

SERVICE MANUAL

GA645 *z* / GA645W *z*
Professional Professional



GA645 *z*
Professional



GA645W *z*
Professional

FUJI PHOTO FILM CO., LTD.

5

5

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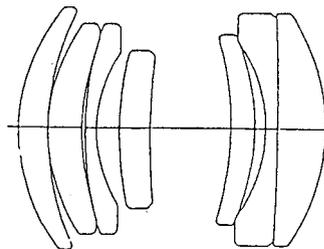
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I. GENERAL

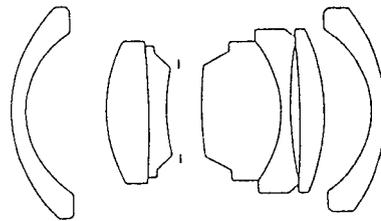
Those enclosed in [] are for GA645W i.

1. Specifications

Type	6x4.5cm Corresponds to the bar code system Full Automatic
Picture size	6x4.5cm (Actual picture size: 56x41.5mm)
Applicable film	120 roll film (16EXP) or 220 roll film (32EXP)
Lens	Super EBC Fujinon 1:4 f=60mm (6 components, 7 elements) Covering power: 60° ; Equivalent to 37mm on 35mm camera [Super EBC Fujinon 1:4 f=45mm (5 components, 7 elements) Covering power: 75° ; Equivalent to 28mm on 35mm camera] Nearest focusing distance: 0.7m Filter diameter: 52mm The lens is at home position when the switch is turned off.



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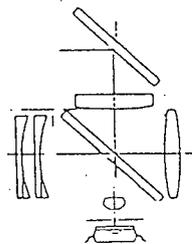
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Focusing

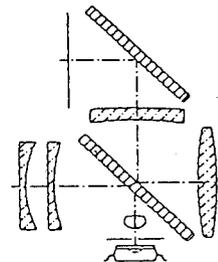
Hybrid (Active/Passive) type auto-focus
Range 0.7m through ∞ Can be switched over to manual focus mode
(0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.5, 1.7, 2.0, 2.5, 3.0, 5.0, 10m inf)
With focus lock Number of AF steps: 870 [426]

Viewfinder

Light collecting type bright frame viewfinder
Automatic parallax compensation
Field of view: 93% [90%] at infinity, 93% [90%] at 3m, and 91 % [90%]
at 1m, Magnification: 0.5x [0.38x]



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Displays in the viewfinder

Field of view frame (Bright frame)

AF target mark

Data indications:

Aperture

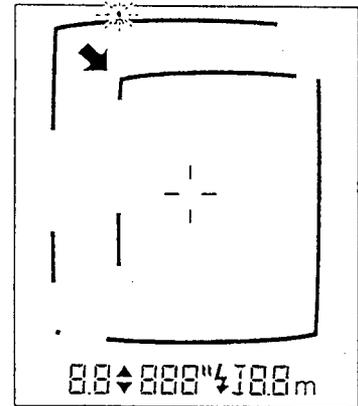
Exposure feasibility (▲ ▼)

Shutter speed

Flash ON

Shooting distance (m, Distances in feet can also be displayed)

Shutter actuated display



Shutter

Programmed AE electronic lens shutter (Aperture priority, Manual exposure setting can be made)

With a shutter operation end buzzer

Shutter speed

Bulb, 2 sec. ~ 1/700 sec. (F4 ~ 9.5 Maximum speed: 1/400 sec.)

Self-timer

Electronically controlled

About 10 sec. delay

With self-timer lamp

Exposure control

TTF center emphasized light measuring (Element: SPD)

*TTF : Through The Finder

Programmed AE, Aperture priority AE, Manual exposure

Working range: EV3 through EV19 / ISO 100

Exposure compensation

±2EV 1/2 step interval

Film speed

ISO 25 through 1600, 1/3 step interval

Automatically set when a bar code system film is used

Flash

Built-in pop-up type

Auto flash

GNo.12 (ISO 100)

Film transporting

Automatic first frame set

Automatic film winding;

With a final frame informing buzzer

Automatic rewinding after exposing the final frame

With mid-roll rewinding button

Winding speed : Within 1.2 sec. per frame <Note>

Exposure counter

LCD

Additive

Automatically interlocked with the pressure plate

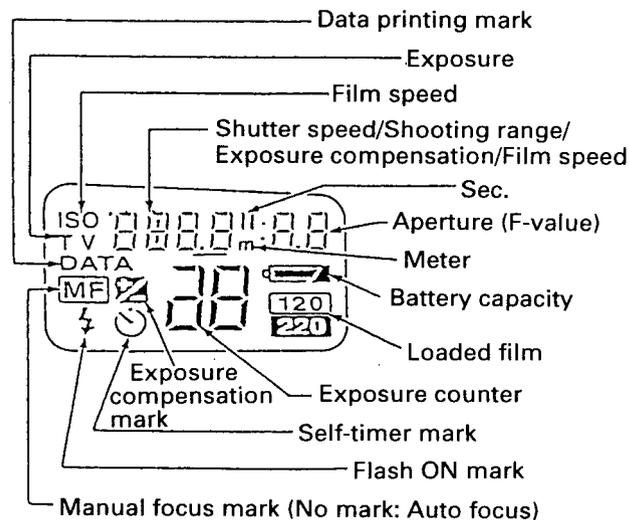
"E" is displayed after exposing the final frame of a film.

<Note>As tested according to FUJI FILM's testing procedure.

Liquid crystal display (LCD)

Exposure counter, Shutter speed, Aperture, Film speed
 Loaded film (120 or 220), Battery capacity mark, Exposure compensation
 Flash ON mark, Self-timer, MF (Manual Focus) mode
 Year/Month/Day, Day/Hour/Minute
 Range indication, Shutter actuation counter

LCD panel (When fully displayed)



Data printing

Outside picture frame printing:

Date, (Year/Month/Day, Hour/Minute)

Photographing data (Exposure mode, Aperture, Shutter speed
 Exposure compensation value, AF/MF indication)

Others

Hotshoe, Film indicator pocket, Cable release socket, Tripod socket,
 Buzzer ON-OFF selectable

Power supply

Lithium battery (CR123A) x2 (6V)

Capacity : <Note> As tested according to FUJI FILM's battery testing procedure.

About 3000 shots without using flash

About 600 shots with flash used

Dimensions

166 (W) x 110 (H) x 66 (D) mm [166 (W) x 110 (H) x 70 (D) mm]

(With the lens in home position)

Weight

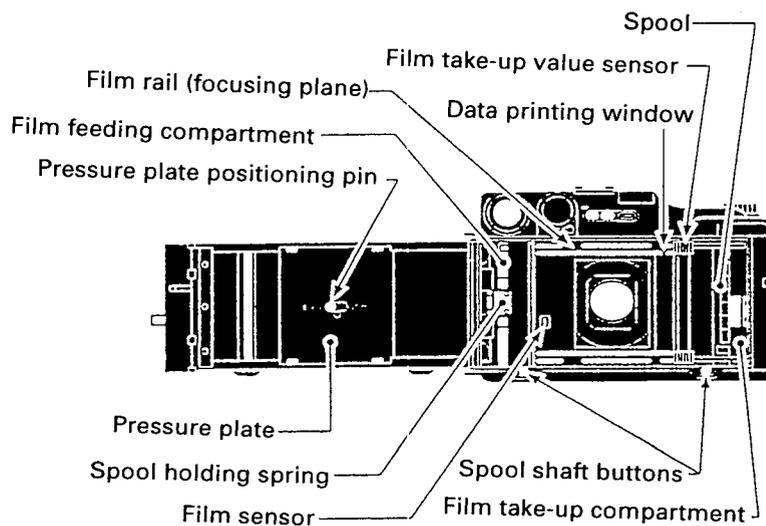
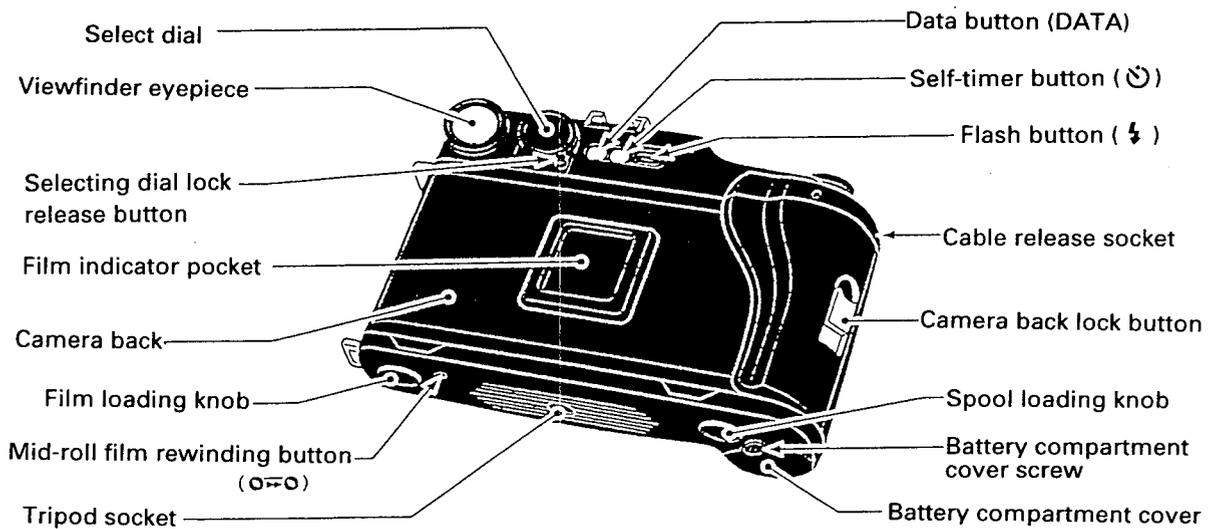
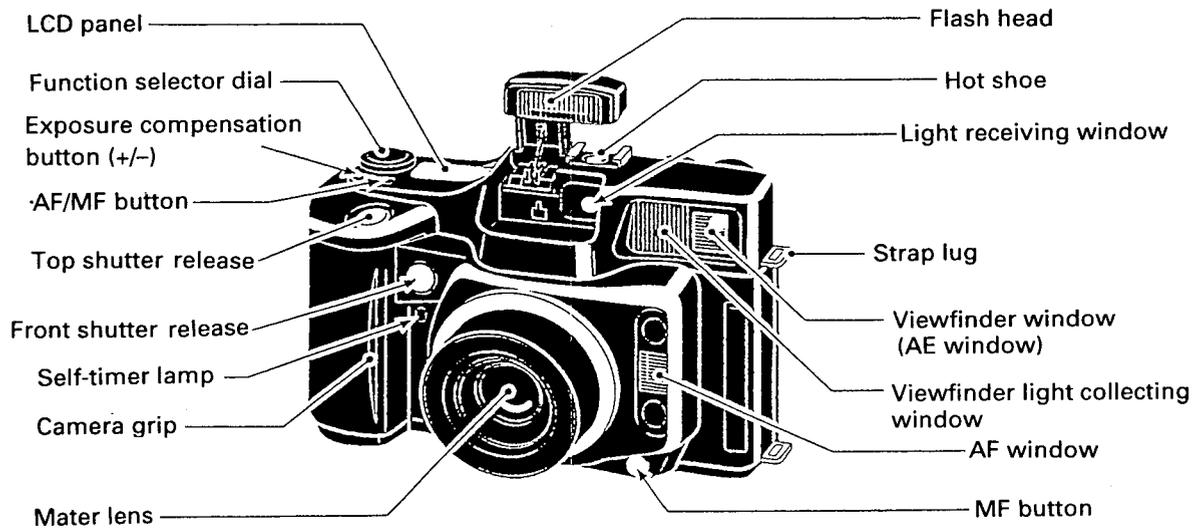
790 grams [820 grams] (without battery)

Attachments in a package

Soft case, Neck strap, Lens hood, Lens cap, Lithium batteries (x2)

* Specifications and performance are subject to change without advance notice.

2. Names of parts

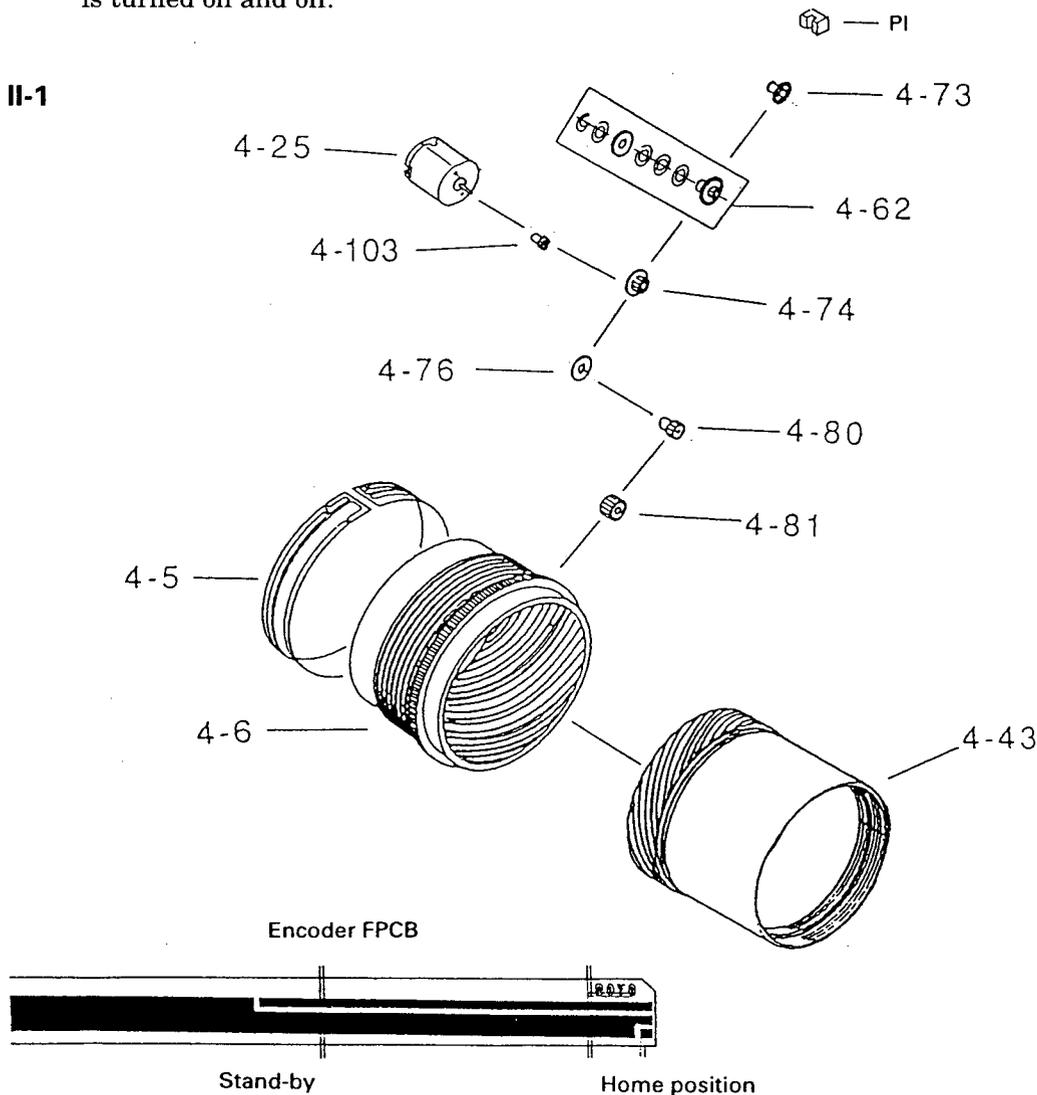


II. DESCRIPTION FOR MECHANICAL SYSTEMS

1. Lens assembly

- 1) When power is supplied to the lens driving motor (4-25), the energy is transferred to the motor gear (4-103), friction gear assembly (4-62), gear L3-L4 (4-74), gear L5 (4-76), gear L6 (4-80), gear L7 (4-81) and helicoid barrel (4-6).
- 2) As the helicoid barrel (4-6) turns, the moving lens barrel assembly (4-43) operates.
- 3) The energy is further transferred from the friction gear assembly (4-62) to the encoder gear (4-73), and the photo-interrupter (PI) senses the encoder gear.
- 4) The encoder FPCB (4-5) is stuck on the helicoid barrel (4-6), and on the FPCB, home and stand-by positions are marked. Thus, the lens stops at the individual positions as the power is turned on and off.

Fig. II-1



Note:

Reference numbers are for GA654 i. For reference numbers for GA645W i, refer to the Part List.

2. Viewfinder

- 1) When power is supplied to the lens driving motor (4-25), the energy is transferred to the motor gear (4-103), friction gear assembly (4-62), gear L3-L4 (4-74), gear L5 (4-76), gear L6 (4-80), gear L7 (4-81) and helicoid barrel (4-6). Refer to 1. Lens assembly.
- 2) The energy is transferred to the interlock gear (4-45) which is engaged with the helicoid barrel (4-6) causing the interlock cam (4-4) to operate, and thus, the cam lever assembly (4-78) operates.
- 3) As the cam lever assembly (4-78) operates, the reticle frame 2 (3-54) is pulled down, causing the field of view frame in the viewfinder to operate.

Displays in the viewfinder

This camera displays various information with red letters in the bottom of the viewfinder.

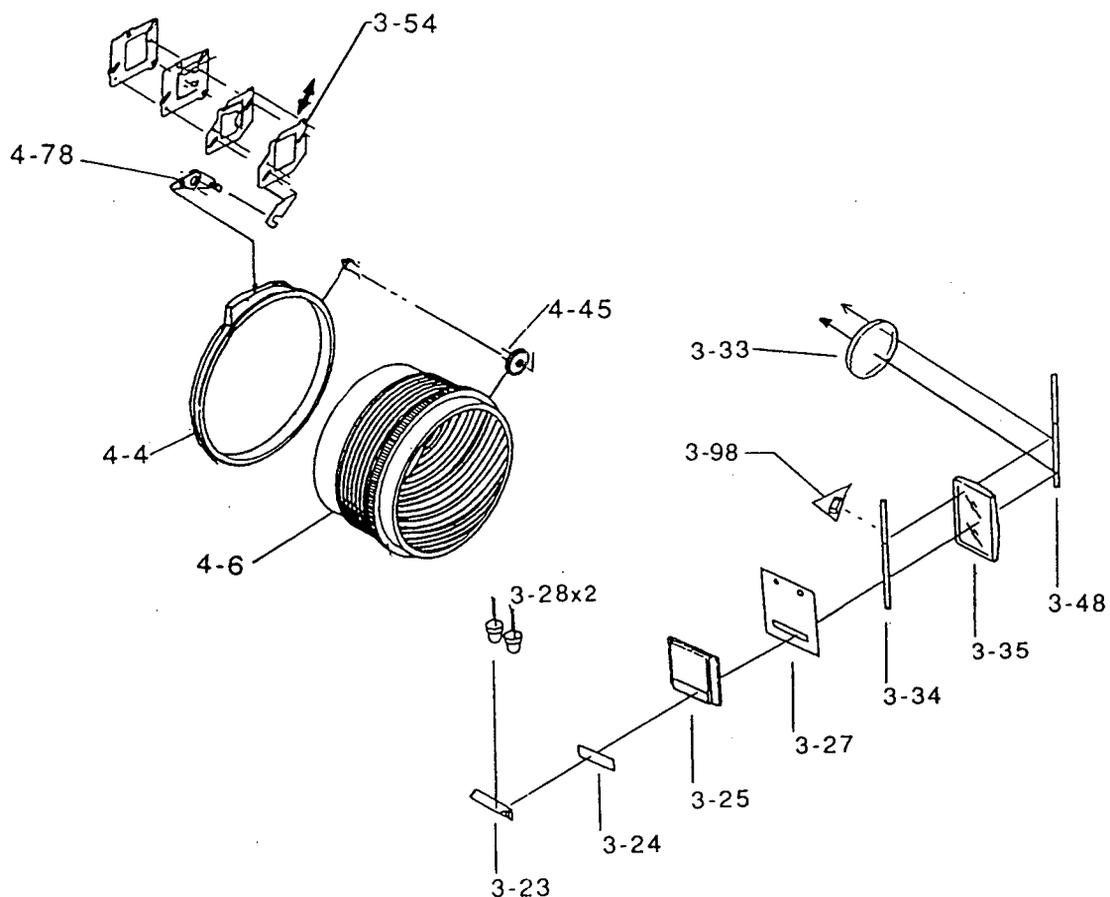
The displayed information are, from the left to right, aperture, shutter speed and shooting range.

As for the construction, light of the red LED goes through the prism (3-23) and after being diffused by the diffuser (3-24), the light passes through the LCD as shown in Fig. II-2.

Thereafter, the light goes through the mirror G6 (3-34) and lens G4 (3-35) and information are displayed as the light is reflected by the mirror G5 (3-48).

When the shutter is actuated, the red LED lights in the upper portion within the viewfinder to indicate that the shutter has been actuated. The red LED of the FL FPCB (3-98) is in the back of the mirror G6 (3-34). When this LED light, the light goes through the lens G4 (3-35), reflects at the mirror G5 (3-48), and thus, actuation of the shutter is displayed in the viewfinder.

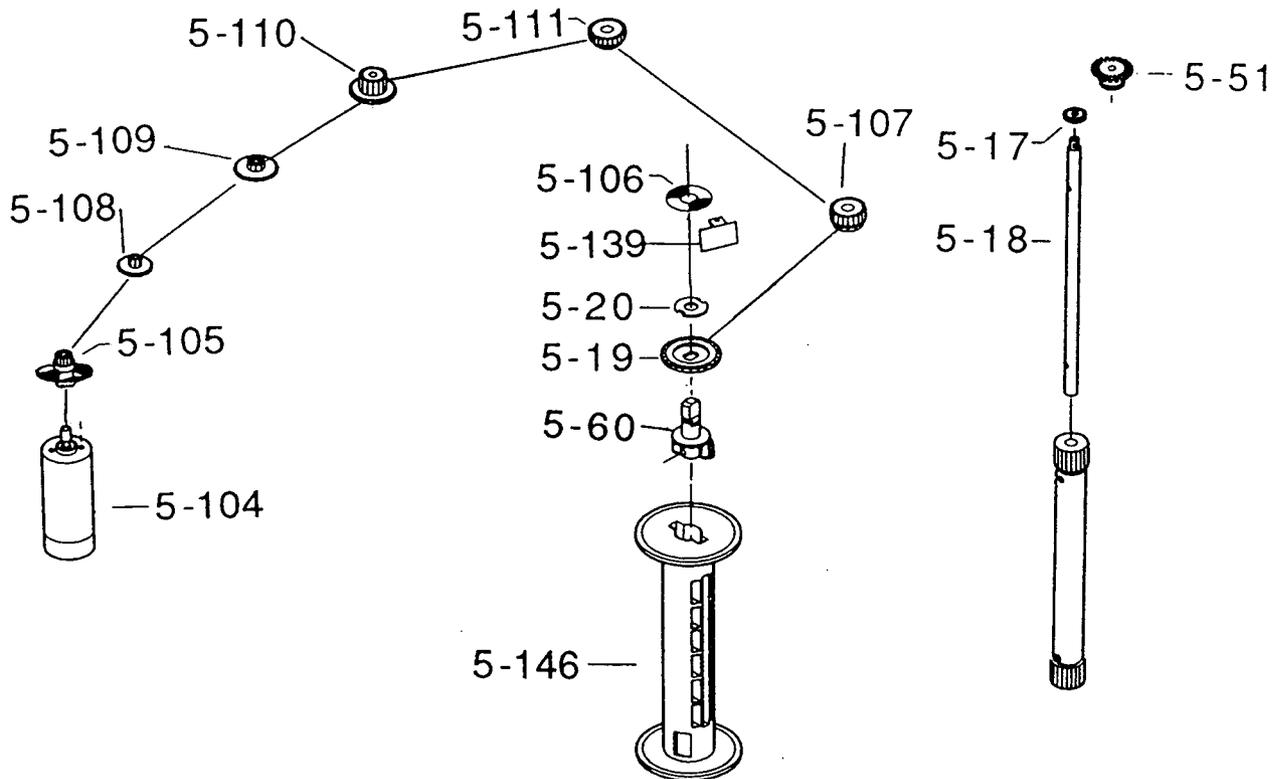
Fig. II-2



3. Film transporting system

- 1) When power is supplied to the film transporting motor (5-104), the energy is transferred to the motor gear assembly (5-105), gear G1 (5-108), gear G2 (5-109), gear G3 (5-110), gear G4 (5-111), gear G5 (5-107), and film take-up gear (5-19).
- 2) The take-up shaft assembly (5-60) turns together with the film take-up gear (5-19) and film is wound at set to the spool.
Then, the energy is transferred to the counter roller (5-25), shaft (5-18), gear (5-17) and encoder gear (5-51), the photo-interrupter (PI) senses the encoder gear operation, and thus, film transporting length is decided.
- 3) When loading a film, the take up spool turns 90° by 90°. When the encoder blade (5-106) (within the film transporting system) which engages with the top of the take-up shaft turns, the PI of the spool FPCB reads the turns, and this system controls the 90° by 90° spool turns.
- 4) The photo-reflector in the PR holder assembly checks the first frame set and film end.

Fig. II-3



4. Bar code system

With the film sensor on the camera, the bar code system of this camera reads the following three types of data printed on the paster tape stuck to the bar code system film.

- (1) Film speed
- (2) Type of film (negative, reversal, monochrome)
- (3) Size of film; 120(6EX), 120(12EX), 220

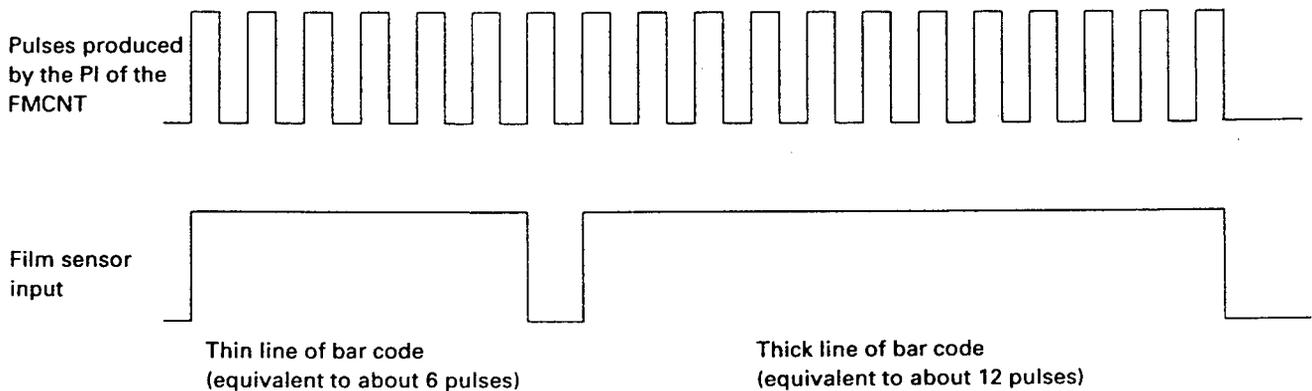
The data read by the camera are used for:

- (1) Automatic film speed setting
- (2) Automatic selection of data printing thickness (film speed and type of film (negative, reversal or monochrome))
- (3) Judgement and display of pressure plate setting

Data reading system

- (1) When a film is loaded and camera back is closed, the film transporting motor starts turning.
- (2) The encoder blade built in the film transporting motor gear and PI in the FMCNT assembly produce standard pulses.
- (3) As the bar code goes over the film sensor, bar code lines (density) are input.
- (4) A thick line and thin line of the bar code are respectively equivalent to about 12 and 6 standard pulses produced as described in (2) above. So, thick lines and thin lines are identified by counting number of pulses.
- (5) Thick line and thin line are stored in the memory of the CPU respectively as "1" and "0".
- (6) The CPU identifies film speed, type of film (negative, reversal, monochrome) and film length based on the data stored in the memory, and thus, sets the camera.

Fig. II-4

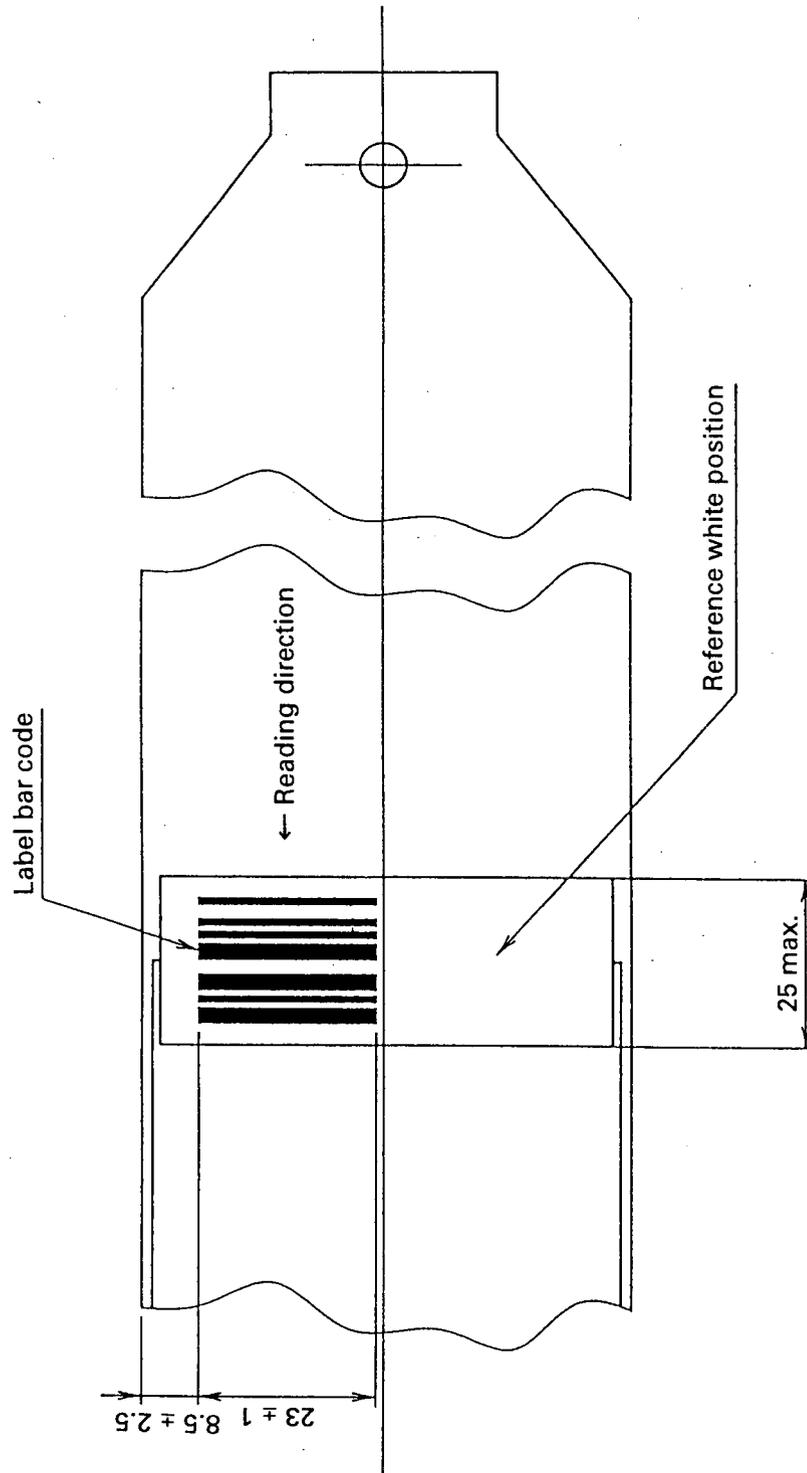


NOTE:

When the pressure plate setting does not agree with the type of loaded film and the loaded film is a bar code system film, "•" mark is printed (in the last of data) regardless of the data printing mode.

Fig. II-5

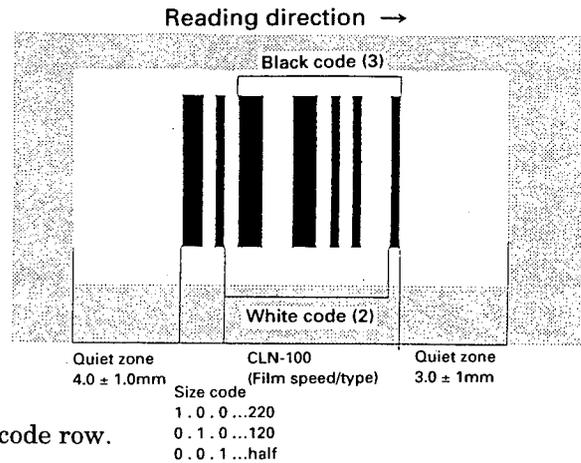
Bar code set position



UNIT : mm

Bar code data

Fig. II-6



(1) Read from the left to the right

(2) Both white and black codes

Thick..... "1"

Thin..... "0"

(3) First of all, film size is read in black-white-black code row.

1, 0, 0 220

0, 1, 0 120

0, 0, 1 120 half

(4) Next, film speed and type are read in each row of the white and black codes.

(5) The above shown example means:

- Film size = 1, 0, 0 → 220 size
- White code = 0, 1, 0, 0, 1 → Character 2 (Refer to Table A.)
- Black code = 1, 1, 0, 0, 0 → Character 3 (Refer to Table A.)
- Applying the above characters to Table B, the film is judged to be CN (negative film) and film speed is judged to be ISO 100.

Table A Characters

Character	Weighting				Parity P
	1	2	4	7	
0	0	0	1	1	0
1	1	0	0	0	1
2	0	1	0	0	1
3	1	1	0	0	0
4	0	0	1	0	1
5	1	0	1	0	0
6	0	1	1	0	0
7	0	0	0	1	1
8	1	0	0	1	0
9	0	1	0	1	0

B/W: Black and white
CR: Reversal
CN: Negative

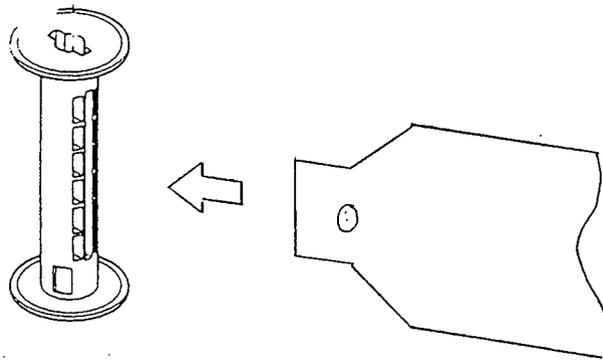
Table B Film speed and type of film

ISO	Black codo	White codo			
		B/W	CR	CN	Others
25	1	0	1	2	3
32		4	5	6	
40		7	8	9	
50	2	0	1	2	3
64		4	5	6	
80		7	8	9	
100	3	0	1	2	3
125		4	5	6	
160		7	8	9	
200	4	0	1	2	3
250		4	5	6	
320		7	8	9	
400	5	0	1	2	3
500		4	5	6	
640		7	8	9	
800	6	0	1	2	3
1000		4	5	6	
1250		7	8	9	
1600	7	0	1	2	3
2000		4	5	6	
2500		7	8	9	
3200	8	0	1	2	3
4000		4	5	6	
5000		7	8	9	
6400	9	0	1	2	3
8000		4	5	6	
10000		7	8	9	

Easy film loading system

Film can be loaded easily and correctly by simply inserting the leader portion of the opaque backing paper into the groove on the spool. The small hole on the leader is caught by the hook in the groove of the spool. This new system correctly stretch the backing paper, prevents an expansion of wound film, and thus, loads the film correctly.

Fig. II-7



III. ELECTRICAL CIRCUIT DESCRIPTION

1. Circuit description

The control FPCB assembly of this camera has two CPUs (U101 and U102). The U101 functions as the master CPU and U102 operates as the slave CPU. Based on SM switch and each mode switch inputs, the U101 decides shooting conditions, the decided conditions are informed to the U102 by means of a serial communication, and thus, the shutter and motors are controlled.

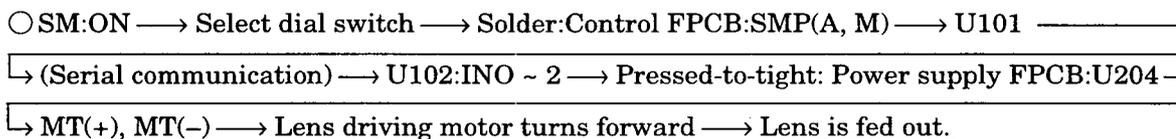
The control FPCB is equipped with an EEPROM (U103), and focusing, AE, AF, flash, etc. can be adjusted automatically.

1) Loading batteries

When two 3V lithium batteries (CR123A) are loaded in the camera bottom, 6V input (VB) is converted to two types of voltage by the power supply FPCB assembly. First, it is converted to 3.5V by U202, and this 3.5V power is supplied to the master CPU (U101). Next, it is converted to 5V by U201, and this 5V power is supplied to the slave CPU (U102), allowing the CPUs to control the camera operations. As the initial processing, the CPUs check the lens position first when SM (SMP, SMA and SMM are totally called SM) switch is turned on, and then, causes the LCD to make its full display. When the SM switch is not turned on, the lens does not operate.

2) Turning on the main switch

When the select dial switch on the camera back is turned to the right (clockwise), the SM switch turns on, causing the lens to move out to the stand-by position.



NOTE:

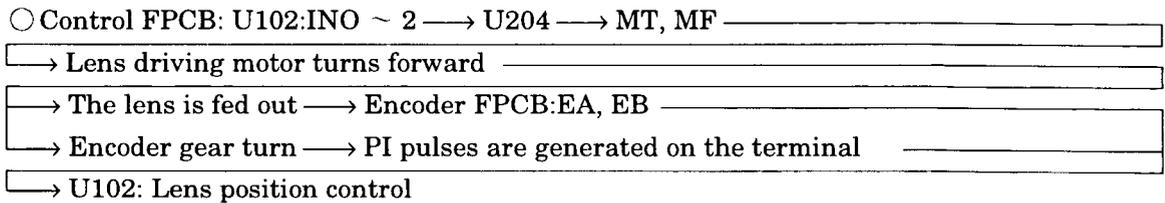
Switches which can be input

Top	Release switch	(SP1, SP2)
	AF switch	(SAF)
	Exposure compensation switch	(SFC)
	Up-down switch	(UP1 through 4)
Front	Manual focus switch	(SMF)
	Release switch	(SP1', SP2')
Back	Select dial switch	(SMP, SMA, SMM, SISO)
	Data switch	(SDATA)
	Self-timer switch	(SSELF)
	Flash switch	
Bottom	Mid-roll rewind switch	(SMR)
	Right side Release switch	(SEXT)

Each switch can be input only when the main switch is turned on, except for the mid-roll rewind switch. The mid-roll rewind switch can be accepted normally.

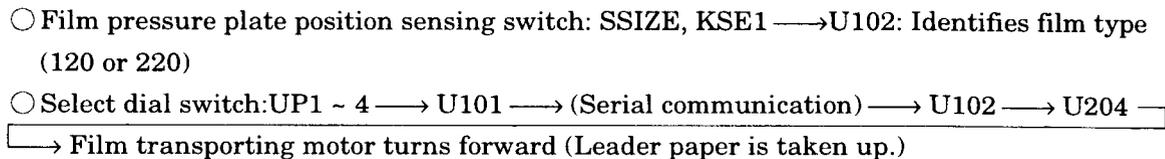
3) Controlling the lens

Lens positions are controlled by digital codes sent from the encoder FPCB and PI installed on the control FPCB. The lens driving motor gear system has encoder gear. As the encoder gear turn in the PI, pulses are generated, and finding a number of lens driving motor turns, lens moving stroke is calculated.

