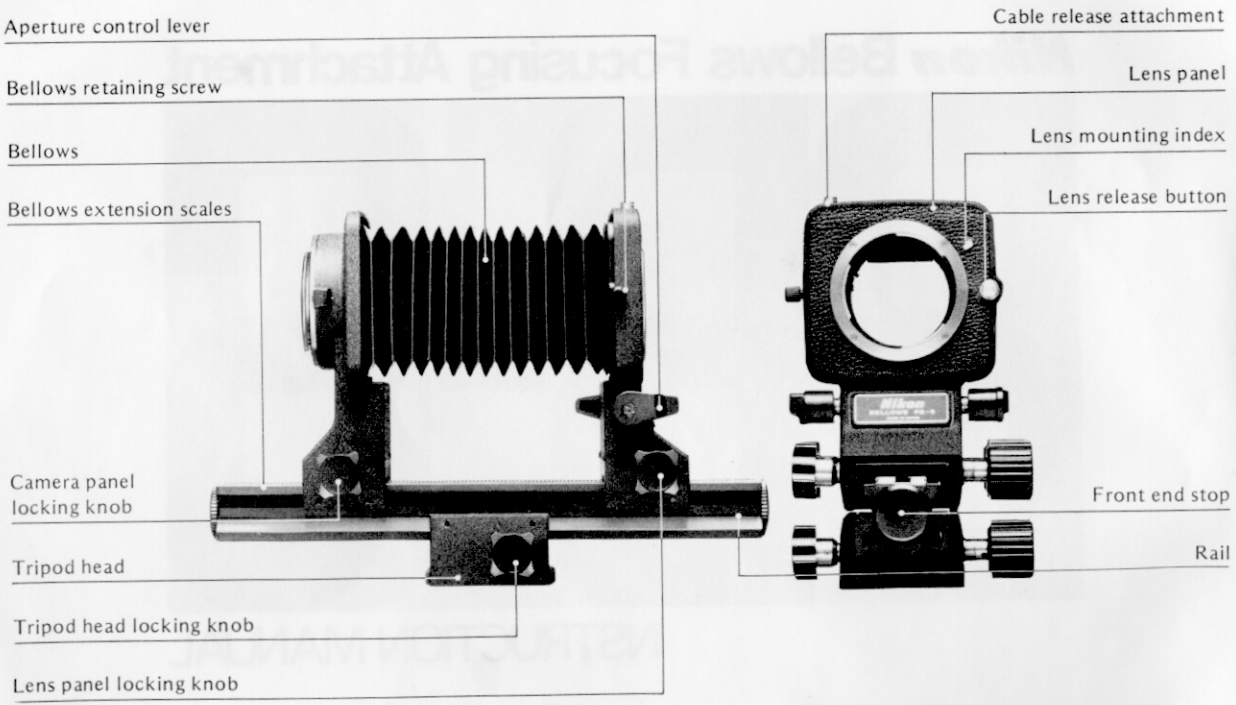
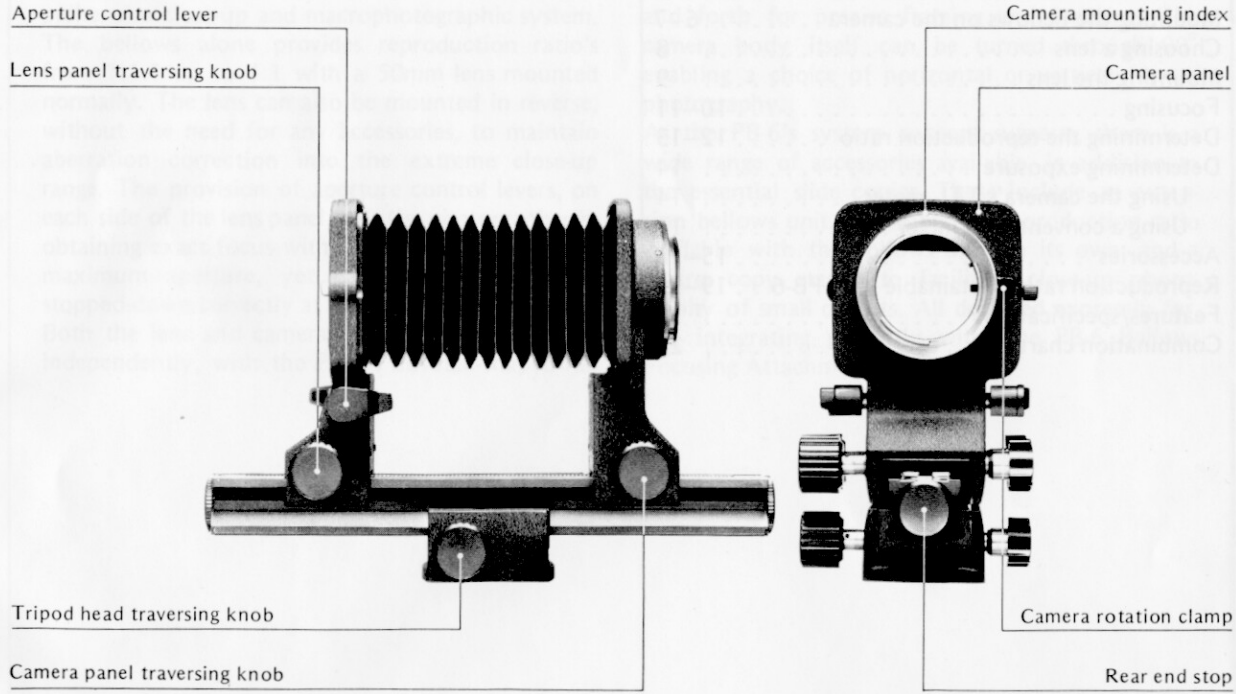
Nikon Bellows Focusing Attachment

