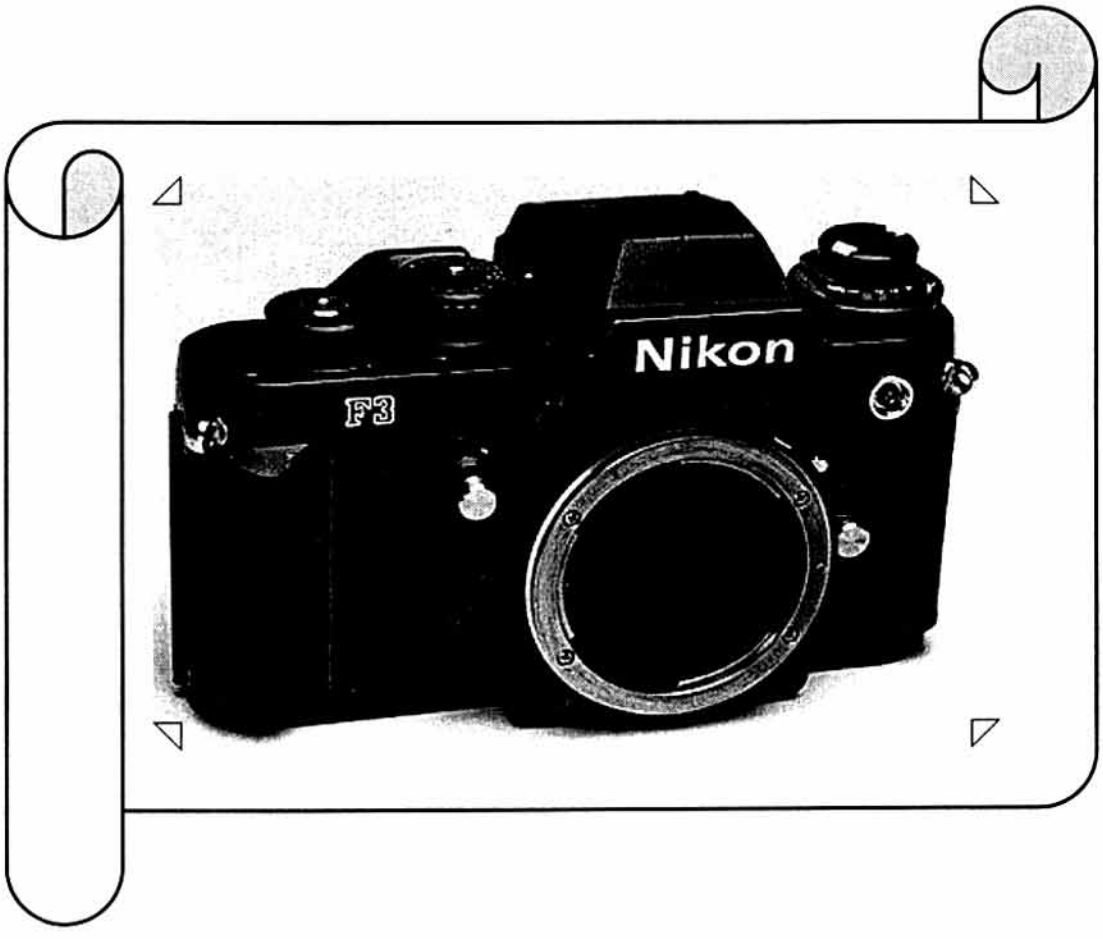
Nikon

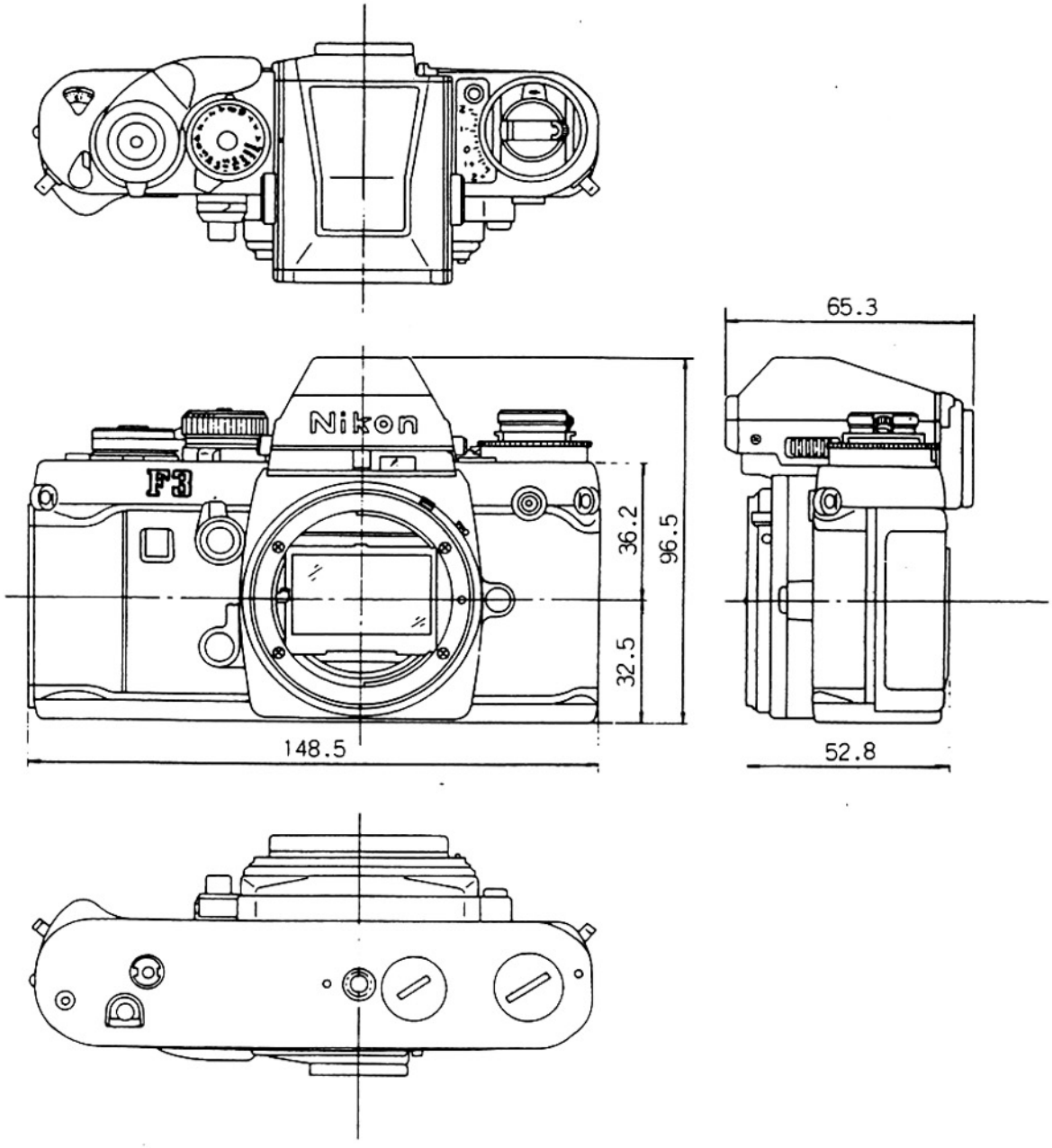


Nikon F3 Repair Manual

Section 1 Specifications & Mechanism

Content

外観図 Figure of External



1-1 Specification

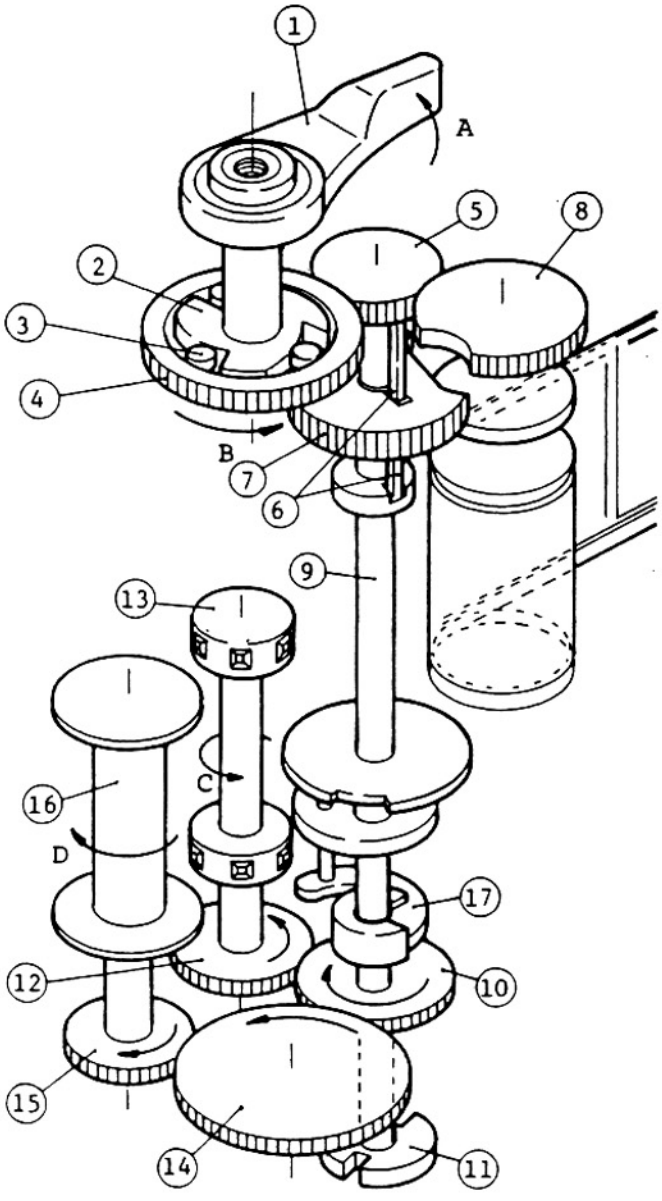
Type:	35mm single lens reflex camera
Picture format:	24mm x 36mm
Viewing system:	Frame coverage; 100% Interchangeable viewfinders
Lenses usable:	AI-type Nikkor lenses and Non AI-type Nikkor lenses (Stop-down exposure metering)
Lens mount:	Nikon bayonet type
Shutter:	Electromagnetic shutter-release; electronically controlled, horizontal-travel titanium focal-plane shutter; automatic shutter speed selection within a range of 8 sec. to 1/2000 sec.; manual shutter speed selection for the 8 - 1/2000 sec. range plus "B" (electronical), "T" (mechanical) and X synchro (1/80 sec.); when power source is exhausted, exposures can be made at 1/60 sec. Via mechanical-release knob (11.5ms)
Self-timer:	Electronically controlled; Red LED flickers to indicate its operation (10 sec.)
Exposure measurement:	TTL center-weighted exposure metering at full aperture; body-built-in meter incorporates one silicon photo-diode (SPD); metering range EV1 to EV18
ASA film speed range:	ASA12 - 6400
Exposure compensation:	+2EV to -2EV (At ASA12, up to EV+1, at ASA6400, down to EV-1)
Memory lock:	Provided
Viewfinder information:	Liquid crystal display; 1) Shutter speed ... four-digit read-out 2) Under/overexposure (manual) ... "+" and "-" display 3) Beyond auto exposure control ... "+2000", or "-8-" display 4) Manual shutter speed setting ... "M" display

