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OLYMPUS[®]

OM
SYSTEM

MANUAL FOR
MACROPHOTO GROUP



Although it escapes the realm of our normal vision, a virtually unknown and unexplored microcosm of photographic subject matter surrounds us. It is a fascinating realm that is at once beautiful and bustling with activity. Those who venture to explore it are afforded new perspectives on the nature of life itself. Not only do they discover new ways of viewing flowers, insects and various other forms of life, but in the process of examining the basic structures of animate and inanimate objects at close range, they also uncover countless colorful and creative shapes they previously never knew existed.

You the OM Photographer — whether working with OM cameras — are blessed with a very special option. At your disposal is one of the most extensive systems of macrophotography ever developed. Comprised of an army of sophisticated and precision macrophoto units, this well-thought-out system not only offers you countless shooting combinations and possibilities, but is

quicker and easier to use than any other system as well.

This booklet has been provided as a guide to familiarize the OM Photographer with the basic macrophoto units in the system and the overall concept of the system itself. It provides various charts outlining the shooting combinations and magnifications possible with the various accessories available so as to assist you in selecting exactly the right combinations to meet your individual shooting needs. In addition, it also furnishes a variety of related data on close-up and macrophotography, from the basic principles of macrophotography for the beginner to helpful hints on lighting and other macrophoto techniques which the experienced photographer will find useful as well. Be sure to keep the booklet nearby as ready reference each time you enter that very special "Olympus World of Macro-photography."

NOTE: The models names OM-4 and OM-2 in this manual also stand for the following models:
OM-4 . . . OM-4T, OM-4Ti OM-2 . . . OM-2S, OM-2S/P, OM-2N



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The opportunities for the macrophotographer are virtually limitless. A snail with its young making its way across a bright green leaf somehow seems to illustrate parental affection.

1X. O'M-2 with Zuiko Macro 50mm F3.5 lens, Auto Extension Tube 25 and T32 Electronic Flash, at f/8.

(Photo by Kon Sasaki)





Flowers are an endless world of beauty and also make fascinating subject matter at close range. A bright red rose with all its intricate patterns and crimson hues seems to convey passion.

2X. OM-2 with Zuiko 1:1 Macro 80mm F4 and Telescopic Auto Tube 65-116 at f/5.6.

(Photo by Kazuto Kihara)

- **Hint for Discovery of Macrophotographic Joys**

Perhaps the old cliché, "a picture is worth a thousand words" best describes the fun-filled world of macrophotography. The photographer planning to enter this fascinating world should try this: with a 3X or 5X power magnifying glass in one hand, walk around and take a look at the objects in the world around you. At home, for example, examine various objects at close range — a watch, a pencil or pen, the prints on the pages of a book, flowers in a vase, cigarettes, matches, and so forth. Then, take the magnifying glass outside and examine the seemingly endless number of objects in the neighborhood as well — the bark of a tree, a blade of grass, insects busy in the yard of garden, even objects along the roadside such as an insect wing, a piece of animal fur, or the rust on an old sign.

The first thing which will amaze you on your new adventure is the vast array of interesting and fascinating objects that will appear before your magnifying glass. In fact, take it along with you on a hike, you will be further amazed at the myriad creations of nature that will make interesting subject matter.

However, simply because certain objects have an intriguing form or appear beautiful through a magnifying glass, it doesn't necessarily mean that they will photograph interestingly. Many of the elements involved in producing quality photo-

graphs in general photography are involved in close-up and macrophotography as well. But, initially, such considerations are of little importance. When you first enter the world of macrophotography, the important thing to remember is simply this: *take as many and as wide a range of photographs as possible.* A few days later when you examine your slides or prints, you will soon discover which attempts were successful, and also where you fell short of achieving your goals. This is the best way to begin.

Essentially the basic criteria for judging a close-up or macrophoto is the same as that for a photo you would take in the general photography range. It is not enough that there is a certain beauty or rarity about the subject, or that you like it personally. It must also hold the viewer's interest, or have the capacity to move people in some way. In addition, many photographers feel that serious consideration should be given to composition as well. And, of course, the photograph must also exhibit that essential combination of split-second timing and good judgement that culminates in "the decisive moment." But, as we said above, you would be best to skip these considerations at first and simply go out and shoot. This is the surest way to discover the fun-filled world of macrophotography, a realm full of intrigue for people of all ages and from all walks of life.

● Improving Your Macrophoto Techniques

When you photograph an object that you feel will make good subject matter, also make it a point to keep a record of the date you photographed the object and other data concerning the photo. This information will prove invaluable as a safeguard against failure when you take similar photographs in the future. It is also extremely helpful to have your photographs criticized by a photographer more experienced than yourself. Practical criticism from a successful photographer is a sure shortcut to developing your own successful techniques.

Books on close-up and macrophotography are plentiful on the market today and it is helpful to read as many as possible. Another sure way to improvement, especially at first, is to imitate the work of others. In a field where trial and error are initially the most important elements, working over the successful techniques of others will quickly show you the areas where you are weakest yourself, and gradually lead you to improve on your own.

In the beginning, do not be deceived by a mastery of the technical aspects of macrophotography. In this field, a corollary to developing good technique is to develop the ability to "read" a photograph, much in the same way you learned to read a book in the early days of school. Observe as many photographs as possible and, in doing so,

constantly ask yourself what it is that makes them successful as well as other pertinent questions about them. In the process of learning to interpret the qualities that constitute a good photograph, you will also learn to apply this knowledge successfully to your own photographs. In addition, you will find yourself discovering new themes and ideas, and you will have also acquired many of the technical abilities needed to capture them skillfully on film.

Lastly, it should be emphasized that in order to achieve full enjoyment in the field of close-up and macrophotography, it is important not to hurry. In high-magnification work, more so than in any other field of photography, the axiom "haste makes waste" holds true. If you rush things in the beginning you may find yourself giving up before you have mastered the basics. More than anything else in this field, remember to take time out to master the basics. Once you have gained a solid foothold with this knowledge, you will progress in leaps and bounds. And, in the process, a whole new world of creative freedom will be yours. (by Kon Sasaki)



When photographed at high magnification a moorgrass takes on the appearance of fine crystal. Using a straight forward composition and a simple background one can easily emphasize its integrate natural beauty. 3X. OM-2 with Zuiko MC Macro 38mm F 3.5 lens, Auto Bellows and Electronic Flash T32.

(Photo by Kon Sasaki)



Wandering through a field on a spring day, you might come across a dandelion blowing in the breeze, perhaps click your shutter in fascination as you watch small insect fighting the elements of nature.

1X. OM-2 with Zuiko Macro 50mm F3.5 lens at F4 and Auto Extension Tube 25. (Photo by Kazuto Kihara)



FEATURES OF THE OM SYSTEM MACROPHOTO GROUP

The world of macrophotography is truly a source of endless beauty and amazement. The Macrophoto Group features a wide variety of system units to assist you in photographing all types of subject matter at close range, including equipment optimized for scientific and industrial work, along with that optimized for creative purposes. The various units in the system may be subdivided into two general groups. One group is the "Composite method" consisting of lightweight, attachment type accessories for use in conjunction with the Macro 50mm Lens or Standard Lens, such as Close-Up Lenses, Extension Tubes or the Auto Bellows and the Handy Copy Stand. The other group is the "Professional method" consisting of hard core macrophoto accessories including the full line-up of Zuiko Macrophoto Lenses, the Auto Bellows and bellows attachments, PMT-35 Macrophoto Equipment, and the unique new Telescopic Auto Extension Tube 65-116.

In addition, accessories within these two methods may be further classified into "indoor type" units such as the Auto Bellows/Macrophoto Stand combination, and "outdoor type" units consisting of Close-Up Lenses used in combination with lightweight, hand-holdable units such as the Telescopic Auto Tube 65-116.

All units in the Macrophoto Group of course have been made as lightweight and compact as

possible in accordance with the design of the OM camera bodies and the original concept of the OM System. In addition, thanks to the "TTL Direct" Light Measuring system pioneered by Olympus, the troublesome calculations for flash photography and other exposure inconveniences traditionally associated with macrophotography have been eliminated. As the following list of features indicates, the OM System's Macrophoto Group contains an unprecedented range of units and has been developed in such a way that macrophotography, which was once a highly specialized realm reserved for the professional or serious amateur, has become incredibly easy for anyone to enter.

Features of the Macrophoto Group are as follows:

- **A Wide Selection of Macrophoto Lenses:**

Nine special lenses have been developed for macrophoto use (including five lenses — the Zuiko Macro 20mm F2, Macro 20mm F3.5, Macro 38mm F2.8, Macro 38mm F3.5, 1:1 Macro 80mm F4 — which are specifically optimized for use with the Auto Bellows or Telescopic Auto Tube 65-116). In addition, the Macro 135mm F4.5 Macro 90mm/F2 and the Macro 50mm F2/F3.5 are designed to meet the photographer's requirements in both the realms of macrophotography and normal photography.

Unprecedentedly Lightweight, Compact and Mobile:

Beginning with the Zuiko Macro Lenses, all accessories in the Macrophoto Group, including the Auto Extension Tubes, Auto Bellows Stands and Copying units, etc., offer unprecedented compactness.

- **TTL Direct "OTF" Light Measurement:**

When the various accessories in the Group are used in conjunction with one of the TTL "OTF" Auto Flash units and the OM-4 (OM-2) camera, light is measured directly "off-the-film" for unprecedented exposure accuracy with minimum fuss. Correct flash exposures are obtained as automatically as non-flash exposures and without exposure calculation regardless of the working aperture or magnification.

- **Easy Multi-Flash in the TTL Direct Mode:**

Moreover, for situations where additional lighting is required due to critical depth-of-field, multi unit flash is also possible in the TTL Direct "OTF" mode using the T10 Ring Flash in conjunction with either the T28, T32 or T20 Auto Flash units via special multiple flash adapter units.

- **Handling with the Ease of Snapshots:**

Simply attach the Telescopic Auto Tube 65-116 and the Zuiko Macro 135mm lens to an OM-4 camera, for example, for hand-held shooting all the way from infinity to magnifications as high as 0.43X. Troublesome subjects such as insects and small animals can be photographed at ample working distances with the ease of snapshots.

- **Shadowless Macrophotographs:**

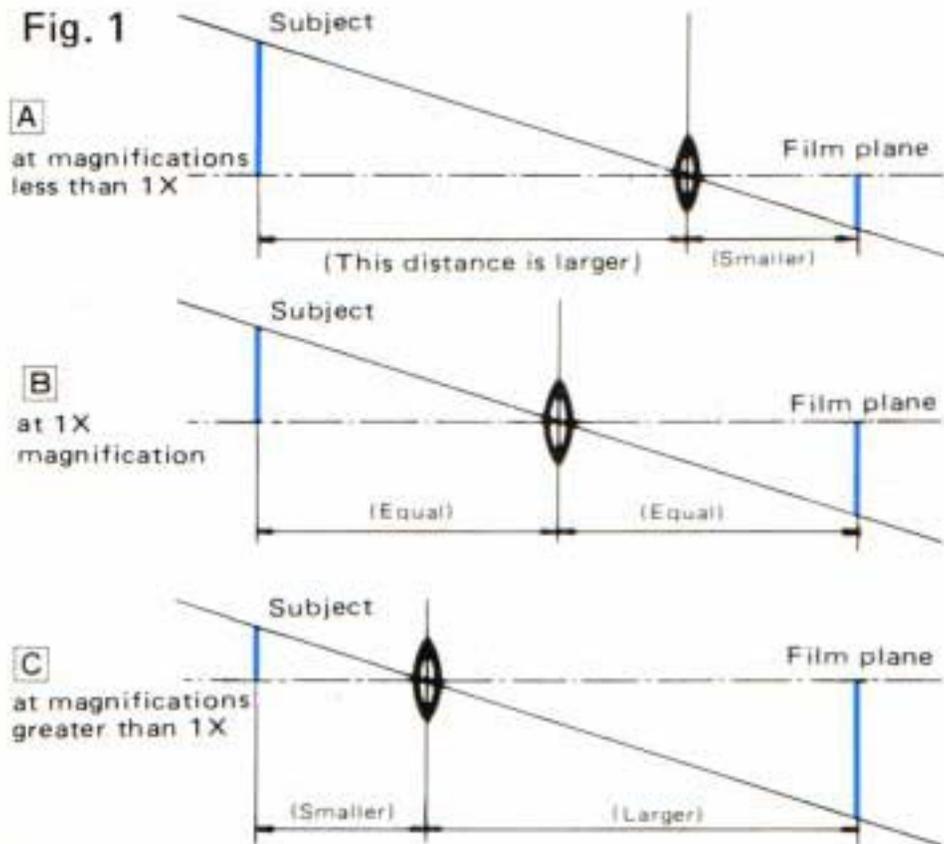
With the T10 Ring Flash 1 or T8 Ring Flash 2 you can obtain full, even illumination for close-up and macro subjects at extremely close working distances. When the T10 Ring Flash 1 is used in conjunction with Ring Cross Filter POL (a special cross-polarizing filter for minimizing direct reflections) "shadowless" photographs are possible. The bounce lighting function made possible by the reflector of the T8 Ring Flash 2 cuts out the direct, ring-shaped reflections that are unavoidable in regular ring flash photography, to achieve beautifully clear pictures that are almost entirely free of shadows. This feature is handy for glossy subjects in general macrophotography and invaluable for critical work in scientific and medical photography where non-glare photos are a must.