PB-6

INSTRUCTION MANUAL

NOMENCLATURE





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FOREWORD

The modular concept of the PB-6 provides the photographer with a versatile start towards a comprehensive close-up and macrophotographic system. The bellows alone provides reproduction ratio's from 1:1.1 up to 4:1 with a 50mm lens mounted normally. The lens can also be mounted in reverse, without the need for any accessories, to maintain aberration correction into the extreme close-up range. The provision of aperture control levers, on each side of the lens panel, aids the photographer in obtaining exact focus with the lens opened up to its maximum aperture, yet ensures that it will be stopped-down correctly at the moment of exposure. Both the lens and camera panels are free to move independently, with the PB-6's dovetail-shaped rail maintaining exact axial alignment. The double-rail construction allows the entire bellows to move back and forth for precise framing and focusing. The camera body itself can be turned through 90° enabling a choice of horizontal or vertical format photography.

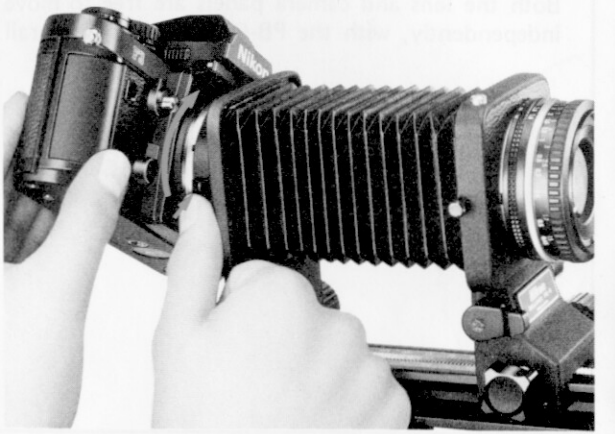
As the PB-6's system concept suggests, there is a wide range of accessories available, in addition to the essential slide copier. These include an extension bellows unit, to double the reproduction ratio available with the bellows unit on its own, and a macro copy stand, to facilitate close-up photography of small objects. All designed expressly for, and integrating perfectly with, the PB-6 Bellows Focusing Attachment.

MOUNTING THE BELLOWS ON THE CAMERA

Any Nikon or Nikkormat camera can be mounted on the PB-6 Bellows Focusing Attachment. Cameras equipped with a motor drive or auto winder can also be mounted, although the method of mounting is a little different due to the increased depth of the motor drive or auto winder. To mount a motor drive-equipped Nikon F3 camera, two Bellows Spacer PB-6Ds are required. They also enable a Nikon F2-series camera equipped with the MD-2 or MD-3 to be mounted on the PB-6 without removing the cordless battery pack MB-1 or MB-2. Without the PB-6Ds, the cordless battery pack has to be removed before mounting the motor drive-equipped F2 camera on the PB-6. Use an accessory connecting cord to supply power to the motor drive in this case. For use of the PB-6Ds, consult the PB-6D's instruction manual.

With AI-type cameras, the meter coupling lever must be locked in the stopped-down position. Please consult your camera's instruction manual for details.

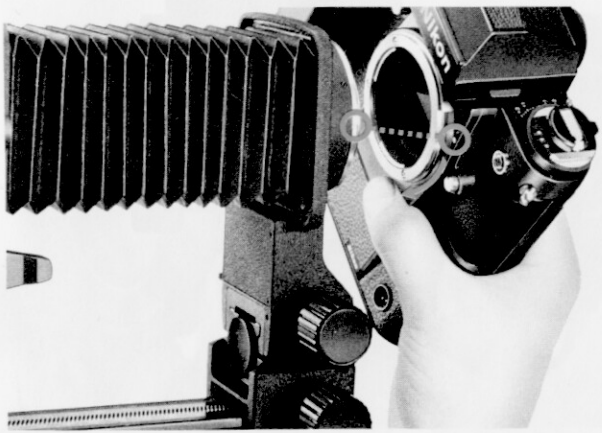
Then mount the camera by loosening the locking knob on the camera panel and racking the panel back on the rail as far as it will go. Position the PB-6 in the camera's bayonet mount, lining up the red line on the camera panel with the lens mounting index on the camera



body. Then, twist the camera body counterclockwise until it clicks into place. Once in place, the camera body can be turned through 90°, giving a choice of horizontal or vertical format photography, irrespective of the camera's position on the rail. A spring catch on the right-hand side of the camera panel locks the camera body at the setting selected. To change from horizontal to vertical, or vice versa, depress the catch and rotate the body until it clicks into place.