	Red LED display At flash shooting, ready-light lights up when flash unit is charged and flickers when the setting is beyond camera's synch range or mounting foot is insufficiently installed or ASA dial is set at a film speed higher than 400.
	Aperture-direct-readout provision enables indication of lens aperture set when lens in use offers AI facility.
	Built-in illuminator illuminates LCD and ADR.
Focusing screen:	Interchangeable, exclusively-designed (F2's screen not usable)
Film advance lever:	Single stroke or a series of strokes; stand-off angle 30°, winding angle 140°
Frame counter:	Shows number of frames exposed; automatically resets to "S" when camera back is opened; automatic operation starts from frame 1.
Multi-exposure:	Possible via multi-exposure lever
Film rewinding	Manual crank-type
Flash synchronization:	Synchronization range; for electronic flash unit, 1/80 sec. to 8 sec. plu "B" synch speed when optional electronic flash unit is mounted; Auto..... 1/80 sec. Manual... 1/80 sec. (X or faster) Set shutter speed (slower than X)
Accessory Shoe:	fitted with hot-shoe contact, ready-light contact and TTL auto flash signal contact.
Reflex mirror:	Automatic instant-return mirror with lock-up feature
Depth-of-field preview button:	Provided
Camera back:	Hinged, swing-open type; removable; memo-holder provided

Motor-drive coupling:	Screw-on type connection Signal 1) Closing curtain signal 2) Electromagnetic shutter-release start signal 3) Film-advance completion signal 4) Power source signal 5) 16 sec.-hold signal 6) Release-metering signal
Cable release socket:	Tapered screw
Meter ON/OFF switch:	Meter switched on when shutter release button is depressed slightly; stays switched on for 16 sec. after finger is lifted off button: Display also stays indicated for 16 sec. after switching off.
Power source:	Two 1.5V silver-oxide batteries (G13); powered by MD's power source when mounted MD.
Battery power check:	can be made by LCD (power is enough while display remains indicated).
Dimensions:	148.5 (W) x 96.5 (H) x 65.5 (D) mm
Weight:	700g

1-2 Outlines of Mechanism

1-2-1 Film-advance Mechanism



The film-advance mechanism of the F3 is characterized by the one-way clutch and the connecting shaft: the former serves for noise reduction, as well as series of shorter film-advancings, the latter simplifies the drive gears train or decreases the torque which the motor-drive needs to fulfil film-advancing.

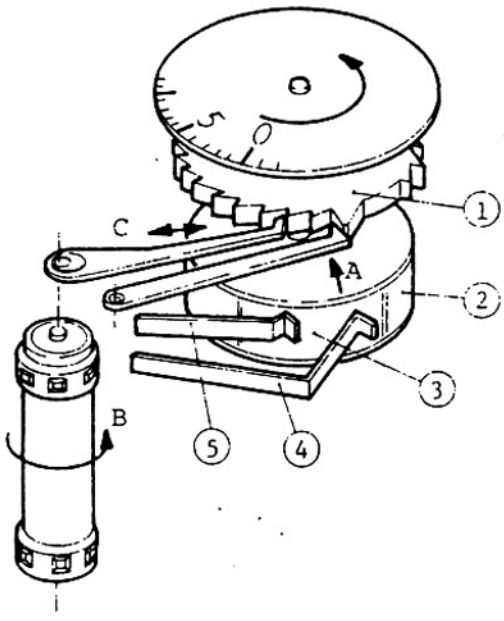
MD take-up torque:
F3 ... 1.0kgcm
F2 ... 3 - 5.5 kgcm

Stroking Film-advance lever ① in the direction A rotates Take-up Gear ④ in the direction B by way of Clutch ② and Roller ③ (One-way clutch). This power rotates Gears ⑤ and ⑦, and reaches Gear ⑩ through the connecting shaft.

Gear ⑦ (Incomplete gear) rotates Gear ⑧ to cock the shutter. But Gear ⑩ drives Sprocket Gear ⑫, Spool Idle Gear ⑭ and Spool Gear ⑮ to rotate Sprocket ⑬ and Spool ⑯ in the respective directions C and D.

Note: Shutter cocking and Take-up Claw ⑰ are referred to Multi-exposure mechanism, page (M9) and Shutter cocking mechanism, page (M15) respectively.

1-2-2 Counter Switch Mechanism



After loading the film into the camera, it is necessary to make a few blank exposures for taking the first picture.

However, as to automatically controlled camera, if the shutter-speed dial is set to "Auto", shutter speed becomes slow under low-light conditions, which prevents rapid picture-taking action.

For quick and easy film loading, auto-exposure control remains cancelled until the frame counter reaches "1" as is already introduced by the EM.

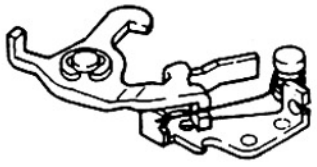
The mechanism is: When the frame counter is advanced by the film-advance operation, ON/OFF changeover of the counter switch is made by the combined operation of Ratchet ①, Insulator ②, Conductor ③, Contact Blade B ④ and Contact Blade A ⑤.

With the shutter-speed dial set to "Auto", when the frame counter is between "S" and "0", the shutter speed becomes automatically 1/80 sec. by the operation of IC circuit.

At shutter-speed dial settings ranged from 1/2000 - 1/125 sec., the shutter speed also becomes 1/80 sec.

Counter switch turns OFF while the frame counter indication is between "0" and "1". Auto-exposure control starts working after the frame counter reaches "1".

1-2-3 Closing Curtain Switch & Film-advance Limit Mechanism



Closing Curtain SW

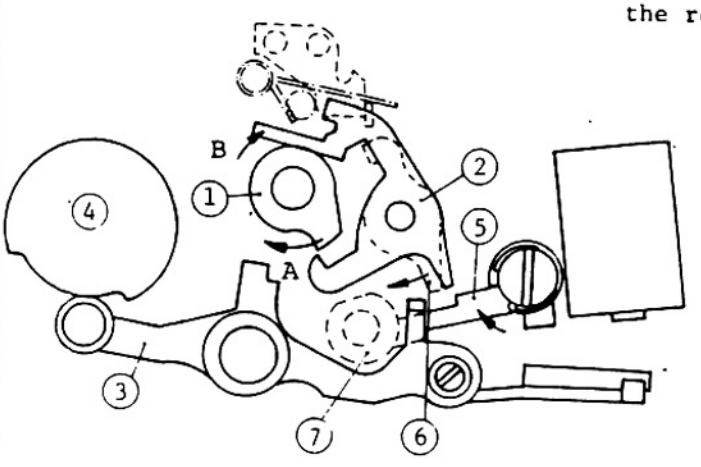
A Closing curtain switch for the F3 opens during film-advance operation and closes at shutter-releasing, which gives film-advance signal to the motor drive.

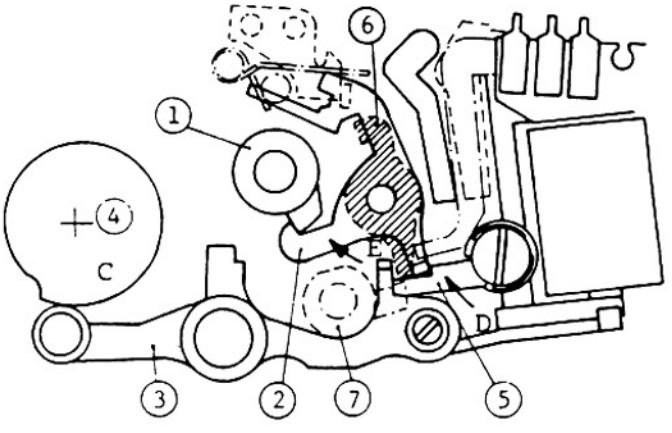
During film-advancing:

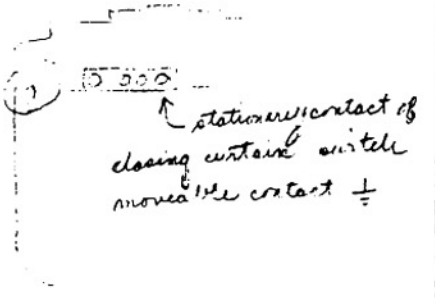
B When Connecting Shaft is rotated, Stopper ① rotates in the direction A and the claw of ① pushes Take-up Stopper ② in the direction B, turning closing curtain switch OFF.