- **The Most Sophisticated and Functional Macrophoto Units Ever Developed:**

Olympus is able to offer you the most advanced and richest range of macrophoto equipment ever assembled. From the "Composite Method" permitting easy hand-held work outdoors or light work indoors, to the "Professional Method" consisting of the Auto Bellows, Stands, Copying Equipment and highly specialized units such as the PMT-35 Macro Equipment, the Macrophoto Group offers a complete array of units for use in various combinations to meet virtually all your macrophoto needs.

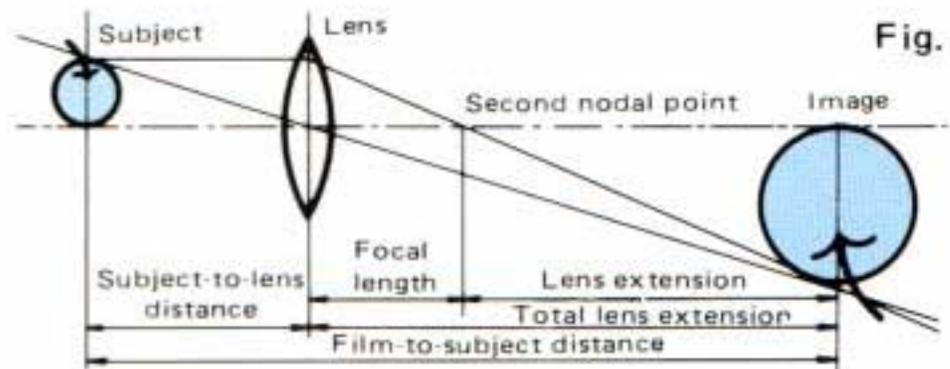
Basics of Close-ups, Macrophotography, and Photomicrography

Many photographers are not actually aware of the distinction between close-up photography and macrophotography and often use the two terms interchangeably. Generally speaking, however, close-up photography covers the magnification ranges from 1/10X to life-size (1X), while macrophotography covers magnifications from



life-size to approximately 30X. Magnifications beyond this range generally fall into photomicrography or photography with a microscope. There is quite a bit of overlapping, however, as the true distinction is not based on magnification but method. More explicitly, photomicrography refers to photography of microscopic subjects involving both an objective and an eyepiece, while macrophotography involves use of the "taking lens" alone without an eyepiece.

Figures 1-A, 1-B and 1-C show the distance relationships of the subject, lens, and film plane at various magnification levels. Note the placement of the lens. At magnifications lower than 1X (Fig. 1-A) the distance between the subject and the lens is greater than between the lens and the film plane. At 1X magnification (Fig. 1-B) the distance between the subject and the film is approximately equal, while at magnifications greater than 1X (Fig. 1-C) the distance between the lens and the film plane is greater than be-



tween the lens and the subject. By these comparisons we can easily see that in order to obtain high magnification photos in the macrophoto range, extension of the distance between the lens and the film is required. Correspondingly, the lens must also be placed closer to the subject than with low close-up or life-size magnifications.

Magnification

Magnification is the relationship between the size of the image on the negative and the size of the actual subject itself. When the image of the subject on the negative or portion of the image corresponds exactly with the dimensions of the subject itself, magnification is said to be life-size or 1X.

Magnification/Distance Relationships with a 50mm Lens

Fig. 3

Magnification (x) \ Distance (mm)	0.2	0.5	1.0	2.0	5.0	10.0
Subject-to-lens distance	300	150	100	75	60	55
Lens-to-film distance	60	75	100	150	300	550
Subject-to-film distance	360	225	200	225	360	605

NOTE: Lens-to-film distance is calculated from the second nodal point (See Fig. 2).

To obtain the high-magnifications required for macrophotography, the distance between the lens and the film must be extended as shown in Fig. 1-C.

This is usually accomplished by placing extension equipment such as a bellows unit, or extension tubes between the lens and the camera, or by using specially developed macro photo lenses.

The subject area also varies in relation to magnification as shown in Fig. 4, and whether to select a short or long focal length lens for a particular shot often depends on which of these two factors is given priority.

Magnification and Subject Area

Fig. 4

Magnification (x)	Subject Area	Magnification (x)	Subject Area
0.1	240x360mm	1.5	16x24mm
0.5	48x72mm	5.0	4.8x7.2mm
1.0	24x36mm	10.0	2.4x3.6mm

Magnification and Exposure Factors

In relation to the degree of lens extension and the corresponding increase in magnification, the light hitting the film is diverged over a wider area and a need for increase in the "exposure factor" results. Although the advantages of through-the-lens exposure measurement offered in all of the

OM cameras automatically compensate for exposure factor increase, it is helpful to know how exposure factors are calculated not only to gain a full understanding of the basics of macrophotography, but for critical exposure situations where you wish to override the meter. The exposure factor for any given magnification may be calculated by the following simple formula: $EF = (1 + \text{Magnification})^2$. Corresponding to the exposure factor increase a discrepancy also arises between the physical f-stop on the lens and the actual f-stop in use. The following formula may be used to calculate the actual or "effective" f-stop (EF-Stop):

$$\text{EF-Stop} = \text{F-Stop} \times (\text{Magnification} + 1)$$

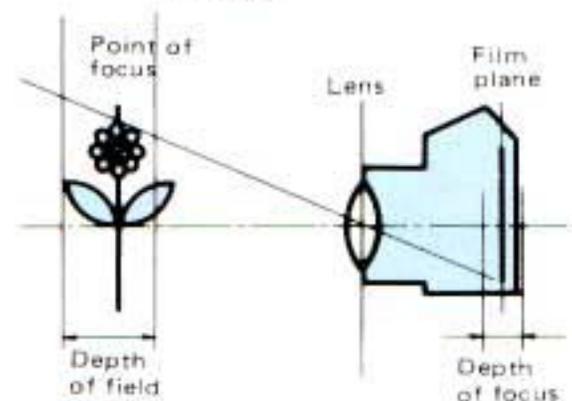
Magnification and Exposure Adjustment Fig. 5

Magnification	Exposure Factor	Increase of Aperture
0.1	1.21	0.3
0.5	2.25	1.2
1.0	4.00	2
1.5	6.25	2.6
2.0	9.00	3.2
3.0	16.00	4
5.0	36.00	5.2
10.0	121.00	7

Fig. 5 gives the exposure factor and corresponding aperture increase for magnifications required for magnifications from 0.1X to 10X.

Note how sharply the exposure factor and the effective aperture increase at high magnifications.

Fig. 6



DEPTH OF FOCUS vs. DEPTH OF FIELD

What is frequently mistakenly called depth of focus should actually be referred to as depth of field. As shown in Fig. 6, depth of focus refers to the area of acceptable focus in front and beyond the image of the subject at the film plane. Depth of field, on the other hand, refers to the area of acceptable focus in front and beyond the actual three-dimensional subject and is influenced by factors such as lens aperture, focal length of the lens and distance from the subject.

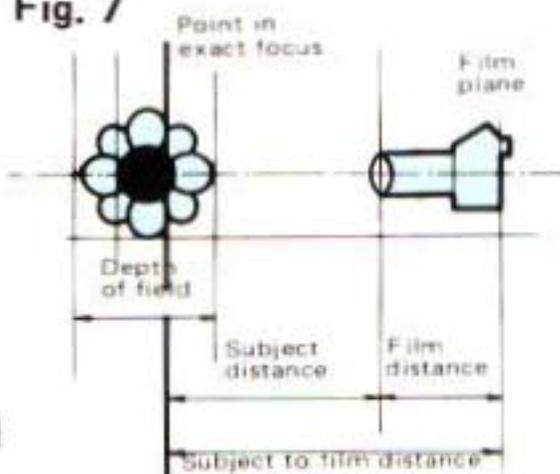
Focusing

Satisfactory focus on the whole can be obtained

with three-dimensional subjects if you focus on the front one-third of the subject, as illustrated in Fig. 7. By doing this, the greater depth of field beyond the point of exact focus will take care of the remaining two-thirds of the subject. If the subject is quite broad, use of very small apertures will give increased depth of field. However, as resolution falls off if the lens is stopped down too far, it's sometimes difficult to maintain a balance between resolution and depth of field.

In many instances you must choose which factor is more important for the particular shot.

Fig. 7



Exposure and Lighting

When additional lighting is required to obtain satisfactory results, portable electronic flash units with their brief flash duration and capacity for arresting motion have much to recommend them for a wide range of macrophoto work. However, traditional exposure calculation has presented somewhat of a problem and the photographer has to rely on troublesome calculations such as the

following based on the magnification and distance corelatives shown in Fig. 8.

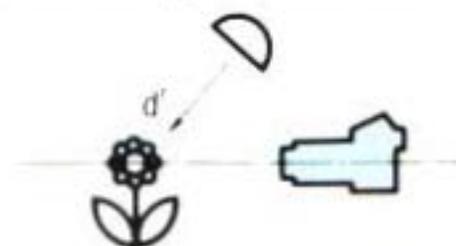
Flash-to-Subject Distance Corelatives Based on Magnifications

Fig. 8

Magnification	0.2X	0.3X	0.5X	1X	1.5X	2X	3X	4X
Distance Corelative	0.82	0.75	0.65	0.5	0.4	0.33	0.25	0.2

① $GN \div f\text{-stop} \times 100 = d'\text{cm}$ ② $d'\text{cm} \times dc = d\text{cm}$
 $dc = \text{distance corelative. } d = \text{flash-to-subject distance}$

Thus, if working at 1X magnification at f/22 with a guide number of 32 (ASA 100 in meters), the correct flash-to-subject distance is 72cm:



① $32 \text{ (GN)} \div 22 \text{ (f-stop)} \times 100\text{cm} = 145\text{cm}$, therefore, ② $145\text{cm} \times 0.5 \text{ (dc at 1X)} = 72.5\text{cm}$. The TTL "off-the-film" centralized control flash system featured with the Olympus TTL "OTF" flash units when linked with the OM-2 camera, however, is ideal for close-distance work. Pioneered by Olympus, this system controls flash output at the film plane from inside the camera and automatically cuts out flash at the precise moment, providing correct exposure regardless of magnification, subject distance or lens aperture.