To mount a motor drive-equipped camera without using the PB-6Ds, rack the panel back on the rail as far as it will go. Then, rotate the bayonet mount on the panel until it is positioned for vertical format photography. The motor drive-equipped camera can then be mounted in the usual way. Once the camera/motor drive combination is mounted, it can be turned to the horizontal position, if desired. Please remember that, whenever the camera/motor drive combination is rotated, the camera panel must always be racked all the way back to the end of the rail.

To remove the camera body, depress the lens release button on the camera and twist the camera body clockwise. When the camera body is set vertically, it can be removed regardless of the position of the camera panel on the rail. If the camera is set for horizontal format photography, or if a motor drive or auto winder is attached, rack the camera panel back to the end of the rail before removing the camera.



Note: When you use the Connecting Cord MC-2, it cannot be attached to the socket of the motor drive until the motor drive-equipped camera is mounted onto the PB-6. This is because the cord hinders the operation of turning the camera/motor drive assembly, hitting against the end stop of the rail.

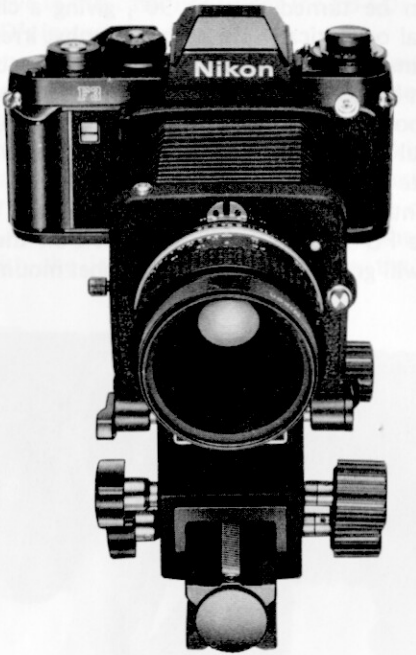
CHOOSING A LENS

Although any of the Nikkor lenses from 20 to 200mm can be used with the PB-6, the Nikkor 50mm f/1.8 is excellent in performance. For critical close-ups, the Micro-Nikkor 55mm f/2.8, 55mm f/3.5 and 105mm f/4 are excellent choices.

For best results at reproduction ratio's greater than 1:1, reverse the lens to maintain its aberration correction.

If the bellows extension remains the same, the shorter the focal length of the lens used, the greater the reproduction ratio. If the reproduction ratio remains the same, increasing the focal length increases the lens-to-subject distance.

At the lens' maximum aperture, depth of field is minimized and some marginal loss of image definition and illumination is likely to occur. However, the smallest aperture is not usually used either since this also may result in image deterioration due to diffraction. The tables on page 19 ~ 21 show the range of reproduction ratios possible with usable Nikkor lenses, mounted in either the normal or reversed position. Information on the recommended lens apertures is also included.



MOUNTING THE LENS

To mount the lens, position it in the bayonet mount on the lens panel, lining up the black dot on the lens with the white dot on the panel. Then, twist the lens counterclockwise until it clicks into place. To remove the lens, depress the lens release button on the lens panel and twist the lens clockwise.

To mount the lens in the reverse position, you have to reverse the lens panel on the rail. To do this, first unscrew the bellows retaining screw on the side of the lens panel and detach the bellows from the panel. Then, unscrew the front end-stop from the rail and remove it. Unclamp the lens panel and rack it out to the end of the rail, until it slips easily off the front. Reverse the panel and replace it on the rail with the front of the lens facing the bellows. Clamp the end of the bellows to the front rim of the lens, gently, by turning the bellows retaining screw. Screw the front end-stop back onto the rail.

FOCUSING

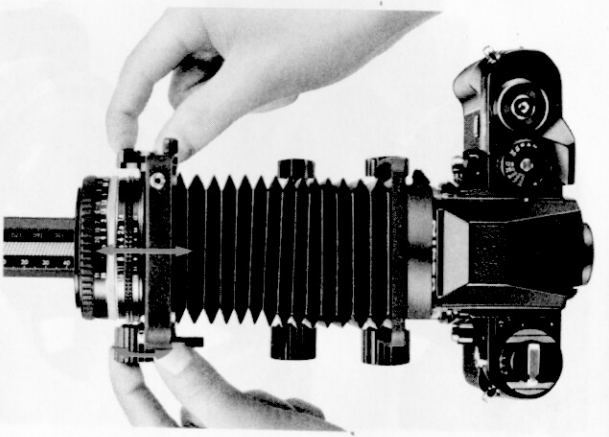
At high magnifications and, consequently, dim images of close-up photography with bellows attachments, it is essential that you focus at full aperture. However, the lens must be stopped-down to the taking aperture before releasing the shutter. The PB-6's aperture control lever, situated on either side of the lens panel, facilitates this by holding the lens open at its maximum aperture for accurate framing and focusing. Depressing the lever stops the lens down to the aperture set and allows you to check depth-of-field. To lock the lens at the working aperture, for the duration of the exposure or for metering, push the lever in towards the lens panel. It will then lock. After completion of the exposure, pull the lever out and release. The lens will then spring open to its maximum aperture, automatically.