End of film-advancing:

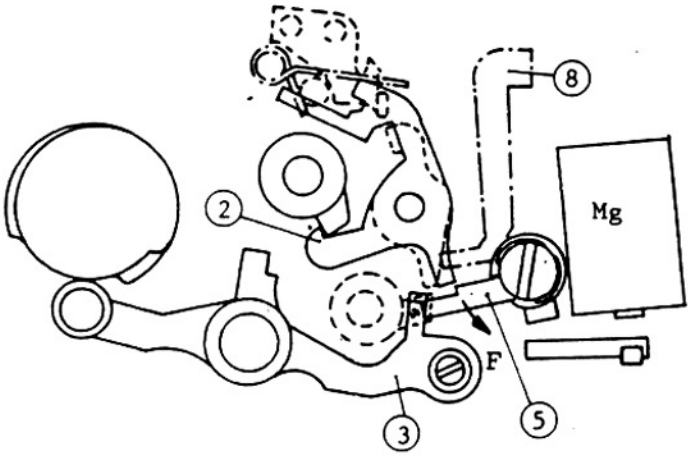
C When film-advance operation is complete, the roller of Charge Lever ③ is pushed in the direction C by Cam ④. As a result, Stopper Lever ⑤ which held by ③ moves in the direction D and engages with ②, thus retaining ②. Film-advancing is limited by the engagement between the claw of ① and ②. In accordance with the movement of ②, Stopper Lever ⑥ moves in the direction E until the tip of ⑥ comes in contact with Stopper ⑦, thereby stopping the rotation of the sprocket.





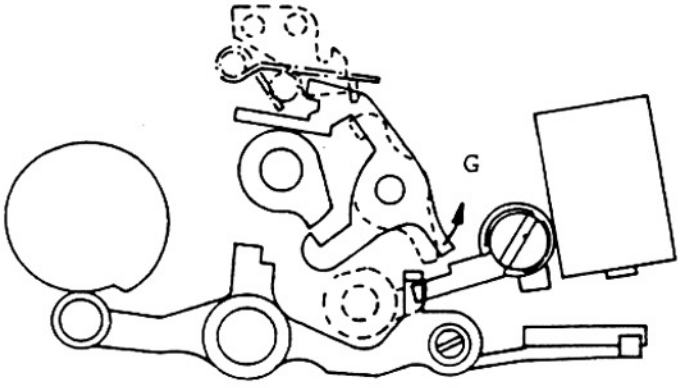


Shutter-releasing :



D When the shutter-release button is depressed, Spring ⑧ is pushed and holds ②. When the closing curtain is released, ③ falls apart from the magnet and the protrusion of ③ (mark※) strikes ⑤ in the direction F.

Completion of Release :



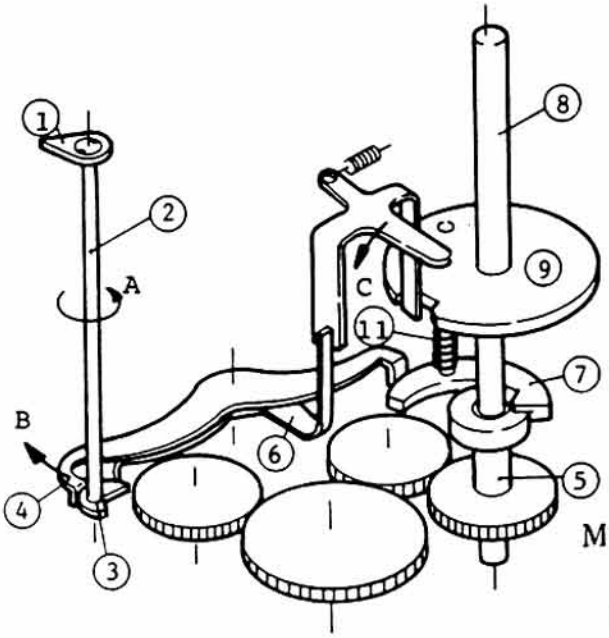
E When the finger is lifted off the release button, ② is rotated in the direction G by Spring force and ② is disengaged from ①. Then, closing curtain Switch becomes ON and film-advance signal is given to the motor drive to start.

Troubleshooting

I) With the motor drive mounted, if closing curtain switch closes earlier than the time when ① is disengaged from ②, the motor drive fails to operate by the operation of film-advance auto-stop circuit.

II) When the shutter is released with the pressure applied onto the film-advance lever, if the spring (#309) is not effectively tensioned, the blurred image may result.

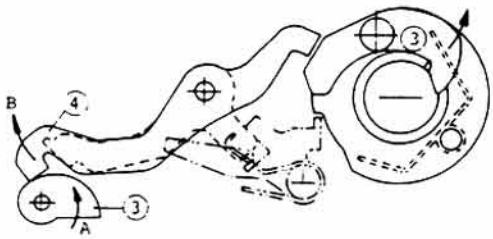
1-2-4 Multi-exposure Mechanism



Multi-exposure mechanism of the Nikon F3 is different from that of the Nikon F2. To facilitate the multi-exposure control, Multi-exposure Lever ① is located on the top of camera body.

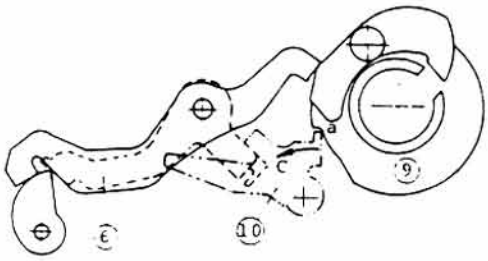
Multi-exposure Setting :

When Multi-exposure lever ① is set to multi-exposure control setting, both Axle ② and Cam ③ are rotated in the direction A and thus Cam rotates Set lever ④ in the direction B. At this moment, Take-up claw ③ is disengaged from the cutout of Lower gear ⑤. Simultaneously, Cam ③ is held by Lock lever ⑥.



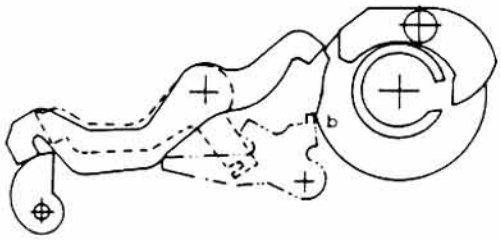
Winding Operation :

When the film-advance lever is stroked with Multi-exposure lever set to multi-exposure control setting, ⑦ is disengaged from the cutout of ⑤. Since the rotation of Connecting shaft ⑧ is not transmitted to ⑤, neither Sprocket nor Spool rotates. However, the shutter is cocked, because Incomplete gear incorporated into ⑧ engages with Shutter curtain control gear.



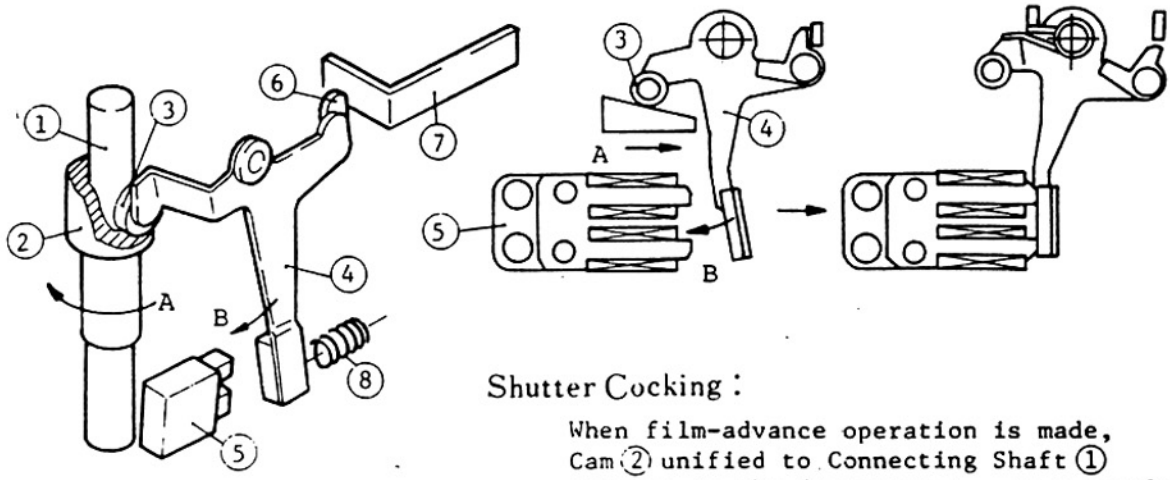
Cancellation :

During film-advance operation cycle, when Take-up disk ⑨ rotates from Point a to Point b, Signal lever ⑩ is pushed in the direction C and thus ③ is disengaged from ④. At the end of film-advance operation (i.e. immediately when ⑩ engages with Portion a of ⑨), ⑦ is engaged with the cutout of ⑤ by Spring ⑪, thereby restoring to the normal condition.



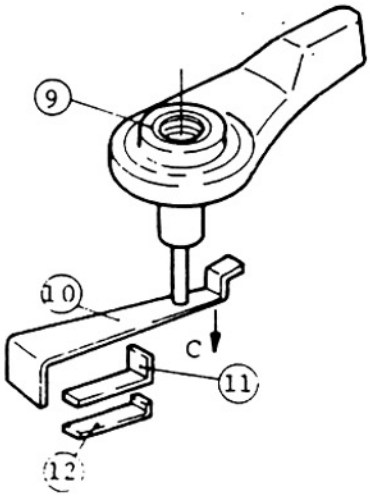
Note: During film-advance operation, ⑤ is not disengaged from ⑥, thus preventing multi-exposure operation.

