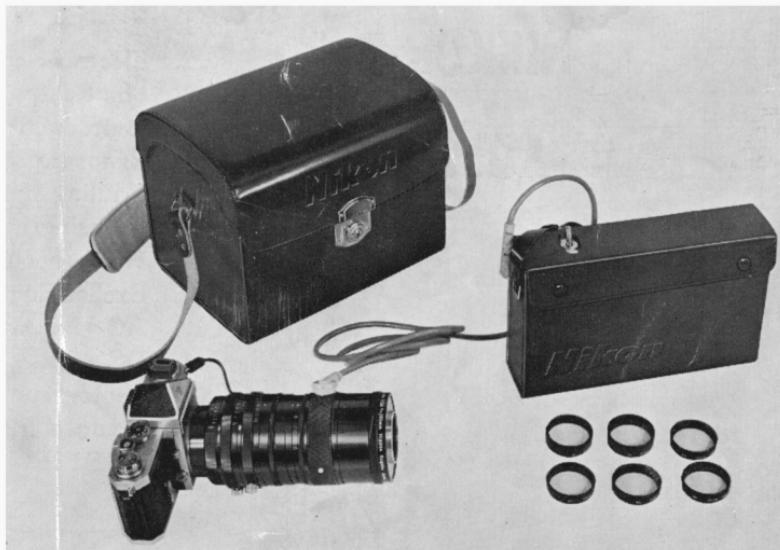


MEDICAL-NIKKOR AUTO

INSTRUCTIONS



INSTRUCTIONS FOR USING MEDICAL- NIKKOR AUTO

CONTENTS

CAUTION	2
NOMENCLATURE	3
SPECIFICATIONS	4
COMPLETE EQUIPMENT	4
HOW TO USE	5
1. Attaching the lens to camera	5
2. Electrical connection	5
3. Shutter speed setting and synchro-selector	6
4. Reproduction ratio	8
5. Exposure setting	8
6. Printing numerical figure	9
7. Focusing and shooting	10
8. When not used for a long time	10
9. Exchanging bulbs used for focusing illumination	11
10. AC Unit	11
11. DC Unit	12
12. Photographing subjects with smooth surface	13
13. Compartment case	13
DEPTH-OF-FIELD TABLE	14

CAUTION !

Keep in mind in handling the lens that it uses a high voltage power source for illumination.

1. Do not touch the cordless synchro contact found in front of the film rewind crank on the camera top, as the camera is provided with a body earth.

