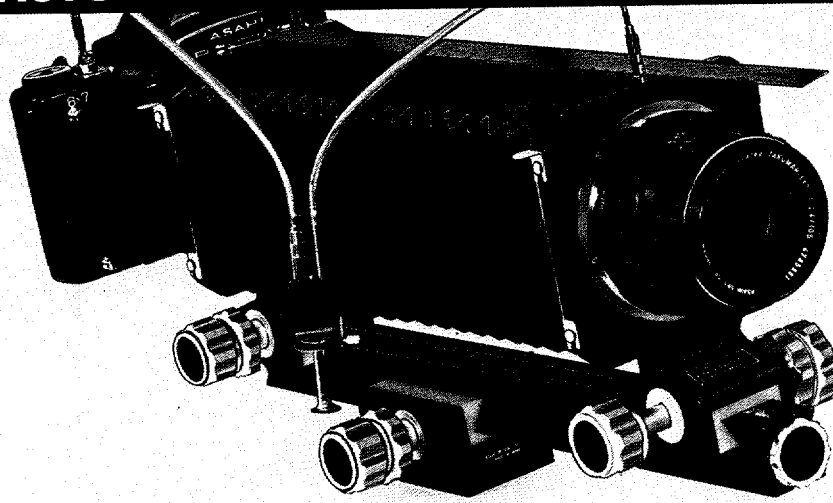
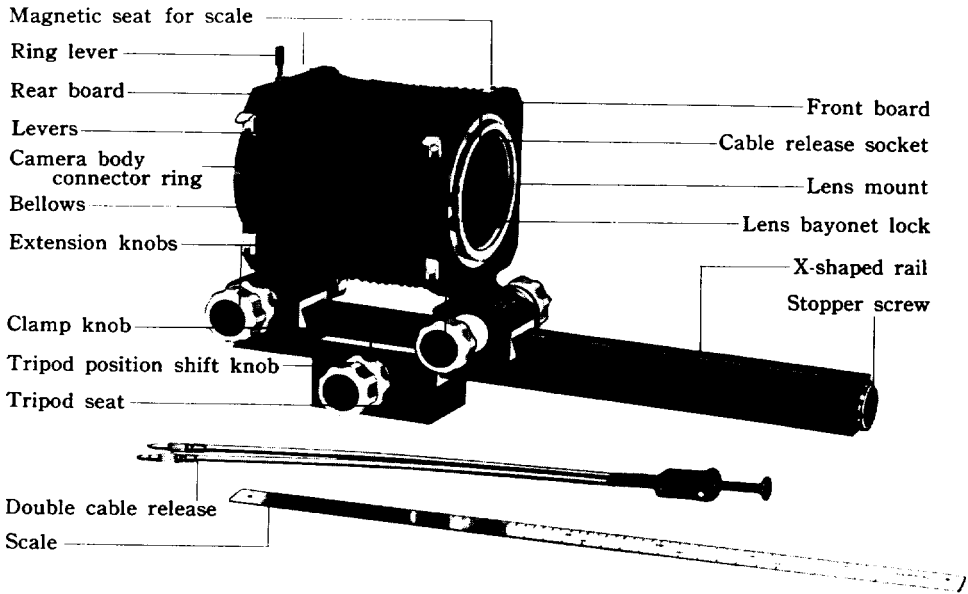
ASAHI PENTAX 6x7

AUTO-BELLOWS OPERATING MANUAL



NOMENCLATURE



SPECIFICATION

Camera	Asahi Pentax 6×7
Lenses	SMC Takumar/6×7 lenses from 55mm to 300mm
Length of lens extensions	At "normal" position: 54mm—352mm (approximately 0.5×—2.0× magnification with standard 105mm lens) At "reverse" position: 100mm—353mm (approximately 0.7×—3.0× magnification with the reversed standard lens)
Double cable release	Releases shutter and automatic diaphragm simultaneously
Lens reverse system	All Takumar 6×7 lenses with 67mm filter size are usable
Dimensions	139mm (width) × 212mm (height) × 409mm (length) (5.48″ × 9.35″ × 16.12″)
Accessories	Double cable release; scale for standard lens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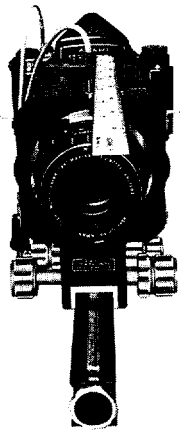
FEATURES



