

# ***Nikon* F4**

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**REPAIR MANUAL**

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修 理 指 針

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Tokyo, Japan

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SUPPLEMENT OF NIKON F4 SPECIFICATIONS

1. Autofocus

{1) AF detection range

EV-1 to EV18 (at" ISO100)

(2) AF mode

AF-c (continuous servo autofocus)

- Shutter can be released regardless of focus status; in focus or out of focus.
- The camera continues focusing according to the movement of the subject for as long as you keep the shutter release button lightly pressed.
- The camera switches to focus tracking mode at AF-C+CL. Shutter release timing in focus tracking mode is after the AF sequence.

AF-s (single servo autofocus)

- Once the subject is in focus, the focus stays locked. Shutter can be released.
- The focus stays locked for as long as the shutter release button is lightly pressed.

MF (manual focus)

Focus aid operation is possible.

(3) Film advance and mechanical charge at each focus mode.

	AF lens			Non AF lens		
	AF-c	AF-s	MF	AF-C	AF-S	m
CH	Parallel			Parallel		
CL	Parallel Focus tracking	Series	Series +100ms	Series <b>+100ms</b>	Series +100ms	Series +100ms
Cs	Parallel			Parallel		
s	Series			Series		

- Parallel: Controls film advance and mechanical charge motors simultaneously.
- Series: Film is advanced after the completion of mechanical charge.
- +100ms: Shutter is released in 100ms after the completion of film advance and mechanical charge operations.

## (4) Filters for autofocus

Two filters for normal shooting and AF illuminator are incorporated which switch automatically according to the shooting situation to improve AF accuracy by eliminating the error of illumination. (See below)

Q Filter will be switched when the spot metering value is less than BV2 or over BV5 as described below while pressing the shutter release button lightly under the AF illuminator firing condition.

- "a. **AF illuminator filter** when the spot metering value is **BV2 or less.**  
 b. Normal shooting "filter" when the spot metering value is **BV5 or over.**

There is some difference in metering values "between "a" and "b" (as mentioned above) so that the filter is not switched due to slight variation of brightness. The filter is not switched when the shutter release button is not lightly depressed (or shutter prerelease timer is activated.) As a result, the filter for normal shooting will be switched to the one for AF illuminator when the AF illuminator firing condition is satisfied.

**AF illuminator firing conditions:**

- The power is ON and the flash unit is mounted.
- Focus mode is set to AF-S.
- Spot metering value is less than BV2.
- \* The focus does not "stay-locked."
- AF lens is mounted.

② When the filter moves back and forth to remove dust on the filter after the completion of auto film loading, regardless of focus mode selection. (Shutter can be released during this operation.)

## (5) Autofocus lock

With the **AF-L button** or the autofocus lock button on the lens side depressed, focusing operation will be locked, AF display will be locked, and shutter prerelease timer is extended.

2. Metering

- (1) Exposure metering system

TTL matrix metering,  
 TTL center-weighted metering and,  
 TTL spot metering

- (2) Full aperture exposure compensation

Electrical exposure compensation

- (3) Metering range (at f/1.4, 1S0100)

EV 0 TO EV21 (up to EV16 + 1/3) with TTL matrix metering.  
 EV 0 to EV21 (with multi-meter finder DP-20), EV2 to 21  
 (with AE action finder DA-20) with TTL center-weighted  
 metering.  
 EV2 to EV21 with TTL spot metering.

- (4) Metering mode and finders

	Matrix	Center-weighted	Spot
Multi-meter finder DP-20	o	0	0
AE action finder DA-20	x	o	" o
6x high magnification finder DW-21	.x.. "	, 'X-	\ . 'o
Waist-level finder DW-20	x	X	o

- (5) Matrix metering (with multi-meter finder DP-20 mounted)

Metering algorithm pattern is about the same as that of F-801

A pair of SPD matrix sensors (divided into three segments)

Matrix metering is activated when AF lens (built-in CPU), AI lens, series E lens or AI lens is mounted. (Modified AI is not available.)

Metering system is automatically changed in center-weighted metering mode when a lens other than one of those mentioned above is mounted, or no lens is mounted in matrix metering mode. For further details, see your instruction manual.

Metering area and its output

Two matrix vertical sensors incorporated in the multi-meter finder detect the vertical and horizontal position. When the sensor detects the vertical position of the camera, the metering output of the top and bottom of the segments changes automatically. (The sensor does not detect the reverse position.) See page MS.

(6) Center-weighted metering

Multi-meter finder DP-20 calculates the correct exposure by using the metering output (BVO) of the SPD sensor.

(See page MS.)

Central-weighted metering concentrates 60%  $\pm$  10% of the metering of the meter's sensitivity. (Approx. 12mm circle at the center of the viewfinder) .

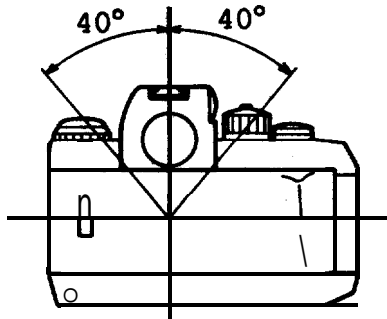
AE action finder DA-20 calculates the correct exposure by using the metering output of a cell of the SPD on the upper part of the eyepiece.