1-2-5 Shutter-release Magnet & Shutter-release Mechanism



Shutter Cocking :

When film-advance operation is made, Cam ② unified to Connecting Shaft ① rotates in the direction A. As a result, Roller ③ on the cam surface (shaded area) is pushed up and Lever ④ moves in the direction B, then sticks to shutter-release Magnet ⑤ , resulting in shutter-cocked condition.



Troubleshooting

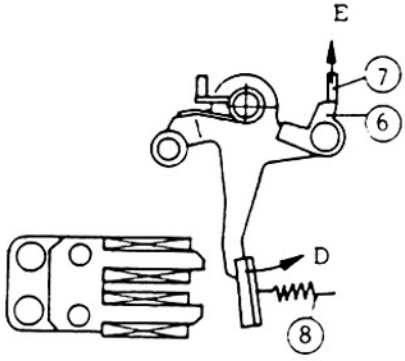
Shutter cannot be completely cocked if the shutter-release magnet unit is incorrectly installed.

Shutter-releasing :

When Shutter-release Button ⑨ is slightly depressed, Lever ⑩ is pushed downward (Arrow C) and comes in contact with Blade ⑪ , closing release-metering switch. Thus power source circuit becomes ON and display system starts operating.

When the button ⑨ is depressed further down, both ⑩ and ⑪ touch Blade ⑫ , closing the release switch.

Simultaneously, release-signal is given to the magnet and the magnet loses the magnetic force.



Therefore, ⑥ being tensioned by Spring ⑧ is drawn in the direction D and Claw ⑥ pushes Lever ⑦ upward (Arrow E) to release the reflex-mirror, thus releasing the shutter.

1-2-6 Mirror Mechanism

Front unit assembly consists of two units: front plate unit and mirror box unit, which have been divided so far in the earlier models.

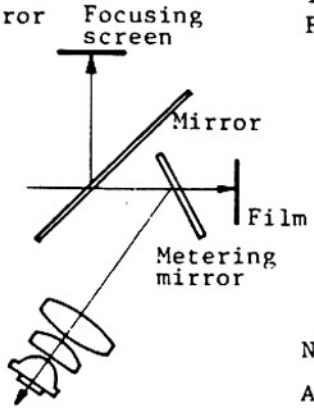
The main components are:

1) Mirror-box (Mirror-actuator and Mirror holder)
2) AI meter coupling
3) Electromagnetic-release
4) Lens manual stop-down and Mirror lock-up
5) Mechanical shutter-release
6) Switches (Shutter SW, Safety SW and Memory SW)
7) Viewfinder
8) Electrical control system

The main features are:

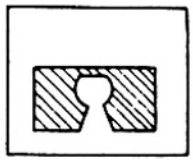
1) Specially treated reflex-mirror and Metering system

Almost all light coming through the lens is led into the viewfinder via the reflex-mirror as usual. However, a small percentage of light will pass through the pinholes half-mirror located in the middle of the reflex-mirror (See fig.) to lead the light to the light sensor via the metering mirror for exposure metering.



Shaded area:

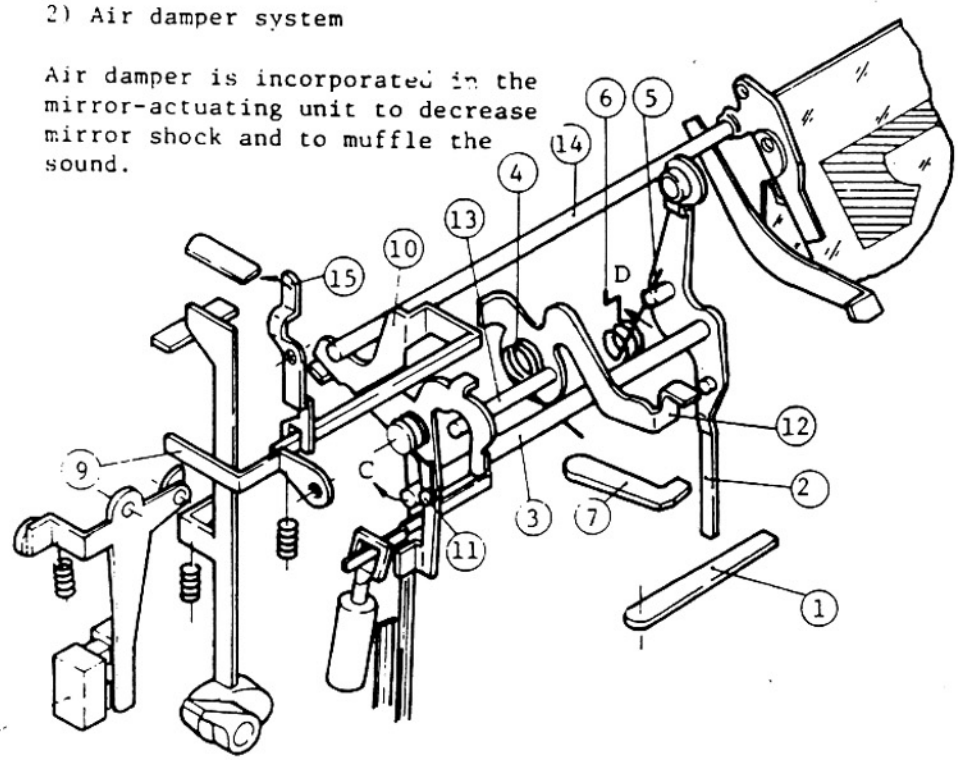
Pinholes half-mirror
Transmission = 8%
Pinhole shape = oval



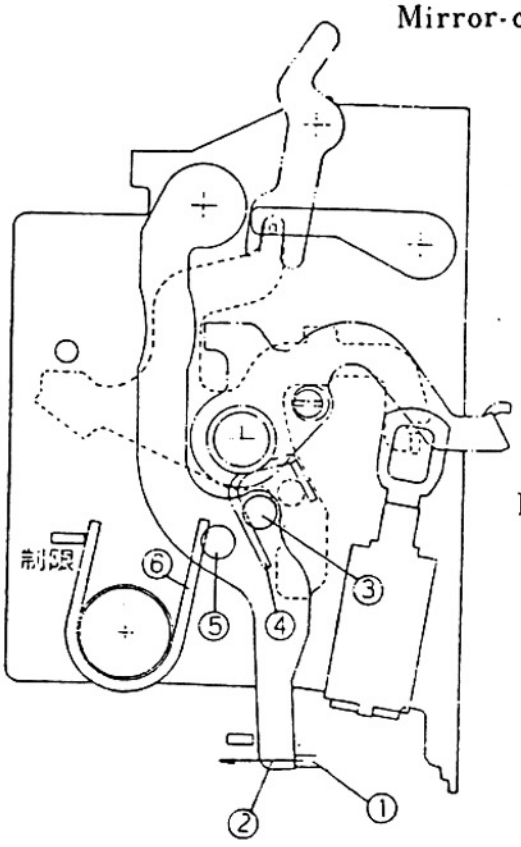
Number of pinholes = Approx. 17,000/c m²

2) Air damper system

Air damper is incorporated in the mirror-actuating unit to decrease mirror shock and to muffle the sound.



Mirror-cocking Mechanism

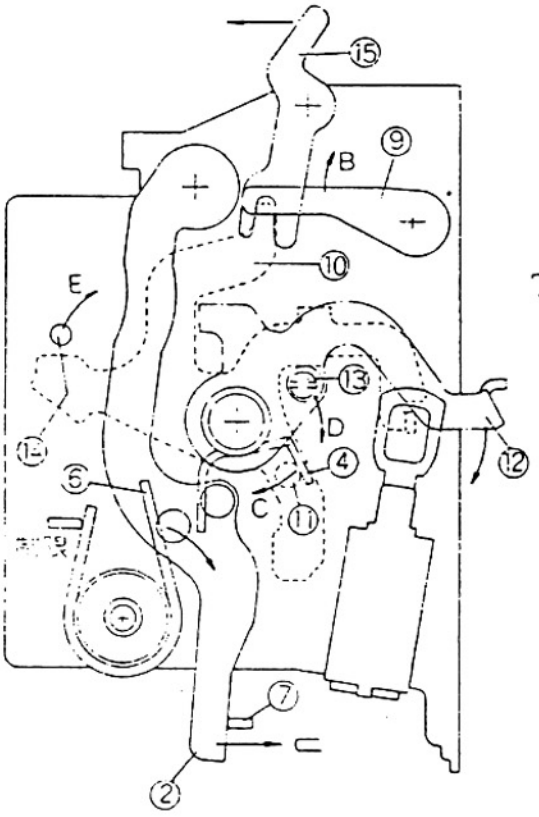


Mirror-cocking :

While the film-advance lever is stroked, Mirror Cocking Lever ① pushes Vertical Lever ② via Mirror-charge Cam in the direction A. Pin ⓐ on ② also charges Spring ③ as soon as Pin ⑤ charges Mirror-down Spring ⑥. When the film-advance lever is further stroked, ② is engaged with Quick Return Lever ⑦, thus completing mirror-cocking. Under the condition, ① returns to its original position.

Mirror-releasing :

When the shutter-release button is fully depressed, Lever ⑨ is pushed upward (Arrow B) and disengages Main Lever ⑩. At the moment, Mirror-up Spring ④ engaged with Pin ⑪ on Lever ⑩ is released and rotates Lever ⑩ in the direction C. When ⑩ rotates, Lever ⑫ is pushed in the direction D via Pin ⑬ and the mirror is raised up (Arrow E) via Pin ⑭. While the mirror is rising to the taking position (Interval between the mirror and the mirror-stopper to be 8.3 ± 1mm), the shutter is released via Lever ⑮ engaged with Lever ⑩.
After completion of closing curtain's travel, ⑦ is disengaged from ② and ② is returned to its original position by Mirror-down Spring ⑥. Other associated levers are also returned to its original position.