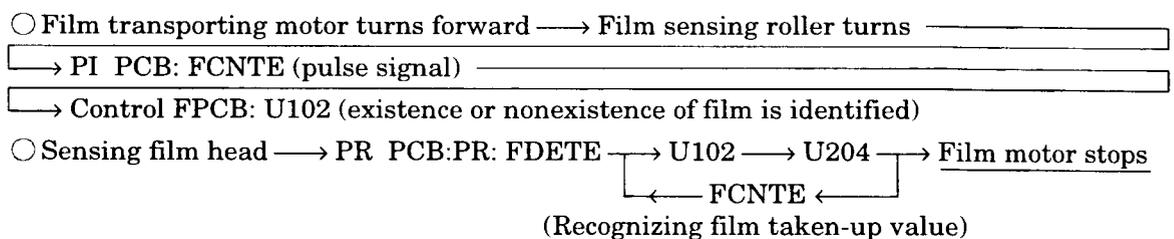


4) Transporting film

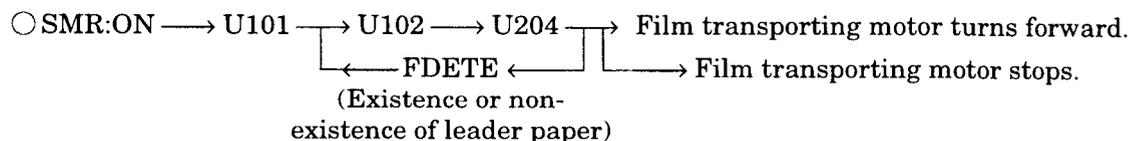
Open the camera back and set the pressure plate to the type of the used film. When the camera back is closed, the set pressure plate position sensing switch identifies the film type. To wind up leader paper on the empty spool after setting the film, turn the Up/Down dial counterclockwise one step by one step. Then, signals UP1 through 4 are input sequentially into U101, the film transporting motor turns forward, and thus, the lead paper is wound up.



When the camera back is closed and SM switch is turned on by turning the select dial, the film transporting motor turns forward for one second. At this time, encoder blades turn in the PI of the PI PCB assembly as the film sensing roller turns. Then, FCNTE pulse signals are generated, and with the pulse signals, existence or non-existence of film is identified. When a film exists, with FDETE signal sent from the PR (film sensor) of the PR PCB assembly, the film head is detected. Thereafter, with the pulse signals of the FCNTE, film taken up value is calculated, and thus, the first frame set is made. Moreover, one frame film advancing is done also by FCNTE.



For manual film winding, when the mid-roll winding switch (SMR) of the control FPCB assembly it turned on, the film transporting motor turns forward and the film is wound up. Thereafter, when the PR of the PR PCB assembly recognizes that the leader paper has gone, the film transporting motor stops 5 seconds later.



5) Power supply FPCB motor terminal output table

	Mode	Terminal			
		MF	MR	MT	MW
Film transporting motor	Forward (Winding)	Hi	Lo	—	—
	Stand-by	Lo	Lo	—	—
Lens driving motor	Forward (Feeding lens out)	—	—	Hi	Lo
	Reverse (Feeding lens in)	—	—	Lo	Hi
	Stand-by	—	—	Lo	Lo

6) Flash

(1) Built-in flash

This flash is not of a self-oscillating type. The built-in flash is charged as the oscillation transistor is turned on by a pulse signal sent from the U102.

Further, this flash is of a flashmatic, and discharge current is controlled by IGBT: Q610, and to its gate, 15V is supplied by the Zener diode (CR607).

○ Control FPCB:U102:FCT → Flash PCB:FCT → Q601 → T601 → CR602

→ Charging the main capacitor

○ Flash PCB: VCM → Control FPCB: U102 → U102:FINH2: L

→ Charging stops

○ Control FPCB:U102:VIGBT: H

→ Q609: ON → Q608: ON → Q610:IGBT: ON

→ CR611: ON → T602: ON → Xenon tube (V601) lights
 (high voltage pulse is generated)

→ Q604: ON → Q605: ON → Q606: Starting to receive light

→ C607, C608 and C609 are charged (Differs depending on each AV)

→ Q602:ON → Q611, Q612:ON → Q610:IGBT: OFF (Stopping flash firing)

(2) Externally mounted flash

This camera has been so designed that an external flash can be mounted on the hotshoe on the top of the camera. For an external flash, flashmatic does function.

○ Control FPCB:U102:FT → Flash PCB:Q603: ON → Q608:ON

→ External flash fires

7) Printing data

Being interlocked with one frame film advancing, seven pieces of red LED built-in this camera light sequentially, and thus, data are printed.

○ Control FPCB:U102 → (Power supply FPCB: Serial communication) → Data FPCB →
→ U401 → DS401 (Red LEDs light) → Data are printed.

When the shutter is released with the camera back opened, seven LEDs light simultaneously and test mode is executed.

8) Self-timer

When the self-timer switch on the camera back is turned on, an SSELF signal is input to the U101 of the control FPCB assembly, and this is displayed on the LCD on the camera top.

○ Self-timer switch: SSELF:ON → Control FPCB:U101 → Indication on LCD

9) Manual winding operations

When manually winding the film, this camera controls so that the spool always stops in a predetermined angle.

When the up/down dial is turned causing the spool shaft to turn, U704 generates pulses, and U102 calculates angle position. Further, with the pulse signal of U703, number of motor speed is detected, and thus, spool turning angle is compensated.

○ Control FPCB: U102 → U204 → Film transporting motor turns → U703,U704 generate pulse signals → Control FPCB : U102 (Calculation and compensation of spool turning angle) → Film transporting motor stops.

10) Bar code reading

When a bar code system film is loaded, this camera reads the bar code during the film is set to the first frame. Reading the bar code, this camera automatically sets film speed (ISO) and other data such as type of the film, and provides alarms when necessary.

To be more specific, U701 senses the bar code, signals which correspond to film advancing length are taken out from U703, and U102 decides each element width (thick or thin) of the bar code.

When the bar code is read completely, "1" and "0" are applied respectively to thick and thin lines, and thus, coded data are obtained.

When the bar code system film cannot be read, the camera operates as follows:

- (1) When the bar code could not be read at all;
—→ The camera operates as if a film without bar code is loaded.
- (2) When the camera has recognized that the film has a bar code, but the camera cannot understand the meaning (in case of an error); To be more specific, when:
 - The result of coded bar code does not agree with the data defined in advance in the CPU.
 - Number of bar codes is over or short.
 - Bar code element width is too thick or too thin;
—→The camera makes error processings.

In this case, the ISO blinks on the LCD.

—→For releasing method, one of the followings applies:

- Set SM to ISO, and reset the film speed. (Refer to the Owner's Manual.)
- Open the camera back. (The film will possibly be exposed.)
- Unload the batteries to make "Power on reset".

○ Control FPCB: U102 —→ U204 —→ Film transporting motor turns

○ U703 generates pulse signal, U701 generates pulse signal —→ Data reading (U102)

—→ ISO set

—→ Pressure plate position
alarm (120/220) blinks

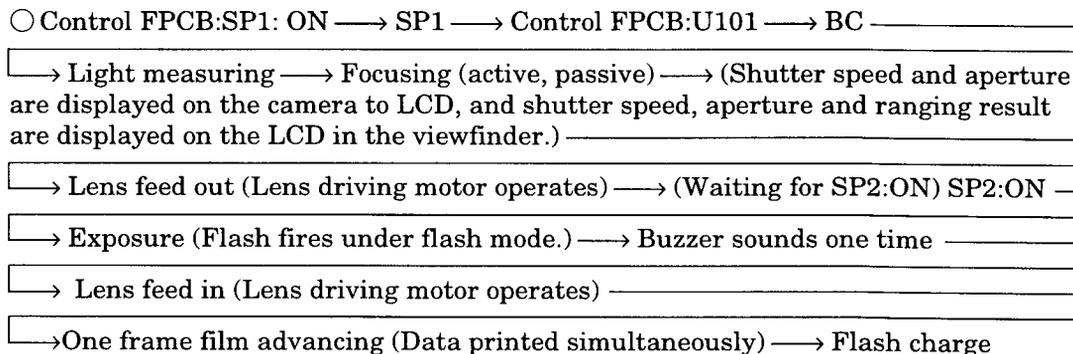
—→ (Error processing)

2. Camera operations

1) Releasing the shutter

(1) Normal shutter release (built-in shutter release)

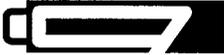
When the shutter release is pressed down, the tact switch installed on the control FPCB assembly turns on, its signal is input to the U101 (CPU), and thus, the shutter is released in the following sequence:



(2) Cable release

When the shutter is released by the use of a cable release, a signal of other tact switch than that used for the normal shutter release is input to the U101 (CPU). In this case, SP1 and SP2 are input simultaneously. The point that differs from the above shown sequence is that there is no SP2 waiting.

2) Battery check voltage

	LCD mark	BC voltage
BC OK	 Lights	About 4.1V
BC warning	 Lights	
BC NG	 Blinks	About 3.9V

3) Light measurement

Output signal sent from the light measuring IC (U501) installed on the light measuring FPCB assembly is AD-converted by the U102 in the control FPCB assembly, and thus, light is measured.

○ Automatic flash firing level at a low brightness under P-mode

	Flash firing level
When film speed is ISO 100	LV12

4) Adjustment of film speed (ISO)

When the film to be used has no bar code, the film speed (ISO No.) must be input before using. Set the selecting dial switch to ISO and turn the Up/Down dial. The set ISO No. will be indicated by the LCD on the camera top.

○ Select dial switch: SISO → Control FPCB: U101 → ISO display (LCD)
 Up-down switch: UP1 ~ 4 →

5) Displays on LCDs

This camera has two LCDs; One is on the camera top and the other is in the viewfinder.

The one on the camera top is called LCD and one in the viewfinder is called FLCD.

These two LCDs are connected to the control FPCB assembly, and displays are controlled by the U101.

○ Control FPCB:U101 → Zebra connector 1 → LCD indications
 → Zebra connector 2 → FLCD indications

8) LED display within the viewfinder

DS701 (red LED) which is synchronized with the shutter actuation is located within the viewfinder, and this LED indicates that the shutter has been actuated.

The red LED lights for about 10 msec. regardless of shutter speed.

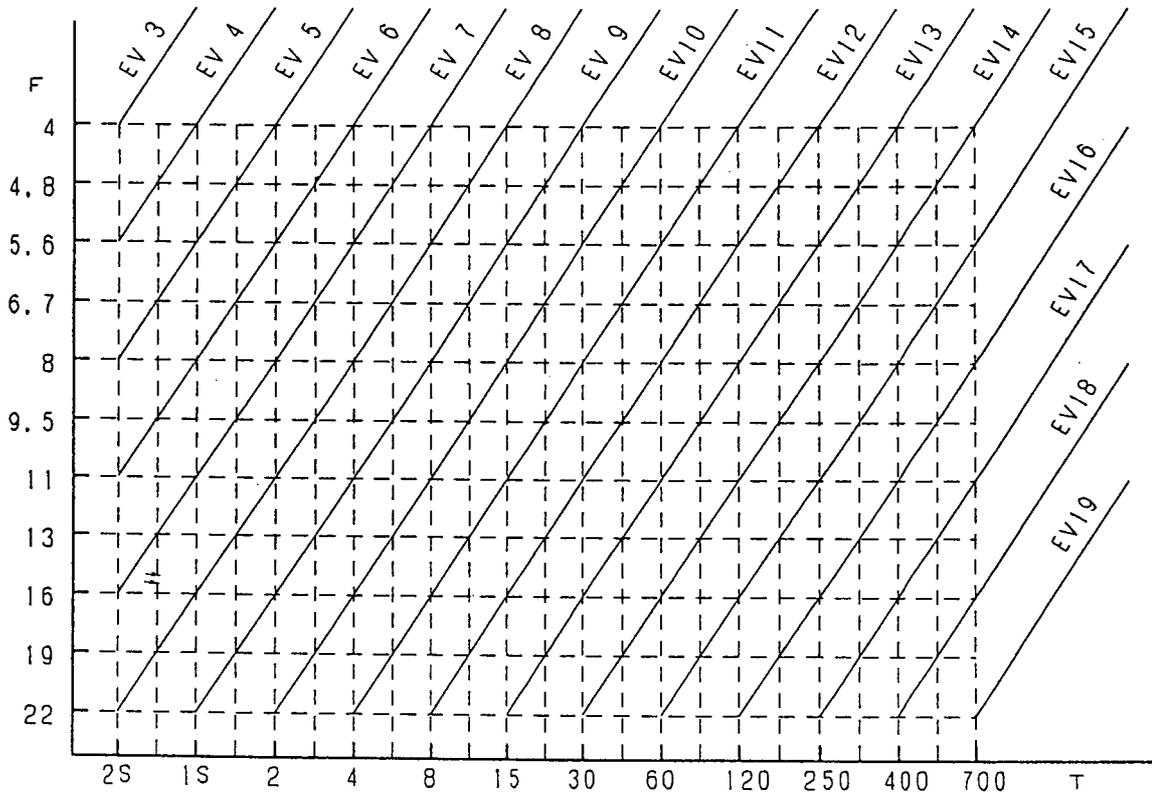
○ Control FPCB:U102: FT → DS701 lights.

9) Front shutter release

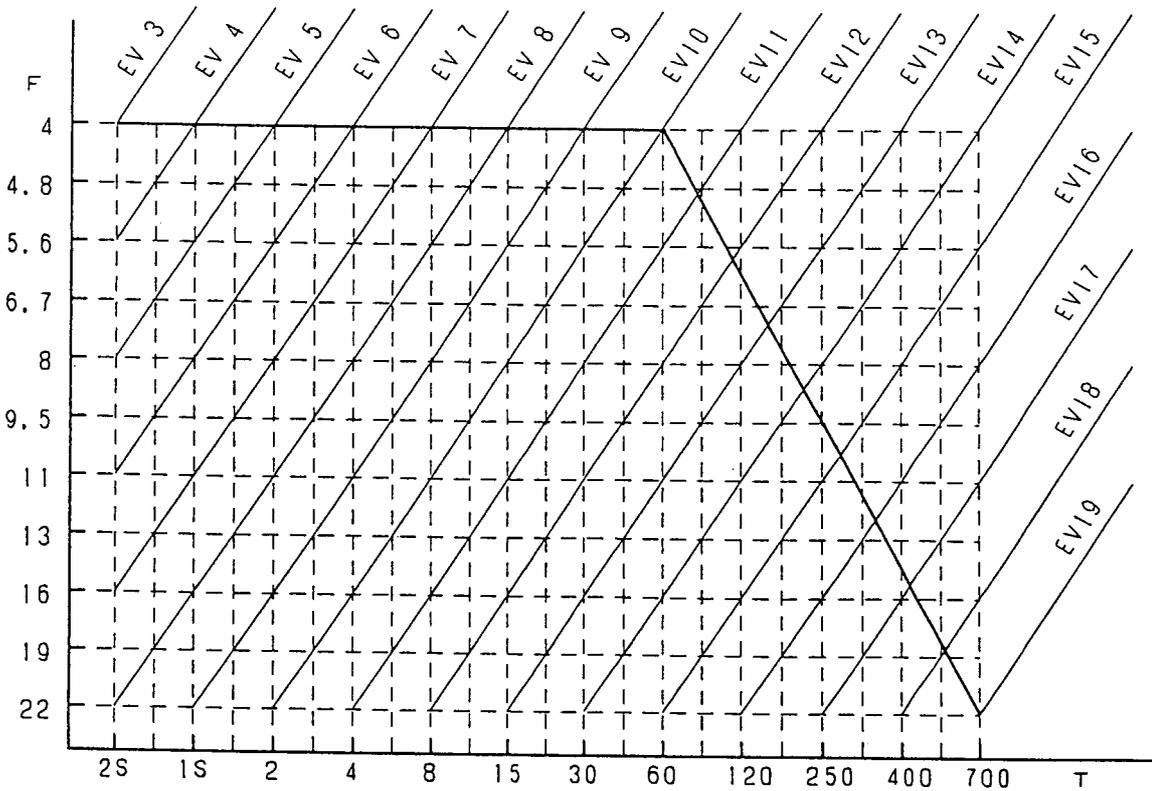
To take horizontally rectangular pictures, this camera has an additional shutter release on the front face. The electrical functions of this shutter release are same as those of the top shutter release. Corresponding to SP1 and SP2, SP1' and SP2' signal names are assigned.

3. Shutter program diagram (ISO 100)

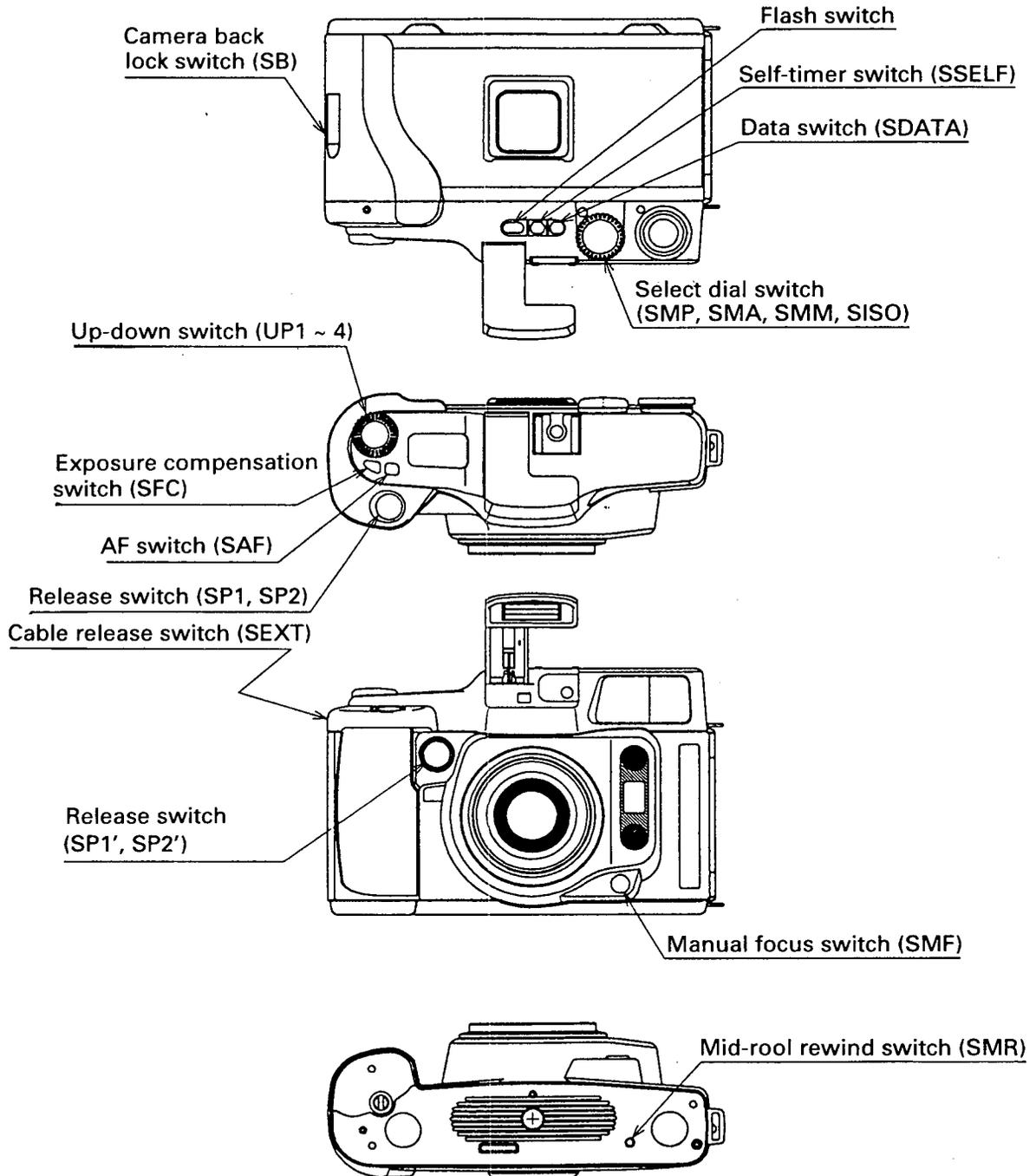
1) A mode, M mode



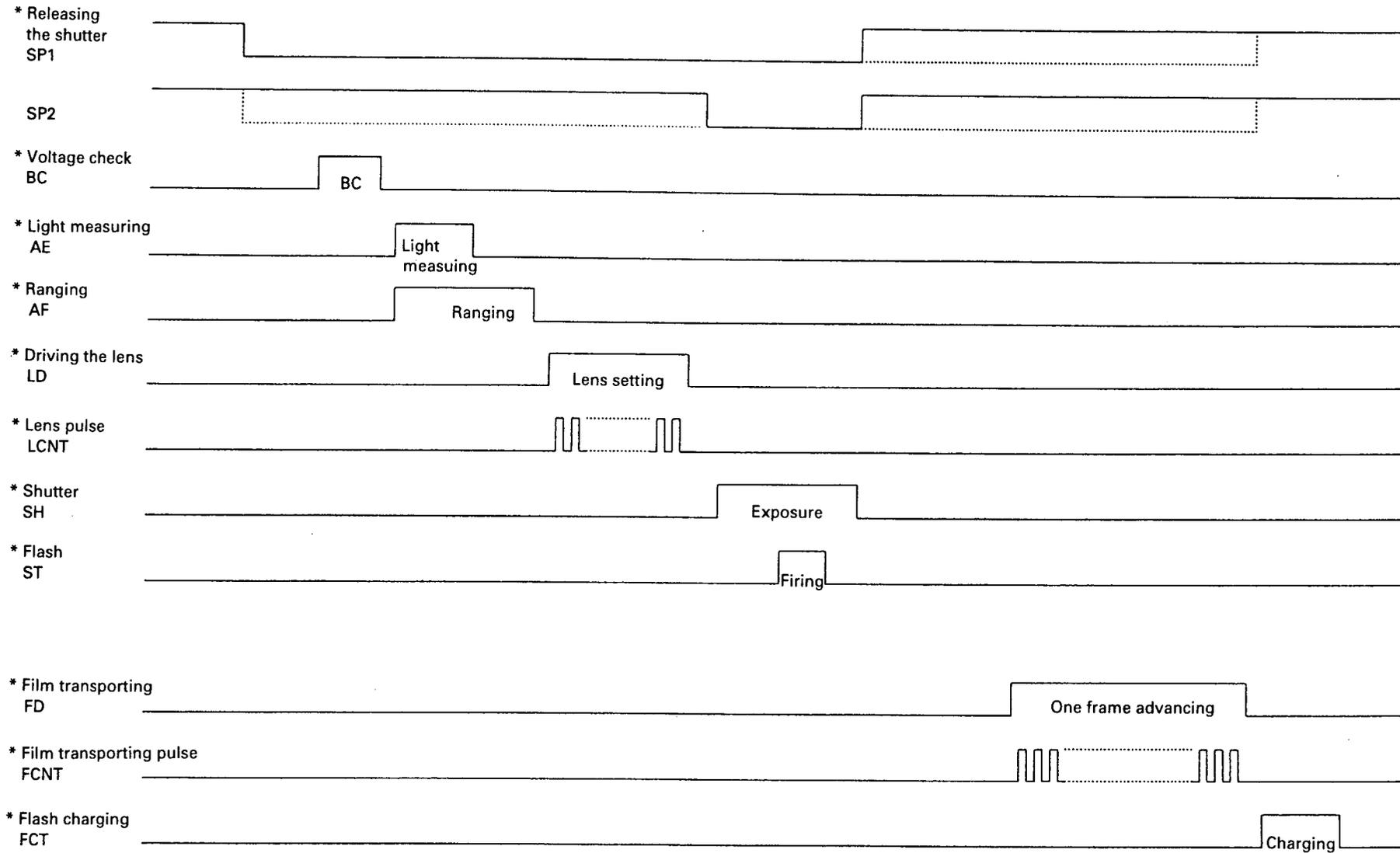
2) P mode (When flash ON – FTL:1/45)



4 Switch layout

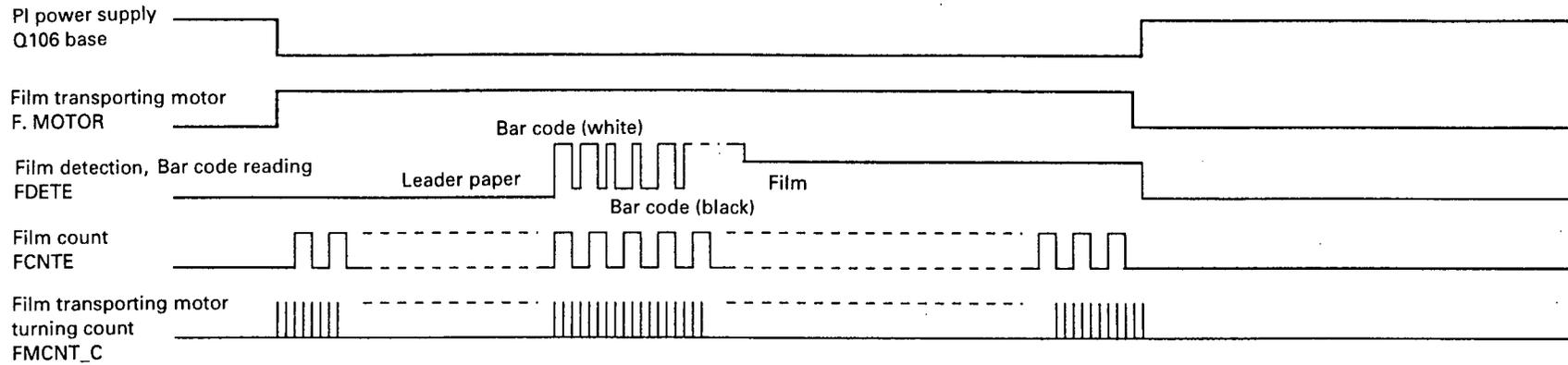


5. Sequence time chart

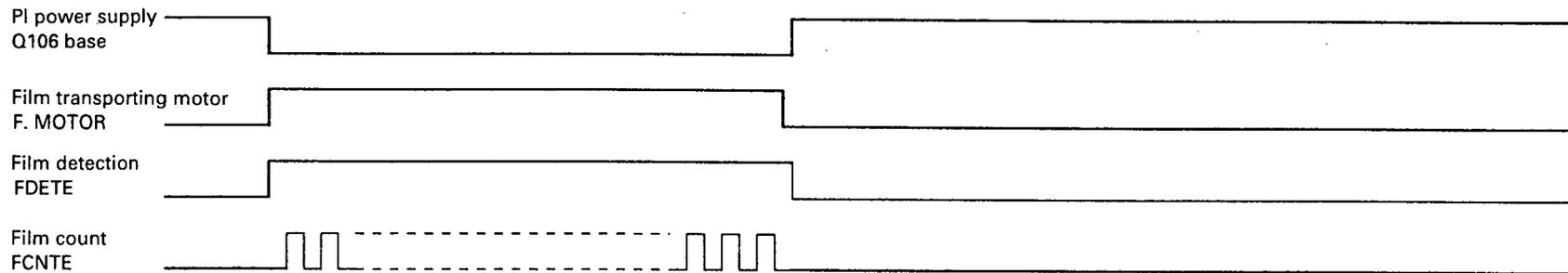


6. Film transporting time chart

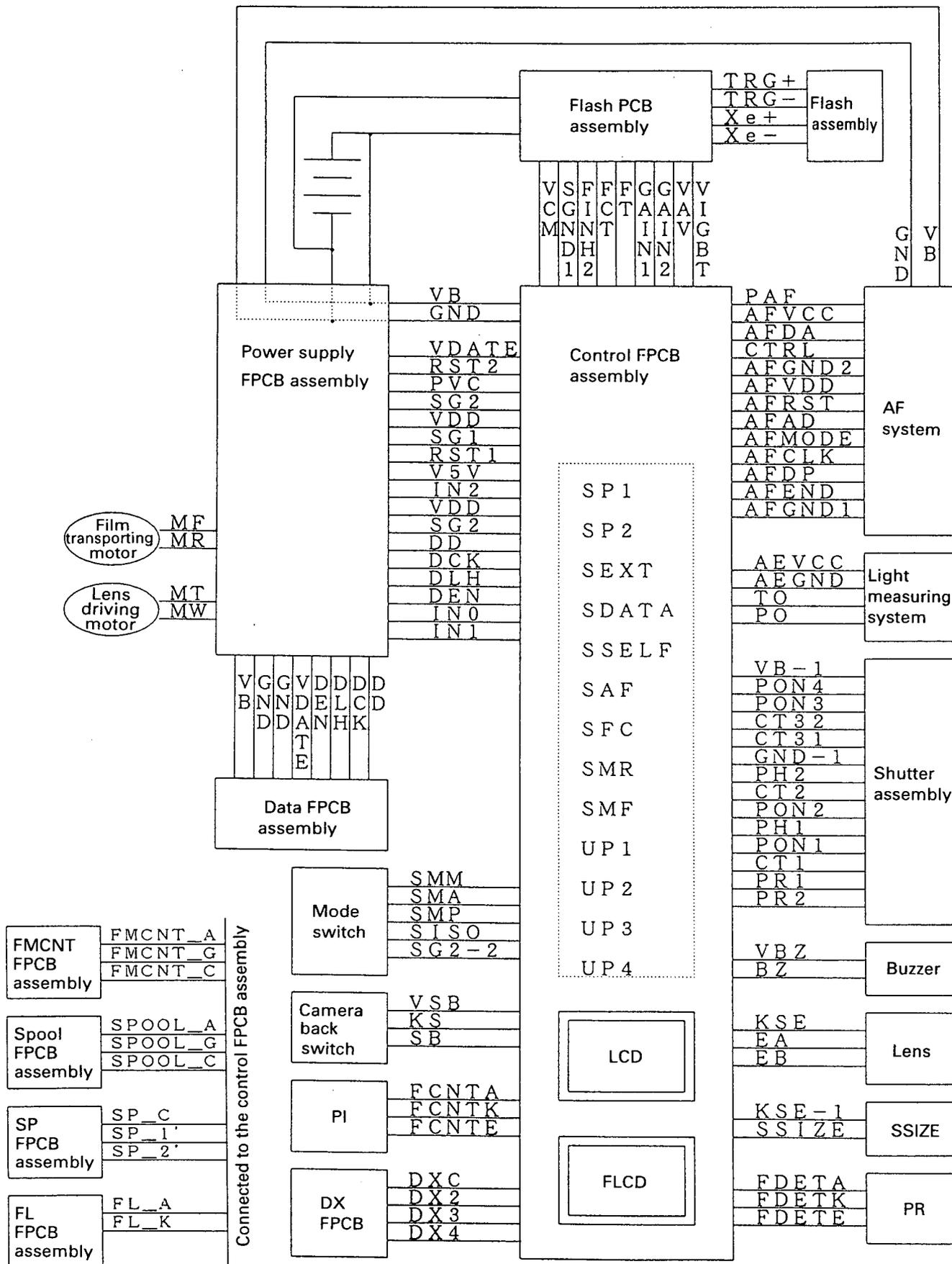
1) First frame setting



2) One frame film advancing



7. Overall circuit block diagram



8. Table of signals

Connections	Signal name	Description
Control FPCB ~ Power supply FPCB	VDATE	Data power supply (+)
	RST2	U102 reset signal
	PVC	DC/DC power starting signal
	SG2	U101 power supply (-)
	VDD	U101 power supply (+)
	SG1	U102 power supply (-)
	RST1	U102 reset signal
	V5V	U101 power supply (+)
	IN0 ~ 2	Motor driver driving signal
	SG2-1	Data power supply (-)
	DD	Data data signal
	DCK	Data clock signal
	DLH	Data latch signal
	DEN	Data enable signal
Control FPCB ~ Select dial switch	SMM	Main switch (Manual)
	SMA	Main switch (Aperture priority)
	SMP	Main switch (Program)
	SISO	Main switch (ISO)
	SG2-2	Ground
Control FPCB ~ Camera back switch	VS	Camera back switch
	KS	Camera back switch
	SB	Camera back switch
Control FPCB ~ PI PCB	FCNTA	Film transporting pulse signal
	FCNTK	Film transporting pulse signal
	FCNTE	Film transporting pulse signal
Control FPCB ~ DX FPCB	DXC	External communication signal (Common)
	DX2	External communication signal
	DX3	External communication signal
	DX4	External communication signal
Control FPCB ~ Flash PCB	VCM	Main capacitor voltage
	SGND1	Flash ground
	FINH2	Flash charge inhibit signal

Connections	Signal name	Description
Control FPCB ~ Flash PCB	FCT	Flash charge signal
	FT	Flash fire signal
	GAIN1	Flash gain signal
	GAIN2	Flash gain signal
	VAV	Flash reference signal
	VIGBT	Flash IGBT signal
Control FPCB ~ AF FPCB	PAF	AF power starting signal
	AFVCC	AF power supply (Active +)
	AFDA	AF active data signal
	CTRL	AF control signal
	AFGND2	AF power supply (Active -)
	AFVDD	AF power supply (Passive +)
	AFRST	AF reset signal
	AFAD	AF address signal
	AFMODE	AF mode signal
	AFCLK	AF clock signal
	AFDP	AF passive data signal
	AFEND	AF end signal
	AFGND1	AF power supply (Passive -)
Control FPCB ~ Light measuring FPCB	AEVCC	AE power supply (+)
	AEGND	AE power supply (-)
	TO	Temperature measuring signal
	PO	Light measuring signal
Control FPCB ~ Shutter assembly	VB-1	Shutter circuit power supply (+)
	PON4	Aperture compensation signal
	PON3	Aperture power supply
	CT32	Aperture driving signal
	CT31	Aperture driving signal
	GND-1	Shutter circuit power supply (-)
	PH2	Shutter open blade driving signal
	CT2	Shutter open blade driving signal
	PON2	Shutter open blade power supply
	PH1	Shutter close blade driving signal

Connections	Signal name	Description
Control FPCB ~ Shutter assembly	PON1	Shutter close blade power supply
	CT1	Shutter close blade driving signal
	PR1	Aperture detection signal
	PR2	Shutter blade detection signal
Control FPCB ~ Buzzer	VBZ	Buzzer power supply
	BZ	Buzzer driving signal
Control FPCB ~ Lens assembly	KSE	Lens encoder common signal
	EA	Lens encoder signal
	EB	Lens encoder signal
Control FPCB ~ Film size switch	KSE-1	Film size signal
	SSIZE	Film size signal
Control FPCB ~ PR PCB	FDETA	Film detection signal
	FDETK	Film detection signal
	FDETE	Film detection signal
Power supply FPCB ~ Film transporting motor	MF	Film transporting motor driving signal
	MR	Film transporting motor driving signal
Power supply FPCB ~ Lens driving motor	MT	Lens driving motor driving signal
	MW	Lens driving motor driving signal
Flash PCB ~ Flash assembly	TRG+	Flash firing signal (+)
	TRG-	Flash firing signal (-)
	Xe+	Xenon tube lighting signal (+)
	Xe-	Xenon tube lighting signal (-)
Battery ~ Each assembly	VB	Battery (+)
	GND	Battery (-)
On the control FPCB	SP1	
	SP2	
	SEXT	
	SDATA	
	SSELF	
	SAF	
	SFC	
	SMR	
	SMF	
UP1 ~ 4		

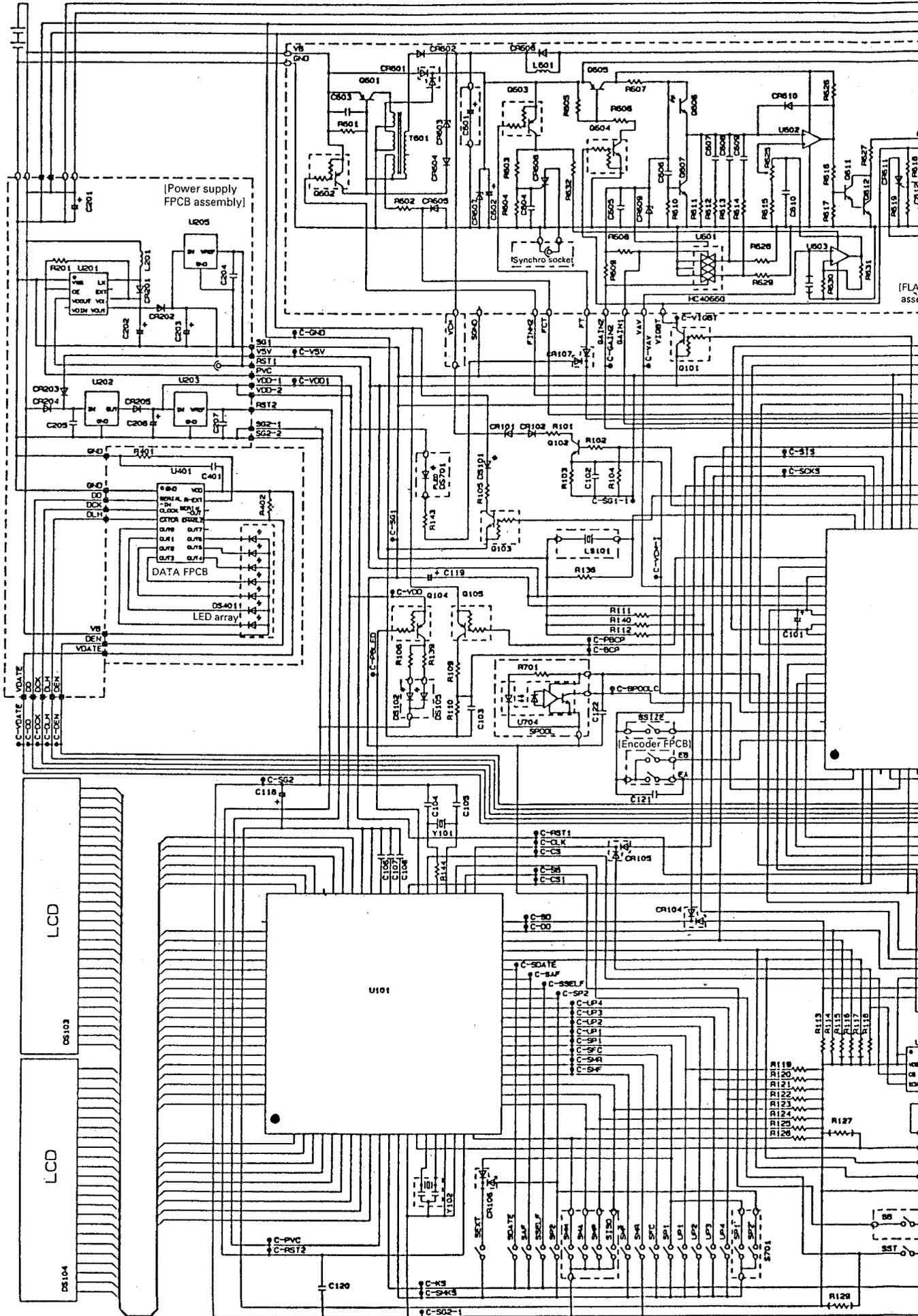
Connections	Signal name	Description
Control FPCB ~ Spool FPCB	SPOOL_A	Spool pulse signal
	SPOOL_G	Spool pulse signal
	SPOOL_C	Spool pulse signal
Control FPCB ~ FMCNT FPCB	FMCNT_A	Film transporting motor pulse signal
	FMCNT_G	Film transporting motor pulse signal
	FMCNT_C	Film transporting motor pulse signal
Control FPCB ~ SP FPCB	SP_C	Release signal (Common)
	SP_1	Release signal (Vertical position)
	SP_2	Release signal (Vertical position)
Control FPCB ~ FL FPCB	FL_A	LED (within viewfinder) signal
	FL_K	LED (within viewfinder) signal