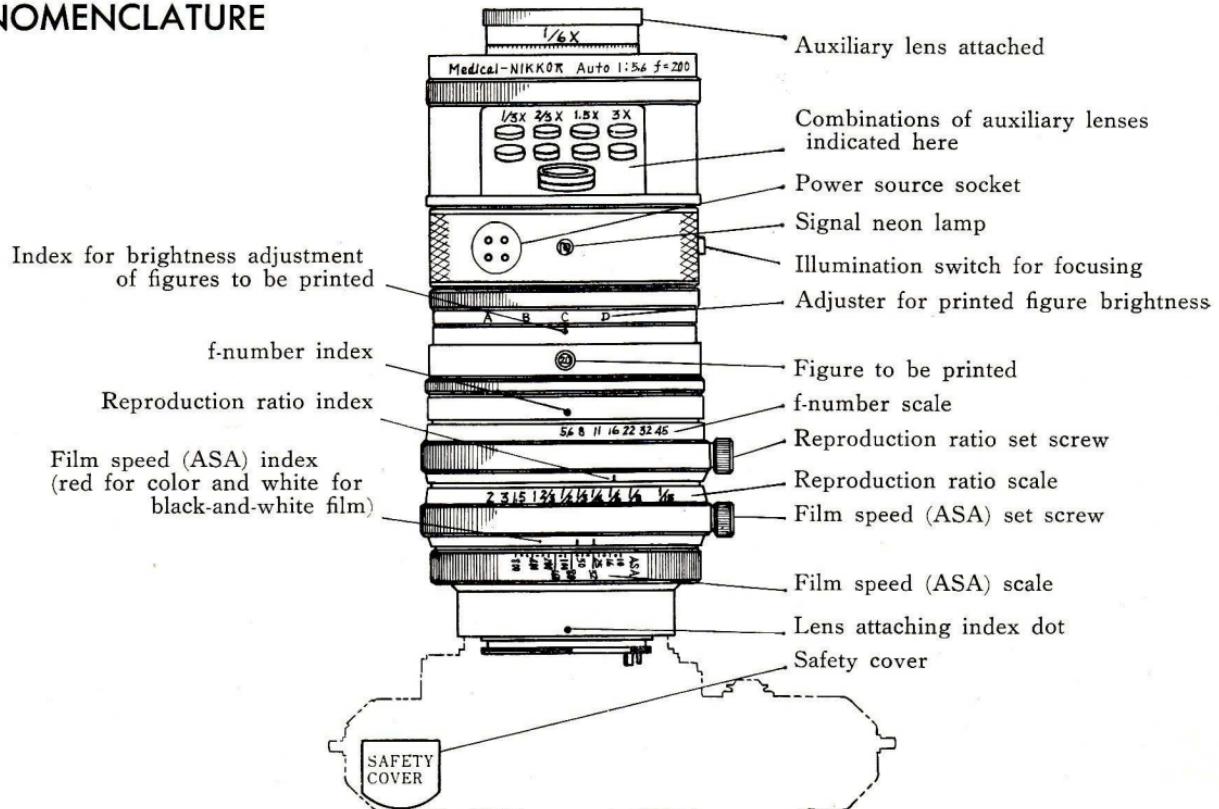
For safety, attach the safety cover onto the accessory shoe. (See Fig. 1)

Fig. 1



2. Repairing of the AC or DC Unit should not be attempted on account of high voltage power source used. Contact our agency or the Factory.
3. Do not forget to turn the power source switch to "OFF" when exchanging the high voltage laminated or other batteries in the DC Unit. Never touch, especially, the spring contact of the laminated battery leaving the switch turned to "ON".
4. The Medical-Nikkor Auto adopts the system of exchanging auxiliary lens to maintain a good distance even when shooting at high magnification as well as to ensure correct exposure. If there is no restriction in the subject distance, it is recommended to use the Micro-Nikkor for its especially high resolution.

NOMENCLATURE



SPECIFICATIONS

Focal length of master lens: f=200 mm

Maximum aperture ratio: 1:5.6

Optical system: Master lens consists of 3 groups, 4 elements, 6 auxiliary lenses for 10 different reproduction ratios

Picture size: 24×36 mm

Aperture diaphragm: f-number is automatically set by determining film speed and repro. ratio

f-numbers: 5.6, 8, 11, 16, 22, 32, 45

Reproduction ratios

Master lens: 1/15×

One auxiliary lens added: $\frac{1}{8} \times$, $\frac{1}{6} \times$, $\frac{1}{4} \times$, $\frac{1}{2} \times$,
 $1 \times$, $2 \times$

Two auxiliary lenses added: $\frac{1}{3} \times$, $\frac{2}{3} \times$, $1.5 \times$, $3 \times$

Lens mount: Nikon F bayonet

Focusing: Fixed; focus distance varies with auxiliary lens or lenses used

Illumination for shooting: Ring type discharge xenon lamp built-in

Output: Approx. 60 W

Flash duration: Approx. 1/500 sec.

Color temperature: 6000° K

Time required for recharging: AC Unit, approx. 13 sec. DC Unit, see p. 12.

Illumination for focusing: 4 bulbs, each 2.5 V built-in

Picture frame number or reproduction ratio printer:

Built in the lens with brightness control for printing numerical figures 1—39 or $1/15 \times$ — $3 \times$ at the corner of the picture frame.