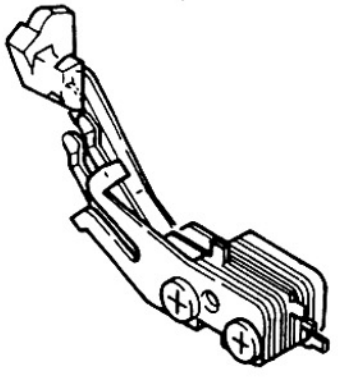


Troubleshooting

Main causes of failure to advance the film when the film-advance lever is stroked with a lens mounted may be traced to the following:

a) Incorrect height of Diaphragm Actuating Lever ⑫
b) Improper engagement between Lever ⑨ and Main Lever ⑩
c) Improper movement of Main Lever ⑩ due to unbalanced power of every spring.

1-2-7 Shutter Switch & Mechanism



Shutter SW

These switches closes when Main Lever ⑩ starts moving and opens at mirror-down.

Note: With the F3, Mirror Switch for memory which has been incorporated into the electronically controlled camera (EL, FE, etc.) is not provided. Instead, memory is done by the combination of the analogue actuating signal and the OFF/ON timing of shutter switch, thereby enhancing the reliability.

Troubleshooting

Should chattering of shutter switch occur, unstable auto-shutter speed may result.

Metering Mirror :

Metering mirror moves in strict accordance with the movement of the reflex-mirror and sticks to the mirror-holder at up-position.
Thus, image cut-off by metering mirror will not occur.

1-2-8 Shutter Mechanism

1-2-8-1 Outlines

The F3 uses a conventional double-roller focal plane shutter, whose curtains are made of titanium. Shutter-speed control is electronical at the automatic/manual setting from Bulb to 1/2000 sec. But it is purely mechanical at the manual setting of 1/2000 sec. and Time (extra-long exposure) operation. Additionally, the seccnd shutter release button is provided for the mechanical release at a speed of 1/55 sec. when the battery's power is exhausted.

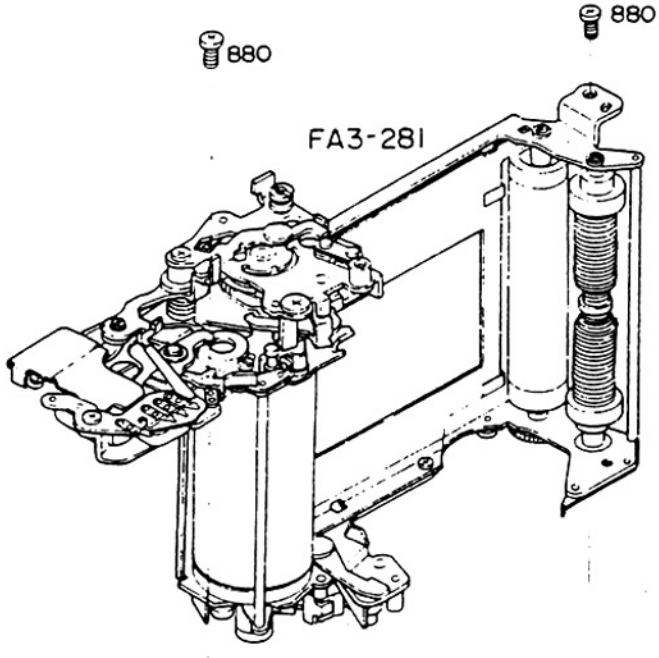
All parts of the shutter mechanism are installed into a complete unit. The unit can be removed alone from the camera body and directly brought under repairs and adjustments.

The performance of the mechanism is assured by the following characters:

1) Cocking the shutter by the incomplete gear separates the shutter mechanism from the film-advance mechanism at the completion of shutter cocking cycle. Thus, the shutter curtains travel does not shock the film-advance mechanism.

2) The time of the shutter curtains travel across the aperture is decelerated to approx. 12ms (the F2 is specified as approx. 10ms). It has the advantage of stabilizing the travel at higher shutter-speed release, improving the durability of curtains and reducing the torque of film-advance.

3) The shutter control mechanism provides a stable start-timing of shutter curtains travel at the setting of 1/2000 sec.

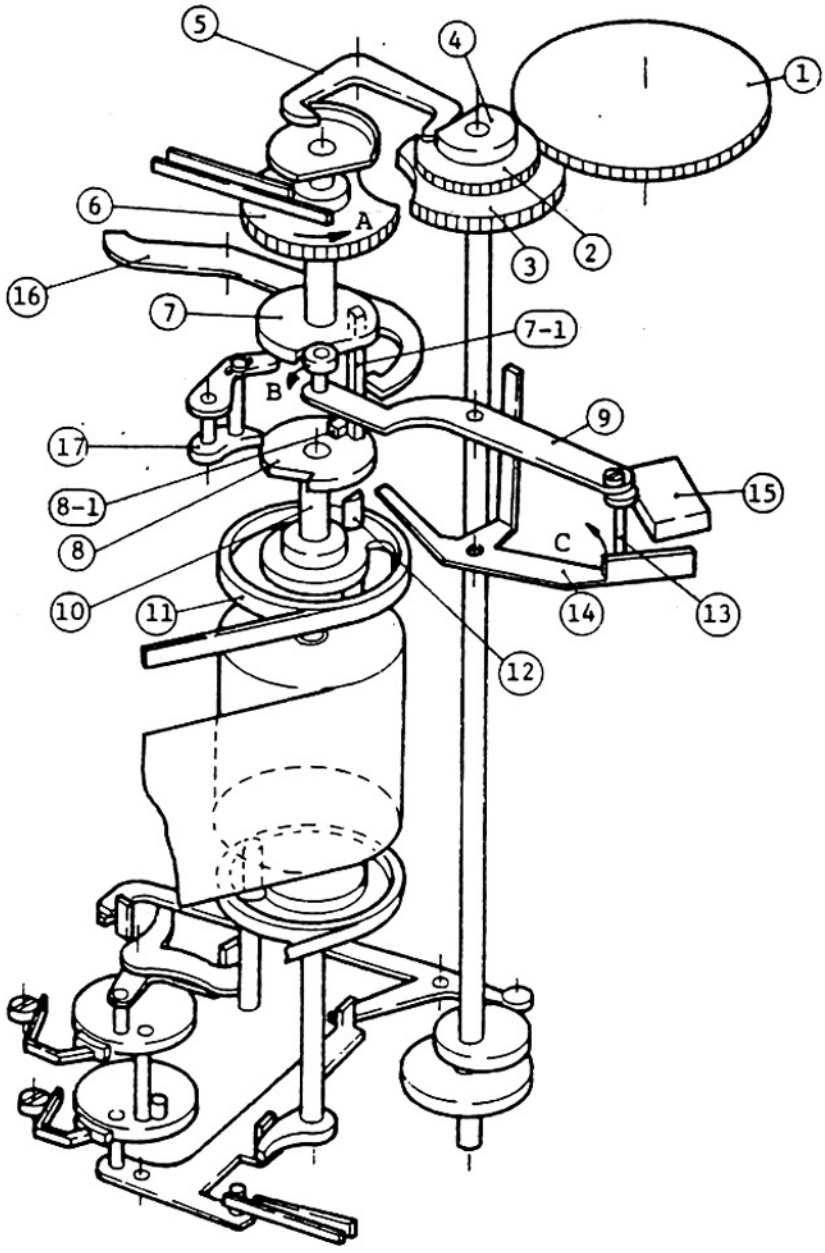


1-2-8-2 Shutter Cocking Mechanism

Stroking the film-advance lever rotates Gear ①, Gear ② and Gear ③ (incomplete Gear). Gear ② disengages Claw ⑤ (bound-proof claw) from the cam on Gear ⑥. Thus, Gear ⑥ allows Cam ⑦ to rotate in the direction A. Cam ⑦ drives Cam ⑧ and Pulley ⑪ through the engagement of Post ⑦-1 with Protrusion ⑧-1. Turning Pulley ⑪ engages with Post ⑫ to start the winding rollers of opening and closing curtains.

Simultaneously, the motion of Cam ⑦ pushes Arm ⑨ in the direction B, and spring-loaded Hook ⑭ follows Arm ⑨ until its end attaches onto Magnet ⑮. Note also that the motion of the cam on Gear ⑥ closes the trigger switch.

At the final stage, Gear ③ is disengaged from Gear ⑥ by the incomplete teeth of each gear so as to cut off the film-advance mech. from the shutter release shock. Lever ⑯ engages with Cam ⑦ for the shutter control. Claw ⑰ latches Cam ⑧ for tensioning the opening curtain. Post ⑫ holds Hook ⑭ for tensioning the closing curtain. Thus, the shutter cocking procedure is completed.


5
4
1
6
A
3
2
16
7
7-1
B
9
17
15
8-1
8
C
10
11
14
13
12

1-2-8-3 Shutter-release Mechanism

At the Automatic/Manual Setting from Bulb to 1/2000

Depressing the shutter-release button raises the mirror to the taking position through use of the electronical signal. After the mirror rising, the signal lever (see page) disengages Lever ⑯ from Cam ⑦. Thus, Cam ⑦ and Gear ⑥ rotates in the direction D.