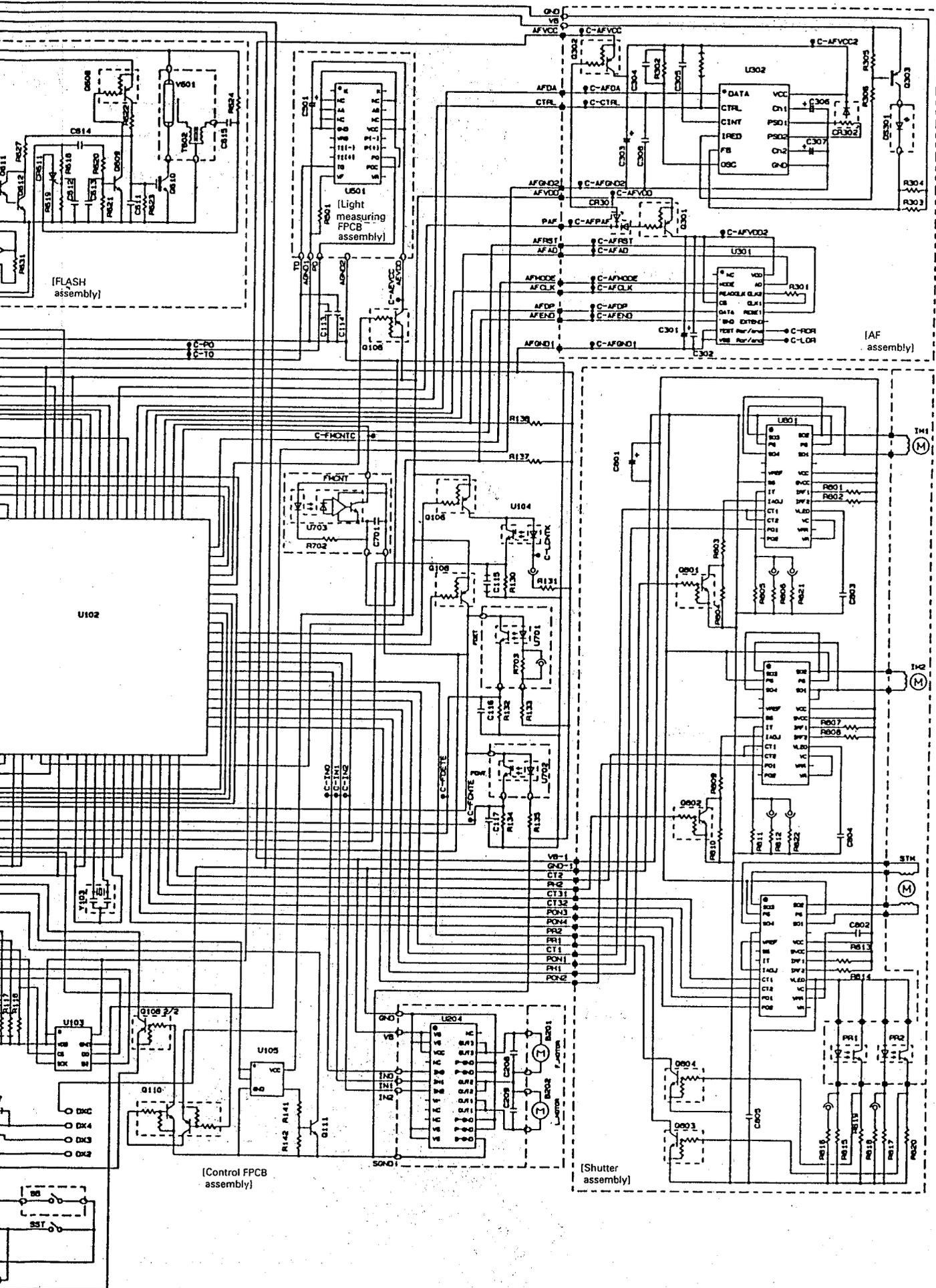
MEMO

○

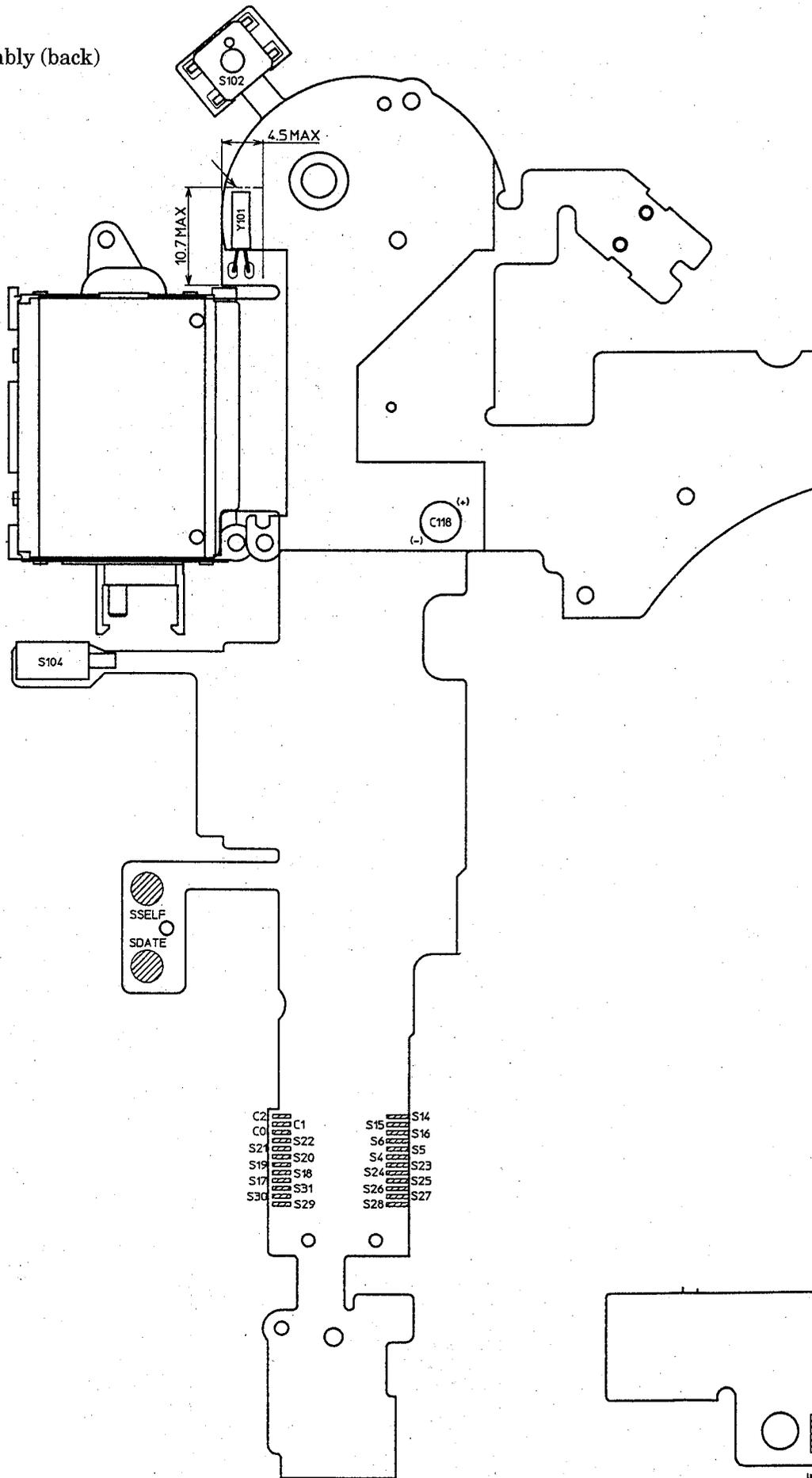
○

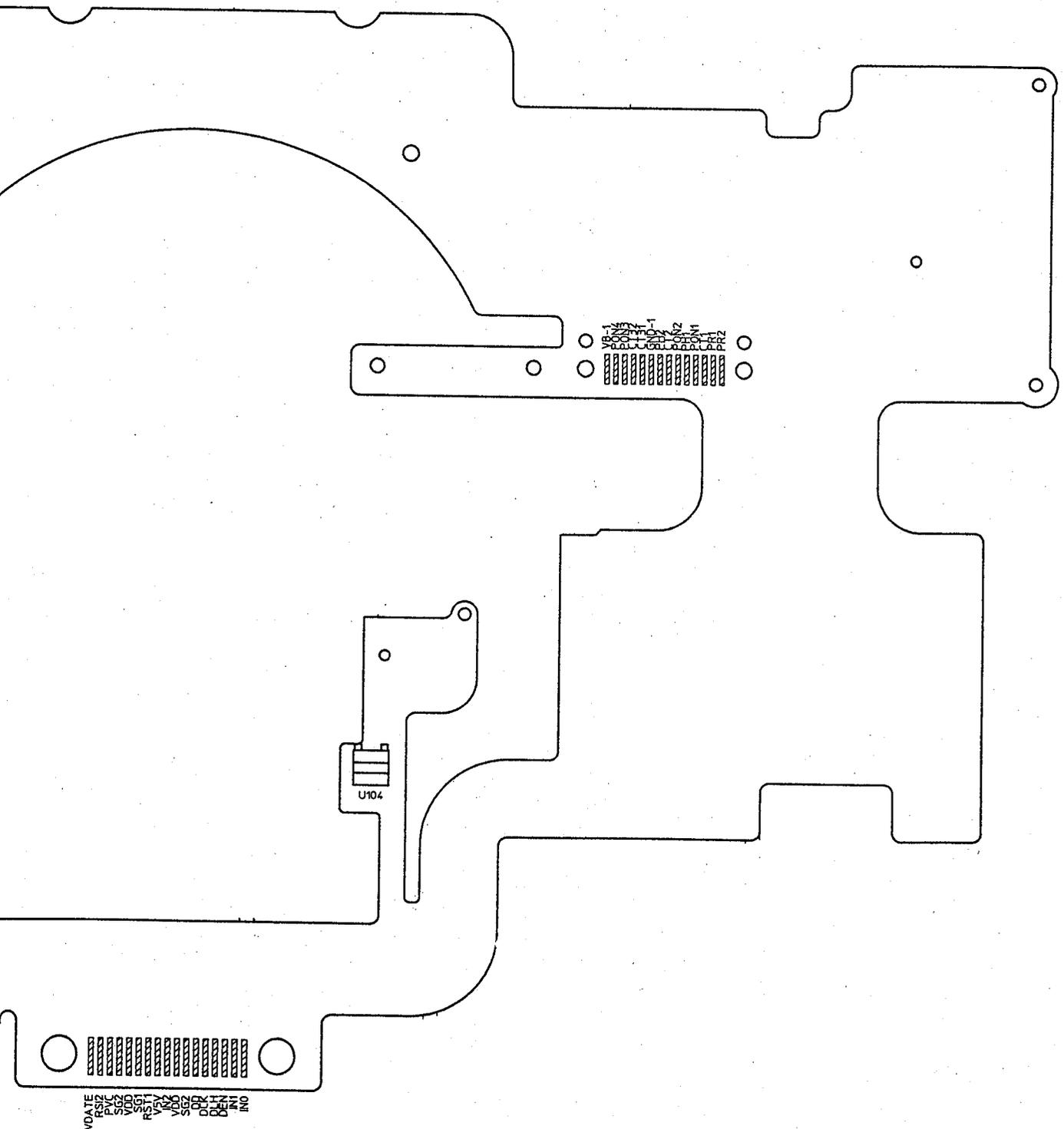
9. Circuit diagram



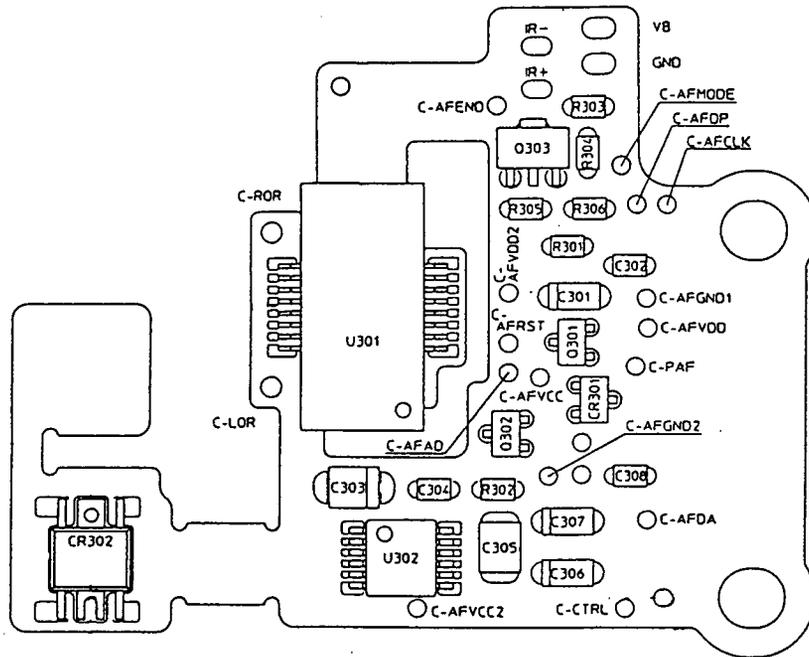


Control FPCB assembly (back)

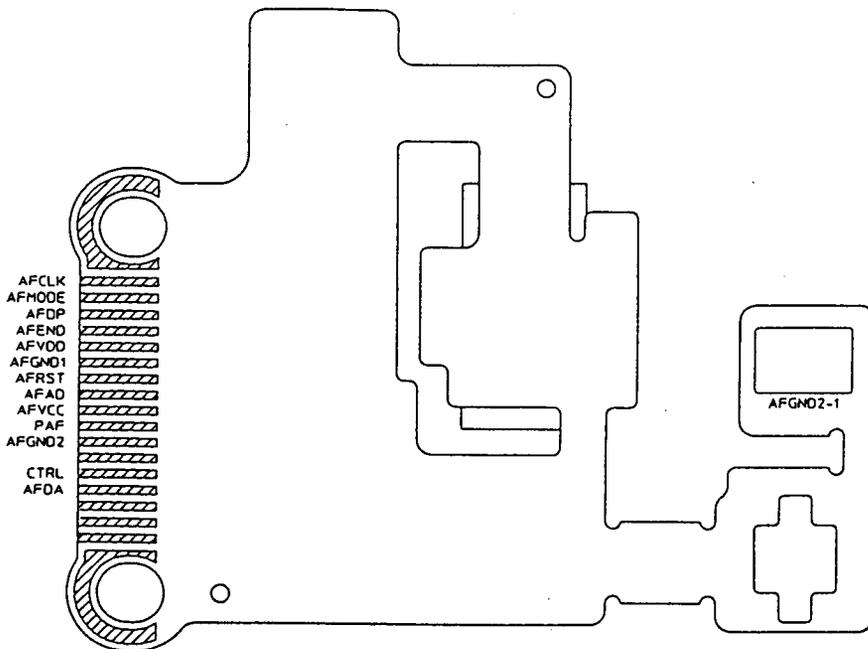




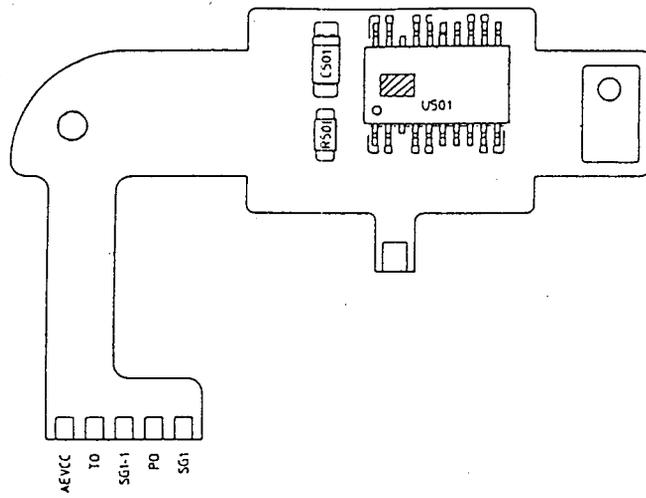
3) AF FPCB assembly (front)



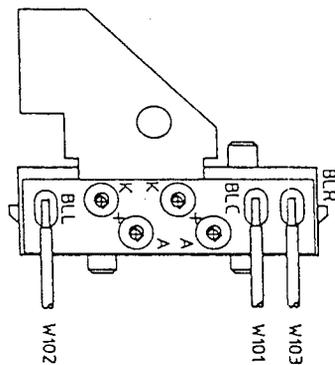
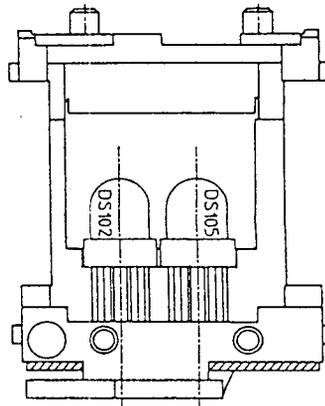
AF FPCB assembly (back)



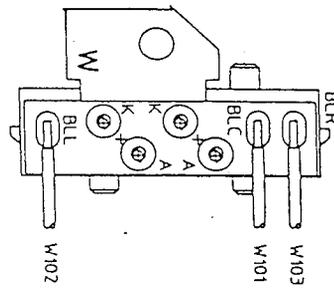
4) Light measuring FPCB assembly



5) BL PCB assembly

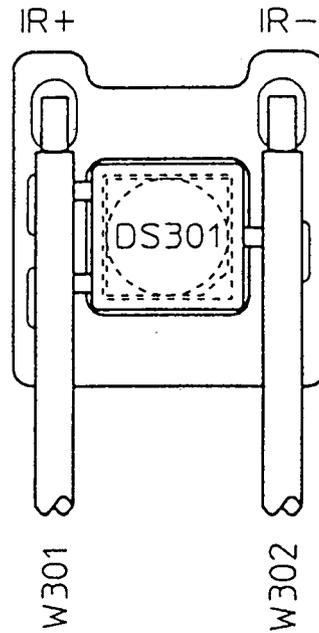


GA645 i Professional

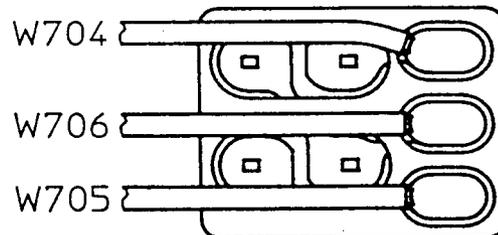
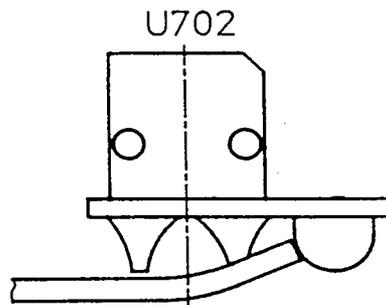


GA645W i Professional

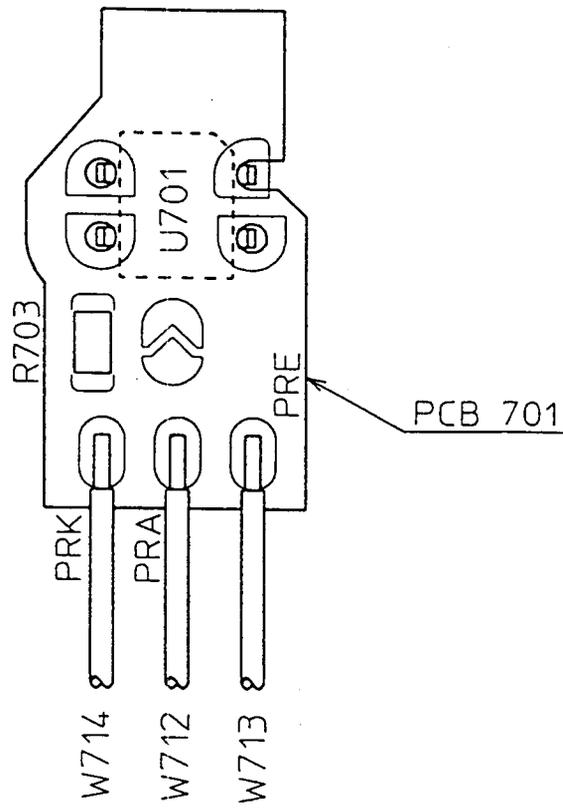
6) IRED PCB assembly



7) PI PCB assembly

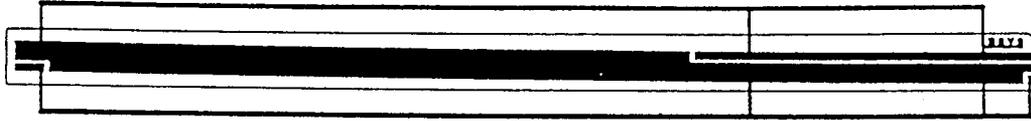


8) PR PCB assembly

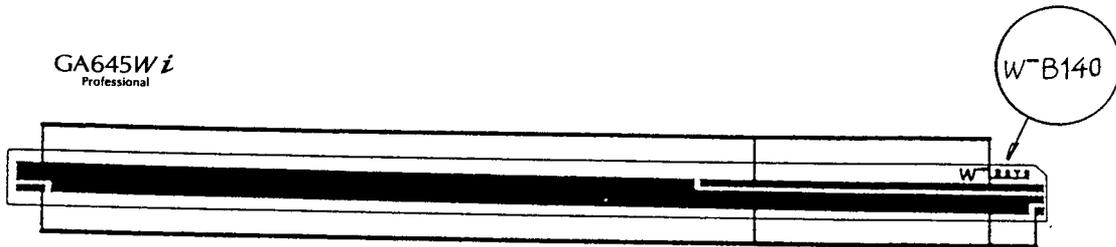


9) Encoder FPCB

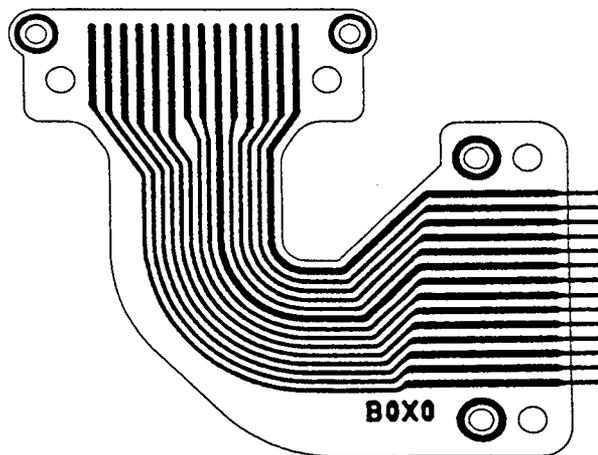
GA645 *z*
Professional



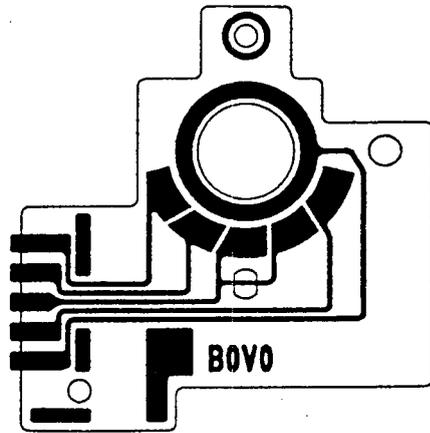
GA645W *z*
Professional



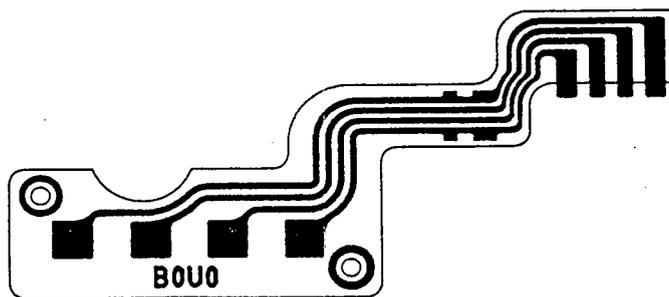
10) Relay FPCB



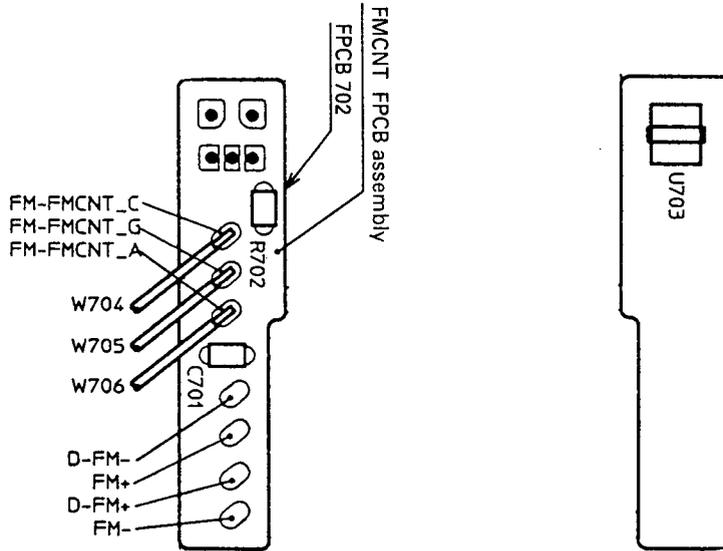
11) Mode switch FPCB



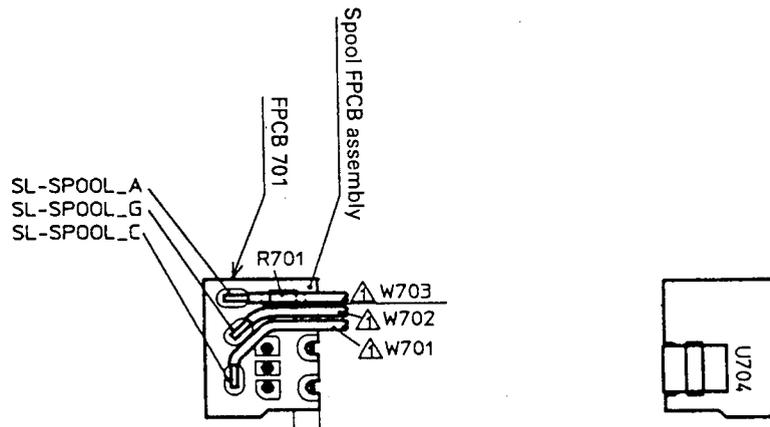
12) DX FPCB



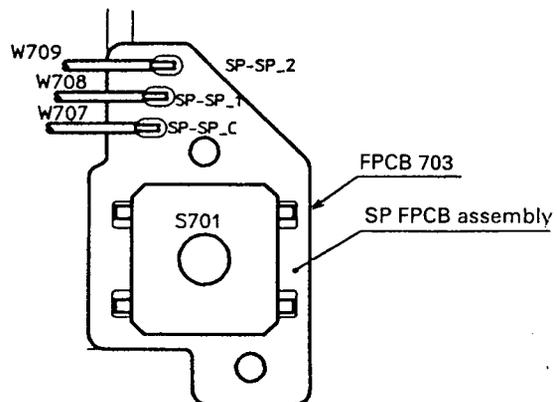
13) FMCNT FPCB assembly



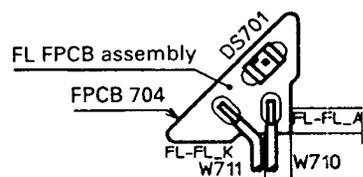
14) SPOOL FPCB assembly



15) SP FPCB assembly



16) FL FPCB assembly



11. Troubleshooting

1. Before starting troubleshooting

1. Precautions

- 1) In the camera under a trouble, a large current may flow damaging elements in the circuit.
- 2) Proceed the troubleshooting by checking current, etc.
- 3) When a large current (except for flash charging current) is flowing, turn off the power immediately, find out the cause of over-current, and take corrective actions.
- 4) The main capacitor is highly charged. Discharge it very carefully.

2. Visual check

- 1) Soldering: Observe each soldered part from various angles to make sure that correct lead wire has been connected, no lead wire has been missed, no lead wire has been floated (lightly pull the lead wire) and no lead wire has been shorted with the adjacent one.
- 2) Fixtures: Make sure that all the fixtures are clean, properly and correctly tightened (rubber fixture is normal, screws are tightened correctly and damaged self-tapping screw hole), positioned correctly and no foreign matter exists on the fixtures. (After checking the fixtures carefully as above, thoroughly clean them, and check operations once again.)

3. For defective control FPCB, the following causes are anticipated:

- 1) Incorrectly soldered (floated or shorted) element pins
- 2) Broken or shorted line of flexible FPCB
- 3) Wrong parts used or incorrect polarity, polarity error
- 4) Defective or damaged element
- 5) Abnormal EEPROM data

4. Source voltage

For the stabilized power supply used to conduct troubleshooting, use 5.60V; 1 ohm.

5. Use of a tester

1) Hints for tester check

Continuity: About 5 to 50 ohms or less

Non-continuity: About 5 kilo-ohms or less → A certain resistance will be indicated since the circuit is connected.

“H”: 3V or higher → Actual voltage is unstable since there are three power supply systems.

“L”: 0.5V or lower

2) Input impedance of the used tester

Should be 10MΩ or more.

6. Relationship with GA645

Many specifications, functions and components of this camera (GA645i) are common with GA645, and for this reason, only troubles of functions added to GA645i are described in the Troubleshooting. For those matters not described in the Troubleshooting, refer to the Service Manual for GA645.

2. Troubleshooting

1. The LED in the viewfinder does not light.

CHECK: LED lighting control signal functions also as an external flash synchro signal (hot shoe). Mount an external flash (Recommend Fuji Flash GA be used) on the camera, and see if the flash fires or not. When the flash fires, FL FPCB assembly is anticipated to be defective.

When the flash does not fire, the control FPCB is anticipated to be defective.

2. The front shutter release does not operate correctly.

The shutter cannot be actuated by the front shutter release.

CHECK: When the shutter can be actuated by the top shutter release, the lead wire of the front shutter release is anticipated to be broken.

Check the lead wire for continuity with a tester.

When the shutter cannot be actuated by the top shutter release also, the control FPCB assembly is anticipated to be defective.

3. First frame set (FFS) cannot be made.

FFS cannot be made regardless of bar code system film or not.

CHECK 1: Load a film, close the camera back, and see if the film transporting motor turns as SM switch turns on. When the motor does not turn, SB switch, U201 (motor driver) of the power supply FPCB assembly and/or film transporting motor is anticipated to be defective.

CHECK 2: With the camera back opened, turn the Up/Down dial, and see if the spool shaft turns (manual winding) or not. When the spool shaft turns, U201 and film transporting motor are normal. SB switch is anticipated to be defective.

CHECK 3: When the film transporting motor turns, check operating time of the motor.

→ When the film transporting motor stops after about one second:

Signal output of U703 (photo-interrupter) of the FMCNT FPCB assembly is anticipated to be defective.

→ When the film transporting motor stops after about 30 seconds:

Signal output of U701 (photo-reflector) of the PR PCB assembly is anticipated to be defective. Check the light emitter/receiver (inside of the slit of the PR holder) of U701 from the film plane to insure they are clean.

NOTE:

When U701 (PR holder assembly) or control FPCB assembly is replaced with a new one, PR sensitivity must be adjusted on the camera.

As the results of the above checks, when FFS still cannot be made, the control FPCB is anticipated to be defective.

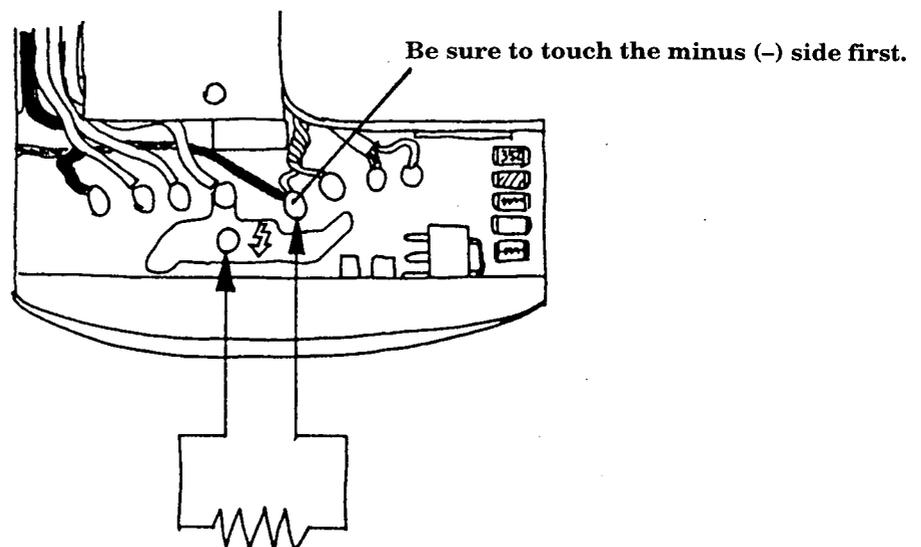
IV. DISASSEMBLY AND REASSEMBLY

Before starting the work

- 1) Thanking to the high technology advancement during the recent years in the electric and electronic fields, this camera uses MOS IC and other electronic parts. These electronic parts are likely to be affected by static electricity causing them to be deteriorated or damaged. When removing even a single parts or repairing the camera, be sure to take the following preventive actions.
 - (1) Lay down a conductive rubber mat on the work table.
 - (2) Ground the soldering iron.
 - (3) Ground your body.
 - (4) Hopefully, ground both the soldering iron and your body to the earth.
- 2) This camera uses a normally charged type flash circuit. Keep this in your mind when repairing a camera. For the sake of safety, be sure to discharge the flash system as soon as the top cover is removed.

To discharge the flash system, use a 3K Ω /10W resistor, and be sure to touch the minus (-) side first.

Failure from this special instruction may result in damaging IGBT of the flash PCB, causing flash light conditioning not to be made.



- 3) When disassembling a camera up to the lens assembly, be sure to start the disassembly after fully opening the shutter. To fully open the shutter, place the camera under manual exposure mode, set the shutter speed to "Bulb", set the aperture to F4, release the shutter after setting manual focus to ∞ , and pull out the battery.

A. Removal and reinstallation

1. Top cover

(1) Removal

- 1) Remove the battery compartment cover assembly (1-64), and pull out the battery.
- 2) Raise the flash head assembly (1-25), remove the screw (1-35) and remove the flash cover (1-34).

NOTE:

When the flash cover (1-34) is removed, discharge the main capacitor.

- 3) Disconnect seven lead wires of the flash head assembly and synchro-contact.

(See Fig. IV-A-1-3.)

NOTE:

If a soldering iron comes into contact with the top cover; the top cover may be deformed.

Carefully handle the soldering iron.

- 4) Remove the shoe cover (1-26), remove three screws (1-27) and screw (1-28), and remove the accessory shoe (1-29) and shoe seat assembly (1-30).
- 5) Remove four screws (1-72).
- 6) After floating up the top cover assembly (1-1), remove the top cover assembly from the camera chassis. The MF button (1-69), FR button (1-70) and rubber switch (1-71) will come off.

Be careful not to lose them.

(2) Reinstallation

- 1) Match the boss of the contact assembly (3-77) with the hole position of the shaft (1-11).
(See Fig. IV-A-1-2.)
- 2) Match the up-down dial inside the top cover as shown in Fig. IV-A-1-1, install the top cover assembly on the camera chassis, and tighten four screws (1-72).

NOTE:

When placing the top cover assembly on the camera chassis, move the flash PCB assembly (3-63) away from the top cover since the frame will run against the top cover.

- 3) Install the shoe seat assembly (1-30) and accessory shoe (1-29).

NOTE:

Pass the synchro lead wires through the space in between the capacitor and transformer of the flash PCB assembly.

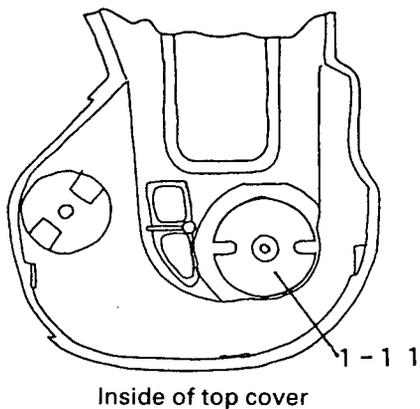
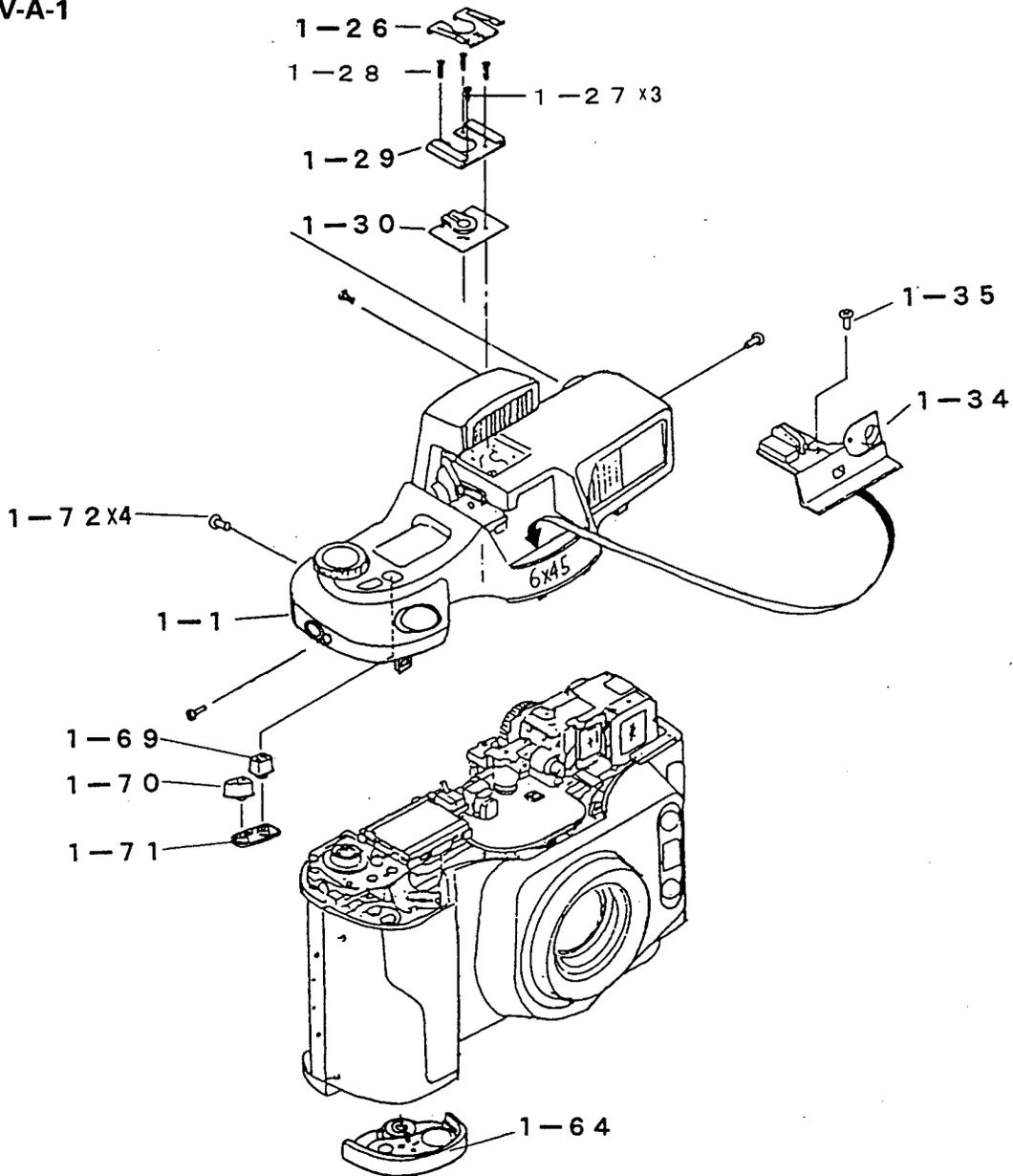
- 4) After soldering seven lead wires, form them as shown in Fig. IV-A-1-3.
- 5) Tighten three screws (1-27) and screw (1-28), and install the shoe cover (1-26).
- 6) Make sure that the link (2-7) is installed on the hinge shaft (1-20), install the flash cover (1-34), and secure it with the screw (1-35).