(7) Spot metering

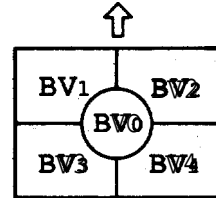
The spot metering sensor is incorporated into the camera body . SPD is located in the AF sensor module.

The area metered is represented by the approx. 5mm-diameter circle at the center of the viewfinder, equivalent to the area of the prism of the type K focusing screen.

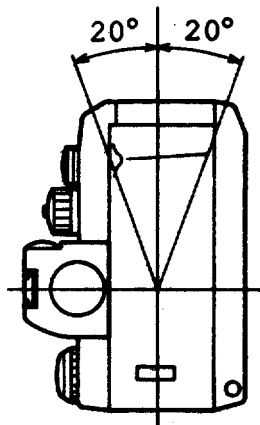
Angle:  $90^\circ \pm 1^\circ$   
 < Normal position >



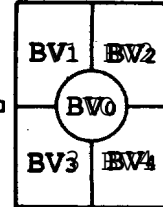
Camera top' side



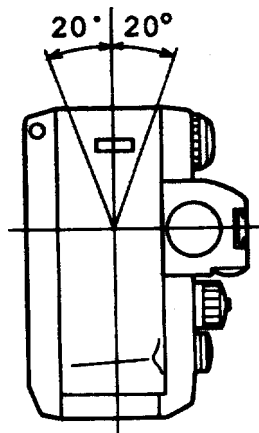
< Vertical position  
 (film advance side is up) >



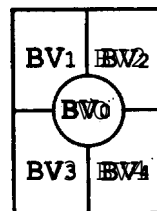
Camera  
 top side ←



< Vertical position  
 (film rewind side is up) >



→ Camera  
 top side



## 3. Exposure control

## (1) Programmed auto exposure modes (P, PH mode)

P, PH mode with DP-20 multi-meter finder mounted

Item"	Description
Built-in CPU lens	P and PH modes are available.
Non-CPU lens (including AF lens for F3)	Automatically shifted to A mode Viewfinder "display also shifted to A mode
Shutter speed control	Refer to the EV chart (controlled within the range of 30 to 1/8000 sec.)
Shutter speed display	Indicated in 1/2EV steps in the viewfinder
Aperture value control	Refer to the EV chart (controlled within the range of f-number (F-FO) of the lens mounted)
Aperture value display	Indicated in 1/2EV steps in the viewfinder
Alert display ----	FEE -> • FEE appears if the lens is not set to the aperture value within the range of 2/3EV. from the smallest aperture setting. " - , • Shutter release is not locked. • Programmed exposure control is performed based on that aperture value as its smallest one.
When shutter dial is set to "T" setting.	Shifted to M mode: • Shutter speed is set to "T" setting. • Stops down to the smallest aperture value (specified aperture value) • Neither shutter speed, aperture value, nor exposure mode are displayed in the viewfinder. "--" sign is displayed instead in place of shutter speed. Remains in P -mode when set to "X", "B" or other "settings."
Overexposure or underexposure	HI or Lo sign appear's in the viewfinder Shutter release is not locked.

(2) Aperture-priority auto exposure mode (A mode)  
A mode with DP-20 multi-meter finder mounted

Item	Description
CPU built-in lens	A mode is available.
Non-CPU lens (including AF lens for F3)	A mode is available. This mode, operates with, virtually all Nikon lenses.
Shutter speed control	Controlled within the range of 30" to 1/8000 sec.
Shutter speed display	Indicated in 1/2EV steps in the viewfinder
Aperture value	Can beset to within the f-number (F- FO) <b>of</b> the lens. mounted.
Aperture value display	Optical direct reading
When shutter dial is set to "T" setting.	Shifted to M mode: • Shutter speed is set to "T" " setting. •Stops down to the smallest aperture value (specified aperture value) •Neither shutter speed nor exposure mode are displayed in the viewfinder. "--" sign is displayed instead in place of shutter speed. Remains in A mode when set to "X", "B" or other settings.
Overexposure or underexposure	HI <b>or</b> Lo sign appears in the viewfinder. .Shutter release is not locked.

(3) Manual exposure mode (M mode)  
M mode'with DP-20 multi-meter finder mounted

Item	Description
Shutter speed	Can be set to "T", "X", or 4 to 1/8000 sec. in 1EV step.
Shutter speed display	Indicated in 1EV step in the viewfinder
Aperture value control	Can be set to within the f-number (F- FO) ,of the lens mounted.
Aperture value display	Optical direct reading
Exposure display	Indicated in bar-graph, 1/3EV steps within $\pm$ 2EV



(4) Shutter-priority auto exposure mode (S mode)

S mode with DP-20 multi-meter finder mounted

Item	Description
CPU built-in lens	S mode is available.
Non-CPU lens (including AF lens for F3)	Automatically shifted to A mode Viewfinder display also shifted to A mode.
Shutter speed control	Can be set to within the range of 4 to 1/8000 sec. in 1EV step.
Shutter speed display	Indicated in 1EV step in the viewfinder
Aperture value control	Can be set to within the <b>f-number</b> (F- FO) of the lens mounted.
Aperture value display	Indicated in 1/2EV steps in the viewfinder
<b>Alert</b> display	FEE -> <ul style="list-style-type: none"> <li>•FEE appears if the lens is not set to the aperture value within the range of 2/3Ev from the smallest aperture setting.</li> <li>•Shutter release is not locked.</li> <li>•Programmed exposure control is performed based on the assumption that aperture value is at its smallest setting.</li> </ul>
When shutter dial is set to "T" or "B" setting	"Shifted to M mode: <ul style="list-style-type: none"> <li>• Shutter speed is set to "T" or "B" setting.</li> <li>•Stops down to the smallest aperture value (specified aperture value)</li> <li>• Neither shutter speed, aperture value nor exposure mode are displayed in the viewfinder. "--" , or "- "sign is displayed instead in place of shutter speed.</li> </ul> Remains in S mode when set to "X" or other settings.
Overexposure or underexposure	HI or LO sign appears in the viewfinder. Shutter release is not locked. When aperture control is necessary over the aperture range of the lens, specified shutter speed will not be shifted automatically.

