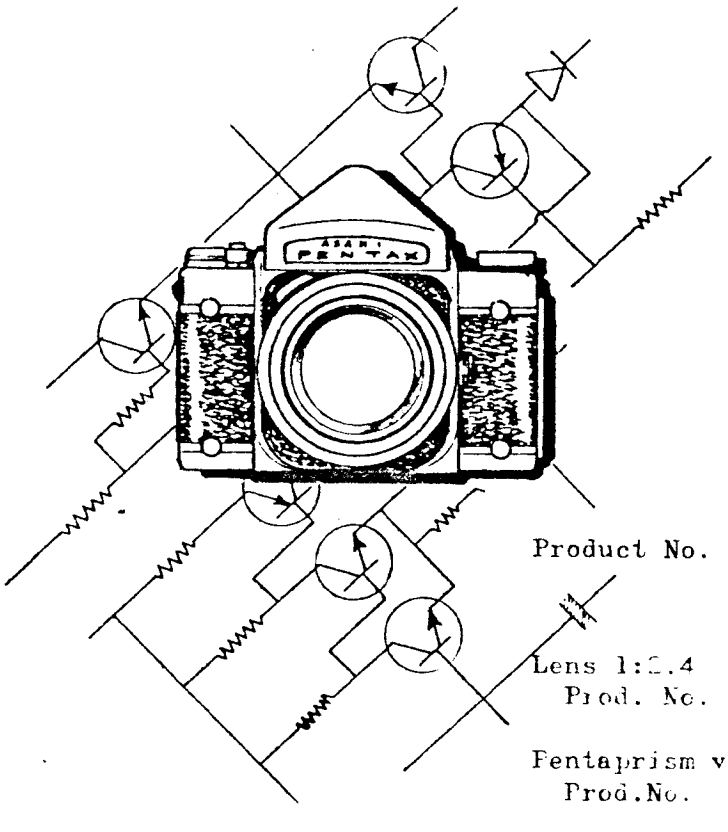
ASAHI PENTAX 6x7

SERVICE MANUAL



Product No. 23400

Lens 1:2.4 f=105 mm
Prod. No. 46000

Pentaprism viewfinder
Prod.No. 70034

4 ASSEMBLING

5 PARTS LIST

- LIST OF MAJOR FIGURES -

TABLE OF CONTENTS

CORRECTION SHEET

Page 2-7 4th line from the bottom
claw clutch ——→ a claw clutch

2-18 In the circuit diagram
Resistor R7 ——→ Discontinued

3-2 7th line from the top
setting screw ——→ set screw
8th line
a role of mirror... ——→ the role of a mirror...

4-23 B - 6 Finishing ——→ After finishing
4-4-15
2. Only the 2nd curtain is.. ——→ 2nd curtain alone is....

4-26 A
Synchronization X

A → 1.2	B → 3.3	C → 4.5	ms
A ≫ 1.2	B ≫ 3.3	C ≫ 4.5	ms

4-27 15 th line from the bottom
nut ——→ nuts

Throughout the service manual

G 4 ——→ G-7b
L5 ——→ G-10

1 - 2 SPECIFICATIONS

TYPE Large format single-reflex camera with interchangeable lenses.

FILM SIZE 120 roll film (10 exposures)
220 roll film (21 exposures)

PICTURE SIZE 55 mm x 69 mm

EXPOSURE COUNTER
Automatic re-set type

FILM TRANSPORT AND SHUTTER COCK
Single stroke rapid wind lever with rotation angle of 180 deg. plus pre-advancing angle of 10 deg..

SHUTTER Electronically time-selecting focal-plane shutter with rubberized silk curtains.

Speeds 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000 sec. and X.

Speed light synchronization.
X , equivalent to 1/30 sec.

Time lag 60 milli sec.

POWER SOURCE FOR ELECTRONIC SHUTTER
6V silver battery (Eveready #544)

VIEWFINDER Detachable eye-level and waist level viewfinders

Viewfinder format area ratio

100%	waist-level
90%	eye-level

Ground glass and Fresnel lens
Combination of microprism center and fine ground glass

Viewfinder magnification
Approx. 1 with f=105 mm lens and pentaprism viewfinder

Visual image distance (pentaprism viewfinder)
Approx. 1 M from the eye-point

DIAPHRAGM Fully automatic for 35 ~ 300 mm lenses
pre-set for over 300 mm lenses

LENS MOUNT Double bayonet

Outside bayonet	for 35~300 mm lenses
Inside bayonet	for over 300 mm lenses

WEIGHT 2.3 Kg with f= 105mm standard lens and pentaprism viewfinder.

1-3 FEATURES

Pentax 6/7 is a large format (55mm x 69mm) SLR with electronically time-selecting focalplane shutter. Detachable eye-level or waist level viewfinders are available.

The electronic shutter consists of shutter curtains, electronic circuit, electromagnet and other mechanism. It controls the slit opening of the shutter curtains which determines exposure time. The electromagnet contains a dual solenoid (or coil) for better stability of its transfer function, electrical to mechanical.

A safety system quenches the shutter operation if any malfunction due to low battery or faulty circuit has appeared, and the film on the frame remains un-exposed. Refer to Chapter 2 for details.

Power switch is invisible from outside. It turns on automatically only

when the shutter button is pushed with cocked shutter. Battery checker tells the life of the battery used.

Single stroke rapid wind lever (rotation angle of 180 deg. +pre-advancing 10 deg.) can cock the shutter and transport the film. The film transport mechanism differs from 35mm Pentax cameras, as it accomodates roll films.

The wind lever advances the film whenever it turns, but cocks the shutter only when the film is ready for exposure.

Film take up operation is:-

1) Load a film. Turn the wind lever leaving the back cover opened, until the arrow mark on the paper back comes to start marking on the body. The shutter remains un-cocked and exposure counter does not function.
2) When the arrow mark matches the marking, close the back cover. Now the wind lever advances the film leader, and the exposure counter begins to function. The shutter still remains un-cocked.
3) When the exposure counter shows about No. 0 marking, the wind lever starts cocking the shutter. The film leader keeps on being transported
4) When No. 1 marking appears the film transport stops even if the wind lever turns. The shutter will be fully cocked when the wind lever fully turns.
   Now, the camera is ready for the first exposure.
5) When the number of the picture exposed, reaches the figure set on the frame number control dial, the shutter automatically turns to " non-operational". With the rotating wind lever, the film advances for taking up the trailer paper to the take up spool.
6) With opening the back cover, the exposure counter re-sets automatically. But if the shutter remains cocked, it does not re-set until the shutter is released.

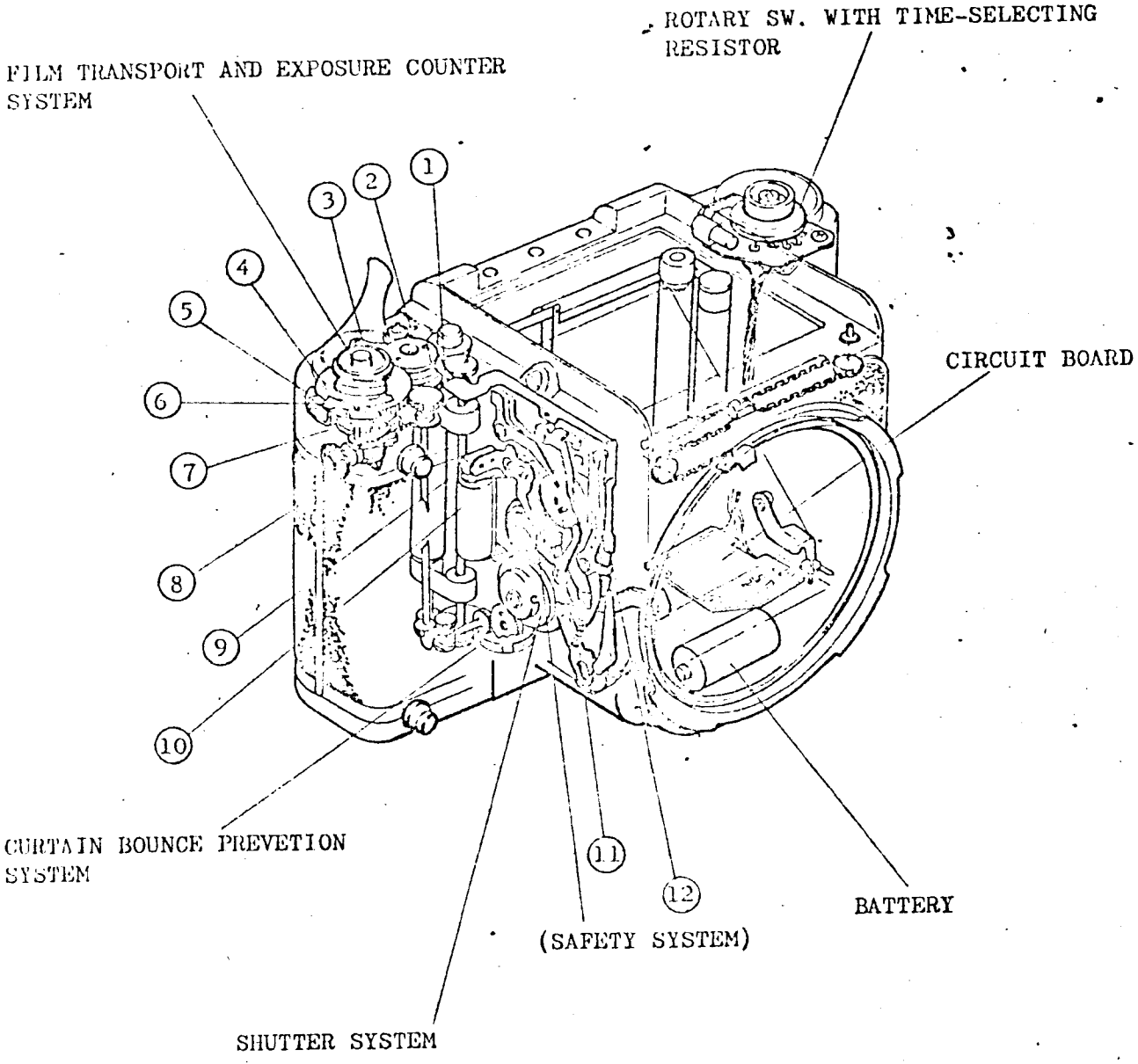
To facilitate the use of super-telephoto lenses, the large sized mirror that flips up with backward movement is installed.

To enable the use of both 120 and 220 type films, 2-positioned pressure plate is employed. By setting it to the right or left, the channel on the camera body varies, accomodating either one of the two types of the film; film with paper back (120) or without paper back (220).

Film type indicator on the back cover also changes its figures with respect to the pressure plate position.

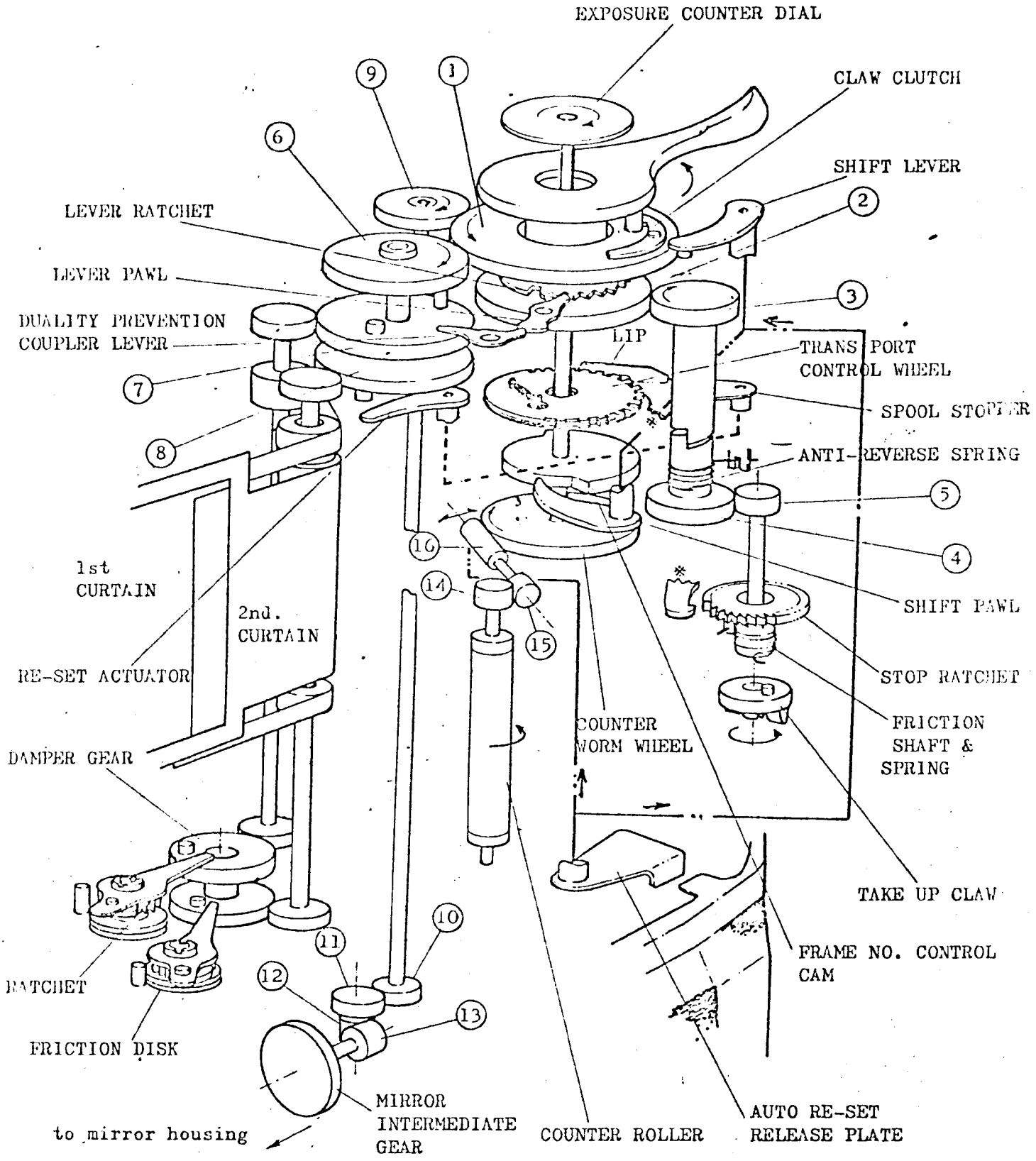
Double bayonet mount holds:- Inside bayonet for Super-Takumar lenses from 35 mm to 300 mm, outside bayonet for -over 300mm.