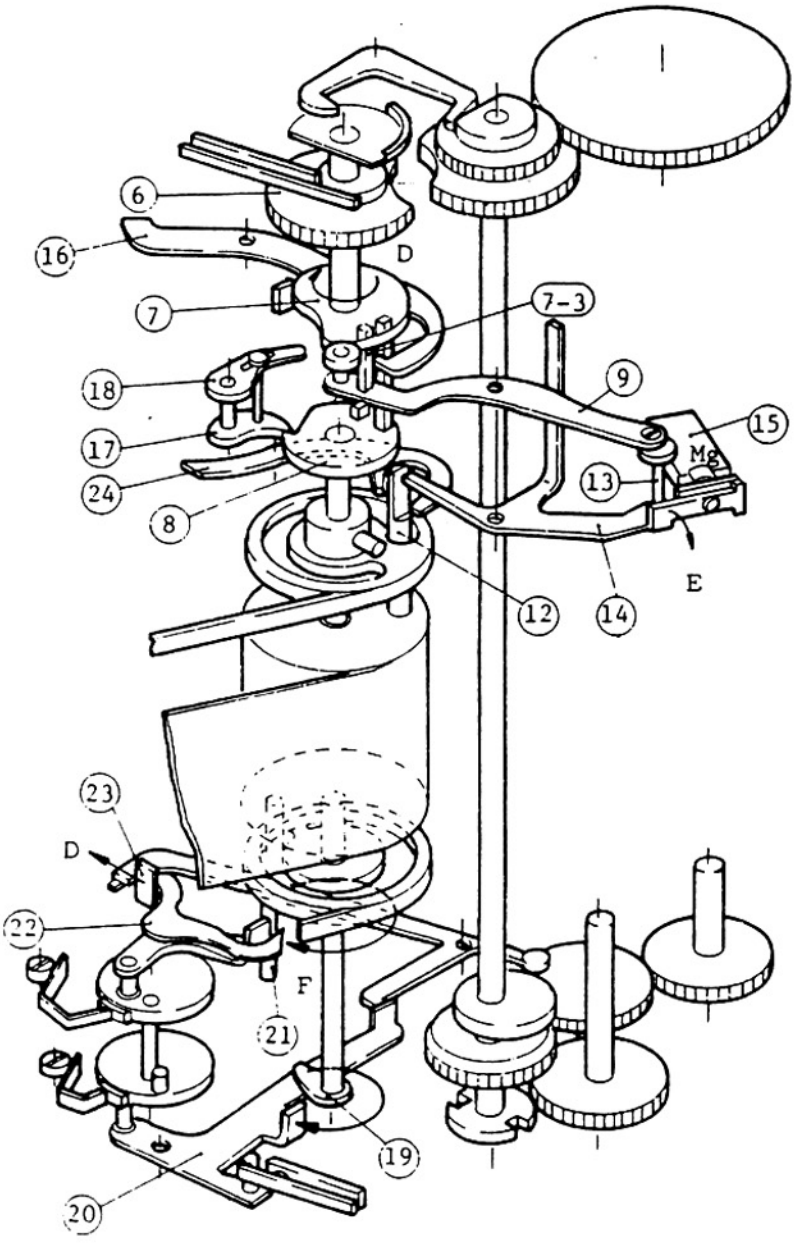
Gear ⑥ opens the trigger switch, and the shutter control circuit will be in operation. It changes Magnet ⑮ to hold Hook ⑭ with its magnetic force.

Post ⑦-③ of Cam ⑦ strikes Lever ⑱, and Lever ⑰ unlatches Cam ⑧. So the opening curtain starts to travel across the aperture.

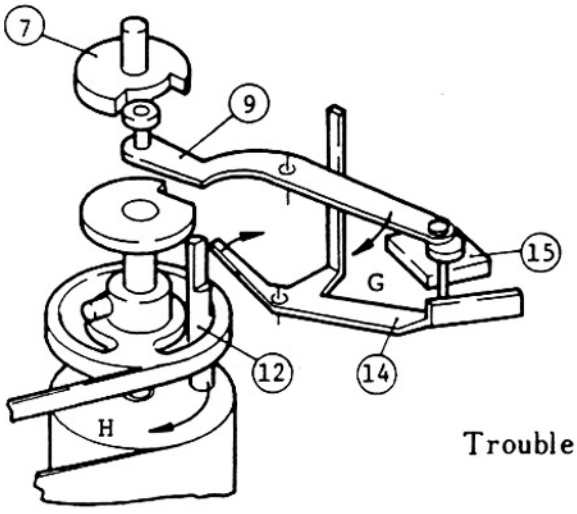
After the shutter speed is determined, the control circuit cuts off the current flow to Magnet ⑮. Magnet ⑮ frees Hook ⑭, and Hook ⑭ is disengaged from Post ⑫. It releases the closing curtain.

To return the mirror to the viewing position, Pin ㉑ strikes Lever ㉒.

Note that when the opening curtain is released, Lever ⑲ closes the syuch contact through Arm ⑳.


6
16
D
7
7-3
18
9
15
17
Mg
24
13
8
E
12
14
23
D
22
F
21
19
20

At the Manual Setting of 1/2000 sec.



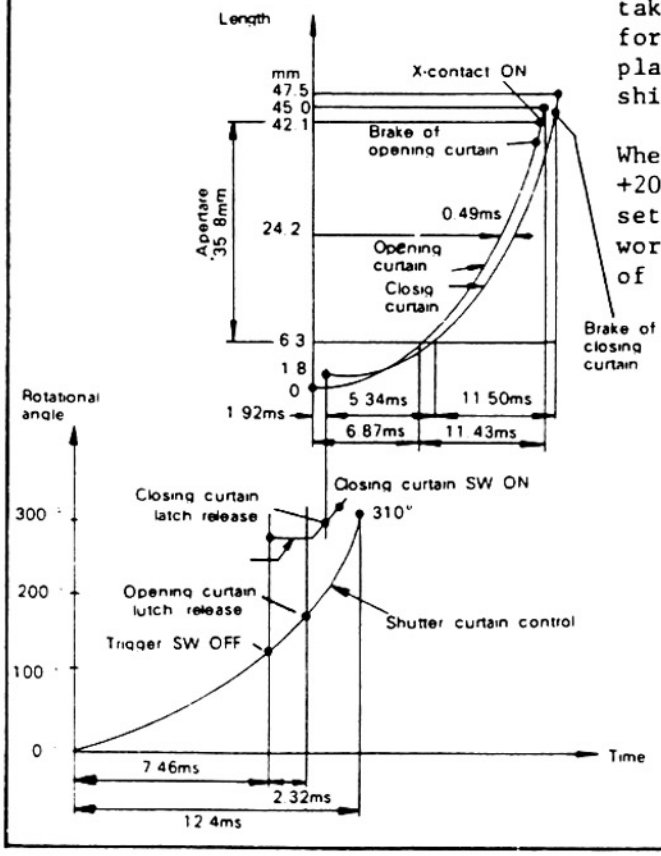
The mechanism operates in the same procedure as at the automatic/manual setting from Bulb to 1/2000 sec. until the opening curtain starts.

At the manual setting of 1/2000 sec. the shutter control circuit does not charge Magnet (15). Thus it does not hold Hook (14). The motion of Cam (7) returns Arm (9) to the original position. Hook (14) follows Arm (9), and disengages Post (12). The closing curtain travels across the aperture.

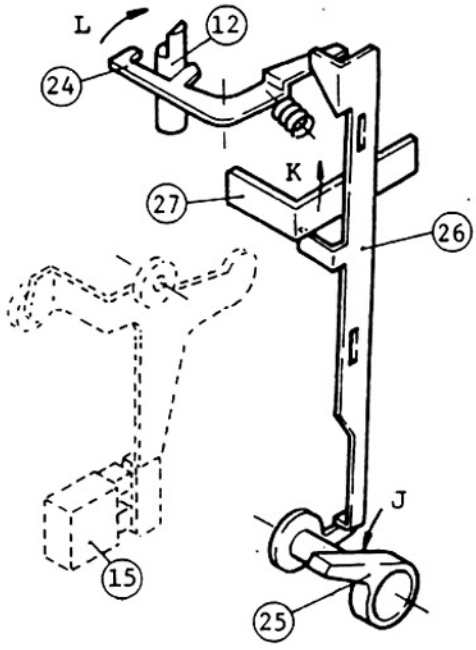
Troubleshooting

Time variations of the shutter curtain-travel fall into two categories at the manual setting of 1/2000 sec. When the variations are less than 0.05ms, they should be troubleshooted to the shutter control components: the movement of Hook (14), the rotation of Cam (7) and loosened Eccentric pin #283. When the variations are more than 0.05ms, they should be troubleshooted to the shutter components; the shutter curtain position, the rotation of the winding/take-up rollers, the defective springs for tensioning curtains, the excessive play of Drum Shaft and deformed light-shield #255.

When the exposure information displays +2000 for shutter speed at the automatic setting, the mechanical limiter can work to release the shutter at min. speed of 0.35ms.



1-2-8-4 Mechanical Shutter Release by the Shutter-release Knob



Depressing Knob (25) pushes Hook (26) upward as illustrated.
This releases the mirror by Lever (27). Simultaneously, Hook (26) disengages Lever (24) from Post (12). As to subsequent mechanical operation to the opening curtain's travel, the mechanism works in the same procedure as at the automatic setting.

After completing the opening curtain's travel, Screw (28) strikes Lever (24) to be disengaged from Post (12). This starts the closing curtain. At the time, Magnet (15) does not hold Hook (14). Thus it frees Post (12) when Arm (9) returns after the motion of Cam (7).

Troubleshooting

When the mechanical release is used at the halfway film-advancing, it results in the mirror lock-up or the uneven frame-to-frame spacing.