- (5) Film speed setting  
 Manual film setting 1S06 to 1S06400  
 DX-coded film setting 1S025 to 1S05000

In DX mode If camera back is closed without loading DX-coded film or patrone, "an LED indicator blinks to alert at 8HZ, and shutter release is locked and an auto film loading becomes impossible.

If DX-coded film patrone is loaded, but the film speed is set manually, the camera gives priority to the manually set ISO number.

- (6) Exposure compensation  
**You** can compensate exposure within the range of  $\pm 2EV$  (in 1/3EV steps)  
 Nothing is displayed in the viewfinder when compensation value is set to 0.  
 Compensation value displayed does not include the compensation value due to accessories (MF-23, SB-24, etc.)

- (7) Auto exposure lock  
 Since **this** function memorizes the BV value, the controlled exposure value and its display value will vary as TV and AV values change in P, **PH**, **A**, or S mode. Shooting is possible in this state.  
 $BV (fix) = AV + TV$

While exposure is locked, "EL" appears in the viewfinder (with DP-20 multi-meter finder mounted). When the simultaneous lock lever is being turned, auto exposure and autofocus can be locked at the same time by pressing the AF-L button. Shutter prerelease timer is delayed while pressing the AE-L button.

- (8) If you turn the simultaneous lock lever to (\*), then **AE-L** and AF-L buttons work independently. If you turn the lever to ("\*"), then both auto exposure and autofocus can be locked at the same time when you press the AF-L button.

- (9) Exposure related signals  
 F-FO, FO, Fmin, from, EE

- (10) Shutter speed dial  
 1/8000, . . . 4, X, T, B.

(11) Shutter unit (Nikon's original development)

Special tungsten-alloy shutter balancer absorbs vibration due to the shutter curtain travel.  
 Dual multi-bladed curtain system: When shutter release button is fully depressed, the rear curtain goes up -> the front curtain starts traveling downward -> the rear curtain follows the front curtain downward -> original dual-curtain formation.

Aluminum-alloy blades: AL (aluminum) x 2 + CFRP (carbon fiber) x 2 "

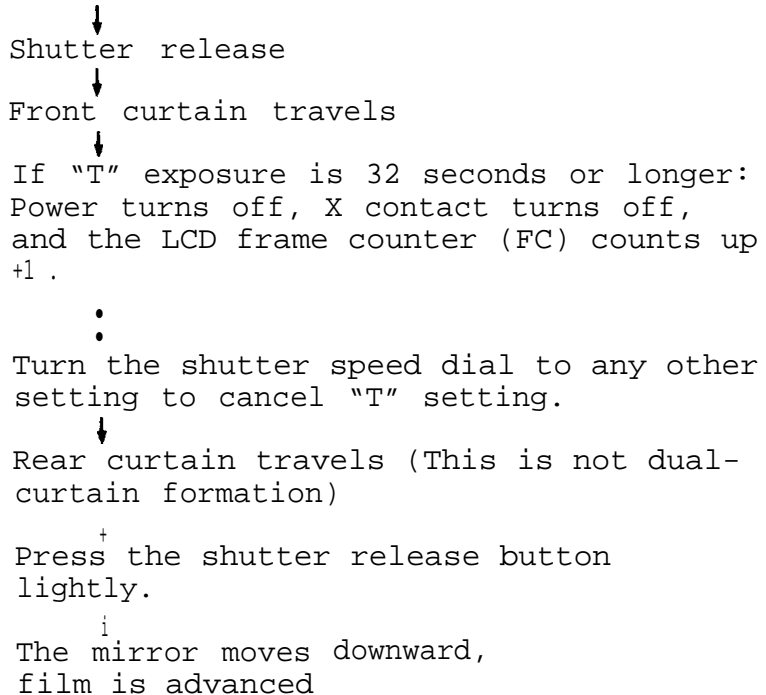
c: Carbon  
 F: Fiber  
 R: Resin  
 P: Plate



Shutter curtain travels from up to down.  
 X sync contact: Semiconductor trigger system same as that of F-801.

(12) T (time) exposure

T operation = Set the shutter dial to "T" setting



\*If T setting .is canceled before shutter prerelease timer turns OFF, immediately the mirror moves downward and film advances in 32 seconds after shutter is released.

Rear curtain sync flash photography at T (time) setting is automatically switched to front-curtain sync. (Rear-curtain sync is impossible.)