Power source: AC or DC Unit

Dimensions of lens: Max. diameter: 80 mm,
length: 168.5 mm

Weight of master lens: Approx. 650 g.

Case: Leather compartment case

COMPLETE EQUIPMENTS

1 master lens

6 auxiliary lenses

1 power source cord

1 front lens cap

1 rear lens cap

1 socket cover

4 spare lamp bulbs

1 AC Unit (DC Unit is available on order)

1 compartment case

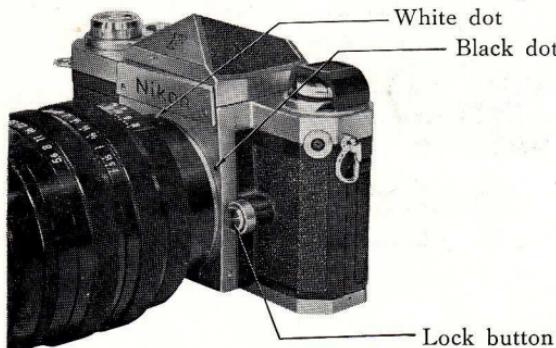
1 safety cover used on the Nikon F and Photomic-T

HOW TO USE

1. Attaching the lens to camera

Proceed the same way as other interchangeable Nikkor lenses, i.e. lining up the white dot on the lens with the black dot on the camera body, press in and turn the lens counter-clockwise until the lens clicks in position. When detaching the lens, reverse the above order, while pushing the lock button.

Fig. 2



2. Electrical connection

Connect the legged plug on the lens to the socket on the AC or DC Unit with the thick grey-colored cord as indicated in Fig. 3.

The black synchro cord is used for connecting the small socket beneath the legged plug on the lens and the synchro socket on the camera.

When using the AC Unit, connect further the brown cord on the primary side to the AC power source.

Turn the power source switch to "ON".

3. Shutter speed setting and synchro-selector

- a) When using Nikon F or Nikon F Photomic-T camera, set the shutter speed to 30 and synchro-selector to FX. Photomic series finder should be removed for set-

ting and replaced.

- b) When using Nikkormat camera, set the shutter speed to 60 and synchro-selector to X.

Fig. 3

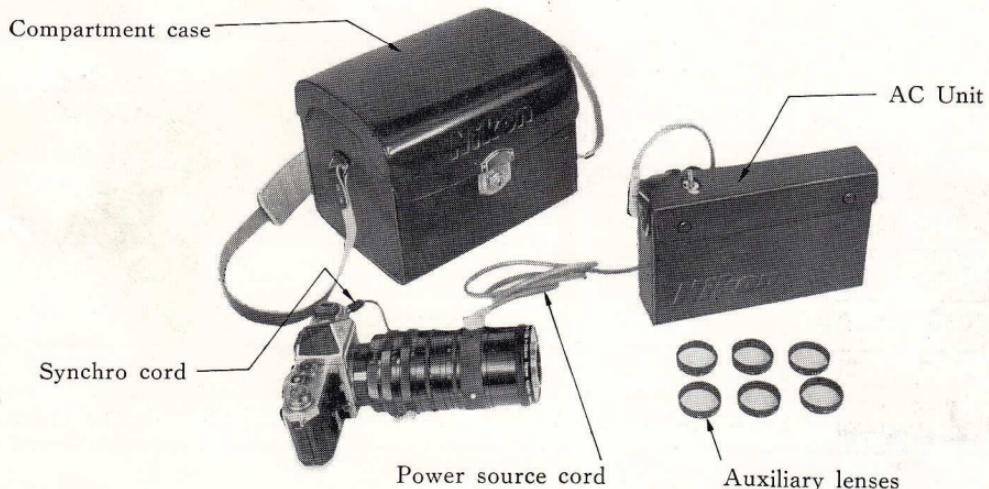


Table 1.