Fig. 2 - 1 SYSTEM LOCATION SKETCH



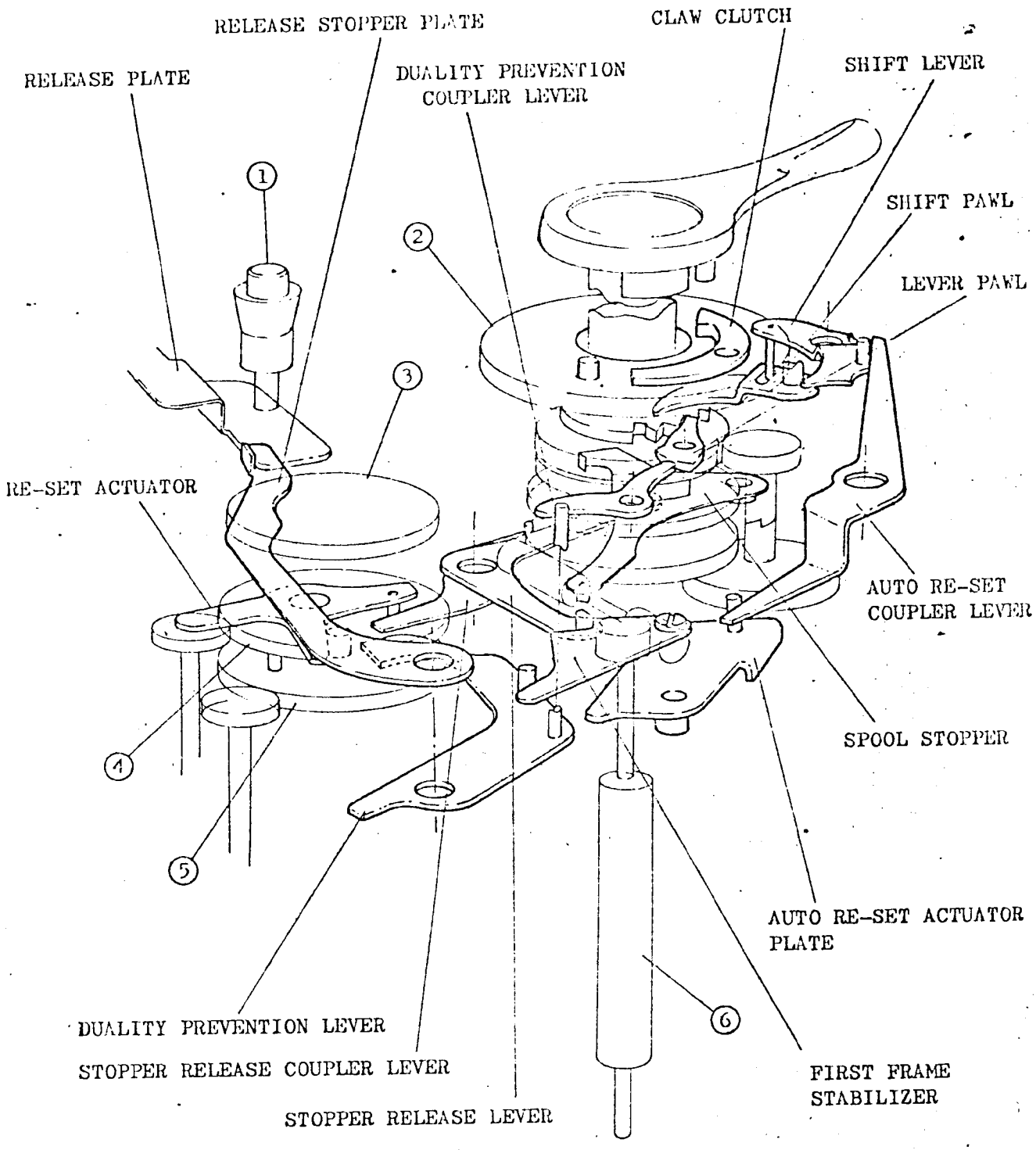
(1) RELEASE STOPPER PLATE (2) CURTAIN CHARGE GEAR (3) DUALITY PREVENTION COUPLER LEVER (4) MAIN GEAR (5) AUTO RE-SET COUPLER LEVER (6) SHIFT LEVER (7) FRAME NO. CONTROL CAM (8) TAKE UP CLAW (9) ARMATURE (10) ELECTROMAGNET (11) TIMING CAM (12) POWER SW. "B" SW

Fig. 2-2 OPERATION SCKETCH (BODY)



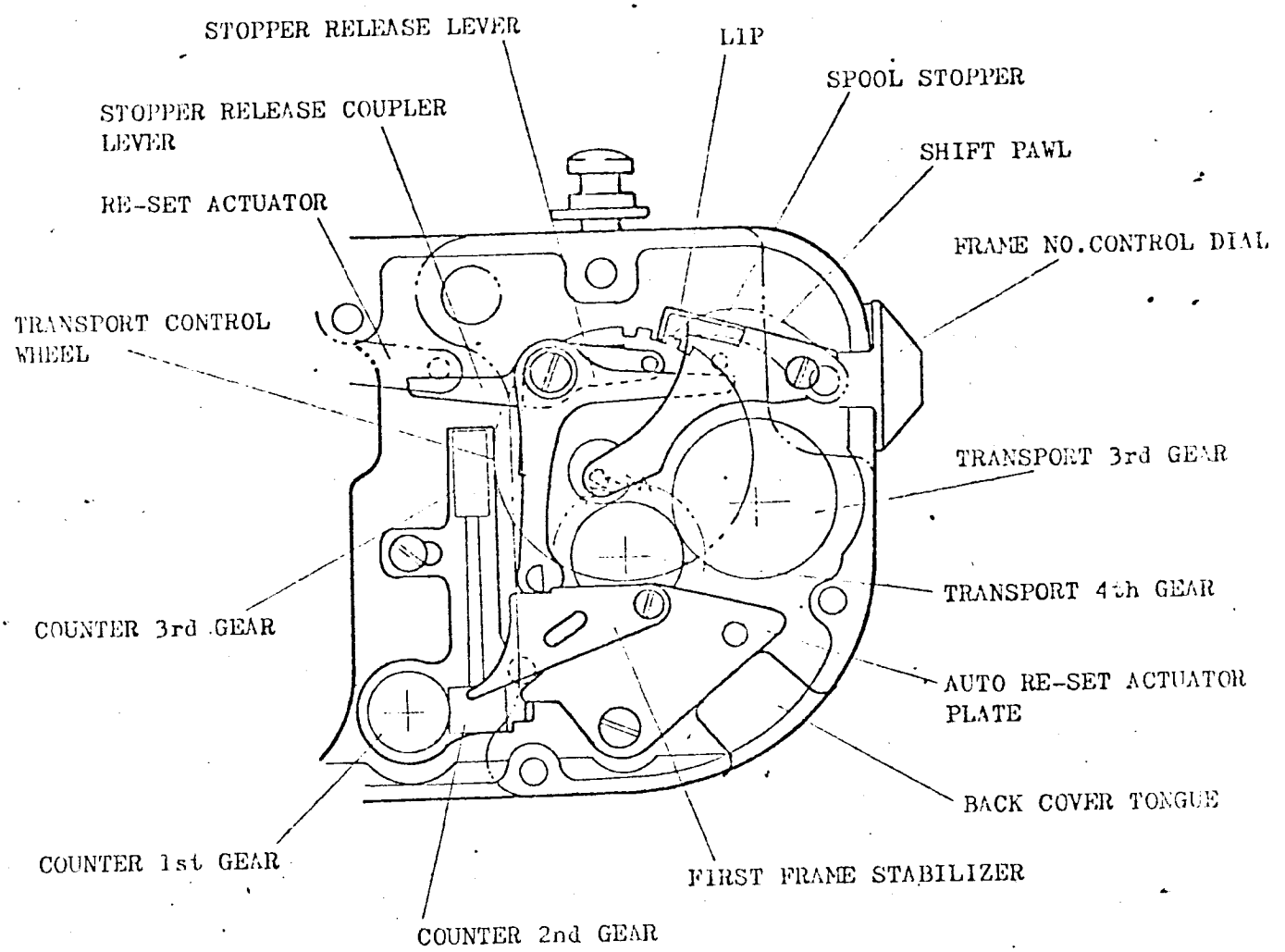
① MAIN GEAR ② TRANSPORT 1st GEAR ③ TRA.2nd GEAR ④ TRA.3rd GEAR ⑤ TRA.4th GEAR ⑥ CUTAIN CHARGE GEAR ⑦ 1st SELECTOR GEAR ⑧ 2nd SELECTOR GEAR ⑨ MIRROR CHARGE 1st gear ⑩ MIRROR CHA.2nd GEAR ⑪ MIRROR CHA.2nd GEAR ⑫ MIRROR CHA.3rd GEAR ⑬ MIRROR CHA.4th GEAR ⑭ COUNTER 1st GEAR ⑮ COUNTER 2nd GEAR ⑯ COUNTER WORM GEAR

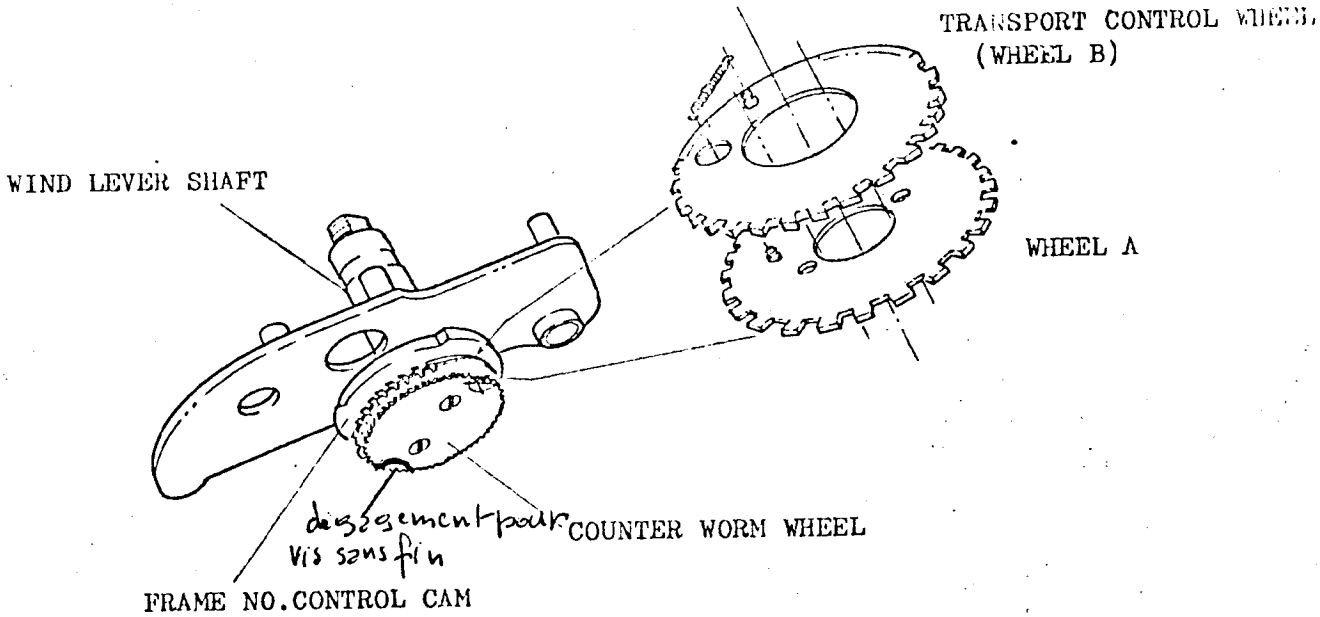
Fig 2 - 3 LEVERS LOCATION SKETCH (TRANSPORT AND EXPOSURE COUNTER SYSTEM)



① SHUTTER BUTTON ② MAIN GEAR ③ CURTAIN CHARGE GEAR ④ SELECTOR GEAR, 1st
⑤ SELECTOR GEAR, 2nd ⑥ COUNTER ROLLER

Fig. 2 - 4 FILM TRANSPORT AND EXPOSURE COUNTER MECHANISM





NOTE: ABOVE SKETCH SHOWS RELATIVE LOCATION OF TRANSPORT CONTROL WHEELS AS AGAINST SPOOL STOPPER WITH ACTUATOR MECHANISM COUPLED.

OPERATION

This chapter explains the operation of the following major systems. In the illustration herein given, some parts differ from the original so as to make the function understandable. Location of each system is identifed in Fig. 2-1.

1 Film transport and exposure counter system
2 Shutter system (mechanical)
3 Curtain bounce prevention system
4 Electronic circuit

2 - 1 FILM TRANSPORT AND EXPOSURE COUNTER

General

Shutter system is charged by the wind up system which revolves reciprocally since the shutter mechanism is not based on the intermeadiate gear mechanism used in other types of Pentax cameras.

One-way clutch, therefore, is used in the film transport system as to make the system free from the reverse movement of the wind up system. The one-way clutch located between the transport 2nd. gear and transport 3rd gear with an anti-reverse spring which prevents backward movement of the take up spool. Exact location of the anti-reverse spring is shown in Fig. 2-9. Refer to Fig. 2-2 operation sketch also.

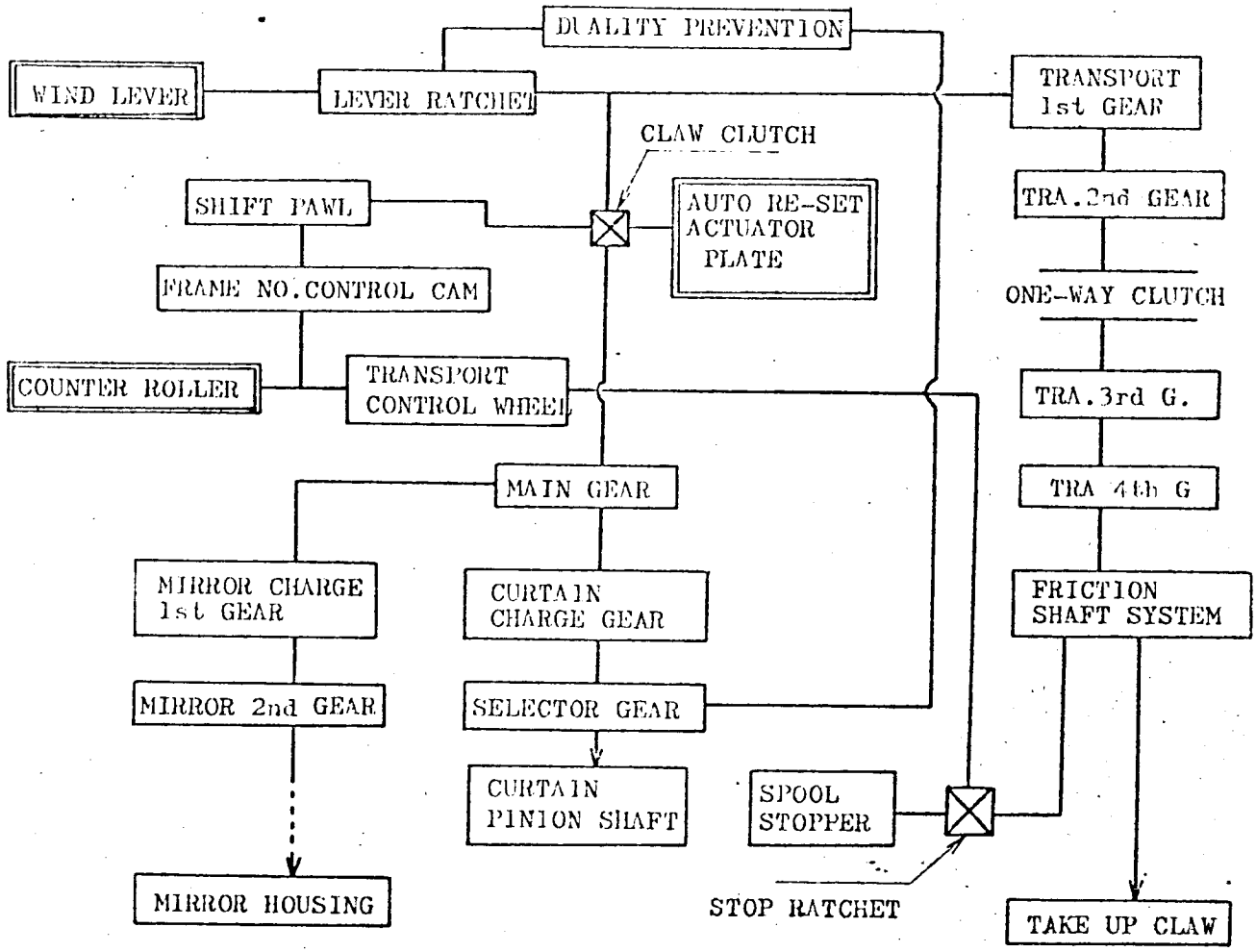


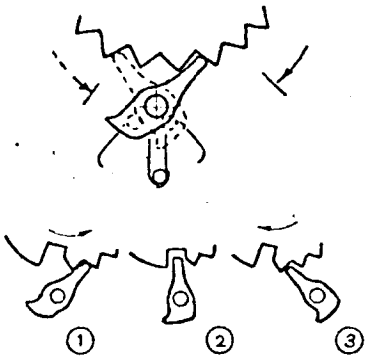
Fig. 2 - 5 OPERATION DIAGRAM

Fool proof system

In connection with the wind up system which reciprocates, a release stopper plate (Fig. 2-1) is employed to prevent an improper pushing of the shutter button ; You can push the shutter button only when the wind lever returns to its original position. Otherwise, the exposure is bound to be a failure.