- T (time) setting
- Basically mechanical control.
  - Current flows to the Mg for 32 seconds after shutter is released at T setting. The power is ON for 32 seconds to activate the camera body for more than 20 seconds at "T" setting, because current flows for maximum 20 seconds in repeating flash mode of the SB-24.
  - Click sound may be heard in 32 seconds after releasing the shutter at T setting, this means that the shutter curtain held by Mg is switched to that held by mechanically.

(13) Self-timer

- 10-sec.** self-timer----- Self-timer LED starts blinking at 2Hz during the first 8 seconds, and at 8Hz during the final two seconds.
- Cancel of self-timer ----- Turn the film advance mode selector to another setting. The self-timer mode is not canceled automatically when a self-timer shooting has been completed.
- B (bulb) ----- Shutter speed is automatically set to 1/250 sec. at the "B" setting.
- T (time) ----- Self-timer shooting is possible at "T" setting.
- AF and **AE** ----- Autofocus and auto exposure modes activate in self-timer operation. Autofocus driving is possible by pressing the shutter release button lightly in self-timer operation.
- AF-S ----- Shutter is released whether or not the subject is in focus, even in the AF-S mode, after the timer operation ends.
- Sequence ----- Film advance and mechanical charge operations return to series driving when self-timer shooting has been completed.

(14) Multiple exposure'

The multiple exposure lever returns to its original position after the exposure.

Frame counter and databack when taking multiple exposures.  
(with DP-20 multi-meter,finder)

Body alone	Frame counter of the body does not count up . LCD counter (in FD) does not count up.
MF-23 camera back	Frame counter of the body does not count up . LCD counter (in FD) does not count up. Frame counter of the MF-23 counts up. The frame number does not correspond to that of the body because the frame counter counts up every time the film advance switch turns ON and OFF. (This is mechanically unavoidable.)
MF-24 camera back	Frame counter of the body does not count up . LCD counter (in FD) counts up. Frame counter of the MF-24 counts up. Frame count-up signal is sent from the MF-24 camera back, therefore the frame number does not correspond to that of the body. (This is mechanically unavoidable.)

\* Multiple data are imprinted when taking multiple exposures with a camera back mounted.

\* The MF-24 incorporates downcount frame number capability. This frame number-does not correspond to that of the **body**.

#### 4. Motor drive sequence and film advance control

##### (1) Motors

Shutter charging motor takes care of mirror down operation, aperture, and charging the shutter curtain. Spool motor is in charge of advancing film. Rewind motor rewinds the film, and changes the filter of the autofocus module.

##### (2) Film advance mode

CH : High-speed film advance mode (max. 5.7 fps, F4S)  
CL: Continuous low-speed film advance mode (focus tracking will be available in this mode)  
CS : Continuous slow and silent film advance mode (low sound level oriented.)  
S: Single film advance mode.

See section (3) on page M2 for the relation between film advance modes and autofocus mode.

## (3) Film loading and blank exposures

① Normal advance film loading. (Spool drive system)  
(Sprocket drive system when the FM-24 camera back is mounted.)

## ② Blank film advance

Fully depress the shutter release button while opening the camera back to rotate the film take-up spool for a certain period of time. If film is loaded, approximately 0.5 frames are advanced on the spool.

- Spool motor advances film by duty (pulse) -driving in order not to damage film perforations.
- Film advance and shutter charging" motors work simultaneously. The shutter charging motor rotates to release film sprocket stopper.

Q Auto film loading (Film is loaded, camera back is closed.)  
Film automatically advances 2.5 to 3.5 frames at auto film loading.

Film advance: Spool motor advances film by duty (pulse) driving in order not to damage film perforations.

Film advance and shutter charging motors work simultaneously. The shutter charging motor rotates to release film sprocket stopper.

Blank exposures stop when the frame counter switch is turned OFF. (Film advances to frame 1.)