COMBINATION OF SYSTEM UNITS FOR CHOICE IN TERMS OF MAGNIFICATION



0.1X

0.2X

0.3X

0.5X

1X

SUBJECT AREA (mm)	240×360		80×120		48×72		24×36	
MAGNIFICATION	0.1X		0.3X		0.5X		1X	
PROFESSIONAL METHOD	ZUIKO MACRO 90mm F2						0.5X	
	ZUIKO MACRO 50mm F2/F3.5						0.5X	
	TELESCOPIC AUTO TUBE 65~116 + ZUIKO MACRO 135mm F4.5						1X	
					TELESCOPIC AUTO TUBE 65~116 + 1:1 MACRO 80mm F4		1.2X	
	AUTO BELLOWS + ZUIKO MACRO 135mm F4.5						1X	
							0.48X	
							0.43X	
COMPOSITE METHOD	STANDARD LENS		AUTO EXTENSION TUBE 7		14		25	
	0.16X		0.3X		0.45X		0.65X	
	STANDARD LENS + CLOSE-UP LENS		AUTO EXTENSION TUBE 7		14		25	
	0.13X		0.63X		0.65X		0.8X	
				ZUIKO 200mm F4		ZUIKO 100mm F2.8		
		0.33X		0.67X				
ZUIKO ZOOM 35 ~ 105mm F3.5 ~ 4.5 (AT CLOSE FOCUS)		0.2X				1.2X		

ATION



2X



3X



5X



8X



12X

12x18	8x12	4.8x7.2	3x4.5	2x3
2x	3x	5x	8x	12x
AUTO EXTENSION TUBE 14 + ZUIKO MACRO 20mm F2 4.2x 4.9x		AUTO EXTENSION TUBE 25 + ZUIKO MACRO 20mm F2 4.4x4.7x 4.9x		TELESCOPIC AUTO TUBE 65~116 + ZUIKO MACRO 20mm F2 6.8x 9.5x
ZUIKO MACRO 38mm F2.8 1.7x 1.8x2x 2.1x	AUTO EXTENSION TUBE 25 + ZUIKO MACRO 38mm F2.8 4.4x4.7x 4.5x		TELESCOPIC AUTO TUBE 65~116 + ZUIKO MACRO 38mm F2.8 3.1x 4.5x	
ZUIKO MACRO 80mm F4 + CLOSE-UP LENS MACRO 80mm 2x 2x		AUTO BELLOWS + ZUIKO MACRO 38mm F2.8 2.3x 6.7x		
MACRO LENS + MACROPHOTOGRAPHIC EQUIPMENT PMT 35 2.2x 2.2x		AUTO BELLOWS + ZUIKO MACRO 20mm F2 5.3x 13.5x		
16x				
TELESCOPIC AUTO TUBE 65~116 2.5x 2.5x		} + STANDARD LENS } + ZUIKO MACRO 50mm F2/F3.5 } + TELESCOPIC AUTO TUBE 65~116		
TELESCOPIC AUTO TUBE 65~116 1.8x 2.8x		} + ZUIKO MACRO 50mm F2/F3.5 } + TELESCOPIC AUTO TUBE 65~116		
AUTO BELLOWS + ZUIKO MACRO 50mm F2/F3.5 4.46x 4.46x		} + ZUIKO MACRO 50mm F2/F3.5 } + TELESCOPIC AUTO TUBE 65~116		

... Recommended close-up range (with lens retracted)
 ... Recommended close-up range (with lens extended)
 ... Possible close-up range
 Automatic diaphragm lenses
 * When using automatic diaphragm lenses with Composite System Units, stop down as far as possible.

As explained previously, the various system units comprising the Olympus Macrophoto Group can be roughly divided into the "Professional Method" and the "Composite Method." The basic magnifications possible with the various units used in different combinations are shown in the chart on page 54. Although the accessories in the "Professional Method" are basically for indoor use, and those in the "Composite Method" are for outdoor use, accessories such as the highly versatile Telescopic Auto Tube 65 – 116 used in conjunction with various macro lenses are convenient for both indoor and outdoor use.

In macrophotography, magnification takes priority over all other factors. Once the magnification is determined, the photographer can select the system units combinations best suited for the particular shot, based on the subject area, the working distances sought and other factors. The following three pages contain examples illustrating actual magnifications and subject areas obtained with the various system unit combinations in the Macrophoto Group. Use them as a guide in selecting accessories which best accord with your own close-up and macrophoto needs.

**0.3X**

Zuiko Macro 135mm
F4.5 with Telescopic
Auto Tube 65-116.





Zuiko Macro 50mm
F3.5

0.5X



1X

Zuko 1:1 Macro
80mm F4 with Tele-
scopic Auto Tube
65-116.





Zuiko Macro
135mm F4.5 with
Telescopic Auto
Tube 65-116

0.4X



2X

Zuiko 1:1 Macro
80mm F4 with Tele-
scopic Auto Tube
65-116 and Close-
up Lens 80mm
Macro





Zuko Macro 38mm
F3.5 with Auto
Bellows

5X



38mm F2.8

38mm F3.5



20mm F2

20mm F3.5

10X

Zuiko Macro 20mm
F3.5 with Auto
Bellows



● Focusing

We have already stated that in close-up photography, the greater the magnification, the more shallow the depth of field. At 0.5X with a 50mm Macro lens, for example, the depth of field is a mere 6mm at f/16, while at f/22 it extends only to 9mm. One of the consequences of shallow depth of field is that even the slight-camera movement will result in picture blur. For this reason, when working with fast moving subjects such as insects, it's best to focus and determine the magnification beforehand based on the size of your subject. Then, follow your subject with the camera, moving it back and forth, so as to keep the subject within the allotted depth of field. When working with flowers or still-life subjects, however, you can mount the camera on a tripod and focus directly on the subject; if time permits also preview the depth of field beforehand with the depth of field preview button.

● Aperture Setting

Because of the shallow depth of field, it is commonly thought that it is best to use the smallest lens aperture possible for close-up work. Actually, however, a wide range of lens apertures can be useful, depending upon the type of work you are doing. Of course, small apertures are recommended for documentary-type photographs of machinery, commercial products and other three-

dimensional subjects that require precise and detailed reproduction. But, for aesthetic applications in artistic and commercial photography, often wide lens apertures are more suitable. This is because the shallow depth of field at wide lens apertures creates an out-of-focus effect in the background that simplifies complicated and cluttered background detail, thereby highlighting the main subject and allowing better overall composition.

● The Decisive Moment

When photographing insects and small animals, countless opportunities for interesting photographs present themselves. However, knowing exactly when to press the shutter button to photograph the subject successfully requires a certain amount of technique. Rather than simply wait for your subject to do what you want, read up on it beforehand and learn its behavior patterns in order to know how to best photograph it. Although, the opportunities for good photographs frequently present themselves, only by exercising forethought and prudence when you press the shutter button will you obtain the results you desire.

● Quality Image Reproduction vs. Blur

The importance of quality image reproduction cannot be understressed in macrophoto work.

There was a period in normal photography when it was popular to blur the image of the main subject for special effects. However, in high magnification work, even the slightest blurring reduces image clarity, and lowers the overall impact of the photograph. For this reason, always be sure to use a tripod, copy stand, macrophoto stand or similar equipment to give your camera solid support for close-distance work. Furthermore, make it a point to use high-quality, fine grain film that is properly exposed. You would also do well to avoid long exposures with natural lighting in favor of the versatility of electronic flash lighting, even though some time may be required to master flash technique.

● **The Advantages of Electronic Flash**

Electronic flash lighting is the most suitable type for close-distance work. Unlike natural lighting, it is a constant lighting source that is unaffected by weather conditions and can be controlled easily. In addition, electronic flash units are compact, lightweight and can be carried about easily. Moreover, because the nature of electronic flash lighting is ultra fast, it is capable of stopping high-speed movement, thus eliminating the problem of picture blur. When working at very close-distances, ring-flash type electronic flash units are the most convenient. These special-

ly designed flash units fit over the front of the lens and let you work closer than with other types. The "shadowless" nature of ring-flash lighting also provide a solution to the problem of dealing with difficult shadows in high magnification work.

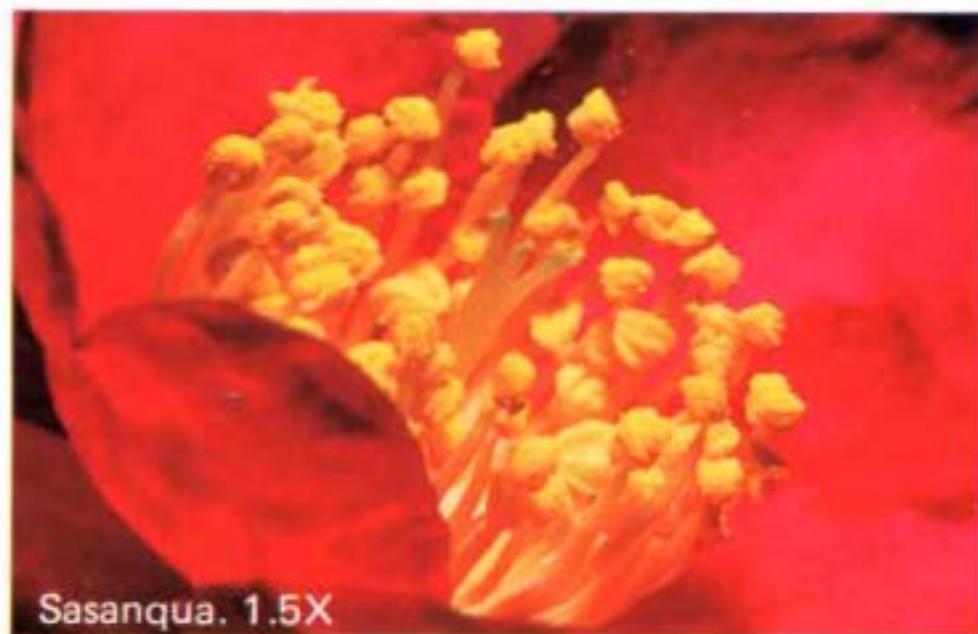
● **Working with 3-Dimensional Subjects**

The important factors to consider when photographing three-dimensional subject matter are the camera angle and lighting. Secondly, you must decide whether to use a short or long focal length lens. While wide-angle lenses serve to emphasize the three-dimensional properties of the subject in close-distance work, they also tend to distort shapes somewhat. In contrast, longer focal length lenses offer a more true-to-life perspective in terms of shape, but tend to de-emphasize the subject's three-dimensional qualities. The only effective way to deal with this problem is to decide which aspects of the subject you wish to emphasize beforehand. As to lighting for three-dimensional subjects in close-distance work, it's safe to think in the same terms you would with three-dimensional subjects in normal photography. You can also make a quick lighting check by eye by shining a small lamp on your subject; if heavy shadows are indicated, use a small reflector to reduce them.

- **Flowers**

Flowers constitute a fascinating realm of subject matter for close-up and macrophoto work. They are relatively stationary and can be easily photographed at both high and low magnifications. Moreover, they present a virtually endless array of colors and shapes, which makes them intriguing for both the beginner and the experienced photographer to photograph. When photographing flowers at magnifications from 0.5X to life-size, the Macro 50mm lens used in conjunction with the Auto Extension Tube 25 is extremely handy and assures excellent results.

In photographing flowers, you are faced with one major problem — the wind. One of the best defenses against the wind is to use a fast shutter speed and wait until it dies down for a spell. You can also bring along a small reflector, which will not only help you deflect the wind but also aid in lighting control. When working in the field, cluttered backgrounds also tend to cause problems. These can be dealt with by using a wide lens aperture, which will blend the various background colors and forms together, and create an interesting highlighting effect around your subject. The longer focal length lenses such as Macro 135mm F4.5 or the 1:1 Macro 80mm F4 lens do an excellent job of simplifying backgrounds.



Sasanqua. 1.5X

- **Insects and Small Animals**

A larva hatching from an egg, entering the pupal stage, then sprouting wings and maturing. Photographing the growth patterns of a dragonfly, a butterfly and the other forms of insect life is another realm of fascinating subject matter for close-distance photography. For photographing natural phenomena such as the hatching of an egg or an insect sprouting wings, excellent results can be obtained by using a tripod in conjunction with precision macrophoto equipment such as the Macro 50mm lens or 1:1 Macro 80mm lens plus the Telescopic Auto Tube and Electronic Flash T32. However, aside from equipment, patience

more than camera technique ultimately spells the difference between success and failure for this type of photography. As insects are acutely attuned to danger, it's best to use a long focal length lens such as Macro 135mm or 1:1 Macro 80mm in situations where they might be frightened away. These lenses used in conjunction with the smooth-extending Telescopic Auto Tube 65 – 116, let you set magnifications freely and provide ample working distances to photograph the subject without frightening it away. Again, however, be sure to use a tripod as camera movement is easily detected with long focal length lenses.