2-direction wind lever ratchet is also employed to prevent the backward movement of the lever and shutter mechanism when the finger is off the wind lever on its way to the fully cocked point. The pawl changes its direction, as illustrated, when it reaches the cut out sections located on the both ends of the teeth on the lever ratchet wheel which moves with the wind lever.

The shutter being cocked, duality prevention keeps the pawl in the same direction by which the rapid wind lever is locked, thereby preventing a double wind up.



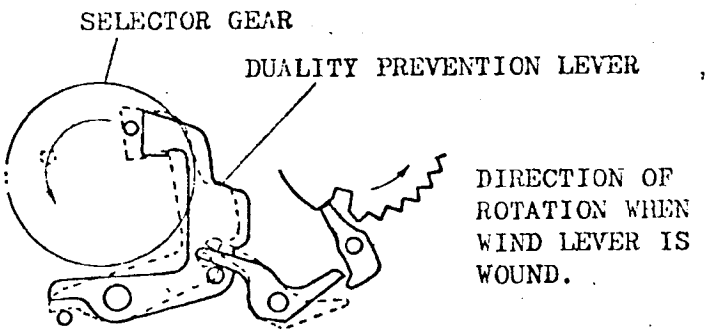


Fig.2-6

Film transport

Roll film in the fed spool is transported by the take up spool. Film length to be transported for each exposure is sensored by the counter roller driven by the film through friction between them. The counter roller advances the exposure counter dial and the transport control wheels (toothed wheels). A certain number of the rotation of the counter roller due to the proper film transport, advances one pitch of the transport control wheel, and the lip of the spool stopper engages the space of the control wheel. Then the spool stopper turns off the film take up rotation of the take up spool at the friction shaft system mentioned later.

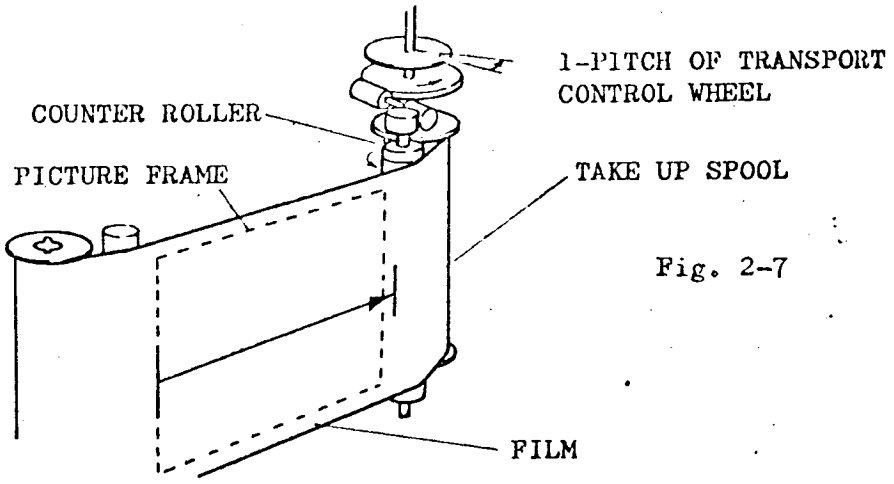


Fig. 2-7

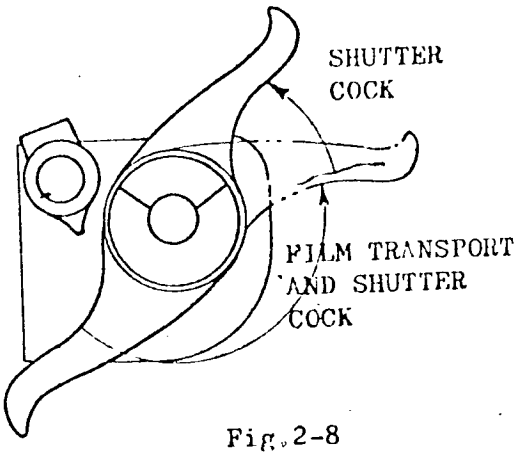


Fig.2-8

The spool stopper operates on the way to the cocked point of the wind lever.

This point of the lever varies according to the radius increase of the take up spool due to the film taken up, and the rest of the wind up stroke is utilized only for cocking the shutter.

Friction shaft system

Proper length of the film to be transported is determined by the transport control wheels, spool stopper, friction shaft system and others. The friction shaft system is illustrated in Fig. 2-9.

On a free stop ratchet, rotation of the friction shaft is transmitted to the take up claw by the friction spring, since the spring tightens grasping of the rotating shaft.

When the tooth of the spool stopper engages the stop ratchet, the friction spring becomes loosen according to the rotation of the shaft, resulting in the film transport cut-off.

Anti-reverse spring beneath the transport 3rd gear, turns the friction shaft backward slightly through the transport gears when the wind lever returns after cocking the shutter. This slight movement of the friction shaft is absolutely necessary for the engaged spool stopper tooth (with the stop ratchet) to escape from the ratchet for the next film transport. Otherwise, a pressure due to reforming force of the friction spring will remain between the tooth and the ratchet after completing the film transport and the shutter cocking, causing a film-transport malfunction for the next frame.

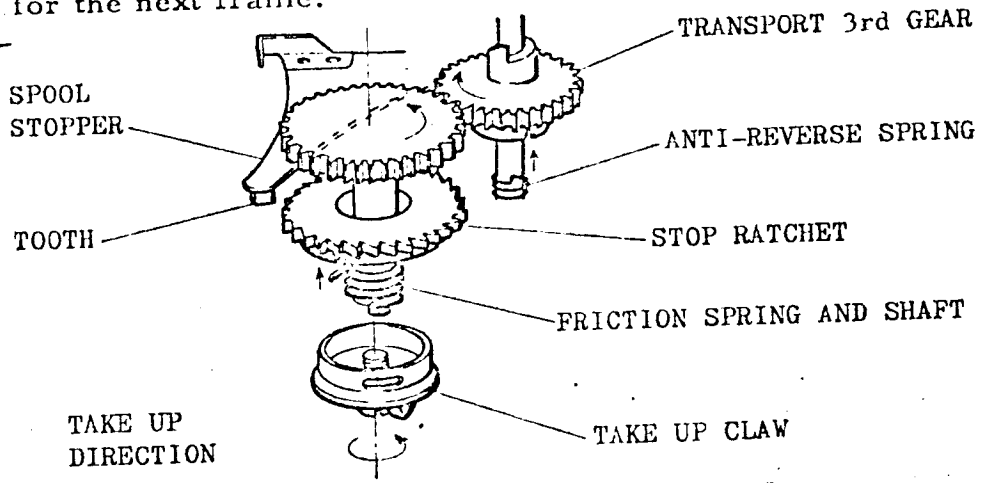


Fig.2-9

Auto-loading system

In order to transport the film without cocking the shutter, before the first frame is ready for exposure and also after the exposure counter reaches the figure set on the frame No. control dial, claw clutch is provided on the main gear. Shift lever can switch the claw clutch to "operational" or "non-operational", and the lever is actuated by both the shift actuator cam through the shift pawl and auto re-set coupler lever.

The cam advances with the exposure counter dial and the lever moves with the back cover. Only on the operational position, the shutter system can be cocked by the rapid wind lever. Refer to Fig. 2-10.

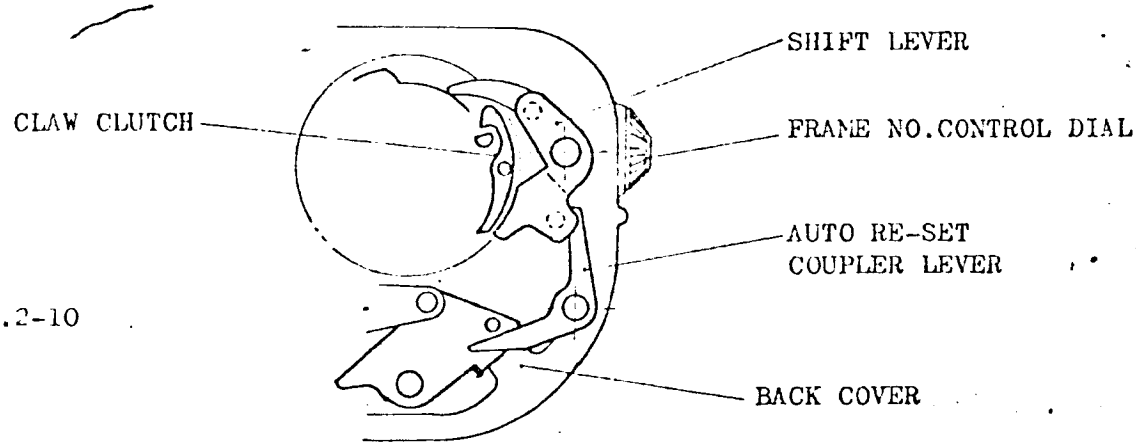


Fig.2-10

Frame number control

Frame number to be exposed (10 or 21 exposures) can be changed by the switching cam coupled to the frame No. control dial.

The frame No. control cam is a dual cam in function, the upper half-portion of the cam surface has a profile for 21 exposures, the lower half-portion has for 10 exposures. And the switching cam set the shift pawl "up" or "down" position against the cam surface, as shown in Fig. 2-11.

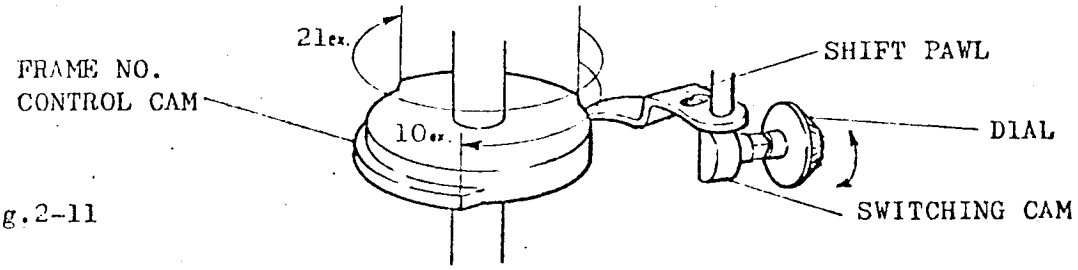


Fig.2-11

Auto re-set

With the back cover opened, the counter worm gear and the shift pawl break loose from the engagement, and the exposure counter dial returns to its starting position by spring. However, if the shutter system remains cocked, the spool stopper lip also remains engaged with the transport control wheels. Therefore,the exposure counter does not re-set until the shutter is released, as mentioned in chapter1. Refer to Fig. 2-12.

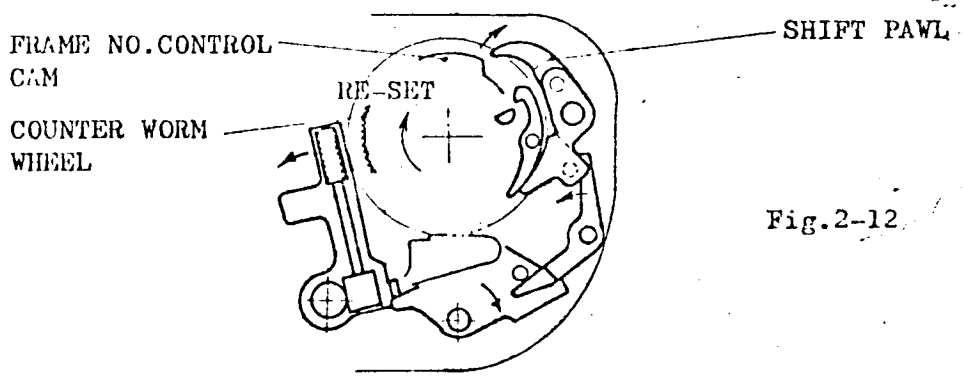


Fig.2-12

Transport control wheels

Transport control wheels (toothed wheel) consist of an upper wheel (wheel B) and a base wheel (wheel A). Wheel A is fixed to the counter dial shaft and rotates with it. Wheel B rotates about the shaft within an angle equivalent to about one-pitch of the wheel A, and a small tension spring is connected between the wheelsA and B. The wheel B stops blocking the space of the wheel A with its teeth. Refer to Fig. 2-4.

As the selector gears rotate for shutter cocking, the lip of the spool stopper is pushed against the circumference of the wheels by spring. However, the lip can not engage with the wheel A, as diturbed by one of the teeth of the wheel B, until the next space of the wheel A reaches the lip. When the lip plunges into the space of the wheel A, the spool stopper engages with the stop ratchet of the friction shaft system at the same time.

When the shutter is released, the 2nd curtain selector gear actuates the spool stopper as to pull the lip out the wheel A through the re-set actuator, stopper release lever and others.

Now the spaces of the wheel A are again blocked by the teeth of the wheel B that has returned to the original position by the spring. This operation repeats itself in the same manner. The movements of these wheels Aand B are illustrated in Fig. 2-13.

A certain number of the rotation on the counter roller required to advance one-pitch of the transport control wheel A, provides a proper length of the film to be transported for each exposure.

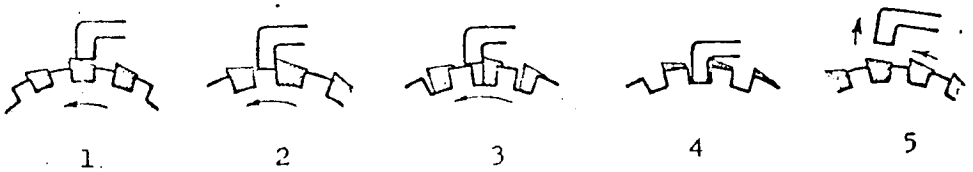


Fig. 2-13

First frame stabilizer

While the film is transported before the exposure counter shows No. 0 marking, the shutter system remains un-cocked. Therefore, in order to stabilize the first plunging operation of the lip to wheel A by which the first frame is provided, the other system which keeps the lip "pushed" even when the shutter remains un-cocked, is necessary.

