REPAIR MANUAL

Nikon F-401

Quartz Date

N4004

FAA21051

FAA21251

FAA21151

SPECIFICATIONS AND MECHANISM

[1] SPECIFICATIONS

Nikon F-401 (N4004 for American market, order No.: FAA21151)

1. Outline

The F-401 has been developed for the purpose of providing customers with a single-lens reflex camera featuring easy operation and low cost to fill the gap between compact and single-lens reflex cameras. Foolproof and simple-to-operate even for first-time users, the F-401 features advanced and well-balanced automatic functions such as autofocus, auto exposure, built-in motorized film loading, power film rewind, multi-pattern light metering, daylight flash, auto setting of film speed, dual-program exposure mode, etc. plus reduced costs due to simplified specifications.

2. Features

(1) Built-in autofocus detection by phase-contrast detection system (mounted on AP2).
(2) New AF lenses focused by the AF motor mounted in the camera.
(3) All information from the CPU in new AF lenses transmitted to the camera.
(4) Built-in auto TTL flash (external flash unit is also usable).
(5) Built-in AMP (for daylight flash and dim light flash firing).
(6) Auto film advance and power rewind with a sequence motor.
(7) Easy-Loading Mechanism for automatic film loading.
(8) Four exposure metering modes available: P, S, A, and M. In the P mode, one of two programmed modes is automatically selected depending on the focal length of the lens in use.
(9) TTL auto flash mode photography.
(10) Program flash that controls the camera aperture in the P and S modes.
(11) Automatic film speed setting when DX-coded film is used.
(12) Capable of distance measurement by using AF illuminator when light intensity is low (with external flash SB-20 or SB-22).

3. Specifications

Type of camera:	Lens interchangeable, autofocus 35mm single-lens reflex with built-in motor drive
Picture size:	24mm x 36mm
Usable film:	Cartridge-type 35mm film (DX/non-DX-coded film)
Usable lens:	1) New AF Nikkor lenses with AF contacts 2) When lens without AF contacts is mounted: * Exposure indicator goes out * Both focusing and flash indicators light up (but no light-insufficient warning) * Shutter release is possible (but locked when shutter dial is set to A) (Same as above when a lens is not mounted)
Standard lens:	New AF Nikkor lens 50mm f/1.8S or New Nikkor zoom lens 35-70mm f/3.3-4.5S

Full aperture exposure compensation:	Automatic compensation by electrical signal
Lens mount:	Nikon F mount
Shutter:	Seiko MFD Electronically controlled vertical-travel focal-plane shutter (2 Mg type), plastic shutter blades employed in combination with metal shutter blades
Exposure control mode:	1) Program mode (P mode) 2) Shutter-priority auto exposure (S mode) 3) Aperture-priority auto exposure (A mode) 4) Manual exposure (M mode) 5) Program flash mode (SBP mode) 6) Daylight flash mode
Electronic circuits (ICs)	1) HD637B05Z (CPU) 2) M51066 (MDIC) 3) M51063 (light metering IC) 4) MB4436 (CCD driver) 5) MB8036LA (CCD) 6) CXK1005 (EEPROM)
AF detection system:	TTL distance metering is made by Nikon's own AP2 phase-contrast detection system. The electrical signal from 200 CCD line sensors in the optical module, which is in the same position as the film plane, but below the mirror, is converted from analogue to digital data. According to the program, the CPU calculates digital data and outputs the focus difference from the focal plane as a predicted defocus value.
AF lens travel:	New AF lens is driven and focused by the AF motor in the camera through the coupling in the mount. AF lens can be driven by depressing the shutter release button halfway.
Servo mechanism:	By comparing the output value from the digital encoder in the camera with a predicted defocus value calculated by the CPU, the new AF system drives the lens to correct focusing position and stops. As the lens comes closer to the correct focusing position, the lens driving speed of the motor slows down by five steps and the motor stops at the correct focusing point.
(1) AF servo mode (Single servo AF mode)	In this mode, the AF lens driving stops once the subject is correctly focused. When depressing the shutter release button halfway, power is on and the AF lens is driven and stops when the subject is correctly focused. Unless the subject is correctly focused, the shutter cannot be released. By removing the finger from the shutter release button and depressing the button halfway once again, the AF lens is driven again and stops when correctly focused.

(2) Focus assist mode (M)

Focus assist mode (FA) which enables the operator to rotate the lens focusing ring manually referring to the focus indicator in the viewfinder without using autofocus.
By turning the focus mode selector to M, manual focusing using the focusing ring becomes possible.

Mounting contacts

Electrical contacts on the upper inside of the body mount transmit signals from the lens to the body. Detailed usage of the contacts is as follows:

Usage	Contact A	B	C	D	E	F	G
New AF lens	Vcc1	R/W1	CLK	SI/SO	--	--	GND

Contacts A-G are arranged from left to right as observed from in front of the body.

F/number required for focus detection:

f/5.6 or larger

Brightness for focus detection:

Approx. EV2-18 (at ISO100)

Focusing range:

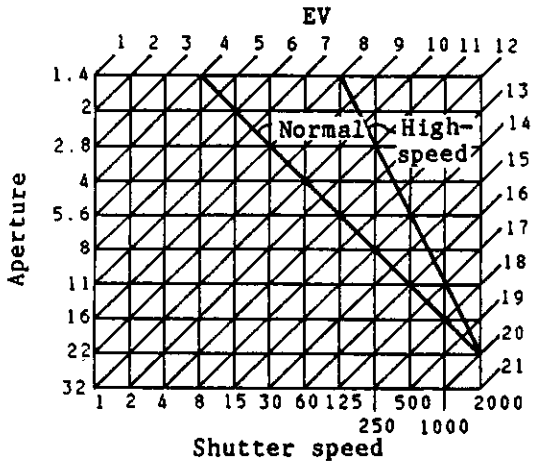
Approx. $\pm$ 150μm within which the correct focus indicator lights up in the viewfinder

AF illuminator photography:

When taking pictures in the single servo AF mode under low-light conditions, AF illumination photography becomes possible when the SB-20 or SB-22 is mounted.
With the SB-20 or SB-22 in any mode, including TTL, A, or M, with an AF lens mounted, the AF illuminator lights up when the shutter release button is depressed halfway, and autofocus detection takes place and drives the AF lens. The AF illuminator lights up until the in-focus indicator appears. However, the AF illuminator goes out if the subject cannot be correctly focused. When pressing the shutter release button halfway after removing the finger from the shutter button once, the AF illuminator lights up again.

Exposure control

(1) Programmed exposure mode
The F-401's built-in microcomputer automatically selects either the normal or the high-speed program. Set the shutter dial to A and the aperture dial to S, and the lens to its minimum aperture. When the lens focal length is less than 135mm, the normal program is selected; when it is 135mm or longer, the high-speed program is selected. The correct exposure LED indicator in the viewfinder lights up when the exposure is correct.



Film speed: ISO100

(2) Shutter-priority exposure mode
After setting the lens to its minimum aperture, the aperture dial to S, and the shutter dial to a particular speed (1, 2, ... 2000), press the shutter release button. Depending on the film speed, the aperture is automatically controlled to the optimum exposure to match the shutter speed and the brightness of the subject. When the correct exposure is obtained, the correct exposure LED indicator in the viewfinder lights up.

(3) Aperture-priority exposure mode
After setting the lens to its minimum aperture, the shutter dial to A, and the aperture dial to a particular aperture (*1.4*2 . . . 32), press the shutter release button. Depending on the film speed, the shutter speed is automatically controlled to the optimum exposure to match the aperture and the brightness of the subject. (The dots in the aperture scale indicate half f/stops). When the correct exposure is obtained, the correct exposure LED indicator in the viewfinder lights up. The shutter speed is controlled continuously within the range of 1 to 1/2000 seconds.

(4) Manual exposure mode
After setting the lens to its minimum aperture, the shutter dial to a particular speed (1, 2, . . . 2000), and the aperture dial to a particular aperture (*1.4*2 . . . 32), press the shutter release button. Depending on the film speed and the brightness of the subject, you will get either:

1. Correct exposure: LED correct exposure indicator in the viewfinder lights up.
2. Overexposure: LED overexposure indicator lights up.
3. Underexposure: LED underexposure indicator lights up.

When pressing the shutter release button after setting the shutter dial to B, the camera enters the electronically-controlled bulb mode and the LED exposure indicators go out.

(5) Program flash mode
When taking photographs in the program mode or shutter-priority exposure mode under conditions of lower than EV10 backlighting, after mounting a new AF lens, setting the built-in flash and external flash units (SB-15, SB-16B, SB-18, SB-20, or SB-22) to the TTL mode, and setting the

aperture to its minimum, the quantity of light can be controlled to the optimum preset aperture value for the film speed. Immediately after the built-in flash is raised or the power of an external flash is turned on, the shutter speed will be set to 1/100 sec. (However, when the shutter speed is set at B or 1-1/60 sec. in the S mode, the shutter speed is set as is.)

(6) Daylight flash mode
When taking photographs in the program flash mode, shutter-priority exposure mode under the conditions of brighter than BV5 backlighting, after mounting a new AF lens, setting the built-in flash or external flash unit (SB-15, SB-16B, SB-18, SB-20 or SB-22) to the TTL mode, and setting the aperture to its minimum, the quantity of light can be controlled to its optimum preset aperture value for the film speed or the intensity of backlighting on the subject. The shutter speed is controlled at 1/100 sec. (However, when the shutter speed is set at B or 1-1/60 sec. in the S mode, the shutter speed is set as is.)

(7) Auto exposure control in program flash mode
With the following combinations, after selecting the optimum aperture, the flash output is controlled in the TTL mode.

Flash unit: SB-15, SB-16, SB-18, SB-20, or SB-22 (TTL mode), or built-in flash
Lens: New AF Nikkor lens
Camera: P or S mode

The above combination is called Program Flash Mode (SBP).

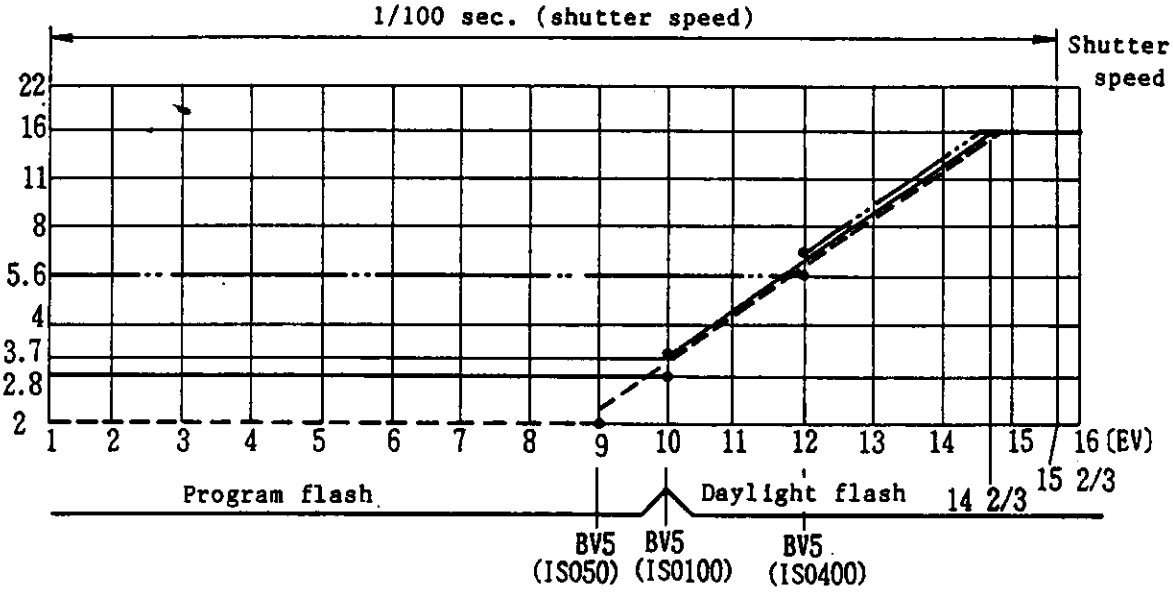
(8) The aperture is controlled by a position controller which counts the number of pulses after the aperture coupling lever moves. The aperture control value varies according to the ISO film speed and the maximum aperture of the lens. Refer to the following aperture value (the TTL mode is possible up to ISO 400).

ISO		25	50	100	200	400	800	1600
F/number	Built-in flash	1.4	2	2.8	4	5.6	8	11
	External flash	2.8	4	5.6	8	11	16	22

The F value varies by 1/3EV step. (If the f/number is lower than the above value, it is set to its maximum aperture.)

(9) In case of the program flash mode, the stop-down accuracy of the aperture coupling lever is $\pm$ 1.0EV as compared to the inspection made using a standard lens.

(10) The aperture value of the program flash and daylight flash modes. Exposure in the P mode is controlled as shown in the figure below.

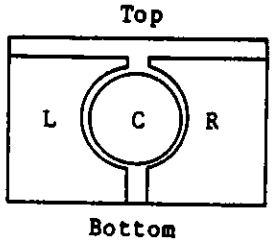


[In A mode, the aperture is set to a default value and the shutter speed is controlled at 1/100 sec. In M mode, the aperture is set to a default value and the shutter speed is controlled to a speed under 1/100 sec.]

——: ISO100, built-in flash, AF 50mm f/1.8
------: ISO 50, built-in flash, AF 50mm f/1.4
—·—: ISO 400, built-in flash, AF 35-105mm f/3.5-4.5
(No warning indicator is displayed between EV10-12 at ISO400)

Light measurement

1) Maximum aperture light metering system
2) Special silicon photo diode for multiple light metering
3) A photo diode for TTL flash is mounted under the mirror box.
4) Multi-pattern light metering
   Usually the correct exposure is calculated according to the light metering value divided into three areas of the picture as shown in the figure below in the P, S, or A mode.
   In the daylight flash mode, backlight and flash illumination can be controlled according to the light metering output calculated by Nikon's triple-sensor metering system as shown in the figure below. In the M mode or when the AEL button is depressed, the light metering value is controlled by the light metering output calculated at the center area.



Metering range
EV1-19 (ISO100, f/1.4)

Exposure meter
Three LED indicators in the viewfinder light up when the shutter release button is depressed halfway or the pre-release timer is activated.

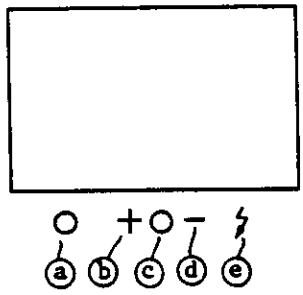
Film speed
Auto (ISO 25-5000)
When using DX-coded film, the film speed is automatically set by reading the CAS code printed on the film cartridge. When non-DX-coded film, the film speed is automatically set to ISO100.

Auto exposure lock
1) When depressing the AEL button on the front cover, the centerweighted metering value is stored and exposure is controlled based on that value.
2) Auto exposure lock is effective only while the shutter release button is pressed lightly and the power is not off.
3) When using flash, the auto exposure lock is automatically cancelled.
4) When the auto exposure lock button is depressed in the M mode, the exposure metering value is locked. But the shutter speed is set to a default value.

Viewfinder
1) Eye-level viewfinder with pentaprism
2) Screen: Type B (matt surface) clear matt with focus bracket
3) Quick return mirror; half mirror with 40% transmission (without mirror-up device).
4) Viewfinder coverage; 92% (both vertical and horizontal).
5) Viewfinder magnification; 0.8 (50mm lens at infinity distance scale)
6) Viewfinder diopter; -1 diopter (visual field), -1.87 diopter (display)

Viewfinder eyepiece
1) Square type (FG type)
2) Attachable eyepiece correction lens and rubber eyecup
3) Attachable eyepiece magnifier with eyepiece adapter (23FAPN)

Inside the viewfinder
1) Three LED exposure indicators:
   b. (+) red LED overexposure indicator
   c. (o) red LED correct exposure AE indicator
   d. (-) red LED underexposure indicator
2) Flash indicator
   e. Red LED flash ready-light indicator
3) Focus indicator
   a. Green LED in-focus indicator



Pre-release switch

1) By depressing the shutter release button halfway, the switch is turned on and light metering continues for 8 seconds after lifting the finger off the shutter release button.
2) Light metering continues for approx. two seconds after lifting the finger off the shutter release button after the completion of film advance.
3) With the built-in flash in the raised position, the pre-release timer operates until recycling is completed. During this time, indicators are displayed and light metering continues.

Indicators and warning in the viewfinder

AF indicator and warning

1) The green LED focus indicator lights up in both auto and manual modes when the correct focus is obtained (while depressing the shutter release button halfway in the AF mode and for eight seconds after that in the manual mode).
2) The green LED focus indicator goes out and the shutter release is locked in the AF mode when the lens is focused in front of or behind the subject.
3) The green LED focus indicator blinks and the shutter release is locked when AF focus detection is impossible (light intensity is low or low contrast).

Exposure indicators and warnings

1) P, A, or S mode.
a) The red LED exposure indicator (o) lights up when correct exposure is obtained in the P, A, or S mode.
b) The red LED exposure indicator (o) blinks at a frequency of 2 Hz to warn of possible camera shake when the shutter speed is 1/30 or slower in the A and P modes. (In the S and M modes, no warning indicator appears.)
c) The red LED overexposure (+) or underexposure (-) indicators blink and the shutter release is locked when the shutter speed and aperture value are not within the available range of the subject brightness and/or ISO film speed.
d) While depressing the AEL button, light metering is automatically shifted from multi-pattern metering to centerweighted metering, and is locked in this state.
e) In the A mode, when the aperture is set wider than the lens minimum aperture value, it is set to the lens minimum aperture, and when the aperture is set smaller than the maximum aperture value, it is set to the maximum aperture value. No warning indicator is displayed.
f) In the S mode, the shutter release is locked when the shutter dial is set to B and the indicators go out.

2) Manual mode
a) If the exposure value set in the M mode is within the range of ±1/3EV for the optimum exposure value, the red LED exposure indicator (o) lights up.
b) If the exposure value set in the M mode is between the range of +1EV and +1/3EV, the red LED correct (o) and overexposure (+) indicators light up simultaneously.

3) If the manually set exposure value is between -1/3EV and -1EV for the correct exposure value, the red LED correct indicator (o) and underexposure indicator (+) both light up.

4) When exposure metering is carried out when light is above the camera's exposure metering range, or over +1EV (in the M mode), the red LED overexposure indicator (+) lights up, or when it is performed when light is below the camera's exposure metering range, or less than -1EV (in the M mode), the red LED underexposure indicator (-) lights up.

5) When the shutter speed dial is set to B, the AE indicator goes out.

6) When the aperture is set to an f/stop larger than the minimum aperture of the lens, or set to one smaller than the maximum aperture of the lens, the aperture will be set to the minimum and maximum aperture of the lens, respectively. (No warning indicator is displayed.)

Flash ready-light indicator and warning

1) When both built-in and external flashes are off and when the camera determines that the daylight flash or low light flash mode is necessary, the LED ready-light indicator (⚡) in the viewfinder blinks when the shutter release button is depressed halfway. (However, the LED ready-light indicator does not blink for daylight flash in the M mode.)

2) When the flash is turned on and fully recycled, the LED ready-light indicator (⚡) lights up when the shutter release button is depressed halfway. If the light intensity of the backlight is less than EV10, the LED exposure indicators go out.

3) When the flash (either built-in or external) fires at full output, the LED ready-light indicator (⚡) blinks for two seconds to indicate this.

4) While the flash (either built-in or external) is recycling, the LED ready-light indicator (⚡) goes out, but the shutter release button is locked only when the built-in flash is used.

5) When the camera selector of the SB-E and the SB-19 is set to EM or B, and the film speed is higher than ISO 400 in the TTL mode, the LED ready-light indicator (⚡) blinks.

6) When both built-in and external flashes are on, the built-in flash takes precedence and displays indicators (2 through 5 above) depending on the conditions of the built-in flash.

Others

1) When a lens other than a new AF lens (one without AF contacts) is mounted or no lens is mounted, the in-focus indicator goes out, but the LED exposure indicators and LED flash ready-light still light up and shutter release is possible. (However, when the shutter speed dial is set to A or with the aperture dial at S, the shutter release is locked.)

2) When the aperture dial is not set to the minimum aperture, both the overexposure (+) and underexposure indicators (-) blink alternatively, and the shutter release button is locked (effective only when a lens with AF contacts is mounted).

Table of viewfinder indicators and warnings

		Green o	+ o -	⚡	Remarks
1) AF	1. In focus	Lights up			A:While the shutter release button is depressed halfway M: For 8 seconds
	2. Focused in front or behind subject	Goes out			A: Shutter release is impossible M: Shutter release is possible
	3. Distance detection is impossible	Blinks			A: Shutter release is locked and indicator is displayed while the shutter is depressed halfway M: Shutter release is possible and indicator goes out
2) AE	1. AE photography is possible (high speed)		o lights up		Always in S mode
	2. AE photography is possible (but possible camera shake)		o blinks		In A and P modes
	3. Above AE metering range		+ lights up		Shutter release is locked
	4. Below AF metering range		- lights up		Shutter release is locked
	5. M mode (±1/3EV)		o lights up		
	6. M mode (±1EV-+1/3EV)		+o light up		
	7. M mode (-1/3EV--1EV		o- light up		
	8. M mode (above light metering range, over +1EV)		+ lights up		Shutter release is not locked
	9. M mode (below light metering range, less than -1EV)		- lights up		Shutter release is not locked Shifts to centerweighted metering
	10. AE lock		1-4		
	11. Set to B		Goes out		
3) SB	1. Flash in-use indicator			Blinks	Low light (under EV10), daylight flash (over BV5), flash power is off prior to shooting
	2. Completion of recycling			Lights up	AE indicator goes out when flash is on in low light

Only while shutter release button is depressed halfway	3. Full flash warning	Blinks	After shooting
	4. External flash setting is not correct	Blinks	Prior to shooting, flash power is on.
	5. Built-in flash is recycling	Goes out	Shutter release is locked.
	6. External flash is recycling	Goes out	Shutter release is not locked.
	7. Both built-in and external flashes are on		Built-in flash works
4) Others	1. Warning for incorrect small aperture setting	+ - blink alternately	Shutter release is locked self-timer LED lighs up
	2. Film end		

Shutter release

1) By depressing the shutter release button fully, the release switch is turned on and the motor starts to activate the release operation.
2) When an AF lens is mounted and the AF mode is selected, shutter release is possible only when correct focus is obtained.

Film loading

Built-in easy film loading system (normal film advance). When depressing the shutter release button fully after pulling film leader out to red index mark and closing the camera back, the film advance indicator turns to "1" after advancing four blank frames, then stops. During this operation, the mirror is up for each frame and film advances without opening the shutter curtain.

Film advance

1) Auto film advance by built-in motor drive.
2) Self-timer LED indicator lights up for eight seconds at the end of the roll. (The indicator lights up repeatedly when the shutter release button is depressed once again.)

Frame counter

Automatically returns to the S position.

Film rewinding

1) Auto film rewinding with built-in motor.
2) Sliding the film rewind lock lever located behind the top cover and pushing the rewind button, the film rewind switch turns on and film rewinding begins.
3) While the film is rewinding, the frame counter counts backward. (This does not occur when there is no film in the camera.)
4) After completion of rewinding, the rewind button returns to its original position and the motor stops automatically.

Self-timer

1) Electronically controlled.
2) After depressing the self-timer button on the top cover, the camera enters the shutter pre-release state and the shutter is released in approx. 10 seconds.
3) If the self-timer button is depressed again within 10 seconds, the self-timer operation is cancelled.

4) The LED self-timer indicator blinks at a rate of 2Hz for the first 8 seconds, then lights up continuously for the last 2.
5) If the shutter release button is depressed fully while the self-timer is operating, the shutter cannot be released. In other words, the self-timer operation takes precedence.
6) In self-timer operation, the AF lens is not driven unless the release button is depressed halfway.

Power supply

Four AA-type alkaline-manganese batteries, four high-grade AA-type manganese batteries, or four AA-type NiCd batteries can be installed in the battery chamber in the handgrip.

Checking battery power

1) Normal	Shutter pre-release timer is activated for approx. 8 seconds
2) Insufficient	Shutter pre-release timer is activated for approx. 2 seconds
3) Use new batteries	No viewfinder LED exposure indicator lights up, shutter release is locked, or AF lens servo motor is locked.

Power consumption

1) Stand-by	Approx. 5 μA
2) For light metering and distance detection (when depressing the shutter release button halfway)	Approx. 80 mA
3) For driving the AF lens	Approx. 250 mA
4) For shutter release operation	Approx. 100 mA
5) For advancing the film (average)	Approx. 750 mA
6) For rewinding the film	Approx. 1,000mA (Results obtained at room temperature)

Camera back

1) Non-detachable
2) Film cartridge confirmation window, film advance indicator (but no memo holder).
3) Open the camera back by sliding the camera back lock release button downward.

Tripod socket

U 1/4 inches

Data back contacts

None provided

Sequence error warning indicators

Safety measures to prevent sequence errors (LED self-timer lights up for 8 seconds, and goes out when the shutter dial is set to L).

1) Aperture control by reverse motor rotation is not completed in a certain period of time.
When no mirror SW signal is received after the shutter is released (after the motor starts rotating in the reverse direction), the motor stops by rotating the motor in the normal direction, then braking the motor after braking the motor rotation in the reverse direction.

2) The film advance and mirror down operations by normal motor rotation are not completed within a certain period.
The motor stops by braking the motor in 10 ms. after the closing shutter curtain Mg is turned off following shutter release and the output of the closing shutter curtain SW signal (or when no film advance complete SW signal is received after the motor starts rotating in the normal direction).

3) If the mirror remains in the "up" state during the previous shutter release operation (for instance, when the power is turned off while making time exposures), the motor stops by braking the motor when detecting that the closing shutter curtain SW is on and the film advance completion SW is off.

4) If the mirror stops while it is going back down during the previous shutter release operation (or when film advance stops before the completion of film advance; for example, when film advance becomes impossible because the film is advanced to the end of roll), the motor stops by braking when detecting that the film advance completion SW is off; the self-timer LED indicator also lights up.

5) Film advance completion SW failure
If the film advance completion SW is on when the mirror starts moving down (or the motor starts rotating in the normal direction), the motor stops after rotating the motor in the normal direction and braking the motor.

6) Mirror SW failure
(See item 1.)

Built-in TTL flash

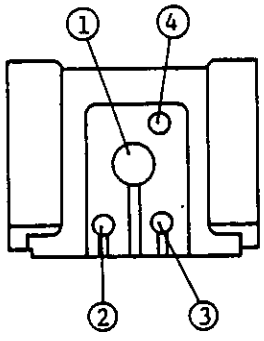
1) Guide number:	12
2) Parallel control system	
3) Angle of coverage:	35mm lens or longer
4) Flash recycling time:	Approx. 4.5 sec. (fresh alkaline batteries at room temperature)
5) Flash ready indicator:	LED flash ready-light lights up inside the viewfinder
6) Number of flashes:	More then 8 rolls of 36-exp. film (with fresh alkaline batteries at room temperature)
7) Pop up:	Manual
8) Cannot be used simultaneously with external flash:	Built-in flash takes precedence

Flash synchronization
1) X-contact only (synchronization under 1/100 sec.)
2) No sync terminal
3) When using Nikon dedicated electronic flashes (SB-15, SB-16B, SB-18, SB-20, or SB-22):
(1) The flash ready-light in the viewfinder lights up when recycling is completed while power is on;

(2) In the P or A mode (or the S and M modes with a shutter speed faster than 1/100 sec.), the shutter speed is automatically set to 1/100 sec. immediately after the flash is turned on. When the shutter speed is set to 1/100 sec. or less in the S or M mode, the shutter speed is set as is;
(3) The LED flash ready-light in the viewfinder blinks for 2 seconds after shooting when the flash fires at full power;
(4) The LED flash ready-light lights up when the film speed is set beyond the acceptable film speed range (over ISO 400);
(5) The LED flash ready-light lights up or blinks only while the shutter pre-release timer is operating;
(6) The flash does not fire until the frame counter indicates "1."

Accessory shoe (the following four contacts are provided)

1) Flash sync contact
2) Ready-light contact
3) TTL light metering contact
4) Monitor contact



Dimensions: Approx. 153.9(W) x 65.58(D) x 102.15(H)mm
(when built-in flash is not raised)

Weight: Approx. 645g (excluding batteries)

Number of 36-exposure rolls that can be taken
(By driving the lens from infinity to the closest distance for each shot)

	Battery Type	With AF 50mm f/1.8 Room temp.	-10 C
No flash	Alkaline	50 rolls	11 rolls
	Manganese	20	2
	NiCd	16	12
Flash is used for half the shots	Alkaline	20	1
	Manganese	8	---
	NiCd	7	1

(Approx. value)

[2] MECHANISM

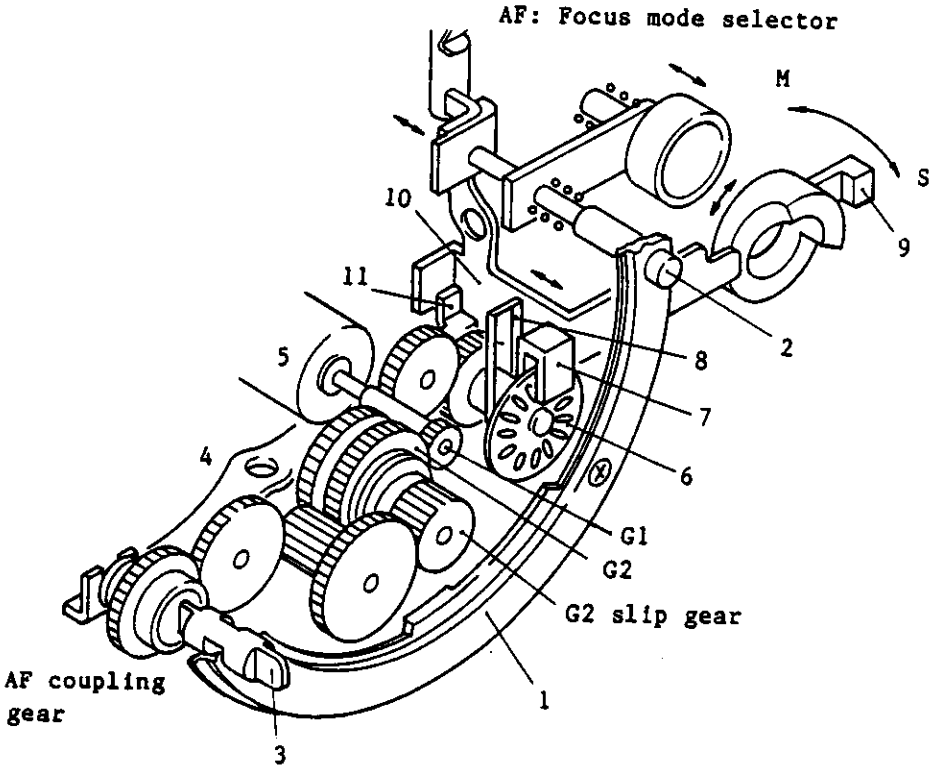


Fig. 1

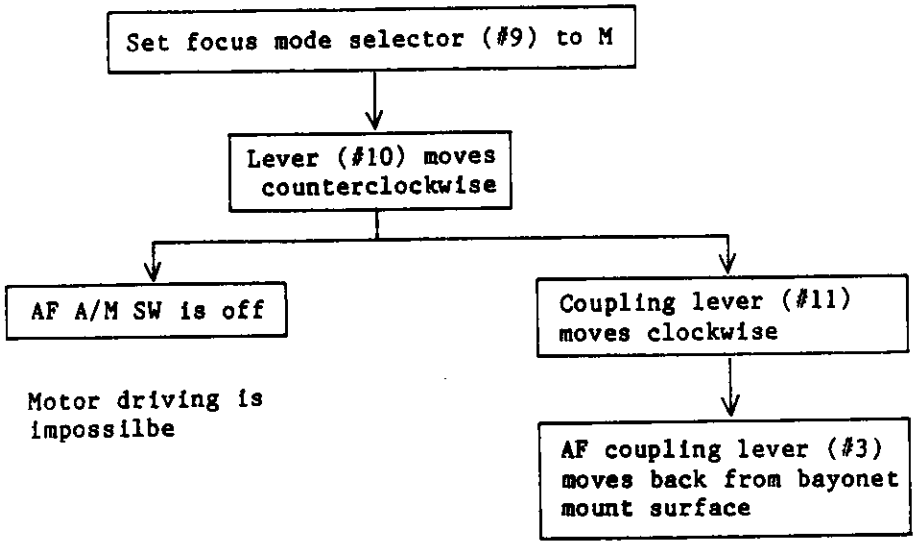
1. AF control mechanism

Fig. 1 shows a schematic diagram of the AF control mechanism as viewed from the front of the camera. [AF (S) mode] #1 is the bayonet mount of the camera on which the lens is mounted. The mounting position of the lens is determined by the stopper pin (#2) to which the lens optical driving coupling is attached. #3 is the AF coupling lever on the camera which connects to the motor (#5) through a reduction gear system (#4). Focus adjustment is made by this motor.

In the reduction gear system, there is a "slip" mechanism, comprised of wave washers, which protects the AF control mechanism by slipping when overload exceeding a certain level is applied. #6 is called the relative distance signal plate and contains 18 holes around the outside. The encoder is composed of the holes and the photo interrupter (#7). The relative distance signal plate (#6) is placed between the plate spring (#8) and a slight load is applied so that the plate does not rotate by itself except when driven by G1 and the idle gears.

Focus adjustment is controlled by the motor which rotates depending on the data calculated by the amount of defocus and the direction necessary for correct focus through a focusing condition detection system and a calculation circuit. The AF system is controlled by counting the number of pulses from the encoder.

M mode


Set focus mode selector (#9) to M
Lever (#10) moves counterclockwise
AF A/M SW is off
Motor driving is impossilbe
Coupling lever (#11) moves clockwise
AF coupling lever (#3) moves back from bayonet mount surface

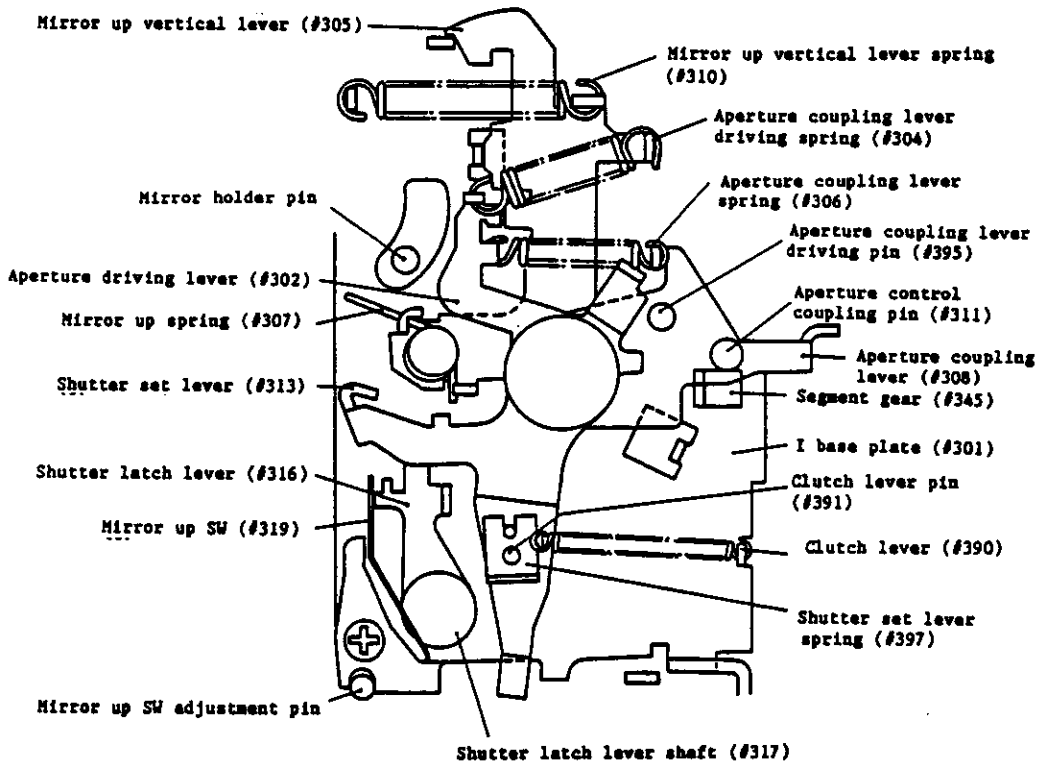
2. Mirror driving mechanism

1) Outline

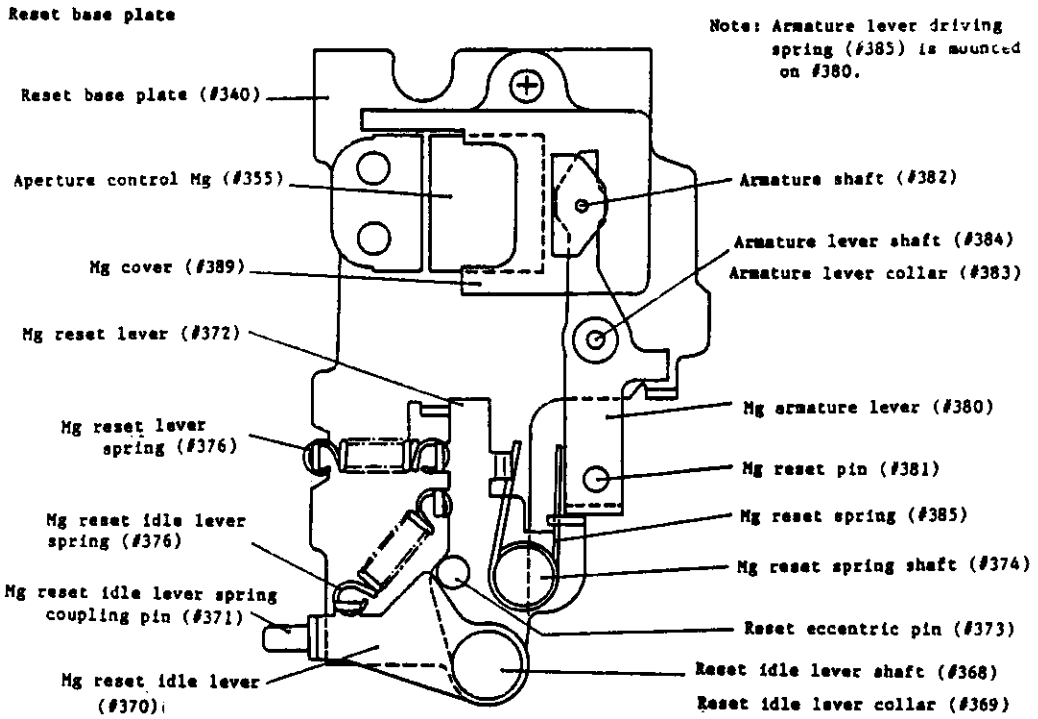
This camera uses a full aperture light metering system that allows the camera to set the aperture and move the mirror up simultaneously by moving the mirror driving lever with a built-in motor (angle of rotation of the reference shaft: 0° to -95°). The aperture is controlled by stopping the aperture coupling lever at the position where the aperture value is preset by counting the number of pulses with the photo interrupter and photo coupler.

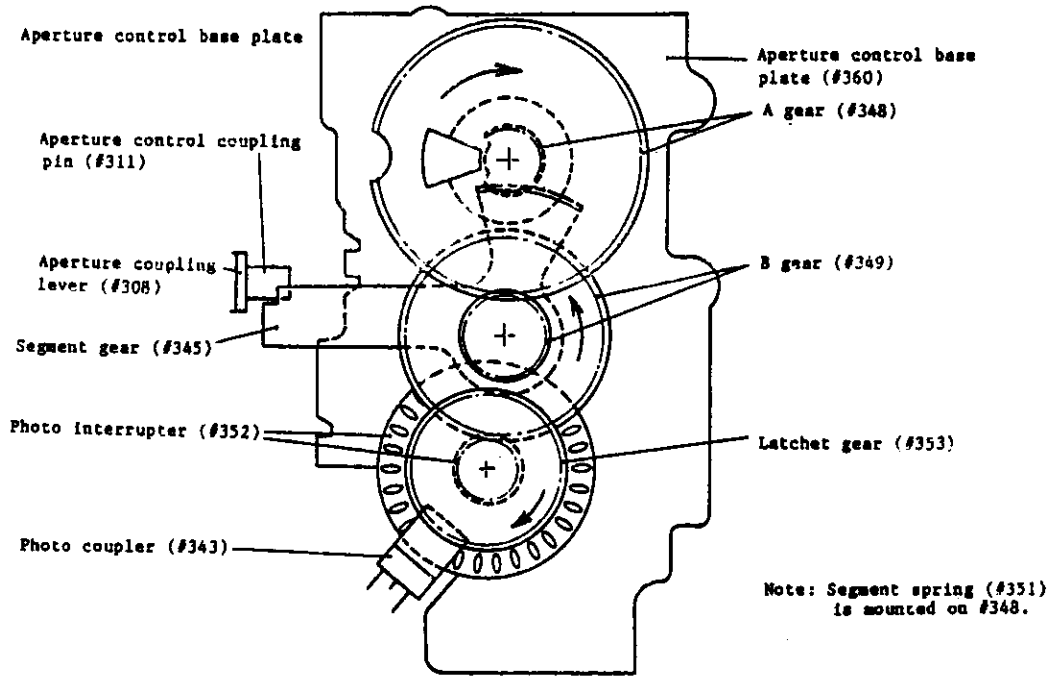
2) Operating diagram

I base plate

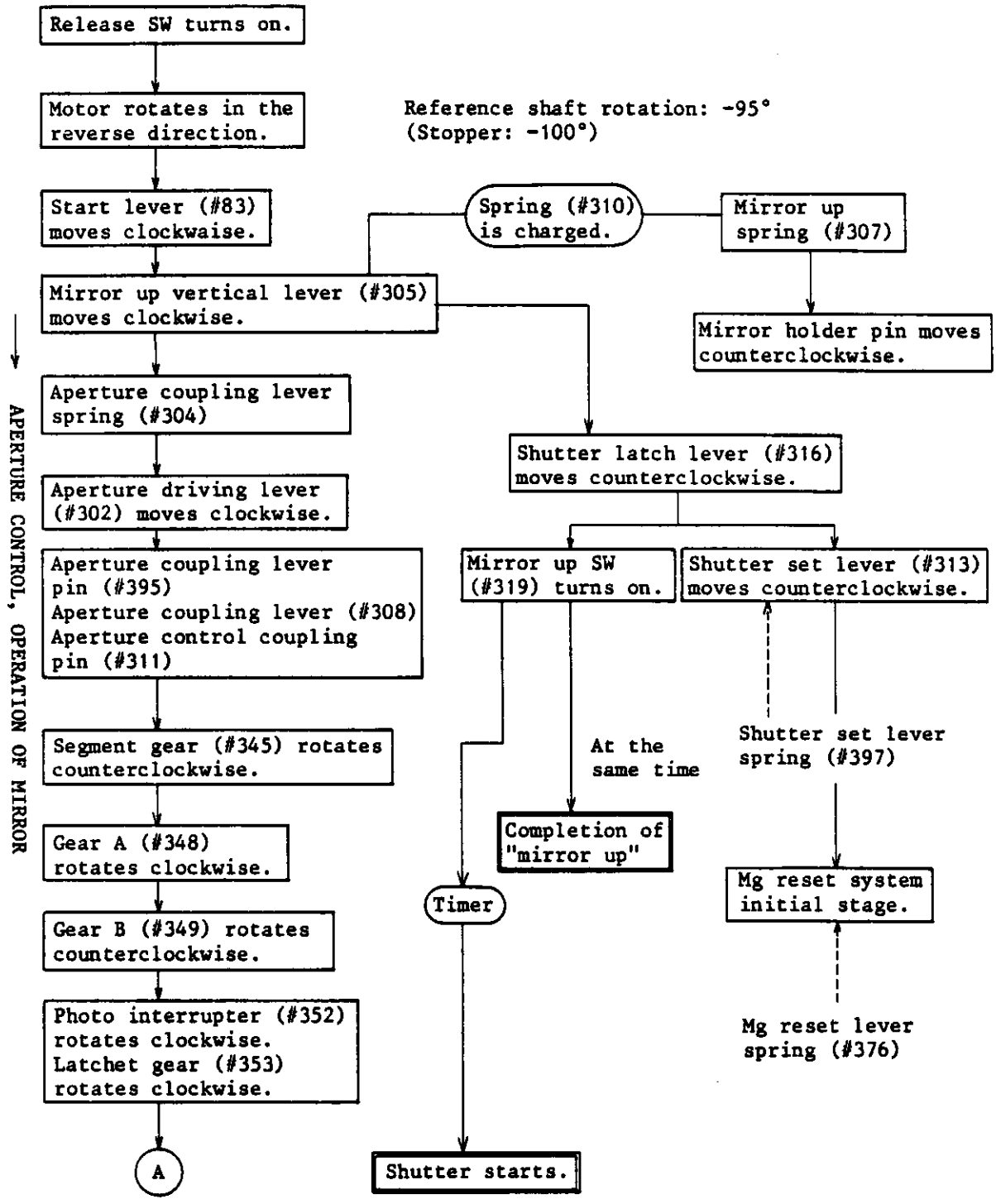


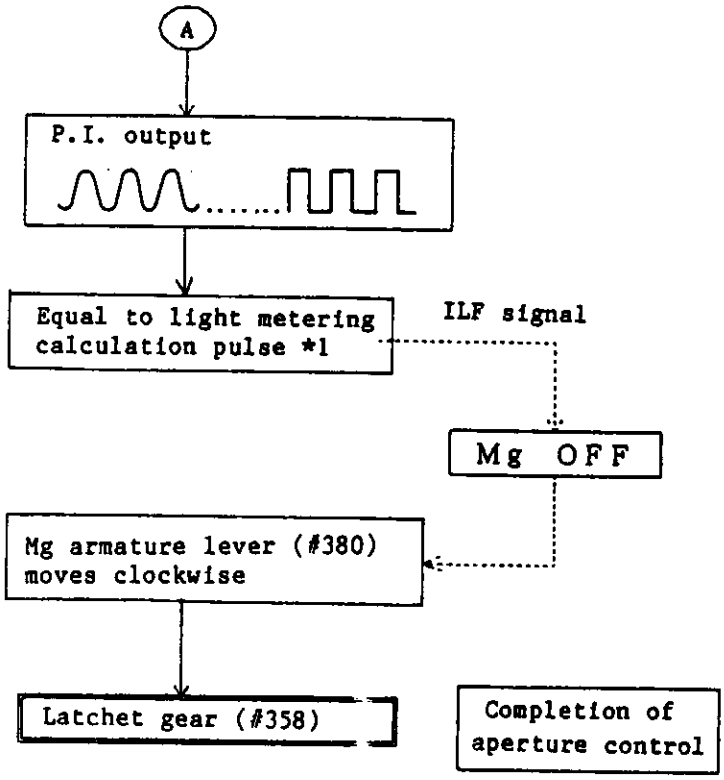
3) Mirror driving system





3) Mirror driving sequence during shutter release operation



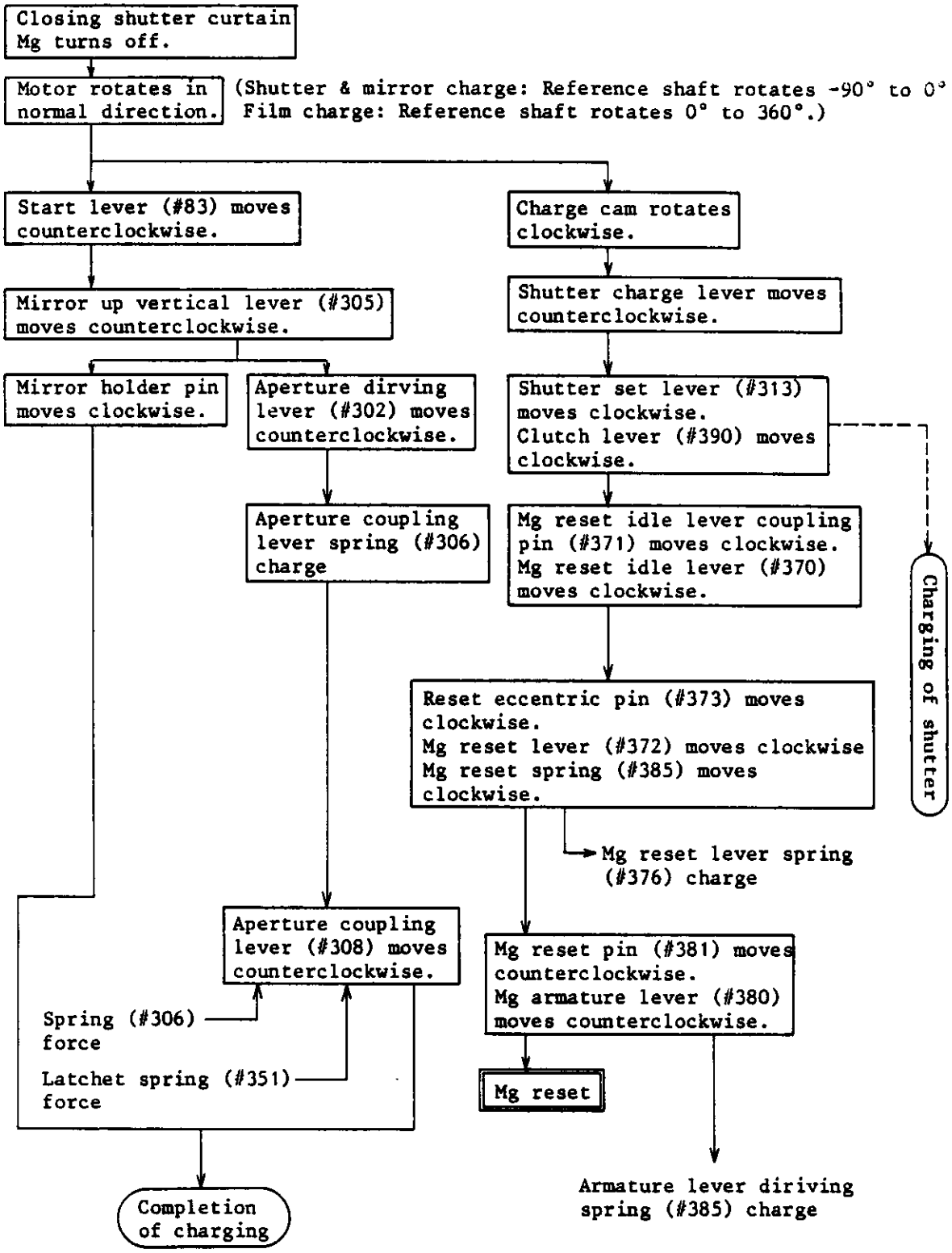


*1

(1) This camera controls the aperture in every mode (P, A, S, and M). Since only new AF lenses are usable with this camera, it is necessary to preset the aperture to its minimum in every mode (P, A, S, and M), because f-fo, fo signals are not provided. Furthermore, the shutter cannot be released unless the aperture is set to its minimum value.

(2) Number of output pulses per step
For the first 1EV: 12 pulses
After the first 1EV: 8 pulses

4) Mirror driving system during charging



3. Film rewind mechanism

Slide the film rewind lever and push the film rewind button

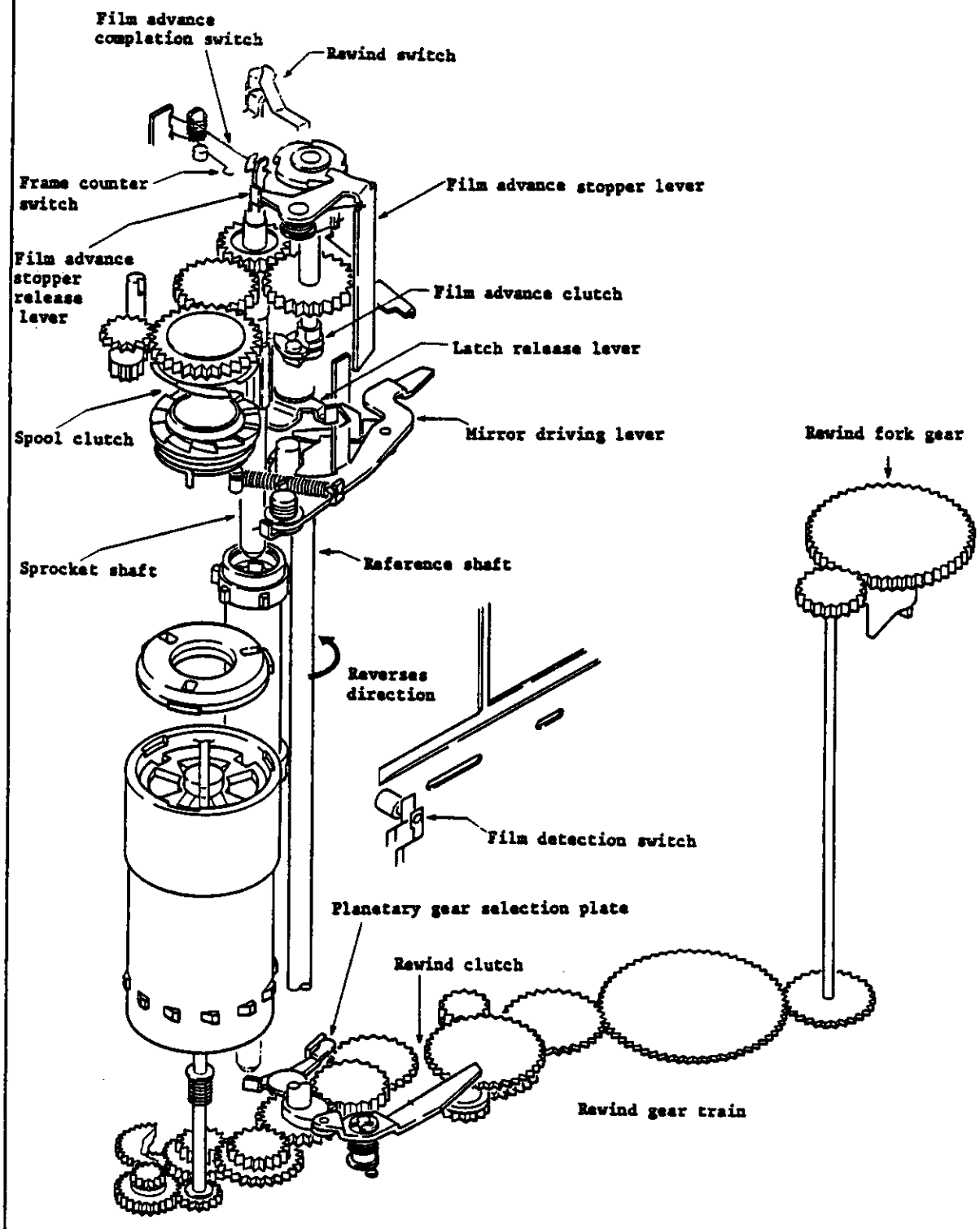
(1) By pushing down the film sprocket shaft and latch release lever, the film-advance stopper release lever and the planetary gear selection plate move to release the latch lever and the mirror driving lever reverts to the locked state. The film rewind clutch engages the film rewind gear train.

(2) By pushing the film sprocket shaft still further, the film rewind switch turns on. If the film detection switch is on (when film is loaded), the motor rotates in the reverse direction and the film rewind clutch engages the rewind gear, beginning the film rewind operation.

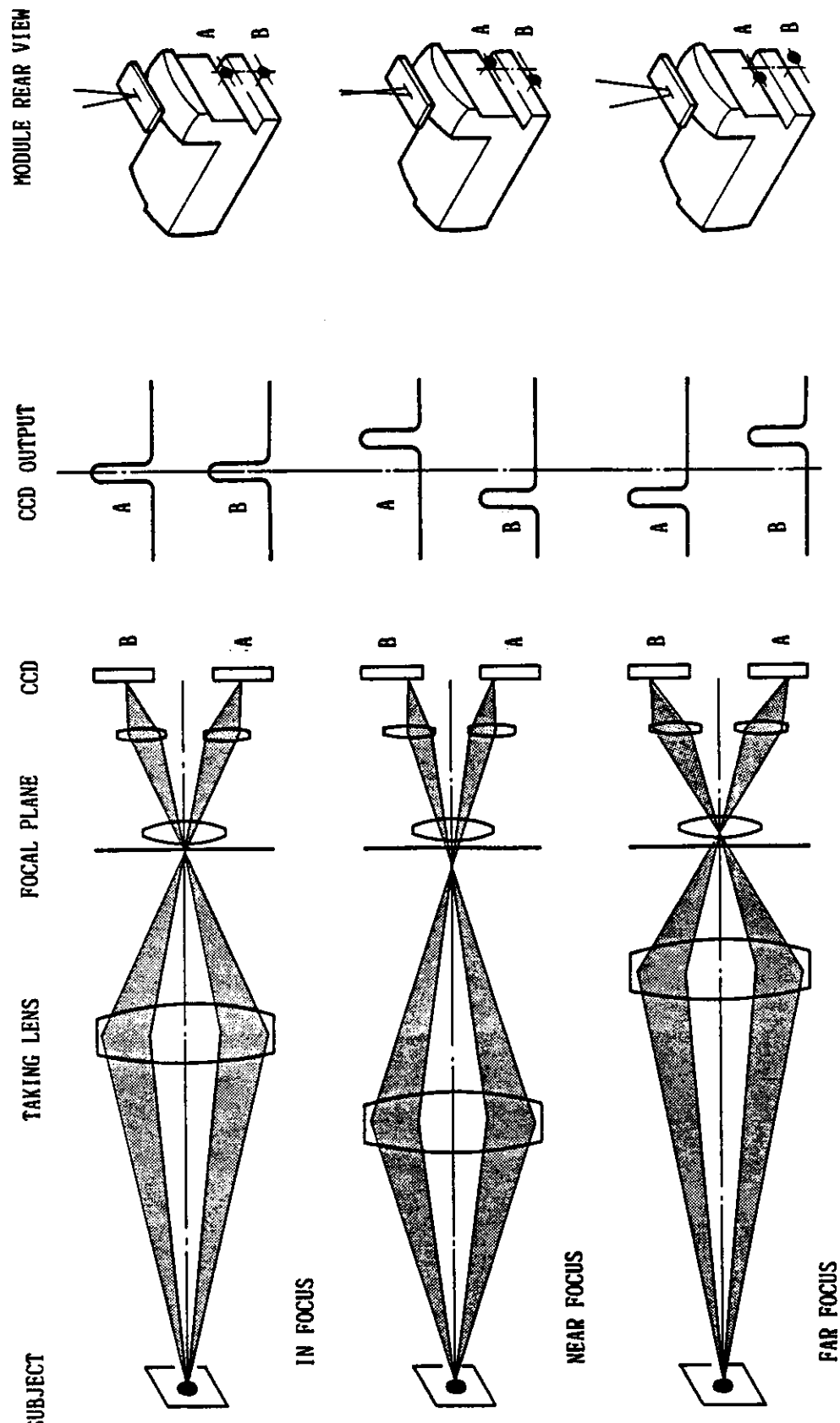
(3) The film sprocket shaft is set to this state (by being pushed down). In this state, the film rewind stopper is released, the mirror driving lever reverts to the locked state, and the film rewind clutch remains in the film rewind state. If the reference shaft rotates in the reverse direction, the mirror driving lever does not operate and the film rewind clutch idles. When the film is rewound, the sprocket rotates and the frame counter rotates in the reverse direction by gears. The film take-up spool also is rotated by the film, but the spool and the clutch idle because of the slow rotation speed of the spool at the spool clutch.

(4) After the frame counter switch turns from on to off, the film detection switch signal detects the existence of the film. When the film detection switch turns from on to off, the film rewind operation is completed.

(5) When film rewinding is completed, the film sprocket rotates in the normal direction for an instant to release the setting of the sprocket shaft, and the motor stops in the state that the film rewind stopper is pushed down.


Film advance completion switch
Rewind switch
Frame counter switch
Film advance stopper lever
Film advance stopper release lever
Film advance clutch
Latch release lever
Spool clutch
Mirror driving lever
Rewind fork gear
Sprocket shaft
Reference shaft
Reverses direction
Film detection switch
Planetary gear selection plate
Rewind clutch
Rewind gear train

BASIC PRINCIPLE OF AF SYSTEM



In focus

The subject is focused on the focal plane. Light coming from the subject through the right side of the taking lens converges an image on the CCD line sensor (A) by way of a divided spherical reflection mirror. Likewise, light coming from the subject through the left side of the taking lens converges an image on the other CCD line sensor (B). The images on both A and B CCD's are the same with no refraction and the CCD output is the same as well.