Users of Nikon cameras with interchangeable screens may prefer to use either a B, C, E or M type focusing screen instead of the standard focusing screen as the central area blacks out at apertures smaller than f/5.6. The choice of screen will, of course, depend on the type of subject, the reproduction ratio and the range of screens available for your camera. If your camera makes no provision for screen changing, focus on the matte field surrounding the central focusing area.

The PB-6 has three focusing controls: the knurled traversing knobs on the left-hand side of the lens panel, the camera panel and the tripod head. The knobs on the lens and camera panels control the bellows extension while the knob on the tripod head moves the whole lens/bellows/camera assembly back and forth. The three cruciform knobs on the right-hand side serve as locking knobs to clamp the respective focusing controls in place at the required positions on the rail.

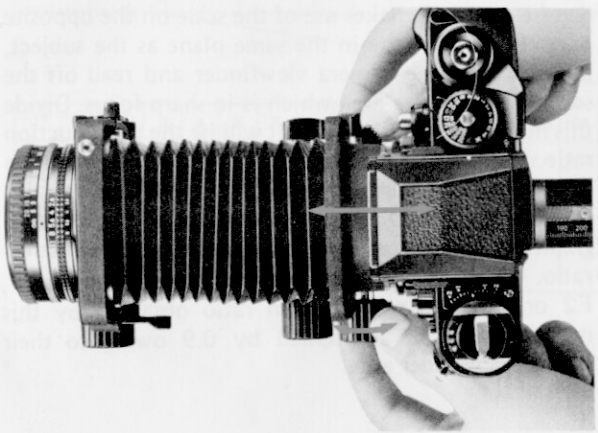
Focusing is done in any of three ways. The first method is to lock the camera panel at the rear end of the rail and move the lens panel back and forth, by turning the lens panel traversing knob, until the subject is in sharp focus.

An alternate method is to lock the lens panel at the front end of the rail and move the camera panel back

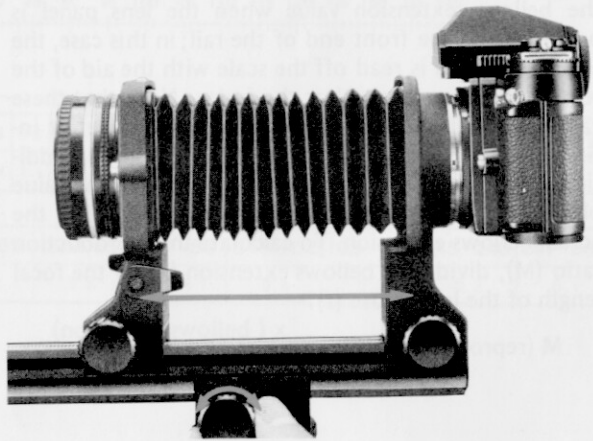


and forth until the subject is in sharp focus. This method is faster, since the lens-to-subject distance remains unchanged. It is also useful when the lens must be brought very close to the subject to focus.

A third method is to move the entire lens/bellows/camera assembly back and forth along the rail using the bellows traversing knob on the tripod head. This is by far the easiest way to focus, since the lens-to-subject distance can be changed without disturbing the bellows extension, tripod or copy-stand set up. It is best for fine focusing after the desired reproduction ratio has been determined and the camera placed at approximately the correct distance from the subject.



Close-ups and macrophotography pose several problems not encountered in general photography. One of these is sensitivity to vibration: the magnification of the image on the film makes even slight image displacement prominent and results in a blurred image. For best results, mount the entire setup on a rigid tripod or support and use a cable release to trip the shutter.



DETERMINING THE REPRODUCTION RATIO

Reproduction ratio is the ratio of the image size recorded on the film to the actual size of the subject. At life-size magnifacation, for example, it is 1:1. Furthermore, the subject and image sizes are proportional to their respective distances from the lens. If lens-to-film distance increases, lens-to-subject distance decreases.

The two scales on the top of the rail enable you to easily determine the reproduction ratio when the lens is mounted in the normal position. The white scale represents the bellows extension when the camera panel is positioned at the rear end of the rail. The extension value is read off with the front of the lens panel serving as the index. The yellow scale indicates the bellows extension value when the lens panel is positioned at the front end of the rail; in this case, the extension value is read off the scale with the aid of the rear of the camera panel as the index. Note that these values are only correct if the lens in use is set at infinity; settings other than infinity will result in additional extension, and this should be added to the value obtained from the scale in order to determine the actual bellows extension. To calculate the reproduction ratio (M), divide the bellows extension (x) by the focal length of the lens in use (f):–

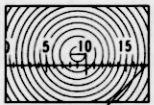
$$M\ (\text{reproduction ratio}) = \frac{x\ (\text{bellows extension})}{f\ (\text{focal length})}$$

For example: 50mm lens (actual focal length 51.6mm) and 104mm bellows extension.