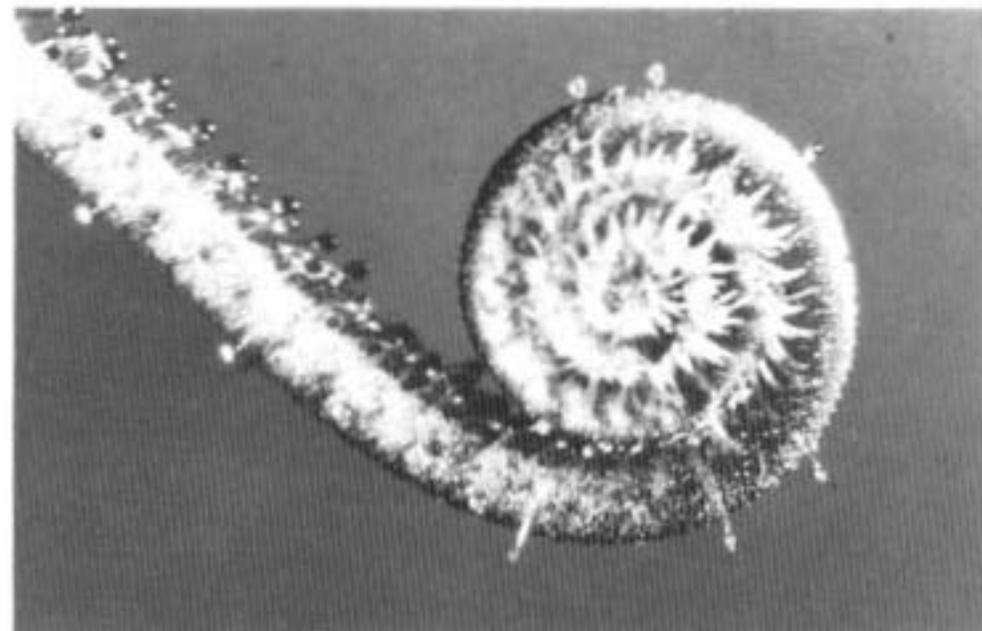


● Still Life

There are countless subjects in your home that will photograph interestingly at high magnifications. The paper clips on top of your desk, a pen, a match, or any of the various objects in your living room, kitchen, etc. Simply decide what you wish to shoot and how to shoot it, the rest is technique. Holding the camera in your hand and using an electronic flash you can improve your technical skills by photographing the various objects in your home under different exposure conditions. Also try various compositions with the same object or try photographing it with lenses of different focal lengths so as to develop your powers of expression and sense of perspective.

• Convenient Lighting Sources

One of the secrets of taking beautiful photographs outdoors is to take advantage of the brilliant lighting provided by the gleaming sun. However, if working indoors, or outdoors on a cloudy day or in the shade, auxiliary lighting is usually necessary. For such situations, electronic flash is one of the most convenient lighting sources available, particularly in close-distance work where high magnifications and small lens apertures are the norm. Moreover, thanks to the TTL Centralized Control Flash system offered with the Olympus auto flash units, a whole new level of exposure convenience and accuracy has been reached in electronic flash photography, as well. This system measures correct flash exposure directly at the film plane from inside the camera to give you correct flash exposures automatically and regardless of lens aperture. In addition, magnifications also can be chosen freely, making flash exposures as easy as



non-flash automatic exposures.

• Illumination with Electronic Flash T32

In many close-range flash situations, you can suffice by using just one T32 electronic flash unit. This is because there is very little difference between the flash angle and the camera angle at close distances, so the angle of illumination can be used to cover the entire subject without producing shadows. The principle involved is similar to that of the lights on the top of the elevator shining down to illuminate the faces of the people entirely without shadows. For horizontal format shooting, you can mount the flash unit directly to the camera and angle the flash head slightly downward to obtain sufficient illumination. In the vertical format, however, best results

are obtained by mounting the flash to Power Bounce Grip 2 or hold the flash back further away from the camera.

Photography with the T28 Macro Flash units

For short working distances, the flash head can be fitted to the front of the lens with a special attachment, the Macro Flash Shoe Ring. This makes the T28 Macro Flash 1 an extremely useful unit. Alternatively, the T28 Twin Flash 1 provides two linked flash heads for very versatile lighting effects, such as accentuated shadows, highlighted backgrounds, etc.

Illumination with the Ring Flash

The T10 Ring Flash 1 is excellent for situations where normal flash illumination will not suffice, such as for photographing inside a hole or tubing and for photographing small sub-

jects in detail at high magnifications without producing shadows. The Ring Flash fits conveniently around the front of the camera lens, permitting you to illuminate the subject freely and without the vignetting from light cut-off by the lens barrel that would occur if you worked with another type of flash unit at such close



range. Focusing problems are also overcome easily by means of a handy focusing lamp built into the Ring Flash unit.

When using a ring flash care must be taken to avoid causing a ring-shaped image on the photograph. With the T10, the special Ring Cross Filter POL will prevent direct reflections from the flash back onto the photo. In the case of the T8, as the light from the flash section is first bounced off the reflector, the lighting is unprecedentedly soft and there is no risk of strong shadow effects.



0.5X Crabs. OM-2 with Zuiko 1:1 Macro 80mm F4 lens, Auto Bellows and Electronic Flash T32, at 1/22.



1X Octopus hatching. OM-2 with
Zuiko 1:1 Macro 80mm F4 lens and
Telescopic Auto Tube 65-116, at
f/22.

OM SYSTEM SELECTING MACRO LENSES

Macro lenses are specially designed interchangeable lenses for offering optimum resolution and convenience when working with subjects in the close distance range. In contrast, standard lenses are usually designed to deliver best performance at infinity, and their performance falls off at close range especially when magnifications approach the vicinity of 1X. However, no single macro lens is capable of delivering optimum performance for the entire range of low, high and mid-range close distance work, either. For this reason, Olympus has developed of seven different macro lenses, each optimized to give maximum results in seven different working areas, enabling the photographer to tailor his choice to individual photographic requirements. Two further essential considerations in the design were functionality and sharp definition. This was in line with the OLYMPUS belief that looking through the eyes of a macro lens opens up an infinite

world of new and exciting discoveries. Every one of the lenses shown here is a triumphant vindication of this belief. As regards precision, they draw on all the vast technological resources of one of the world's leading microscope manufacturers. Select the most suitable lens for your needs and for the range of magnifications — low, life size, or high — that you require. Then build up the necessary system units around that lens, and you will be fully prepared to tackle the fascinating world of macro. If your work is mostly indoors in studio conditions, the Auto Bellows will be the extension unit of choice. For outdoor 'action' macrophotography, on the other hand, the Telescopic Auto Tube 65-116 is ideal... The OM System guarantees satisfaction in everything from serious scientific macrophotography, to handling and performance that make hand-held shooting almost as easy as taking snapshots.

■ **Zuiko Macro 135mm F4.5**
Developed for use in conjunction with the Telescopic Auto Tube 65-116 or Auto Bellows, this lens focuses all the way from infinity to 0.43X, and apertures extend all the way to f/45. An excellent lens for use in both



macrophotography and normal photography as well. For high magnification work, its telephoto focal length provides pleasant perspective with ample working distance, making it ideal for photographing live subjects such as insects and small animals.

■ **Zuiko 1:1 Macro 80mm F4**

This lens was also developed for use in conjunction with the Telescopic Auto Tube 65-116 or Auto Bellows. It is specially designed to offer optimum resolution in the vicinity of life-size, where its sharpness is unparalleled.



In addition, it also produces excellent results throughout its entire magnification range running from 0.5X to 2X, offering greater working distances than its short focal length counterparts. Subject area coverage runs from 48mm x 72mm down to 12mm x 18mm.

■ **Zuiko Macro 90mm F2**

A medium telephoto macro lens with a magnification range from 1/2 life size to infinity. Subject area coverage runs from infinity to 72mm x 48mm.

With an F2 aperture the brightest lens in its class, featuring



superb resolution at macro distances and excellent performance even with subjects at infinity.

The exclusive Olympus focus aberration correction mechanism guarantees first class picture sharpness all the way from minimum focus to infinity.

■ **Zuiko Macro 50mm F2/F3.5**

This outstanding 50mm macro lens features continuous focusing all the way from infinity down to 0.5X, while subject area coverage runs from infinity to 72mm x 48mm. It is standardized for magnifications of



0.1X and doubles as a high resolution standard lens. However, it also features an automatic correction system for close-distance aberration — the first lens of its kind — and is capable of high resolution over its entire operating range.

■ **Zuiko Macro 38mm F2.8**

Features full automatic aperturing over a magnification range from 3.1 to 4.5X life size with the Telescopic Auto Tube 65-116. With the Auto Bellows and various attachments, the photographic range extends from 1.7



to 8X. As with the Zuiko 20mm F2, special attention was paid to lighting requirements. The front of the lens is tapered to minimize the problem of shadows from the lens spoiling the picture.

■ **Zuiko Macro 20mm F2**

The super bright F2 aperture is a world first in this class of high magnification macro lens. With the Telescopic Auto Tube 65-116 it offers fully automatic aperturing over a magnification range from 6.8 to 9.3X life size.



With the Auto Bellows and various attachments, the photographic range increase to 4.2 – 16X life size. Adopts high refractive index, low dispersion optical glass. Chromatic aberrations are almost totally eliminated.

■ **Zuiko Macro 38mm F3.5**

This lens is specially designed to solve the problem of obtaining high resolution images for magnification ranges from 2X to 6X. Subject area coverage runs from 20mm x 13mm down to 6mm x 4mm. (With Auto Bellows)



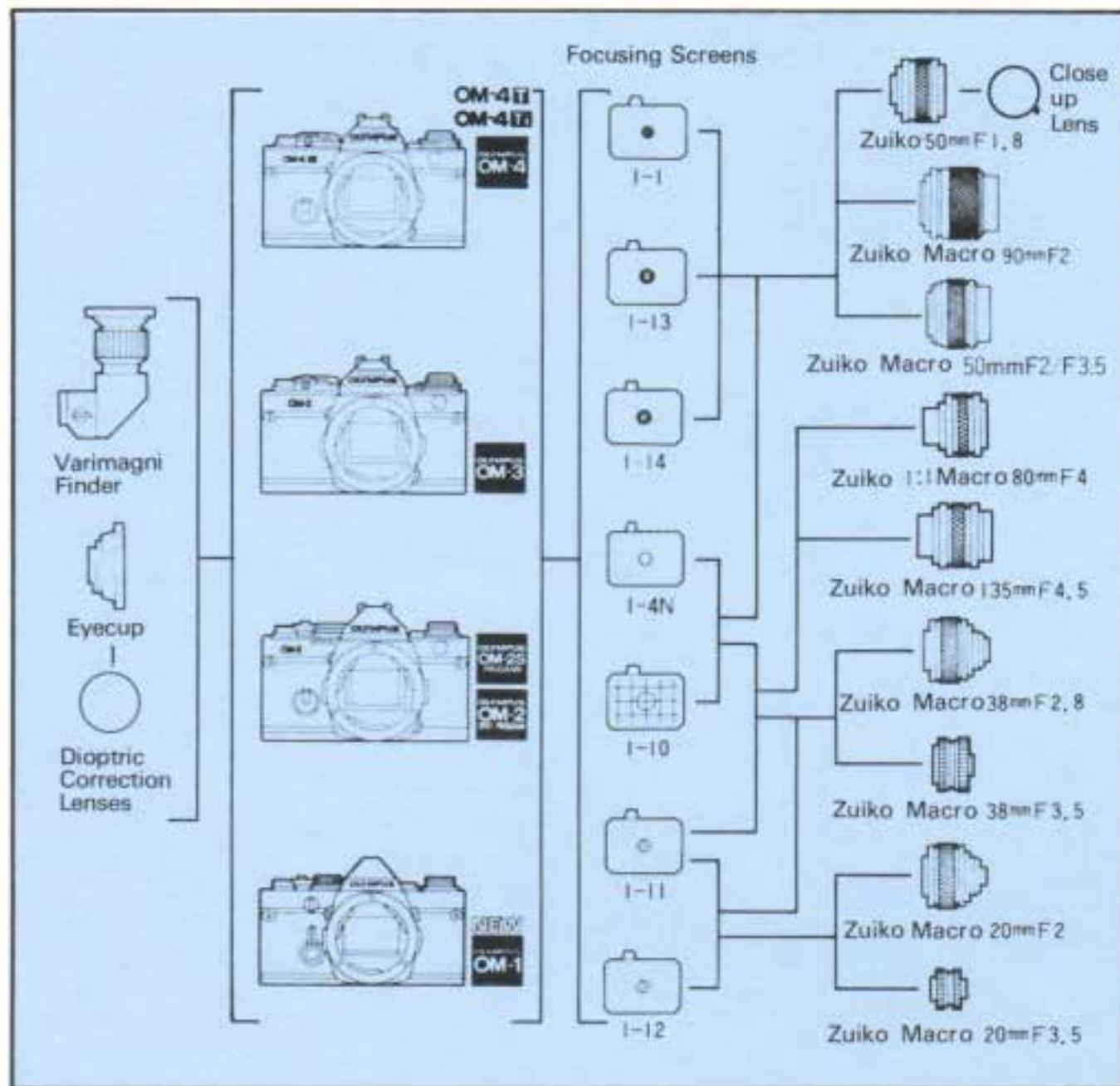
(The aperture ring is operated manually only.)