NOTE:

Reference numbers are for GA654i.

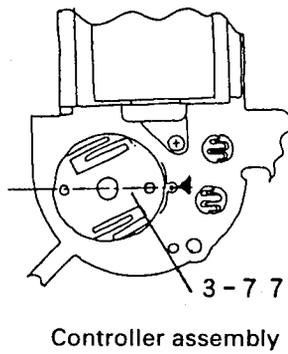
For reference numbers for GA645Wi, refer to the Part List.

Fig. IV-A-1



Inside of top cover

Fig. IV-A-1-1



Controller assembly

Fig. IV-A-1-2

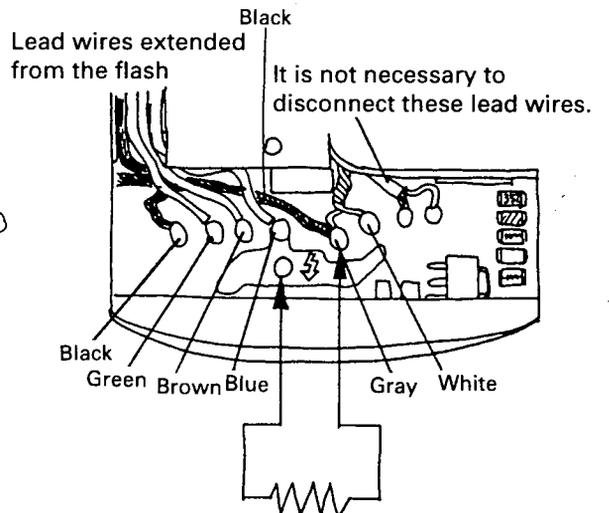


Fig. IV-A-1-3

2. Bottom cover assembly (1-60), front cover assembly (1-46) and camera back assembly (2-22).

(1) Removal

- 1) Remove three screws (1-63).
- 2) Remove the bottom cover assembly (1-60) from the camera chassis. The FW button (1-62) will come out. Be careful not to lose it.
- 3) Disconnect two lead wires extended from the buzzer at the FPCB in the camera chassis side.
- 4) Disconnect the lead wire (SG2) (6-43) from the lug (3-132), disconnect three lead wires (6-46, 6-47 and 6-48) extended from the SP FPCB assembly (1-82), and remove four screws (1-78) and two screws (1-59).
- 5) Remove the front cover assembly (1-46) from the camera chassis. The focus lock button (1-57) and rubber switch (1-56) will come out. Be careful not to lose them.
- 6) Remove four screws (1-80), and remove the camera back assembly (2-22).

(2) Reinstallation

- 1) Perform inspection before installing the front cover assembly.
(Refer to **V-1** Inspecting the camera without covers, in pages 97 through 100.)
- 2) Thoroughly clean the receiving lens (3-102) and emitting lens (3-103) of the AF system assembly (3-100) with alcohol, and make sure that the lenses are not scarred or scratched.
- 3) Install the front cover assembly (1-46) on the camera chassis with four screws (1-78) and two screws (1-59).
- 4) Pass three lead wires (6-46, 6-47 and 6-48) extended from the SP FPCB assembly (1-82) through the space underneath the control assembly, and connect them to the control assembly by means of a soldering. Connect the lead wire extended from the grounding plate to the lug (3-132) by means of a soldering.
- 5) Connect two lead wires extended from the buzzer on the bottom cover assembly (1-60) by means of a soldering, and install the FW button (1-62) as shown in Fig. IV-A-2-1.

NOTE:

When installing the bottom cover assembly (1-60), be careful not to hold lead wires in between the camera chassis and bottom cover assembly.

- 6) Tighten three screws (1-63).
- 7) Install the camera back assembly (2-22) with four screws (1-80).

Fig. IV-A-2

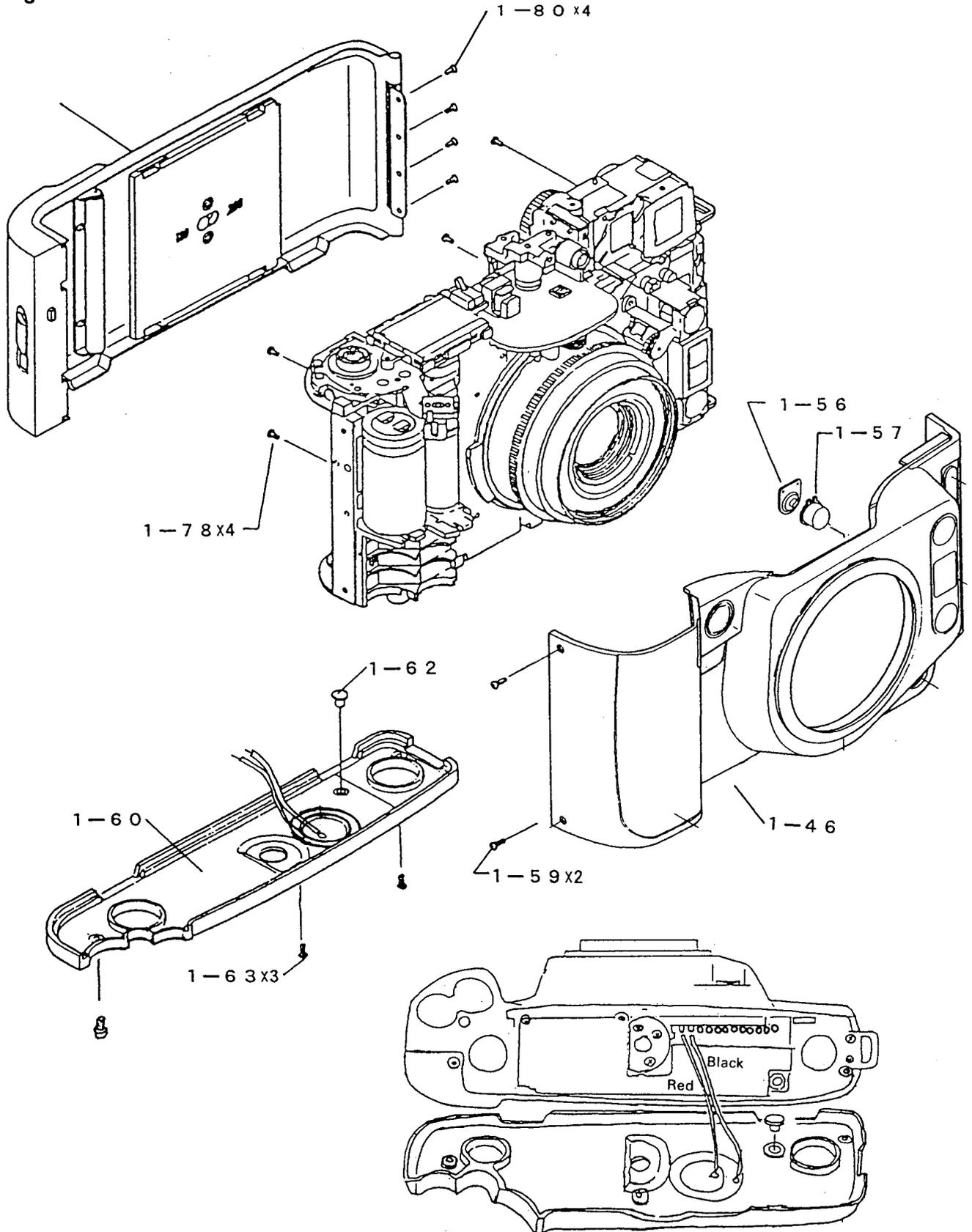


Fig. IV-A-2-1

3. AF system assembly (3-100) and flash PCB assembly (3-63)

(1) Removal

- 1) Disconnect two lead wires (6-18, 6-19).
- 2) Remove two screws (3-94), and remove the metal fixture (3-95).
NOTE: The rubber piece (5-125) is likely to come off. Take and keep it so as not to lose.
- 3) Remove two screws (3-122), and remove the AF system assembly (3-100) from the camera chassis.
- 4) Unsolder eight solder joints across the flash PCB assembly (3-63) and control FPCB assembly (3-70). (See Fig. IV-A-3-1.)
- 5) Disconnect five lead wires of the flash PCB assembly (3-63).
- 6) Remove the screw (left) (3-67) and screw (3-68), and remove the lug (3-132) and flash PCB assembly from the camera chassis.
- 7) Remove the rubber switch (3-64) and switch holder (3-66) from control FPCB assembly (3-70).

(2) Reinstallation

- 1) Install the flash PCB assembly (3-63) and switch holder (3-66) with the screw (3-67), and install the Mylar insulator (3-96) and lug (3-132) with the screw (3-68).
- 2) Solder and connect three lead wires (6-1, 6-3, and 6-5).

NOTE:

Connect the remaining two lead wires extended from the main capacitor after completing the inspection.

- 3) Solder eight solder joints across the flash PCB assembly (3-63) and control FPCB assembly (3-70) as shown in the Fig. IV-A-3-1.
- 4) Install the switch holder (3-66) on the control FPCB assembly, and install the rubber switch (3-64).

NOTE:

Thoroughly clean the flexible PCB with alcohol.

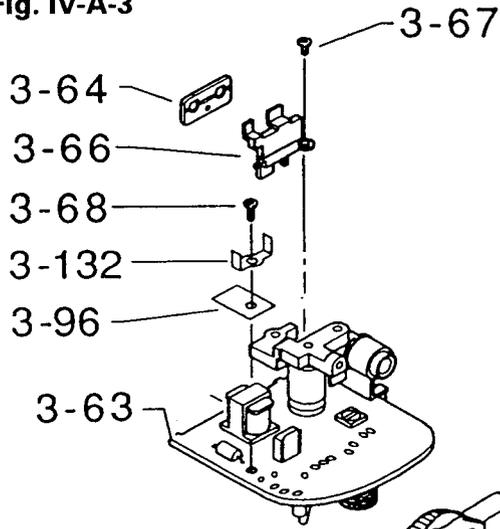
- 5) Install the AF system assembly (3-100) on the camera chassis with two screws (3-122).
- 6) Install the rubber piece (5-125) as shown in Fig. IV-A-3-2, and install the metal fixture (3-95) with two screws (3-94).

NOTE:

Clean the tightly connected portions of each flexible PCB with alcohol.

- 7) Solder and connect two lead wires (red (6-18) and black (6-19)) extended from the power supply FPCB assembly.

Fig. IV-A-3



Push the back of the flexible PCB and solder eight solder joints.

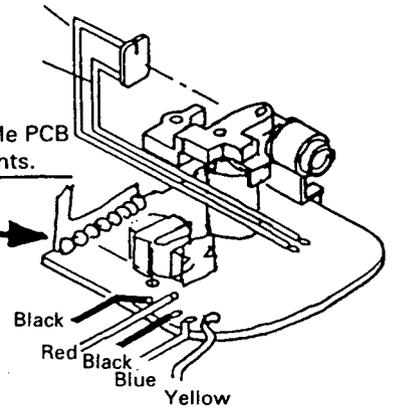


Fig. IV-A-3-1

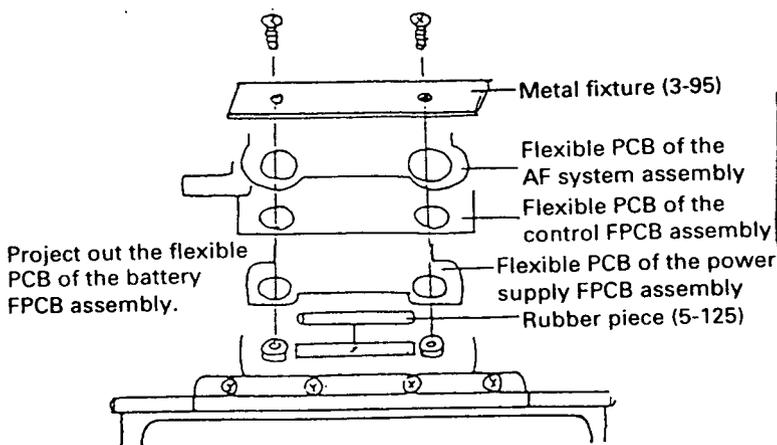
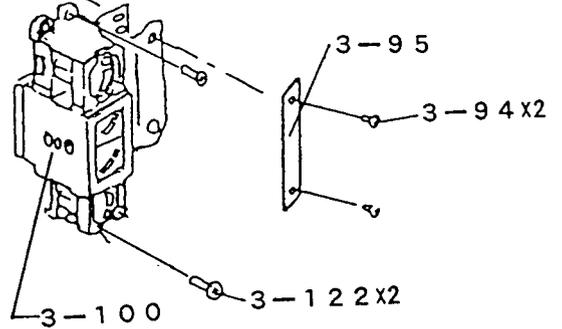
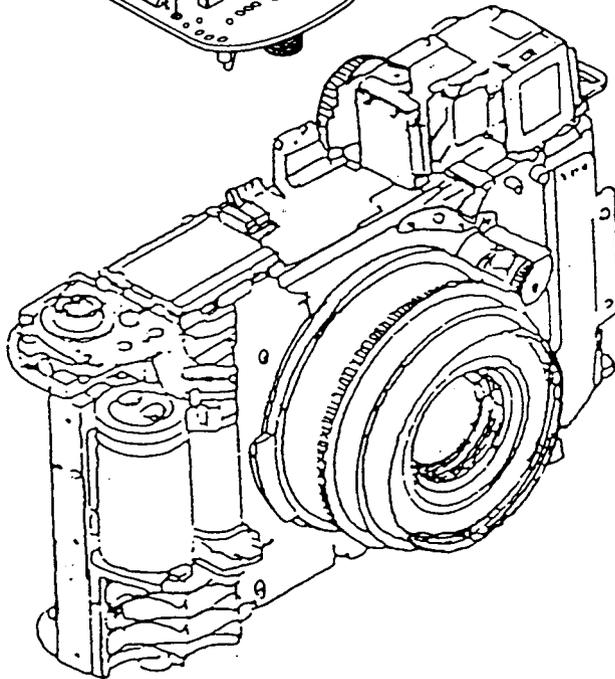


Fig. IV-A-3-2

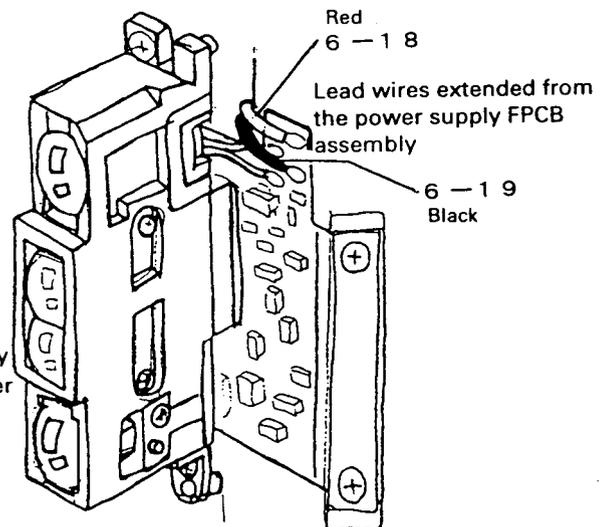


Fig. IV-A-3-3

4. Mode switch assembly (3-1) and viewfinder assembly (3-31)

(1) Removal

- 1) Unsolder and disconnect four soldered points with the mode switch assembly (3-1) on the top of the viewfinder assembly (3-31) and five soldered points on the front face. Disconnect two lead wires (6-52 and 6-53) extended from the FL FPCB assembly (3-98) at the control assembly.
- 2) Turning down the top of the mode switch assembly (3-1) forward, move down the overall the mode switch assembly, and pull it out.
- 3) Remove the screw (3-69).
- 4) Pull out the flexible PCB from the boss of the viewfinder chassis (3-32), and raising the FLCD portion of the control assembly, pull it out from the viewfinder chassis (3-32) upward. (See Fig. IV-A-4-2.)
- 5) Remove two screws (3-61) and screw (3-49), and remove the viewfinder assembly from the camera chassis.
Be careful not to bend the lever of the reticle frame 2 (3-54) on the front face of the viewfinder.

(2) Reinstallation

- 1) Hooking the lever of the reticle frame 2 (3-54) on the pin of the cam lever assembly (4-78), install the viewfinder assembly (3-31), and tighten three screws (3-61x2, 3-49x1).
- 2) Turn the eccentric pin of the cam lever assembly (4-78) to adjust infinity.
(See Fig. IV-A-4-1.)

[In case of GA645Wⁱ Professional]

Turn the lens barrel by hand, and match the left end of the index of the focusing cam ring with the head of the cam lever. Turn the eccentric pin of the cam lever assembly (4-78) to adjust gap in between the top of the AF target and moving reticle so that the gap is within 0.1mm when observed from the front face of the camera.

(See Fig. IV-A-4-3.)

- 3) Install the control FPCB assembly on the viewfinder assembly by matching the FLCD portion with the viewfinder assembly. (See the Fig. IV-A-4-2.)

NOTE:

The LCD panel (F) (3-25) is likely to be broken easily. Be careful.

- 4) Insert the flexible PCB into the viewfinder chassis (3-32), and tighten the screw (3-69).
- 5) Insert the mode switch assembly (3-1) into the viewfinder chassis (3-32), and secure it.
- 6) Solder and join the the top and front of the viewfinder assembly.

NOTE:

When the reticle assembly (3-50) of the viewfinder assembly is removed from the viewfinder chassis (3-32), be sure to adjust parallax after installing the AF assembly.

Fig. IV-A-4

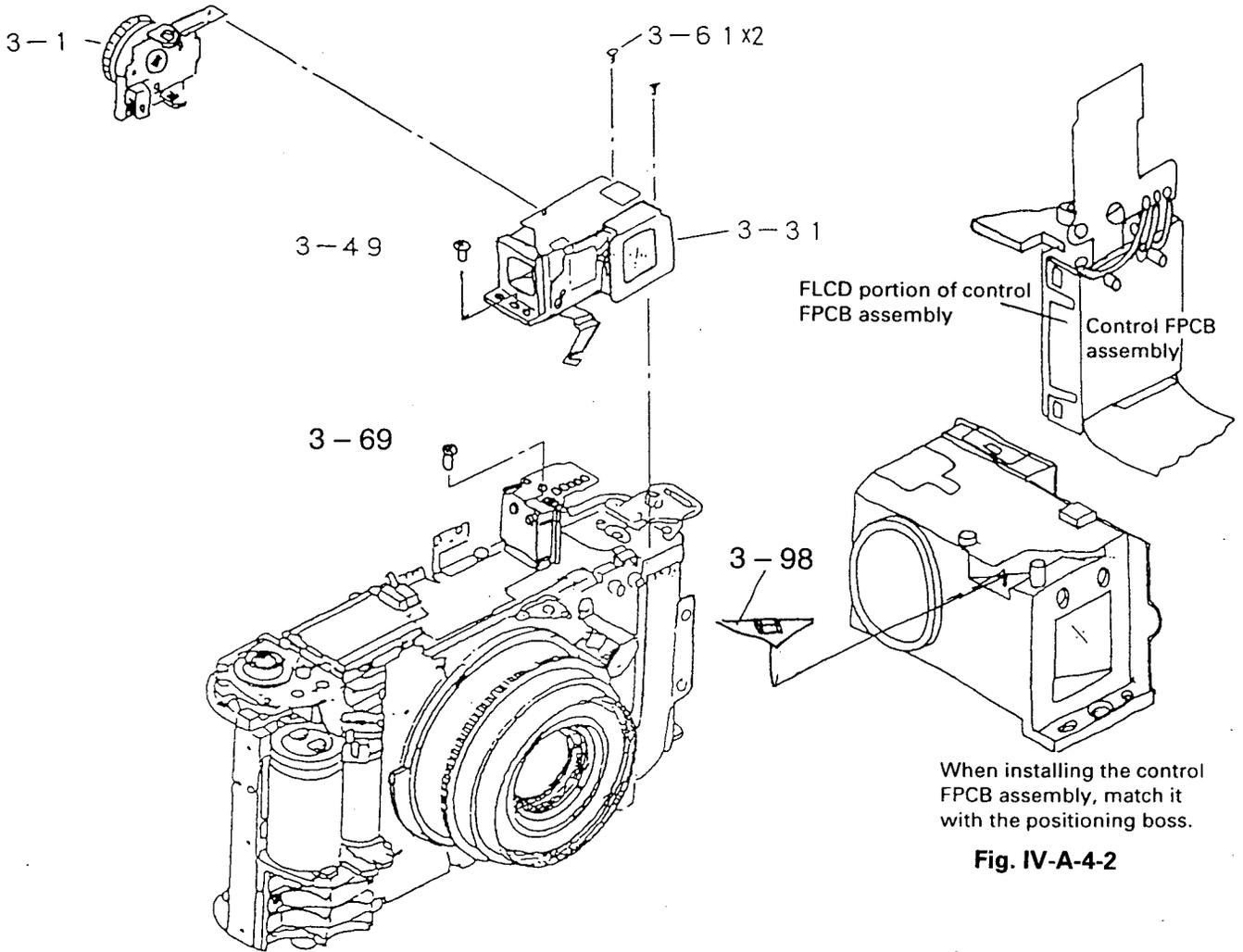


Fig. IV-A-4-2

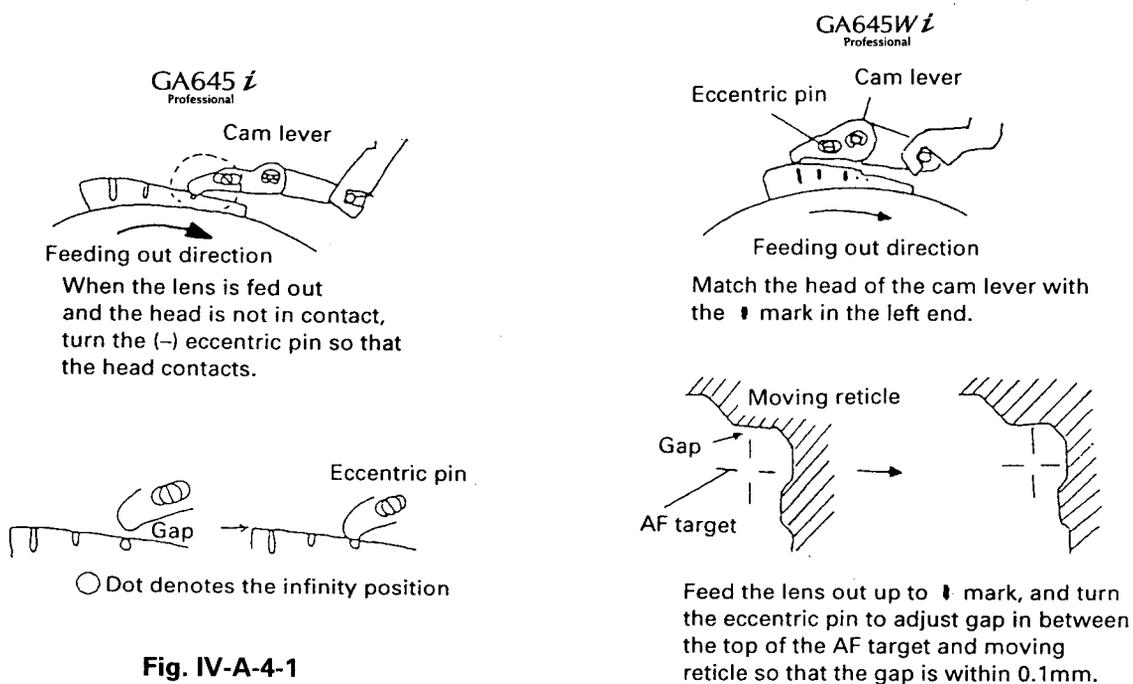


Fig. IV-A-4-1

Fig. IV-A-4-3

5. Control FPCB assembly (3-70)

(1) Removal

- 1) Unsolder and disconnect 23 lead wires and solder joint across the control FPCB assembly (3-70) and DX FPCB (5-64).
- 2) Remove the adhesive tape (3-92) and three screws (3-86).
- 3) Push down the boss of the PI of the gear train assembly (4-55) and remove it from the top base plate (4-79).
- 4) Remove the tact switch (3-81) from the top base plate (5-103).

NOTE:

Handle the top base plate (5-103) carefully. The claw of the top base plate is likely to be broken easily.

- 5) Remove two screws (3-90) and remove the metal fixture (3-88).
- 6) Remove the switch (3-74) from the LCD frame (3-75).
- 7) Remove two screws (3-76), the screw (3-89) and three screws (3-62).
- 8) Remove the control FPCB assembly (3-70) from the camera chassis.

NOTE:

The control FPCB assembly is secured on the camera chassis with adhesive tape. When removing the control FPCB assembly, be careful not to damage the flexible PCB.

(2) Reinstallation

- 1) Install the control FPCB assembly on the camera chassis with screws.
- 2) Insert the tact switch (3-81) into the top base plate (5-103), and secure the control FPCB assembly with screws.
- 3) Fold the flexible PCB, and install the LCD frame (3-75) with two screws (3-76).
- 4) Stick the flexible PCB to the position shown in Fig. IV-A-5-1 with adhesive tape (5-44), and fit the switch (3-74) to the LCD frame (3-75).
- 5) Referring to Fig. IV-A-5-3, install the control FPCB assembly and relay FPCB (4-16), install the metal fixture (3-88) and tighten two screws (3-90).

NOTE:

Thoroughly clean the tightly connected portion of the flexible PCB with alcohol.

- 6) Fit the PI to the gear train assembly (4-55), and secure the flexible PCB with three screws (3-86).
- 7) Solder the solder joints across the control FPCB assembly (3-70) and DX FPCB (5-64), and solder and connect 23 lead wires as shown in the Figs. IV-A-5-2, 3 and 4.
- 8) Secure the flexible PCB with adhesive tape.

Fig. IV-A-5

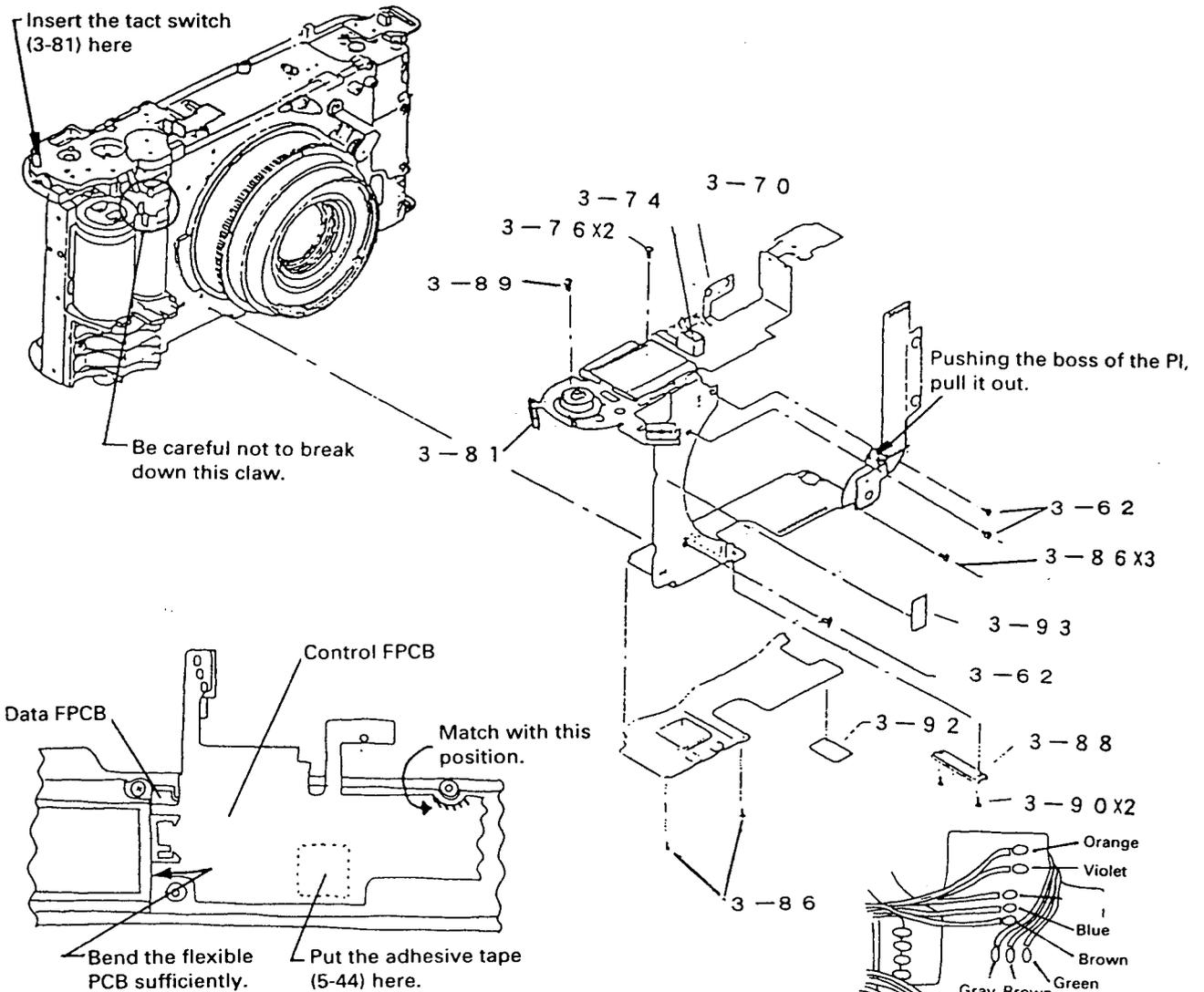


Fig. IV-A-5-1

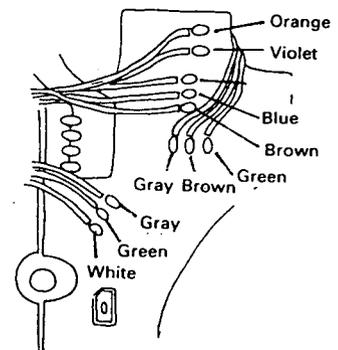


Fig. IV-A-5-2

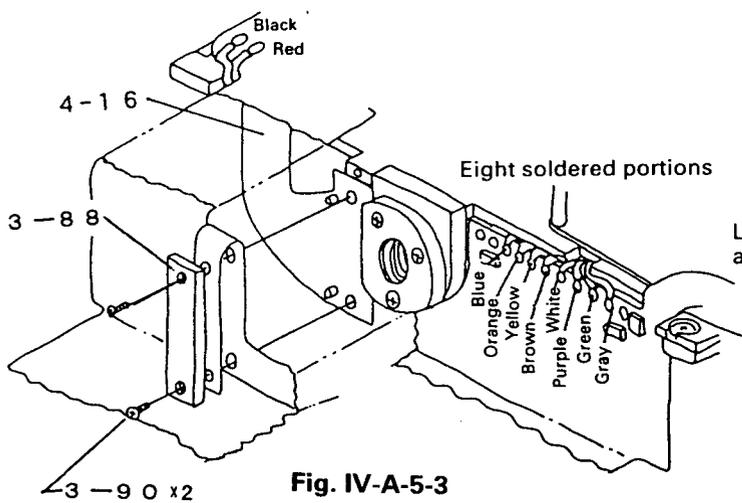


Fig. IV-A-5-3

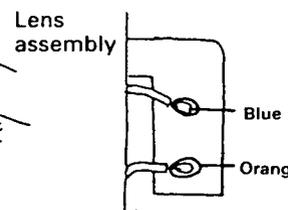


Fig. IV-A-5-4

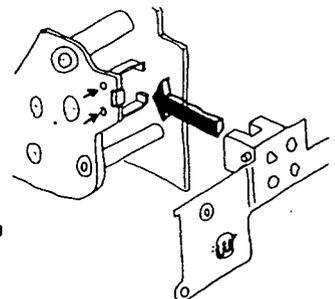


Fig. IV-A-5-5

6. Lens assembly (4-1) and film transporting mechanism assembly (1) (5-96)

(1) Removal

- 1) Remove the relay FPCB (4-16) (which is beneath the lens assembly (4-1)) from the camera chassis (5-7).
- 2) Remove four screws (4-84), and remove the lens assembly (4-1) carefully and slowly from the camera chassis (5-7).
- 3) Remove the PI (5-93) from the film transporting mechanism assembly (5-96).
- 4) Remove the main capacitor (5-94).
- 5) Disconnect two lead wires (6-31 and 6-32) extended from the film transporting mechanism assembly (1) (5-96) at the power supply FPCB assembly (5-79).
- 6) Peel off the tape (5-48), and detach the lead wires from the cord clamp (5-31).
- 7) Remove two screws (5-121) and screw (5-131), and remove the film transporting mechanism assembly (1) (5-96) from the camera chassis (5-7).
- 8) Pull out the encoder gear (5-51) from the camera chassis (5-7).

(2) Reinstallation

- 1) Install the encoder gear (5-51) on the shaft on the camera chassis (5-7).
- 2) Match the D-cut of the film take up gear shaft on the camera chassis with the opening of the encoder blade (5-98) of the film transporting mechanism assembly, install the film transporting mechanism assembly on the camera chassis, and tighten three screws (5-121x2 and 5-131) to secure the film transporting mechanism assembly.
- 3) Fit the PI (5-93) to the film transporting mechanism assembly (1) (5-96).
- 4) Solder and connect lead wires of the film transporting motor (5-104) to the power supply FPCB, and shape them up as shown in Fig. IV-A-6-1.
- 5) Pass the lead wires of the main capacitor (5-94) through the space beneath the film transporting motor (5-104), and stick the main capacitor (5-94) to the camera chassis (5-7).

NOTE:

When the adhesive tape on the main capacitor is deteriorated, replace it with a new one.

- 6) Install the lens assembly (4-1) on the camera chassis (5-7) with four screws (4-84) carefully so as not to hole any lead wire and flexible PCB in between the lens assembly and camera chassis.

Fig. IV-A-6

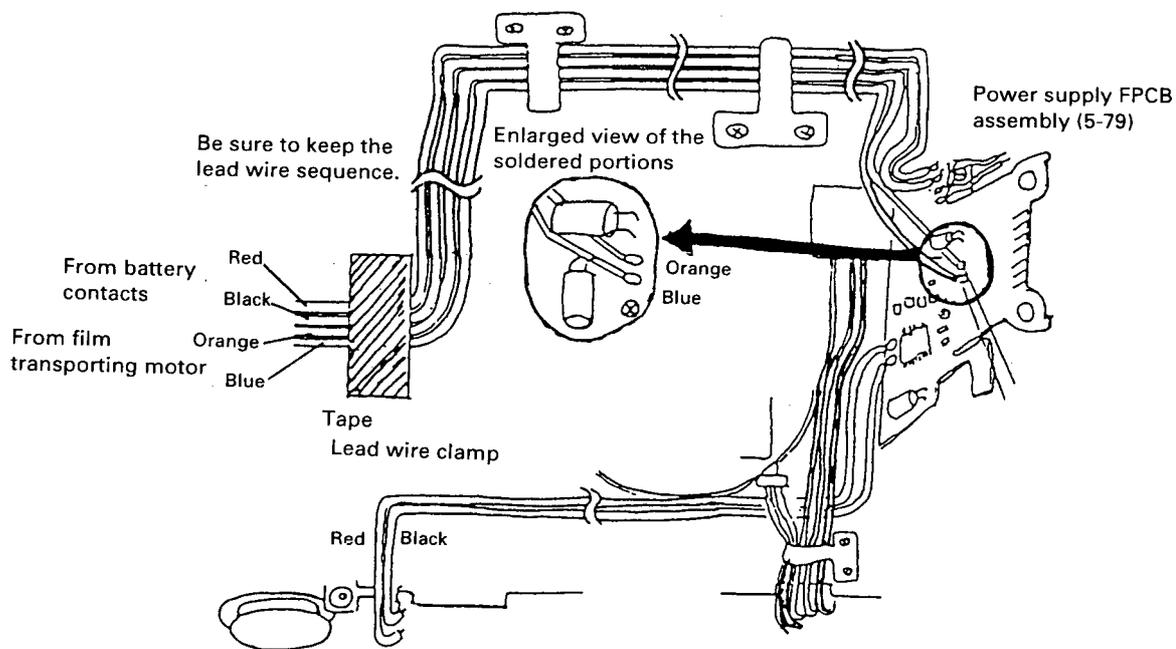
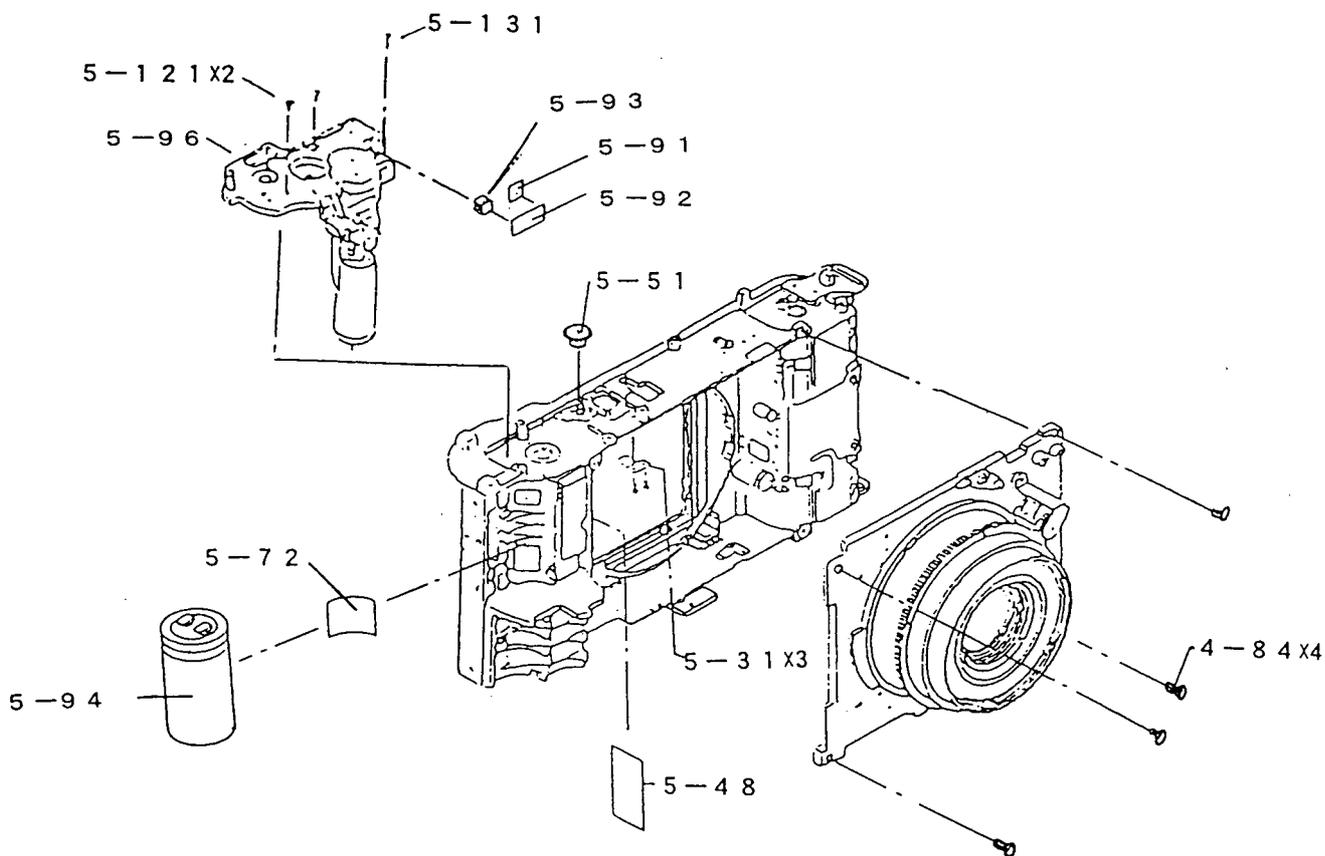


Fig. IV-A-6-1

B. Disassembly and reassembly

1. Top cover assembly (1-1)

(1) Disassembly

- 1) Pull out the shaft (1-24) after sliding it toward the eyepiece side, and as the flash head assembly (1-25) accommodated, raise the eyepiece side. The flash head assembly (1-25) can then be removed.
- 2) Peel off the adhesive, and remove the spring (1-16).
- 3) Remove the screw (1-17) and remove the pop-up lever (1-15).
- 4) Remove the screw (1-22), and remove the hinge assembly (1-18).
- 5) Peel off the guide (1-10) adhered by two pieces of adhesive tape (1-9) with the lead wire attached.
- 6) Peel off the name plate (1-40) secured with the adhesive tape (1-41) and remove the screw (1-42). The button (1-43), cover ring (1-39) and shaft (1-11) can then be removed. Be careful not to lose the click plate (1-44) and two springs (1-45) located underneath the button (1-43).
- 7) Peel off the adhered diffuser (1-3) and window glass (1-4).
- 8) Peel off the adhesive tape (1-21).