First frame stabilizer (a lever) keeps the stopper release lever in its original position permitting the lip being pushed while the shutter remains un-cocked. As the first shutter cocking is completed, the selector gear disengages the first frame stabilizer through the coupler lever. Following operations are the same as described.

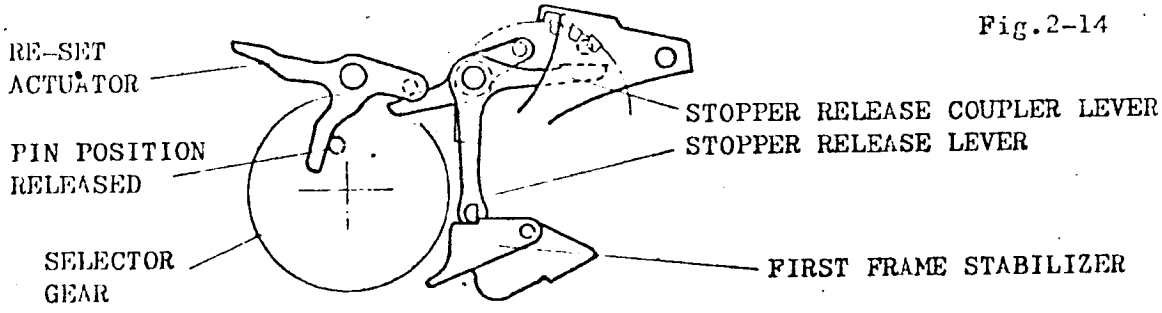
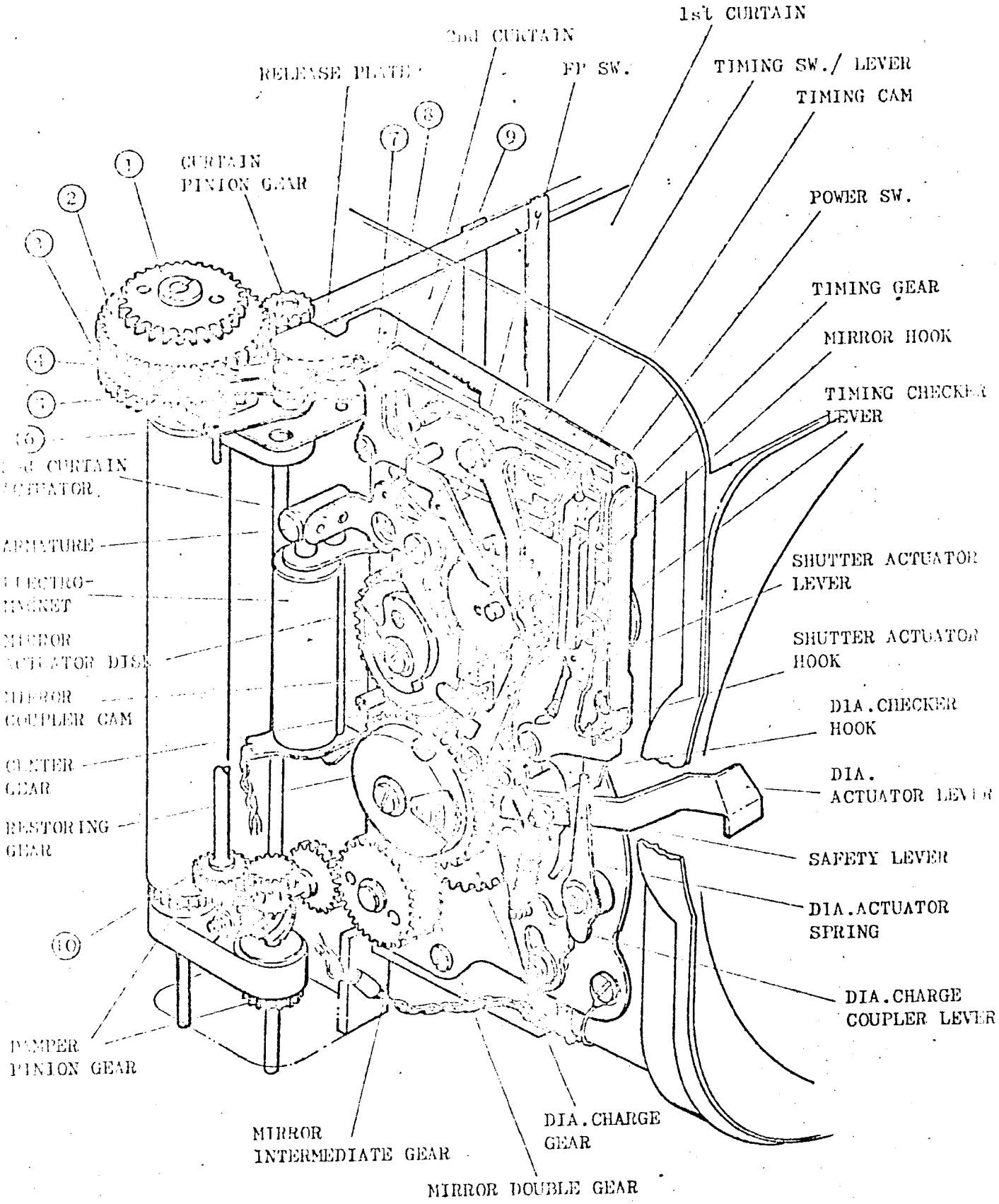


Fig.2-14



(1) CURTAIN CHARGE GEAR (2) 1st SELECTOR GEAR (3) 2nd SELECTOR GEAR (4) 1st CURTAIN CHECKER LEVER (5) 2nd CURTAIN CHECKER LEVER (6) RE-SET ACTUATOR (7) 1st CURTAIN INTERMEDIATE LEVER (8) 2nd CURTAIN INTERMEDIATE LEVER (9) RE-SET INTERMEDIATE LEVER (10) MIRROR CHARGE 2nd GEAR

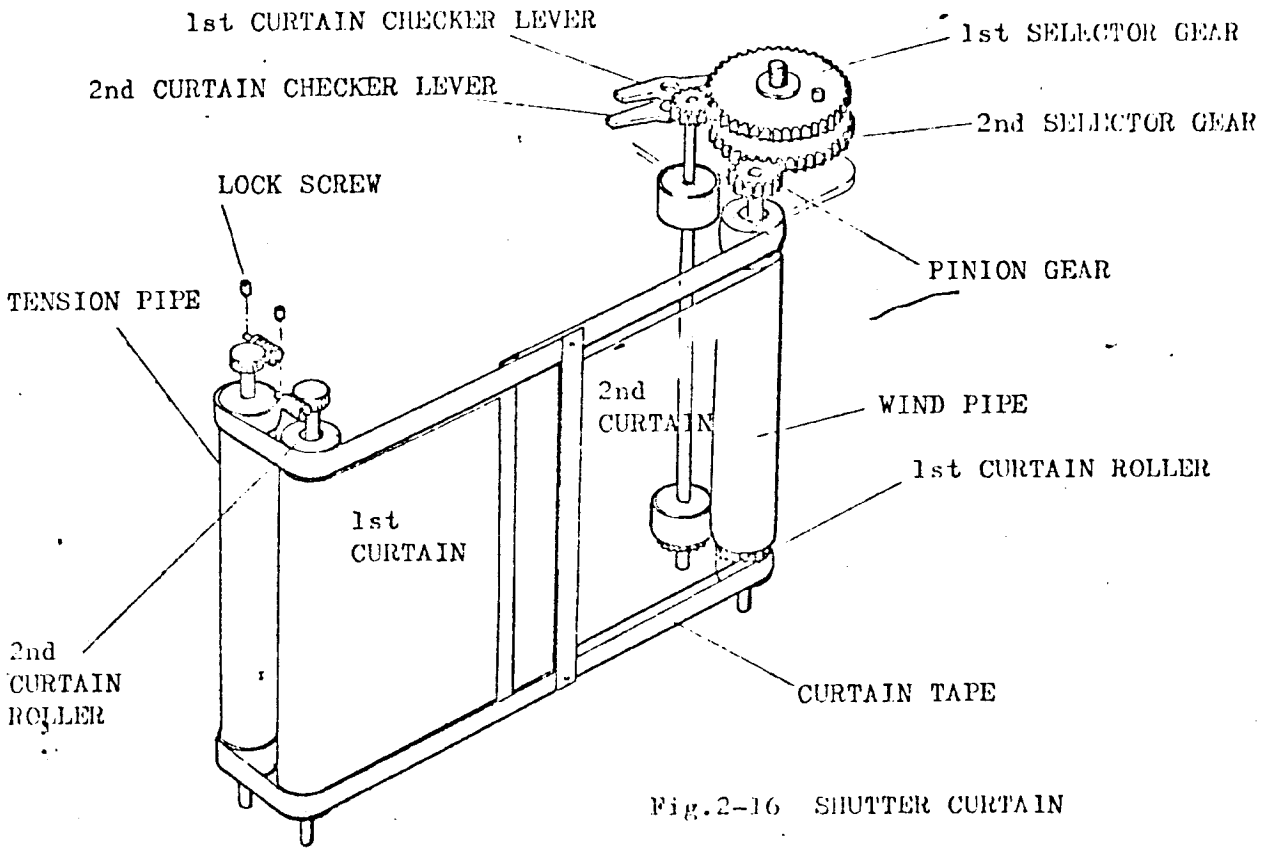


Fig.2-16 SHUTTER CURTAIN

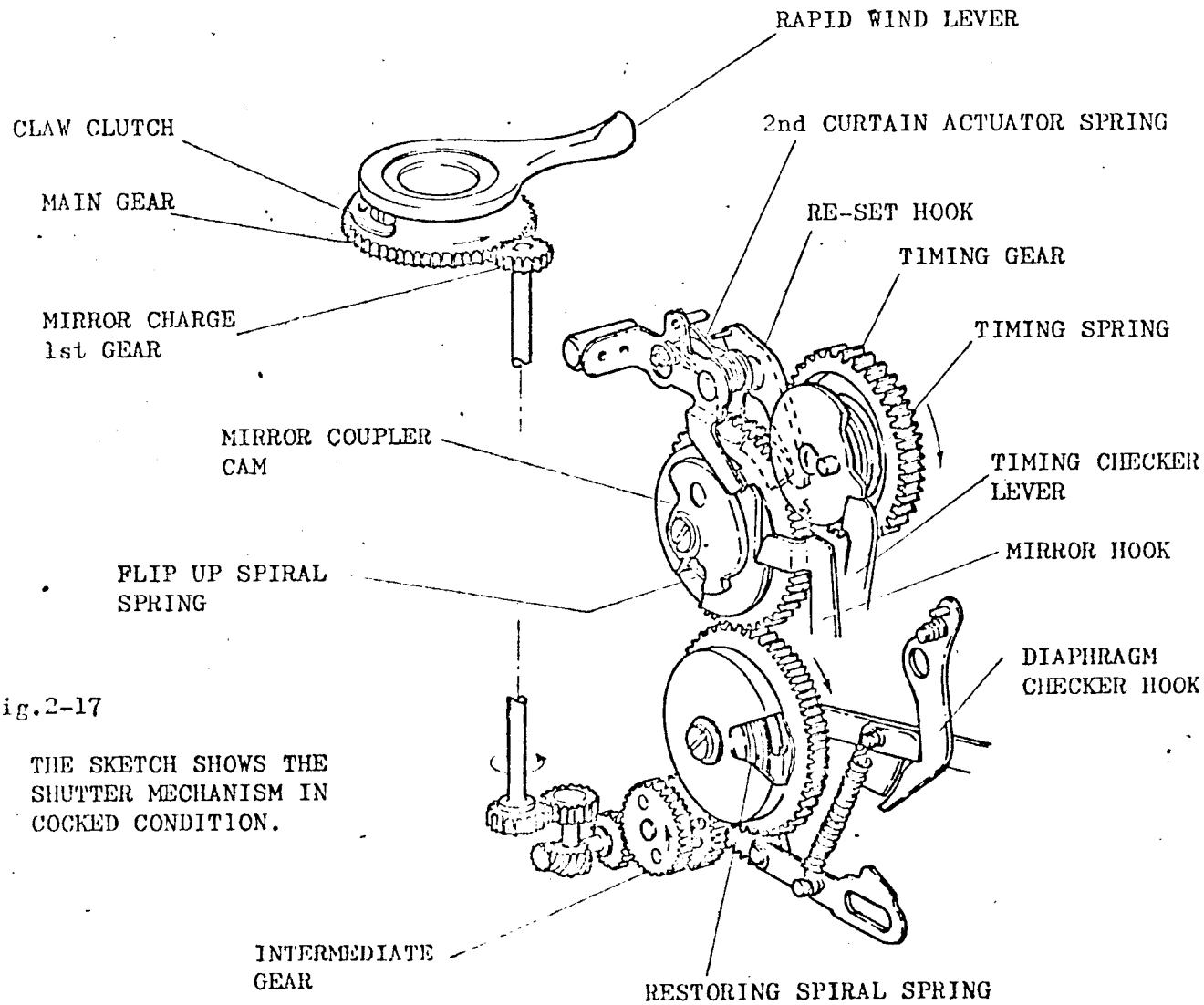
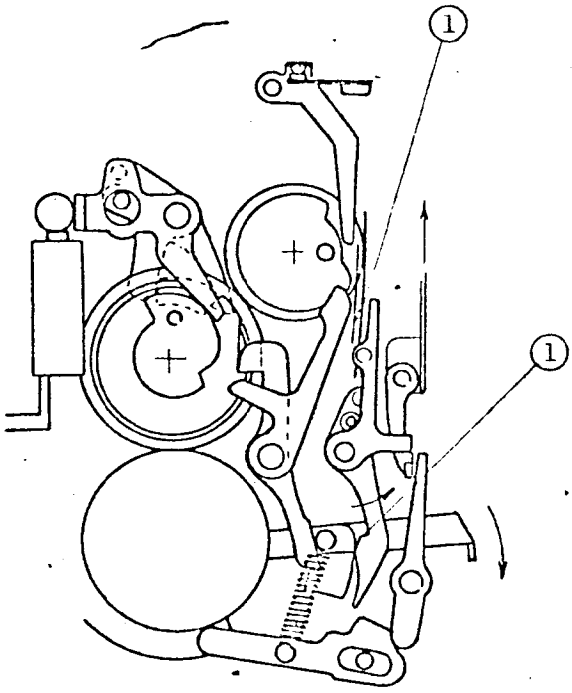


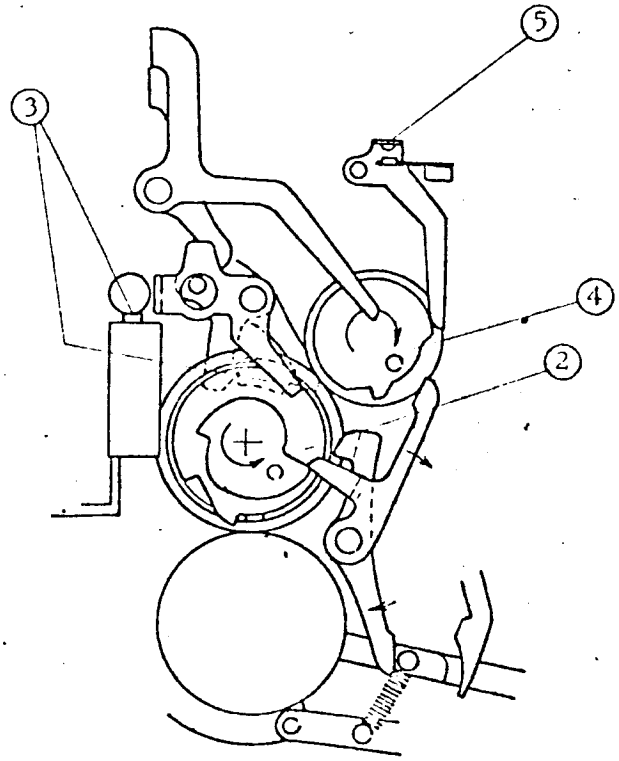
Fig.2-17

THE SKETCH SHOWS THE SHUTTER MECHANISM IN COCKED CONDITION.

