

Image Contrast

35-70mm 1/2.8-3.5 Canon Zoom at 35mm No. 10170				
f/no.	Center Percentage		Corner Percentage	
2.8	High	52	High	34
4	High	57	High	38
5.6	Medium	59	High	52
8	High	66	High	57
11	High	65	High	54
16	High	58	High	48
22	Medium	51	Medium	39

At 50mm				
f/no.	Center Percentage		Corner Percentage	
2.8	Low	39	Medium	29
4	Medium	51	Medium	33
5.6	Medium	55	Medium	36
8	Medium	56	High	44
11	Medium	54	High	48
16	Medium	50	High	48
22	Low	45	Medium	39

At 70mm				
f/no.	Center Percentage		Corner Percentage	
3.5	Low	32	Medium	28
4	Low	39	Medium	29
5.6	Medium	56	Low	34
8	High	62	Medium	38
11	High	60	Medium	38
16	High	56	Low	32
22	Low	47	Low	30

than we have experienced with most other zooms.

Residual ghosts and flare: Our test slides revealed that a very bright source just outside the frame produced a small but rather bright ghost in the opposite corner. Generally, ghosts were well controlled, particularly for a zoom lens. The multicoating was quite effective in reducing flare from a bright source within the picture area.

Linear distortion: Barrel-type distortion, as noted previously, was rather large at wide-angle position but became much smaller at 50 to 70mm settings.

What we have here, then, is really a superbly designed optic, but one with somewhat less than a wide range of applications. It would probably be used best outdoors in normal range, where it would give us more precise composing abilities than a standard lens while maintaining camera-to-subject distance. The so-called macro range remains to be used only in an emergency, as when there is something to be photographed swiftly at close range and switching to more suitable optical equipment might result in the loss of the subject.

We wonder, however, whether Canon would not have served photographers better in a practical sense by introducing a lens with a somewhat lower optical standard but an increased zoom ratio, closer focusing and a more compact physical design. Most other macro zoom manufacturers have been following this trend, and producing less costly optics as well.

21MM F/3.5 ZUIKO: SHARP AND COMPACT

MANUFACTURER'S SPECIFICATIONS: 21mm f/3.5 G. Zuiko Auto-W in mount for Olympus OM-1 cameras. **FEATURES:** Apertures to f/16, focusing to 8 in. (0.2 m), accepts 49mm accessories. **PRICE: \$329.95.**

At first glance, Olympus' seven-element, seven-group 21mm f/3.5 looks like the 50mm f/1.8 normal lens when mounted on the OM-1 camera, a tribute to its extraordinarily compact dimensions for a super-wide optic for an SLR—2 3/4 in. (61mm) diameter, extending 1 1/4 in. (30mm) from the camera body at infinity. Not surprisingly, it weighs a featherlight 6 oz. (170 g).

In keeping with the design scheme of the rest of the Zuiko line, the 21 features white-on-black metric distances and orange-on-black footage markings on the 1/4 in. (3mm) wide focusing scale, a 1/8 in. (10mm) wide rubberized focusing ring, and a knurled 3/16 in. (4mm) wide aperture ring at the front with clicks at whole-stop intervals.

While the 21's focusing image is understandably somewhat less bright than that provided by wider-aperture Zuikos, it is nevertheless evenly illuminated to the corners and functions surprisingly well with the OM-1's standard central micropattern screen. Although the micropattern is more apparent with this medium-speed optic, out-of-focus images are shattered quite nicely and the lens focuses decisively at all distances closer than 10 ft. (3m). At farther distances, the 21's extremely large depth of field makes precise focusing more difficult, but this is true with all lenses of this speed and focal length. In any case, picture sharpness (which is likewise benefited by the same phenomenon) does not suffer. The 21 focuses to its closest marked distance of 0.2m in a smooth backlash-free 90° turn of the focusing collar, so focusing is just about as facile as it can be.

One question that always comes up with super-wide lenses of this type, (the angle of view is 92°) is linear distortion. We're happy to report that the 21mm Zuiko was quite rectilinear, with a measured linear distortion of only about two percent. The following optical bench observations and analyses of Kodachrome transparencies shot with this lens prove unequivocally that its other optical parameters are certainly up to snuff.

Central color fringing (causes image unsharpness with color fringing): On the optical bench, we observed some reddish to greenish fringing wide open. This was substantially reduced by closing down one stop. Our test slides confirmed that central color fringing was very well con-

trolled. No fringing was seen at any aperture, a decidedly better than average performance in a super-wide lens of this type.