Reproduction ratio	Combination of lenses	Distance of object from front surface of lens (inch)	Object field (inch × inch)
1/15 ×	(Master lens)	10' 11.89"	14.17 × 21.26
1/8 ×	($\frac{1}{8}$ ×) + (Master lens)	5' 10.08"	7.56 × 11.34
1/6 ×	($\frac{1}{6}$ ×) + (Master lens)	4' 4.64"	5.67 × 8.50
1/4 ×	($\frac{1}{4}$ ×) + (Master lens)	2' 11.04"	3.78 × 5.67
1/3 ×	($\frac{1}{4}$ ×) + ($\frac{1}{6}$ ×) + (Master lens)	2' 1.0"	2.72 × 4.06
1/2 ×	($\frac{1}{2}$ ×) + (Master lens)	1' 5.32"	1.89 × 2.83
2/3 ×	($\frac{1}{2}$ ×) + ($\frac{1}{4}$ ×) + (Master lens)	1' 0.72"	1.38 × 2.09
1 ×	(1 ×) + (Master lens)	8.66"	0.94 × 1.42
1.5 ×	(1 ×) + ($\frac{1}{2}$ ×) + (Master lens)	5.98"	0.67 × 0.98
2 ×	(2 ×) + (Master lens)	4.17"	0.47 × 0.71
3 ×	(2 ×) + (1 ×) + (Master lens)	2.76"	0.33 × 0.50

4. Reproduction ratio

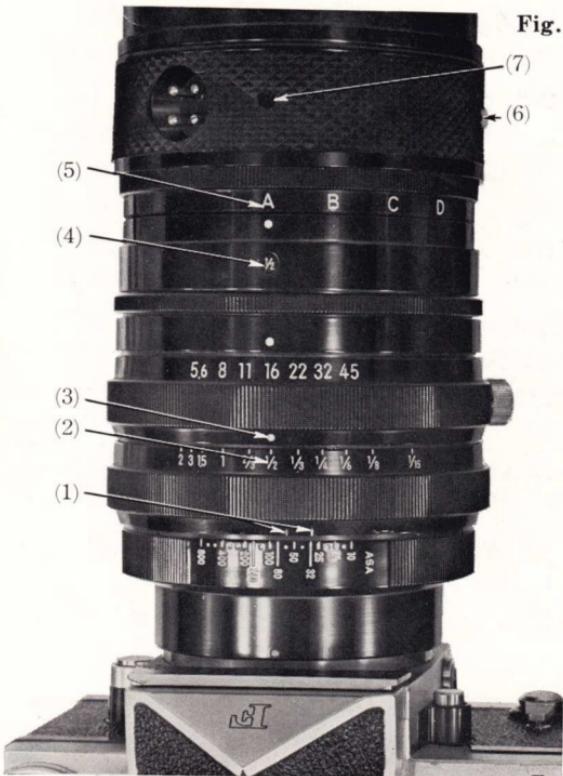
Reproduction ratio varies with the auxiliary lens or lenses attached. (*See Table 1*)

When using two auxiliary lenses, attach them in the order indicated by the figures on the front part of the lens barrel.

5. Exposure setting (Fig. 4)

Speed (ASA) of the film being used is first set to the index (1). For color film, use the red, for black-and-white film, the white index. Lock the film speed ring in position. Then, setting the index (3) to the reproduction ratio being used on the scale (2), fasten the lock screw. Now the aperture has been pre-set. It goes without saying that some adjustment may be required according to brightness of the subject to be photographed to attain the best result.

Fig. 4



6. Printing numerical figure (Fig. 4)

The numerical figure, which comes in sight one after another in the window (4) by turning the ring, can be printed at the lower righthand corner of the film as large as about 1.5 mm, the flash light from the ring type Xenon discharge lamp being utilized; white figures from 1 to 39 may serve for printing, for example, film number, date, diagnosis card number; yellow figures from $1/15\times$ to $3\times$ for reproduction ratio or the like.

Depending upon the speed of the film being used, brightness of the figure is to be adjusted by turning the ring (5) to A, B or C as shown in the righthand table.