Fig.2-18 SHUTTER OPERATION



1



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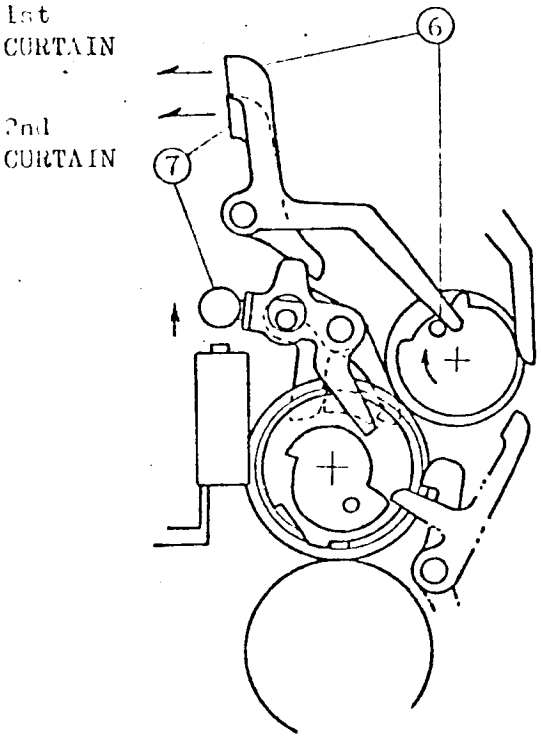

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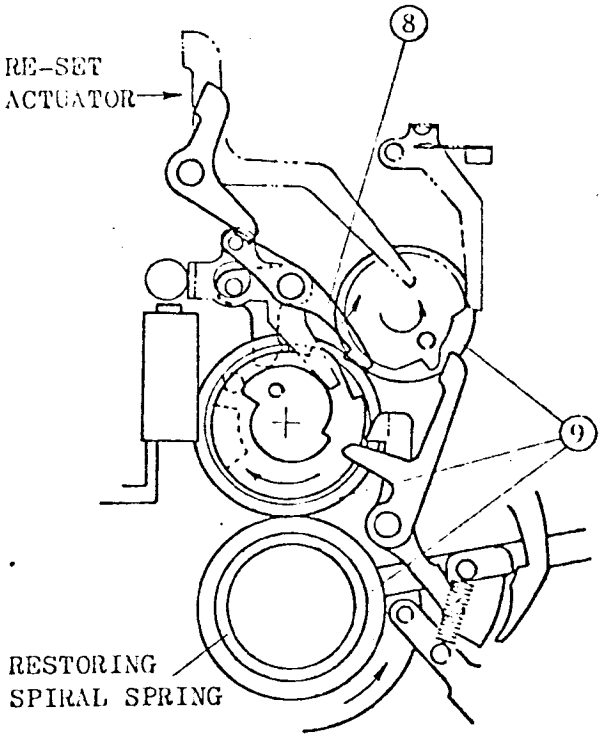


4

2 - 2 SHUTTER SYSTEM

General

Except for the shutter curtains, most parts of the shutter system locate on the wind lever side of the mirror housing, and use of two spiral springs (one for mirror flip up and the other for shutter restoring) is a feature unlike the other types of Pentax. External apperance is shown in Fig. 2-15.

Shutter curtains

The shutter curtain system mainly consists of the rubberized silk curtains with plastic curtain tapes, selector gears, checker levers and tension pipes, as illustrated in Fig. 2-16.

Shutter curtain traveling is transmitted to the selector gears by the curtain pinion gears, but the system itself does not have a traveling stopper:- original and fully wound up positions of the shutter curtains are provided by the bounce prevention system and wind up system (film transport system) respectively.

Shutter cocking

The shutter is cocked by the wind lever through the main gear, mirror charge gears and curtain charge gear, as shown in Fig. 2-17.
The main gear engages with the wind lever shaft through the claw clutch which can switch the shutter system to "operational" or "non-operational".

After cocking the shutter, the spring tension and torque are checked by hooks and checker levers.

Shutter operation

Operation which follows after the shutter release is:-
Refer to Fig. 2-18.

1 Power SW turns "on", diaphragm checker hook disengages. (Current starts flowing through the electromagnet, lens aperture diaphragm is closed down)

2 With the disengagement of the mirror hook, the mirror actuator disk rotates together with the mirror coupler cam. (Mirror flips up)

3 Second curtain actuator maintains its position by the magnetic attraction from the electromagnet, even after the mechanical sustaining force terminates.

4 With the timing checker lever disengages, the timing cam starts rotating.

5 Timing SW "off"

6 1st curtain starts traveling.

7 With operation of the "electronic circuit," the magnetic attraction from the electromagnet terminates. The 2nd curtain actuator jumps up releasing the 2nd curtain. The 2nd curtain starts traveling.

8 Completing the exposure on the picture frame, the 2nd curtain selector gear disengages the re-set hook through the re-set intermediate lever and the re-set actuator.

9 With the restoration of the spiral spring, the gear train, mirror

actuator disk , timing cam and so on, return to the starting position.

5 → 7 "time" measured by the electronic circuit
6 → 7 "time" to be exposed on the picture frame

Safety system

If the electromagnet does not hold the armature of the 2nd curtain actuator because of a low battery or faulty circuit, the actuator in wrong position checks the rotation of the mirror coupler cam on its way to the point where the cam actuates the timing checker lever. The shutter operation stops when the mirror has flipped up half-way. The shutter mechanism in this condition is shown in Fig. 2-19.

If the electromagnet holds the armature properly, operation proceeds normally, since the actuator does not disturb the cam.

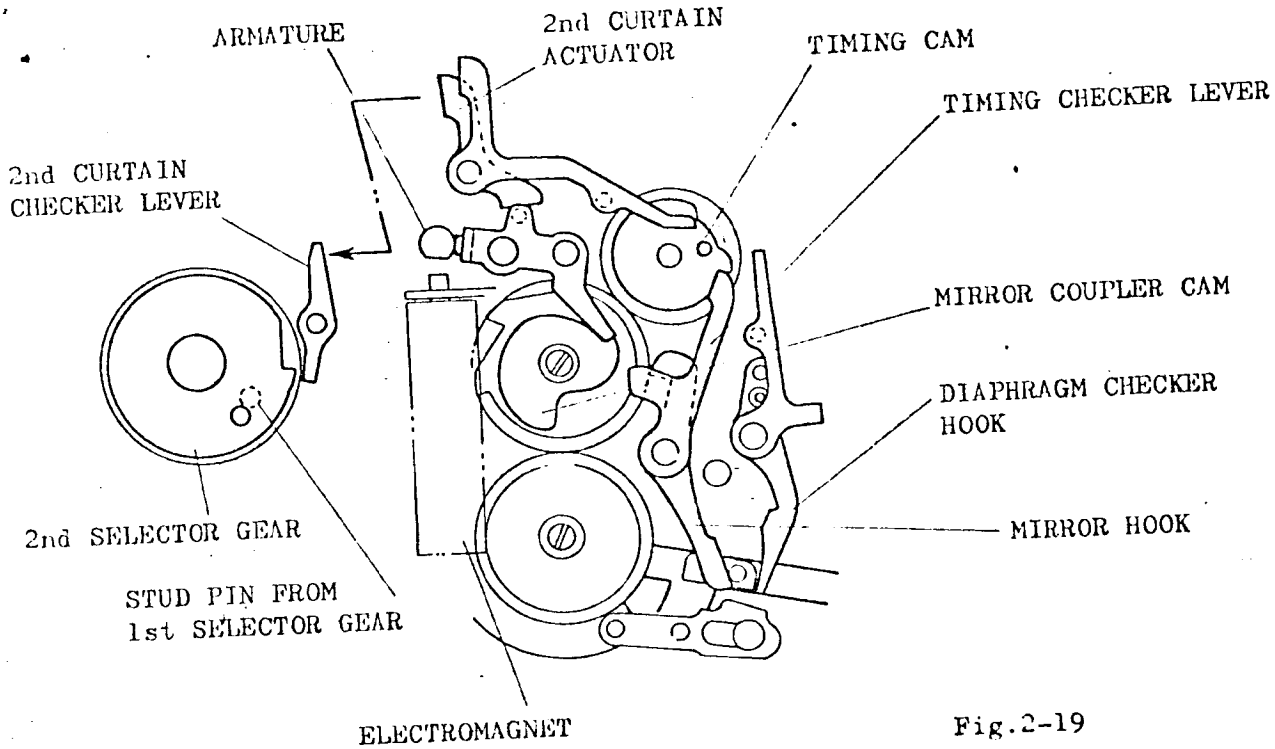


Fig.2-19

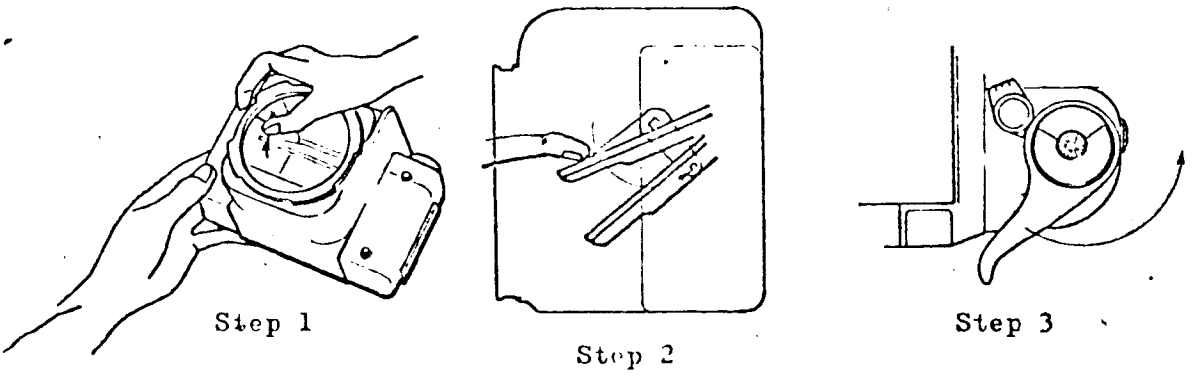
Restoring steps

After taking the lens off the camera body:-

1 Retrieve the diaphragm actuator lever to the starting position.
2 Set the mirror actuator arm to the starting position by turning it counterclockwise with a finger.
3 Turn the wind lever again.

Step 1 reengages the diaphragm checker hook. Step 2 reengages the mirror hook. Step 3 sets the 2nd curtain to the cocked position. (As the 2nd curtain checker lever has already released the curtain when the actuator flipped up. The curtain is stopped by the selector gears now. Therefore, a rewinding up is necessary).

Fig.2-20



Power switch

Shutter actuator lever operates the power SW and B(bulb) SW. B SW turns "on" when the lever is in its original position. With the shutter dial set at B, B SW close a short circuit from the source to the capacitor, C 1. (Refer to Fig. 2-21)

The power SW turns "on" before the shutter mechanism starts operation in order to supply a current to the circuit beforehand. Actuator pin on the diaphragm checker hook keeps the power SW "on", even when the actuator lever returns to the original position (taking the finger off the shutter button) during low-speed exposure.

The safety lever which changes its direction depending on the position of the diaphragm charge coupler lever, shifts the engagement between the shutter actuator lever and hook to "on" or "off", as shown in Fig. 2-21.

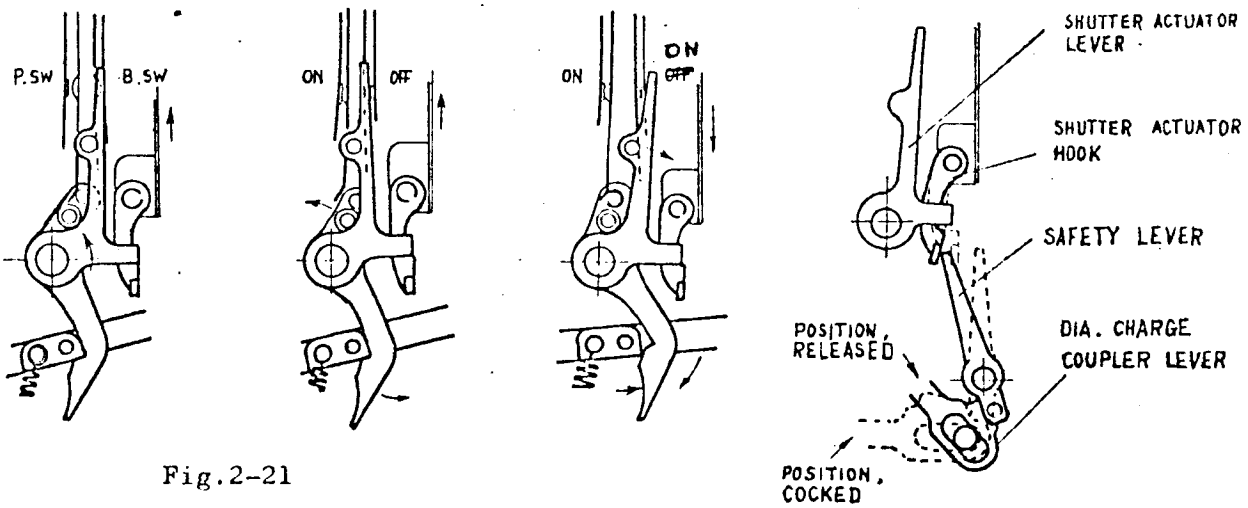


Fig.2-21

2 - 3 SHUTTER CURTAIN BOUNCE PREVENTION

Unlike the other types of Pentax, both the 1st and 2nd curtains have their respective bounce prevention system in this Pentax 6x7. As a bounce prevention, the friction disk absorbs the kinetic energy of the shutter curtains that has passed over the picture frame. The prevention system starts its operation (the curtain speed starts decreasing) shortly before the curtain edger reaches the end of the picture frame. This system also determines the original position of the respective curtain.

The system mainly consists of friction disks, ratchets, damper gears and arms. The ratchet makes the damper arm free from the friction disk when the arms are re-set.

Although the operational principle of the bounce prevention system

is given in Fig. 2-2, details of the system are shown in Chapter 5, as an exploded view.

2 - 4 MIRROR FLIP UP

To enable the mirror sheet to move backward while flipping up, four arms are employed for sustaining the mirror sheet. Mirror flip up force from the shutter system is transmitted to the sheet by the rotating arm. The operation is shown below in Fig. 2-22.

A shock damper is employed to minimize the mirror shock when the mirror returns to the original position. This damper is also utilized as mirror angle setter.