The 6×7 Auto-Bellows is a versatile closeup and macrophotographic instrument for use with the Asahi Pentax 6×7 camera and various Takumar 6×7 lenses. The double cable release, supplied with the Auto-Bellows, allows use of the automatic diaphragm. A lens reversal system that gives improved resolution also functions with the automatic diaphragm. The x-shaped single rail assures the highest accuracy and stability. The tripod seat below the rail is freely movable, a feature that simplifies the process of focusing while a specific rate of magnification is maintained. Focusing knobs for fine adjustment are on both the body and the lens side of the tripod seat.

The closeup tables on pages 22～27 give all the necessary technical data on the 6×7 Auto-Bellows and the 6×7 Takumar lenses that can be used with it.

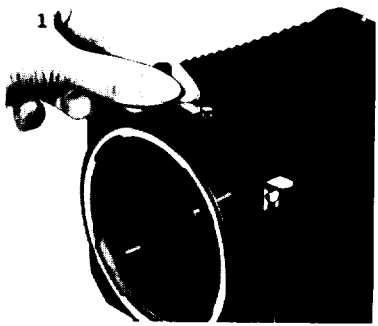
ASSEMBLY

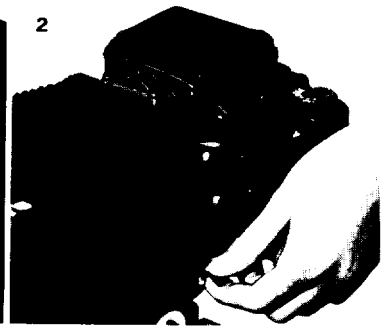
Normal Position

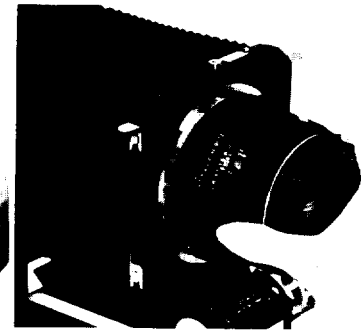
1. Move the camera body connector ring lever on the back of the Auto-Bellows until it is in a vertical position.

2. Fit the body mount into the back of the Auto-Bellows and turn the camera body connector ring lever to the left until the camera is fastened in place. When changing the camera's vertical or horizontal position, loosen this connector ring.

3. Place the lens in the lens mount which is secured in the front board of the Auto-Bellows.

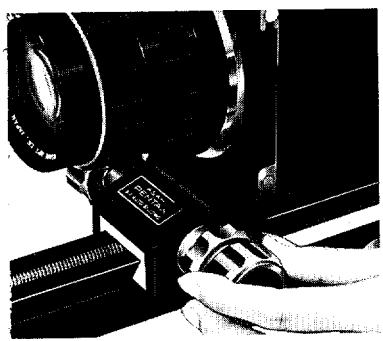


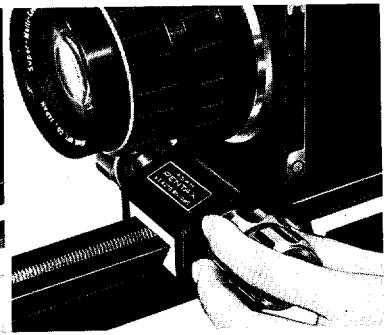


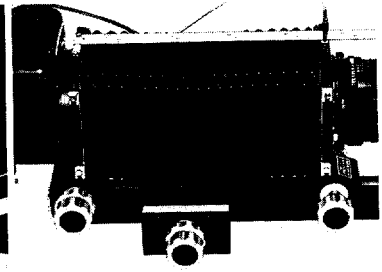


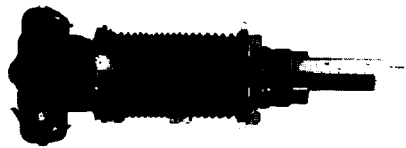
4. Turn the outer extension knobs to extend or contract the bellows. Then tighten the inner clamp knobs to set the bellows at the desired position. Always loosen the clamp knobs before extending or contracting the bellows.