■ **Zuiko Macro 20mm F3.5**

A short focal length Macro Lens specifically designed to produce sharply focused pictures for magnifications from 4X to 12X. Subject area coverage extends from 8.4mm x 5.6mm to 3mm x 2mm. (With Auto Bellows)

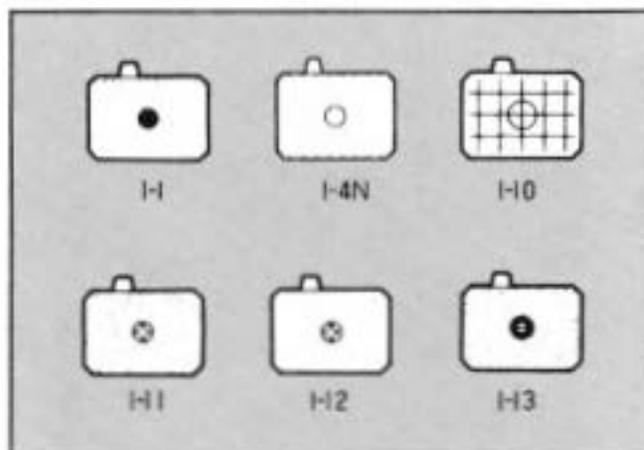


The viewfinder of the OM camera takes on a special importance in macrophotography. Looking through the viewfinder the photographer performs the various operations of focusing, composition, and adjusting the exposure. He also sets the depth of field which is extremely shallow in macrophotography, even with the lens stopped down to f/5.6 or f/11. Moreover, the viewfinder is darker than normal and the view is complicated by grain apparent at high magnifications. Yet, in spite of this, greater precision in focusing is required. These factors must be borne in mind for choosing viewfinder accessory equipment suitable for the subject matter and macro equipment you are working with.



■ Focusing Screens

The OM System features a total of 14 interchangeable focusing screens to meet the gamut of focusing needs. The six screens as outlined below are most suitable for macrophoto work.



Lens	Magnification	Screen
Macro 90mm Macro 50mm	$\infty \sim 0.5X$	1-1, 1-4N, 1-10, 1-13
Macro 80mm	0.5X ~ 2X	1-4N, 1-10, 1-11
Macro 135mm	$\infty \sim 0.5X$	1-4N, 1-10, 1-11
Macro 38mm	2X ~ 6X	1-4N, 1-10, 1-11, 1-12
Macro 20mm	4X ~ 12X	1-11, 1-12,

■ Varimagni Finder

A convenient focusing aid facilitating comfortable viewing at low angles and in other difficult situations. The eyepiece rotates 360° while working as a combination of angle-finder and magnifier in accurate focusing. Mag-



nifications are variable in two steps from 1.2X to 2.5X. Built-in dioptric correction is featured to meet individual eye-sight requirements.

■ Eyecup 1

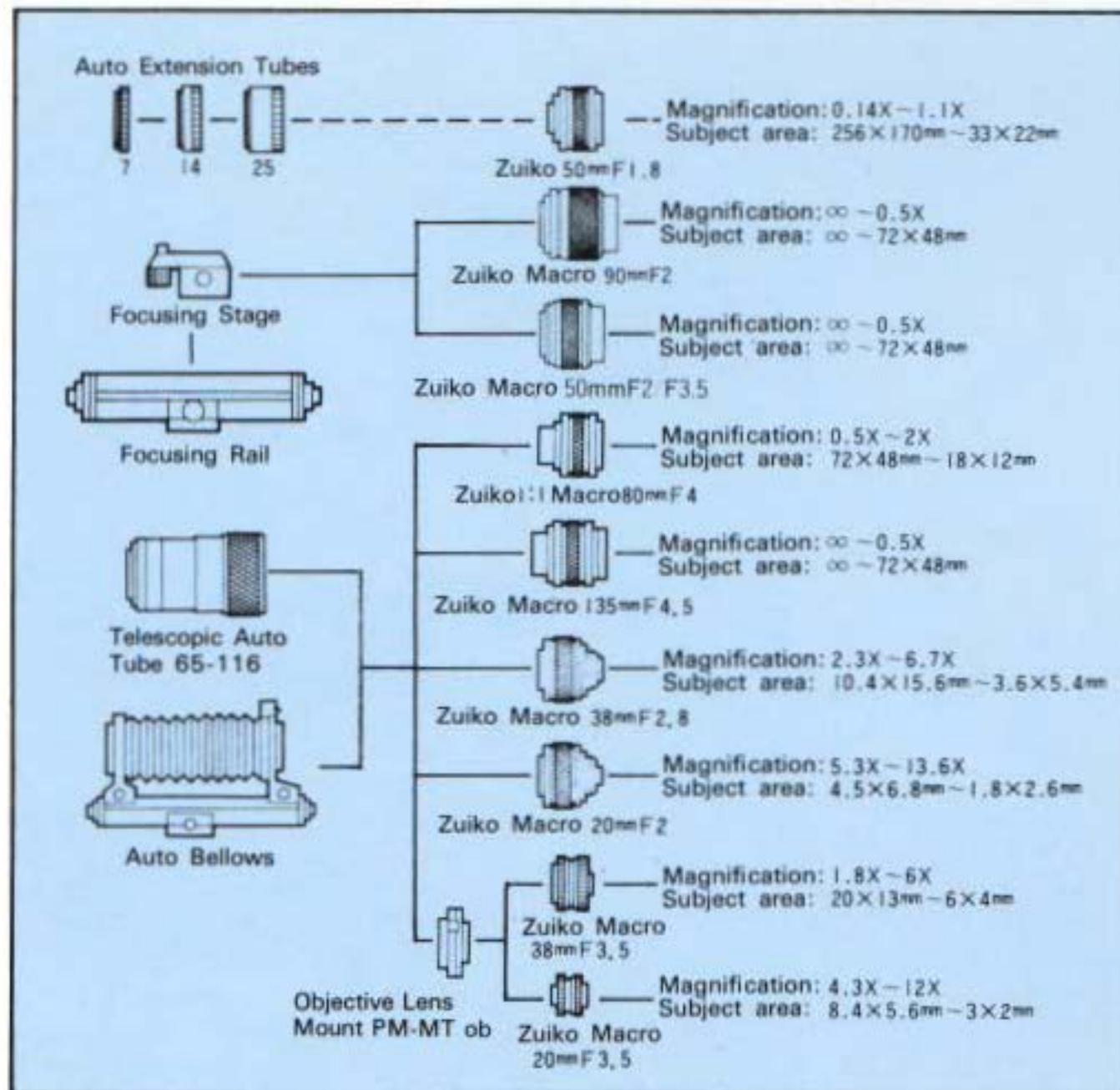
Fits over the viewfinder frame to prevent glare and loss of contrast resulting from stray light hitting the eyepiece. An essential aid for high-magnification work with dark subjects or when shooting at stopped-down apertures.



■ Dioptric Correction Lenses 1

A focusing aid for eyeglass wearers. These fit to the eyecup 1 and are available in eight different dioptric strengths meeting the requirements of both short- and far-sightedness.

Using a Zuiko Standard lens alone you can only focus as close as 45cm, while with a close-up lens mounted over the standard lens, focus can be extended down to 19cm. To obtain extension sufficient for high magnification macrophoto work, however, extension devices such as those in the right must be fitted between the taking lens and the camera body. The Auto Bellows has an extension range of 36mm-198mm and is the most versatile extension unit for basic macrophoto work. However, the newly developed Telescopic Auto Tube 65-116, which offers continuous extension from 65mm-116mm, is a highly convenient alternative and is especially suited for outdoor work. Lenses for use with these may be chosen in accordance with magnification and subject area desired.



■ Telescopic Auto Tube 65-116

This is a revolutionary new macrophoto units, compact, lightweight, featuring automatic diaphragm linkage and offering continuous extension from 65 mm 116mm. It allows you to vary magnifications and subject



area freely, making macrophoto work as easy as snapshots. Subject area extends to 72mm x 48 mm when used with the 135mm macro lens, and runs all the way from 72mm x 48mm down to 30mm x 20mm with 80mm macro lens.

■ Auto Extension Tubes 7, 14, 25

Each of these Auto Extension Tubes incorporates an automatic diaphragm lever to stop down the lens diaphragm to the preset aperture at the moment of exposure. It is interlinked between the OM camera body and lens for close-up photography. The



respective lengths of these tubes are 7mm, 14mm and 25mm, which make seven different lengths by single or combined uses. (For magnification up to 0.5X, however, the Macro 50mm lens is recommended for superior resolution.)

■ Close-up Lens 49mm, 55mm f=40mm

These close-up attachment lenses thread directly over the standard lenses or 50mm macro lens, permitting magnification increase without affecting automatic diaphragm action. The 49mm model is used with the 50mm



F1.8, F1.4, F1.2 standard and 50mm F3.5 macro lenses; the 55mm model fits the 55mm F1.2 standard lens.

■ Close-up Lens 80mm Macro

For use with the 80mm F4 macro lens. Extends magnifications with the Telescopic Auto Tube from 1X to 2X.

■ **Auto Bellows**

The basic extension unit for the majority of macrophoto work. A double-cable release permits automatic stop down to the pre-selected lens aperture at the moment of exposure, while a pre-set lever lets you view the



depth of field prior to taking the picture.

■ **Objective Lens Mount PM-MTob**

A specially designed unit for mounting either the 20mm F3.5 or 38mm F3.5 macro lenses with extension units.

■ **Focusing Rail**

Designed for use in conjunction with the Focusing Stage. It permits smooth and free movement of the camera along the rail, letting you focus and compose as desired. Focusing knob provided on the rail.



■ **Focusing Stage**

Mounts the camera to the Focusing Rail, and permits convenient shifting of the camera position. Features a built-in clamp screw that fits to the camera tripod socket and a camera shift knob for control.

■ **Slide Copier**

Operates in conjunction with the Auto Bellows for copying transparencies in color or B&W. Features a removable front plate and accepts either mounted slides or film strips.



■ **Roll Film Stage**

Works in conjunction with the Auto Bellows and Slide Copier for duplicating roll films. Permits convenient handling and prevents scratching.



0.5X Butterfly emerging. OM-2 with Zuiko 1:1 80mm F4 and Electronic Flash T32, at f/22.

Lens extension imposes certain restrictions on macrophoto versatility. Unless additional lighting is provided, use of slow shutter speeds and wide lens apertures is necessary, making it impossible to photograph moving subjects such as insects and resulting in loss of precious depth of field for still-life work. The Olympus TTL Direct "off-the-film" Light Measuring and Centralized Control System provide the ideal answer to the common exposure problems of macrophotography. Featured with the T-series electronic flash units described on the right when linked with the OM-4 (OM-2) camera, this system measures light directly at the film plane from inside the camera during the actual moment of exposure. Correct exposures for flash photography are obtained as easily as non-flash auto exposures, regardless of lens aperture and without precalculating subject distances. The result is macrophoto versatility unparalleled.

■ T Power Control 1

A compact power unit for the T10•T8•T28 Macro Flashes which mounts via accessory shoe to the top of the OM body. Offers both TTL Direct "OTF" auto operation or manual flash. Powered by 4 AA-size batteries or optional AC Adapter 2, 3.



■ T10 Ring Flash 1

Designed principally for use with the OM System macro lenses, this unit provides full and even flash illumination at working distances far closer than possible with other flash units. Operates in conjunction



with the T Power Control 1.

■ Ring Cross Filter POL

A cross-polarizing filter which minimizes direct reflections from the T10 Ring Flash 1 for highly reflective subject matter.

■ T8 Ring Flash 2

This ring flash is particularly useful for medical and copying applications, etc. The bounce lighting effect obtained by the assembly of the T8 and its reflector (200mm and 150mm diameter types are available) is



unprecedentedly soft. Assures shadowless illumination for any subject smaller than the reflector unit. The guide number in TTL Auto mode is 8 (ISO/ASA 100, meters).

■ T28 Macro Single Flash 1

An exceptionally small and light TTL auto flash unit. It assures equally simple flash operation for normal photography and for close-up and macro subjects. The angle of flash coverage is 53° vertically and 74° horizon-



tally. The unit can be angled as much as 70° up, 45° down and 360° horizontally. In TTL Auto mode the guide number is 28. In Manual it can be switched between 28 and 14 (ISO/ASA 100, meters).

■ T28 Macro Twin Flash 1

A TTL Auto flash unit with two separate flash heads. Achieves extremely versatile effects, for example high contrast lighting with deep shadows, highlighted backgrounds, etc. Each flash head can be angled as with the



T28 Single Flash 1. Each flash head can be fired separately, or both together. Single flash guide numbers are the same as with the T28 Single Flash 1. For both flashes together, the guide number is 22 in TTL auto mode, 22 or 9 in manual mode (ISO/ASA 100, meters).