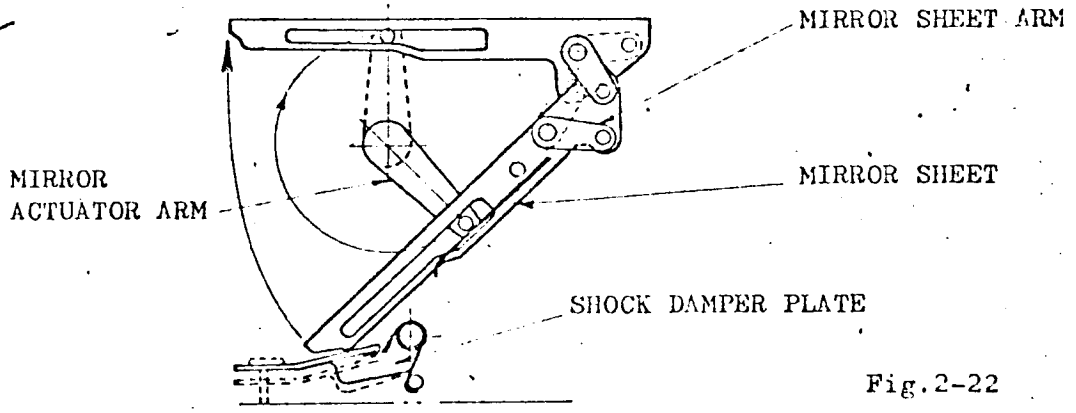


Fig. 2-22

2 - 5 FP, X SYNCHRONIZATION

FP synchro. contact locates in the shutter system as shown in Fig. 2-15. The 1st curtain intermediate lever turns "on" the contact when it activates the 1st curtain checker lever.

X synchro. contact locates in the curtain bounce prevention system. The 1st curtain damper disk turns "on" the X contact when the 1st curtain finishes its traveling.

2 - 6 ELECTRONICAL CIRCUIT

A General

A 6V silver battery powered circuit mainly consists of a circuit board, an electromagnet and a rotary switch. Transistors, resistors and capacitors locate on the circuit board. The circuit is composed of two sections, regarding the operation; shutter speed governor circuit and BATT checker circuit.

B Governor circuit

Principle of Electronic shutter

To measure "time" for an exposure, a capacitor, resistor and power source are used. The capacitor connected to the source through the resistor, as shown in Fig. 2-23, accumulates a current from the source. The terminal voltage of the capacitor rises up to the same voltage as the source has when it is saturated. Certain "time" is necessary for the saturation, and is variable in proportion to the resistance value of the resistor.

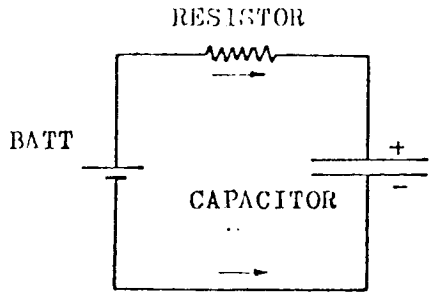


Fig.2-23

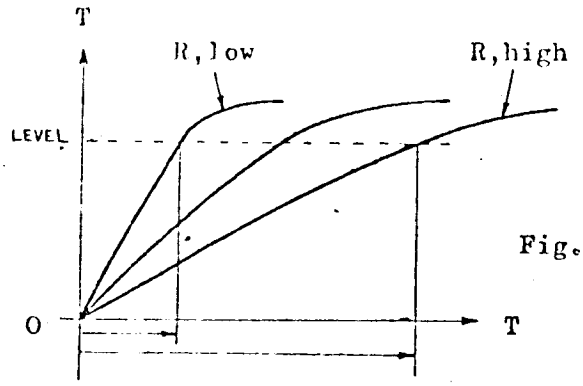


Fig.2-24

By setting a certain voltage level and by changing the resistance value, it is possible to measure the "time" for an exposure, as shown in Fig. 2-24. This 0-to-level time is transformed to mechanical operation of the shutter curtains by the electronic circuit.

Timing SW

Timing SW gives an electrical signal of the 1st curtain departure to the circuit, the signal is given as "earth off". However, the timing SW turns off slightly ahead of the 1st curtain departure to compensate a time lag of the shutter mechanism.

Electromagnet

Electromagnet gives a mechanical signal of the 2nd curtain departure out of an electrical signal from the circuit. The electromagnet consists of iron cores and a dual solenoid (or coil).

The electrical signal is given as a combination of "cutting off" the flowing current going through the coil A, and "turning on" the another current which goes through the coil B. As a result, total magnetic attraction toward the armature on the 2nd curtain actuator, terminates in an instant.

The coil B which forms a weak magnetic field contrary to the coil A in polarity, supplies it to the coil A. As shown in Fig. 2-25, this operation can shorten and stabilize the magnetic reduction time of the electromagnet. This means the stabilization of the exposure time at the same time.

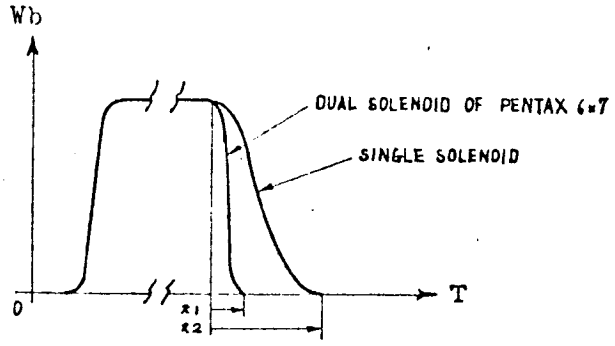


Fig.2-25
MAGNETIC FLUX INCREMENT AND REDUCTION CURVE

Operation of the governor circuit

This circuit mainly consists of a sensor and a DC amplifier. A capacitor and transistor TR 1 form the sensor, and TR 2~5 form the DC amplifier with resistors.

With pushing the release button, the power SW turns "on", timing SW turns "off" and the 1st curtain starts traveling.

When the timing SW turns "off", C 1 starts storing the current (i 1) from the source through Rs and VR 2, resulting in an increment (augmentation) of the potential difference across the terminal of the C 1. Then the increment

starts from 0, and potential across the points A and B starts from 0 equally. When the potential is 0, TR 1 has a high impedance. Therefore the current i 2 flows through TR 2, producing i 3 (TR 2 is positively biased). The current in VR 1 and R3 causes the potential difference Vb-c across the points B and C, and this V b-c is also negative bias voltage base-to-emitter of the TR 1.

TR 2 in low impedance turns on TR 3, similarly TR 3 turns on TR 4, which produces the current i 8. The current i 8 flows through the coil A, producing the magnetic attraction of the electromagnet, by which the 2nd curtain is held. TR 4 in low impedance turns "off" TR 5, so the current through the coil B is not produced.

When the terminal voltage of the C 1 (potential across the terminals) rises higher than V b-c, the potential at the point A becomes positive with respect to the point B. In this condition, TR 1 turns on, since the positive base-to-emitter bias voltage is supplied to the TR 1. TR 1 in low impedance turns "off" TR 2, since the former positive bias has now been turned to negative by TR 1 which has low impedance.

TR 2 turns "off" TR 3, the TR 3 turns "off" TR 4, as a result, the current through the coil A terminates. This "turn off" operation is just contrary to the "turn on" operation.

When TR 4 is turned "off", TR 5 turns on, producing the current i 10 which flows through the coil B, since the TR 4 in high impedance provides TR 5 with a positive bias voltage. At this stage, the magnetic attraction from the electromagnet terminates, and the 2nd curtain starts traveling.

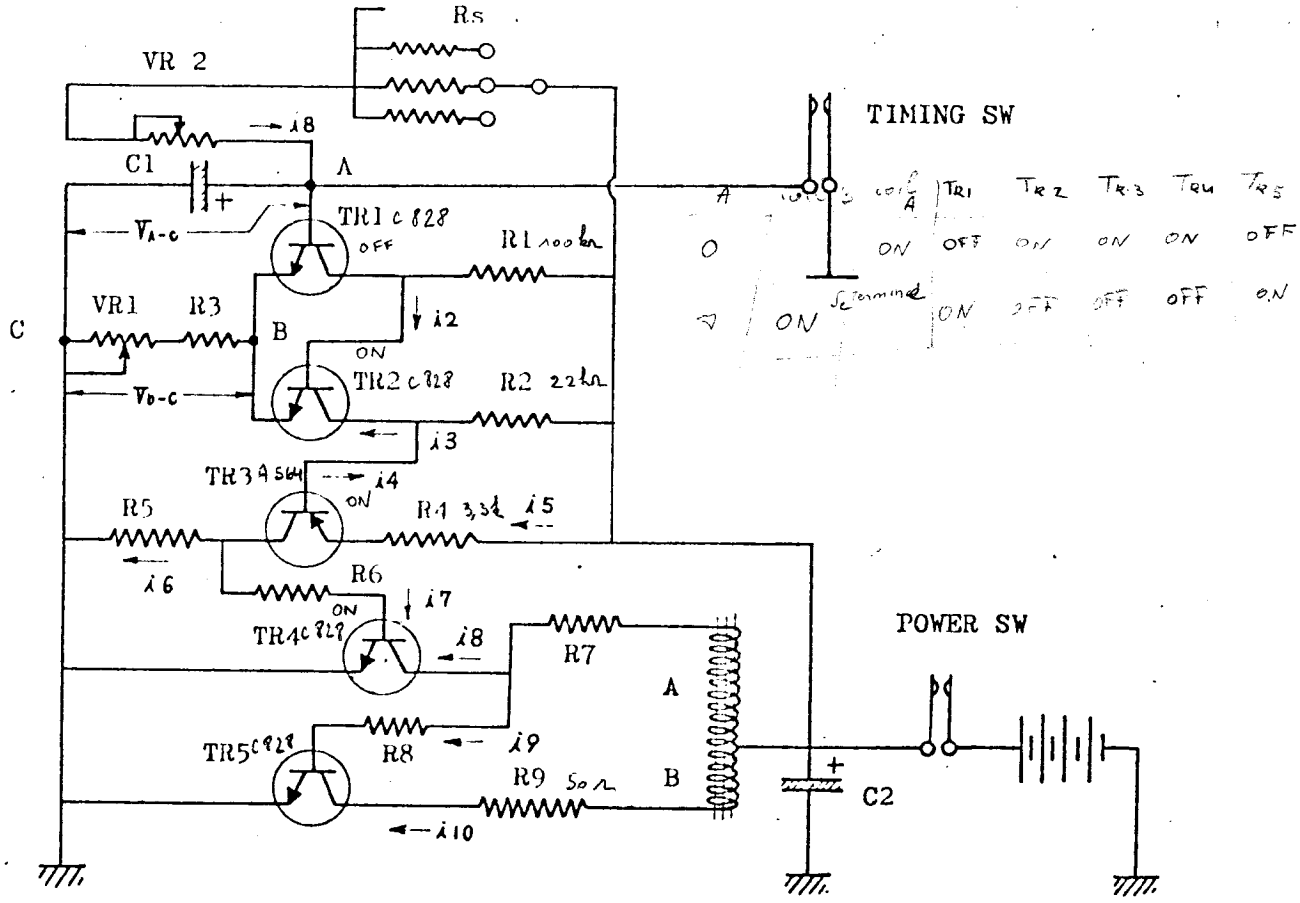


Fig.2-26

Exposure time-selecting

For selecting the exposure.time, the value of resistor Rs must be changed. Rotary SW which rotates with the shutter dial, shifts the circuit which determines the resistance value of the metal foil resistor plated on the ceramic disk. Resistance value of Rs is 800Ω for 1/1000 sec.····· 800kΩ for 1/1sec.

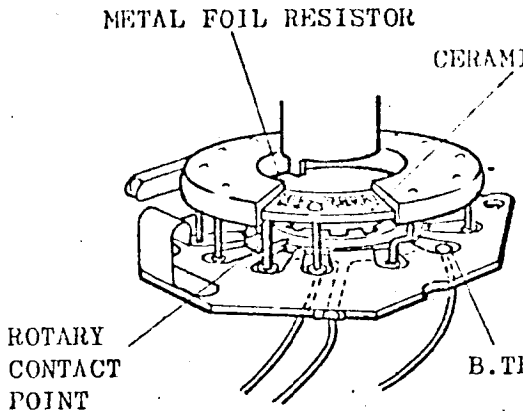


Fig.2-27

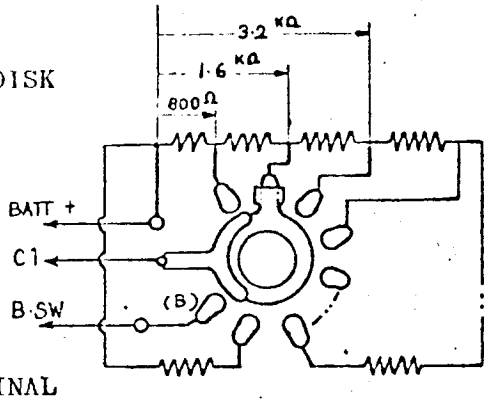


Fig.2-28

Shutter speed adjustment

Whole exposure level setting except for 1/1000sec. is provided by adjusting VR 1. VR 1 changes the potential difference across point A and B while i3 is flowing. Thereby "0-to-level time" is changed (Refer to Principle of Electronic shutter).

1/1000sec. adjustment in which the slit opening is very narrow, requires a fine adjustment, adjusting VR2 in series with Rs. With adjusting the resistance value of VR2, the 2nd curtain departure slows down or speedsup in proportion to the change in the resistance value.

C BATTERY CHECKER CIRCUIT

General

By pushing in the BATT checker button, the battery life can be checked easily; If the indicator does not glow, the battery is out of use. Battery checker circuit is shown in Fig. 2-29.

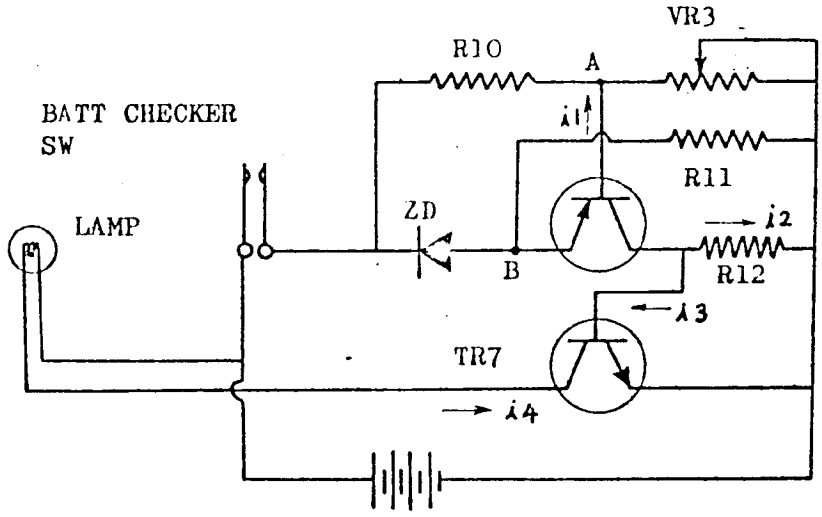


Fig.2-29

Operation

As a sensor for checking the battery out-put, resistors R10, R11 R12 and a zener diode (ZD) form a bridge. Two points A and B on the bridge are connected to the base and emitter of TR6 respetively, as shown in Fig. 2-29.

Potential difference across the two points turns "on" or "off" the TR6, depending on the polarity; If the point A is negative with respect to the point B, TR6 is turned "on". If positive TR6 is turned "off".

As considered, if the battery has enough out-put voltage, the point B becomes positive with respect to the point A, since the ZD is biased with the voltage higher than its zener level. Then TR6 turns "on", producing the collector current i2.