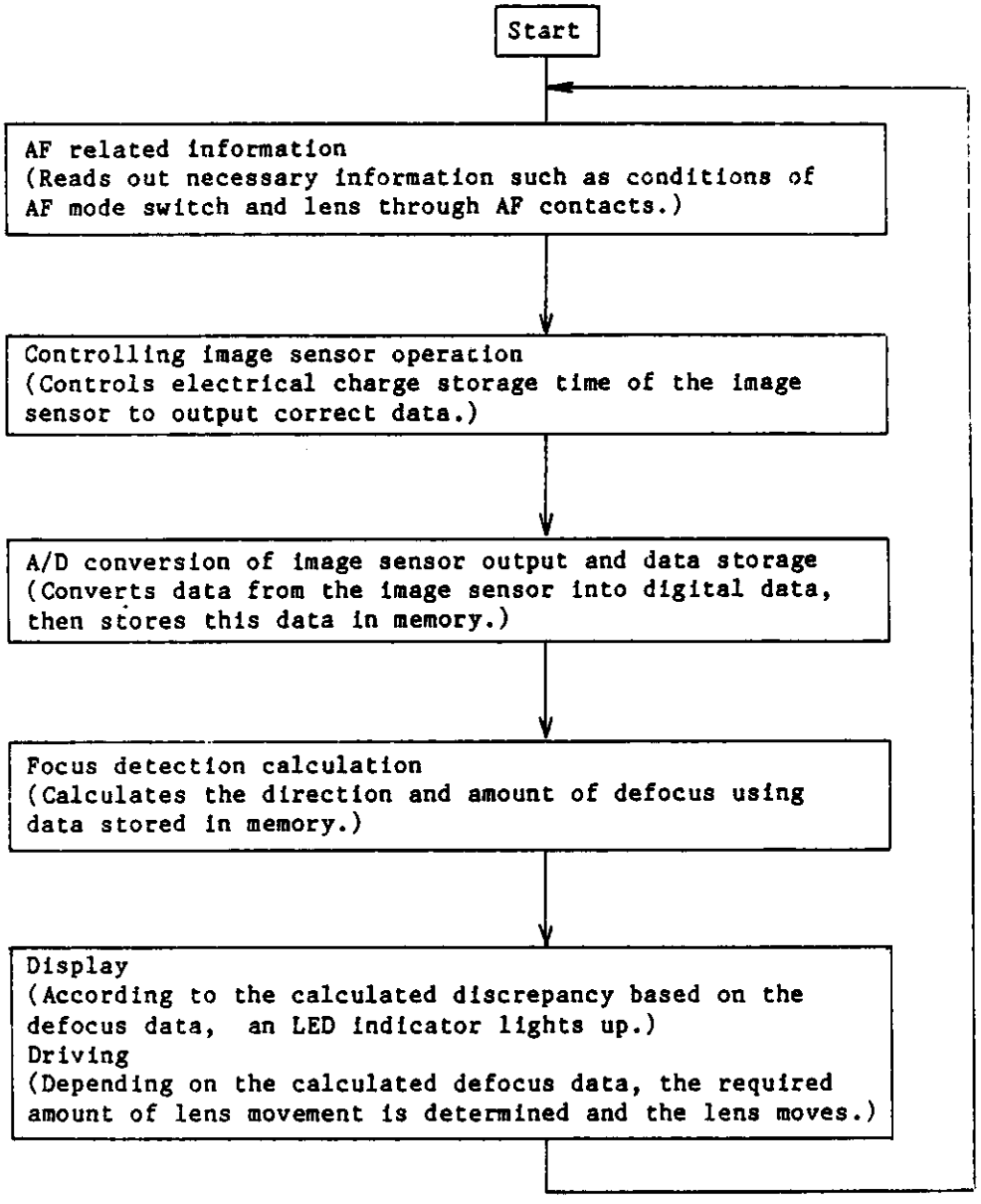
Near focus

When the image of the subject is focused in front of the focal plane (closer to the subject), the image focused on A moves toward the right as compared to that of the situation when the subject is in-focus, while the image focused on B moves toward the left (see rear view of module). The CCD reads out these discrepancies (magnitude and direction), and calculates the focusing detection by using this information and various parameters. Based on this calculation, the correct focus can be obtained, which lights up the LED indicator and moves the taking lens with the AF motor.

Far focus

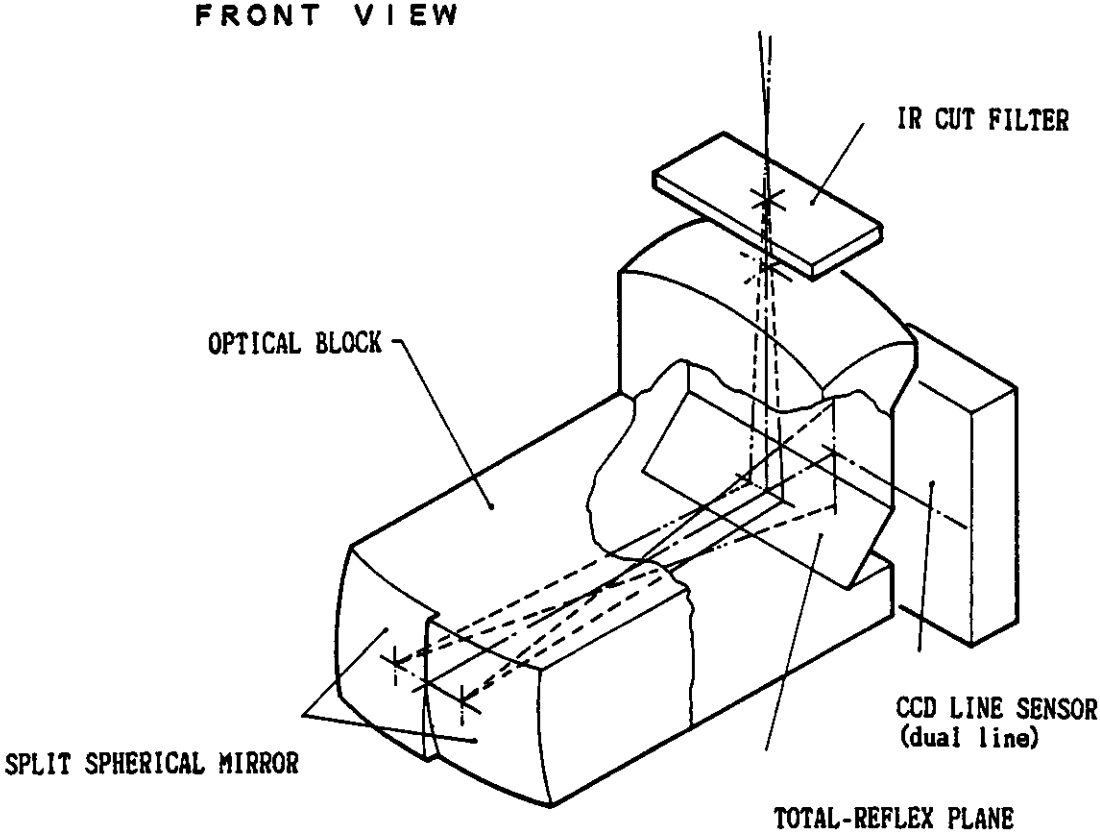
When the image of the subject is focused behind the focal plane (away from the subject), the image focused on A moves toward the left as compared to that of the in-focus condition, while the image focused on B moves toward the right (again see rear view of module). The image on the CCD is now the opposite of near focus. The camera senses this and makes the appropriate calculations.

Concept of AF operation

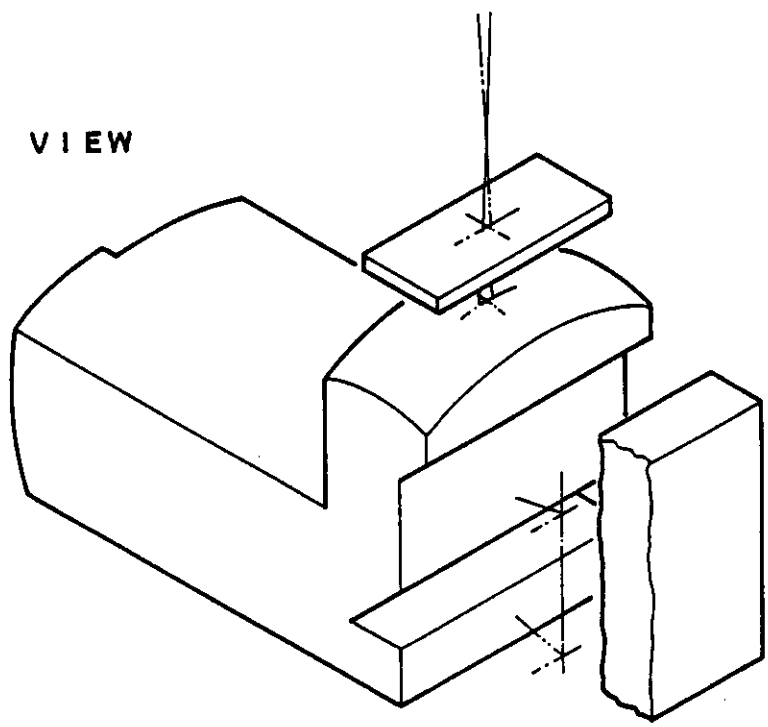


AF SENSOR MODULE ILLUSTRATION

FRONT VIEW

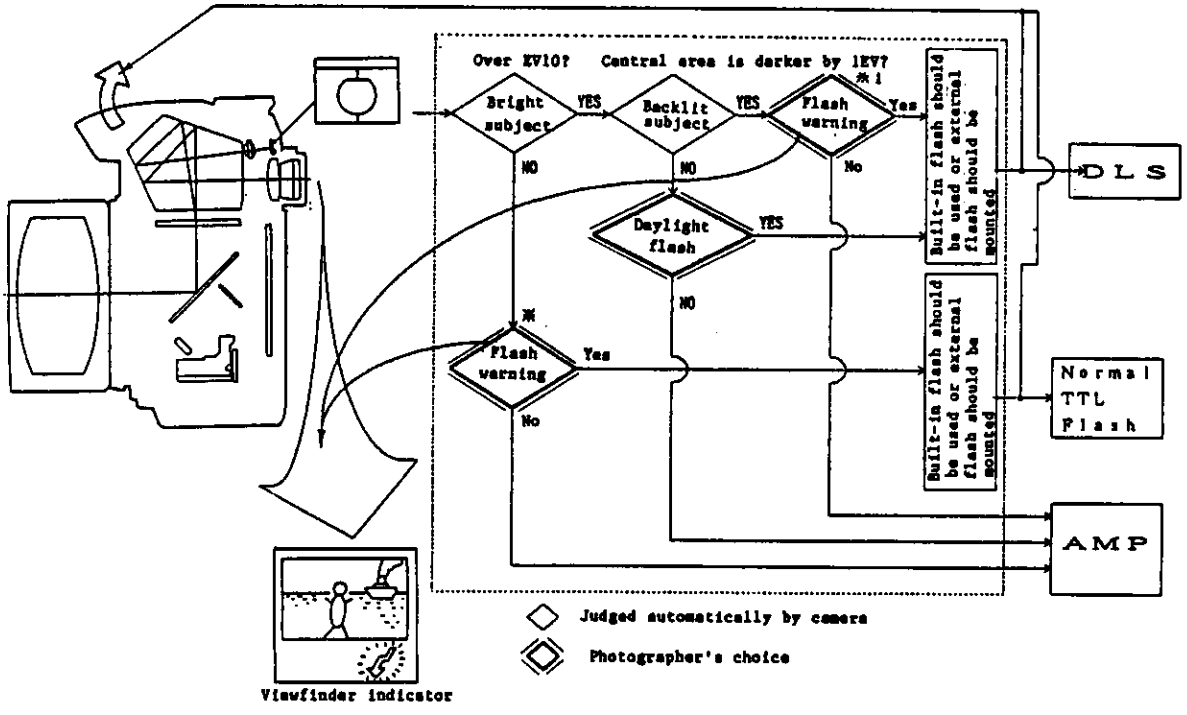


REAR VIEW



5. AMP and DLS system

Comprehensive system
Light coming from the subject enters Nikon's three separate-area silicon photo diode (SPD). The quantity of the light is logarithmically decreased, amplified, A/D converted successively and input into the CPU. According to the calculation algorithm of the AMP and DLS, the CPU controls the indicators in the viewfinder, the shutter speed, and performs TTL flash control.



* The LED flash ready-light blinks when flash power is off and the shutter release button is depressed halfway. When flash power is turned on, the LED exposure indicators go out, then the LED flash ready-light lights up when recycling is completed.

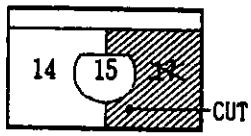
AMP

Based on the quantity of light coming into the three separate-area SPD, light metering can be controlled by selecting one of the three metering pattern methods, such as (1) centerweighted metering, (2) average metering, and (3) low-light zone weighted metering. Like multi-pattern metering on the FA camera, high and low intensity light are excluded.

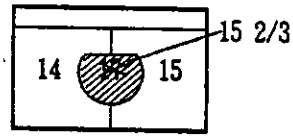
Table of brightness patterns

High brightness limit cutting process

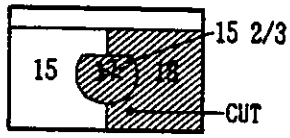
(1) One surrounding area > 15-2/3



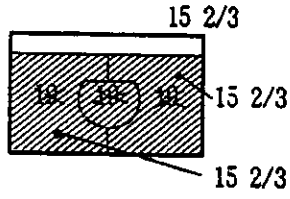
(2) Center > 15-2/3



(3) Two areas > 15-2/3

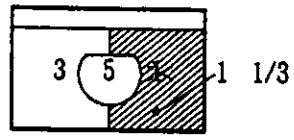


(4) Two areas > 15-2/3

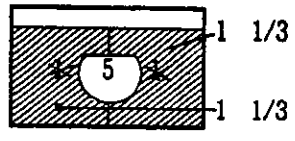


Low brightness limit cutting process

(5) One surrounding area < 1-1/3



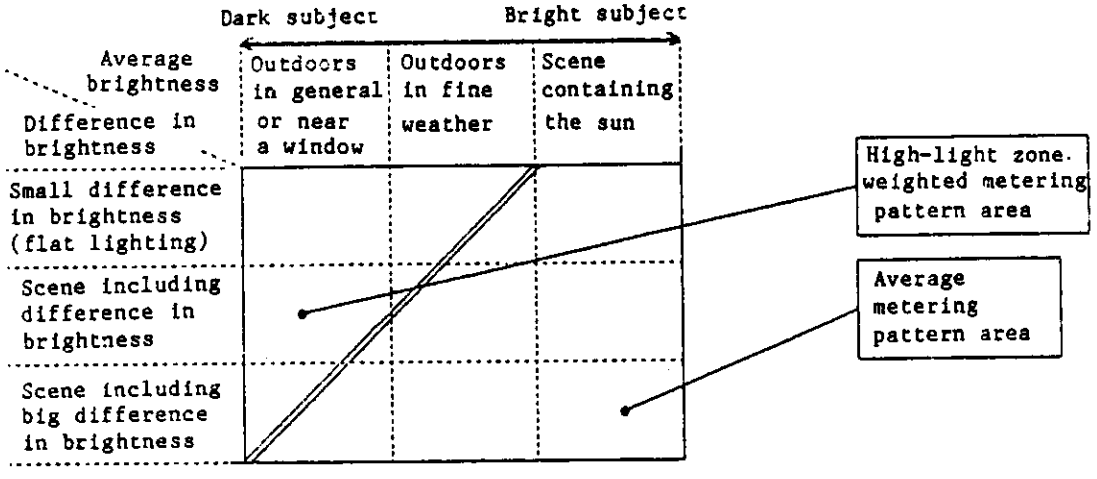
(6) Two surrounding area < 1-1/3



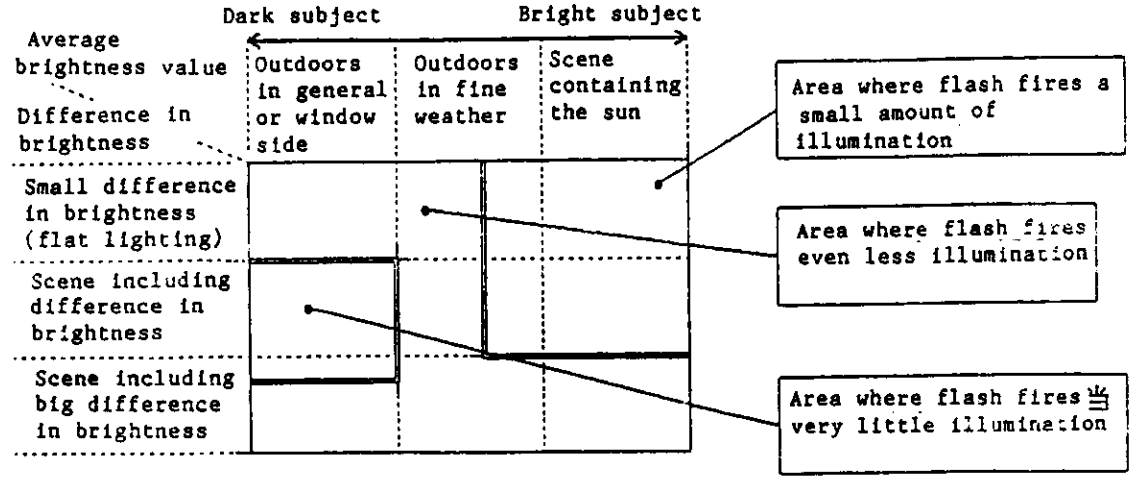
DLS

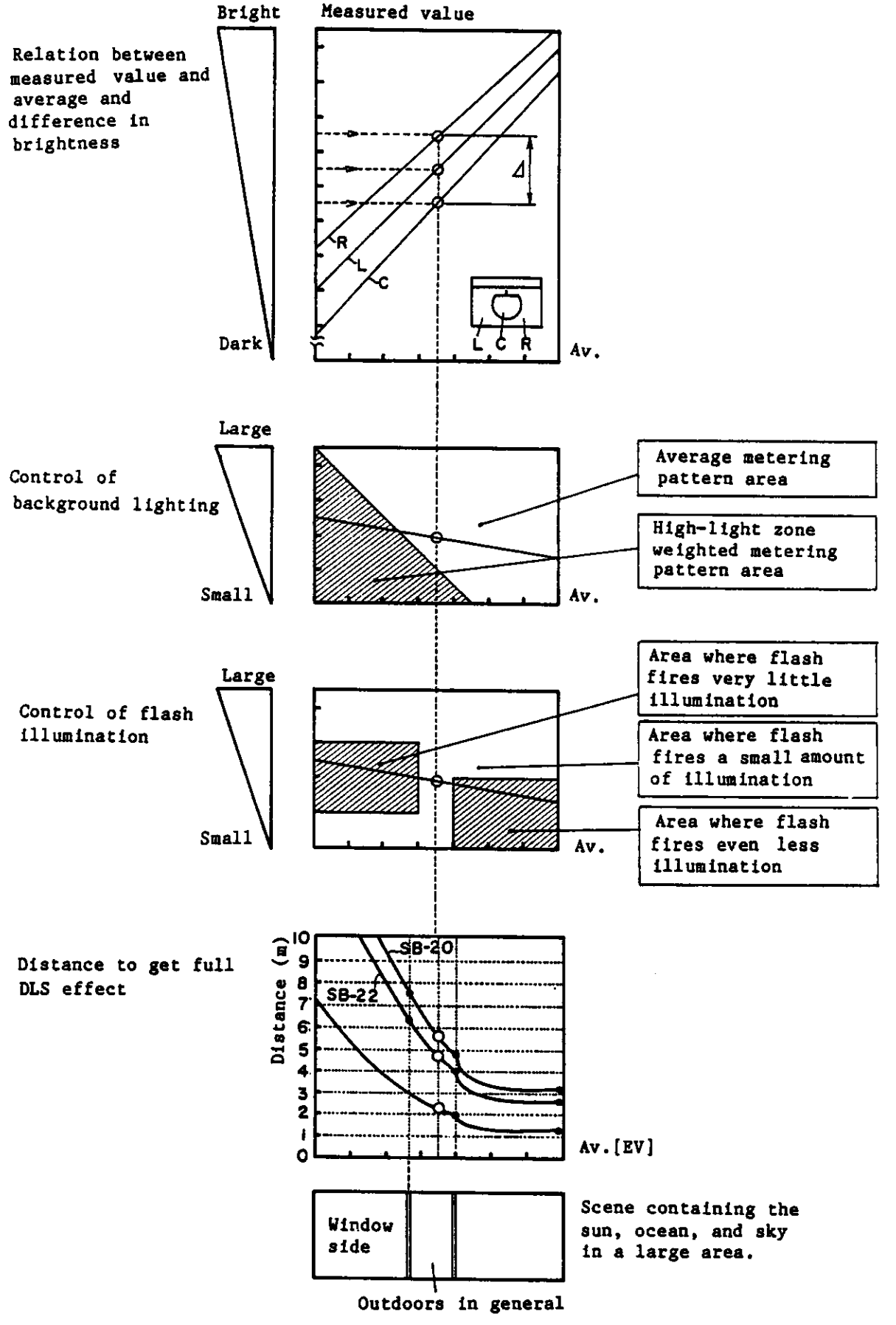
If the central area is darker than the other two areas (by more than 1.5EV), the LED flash ready-light in the viewfinder blinks to recommend the use of flash. There are two parameters used for DLS. Either average metering or high-light zone metering is selected, depending on the difference in brightness and average value. The amount of flash illumination is also compensated to prevent the subject from becoming overexposed by dividing the amount of flash illumination into three steps according to the difference in brightness and average value.

Example of controlling background lighting.



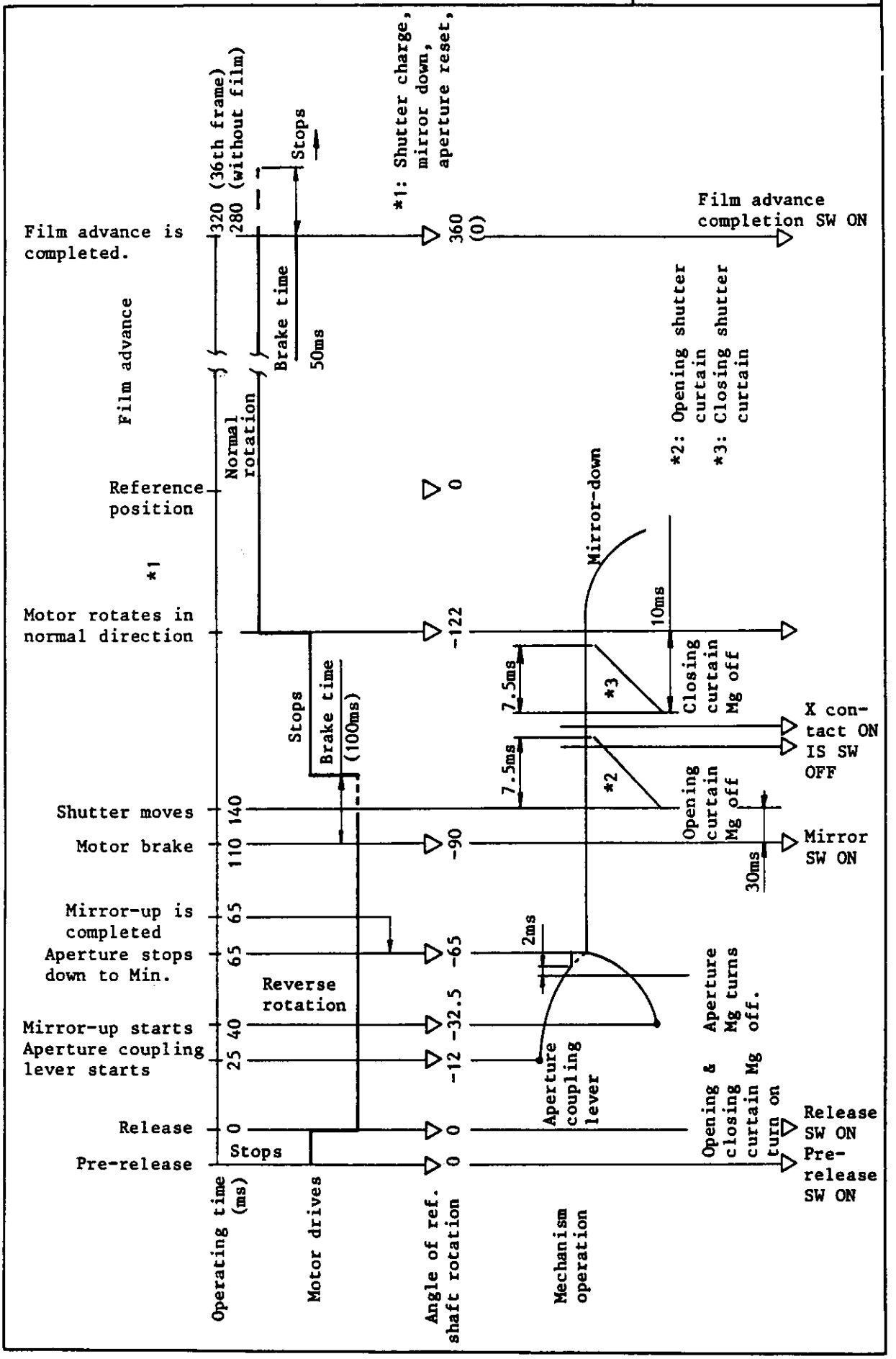
Control of flash illumination




Relation between measured value and average and difference in brightness
Bright
Dark
Measured value
R
L
C
L C R
Av.
Control of background lighting
Large
Small
Av.
Average metering pattern area
High-light zone weighted metering pattern area
Control of flash illumination
Large
Small
Av.
Area where flash fires very little illumination
Area where flash fires a small amount of illumination
Area where flash fires even less illumination
Distance to get full DLS effect
Distance (m)
10
9
8
7
6
5
4
3
2
1
0
SB-20
SB-22
Av.[EV]
Window side
Outdoors in general
Scene containing the sun, ocean, and sky in a large area.

BASIC TIMING CHART

FAA21051 - R.3223.A



DISASSEMBLNG, ASSEMBLING, AND ADJUSTMENT

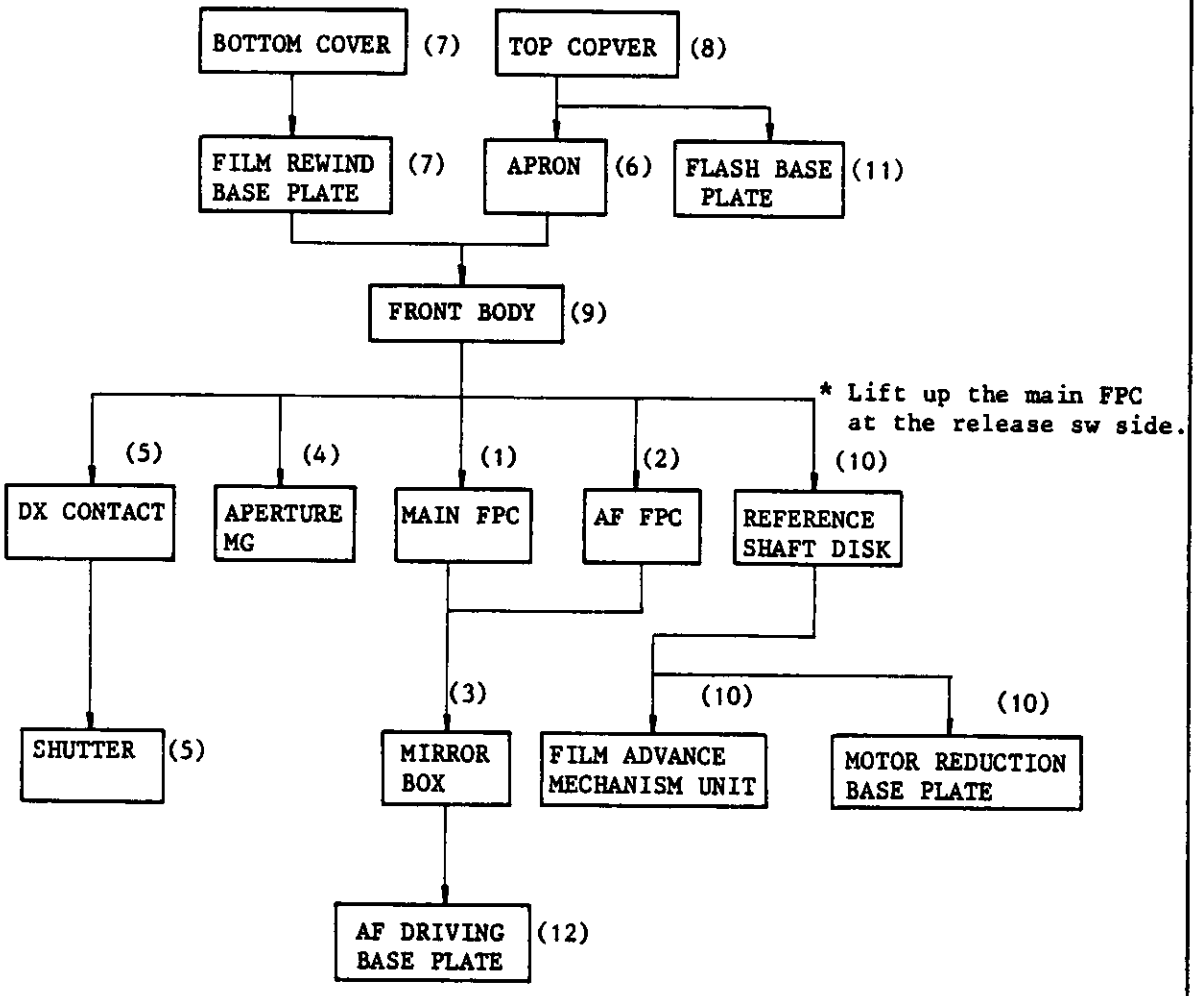
[1] DISASSEMBLNG

[2] ASSEMBLING AND ADJUSTMENT

[1] DISASSEMBLING

1. DISASSEMBLING OUTLINE

Note: 1) Disassembling should be started after the batteries are removed.
2) Figure numbers refer to figures in assembling procedures.
3) Be sure to learn how the lead wires are arranged.
4) As ICs are easily affected by the static electricity, be sure to ground the camera when soldering or handling.



2. DISASSEMBLING PROCEDURES

(( )): Initially delivered products

(1) Main FPC

Unsolder lead wires on the main FPC

(at the front of the body)
a) AF mode selector SW (yellow) ((Orange))
b) AF mode selector SW (gray) ((Blue))
c) F min SW (purple)
d) Mirror SW (gray) ((purple))
e) Mirror SW (yellow)

(at the rewind side of the top of the pentaprism)
a) Lens contact Vcc (red)
b) Lens contact R/W1 (orange)
c) Lens contact S CLK (yellow)
d) Lens contact S I/O (green)
e) Lens contact GND (black)

(at the release SW side of the top of the pentaprism)
a) TTL SPD (two portions)
b) Multi SPD COM (orange)
c) Multi SPD P1 (blue)
d) Multi SPD P2 (purple)
e) Multi SPD P3 (green)

(at the side of mirror box)
a) AF motor (red)
b) AF motor (black)
c) AF photointerruptor (brown)
d) AF photointerruptor (orange)
e) AF photointerruptor (blue)

Unsolder LED indicator (seven portions)

SPD retainer plate #436 Fig.6

⊕ #725x2

Press-contact of AF FPC Fig.7

Screw #813x2
Press-contact retainer plate #154
Press-contact rubber #152

Unsolder DC/DC converter Fig.7

Raise hooks at upper portion of main FPC #426 Fig.6

Main FPC

As the main FPC is attached to the pentaprism with double-sided adhesive tape, turn it up when taking off the main FPC.

(2) AF FPC

Press-contact Fig.7

Screw ⊕ #813x2
Press-contact retainer plate #154
Press-contact rubber #152

Screw ⊕ #812 Fig.7

AM200 adjustment screw ⊖ #405x3 Fig.7

AM200 adjustment spring #406x3

AF FPC Fig.7

FPC rear plate #151 Fig.7

⊕ #732x1

(3) Mirror box

Mirror box

⊕ #733x1
⊕ #727x3

AF seesaw lever base plate B944 Fig.4

⊕ #726x2

AF driving base plate B901 Fig.4

⊕ #831x1
⊕ #926x1
AF mode switch mold #955

(4) Aperture Mg

Screw ⊕ #851x3 Fig.6

* One screw is unfastened from the cut-out of gear after you push down the aperture lever.

Aperture Mg B2340 Fig.6

(5) DX contact, Shutter

Film guide retainer plate #218 Fig.1

⊕ #731x1
The film guide retainer plate is located in the film cartridge chamber.

DX contact screw #835 Fig.11

DX contact guide plate #212
DX contact B211 SCREW TO FILM CART, AREA HOLDING DX AXST GUIDE EDGE

Remove lead wires from the film advance mechanism unit.

Unsolder lead wire on the shutter FPC

Film detection SW (black)

Shutter fig.1

⊕ #806x1
⊕ #815x2

(6) Apron

Camera back key cover #220 Fig.11

⊕ #803x2
Camera back open/close key #221
Spring #222

Switching lever plate #957 Fig.11

AF mode switch lever #956 Fig.8

⊕ #734x1

Apron #22 Fig.8

⊕ #830x2
AE lock button #452

(7) Bottom cover, Film rewind base plate

Open battery chamber lid.

Remove batteries.

Screws Fig.12

⊕ #827
⊕ #829
⊕ #828
⊕ #830x2

Unsolder lead wires

Battery chamber ⊖ (yellow)
Battery chamber ⊕ (red)

Bottom cover B1024 Fig.12

Remove the adhesive tape attached to the lead wire of film detection SW.

Film rewind base plate B176 Fig.12

⊕ #816x3
⊕ #817x2
Rewind gear D #194

(8) Top cover

Grip rubber #37 Fig.11

Turn up the rubber at the protector plate side.

Release cover #38 Fig.11

Release cover is fixed with double-sided adhesive tape.

Protector plate #36 Fig.11

⊕ #809x2

*Discharging of the condenser

Unsolder lead wires on flash base plate

Xe ⊖ (blue)
Trg ⊕ (yellow)
Xe ⊕ (orange)

Screw on top cover Fig.11

⊕ #819x2
⊕ #735x1
⊕ #865x2
⊕ #801x2
Eyepiece cap #431
#432

Unsolder lead wires on top cover

a) X contact SW (gray)
b) GND (blue)

Unsolder lead wires on main FPC

a) Self-timer SW (yellow)
b) Self-timer SW (black)
c) Pop-up SW (black) ((brown))
d) Pop-up SW (orange)
e) Ready terminal (brown)
f) TTL terminal (gray)
g) STOP terminal (yellow)
h) X contact SW (green)

Top cover B123

(9) Front body

Set the mirror at the "UP" position using the manual film advance tool.

Unsolder lead wires on the main FPC

(at the film cartridge side of the front of the body)
a) DX code (black)
b) DX code (pink) ((orange))
c) DX code (green) ((gray))
d) DX code (brown) ((purple))
e) DX code (orange) ((blue))
f) DX code (blue) ((green))
g) Shutter 1 Mg (white)
h) Shutter 2 Mg (purple) ((green))
*Remove adhesive tape attached to the lead wires of shutter 1 Mg and shutter 2 Mg.
i) Unsolder two portions on the data back FPC. (Only in the camera with data back)

(at the release SW side of the front of the body)
a) Film detection SW (green)
b) Aperture interruptor (blue)
c) perture interruptor (red)
d) Aperture interruptor (brown)

(at the shutter dial side of the top of the body)
a) Shutter IS (yellow)
b) Shutter V bat (red)
c) Shutter GND (blue) ((black))

(around release sw on the body)
a) Film advance motor (orange)
b) Film advance motor (blue)
c) CHG (gray)
d) START (blue)
e) STOP (brown)
f) READY (white)
g) BATT A (red)
h) BATT B (orange)
i) GND (purple)
j) Aperture Mg (red)
k) Aperture Mg (blue)
l) V bat (red)
* Unsolder on the battery chamber ⊖

Screws fastening main FPC — Fig.8

(at the top of the film cartridge side)
⊕ #820x2
⊕ #832x1

(at the front of the film cartridge side)
⊕ #837x1

(at the front of the grip side)
⊕ #736x1

(at the top of the shutter dial side)
⊕ #820x3

Frame counter #129 — fig.3

⊕ #134x1
Frame counter spring #133
Film advance completion sw #135
Counter SW #136
Insulation washer #174

Screw fastening release SW ⊕ #866 — Fig.8

Film advance lever unit B121 — Fig.3

⊕ #702, ⊕ #818, ⊕ #819
(To float FPC)
Sprocket shaft #62
Sprocket washer #65

Screws fastening DC/DC converter ⊕ #809x2 — Fig.8

Front body — Fig.8

⊕ 721x4
⊕ #722x2

(10) Film advance mechanism unit, Motor reduction base plate

Reference shaft disk B72 — Fig.3

⊕ #74x1
* Rotate the disk counterclockwise, hang it on the over-run prevention lever and remove it. Or, Fix the hole of the disk with a screwdriver and then remove.

Float the MD lead wire from the ditch.

Motor reduction base plate B41 — Fig.2

⊕ #809x3

Fig.3
Film advance mechanism unit B81

⊕ #807x3

Sprocket #61 — Fig.3

Sprocket spring #64
Sprocket lower bearing #66

Film guide B1202 — Fig.2

*Push up the shaft of the guide by inserting the 1st screwdriver into the hole on the bottom of the diecasting body.

*Be careful not lose the collar and spring around the guide roller.

(11) Flash unit

Unsolder lead wires on the main FPC (around release SW)

CHG (gray)
START (blue)
STOP (brown)
READY (white)
BATT B (orange)
GND (purple)
BATT A (red)

↓

Screw fastening release SW — Fig.8

⊕ #866

↓

Main FPC
Unsolder negative contact of battery box.

↓

Flash unit — fig.1

⊕ #809x2

(12) AF driving base plate

AF seesaw lever base plate B944 — Fig.4

⊕ #726x2

↓

AF driving base plate B901 — Fig.4

⊕ #926x1
⊕ #831x1
AF mode SW mold #955

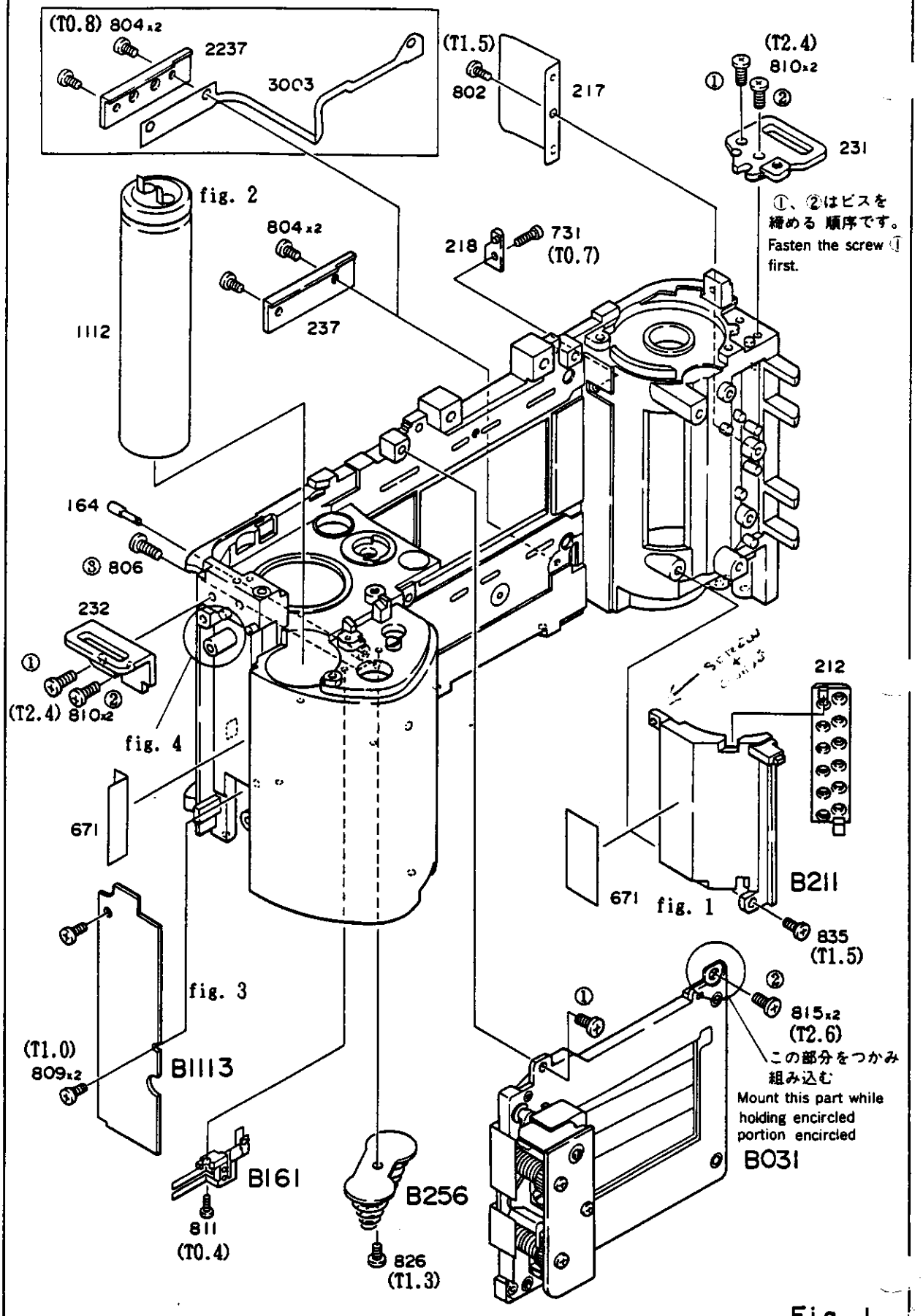

(T0.8) 804x2
2237
3003
(T1.5)
802
217
(T2.4)
810x2
①
②
231
①、②はビスを締める 順序です。
Fasten the screw ① first.
fig. 2
804x2
237
1112
218
731
(T0.7)
164
③ 806
232
①
(T2.4) 810x2
fig. 4
671
212
671
fig. 1
B211
835
(T1.5)
fig. 3
(T1.0)
809x2
B1113
B161
811
(T0.4)
B256
826
(T1.3)
①
②
815x2
(T2.6)
この部分をつかみ組み込む
Mount this part while holding encircled portion encircled
B031

Fig. 1

Fig. 1

Attach with adhesive tape making sure not to jam the lead wires from the DX-contact setting around the center (area indicated by arrows in the figure)

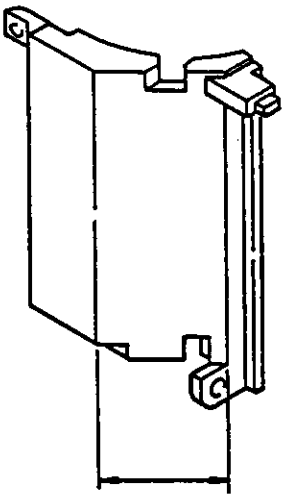
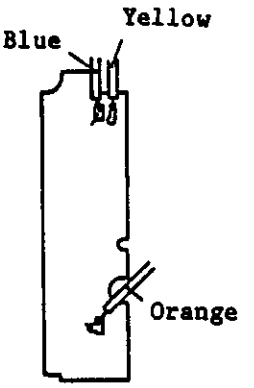


Fig. 2 Installing main condenser

Place the electrodes of the main condenser perpendicular to the rail, then attach the main condenser with adhesive tape so that the bottom end lines up with diecast body.

Fig. 3 Soldering portion of flash base plate

Fig. 4 Pass SB lead wires through columns



MOTOR ROTATION REDUCING BASE PLATE

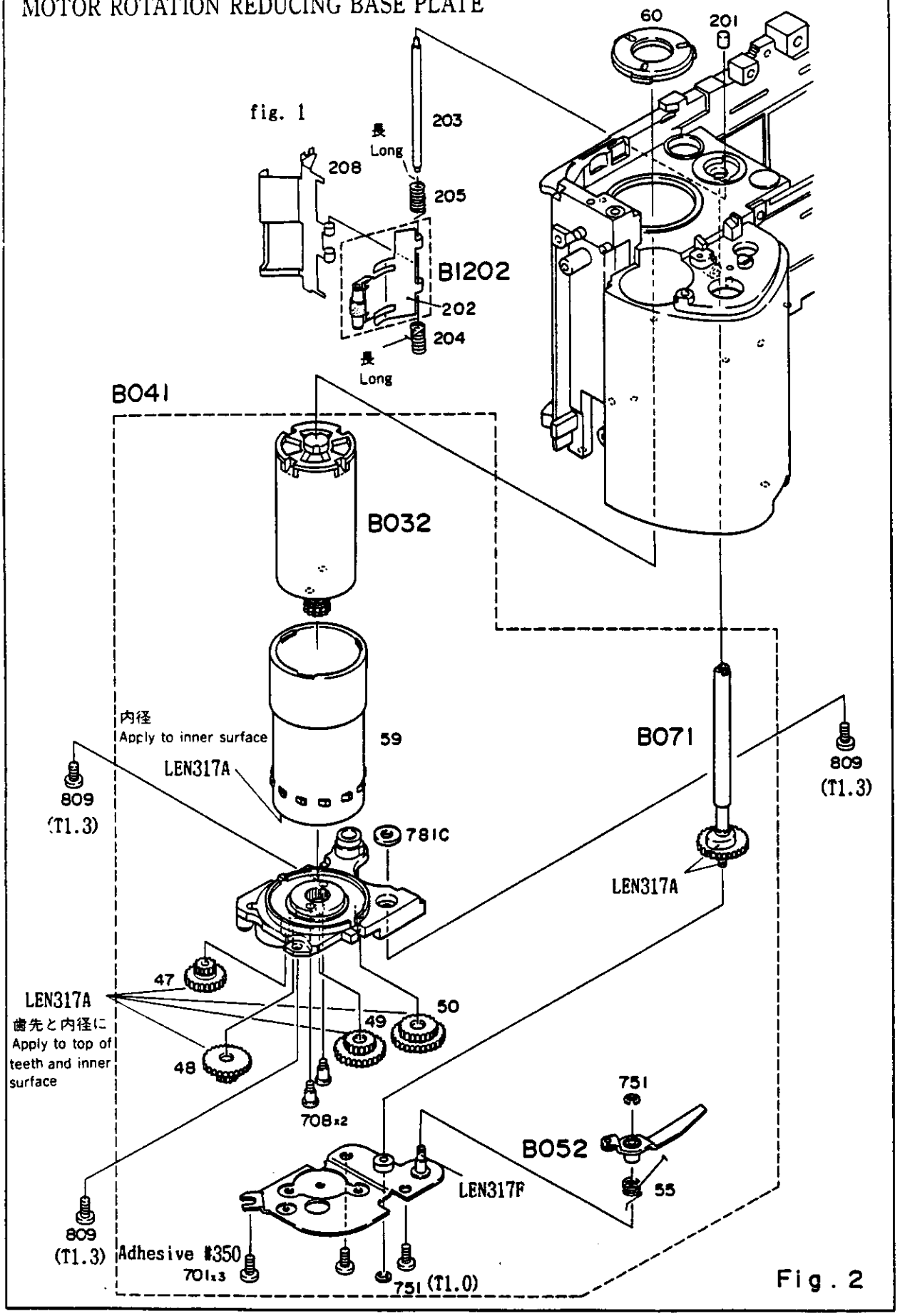


Fig. 2

Fig. 1 Mounting film guide plate

(1) Hold the guide plate in place using clips prior to mounting it as shown in the figure.

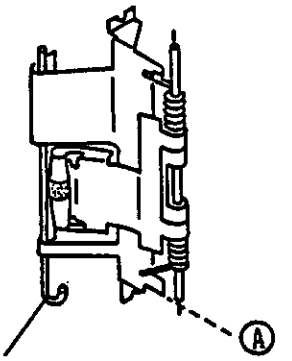
(2) As indicated by letter A in the figure, set the shaft.

(3) While holding the guide roller with your finger, remove the clips.

(4) First install the top end of the film guide plate shaft, then install the botton end of the shaft while pushing the shaft upward.

(5) Push the shaft down (#203).

(6) Place the bearing collar (#201) on the tip of the film guide shaft.



Straightening the clip

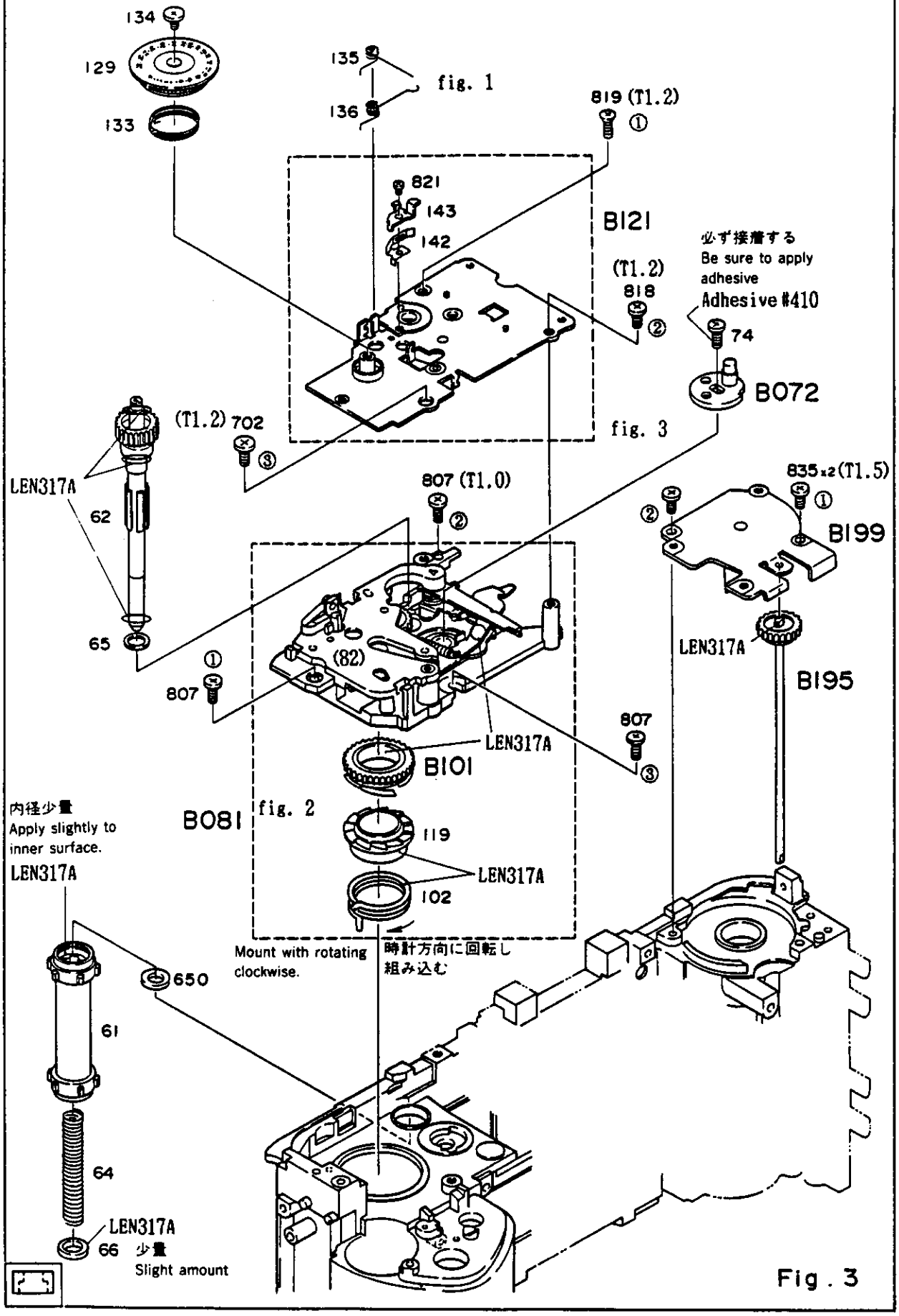

134
129
133
135
136
fig. 1
819 (T1.2) ①
821
143
142
B121
(T1.2) 818 ②
必ず接着する
Be sure to apply adhesive
Adhesive #410
74
B072
fig. 3
(T1.2) 702 ③
LEN317A
62
65
807 (T1.0) ②
835×2(T1.5) ①
B199
LEN317A
B195
807 ①
(82)
807 ③
LEN317A
B101
B081
fig. 2
119
LEN317A
102
内径少量
Apply slightly to inner surface.
LEN317A
650
61
64
LEN317A
66 少量
Slight amount
Mount with rotating clockwise.
時計方向に回転し組み込む
Fig. 3

Fig. 1 Spring system of film advance completion switch and frame counter switch

* Be sure to use insulation washer (#174) (See Fig. 8)

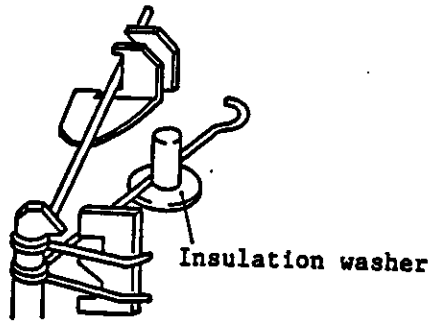
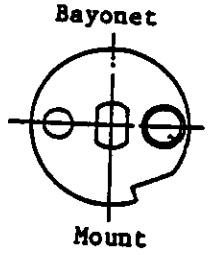


Fig. 2 The parts #101 and #119, and #102 cannot be removed unless the film-advance mechanism unit (#82) is disassembled.

Fig. 3 Mounting reference shaft disk

(1) Set the disc at an angle of 0°.

(2) The shutter set lever should be on the shutter side.



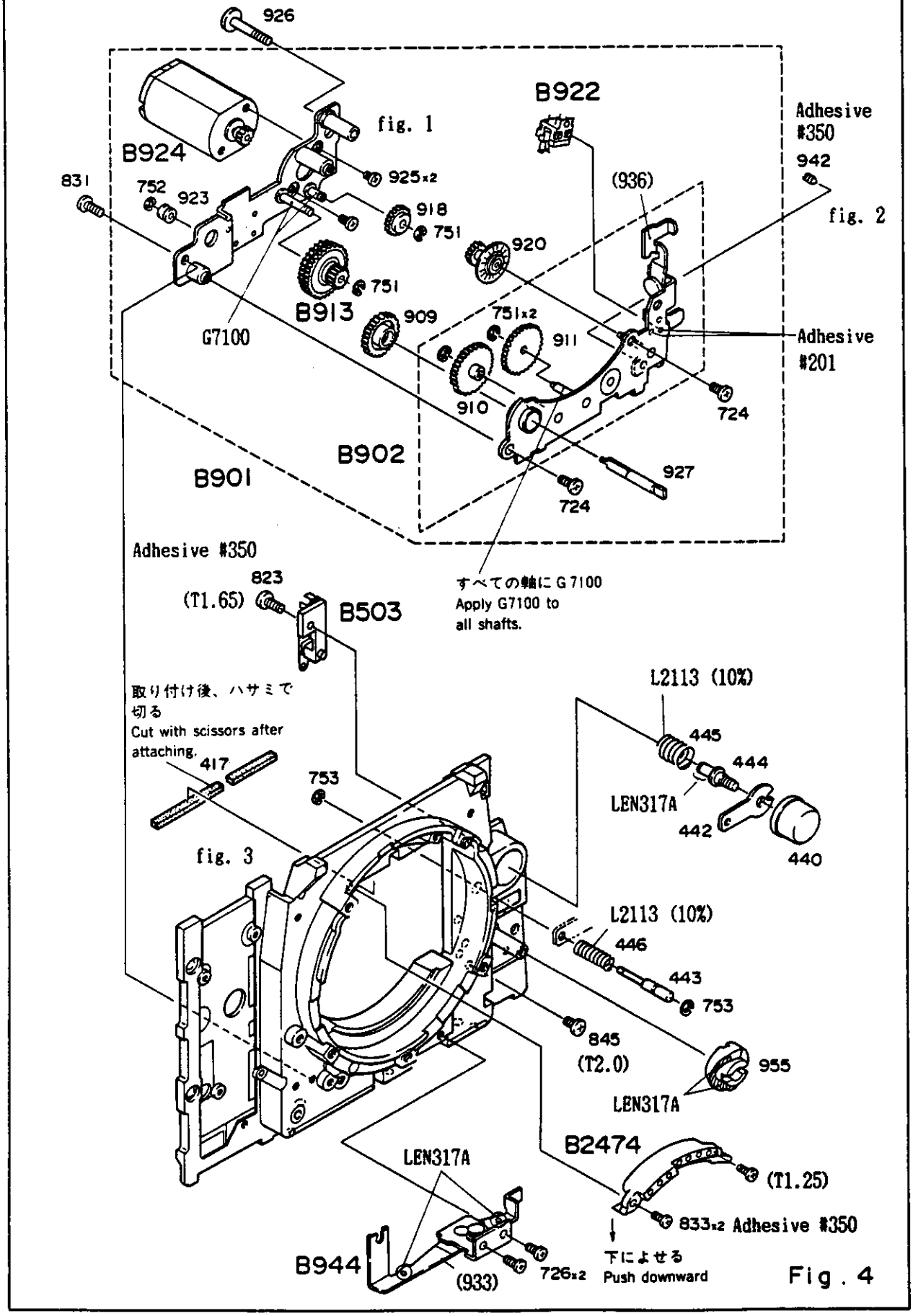

926
B924
fig. 1
B922
Adhesive #350
942
fig. 2
831
752
923
925×2
918
751
920
(936)
751
B913
909
751×2
911
G7100
Adhesive #201
910
724
B902
B901
927
724
Adhesive #350
823
(T1.65)
B503
すべての軸にG7100
Apply G7100 to all shafts.
取り付け後、ハサミで切る
Cut with scissors after attaching.
417
753
L2113 (10%)
445
444
LEN317A
442
440
fig. 3
L2113 (10%)
446
443
753
845
(T2.0)
955
LEN317A
B2474
(T1.25)
LEN317A
833×2 Adhesive #350
下によせる
Push downward
B944
(933)
726×2
Fig. 4

Fig. 1 Adhering motor mounting screws

Do not use too much adhesive agent (#350), because it may spread outside the screw head.

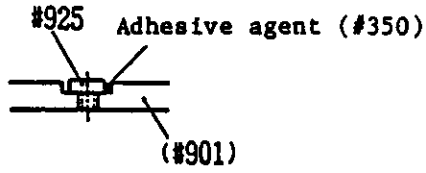


Fig. 2 Adjusting coupling shaft position

Adjust the screw (#942) so that the coupling shaft (#927) protrudes from the bayonet surface by 1.6mm ± 0.1 while the lens release button (#440) is not depressed.
After the completion of the adjustment, adhere the screw using the adhesive agent (#350).

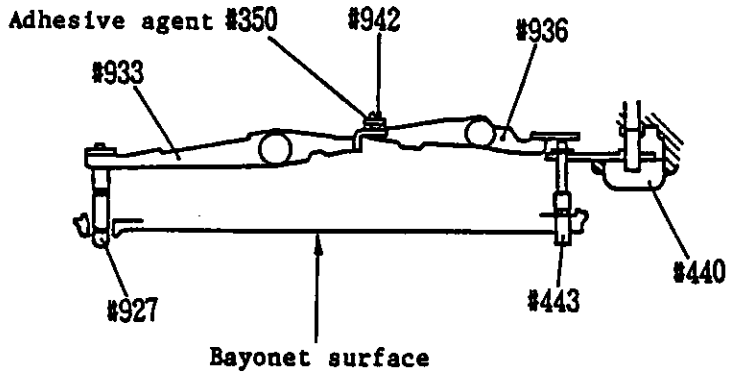
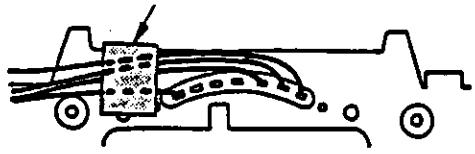


Fig. 3 Processing lead wires of AF contacts

Adhesive tape extends over to the bayonet side.



Polyester adhesive tape

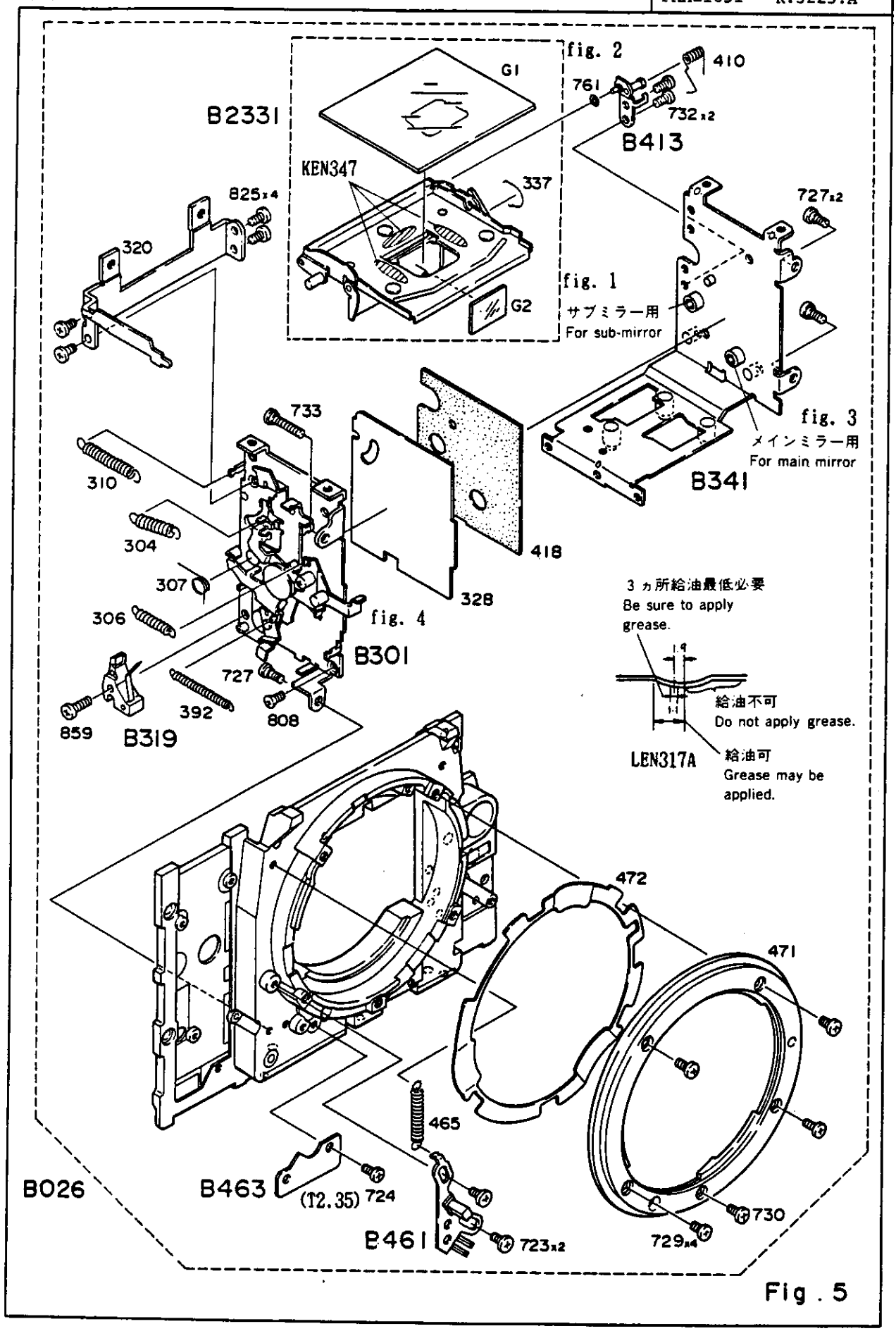

B2331
G1
KEN347
337
G2
fig. 2
761
410
732x2
B413
825x4
320
fig. 1
サブミラー用
For sub-mirror
727x2
fig. 3
メインミラー用
For main mirror
B341
733
310
304
307
306
418
328
fig. 4
B301
727
392
808
859
B319
3ヵ所給油最低必要
Be sure to apply grease.
給油不可
Do not apply grease.
給油可
Grease may be applied.
LEN317A
472
471
465
B026
B463
(T2.35) 724
B461
723x2
730
729x4
Fig. 5

Fig. 1 Attaching sub-mirror

(1) As shown in the figure, spread a small amount of silicon (KE357) at three places.