■ Macro Flash Shoe Ring

An attachment unit that vastly increases the photographic range of the T28 Macro Single Flash 1 and the T28 Macro Twin Flash 1. The flash heads are fitted to the Shoe Ring after this unit has been secured to the front of the



lens. The shoe mount can be revolved freely and locked at any position desired. Can be used with the Zuiko Macro 38mm F2.8, 50mm F3.5, 135mm F4.5, 1:1 Macro 80mm F4, and standard OM System lenses.

■ Electronic Flash T45

A fully automatic, grip-type flash unit that forms the core of the OM System Flashphoto Group. Despite the powerful 45 (ISO/ASA 100, meters) guide number, it requires no shoulder pack type external power source.



All three flash modes – TTL auto, normal auto and manual – can be set. An exciting feature is TTL Auto Flash with the OM-4 or OM-2. Both the auto light sensor and the computer controlling the flash emission are built into the camera body to

assure fully centralized control of flash function. Film speed, aperture, etc. are set on the camera only, not the flash unit. All aperture values available on the taking lens may be used freely. Even sophisticated techniques such as bounce flash, diffused flash and multi-flash are fully automatic. The T45 power source is a special rechargeable Ni-Cd battery pack that fits inside the grip section. Both the recycling time of 0.2–2.2 secs. and the 100–500 flashes per charge (with the special Ni-Cd battery pack) are about twice as good as with conventional flash units of this class. The built-in bounce mechanism permits angling through a range of 90° vertically and 340° horizontally.

■ Electronic Flash T32

A high output auto flash unit offering TTL Direct "OTF" auto flash operation with the OM-4 (OM-2) camera. The flash head tilts 90° upward and 15° downward, a setting which is highly convenient for macro-photo work.



■ Electronic Flash T20

A lightweight and compact electronic flash unit featuring a guide number of 20 (ISO100 in meters) or 66 (ISO100 in feet) and TTL Direct "OTF" Auto Flash capability. Angular coverage is sufficient for a 35mm wide-angle lens.

1 TTL Auto Connector Types 3 and 4

These adapter units permit off-camera operation of the T32 and T20 Electronic Flash units with the OM-1 and OM-2.

2 Accessory Shoes 3 and 4

These attachments permit direct hot shoe mounting of the T32,



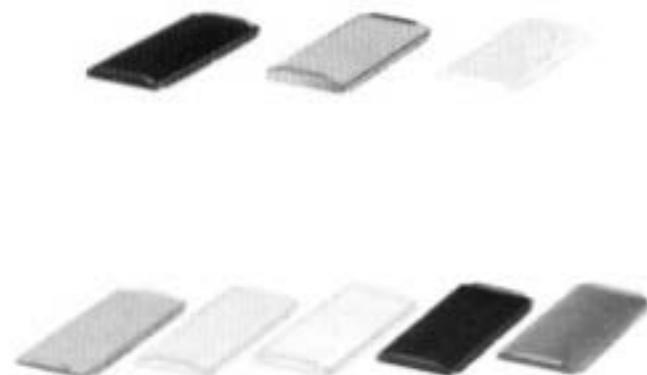
T20 or T Power Control 1 to OM-1 and OM-2 camera models.

3 TTL Auto Multi Connector
Permits use of two or more T-series flash units for multiple flash operation.

4 TTL Auto Connector T20

■ Wide Adapter • ND Filter Set T32

Special neutral density filters for the T32-T28 Electronic Flashes for reducing light intensity without affecting color and contrast.



■ Color Filter Set T32

For special effects flash. Five colors are available: red, blue, yellow, orange and green.

■ **Power Bounce Grip 2**

An auxiliary power unit which converts the T32 and T20 electronic flash units into grip-type units. The grip head may be angled in all directions, -110° vertically, 240° to the left, 60° to the right — for maximum ver-



satility in bounce and close-up flash. Grip section houses four 1.5V C size batteries.

■ **TTL Auto Cords T 0.3m, 0.6m, 2m, 5m**

Links the electronic flash units with the OM body when used separate from the camera.

■ **TTL Auto Cords T2 — 0.1m, 0.15m**

Links the electronic flash T45 with the OM body.



■ **M. Grip Cord (M. Grip Cord 2)**

Connects the remote shutter release on the Power Bounce Grip 2 (T45) for operation with the Motor Drive or Winder units.

■ **Electronic Flash AC Adapter 3**

Enables operation of the T10•T8•T28 Macro Flashes and its modelling lamp on AC current.



■ **6V Power Pack 2**

An auxiliary power source unit for the modelling lamps or winder units. Powered by four D size batteries.

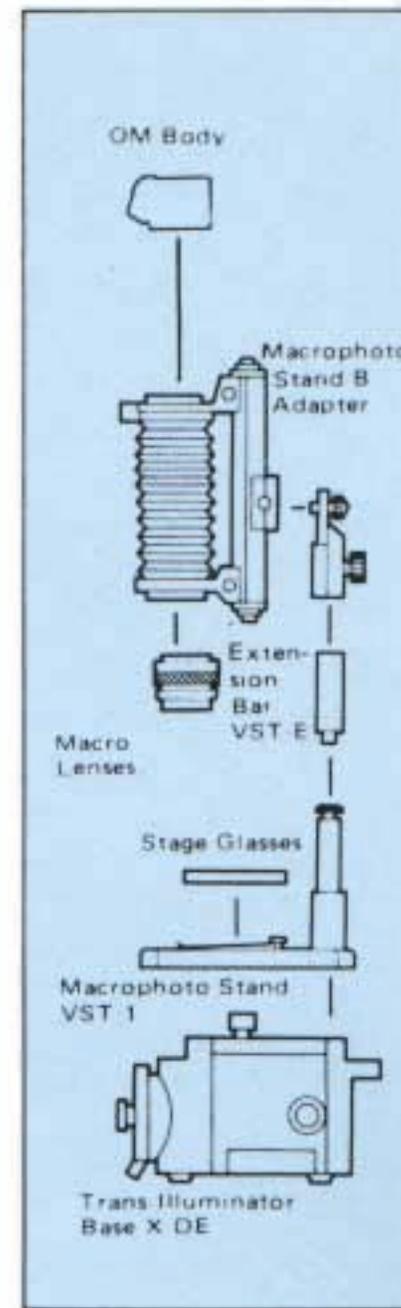
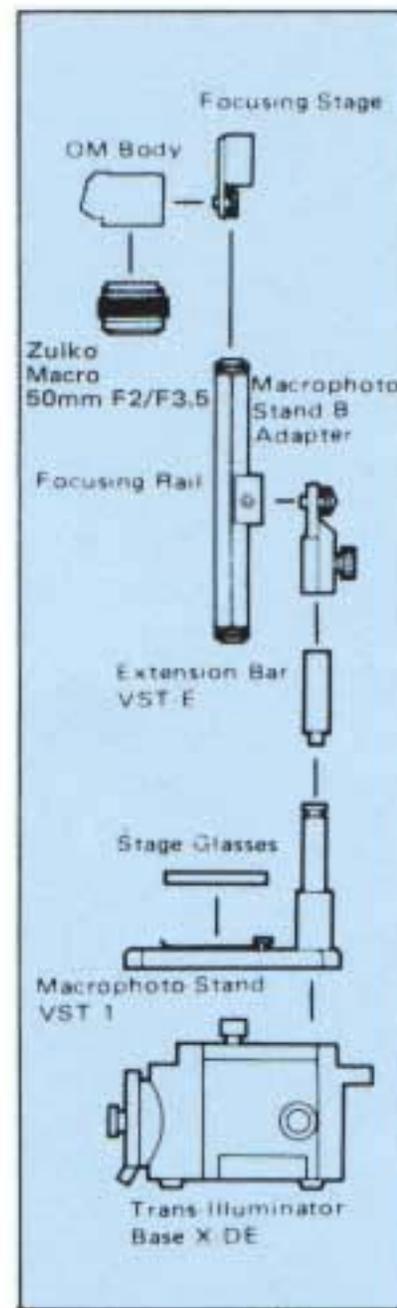
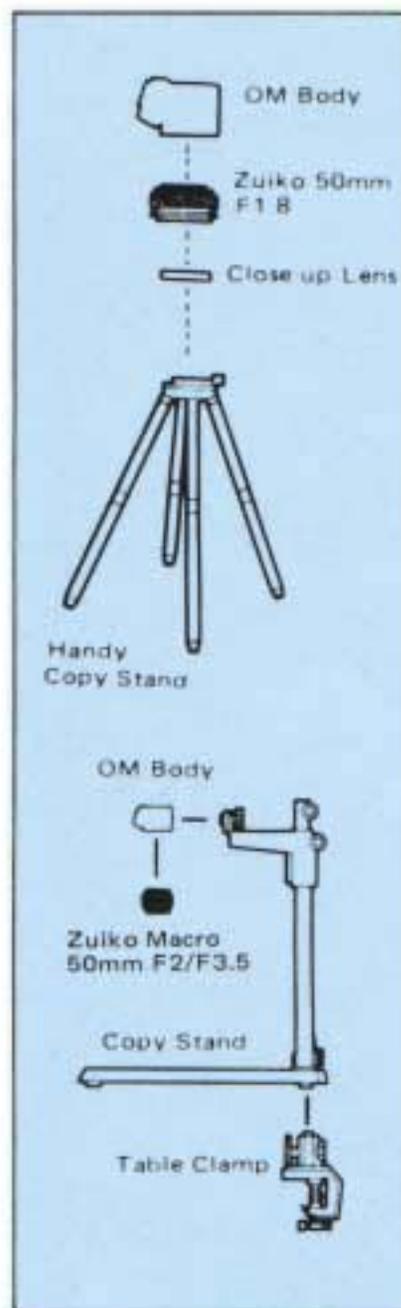
■ **Electronic Flash AC Adapter 2**



1X May-flies. OM-2 with Zuiko Macro 50mm F3.5 lens, Auto Extension Tube 25 and Electronic Flash T32, at f/22.

OM SYSTEM SELECTING STANDS AND BASES

Except when working with fast moving subjects outdoors, macrophotography generally requires steady camera support. This is due to the delicate focusing and lighting requirements arising from the shallow depth of field and the tendency to blur at high magnifications. Moreover, as the subject is usually small, it is important to have a convenient means of varying camera-to-subject distances to allow for adequate lighting. The following accessories serve as camera support systems for copy and macrophoto work. Among these, the VST-1 Macrophoto Stand, which is designed to accommodate the trans-illuminator Base X-DE, serves as a basic tool.



■ Macrophoto Stand VST-1

A compact and sturdy multi-purpose stand for solid camera support in close-up and macro-photo work. Comes with frosted stage glass for incident light and may be used in conjunction with Trans-illuminator Base X-DE for lighting of transparent subjects from beneath.

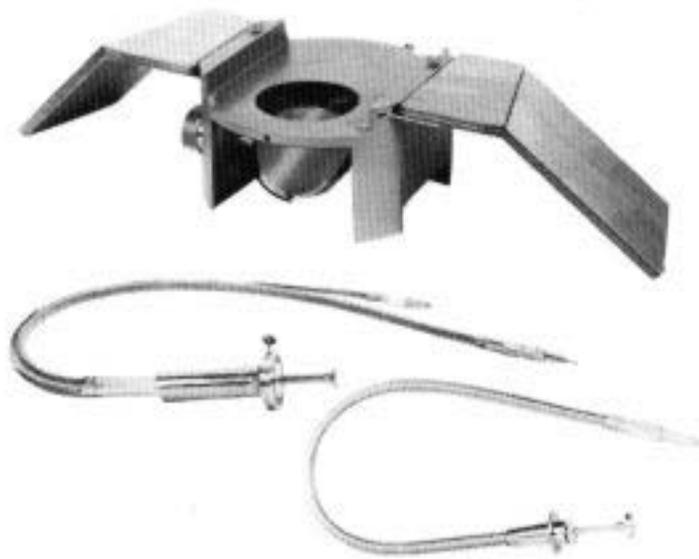


■ **Macro Photo Stand B Adapter**
Designed for mounting camera or extension units to Macrophoto Stand VST-1.

■ **Macrophoto Stand Extension Bar VST-E**
(Extends height of Macrophoto Stand VST-1)

■ Trans-Illuminator Base X-DE

Multipurpose base stand permitting transmitted lighting in conjunction with Macrophoto Stand VST-1, stage plates and other accessories. Features built-in 20W illuminator, reversible plano-cylindrical mirror and



polished wood hand rests. Also permits use of external transmitted and incident lighting sources.