This i2 in R12 causes the potential difference across R12, by which TR7 is turned "on". Collector current of TR7 (i4) lights the indicator lamp. The lamp which draws the current i4 from the source is also used as a load to the source (battery).

If the battery is low, the ZD turns out to be a high resistor. Thereby TR6 is turned "off" and operation to be followed is just contrary to when TR6 is turned "on".

Adjustment

For adjustment, TR3 must be adjusted so that the potential difference across the ZD with the battery out-put 5.0 V, is equal to the zener voltage level of the ZD.

3 DISASSEMBLING

3 - 1 GENERAL

Instructions for disassembling the camera are explained in this chapter.

3 - 2 COVERS

Points for disassembling the covers are:- Refer to Fig. 4-

1 Except for the both sides covers, each cover can be taken apart from the camera body independently of the other cover.

2 Insure that the shutter is released when removing the retainer screw (C126) of the exposure counter dial. Otherwise, the lip of the spool stopper (C20) is damaged. Keep the back cover opened.

3 Wind lever (C13), Frame No. control dial (C105), etc. must be removed, and Main gear (C01) must be returned to its original position, before taking Top cover right (A07) apart from the body.
It is recommended to fix the dial again after taking off the cover for facilitating the handling of the camera.

4 Before taking off Top cover left (A08), Shutter dial (D125) must be removed.

5 When removing the top covers, slide them toward the outer side until they stop. Then remove them.

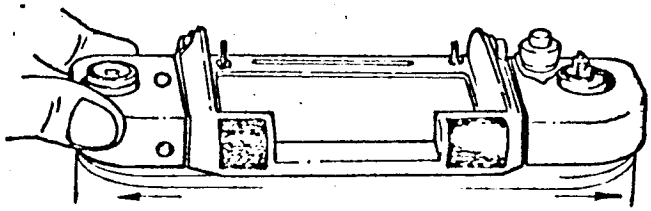


Fig.3-1

3 - 3 MIRROR HOUSING

Decoupling of the body and mirror housing can be done by pushing up the mirror housing from the body. Following parts, however, must be taken apart beforehand. Refer to Fig. 3-3.

1. Lever stopper (C27) 2. Shift lever (C23) 3. Main gear (C01) 4. Mirror gear block (C09) 5. Connecting gear (C08) 6. Screws and others.

Points for the decoupling are:-

- Push up the mirror housing after releasing the shutter if it is cocked, as the Re-set actuator (E87) in cocked position disturbs the operation.
- The connecting gear (C08) should be pulled out until it stops contacting the pinion shaft, then turn it around the shaft to take it out.
- Beware of the curtain edgers and tapes which may get caught to the body.

3 - 4 OTHERS

Curtain bounce prevention system

Avoid unnecessary disengagement of the damper gears and pinion gears, as their engagement requires a delicate adjustment.
If they are disengaged, do not try to operate the shutter. It will cause a curtain tape peeling off.

Shutter mechanism plate

Shutter system with the mechanism plate can be taken apart from the mirror housing as a unit. But the damper armA(D132) must be disassembled beforehand. For the disassembling, use a long nose screw driver (225K-E30-A) through the hole on the other side of the mirror housing.

Shock damper

Avoid unneceaasry disassembling of the setting screws(D148). The setting screw on the mirror actuator arm side has a role of mirror angle setter.

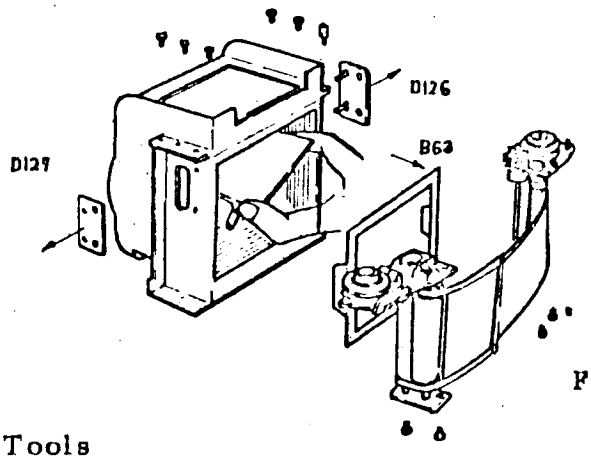
Mirror

In addition to the retainer plates, the mirror is bonded to the sheet at three points on the reverse side, where the retainer plates are located. Solvent:Ketone.

Removing of the mirror sheet

Before taking out the sheet from the mirror housing, shutter curtain system, mirror housing frame(B63) and the relevant parts must be taken apart beforehand. Use a proper amount of solvent;Ketone, for removing the mirror housing frame(B63) and light(B95) curtain bonded.

Remove the two lock washers(LW13) and the two arm rests A, B (D126, D127), then withdraw the sheet from the back of the mirror housing, tilting it as shown in Fig. 3-2.



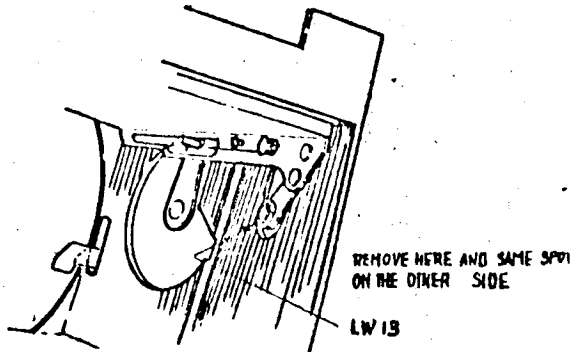
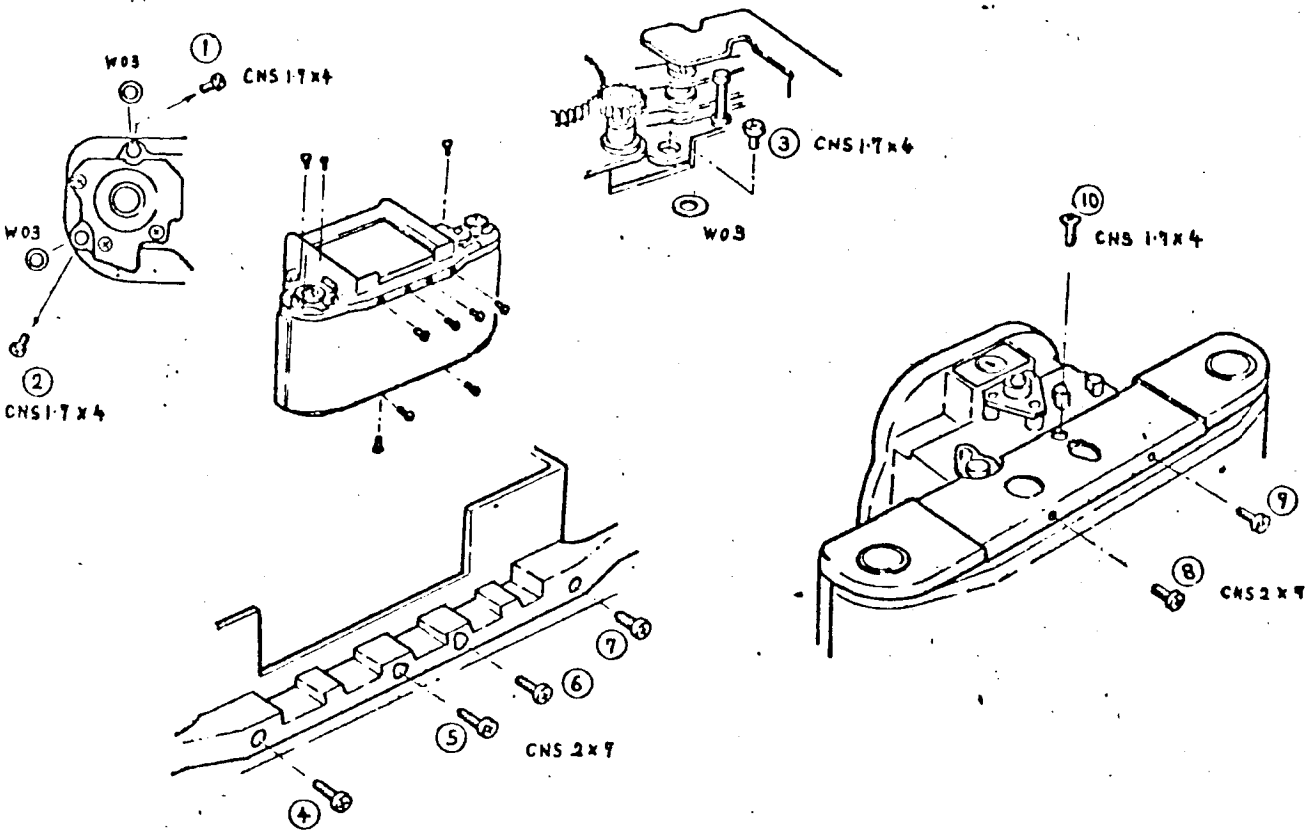
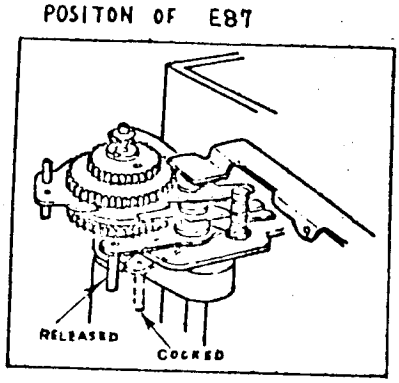


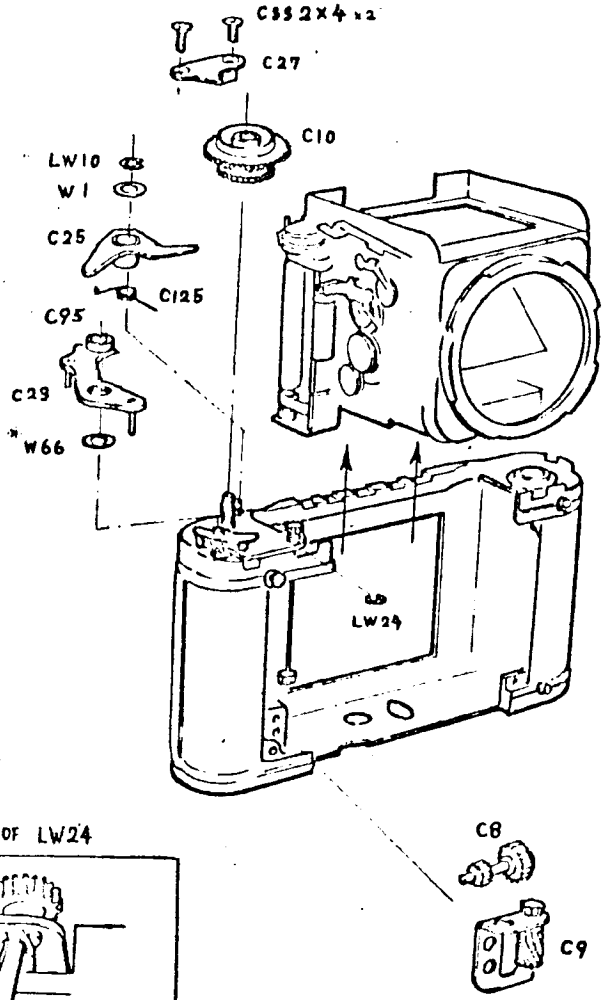
Fig.3-2

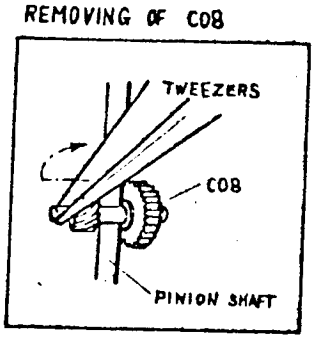
Tools

Some parts require special tools for disassembling as in the case of assembling. The tools are explained in Chapter 4.









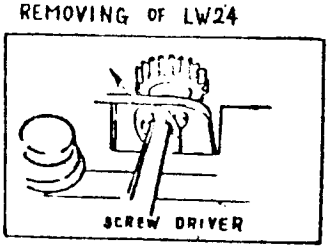


Fig.3-3 DECOUPLING OF MIRROR HOUSING AND BODY

4 ASSEMBLING

4 - 1 General

In this chapter, points for assembling and adjusting, and standards for adjusting and checking are explained. Location of the parts to be assembled, major oiling points and oils to be used are shown in Figures at the end of this chapter. Parts which need special tools can also be identified in the Figures.

Phillips head screws(⊕ head screws)are widely used, and Arontite (anaerobic adhesive for locking and retaining,mentioned elsewhere) is used to lock some parts. The Arontite is abbreviated as Aro. in this chapter.

Following codes are also used in Chapter 3, 4 and 5.

-screws-

− head screw	F ⟶	Cheese head ( )
	S ⟶	Flat head ( )
+ head screw	CN ⟶	Pan-head ( )
	CS ⟶	Flat head ( )

Head size S ⟶ small M ⟶ medium

EX: CNS 1.7x3 FM 1.7x3

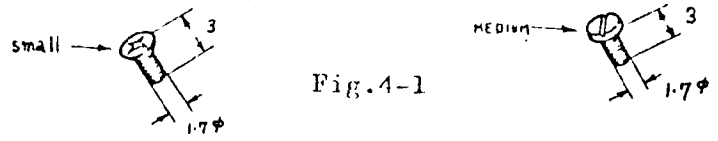


Fig.4-1

-washers-

Codes for material:

PB ⟶	Phosphor bronze
Bs ⟶	Brass
S ⟶	Steel

-oils-

L-1	Liquid, transparent
L-5	" , gray
G-3	Grease, brown
G-4	" , gray

4- 2 NOTICE FOR EXPLODED VIEW

1 Screws with reversed pitch thread (left handed screws) can be identified by small "r" on the left shoulder of Parts No..

2 "*" marked washers require adjustment.

3 A small figure marked with "x" after Part No., indicates quantity involved.

4 Parts No. or screws in block letters indicate those which should be glued by Arontite.

5 "*" parts require the special tools for assembling and disassembling.

4 - 3 ASSEMBLING ORDER

Assembling procedures are explained in the following order, however, some process can be completed separately.

1 Mirror sheet 2 Shutter curtains 3 Selector gear adjustment 4 Curtain bounce prevention system(assembling and installing) 5 A-M SW 6 Meter coupler 7 Shutter mechanism plate 8 Wiring 9 Magnet core 10 Shutter dial 11 Transport and exposure counter me-

chanism 12 Coupling, body and mirror housing 13 Curtain charge gear adjustment 14 Mirror coupler gear 15 Duality prevention adjustment 16 SW adjustment 17 Operation check, transport and exposure counter mechanism 18 Shutter speed adjustment 19 BATT checker adjustment 20 Bounce prevention adjustment 21 Viewfinder 22 Wind lever and exposure counter 23 Mechanical back adjustment 24 Ground glass adjustment 25 Mirror angle adjustment

4 - 4 ASSEMBLING PROCEDURE

Locations where parts are to be assembled, are shown in Figure at the end of this chapter. Reference figure is shown by Fig. number immediately following the headings of each section.

For oiling, the amount of oil(L-1) to be applied is explained as follows:

Very small amount: Quantity enough to form thin oil film on the bearing portion.

Proper amount : Quantity larger than the above, but not so large as to flow out from the bearing.