(2) While holding the sub-mirror with your finger, attach it to the portion indicated by letter a and b in the figure.

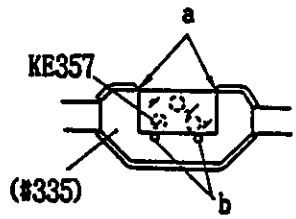


Fig. 2 Attaching main mirror

(1) Spread silicon at three portions (see figure).

(2) While holding it, set the mirror at the position shown in the figure.

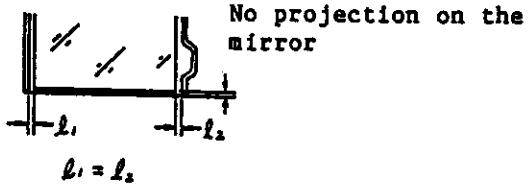
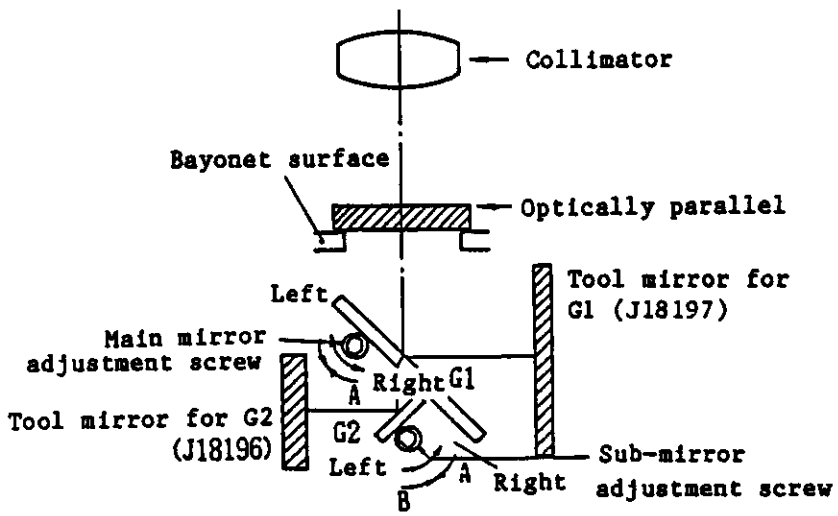


Fig. 2-1 Spread mat agent to avoid internal reflections

Fig. 3 Adjust the angle (45°) of main mirror and sub-mirror

Adjustment diagram of main mirror and sub-mirror



To determine the angle (45°), the following equipment is required:

(Main mirror)
* Tool mirror (J18197)
* Optical parallel (J18037)
* Hexagonal wrench

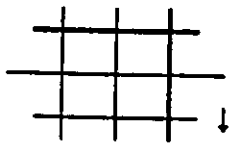
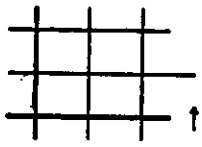
(Sub-mirror)
* Tool mirror (J180197)
* Hexagonal wrench

Table 1 Rating

	G1	G2
Discrepancy (right/left)	Within ± 20'	Within ± 30'
Discrepancy (Up/down)	Within ± 5'	Within ± 10'
Distortion	Within ± 8'	Within ± 8'

Adjustment method
Rotate the eccentric pin using a hexagonal wrench for adjusting discrepancy (up/down)

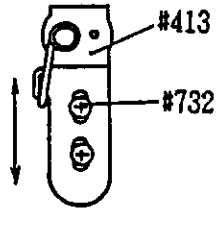
Table 2

Reflecting Mirror image	Up	Down
— Optical		
— Mirror	Down	Up
Adjustment Set the mirror reflecting image to the optical reflecting image	Turn the eccentric pin to the left toward mirror A	Turn the eccentric pin to the right toward mirror B

Discrepancy (right/left)
(1) Unfasten the screws (#732 x 2) attaching the #413, and fasten the screws again after moving #413 in an up and down direction (see the figure).

(2) Check discrepancy (right/left) again.
Repeat the same procedures (1) and (2) unless it is outside the rating (Table 1). Attach the mirror again from the beginning if distortion appears.

* When the adjustment is completed, move the mirror 2 to 3 times to check their accuracy.

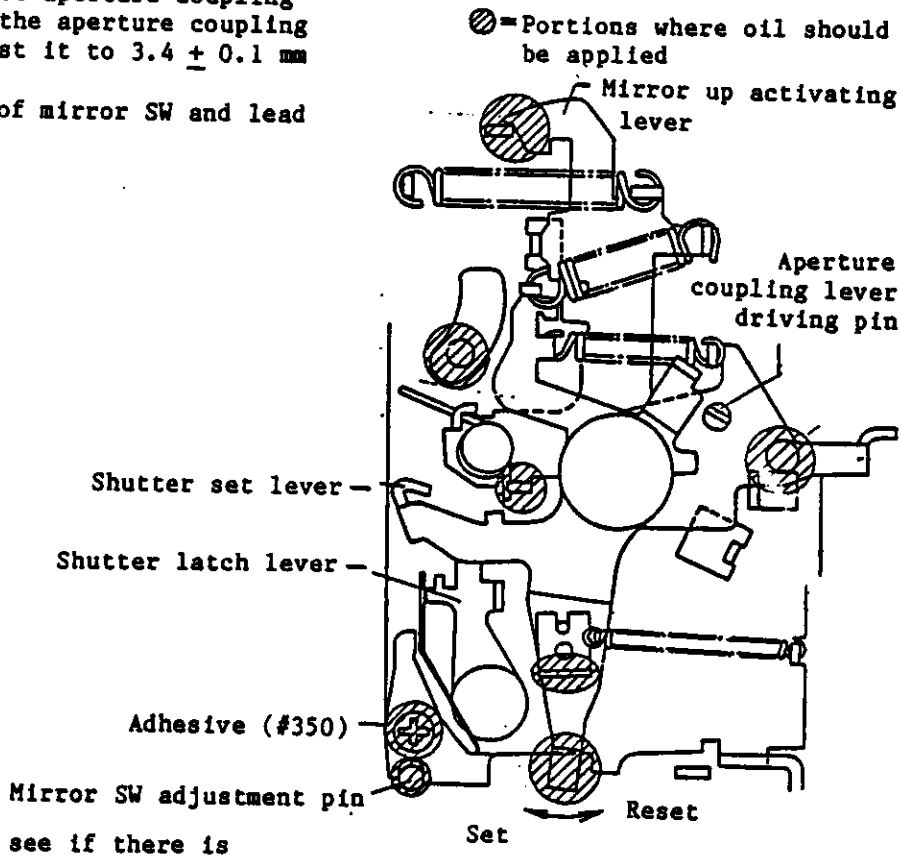


(1) I base plate where oil should be applied and spring installation

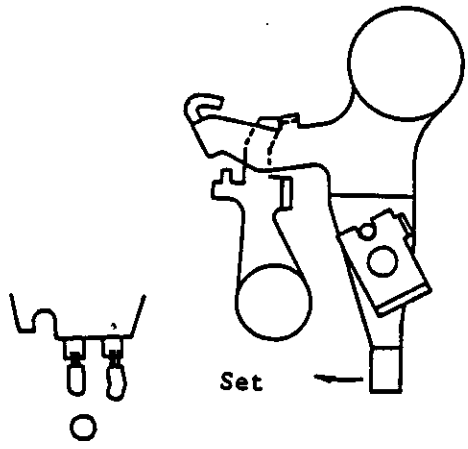
Use oil (LEN317A)

(2) Adjustment of aperture coupling
While rotating the aperture coupling lever pin, adjust it to 3.4 ± 0.1 mm

(3) Adjustment of mirror SW and lead wires



(a) Check to see if there is continuity between the purple and yellow lead wires from the mirror SW using a tester.
(b) While moving the mirror up actuating lever, reset the shutter set lever.
(c) After moving the shutter set lever in the shutter set direction with your finger, adjust the mirror SW adjustment pin so that the mirror SW turns on within the range of plate thickness of the shutter set lever.
(d) When the adjustment is completed, spread adhesive on the mirror SW adjustment pin and the above screw.
(e) Arrange lead wires as shown in the figure so that they do not come in contact with the gear.



Solder lead wires straight against terminals.

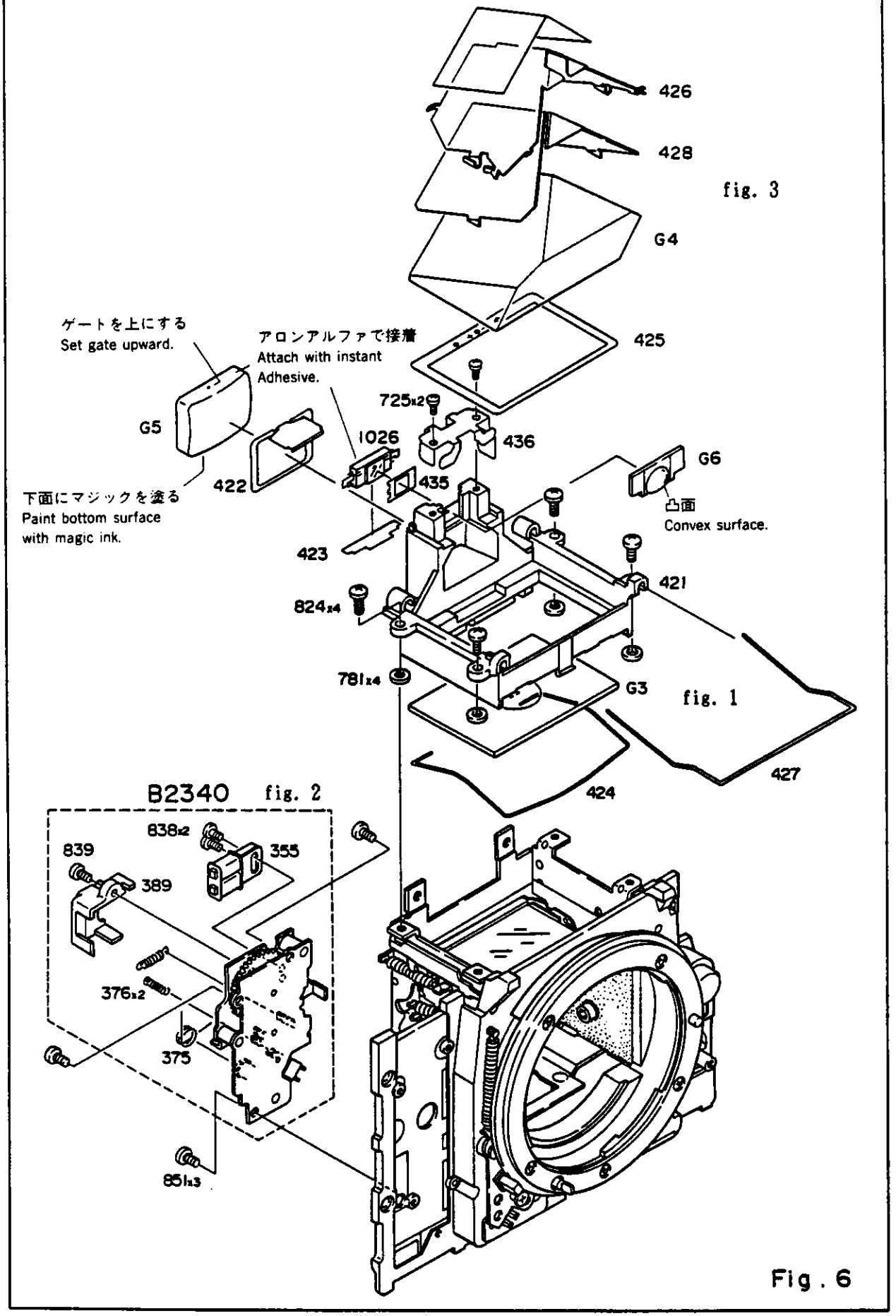

426
428
fig. 3
G4
425
ゲートを上にする
Set gate upward.
アロンアルファで接着
Attach with instant
Adhesive.
725x2
G5
1026
436
G6
422
435
凸面
Convex surface.
下面にマジックを塗る
Paint bottom surface
with magic ink.
423
421
824x4
781x4
G3
fig. 1
427
424
B2340 fig. 2
838x2
839
355
389
376x2
375
851x3

Fig. 6

Fig. 1 Direction of Fresnel

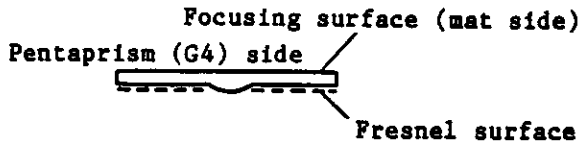


Fig. 2 Magnet installation position and checking of tension

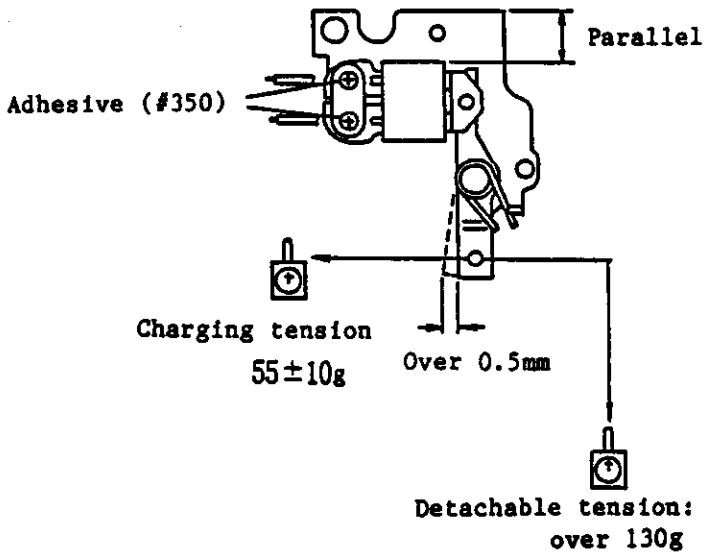


Fig. 3 Spread felt-tip marker ink on the pentaprism (G4)

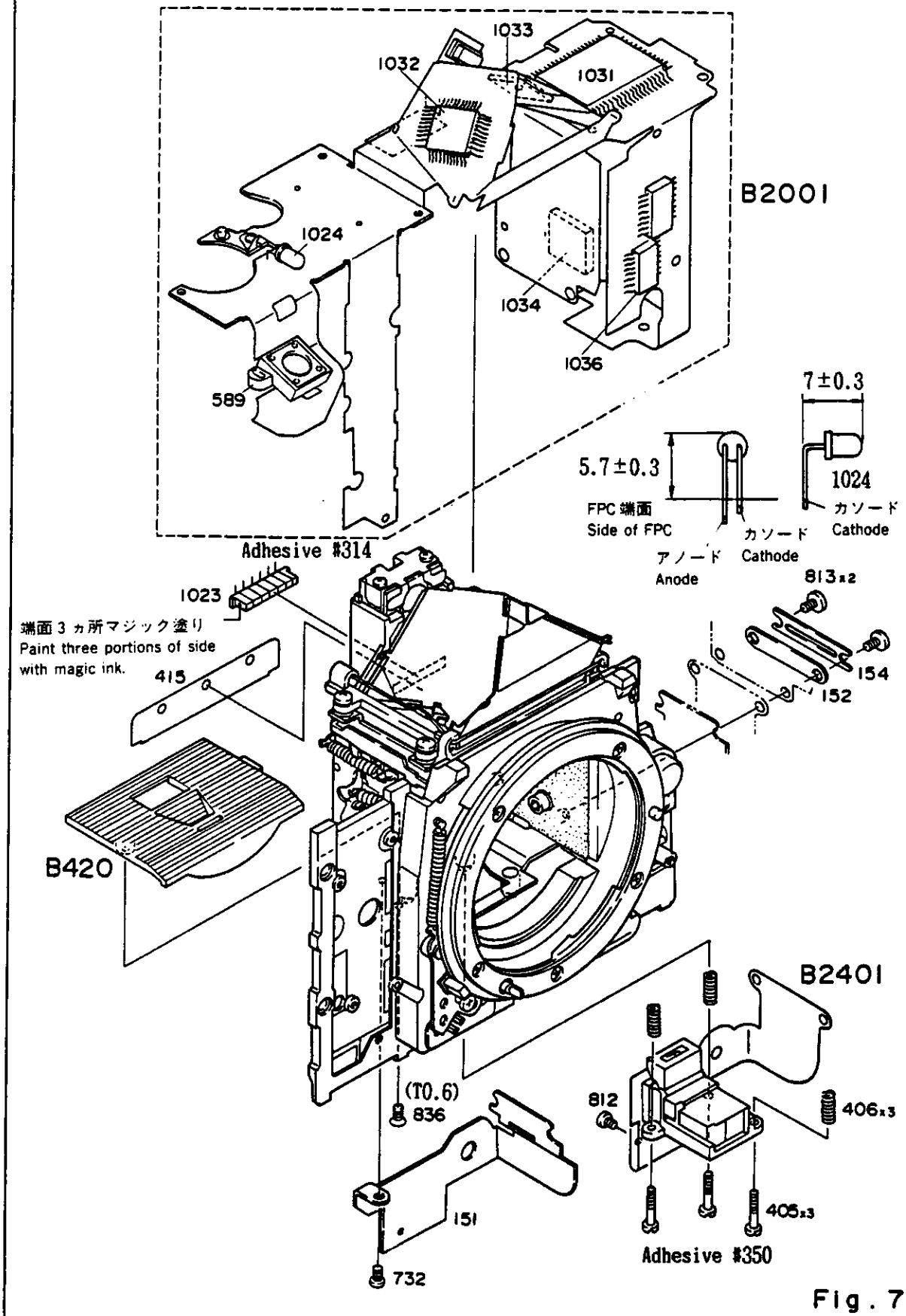
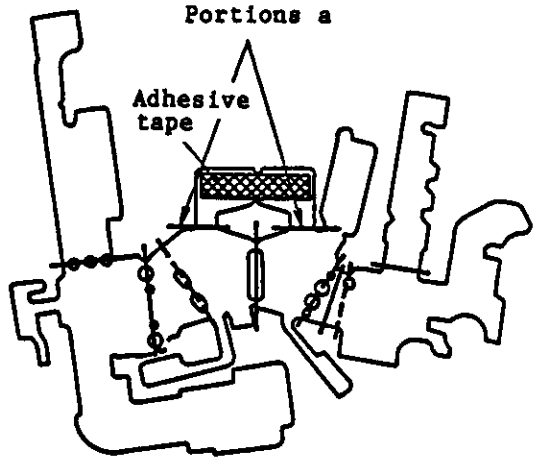

1033
1032
1031
B2001
1024
1034
1036
589
7±0.3
5.7±0.3
1024
FPC 端面
Side of FPC
カソード
Cathode
アノード
Anode
カソード
Cathode
Adhesive #314
813x2
1023
端面 3 ヵ所マジック塗り
Paint three portions of side
with magic ink.
154
415
152
B420
B2401
(T0.6)
836
812
406x3
151
406x3
732
Adhesive #350

Fig. 7

How to bend main FPC

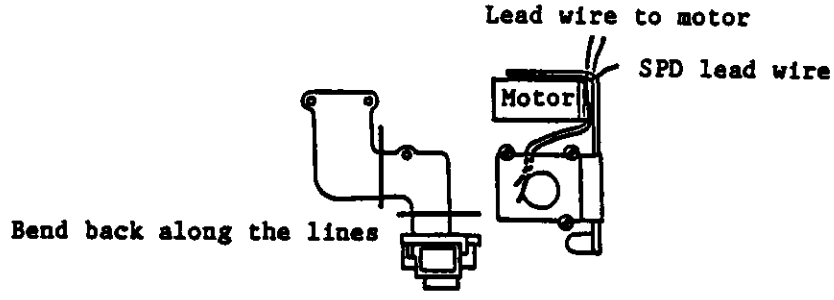
Bend the FPC as indicated in the figure. Attach adhesive tape on the portions indicated by letter a.



——— Solid line means bend back

-------- Dotted line means bend forward

Method of bending AF FPC
Position of AF motor



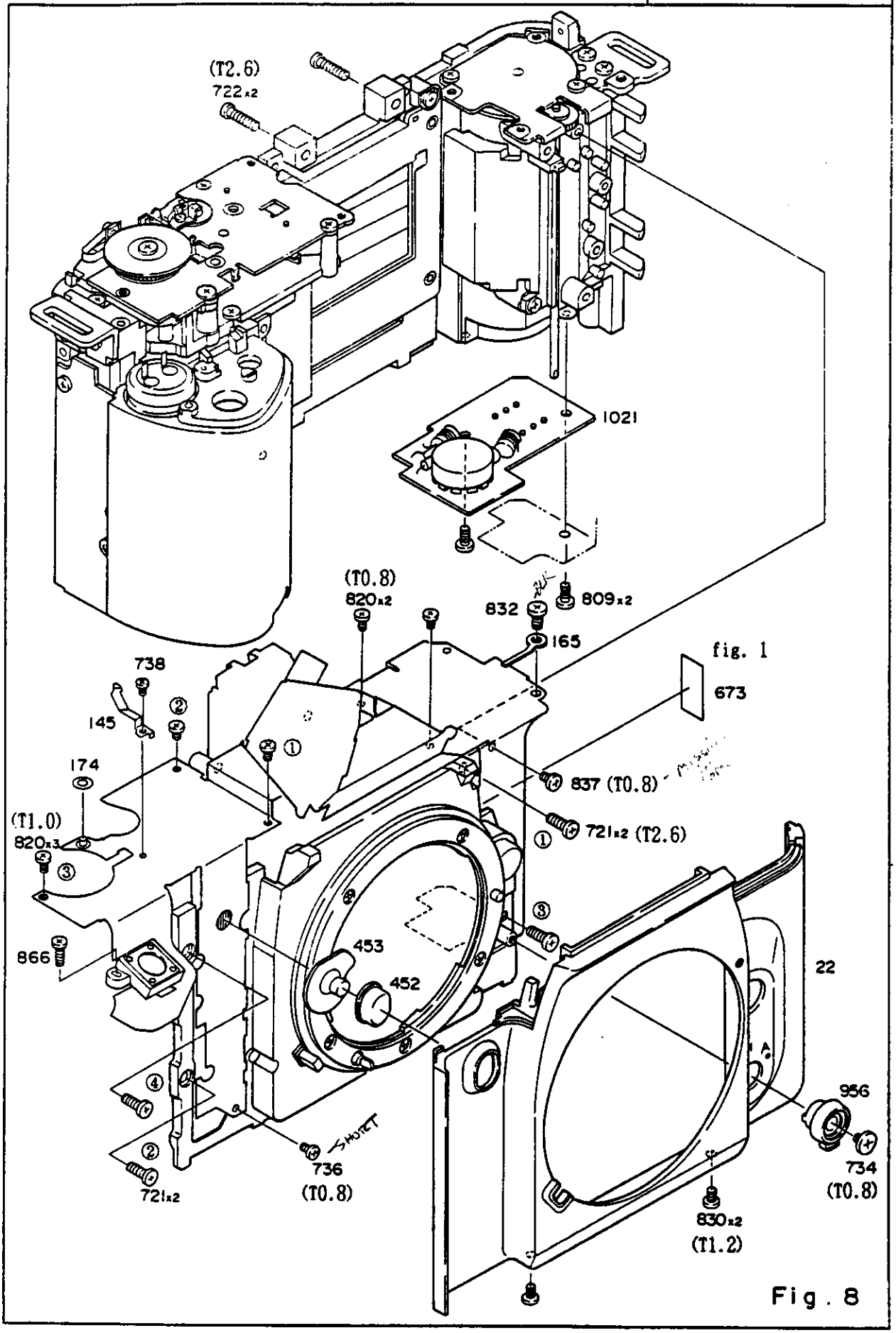
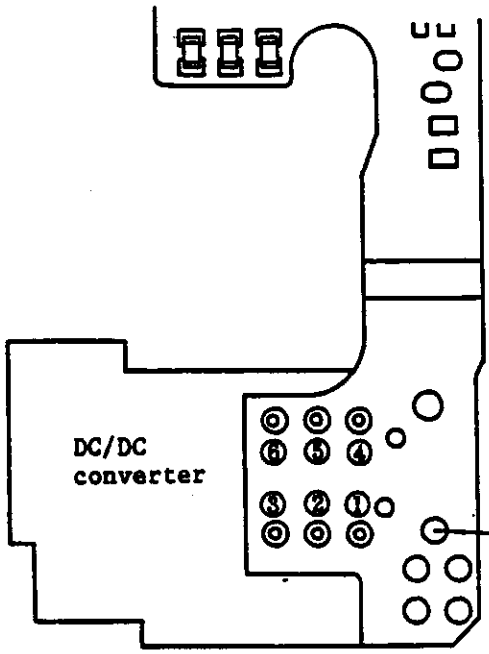

(T2.6)
722x2
1021
(T0.8)
820x2
832
809x2
165
fig. 1
673
738
145
174
(T1.0)
820x3
837 (T0.8)
721x2 (T2.6)
866
453
452
22
956
734
(T0.8)
721x2
736
(T0.8)
830x2
(T1.2)

Fig. 8

DC/DC converter

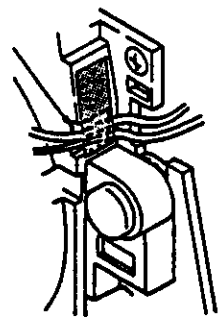
DC/DC converter
(1) R-C
(2) Vin (+)
(3) Vin (-)
(4) Vout (5.25V)
(5) Vout (12V)
(6) Vout (-)



IS terminal
Solder yellow lead wires of
the IS terminal tool (J15273)

Fig. 1 Attach white and green shutter lead wires with adhesive tape

* Do not allow lead wires to protrude from the groove.



上カバー部1 TOP COVER 1

FAA21051 - R.3223.A

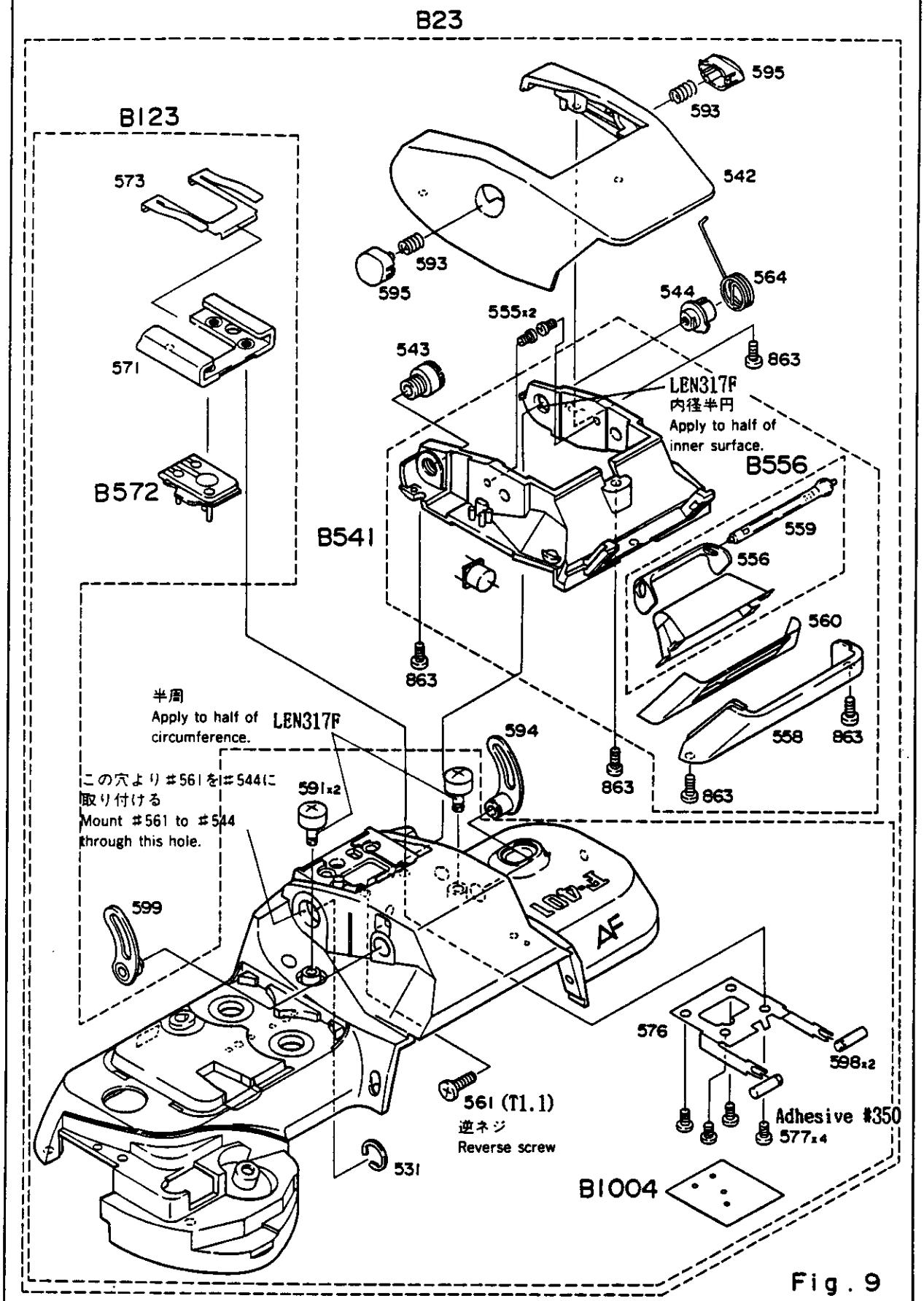
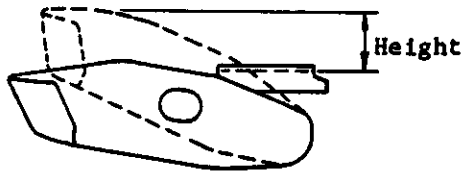


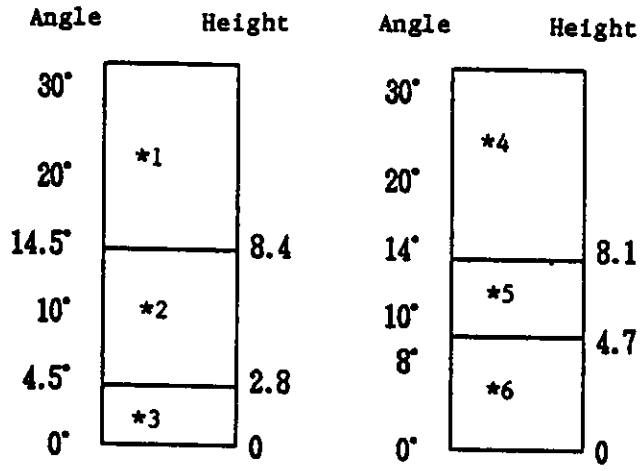
Fig. 9

Switching position of built-in flash

Pop-up switch
The pop-up switch turns on within the range of 4.7-8.1mm.

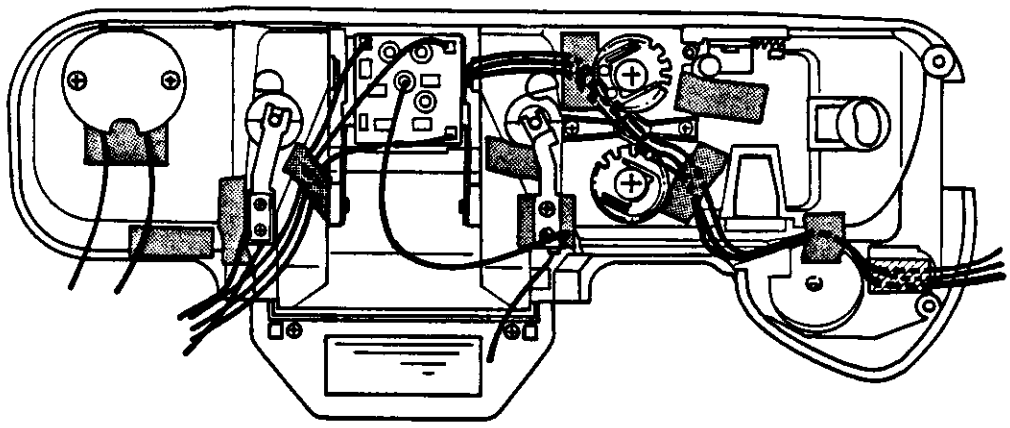


Flash selection switch
There is an intermediate range of 2.8-8.4mm where neither the built-in flash nor external flash is on.



*1 Built-in flash selection SW is on
*2 Neutral area
*3 External flash selection SW is on
*4 Detection of built-in flash pop up
*5 Switching region
*6 Built-in flash does not pop up

Attachment of adhesive tape to top cover and arrangement of lead wires



Mounting top cover
Mount the top cover so that the lead wires for the self-timer (two), pop-up SW (two), and shoe accessory (three) are on top of the CPU.

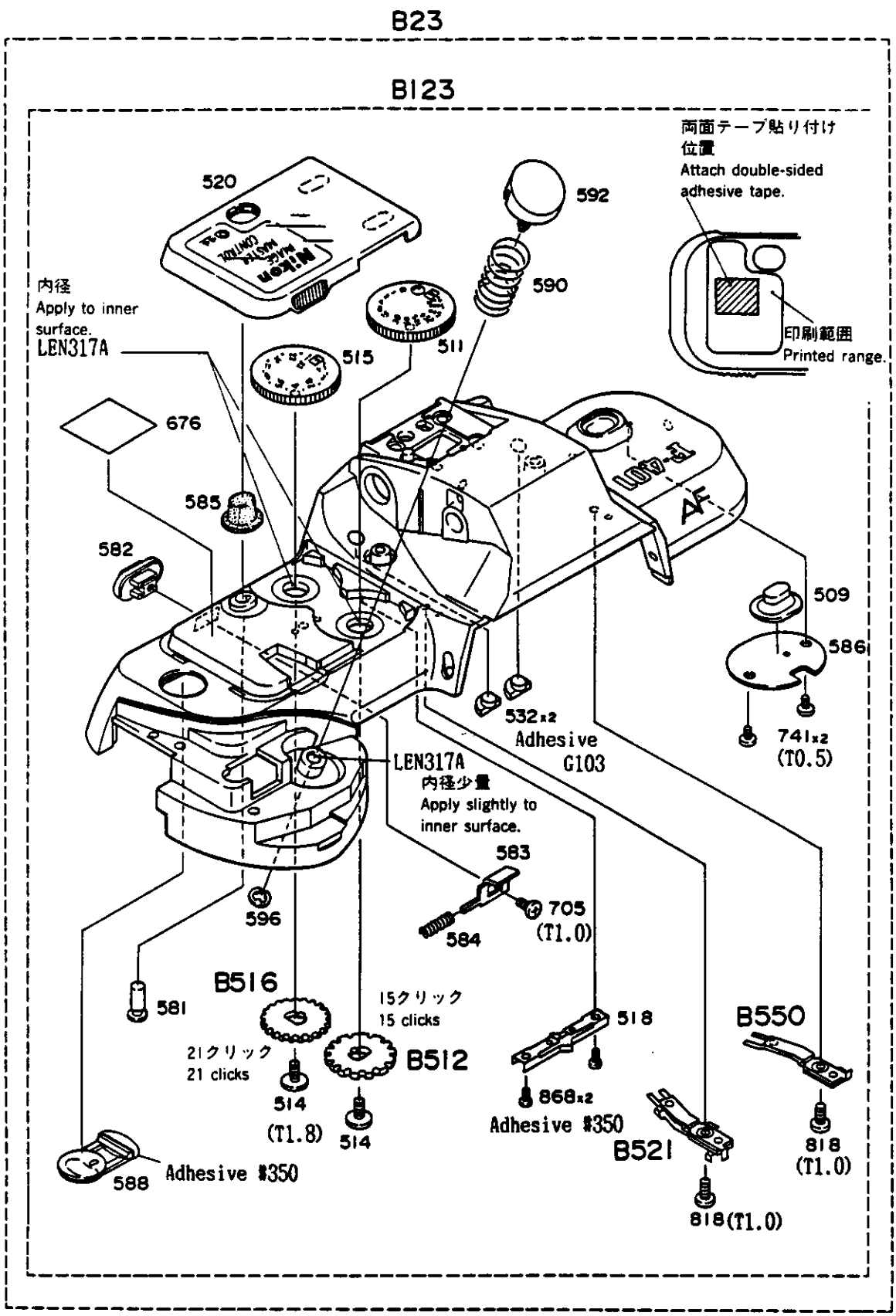

B23
B123
両面テープ貼り付け位置
Attach double-sided adhesive tape.
印刷範囲
Printed range.
520
592
590
511
515
内径
Apply to inner surface.
LEN317A
676
585
582
509
586
532×2
Adhesive G103
741×2
(T0.5)
LEN317A
内径少量
Apply slightly to inner surface.
583
705
(T1.0)
584
596
581
B516
15クリック
15 clicks
21クリック
21 clicks
B512
514
(T1.8)
514
518
868×2
Adhesive #350
B550
B521
818
(T1.0)
818(T1.0)
588
Adhesive #350

Fig.10

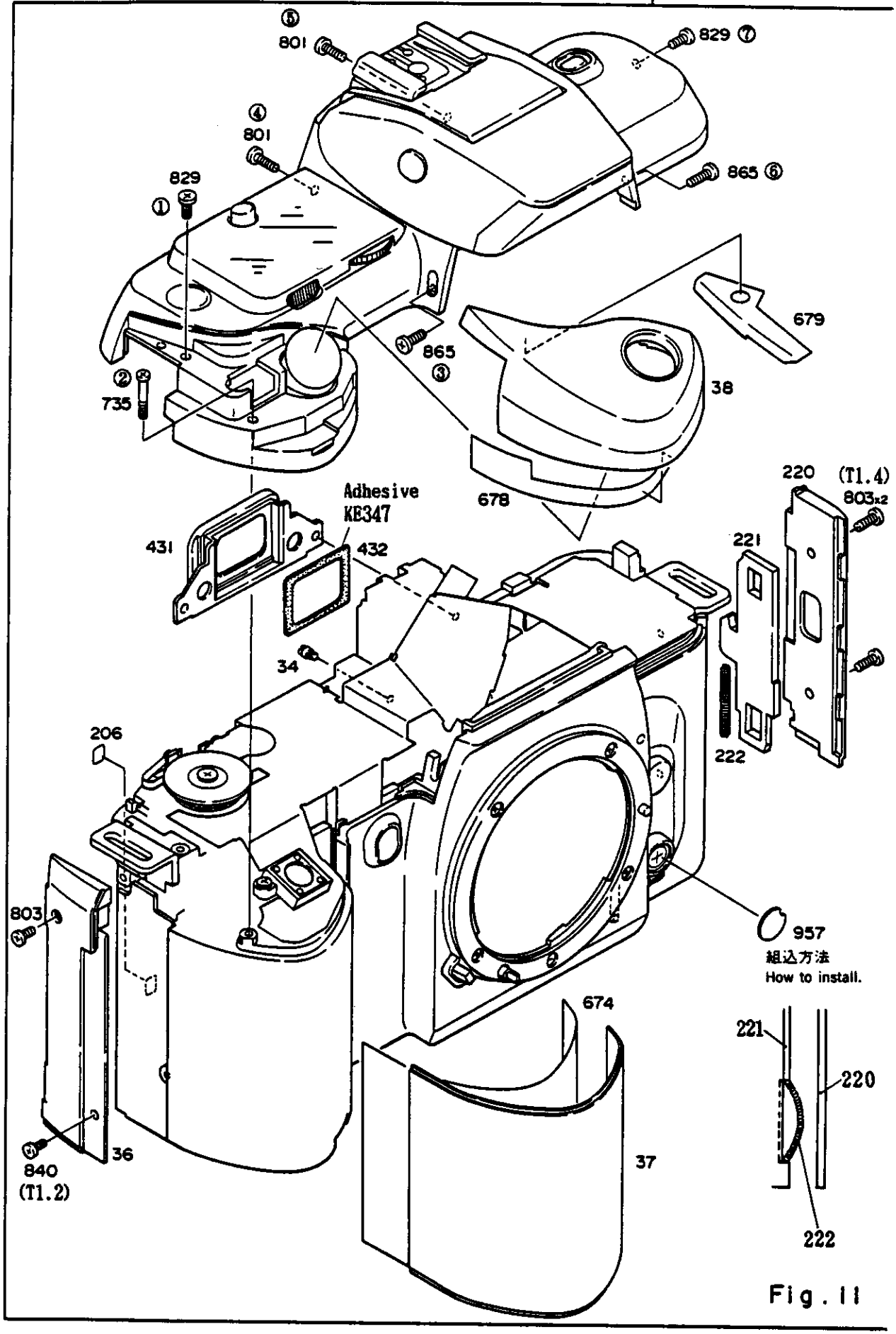

⑤
801
829 ⑦
④
801
865 ⑥
829
①
679
865
③
38
②
735
678
220 (T1.4)
803x2
Adhesive
KE347
431
432
221
34
206
222
803
957
組込方法
How to install.
674
221
220
840
(T1.2)
36
37
222

Fig. 11

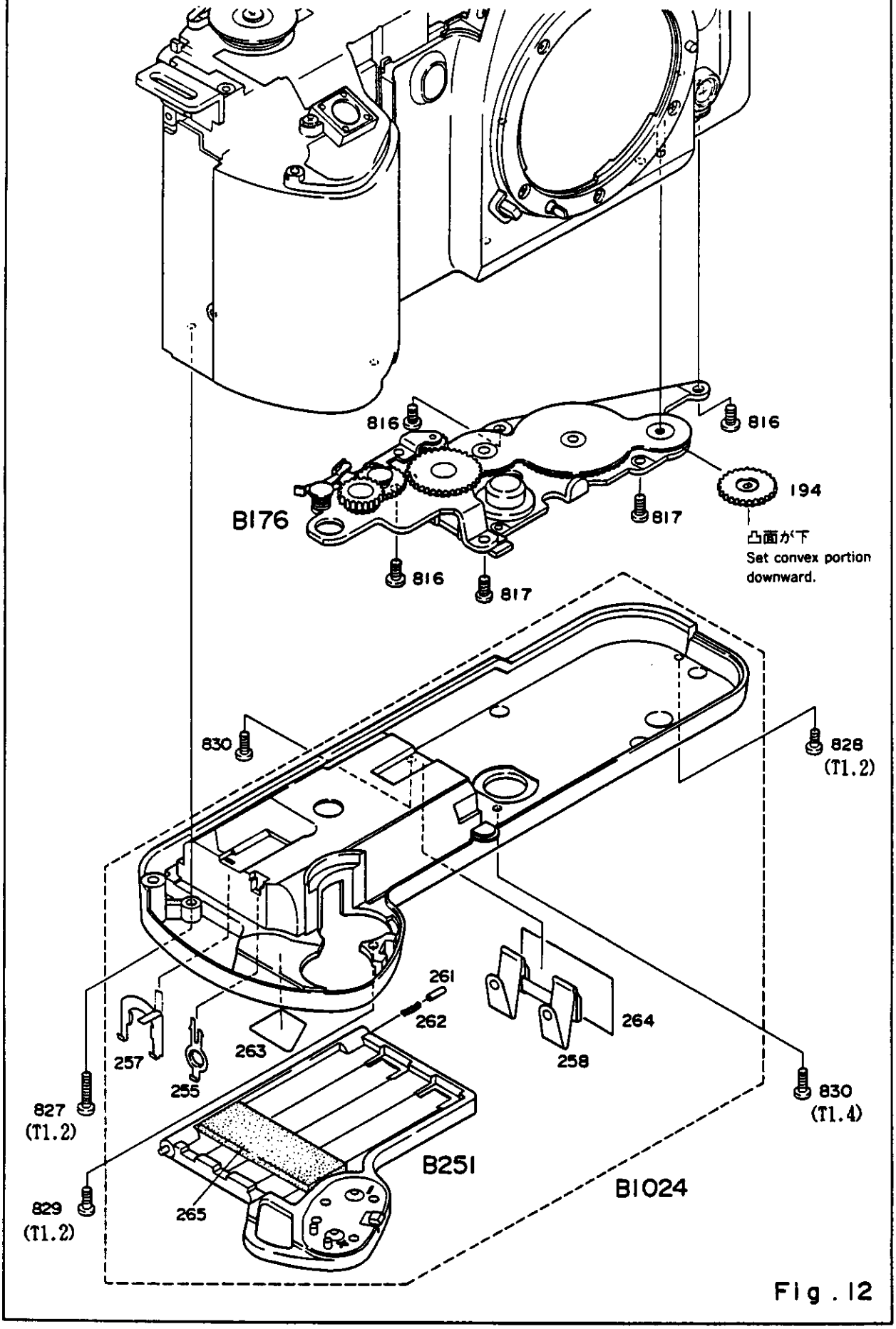

816
816
194
B176
817
凸面が下
Set convex portion
downward.
816
817
830
828
(T1.2)
261
262
264
257
263
258
255
830
(T1.4)
827
(T1.2)
B251
B1024
829
(T1.2)
265

Fig. 12

Attachment positions for tape, seal, and sponge

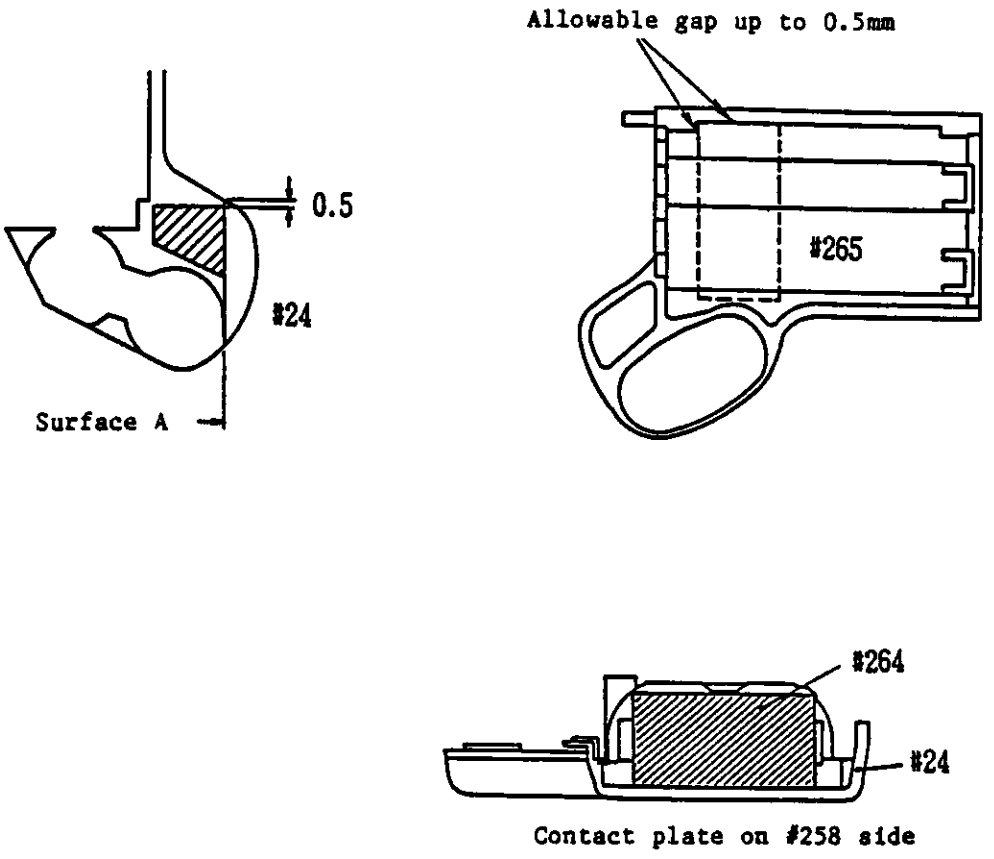
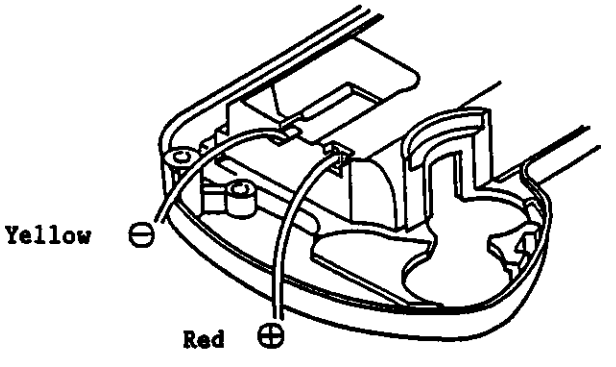


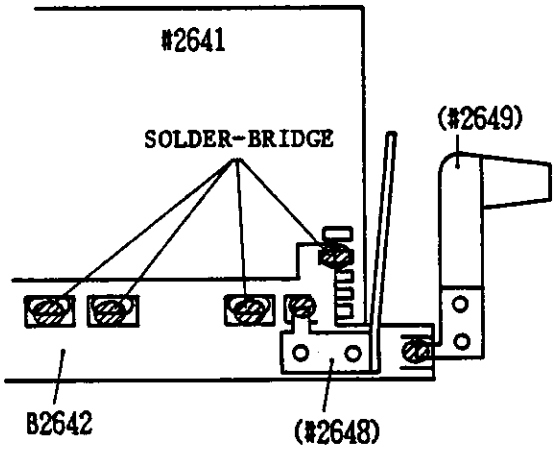
Fig. 1 Solder lead wires to battery chamber

Do not jam red and yellow lead wires with the bottom cover when assembling.

* Push lead wires toward the flash base plate side.



DATA BACK



Inspection:

1) The indication "8012 1" is to appear when the battery is installed.

2) To light up when the contact pin (2644) is short-circuited.

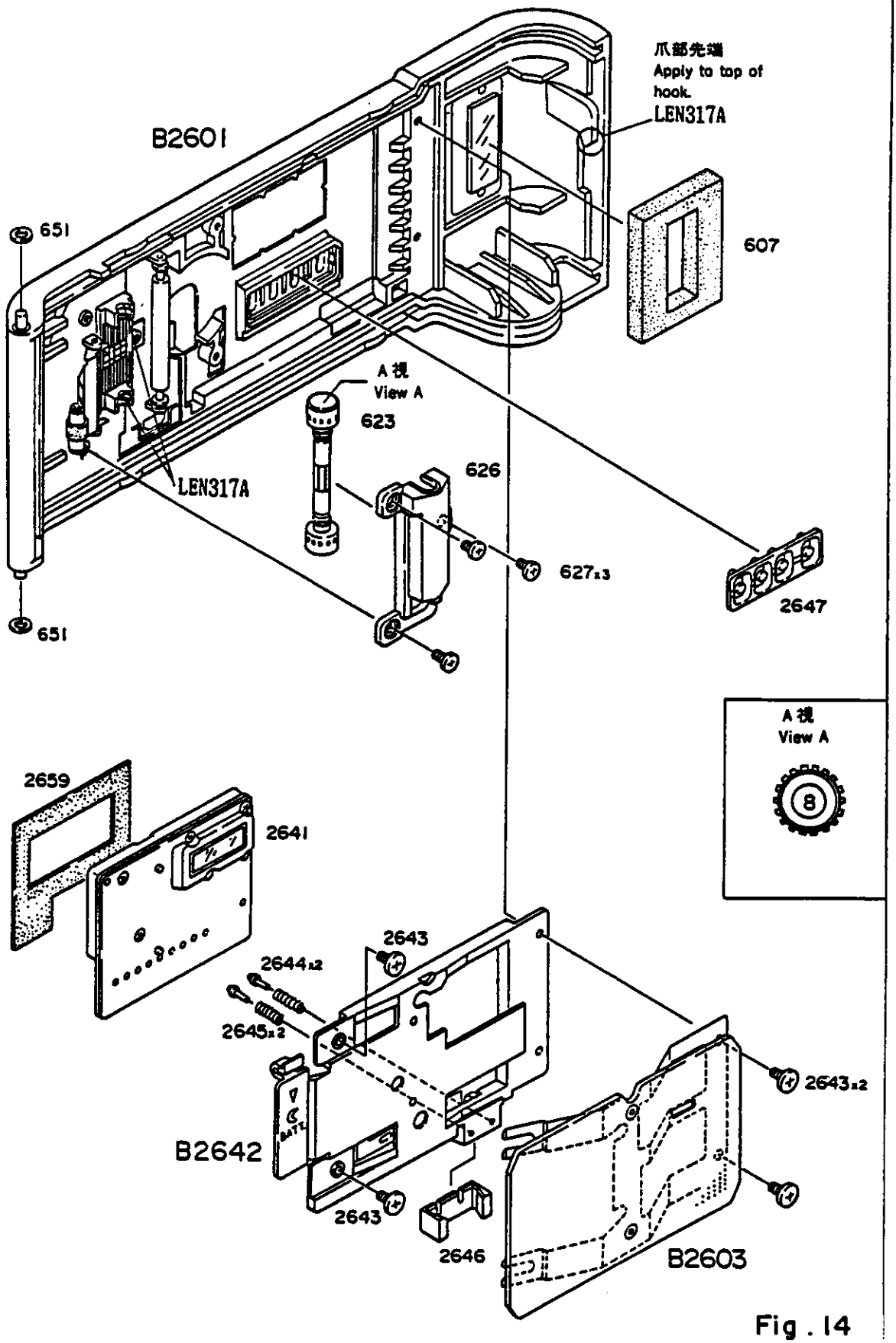
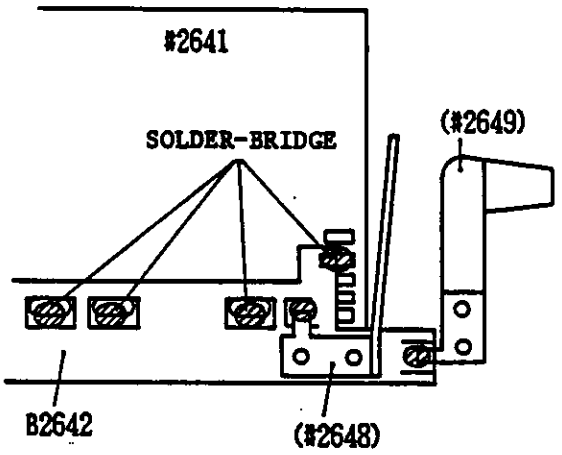

爪部先端
Apply to top of hook.
LEN317A
B2601
607
651
A視
View A
623
626
LEN317A
627x3
2647
651
A視
View A
8
2659
2641
2643
2644x2
2645x2
2643x2
B2642
2643
2646
B2603

Fig . 14

DATA BACK



Inspection:

1) The indication "8012 1" is to appear when the battery is installed.

2) To light up when the contact pin (2644) is short-circuited.

FRONT BODY MOUNTING PROCEDURES
(( )): Initially delivered products

Mount the front body

Unsolder lead wires from main FPC (front body side)

1. Focus mode selector SW ((Orange)) (yellow)
2. Focus mode selector SW ((Blue)) (gray)
3. F min SW (gray)
4. Mirror SW (yellow)
5. Mirror SW ((purple)) (gray)

WHAT? IGNORE THIS

Set the reference shaft disk in place

Using the manual film rewinding tool (See Fig. 1)

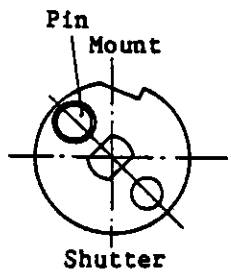


Fig. 1

Reset shutter set lever by moving the vertical lever on the front plate

See Fig. 2.

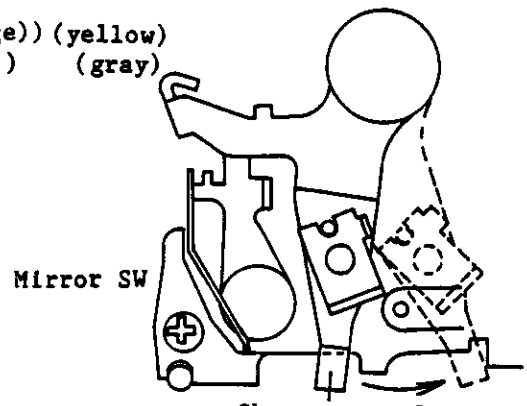


Fig. 2

While lifting up main FPC (DC/DC converter side) toward the CPU side, mount the front body from the eyepiece side
(1) Mount shutter set lever on shutter lever charge lever (See Fig. 3)
(2) Move shutter set lever toward the bayonet side (See Fig. 4)

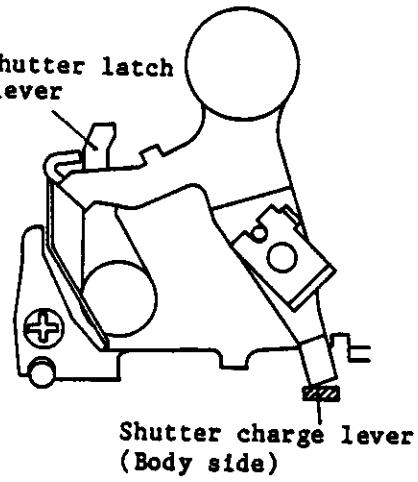


Fig. 3

Check the mounting

While holding the front body with your fingers, set the manual film rewind tool and turn it counterclockwise. Then the mirror moves up and the shutter curtain moves from ~~down~~ UP TO DOWN ~~to up~~. Turn clockwise and the mirror moves down.

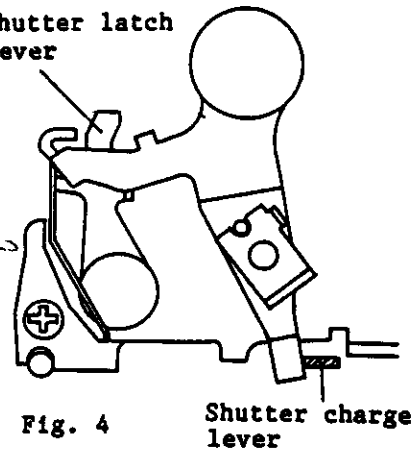


Fig. 4

Insert main FPC (film rewind side) into the gap between the front and rear bodies

* Distribute all lead wires and DB FPC on the FPC.

Attach front body with screws

Move the front body toward the flash base plate and fasten screws in the order shown in Fig. 5.
(+) #721 x 4
(+) #722 x 2

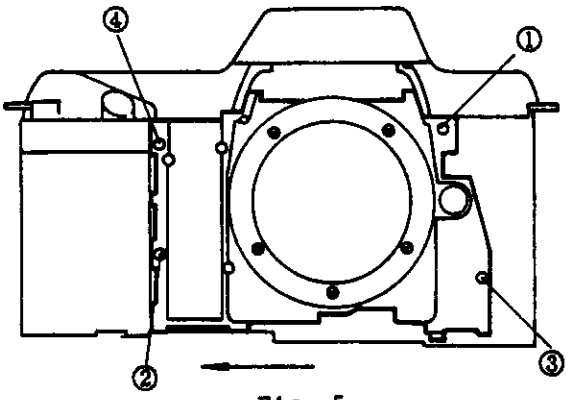


Fig. 5

Attach DC/DC converter with a screw

(+) #809 x 2

Mount film-advance lever unit

(1) Mount sprocket washer (#65).
(2) Insert MD lead wires (red, blue) in the groove on the film-advance lever unit.
(3) Set the reference shaft disk at an angle of 180°. (Fig. 6)

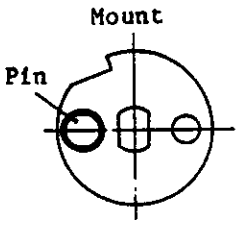
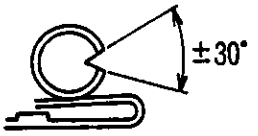


Fig. 6



Frame counter advance gear position

Fig. 7

(4) Set frame counter advance gear (Fig. 7).

(5) After setting the film advance stopper lever to the film advance completion position, set the film advance clutch at the postion as shown in Fig. 8.