■ Double Cable Release

Operates automatic diaphragm of lens attached to Auto Bellows in synchronization with shutter.

■ SR II Cable Release

■ Copy Stand

A sturdy close-up and copy stand with a 48cm x 44cm base board for accommodating large size subjects. Includes 80cm detachable column and movable camera support for fine adjustments. (Gooseneck light arms extra.)



■ Light Arms

A flexible gooseneck lamp shaft accepting dual lamps for free adjustment of lighting. Fits to Copy Stand or separate base unit.

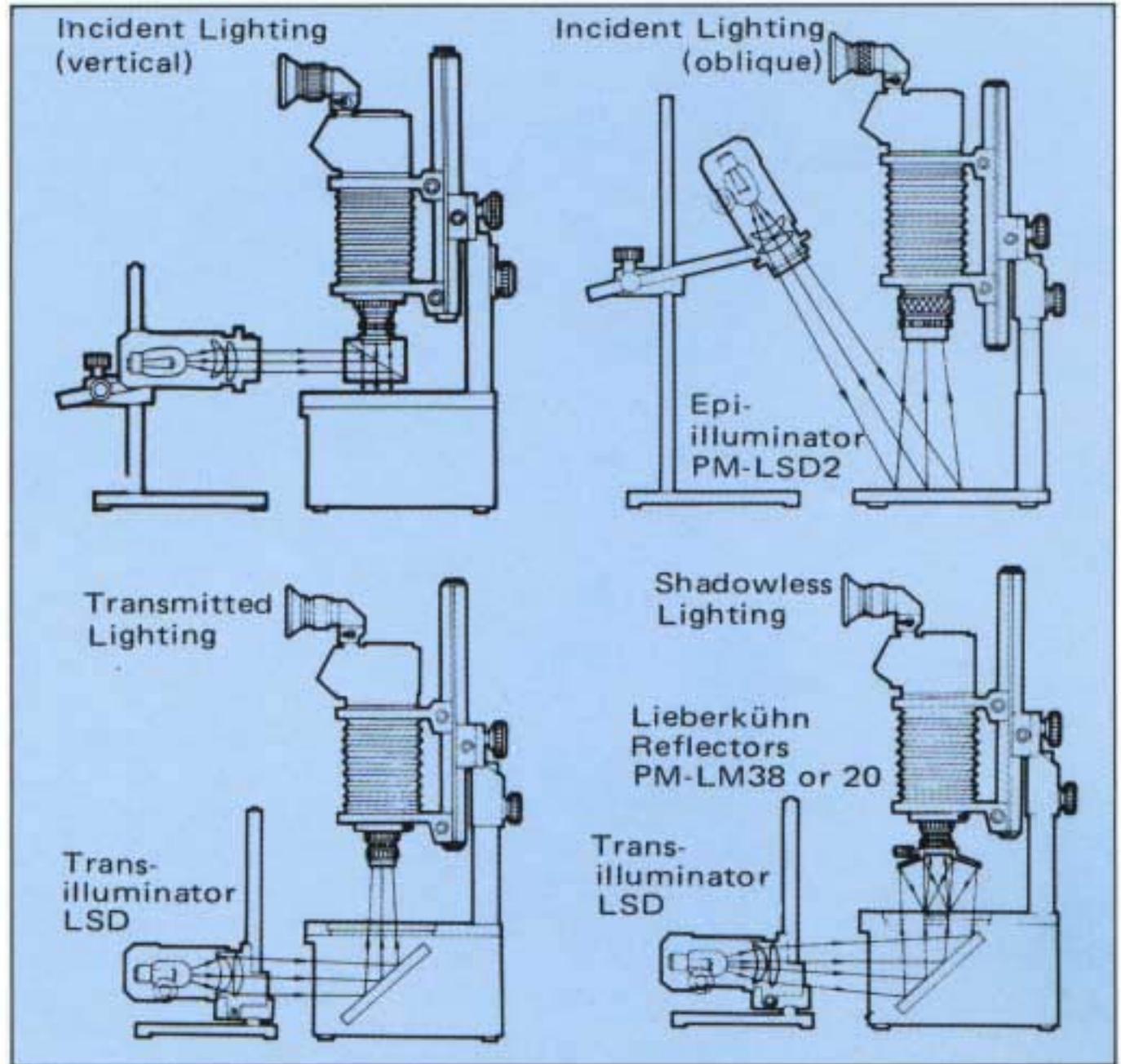
■ Handy Copy Stand



SELECTING ILLUMINATORS

Natural lighting is adequate for many situations in normal photography but does not give the photographer the precise control over light required for macrophotography. Since the subject matter is usually small, the lighting source must be sufficiently concentrated to bring out important details and provide even illumination.

Specialized lighting for macrophotography consists of two basic types: incident lighting which is used mostly for opaque subjects, and transmitted lighting for translucent subjects. The OM System features exclusively designed illuminator units for both types, plus special reflectors, filters and other lighting control accessories to afford precision lighting control for both scientific and creative assignments.



■ **Epi-illuminator PM-LSD 2**

A prime lighting source for incident lighting consisting of a pair of high-intensity tungsten lamps and variable transformer. Provides oblique incident lighting, or vertical incident lighting with the PM-EL unit mounted



■ **Trans-illuminator LSD**

A universal type Trans-illuminator for use with Trans-illuminator Base X-DE. Permits shadowless incident lighting when used with the Lieberkühn Reflector. Lighting provided by a built-in 6V 30W lamp; conden-



sor lens mounted on a rack-and-pinion permits beam convergence (at 10cm focal length), divergence or parallel adjustment. Equipped with 6-8V variable transformer and square cobalt filter (optional filters also available).

■ **Lieberkühn Reflectors PM-LM 38, PM-LM 20.**

Model PM-LM 38 designed exclusively for 38mm Macro lens, PM-LM 20 for 20mm Macro lens. Provide soft, shadowless lighting using Trans-Illuminator LSD and Trans-Illuminator Base X-



DE in conjunction with stage plate.

■ **Centering Mirror PM-ELCS**

Permits precise adjustment of the optical axis for vertical incident lighting in conjunction with the PM-EL Mirror Housing units.

to the lens. Focus adjustable by shifting bulb position; light beam spread also adjustable.

■ **Incident Illuminator Mirror Housings PM-EL 80, PM-EL 38 and PM-EL 20**

Facilitate incident lighting when the respective 80mm, 38mm or 20mm Macro Lenses are used in conjunction with the Auto Bellows or Macrophoto Equipment PMT-35.



■ **Spare Lamp 6V 5A TB-1**
(for PM-LSD 2/LSD)

■ **Spare Lamp 6V 5A TP-1**
(for PMT-35)

■ **Adapter PM-EA**
(For PMT-35)

■ **Interchangeable Stage Plates for Macrophoto Stand VST-1**

(Five are available)

■ **Shade Stage Plate**
(Accepts black or white shutter interrupters)

■ **28mm Stage Plate** (black metal)

■ **45mm Stage Plate** (black metal)



■ **Stage Glass (Clear)**
(For both incident and transmitted lighting)

■ **Stage Glass (Frosted and Black)**
(Frosted side for dark subjects, black side to increase contrast with light subjects)

■ **Mechanical Stage FM**

Enables pin pointing of subject for high magnification work with Macrophoto Stand VST-1. Features vernier scale calibrated with 0.1mm increments.



■ **Filters**
Indispensable for artificial lighting. Round type for PM-LSD 2, and LSD or square type for LSD.







■ **Macrophotographic Equipment PMT-35***

The PMT-35 is a complete macrophotographic system for use with the OM System. It consists of 46 units, including 26 standard units. It permits use of transmitted or incident illumination for sharply focused detail in the entire image field or part of the image field as desired. The magnification range with various macro lenses is from 0.45X to 16.5X. The OM Mount Photomicro Adapter H connects the OM body to the PMT-35.

■ **Light Shield Tube PM-SDM**

A special attachment unit for photomicrography which is also available with the PMT-35 equipment above. Cuts down camera shake for precision photos in photomicrography when used in conjunction with the Auto Bellows.

*NOTE: Contact the Olympus Microscope Distributors for further details.