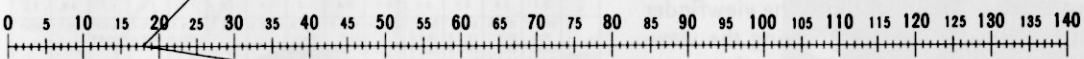
$$M = \frac{x}{f} = \frac{104}{51.6} = \text{approx. } 2{:}1$$

When the lens panel and the camera panel are both at intermediate positions on the rail, use either the white or the yellow scale. Read off the values, using the outside edges of the panels as before; then, calculate the difference between them, and subtract 22–this will give you the actual bellows extension. Then use the formula, as before.

Another method of determining the reproduction ratio, when the lens is mounted in either the normal or the reverse position, makes use of the scale on the opposite page. Place the scale in the same plane as the subject, look through the camera viewfinder and read off the scale length of the area which is in sharp focus. Divide this number into 36, the result will be the reproduction ratio. For example, if the horizontal scale image which is in focus is 18mm in length, the reproduction ratio will be 36/18 = 2X. For convenience, use the nomograph on the opposite page to find the reproduction ratio. When using Nikon cameras other than the F, F2 or F3, the reproduction ratio obtained by this method must be multiplied by 0.9 owing to their smaller viewfinder area.



Scale



Lengthwise reading (mm)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Reproduction ratio	12×	9	7.2	6	5.1	4.5	4	3.6	3.3	3	2.8	2.6	2.4	2.3	2.1	2	1.9	1.8	1.7	1.6	1.5		1.4		1.3		1.2		

Lengthwise reading (mm)	32	33	34	35	36	37	38~42	43~48	49~55	56~65	66~80	81~102	103~144	145~240	241~380
Reproduction ratio	1.1×			1			0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1

DETERMINING EXPOSURE

USING THE CAMERA'S TTL METER

The insertion of the PB-6 between the lens and the camera body serves the linkage of the lens diaphragm to the camera's exposure meter. These meters can still be used to measure exposure, however, using the stop-down method. The method for setting your camera to the stop-down mode depends on the actual model you are using, so please consult your camera's instruction book for details.

To ensure correct exposure, take the meter reading after focusing, as an out-of-focus image can result in incorrect exposures being obtained. Also, when metering, prevent the entry of stray light into the viewfinder by either using a rubber eyecup or covering the viewfinder window with your hand and using the meter indicator on the top of the camera, if your camera is provided with one.

USING A CONVENTIONAL EXPOSURE METER

If a separate light meter is used, exposure compensation is necessary at reproduction ratios greater than 1:10. The following formula allow you to calculate the necessary exposure factor.

Exposure factor = $(1 + M)^2$ (M: reproduction ratio)

However, when using a lens of retrofocus or telephoto type, the difference in pupillary magnification must be taken into account to establish the correct exposure.

The pupillary magnification is the ratio of the exit pupil diameter to that of the entrance pupil. The following formula is used to calculate the exposure factor when a retrofocus or telephoto type lens is used in normal position:

$$\text{Exposure factor} = (1 + 1/\Psi \cdot M)^2$$

(where Ψ = pupillary magnification)

When the lens is in reverse position:

$$\text{Exposure factor} = (1/\Psi + M)^2$$

The values of $1/\Psi$ vary depending on the lens in use, as shown below.

$\frac{1}{\Psi}$	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.4	1.6	1.7	1.8	2.2
Lenses	58/1.2 Noct 200/4IF Micro★	20/3.5 20/4 24/2 24/2.8 28/3.5 PC	28/2 28/2.8 28/3.5 35/1.4 50/1.2	35/2 35/2.8 35/2.8 PC 55/1.2 E 35/2.5	50/1.4	50/1.8 50/2	55/2.8 Micro 55/3.5 Micro 105/4 Micro	105/2.5	85/2	135/3.5 E100/2.8	135/2.8 180/2.8	200/4IF Micro★★	135/2	200/4

★at closest focusing distance setting
★★at infinity (∞) setting

Once the exposure factors are obtained, you have to adjust the lens diaphragm or shutter speed according to the indicated numbers.

If the exposure factor is 4, there are two alternatives:

(1) Decrease the shutter speed by two steps; i.e., if the normal exposure time is 1/125 sec., the corrected exposure time is 1/30 sec.

(2) Open the aperture by two f/stops; i.e., if the normal f/stop is f/22, the corrected f/stop value is f/11.

ACCESSORIES

AR-4 and AR-7 Double Cable Releases

The AR-4 or AR-7 Double Cable Release gives the user one-handed shutter release operation and automatic diaphragm control when used in conjunction with the PB-6 Bellows Focusing Attachment. Provision for time exposures is built-in, making this the preferred means of shutter/aperture control for all applications of macrophotography. The AR-4 is for use with the Nikon F2, FE and FM, while the AR-7 is for the Nikon F3, FE, FM and EM.