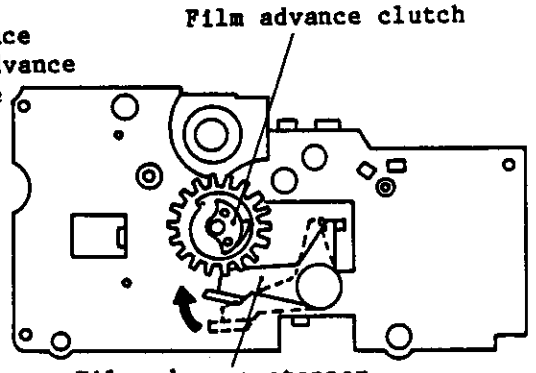


Fig. 8

Insert the sprocket shaft in the film-advance lever unit at the position indicated in Fig. 9, and mount it on the film-advance mechanism unit by attaching the part #142

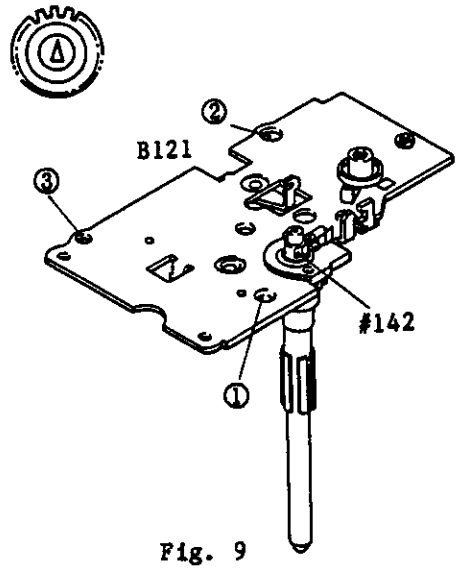


Fig. 9

* Do not deform the film rewind SW. Disassembling is recommended.

Attach with screws

Fasten screws in the order indicated in Fig. 9.

Check the position of the sprocket

(1) Rotate the manual film rewind tool in the counterclockwise direction to move the mirror up.
(2) Rotating in the clockwise direction moves the mirror down.
(3) Rotate another 360° in the same direction and attach to the film advance stopper. Check the gear position of the sprocket.

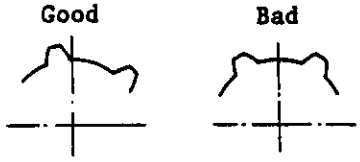


Fig. 10

Rotate the manual film rewind tool by 90° in the counterclockwise direction.

* For not apply undue force on the sprocket gear.

Push the lower sprocket gear down

(Mount main FPC on the release SW side)

Pull out four lead wires (blue, gray, green, white) from the shutter to the lens mounting side through the bloom of the FPC

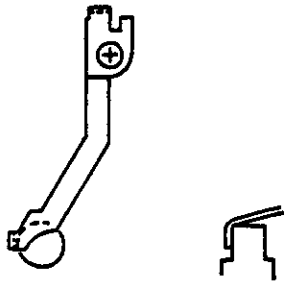


Fig. 11

Mount FPC on the film-advance lever unit. Make sure that the corner of the RSW comes in contact with the side of the sprocket shaft.
(+) #820 x 3

Check film rewind switch and fasten the shutter pre-release SW

(1) Rotate the sprocket in the clockwise direction using your fingers to free the sprocket shaft.
(2) Push the sprocket shaft down. The sprocket shaft is latched by #142. (R SW is off.)
(3) When pushing the sprocket shaft down further, the switch turns on.
* If it doesn't, unsolder the switch, remove screws and bend the SW.
(4) Attach the soldered SW with screws without jamming the flash and DM lead wires together.
(+) #866 x 1

Attach main FPC with screws — Fig. 8

Front plate	Front side	Film advance side	#736 x 1
		Film rewind side	#837 x 1
	Top side	Film rewind side	#820 x 2
			#832 x 1

Mount film advance completion SW (#135), frame counter SW (#136), and insulation washer (#174) — Fig. 3, Fig. 8

Mount frame counter spring (#133), counter (#129) (+) #134 — Fig. 3

* Rotate once in the clockwise direction.

Solder main FPC

(Around shutter pre-release SW)

Film advance MD	1	Blue	2	Red					
SB	3	Gray	4	Blue	5	Brown	6	White	
	7	Orange	8	Purple	9	Red	10	Red	
Aperture Mg	11	Red	12	Blue					

Solder GND of Battery Box

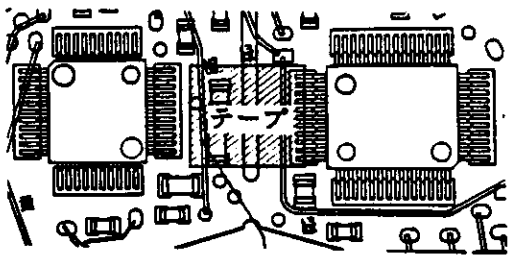
(Film advance side of the front plate)
Insert the green lead wire from the film detection SW into the gap between the handgrip and the front body.

Film detection SW	1	Green
Photo interrupter	2	Red 3 Blue 4 Brown

(Film rewind side of the front plate)
Attach two lead wires (white, green) from the shutter on the detachable button using adhesive tape.

F min SW	1	Purple ((Brown))
DX SW	2	((Black)) 3 ((Orange))
	4	Green ((Gray))
	5	((Purple)) brown 6 Orange ((Blue))
Focus mode selection SW	8	Gray ((Orange)) 9 Yellow ((Blue))
Shutter SW	10	((White)) 11 Purple ((Green))

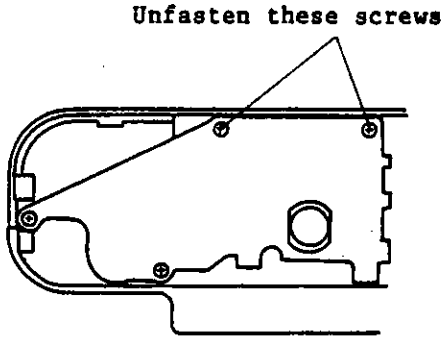
* Lead wire (Green) from IS delay base plate should not be mounted on the decoder IC.



FLANGE FOCAL DISTANCE ADJUSTMENT

The flange focal distance may be changed if the film rewind base plate and the front plate are disassembled. Adjust the flange focal distance according to the following procedures:

(1) Unfasten two screws that attach the film rewind base plate to the bottom cover.

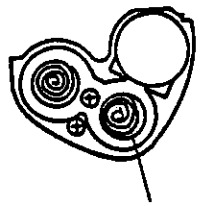


(2) While moving the body diecast up and down, fasten the screws.

ACCURACY DETERMINATION (AE, AF)

Make an accuracy adjustment according to the following procedures when either the main FPC or AF FPC is replaced or the camera does not work properly.

Disassemble bottom cover (B1024)



Set the regulated power supply voltage to 5.5V

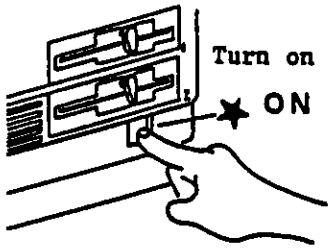
* Connect the red lead wire from the battery box to the + electrode, and connect the - electrode to the - contact of the battery chamber. Do not connect in the reverse order as this may damage the DC/DC converter.

Insert the DX-contact tool (J15270) into the terminal (I/O board J15275) on the rear of the personal computer

* This procedure is required only once.

Start the personal computer

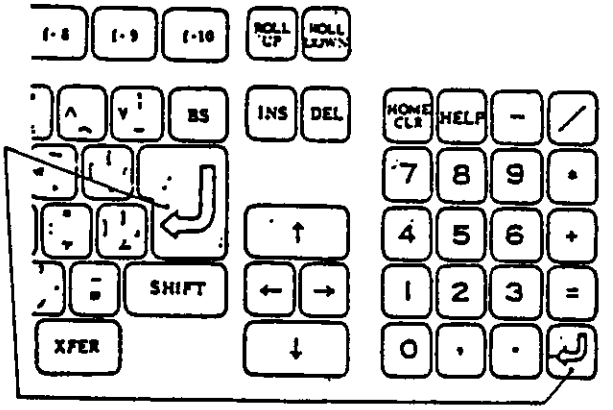
Turn on the personal computer



After a little while, the question, "How many files (0-15)?" appears on the screen.

Hit Return key

Return key

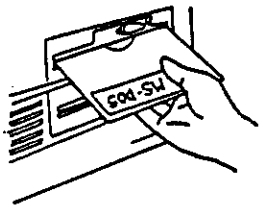


Then the following sentences are displayed on the screen

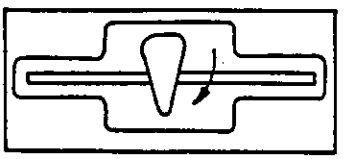
```
How many files (0-15) ?
NEC N-88 BASIC(86) Version 2.0
Copyright. (C) 1983. by NEC
Corporation/Microsoft.....
x x x x x Bytes free
OK
```

Insert floppy disc

1. Insert a floppy disc (MS-DOS system disc) into disc drive A



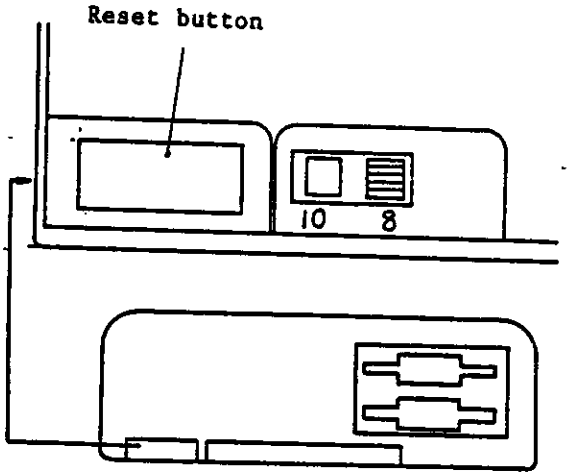
Insert floppy disc



Turn the drive lever down

2. Insert another floppy disc (program disc for F-401) into disc drive B

Push Reset button



On the screen:
1. F-401 adjustment program
2. How to make a backup copy are displayed.

Hit key "1" first then hit Return key

Connect DX-contact tool (J15200) to the camera

Hit Return key

While depressing the shutter release button halfway, hit Return key

Display appears on the screen

Select "1" or "2" and hit Return key

1. AE accuracy adjustment
2. AE accuracy inspection
3. AF accuracy adjustment
4. AF accuracy inspection
5. Inspection of camera
6. Completion of adjustment

"1" ?

No

Yes

Go to AE adjustment (Page A34)

Go to AF adjustment (Page A36)

Adjustment of AE accuracy

Necessary tools and testers

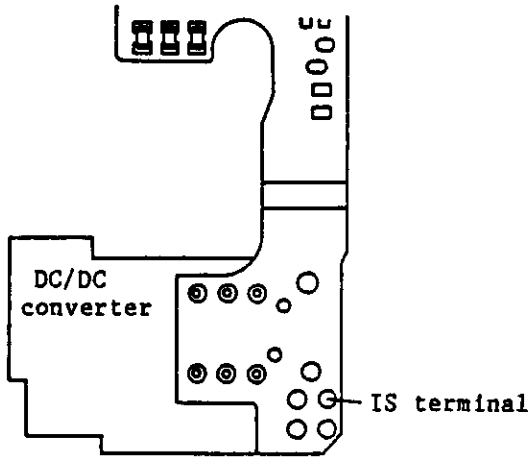
Personal computer (with I/O board), shutter tester SF-4DNS (J19040)
Regulated power supply, AF50/1.8S
DX-contact tool (J15270), Time counter (J18142), IS terminal tool (J15273), Flash dummy connector (J15225), Standard reflector

Adjustment: Follow the instructions displayed on the screen

Adjustment of auto " δ" level	After measuring inclination of light metering output, write this value into the EEPROM memory device.
Check shutter accuracy	
Adjustment of TTL flash output	Measure STOP TIME and write this value into the EEPROM memory device.

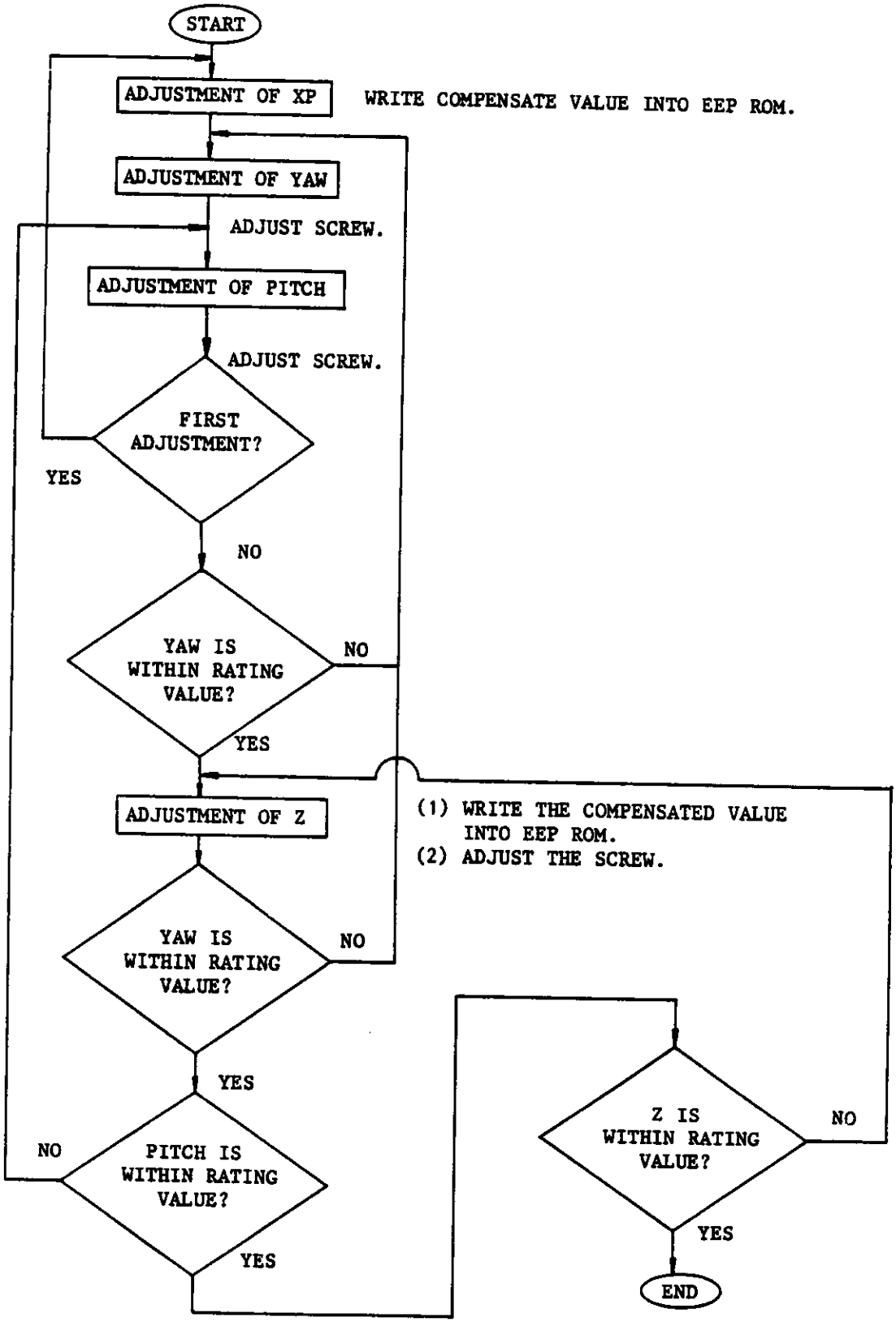
(1) Solder the yellow lead wire of the IS terminal tool to the IS terminal of the main FPC on the bottom of the body.
(2) Solder the red lead wire to the IS terminal of the time counter.
(3) Solder the black lead wire to the GND of the body or the GND of the timer counter.

* Other procedures are the same as TTL flash output of other models.



M 1/2000	Compensate the mechanical discrepancy of high-speed shutter, and write the value into the EEPROM memory device.
Check M accuracy	

OUTLINE OF AF ADJUSTMENT



Adjustment of AF accuracy

Necessary tools and testers

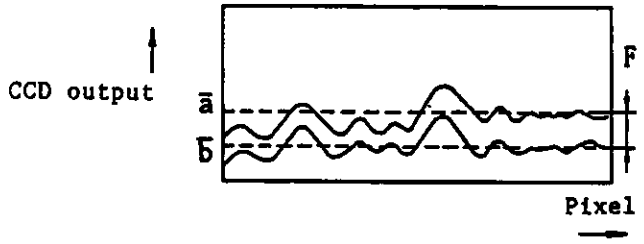
Shutter tester or light metering box, Z illuminator (J15264), ND filter, Pitch adapter (J18185), Fluorescent lamp (J15264-2), YAW adapter* (J18184), Transformer*, AF adjustment stand (J15259)*, Lead wires for transformer* (* for overseas market). Z lens (for 2m measurement). (All those mentioned above are common to F-501.)

PK-13 (J18199), Z adjustment chart (J18198), Chart board (J15274), DX contact tool (J15270), Tripod socket position conversion adapter (J15271), a personal computer system (with I/O board)

* Some modification is necessary for Z lens (see page R11).

Adjustment of $\overline{XP}$

After comparing the output value between the two CCD lines in the AM200 and calculating its discrepancy, write this value into the EEPROM memory device.

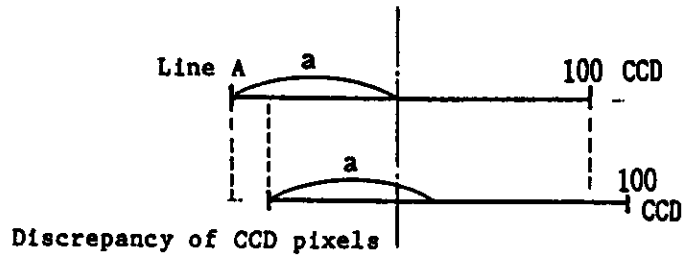


Adjustment of YAW and Pitch

Utilizing CCD output value, adjust the inclination of the AM200 (same as F-501)

Adjustment of Z

Adjustment of mechanical pixel discrepancy between two CCD lines (A and B) and adjustment of its position.
Suppose that the position of the CCD elements is moved during the production process of the AM200 as shown in the following figure, the correct focusing operation become impossible when directing the camera at the same subject because a relative discrepancy appears between the two CCD lines. Measure this discrepancy and write it into the EEPROM memory. (L1)
The adjustment of the position of the actual image and the focusing position of the AM200 can be adjusted with three screws (Δ Z). Write this value into the EEPROM memory. The CPU calculates the discrepancy using data stored into the EEPROM.



Adjustment of AF accuracy

Main mirror and sub-mirror are positioned at an angle of 45°

↓

Install the tripod position conversion adapter in the tripod socket.

↓

Place the camera lengthwise in the same manner as the F-501.

↓

Follow the instructions displayed on the personal computer screen.

↓

Adjustment of XP

↓

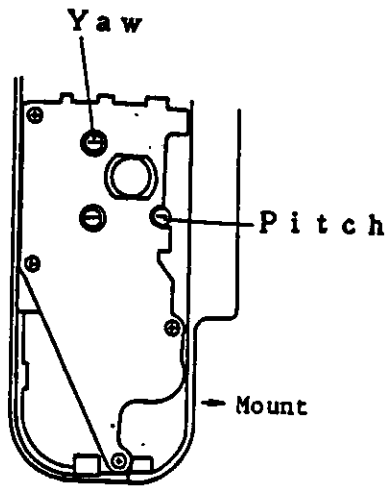
Adjustment of YAW

↓

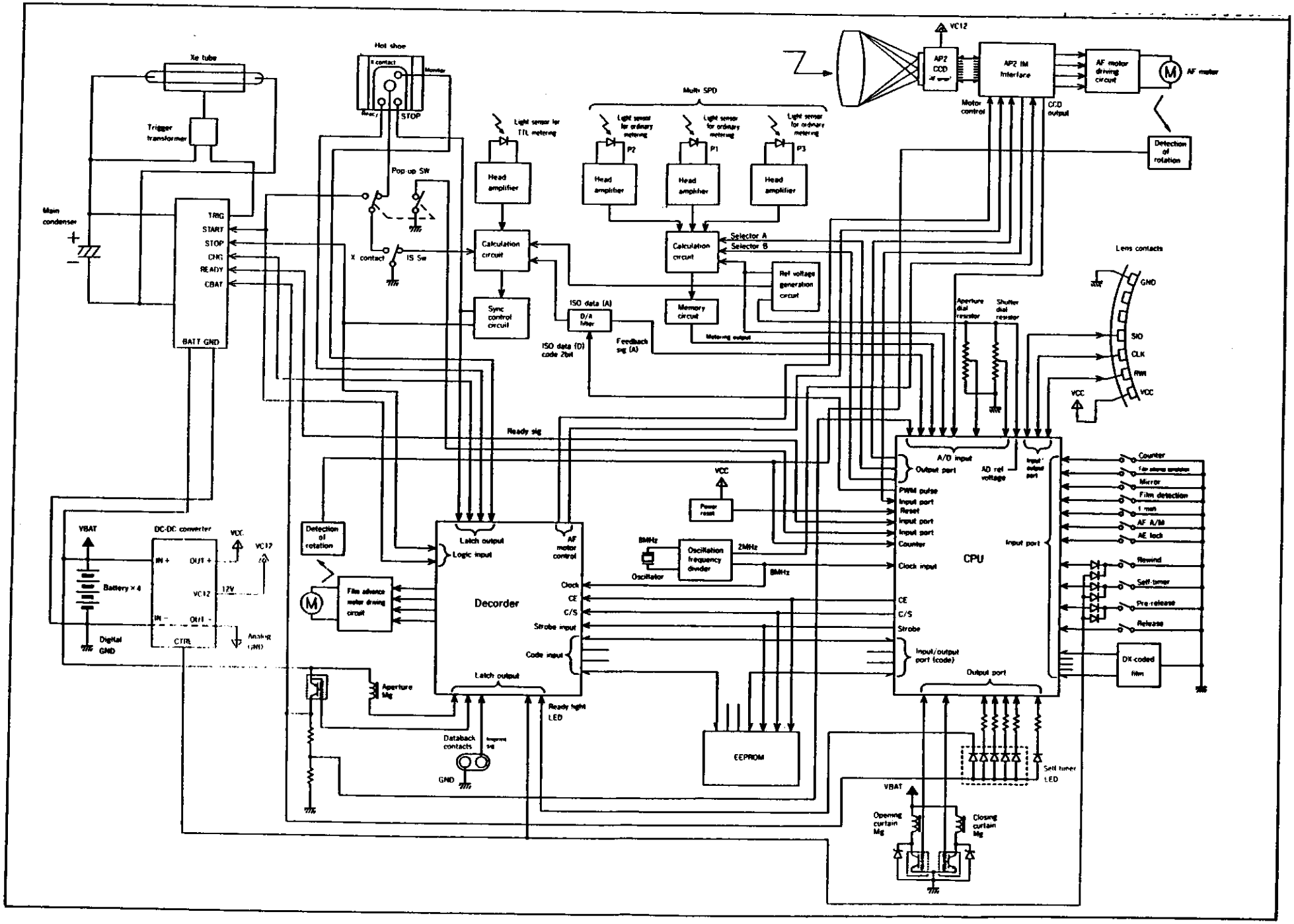
Adjustment of Pitch

↓

Adjustment of Z



ELECTRICAL CIRCUIT


Xe tube
Trigger transformer
Main condenser
TRIG
START
STOP
CHG
READY
CBAT
BATT GND
Hot shoe
X contact
Monitor
Ready
STOP
Pop-up SW
X contact
IS Sw
Light sensor for TTL metering
Head amplifier
Calculation circuit
Sync control circuit
ISO data (A)
D/A hfter
ISO data (D) code 2bit
Feedback sig (A)
Multi SPD
Light sensor for ordinary metering
P2
P1
P3
Head amplifier
Calculation circuit
Selector A
Selector B
Ref voltage generation circuit
Memory circuit
Metering output
VC12
AP2 CCD AF sensor
AP2 IM interface
Motor control
CCD output
AF motor driving circuit
AF motor
Detection of rotation
Lens contacts
GND
SIO
CLK
RWI
VCC
Aperture dial resistor
Shutter dial resistor
Ready sig
VBAT
DC-DC converter
IN +
OUT +
VCC
VC12
12V
IN −
OUT −
CTRL
Battery × 4
Digital GND
Detection of rotation
Film advance motor driving circuit
Latch output
Logic input
AF motor control
Decorder
Clock
CE
C/S
Strobe input
Code input
Latch output
Ready light LED
Aperture Mg
Databack contacts
Imprint sig
GND
VCC
Power reset
8MHz
Oscillator
Oscillation frequency divider
2MHz
8MHz
EEPROM
A/D input
Output port
AD ref voltage
Input/output port
PWM pulse
Input port
Reset
Input port
Input port
Counter
Clock input
CE
C/S
Strobe
Input/output port (code)
Output port
CPU
Input port
Counter
Mirror
Film detection
1 min
AF A/M
AE lock
Rewind
Self-timer
Pre-release
Release
DX-coded film
Self timer LED
VBAT
Opening curtain Mg
Closing curtain Mg

OUTLINE OF THE F-401 CIRCUIT DIAGRAM

The major electrical circuits of the F-401 consist of the following components:

1. Power supply
2. Operation and data input processing
3. CPU
4. Decoder and driver units
5. Film-advance motor driving
6. AE metering amplifier
7. TTL flash output calculation controller
8. AF sensor module (CCD)
9. AF interface, AF lens controller
10. Built-in flash firing driver
11. Reference clock generator
12. EEPROM

1. Power supply

Power is supplied by four AA-type batteries (nominal voltage: 6V hereinafter called VBAT). The DC/DC converter provides the circuits with a regulated 12V and 5.25V power (hereinafter called VCC). Power for the electrical circuits, requiring a large current, such as flash, motor drive, shutter magnet, and aperture magnet circuits, is supplied from VBAT.
Power holding operation using a power hold timer is carried out by maintaining power while controlling the terminal of the DC/DC converter.

2. Operation and data input processing

Data from the shutter and aperture dials and data from switches determining the sequence timing are entered into either one of following three components: 1) CPU, 2) light metering amplifier, or 3) decoder and driver units.
Digital inputs to be entered into the CPU are data signals from switches, such as the shutter pre-release SW, release SW, self-timer SW, AE lock SW, film rewind SW, built-in flash lock-release SW, focus mode selector SW, F min SW, and sequence control switches such as frame counter SW, film advance complete SW, mirror SW, film detection SW, and DX-code.

Analogue inputs to be entered into the CPU originate from operational switches such as the shutter speed dial, aperture dial, and film speed dial. Digital input to be entered into the light metering amplifier is an IS SW. Digital input to be entered into the decoder and driver originates from the flash selection SW for the built-in flash.

List of operations and data input processing

CPU

Digital data

Shutter pre-release SW	1 bit
Release SW	1 bit
Self-timer SW	1 bit
Auto exposure lock SW	1 bit
Film rewind SW	1 bit
Built-in flash lock release SW	1 bit
Focus mode selector SW	1 bit
F min. SW	1 bit
Frame counter SW	1 bit
Flash advance completion SW	1 bit
Mirror SW	1 bit
Film detection SW	1 bit
DX-code	5 bits

Analogue data

Shutter speed dial	1 ch
Aperture dial	1 ch

Light metering amplifier

Digital data

IS SW	1 bit

Decoder and driver

Digital data

Flash selection SW for built-in flash	1 bit

3. CPU

The CPU has the following eight major functions:

(1) Sequential control
This controls shutter pre-release, shutter pre-release timer, shutter release, and film advance operations by reading data from various switches.

(2) Calculation of viewfinder indicators
According to the multi-pattern light metering algorithm together with digital ISO data, it calculates data for the indicators by converting analogue data from the light metering output (triple-sensor SPD) amplified in the AE light metering amplifier into digital data.
By converting analogue data from the aperture dial and shutter speed dial into digital data, the LED indicators are displayed in the viewfinder. If the setting is the correct exposure in each mode (program, aperture-priority, shutter-priority exposure, and manual modes), the (o) LED indicator lights up, if overexposure, the (+) indicator lights up, and if underexposure, the (-) indicator lights up.

(3) Shutter control in the manual and shutter-priority exposure modes
Analogue shutter speed data from the shutter speed dial is converted into digital data and the shutter speed is controlled by the digital timer. However, the shutter release is locked if the shutter speed dial is set to B in the shutter-priority exposure mode.

(4) Shutter control in aperture-priority exposure mode
After converting analogue output data from the light metering amplifier into digital data, the shutter speed is controlled by a digital timer by calculating the correct shutter speed using the aperture value from the aperture dial and film speed data from the DX-code.

(5) Aperture control in the manual and aperture-priority modes
(i) New AF lens
If the lens aperture ring is stopped down to the minimum aperture, the CPU reads the maximum aperture value through data communication with the CPU in the lens, converts the analogue aperture data from the aperture dial into digital data, and calculates the difference between the maximum aperture value and aperture value from the aperture dial. After releasing the shutter, the aperture is controlled by activating the aperture control magnet through the decoder and driver units when the aperture value matches the calculated aperture value.

If the lens aperture ring is not stopped down to the minimum aperture, the shutter is locked and the (+) and (-) indicators in the viewfinder blink alternately as a warning.

(ii) Old AF lens and old lens
If old lenses are mounted, the lens stops down to the aperture value of the lens aperture ring, and the aperture value set from the camera is disregarded. But if the aperture dial is set to S, the shutter release button is locked.

(6) Aperture control in the shutter-priority exposure mode
After converting the analogue output signal from the light metering amplifier into a digital signal, aperture control is carried out by the photo interrupter output and aperture magnet by calculating the correct aperture value using shutter speed data from the shutter speed dial and film speed data from the DX-code, just as in the manual and aperture-priority exposure modes.

(7) Exposure control in the program mode
After converting the analogue output signal from the light metering amplifier, the shutter speed and aperture value are calculated according to the programmed arithmetic algorithm. The shutter speed is controlled by the digital timer and the aperture value is controlled by the photo interrupter output pulse and aperture control magnet. The shutter release button is always locked when an old lens is mounted and is locked when a new AF lens is mounted but its aperture ring is not set to the minimum aperture.

(8) Distance detection calculation, lens driving and indicators
CCD output signal from the AF sensor module is amplified in the AF interface IC. The amplified signal is entered into the CPU as an analogue signal successively synchronizing with clock signals from the CPU. In the CPU, the analogue signal is converted into digital, and the defocus amount from the subject is calculated in the programmed calculation routine based on the digital data. Depending on the direction or the amount of calculated defocus value, the lens rotating direction (normal or reverse) and the amount of rotation required can be determined.
In the next step, exchanging data with the CPU installed in the new AF lens through serial I/O terminals, the image surface shift amount coefficient necessary for controlling lens driving is read out. The CPU counter counts the number of pulses related to the motor rotation during the motor movement which rotates an amount equivalent to the calculated value of the defocus amount. Furthermore, as the lens approaches the in-focus position, the motor rotating speed decreases by a duty ratio in 100%-50%-25%-12.5% steps to obtain much higher focusing accuracy.
When the correct focus is obtained, a green LED focus indicator inside the viewfinder lights up.

Note: The AF mechanism of this camera operates only when a new AF lens is mounted. If an old lens (old AF lens) is attached, the in-focus indicator is displayed, but the near and far focus indicators do not appear.

4. Decoder and driver

A six-bit code signal from the CPU is decoded and hooked up with the strobe signal. The decoder and driver also control the following operations:

(1) Output of control signal for AF motor driving (normal, reverse, duty ratio, etc.)
(2) Output of data back imprinting signal
(3) Output of main power supply (DC/DC converter) control signal
(4) Photo interrupter driving control for aperture and AF
(5) Gate control for repair and communication
(6) Reference voltage output selection control (for AF and AE)
(7) Output of ISO warning signal for external flash
(8) Output of AF illuminator control signal
(9) Flash ready-light control (including ISO and after-firing warnings)
(10) Output of built-in flash oscillation control signal
(11) Output of film advance motor driving control signal
(12) Aperture magnet driving control
(13) Output of C-bat power supply signal

5. Film-advance motor driving

After receiving four driving signals from the decoder, the bridge circuit, comprised of four power transistors, controls the motor operations such as normal and reverse rotation, braking, and stop operations.

6. AE metering amplifier

In the shutter pre-release or pre-release timer states, the quantity of light at the maximum aperture enters into the triple-sensor metering system. Current from the sensor module is converted into a logarithmically compressed voltage by the head amplifier. This voltage is amplified by a fixed amount (varies depending on the external resistance ratio), and is transmitted to the A/D input of the CPU from an output terminal successively.

7. TTL flash output calculation controller

If the shutter release button is depressed when receiving a TTL flash mode signal through the monitor contact on the accessory shoe, or when receiving a built-in flash activating signal, the light quantity integration condenser starts operation immediately after the shutter IS SW turns off. The input voltage of this circuit is equal to the voltage logarithmically compressed in the head amplifier plus the analogue data (ISO data) converted by the PWM D/A converter. This voltage raises suddenly when the flash selection SW turns on and the flash starts firing immediately after IS SW turns on. Accordingly, the integrated voltage increases as well. When the voltage reaches a certain level, a signal to stop firing is sent to the accessory shoe, or this signal is sent to the flash through the stop signal terminal when the built-in flash is used.

8. AF sensor module (CCD)

The AF sensor module includes two CCD line sensors consisting of 100 pixels in each A and B line. This module can store and send an electrical charge generated in proportion to the intensity of light corresponding to the driving clock signal from the AF interface IC.

9. AF interface, AF lens controller

The AF interface IC sends instructions for storing and transmitting electrical charges to the AF sensor module by the instruction of the CPU and sends an output signal to the CPU as an analogue signal. The clock signal that controls the AF sensor module driving is a 2 MHz-clock signal from the reference clock generator. The analogue signal sent to the CPU is converted to a digital signal in the CPU, which is calculated according to a fixed algorithm, which in turn sends four modes (normal, reverse, brake, and stop) to the decoder and driver for outputting the pulse control signal (2-bit) from the decoder and driver to the AF interface IC. The AF motor is controlled with the bridge circuit consisting of four power transistors by receiving four driving signal from the AF interface IC.

10. Built-in flash firing and driver units

The built-in flash firing and driver units are divided roughly into three parts: Xenon tube, trigger transformer, and oscillation and control circuits.
When the built-in flash lock-release signal is input into the CPU and the shutter release button is depressed halfway, an oscillation signal (CHG signal) is entered and oscillation begins. If oscillation is completed, the flash ready-light signal is transmitted to the CPU from the ready-light terminals. If the shutter is released in this state, the trigger transformer is activated by the signal from the flash selection SW to fire the Xenon tube.
Flash output control is carried out as stated in Section 7, and firing stops when the stop signal is entered.

11. Reference clock generator

The reference clock signal is generated by an external 8 MHz oscillator and outputs an 8 MHz reference signal to the CPU and a 2 MHz signal to the interface IC as long as the shutter release button is depressed halfway.

12. EEPROM

Many control operations such as AE control using analogue signals in the past have been replaced by digital control of the CPU. Accordingly, analogue data conventionally adjusted by volume controls have been stored in memory as digital data. The CPU recalls and compensates the digital value as a compensated coefficient when the CPU performs calculation.
EEPROM is the memory device capable of writing and erasing compensated coefficients as digital data. The following compensated coefficients are stored in the EEPROM device:
(1) Adjustment of level between triple-sensor modules
(2) Adjustment of SV value level in TTL mode
(3) Adjustment of shutter speed (compensates time delay of the mechanism)
(4) Adjustment of balance of AF sensor module output
(5) Adjustment of output gain of AF sensor module
(6) Adjustment of noise level of AF sensor module output
(7) Adjustment of in-focus position
(8) Adjustment of battery check voltage

SWITCHES

Name	Position	Operation
Pop-up SW	Top cover	When pushing the flash lock-release button, the SW turns on to activate built-in flash.
Flash selection SW	Top cover	When pushing the flash lock-release button, the SW turns on to change from the X contact trigger to flash base plate trigger.
Self-timer SW	Top cover	When the self-timer button is depressed, the SW turns on to activate self-timer operation.
Frame counter SW	Main FPC	The SW turns off when the frame counter reaches 1.
	Film-advance lever unit	Used for blank film advance.
Film advance completion SW	Main FPC	The SW turns on when the film advance is completed.
	Film-advance lever unit	Stops motor rotating in normal direction.
Film rewind SW	Main FPC	The SW turns on when the film rewind button is depressed.
	Film-advance lever unit	Film rewinding starts.
Shutter pre-release release SW	Main FPC on the handgrip	2-step SW 1st step: Pre-release SW is on. 2nd step: Release SW is on.
AE lock	Front side of main FPC	When the AEL button is depressed, the SW turns on and the light metering value is memorized.
Film detection SW	Body diecast	The SW turns on when film is loaded.
	Under aperture	The SW turns off when film rewinding is completed.
F min SW	Front side of front body	The SW turns on when the aperture ring is set to the minimum aperture.
Mirror SW	Side of front body	This SW turns on after the mirror moves up to provide a shutter moving signal.
Focus mode selector SW	Front side of front body	In the M mode, this switch is turned off and AF servo is changed to the focus aid mode.

実体配線図 WIRING DIAGRAM

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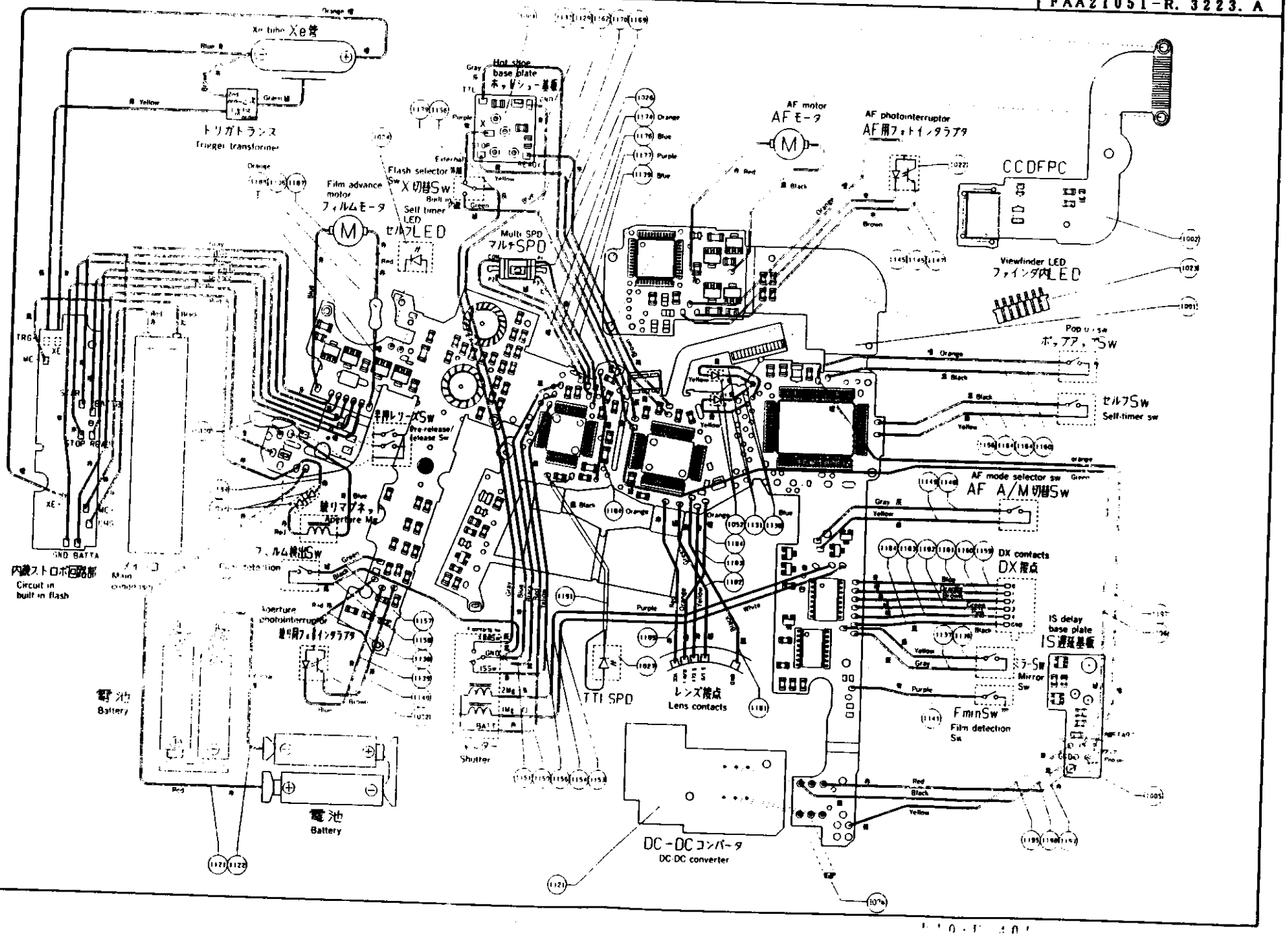
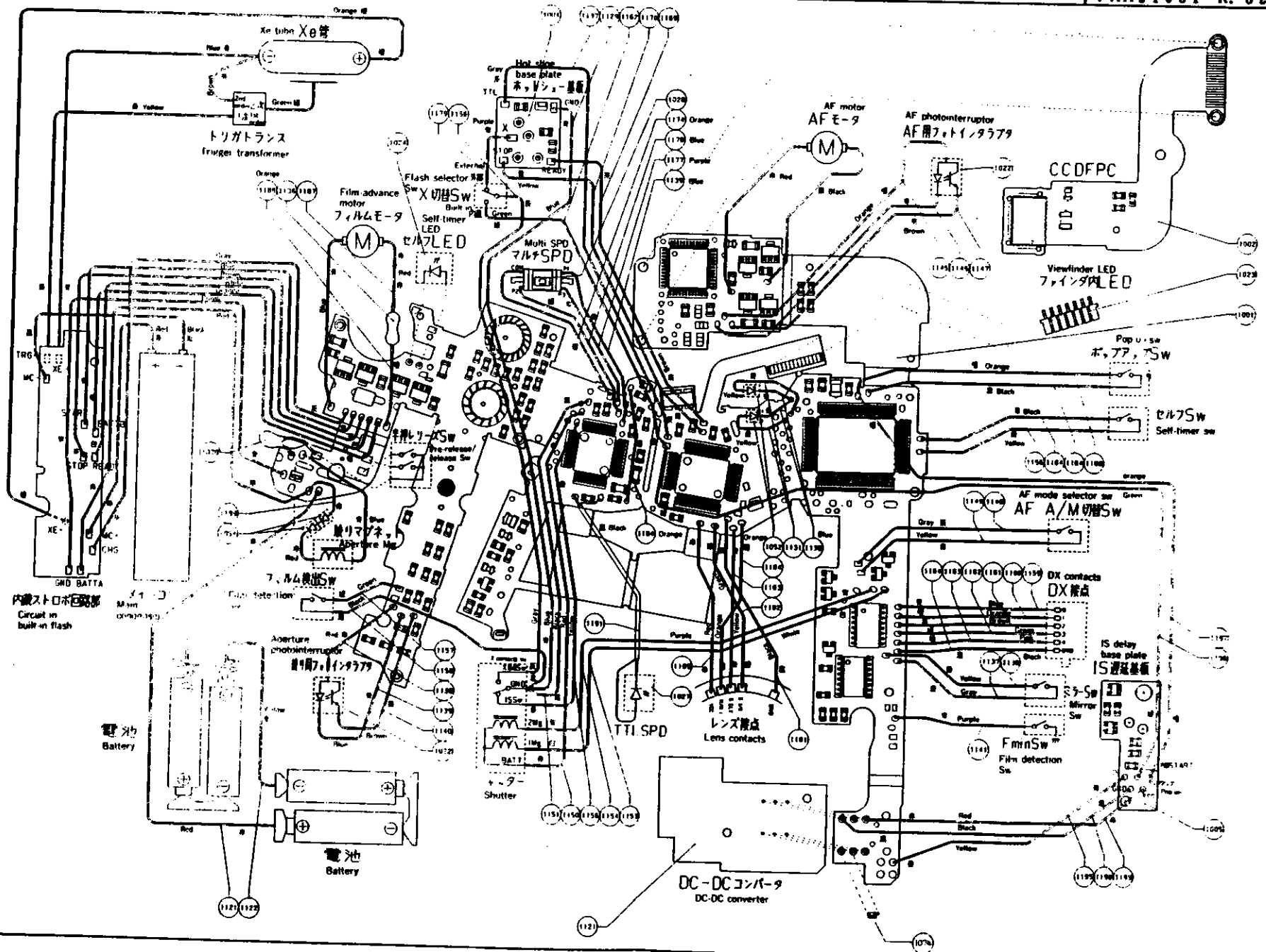
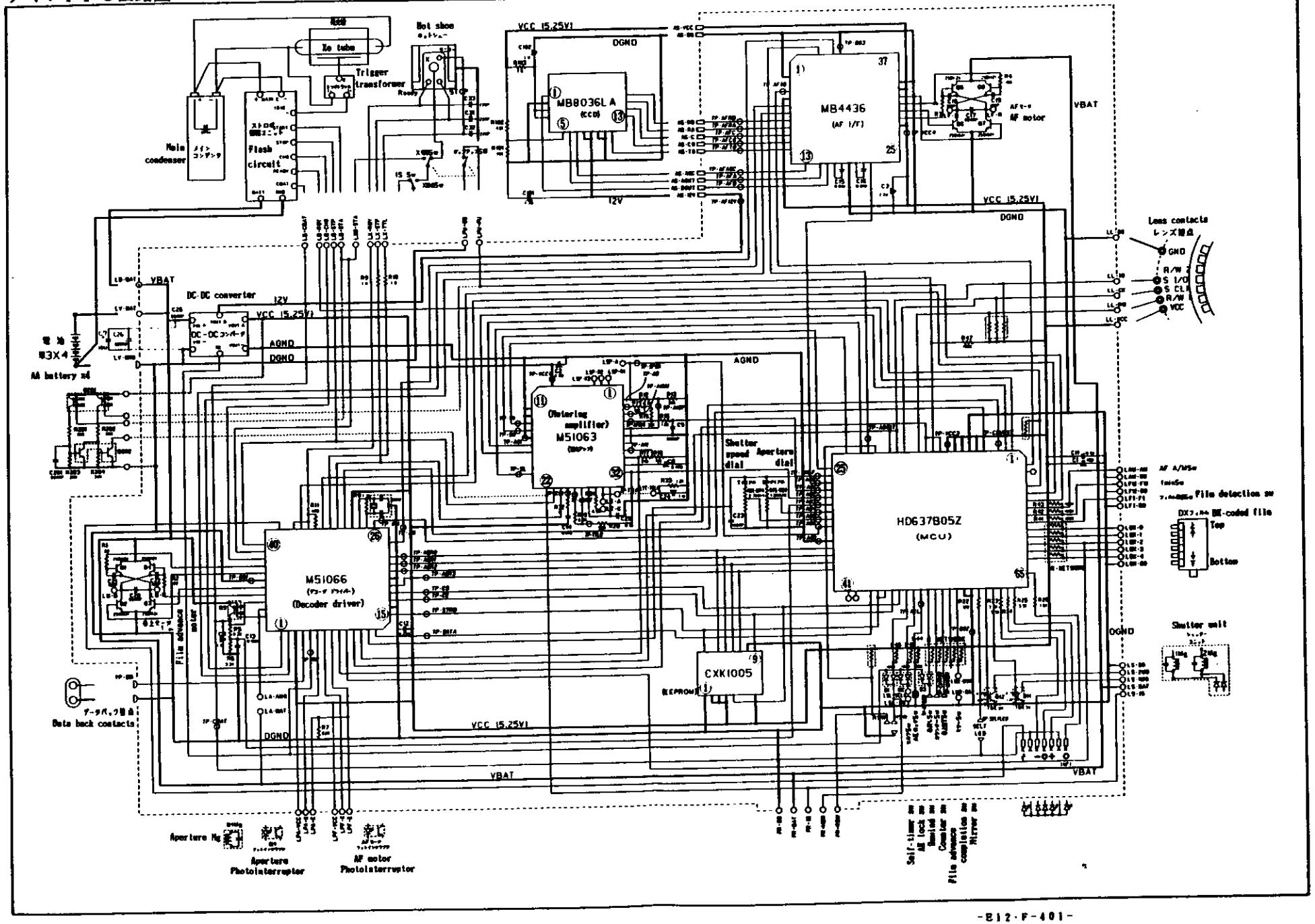


実体配線図 WIRING DIAGRAM

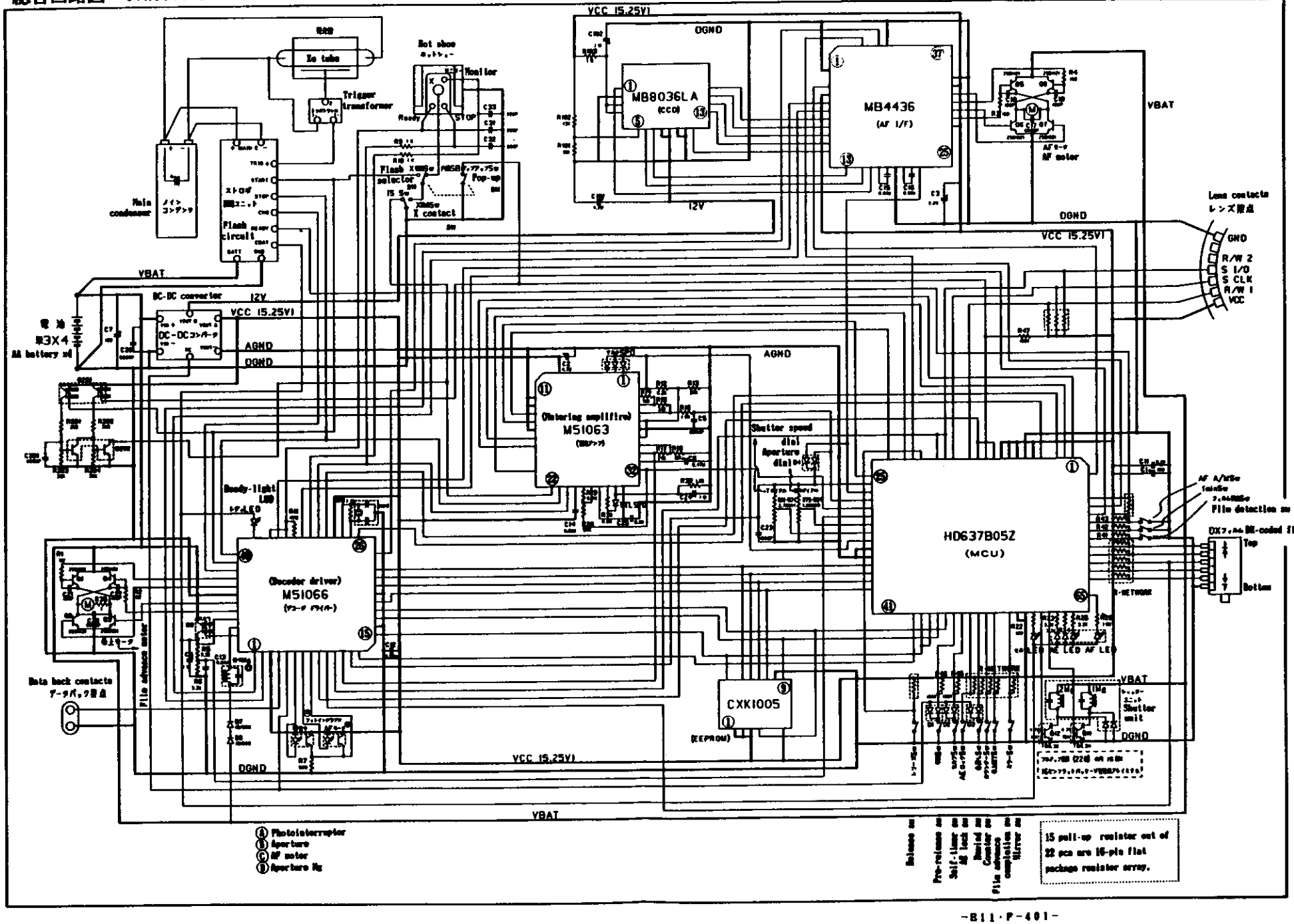
FAA21051-R. 3223. A



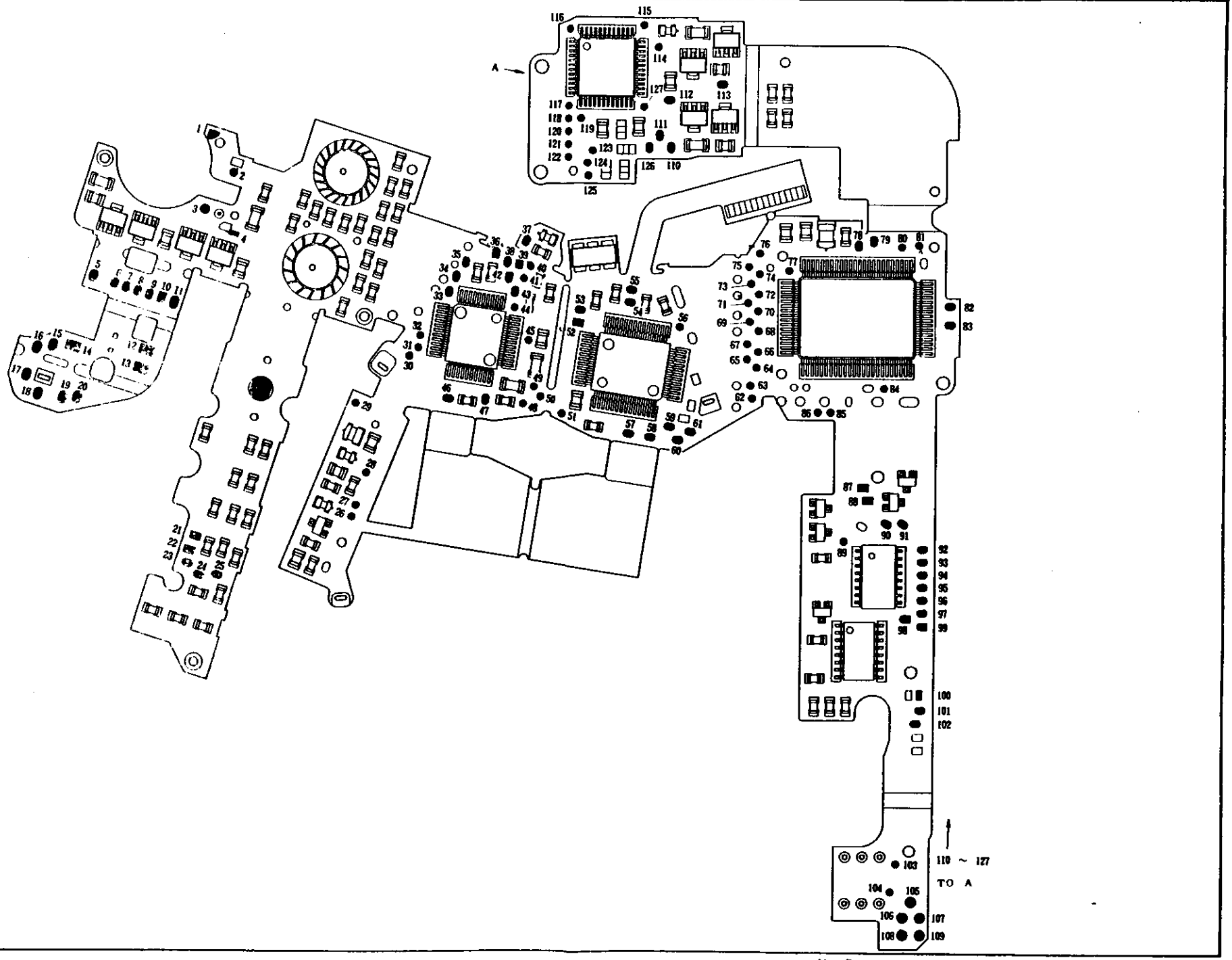
メインFPC回路図 CIRCUIT DIAGRAM (MAIN FPC)



総合回路図 CIRCUIT DIAGRAM



メインFPCチェックランド CHECKING LANDS (MAIN FPC)



CHECK LANDS

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No.	Name	Terminal Description
1	TP-CNTR SW	Frame counter switch
2	TP-MAKI SW	Film advance complete switch
3	TP-SELF LED	Self-timer LED
4	TP-REW SW	Film rewind switch
5	LM-B	Film advance motor (blue)
6	LB-CHG	Built-in flash charge signal
7	LB-STA	Built-in flash start
8	LB-STP	Built-in flash stop
9	LB-RDY	Built-in flash ready
10	LB-CBAT	Built-in flash discrete power supply
11	LM-R	Film advance motor (red)
12	RSW	Release switch land
13	HSW	Shutter pre-release switch land
14	GND	GND land for switches
15	LA-BAT	Aperture Mg(power supply side)
16	LA-AMG	Aperture Mg (driver side)
17	LV-GND	Battery (GND) (not used)
18	LB-GND	Built-in flash GND
19	LB-BAT	Built-in flash power supply (6V)
20	LV-BAT	Battery (6V)
21	LFI-DG	Film detection switch GND
22	LFI-FI	Film detection switch (CPU side)
23	LPA-VCC	Photo interrupter power supply (for aperture)
24	LPA-K	Photo interrupter cathode (for aperture)
25	LPA-E	Photo interrupter emitter (for aperture)
26	TP-TTLG	A15 input
27	TP-A15 OUT	A15 output (extended Tr emitter voltage)
28	TP-ICON	TTL flash output integration condenser
29	TP-CBAT	LED built-in flash switching power supply
30	TP-VCC1	DC/DC secondary power supply 1
31	TP-SL	TTL flash output mode selection
32	TP-S1	Multiple SPD sensor module code 1
33	LS-IS	Shutter unit IS switch
34	LS-BAT	Shutter unit power supply
35	LS-DG	Shutter unit GND
36	LSP-A	Multiple SPD anode (common)
37	LT-TTLA	TTL flash output reference
38	LSP-K3	Multiple SPD cathode (P3)
39	TP-SPDA	SPD anode for AE (common)
40	TP-A7OUT	AE metering putput monitor
41	TP-A1OM	Intermediate point of AE output gain
42	LSP-K2	Multiple SPD cathode (P2)
43	LSP-K1	Multiple SPD cathode (P1)
44	TP-A9	A9 output (AE SPD output)
45	TP-A1OP	AE output gain setting reference
46	LT-K	TTL flash output SPD cathode
47	LT-A	TTL flash output SPD anode
48	TP-TTLA	TTL flash output SPD anode
49	TP-A11	A11 input (T proportional reference)
50	TP-AG1	Analogue GND 1
51	TP-DG-1	Digital GND 1
52	LXS-STA	X selection switch (built-in flash side)
53	LX-TTL	Hot shoe monitor
54	LX-STP	Hot shoe stop
55	LX-RDY	Hot shoe ready
56	TP-8M	Clock (8MHz) for CPU
57	LL-VCC	Lens contact power supply
58	LL-IO	Lens contact I/O
59	LL-DG	Lens contact GND
60	LL-CK	Lens contact clock
61	LL-RW	Lens contact R/W 1
62	TP-DATA	Latch DATA code
63	TP-STRB	Latch strobe signal
64	TP-ADR3	Latch code input D