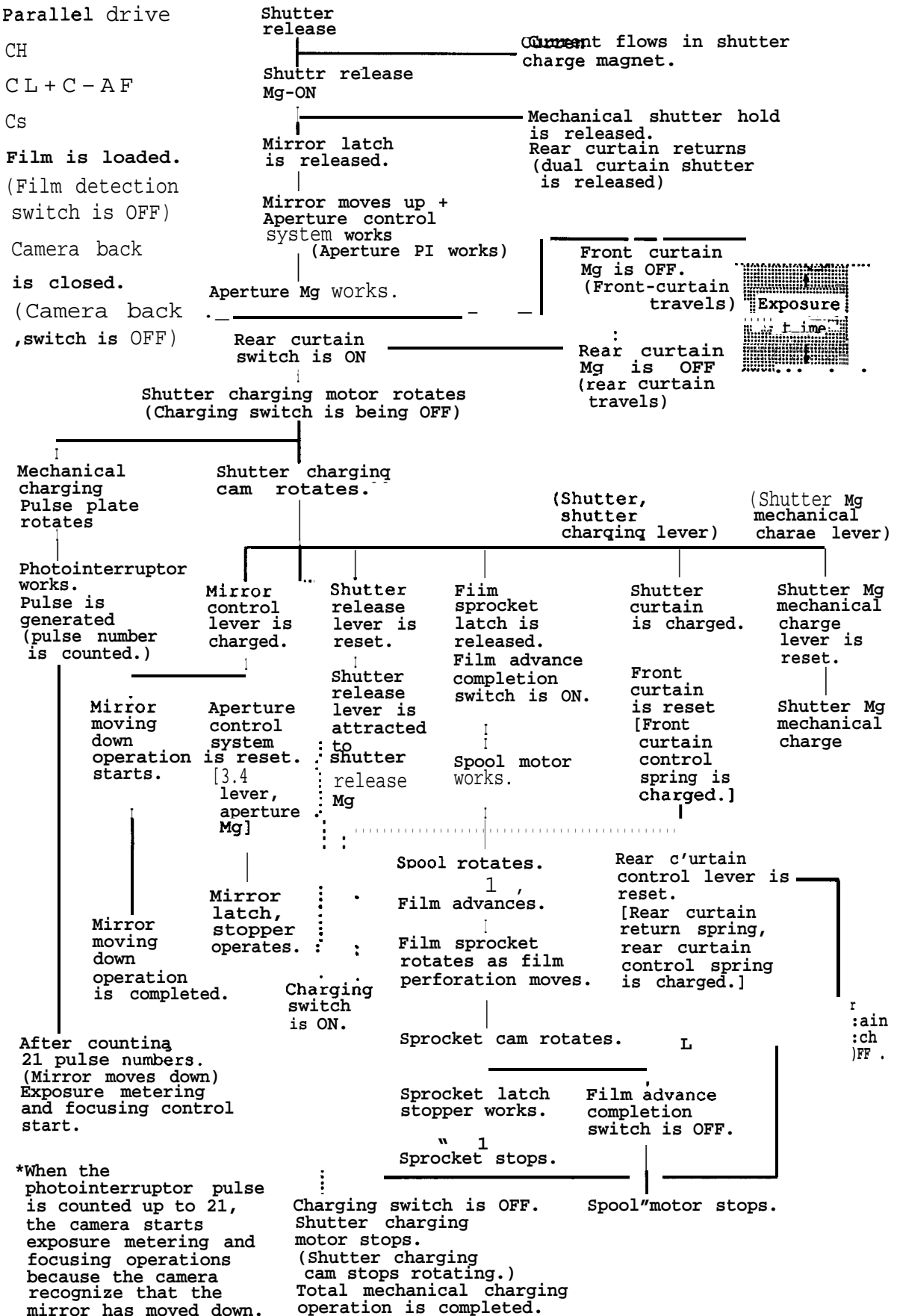
Duty ratio of the duty (pulse) driving changes as temperature and voltage vary.

Auto film loading  
error

If blank exposures are not taken while the film detection switch is OFF, the film take-up spool rotates for one second and mechanical charging takes place three times (shutter charging motor rotates), the LED indicator lights up (alert LED), and the shutter release is locked.

(4) Film advance and mechanical sequence

① Parallel drive



@Series drive

CL

s

Film is loaded.  
(Film detection switch is OFF)

Camera back is closed.  
(Camera back switch is OFF)

Shutter release  
Current flows in shutter charge magnet.

Shutter release Ma-ON

"

Mirror latch is released.

Mirror moves up + Aperture control system works (Aperture PI works)

Aperture Mg works.

Rear curtain switch is ON

Shutter charging motor operates (Charging switch is being OFF),

Mechanical charging Pulse plate rotates

Photointerruptor works.

Pulse is generated (pulse number is counted.)

Mirror moving down operation starts.

Mirror moving down operation is completed.

After counting 21 pulse numbers. (Mirror moves down)

Exposure metering and focusing control start.

\*When the photointerruptor pulse is counted up to 21, the camera starts exposure metering and focusing operations because the camera recognize that the mirror has moved down..

Shutter release lever is reset.

Shutter release lever is attracted to shutter release Mg 23.

Charging switch is ON.

Charging switch is OFF.

Shutter charging motor stops. (Shutter charging cam stops rotating.)

Total mechanical charging is completed.

Spool motor does not rotate correctly

Spool motor rotates.

Spool rotates.

Film advances. Film sprocket rotates as film perforation moves.

Sprocket cam rotates.

Sprocket latch stopper works.

Sprocket stops.

Film advance completion switch is OFF.

Spool motor stops.

Mechanical shutter hold is released. Rear curtain returns (dual curtain shutter is released)

Front curtain Mg is OFF. (Front curtain travels)

Rear curtain Mg is OFF (rear curtain travels)

Shutter charging cam rotates.

(Shutter, shutter charging lever)

(Shutter Mg mechanical charge lever)

Film sprocket latch is released. Film advance completion switch is ON.

Shutter curtain is charged.

Shutter Mg mechanical charge lever is reset.

Shutter Mg mechanical charge

Rear Curtain control lever is reset. [Rear curtain return spring, rear curtain control spring is charged.]

Rear curtain switch is OFF.

Current flows in shutter charge magnet.

Mechanical shutter hold is released. Rear curtain returns (dual curtain shutter is released)

Front curtain Mg is OFF. (Front curtain travels)

Rear curtain Mg is OFF (rear curtain travels)



Mechanical charging Pulse plate rotates

Photointerruptor works.

Pulse is generated (pulse number is counted.)

Mirror moving down operation starts.

Mirror moving down operation is completed.

After counting 21 pulse numbers. (Mirror moves down)

Exposure metering and focusing control start.

\*When the photointerruptor pulse is counted up to 21, the camera starts exposure metering and focusing operations because the camera recognize that the mirror has moved down..

Shutter charging cam rotates.

Mirror control lever is charged.

Aperture control system is reset. [3.4 lever, aperture Mg]

Mirror latch, stopper operate

Charging switch is ON.