5. Loosen the inner clamp knob and turn the tripod position shift knob until the tripod seat is in a position where the entire unit is well balanced. Retighten the clamp knob and mount the unit on the tripod. It is possible to move the bellows unit after it is mounted on the tripod.









6. Place the scale as shown in the photograph. (The scale seats are magnetized.) Set the lens distance scale to infinity (∞) and the depth-of-field preview lever at AUTO.
7. Attach the double cable release. The end with the red ring fits into the cable release socket on top of the front board, while the other end fits into the shutter release button on the camera body.

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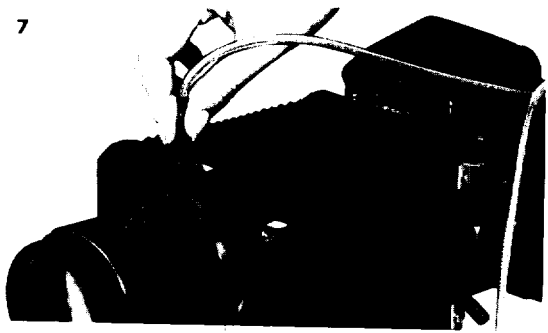

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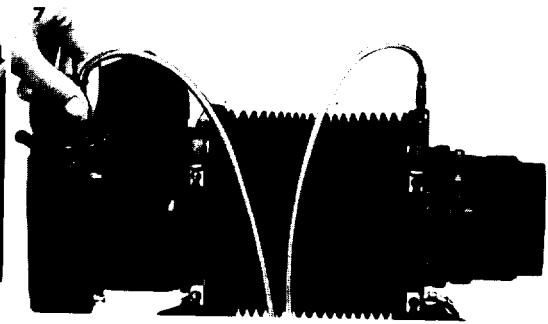


When the Auto-Bellows unit is fully contracted, the distance from the camera body connector to the lens mount is 54mm, which is longer than closeup ring number 3. With the standard 105 mm 6×7 Takumar lens macrophotographs with magnifications of 0.51× to 3.02× can be taken (see closeup tables 1 and 5).

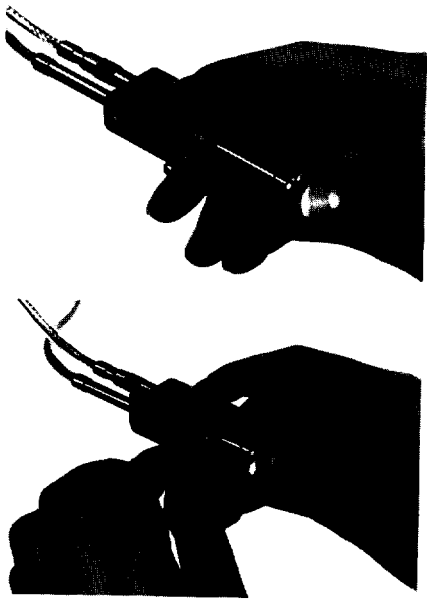
1. When using the standard 105mm lens, extend the bellows to the point of the desired magnification as shown on the magnification scale. Match the index on the front board with the point selected on the scale. When using lenses of shorter focal length, first fasten the lens mounted end of the bellows at the front end of the rail and then move the body end of the bellows to avoid getting the end of the rail in the picture.

   When using other 6×7 lenses, determine the desired magnification or picture area from tables 2~4. Extend the bellows to the required lens extension, according to the calibration on the scale, and then adjust the distance to the subject.

   When the desired picture area is first determined, the proper lens extension can be determined from the closeup tables.

2. To focus the image on the viewfinder, simply turn the extension knobs to move the bellows back and forth until a sharp picture appears.

   An exact magnification is usually not required. Therefore, when the bellows has been extended to the approximately correct position, turn



the extension knob until sharp focus is obtained.