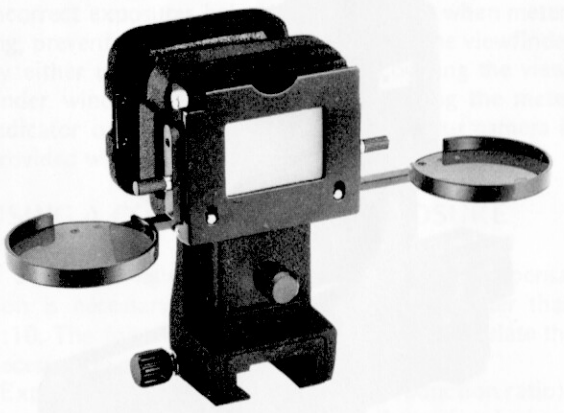
PB-6E Extension Bellows

Attaches easily to the front of the PB-6 and allows reproduction ratios double those of the standard bellows to be achieved. Lens stop-down control is through either the built-in aperture control lever or the accessory AR-4 or AR-7 Double Cable Release.

ACCESSORIES — continued

PS-6 Slide Copying Adapter

The PS-6 attaches to the rail of the PB-6 for slide copying and negative duplication. The slide holder can be shifted either laterally or vertically, or both at the same time, allowing precise cropping of the selected area of the original. Film strip carriers are supplied to support uncut film rolls.

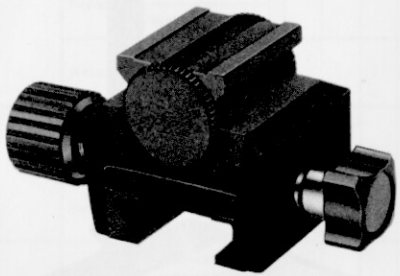


PB-6M Macro Copy Stand

Attaches to the front end of the rail and acts as both the subject stage and as a support for the camera/bellows/lens combination in macrophotography. A translucent plate serves as the subject support for both reflected and transmitted light photography. A grey plate is also supplied, and serves both as a subject support and as a standard 18% reflective grey scale for exposure determination.

PB-6D Bellows Spacer

Use of two PB-Ds enables a motor drive-equipped F3 to be moved on the PB-6's rail without any interference. Also, a motor-equipped F2 can be mounted onto the PB-6 without removing the cordless battery pack. This makes the horizontal/vertical format changeover of motor-driven F3, FE, FM or EM (not F2) possible anywhere along the rail, while that of a motor-driven F2 is possible only with the camera panel at the end of the rail. Two PB-6Ds are required when using the PB-6 by itself. With either the PB-6E or PB-6M attached, a third PB-6D is needed.



Right-Angle Viewing Attachment DR-3

Screws into any current Nikon or Nikkormat camera and provides an upright and unreversed image at a 90° angle to the camera's optical axis. It can be rotated laterally to provide views from either side, as well as from above. A built-in rubber eyecup and eyesight correction from −5 to +3 diopters are provided.

ACCESSORIES — continued

6X High Magnification Finder DW-4 for Nikon F3

This finder magnifies the entire viewing field six times for pinpoint focusing in closeups, macrophotography and other applications where critical focusing is essential. Eyesight adjustment from −5 to +3 diopters is possible.

Reprocopy Outfit PF-4

Sturdy and convenient setup for copying documents, books and other small objects which are more or less flat.

REPRODUCTION RATIOS OBTAINABLE WITH PB-6

(mm)

Lens	Mounting position	Subject field / Reproduction ratio	∞ 360 180 144 108 72 36 18 12 9 7.2 6 5.1 4.5 4 3.6 3.3 3 × × × × × × × × × × × × × × × × × × ∞ 240 120 96 72 48 24 12 8 6 4.8 4 3.4 3 2.7 2.4 2.2 2 1/∞× 1/10× 1/5× 1/4× 1/3× 1/2× 1× 2× 3× 4× 5× 6× 7× 8× 9× 10× 11× 12×	Remarks
f/3.5 20mm f/4	Reverse	Extension	(4.5×) 78 87 108 128 148 169 189 208 (18.5×)	Image quality is best at f/8.
		Working distance	38.0 37.6 36.9 36.4 36.1 35.8 35.5 35.4	
f/2.8 24mm f/2	Reverse	Extension	(3.9×) 83 111 135 160 184 208 (9.0×)	Image quality is best at f/8.
		Working distance	39.8 38.4 37.6 37 36.6 36.2	
f/3.5 f/3.5PC 28mm f/2.8 f/2	Normal	Extension	(1.7×) 48 57 84 (2.9×)	The further the lens is stopped down, the better the image quality. Unsuitable for copying.
		Working distance	7.3 4.6 0	
	Reverse	Extension	(3.3×) 83 105 133 162 191 208 (7.6×)	Image quality is best at f/8.
		Working distance	42.3 40.7 39.2 38.3 37.6 37.3	
Series E 28mm f/2.8	Normal	Extension	(1.7×) 48 58 86 115 144 173 202 208 (7.2×)	The further the lens is stopped down, the better the image quality. Unsuitable for copying.
		Working distance	13.8 10.9 6.1 3.7 2.3 1.3 0.61 0.49	
	Reverse	Extension	(3.0×) 72 100 129 158 187 208 (7.7×)	Image quality is best at f/8.
		Working distance	43.0 40.7 39.3 38.3 37.6 37.2	
f/2 35mm f/1.4	Normal	Extension	(1.3×) 48 72 108 144 154 (4.3×)	The further the lens is stopped down, the better the image quality.
		Working distance	18.6 9.6 3.6 0.6 0	
	Reverse	Extension	(2.6×) 89 105 141 177 208 (5.9×)	Image quality is best at f/8.
		Working distance	47.6 45.5 42.5 40.7 39.6	
f/2.8 35mm f/2.8PC	Normal	Extension	(1.3×) 48 72 108 144 180 208 (5.8×)	The further the lens is stopped down, the better the image quality.
		Working distance	24.2 15.2 9.1 6.2 4.4 3.4	
Series E 35mm f/2.5	Reverse	Extension	(2.4×) 83 105 141 177 208 (5.9×)	Image quality is best at f/8.
		Working distance	48.5 45.5 42.5 40.7 39.6	