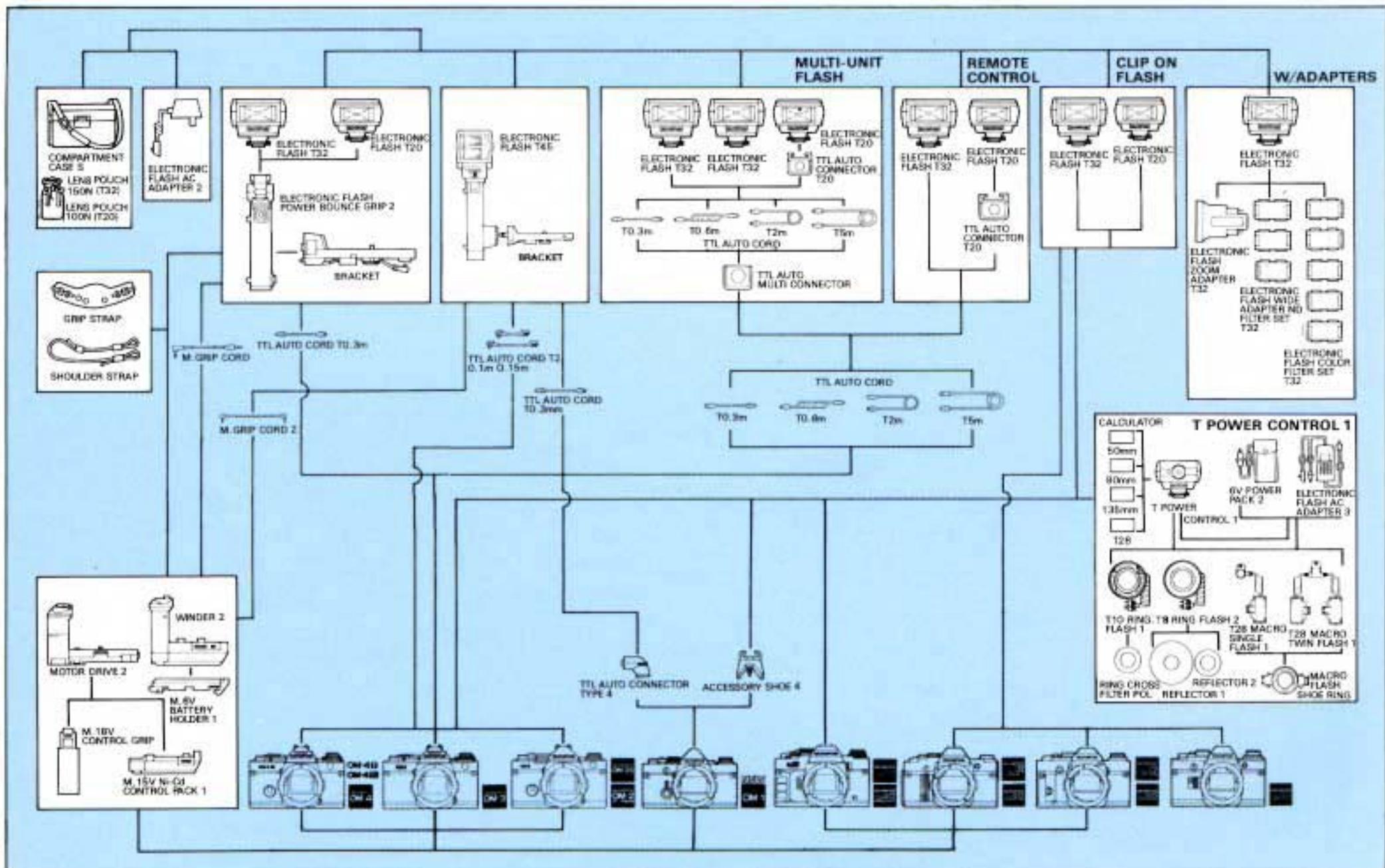


CHART OF PHOTOGRAPHIC RANGES

INTERCHANGEABLE LENS	EXTENSION UNITS	SUBJECT DISTANCE (mm)	180	120	72	60	45	36	24	12	7.2	3.6	MICRO (mm)					
		360	120	80	48	40	30	24	16	8	4.8	2.4						
		MAGNIFICATION	0.1x	0.2x	0.3x	0.5x	0.6x	0.8x	1x	1.5x	3x	5x	10x	100x	500x	1000x		
PROFESSIONAL METHOD	Interchangeable Lenses	∞	0.1-0.14x															
	ZUIKO Macro 90mmF2	∞	0.5x															
	ZUIKO Macro 50mmF2/F3.5	∞	0.5x															
	ZUIKO Macro135mmF4.5	TELESCOPIC AUTO TUBE 65-116	∞	0.43x														
		AUTO BELLOWS	∞	0.5x		0.5x												
	ZUIKO 1:1 Macro 80mmF4	TELESCOPIC AUTO TUBE 65-116	∞	0.48x			1.2x											
		TELESCOPIC AUTO TUBE 65-116 with CLOSE-UP LENS	∞	1x							2x							
		AUTO BELLOWS	0.09x	0.5x			2.2x											
	ZUIKO Macro 38mmF2.8	AUTO EXTENSION TUBE14	∞	1.7x						1.8x								
		AUTO EXTENSION TUBE25	∞	2x						2.1x								
		TELESCOPIC AUTO TUBE 65-116	∞	3.1x						4.5x								
		AUTO BELLOWS	∞	2.3x						6.7x								
ZUIKO Macro 20mmF2	AUTO EXTENSION TUBE14	∞	4.2x						4.4x									
	AUTO EXTENSION TUBE25	∞	4.7x						4.9x									
	TELESCOPIC AUTO TUBE 65-116	∞	6.8x						9.5x									
	AUTO BELLOWS	∞	5.3x						13.6x									
ZUIKO Macro LENSES30mm,35mm,20mm	MICROPHOTOGRAPHIC EQUIPMENT PHOTO	∞	0.5x		0.16x													
MICROSCOPE	OMMOUNT PHOTOMICRO ADAPTER	∞	3.3x										750x					
COMPOSITE METHOD	ZUIKO Macro 90mmF2	AUTO EXTENSION TUBE7	0.08x	0.58x														
		AUTO EXTENSION TUBE14	0.16x	0.65x														
		AUTO EXTENSION TUBE25	0.28x	0.77x														
		AUTO EXTENSION TUBE7+14+25	0.52x	1x														
	STANDARD LENS	CLOSE-UP LENS	0.13x	0.28x														
		AUTO EXTENSION TUBE7	0.16x	0.3x														
		AUTO EXTENSION TUBE14	0.3x	0.45x														
		AUTO EXTENSION TUBE25	0.5x	0.65x														
	ZUIKO Macro 50mmF2/F3.5	CLOSE-UP LENS	0.13x	0.63x														
		AUTO EXTENSION TUBE25	0.5x	1x														
ZUIKO Macro or STANDARD LENS	TELESCOPIC AUTO TUBE 65-116	∞	1.8x									2.8x						
	AUTO BELLOWS	∞	0.71x											4.1x				

... Recommended close up range (with lens retracted)
 ... Recommended close up range (with lens extended)
 ... Possible close up range

OM SYSTEM CHART OF FLASH PHOTO GROUP

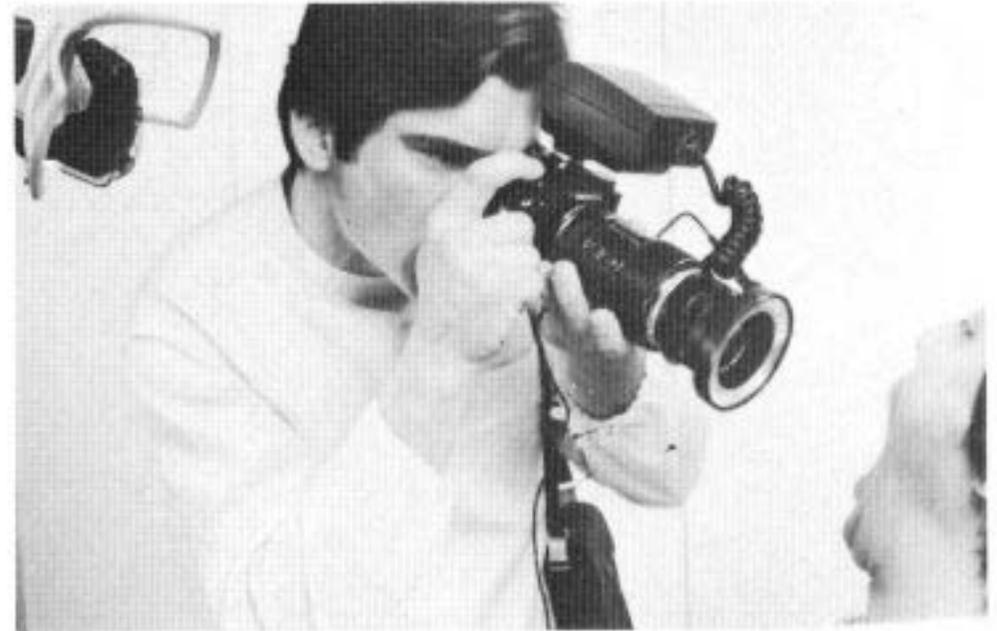






The macrophoto equipment traditionally provided for medical and dental photography is notorious for being heavy and bulky, requiring extensive preparations before use and lacking adequate reflection control. The equipment in the Zuiko Medical Macro System, however, which is comprised of remarkably lightweight and portable units from the Macrophoto Group such as the T10 Ring Flash 1 and Telescopic Auto Tube 65-116, has brought a totally new era of convenience to medical photography. Centering about its remarkable compactness and ease of operation, the system offers you the following features:

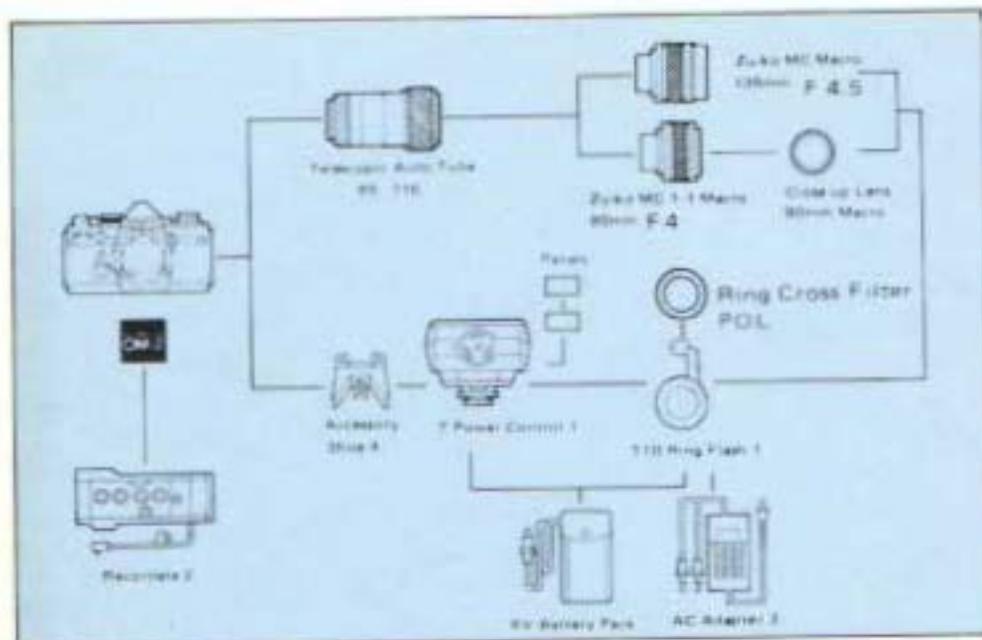
- **Correct Flash Exposures "Instantly" with TTL Direct "OTF" Light Measuring Method**



Lighting is provided by the T10 Ring Flash — the first unit of its kind to offer centralized flash control from inside the camera. The result is automatic correct exposures without time-consuming calculations.

- **Free and Easy Selection of Magnifications even during Hand-Held Operation**

Using the unique new Telescopic Auto Tube 65-116 for lens extension (a highly flexible accessory combining extension tube compactness with bellows versatility) you can set magnifications freely over a wide range with your eye to the viewfinder while you work with the camera in your hands.



● **Macro Lenses to Meet the Situation**

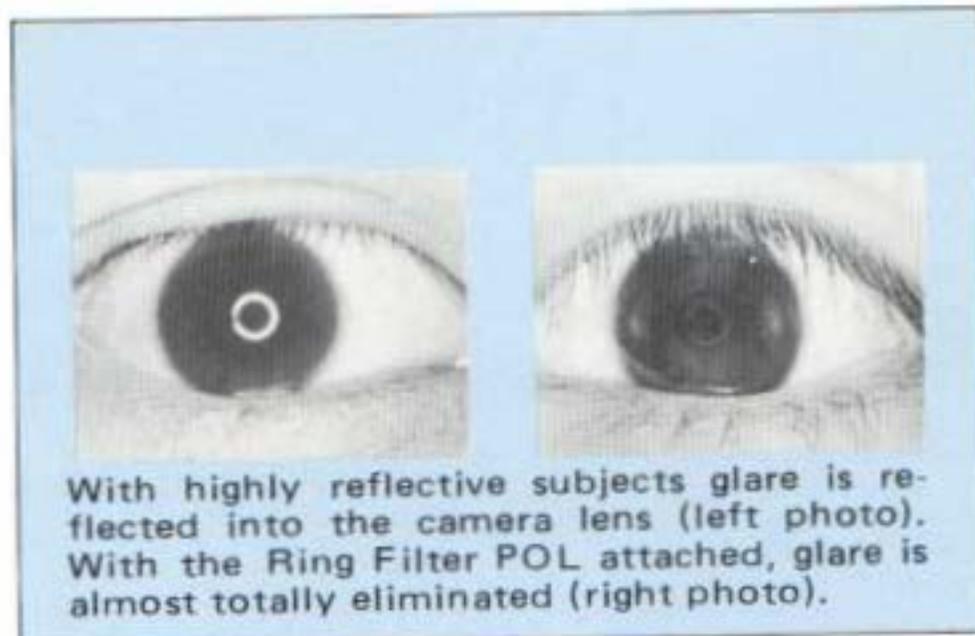
Two convenient working lenses meet your needs: the Macro 135mm F4.5 lens when a long working distance is required between the camera and the subject, the 1:1 Macro 80mm lens when higher magnifications are required at less working distance.

● **“Shadowless” Photos without Glare**

The T10 Ring Flash 1 not only gives you “shadowless” photos, but for highly reflective specimens, etc., simply attach the Ring Cross Filter POL to the unit to virtually eliminate glares.

● **System within a System**

Each of the Zuiko Medical Macro accessories is fully compatible with other accessories in the



With highly reflective subjects glare is reflected into the camera lens (left photo). With the Ring Filter POL attached, glare is almost totally eliminated (right photo).

Macrophoto Group and the entire OM System.

● **Bright Viewfinder Focusing**

The extra-bright viewfinder of the OM camera offers unprecedented focusing ease, while the focusing lamps of the T10 Ring Flash 1 assist you when working in limited lighting.

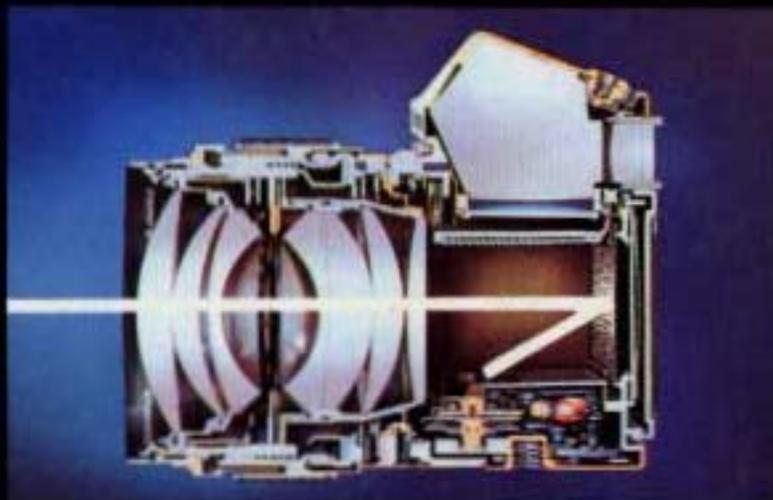
● **Data Printed Automatically on the Photo**

The Recordata 2 unit attached on the back of the OM camera can print data on specimens and patients directly on the photo.

● **AC/DC Power Sources Options**

Use the battery-powered T Power Control 1 or 6V Power Pack for portable operation. For longer use, switch to AC Adapter 3.

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