D is used when printing is unnecessary.

Table 2.

Film speed Mark \	Black-and-white film in ASA	Color film in ASA
A	32 or lower	64 or lower
B	40—200	80—400
C	250 or higher	500 or higher

7. Focusing and shooting (Fig. 4)

First, be sure that the signal neon lamp (7) is lighting.

Holding the camera with your right hand, manipulate the knurled ring with your left hand.

Pushing of the micro switch (6) will light 4 small lamp bulbs for focusing. (This illumination is useful especially at high magnification.)

For shooting, first move the camera back and forth until the screen image is brought in sharp focus, and at this instant depress the shutter release button. Then the aperture diaphragm will automatically be stopped down to the pre-selected aperture, and by simultaneous firing of the discharge tube, the exposure will be made.

For the next exposure, wait until the neon lamp (7) lights (The shutter release button should be depressed in a few seconds after

lighting especially when exact exposure is necessary). To observe the depth-of-field for the pre-selected aperture, push the button provided on the camera for this purpose.

* Use of the mat screen without split-image center is recommended which can be mounted in place of the standard split-image screen.

8. When not used for a long time

After the lens has not been used for a long time, recharging time will be prolonged for the first 2 or 3 shots due to the characteristics of the condenser.

Also the time required for lighting of the neon lamp will be lengthened, as the lighting voltage tends to rise to a certain degree.

9. Exchanging bulbs used for focusing illumination

To exchange the lamp bulb, remove the protecting ring at the end of the lens (*See Fig. 5*). Do not forget, in this case, to disconnect the grey-colored cord for safety.

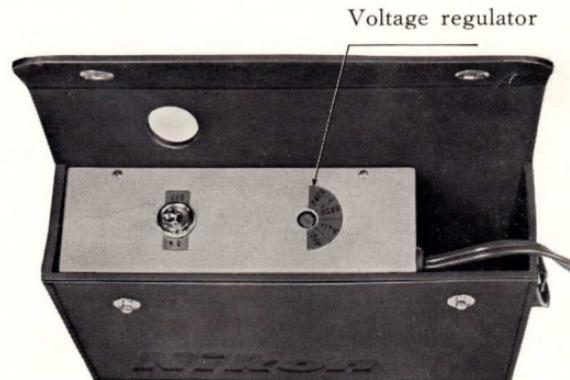


Fig. 5

10. AC Unit

The AC Unit is designed for use with 100 V, 117 V, 220 V and 240 V mains. To adjust the primary voltage according to the power voltage, open the lid of the leather case of the AC Unit. Inserting a screw driver through the small hole into the groove, set the direction of the groove until this comes opposite to the figure desired. If the voltage is 115 V or 120 V, set the groove to 117 V.

Fig. 6



11. DC Unit (Fig. 7, 8)

For the DC Unit, use one 240 V high voltage dry cell and four D-type batteries, each 1.5 V. First take out the Unit from the leather case, and deposit the batteries (240 V and 1.5 V) in the battery chamber, according to the plus (+) and minus (-) symbols.

If the Unit is not used for a long time or used only intermittently, turn the power switch to "OFF" to prevent the drain of the battery. It is recommended to take all the batteries out of the case when the Unit is not to be used for some time.

In case the DC Unit is used as a power source and if shots are taken in rapid succession, it is unavoidable that the time required for lighting of the neon pilot lamp will become gradually delayed due to drop in the battery capacity.

Consecutive use of the unit in a short duration will reduce the life of the battery more

than when used 10 to 20 times a day with intervals between shots. Especially, rundown batteries will decrease the number of times the Unit can be used.