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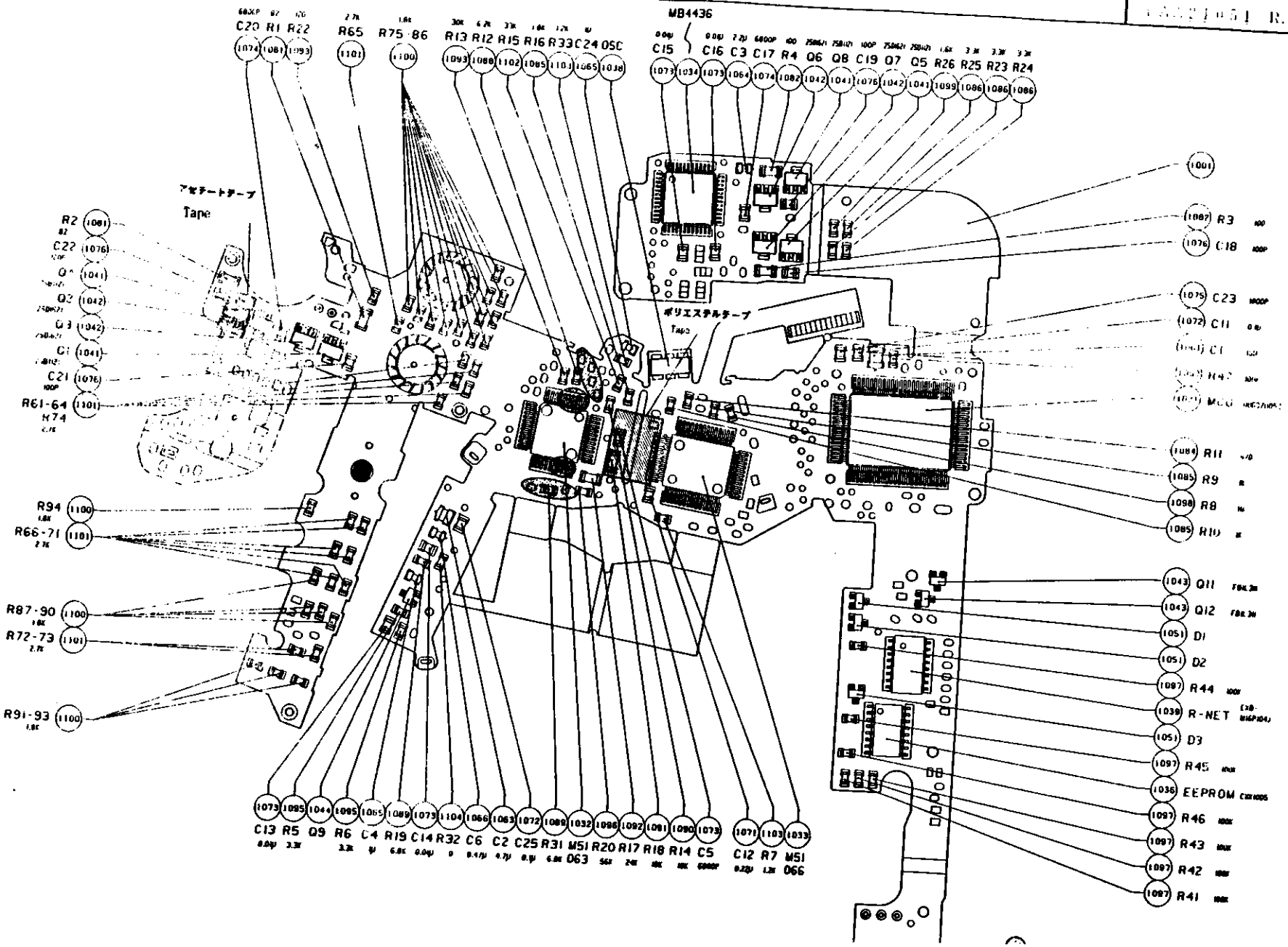
No.	Name	Terminal Description
65	TP-ADR	Latch code input C
66	TP-ADR1	Latch code input B
67	TP-ADR0	Latch code input A
68	TP-AD6	A/D temperature monitor (AE SPD)
69	TP-AD5	A/D shutter dial
70	TP-AD4	A/D aperture dial
71	TP-AD3	A/D battery voltage
72	TP-AD2	A/D 5V monitor (for flash output)
73	TP-AD1	A/D metering output
74	TP-AD0	A/D CCD output
75	TP-AG2	Analog GND 2
76	TP-VREF	A/D input reference
77	TP-S0	Multiple SPD sensor module select code 2
78	LPU-PU	Flash lock-release switch (CPU side)
79	LPU-DG	Flash lock-release switch GND
80	TP-CPU RST	Reset CPU
81	TP-VCC3	DC/DC secondary power supply 3
82	LSL-DG	Self-timer switch GND
83	LSL-SELF	Self-timer switch (CPU side)
84	TP-DG2	Digital GND 2
85	TP-CS	Latch channel select
86	TP-CE	Chip enable
87	LAM-DG	AF A/M select switch GND
88	LAM-AM	AF A/M select switch(CPU side)
89	TP-AEL	Auto exposure lock
90	LS-2MG	Shutter unit (closing shutter curtain Mg)
91	LS-1MG	Shutter unit (opening shutter curtain Mg)
92	LDX-0	DX-code contact
93	LDX-1	DX-code contact
94	LDX-2	DX-code contact
95	LDX-3	DX-code contact
96	LDX-4	DX-code contact
97	LDX-DG	Dx code contact GND
98	LMR-MSW	Mirror switch (CPU side)
99	LMR-DG	Mirror switch GND
100	TP-DBA	Data back
101	LMF-FM	f min switch (CPU side)
102	LMF-DG	f min switch GND
103	TP-AF12V	DC/DC secondary power supply (12V)
104	TP-RC	DC/DC control
105	PR-RSW	Prober release switch
106	PR-HSW	Prober pre-release switch
107	PR-IS	Prober IS switch
108	PR-DG	Prober GND
109	PR-BAT	Prober battery
110	LPF-E	Photo interrupter emitter (for AF)
111	LPF-VCC	Photo interrupter power supply (for AF)
112	LF-R	AF motor (red)
113	LF-B	AF motor (blue)
114	TP-DG3	Digital GND 3
115	TP-2M	Clock (2MHz) for AP2
116	TP-ADINT	CCD A/D synchronous output
117	TP-AFTC	CCD transfer gate clock
118	TP-AF	CCD clear gate clock
119	TP-AFAGC	CCD AGC
120	TP-AFC	CCD transfer clock
121	TP-AFRA	CCD reset clock (raw A)
122	TP-AFRB	CCD reset clock (raw B)
123	TP-AFB	CCD output (raw B)
124	TP-AFA	CCD output (raw A)
125	TP-AFIG	CCD storage control
126	LPF-K	Photo interrupter cathode (for AF)
127	TP-VCC4	DC/DC secondary power supply 4

電気部品配置図 (メインＦＰＣ部) CIRCUITRY PARTS LOCATIONS (MAIN FPC)

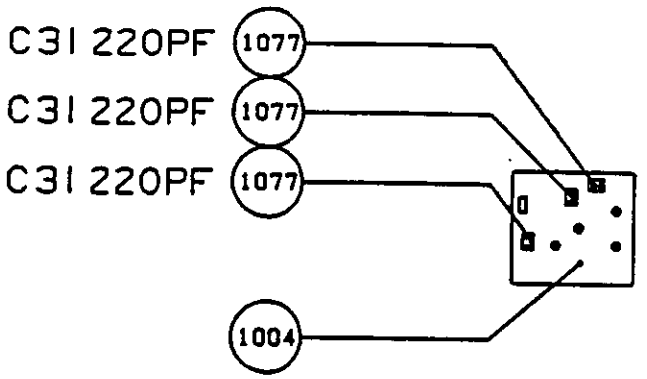


CIRCUITRY PARTS LIST

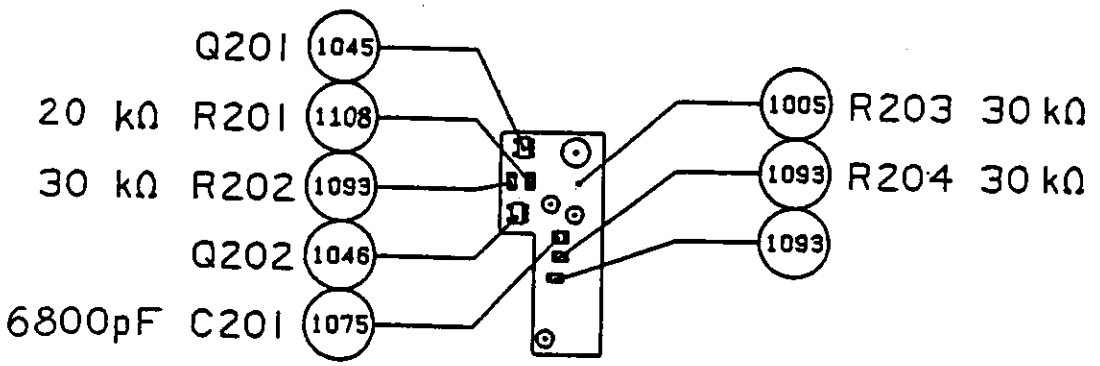
FAA21051-R. 3223. A

Index	Rating value	Name	Index	Rating value	Name
C 1	10μ	Electrolytic condenser	R24	3.3K	AE LED (○)
C 2	4.7μ	Electrolytic condenser	R25	3.3K	AE LED (−)
C 3	2.2μ	Electrolytic condenser	R26	1.6K	AF LED
C 4	1 μ	Smoothing condenser	R31	6.8K	Flash output SPD
C 5	0.01μ	Memory condenser (head amplifier)	R32	0	Differential compensation
C 6	0.47μ	D/A smoothing condenser	R33	1.2K	Flash output reference filter
C 7	10μ	DC/DC primary condenser	R35	1	Film advance motor torque reduction
C11	0.1μ	By-pass condenser	R41	100K	CPU pull-up (pin 72)
C12	0.22μ	By-pass condenser	R42	100K	CPU pull-up (pin 73)
C13	0.01μ	Aperture magnet condenser	R43	100K	CPU pull-up (pin 74)
C14	0.01μ	Light metering intergration	R44	100K	CPU pull-up (pin 51)
C15	0.01μ	CCD output coupling	R45	100K	CPU pull-up (pin 50)
C16	0.01μ	CCD output coupling	R46	100K	CPU pull-up (pin 49)
C17	6800P	AF motor noise filter	R47	100K	CPU pull-up (pin 12)
C18	100P	Noise filter	R-NETWORK	100K ×15	CPU pull-up
C19	100P	Noise filter	R61-R74	2.7K	Shutter speed dial
C20	6800P	Film rewind motor noise filter	R75- R94	1.8K	Aperture dial
C21	100P	Noise filter	R101	10K	CCD partial pressure 1
C22	100P	Noise filter	R102	43K	CCD partial pressure 2
C23	1000P	Smoothing condenser (reference voltage)	R103	1K	CCD power supply filter
			R201	20K	IS delay
C24	1 μ	Smoothing condenser (TTL reference)	R202	30K	IS current limiter
C25	0.1μ	Smoothing condenser (TTL partial pressure)	R203	30K	Leakage cut
			R204	30K	Leakage cut
C26	6800P	DC/DC primary condenser			
C31	220P	Flash noise filter	Q 1	2SB1121	Transistor for MD
C32	220P	Flash noise filter	Q 2	2SD1621	Transistor for MD
C33	220P	Flash noise filter	Q 3	2SD1621	Transistor for MD
C101	4.7μ	CCD power supply condenser(12V)	Q 4	2SB1121	Transistor for MD
C102	1 μ	CCD power supply filter	Q 5	2SB1121	Transistor for AF MD
C201	6800P	IS delay	Q 6	2SD1621	Transistor for AF MD
			Q 7	2SD1621	Transistor for AF MD
			Q 8	2SB1121	Transistor for AF MD
R 1	82Ω	Film advance motor base resistor 1	Q 9	FN1A4P	Driving current supply transistor
R 2	82	Film advance motor base resistor 2	Q11	FB1L3N	Opening shutter curtain drive transistor
R 3	100	AF motor base resistor 1	Q12	FB1L3N	Closing shutter curtain transistor
R 4	100	AF motor base resistor 2	Q201	FMA1	Built-in flash transistor
R 5	3.3K	Battery check monitor 1	Q202	FMW1	IS delay transistor
R 6	3.3K	Battery check monitor 2			
R 7	1.2K	Photo interrupter emitter			
R 8	1 M	Oscillator feedback			
R 9	1 K	Flash filter (STOP)	D 1	DCB010	Shutter pre-release diode
R10	1 K	Flash filter (monitor)	D 2	DCB010	Self-timer diode
R11	470	Flash ready-right voltage limiter	D 3	DCB010	Film rewind diode
R12	6.2K	Light metering reference partial pressure 1	D 4	SB01W05C	A/D input stabilizing diode
			D 7	1S1588	Aperture Mg diode
R13	30K	Light metering reference partial pressure 2	D 8	1S1588	Aperture Mg diode
R14	10K	Light metering output amplification 1			
R15	33K	Light metering output amplification 2	HD637B05Z		MCU
R16	1 K	Light metering output memory filter	M51063FP		Light metering amplifier
R17	22K	T proportional voltage 1	M51066FP		Decoder driver
R18	15K	T proportional voltage 2	MB4436		AF interface
R19	6.8K	Flash output reference amplification 1	MB8036LA		AF sensor module
R20	56K	Flash output reference amplification 2	CXK1005		EEPROM
R22	120	Self-timer LED			
R23	3.3K	AE LED (+)			

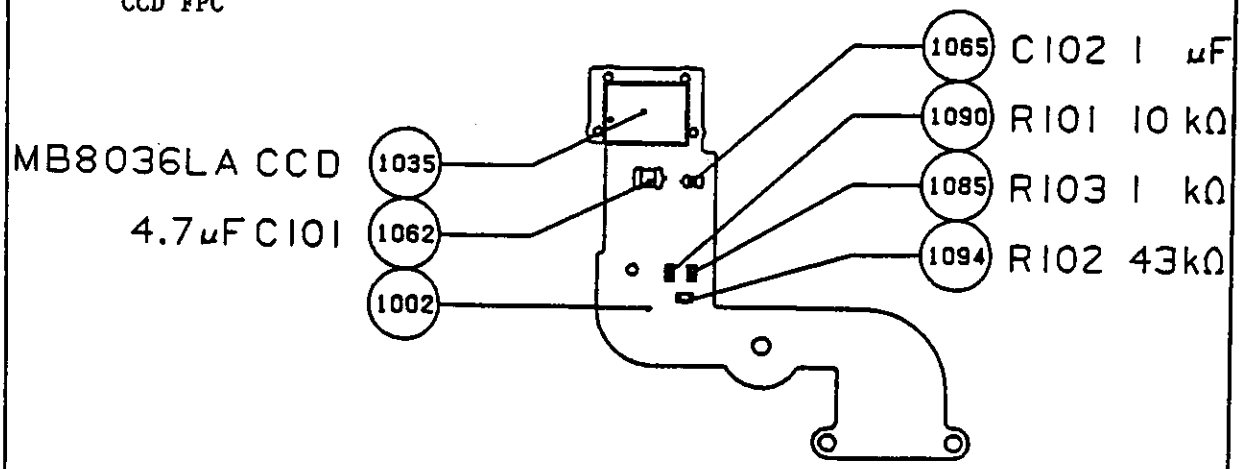
ACCESSORY SHOE BASE PLATE



IS DELAY BASE PLATE

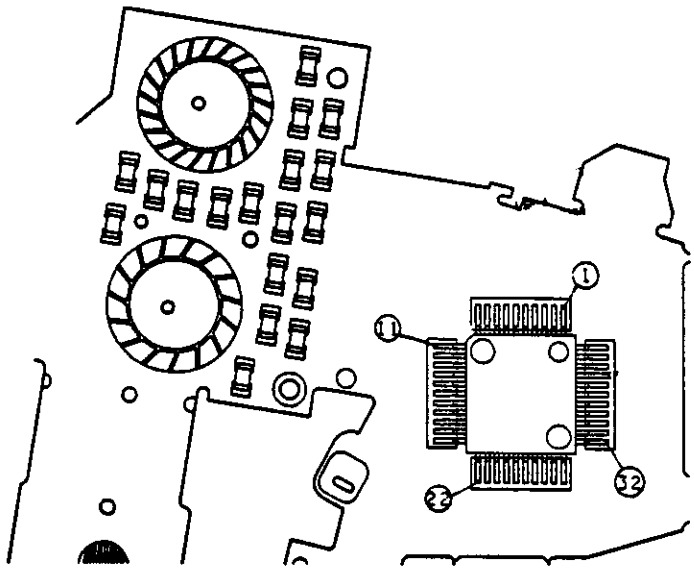


CCD FPC



LIGHT METERING AMPLIFIER TERMINALS

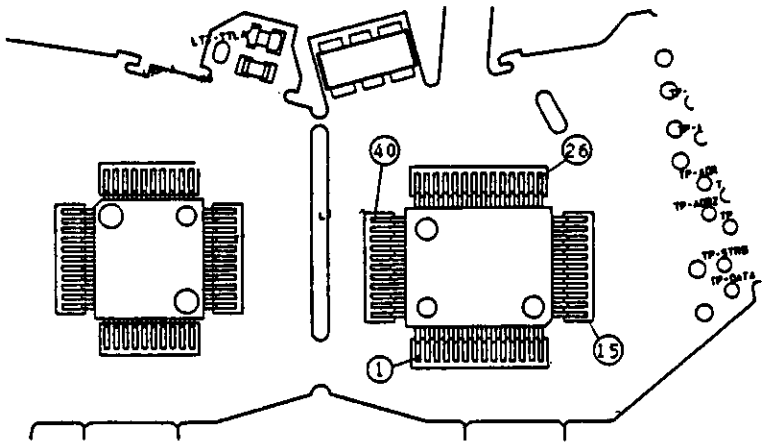
M51063FP



No.	Name	Terminal Description	No.	Name	Terminal Description
1	SPD K1	A1 input (P1K)	21	SL	Flash output circuit operation input
2	SPD K2	A2 input (P2K)	22	IS	Intagration (IS) starting signal
3	SPD K3	A3 input (P3K)	23	STOP 1	Built-in flash stop
4	SPD K4	NC	24	STOP 2	External flash stop
5	SPD K5	NC	25	Integration	Flash output integrator condenser
6	SPD K6	NC	26	A15 OUT	A15 output
7	A3 OF1	NC	27	A15 (-) IN	A15(-) input
8	A3 OF2	NC	28	A15 (+) IN	A15(+) input
9	Vcc	Vcc	29	TTL SPD K	Flash output SPD cathode
10	$\overline{\text{RESET}}$	NC	30	TTL SPD A	Flash output SPD anode
11	REC	NC	31	A12 OUT	A12 output
12	S3	GND	32	SV monitor	A16 output
13	S2	GND	33	C D/A	D/A charge/discharge condenser
14	S1	A9 select input (S1)	34	Vref OUT	A11 output (T proportional)
15	S0	A9 select input (S0)	35	Vref IN	A11 input
16	GND	GND	36	A10(+)2	A10(+) input 2
17	D/A1	D/A discharge input	37	GND	GND
18	D/A2	D/A charge input	38	A10(+)1	A10(+) input 1
19	LED CIN	NC	39	A10 OUT	A10 output
20	LED CONT	NC	40	A10(-)	A10 (-) input
			41	A9 OUT	A9 output
			42	A7 OUT	A7 output (SPD A)

DECODER AND DRIVER IC TERMINALS

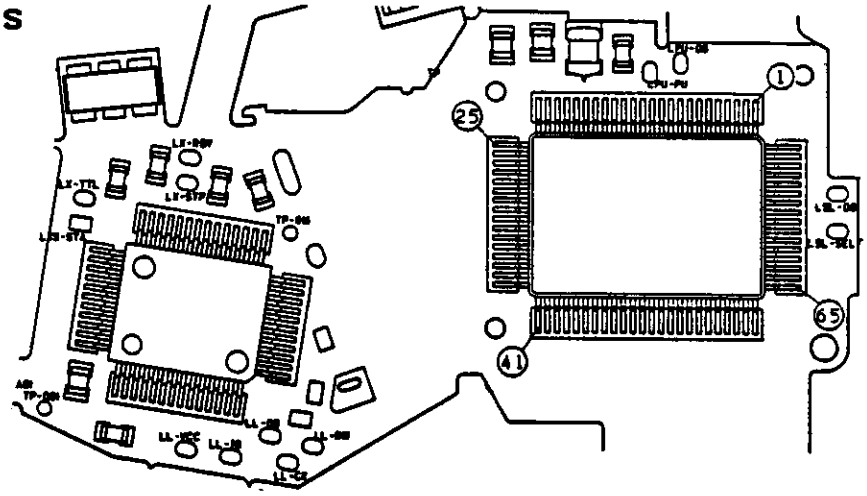
M51066FP



No.	Name	Terminal Description
1	AFMD X	AF motor control X
2	AFMD Y	AF motor control Y
3	Vcc1	Vcc
4	Latch 1	Data back impriting
5	DC/DC RC	DC/DC converter control
6	PI LED aperture	Photo interrupture LED (for aperture)
7	PI LED AF	AF photo interrupter LED
8	PIR IN	A2 comparator input
9	PIR OUT	A2 comparator output
10	TG2	Transmission gate Z2
11	TG1	Transmission gate Z1
12	T proportional Vref	A1 amplifier T proportional input
13	Vref OUT	A1 amplifier output
14	DATA	Latch DATA input
15	STROBE	Strobe signal input
16	$\overline{CE}$	Chip select F
17	CE	Chip select E
18	C/S	Latch channel select S
19	ADR 3	Latch code input D
20	GND 2	GND
21	ADR 2	Latch code input C
22	ADR 1	Latch code input B
23	ADR 0	Latch code input A
24	Reset	NC
25	CK AP2	AP2 clock (2MHz)
26	CK CPU	CPU clock (8MHz)

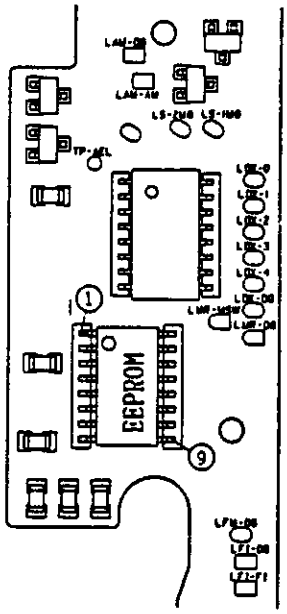
No.	Name	Terminal Description on
27	OSC 1	Oscillator input 1
28	OSC 2	Oscillator input 2
29	Vcc 2	Vcc
30	CPU reset	CPU reset
31	ISO	ISO warning
32	TTL IN	TTL identification input
33	TTL OUTPUT	TTL identification output
34	External ready IN	External flash ready-light input
35	PICA PIN	AF illuminator control
36	External ready OUT	External flash ready-light output
37	Latch 2	AF illuminator control
38	PCV	NC
39	Ready LED	Flash ready-light LED driver
40	Built-in STOP	Built-in flash stop input
41	X contact	Built-in flash X-contact input
42	Built-in charging control	Built-in flash DC/DC control
43	MD1	Film advance motor control W1
44	MD2	Film advance motor control W2
45	GND1	GND
46	MD3	Film advance motor control W3
47	MD4	Film advance motor control W4
48	Battery voltage	A3 comparator input
49	Aperture magnet	Aperture magnet control
50	Latch	Vcc monitor

MCU TERMINALS
HD637B05Z



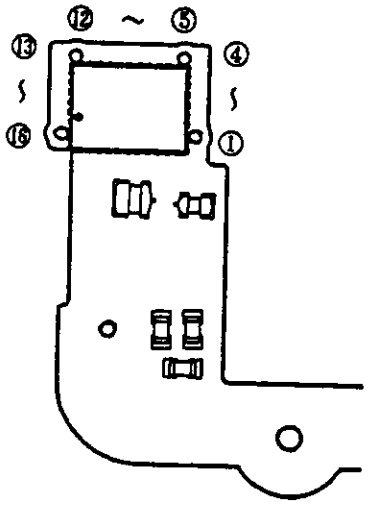
Pin	Name	Terminal Description	I/O	Pin	Name	Terminal Description	I/O
1	PB6	D/A charge output	O	41	PH5	NC	
2	PB7	D/A discharge output	O	42	PH6	NC	
3	RES	Reset input		43	PH7	NC	
4	XTAL	NC		44	PJ4	Latch data signal	O
5	EX	Clock inoput		45	PJ3	Latch strobe signal	O
6	MP1	Vcc		46	PJ2	Latch strobe signal	O
7	MP0	GND		47	PJ1	Chip select	O
8	$\overline{NMI}$	Vcc		48	PJ0	Latch channel select	O
9	$\overline{STBY}$	Vcc		49	PF7	Shutter pre-release switch	I
10	Vdd	Vcc		50	PF6	Self-timer switch	I
11	PC7	Photo interrupter input	I	51	PF5	AE lock switch	I
12	PC6	Built-in flash in up position	I	52	PF4	Film rewind switch	I
13	PC5	Photo interrupture input	I	53	PF3	Frame counter switch	I
14	PC4	AF lens signal R/W1	I/O	54	PF2	Film advance completion switch	I
15	PC3	NC		55	PF1	Pull-up	
16	PC2	AF lens signal S CLK	I/O	56	PF0	Mirror switch	I
17	PC1	AF lens signal S I/O	I/O	57	MP2	GND	
18	PC0	AF lens signal S I/O	I/O	58	Vss	GND	
19	PA0	NC		59	PE7	Self-timer LED	O
20	INT1	Release SW	I	60	PE6	Closing shutter curtain control	O
21	INT2	AF interface A/D synchronous	I	61	PE5	Opening shutter curtain control	O
22	PA3	Flash output circuit becomes activated	O	62	PE4	AE LED (−)	O
23	PA4	NC		63	PE3	AE LED (○)	O
24	PA5	Multiple SPD output select S1	O	64	PE2	AE LED (+)	O
25	PA6	Multiple SPD output select S0	O	65	PE1	AF LED	O
26	AVcc	Reference voltage Vref input		66	PE0	NC	
27	PD0	CCD output (A/D)	I	67	PG0	DX input 2	I
28	PD1	Light metering output (A/D)	I	68	PG1	DX input 3	I
29	PD2	SV monitor (A/D)	I	69	PG2	DX input 4	I
30	PD3	Battery voltage (A/D)	I	70	PG3	DX input 5	I
31	PD4	Aperture dial (A/D)	I	71	PG4	DX input 6	I
32	PD5	Shutter speed dial (A/D)	I	72	PG5	Film detection switch	I
33	PD6	Temperature monitor (A/D)	I	73	PG6	fmin SW	I
34	PD7	NC		74	PG7	AF A/M selection switch	I
35	AVss	GND		75	PB0	Identification of external flash TTL	I
36	PH0	Latch code output A	I/O	76	PB1	External flash ready-light input I	I
37	PH1	Latch code output B	I/O	77	PB2	Built-in flash ready-light input I	I
38	PH2	Latch code output C	I/O	78	PB3	NC	
39	PH3	Latch code output D	I/O	79	PB4	NC	
40	PH4	NC		80	PB5	CCD storage control	O

EEPROM TERMINALS
CXK1005



Pin	Name	Terminal Description	I/O
1	IN1	NC	I
2	TEST1	Vcc	
3	TEST2	Vcc	
4	Vcc	Vcc	
5	OSC	Oscillation (channel select)	(1)
6	NC	NC	
7	NC	NC	
8	CE	Vcc	I
9	$\overline{CE}$	Channel enable input	I
10	Vss	GND	
11	I/O 4	Address and data I/O 4	I/O
12	I/O 3	Address and data I/O 3	I/O
13	I/O 2	Address and data I/O 2	I/O
14	I/O 1	Address and data I/O 1	I/O
15	$\overline{BUSY}$	NC	0
16	$\overline{CLK}$	Syncronous clock input (strobe)	I

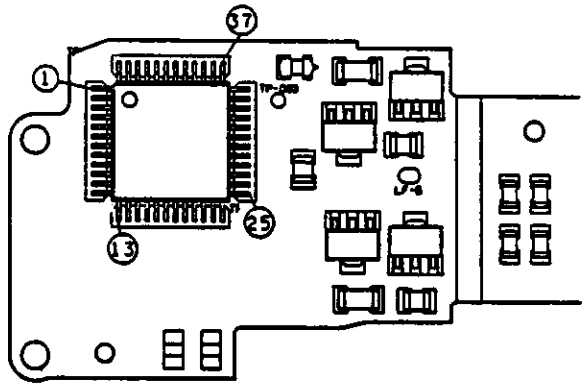
AF LIGHT SENSOR TERMINALS
MB8036A



Pin	Name	Terminal Description
1	VOUT-B	Output (BCH)
2	Vss	Reference voltage
3	Vcc	Vcc voltage
4	ID	Input diode
5	OG	Output gate
6	Vout-A	Output (ACH)
7	AGC	AGC output
8	Vod	Outout drain voltage
9	Vdd	Drain voltage
10	IG	Input gate
11	SH	Shield
12	ϕTG	Transfer gate clock
13	ϕCG	Clear gate clock
14	ϕC	Transfer clock
15	ϕRA	Reset clock (ACH)
16	ϕRB	Reset clock (BCH)

AF INTERFACE IC TERMINALS

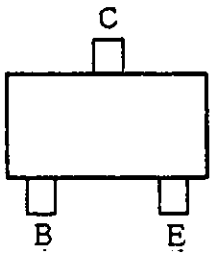
MB4436



No.	Name	Terminal Description	No.	Name	Terminal Description
1	Reset pulse	NC	25	6V control output	NC
2	Lens mode	GND	26	6V monitor	NC
3	Focus clock	NC	27	6V control	NC
4	Storage control	Storage control	28	Vcc	Vcc
5	Storage mode	Vcc	29	AF MD1	AF motor drive 1
6	NEAR	NEAR drive	30	AF MD4	AF motor drive 4
7	FAR	FAR drive(BCH)	31	AF MD2	AF motor drive 2
8	ϕRB	Reset clock(BCH)	32	AF MD3	AF motor drive 3
9	ϕRA	Release clock(ACH)	33	D Vcc	Vcc
10	ϕC	Transfer clock	34	D GND	GND
11	ϕCG	Clear gate clock	35	Data transformer	NC
12	ϕTG	Transfer gate clock	36	Data receive	NC
13	AGC	AGC	37	SCK IN	NC
14	Hold	NC	38	SCK OUT	NC
15	CCDA	CCD output (ACH)	39	Relative pulse OUT	NC
16	CCDB	CCD output (BCH)	40	Relative pulse IN1	NC
17	CA1	ACH reversal output	41	Relative pulse IN2	NC
18	CA2	ACH input	42	Stopper	NC
19	GND	GND	43	GND	GND
20	CB1	BCH reversal output	44	CLK	Clock input
21	CB2	BCH input	45	Hard AGC	NC
22	AB OUT	ACH, BCH output	46	A/D synchronous	A/D synchronous
23	AGC level	NC	47	Direction control	NC
24	Vref	NC	48	LAE	NC

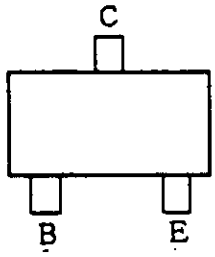
CIRCUITRY PARTS TERMINAL LOCATIONS

NPN transistor
FB1L3L (Q11, Q12)



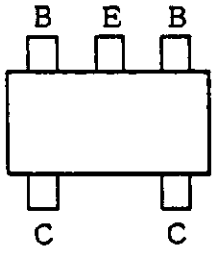
RB :4.7KΩ
RBE:10KΩ

PNP transistor
FN1A4P (Q9)



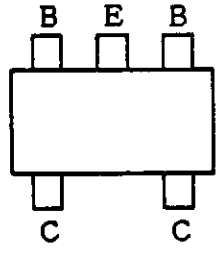
RB :10KΩ
RBE:47KΩ

PNP transistor
FMA1 (Q201)

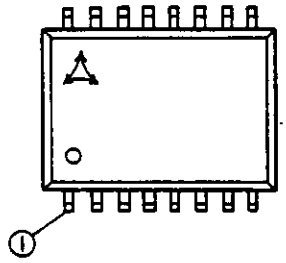


RB :22KΩ
RBE:22KΩ

NPN transistor
FMW1 (Q202)



Resistor array
EXB-M16P104J



Resistance value 1/32 W/components
100k ±50% x 15 components

Double diode
DCB010 (D,1 D2, D3)

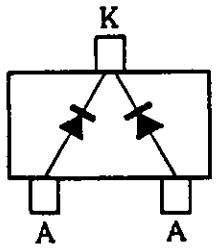
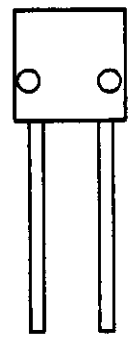
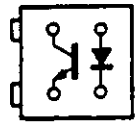


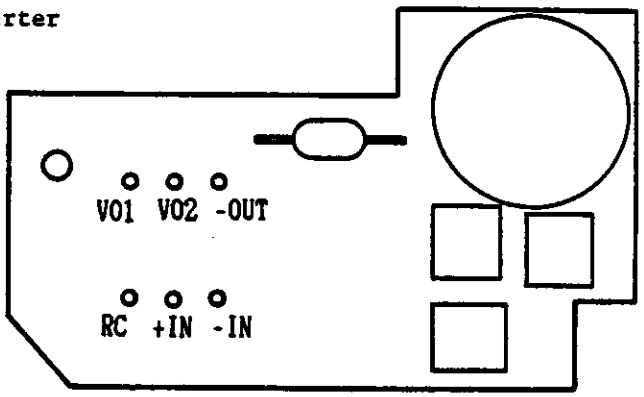
Photo interrupter
INT-107M-8



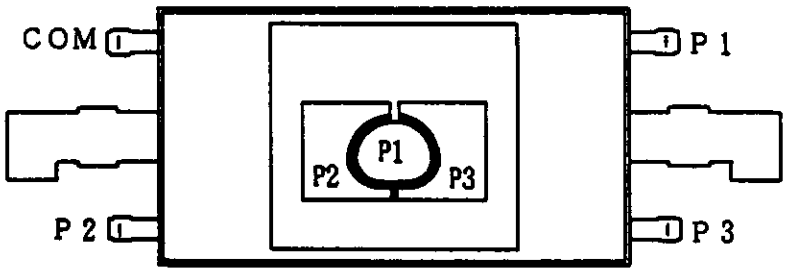


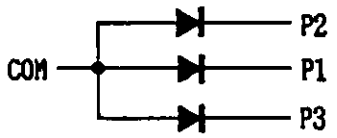
Location of terminals
(Bottom view)

DC/DC converter



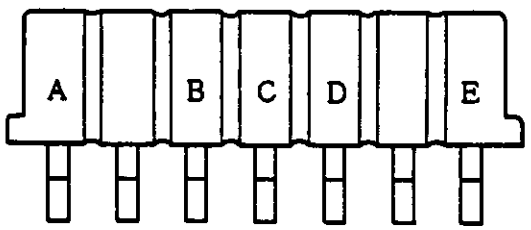
Multiple metering SPD

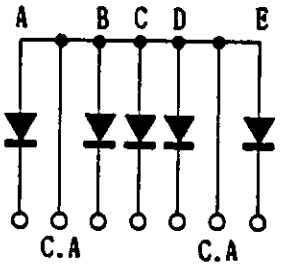




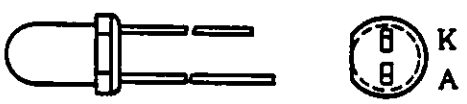
(Anode, common)

LED array



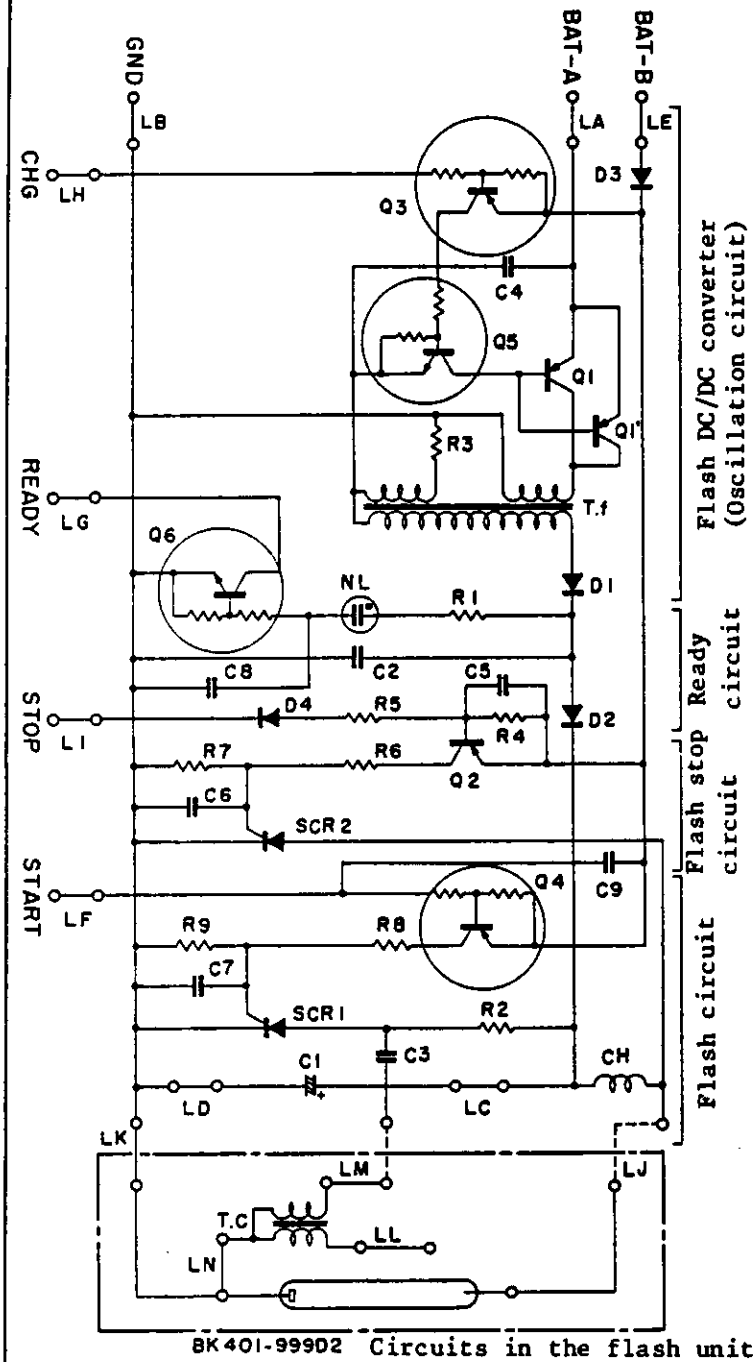


LED
LT3D7W



FAA21051 - R.3223.A

FLASH BASE PLATE



BK401-999D2 Circuits in the flash unit

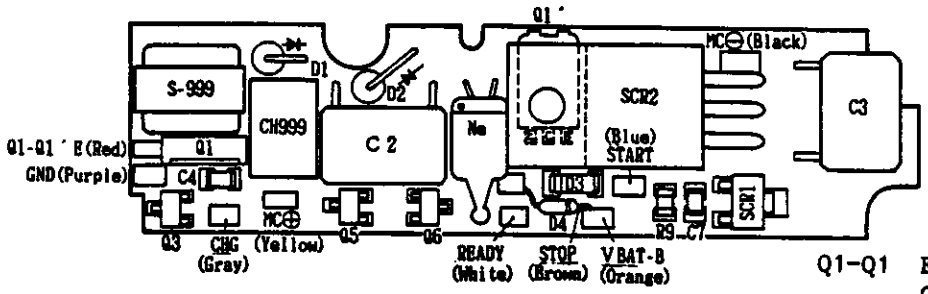
-------: Connected inside the camera

Construction of the circuit can be devided as above.

Q1	2SA1242-Y
Q1	2SA1242-Y
Q2	2SA1037K
Q3	DTA143XK
Q4	DTA114EK
Q5	UN2218
Q6	DTC114YK
D1	ES1F
D2	MPG06G
D3	RLS73
D4	1S1588
SCR1	CR08AS
SCR2	CR6AH
R1	1MΩ
R2	1MΩ
R3	10K Ω
R4	10K Ω
R5	7.5KΩ
R6	150 Ω
R7	1KΩ
R8	1KΩ
R9	1KΩ
C1	250 μF
C2	0.033 μF film C
C3	0.033 μF film C
C4	0.01μF
C5	4700PF
C6	0.01μF
C7	0.01μF
C8	0.01μF
C9	0.01μF
CH	Coil 99 (9.6mH 185mΩ)
CH 999	Choke coil
S-999	Oscillation transformer

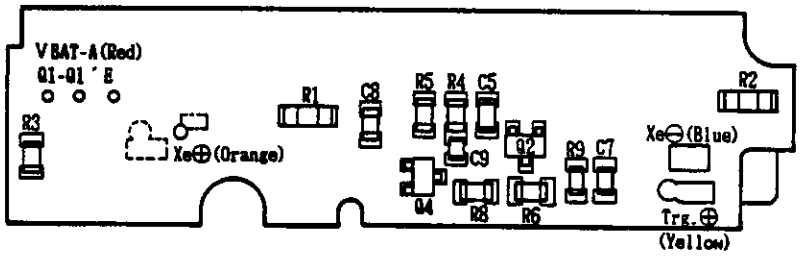
PATRS LOCATIONS ON FLASH BASE PLATE

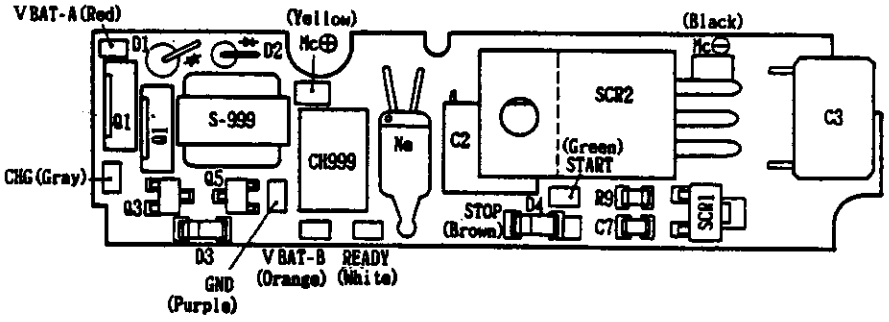
FAA21251 - R.3223.A

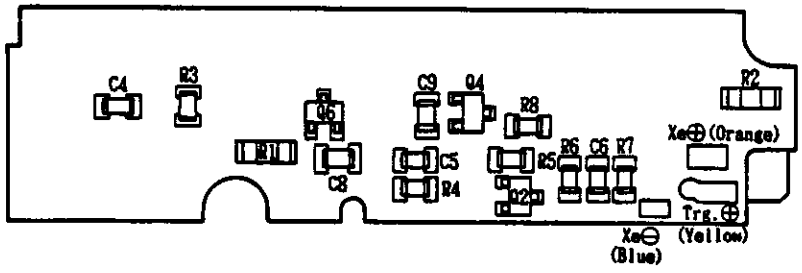


Intial 60,000 products Transformer (yellow)

Q1-Q1 Emitter (E) Red
Collector (C)
Orange
Base (B) Green





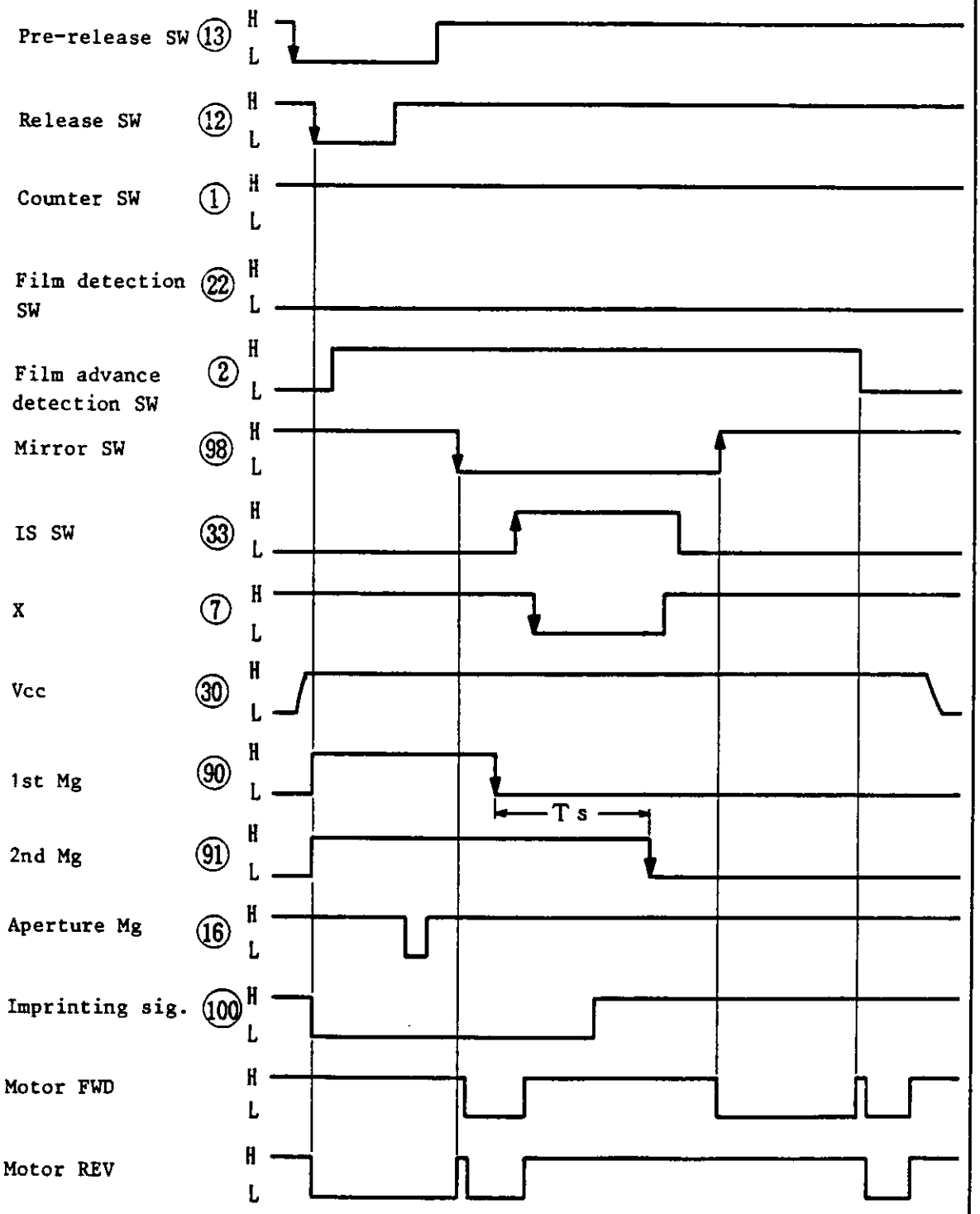


Except initial 60,000products

The following points are different from intial products

1. Solder lands of negative and positive terminals of Xe tube and positive termina) of Trg.
2. Modified oscillation transformer with blue tape
3. Position of the lead of choke coil
4. Lead wires of power transistors Q1 and Q1' are discarded.
5. Mounting position of other parts

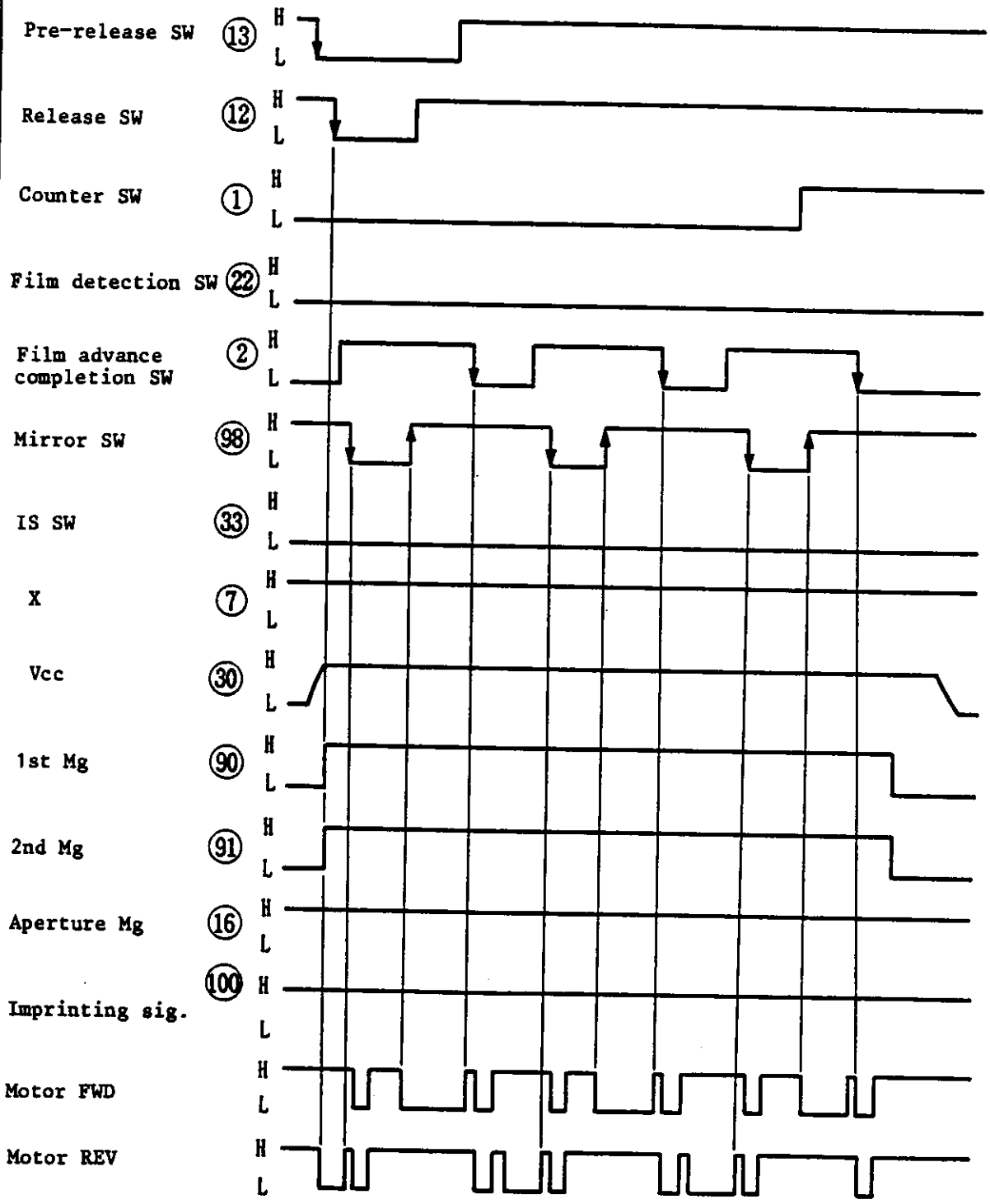
Timing chart during shooting (in M, A, S and P mode)



Ts: Shutter speed

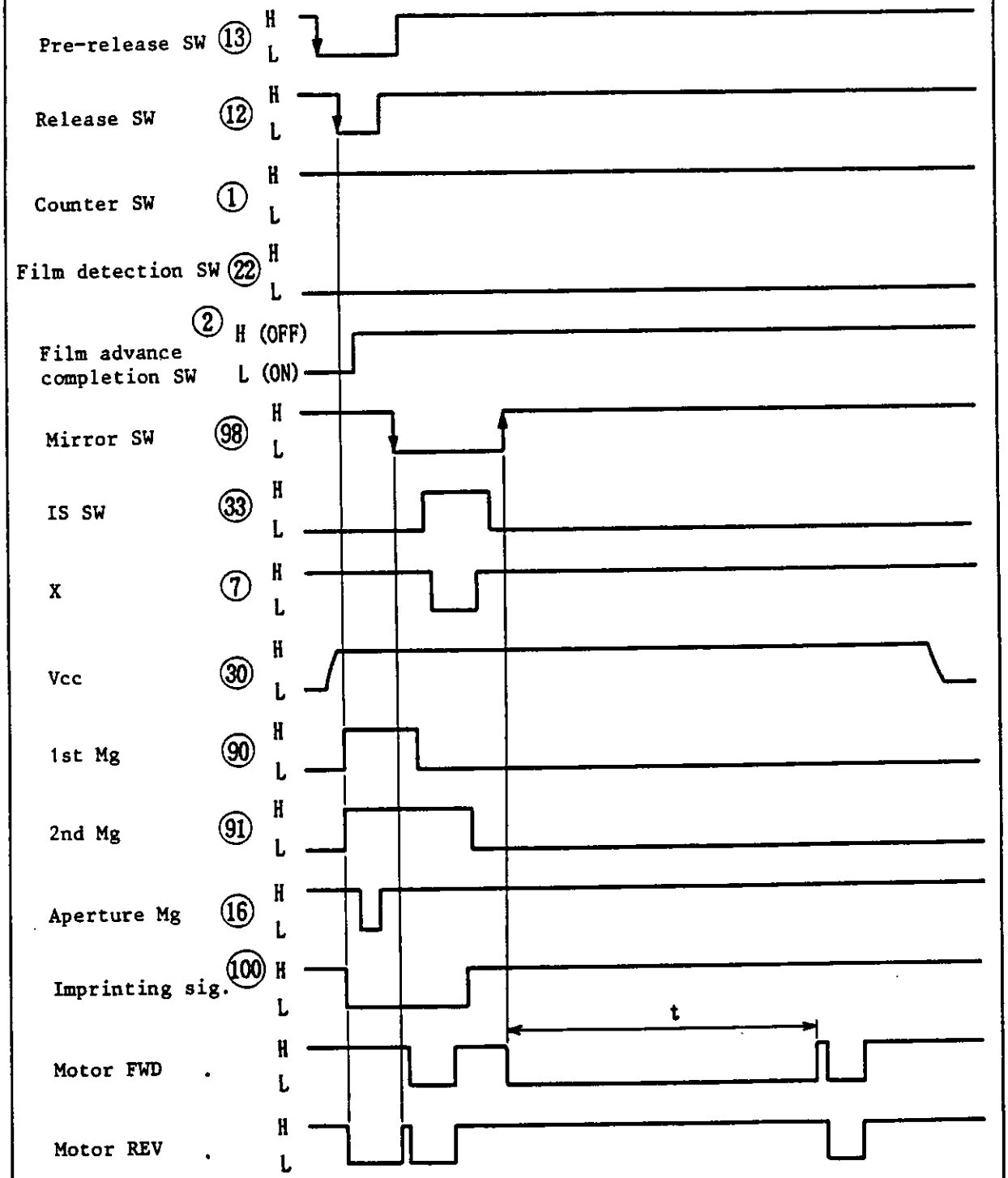
The number in a circle refers to the check land number.

TIMING CHART DURING BLANK SHOT



When film advance completion SW and counter SW are "Low", the blank shots are not judged to be completed.

TIMING CHART AT THE END OF FILM



Film end is detected when the film detection SW does not turn on during the time of t (1 sec.).

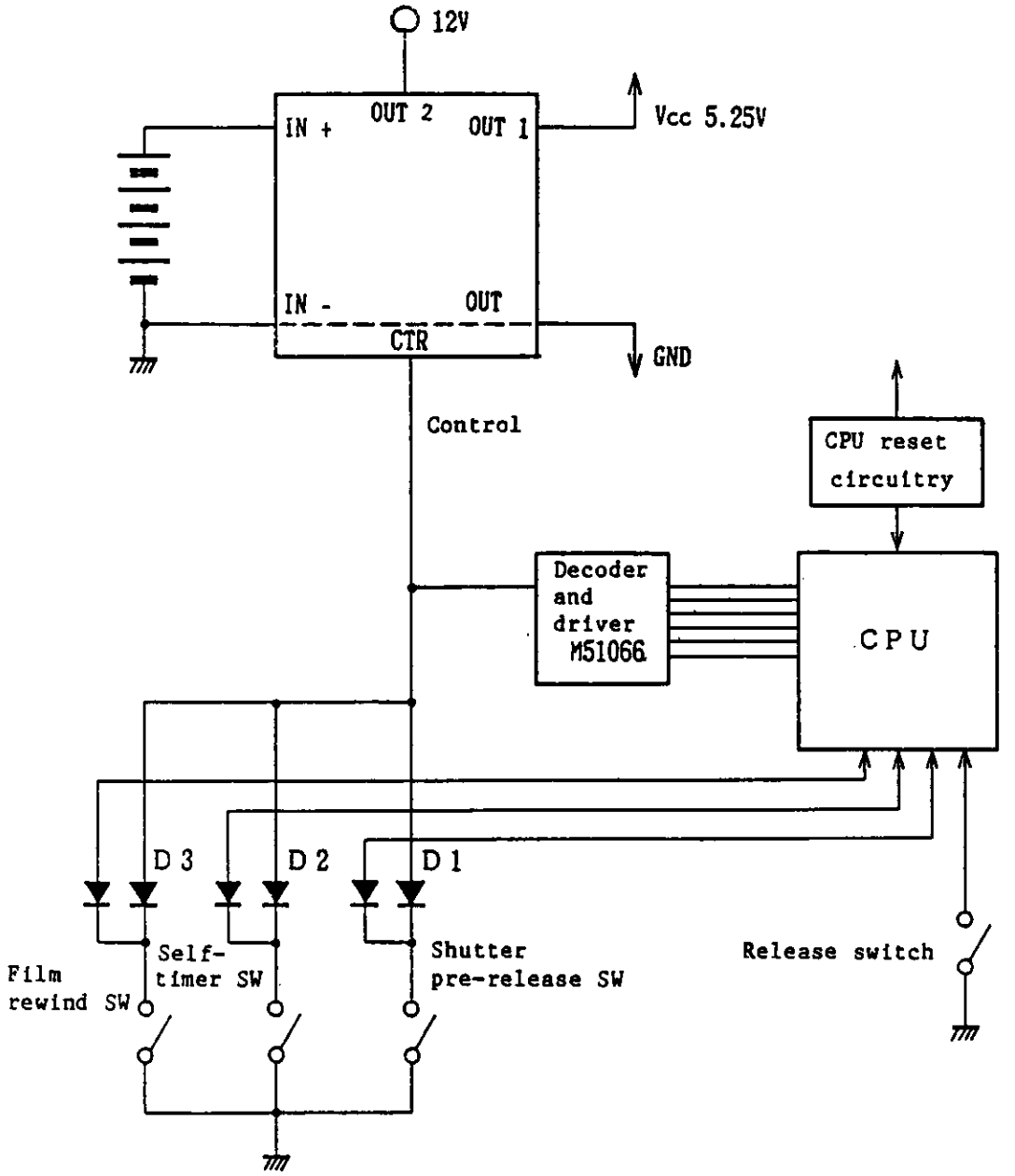
CIRCUITRY OUTLINE

1. Power control circuit

When the shutter release button is depressed halfway, the shutter pre-release switch is turned on and the voltage of the control terminal of the DC/DC converter goes down. Within 10ms, the DC/DC converter supplies power to the circuit. The reset signal from the power reset circuit to the CPU is cancelled immediately after power is supplied. The CPU provides the decoder and driver IC (M51066FP) with a decoder signal to output a power holding signal for the shutter pre-release timer. And the CPU activates the pre-release timer for eight seconds. The decoder and driver IC keeps the voltage of the control terminal low until a power holding cancel signal is received from the CPU.

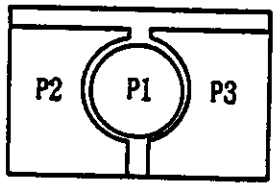
The order of priority of the power holding timer:
(1) Power is on while the shutter pre-release SW is on.
(2) Power is on while the memory lock SW is on.
(3) Power is turned off in one second after film advance is completed following shutter release.
(4) Power is on while the self-timer is working or during film rewinding.
(5) Power is turned off in eight seconds after the shutter pre-release SW is turned off.

Power control circuit



2. Light metering and indicators

The F-401 incorporates a head amplifier that logarithmically compresses each output signal from the triple-sensor module and sends them to the next-step amplifier by coded signals from the CPU. In this way, the non-linear portion of the output signal to the next-step amplifier is eliminated and the correct light metering value can be obtained. The voltage of this output is applied to the terminal of the A/D converter after passing through a CR noise filter circuit. This voltage varies approximately 117.5 mV for each 1EV (at 25°C). The CPU converts this analogue signal into digital to provide three light metering output BV values at maximum aperture. These three BV values are used for performing simplified multi-pattern metering and centerweighted metering.



Triple-sensor module

Other data such as SV, TV, and AV necessary for displaying indicators are sent to the CPU in the following ways:

SV:	DX-code (digital) from DX-coded film cartridge.
AV, TV:	Obtained by an A/D-convertion of the brush voltage of the resistors connected between the A/D reference voltage and the GND.
AVo, AVmin:	Obtained by reading out the digital signal from the CPU in a new AF lens.

Note: Centerweighted metering is available only in the manual mode or when the AEL button is depressed. In all other modes, multi-pattern metering is employed.

The CPU calculates the digital data depending on the mode selected, resulting in the display of three exposure LED indicators (+, o, -) inside the viewfinder.

(1) Manual exposure mode
When AV+TV is smaller than BV+SV, the (+) LED indicator lights up.
When AV+TV is equal to BV+SV, the (o) LED indicator lights up.
When AV+TV is larger than BV+SV, the (-) LED indicator lights up.

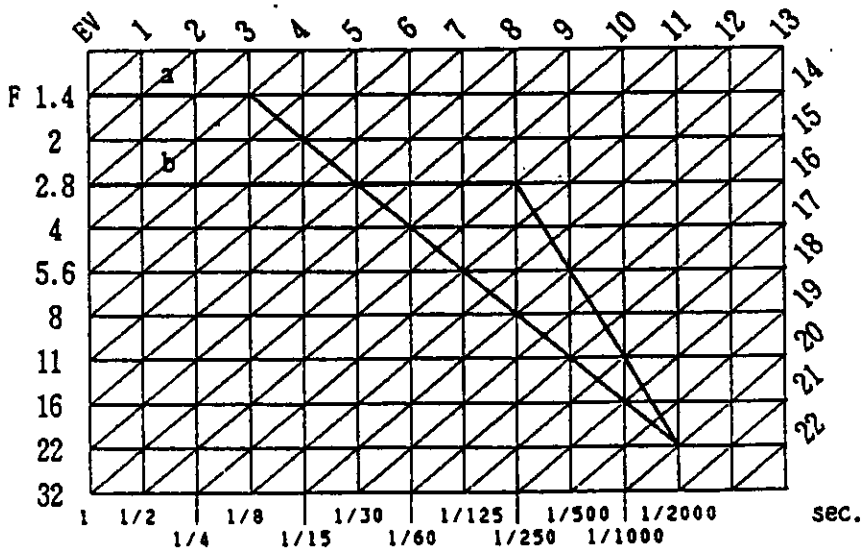
(2) Aperture-priority exposure mode
When TV is smaller than BV+SV-AVmin, the (+) LED indicator lights up (AVmin: minimum aperture)
When TV is larger than BV+SV-AVo, the (-) LED indicator lights up (AVo: maximum aperture)
In cases other than those mentioned above, the (o) LED indicator lights up.

(3) Shutter-priority exposure mode
When AV is smaller than BV+SV-TVmin, the (+) LED indicator lights up (TV: maximum value)
When AV is larger than BV+SV-TVo, the (-) LED indicator lights up (TVo: minimum value)
In cases other than those mentioned above, the (o) LED indicator lights up.

(4) Program auto exposure mode
When AVmin+TVmin is smaller than BV+SV, the (+) LED indicator lights up.
When AVo+TVmax is larger than BV+SV, the (-) LED indicator lights up.
In cases other than those mentioned above, the (o) LED indicator lights up.

Note: TVmax=SV+BV-AVo (3V-AVo=-7)
=SV-7
For instance, TVmax is four seconds at ISO 100 (f/1.4) and 16 seconds at ISO 25 (f/1.4)

Program chart (example)



a: Normal program (with AF 50mm f/1.4 lens)
b: High-speed program (with AF 180mm f/2.8 lens)

Note: The lens focal length is obtained from the CPU's in both camera and lens.

3. Aperture control

Aperture control in the manual and aperture-priority exposure modes is carried out by the CPU by reading the setting value after converting analogue data from the aperture dial into a digital signal. Next the CPU calculates the difference (f-fo) between the fo data from the lens and the aperture value from the aperture dial. When the shutter is released and the mirror moves up, the aperture is stopped down. The CPU sends a decode signal to the decoder and driver when the aperture is stopped down up to the difference value (f-fo) by monitoring and counting the number of pulses generated in the rotating blade.
This signal from the CPU turns on the control magnet to perform aperture control.