Central spherical aberration (causes focus shift and flare): At f/3.5, the flare pattern seen on the optical bench was quite small, but the flare intensity was moderately high. Flare disappeared almost entirely at f/5.6. Focus shift was a safe 0.04mm at the film plane. In actual picture taking, only a very small amount of flare was observed. No double line effect in out-of-focus images was observed.

Edge lateral color fringing (causes persistent image unsharpness, possible multiple colored images): Lateral color appeared to be quite well controlled in our optical bench examination, becoming moderate only in the extreme corners. Our test slides confirmed our lab conclusions. Slight fringing was observed from the zonal area to the corners, but the size and intensity of the fringe was always commendably small.

Resolution Power

21mm f/3.5 Zuiko Auto-W No. 100355 At 1:50 Magnification				
f/no.	Center Lines/mm		Corner Lines/mm	
3.5	V/Good	50	Good	28
5.6	Exc.	56	V/Good	35
8	V/Good	56	Exc.	40
11	Exc.	56	Exc.	40
16	Exc.	63	V/Good	35

Actual Focal Length: 21.5mm

Edge astigmatism (causes image streaking): On the bench, a slight amount of astigmatism was observed in the zonal area at f/3.5 and f/5.6. It disappeared almost entirely by f/8. Moderate astigmatism was observed in the extreme corners wide open. It was substantially reduced on stopping down, but slight streaking persisted until f/16. In actual picture taking, astigmatism was less prominent. Slight streaking was observed, but it was well controlled at all apertures.

Edge coma (causes flare): Skew-ray flare at f/3.5 was slight to the zonal area, becoming moderate at the corners. Stopping down to f/5.6 yielded a substantial flare reduction, and all flare was eliminated at f/8. Coma appeared to be well corrected; the size and intensity of the comatic tail was always rather small. On our test transparencies, only a very slight comatic flare was detectable.

Optical decentering (causes problems in all areas): No decentering was observed in our optical bench examination.

Residual ghosts and flare: With a bright source just outside the picture area, no ghosting and only slight flare were observed.

Linear distortion: Barrel-type distortion measured about two percent, rather good for a lens of this focal length.

All in all, Olympus' jewel-like 21mm is an admirable compromise of optical and physical properties that should find its way onto many existing Olympus OM-1 cameras. For that matter, 21mm fanciers may well be tempted to acquire the camera just to get the lens. It's that dandy.

Image Contrast

21mm f/3.5 Zuiko Auto-W No. 100355 At 30 lines/mm				
f/no.	Center Percentage		Corner Percentage	
3.5	Low	42	High	60
5.6	Medium	58	High	62
8	Medium	64	High	63
11	High	67	High	64
16	High	67	High	64

55MM MACRO LENS FOR MIRANDA SLR CAMERAS

MANUFACTURER'S SPECIFICATIONS: 55mm f/3.5 Auto-Miranda Macro in bayonet mount for all Miranda 35mm single-lens reflexes. **FEATURES:** Apertures to f/32, focusing to 8.78 in. (22.3cm) (1:1), accepts 58mm accessories. **PRICE: \$229.95.**

If Miranda owners had to wait longer than those who had other system cameras to get a macro-focusing normal lens, it was well worth it. Unlike almost every other macro lens, the Auto Macro does not simply focus down to 1:2 and then need the aid of an extension tube to get down to 1:1. The Macro moves effortlessly and continuously from infinity right to 1:1 with no accessories. And while it uses nothing more complicated optically than a traditional three-group, four-element Tessar formula, it provides professional results at normal focusing distances as well as close-ups (as our charts attest) while maintaining fully-automatic diaphragm operation. Its only concession to being usable on all Mirandas is that the lens does not couple directly to the Sensorex's full-aperture or automatic-exposure meter systems. Exposure is best determined, we feel, by making a reading at shooting aperture. You can make readings at full aperture with the Sensorex camera via the camera body's aperture setting arm, but you must then transfer the reading from the aperture scale on the body to the lens' aperture ring, a minor nuisance.

The 14 oz. (400 g) lens itself is amazingly compact—2 3/4 in. (69mm) minimum length and 2 1/2 in. (66mm) total diameter—particularly when you realize it contains sufficient helical threads to propel the lens all the way to 1:1 where it reaches a total length of 5 in. (125mm). The 1 1/16 in. (27mm) wide, diamond-studded rubberized focusing ring (metal knurled on earlier models) is very