Charging switch is OFF. Shutter charging motor stops. (Shutter charging cam stops rotating.) Total mechanical charging is completed.

(Shutter, shutter charging lever)

Film sprocket latch is released. Film advance completion switch is ON.

Spool motor does not rotate correctly

Spool motor rotates.

Spool rotates.

Film advances. Film sprocket rotates as film perforation moves.

Sprocket cam rotates.

Sprocket latch stopper works.

Sprocket stops.

(Shutter Mg mechanical charge lever)

Shutter curtain is charged.

Front curtain is reset [Front curtain control spring is charged.]

Rear Curtain control lever is reset. [Rear curtain return spring, rear curtain control spring is charged.]

Shutter Mg mechanical charge lever is reset.

Shutter Mg mechanical charge

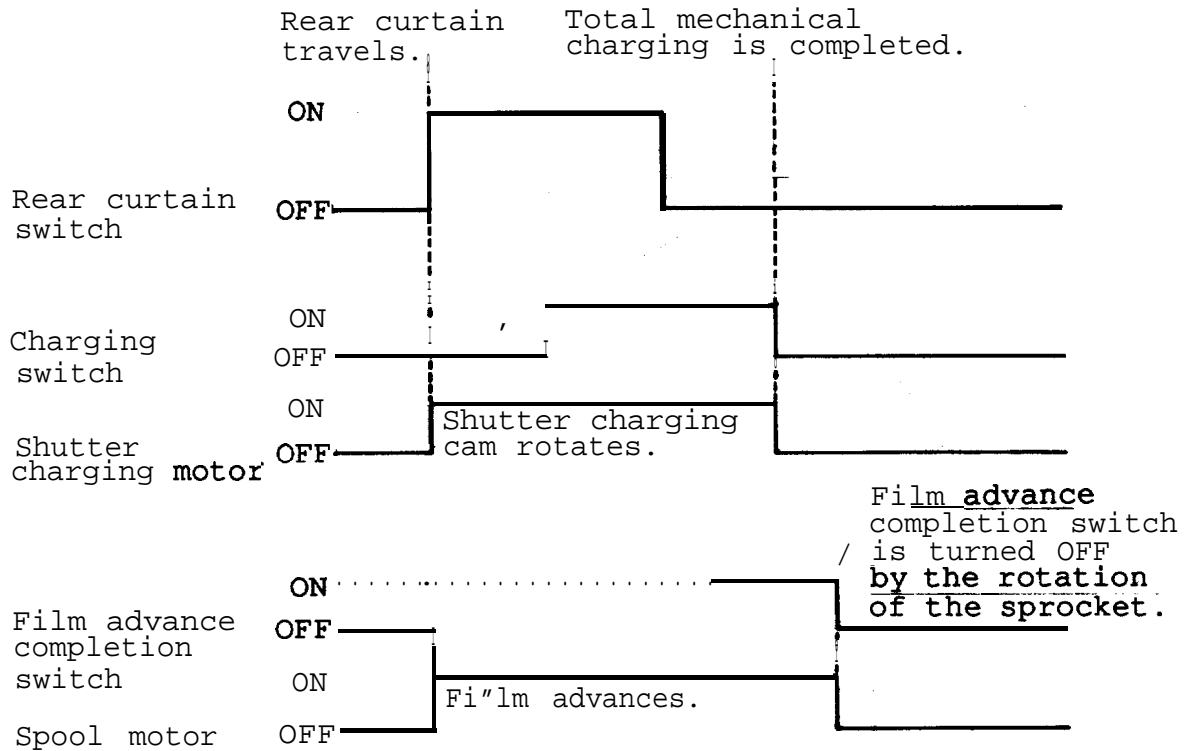
Rear curtain switch is OFF.

Film advance completion switch is OFF.

Spool motor stops.



spool motor and shutter charging motor



Mechanical charge pulse

- ① 84 to 94 pulses are output for one sequence.
- ② Detection of mirror down  
After counting 21 pulses, the camera recognizes that the mirror is down, and starts exposure metering and autofocusing.
- ③ Film advance and speed control of mechanical charge in Cs mode  
Film advance speed and mechanical charge speed are controlled by monitoring the output pulse of the mechanical charge.
- (5) Detection of the end of roll

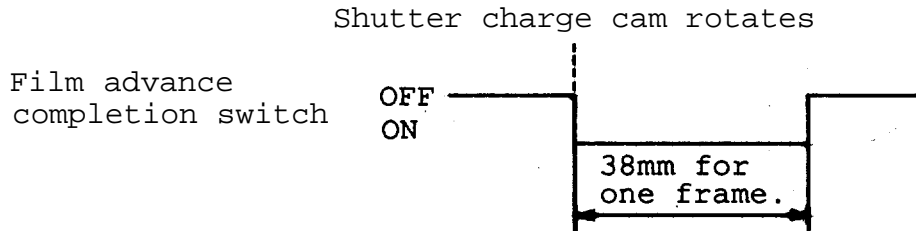
If no film advance completion signal is output within one second after the completion of mechanical charge when film is loaded, a spool motor rotates for one second, and an alert LED lights up. Shutter release operation is locked.

Completion of mechanical charge: Shutter, mirror, shutter release Mg, etc. are all charged. (Charge switch is OFF.)

Film advance completion signal:

- Same as the film advance completion switch.