The eyepiece (1-23) and LCD window (1-6) have been caulked on the on the top cover (1-2), and the nut (1-14) and screw (1-13) are adhered. So, no disassembly is allowed anymore.

Fig. IV-B-1

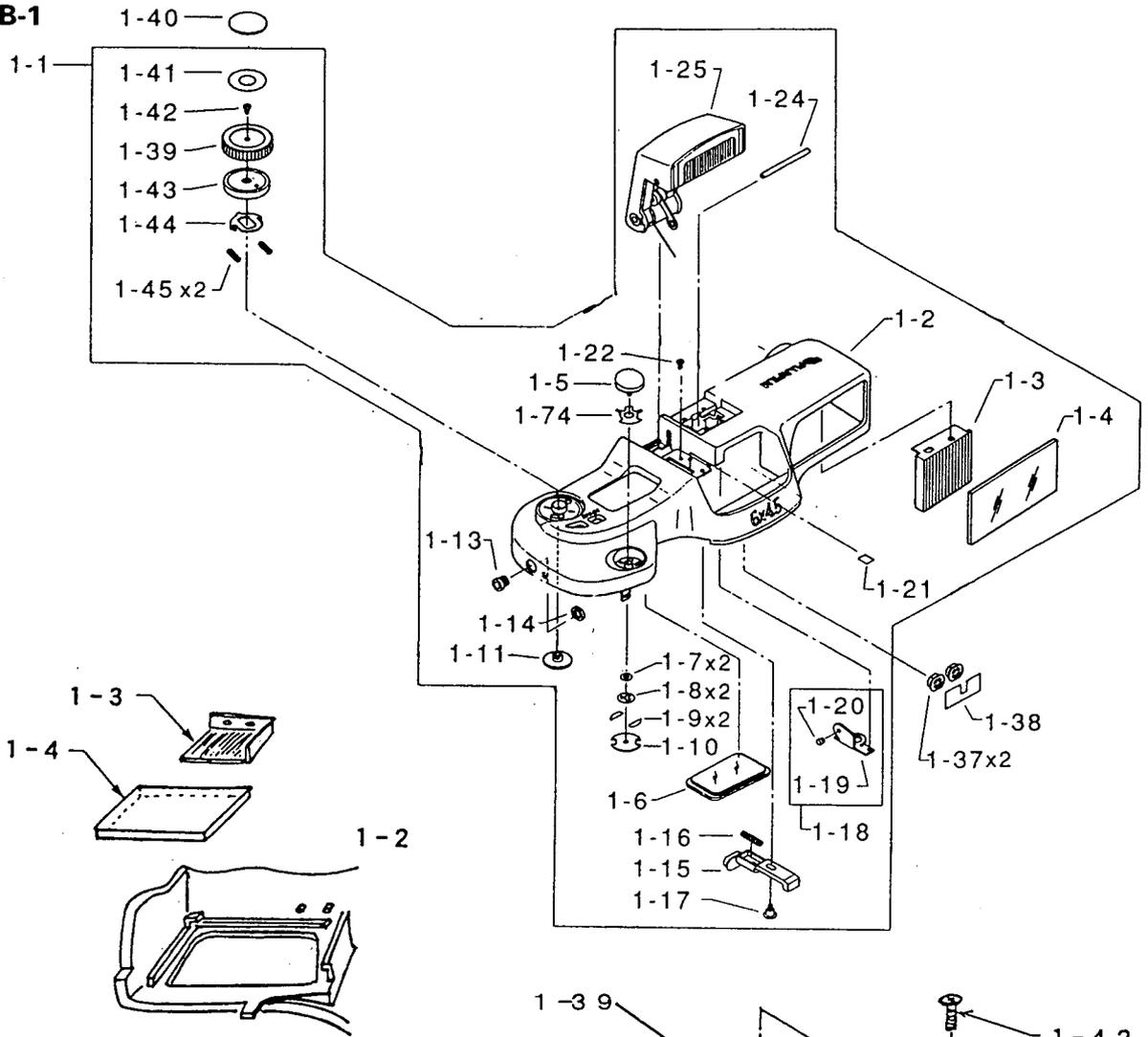


Fig. IV-B-1-1

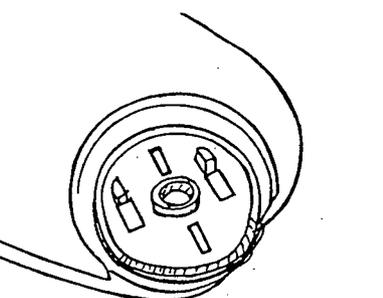
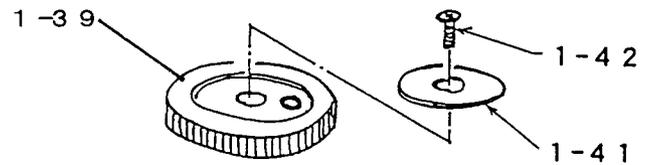


Fig. IV-B-1-2

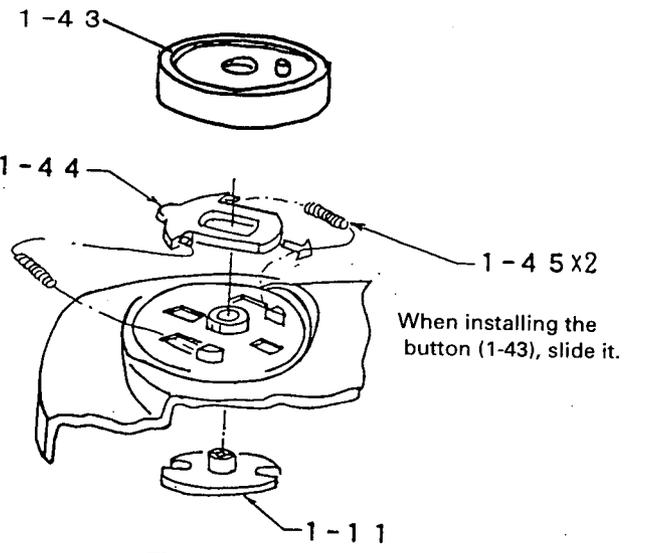


Fig. IV-B-1-3

(2) Reassembly

- 1) Put the adhesive tape (1-21).
- 2) Apply adhesive (Three Bond 1521B or equivalent) and install the window glass (1-4).
Before installing the window glass, make sure that the window glass is clean.
- 3) Apply adhesive (Three Bond 1521B or equivalent) and install the diffuser (1-3).
(See Fig. IV-B-1-1.)
- 4) Apply lubricant (tungsten bisulfide) as shown in Fig. IV-B-1-2.
- 5) Place the click plate (1-44) in its position, hook two springs (1-45), insert the shaft from the back with the button (1-43) built-in, engage the shaft with the head of the button (1-43), and tighten the screw (1-42). (Refer to Fig. IV-B-1-3.)
- 6) Stick the name plate (1-40) on the button (1-43) with adhesive tape.
- 7) Apply the blind cover (1-74) by matching it with the shape of the hole of the shutter release (1-5), and install the shutter release (1-5).
- 8) With the shutter button pressed in, apply the washer (1-7) to the column of the shutter release (1-5), and fit the clip ring (1-8).
- 9) Stick two pieces of the adhesive tape, and stick the guide (1-10) to which the lead wire has been connected.
- 10) Install the hinge assembly (1-18) with the screw (1-22).
- 11) Install the pop-up lever (1-15) with the screw (1-17).
- 12) Apply the spring (1-16) to the long groove on the pop-up lever (1-15), and apply adhesive (Three Bond 1521B or equivalent) to the lens side end of the spring (1-16).
- 13) Place the spring (2-6) in the groove on the top cover (1-2), apply the projected portion of the flash outer cover (2-1) to the recess on the top cover interior, and lay down and install the flash head assembly (1-25).
- 14) Insert the shaft (1-24) into the holes on the top cover (1-2) and flash head assembly (1-25) so that the slit on the shaft (1-24) is faced toward the eyepiece.

Fig. IV-B-1

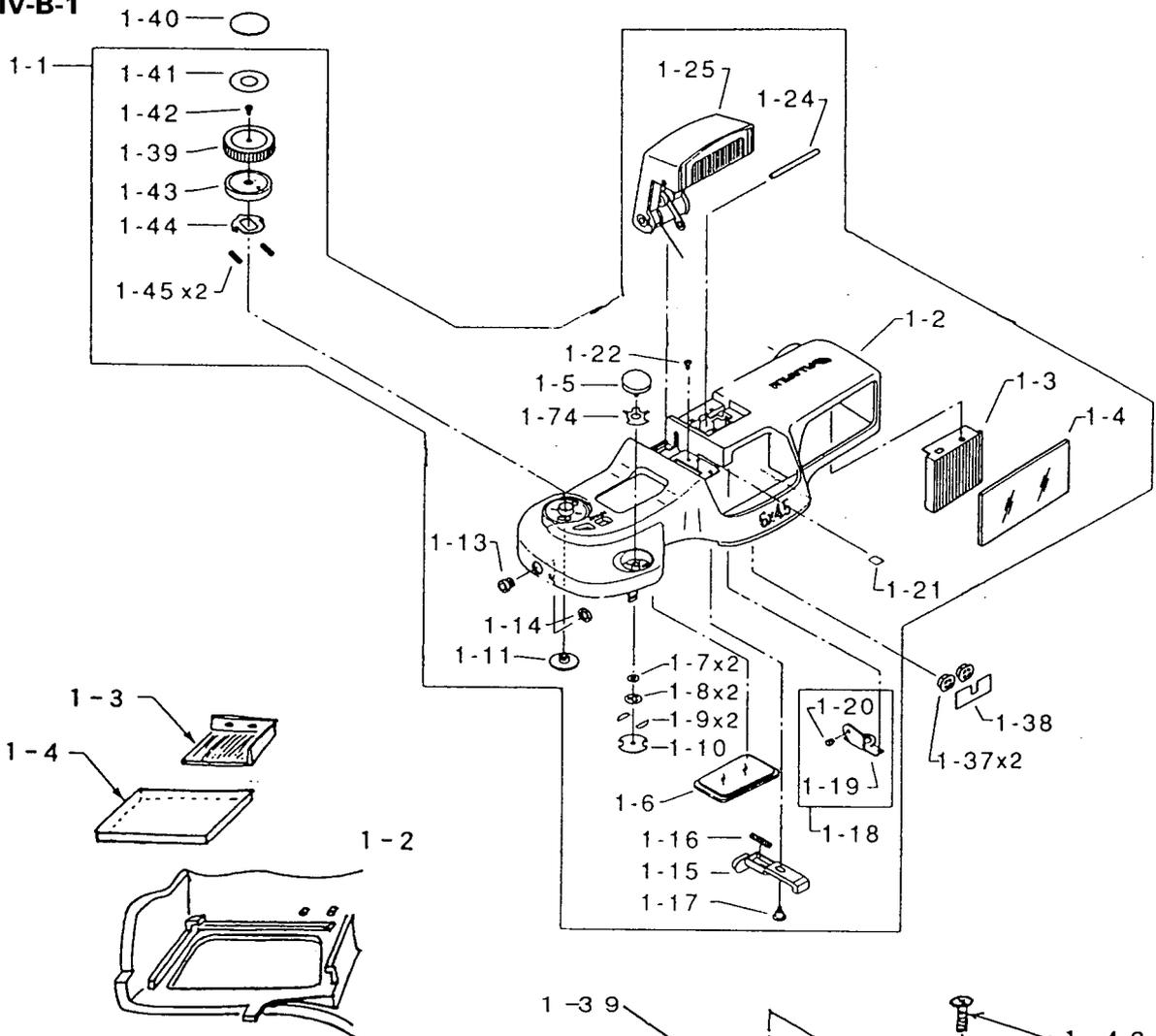


Fig. IV-B-1-1

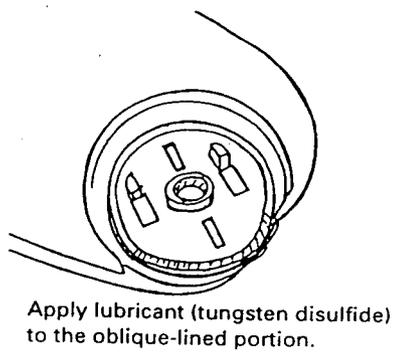


Fig. IV-B-1-2

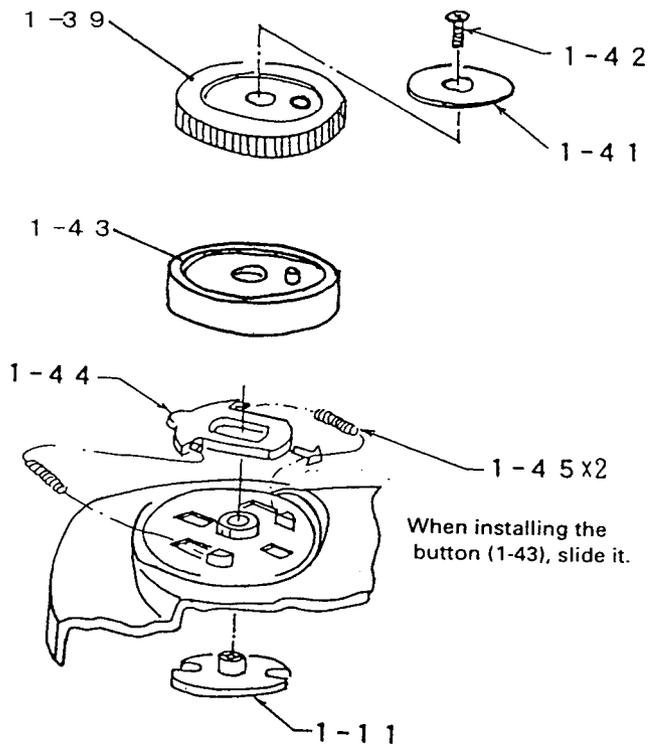


Fig. IV-B-1-3

2. Battery compartment cover assembly (1-64) and camera back assembly (2-22)

(1) Disassembly

- 1) Remove the E-clip (1-66), and remove the set screw (1-68).

NOTE:

The battery contact (1-65) is heat-caulked on the battery compartment cover (1-67), and cannot be removed.

- 2) Pull out the hinge shaft (2-25) from the camera back (2-23), and remove the hinge (2-24).
- 3) Remove three screws (2-53), and remove the light shielding plate (2-51) on which the moquette (2-52) is stucked.
- 4) Remove two screws (2-47), and with the camera back lock knob (2-43) raised, remove the grip (2-54).
- 5) Pull out the shaft (2-44), and remove the camera back lock knob (2-43).
- 6) Remove the spring (2-45).
- 7) Peel off the leather (2-26), and pull out the cover plate (2-28) from the pocket (2-27).
- 8) Push the head of the pin (2-50) into the roller (2-48), and remove it from the roller supporter (2-36). Be careful not to lose the spring (2-49).
- 9) Peel off the moquette (2-52) from the light shielding plate (2-51).

NOTE:

Further disassembly cannot be made as the parts are caulked.

(2) Reassembly

- 1) Apply the set screw (1-68) from the bottom of the battery compartment cover(1-67), and secure it with the E-clip (1-66).
- 2) With two pins (2-50) and two springs (2-49) applied on both ends of the roller (2-48), installed them on the roller supporter (2-36).
- 3) Put the cover plate (2-28) into the pocket (2-27).
- 4) Install the leather (2-26) with adhesive (Pliobond FHD011) using the pocket as the center.
- 5) Apply the spring (2-45) to the pin on the camera back and to the hook (2-38).
- 6) Match the opening of the camera back lock knob (2-43) with the opening on the hook (2-38), and insert the shaft (2-44).
- 7) With the camera back lock knob (2-43) raised, insert the camera back lock knob (2-43) into the square opening of the grip (2-54), install them on the camera back (2-23), and tighten two screws (2-47).
- 8) Install the light shielding plate (2-51) with three screws (2-53).
- 9) Apply adhesive (Pliobond FHD011) to the light shielding plate (2-51), and install the moquette (2-52) on the light shielding plate (2-51)

Fig. IV-B-2

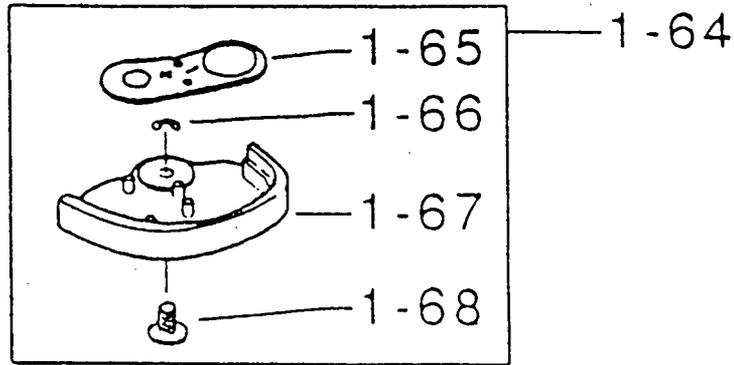


Fig. IV-B-2-1

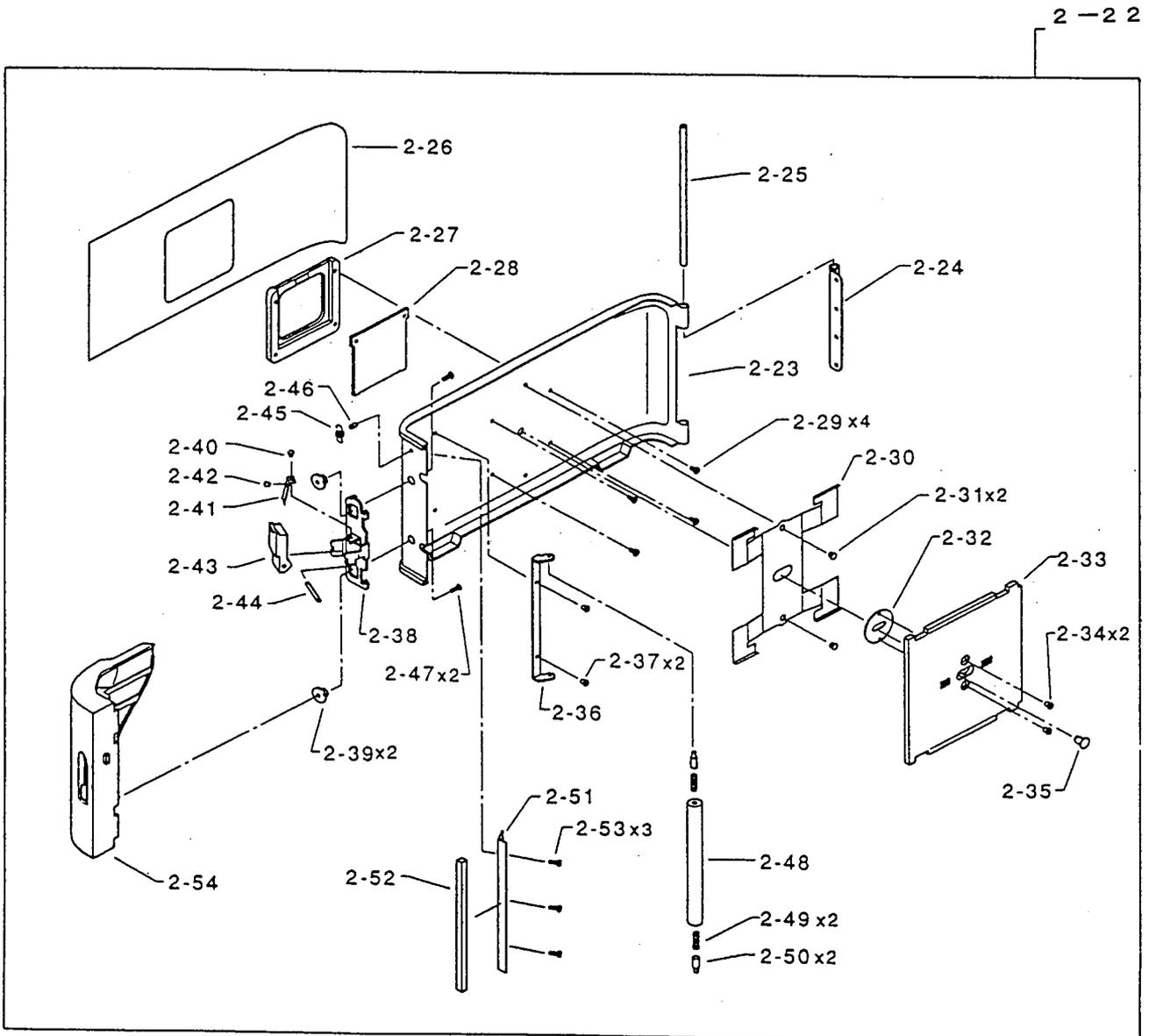


Fig. IV-B-2-2

3. Flash assembly (2-20)

(1) Disassembly

- 1) Remove two screws (2-2), and remove the flash outer cover (2-1).
- 2) Pull out the slider (2-9), slide shaft (2-10) and link (2-7) from the flash assembly (2-20), and remove the sleeve (2-4), washer (2-5) and spring (2-6).
- 3) Peel off the blind (2-3) from the flash outer cover (2-1).
- 4) Remove two screws (2-18), and pull out the reflector case (2-13) from the flash inner cover (2-8).
- 5) Remove the reflector (2-12), and remove the protector lens (2-11) from the flash inner cover (2-8).

(2) Reassembly

- 1) Place the protector lens (2-11) in the flash inner cover (2-8).
- 2) Install the reflector (2-12) and reflector case (2-13), and tighten two screws (2-18).

NOTE:

Be careful not to hold any lead wire in between the parts.

- 3) Stick the blind (2-3) to the flash inner cover (2-8). (See Fig. IV-B-3-1.)
- 4) Apply the washer (2-5) and spring (2-6) to the sleeve (2-4), and install them on the flash outer cover (2-1). (See Fig. IV-B-3-2.)
- 5) Apply the link (2-7) to the slider (2-9), insert the shaft (2-10) through the link (2-7) and slider (2-9), and install them on the flash assembly (2-20).

Now, install the flash outer cover (2-1) with two screws (2-2).

Fig. IV-B-3

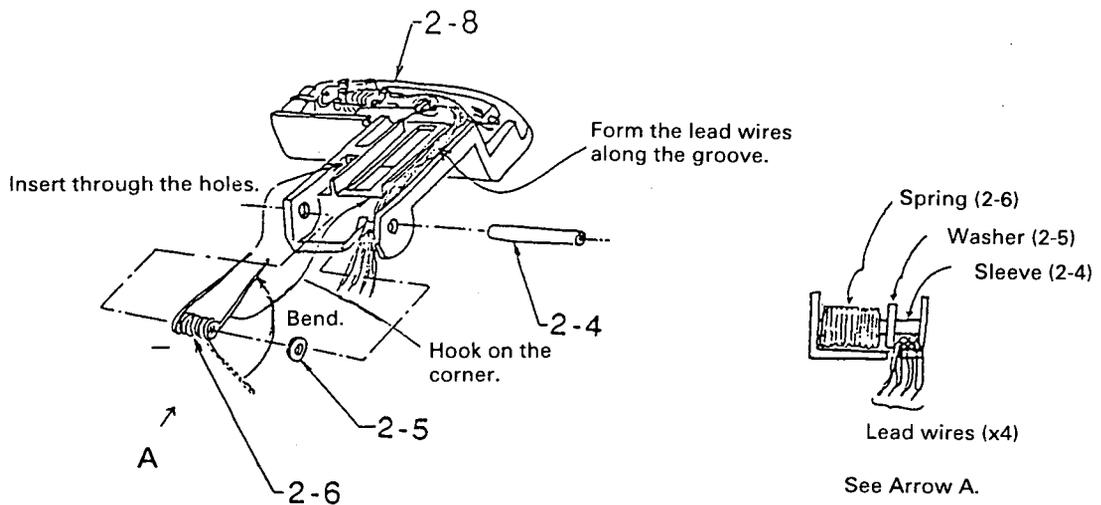
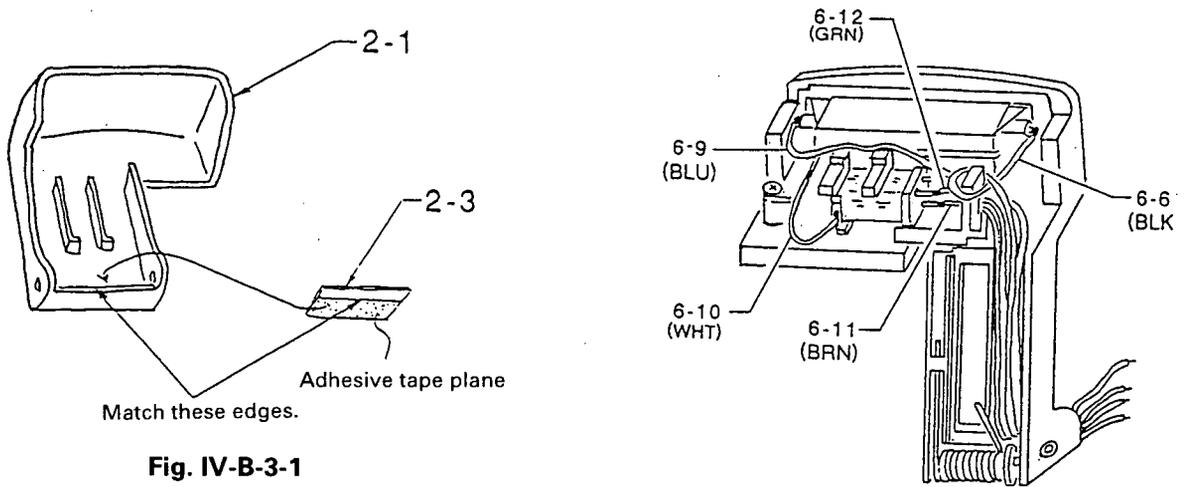
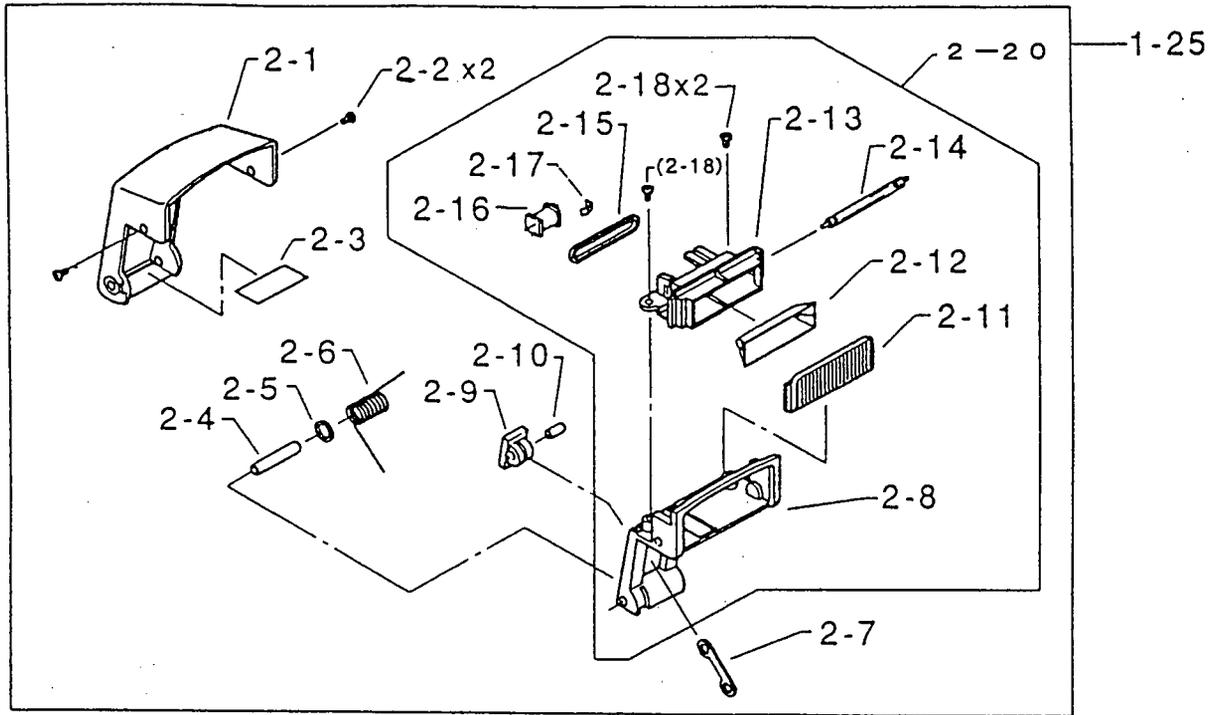


Fig. IIV-B-3-2

4. Front cover assembly (1-46)

(1) Disassembly

- 1) From the back of the front cover (1-47), turn the cover ring (1-48) clockwise to remove it, and remove the light shielding ring (1-50). Apply alcohol to the adhesive to ease the removing.
- 2) Light shielding cloth (1-49) has been stucked on the interior of the cover ring (1-48) with adhesive tape.
- 3) The self-timer window (1-51) has been stucked with adhesive. Push it forward from the back of the front cover (1-47) to remove it.
- 4) Peel off the name plate assembly (1-55).
- 5) The AF window (1-52) has been adhered. Push it forward from the back of the front cover (1-47) to remove it.
- 6) Remove two screws (1-84). The holder (1-83), SP FPCB assembly (1-82) and grounding plate (1-81) can then be removed.
- 7) Pull out the clip ring (1-8) and washer (1-7) from the column of the shutter button (1-85), and remove the shutter button (1-85). The cover ring (1-86) and front cover (1-47) have been secured with adhesive.

(2) Reassembly

- 1) When the cover ring (1-86) was removed, apply adhesive (Three Bond 1521B or equivalent) to the front cover properly before installing the cover ring (1-86). In this case, be sure that the adhesive has not come out of the cover ring (1-86).
- 2) Exercising care for the direction of the shutter button (1-85), install the shutter button on the front cover (1-47), and install the washer (1-7) and clip ring (1-8) in that order. Install the grounding plate (1-81), SP FPCB assembly (1-82) and holder (1-83) in that order, and tighten two screws (1-84) to secure them. Be careful not to hold the lead wires of the SP FPCB assembly in between the parts.
- 3) Install the self-timer window (1-51), AF window (1-52) and name plate assembly (1-55) on the front cover (1-47) with adhesive (Three Bond 1521B or equivalent). Be careful not to allow the adhesive come out of the parts.
- 4) When the light shielding cloth (1-49) has been peeled off, stick it on the interior of the cover ring (1-48) tightly.
- 5) Matching the light shielding ring (1-50) with two bosses on the back of the front cover (1-47), turn the cover ring clockwise from the front of the front cover (1-47) to install it temporarily. Next, apply adhesive (Three Bond 1401B) to the threads, and turn the light shielding ring (1-50) counterclockwise from the back of the front cover to secure it finally. (Refer to Fig. IV-B-4-1.)

Fig. IV-B-4

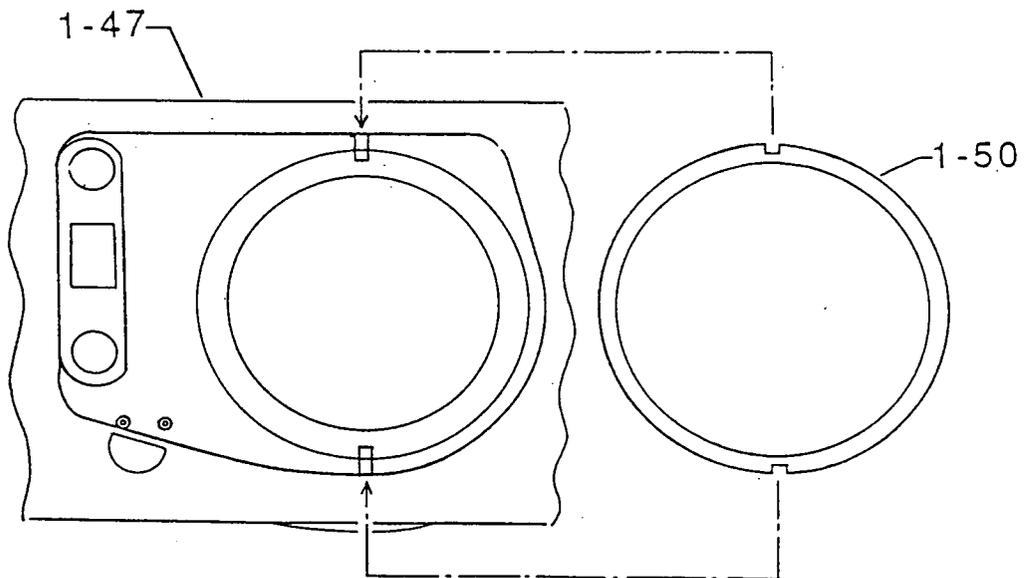
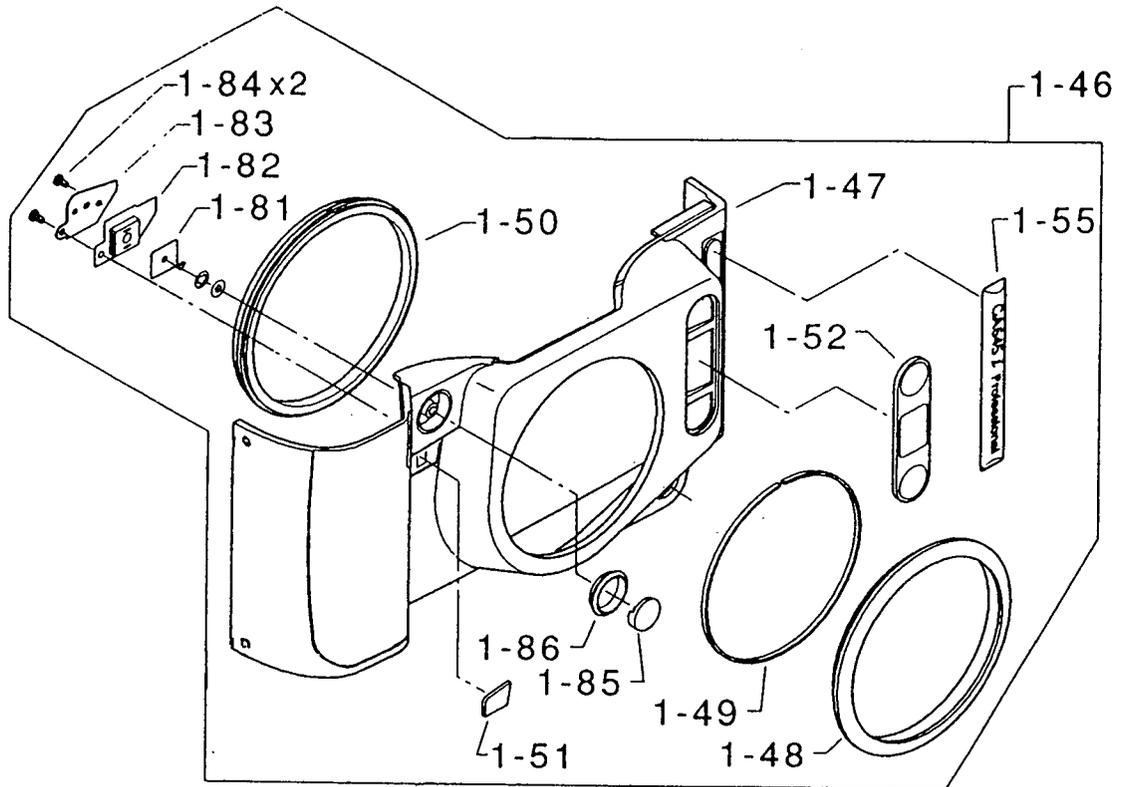


Fig. IV-B-4-1

5. AF system assembly (3-100)

(1) Disassembly

- 1) Unsolder and disconnect lead wires (6-35) and (6-36), and peel off the adhered light shielding plate (3-110).
- 2) Remove the screw (3-121), remove the PSD holder (3-120) and pull out the PSD (3-112) from the positioning boss.
- 3) Remove two screws (3-119), and pull out the holder (3-118).
- 4) Pull out the AF FPCB assembly (3-129) from the AF system chassis (3-101).
- 5) Peel off the light shielding tapes (3-109 and 3-108), and remove the moquette (3-106).
- 6) Remove the emitting lens (3-103) and receiving lens (3-102).

NOTE:

No further disassembly can be made because AF light emitting adjustment is extremely difficult.

(2) Reassembly

- 1) Apply adhesive (Three Bond 1521B or equivalent), and install the emitting lens (3-103) and receiving lens (3-102). When installing these lenses, refer to Fig. IV-B-5-1.
Thickness of the emitting lens differs from that of the receiving lens.
(Leave these lenses for at least 30 minutes after adhering them.)
- 2) Stick the light shielding tapes (3-109 and 3-108), install the AF FPCB assembly (3-129) (on which the moquette (3-106) is installed) on the AF system chassis (3-101), and after inserting the holder (3-118), tighten two screws (3-119). (Refer to Fig. IV-B-5-2.)
- 3) Fit the PSD (3-112) to two positioning bosses firmly so that the flat surface of the PSD (3-112) is faced toward the receiving lens (3-102).
- 4) Place the flexible PCB on the PSD (3-112) so that the gold-plated portion of the flexible PCB is faced to the front, and secure the PSD holder (3-120) with the screw (3-121).
- 5) Apply adhesive (Three Bond 1521B or equivalent) and stick the light shielding plate (3-110). (Refer to Fig. IV-B-5-3.)
- 6) Now, solder two lead wires (6-35 and 6-36).