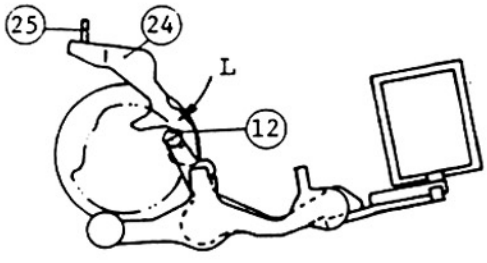


fig. I

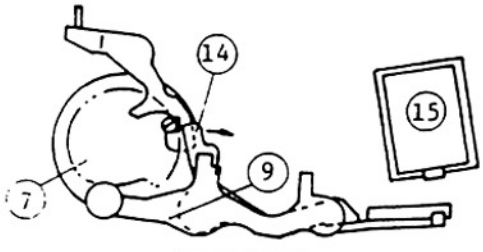


fig. II

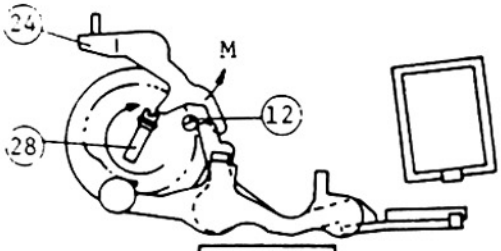
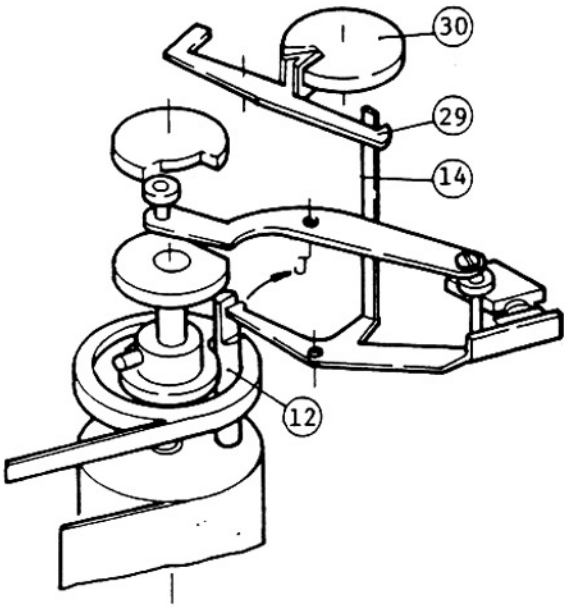


fig. III

1-2-8-5 Time Operation for Extra-long Exposure



Setting the shutter-speed dial to "T" places Lever (29) against Cam (30) as in fig. I, and engages the end of Lever (29) with Hook (14). Mechanical sequence from shutter-release operation to the opening curtain travel is exactly the same as at the manual setting of 1/2000 sec. However, the closing curtain does not travel immediately after the opening curtain, since the engagement of Lever (29) and Hook (14) holds the shutter open for the time-operation.

When the shutter-speed dial is set to "B" or "X" to terminate the time-operation, Cam rotates to disengage (29) from Hook (14). Subsequently, the closing curtain starts.

Troubleshooting

Malfunction of the time-operation is caused by the improper movement of Lever (29) and the insufficient engagement between Lever (29) and Hook (14).

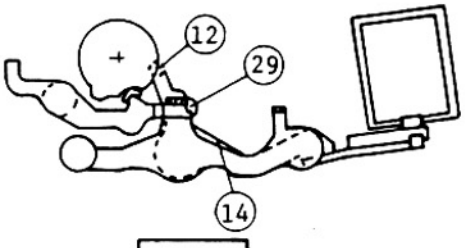


fig. I

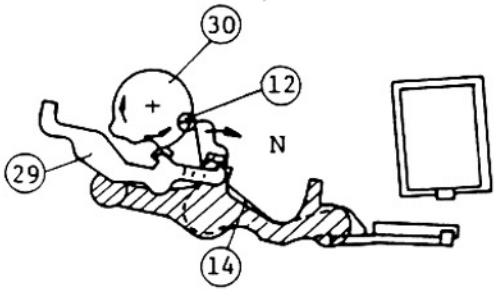
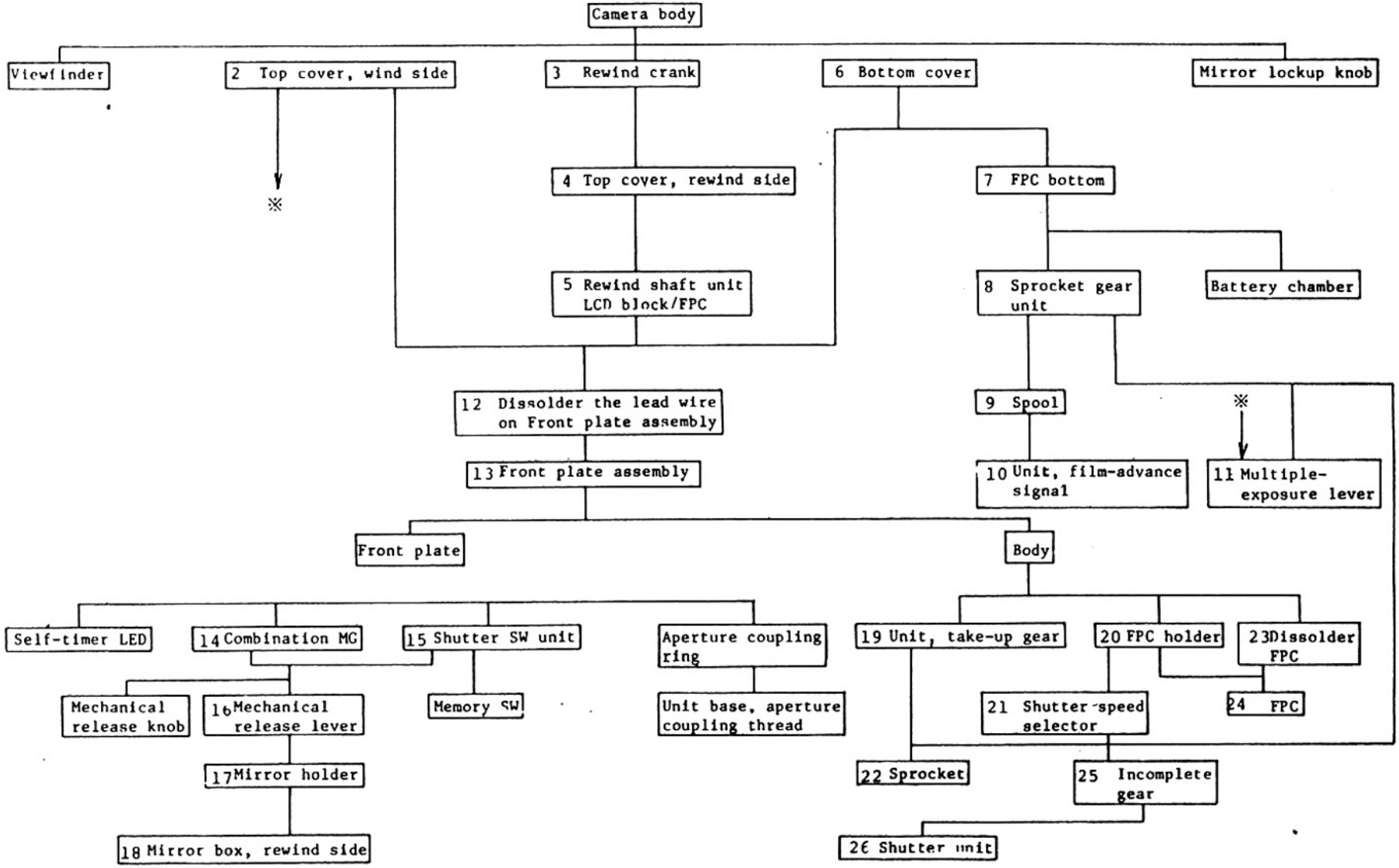


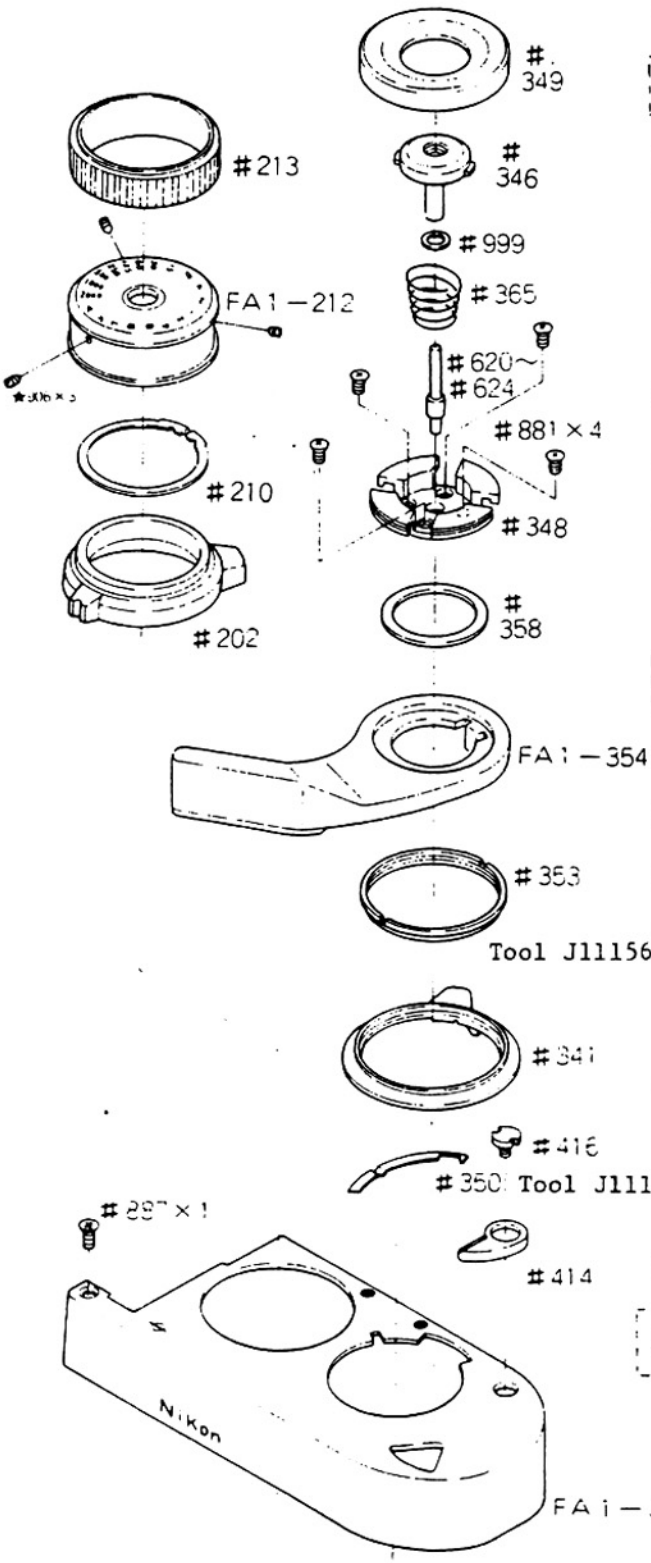
fig. II

Section 2 Disassembling

Content


Camera body
Viewfinder
2 Top cover, wind side
※
3 Rewind crank
6 Bottom cover
Mirror lockup knob
4 Top cover, rewind side
7 FPC bottom
5 Rewind shaft unit
LCD block/FPC
8 Sprocket gear unit
Battery chamber
12 Dissolder the lead wire on Front plate assembly
9 Spool
※
13 Front plate assembly
10 Unit, film-advance signal
11 Multiple-exposure lever
Front plate
Body
Self-timer LED
14 Combination MG
15 Shutter SW unit
Aperture coupling ring
19 Unit, take-up gear
20 FPC holder
23 Dissolder FPC
Mechanical release knob
16 Mechanical release lever
Memory SW
Unit base, aperture coupling thread
21 Shutter speed selector
24 FPC
17 Mirror holder
22 Sprocket
25 Incomplete gear
18 Mirror box, rewind side
26 Shutter unit