3. Once you have set the desired exposure and the shutter release button is depressed, the diaphragm closes automatically to the predetermined aperture and the shutter is released immediately. The release button must remain depressed while the shutter is in motion; special care must be taken when photographing at slow shutter speeds.

When a time exposure is desired, set the shutter speed to B and, with the shutter button depressed with the cable release, tighten the locking screw to keep the shutter open. Loosen the locking screw, and the shutter button will return to its original position and the shutter will close.

MAGNIFICATION AND BELLOWS EXTENSION SCALES

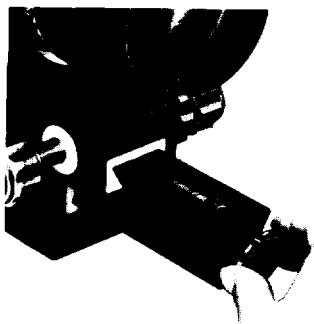
The magnification scale, for use with the standard 105mm lens, is graduated at 1mm intervals that show the degree of bellows extension when other lenses are used. The back of the scale has graduations that are referred to when the lenses are fitted in reverse position. (See instructions for lens reverse system on pages 11~14.)

DOUBLE CABLE RELEASE

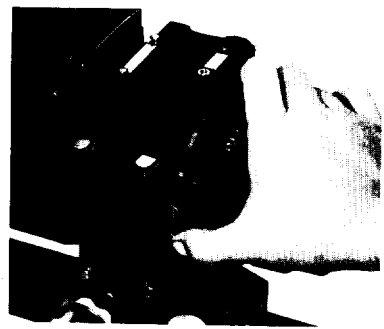
The double cable release, which automatically releases the shutter and diaphragm, is so adjusted that when the release is pushed the red-marked end of the cable plunges first and the other cable plunges immediately after. This allows the diaphragm to close down completely to the preset position before the shutter is released. If the time lapse between the two is not sufficient, you can adjust the shutter release cable (the non-red cable) by loosening the ring on the plunger end and turning the entire cable to shorten or lengthen the distance that the shutter release plunger must move after the diaphragm plunger.

REVERSING LENSES

1. Remove the stopper screw at the end of the rail.



2. To remove the lens, depress the bayonet locking lever and turn the lens counter-clockwise until the two orange dots face each other.

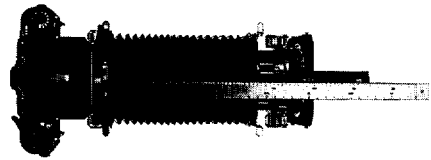


3. Raise the levers on both sides of the front board to separate it from the bellows. When the bellows is fully contracted, it will remain in place.

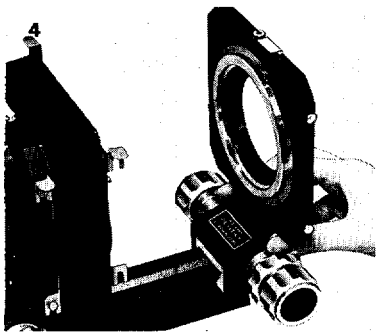
4. Pull the front board out, turn it around, and fit it back onto the rail.

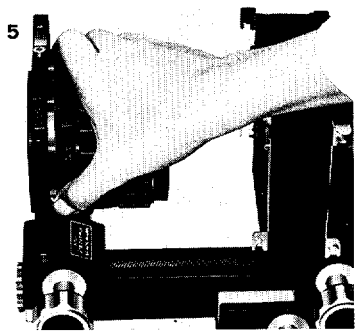
5. Mount the lens to the camera side of the front board.

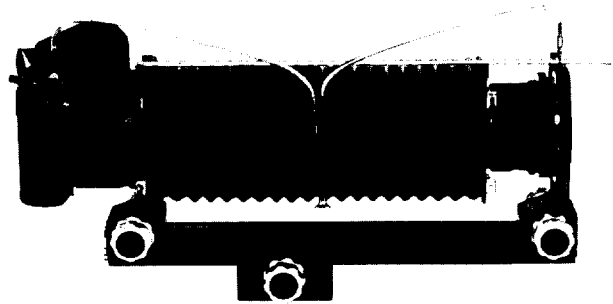
6. Raise the levers on both sides of the rear board and remove the bellows. Match the orange dots on the lens and bellows and re-install the bellows using the filter bayonet on the lens front frame. Stretch the bellows and fasten it to the rear board as before.