Film sprocket rotates when film advances through the 'film take-up spool, and the film advance completion switch turns ON and OFF.



(6) Film rewind

Manual film rewind: Rewinds film after turning the film rewind lever RI.

Auto film rewind:

- Turn film rewind levers R1 (to release sprocket, RI switch) and R2 (R2 switch) to start automatic film rewinding.
- During film rewind, an alert LED blinks at 1Hz.
- Film rewind motor stops automatically in 1.5 sec. when film detection switch is turned from OFF to ON. (No film leader)
- Film rewind motor also stops by manually releasing the R2 lever.
- Film rewind time measured at ordinary temperature (20°C) when using 36-exposure film:

Approx. 12 seconds (MB-20)

Approx. 8 seconds (MB-21)

- Frame counter in the body counts backward.

LCD frame counter in FD returns to frame number 0 just before the completion of film rewind operation. Open camera back to release the LCD frame counter.

You have the option to either leave the film leader in the camera or not by rewriting the data on the EEPROM memory chip. If you select to leave film leader, the film rewind motor stops immediately after the film detection switch turns from OFF to ON.

Film leader leaves when rewinding film when the frame counter shows less than 1 (frame counter switch is ON) disregarding EPROM data.

If you turn film rewind lever (R2) alone, an LED indicator (alert LED) blinks and alert at 8Hz.

- (7) Shooting speed (Average values when using 36-exposure with fresh batteries and the shutter speed of 1/250 sec. or faster at room temperature (20°C) .

(frame/sec.)

		CH	CL	Cs
AF-c	MB-20	4.0	3.3	0.8
	MB-21	5.7	3.4	1.0
MF	MB-20	4.0	2.2	0.8
	MB-21	5.7	2.9	1.0

Shooting speed is not definite when setting in AF-S mode.

8) Distance between frames (mm)

	Other than CS mode	CS mode
Standard	+0.2 2-0.4	+().7 2-0.9
MF-24	+0.3 2-0.5	———.

(9) Sequence errors

An LED indicator (alert LED) blinks at 8Hz to alert in the following errors:

- Q Mechanical charge sequence error:  
Mechanical charge pulse is not output for over 255ms during shutter charge completion switch turns ON until it turns OFF.
- ② Rear curtain sequence error:  
Rear curtain switch signal is not output in 300ms after rear curtain Mg is turned OFF.
- @ Aperture control error:  
Aperture pulse is counted more than 21 in 10ms after aperture Mg is turned ON.
- ④ Sync contact close error  
Sync contact has already been closed when power is ON.

No LED indicator (alert LED) blinks in the following errors:

- Q Power voltage drops below the rated voltage of DC/DC converter.
- ⑥ Main CPU is hung up.
- ⑦ Desired number of pulses (aperture value) is not output when controlling aperture. [In this case, this is compensated by shutter speed based on the number of pulses output (aperture value)]

Errors from ① to ⑦ will be stored in EEPROM (address 30) memory when error occurs.

5. Power source

(1) Battery pack

**MB-20**

Alkaline-manganese batteries are acceptable. Reverse mounting preventive mechanism is provided.

MB-21

Alkaline-manganese, Ni-Cd, and Manganese batteries are acceptable, but some Ni-Cd models can not be acceptable due to the F4's reverse mounting preventive mechanism. Vertical position shutter release button, battery check function, remote connector and battery identification switch (changes battery checker level by selecting alkaline-manganese or Ni-Cd batteries) are provided.

MB-22

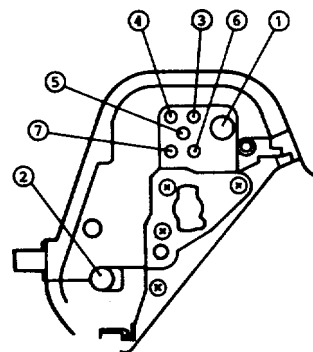
Grip unit in common with the MB-21. Nikon AC/DC converter MA4 including regulator to convert 15V to 8.2V, and the AC/DC converter with 9-20v (3A or more) output power are available. Remote connector, and vertical position shutter release button **are** provided.

MF-24G

Battery holder and grip unit for MF-24.

(2) Battery pack contacts

Viewed from the bottom of camera.



- ①. Power terminal (+)
- ②. Power terminal (-)
- ③. Shutter release signal contact
- ④. Shutter prerelease signal contact
- ⑤. Film advance signal contact (controlling MF-24)
- ⑥. Battery identification contact
- ⑦. Film back contact (detecting the loading of MF-24)

Contacts for each battery pack are as follows:

- MB-20 :           ①, ②
- MB-21 :           ①, ②, ③, ④, ⑥
- MB-22 :           ①, ②, ③, ④, ⑥ (but ⑥ is not effective)
- MB-24G:           ①, ②, ③, ④, ⑤, ⑥, ⑦

## (3) Battery checker

MB-20 is mounted:

Checks battery by using shutter prerelease timer in the body side.

Shutter prerelease timer prolongs 16 seconds: Battery is usable.

Shutter prerelease timer prolongs 0 second: Battery is used up.

No viewfinder display appears, shutter release is locked: Change batteries.

MB-21 is mounted:

See specifications of the MB-21.

## (4) Current consumption (when DP-20 is mounted at ordinary temperature (20°C) using MB-20.)

① Under **5 $\mu$ A** when power switch is OFF.