2-2 Film-advance Lever



Cover ring #349

Tool: J11157

Release button shaft #346

Release shaft #620

Screw #881 x 4
Stopper #348

Washer #358

Film-advance lever FA1-354

Ring #353

Tool: J11157

Power lock lever #341

Click spring #350

Rubber ring #213

Tool: Use a lising solution to Priobond.

Screw ⊖ #906 x 3
Shutter speed selector FA1-212

Disk FA1-208

Spring #209

Retaining ring #210

Self-timer lever #202

Note: Turn #202 to ON-position for removing.

Screw #416

Tool: J11158
Note: Unscrew #416 with #414 holding.

Multi-exposure lever #414

Screw ⊕ #887
Top cover FA1-3

2-3 Rewind Crank

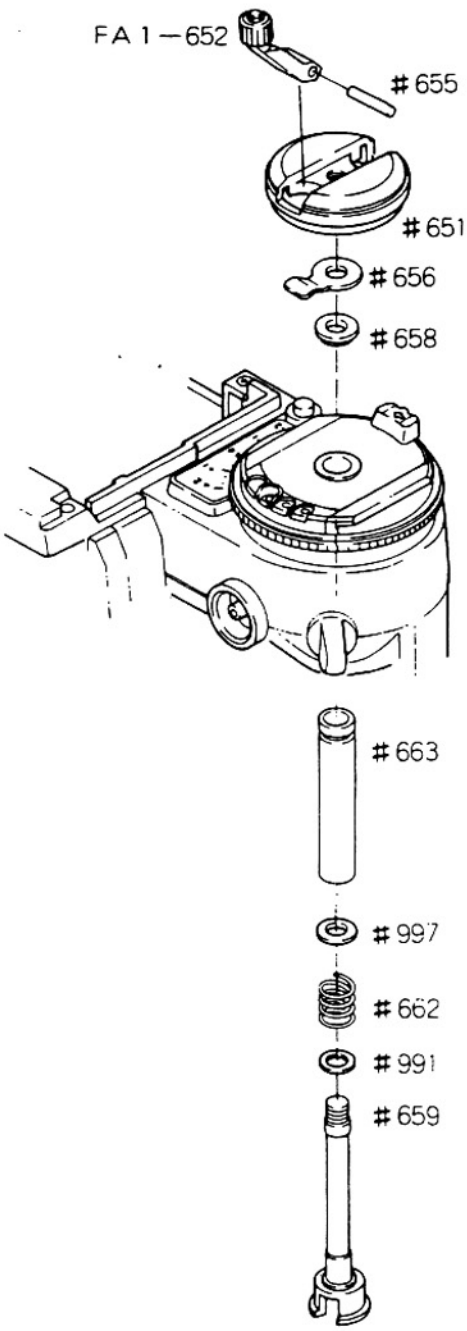
Rewind knob #651
Rewind crank FA1-652
Rod #655

↓

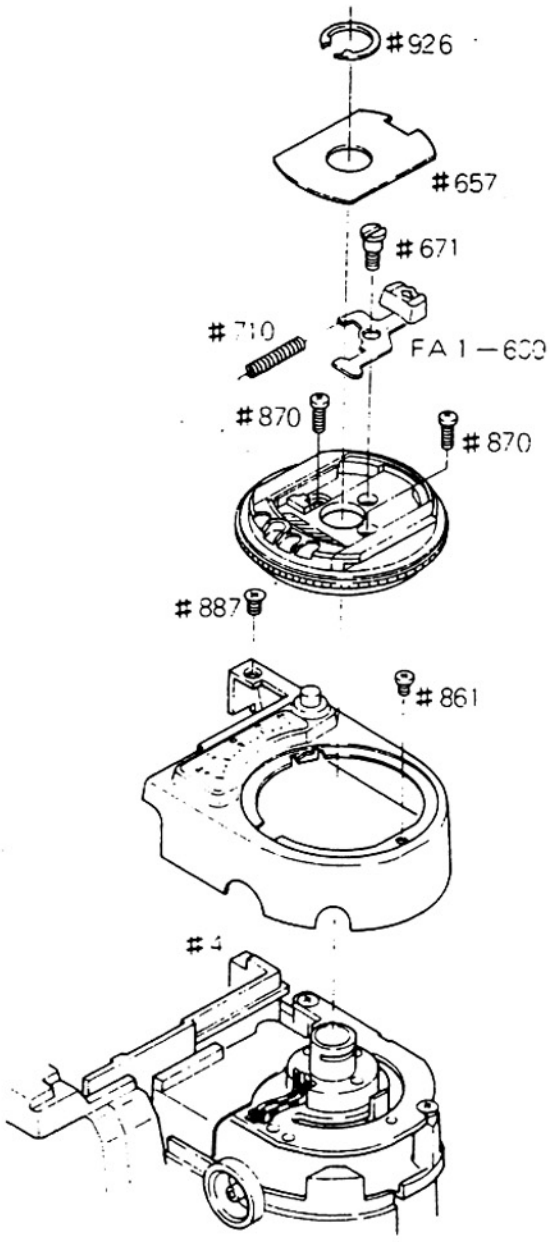
Spring #656
Washer #658

↓

Rewind shaft #659
Washer #991
Friction spring #662
Tube #663



2-4 Top Cover, rewind side



Snap ring #926

↓ Tool: J5272

Cover #657

↓

Spring #710

↓

Screw #671

↓

Tab Fa1-669

↓

Dissolder

↓ Lead wire (orange) #1075
Lead wire (white) #1074
Lead wire (blue) #1073

Screw ⊕ #870 x 2
Shoe FA1-664

↓

Screw ⊕ #861
Screw ⊕ #887
Top cover, rewind side FA1-4

2-5 Display Block

Dissolder

Lead wire (orange) #1075
Lead wire (white) #1074
Lead wire (blue) #1073
Lead wire (brown) #1078

Screw ⊕ #914 x 3
Unit, rewind shaft FA2-661

Dissolder

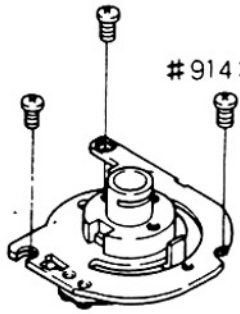
Lead wire (violet) #1076
Lead wire (orange) #1080

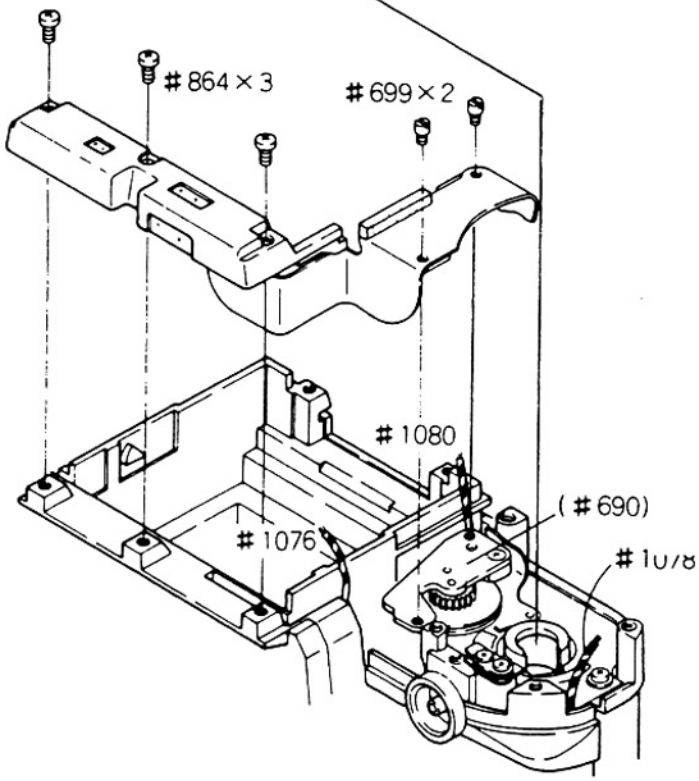
Screw ⊖ #669 x 2

Note: Loosen the one of #669, which locates near the front plate, first thing.

Screw ⊕ #864 x 3
Display block FA1-132

Note: Use care not to damage the FPC.





2-6 Bottom Cover

Screw #898
↓
MD coupling #549
↓
Screw ⊕ #870
Post #587
↓
Screw ⊕ #888 x 2
Bottom cover FA1-7
↓
Note: Reinstall #549 in place.
↓
Spring #534