7. Tighten the stopper screw on the front end of the rail and install the scale back side up.







The Auto-Bellows with the reversed lens is used in the same way as with the normally positioned lens.

The reversed lens can be used only for closeups of higher than 1× magnification. You can easily obtain higher magnifications by using shorter focal length lenses reversed with the same lens/bellows extension as for the normal lens position.

REVERSE THE LENS FOR CLOSEUPS OF 1X AND GREATER MAGNIFICATIONS

The optical characteristics of most lenses are such that reversing them will give greater resolution when taking closeups of higher than 1+ magnification. The Auto-Bellows lens reverse system allows the use of only 6×7 lenses with 67mm filter size. The first four closeup tables (pages 21 ~ 24) are used when the lens is in the normal position, while the other tables (pages 25 ~ 26) are used when the lens is used in reverse position. It is not recommended to use wide-angle lenses in the normal position for extreme macrophotography, as full-format illumination and focus become extremely difficult because of the proximity of subject to lens.

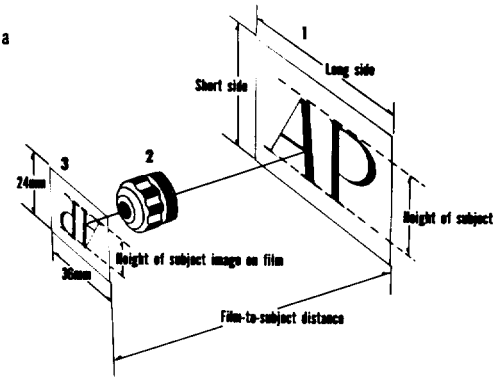
Figures for bellows extensions that are not suitable for particular lenses are not included in the tables, nor are closeup tables for lenses not suitable for macrophotography show.

The SMC-Takumar 6×7 135mm f/4 lens is most suitable for macrophotography; it is not necessary to use a bellows unit with this lens.

The greater the distance between lens and film, the greater the magnification of the picture. Bellows extension means the distance from the surface of the lens mount of the camera body to the flange surface of the lens thread. The Auto-Bellows can be extended from 54mm to 352mm.

Explanation of closeup tables

1. Picture area
2. Lens
3. Film



MAGNIFICATIONS

$$\text{Magnifications} = \frac{\text{Image size}}{\text{Subject size}} = \frac{\text{Short/long side of film}}{\text{Short/long side of picture area.}}$$

Since film size is 55mm × 70mm, the above will be equal to:

$$\frac{55\text{mm}}{\text{Short side of picture area}} \text{ or } \frac{70\text{mm}}{\text{Long side of picture area.}}$$

EXPOSURE FACTOR

The farther the lens moves forward, the greater the distance between lens and film, plane, and the less the amount of light reaching the film. This amount of light lost in normal photography is negligible, but it becomes a very important factor when using the Auto-Bellows. The intensity of light is inversely proportional to the square of the distance, therefore exposure must be increased to compensate for the loss of light. This is called "exposure factor."

The new 6×7 TTL pentaprism viewfinder measures the intensity of light reaching the film, and it is not necessary to compensate exposure factor.

PICTURE AREA

This is the actual subject area that can be taken on the film. With the pentaprism viewfinder, approximately 90% of the picture area can be seen, while the waist-level viewfinder shows 100% of the picture.

HOW TO USE CLOSEUP TABLES

Depending on the specific purpose of your closeup or macrophotography, determine 1) the picture area, 2) the film-to-subject distance, or 3) the magnification desired. Refer to the appropriate table and set the bellows accordingly. The closeup tables give figures based on the lens distance scale set at infinity. When a given lens is set at its minimum focusing distance, that added length must be considered in determining exposure and magnification.

DETERMINING MAGNIFICATION FIRST

When taking a photograph of a subject of which a specific size is required on the film, first determine the magnification. For ex-

ample, if the subject is 20 10, or 2.0. Using the 105mm lens, the bellows extension will be approximately 210mm and the picture area approximately 28mm × 35mm, as shown in table 1.