REPRODUCTION RATIOS OBTAINABLE WITH PB-6 — continued

(mm)

Lens	Mounting position	Subject field / Reproduction ratio	∞ 360 180 144 108 72 36 18 12 9 7.2 6 5.1 4.5 4 3.6 3.3 3 / ∞ 240 120 96 72 48 24 12 8 6 4.8 4 3.4 3 2.7 2.4 2.2 2 / 1/∞× 1/10× 1/5× 1/4× 1/3× 1/2× 1× 2× 3× 4× 5× 6× 7× 8× 9× 10× 11× 12×	Remarks
f/1.8 50mm f/2 f/1.4 f/1.2 Series E 50mm f/1.8	Normal	Extension	48 52 103 155 208 (1/1.1×) (4.0×)	The further the lens is stopped down, the better the image quality. ✱
		Working distance	81.0 77.1 51.3 42.7 38.3	
	Reverse	Extension	64 110 161 208 (1.1×) (3.9×)	Image quality is best at f/8. ✱✱
		Working distance	79.8 59.3 50.7 46.7	
f/2.8 Micro 55mm f/3.5 Micro f/1.2	Normal	Extension	48 55 110 165 208 (1/1.1×) (3.8×)	Image quality is best at f/8 and deteriorates at smaller aqerture. The 55mm f/1.2 lens is unsuitable for copying.
		Working distance	65.4 57.4 29.9 20.7 16.9	
	Reverse	Extension	99 128 183 208 (1.5×) (3.5×)	
		Working distance	70.9 61.0 51.8 49.4	
58mm f/1.2Noct	Normal	Extension	48 58 116 174 208 (1/1.2×) (3.6×)	Unsuitable for copying.
		Working distance	74 61.7 32.7 23.0 19.9	
	Reverse	Extension	88 125 183 208 (1.4×) (3.4×)	Corner image quality deteriorates at smaller reproduction ratios.
		Working distance	76 63 53 50	
85mm f/2 f/1.4	Normal	Extension	48 85 170 208 (1/1.8×) (2.4×)	The further the lens is stopped down. the better the image quality.
		Working distance	210 140 97 90	
	Reverse	Extension	90 103 146 208 (1/3.0×) (1.7×)	Corner image quality deteriorates at smaller reproduction ratios.
		Working distance	290 200 120 83	
Series E 100mm f/2.8	Normal	Extension	48 50 100 200 208 (1/2.1×) (2.1×)	Image quality is best at f/8.
		Working distance	311 303 203 153 151	
	Reverse	Extension	106 116 126 131 139 156 208 (1.0×)	Corner image quality deteriorates at smaller reproduction ratios.
		Working distance	∞ 1034 534 434 334 234 132	

* Use f/5.6 or smaller apertures with 50mm f/1.2; unsuitable for copying.
** The further the lens is stopped down, the better image quality the 50mm f/1.2 offers; unsuitable for copy work at smaller reproduction ratios.

(mm)

Lens	Mounting position	Subject field / Reproduction ratio	∞ × ∞	360 × 240	180 × 120	144 × 96	108 × 72	72 × 48	36 × 24	18 × 12	12 × 8	9 × 6	7.2 × 4.8	6 × 4	5.1 × 3.4	4.5 × 3	4 × 2.7	3.6 × 2.4	3.3 × 2.2	3 × 2	Remarks
			1/∞×	1/10×	1/5×	1/4×	1/3×	1/2×	1×	2×	3×	4×	5×	6×	7×	8×	9×	10×	11×	12×	
105mm f/2.5 f/1.8 f/4 Micro	Normal	Extension							48	53	105	208									The further the lens is stopped down, the better the image quality.
		Working distance							(1/2.2×)			(2.0×)									
									300	280	170	120									
	Reverse	Extension			133	142	151	168	208												Corner image quality deteriorates at smaller reproduction ratios.
		Working distance		(1/6.1×)						(1/1.1×)											
					670	450	350	240	150												
135mm f/2.8 f/2 f/3.5	Normal	Extension							48	68	135	208									The further the lens is stopped down, the better the image quality.
		Working distance							(1/2.8×)			(1.5×)									
									520	420	280	230									
	Reverse	Extension	180	194	208																Corner image quality deteriorates at infinity.
		Working distance		(1/4.8×)																	
			∞	1400	680																
180mm f/2.8 f/2.8 ED	Normal	Extension					48	60	90	180	208										The further the lens is stopped down, the better the image quality.
		Working distance				(1/3.8×)					(1.2×)										
							830	690	510	330	310										
200mm f/4	Normal	Extension					48	67	100	208											The further the lens is stopped down, the better the image quality.
		Working distance				(1/4.2×)				(1.0×)											
							1200	920	720	520											
200mm f/4(IF) Micro	Normal	Extension					48	50	67	100	208										The further the lens is stopped down, the better the image quality.
		Working distance				(1/4.2×)				(1.0×)											
							990	957	754	557	349										