② Under 10pA (approx. 100pA when film rewind lever R2 is ON) when power switch is ON (shutter prerelease timer is OFF) .

@ Under approx. 180mA (when AF illuminator is OFF) and under approx. 220mA (when AF illuminator is ON), when shutter prerelease timer is ON.

## (5) Continuous shooting time at the B (bulb) setting (using fresh batteries at room temperature) .

Four hours (MB-20), and six hours (MB-21) with alkaline-manganese batteries.

Three hours (MB-21) with Ni-Cd batteries.

## (6) Power source switch

Use following dial and buttons to prolong the shutter prerelease timer:

Shutter release button (prerelease, release)

Exposure compensation dial

Film advance mode selector

Shutter speed dial

Lens aperture ring (F-Fo signal)

AE lock button

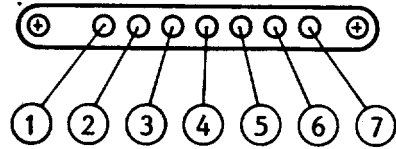
Exposure mode selector

AF lock button

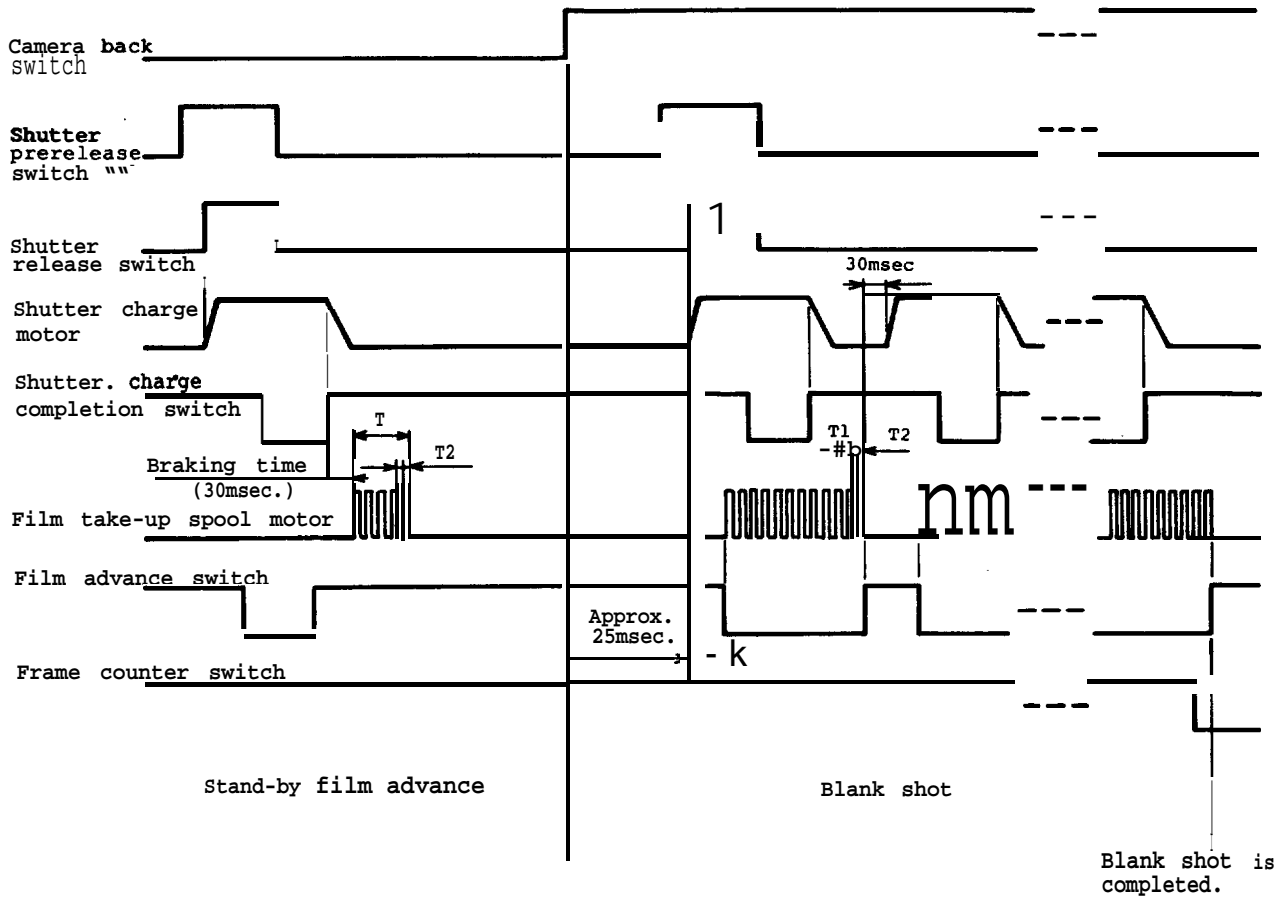
Key operations of other accessories (MF-23, SB-24, etc.)

## 6. Data back contacts

- ①. Inspection contact
- @. Shutter prerelease/release signal contact
- ③. Data imprint signal contact
- ④. 1/0 contact
- ⑤. DC 1/0 contact
- ⑥. Clock signal contact
- ⑦. GND



Time chart (stand-by film advance, blank shot)





Time chart (using AA penlight battery x 4, in CH mode, AF-C mode, at room temperature)