DETERMINING PICTURE AREA FIRST

To obtain a photograph of a specific picture area, measure the length and width of the area of the subject you wish to shoot. Refer to the picture area column in the tables. For example, if your desired picture area is 34mm × 42mm and you are using the 105mm lens, table 1 shows that the lens extension should be approximately 170mm and the magnification 1.6.

DETERMINING FILM TO SUBJECT DISTANCE FIRST

If the lens cannot be brought closer to the subject, determine the film to subject distance you can use. This distance varies with the lens used, so choose the appropriate lens from the table. When taking a closeup or macrophotograph from a relatively long distance, it is best to use lenses with long focal length.

FOCUSING

Keep the depth-of-field preview lever of the lens in the automatic position when focusing. This allows focusing with the diaphragm wide open. For closeups and macrophotography accurate focusing through the central micro-prism portion of the viewfinder is difficult, so use the outer ground-glass portion for precise focusing If focusing is difficult, slowly move the subject or the Auto-Bellows back and forth while observing the image in the viewfinder.

To check depth of field, shift the preview lever of the lens from automatic to manual position. As the diaphragm closes, the depth of field increases. To obtain optimum results it is best to focus, with the diaphragm wide open, at the center of the subject because when the lens is stopped down both the areas in front of and behind that point will come into focus.

DEPTH OF FIELD

As the camera approaches the subject, the zone of sharpness, or depth of field decreases considerably. Thus the diaphragm must be closed more than in ordinary photography; that is, a larger f/stop number is required. The smallest possible aperture should be used to obtain the maximum depth of field. The smaller aperture means that slower shutter speeds must be used, so it is important that the equipment be held securely on a steady tripod to prevent movement and vibration. The cable release is a great asset and helps inhibit any movement.

DETERMINING EXPOSURE

When the desired bellows extension, picture composition, focus and aperture have been selected, the next step is to determine the proper exposure. If your exposure meter indicates f/16 at 1/125 and the exposure factor is 2, either the shutter speed or the lens opening must be increased by 2 times. Therefore f/11 at 1/125 or f/16 at 1/60 can be used. Exposure correction in closeup photography is normally made by keeping the aperture the same and adjusting the shutter speed. If multiples are not whole numbers, make adjustment as described below.

3.1 Multiply 3; slow down shutter speed by one stop, and open the diaphragm by a half f/stop.

4.6 Multiply 4; slow down shutter speed by 2 stops.

6.3 Multiply 6; slow down shutter speed by 2 stops, and open the diaphragm by a half f/stop.

8.4 Multiply 8; slow down shutter speed by 3 stops.

When using the 6×7 TTL pentaprism, disregard exposure factors and determine exposure simply by reading the meter.

The TTL pentaprism should be operated as explained below. First select an f/stop, set the diaphragm release lever to manual, and turn on the switch. Turn the shutter dial until the needle comes to the center of the viewfinder. If it is so dark that the meter needle does not come to the center, open up the diaphragm and measure the exposure; adjust the diaphragm and shutter in reference to the measured exposure.

For example, if the meter needle is centered at f/2 at 1 second:

f/stop	F	2	2.8	4	5.6	8	11	16
Shutter speed (sec.)		1	2	4	8	16	32	64

The f/stop of 16 corresponds to 6 steps up in shutter speed. Thus if the shutter speed is slowed by 6 steps, the same exposure will be obtained.

For exposures longer than 1 second, use shutter dial B and keep the cable release button depressed while timing the exposure with a watch.

WITHOUT CLOSEUP TABLES

Approximate exposure factors can be calculated without referring to the closeup tables in the following manner:

If a lens is extended as long as its focal length, the magnification will be 1× (life size), and the exposure factor will be about 4×, though this varies somewhat depending on the f/stop used. If the shutter speed is slowed by 2 steps for an exposure 4 times the value indicated by the exposure meter, the proper amount of light will reach the film. When extending a 105mm lens by 200mm for shooting a closeup, the film to lens distance is about 3 times the focal length. Thus according to the law of the intensity of ligth, the proper exposure factor will be approximately 9. If the shutter speed dial indicates 1/30, slow it to approximately 1/4 for correct exposure. This calculation applies only when the lens distance is set at infinity.