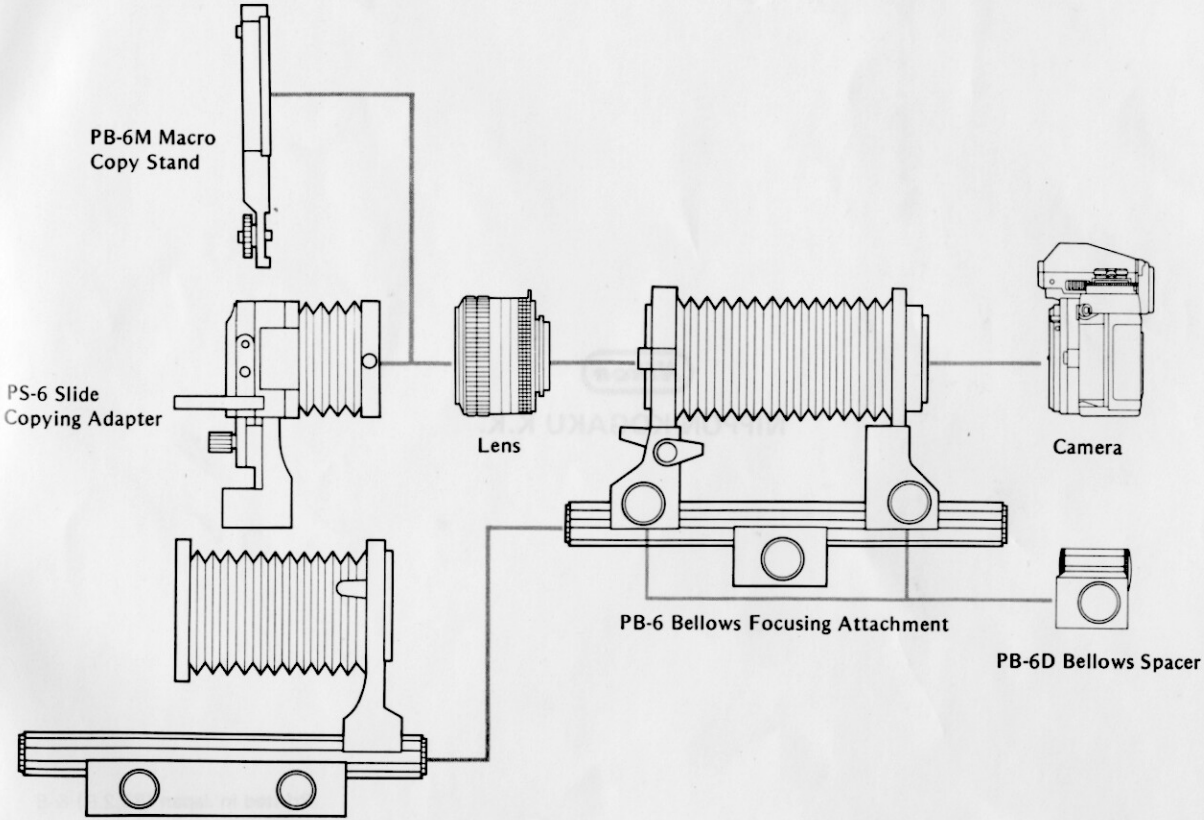
Working distance: Distance between the subject plane in focus and the front edge of the lens barrel; with the lens mounted in reverse, the distance is between the subject and the rear edge of the lens barrel.

Notes:
1) Reproduction ratios are those obtained at infinity.
2) If more than one lens is included in each lens column (i.e., 24mm f/2.8 and f/2), the reproduction ratios apply only to the first lens (i.e., 24mm f/2.8).
3) The 180mm f/2.8, 180mm f/2.8 ED, 135mm f/2, 105mm f/1.8, 85mm f/1.4 and 28mm f/3.5 PC lenses cannot be used in the reversed position because of the larger size of their attachments.
4) For close-ups and macrophotography, the following lenses are especially recommended: 55mm f/2.8 Micro, 55mm f/3.5 Micro, 105mm f/4 Micro, 200mm f/4 (IF) Micro, 50mm f/1.8, Series E 50mm f/1.8, etc.

FEATURES/SPECIFICATIONS

Compatible cameras:	All Nikon cameras having Nikon F bayonet mount
Usable lenses:	20mm ~ 200mm
Bellows extension:	48mm ~ 208mm
Reproduction ratio:	With 50mm f/1.8: 1/1.1 ~ 4X (in normal position) 1.4X ~ 4X (in reverse position) See tables on pages 19 ~ 21 for details.
Tripod head movement:	180mm
Dimensions:	98 x 155 x 238mm (W x H x L)
Weight:	Approx. 1kg

COMBINATION CHART



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