In the program mode, the aperture value is determined before the shutter is released by calculating light metering at maximum aperture together with the shutter speed in the CPU. The aperture is controlled by reading the fo signal from the lens and calculating the f-fo value by exchanging data between the CPU's in both camera and lens. The rest of the operation is the same as above.

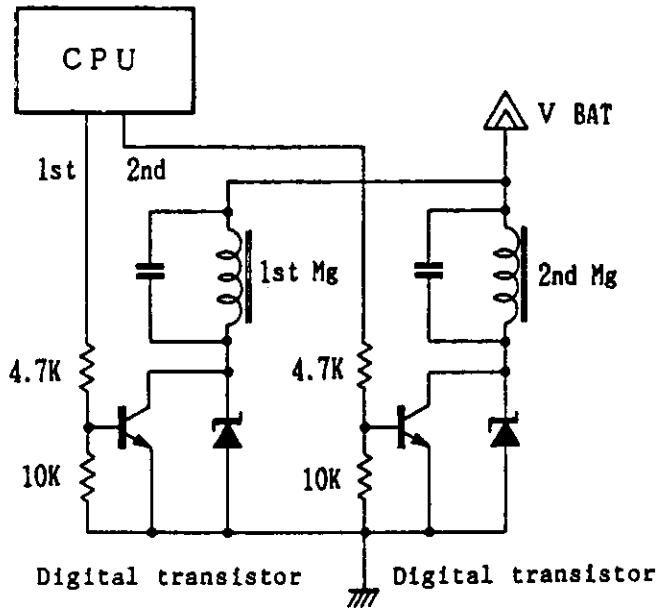
Note: Aperture control is available only when a new AF lens is mounted and its aperture is set to the minimum aperture (F min SW on). And the (+) and (-) LED exposure indicators inside the viewfinder blink alternately and the shutter release is locked when the F min SW is off.

4. Shutter control

In the manual and shutter-priority modes, the shutter is controlled after converting the analogue signal from the shutter speed dial into a digital signal. This signal is then sent to the CPU which counts time and controls the shutter magnet driver (digital transistor).
In the aperture-priority and program modes, shutter control is carried out by the CPU which controls the shutter magnet after reading output data from the light metering amplifier, film speed, and aperture value. Thus, shutter time is controlled digitally by the CPU.

5. Shutter driving circuit

Movement of both the opening and closing shutter curtains is carried out by cutting off electric current to the magnet. When the voltage of both the 1st and 2nd Mg signals is high and current flows through both magnets, both opening and closing shutter curtains do not move even after the mechanical holding is cancelled.
When the mirror up operation is completed, the voltage of the 1st magnetic signal becomes low and current flow to the 1st magnet stops, thus causing the opening shutter curtain to start its travel.
After the voltage of the 1st Mg signal becomes low and the shutter is released at a certain shutter speed, the voltage of the 2nd Mg signal becomes low and the current flow to the 2nd Mg is cut off, thus causing the second shutter curtain to move.

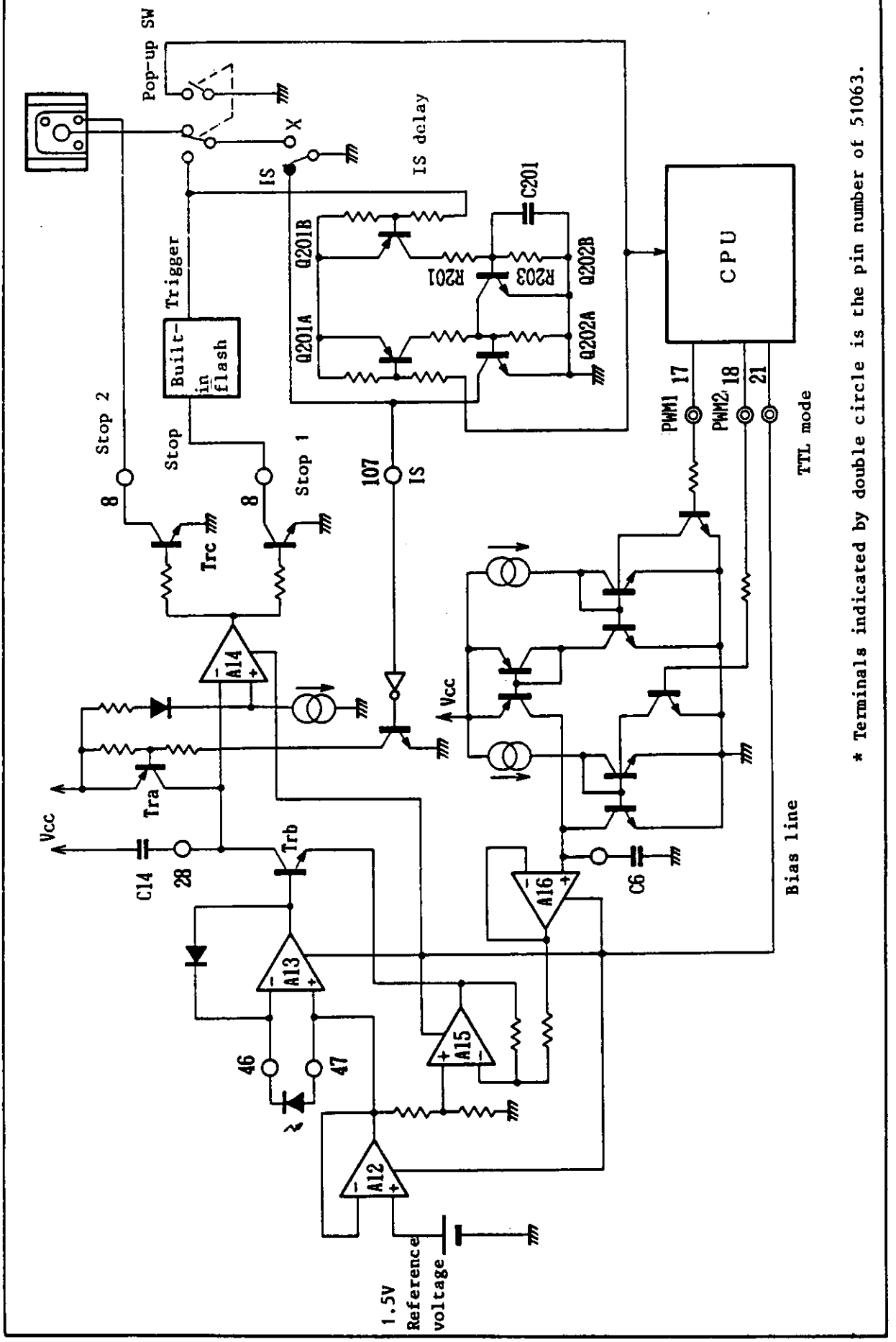


6. TTL flash output control

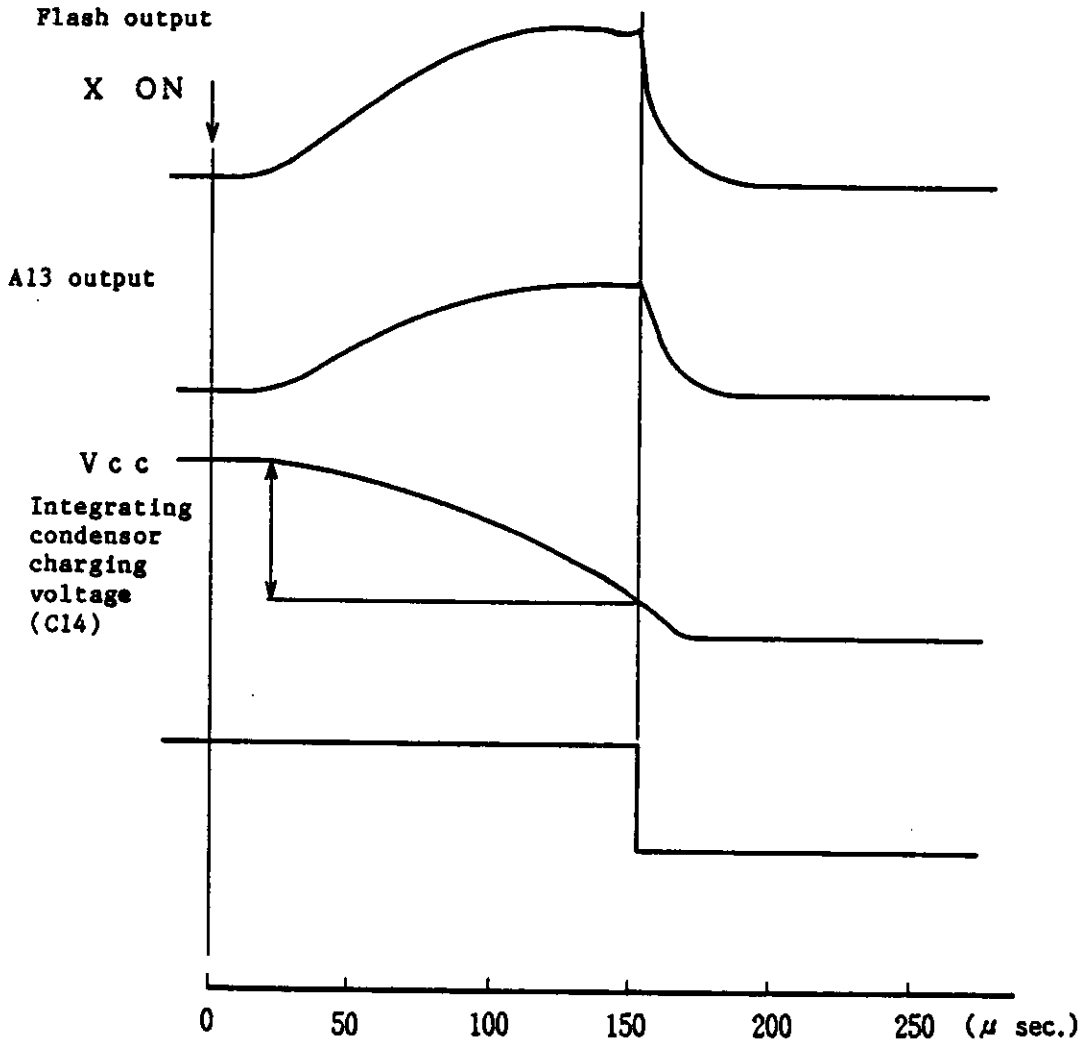
When the built-in flash or an external flash set to the TTL mode is used, the CPU sends an auto TTL flash output control signal to the flash output control circuit (incorporated in the M51063 light metering amplifier IC) to make them ready for flash operation.
Described below are the circuits used for TTL flash photography:
Prior to when the shutter release button is depressed, the shutter IS (integration starting) SW is closed and integrating condenser C14 is discharged via transistor Tra. After the ISO film speed data is converted into analogue ISO data by the PWM D/A converter, the CPU stores this data in condenser C6 and transmits it to the emitter terminal of transistor Trb.
Immediately after the shutter release button is depressed and the opening shutter curtain movement is completed, the integrating condenser C14 becomes ready for recharging when the transistor is off and the IS SW turns off (external flash). When the built-in flash is used, the IS terminal does not turn off when the IS SW is closed while Q201A and Q202A are on and Q201B and Q202A are off, because the flash pop-up switch is included in the circuitry. Integrating condenser C14 becomes ready for recharging when transistor Tra turns off while Q202B is on and Q202A is off after a predetermined period of time. (A delay circuit is incorporated for eliminating trigger noise generated while the built-in flash is firing.)
When the X-contact turns on, the flash fires. A logarithmically compressed voltage appears at the output terminal of head amplifier A13 and is logarithmically expanded to recharge integration condenser C14. This recharging voltage value represents the integrated output of the flash.
As mentioned above, the optimum flash output for the film in use is attained when this voltage reaches a certain level, because the ISO data is included in the value mentioned above. Monitoring the recharging voltage, A14 sends a flash stop signal to the STOP terminal (the STOP terminal voltage becomes low). This terminal reopens when shutter release is completed and the IS SW turns on, because the integrating condenser is discharged.

TTL flash output control

FAA21051 - R.3223.A



Waveforms (TTL flash output mode)

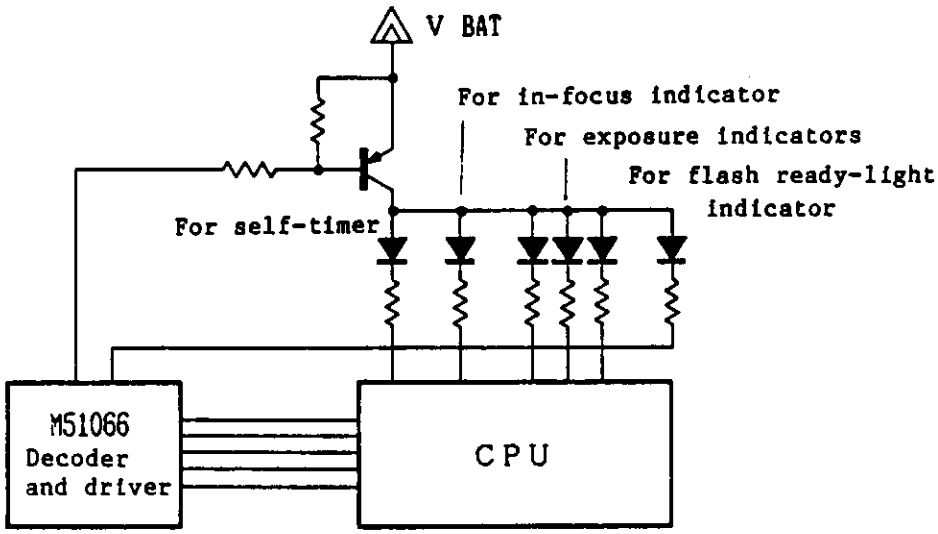


7. Driving the LED indicators

There are two types of LED indicators: those inside the viewfinder and the self-timer indicator.

(1) Viewfinder LED indicators
There are five LED indicators inside the viewfinder: the green LED in-focus indicator (o), three red LED exposure indicators (+, o, -), and a flash LED ready-light indicator ( ).
The in-focus indicator and exposure indicators are controlled (are lit up) by the CPU port direct driver, while the flash ready-light indicator is controlled (is lit up or made to blink) by the random logic circuitry in which the decoder and driver (M51066) receives a coded signal from the CPU.

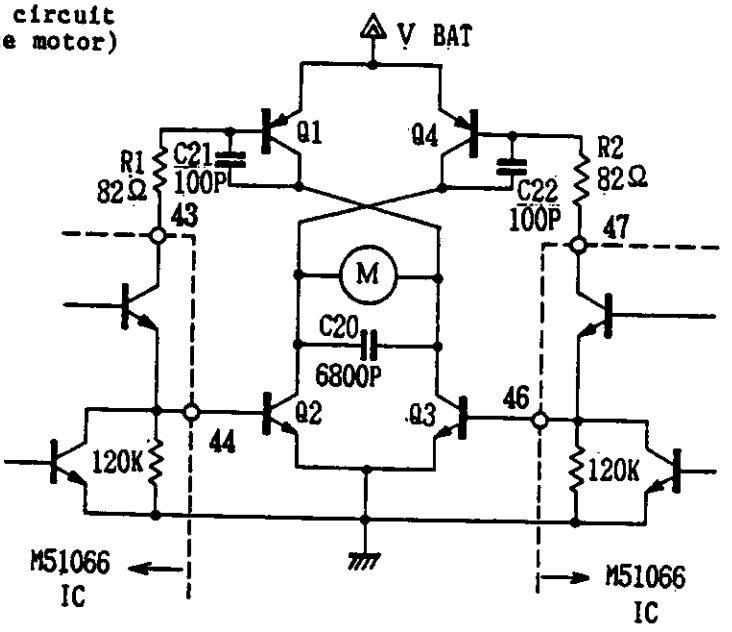
(2) LED self-timer indicator
The LED self-timer indicator is controlled (is made to blink) by the CPU port direct drive.



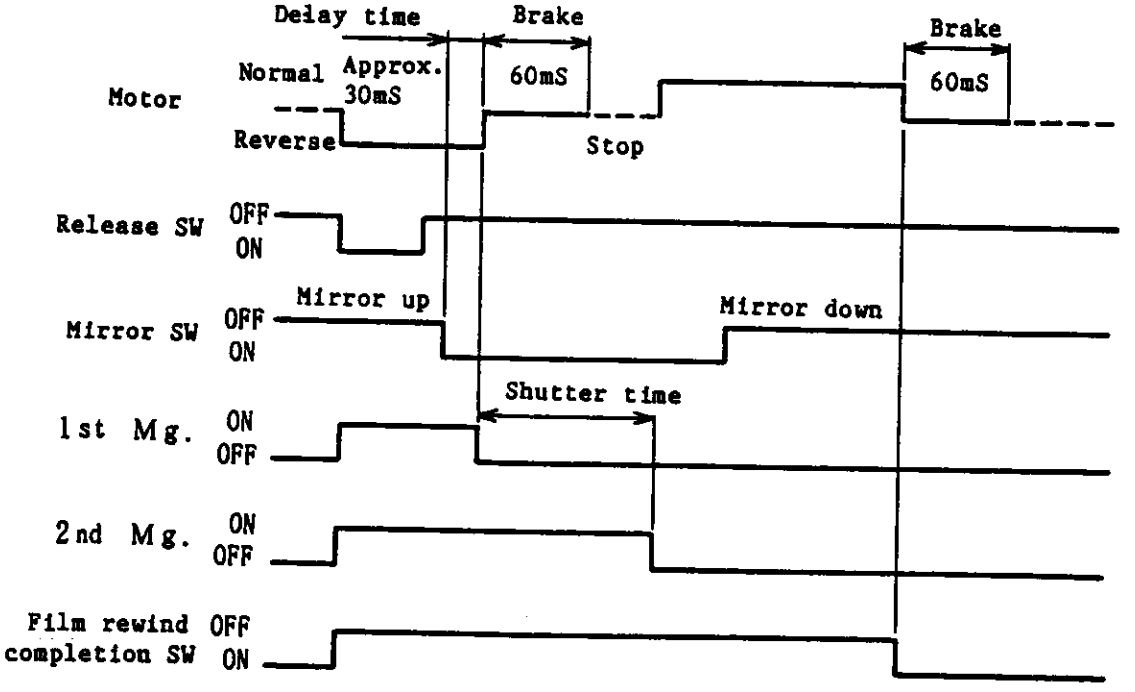
8. Motor drive

The motor drive is controlled by four bridge-connected power transistors connected to both terminals of the motor. Because these four transistors are saturated during operation, a battery voltage is applied directly to the motor terminals. (1.5-2A of current flows into the motor at the initial stage and 400-600mA during steady operation.) When braking the motor, both PNP transistors are activated to form a loop circuit to short-circuit the motor terminals. The base current of the power transistor is approx. 50mA at 6V VBAT.

Motor drive circuit
(film advance motor)

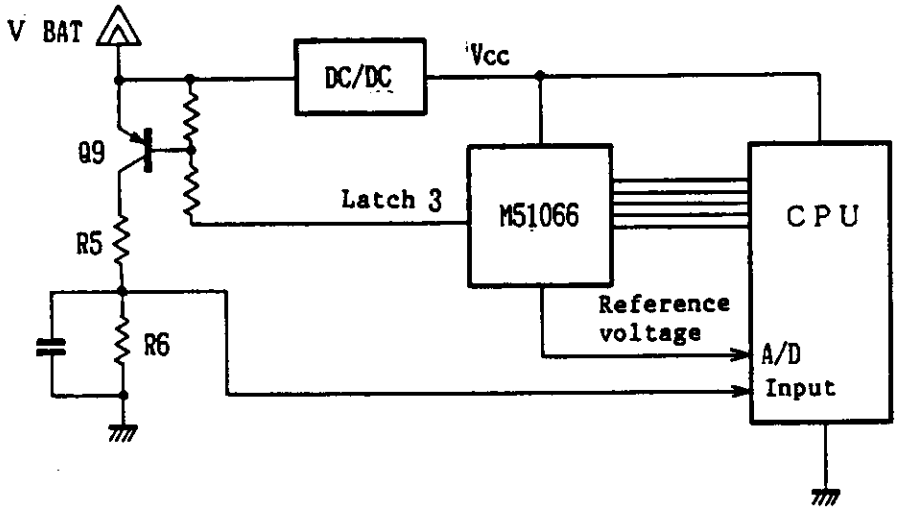


Motor drive timing chart



9. Battery checking

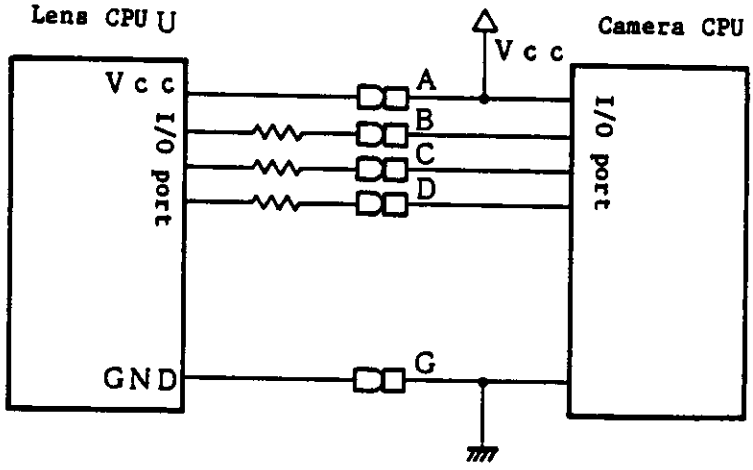
When power is on and the CPU is activated (Vcc voltage is applied), the CPU reduces the control terminal voltage of the DC/DC converter and saturates transistor Q9 by turning on latch 3. Then the collector voltage of transistor Q9 becomes equal to VBAT (battery voltage) and a voltage drop in resistors R5 and R6 occurs. This divided voltage is applied to the input terminal of the A/D converter of the CPU. The CPU then calculates the difference between the divided voltage and the reference voltage (regarded as a reference voltage of M51066 which is constant regardless of battery voltage fluctuation) to be applied to another DC/DC converter. When the difference exceeds a certain voltage, the battery check circuit works until the above-mentioned difference value comes within a certain level or until battery power recovers. During this time, no indicators are displayed and no sequence and focusing controls are carried out.



10. AF lens data exchange

The camera CPU performs serial data exchange through the AF contacts whenever data from the lens is necessary during auto exposure or auto focus operation. If a new AF lens is mounted (except AF teleconverter TC-16AS), the necessary data is provided. The camera CPU detects whether or not a new AF lens is mounted by checking for a signal from the lens CPU.
There are three signal line terminals (B, C, and D) for data exchange. First, signal B from the camera CPU detects the presence of a lens CPU. Then, digital command is transmitted serially by signal D, which is read simultaneously by the CPU. The lens CPU processes these signals and returns a data selection ready signal back to the camera CPU.
Next, the camera CPU sends signal C, indicating it is ready to receive data from the lens CPU. The lens CPU sends address data to the camera CPU via signal C. After that, signal B sends data on the completion of data transmission and also sends data that the lens CPU is ready to receive the next command from the camera CPU.
The above cycle represents data exchange between the two CPU's. By repeating this operation, the camera CPU is able to transmit a number of data.

Note: The AF teleconverter TC-16AS is unusable for AF operation, because it is regarded as an old lens due to the output terminal of the TC-16AS.



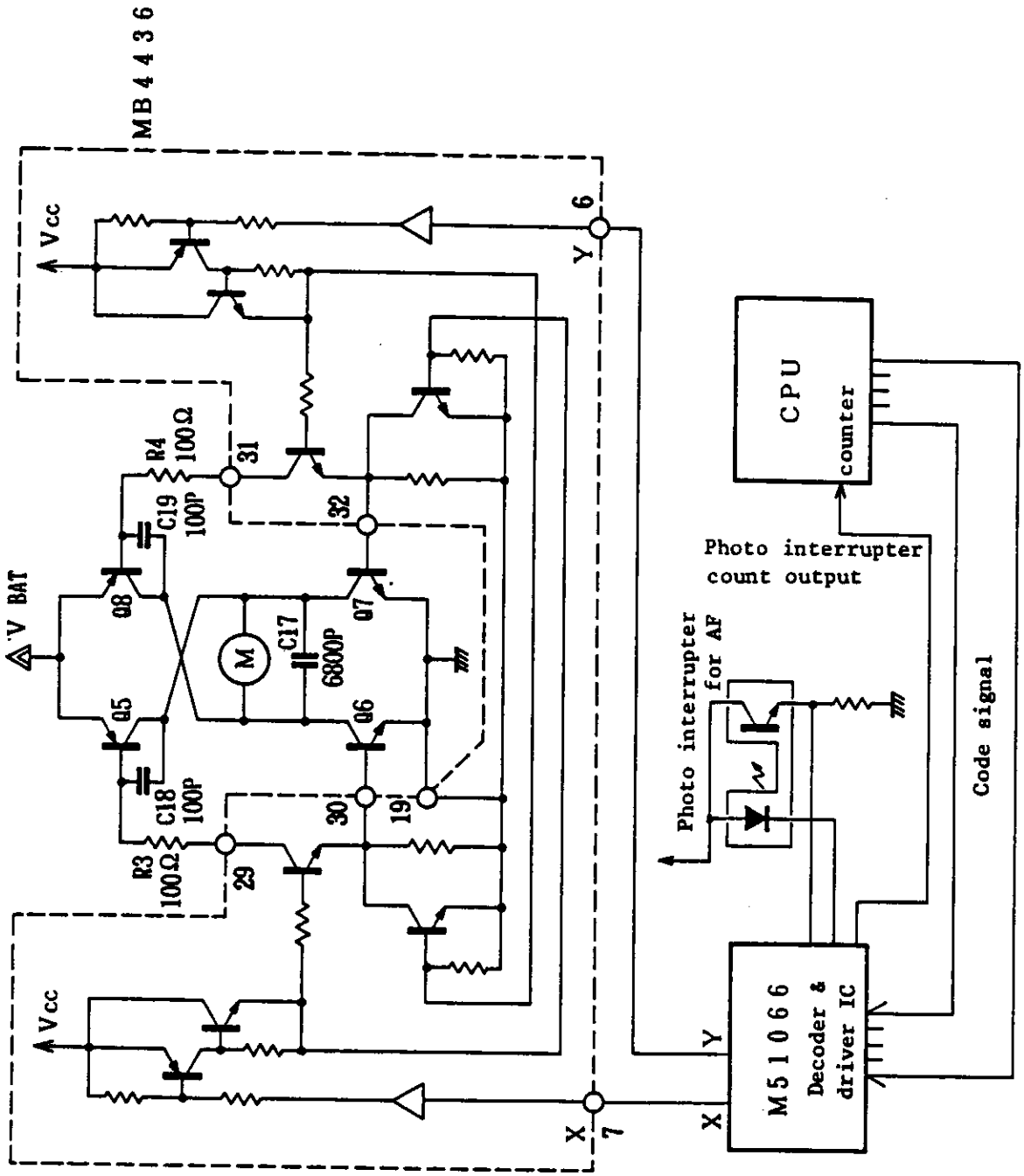
11. AF lens driving control circuit

The F-401 has an AF lens driving circuit which is usable only with new AF lenses (except the AF teleconverter TC-16AS). The AF driving circuit for old AF lens and AF teleconverter is not usable with the F-401.

Operation

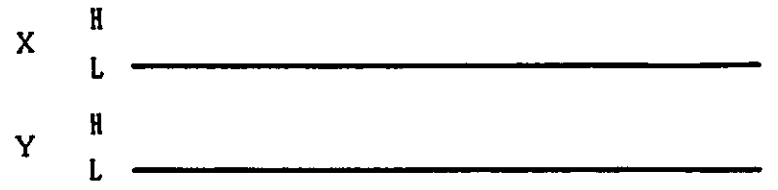
The CPU performs the necessary calculations for distance metering and determines the direction and amount of the rotation of the motor. The CPU sends coded output data for determining the direction and amount of motor rotation to the decoder and driver IC (M51066FP). Through two AF motor driving control lines from the decoder and driver IC, the AF lens driving duty signal is sent to the AF interface IC (MB4436). The AF interface IC controls the AF motor according to the duty signal.
When driving the lens, the voltage of either the X or Y signal should be low. And when applying a brake to the lens, the voltage of both X and Y signals must be low. Thus, when the voltage of either X or Y signal--or both X and Y signals--become low, a base current is supplied. This base current is approx. 40mA and the motor current is approx. 600-800mA at the initial stage and 200mA during steady operation.
The photo interrupter which detects the rotation of the motor is designed to operate only when required. The interrupter LED lights up only when the current flows into the motor drive circuit (driving or braking), and the feedback pulse (rectangular waveform formed through the comparator) is sent to the CPU.

Motor driving circuit (for AF motor)



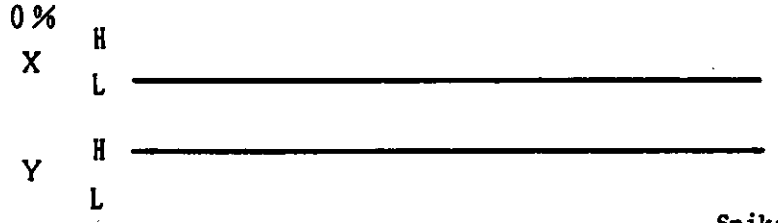
AF motor driving control signal

(i) Braking

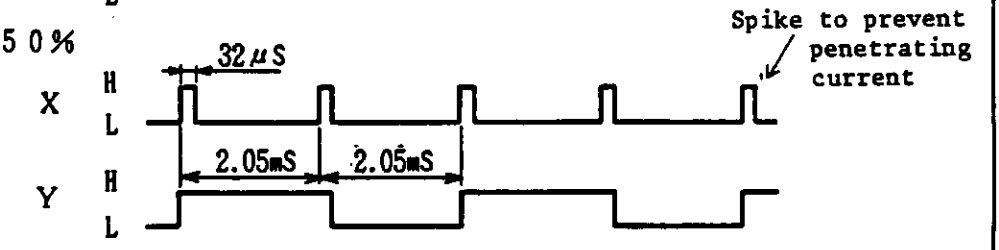


(ii) Normal rotation

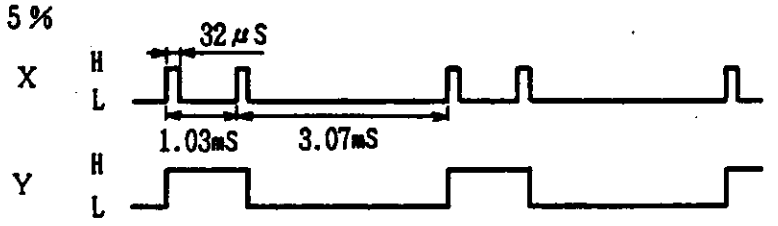
①DUTY 100%



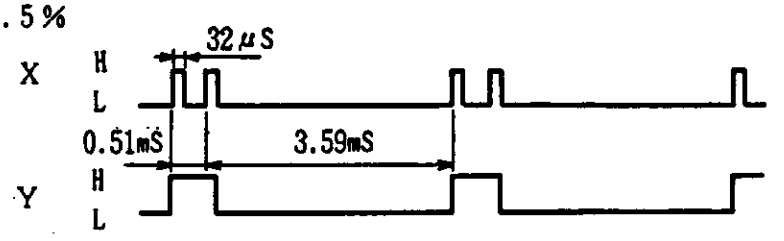
②DUTY 50%



③DUTY 25%



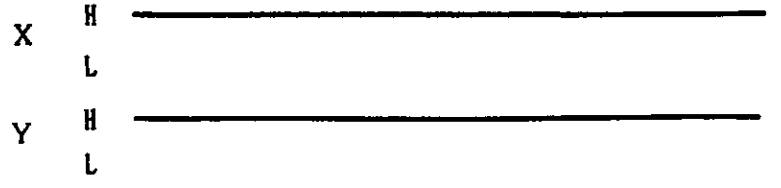
④DUTY 12.5%



(iii) Reverse rotation

Reversed pulse is output.

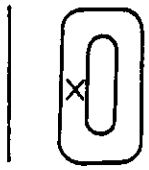
(iv) Stop

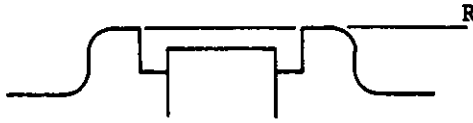


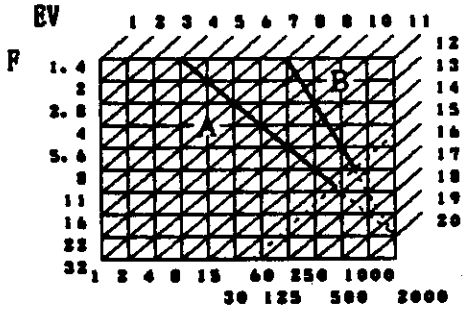
INSPECTION STANDARD & TOOLS

	ITEM	STANDARD
VIEWFINDER	Diopter	-1.87dpt.
	Magnification	0.8±0.05 X (at infinity with 50mm lens)
	Viewfinder coverage	92^{+3}_{-1}% (Vertically/Horizontally)
	Focusing accuracy at infinity	0±30"
	Image inclination	1°30' or less
	Focus brackets	Inclination: 1° or less (against viewfinder frame) Displacement: X=0±0.2mm -ditto- Y=0±0.2mm -ditto- Observe visually (at 7 feet, 40 magnification)
METERING	Center-weighted ratio	70% (at the center of ø12)
	Metering range	EV1 - EV19 (with ISO 100 film and F1.4 lens)
LENS MOUNT	Lens release button	Tension: 750g or less (Measure when the lens release pin sinks to the mount surface.)
	Lens release pin	Height: $1.4^{+0.05}_{-0.1}$mm
		Tension: 750g or less
		To sink below the mount surface when the button is fully depressed
	Lens release torque	6 - 12kg.cm
	AF coupling	Height: $1.4^{+0.05}_{-0.1}$mm
SHUTTER/APERTURE DIALS	Rotation torque	Tension: 60g or more
		105±30g.cm
	Click torque	145±35g.cm (when rotation starts from S, A or L)
	Alignment of scale	Not to be remarkable discrepancy
SHUTTER RELEASE BUTTON	Pre-release ON	Position: 0.3±0.25mm below the surface of grip
		Stroke: 0.9mm
		Tension: 330±115g
	Release ON	Position: 0.6±0.25mm below the surface of grip
		Stroke: 0.9mm
		Tension: 330±115g

	ITEM	STANDARD
	Whole stroke	1mm or more
	Difference between "Pre-release ON" and "Release ON"	Stroke: 0.3±0.15mm Tension: 80g or more
FOCUS MODE SELECTOR	Switching torque	150 - 500g.cm
F MIN SW	ON position	211°15'±1°
FILM RAILS	Flange focal distance	46.67+0.02mm Parallelness: 0.02mm or less Balance of height between inner and outer film guide rails: 0.23±0.02mm Balance of height between inner film guide rail and aperture plane: 0.2mm or more (Reference: lens mount surface)
FILM DETECTION SW	Height	1.5mm±0.1mm (from inner film guide rail)
	ON position	0.5 - 1.2mm (from inner film guide rail)
	Tension	30^{+30}_{-20}g (to inner film guide rail)
FRAME COUNTER	Alignment of index	Displacement: Less than 1/3 of the index
FILM REWIND LEVER	Release stroke	0.5 - 0.9mm
	Tension	100 - 200g (at the limit)
FILM REWIND BUTTON	Operation	The film rewind switch is to turn on securely when the film rewind lever is set and the film rewind button is pushed down.
	Height	3.5mm (from the dial cover)
	ON position	1.5 - 2.3mm (from the dial cover)
	Tension to turn on	700g or less
APERTURE LEVER	Height	3.4±0.1mm
	Stroke	7.4mm or more

	ITEM	STANDARD
MIRROR	Spectral transmission factor of main mirror	Approx. 40%
	Angle (45°) of main mirror	Displacement: 0±5' (vertically), 0±20' (horizontally) Torsion: Within 8'
	Angle (45°) of sub-mirror	Displacement: 0 - -20' Torsion: Within 8'
CAMERA BACK	Tension	To open: 500 - 1000g To close: 900 - 1800g  Push the portion with X mark. Push film cartridge spring.
PRESSURE PLATE	Pressure	35 - 500g (at the center of the frame)
	Flatness	0.02mm or less (in the frame range)
SPOOL	Friction torque	220±50g.cm (both static and dinamic torque)
SPROCKET	Position of gear teeth	$27.7^{+0.8}_{-0.4}$mm apart from the aperture (when the film advance is completed)
	Play	0.8mm or less at the top of the teeth (when the film advance is completed)
BATTERY CHAMBER LID	Tension	To open: 415±40g (without batteries)
		To close: 500g or less (without batteries)
DX CONTACT	Tension	30 - 45g
PRE-RELEASE SW	Pre-release operating duration	8 sec.
		After shooting: Approx. 2 sec. (Flash indicator LED also stays.) Start measuring when the finger is lifted up from the shutter release button.
		In case the built-in flash is up, the power is held until charging is completed.

	ITEM	STANDARD	
BATTERY CHECK	Full battery power	Pre-release operating duration: approx. 8 sec.	
	Insufficient battery power	Pre-release operating duration: approx. 2 sec.	
	Batteries are exhausted	Indicators in the viewfinder disappear. Shutter release and lens servo are locked.	
BATTERY CONSUMPTION, FILM REWIND DURATION	Metering, distance detection	Approx. 80mA	At ordianry temperature
	Lens traveling	Approx. 250mA	
	Shutter operation	Approx. 100mA	
	Film advancing	Approx. 750mA (average)	
	Film rewinding	Approx. 500mA	
	Built-in flash firing	Approx. 3000mA sec. a time	
	Film rewind duration	Approx. 25sec. (with 36-exposure film and fresh batteries at ordianry temperature)	
SELF-TIMER	Stroke of button	0.7 - 0.9mm	 The self-timer LED blinks at 2Hz.
	ON position	Approx. 1.2mm	
	Tension to turn on	120 - 200g	
	Delay-time	10±2 sec.	
EXPOSURE CONTROL (SHUTTER)	Traveling speed of shutter curtain	7ms or higher (both opening and closingcurtains)	Measure five times or more.
	Tolerance	P, S or A mode: 1/2000 - 1/250 sec. ±0.65EV 1/125 - 1 sec. ±0.5EV M mode: 1/2000 - 1/250 sec. ±0.45EV 1/125 - 1 sec. ±0.3EV	
	Dispersion	1/2000 - 1/250 sec.: within ±0.45EV 1/125 - 1 sec.: within ± 0.3EV	
	Unevenness	1/2000 - 1/250 sec.: within ±0.6EV 1/125 - 1 sec.: within 0.2EV	
	Exposure difference between two shutter speeds	1/2000 - 1/250 sec.: 1±0.65EV 1/125 - 1 sec.: 1±0.45EV	

	ITEM	STANDARD	
EXPOSURE CONTROL (SHUTTER)	Shutter speed in flash photography	P and A mode: 1/100 sec.	Actual shutter speed 1/100 sec. speed in set
		S and M mode: Shutter speed in set 1/2000 - 1/125 sec. 1/60 - 1 sec.	
		Tolerance: 1/125 - 1 sec. +0.3EV - -0.15EV	Voltage dependency
		Dispersion: 1/125 - 1 sec. 0.2EV or less	When the battery voltage is 6V or 4.5V (DC), the values stated left should be satisfied.
		Unevenness: 1/125 - 1 sec. 0.2EV or less	
		Difference of exposure between two shutter speed: 1/125 - 1 sec. 1±0.45EV	
		Full opening time: 0.9ms	
	Difference of aperture value	±0.3EV (at F5.6)	
	Accuracy of aperture value	±0.5EV (EV12, ISO 100)	
	Exposure value on image surface	1/2000 - 1/1000 sec. ±0.65EV 1/500 - 1 sec. ±0.5EV (in P, S or A mode)	
PROGRAM MODE	Exposure control		Shutter speed dial: A Aperture dial: S

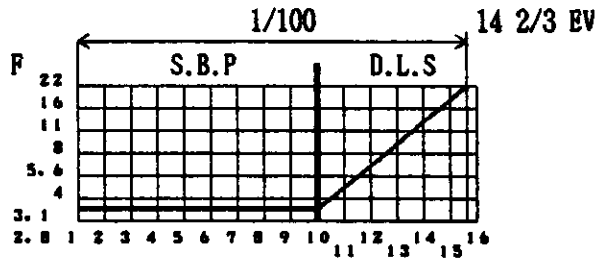
Note: As the effective aperture of the 50/1.8 lens is close to F2, it is regarded as F2.

A: Standard program Shorter than 135mm
B: High-speed program 135mm or longer

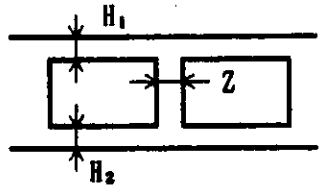
If the brightness is higher than EV15·2/3, the exposure is automatically set to the value at EV15·2/3 on P, A or M mode. When the AE lock is used, the center-weighted metering is performed and the exposure is controlled as indicated by dotted lines in the above graph.

	ITEM	STANDARD		
A OR S MODE	Shutter speed control	Official value	Standard (ms)	Tolerance (ms)
		1/2000	0.49	0.31 - 0.77
		1/1000	0.98	0.62 - 1.54
		1/500	1.95	1.24 - 3.06
		1/250	3.91	2.49 - 6.13
		1/125	7.81	5.52 - 11.05
		1/60	15.63	11.05 - 22.10
		1/30	31.25	22.10 - 44.19
		1/15	62.5	44.19 - 88.39
		1/8	125	88.39 - 176.78
		1/4	250	176.78 - 353.55
		1/2	500	353.55 - 707.11
		1	1000	707.11 - 1414.21
		S mode Shutter speed dial: 1/2000 - 1 sec. Aperture dial: S A mode Shutter speed dial: A Aperture dial: 1.2 - 32		
M MODE	Shutter speed control	Official value	Standard (ms)	Tolerance (ms)
		1/2000	0.49	0.36 - 0.67
		1/1000	0.98	0.72 - 1.34
		1/500	1.95	1.43 - 2.66
		1/250	3.91	2.86 - 5.34
		1/125	7.81	6.34 - 9.62
		1/60	15.63	12.70 - 19.24
		1/30	31.25	25.38 - 38.47
		1/15	62.5	50.77 - 76.95
		1/8	125	101.53 - 153.89
		1/4	250	203.06 - 307.79
		1/2	500	406.13 - 615.57
		1	1000	812.25 - 1231.14
		Shutter speed dial: 1/2000 - 1 sec. Aperture dial: 1.2 - 32		

	ITEM	STANDARD
FLASH	Insulation resistance	500V, 30M or more (Temperature: 20±15°C, Humidity: 60±20%)
	Efficiency	60% or more (when the gate time is either 1ms or 2.5ms)
	Firing timing	Over 0.3ms after opening shutter curtain has opened
	Synchronizing shutter speed	1/100 sec. on P and A mode 1/100 - 1 sec. on S and M mode
	Flash program	Program chart for flash photography
	TTL flash control	Usable film: ISO 25 - ISO 400
BUILT-IN FLASH	Guide number	12
	Recycling time	Approx. 5.5 sec. (with fresh alkaline batteries at ordinary temperature)
	Number of flashes	8 rolls or more (with fresh alkaline batteries at ordinary temperature)
	Priority of built-in flash	An external flash cannot be used together with the built-in flash. (Built-in flash has priority to external flash in indication as well.)
	Before recycling	Shutter locks when recycling is not completed.

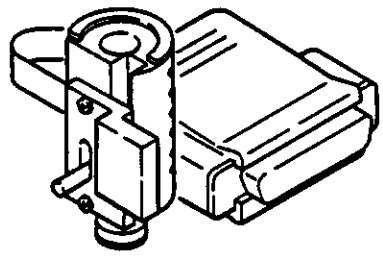
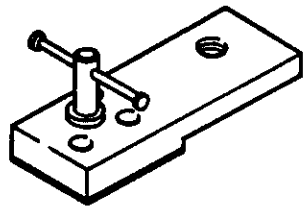
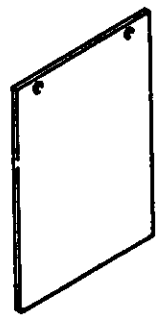
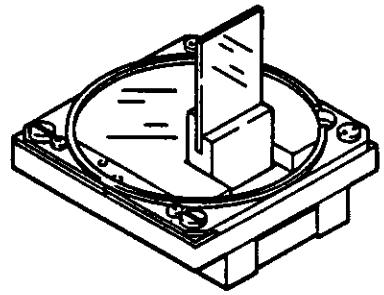


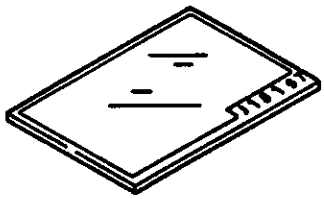
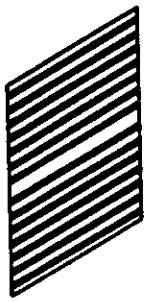
	Darker than EV10						Brighter than EV10	
ISO	25	50	100	200	400	800	1600	
Aperture	1.4	2	2.8	4	4	5.6	8	Built-in flash
Aperture	2.8	4	5.6	8	11	16	18	Accessory flash

	ITEM	STANDARD	
BUILT-IN FLASH	Switching of flash selector switch (when flash being raised)	X contact for external flash is ON: 60.4mm or lower X contact for built-in flash in ON: 66mm or higher	Measure the height of the top of the flash from the optical axis of the body.
	Switching of flash selector switch (when flash is pushed down)	X contact for external flash is ON: 62.3mm or lower X contact for built-in flash is ON: 65.7mm or higher	
	Flash lock-release button	Height: 1.6mm Tension: 60 - 300g	
	Built-in flash	Tension: 100 - 300g Height: 46.8±15mm (from optical axis of body to top of flash, while flash is raised) Inclination: within 70' Gap between flash and top cover or front body: 1mm or less	
AF	Usable F number	F5.6 or brighter	Accuracy of defocus amount with ISO 100 film at ordinary temperature
	AF possible brightness	Approx. EV2 - EV18	
	Focusing zone	Approx. 0±150μm (at the image surface)	
	AF accuracy	Z: 0±50um	
	Standard for adjustment	Yaw : 0±5mrad Pitch: 0±8mrad ΔZ : -100±200	
PICTURE FRAME	Picture frame size	$24^{+0.4}_{-0}$ x $36^{+0.4}_{-0}$mm	
	Frame-to-frame space	Z: 1 - 3mm The center of the space should not be aligned with a perforation.	
	Variation of vertical position of frames	H1-H2 ≦ 0.4mm	
	R at corner of frame	0.4mm or less	
	Shade in picture	There should not be remarkable shade with 800mm lens. (with Ektachrome film at 1/2000 shutter speed)	

2 TOOLS

1. SPECIAL TOOLS FOR F-401/N4004

Tool No.	Name	Illustration	Class	Remarks
*J15270	DX contact tool		A	
*J15271	Tripod socket conversion adapter		A	
*J15273	IS terminal tool		A	Home-made tool
*J15274	Chart board (for J15264)		A	
*J15275	I/O board		A	
J18196	Sub-mirror angle adjustment tool		A	

Tool No.	Name	Illustration	Class	Remarks
J18197	Mirror angle inspection mirror		A	
*J18198	Chart for Z adjustment		A	
*J18199	PK-13		A	Merchandise
*J18200-1	Floppy disk for F-401 adjustment		A	
*J19041	CPU	PC-9801VM2E	A	
*J19041-1	14-inch colour CRT	APC-H131	A	
*J19041-2	Expanded RAM board	PC-9801-41	A	
*J19041-3	MS-DOS	PS-98-125-HMW	A	
*J19041-4	MS mouse	PC-9872K	A	

Note: The tools with * mark are to be used in conbination.

How to modify the lens for Z adjustment (J18183)

It is necessary to modify the lens for Z (J18183) in order to adjust the AF of F-401.

1) Remove three screws on the mount.

2) Disassemble the mount.

3) Unfasten two screws which fastening the aperture lever (3.1 lever). Then, disassemble the aperture lever.

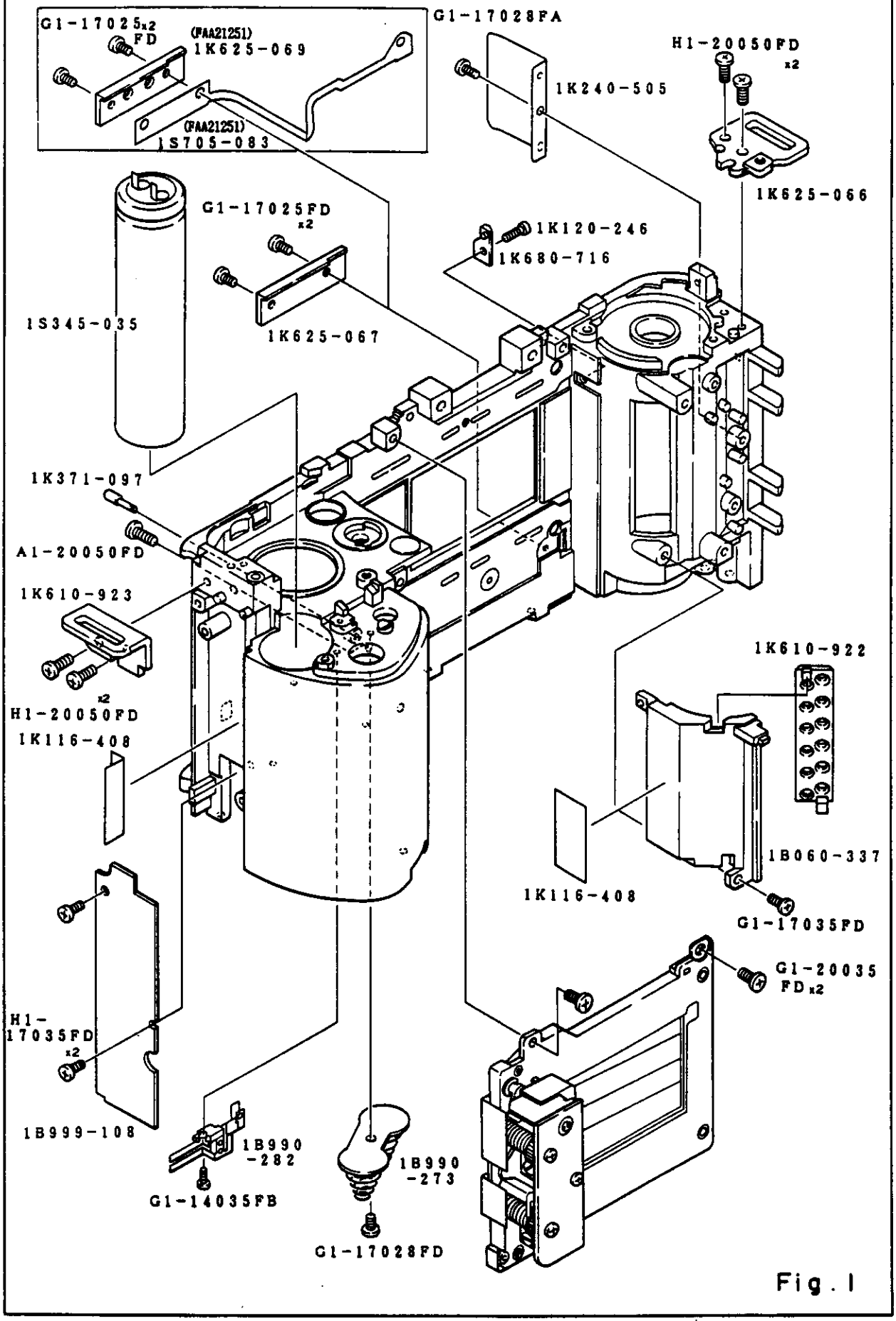
4) Disassemble the aperture ring, remove adhesive and install the aperture ring so that it can rotate.

5) Assemble the mount and fasten it with the screws.

EXPLODED DRAWINGS AND PARTS LIST

[1] EXPLODED DRAWINGS

[2] PARTS LIST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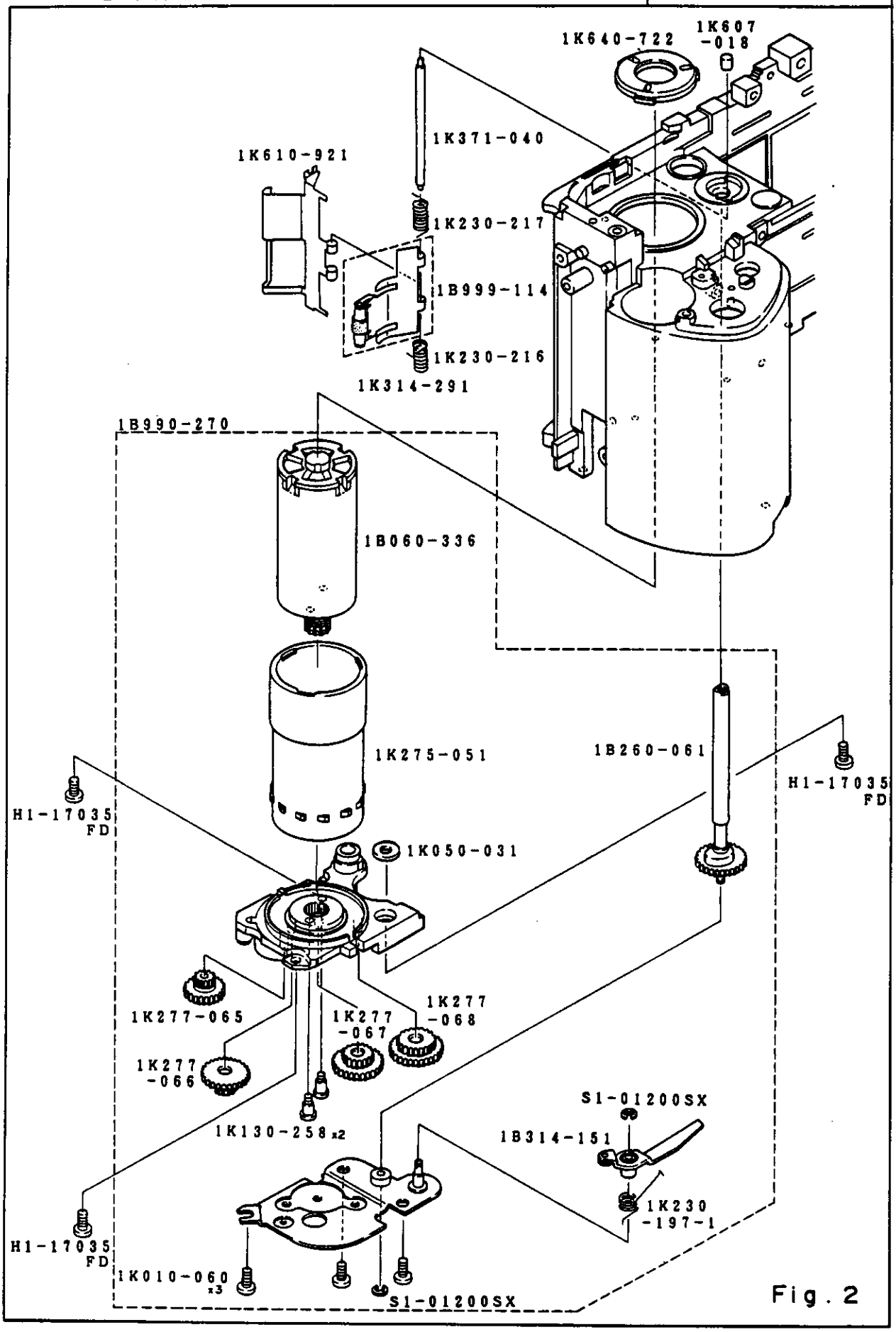
(FAA21251) 1K625-069
(FAA21251) 1S705-083
G1-17028FA
1K240-505
H1-20050FD x2
1K625-066
G1-17025FD x2
1K625-067
1S345-035
1K120-246
1K680-716
1K371-097
A1-20050FD
1K610-923
H1-20050FD x2
1K116-408
1K610-922
1B060-337
1K116-408
G1-17035FD
G1-20035 FD x2
H1-17035FD x2
1B999-108
1B990-282
G1-14035FB
1B990-273
G1-17028FD
Fig. 1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1K371-040
1K610-921
1K230-217
1B999-114
1K230-216
1K314-291
1B990-270
1B060-336
1K275-051
1B260-061
H1-17035 FD
H1-17035 FD
1K050-031
1K277-065
1K277-067
1K277-068
1K277-066
1K130-258 x2
S1-01200SX
1B314-151
1K230-197-1
H1-17035 FD
1K010-060 x3
S1-01200SX

Fig. 2

下地基板部 FILM-ADVANCE MECHANISM UNIT

FAA21051-R.3223.A

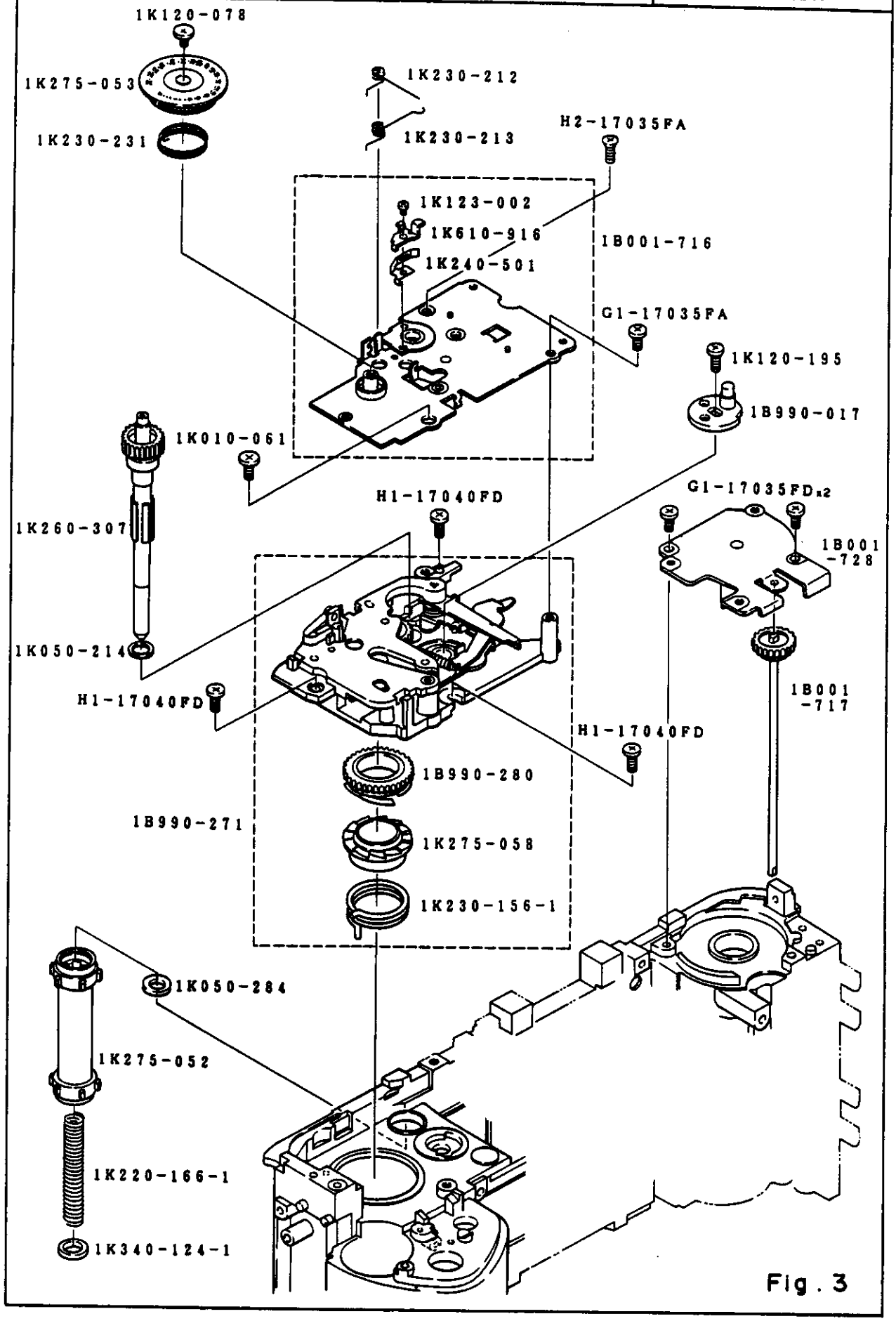
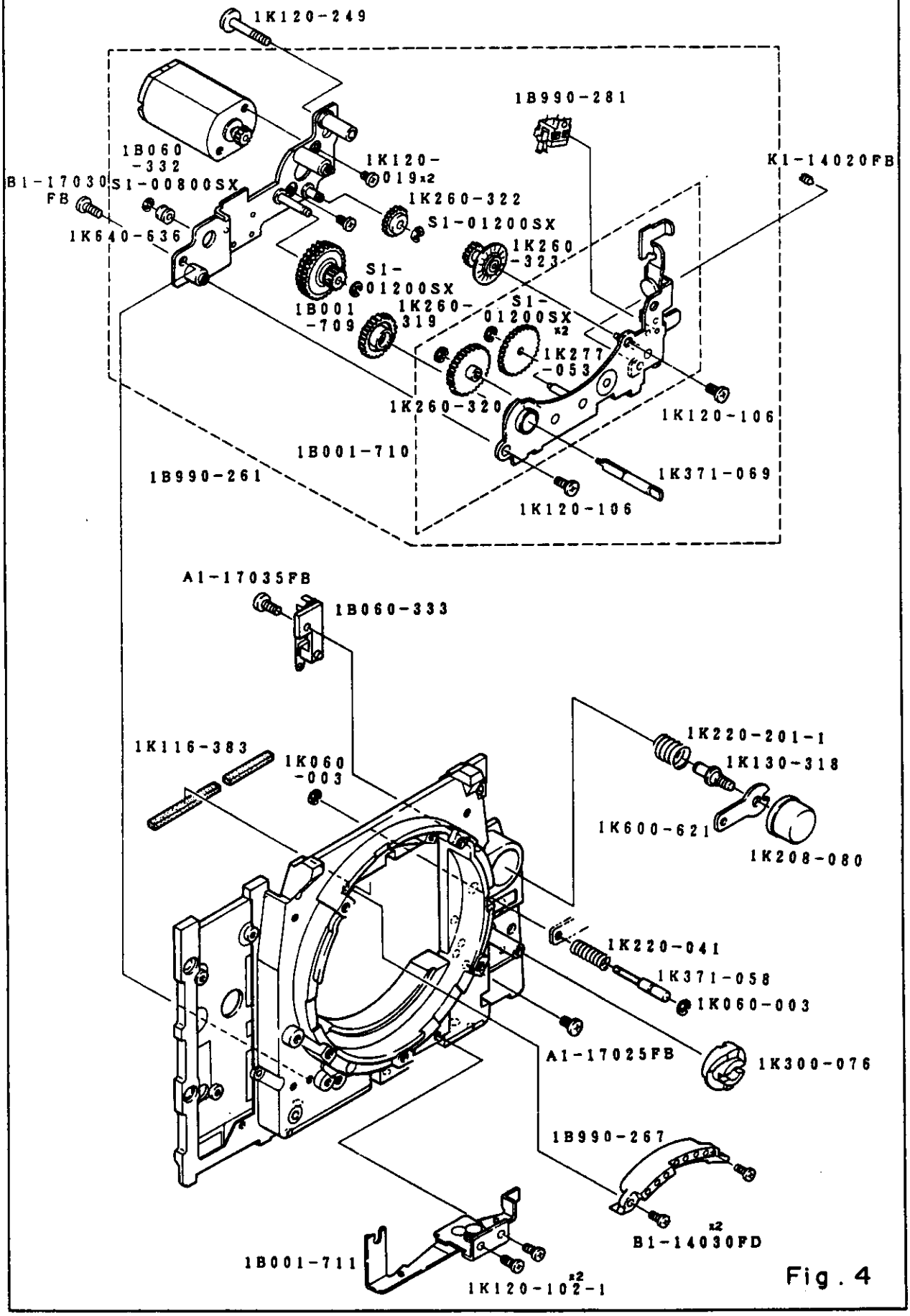