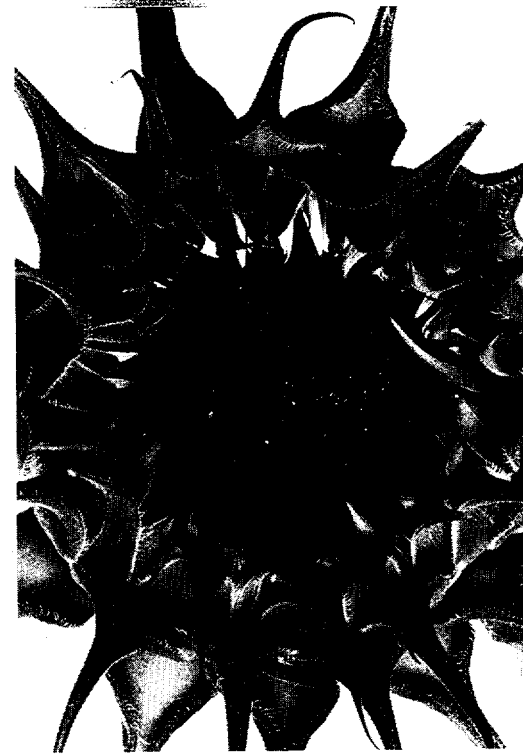


Table 1 SMC Takumar/6x7 105mm f/2.4 lens

(Distance scale set at ∞)

MAGNIFICATION	LENS EXTENSION	PICTURE AREA	FILM-TO-SUBJECT DISTANCE	EXPOSURE FACTOR
0.51	54mm	106.9×134.2mm	46.1cm	×2.3
0.57	60	96.2×120.7	44.7	×2.5
0.67	70	82.5×103.5	43.1	×2.8
0.76	80	72.2× 90.6	42.1	×3.1
0.86	90	64.2× 80.5	41.6	×3.4
0.95	100	57.7× 72.4	41.3	×3.8
1.05	110	52.5× 65.9	41.3	×4.2
1.14	120	48.1× 60.4	41.5	×4.6
1.24	130	44.4× 55.7	41.8	×5.0
1.33	140	41.2× 51.7	42.2	×5.4
1.43	150	38.5× 48.3	42.7	×5.9
1.52	160	36.1× 45.3	43.2	×6.4
1.62	170	34.0× 42.6	43.8	×6.9
1.71	180	32.1× 40.2	44.4	×7.4
1.81	190	30.4× 38.1	45.1	×7.9
1.90	200	28.9× 36.2	45.8	×8.4
2.00	210	27.8× 34.8	46.4	×8.9

Table 2 SMC Takumar/6x7 150mm f/2.8 lens

(Distance scale set at ∞)

MAGNIFICATION	LENS EXTENSION	PICTURE AREA	FILM-TO-SUBJECT DISTANCE	EXPOSURE FACTOR
0.36	54mm	152.8×191.7mm	74.7cm	×1.9
0.40	60	137.5×172.5	71.2	×2.0
0.47	70	117.9×147.9	66.8	×2.2
0.53	80	103.1×129.4	63.8	×2.4
0.60	90	91.7×115.0	61.7	×2.6
0.67	100	82.5×103.5	60.2	×2.8
0.73	110	75.0× 94.1	59.1	×3.0
0.80	120	68.7× 86.2	58.4	×3.2
0.87	130	63.5× 79.6	58.0	×3.4
0.93	140	58.9× 73.9	57.7	×3.7
1.00	150	55.0× 69.0	57.6	×4.0
1.07	160	51.6× 64.7	57.7	×4.3
1.13	170	48.5× 60.9	57.9	×4.6
1.20	180	45.8× 57.5	58.2	×4.9

Table 3 Super-Takumar / 6x7 200mm f/4 lens

(Distance scale set at ∞)