Fig. IV-B-5

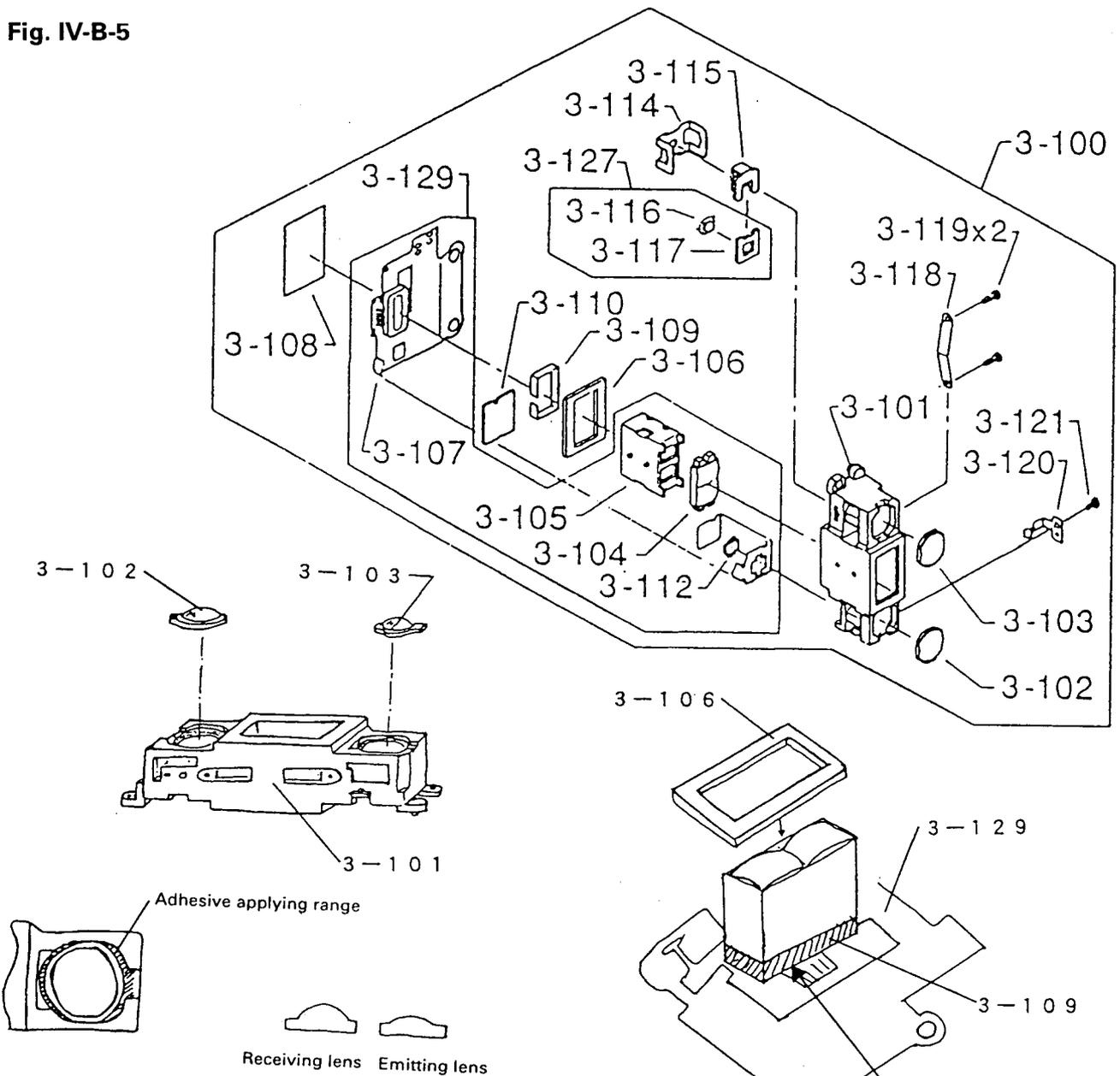


Fig. IV-B-5-1

Fig. IV-B-5-2

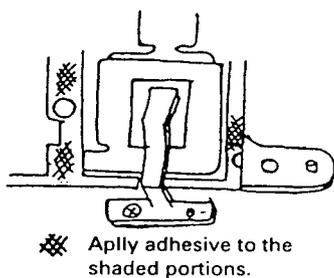


Fig. IV-B-5-3

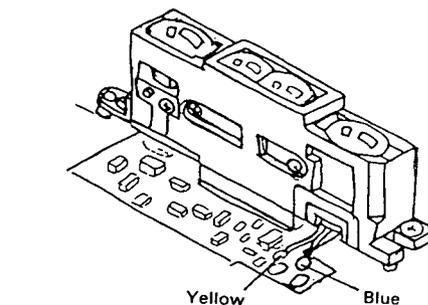


Fig. IV-B-5-4

6. Viewfinder assembly (3-31)

[See Fig. IV-B-6-2 in case of GA645W i Professional]

(1) Disassembly

- 1) Peel off the photographic tape (3-47), and remove the lens holder (3-38).
- 2) Remove the spring (3-57), remove two screws (3-60, 3-113), and take out the reticle assembly (3-50).

NOTE:

The reticle assembly (3-50) cannot be disassembled further because the components are caulked.

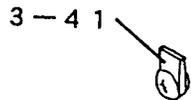
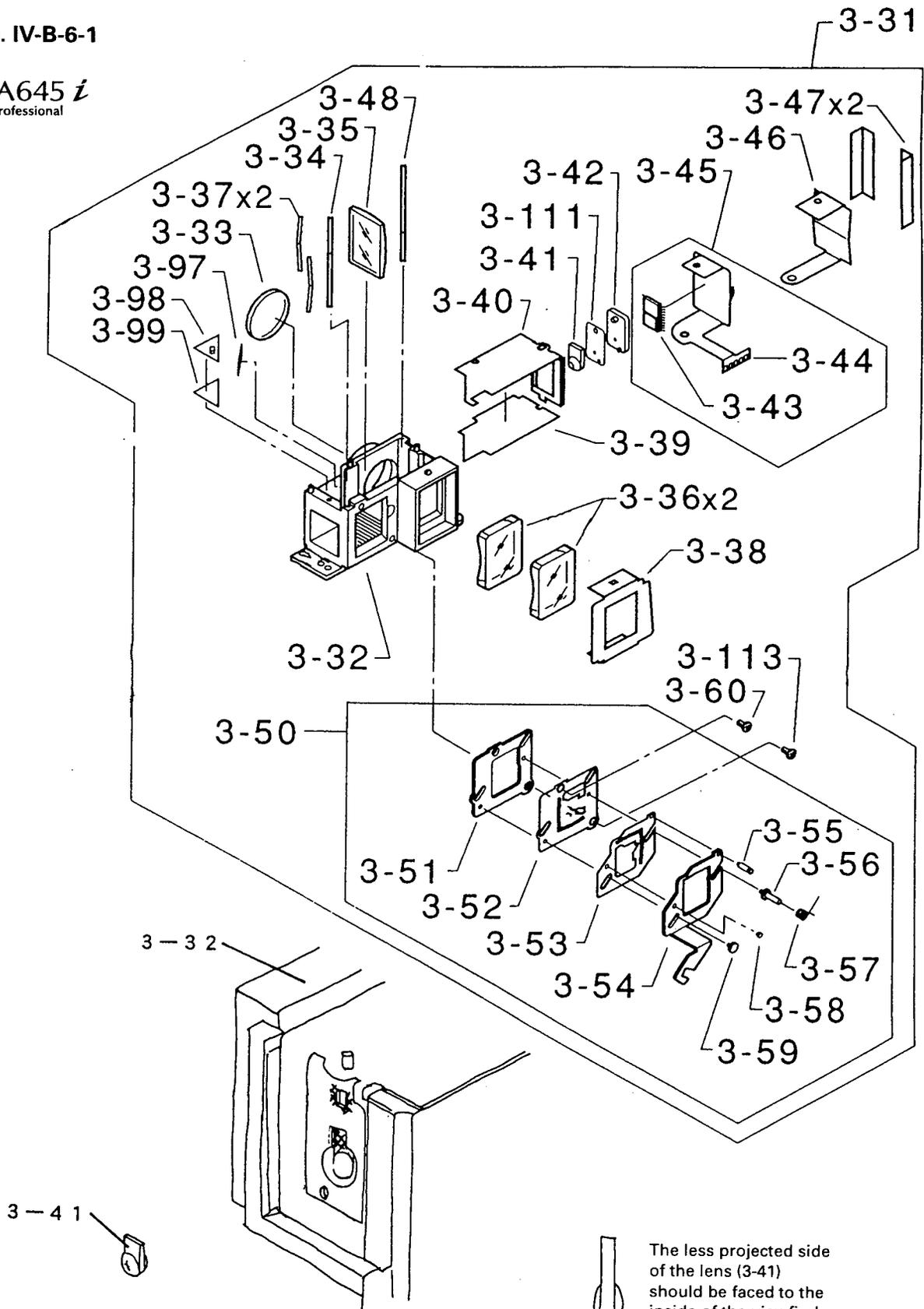
- 3) Unsolder and disconnect the FPCB assembly (3-45) from the FPCB holder (3-46), and remove the FPCB holder (3-46). Next, remove the FPCB assembly (3-45).
- 4) When replacing the light receiving lens (3-41) of the AE, remove the frame (3-42), and remove the adhered lens.
- 5) The FL FPCB assembly (3-98) has been secured on the viewfinder chassis (3-32) with adhesive tape (3-99). The diffuser (3-97) has been secured with adhesive.

NOTE:

The mirror and lens can no longer be removed from the viewfinder chassis (3-32) because the optical adjustment is extremely difficult.

Fig. IV-B-6-1

GA645 *i*
Professional



The less projected side of the lens (3-41) should be faced to the inside of the viewfinder chassis (3-32).

Apply adhesive to the shaded portions.

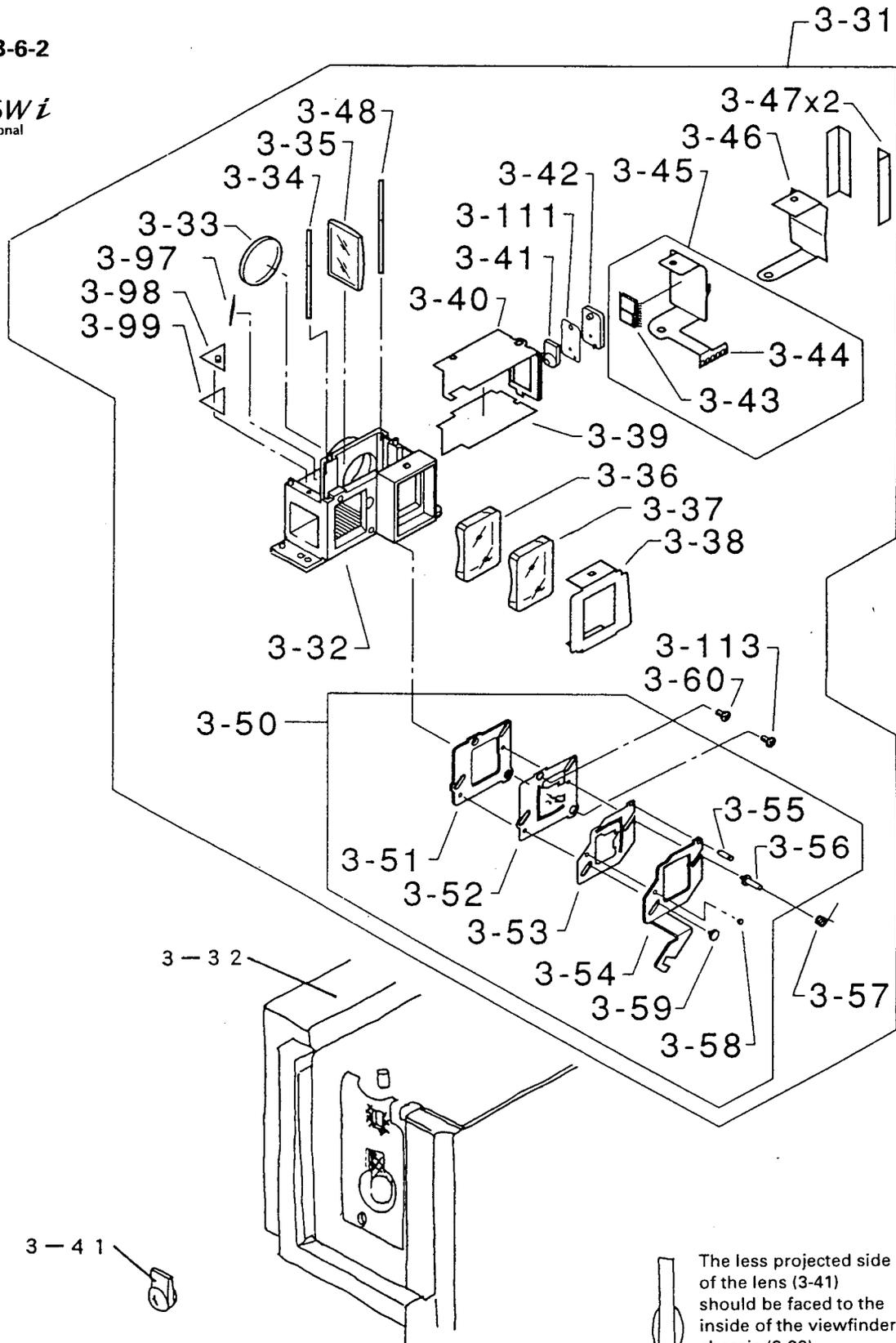
Fig. IV-B-6-1-1

(2) Reassembly

- 1) Install the diffuser (3-97) on the viewfinder chassis (3-32) with adhesive (Three Bond 1521B or equivalent). Install the FL FPCB assembly (3-98) with adhesive tape so that the LED is in right front of the diffuser (3-97).
- 2) When replacing the receiving lens (3-41) with a new one, apply adhesive (Three Bond 1521B or equivalent) to the viewfinder chassis (3-32), install the lens (3-41), AE aperture (3-111) and install the frame (3-42).
- 3) Install the FPCB assembly (3-45) on the top and bottom bosses on the viewfinder chassis (3-32), and after securing it with the FPCB holder (3-46), solder the FPCB assembly (3-45) and FPCB holder (3-46).
- 4) Stick two sheets of photographic tape (3-47), and after temporarily fixing the reticle assembly (3-50) with two screws (3-60, and 3-113), install the spring (3-57). Apply lubricant (Losoid 6308/1G) to the pin on which the spring is hooked.
- 5) After adjusting parallax, install the reticle assembly (3-50) completely, and fit the lens holder (3-38).

Fig. IV-B-6-2

GA645W i
Professional



⌘ Apply adhesive to the shaded portions.

The less projected side of the lens (3-41) should be faced to the inside of the viewfinder chassis (3-32).

Fig. IV-B-6-2-1

7. Mode switch assembly (3-1)

(1) Disassembly

- 1) Peel off the name plate (3-19) secured with adhesive tape, remove the screw (3-16), and remove the cover ring (3-6) and select dial (3-15). Remove and keep the click plate (3-13) and two springs (3-14) also at this time so as not to lose them. Be careful.
- 2) Remove the screw (3-18), and remove the mode switch FPCB assembly (3-128) from the mode switch frame (3-2).
- 3) Pull out the spring (3-7) and lock lever assembly (3-125), and remove the contact assembly (3-124).

NOTE:

The lock lever assembly (3-125) and contact assembly (3-124) cannot be disassembled further because they are caulked.

- 4) The mode switch FPCB (3-3) is installed on the base plate (3-5) with the adhesive tape (3-4).

(2) Reassembly

- 1) Matching with the hole position of the base plate (3-5), stick the mode switch FPCB (3-3) to the base plate, and apply lubricant (tungsten bisulfide) by referring to Fig. IV-B-7-1.
- 2) Apply lubricant (tungsten bisulfide) to the mode switch frame (3-2) (Refer to Fig. IV-B-7-2.), install the contact assembly (3-124), lock lever assembly (3-125) and spring (3-7), and install the mode switch FPCB assembly (3-128) on them with the screw (3-18). Make sure that the pin of the lock lever assembly (3-125) is in the hole on the base plate (3-5) correctly.
- 3) Place the click plate (3-13) on the mode switch frame (3-2), and install two springs (3-14) as illustrated in Fig. IV-B-7-3. Next, apply lubricant (tungsten bisulfide) to the select dial (3-15) (See Fig. IV-B-7-4.), place it on the mode switch frame (3-2), match the positioning hole of the cover ring (3-6), and tighten the screw (3-16).
- 4) Install the adhesive tape on the cover ring (3-6).
Recommend the name plate (3-19) be stucked by matching it with the index after assembling the camera completely.

Fig. IV-B-7

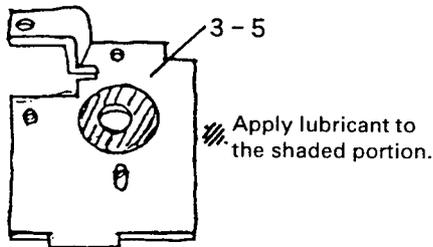
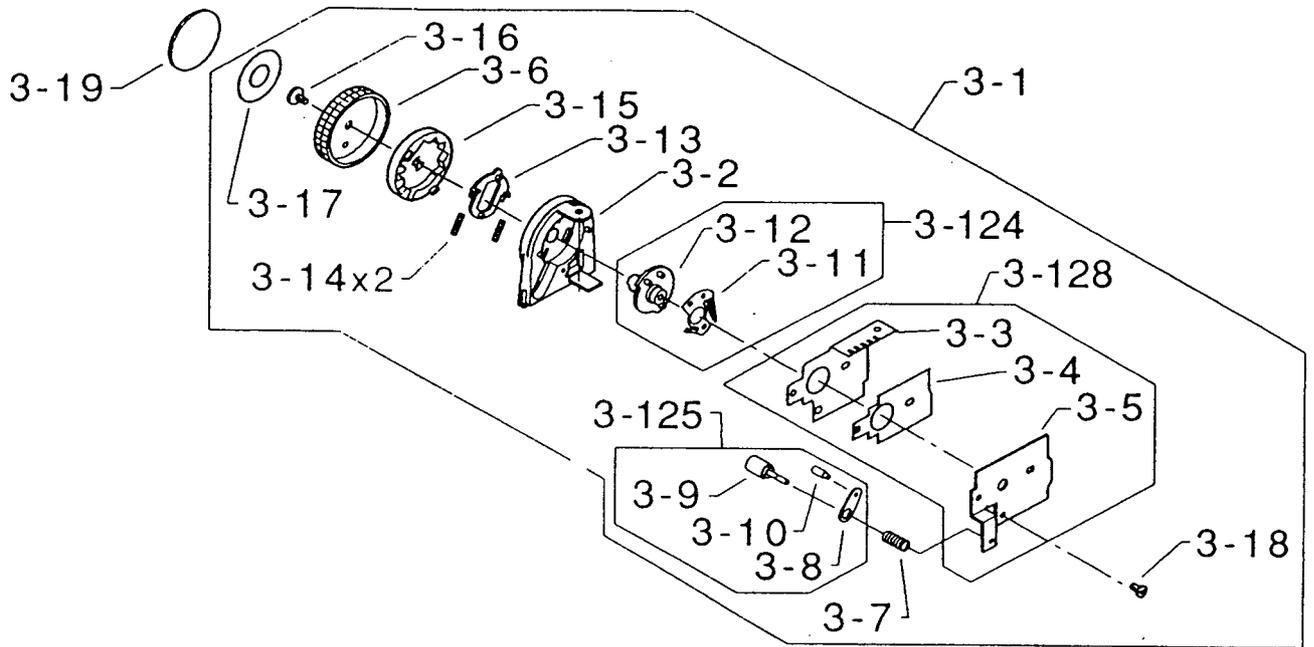


Fig. IV-B-7-1

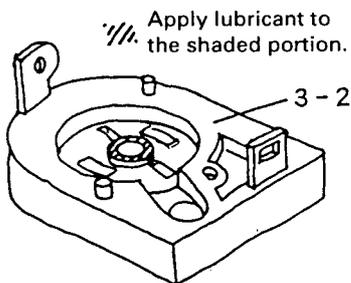
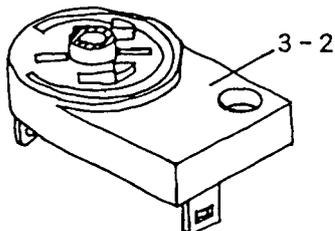


Fig. IV-B-7-2

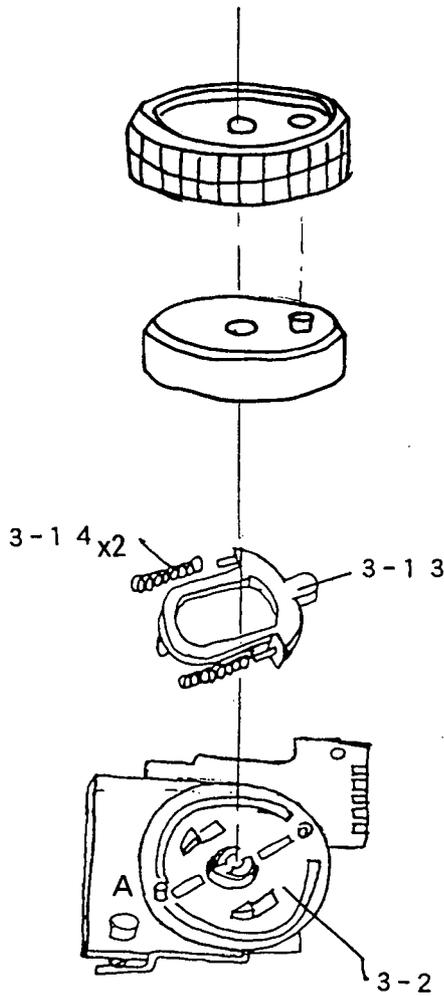


Fig. IV-B-7-3

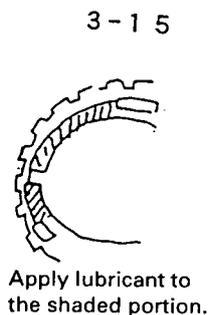


Fig. IV-B-7-4

8. Lens assembly (4-1)

(1) Disassembly

- 1) Remove two screws (4-19), and remove the metal fixture (4-18), rubber piece (4-17) and relay FPCB (4-16).
- 2) Pull up the connector portion of the shutter circuit assembly (4-31), pull out the FPCB of the shutter assembly (4-30), and after removing the screw (4-20), remove the shutter circuit assembly (4-31).
- 3) Remove the E-clip (4-53), and pull out the cam lever assembly (4-78), and removing the shaft (4-47), use a special tool (JA60035).
- 4) Remove three screws (4-83), and remove the gear train assembly (4-55).
- 5) Remove two screws (4-28), and remove the lens driving motor assembly (4-64).
- 6) Peel off the tape (4-26), unsolder and disconnect the lead wires (6-37 and 6-38), and pull out the motor gear (4-103).
- 7) Remove the screw (4-46), and remove the gear holder (4-44) and interlock gear (4-45).
- 8) Peel off the light shielding tape (4-23), and remove the encoder holder (4-22) after removing two screws (4-24).
- 9) Unbend the cord clamp (4-14) which combines lead wires (6-20 through 6-22), and after disconnecting the lead wires, remove the encoder contact (4-21).
- 10) Remove two screws (4-13), pull out the guide (4-11), and peel off the light shielding sheet (4-12) as required.
- 11) Remove four screws (4-10), pull out two helicoid keys (4-8), and peel off two sheets of the light shielding sheet (4-9) as required.
- 12) Turn the moving lens barrel assembly (4-43) counterclockwise (when observed the see-through (4-2) from the front) to remove it, and turn the helicoid barrel (4-6) clockwise and remove it.
- 13) Peel off the encoder FPCB (4-5) as required.
- 14) Matching the interlock cam (4-4) with the shape of the fixed barrel (4-3), pull the interlock cam (4-4), peel off the rubber seat (4-27) as required, and remove the guide ring (4-104). Remove four screws (4-15), and remove the fixed barrel (4-3) from the see-through (4-2).

(2) Reassembly

- 1) Install the fixed barrel (4-3) on the see-through (4-2) with four screws (4-15). When the rubber seat (4-27) has been removed, apply adhesive (Three Bond1521B or equivalent), and install the rubber seat (4-27).
- 2) Matching the interlock cam (4-4) with the shape of the fixed barrel (4-3), instal the interlock cam (4-4) so that the front side can be seen.
- 3) When the encoder FPCB (4-5) has been removed, stick (install) it by matching with the rib of the helicoid barrel (4-6). (Refer to Fig. IV-B-8-1.)

Fig. IV-B-8

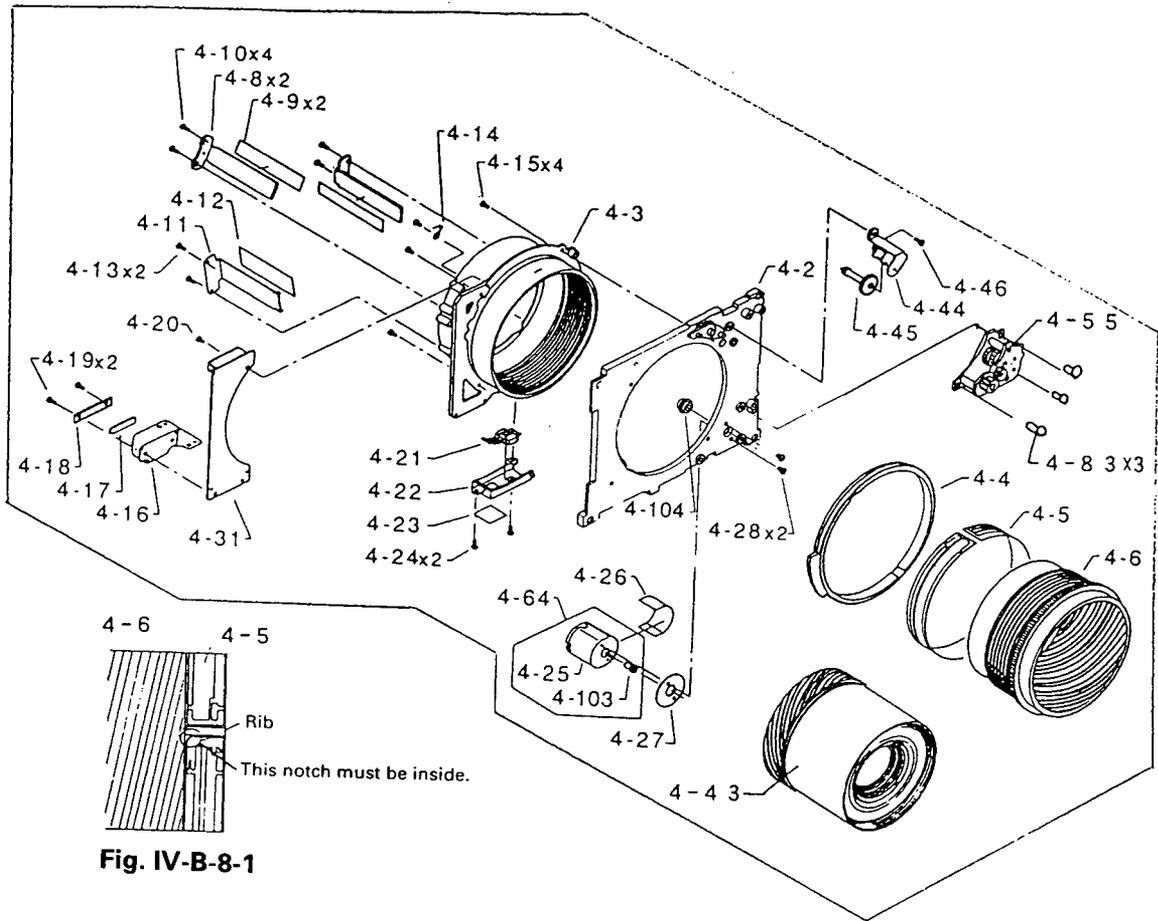


Fig. IV-B-8-1

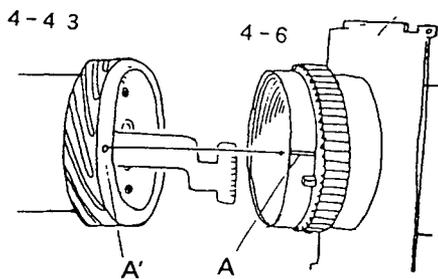


Fig. IV-B-8-2

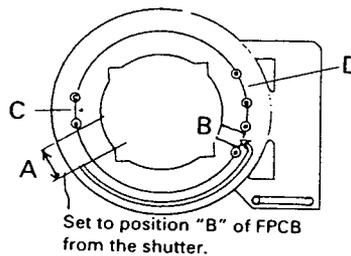


Fig. IV-B-8-3

Matching position of the flexible circuit.

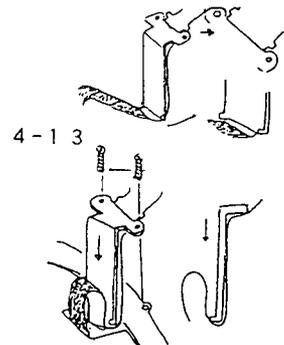


Fig. IV-B-8-4

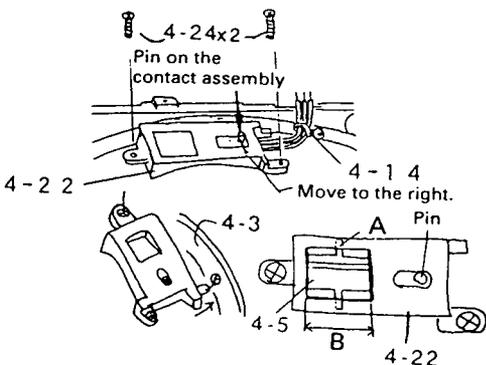


Fig. IV-B-8-5

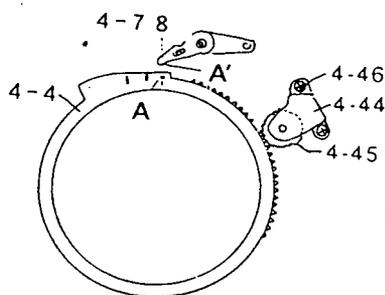


Fig. IV-B-8-6

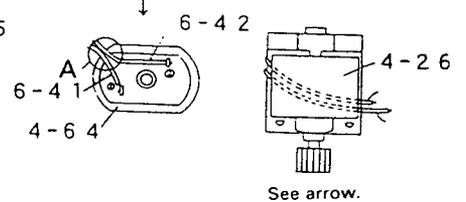


Fig. IV-B-8-7

- 4) Turning the helicoid barrel (4-6) counterclockwise, screw the helicoid barrel (4-6) assembled as described in 3) above into the fixed barrel (4-3).
- 5) Insert the shutter flexible circuit of the moving lens barrel assembly (4-43) into the helicoid barrel (4-6), match the portion A of the helicoid barrel (4-6) with the portion A' of the moving lens barrel assembly (4-43), turn it clockwise so that they are combined completely. (See Fig. IV-B-8-2.) In this case, the shutter flexible circuit must be within range A. (See Fig. IV-B-8-3.)
- 6) Watching the shutter assembly (4-30), turn the helicoid barrel (4-6) counterclockwise to position from A to B, apply two helicoid keys (4-8) on which two light shielding sheets (4-9) are installed to C and D, and tighten four screws (4-10). (Refer to Fig. IV-B-8-3.)
- 7) Install the guide (4-11) on which the light shielding sheet (4-12) is installed, and tighten two screws (4-13). (Refer to Fig. IV-B-8-4.)
- 8) Solder and connect three lead wires to the encoder contact (4-21), place it on the fixed barrel (4-3), apply the projected portion of the encoder holder (4-22) to the fixed barrel (4-3), and tighten two screws (4-24). At this time, the encoder contact (4-21) must in position A. Next, bind three lead wires (6-20 through 6-22) with the cord clamp (4-14). (Refer to Fig. IV-B-8-5.)
- 9) Install the shutter circuit assembly (4-31) on the fixed barrel (4-3) with the screw (4-20), and fit the shutter assembly (4-30) to the connector.
- 10) When the shaft (4-47) has been removed, install it by the use of a special tool (JA60035), install the cam lever assembly (4-78), and secure it with the E-clip (4-53).
- 11) Place the lens assembly reassembled up to step 10) above on a camera body, tighten four screws, place them on a focus adjust stand, look into a collimator, and obtain the infinity position by turning the helicoid barrel (4-6). At this position, look through the square hole of the encoder holder (4-22) and make sure that the portion A of the encoder FPCB (4-5) is within range B. Now, dismount the lens from the camera body carefully so as not to move the helicoid barrel (4-6). (Refer to Fig. IV-B-8-5.)
- 12) Turn the interlock cam (4-4), and at the position where portion A of the interlock cam (4-4) is matched with portion A' of the cam lever assembly (4-78), install the gear holder (4-44) on which the interlock gear (4-45) is installed on the see-through (4-2) with the screw (4-46). (Refer to Fig. IV-B-8-6.)
- 13) Put the light shielding tape (4-23) on the square hole of the encoder holder (4-22).
- 14) Apply the motor gear (4-103) to the lens driving motor (4-25) until it stops, solder and connect two lead wires, extend the lead wires through portion A, and secure the lead wires with a piece of tape. (Refer to Fig. IV-B-8-7.)
- 15) Pass the lens driving motor assembly (4-64) through the back of the see-through (4-2), and install it with two screws so that the lead wires are in the fixed barrel (4-3) side.
- 16) Install the relay FPCB (4-16) on the shutter circuit assembly (4-31), and install the rubber piece (4-17) and metal fixture (4-18) on them with two screws (4-19).

Fig. IV-B-8

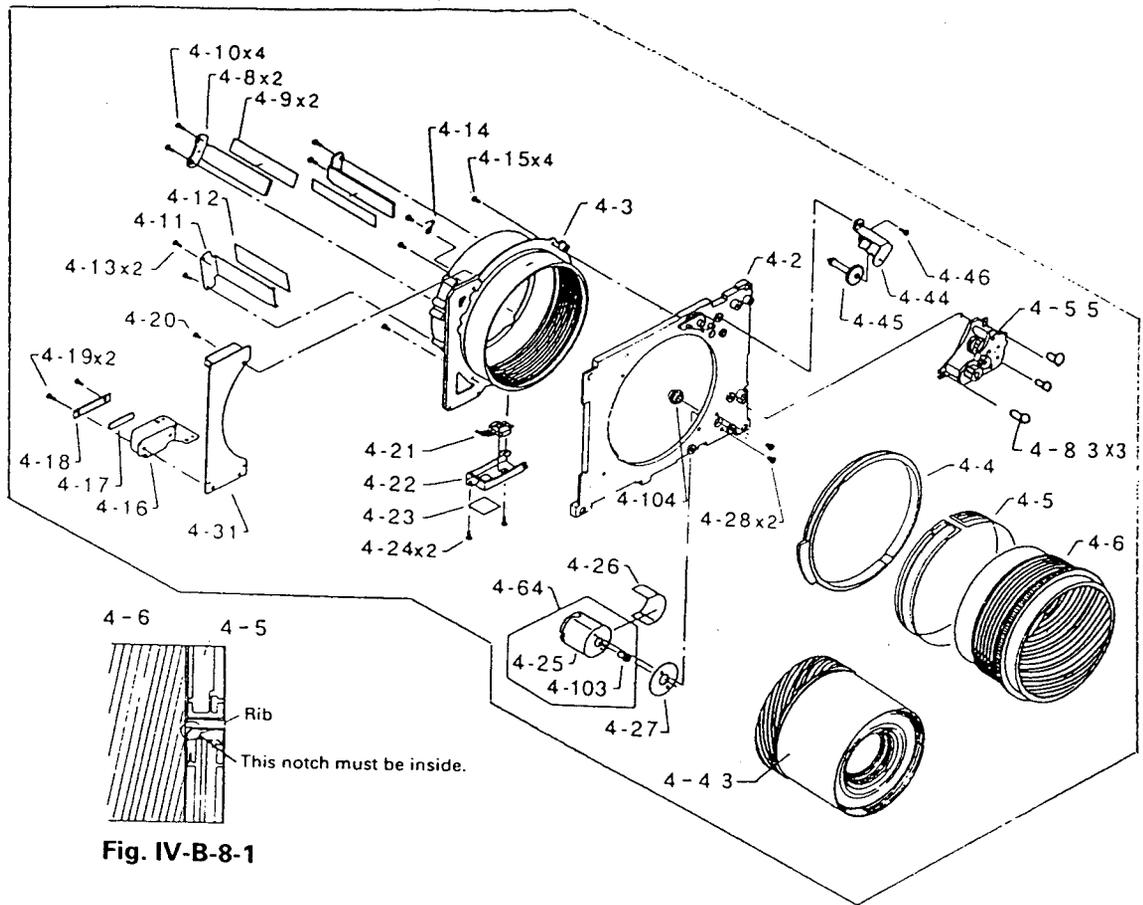


Fig. IV-B-8-1

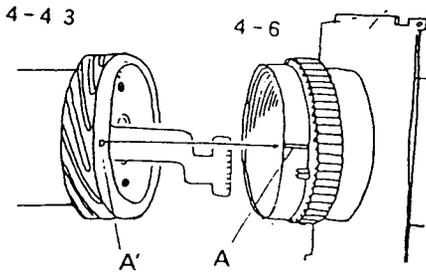


Fig. IV-B-8-2

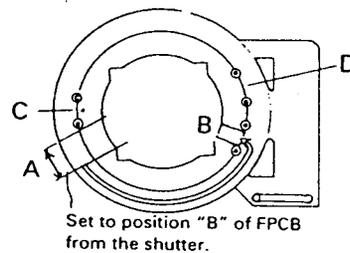


Fig. IV-B-8-3

Matching position of the flexible circuit.

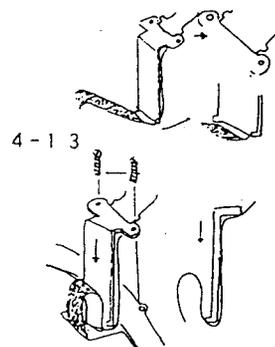


Fig. IV-B-8-4

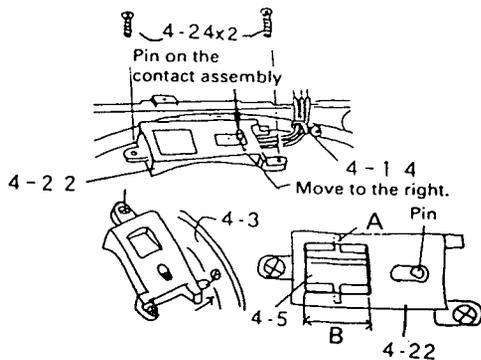


Fig. IV-B-8-5

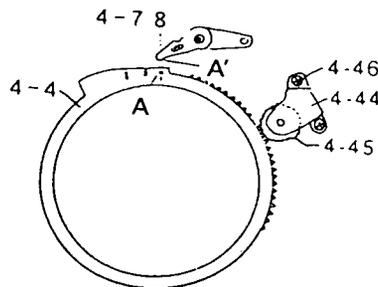


Fig. IV-B-8-6

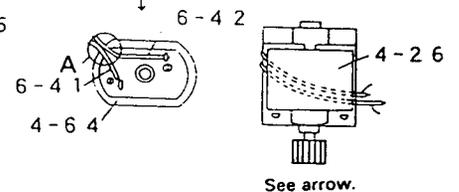


Fig. IV-B-8-7

9. Moving lens barrel assembly (4-43)

(1) Disassembly

- 1) Remove two screws (4-36) and remove the light shielding plate (4-34).
- 2) Remove three screws (4-35), raise the hood (4-33) to swell the center portion of the FPCB of the shutter assembly (4-30), remove the shutter assembly (4-30) from the hook on the hood (4-33), and remove the hood (4-33).
- 3) Turn the front lens assembly (4-41) counterclockwise and remove it by the use of a tool (compass).
- 4) Peel off the moquette (4-42), remove three screws (4-38), and remove the shutter assembly (4-30) from the shutter frame (4-32).
- 5) Remove two screws (4-37), and remove the moving lens barrel (4-7).

NOTE:

The front lens assembly (4-41) and rear lens assembly (4-40) cannot be disassembled further as the optical adjustments are extremely difficult.

[In case of GA645W~~i~~] (Refer to Fig.s IV-B-9-1-2 and IV-B-9-2-2.)
Professional

Remove the rear lens assembly (4-40), remove two screws (4-37) and remove the moving lens barrel (4-7).

NOTES:

1. The spacer (4-101) is in between the rear lens assembly (4-40) and shutter frame (4-32). Be careful not to lose it.
2. The front lens assembly (4-41) and rear lens assembly (4-40) cannot be disassembled due to the optical adjustments.
3. When replacing either one of the front lens assembly (4-41), rear lens assembly (4-40) and shutter frame (4-32) with a new one, be sure to replace it as a set. These three components are optically adjusted as a set.