Fig. 3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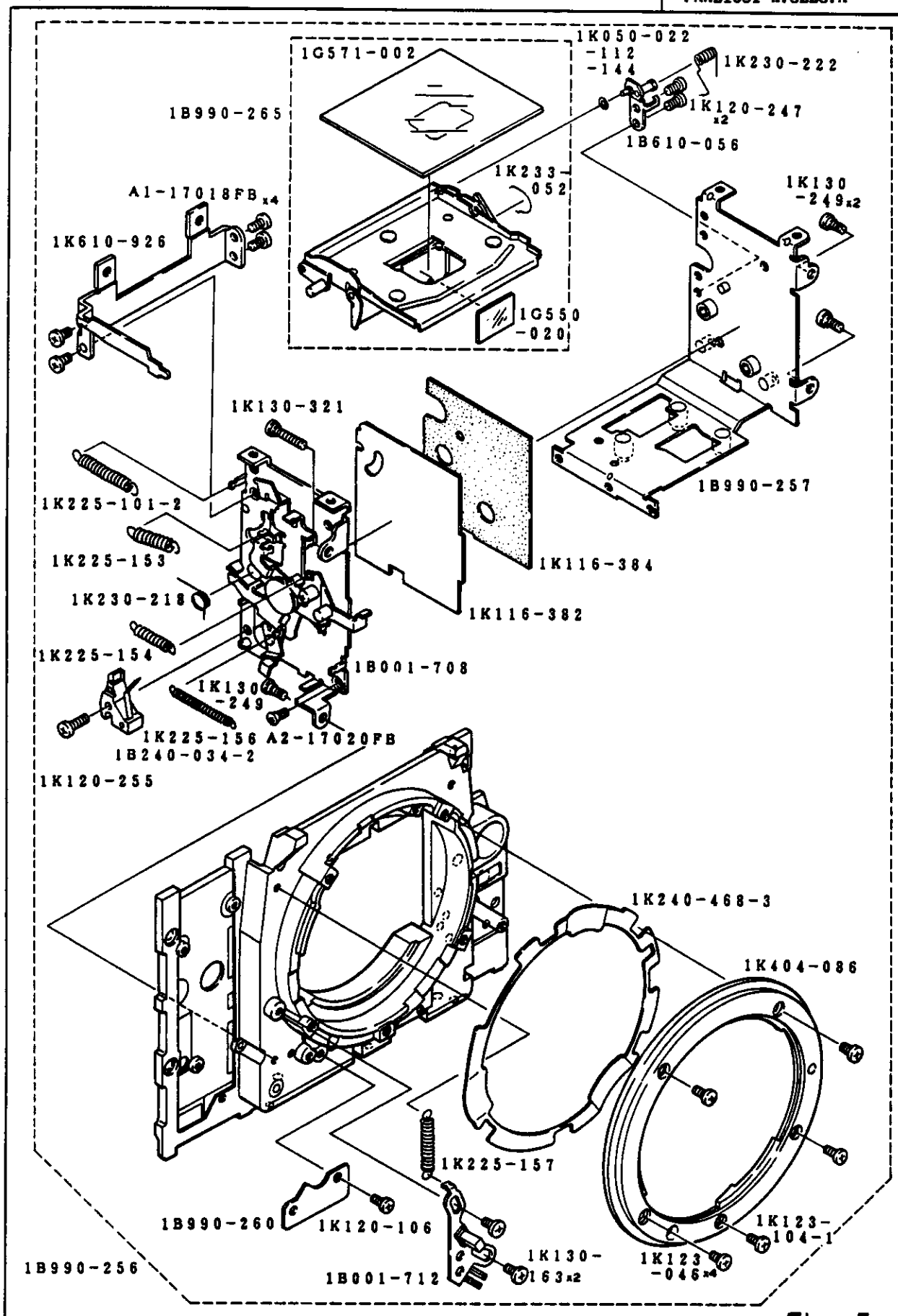
1B060
-332
1K120-
019x2
K1-14020FB
B1-17030
FB
S1-00800SX
1K260-322
S1-01200SX
1K640-636
1K260
-323
S1-
01200SX
1B001
-709
1K260-
319
S1-
01200SX
x2
1K277
-053
1K260-320
1K120-106
1B001-710
1K371-069
1B990-261
1K120-106
A1-17035FB
1B060-333
1K116-383
1K060
-003
1K220-201-1
1K130-318
1K600-621
1K208-080
1K220-041
1K371-058
1K060-003
A1-17025FB
1K300-076
1B990-267
B1-14030FD
x2
1B001-711
1K120-102-1
x2

Fig. 4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1K050-022
-112
-144
1K230-222
1K120-247 x2
1B610-056
1B990-265
1K233-052
A1-17018FB x4
1K610-926
1K130-249 x2
1G550-020
1K130-321
1K225-101-2
1K225-153
1K230-218
1K225-154
1K116-384
1K116-382
1B990-257
1B001-708
1K130-249
1K225-156
A2-17020FB
1B240-034-2
1K120-255
1K240-468-3
1K404-086
1K225-157
1B990-260
1K120-106
1B990-256
1B001-712
1K130-163 x2
1K123-046 x4
1K123-104-1

Fig. 5

FAA21051-R.3223.A

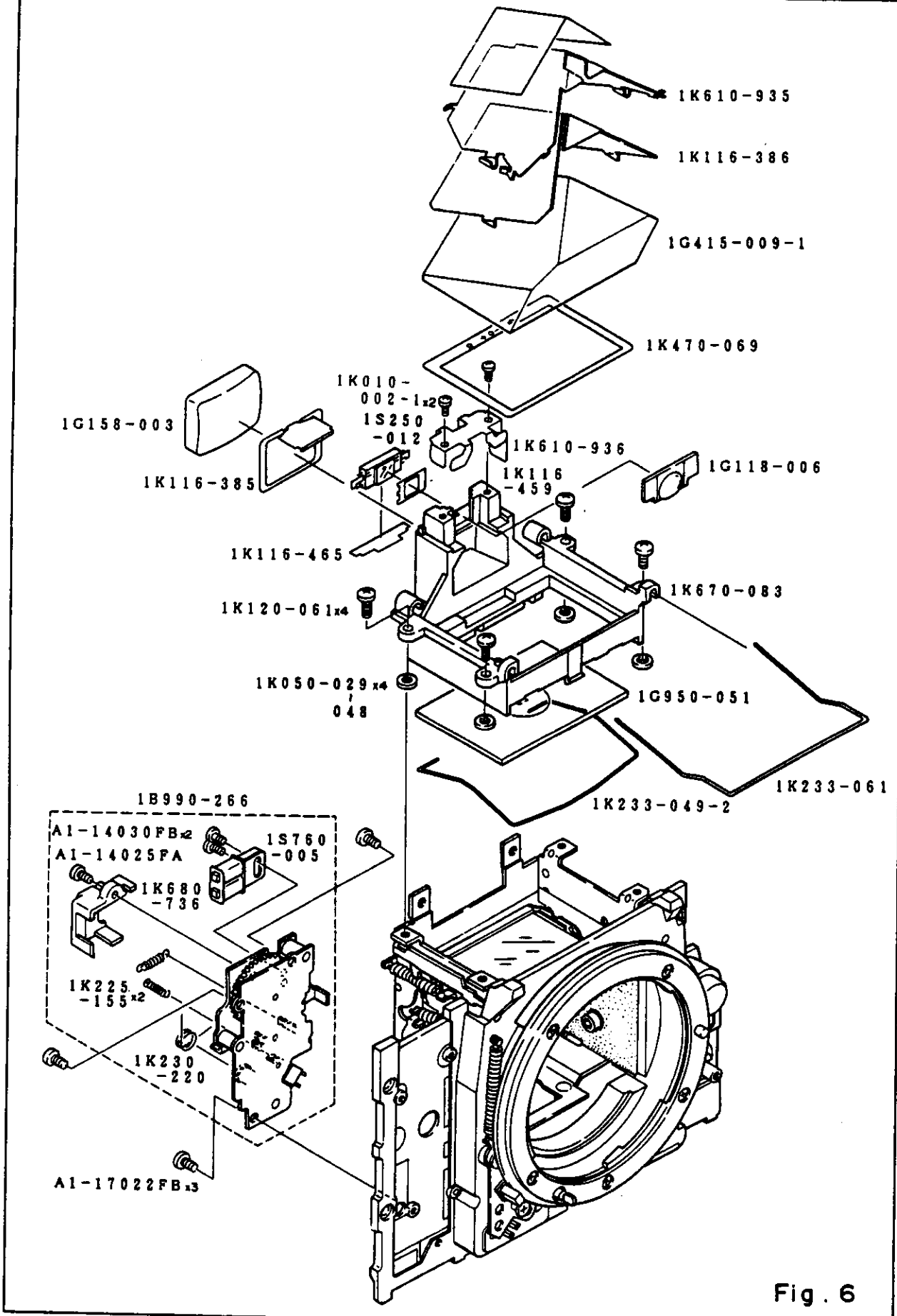
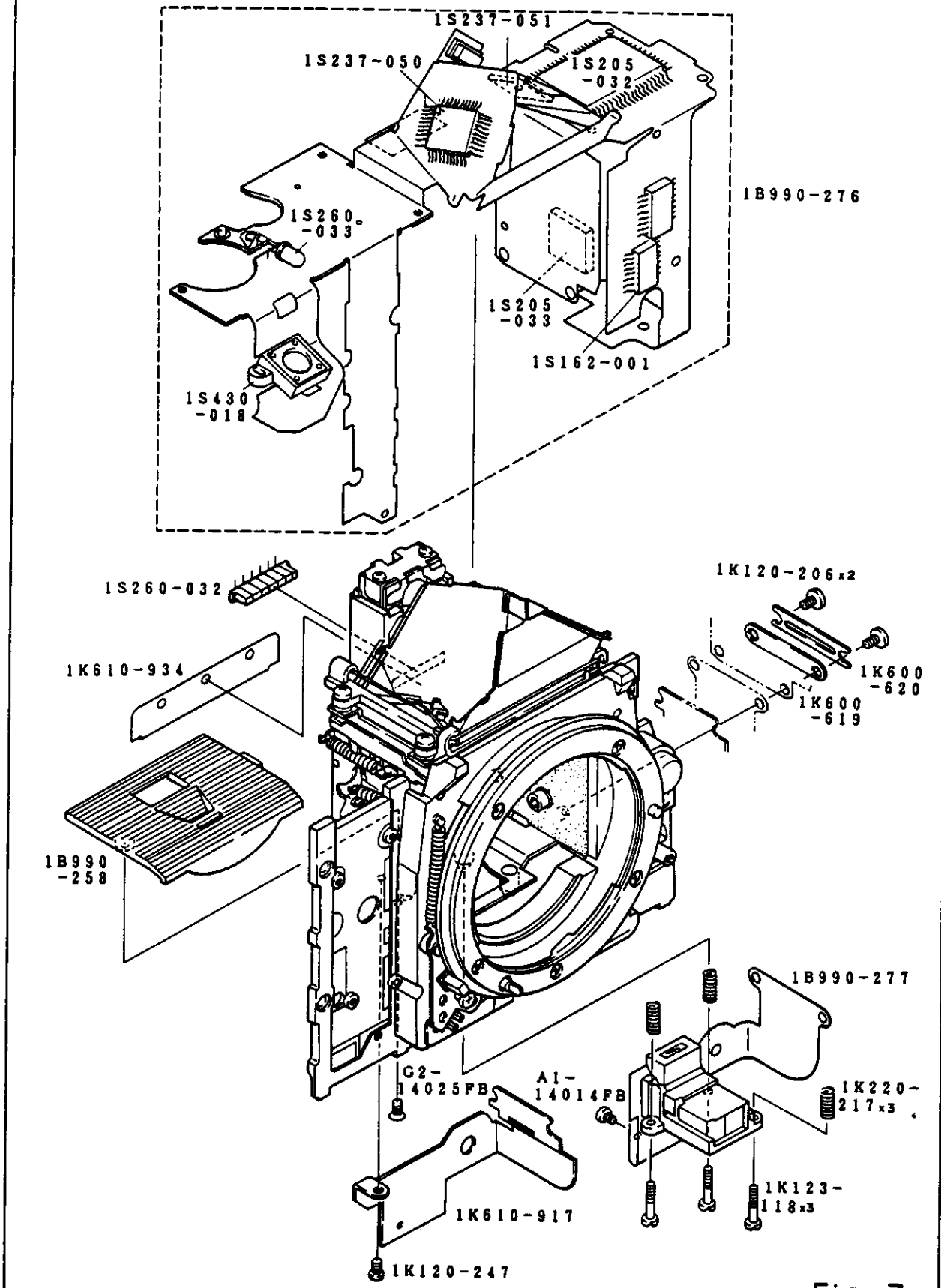


Fig. 6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1S205
-032
1B990-276
1S260
-033
1S205
-033
1S162-001
1S430
-018
1S260-032
1K120-206x2
1K610-934
1K600
-620
1K600
-619
1B990
-258
1B990-277
G2-
14025FB
A1-
14014FB
1K220-
217x3
1K123-
118x3
1K610-917
1K120-247

Fig. 7

前ボディ部 FRONT BODY

FAA21051-R.3223.A

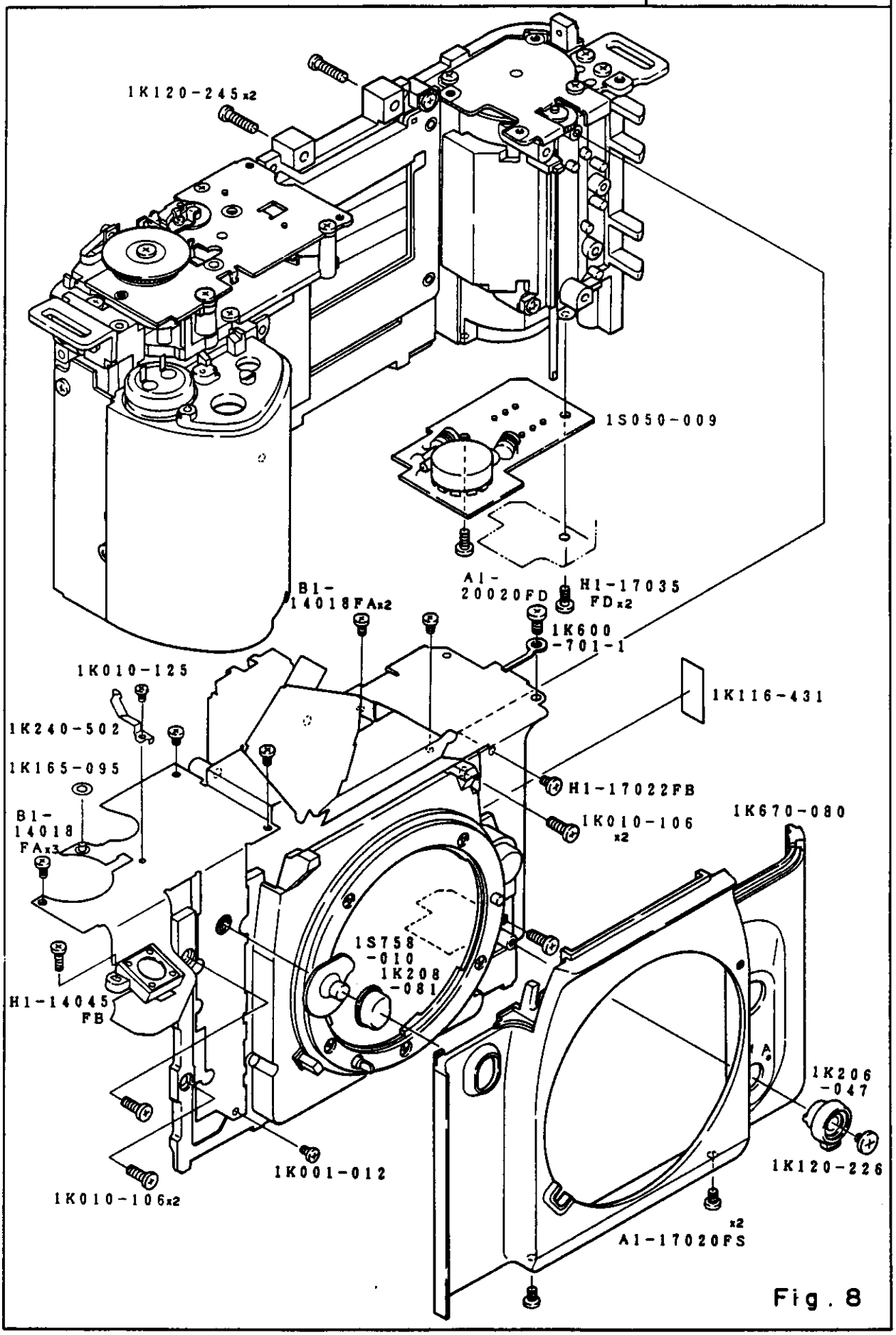
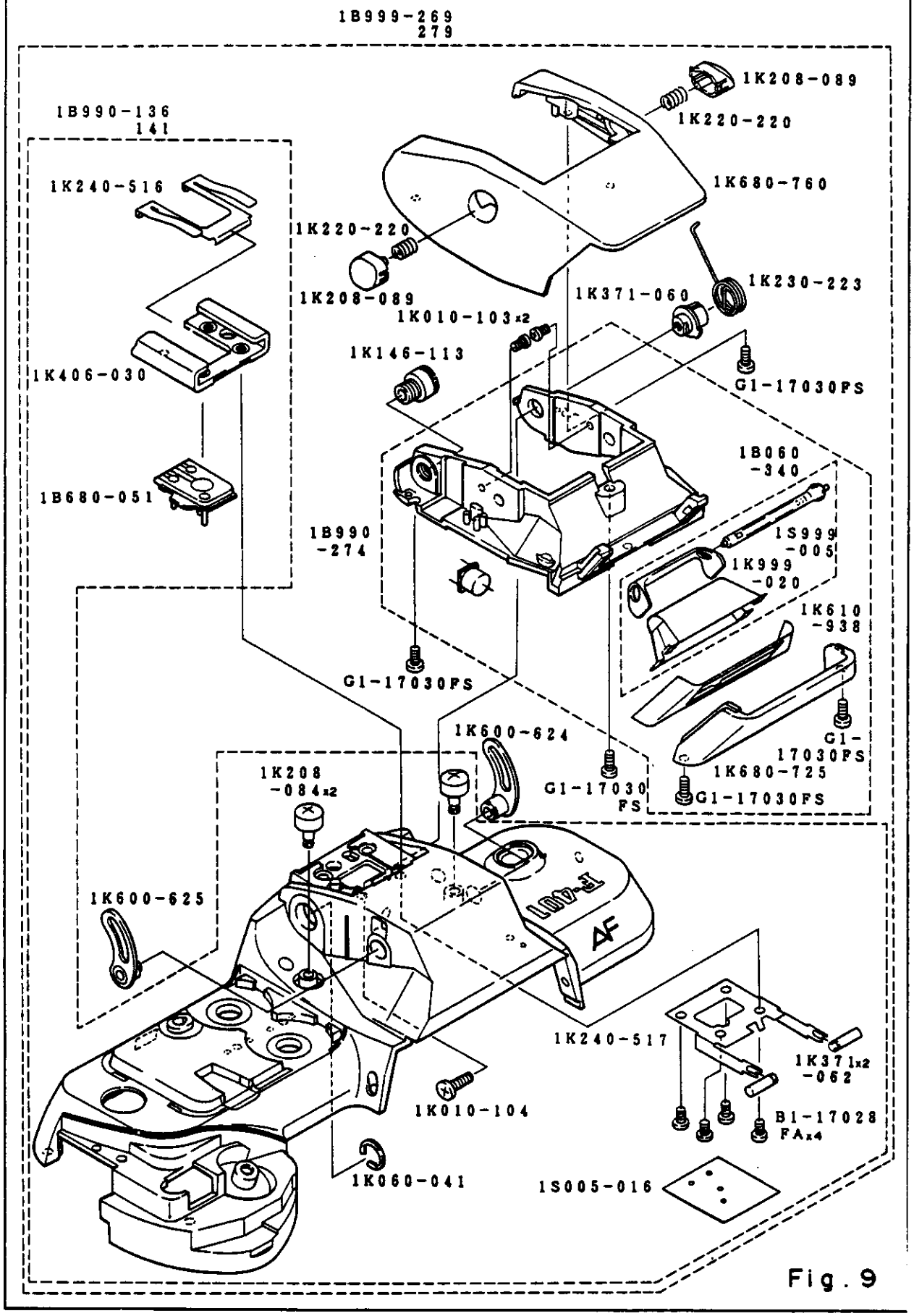
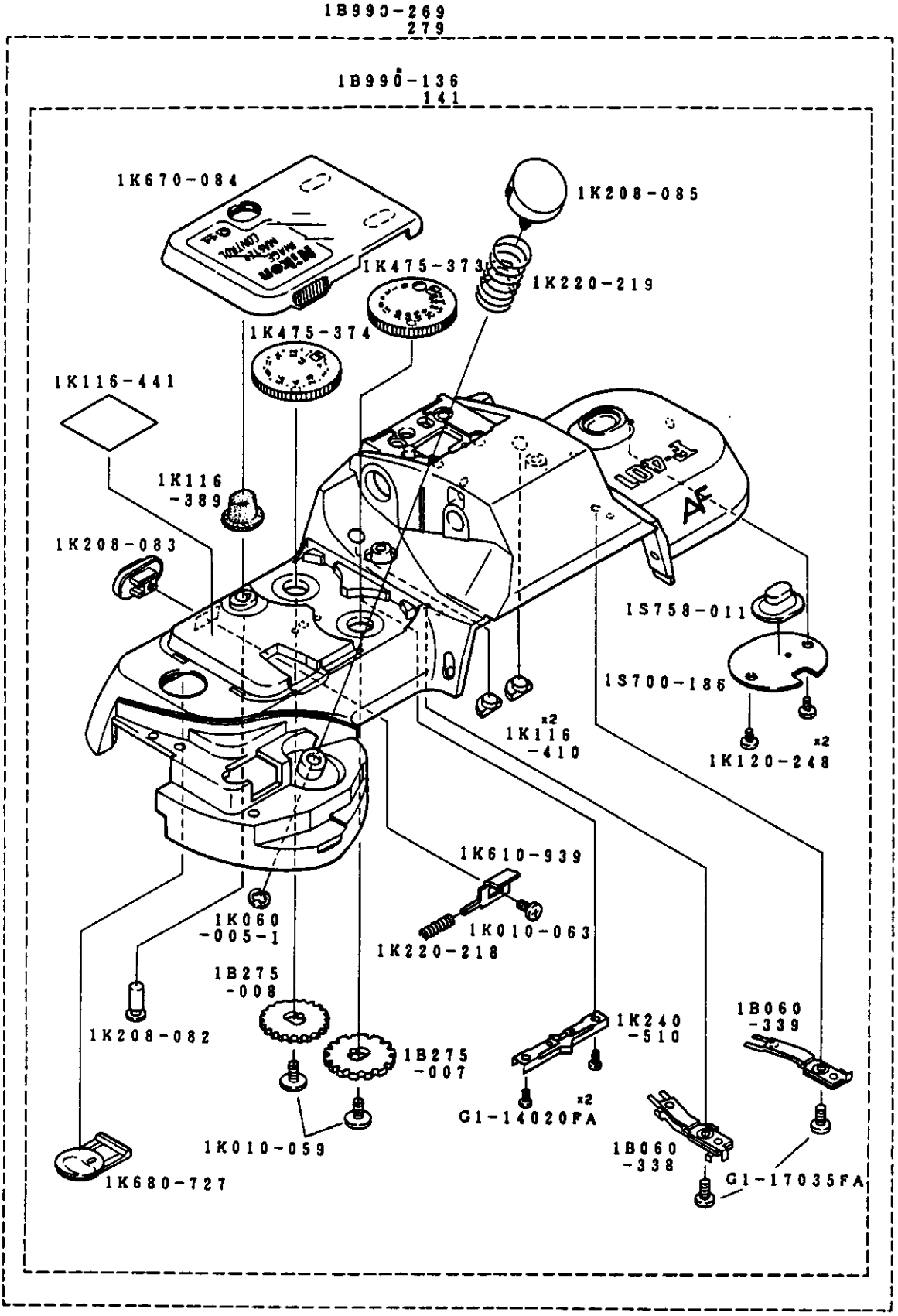


Fig. 8

上カバー部1 TOP COVER 1

FAA21051-R.3223.A

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1B990-136
141
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1K208-085
1K475-373
1K220-219
1K475-374
1K116-441
1K116
-389
1K208-083
1S758-011
1S700-186
x2
1K116
-410
x2
1K120-248
1K610-939
1K060
-005-1
1K010-063
1K220-218
1B275
-008
1K208-082
1B275
-007
1K240
-510
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-339
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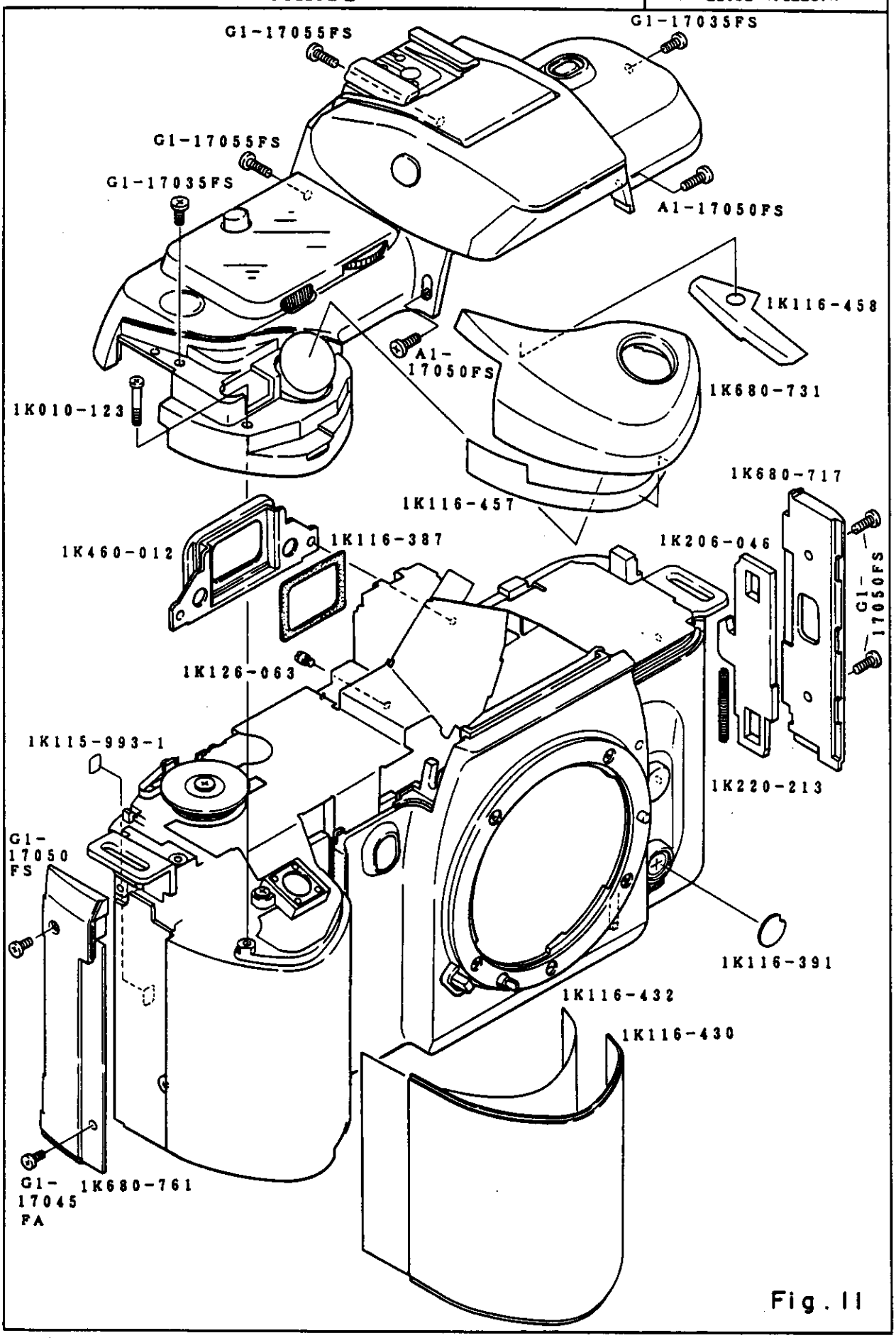
G1-17035FA
1K680-727

Fig. 10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G1-17055FS
G1-17035FS
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1K680-731
1K010-123
1K680-717
1K116-457
1K460-012
1K116-387
1K206-046
G1-17050FS
1K126-063
1K115-993-1
1K220-213
G1-17050FS
1K116-391
1K116-432
1K116-430
G1-17045FA
1K680-761

Fig. 11

底カバー部 BOTTOM COVER

FAA21051-R.3223.A

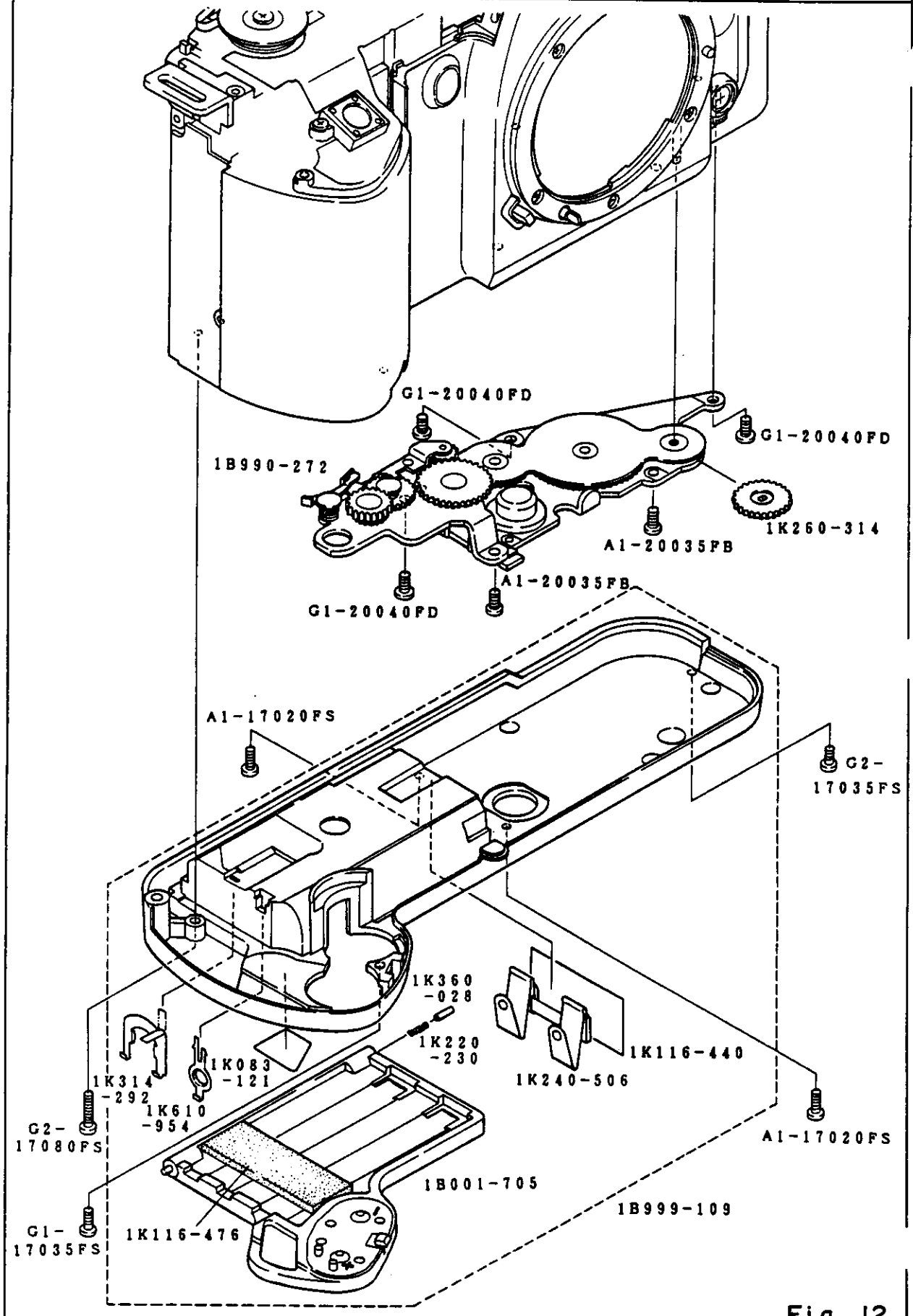
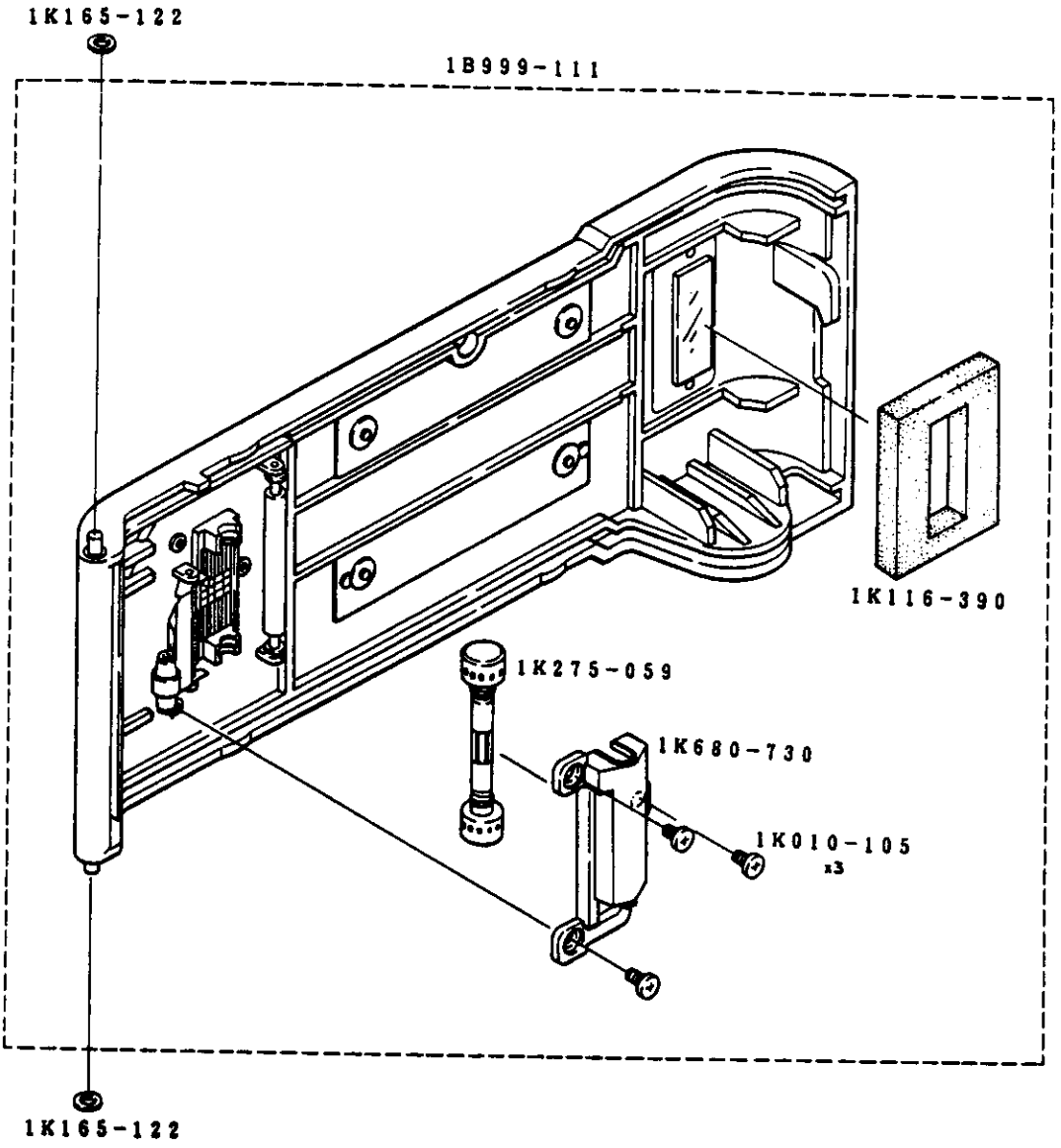


Fig . 12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x3
1K165-122

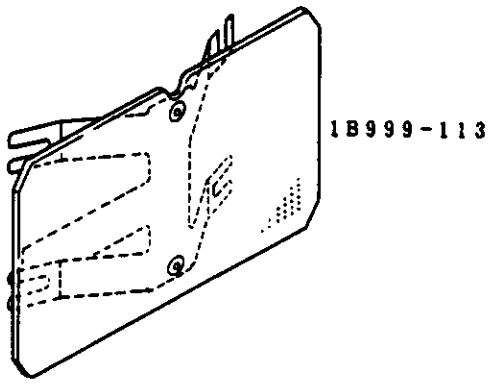
1B999-113

Fig.13

DB裏蓋部 DB CAMERA BACK

FAA21251-R.3223.A

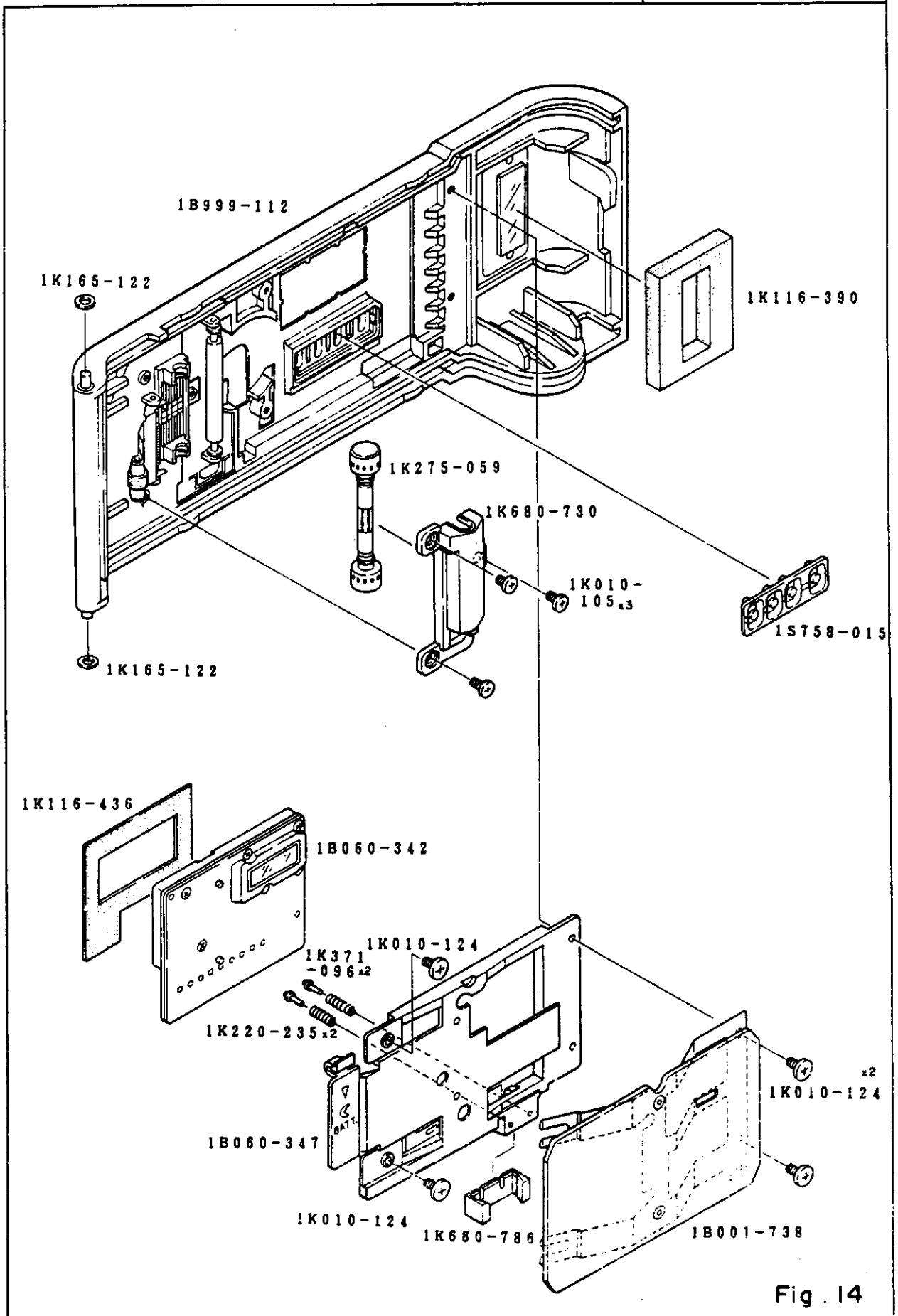

Fig. 14

部品対照表
Parts Number Reference Table

補助番号 Auxiliary No.	部品番号 Part Number	補助番号 Auxiliary No.	部品番号 Part Number
G1	1G571-002	136	1K230-213
G2	1G550-020	142	1K240-501
G3	1G950-051	143	1K610-916
G4	1G415-009-1	145	1K240-502
G5	1G158-003	151	1K610-917
G6	1G118-006	152	1K600-619
		154	1K600-620
		164	1K371-097
		165	1K600-701-1
		174	1K165-095
		194	1K260-314
22	1K670-080	201	1K607-018
34	1K126-063	202	1K314-291
36	1K680-761	203	1K371-040
37	1K116-430	204	1K230-216
38	1K680-731	205	1K230-217
47	1K277-065	206	1K115-993-1
48	1K277-066	208	1K610-921
49	1K277-067	212	1K610-922
50	1K277-068	217	1K240-505
55	1K230-197-1	218	1K680-716
59	1K275-051	220	1K680-717
60	1K640-722	221	1K206-046
61	1K275-052	222	1K220-213
62	1K260-307	231	1K625-066
64	1K220-166-1	232	1K610-923
65	1K050-214	237	1K625-067
66	1K340-124-1	255	1K610-954
74	1K120-195	257	1K314-292
102	1K230-156-1	258	1K240-506
119	1K275-058	261	1K360-028
129	1K275-053	262	1K220-230
133	1K230-231	263	1K083-121
134	1K120-078		
135	1K230-212		

FAA21051-R. 3223. A

部品対照表

Parts Number Reference Table

補助番号 Auxiliary No.	部品番号 Part Number	補助番号 Auxiliary No.	部品番号 Part Number
264	1K116-440	444	1K130-318
265	1K116-476	445	1K220-201-1
304	1K225-153	446	1K220-041
306	1K225-154	452	1K208-081
307	1K230-218	453	1S758-010
310	1K225-101-2	465	1K225-157
320	1K610-926	471	1K404-086
328	1K116-382	472	1K240-468-3
337	1K233-052	509	1S758-011
355	1S760-005	511	1K475-373
375	1K230-220	514	1K010-059
376	1K225-155	515	1K475-374
389	1K680-736	518	1K240-510
392	1K225-156	520	1K670-084
405	1K123-118	531	1K060-041
406	1K220-217	532	1K116-410
410	1K230-222	542	1K680-760
415	1K610-934	543	1K146-113
417	1K116-383	544	1K371-060
418	1K116-384	555	1K010-103
421	1K670-083	556	1K999-020
422	1K116-385	558	1K680-725
423	1K116-465	559	1S999-005
424	1K233-049-2	560	1K610-938
425	1K470-069	561	1K010-104
426	1K610-935	564	1K230-223
427	1K233-061	571	1K406-030
428	1K116-386	573	1K240-516
431	1K460-012	576	1K240-517
432	1K116-387	577	B1-17028FA
435	1K116-459	581	1K208-082
436	1K610-936	582	1K208-083
440	1K208-080		
442	1K600-621		
443	1K371-058		

部品対照表
Parts Number Reference Table

補助番号 Auxiliary No.	部品番号 Part Number	補助番号 Auxiliary No.	部品番号 Part Number
583	1K610-939	725	1K010-002-1
584	1K220-218	726	1K120-102-1
585	1K116-389	727	1K130-249
586	1S700-186	729	1K123-046
588	1K680-727	730	1K123-104-1
589	1S430-018	731	1K120-246
590	1K220-219	732	1K120-247
591	1K208-084	733	1K130-321
592	1K208-085	734	1K120-226
593	1K220-220	735	1K010-123
594	1K600-624	736	1K001-012
595	1K208-089	738	1K010-125
596	1K060-005-1	741	1K120-248
598	1K371-062	751	S1-01200SX
599	1K600-625	752	S1-00800SX
607	1K116-390	753	1K060-003
623	1K275-059	761	1K050-144
626	1K680-730	761	1K050-022
627	1K010-105	761	1K050-112
650	1K050-284	781	1K050-029
651	1K165-122	781	1K050-030
671	1K116-408	781	1K050-031
673	1K116-431	781	1K050-032
674	1K116-432	781	1K050-033
676	1K116-441	781	1K050-034
678	1K116-457	781	1K050-035
679	1K116-458	781	1K050-036
701	1K010-060	781	1K050-037
702	1K010-061	781	1K050-038
705	1K010-063	781	1K050-039
708	1K130-258	781	1K050-040
721	1K010-106	781	1K050-041
722	1K120-245		
723	1K130-163		
724	1K120-106		

部品対照表
Parts Number Reference Table

補助番号 Auxiliary No.	部品番号 Part Number	補助番号 Auxiliary No.	部品番号 Part Number
781	1K050-042	833	B1-14030FD
781	1K050-043	835	G1-17035FD
781	1K050-045-1	836	G2-14025FB
781	1K050-046-1	837	H1-17022FB
781	1K050-047-1	838	A1-14030FB
781	1K050-048	839	A1-14025FA
801	G1-17055FS	840	G1-17045FA
802	G1-17028FA	845	A1-17025FB
803	G1-17050FS	851	A1-17022FB
804	G1-17025FD	859	1K120-255
806	A1-20050FD	863	G1-17030FS
807	H1-17040FD	865	A1-17050FS
808	A2-17020FB	866	H1-14045FB
809	H1-17035FD	868	G1-14020FA
810	H1-20050FD	909	1K260-319
811	G1-14035FB	910	1K260-320
812	A1-14014FB	911	1K277-053
813	1K120-206	918	1K260-322
815	G1-20035FD	920	1K260-323
816	G1-20040FD	923	1K640-636
817	A1-20035FB	925	1K120-019
818	G1-17035FA	926	1K120-249
819	H2-17035FA	927	1K371-069
820	B1-14018FA	942	K1-14020FB
821	1K123-002	955	1K300-076
823	A1-17035FB	956	1K206-047
824	1K120-061	957	1K116-391
825	A1-17018FB	1004	1S005-016
826	G1-17028FD	1021	1S050-009
827	G2-17080FS	1023	1S260-032
828	G2-17035FS	1024	1S260-033
829	G1-17035FS		
830	A1-17020FS		
831	B1-17030FB		
832	A1-20020FD		

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Parts Number Reference Table

補助番号 Auxiliary No.	部品番号 Part Number	補助番号 Auxiliary No.	部品番号 Part Number
1026	1S250-012	B341	1B990-257
1031	1S205-032	B413	1B610-056
1032	1S237-050	B420	1B990-258
1033	1S237-051	B461	1B001-712
1034	1S205-033	B463	1B990-260
1036	1S162-001	B503	1B060-333
1112	1S345-035	B512	1B275-007
2237	1K625-069 (FAA21251)	B516	1B275-008
3003	1S705-083 (FAA21251)	B521	1B060-338
		B541	1B990-274
		B550	1B060-339
		B556	1B060-340
B23	1B999-269	B572	1B680-051
B23	1B999-279	B901	1B990-261
B26	1B990-256	B902	1B001-710
B31	1B990-278	B913	1B001-709
B32	1B060-336	B922	1B990-281
B41	1B990-270	B924	1B060-332
B52	1B314-151	B944	1B001-711
B71	1B260-061	B1024	1B999-109
B72	1B990-017	B1113	1B999-108
B81	1B990-271	B1202	1B999-114
B101	1B990-280	B1601	1B999-111
B121	1B001-716	B1603	1B999-113
B123	1B990-136	B2001	1B990-276
B123	1B999-141	B2331	1B990-265
B161	1B990-282	B2340	1B990-266
B176	1B990-272	B2401	1B990-277
B195	1B001-717	B2474	1B990-267
B199	1B001-728		
B211	1B060-337		
B251	1B001-705		
B256	1B990-273		
B301	1B001-708		
B319	1B240-034-2		

部品対照表

Parts Number Reference Table

補助番号 Auxiliary No.	部品番号 Part Number	補助番号 Auxiliary No.	部品番号 Part Number
2641	1B060-342		
2643	1K010-124		
2644	1K371-096		
2645	1K220-235		
2646	1K680-786		
2647	1S758-015		
2659	1K116-436		
B2601	1B999-112		
B2603	1B001-738		
B2642	1B060-347		

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K001-012	736	Screw	1		8	○		10
※1K010-002-1	725	Screw	2		6	○	P-501	10
※1K010-059	514	Tダイアルビス Screw, shutter dial	2	1B990-269	10	○△	P-501	10
※1K010-060	701	Screw	3	1B990-270	2	○△	P-501	10
※1K010-061	702	Screw	1		3	○	P-501	10
※1K010-063	705	Screw	1	1B990-269	10	○△	P-501	10
1K010-103	555	補強板ビス Screw, supporting plate	2	1B990-269	9	○△		10
1K010-104	561	ばね掛けヒンジビス Screw, spring hinge	1	1B990-269	9	○△		10
1K010-105	627	押さえモールドビス Screw	3	1B999-111	13	○△		10
1K010-106	721	Screw	4		8	○		10
1K010-123	735	Screw	1		11	○		10
1K010-125	738	Screw	1		8	○		10
※1K050-022	761B	チリトリ用調整ワッシャー Washer, mirror holder	0-1		5	○		10
※1K050-029	781A	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	P-501	10
※1K050-030	781B	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	P-501	10
※1K050-031	781C	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	P-501	10
※1K050-032	781D	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	P-501	10
※1K050-033	781E	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	P-501	10

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Par Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
*1K050-034	781F	プリズムBOXワッシャー Washer, pentaprism	1-5		6	○	F-501	10
*1K050-035	781G	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-036	781H	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-037	781I	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-038	781J	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-039	781K	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-040	781L	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-041	781M	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-042	781N	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-043	781O	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-045-1 (1K050-045)	781P	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-046-1 (1K050-046)	781Q	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-047-1 (1K050-047)	781R	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-048	781S	プリズムBOXワッシャー Washer, pentaprism	0-4		6	○	F-501	10
*1K050-112	761C	チリトリ用調整ワッシャー Washer, mirror holder	0-1		5	○	F-501	10
*1K050-144	761A	チリトリ用調整ワッシャー Washer, mirror holder	0-1		5	○	F-501	10
*1K050-214	65	スプロケットワッシャー Washer, sprocket	1		3	○	F-501	5
1K050-284	650	スプロケットガタ取りワッシャー Washer	1		3	○		10
*1K060-003	753	Screw	2		4	○		10

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
*1K060-005-1	596	E リング E ring	1	18990-269	10	○△		100
1K060-041	531	CE リング CE ring	1	18990-269	9	○△		10
1K083-121	263	電池シール Battery seal	1	18999-109	12	○△		10
*1K115-993-1	206	フイルムマーク Film leader index	1		11	○	F-501	5
1K116-382	328	I基板植毛紙 Flocked sheet,I base plate	1		5	○		5
1K116-383	417	ミラー受けモルト Sponge,mirror holder	1		4	○		10
1K116-384	418	L基板植毛紙 Flocked sheet,L base plate	1		5	○		5
1K116-385	422	接眼視野枠 Eyepiece mask	1		6	○		5
1K116-386	428	ペンタ保護シート Pentaprism protection sheet	1		6	○		5
1K116-387	432	接眼ゴム Eyepiece rubber	1		11	○		5
1K116-389	585	防滴カバー Drip-proof cover	1	18990-269	10	○△		10
1K116-390	607	F窓モルト Sponge,film cartridge window	1	18999-111	13	○△		10
1K116-391	957	切換レバー飾り板 Switching lever plate	1		11	○		10
1K116-408	671	片面テープ 19×9 Adhesive tape	2	18060-337	1	×	TA-0005	一巻 1 Roll
1K116-410	532	ゴム蓋 Rubber lid	2	18990-269	10	○△		10
1K116-430	37	グリップ Grip	1		11	○		5
1K116-431	673	片面テープ 13×6 Adhesive tape	5		8	×	TA-0005	一巻 1 Roll
1K116-432	674	両面テープ Double coated adhesive tape	1		11	○		10

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K116-440	264	アセテートクロステープ 26×14 Acetate cloth tape	1	1B999-109	12	×	TA-0006	一巻 1 Roll
1K116-441	676	両面テープ Double coated adhesive tape	1	1B999-136 1B990-283	10	○△		10
1K116-457	678	両面テープ Double coated adhesive tape	1		11	○		10
1K116-458	679	両面テープ Double coated adhesive tape	1		11	○		10
1K116-459	435	押さえ板 Plate	1		6	○		10
1K116-465	423	接眼押さえ板 Plate	1		6	○		10
1K116-476	265	モルト Cushion	1	1B999-109	12	○△		10
*1K120-019	925	モーター取付ビス Screw, motor fixing	2	1B990-261	4	○△	F-501	10
1K120-061	824	Screw	4		6	○		10
*1K120-078	134	枚数計ビス Screw, frame counter	1		3	○	F-501	10
*1K120-102-1	726	Screw	4	1B990-266	4	○△		10
*1K120-106	724	Screw	3	1B990-261	4, 5	○△		5
*1K120-195	74	基準軸ビス Screw, top cover	1		3	○	F-501	10
*1K120-206	813	Screw	2		7	○	F-501	10
*1K120-226	734	Screw	1		8	○	F-501	10
1K120-245	722	Screw	2		8	○		10

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K120-246	731	Screw	1		1	○		10
1K120-247	732	Screw	3		5, 7	○		10
1K120-248	741	Screw	2	1B990-269	10	○△		10
1K120-249	926	AF基板ビス Screw, AF base plate	1		4	○		10
1K120-255	859	Screw	1		5	○		10
*1K123-002	821	Screw	1	1B001-716	3	○△		10
*1K123-046	729	Screw	4		5	○		10
*1K123-104-1	730	Screw	1		5	○		10
*1K123-118	405	AM-200調整用ビス Screw, AM-200 adjustment	3		7	○		10
1K126-063	34	レールビス Screw	1		11	○		10
*1K130-163	723	Screw	2		5	○		50
*1K130-249	727	screw	3		5	○	F-501	5
*1K130-258	708	Screw	2	1B990-270	2	○△	F-501	10
1K130-318	444	レンズ着脱ボタン軸 Axle, lens release button	1		4	○		10
1K130-321	733	Screw	1		5	○		10
1K146-113	543	チューブビス Screw	1	1B990-269	9	○△		10
*1K165-095	174	カウンターワッシャー Washer, frame counter	1		8	○	F-501	5
1K165-122	651	裏蓋用ワッシャー Camera back washer	2		13	○		10
1K206-046	221	裏蓋開閉キー Camera back open/close key	1		11	○		5

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K206-047	956	AF-M切り換えレバー AF mode switch lever	1		8	○		5
1K208-080	440	レンズ着脱ボタン飾り環 Ring, lens release button	1		4	○		5
1K208-081	452	AEロックボタン AE lock button	1		8	○		5
1K208-082	581	Rボタン Film rewind button	1	1B990-269	10	○△		5
1K208-083	582	Rロックレバー Film rewind lock lever	1	1B990-269	10	○△		5
1K208-084	591	ストロボスイッチボタン Flash switch button	2	1B990-269	9	○△		5
1K208-085	592	レリーズボタン Shutter release button	1	1B990-269	10	○△		5
1K208-089	595	ストロボ操作ボタン Flash setting button	2	1B990-269	9	○△		5
*1K220-041	446	レンズ着脱ピンバネ Spring, lens release pin	1		4	○	F-501	10
*1K220-166-1 (1K220-166)	64	スプロケットバネ Sprocket spring	1		3	○	F-501	5
*1K220-201-1	445	レンズ着脱受バネ Spring, lens release button axle	1		4	○	F-501	5
1K220-213	222	Spring	1		11	○		5
1K220-217	406	AM-200調整バネ Spring, AM-200 adjustment	3		7	○		10
1K220-218	584	Rロックバネ Spring, film rewind lock	1	1B990-269	10	○△		10
1K220-219	590	レリーズボタンバネ Spring, shutter release button	1	1B990-269	10	○△		10
1K220-220	593	操作ボタン戻しバネ Reset spring	2	1B990-269	9	○△		10
1K220-230	262	電池蓋開閉鍵バネ Spring, battery chamber lid lock	1		12	○		10
*1K225-101-2 (1K225-101)	310	絞りレバーバネ Aperture lever actuating spring	1		5	○	F-501	10

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K225-153	304	ミラーアップバネ Mirror-up spring	1		5	○		10
1K225-154	306	絞りレバー戻しバネ Aperture lever reset spring	1		5	○		10
1K225-155	376	リセットレバー戻しバネ Spring, reset lever	2	1B990-266	6	○△		10
1K225-156	392	Sセットレバー戻しバネ Spring, shutter set lever	1		5	○		10
1K225-157	465	FM INスイッチバネ Spring, FM IN switch	1		5	○		10
*1K230-156-1	102	スプールフリクションバネ Spool friction spring	1	1B999-271	3	○△		5
*1K230-197-1	55	Sチャージバネ Shutter charge spring	1	1B990-270	2	○△	F-501	5
1K230-212	135	巻き上げ制限SWバネ Spring, film advance limitter switch	1		3	○		10
1K230-213	136	カウンターSWバネ Spring, frame counter switch	1		3	○		10
1K230-216	204	フィルムガイド板バネA Spring A, film guide plate	1		2	○		10
1K230-217	205	フィルムガイド板バネB Spring B, film guide plate	1		2	○		10
1K230-218	307	ミラー駆動バネ Mirror driving spring	1		5	○		10
1K230-220	375	オーバーチャージバネ Over-charge spring	1	1B990-266	6	○△		10
1K230-223	564	コイルバネ Coil spring	1	1B990-269	9	○△		10
1K230-222	410	ミラーダウンバネ Mirror-down spring	1		5	○		10
1K230-231	133	カウンターバネ Frame counter spring	1		3	○		10
*1K233-049-2 (1K233-049-1)	424	スクリーンバネ Focusing screen spring	1		6	○		10
*1K233-052	337	サブミラーバネ Sub mirror spring	1	1B990-265	5	○△	F-501	5
1K233-061	427	ペンタ押さえバネ Pentaprism retaining spring	1		6	○		5