MAGNIFICATION	LENS EXTENSION	PICTURE AREA	FILM-TO-SUBJECT DISTANCE	EXPOSURE FACTOR
0.27	54mm	203.7×255.6mm	120.1cm	×1.6
0.30	60	183.3×230.0	113.3	×1.7
0.35	70	157.1×197.1	104.8	×1.8
0.40	80	137.5×172.5	98.6	×2.0
0.45	90	122.2×153.3	94.1	×2.1
0.50	100	110.0×138.0	90.6	×2.3
0.55	110	100.0×125.5	88.0	×2.4
0.60	120	91.7×115.0	86.0	×2.6
0.65	130	84.6×106.2	84.4	×2.7
0.70	140	78.6× 98.6	83.2	×2.9
0.75	150	73.3× 92.0	82.3	×3.1
0.80	160	68.8× 86.3	81.6	×3.2
0.85	170	64.7× 81.2	81.2	×3.4
0.90	180	61.1× 76.7	80.9	×3.6
0.95	190	57.9× 72.6	80.7	×3.8
1.00	200	55.0× 69.0	80.6	×4.0

Table 4 Super-Takumar / 6x7 300mm f/4 lens

(Distance scale set at ∞)

MAGNIFICATION	LENS EXTENSION	PICTURE AREA	FILM-TO-SUBJECT DISTANCE	EXPOSURE FACTOR
0.18	54mm	305.6×383.3mm	244.9cm	×1.4
0.20	60	275.0×345.0	228.9	×1.4
0.23	70	235.7×295.7	208.4	×1.5
0.27	80	206.3×258.8	193.4	×1.6
0.30	90	183.3×230.0	181.9	×1.7
0.33	100	165.0×207.0	172.9	×1.8
0.37	110	150.0×188.2	165.7	×1.9
0.40	120	137.5×172.5	159.9	×2.0
0.43	130	126.9×159.2	155.1	×2.1
0.47	140	117.8×147.9	151.2	×2.2
0.50	150	110.0×138.0	147.9	×2.3
0.53	160	103.1×129.4	145.1	×2.4
0.57	170	97.1×121.8	142.8	×2.5
0.60	180	91.7×115.0	140.9	×2.6
0.63	190	86.8×108.9	139.2	×2.7
0.67	200	82.5×103.5	137.9	×2.8

Bellows extension for reversed lens position means the distance from the camera mount to the lens mount in the reversed position on the scale.

Table 5 SMC Takumar/6x7 105mm f/2.4 lens

(Reversed lens position)
(Distance scale set at ∞)

MAGNIFICATION	LENS EXTENSION	PICTURE AREA	FILM-TO-SUBJECT DISTANCE	EXPOSURE FACTOR
0.73	110mm	75.4×94.6mm	42.4cm	×3.0
0.82	120	66.7×83.7	41.7	×3.3
0.92	130	59.8×75.0	41.4	×3.7
1.02	140	54.2×68.0	41.3	×4.1
1.11	150	49.5×62.2	41.4	×4.5
1.21	160	45.6×57.2	41.7	×4.9
1.30	170	42.3×53.1	42.1	×5.3
1.39	180	39.4×49.4	42.5	×5.7
1.49	190	36.9×46.3	43.0	×6.2
1.59	200	34.7×43.5	43.6	×6.7
1.68	210	32.7×41.0	44.2	×7.2
1.78	220	31.0×38.8	44.9	×7.7

MAGNIFICATION	LENS EXTENSION	PICTURE AREA	FILM-TO-SUBJECT DISTANCE	EXPOSURE FACTOR
1.87	230mm	29.4×36.9mm	45.6cm	× 8.2
1.97	240	28.0×35.1	46.3	× 8.8
2.06	250	26.7×33.5	47.1	× 9.4
2.16	260	25.5×32.0	47.8	×10.0
2.25	270	24.4×30.6	48.6	×10.6
2.35	280	23.4×29.4	49.5	×11.2
2.44	290	22.5×28.2	50.3	×11.9
2.54	300	21.7×27.2	51.1	×12.5
2.63	310	20.9×26.2	52.0	×13.2
2.73	320	20.2×25.3	52.8	×13.9
2.83	330	19.5×24.4	53.7	×14.6
2.92	340	18.8×23.6	54.6	×15.4
3.02	350	18.2×22.9	55.5	×16.1

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