Fig. 7

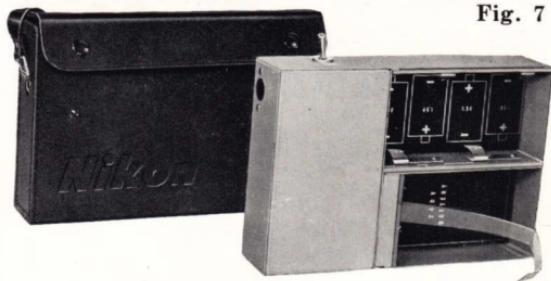


Fig. 8

12. Photographing subjects with smooth surface

If subjects to be photographed have smooth surfaces such as glass, they should not be aimed at from a vertical angle, but from an oblique angle to prevent a ring-shaped light source image reflected on the surface, from being reproduced in the picture.

13. Compartment case

Fig. 9



(+) for farther depth range

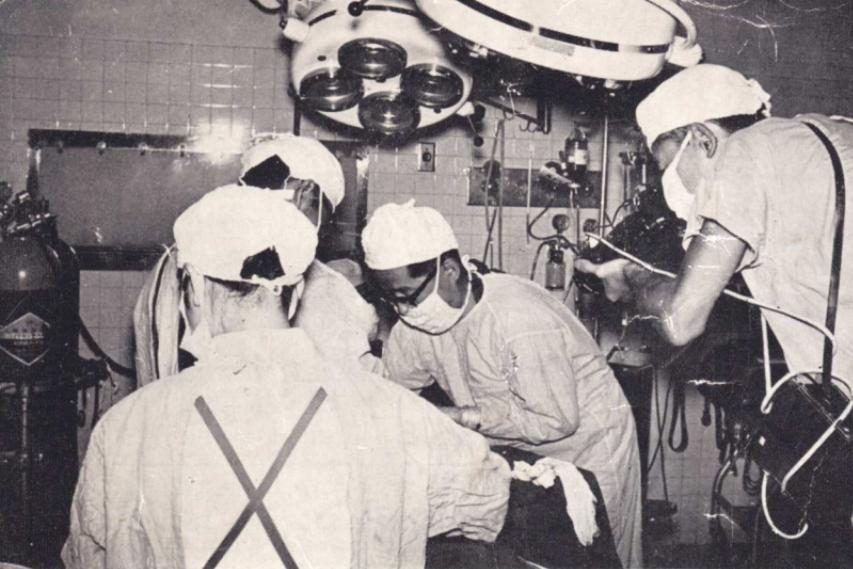
(-) for nearer depth range

Table 3. DEPTH-OF-FIELD

Unit: inch

f-number Reproduction ratio	f/5.6	f/8	f/11	f/16	f/22	f/32	f/45
1/15×	+2.5	+3.6	+5.0	+7.4	+10.4	+15.6	+22.8
	-2.4	-3.4	-4.7	-6.8	- 9.2	-13.0	-17.7
1/8×	+0.71	+1.02	+1.42	+2.1	+ 2.9	+ 4.3	+ 6.2
	-0.69	-0.99	-1.36	-1.95	- 2.7	- 3.8	- 5.2
1/6×	+0.40	+0.57	+0.79	+1.16	+ 1.61	+ 2.37	+ 3.42
	-0.39	-0.56	-0.76	-1.10	- 1.51	- 2.16	- 2.99
1/4×	+0.177	+0.254	+0.350	+0.512	+ 0.709	+ 1.043	+ 1.484
	-0.175	-0.250	-0.343	-0.496	- 0.677	- 0.976	- 1.354
1/2×	+0.044	+0.063	+0.087	+0.127	+ 0.17	+ 0.25	+ 0.36
	-0.004	-0.063	-0.086	-0.125	- 0.17	- 0.24	- 0.34
1×	+0.011	+0.016	+0.022	+0.031	+ 0.044	+ 0.064	+ 0.089
	-0.011	-0.016	-0.022	-0.031	- 0.043	- 0.062	- 0.083
2×	+0.003	+0.004	+0.006	+0.008	+ 0.011	+ 0.016	+ 0.022
	-0.003	-0.004	-0.006	-0.008	- 0.011	- 0.016	- 0.022

(Circle of confusion : 1/20 mm)



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