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
*1K240-468-3	472	バヨネットバネ Bayonet ring spring	1		5	○	F-501	5
1K240-501	142	Rセット板バネ Leaf spring	1	1B001-716	3	○△		10
1K240-502	145	巻き戻しスイッチバネ Spring, film rewind switch	1		8	○		5
1K240-505	217	パトローネ押さえバネ Spring, film cartridge retaininer	1		1	○		5
1K240-506	258	電池接点バネ Battery contact spring	1	1B999-109	12	○△		10
1K240-510	518	T. FDダイアルビス Screw, shutter and aperture dial	1	1B990-269	10	○△		5
1K240-516	573	シュー座 Accessory shoe base	1	1B990-269	9	○△		5
1K240-517	576	裏押さえ板 Rear retainer plate	1	1B990-269	9	○△		5
1K260-307	62	スプロケット軸 Sprocket shaft	1		3	○		5
1K260-314	194	巻き戻しギアD Film rewind gear D	1		12	○		5
1K260-319	909	AFカップリングギア AF coupling gear	1	1B990-261	4	○△		5
1K260-320	910	第4アイドルギア 4th idle gear	1	1B001-710	4	○△		5
1K260-322	918	インタラプタアイドルギア Interrupter idle gear	1	1B990-261	4	○△		5
1K260-323	920	インタラプタギア Interrupter gear	1	1B990-261	4	○△		5
1K275-051	59	スプール Spool	1	1B990-270	2	○△		5
1K275-052	61	スプロケット sprocket	1		3	○		5
1K275-053	129	カウンターメモリー板 Frame counter ratchet	1		3	○		5
1K275-058	119	スプールクラッチ Spool clutch	1	1B990-271	3	○△		5

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K275-059	623	Fローラー Film roller	1	1B999-111	13	○		5
1K277-053	911	第3アイドルギア 3rd idle gear	1	1B001-710	4	○△		5
1K277-065	47	減速ギア Speed reduction gear	1	1B990-270	2	○		5
1K277-066	48	減速ギア Speed reduction gear	1	1B990-270	2	○		5
1K277-067	49	減速ギア Speed reduction gear	1	1B990-270	2	○		5
1K277-068	50	減速ギア Speed reduction gear	1	1B990-270	2	○		5
1K300-076	955	AF, M切り換えモールド AF mode switch mold	1		4	○		5
1K314-291	202	フィルムガイド板 Film guide plate	1	1B001-718	2	○△		5
1K314-292	257	電池接点板 Battery contact plate	1	1B999-109	12	○△		5
*1K340-124-1	66	スプロケット下軸受け Bearing, sprocket lower shaft	1		3	○	P-501	5
1K360-028	261	電池蓋軸 Battery chamber lid axle	1	1B001-705 1B999-109	12	○△		10
1K371-040	203	フィルムガイド板軸 Film guide plate shaft	1	1B001-718	2	○		5
1K371-058	443	レンズ着脱軸 Lens release shaft	1		4	○		10
1K371-060	544	ヒンジB Hinge B	1	1B990-269	9	○△		10
1K371-062	598	制限ピン Stopper pin	2	1B990-269	9	○△		10
1K371-069	927	AFカップリング軸 AF coupling shaft	1	1B990-261	4	○△		5
1K371-097	164	F検出スイッチピン Film detection switch pin	1		1	○		5
1K404-086	471	バヨネット Bayonet	1		5	○		1

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K406-030	571	シュー Accessory shoe	1	1B990-269	9	○△		5
1K460-012	431	接眼モールド Eyepiece cap	1		11	○		1
1K470-069	425	視野枠 Viewfield frame	1		6	○		5
1K475-373	511	Tダイアル Shutter dial	1	1B990-269	10	○		5
1K475-374	515	Fダイアル Aperture dial	1	1B990-269	10	○△		5
1K600-619	152	圧接押さえゴム Rubber, press-contact retaining	1		7	○		5
1K600-620	154	圧接押さえ板 Press-contact retaining plate	1		7	○		5
1K600-621	442	レンズ着脱板 Lens release plate	1		4	○		5
1K600-624	594	補強板A Support plate A	1	1B990-269	9	○△		5
1K600-625	599	補強板B Support plate B	1	1B990-269	9	○△		5
1K600-701-1	165	平板 Plate	1		8	○		5
1K607-018	201	ガイド板軸受けカラー Guide plate bearing collar	1		2	○		5
1K610-916	143	Rセットスイッチバネ押さえ Spring retainer	1	1B001-716	3	○△		1
1K610-917	151	フレキ裏打ち板 FPC rear plate	1		7	○		1
1K610-921	208	フィルムガイド押さえ板 Retainer plate	1	1B001-718	2	○△		5
1K610-922	212	DX接点ガイド板 DX contact guide plate	1		1	○		5
1K610-923	232	吊り環（巻き上げ側） Neckstrap ring (Film advance side)	1		1	○		5
1K610-926	320	I基板L基板支え板 Supporting plate	1		5	○		1

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K610-934	415	遮光板 Light baffle plate	1		7	○		5
1K610-935	426	ペンタ押さえ板 Pentaprism retainer	1		6	○		5
1K610-936	436	SPD押さえ板 SPD retainer	1		6	○		5
1K610-938	560	SB遮光枠 Shading frame	1	1B990-274 1B990-269	9	○△		5
1K610-939	583	Rロック板 Lock plate	1	1B990-261	10	○△		5
1K610-954	255	電池接点板B Battery contact plate B	1	1B999-109	12	○△		5
1K625-066	231	吊り環（巻き戻し側） Neckstrap ring (Film rewind side)	1		1	○		5
1K625-067	237	DB接点目隠しモールド Data back contact cover	1		1	○		5
*1K640-636	923	カップリングカラー Coupling collor	1	1B990-261	4	○△	F-501	5
1K640-722	60	スプール上座 Spool upper cover	1		2	○		5
1K670-080	22	エプロン Apron	1		8	○		1
1K670-083	421	プリズムBOX Pentaprism box	1		6	○		1
1K670-084	520	ダイアルカバー Dial cover	1	1B990-269	10	○△		1
(FAA21151) 1K670-095	520	ダイアルカバー Dial cover	1	1B990-279	10	○△	For U.S.A. and CANADA	5
1K680-716	218	フィルムガイド押さえ板 Film guide retainer plate	1		1	○		5
1K680-717	220	裏蓋鍵カバー Camera back key cover	1		11	○		1
1K680-725	558	プロテクター Protector	1	1B990-274	9	○△		5
1K680-727	588	枚数計窓 Frame counter window	1	1B990-269	10	○△		5

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K680-730	626	給送シグナル Film advance indicator	1	1B999-111	13	○		5
1K680-731	38	レリーズカバー Shutter release button cover	1		11	○		5
1K680-736	389	Mgカバー Mg cover	1	1B990-266	6	○△		5
1K680-760	542	ストロボ下ケース Lower flash cover	1	1B990-269	9	○△		1
1K680-761	36	保護カバー板 Protector plate	1		11	○		1
1K999-020	556	リフレクター Reflector	1	1B060-340 1B990-274	9	○△		5

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1S005-016	1004	ホットシュー基板 Hot shoe plate	1		9	○△		5
1S050-009	1021	DC-DCコンバータ DC-DC converter	1		8	○		5
1S162-001	1036	EEP ROM (CXK1005M)	1	1B990-276	7	○△		5
1S205-032	1031	CPU (HD637B05Z)	1	1B990-276	7	○△		5
1S205-033	1034	I/F IC (MB4436)	1	1B990-276	7	○△		5
1S237-050	1032	H AMP (M51063)	1	1B990-276	7	○△		5
1S237-051	1033	MO IC (M51066FP)	1	1B990-276	7	○△		5
1S250-012	1026	S AMP SPD	1		7	○		5
1S260-032	1023	LEDアレイ LED array	1		7	○		5
1S260-033	1024	セルフLED Self-timer LED	1	1B990-276	7	○△		5
1S345-035	1112	メインコンデンサ 330V 240μF Main coodenser	1		1	○		5
1S430-018	589	ダブルスイッチ Double switch	1	1B990-276	7	○△		5
1S700-186	586	セルフプリント板 Self-timer printed board	1	1B990-269	10	○△		5
1S758-010	453	AEロックスイッチ AE lock switch	1		8	○		5
1S758-011	509	セルフボタンゴム Self-timer button rubber	1	1B990-269	10	○△		5
1S760-005	355	絞り制御Mg Aperture control magnet	1	1B990-266	6	○△		5

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1S810-891	1121	Lead wire (Red) 1=133	1			×	W-0120RE	
1S810-892	1122	Lead wire (Yellow) 1=130	1	1B990-273		△	W-0120YE	
1S810-893	1129	Lead wire (Blue) 1=135	1	1B990-278		△	W-0056BE	
1S810-895	1136	Lead wire (Yellow) 1=85	1			×	W-0056YE	
1S810-896	1137	Lead wire (Purple) 1=85	1			×	W-0056PU	
1S810-897	1138	Lead wire (Red) 1=30	1	1B990-266		△	W-0056RE	
1S810-898	1139	Lead wire (Blue) 1=35	3	1B990-266		△	W-0056BE	
1S810-899	1140	Lead wire (Brown) 1=40	1	1B990-266		△	W-0056BN	
1S810-900	1141	Lead wire (Brown) 1=80	1	1B990-260		△	W-0056BN	
1S810-903	1145	Lead wire (Orange) 1=50	1	1B990-281		△	W-0056OR	
1S810-904	1146	Lead wire (Blue) 1=50	1	1B990-281		△	W-0056BE	
1S810-905	1147	Lead wire (Brown) 1=50	1	1B990-281		△	W-0056BN	
1S810-906	1148	Lead wire (Orange) 1=35	1	1B060-333		△	W-0056OR	
1S810-907	1150	Lead wire (Red) 1=75	1	1B990-278		△	W-0056RE	
1S810-908	1151	Lead wire (Black) 1=70	1	1B990-278		△	W-0056BK	
1S810-909	1153	Lead wire (White) 1=180	1	1B990-278		△	W-0056WH	
1S810-910	1154	Lead wire (Green) 1=190	1	1B990-278		△	W-0056GN	
1S810-911	1155	Lead wire (Yellow) 1=80	1	1B990-278		△	W-0056YE	

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1S810-912	1156	Lead wire (Gray) 1=105	1	1B990-278		△	W-0056GY	
1S810-913	1157	F検知コード Lead wire (Black) 1=20	1	1B990-282		△	W-0056BK	
1S810-914	1158	F検知コード Lead wire (Green) 1=60	3	1B990-282		△	W-0056GN	
1S810-916	1160	Lead wire (Blue) 1=60	1	1B060-337		△	W-0056BE	
1S810-917	1161	Lead wire (Purple) 1=60	1	1B060-337		△	W-0056PU	
1S810-918	1162	Lead wire (Gray) 1=60	1	1B060-337		△	W-0056GY	
1S810-919	1163	Lead wire (Orange) 1=60	2	1B060-337		△	W-0056OR	
1S810-920	1164	Lead wire (Black) 1=60	3	1B060-337		△	W-0056BK	
1S810-922	1166	Lead wire (Yellow) 1=60	1	1B990-269		△	W-0056YE	
1S810-925	1169	Lead wire (Brown) 1=90	1	1B990-269		△	W-0056BN	
1S810-926	1170	Lead wire (Yellow) 1=90	1	1B990-269		△	W-0056YE	
1S810-927	1171	Lead wire (Gray) 1=85	1	1B990-269		△	W-0056GY	
1S810-929	1173	Lead wire (Purple) 1=55	1	1B060-338 1B990-269		△	W-0056PU	
1S810-930	1181	Lead wire (Black) 1=35	1	1B990-267		△	W-0056BK	
1S810-931	1182	Lead wire (Green) 1=40	1	1B990-267		△	W-0056GN	
1S810-932	1183	Lead wire (Yellow) 1=40	1	1B990-267		△	W-0056YE	
1S810-933	1184	Lead wire (Orange) 1=40	2	1B990-267		△	W-0056OR	
1S810-934	1185	Lead wire (Red) 1=55	1	1B990-267		△	W-0056RE	

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1S810-948	1174	Lead wire (Orange) l=25	1	1B990-283		△	W-0056OR	
1S810-950	1176	Lead wire (Green) l=25	1	1B999-108		△	W-0056GN	
1S810-951	1117	Lead wire (Purple) l=32	1	1B999-108		△	W-0056PU	
1S999-005	559	Xe管 Xe tube	1	1B060-340 1B990-274	9	○△		5
1S999-006	1201	トリガーコイル Trigger coil	1	1B990-274	9	○△		5
A1-14014FB	812	Screw	2	1B990-271	7	○		50
A1-14030FB	838	Screw	2	1B990-266	6	○△		50
A1-14025FA	839	Screw	1	1B990-266	6	○△		50
A1-17018FB	825	Screw	4		5	○		50
A1-17020FS	830	Screw	4		8,12	○		50
A1-17022FB	851	Screw	3		6	○		50
A1-17025FB	845	Screw	1		4	○		50
A1-17035FB	823	Screw	1		4	○		50

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
A1-17050FS	865	Screw	2		11	○		50
A1-20020FD	832	Screw	1		8	○		50
A1-20035FB	817	Screw	2		12	○		50
A1-20050FD	806	Screw	1		1	○		50
A2-17020FB	808	Screw	1		5	○		50
B1-14030FD	833	Screw	2		4	○		50
B1-14018FA	820	Screw	6		8	○		50
B1-17028FA	577	Screw	4	18990-269	9	○△		50
B1-17030FB	831	Screw	1		4	○		50
G1-14020FA	868	Screw	2	18990-269	10	○△		50
G1-14035FB	811	Screw	1		1	○		50
G1-17025FD	804	Screw	2		1	○		50
G1-17028FA	802	Screw	1		1	○		50
G1-17028FD	826	Screw	1		1	○		50
G1-17030FS	863	Screw	5		9	○		50
G1-17035FA	818	Screw	3		3,10	○		50
G1-17035FD	835	Screw	3		1, 3	○		50

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
G1-17035FS	829	Screw	3		11 12	○		50
G1-17045FA	840	Screw	1		11	○		50
G1-17050FS	803	Screw	3		11	○		50
G1-17055FS	801	Screw	2		11	○		50
G1-20035FD	815	Screw	2		1	○		50
G1-20040FD	816	Screw	3		12	○		50
G2-14025FB	836	Screw	1		7	○		50
G2-17035FS	828	Screw	1		12	○		50
G2-17080FS	827	Screw	1		12	○		50
H1-14045FB	866	Screw	1		8	○		50
H1-17022FB	837	Screw	1		8	○		50
H1-17035FD	809	Screw	7		1, 2 8	○		50
H1-17040FD	807	Screw	6		3	○		50
H1-20050FD	810	Screw	4		1	○		50
H2-17035FA	819	Screw	1		3	○		50
K1-14020FB	942	Screw	1		4	○		50
S1-00800SX	752	E-ring	1	18990-261	4	○△		50
S1-01200SX	751	E-ring	6	18001-710 18990-261 18060-336 18990-270	2, 4	△ and ○△		50

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部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1G118-006	G6	測光レンズ Metering lens	1		6	○		5
1G158-003	G5	接眼レンズ Eyepiece lens	1		6	○		5
1G415-009-1	G4	ペンタプリズム Pentaprism	1		6	○		1
1G550-020	G2	サブミラー Sub-mirror	1	1B990-265	5	○△	P-501	5
1G571-002	G1	主ミラー Main mirror	1	1B990-265	5	○△		5
1G950-051	G3	フレネル Viewfiader screen	1		6	○		5

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部組品番号 Assembly No.	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	大部組品番号 Main assembly No.	参照図番 Fig.	備考 Remarks	要求単位 Q'ty per order
1B001-705	B251	電池蓋 Battery chamber lid	1	1B999-109	12		5
1B001-708	B301	I基板 Base plate I	1		5		1
1B001-709	B913	フリクションギア Friction gear	1	1B990-261	4		5
1B001-710	B902	AF駆動補助基板 AF driving assist base plate	1	1B990-261	4		1
1B001-711	B944	AFシーソーレバー基板 AF seesaw lever base plate	1		4		5
1B001-712	B461	f min. SW	1		5		5
1B001-716	B121	上地基板 Film advance unit	1		3		1
1B001-717	B195	巻き戻しギア軸 Film rewind gear shaft	1		3		5
1B001-728	B199	巻き戻しフォークベース Film rewind fork base	1		3		5
1B060-332	B924	AFモーター AF motor unit	1	1B990-261	4		5
1B060-333	B503	AF-M切り換えスイッチ AF mode switch	1		4		5
1B060-336	B 32	モーター Motor unit	1		2		5
1B060-337	B211	DX接点 DX contact	1		1		5
1B060-338	B521	X接点部 X contact	1	1B990-269	10		5
1B060-339	B550	UPスイッチ UP switch	1	1B990-269	10		5
1B060-340	B556	SB発光部 Flash head	1	1B990-269	9		1
1B240-034-2	B319	モーター逆転停止スイッチ Reverse rotation prevention switch	1		5	P-501	5
1B260-061	B 71	基準軸円盤 Reference shaft disk	1	1B990-270	2		5

部品組品表 Assembly List

FAA21051-R. 3223. A

部組品番号 Assembly No.	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	大部組品番号 Main assembly No.	参照図番 Fig.	備考 Remarks	要求単位 Q'ty per order
1B275-007	B512	Tブラシ環 Shutter brush ring	1	1B990-269	10		5
1B275-008	B516	Fブラシ環 Aperture brush ring	1	1B990-269	10		5
1B314-151	B 52	シャッターチャージレバー Shutter charge lever	1		2		5
1B610-056	B413	ミラー軸調整板 Mirror axis adjustment plate	1		5		5
1B680-051	B572	シューモールド Accessory shoe mold	1	1B990-269			5
1B990-017	B 72	基準軸円盤 Reference shaft disk	1		3		5
1B990-256	B 26	前ボディ Front body	1		4. 5		1
1B990-257	B341	L基板 Base plate L	1		5		1
1B990-258	B420	ミラーボックス底板 Mirror box bottom plate	1		7		5
1B990-260	B463	f min. プリント板 f min. printed board	1		5		5
1B990-261	B901	AF駆動基板 AF driving base plate	1		4		1
1B990-265	B2331	ミラー組品 Mirror unit	1		5		1
1B990-266	B2340	絞り制御部 Aperture control unit	1		6		1
1B990-267	B2474	AF接点2 AF contact 2	1		4		5
1B990-269	B 23	上カバーストロボユニット Top cover flash unit	1		9.10		1
1B990-270	B 41	M減速基板 Motor rotation reducing unit	1		2		1
(FAA21151) 1B990-279	B 23	上カバーストロボユニット Top cover flash unit	1		9.10	FOR U.S.A. and CANADA	1
1B990-271	B 81	下地基板 Film advance mechanism unit	1		3		1

部 組 品 表 Assembly List

FAA21051-R. 3223. A

部組品番号 Assembly No.	補助番号 Ckt. No.	名 称 Name	1台分個数 Pcs. Per Unit	大部組品番号 Main assembly No.	参照図番 Fig.	備 考 Remarks	要求単位 Q'ty per order
18990-272	B176	巻き戻し基板 Film rewind base plate	1		12		1
18990-273	B256	電池接点 Battery contact	1		1		5
18990-274	B541	ストロボ下ケース Flash unit	1	18990-269	9		1
18990-276	B2001	メインFPC Main FPC	1		7		1
18990-277	B2401	AF-FPC (AM-200)	1		7		1
18990-278	B 31	シャッター Shutter unit	1		1		1
18990-280	B101	スプールギア Spool gear	1	18990-271	3		5
18990-281	B922	フォトインタラプタ板バネ Photo interrupter leaf spring	1	18990-261	4		5
18990-282	B161	F検出スイッチ部 Film detection switch unit	1		1		1
18999-108	B1113	ストロボ基板 Flash base plate	1		1		1
18999-109	B1024	底カバー Bottom cover	1		12		1
18999-111	B1601	裏 蓋 Camera back	1		13		1
18999-113	B1603	圧 板 Pressure plate	1		13		5
18999-114	B1202	フィルムガイド Film guide	1		2		1
18999-136	B123	上カバー Top cover	1	18990-269	9,10		1
(FAA21151) 18999-141	B123	上カバー Top cover	1	18990-279	9,10	For U.S.A. and Canada.	1

部品表 Parts List

FAA21251-R. 3223. A

部品番号 Part No	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	部組品番号 Assembly	参照図番 Fig.	販売区分 Term of Delivery	備考 Remarks	要求単位 Q'ty per order
1K010-124	2643	DB止めビス Screw	4		14	○		10
1K116-436	2659	液晶窓モルト Sponge, LCD-window	1		14	○		10
1K220-235	2645	接点バネ Contact spring	2		14	○		10
1K371-096	2644	接点ピン Contact pin	2		14	○		10
1K625-069	2237	DB目隠し板 Plate	1		1	○		10
1K680-786	2646	接点蓋 Contact cover	1		14	○		5
1S705-083	3003	DB－FPC（ボディ側） (Body side)	1		1	○		1
1S758-015	2647	導電ゴムスイッチ Rubber switch	1		14	○		1

部組品表 Assembly List

部組品番号 Assembly No.	補助番号 Ckt. No.	名称 Name	1台分個数 Pcs. Per Unit	大部組品番号 Main assembly No.	参照図番 Fig.	備考 Remarks	要求単位 Q'ty per order
1B001-738	B2603	DB用圧板 Pressure plate(Data back)	1		14		5
1B060-342	2641	モジュール Module	1		14		1
1B060-347	B2642	モジュール支持基板	1		14		1
1B990-283	B 23	上カバーストロボユニット Top cover flash unit	1		14		1
1B999-110	B3024	DB用底カバー Bottom cover(Data back)	1		14		1
1B999-112	B3601	DB用裏蓋 Camera back(Data back)	1		14		1
1B999-142	B123	上カバー Top cover	1	1B990-283	14		1

・その他の部品はF－401AF(FAA21051)と共通。 Other parts are common to F-401AF(FAA21051).

TECHNICAL INFORMATION

Product Name: F-401/N4004

Ref. No. F401-870055

Repair manual:

Date: October 1987

Subject: TROUBLES IN F-401/N4004

RP information list:

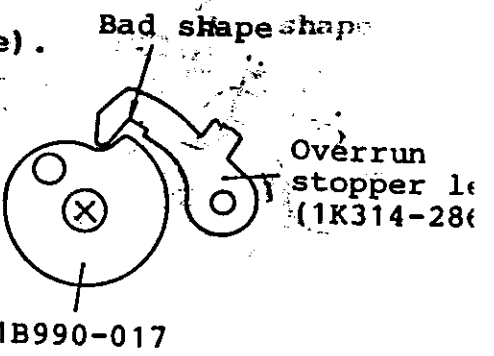
(I) Mirror comes down too early or a part of photo becomes under-exposed when the photos are taken at the slow shutter speed.

Cause: Bad-shaped overrun stopper lever

Repair:

Replace overrun stopper lever in the following order:

1. Remove top cover.
2. Take up FPC (only at the film advance side).
3. Remove film advance unit (1B001-716).
4. Remove coiled spring which is hooking on the post.
5. Unhook the spring fixed on the post from the overrun stopper lever.
6. Hold the post with tweezers (hold where the spring is fixed) and lift it straight up to pull it out as shown in the figure below.
   Note: Hold the upper plate of film advance mechanism unit (1B990-271) with your finger in order that it should not come off.
7. Replace overrun stopper lever.
8. Press-fit the post.
9. Hook the spring on the overrun stopper lever.
10. Hook the coiled spring on the post.
11. Mount film advance unit, FPC and top cover.



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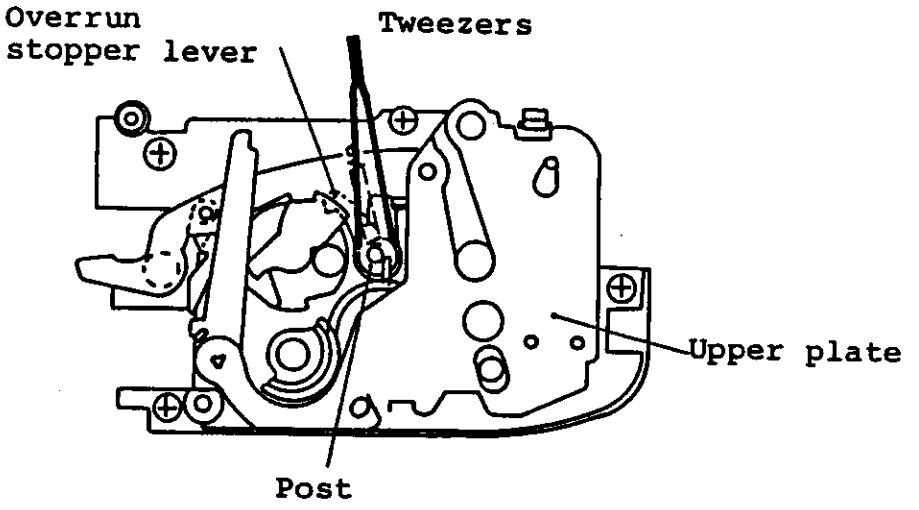

Modified part: 1K314-286-2
Please order this part from Parts Control Section.

(II) Shutter curtain fails to open.

Cause: Charging stroke of shutter becomes insufficient due to the bad-shaped shutter charge lever, and the pin of the aperture magnet reset lever sticks to shutter set lever. As a result, shutter set lever becomes unmoved and shutter curtain fails to run.

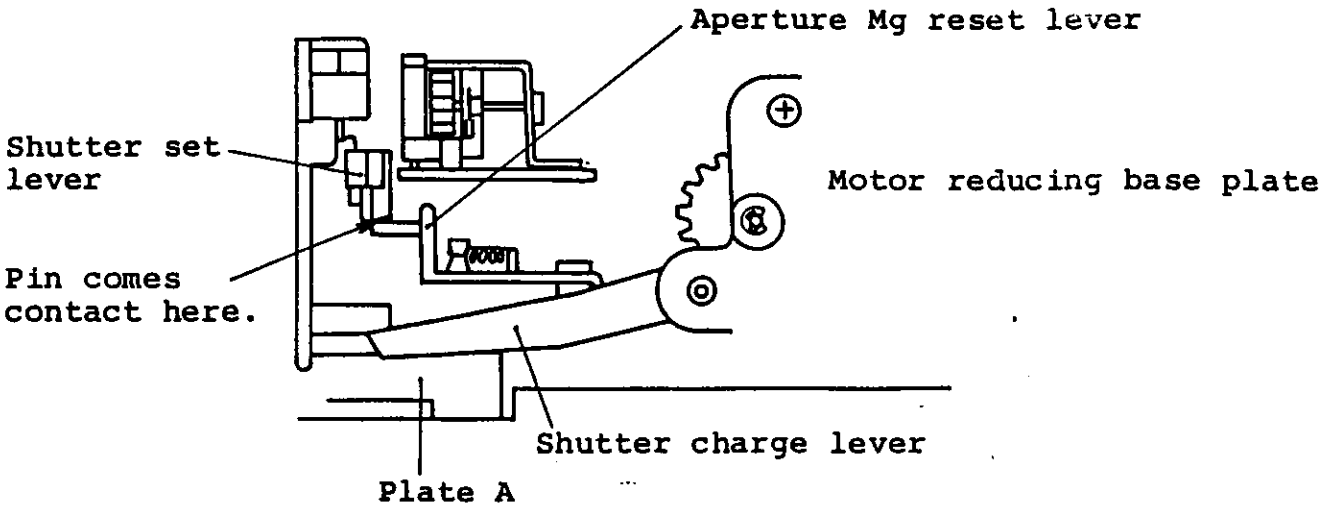

Fig.1

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Inspection before repair

1. Remove bottom cover and connect power supply.
2. Set shutter speed dial to B.
3. Turn off the power while depressing the shutter release button.
4. Observe the space between the top of shutter charge lever and plate A through the film rewind base plate. (Refer to Fig.2)
5. If there is no space, remove film rewind base plate and bend the shutter charge lever so that the space will become 0.5-0.9mm. (Refer to "Repair" section.)
6. Adjust flange focal distance when mounting film rewind base plate.

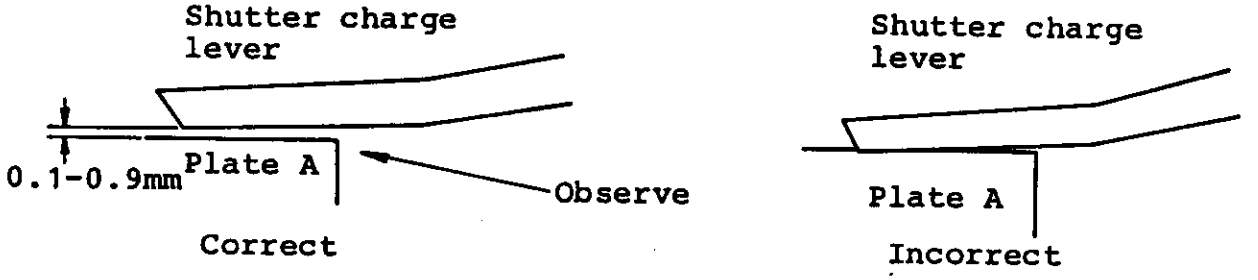

Fig.2

Note that the space between shutter charge lever and plate A cannot be seen from above if film rewind base plate is installed. In this case, observe it from battery chamber obliquely.

Repair:

Bend the shutter charge lever so that the space between the top of the lever and plate A will become 0.5-0.9mm.

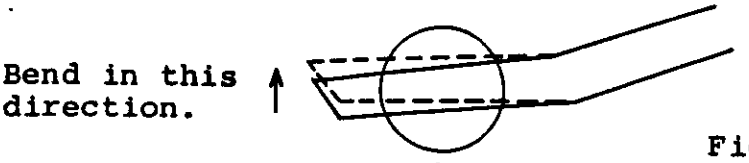

Fig.3

Camera to be inspected:

Serial number 2162901 or below (For F-401, N4004)
5034701 or below (For F-401QD)

In case you have replaced the overrun stopper lever or made sure of the space between shutter charge lever and plate A, open battery chamber lid and make the marking on main condenser with white paint as shown in the following figure.

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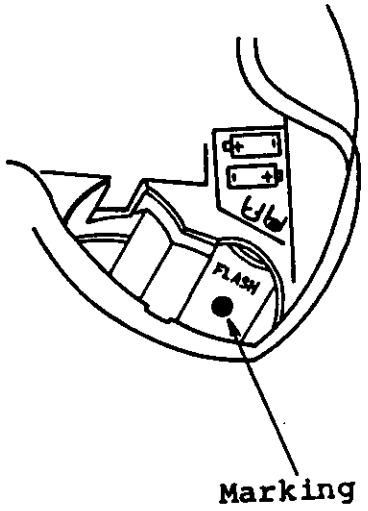

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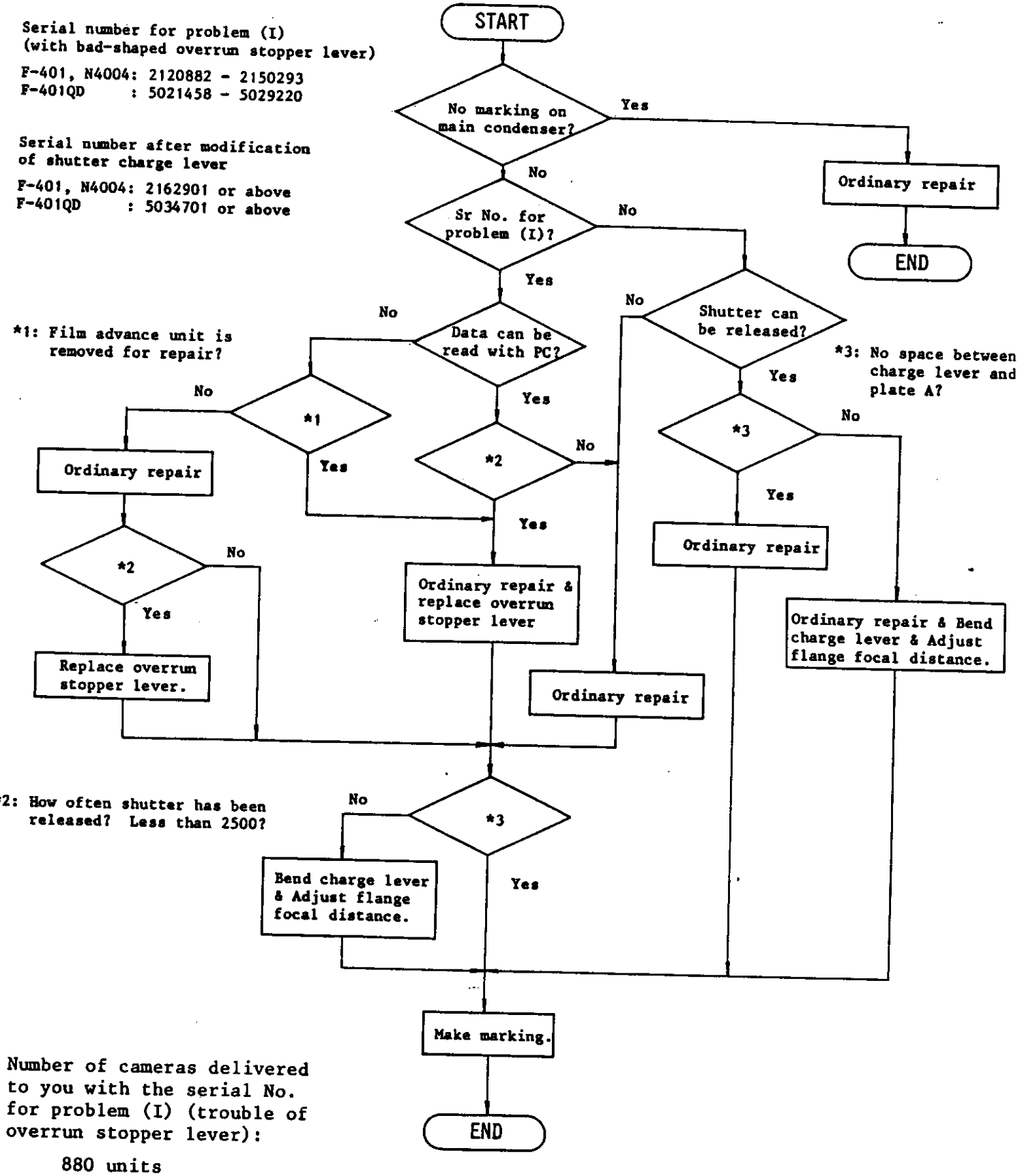
HOW TO INSPECT BAD-SHAPED OVERRUN STOPPER LEVER AND SHUTTER CHARGE LEVER

Serial number for problem (I)
(with bad-shaped overrun stopper lever)

F-401, N4004: 2120882 - 2150293
F-401QD : 5021458 - 5029220

Serial number after modification of shutter charge lever

F-401, N4004: 2162901 or above
F-401QD : 5034701 or above



*1: Film advance unit is removed for repair?

*2: How often shutter has been released? Less than 2500?

*3: No space between charge lever and plate A?

Number of cameras delivered to you with the serial No. for problem (I) (trouble of overrun stopper lever):

880 units

TECHNICAL INFORMATION

Product Name: Nikon F-401/N4004 Ref. No. F401-870020

Repair manual: Date: June 1987

Subject: SOFTWARE SPECIFICATIONS FOR F-401/N4004 AND EEPROM VALUE

RP information list:

Background

Currently four different program versions (V.1.0H, V.1.1H, V.1.3H, and V.1.4H) are available for the F-401/N4004. Specifications are different depending on the version numbers.
(Note: V.1.2H is lacking. This version number can be seen via the personal computer.)

Software specifications for F-401/N4004 by version number

Problems occurred requiring measurements	Version	After measurements were taken
FLASH		
1. When a film (faster than ISO 400) is used in the A or M mode with an external flash, the ISO warning indicator LED blinks. (Always occurs).	1.1	ISO warning indicator does not blink.
2. When used in the DLS and shutter-priority exposure modes (or program mode), the + LED indicator lights up and the aperture becomes maximum. (Always occurs.)	1.1	Aperture stops down to the minimum value.
3. Sometimes the TTL flash output results in underexposure at all ISO values (e.g., 0.5-0.7EV for built-in flash, 1EV for external flash). (Occurs once every thirty or forty of times.)	1.1	Proper TTL flash output.

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4. When a film (faster than ISO 400) is used in the TTL flash output mode with an external flash (except at ISO 400), the flash fires but at a reduced output. (Always occurs.)	1.1	Flash output is normal.
5. When the built-in flash pops up, the following phenomenon may occur although the power supply voltage is lower than 4.5V:	1.3	
• Focus and exposure indicators light up.		Indicators go out.
• Lens servo operation works.		Servo operation stops.
• Shutter pre-release switch does not open and power is not turned off (shutter release is locked).		Power is not turned on.

INDICATORS

1. Underexposure warning indicator blinks (+ and - LED indicators blinks simultaneously) when the power supply voltage is around 4.5V. (Seldom occurs.)	1.1	+ and - LED indicators blink alternately.
2. When using a film (faster than ISO 1600) in the P mode at over EV20, the + LED exposure indicator goes out but the shutter release is locked. (Always occurs.)	1.3	+ LED indicator lights up.
3. When performing autofocus operation while holding down the shutter release button, the shutter is released immediately after the image is focused correctly and the green LED does not light up. (Sometimes occurs.)	1.3	Green LED lights up.

SEQUENCE CONTROL

1. Film rewinding becomes impossible when the shutter speed dial is set to the L position. (Always occurs.)	1.1	Film rewind is possible.

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2. Accuracy of both aperture and shutter controls is insufficient when the shutter is released right after making blank shots. (Sometimes occurs).	1.3	Normal control is carried out.
3. The data back cannot be mounted properly, since no data back signal is transmitted. (Always occurs.) (No camera body with data back is available for V.10 an V.1.1.)	1.3	Normal data back signal is transmitted.
4. Self-timer cannot be cancelled easily while the picture blur warning indicator blinks.	1.4	Cancelled normally.
AUTOFOCUS		
1. The lens does not move forward when the subject is of low contrast and the AF indicator does not light up. (Sometimes occurs.)	1.1	The lens does not move, but the AF indicator lights up.
2. If there is a bright object outside the focus brackets, the lens hunts focus. (Sometimes occurs.)	1.1	No hunting occurs.
3. When using the Micro 55mm f/2.8 lens, the lens does not move if the subject is too close. (Sometimes occurs.)	1.3	The lens moves.
4. When focusing on a subject of low contrast like white paper, the lens stops while focusing. (Sometimes occurs.)	1.3	The lens does not stop.
5. The shutter is released before reaching the correct focusing position when holding down the shutter button during focusing. (Sometimes occurs.)	1.4	The shutter is not released.

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Cable: NIKKO TOKYO

TECHNICAL INFORMATION

Product Name: Nikon F-401/N4004

Repair manual:

Ref. No. F401-870028

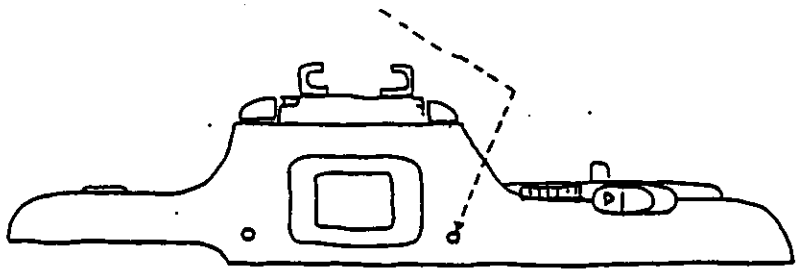
Date: July 1987

Subject: SHUTTER RELEASE OPERATION BECOMES IMPOSSIBLE

RP information list:

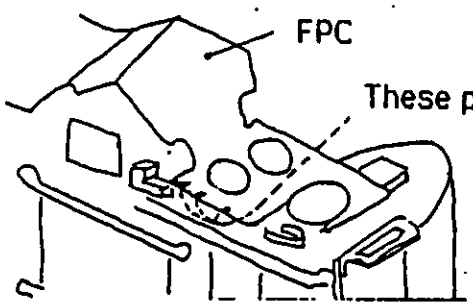
First Situation

When the frame counter reaches "1", shutter release becomes impossible, although the camera made blank shots. The shutter release power switch is held for eight seconds. The LED flash ready-light indicator lights up. The - LED exposure indicator lights up or blinks. During the inspection mode, all A/D values become 255 (decimal number). Depending on the particular camera, this problem occurs either all the time, intermittently, or only when the top cover is pushed down. It may not occur if the screw located at the right-hand side of the viewfinder is removed.

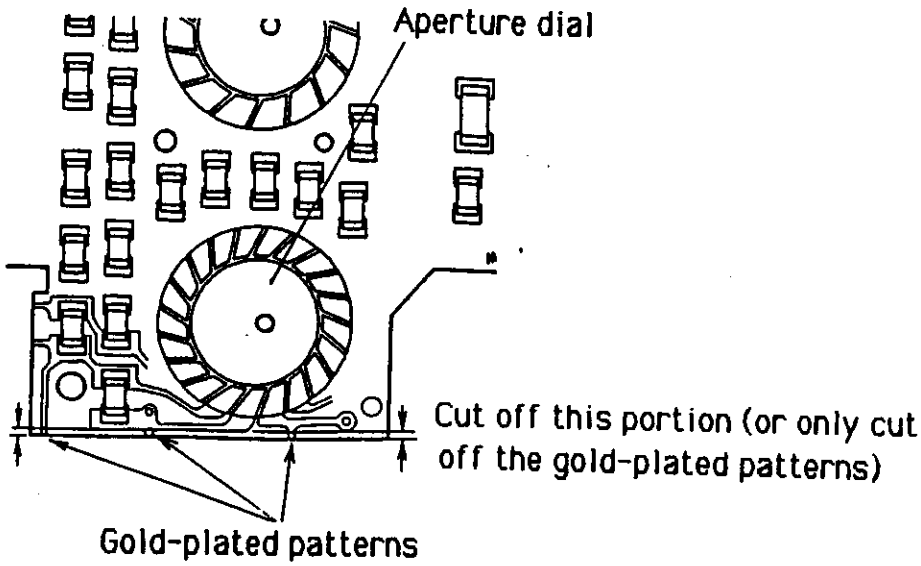


The Cause

Certain gold-plated circuit patterns on the FPC come into contact with the top cover.



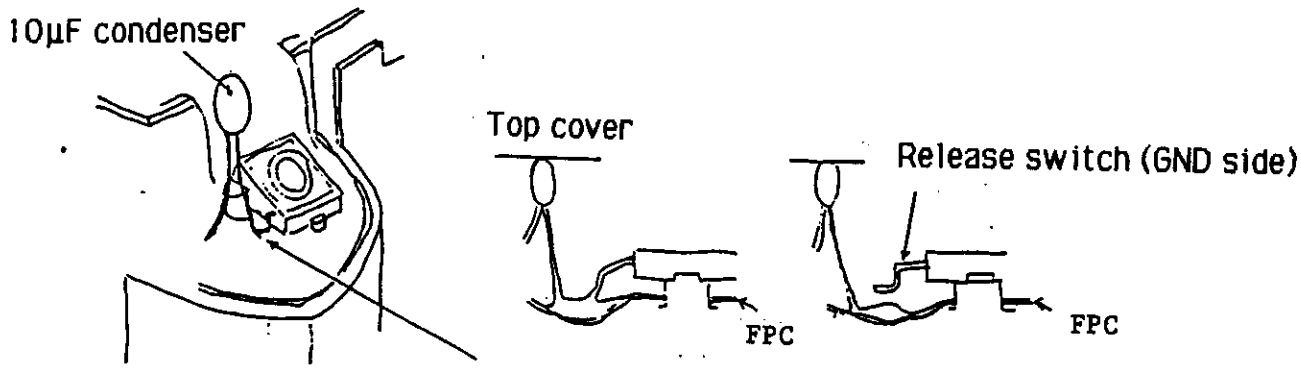
For customer service
When receiving cameras for repair with serial numbers below 2044568 (for the F-401/N4004) or below 5007881 (for the F-401 Quartz Date), cut off the edge of the FPC pattern so that the end of the pattern is shorter than the reinforcement plate on the rear of the FPC.



This modification was already made at the factory to approximately 12,000 bodies among the first 52,000 units produced.

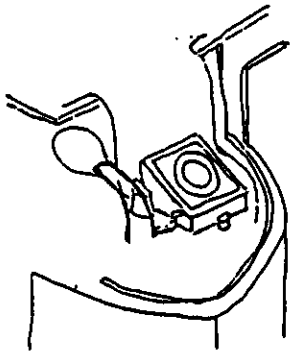
Second Situation
Both blank shots and shutter release are impossible. Power does not flow into the body when the shutter release button is depressed halfway. However, a current of 100-300mA may flow when the shutter release button is depressed fully.

The Cause
The soldered portion between the release switch terminal and the FPC becomes disconnected, because the temporarily mounted condenser (10μF) near the release switch is pressed down by the top cover. Some bodies have an insufficiently soldered portion because these two parts are soldered in one land.



For customer service

When receiving cameras for repair with the same serial numbers as those mentioned in the first situation, remount the top cover after bending the pins of the condenser (10µF) as shown in the figure below. Make sure when remounting the top cover that it does not come into contact with the top end of the condenser by looking in through the hole in the top cover. Also make sure that the release switch terminal (GND side) is not detached from the circuit patterns.



After bending the pins of the condenser, mount it on the left side of the FPC.

In approximately 32,000 cameras among the first 52,000 units produced, a condenser with short pins was mounted. Therefore, it is recommended to check and take measures for every camera received for repair, because it is difficult to tell if the pins of the condenser are short.

Nikon

TECHNICAL INFORMATION

Product Name: Nikon F-401/N4004

Ref. No. F401-870031

Repair manual:

Date: July 1987

Subject: DIAPHRAGM DOES NOT STOP DOWN

RP information list:

Background

It has been found that the diaphragm does not stop down. This is due to the CPU which instructs the decoder (M51066) to generate an error signal when the power voltage (Vcc) is low while depressing the shutter pre-release button halfway or when the shutter pre-release timer is off. This trouble is likely to occur when cameras are used under high temperatures. The reset voltage of the M51066 is readily affected by temperature and is released at low voltage when the temperature is high.

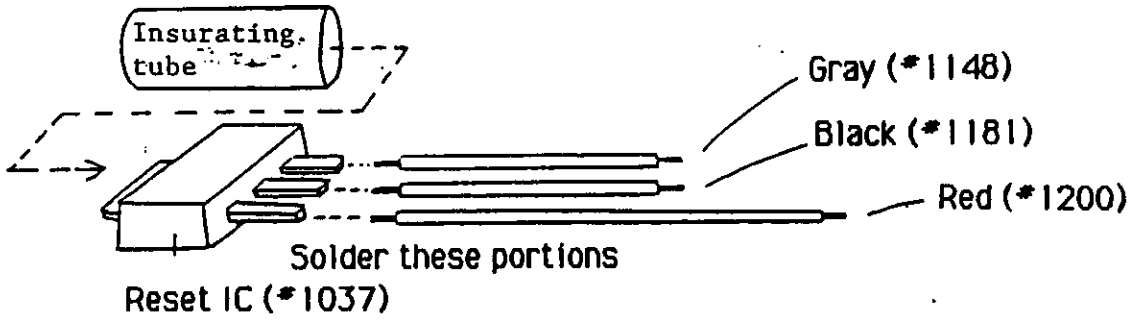
For customer service

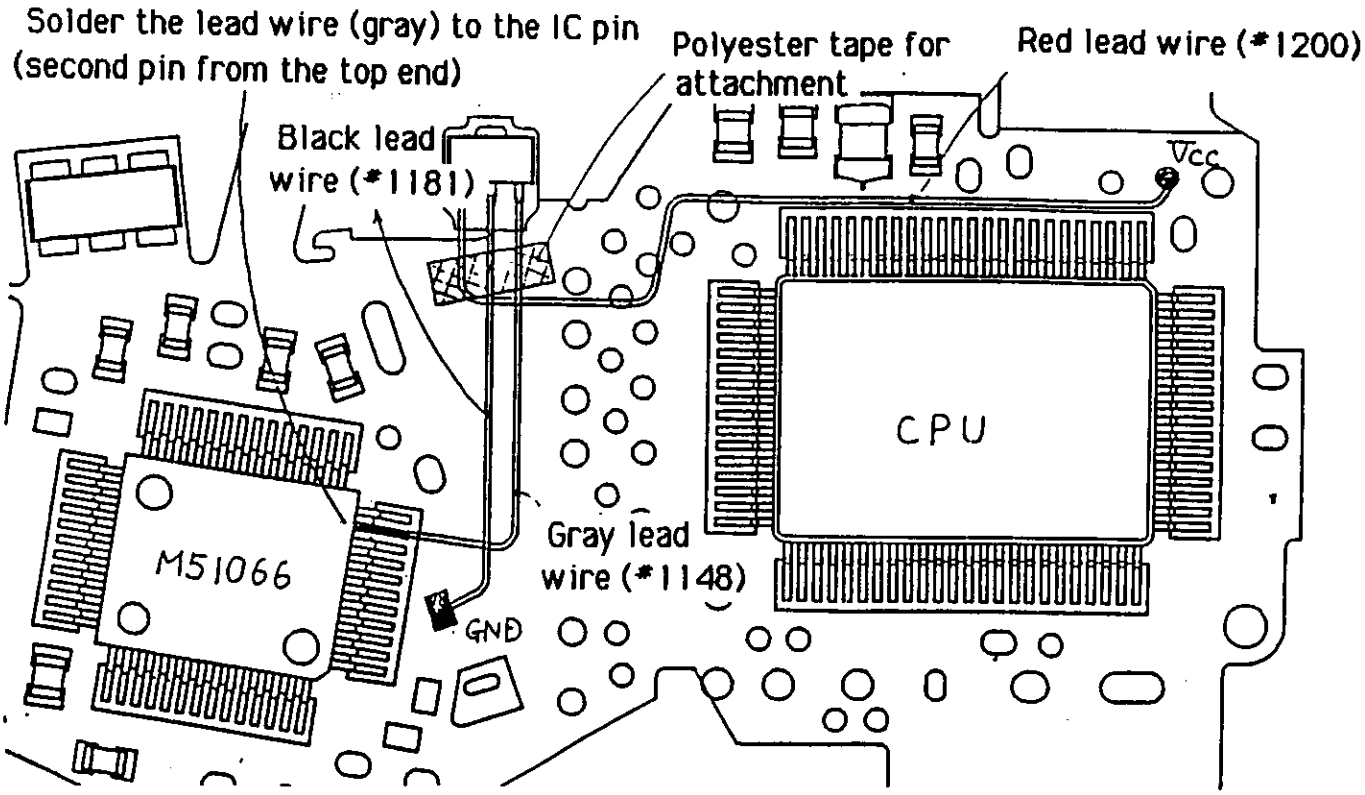
When receiving cameras for repair, perform the following repairs:

Connect the reset IC (M51943AML commonly used in the F-301 and F-501 cameras) to pin 24 of the reset terminal of the M51066 (see the figures below).

Added parts:

Reset IC	#1037	1S226-009	M51943AML
Lead wires	#1181	1S810-930	L= 35 (Black)
	#1148	1S810-906	L= 35 (Gray)
	#1200	1S810-990	L= 45 (Red)
Insulation tube	#1119	1S720-143	ø4, L=10
Polyester tape		1K116-431	6 x 13


Insurating tube
Gray (*1148)
Black (*1181)
Red (*1200)
Solder these portions
Reset IC (*1037)


Solder the lead wire (gray) to the IC pin (second pin from the top end)
Polyester tape for attachment
Red lead wire (*1200)
Black lead wire (*1181)
Vcc
CPU
M51066
Gray lead wire (*1148)
GND

Nikon

TECHNICAL INFORMATION

Product Name: Nikon F-401/N4004

Ref. No. F401-870032

Repair manual:

Date: July 1987

Subject: SHUTTER PRE-RELEASE SWITCH DOES NOT OPEN

RP information list:

Background

It has been found that the shutter pre-release switch does not open. As mentioned in Technical Information (No. F401-870031), this is due to the CPU which generates an error data code (ON code) repeatedly to the decoder IC (M51066) to turn off the DC/DC converter control terminals when the power voltage is low while depressing the shutter pre-release button halfway or when the shutter pre-release timer is off. Then the DC/DC converter is activated by an error signal and the decoder IC (M51066) does not send a reset signal to the CPU. The shutter pre-release timer does not operate. This state continues until batteries are removed.

For customer service

When receiving cameras for repair, perform the following repairs:

(1) Insert a condenser (0.01µF) between pin 5 of decoder IC (M51066) and pin 3 of the CPU (see figures below).

(2) As mentioned in the Technical Information (No. F401-870031), connect the reset IC (M51943AML) to pin 24 of the reset terminal of M51066 (see figures below).

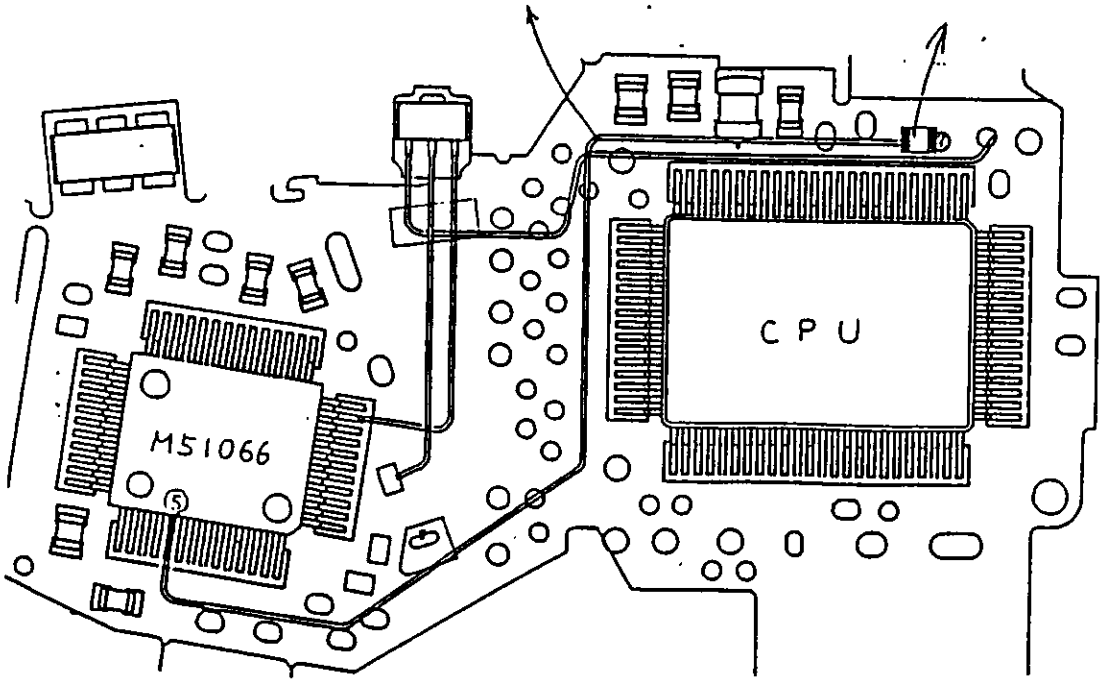
Added parts

(1)	0.01µF	*1073	1S335-091	
	Lead wire	*1137	1S810-896	L=85 (gray)
(2)	Reset IC	*1037	1S226-009	M51943AML
	Lead wire	*1181	1S810-930	L=35 (Black)
		*1148	1S810-906	L=35 (Gray)
		*1200	1S810-990	L=45 (Red)
	Insulation tube	*1119	1S720-143	L=10 (Black) ø4
	Polyester tape		1K116-431	6 x 13

As for item (1), proceed as described in the following instructions:

Lead wire (*1137)
Solder the lead wire to pin 5 of the decoder IC (M51066) and to one end of the electrode of a 0.01µF condenser.

Condenser (0.01µF, *1073)
Solder one end of the electrode of the condenser to pin 3 of the CPU check land.



As for item (2), refer to the Technical Information (No. F401-870031).

Nikon

TECHNICAL INFORMATION

Product Name: Nikon F-401, F-401 Quartz Date/N4004

Ref. No. F401-870033

Repair manual:

Date: July 1987

Subject: TTL FLASH OUTPUT WARNING INDICATOR DOES NOT BLINK

RP information list:

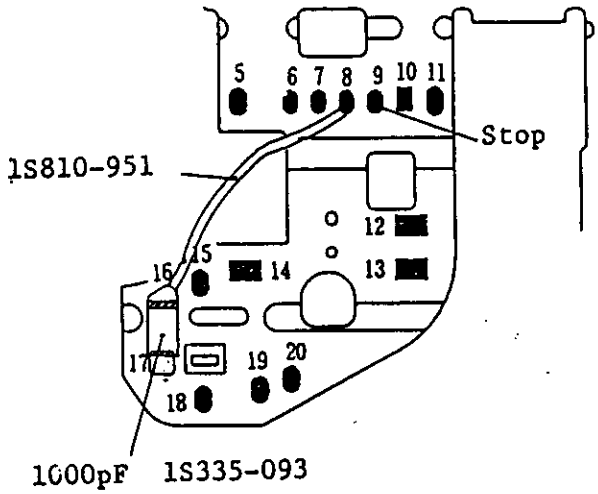
Background

The full flash output warning indicator does not blink because the circuit decides that it receives a stop signal when trigger noise enters the TTL-STOP signal line. But the TTL mode works normally.

Repair procedure

Insert a condenser (1000pF) between the stop line of the built-in flash and the GND (see figure below).

Solder one of the electrodes of a 1000pF condenser to the GND pattern of the main FPC (*1001), and solder the lead wire and the other electrode of the condenser to the FPC stop land.



Necessary parts

Ceramic condenser (1000pF)	1S335-093 x 1
Lead wire (ø0.58 L=32 mm, purple)	1S810-951 x 1

This repair should be made for cameras with serial numbers below 2041031 (for the F-401/N4004) and 5007481 (for the F-401 Quartz Date)

For customer service

When receiving cameras for repair, perform the above repairs.

Nikon

TECHNICAL INFORMATION

Product Name: Nikon F-401/N4004

Repair manual:

Ref. No. F401-870034

Date: July 1987

Subject: REVERSELY SOLDERED LEAD WIRES

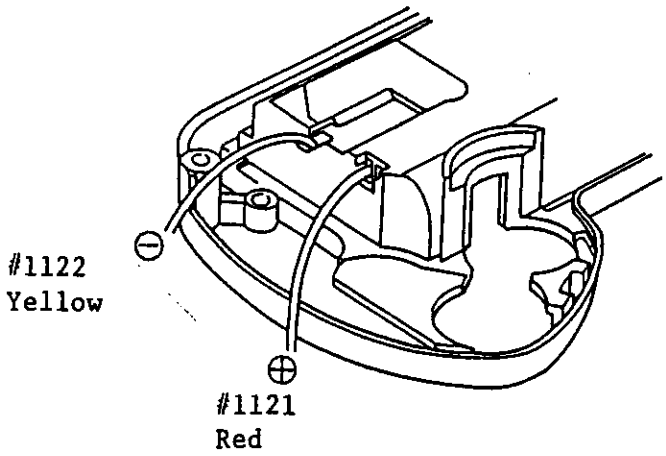
RP information list:

Background

Since a faulty power inspection tool was used at the stage of camera shipment inspection, cameras with reversely soldered power lead wires (*1121, *1122) were delivered. These cameras does not operate at all whether or not batteries are installed properly.

For customer service

When receiving cameras for repair, solder two lead wires (*1121, *1122) correctly.



This is soldered correctly.

A continuity test has been made at the stage of shipment inspection for cameras with serial numbers above 2058228 and 5009981 (with Data Back).

Nikon

TECHNICAL INFORMATION

Product Name: Nikon F-401/N4004

Ref. No. F401-870035

Repair manual:

Date: July 1987

Subject: BUILT-IN FLASH FIRES WHEN SHUTTER PRE-RELEASE SWITCH OPENS

RP information list:

Background

It was found that the built-in flash fires when raised, if the main condenser is fully charged and the shutter pre-release timer is turned off. This trouble is attributable to a defective decoder IC (M51066). Nikon plans to replace the decoder IC (M51066) with a revised one as a permanent remedy. Before this takes place, Nikon has added a diode as a temporary measure. However, approximately 13,000 units were delivered without performing this temporary measure.

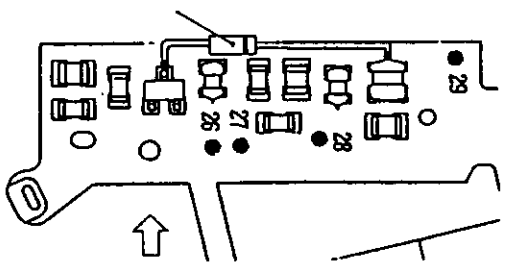
Specifically, Nikon did not add a diode to cameras with serial numbers below 2020741 (for the F-401/N4004) and below 5001821 (for the F-401 with Data Back).

For customer service

When receiving cameras for repair, perform the following repair:

Insert a diode (1S1588) between the collector and the Vcc of the transistor Q9. Consider the Vcc as a cathode. Part number: 15110-001

Added diode



This is located under the front of the pentaprism.

Nikon

TECHNICAL INFORMATION

Product Name: Nikon F-401/N4004

Ref. No. F401-870037

Repair manual:

Date: July 1987

Subject: CUTTING OF PATTERNS (MENTIONED IN TECHNICAL INFORMATION NO. F401-870028)

RP information list:

Background

It was mentioned in Technical Information No. F401-870028 that shutter release becomes impossible, due to a short circuit between the top cover and the FPC; therefore, it is suggested to cut off the edge of the FPC. But if you cut off too much, the pattern on the rear side will also be cut off, too, and as a result shutter release becomes impossible when the top cover is mounted. Just in case you cut off the patterns, connect a lead wire between the resistors as shown in the figure below.

Note: If shutter release becomes impossible when the top cover is mounted, check whether or not the patterns on the rear side of the FPC is cut off using a personal computer.

Select number 2 (A/D monitor mode) on the menu screen of the computer. If (1) the shutter speed dial is set to the A mode regardless of the location of the dial, (2) the aperture dial is set to the S mode regardless of the location of the dial, or (3) the output value of the SPD is always 255 regardless the external brightness, the patterns on the rear side of the FPC may have been cut off.