon users.

## PERFORMANCE

| Our Standard   | Tested                 |
|--|------------------------|
| <b>Focal length:</b> ±5%<br>(475 to 525 mm)                                    | 505 mm                 |
| <b>Max. aperture:</b> ±5%<br>(f/7.6 to f/8.4)                                  | f/7.64                 |
| <b>Distortion:</b><br>±3.5%  | + 1.0%<br>(pincushion) |
| <b>Light falloff:</b> at f/8<br>+ 1 stop from theoretical limit<br>(0-1 stops) | .8 stops               |

## RESOLUTION

| at 1: magnification |                    |                    |  |
|---------------------|--------------------|--------------------|--|
| f/ no.              | Center<br>Lines/mm | Corner<br>Lines/mm |  |
| 8                   | Excellent 54       | Excellent 44       |  |

## CONTRAST

| at 20 lines/mm |          |          |  |
|----------------|----------|----------|--|
| f/ no.         | Center % | Corner % |  |
| 8              | Low 38   | Low 32   |  |

## HIGH-SPEED VIVITAR WIDE-ANGLES

**Specifications:** 28mm f/2 Vivitar Auto-Wide Angle No. 22810528; mounts for Canon, Nikon, Minolta, Pentax thread and bayonet, Olympus, Konica; 55mm filter size; f/2 to f/16; min. foc. dist. 12 in. (30.5 cm); 1 1/4 in. long x 2 1/2 in. diam.; 8 1/2 oz. (240 g); \$199

**Specifications:** 24mm f/2 Vivitar Auto-Wide Angle No. 22802864; mounts as above; 55mm filter size; f/2 to f/16; min foc. dist. 12 1/4 in. (31 cm); 1 13/16 in. long x 2 1/2 in. diam.; 8 1/2 oz. (240 g); \$282



Superfast Vivitar wide-angles share same barrel mounts, are remarkably light, compact.



**Practical Comments:** Fine satin black finish, very large numerals, smooth controls, 3/8-in-wide, diamond-pattern rubberized focusing rings; very good construction; both lenses

use same compact barrel mounts.

**Optical Bench:** 28mm: On axis slight yellow flare; some element decentering; some over-corrected spherical. Off axis—some astigmatism and coma at f/2, slight red flare, slight red-

## PERFORMANCE (28mm)

| Our Standard  | Tested        |
|---|---------------|
| <b>Focal length:</b> ±5%<br>(26.6 to 29.4 mm)                                     | 29.4 mm       |
| <b>Max. aperture:</b> ±5%<br>(f/1.9 to f/2.1)                                     | f/2.09        |
| <b>Distortion:</b><br>±2.5%   | 1.1% (Barrel) |
| <b>Light falloff:</b> at f/5.6<br>+ 1 stop from theoretical limit<br>(2.25 stops) | 0.63 stops    |

## RESOLUTION (28mm)

| at 1:47 magnification |                    |                    |  |  |
|-----------------------|--------------------|--------------------|--|--|
| f/ no.                | Center<br>Lines/mm | Corner<br>Lines/mm |  |  |
| 2                     | V. Good 47         | Good 30            |  |  |
| 2.8                   | V. Good 47         | V. Good 33         |  |  |
| 4                     | Good 53            | V. Good 37         |  |  |
| 5.6                   | V. Good 59         | Excellent 42       |  |  |
| 8                     | V. Good 59         | Excellent 47       |  |  |
| 11                    | Excellent 59       | Excellent 47       |  |  |
| 16                    | V. Good 53         | Excellent 42       |  |  |

## CONTRAST (28mm)

| at 30 lines/mm |          |           |  |  |
|----------------|----------|-----------|--|--|
| f/ no.         | Center % | Corner %  |  |  |
| 2              | Low 32   | Low 22    |  |  |
| 2.8            | Low 41   | Low 24    |  |  |
| 4              | Low 38   | Low 27    |  |  |
| 5.6            | Low 42   | Medium 42 |  |  |
| 8              | Low 43   | Low 38    |  |  |
| 11             | Low 48   | Medium 35 |  |  |
| 16             | Low 48   | Low 32    |  |  |

## PERFORMANCE (24mm)

| Our Standard  | Tested     |
|---|------------|
| <b>Focal length:</b> ±5%<br>(22.8 to 25.2 mm)   | 24.96 mm   |
| <b>Max. aperture:</b> ±5%<br>(f/1.9 to f/2.1)   | f/2.07     |
| <b>Distortion:</b><br>±4%<br>less than 1.0% (Barrel)                                      |            |
| <b>Light falloff:</b> at f/5.6<br>+ 1 stop from theoretical limit<br>at 28mm (2.63 stops) | 0.75 stops |

## RESOLUTION (24mm)

| at 1:47 magnification |                    |                    |  |  |
|-----------------------|--------------------|--------------------|--|--|
| f/ no.                | Center<br>Lines/mm | Corner<br>Lines/mm |  |  |
| 2                     | Good 47            | Good 30            |  |  |
| 2.8                   | Excellent 53       | V. Good 33         |  |  |
| 4                     | V. Good 60         | V. Good 38         |  |  |
| 5.6                   | Excellent 67       | Excellent 42       |  |  |
| 8                     | Excellent 67       | Excellent 42       |  |  |
| 11                    | Excellent 60       | Excellent 42       |  |  |
| 16                    | V. Good 53         | V. Good 38         |  |  |

## CONTRAST (24mm)

| at 30 lines/mm |           |          |  |  |
|----------------|-----------|----------|--|--|
| f/ no.         | Center %  | Corner % |  |  |
| 2              | Medium 52 | Low 23   |  |  |
| 2.8            | High 68   | Low 25   |  |  |
| 4              | Low 59    | Low 28   |  |  |
| 5.6            | Low 62    | Low 30   |  |  |
| 8              | Low 58    | Low 30   |  |  |
| 11             | Low 54    | Low 29   |  |  |
| 16             | Low 47    | Low 27   |  |  |

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green lateral color; image very good at  $f/5.6$ . 24mm: On axis—some yellow flare; some element decentering; primary under-corrected chromatic; at  $f/5.6$  flare and chromatic greatly reduced; image very good at  $f/8$ . Off axis—slight flare at  $f/2$ ; image very good at  $f/5.6$  and smaller.

**Field Test:** 28mm—On axis very slight softness at  $f/2$ , but good detail. Very good to excellent by  $f/4$ . Same for off-axis images. Close-up imaging good at  $f/2$ , excellent by  $f/4$ ; no color fringing. Shooting into sun, little light scatter, some weak ghosts. Overall on-film image quality very good to excellent. 24mm—On axis at  $f/2$ , clean, crisp images free of color fringing. Off axis, slight one-sided flare, trace of green-purple chromatic aberration. Image quality over entire field excellent by  $f/4$ . Close-up slightly soft at  $f/2$ , very good by  $f/4$ . Shooting into sun, some flare, but no prominent ghosts. Overall image quality very good to excellent.