Fig. IV-B-9

[In case of GA645 i Professional]

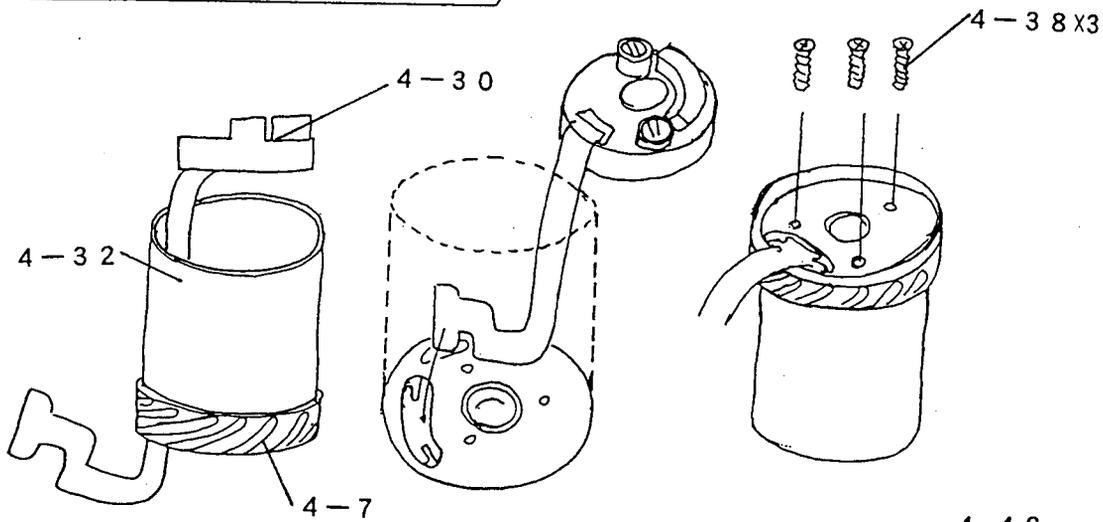
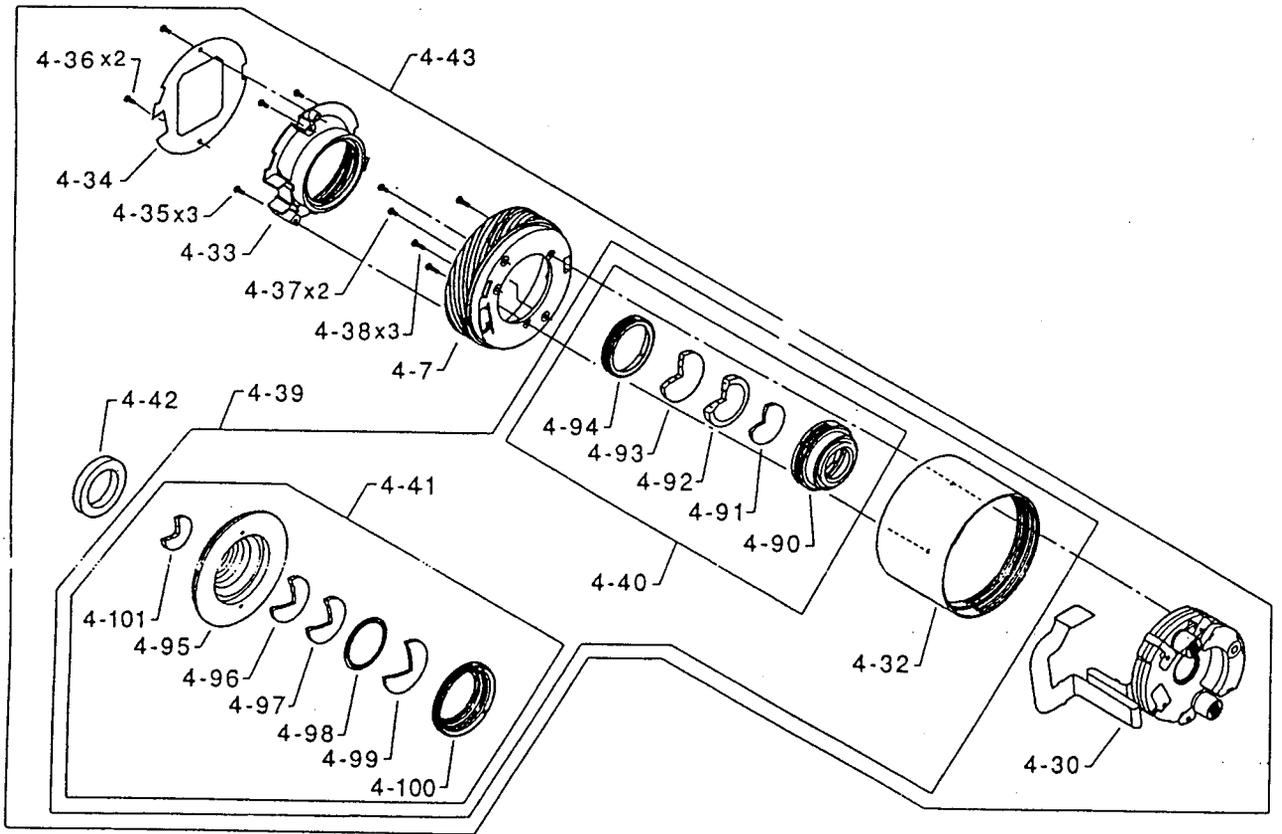


Fig. IV-B-9-1-1

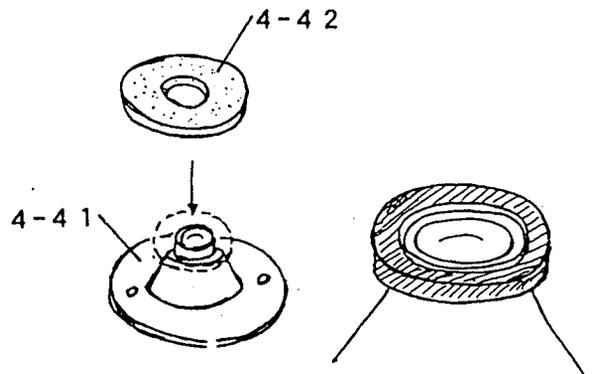


Fig. IV-B-9-2-1

(2) Reassembly

- 1) Place the moving lens barrel (4-7) by matching it with the shape of the shutter frame (4-32), and tighten two screws (4-37).

[In case of GA645W i Professional] (Refer to Figs IV-B-9-1-2 and IV-B-9-2-2.)

Apply the spacer (4-101) to the shutter frame (4-32) and screw in the rear lens assembly (4-40). Install the rear lens assembly (4-40) very carefully so that the spacer will not be twisted. If the spacer comes out of the correct position, the gap between the front and rear lens assemblies will be deviated. Then, the focus may be adjusted but the circumference resolving power will not satisfy the rating.

- 2) With the shutter assembly (4-30) positioned down side, pass the head of the flexible circuit through the opening of the shutter frame (4-32), pull the head of the flexible circuit, place the shutter in the shutter frame, and tighten three screws (4-35) from the back. (Refer to Fig. IV-B-9-1-1.)
- 3) Pass the shutter assembly (4-30) through the hook on the hood (4-33), place the hood (4-33) in the moving lens barrel (4-7), and secure the hood (4-33) with three screws (4-35).
- 4) Matching it with the shape of the hood (4-33), install the light shielding plate (4-34) with two screws (4-36), and install the front lens assembly (4-41) to which the moquette (4-42) is stuck on the shutter frame (4-32) by the use of a tool (compass). (Refer to Fig. IV-B-9-2-1.)

Fig. IV-B-9

[In case of GA645W i Professional]

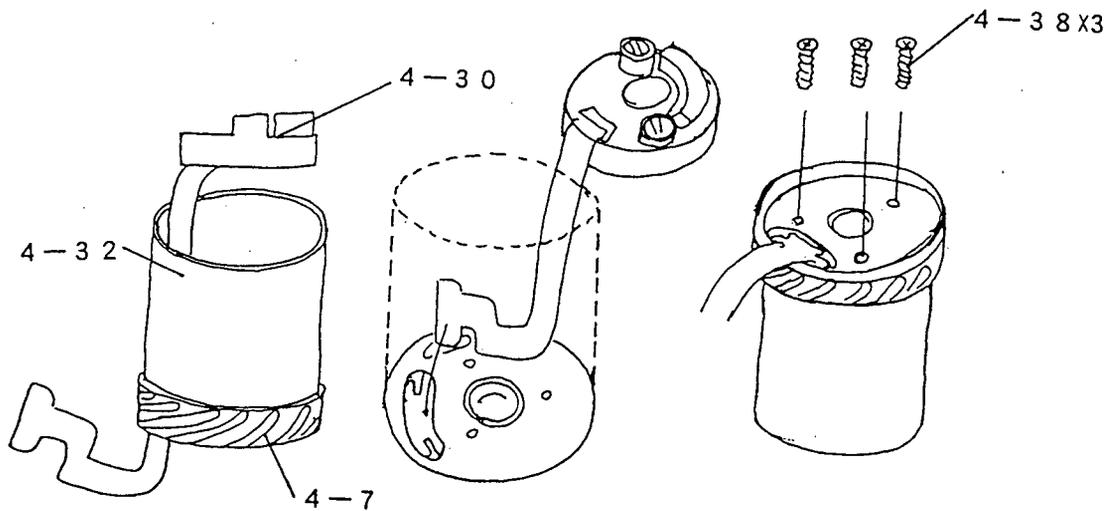
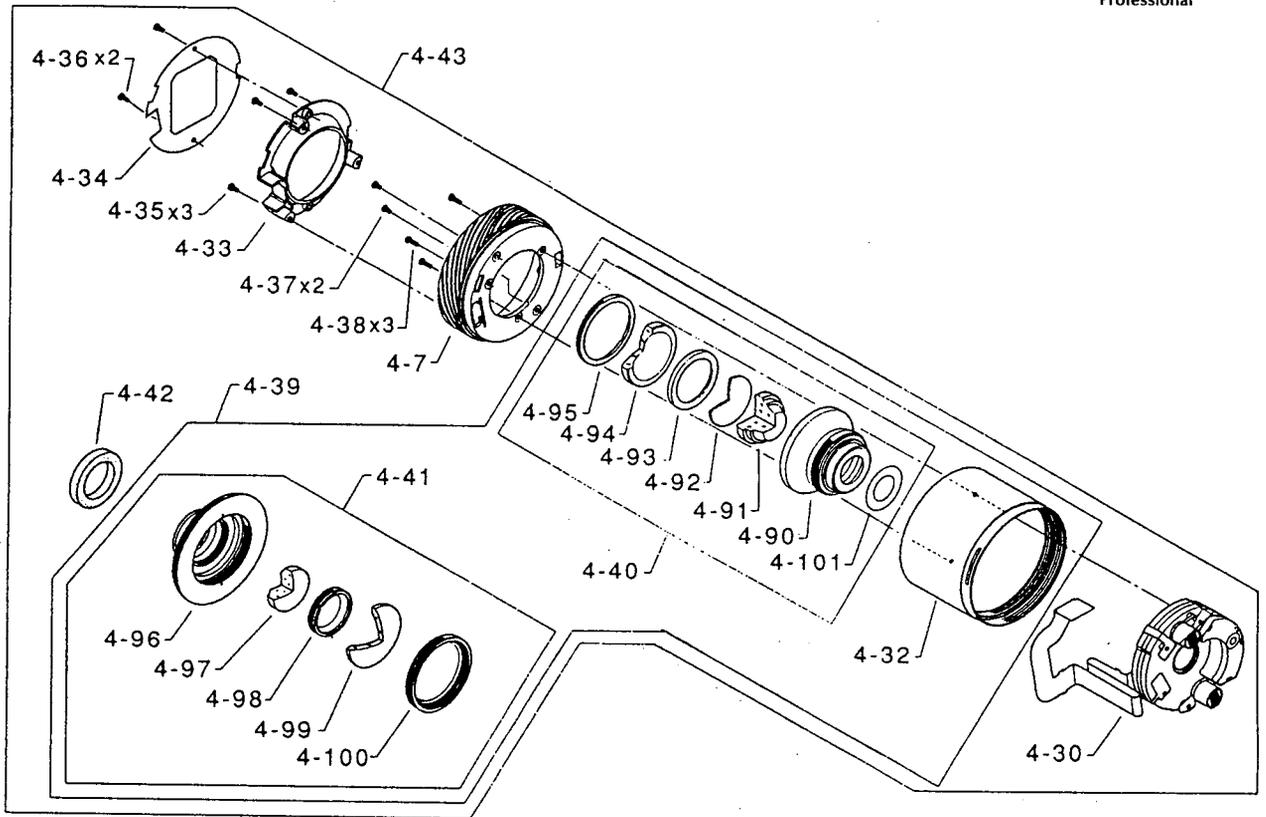


Fig. IV-B-9-1-2

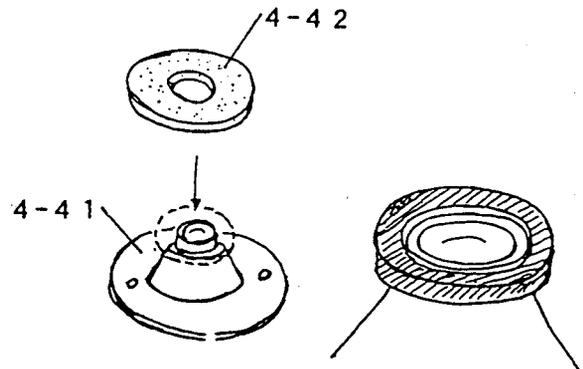


Fig. IV-B-9-2-2

10. Gear train assembly (4-55)

(1) Disassembly

- 1) Remove two screws (4-57), remove the top base plate (4-79), and pull out the friction gear assembly (4-62).
- 2) Pull out the encoder gear (4-73), and remove the gear L3-L4 (4-74).
- 3) Remove the E-clip (4-82), remove the gear L7 (4-81), remove the screw (4-69), and remove gears L5 (4-76) and L6 (4-80).

NOTE:

The gear train assembly (4-55) cannot be disassembled further because the parts are caulked.

(2) Reassembly

- 1) Apply grease (G30M) to the shaft holder interior, install the gear L6 (4-80), and matching the gear L5 (4-76) with the shape of the gear L6 (4-80), secure the gear L6 (4-80) with the screw (4-69).
- 2) Apply grease (G30M) to the shaft (4-70), install the gear L7 (4-81) on the shaft, and secure the gear L7 (4-81) with the E-clip (4-82).
- 3) Apply grease (G30M) to the shaft (4-68), and install the gear L3-L4 (4-74) on the shaft.
- 4) Apply grease (G30M) to the shaft (4-67), and install the encoder gear (4-73) on the shaft.
- 5) Apply grease (G30M) to the gear shaft (4-66), install the friction gear assembly (4-62) and install the top base plate (4-79) with two screws (4-57).

Fig. IV-B-10

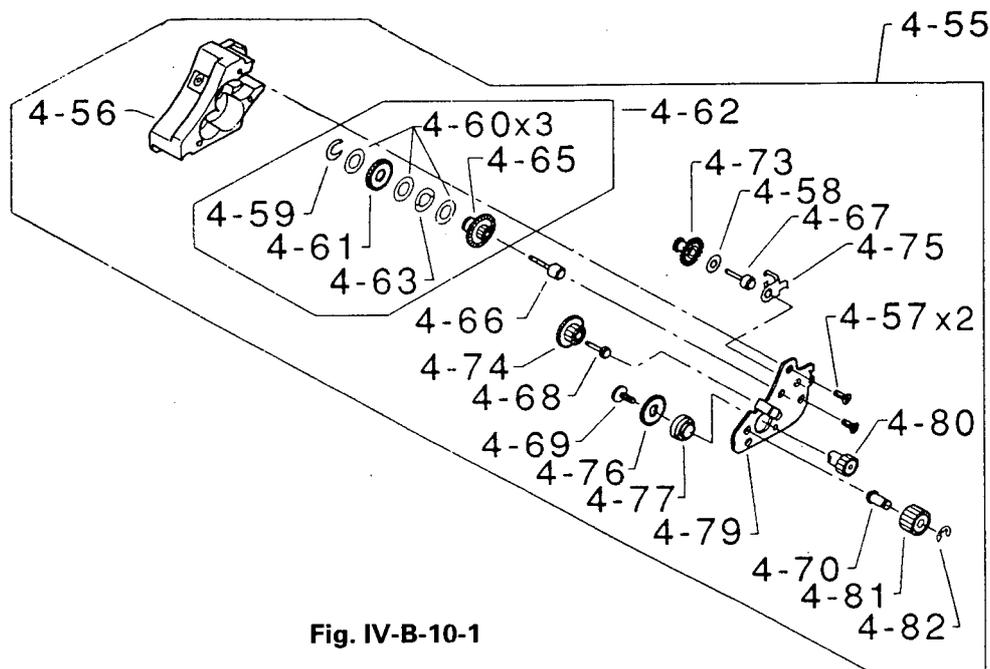


Fig. IV-B-10-1

11. Friction gear assembly (4-62)

(1) Disassembly

- 1) Pull out the C-clip (4-59), and remove the gear L1 (4-61) after removing the washer (4-60).
- 2) Remove the washer (4-60) and friction ring (4-63), and remove the washer (4-60) from the gear L2-E1 (4-65).

(2) Reassembly

- 1) Apply the washer (4-60) to the gear L2-E1 (4-65), apply the friction ring (4-63), and apply the washer (4-60).
- 2) Apply the gear L1 (4-61), apply the washer (4-60), and matching it with the shape of the gear L2-E1 (4-65), install the C-clip (4-59).

Fig. IV-B-11

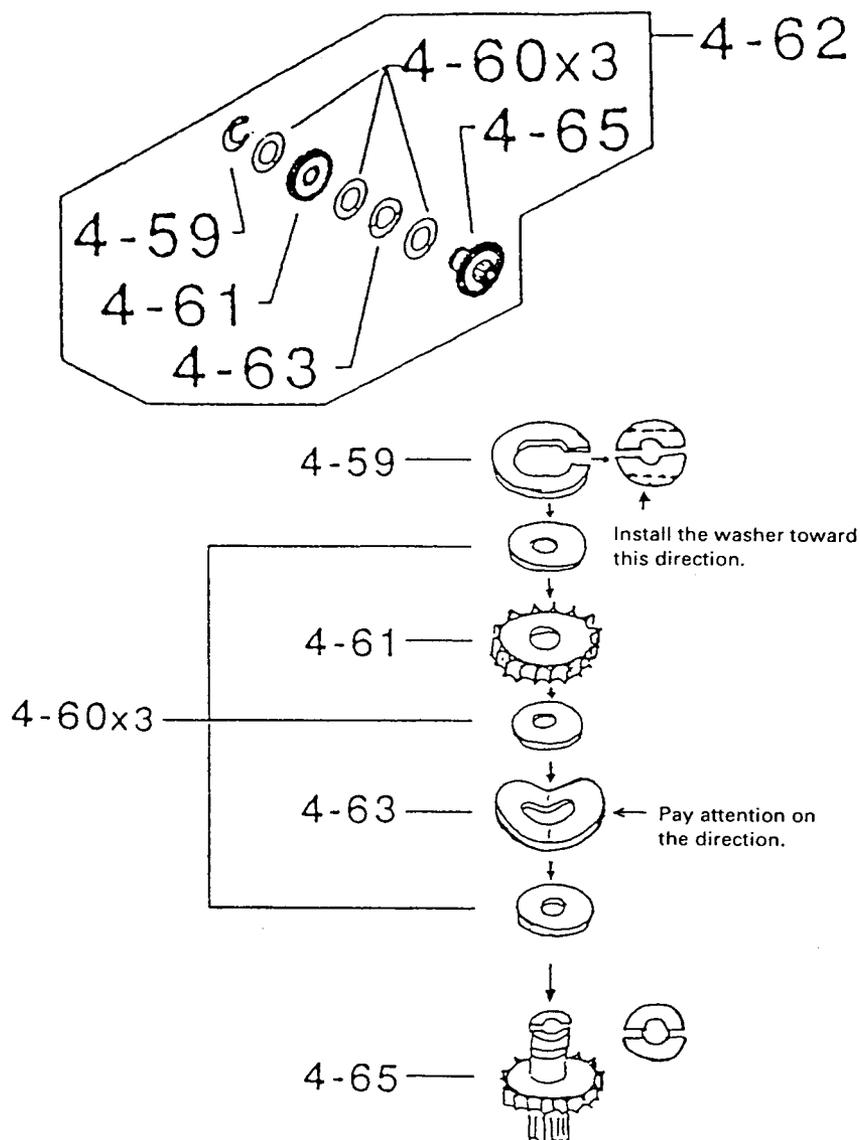


Fig. IV-B-11-1

12. Film transporting mechanism assembly (1) (5-96)

(1) Disassembly

- 1) Disconnect two lead wires (red and black) extended from the film transporting motor (5-104) at the FMCNT FPCB assembly (5-143). The FMCNT FPCB assembly (5-143) has been stuck on the film transporting mechanism assembly (1) (5-96) with adhesive tape (5-142).
- 2) Remove three lead wires adhered in the groove of the film transporting mechanism assembly (1) (5-96). The spool FPCB assembly (5-139) has been secured with adhesive tape and adhesive.
- 3) Remove two screws (5-122), unhook the claw of the top base plate (5-103), and remove the top base plate.
- 4) Remove the encoder blade (5-106), gear G4 (5-111), gear G3 (5-110), gear G2 (5-109), gear G1 (5-108) and gear G5 (5-107).
- 5) Remove the shaft G1 (5-101), shaft G2 (5-100), shaft G4 (5-123) and shaft G5 (5-124) from the bottom base plate (5-102), and push down the shaft G3 (5-128) from the top to pull it out.

The motor gear assembly (5-105) has been fitted to the film transporting motor (5-104), and the bottom base plate (5-102) has been sandwiched. The motor is of a coreless type, and the motor gear assembly cannot be fitted to the motor without using a special tool. For this reason, the motor gear assembly should not be removed.
- 6) Remove two screws (5-130) from the top base plate (5-103), and remove the release lever assembly (5-113).

(2) Reassembly

- 1) Place the release lever assembly (5-113) on the top base plate (5-103), and tighten two screws (5-130).
- 2) To the bottom base plate (5-102) to which the motor gear assembly (5-105) and film transporting motor (5-104) have been fitted, fit the shaft G1 (5-101), shaft G2 (5-100), shaft G4 (5-123) and shaft G5 (5-124), and push to fit the shaft G3 (5-128) from the bottom to the bottom base plate (5-102).
- 3) Apply lubricant (Losoid grease 6308-1G) to the bottom base plate (5-102).
- 4) Install the gear G5 (5-107), gear G1 (5-108), gear G2 (5-109), gear G3 (5-110), gear G4 (5-111) and encoder blade (5-106) on the bottom base plate in that order.
- 5) Place the top base plate (5-103) on the bottom base plate and secure it with two screws (5-122).

- 6) Stick the spool FPCB assembly (5-139) to the film transporting mechanism assembly (1) (5-96), and secure the lead wires with adhesive after forming them.
- 7) Insert the PI of the FMCNT FPCB assembly (5-143), and secure it with adhesive tape correctly so that it is not bent.
- 8) Solder and connect two lead wires extended from the film transporting motor (5-104) to the FMCNT FPCB assembly (5-143).

Fig. IV-B-12

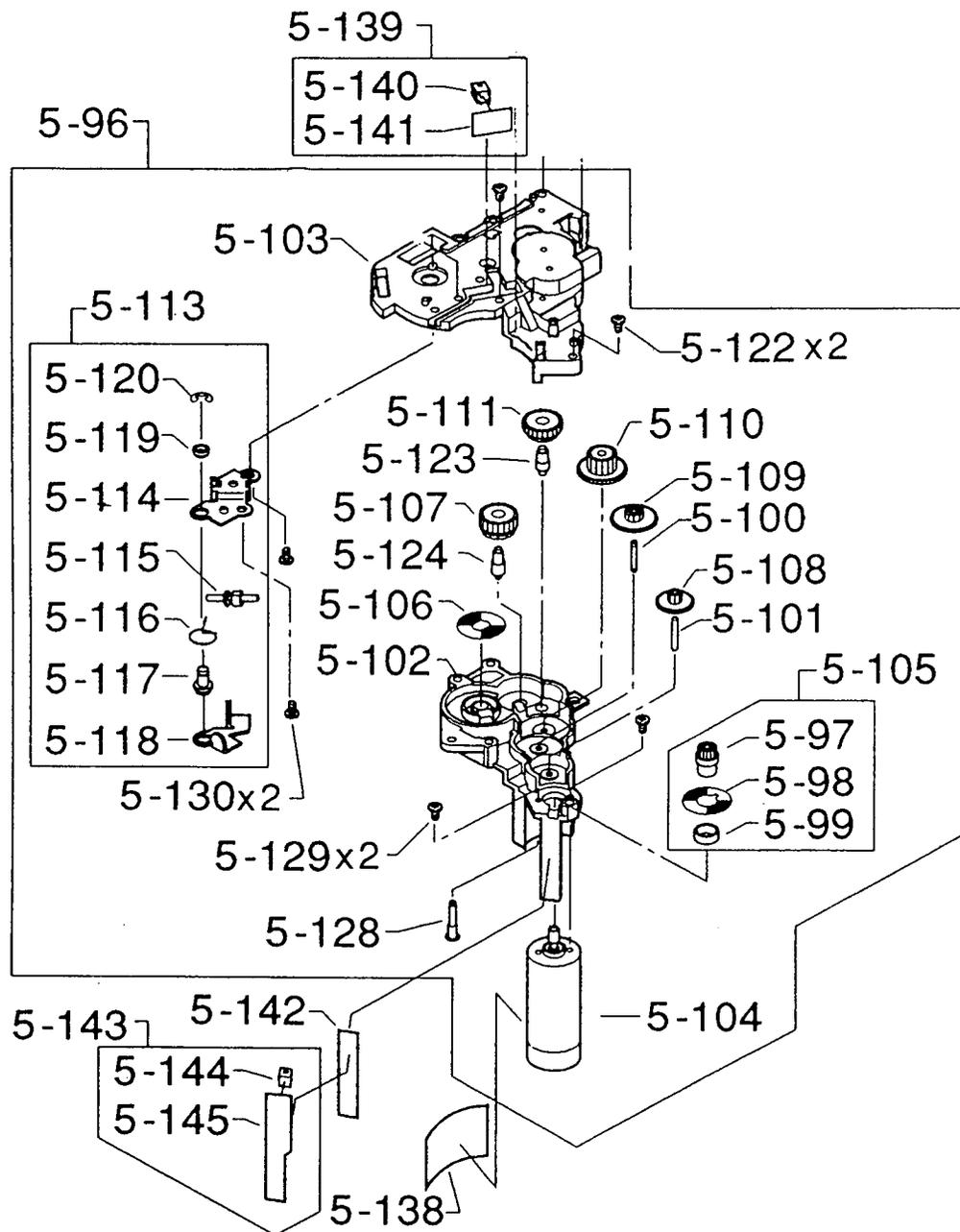


Fig. IV-B-12-1

13. Camera body assembly (2) (5-1)

(1) Disassembly

- 1) Pull out the moquette (5-86), remove four screws (5-88), remove the hood (5-87), and pull out the pin (5-73).
- 2) Remove the SZ switch (5-89) from the hood (5-87), peel off the moquette (5-90), and unsolder the disconnect the lead wires (6-23 and 6-24) from the SZ switch (5-89).
- 3) Unsolder and disconnect two lead wires (6-2 and 6-4) extended from the battery contact (5-67), and pull out the lead wires from the cord clamp (5-31). Peel off the tape (5-48).
- 4) Remove the set screw (5-82), and remove the washer (5-81) and rubber ring (5-80).
- 5) Remove two screws (5-84), and remove the power supply FPCB assembly (5-79) from the bracket (5-83). Next, remove two screws (5-85) and remove the bracket (5-83).
- 6) Remove the screw (5-127), raise the data FPCB assembly (6-44), remove the mask (5-58), remove two screws (5-126) and remove the data FPCB assembly (6-44).
- 7) Remove the screw (5-59), and remove the data lens assembly (5-132).
- 8) Remove the screw (5-77) and remove the PR holder assembly (5-78).
- 9) Remove the screw (5-71), remove the SB switch (5-69) and holder (5-70), and unsolder and disconnect the lead wires (6-16 and 6-17) extended from the SB switch (5-69).
- 10) Remove two adhered battery contacts (5-67), and unsolder and disconnect lead wires (6-1 through 6-4). Peel off the adhesive tape (5-72).

Fig. IV-B-13

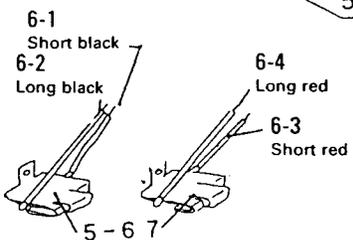
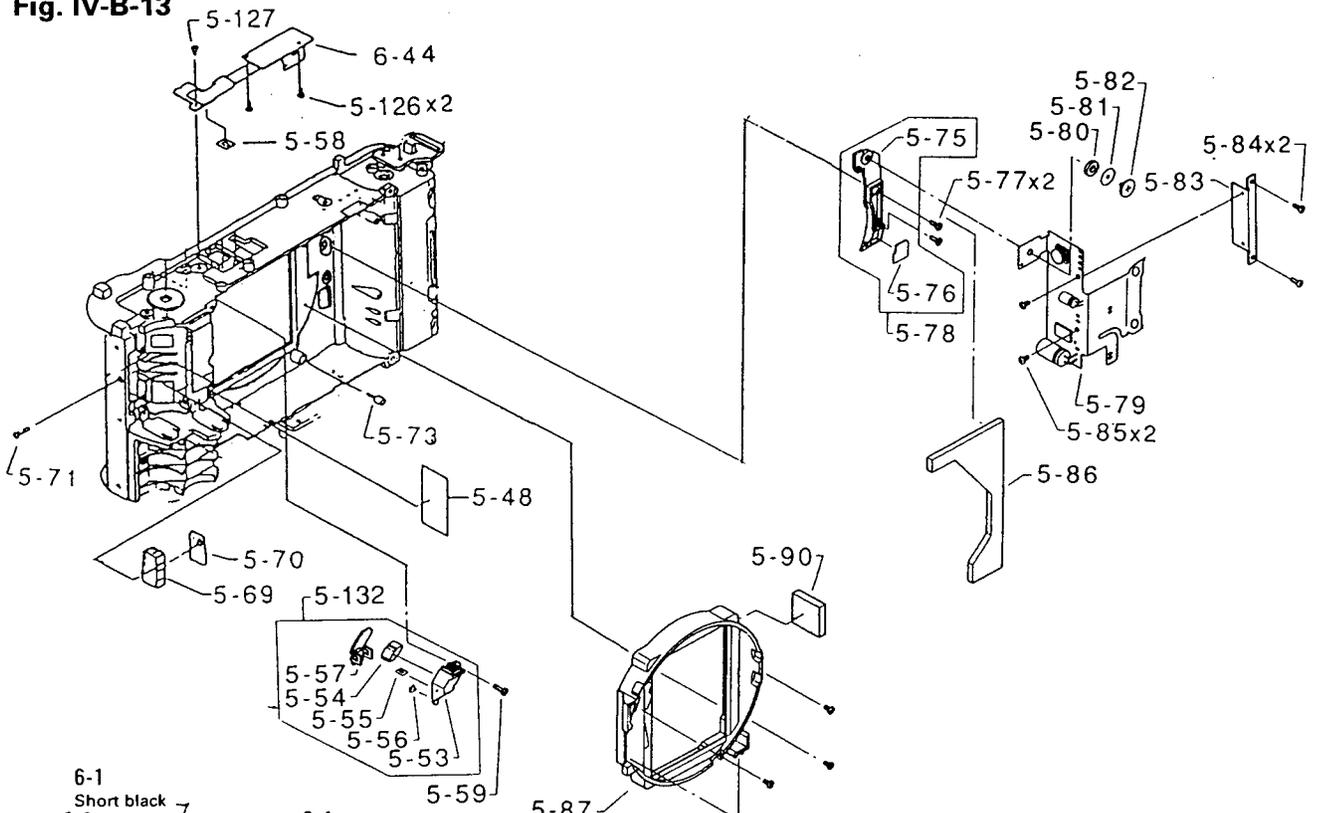


Fig. IV-B-13-1

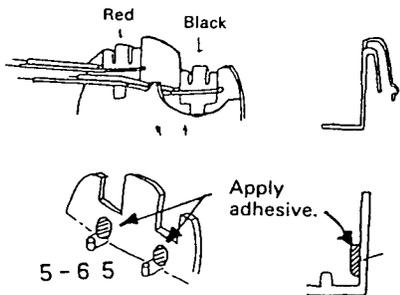


Fig. IV-B-13-2

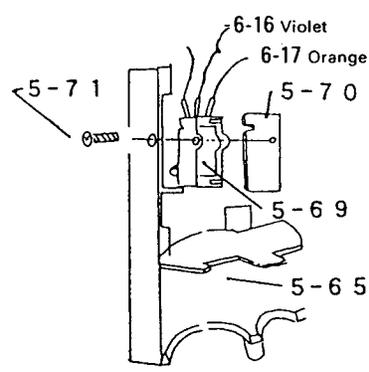


Fig. IV-B-13-3

Stick the tape so that the tape is in contact with the wall in the camera chassis.

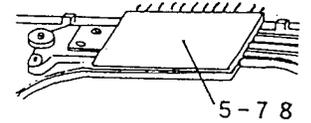


Fig. IV-B-13-4

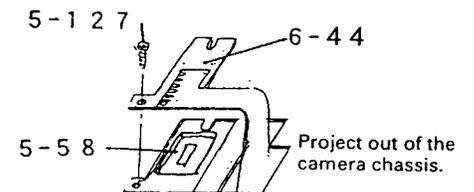


Fig. IV-B-13-5

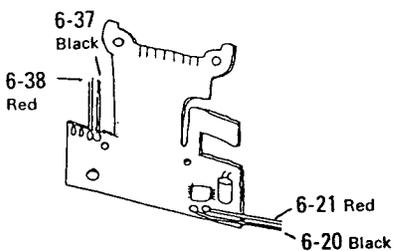


Fig. IV-B-13-6

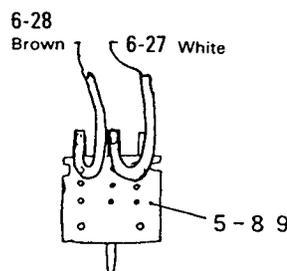


Fig. IV-B-13-7

(2) Reassembly

- 1) Solder and connect four lead wires (6-1 through 6-4) to two battery contacts (5-67), install the battery contacts (5-67) on the battery compartment base (5-65) on which adhesive (Three Bond 1521B or equivalent) is applied, and put the adhesive tape (5-72). (Refer to Figs. IV-B-13-1 and IV-B-13-2.)
- 2) Install the SB switch (5-69) (to which two lead wires (6-16 and 6-17) are soldered) on the battery compartment base (5-65) together with the holder (5-70) with the screw (5-71), and form the lead wires. (Refer to Fig. IV-B-13-3.)
- 3) Install the PR holder assembly (5-78) on the camera chassis with the screw (5-77). (Refer to Fig. IV-B-13-4.)
- 4) Install the data lens assembly (5-132) on the camera chassis (5-7) with the screw (5-59), project out the LED of the data FPCB assembly (6-44) from the opening on the interior of the camera chassis (5-7), and with the gold-plated circuit pattern placed on the holder (5-75), secure the PR PCB assembly on the camera chassis (5-7) with the screw (5-77).
- 5) Place the mask (5-58) on the data lens assembly (5-132), place them so that the LED of the data FPCB is faced downward, and tighten the screw (5-127). (Refer to Fig. IV-B-13-5.)
- 6) Solder and connect four lead wires to the power supply FPCB assembly (5-79), and after securing it on the bracket (5-83) with two screws (5-84), install the bracket on the camera chassis (5-7) with two screws (5-85). (Refer to Fig. IV-B-13-6.)
- 7) Apply the tightly connected portion of the power supply FPCB assembly (5-79) to the guide boss of the holder (5-75), put the rubber ring (5-80) and washer (5-81) in that order, and tighten the set screw (5-82).
- 8) Install the pin (5-73) on the camera chassis (5-7), fit the SZ switch (5-89) (to which the lead wires are soldered) to the hood (5-87) (Refer to Fig. IV-B-13-7.) install the moquette (5-90), and tighten four screws (5-88).
- 9) Solder and connect two lead wires (6-2, and 6-4) to the power supply FPCB assembly (5-79), and form the lead wires. Install the moquette (5-86) on the camera chassis (5-7).

Fig. IV-B-13

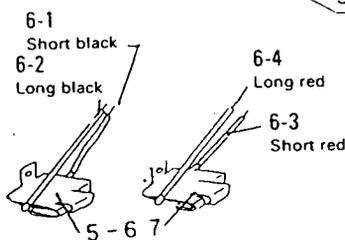
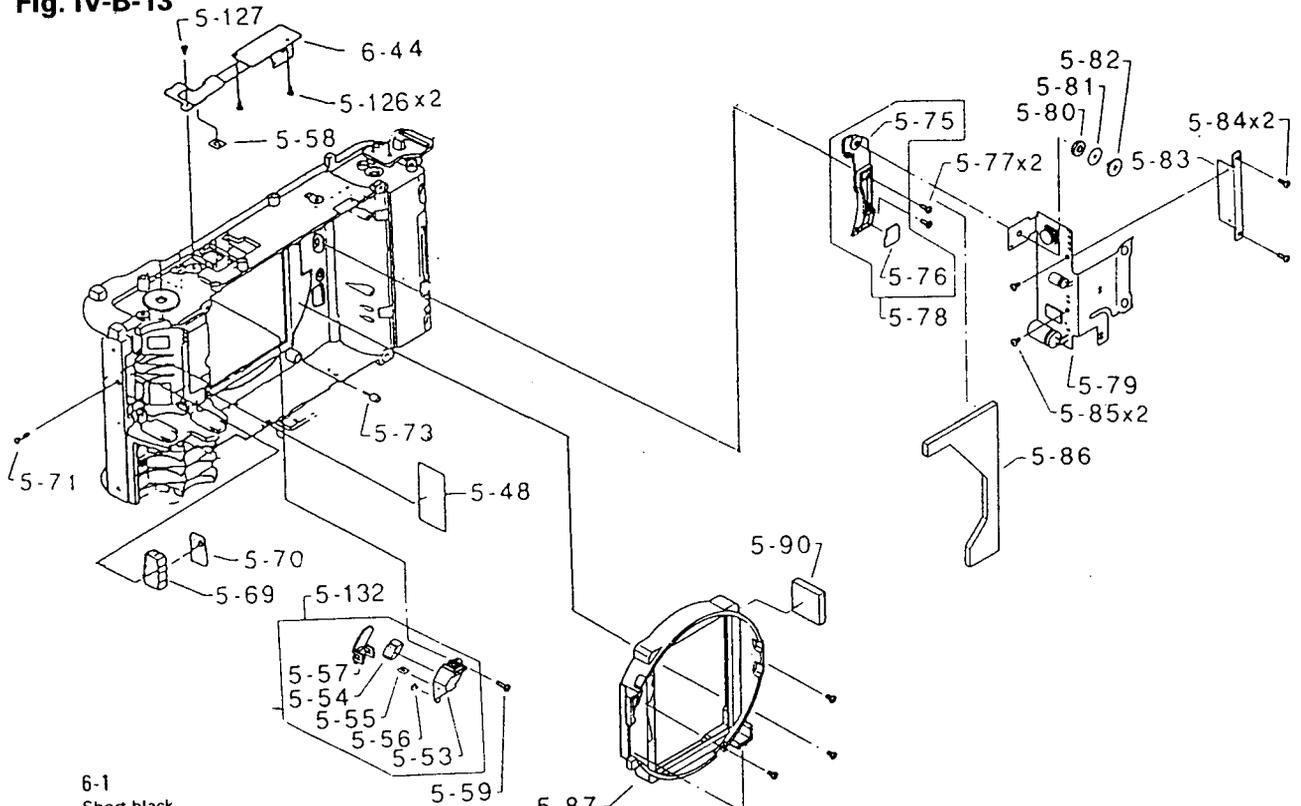


Fig. IV-B-13-1

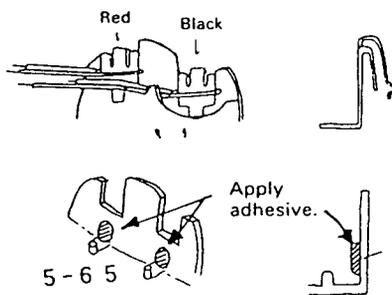


Fig. IV-B-13-2

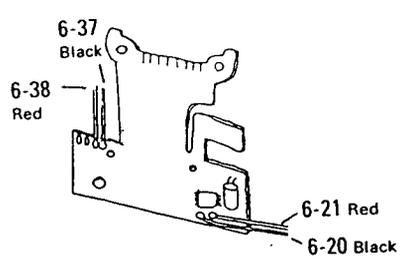


Fig. IV-B-13-6

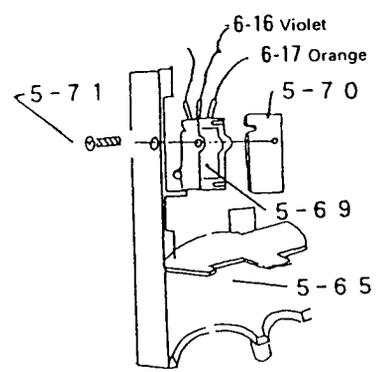


Fig. IV-B-13-3

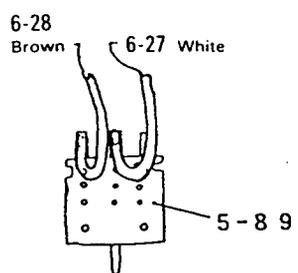


Fig. IV-B-13-7

Stick the tape so that the tape is in contact with the wall in the camera chassis.

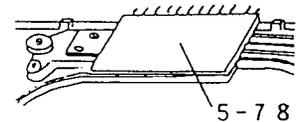


Fig. IV-B-13-4

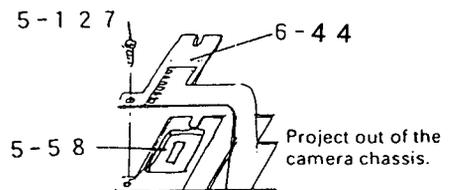


Fig. IV-B-13-5

14. Camera body assembly (1) (5-2)

(1) Disassembly

- 1) Remove three screws (5-68) and remove the battery compartment base (5-65).
- 2) Remove the DX FPCB (5-64) from the battery compartment base (5-65), and peel off the battery label (5-66).
- 3) Remove six screws (5-32) and remove three cord clamps (5-31).
- 4) Remove the encoder shaft (5-52), remove the screw (5-20), and remove the film take-up gear (5-19) and take-up shaft assembly (5-60).
- 5) Remove two screws (5-24), and pull out the shaft (5-18) in which the gear (5-17) installed from the camera chassis (5-7). Now, remove two counter rollers (5-25) from the counter drum (5-23). Further, remove the gear (5-17) from the shaft (5-18).
- 6) Peel off the moquette (5-47) and two pieces of the moquette (5-26), peel off three insulators (5-45, 5-46 and 5-50), remove the rubber piece (5-49), and remove the light shielder (5-133).
- 7) Push two pins (5-15) through the hole on the top of the camera chassis (5-7) and remove the roller (5-14). Be careful not to lose two springs (5-16) and two pins (5-15).
- 8) Remove two screws (5-22), and remove the leaf spring assembly (5-4) and leaf spring (5-21).
- 9) Remove two screws (5-30), remove the strap lug (bottom) (5-29), remove two screws (5-28), and remove the strap lug (top) (5-27).
- 10) Remove four screws (5-43), remove two guide ring assemblies (5-3), remove two springs (5-34), and pull out two release bars (5-37 and 5-33).
- 11) Remove three screws (5-36), and remove the tripod socket (5-35).
- 12) Remove the shaft holder (5-13) and shaft holder (5-12).

NOTE:

Other parts are caulked and cannot be disassembled further.

Fig. IV-B-14

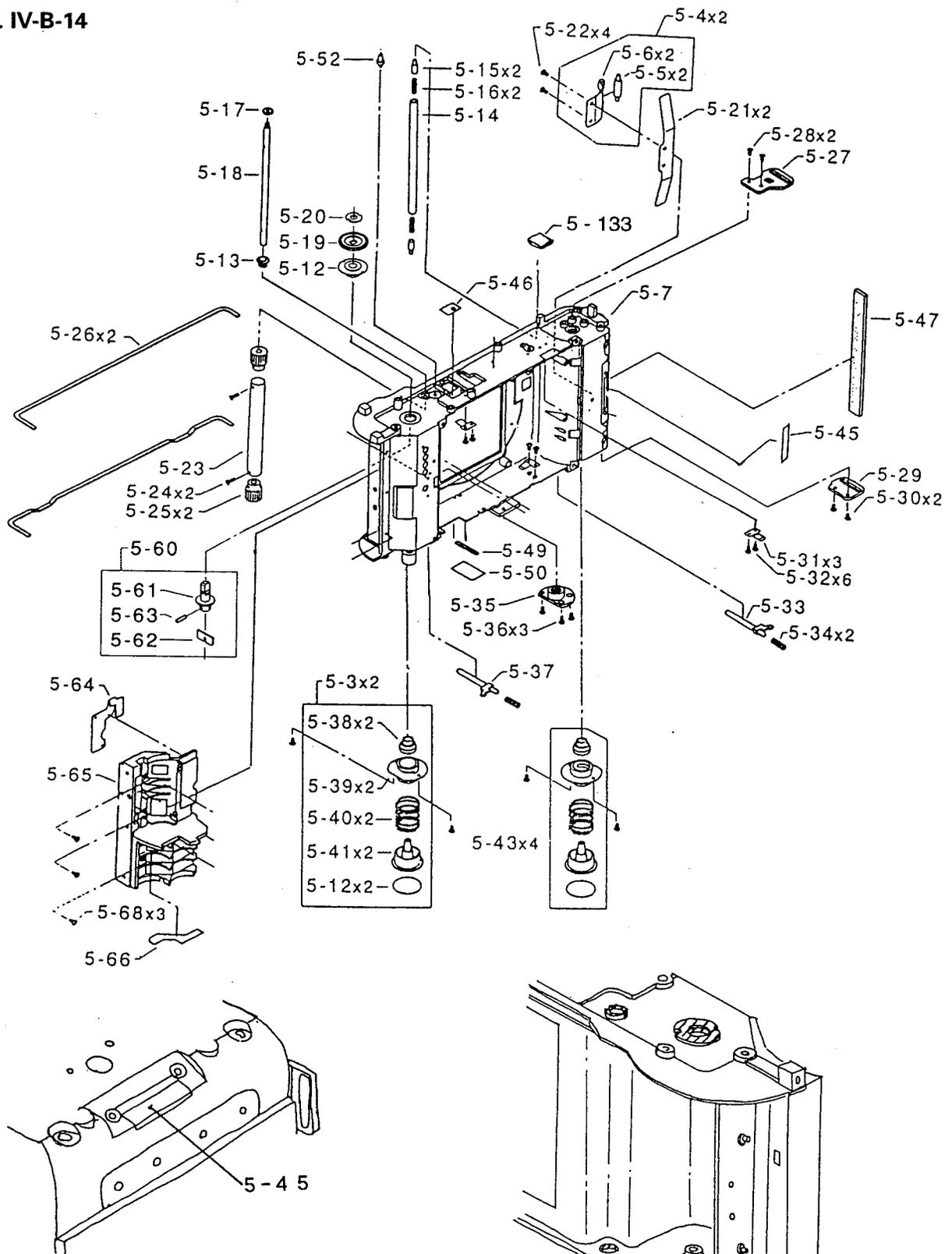
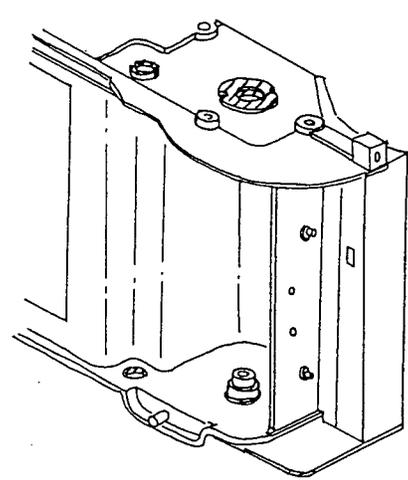


Fig. IV-B-14-1



Apply lubricant to the shaded portion.

Fig. IV-B-14-2

(2) Reassembly

- 1) Lightly screw the shaft holder (5-12) and shaft holder (5-13) into the camera chassis (5-7), and after applying adhesive (Pliobond FHD011), tighten two shafts completely.
- 2) Install the tripod socket (5-35) on the camera chassis (5-7), and after applying screw locking agent (Technotite H-100), tighten three screws (5-36).
- 3) Install two release bars (5-37 and 5-33) on the camera chassis (5-7), pass two springs (5-34) through heads of two release bars (5-37 and 5-33), install two guide ring assemblies (5-3), and after applying screw locking agent (Technotite H-100), tighten four screws (5-43).
- 4) Install the top and bottom strap lugs (5-27 and 5-29) respectively with screws (5-28x2 and 5-30x2) after applying screw locking agent (Technotite H-100) to the screws.
- 5) Install the leaf spring (5-21) and leaf spring assembly (5-4) in the film chamber of the camera chassis (5-7) in that order, and tighten two screws (5-22).
- 6) With the springs (5-16) and pins (5-15) installed on both ends of the roller (5-14), install the roller (5-14) on the camera chassis (5-7).
- 7) Place the rubber piece (5-49) in the groove on the camera chassis, and stick the insulator (5-45) on the metal fixture. Now, stick two insulators (5-46 and 5-50) to the camera chassis. (Refer to Fig. IV-B-14-1.)
- 8) Apply adhesive (Pliobond FHD011) to the grooves on the top and bottom of the camera chassis and side surface of the camera chassis, and install the moquettes (5-47 and 5-26x2). Next, apply lubricant (Helicolube FHA054) to the shaded portion of the camera chassis (5-7). (Refer to Fig. IV-B-14-2.)
- 9) Apply screw locking agent (Technotite H-100) to the head of the shaft (5-18) install the gear (5-17) on the shaft (5-18).
- 10) With the counter rollers (5-25) applied to both ends of the counter drum (5-23), install the counter drum (5-23) on the camera chassis (5-7), install the shaft (5-18) and tighten two screws (5-24).
- 11) Apply the take-up shaft (5-60) to which lubricant (Helicolube FHA054) has been applied from the film chamber side of the camera chassis, install the film take-up gear (5-19) on the shaft holder (5-12), and secure it with the screw (5-20). Then, apply adhesive (Cemedine High Super) to lock it.
- 12) Stick the battery label (5-66) by matching it to the shape of the battery compartment base (5-65), fit the DX FPCB (5-64) to the guide boss, and tighten three screws (5-68).
- 13) Install the light shielder (5-133) on the camera chassis (5-7), and install the encoder shaft (5-52).

Fig. IV-B-14

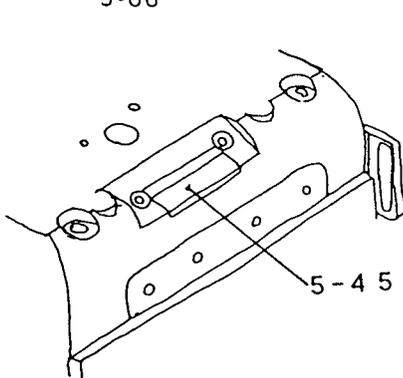
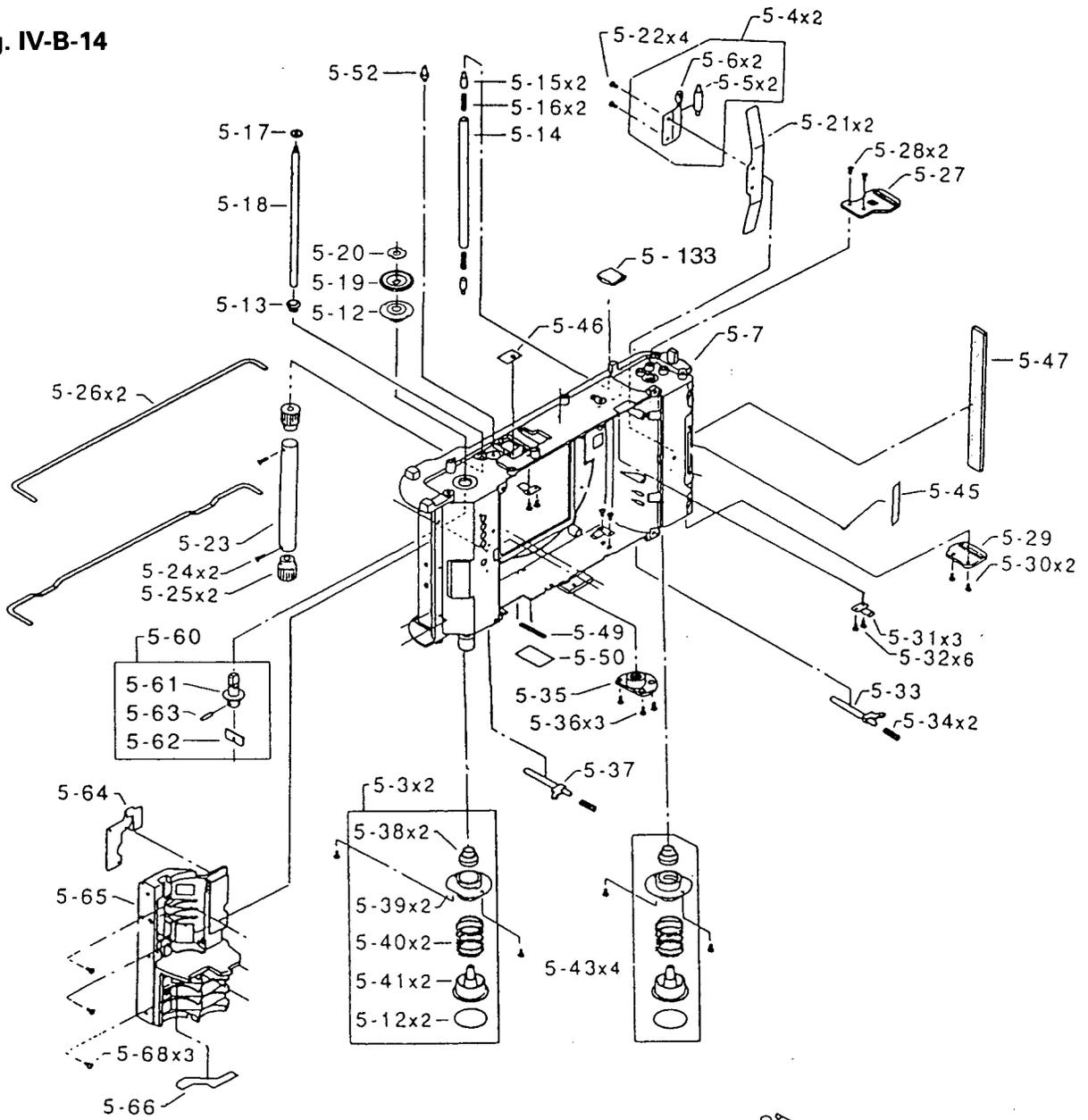
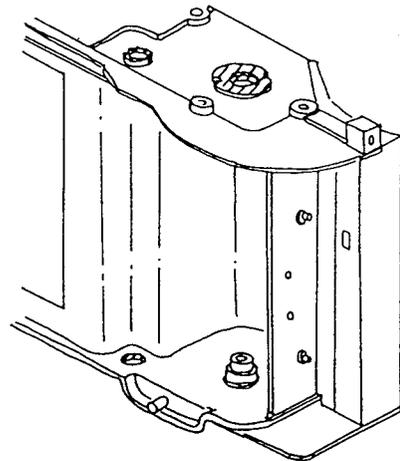


Fig. IV-B-14-1



Apply lubricant to the shaded portion.

Fig. IV-B-14-2

15. Data lens assembly (5-132)

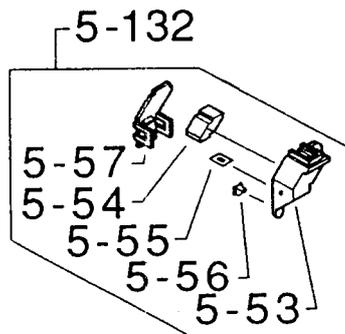
(1) Disassembly

- 1) Moving two claws of the cover (5-57) away, remove the cover (5-57) from the prism frame (5-53).
- 2) Pull out the diaphragm (5-55), lens (5-56) and prism (5-54).

(2) Reassembly

- 1) Apply the prism (5-54), lens (5-56) and diaphragm (5-55) to the prism frame (5-53) in that order.
- 2) Install the cover (5-57).

Fig. IV-B-15

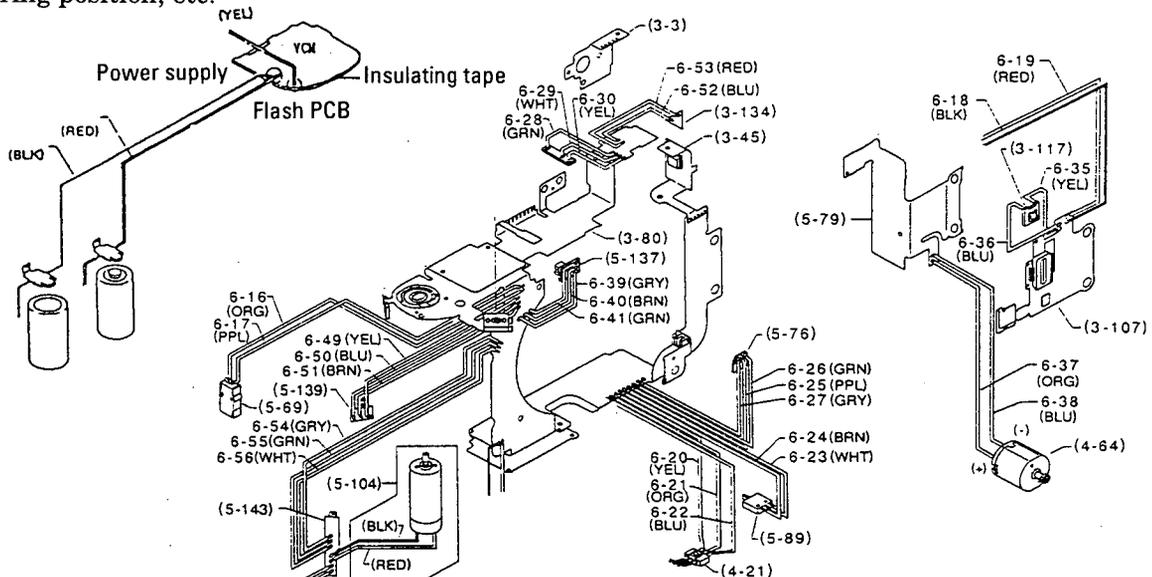


V. INSPECTION AND ADJUSTMENT

1. Inspecting the camera without covers

	Procedure	Checked Item	Remarks
1. Checking stabilized power supply		Output : 5.6V ± 0.05V	Dummy battery (JA60081)
2. Inspected item 2.1 Appearance (1) Soldering of wire		(1) Control FPCB assembly → BLED (3), AF (2), Lens driving motor (2), SB (2), Shutter (2), Encoder (3), SSIZE (2), PR (3), PI (3), FMCNT (3), FL (2), Spool (3) (2) Flash PCB assembly → Battery (2), VCM	Erroneous wiring, connected position and soldered condition
(2) Soldering across flexible FPCBs		(1) Control FPCB assembly → Flash PCB, Mode switch assembly Light measuring FPCB assembly DX FPCB	Crack and short-circuit
(3) Tightness of connection		(1) Control FPCB assembly → Triple layer	FPCB deviation
(4) Insulating tape		(1) Soldered surface of flash PCB (2) Main FPCB (CPU)	Peel off

*Wiring position, etc.



- Wrist band •Jig (Dummy battery) •Ammeter (100µA)
- Connect a 1Ω±5% resistor to the stabilized power supply (5A or greater additive capacity).

	Procedure	Checked Item	Remarks
2. Inspected item 2-2 Performance inspection (1) Checking power start and leak current	Turn off SM switch, and load a dummy battery with the camera back . closed	<ul style="list-style-type: none"> Both FLCD and LCD must fully light, each display must be in correct position and all characters must be displayed fully and clearly. Leak current: 35µA or less 	Check with an ammeter
(2) Power supply – 1 operation check (LCD)	(1) Open the camera back (2) Turn the UP/DOWN to the left. (3) Set the pressure plate to [120], and close the camera back. (4) Open the camera back, set the pressure plate to [220] and close the camera back.	<ul style="list-style-type: none"> ISO count must indicate “ 0 ” Film transporting motor must turn. [120] must be displayed on the LCD. [220] must be displayed on the LCD. 	Check with the shaft.
	(5) Set SM switch to [P].	<ul style="list-style-type: none"> The film transporting motor must turn about one second and the lens must move from the home position to stand-by position. 	P → A → M when the SM switch is turned to the right ISO when turned to the left.
(3) Self-timer operation check (LCD)	(1) Press down SSELF on the camera back. (2) Press down SSELF again.	<ul style="list-style-type: none"> Self-timer mark [☺] must be displayed. Self-timer mark [☺] must go out. 	Rubber switch on the back Right: SSELF Left: SDATA
(4) Data operation check (LCD)	(1) Press down SDATA on the camera back. (2) Press down SDATA again. (3) Press down SDATA again. (4) Press down SDATA again. (5) Press down SDATA again. (6) Press down SDATA again. (7) Press down SDATA again.	DATA [-----] lights DATA [YMMDD] lights DATA [DDtmm] lights DATA [TV AV] lights DATA [YMD] [TVAV] must blink alternately DATA [YMD] [tm] must blink alternately DATA [-----] lights	For example: 95_1_1

	Procedure	Checked Item	Remarks
(5) FC operation check (LCD)	<ol style="list-style-type: none"> (1) Keep pressing SFC on the camera top. (2) Release SFC from pressing. 	<ul style="list-style-type: none"> • FC mark [+/_] must light. • FC mark [+/_] must go out. 	The switch in the right side of the camera top FPCB (In front of UP/DOWN switch) Right side: SFC Left side: SAF
(6) Power supply – 2 operation check (LCD)	<ol style="list-style-type: none"> (1) Set SM switch to [A]. 	<ul style="list-style-type: none"> • Flash mark [⚡] must light. 	
	<ol style="list-style-type: none"> (2) Set SST to ON (turned down toward you) 	<ul style="list-style-type: none"> • Flash mark [⚡] must go out. 	
	<ol style="list-style-type: none"> (3) Set SM switch to [OFF] 	<ul style="list-style-type: none"> • The lens must move from the stand-by position to home position. 	
	<ol style="list-style-type: none"> (4) Set SM switch to [ISO]. (5) Turn UP/DOWN switch and check ISO indication. (6) Turn UP/DOWN switch and set ISO to [100]. 	<ul style="list-style-type: none"> • [ISO] must blink. • ISO display must change from 25 to 1600. • Set ISO to [100]. 	Set it to “25”, turn about 1-1/4 and check 1600.
(7) Lens operation check	<ol style="list-style-type: none"> (1) Set SM switch to [P]. (2) Press down SAF switch (3) Keep pressing SMF switch, and turn UP/DOWN to set it to [Inf]. 	<ul style="list-style-type: none"> • The lens must move from the home position to stand-by position • [MF] mark must be displayed. • [MF] mark blinks when SMF switch is pressed down. • [Inf] mark must be displayed. 	The switch in the right side of the camera top FPCB (In front of the UP/DOWN switch) Right side: SFC Left side : SAF
	<ol style="list-style-type: none"> (4) Set SP switch to ON (press down lightly) and release it. 	<ul style="list-style-type: none"> • The lens must be fed out from the stand-by position and viewfinder frame must move accordingly. • The lens must stay in the fed out position when SP switch is turned off. 	
	<ol style="list-style-type: none"> (5) Press down SAF switch. 	<ul style="list-style-type: none"> • MF mark goes out. • The lens must move from fed out position to stand-by position. 	

	Procedure	Checked Item	Remarks
(8) Shutter operation check	(1) Make the place around the camera bright, face the camera to an object in a distance (0.7m or longer), and set SP switch to ON (press down lightly).	<ul style="list-style-type: none"> • [\ast. \astm] must be displayed on FLCD. • The lens must move from the stand-by position to fed out position. • The lens must move from the fed out position to stand-by position when SP switch is turned off. 	Distance fluctuates as AF has not been adjusted. AV \neq 4, TV \neq 60
	(2) Press down SP switch deeply.	<ul style="list-style-type: none"> • SELF LED must light for a second when the shutter is released. • The lens must move from the fed out position to stand-by position. 	After the SP switch is turned off, measured light value must be displayed in the viewfinder for about 5 seconds. Check the front shutter release, also
	(3) Set SP switch to OFF.	<ul style="list-style-type: none"> • The display in the FLCD goes out. 	
	(4) Cover up the lower side of the AF, face the camera to an object, and set SP switch to ON (press down lightly).	<ul style="list-style-type: none"> • [\ast. \astm] must be displayed on FLCD, and the lens must move to the fed out position. 	Passive inspection
	(5) Set SP switch to OFF.		
	(6) Face the camera to a 9% reflector located in a position about 50cm from the camera, and set SP switch to ON (press down lightly).	<ul style="list-style-type: none"> • [0.7m] must blink on FLCD. 	Active inspection
	(7) Set SP switch to ON (press down lightly) once again.	<ul style="list-style-type: none"> • IRED must blink. • The lens must move to the fed out position. 	
	(8) Set SP switch to OFF.		
(9) End	(1) Set SM switch to OFF (2) Set power switch to OFF.	<ul style="list-style-type: none"> • The lens must returns to the home position. • LCD goes out. 	Condition of camera at the end: Pressrue plate → 220

2. Inspecting the camera with covers installed.

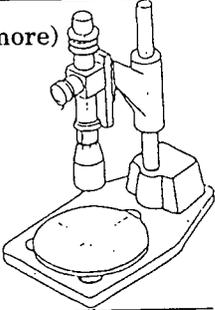
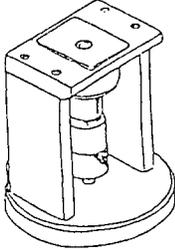
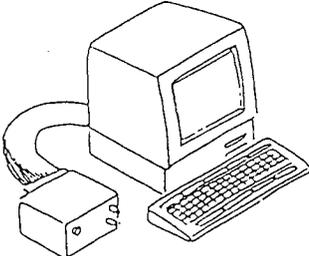
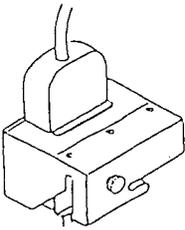
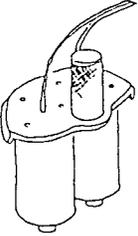
Inspected item	Method of inspection	Judgement standard
1. Shock the camera lightly.		(Battery label)
2. Checking M-mode (manual mode)	<ul style="list-style-type: none"> • Set the mode dial to “M”, and turn the UP/DOWN dial. • Pushing  button, turn the UP/DOWN dial and watch LCD. • Set the shutter to BULB, and by pressing down the shutter release, watch the lens. • Pop up the flash head, face the camera to a bright object, and see if the flash fires or not. 	<ul style="list-style-type: none"> • Aperture display must change (4.0 ~ 22) • Shutter speed display must change. • The lens must be clean. • The flash head must pop up smoothly. • The flash must fire (normal firing).
3. Checking A-mode (Aperture priority mode)	<ul style="list-style-type: none"> • Set the mode dial to “A”, press down the shutter release by changing brightness, and watch the displays in the viewfinder and on the LCD. • Pop up the flash head, change distance to an object, and see if the flash fires or not. 	<ul style="list-style-type: none"> • The aperture must not change even if the brightness changes, but shutter speed must change. • The display in the viewfinder must be same as that on the LCD. • The flash must fire. (normal firing, check synchronizing)
4. Checking P-mode (Program mode) and automatic flash firing at a low brightness	<ul style="list-style-type: none"> • Set the mode dial to “P”, press down the shutter release by changing brightness, and watch the displays in the viewfinder and on LCD. • Pop up the flash head, face the camera to a bright and dark objects, and release the shutter. 	<ul style="list-style-type: none"> • Aperture value and shutter speed combination must change when brightness changes. • The display in the viewfinder must be same as that on the LCD. • The display in the viewfinder must be complete and has no remarkable reflection. • The flash must not fire when the camera is faced to a bright object, must fire when the camera is faced to a dark object, and it must be synchronized.

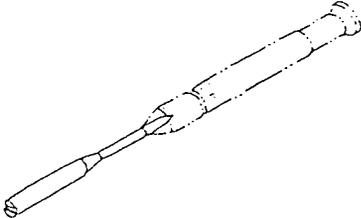
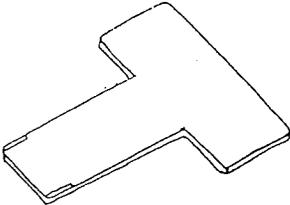
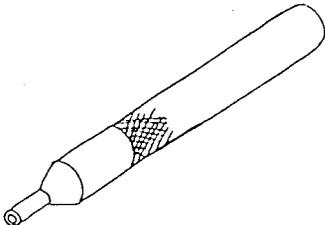
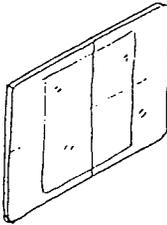
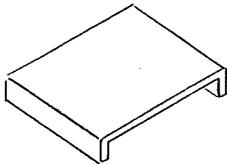
Inspected item	Method of inspection	Judgement standard
5. AF/MF switch over.	<ul style="list-style-type: none"> • Press down <input type="checkbox"/> AF <input type="checkbox"/> button and watch LCD. 	<ul style="list-style-type: none"> • At AF: No display must be made. • At MF: <input type="checkbox"/> MF <input type="checkbox"/> must be displayed. The field of view frame must move when 5m is selected.
6. Checking MF setting	<ul style="list-style-type: none"> • Set the camera to <input type="checkbox"/> MF <input type="checkbox"/> mode, turn the UP/DOWN dial by pressing down the MF button, and watch the LCD. 	<ul style="list-style-type: none"> • <input type="checkbox"/> MF <input type="checkbox"/> mark must blink and the display must be made from 0.7m through Inf.
7. Film transporting	<ul style="list-style-type: none"> • Transport each one 120 and 220 size film. Change over the setting of the pressure plate, also. After one film is transported completely, open the camera back and unload the film. • Transport a bar code system film. • With the camera back closed, press down the film loading knob. 	<ul style="list-style-type: none"> • The spool installation, FFS, one frame film advancement, Film speed (ISO) setting, exposure counter display, etc. must be normal. • Electronic sound must be generated whenever the shutter is released. (When no electronic sound is generated, check if the camera is under ON mode or not.) • Mid-roll rewind (MR) (3 to 4 frames) must be made. • Type of film changeover on the pressure plate must coincide with the display on the LCD. • 16 frames must be exposed with a 120 film, 32 frames must be exposed with a 220 film, the exposure counter must displays "E" at the end of film, and the "E" must go out when the camera back is opened. • The knob must not jump out.
8. Checking self-timer	<ul style="list-style-type: none"> • Press down the self-timer button and watch the LCD. • Press down the shutter release and watch the self-timer LED. 	<ul style="list-style-type: none"> • Self-timer mark must be displayed. • The LED must light first, blink thereafter, and the shutter must be released.
9. Cable release installation	<ul style="list-style-type: none"> • Install a cable release, and try to release the shutter. 	<ul style="list-style-type: none"> • It must be possible to install a cable release. • The shutter must be released.

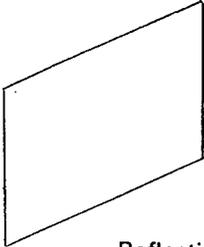
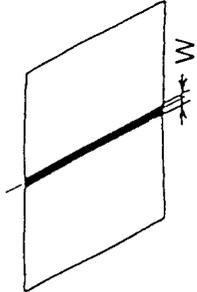
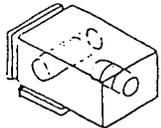
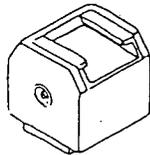
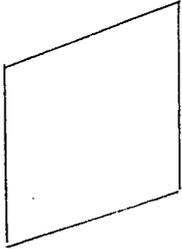
Inspected item	Method of inspection	Judgement standard
10. Interior appearance	<ul style="list-style-type: none"> • Open the camera back, and visually check inside the camera body and camera back interior. 	<ul style="list-style-type: none"> • The roller and film size changeover pin (push it) must operate normally. • There should be no remarkable scar, contamination and lack of parts. • All the moquettes are installed correctly.
11. Checking data changeover and printing	<ul style="list-style-type: none"> • Press down the DATA button and watch the LCD. • Open the camera back, and watch the LED lighting on the mask. 	<ul style="list-style-type: none"> • DATA must blink, and it is changed over in the order of month/day/hour, aperture, shutter speed and print inhibit. • The LEDs must light correctly.
12. Exterior appearance	<ul style="list-style-type: none"> • Check the top cover, camera back, front cover, bottom cover and lens for appearance. 	<ul style="list-style-type: none"> • There should be no remarkable scar, scratch, contamination and incorrect printing. • All the parts must be installed correctly and firmly.
13. Checking fractional control	<ul style="list-style-type: none"> • Pushing <input type="checkbox"/> +/- <input type="checkbox"/> button, turn the UP/DOWN dial and watch the LCD. 	<ul style="list-style-type: none"> • The display must change 0.5 step by 0.5 step. <div style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px; display: inline-block;"> <p style="text-align: center;">-2.0 through +2.0 No LCD display at zero only.</p> </div>
14. Viewfinder	<ul style="list-style-type: none"> • Press down the shutter release at a close-up distance (about 70 cm), and look into the viewfinder. • Make sure that no dust exist in the viewfinder and object can be seen clearly. • Check the LED for lighting. 	<ul style="list-style-type: none"> • The frame must be reduced (It must operate smoothly without dragging. It must return when the shutter release is released from the depression.) • No dust should exist and any object must be seen clearly. • The red LED must light for a second.
15. Checking feet and meter changeover	<ul style="list-style-type: none"> • With the <input type="checkbox"/> AF <input type="checkbox"/> button pressed down, set the mode dial from OFF to ISO and watch the LCD. 	<ul style="list-style-type: none"> • m and Ft must be displayed.

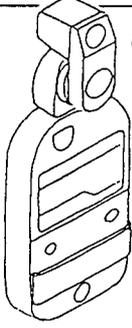
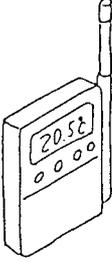
Inspected item	Method of inspection	Judgement standard
16. Film speed (ISO) changeover	<ul style="list-style-type: none"> Set the mode dial to ISO, turn the UP/DOWN dial and watch the LCD. 	<ul style="list-style-type: none"> It must be locked when the mode dial is set to OFF, and it should not operate unless the release button is pressed down. Further, it must click. ISO display must change accordingly. (25 through 1600)
17. Checking AF	<ul style="list-style-type: none"> Face the camera to a chart, and watch the viewfinder display. Inspect for 1.0m, 2.0m and ∞. (Inspections for both active and passive. When inspecting for passive, cover up the light emitter of active.) 	<ul style="list-style-type: none"> The viewfinder display must change accordingly at 1.0m, 2.0m and ∞. <div style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Test chart</p> <p>Active : Gray chart</p> <p>Passive : Pattern chart</p> </div>
18. Checking AE	<ul style="list-style-type: none"> Set the mode dial to "P", and set the camera on an AE tester. (ISO 100) 	<ul style="list-style-type: none"> LV8 : Within ±0.3EV LV12: Within ±0.3EV
19. Intrusion of foreign matter	<ul style="list-style-type: none"> Shake the camera and see if any noise is generated or not. 	<ul style="list-style-type: none"> No noise should be generated.
20. Contact efficiency	<ul style="list-style-type: none"> Measure by means of a measuring instrument. 	<ul style="list-style-type: none"> Must be 60% or higher.

VI. SPECIAL TOOL LIST

Name	Application	Remarks
Collimater	For adjustment of focus	(f = 200mm or more) 
Focus adjust stand (JF010)	For adjustment of focus	(Common used 6 X 9) 
EEPROM adjust jig	For adjustment of AE, BC, AF and focus (For EEPROM writing)	
Communication connector (JF011)	For adjustment of AE, BC, AF and focus (For EEPROM writing)	
Dummy battery (JA60081)	(For EEPROM writing)	

Name	Application	Remarks
Shaft tightening jig (JA60035)	To tighten shaft (4-47)	
Rear lens assembly tightening jig (JA1499)	To tighten rear lens assembly (4-40)	
Clip ring tightening jig (JA1497)	To tighten clip ring (1-8)	
Parallax adjust jig (JA1495)	For adjustment of viewfinder Parallax	
PR sensitivity adjust jig (JF1074)	Adjustment of PR sensitivity (For EEPROM writing)	

Name	Application	Remarks
AF chart (JF 012)	For adjustment of active AF (For EEPROM writing)	 <p>Reflection ratio: 36%</p>
AF chart Type A (JT115) Type B (JT116)	For adjustment of passive AF (For EEPROM writing)	 <p>Type A Size: A3 Line width: 9mm</p> <p>Type B Size: A2 Line width: 28mm</p>
Level (Available in a commercial market)	For adjustment of passive AF (For EEPROM writing)	
Flash cord connecting adapter (Available in a commercial market)	For measurement of synchro delay time (For EEPROM writing)	
Grey chart (Available in a commercial market) (Superior seamless paper No. 22)	For adjustment of flash (For EEPROM writing)	 <p>Size: 1.5m x 1.5m Reflection ratio: 18%</p>

Name	Application	Remarks
Flash meter (Available in a commercial market)	To measure synchronization (For EEPROM writing)	 <p>(With 10° viewfinder)</p>
Thermometer (Available in a commercial market)	To measure temperature (For EEPROM writing)	

VII. LUBRICANTS, ADHESIVES AND SOLVENT

The following table shows the lubricants, adhesives and solvent required when repairing the camera.

No volume is specified particularly. Apply them properly.

Segment	Name	Maker	Main application
Lubricant	Losoid 6308/1G	Logimole	Film transporting mechanism
	G30M	Taken care by FPO-TS	Lens driving system
	Helicolube (FHA054)	Taken care by FPO-TS	Camera body (take-up shaft)
	Tungsten bisulfide (WS2)	Taken care by FPO-TS	Camera body Film transporting system Top cover assembly
	Hilube A7104	Harves	Controller assembly (UP/DOWN contact)
	Dry Surf MF-2400N	Harves	Top cover assembly (Pop-up lever)
Adhesive	Three Bond 1521B	Three Bond	
	Three Bond 1401B	Three Bond	Front cover assembly (Front lens)
	Technotite		Camera body
	Pliobond	Taken care by FPO-TS	Number plate, Leather on the camera back
	Cemedine Hi-Super 30	Cemedine	AF system (PSD)
Solvent	(Cleaning alcohol)	Not designated particularly	Cleaning contacts in the electrical system

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