4-4-1 MIRROR SHEET

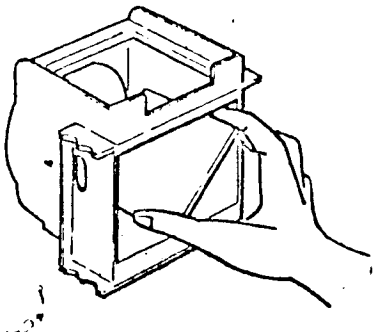
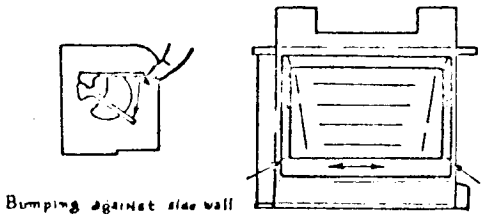


Fig. 4-2

After installing levers(D134), insert the sheet into the mirror housing from the back, tilting it as shown in Fig. 4-2.

The sheet must return to its original position by its own weight, after the finger is off at the top. Adjust with W2 so as to prevent the sheet from bumping against the side wall.



Apply a small amount of Aro. on the threads of the retainer screws(D147) before installing them. When screwing them(D147) be careful not to damage the screw threads of the wall.

Oiling: A proper amount of L-1 to each bearing or shaft.

Note: Shock damper(D113)must be installed before Shutter mecha. plate is attached to the mirror housing.

4-4-2 SHUTTER CURTAINS (Fig. 4-108)

A Both 1st and 2nd curtains are supplied with a tension shaft and wind shaft as assembled parts. Curtains are installed in the mirror housing by Curtain shaft rest(E115), Shaft plate A(E67), Shaft plate B(E68) and Shaft plate C(E69). Beware of the positions where the retainer screw with shoulder (E93x4, E94, E138x2) are fixed as shown in Fig. 4-108.

B Clearance adjustment of tension shafts

A proper clearance should be maintained on the tension shafts, as shown in Fig. 4-3. For adjustment, exchange "*" marked washer W8(t=0.1, 0.2) with a proper one. The adjustment should be performed, under conditions the tension spring is freed.

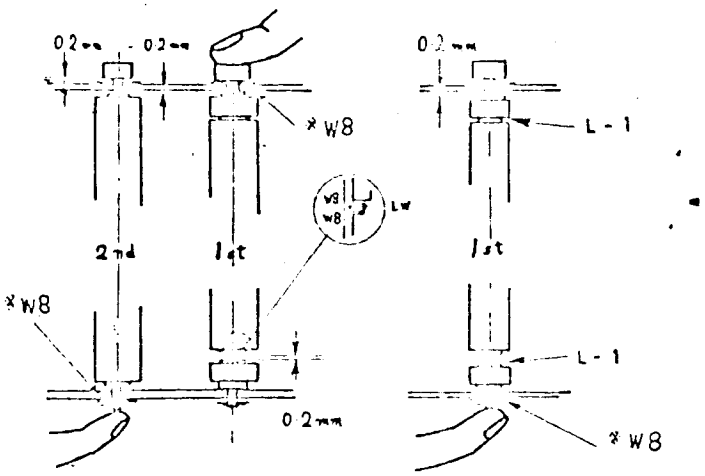


Fig. 4-3

C Oiling

Apply 1~2 drops of L-1 on the following spots with a watch oiler. Avoid too much oiling which might cause curtain tape peeling.

Tension shaft:- 2 spots, both ends of the 1st tension shaft
Wind shaft:- 6 points, on each bearing

D Bonding of curtain tape

If a curtain tape is peeled off, re-bond it as follows:

1 Clean up the remainder of the adhesive.
2 Give a curl to the tape end by using a pair of tweezers so that the tape end well contacts around the wind shaft. Use smooth edged tweezers not to tear off the tape. Refer to Fig. 4-4.
3 Apply the adhesive, on the surface of the wind shaft and curtain tape.
4 When the surface seems to have been dried, put the tape to the position, fitting the tape end to the scratched line on the shaft surface.

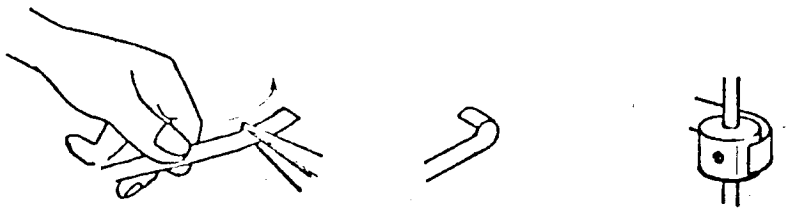


Fig. 4-4

E Pre-tensioning

As a pre-tensioning, turn the tension wheel(E64) of the both 1st and 2nd curtain for 2 1/2 revolutions. Start tensioning when the curtains are returned, and the springs are freed.

4-4-3 SELECTOR GEAR ADJUSTMENT (Fig. 4-108)

Both 1st and 2nd selector gears require an adjustment when they are installed.

A 2nd selector gear (E76)

2nd selector gear must be engaged with the 2nd curtain pinion gear so that the edger of the 2nd curtain coincides with a line on Mirror housing frame(B63), when the selector gear is checked by Checker lever(E83), as shown in Fig. 4-5. The line shows a distance of 5.2mm from the frame edge, and the curtain edger position must be:

5.2 ± 0.2 mm

Oiling: Proper amount of L-1 to the shaft, and G4 to the points shown.

Note: If the bounce prevention system is not coupled, do not operate the shutter.

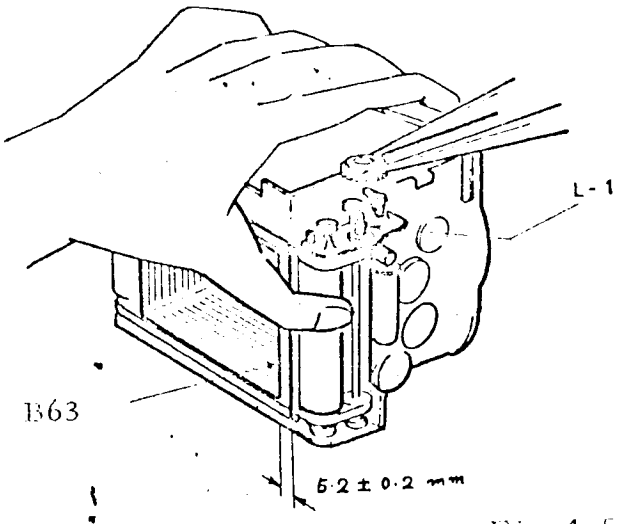
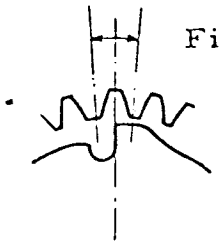
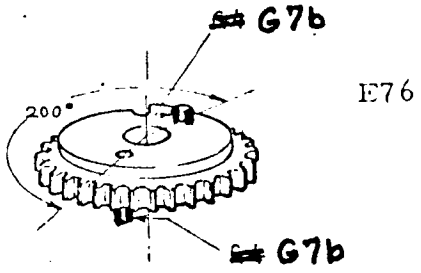


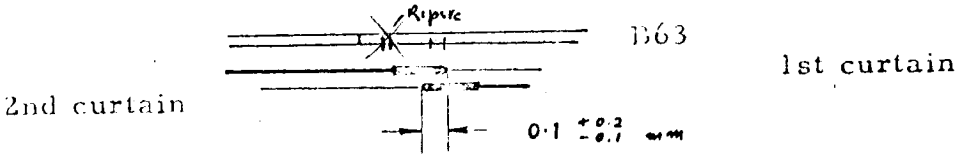
Fig. 4-5





B 1st selector gear (E75)

Over-lapping of the 1st and 2nd curtain edgers must be $0.1^{+0.2}_{-0.1}$ mm when the both 1st and 2nd selector gears are checked by the checker levers respectively.



Install Selector shaft collar(E78). Engage the 1st selector gear(E75) with the 1st curtain pinion gear, so that the curtain edgers overlap as shown above, when checked by the checker levers.

Oiling; Proper amount of L-1 to the shaft.
Small amount of G4 to the points shown in Fig. 4-7.

Note: If the bounce prevention system is not coupled, do not operate the shutter.

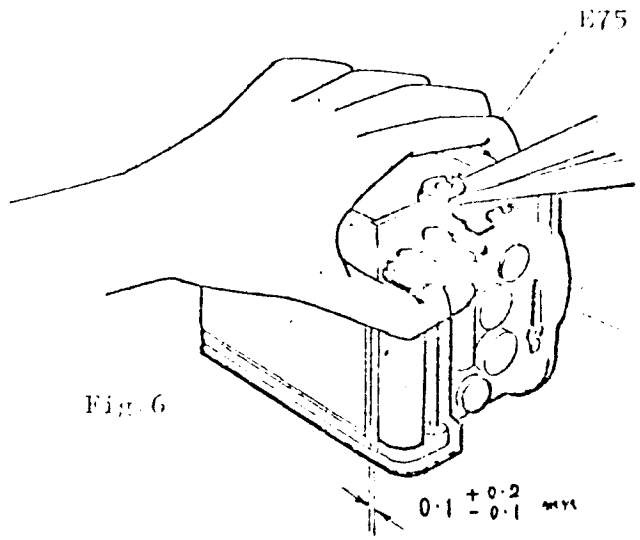
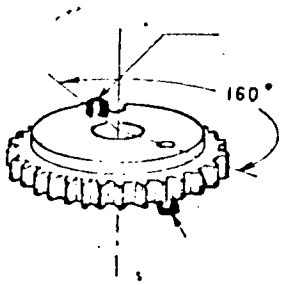


Fig. 6



(E75) Up side down view

Fig. 7

4-4-4 CURTAIN BOUNCE PREVENTION SYSTEM (Fig. 4-107)

A Assembling

Curtain bounce prevention system can be assembled as a unit. Parts location, oiling points and oil to be used are shown in Fig. 4-107. However, oiling procedure for the friction plates is described below.

Oiling to the friction plates

1 Clean them with Benzine.

2 When the surface dries up, apply L-1 on each plate with a small brush, so that a layer of L-1 covers the surface. Both surfaces need oiling.

Cleaning

If there are tiny flakes from the plate due to long use, clean them up without letting them escape into inner places.

G ring

G-ring must be assembled or disassembled from the axis direction. Widen the opening carefully not to damage the ring.

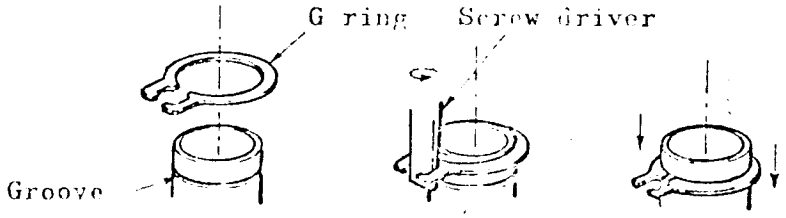


Fig. 8

B Installing

When installing the system to the mirror housing, the damper gears must be engaged with the damper pinion gears, so that the system operates as follows:

While curtains are wound up;-

At the moment the 2nd selector gear is checked by the checker

lever, both 1st and 2nd curtain damper arms must be in parallel with the intermediate levers respectively, as shown in Fig. 4-9.

After releasing curtains;-

Curtain stops traveling when the damper disk hits the stopper. Then the location of the curtain edger must be:

1st edger	5.5±0.3mm inside from the frame edge
2nd edger	Overlaps the 1st edger, 0.3± 0.5 mm.

A line on the frame(B63) shows 5.5mm distant from the frame edge.

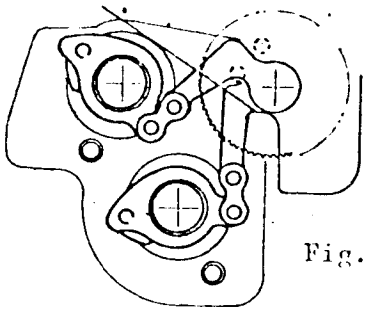


Fig.4-9

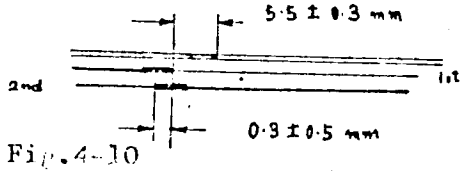


Fig.4-10

234J-05080-A

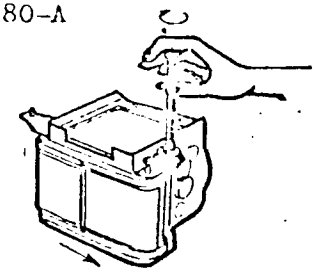


Fig.4-11

Installing procedures are:

1 Wind up the curtains by turning Curtain charge gear(E80) with special tool(234J-05080-A) as shown, until both selector gears are brought to a stop.

2 Insert the assembled system into the installing position. At which time, remove X SW(E29) if it is fixed.

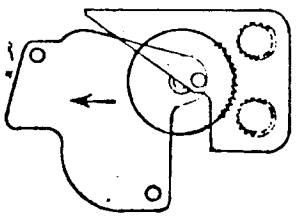


Fig.4-12

3 Slide the system to the outside to disengage the damper gears from the pinion gears. Turn the each damper gear counterclockwise, until the stud-pins on the damper gears make contact with the damper arms respectively.

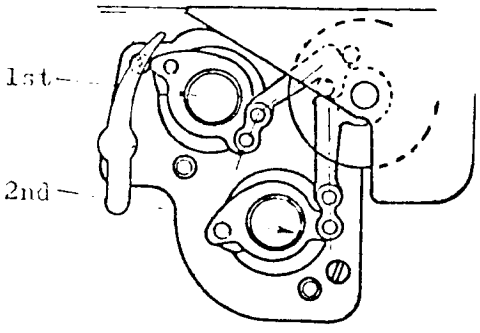


Fig.4-13

4 Set the damper gears so that the arms come into the place as shown in Fig. 4-13, by turning the damper gears.

If the arm does not stop at the right place, turn the friction disk a little by screw driver, as to change the relative location of the ratchet.

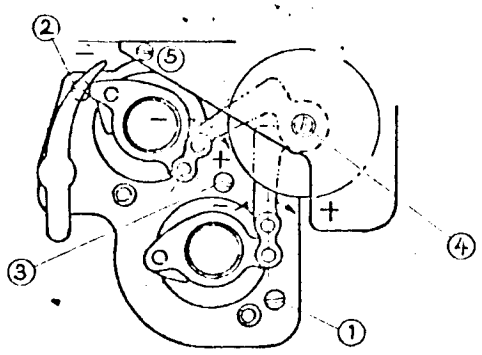
1st curtain damper arm:
Just in parallel with the intermediate lever.
2nd curtain damper arm:
The arm and lever make a dull angle as shown.

5 Slide the system into the position again so that the damper gears engage with the pinion gears. At which time, it is recommended to hold the damper gears with tweezers, so as to prevent the gear rotation. Fix the system by two screws as shown in Fig. 4-14.

6 After releasing the curtains, rewind them by turning the curtain charge gear(E80), and see whether the damper arms are in the right place, when the 2nd selector gear is brought to a stop by the checker lever. Assure that the arms are in contact with the stud-pins respectively.

7 When a rough adjustment is over, release the curtains. Check if the both damper disks hit the stopper. See whether the curtain edgers stop at the right place.

8 If the curtain position is deflected, perform "4" adjustment, taking into consideration the following angle modification.



Modification toward
\+ Increase in the traveling distance of the curtain.
− Decrease in the traveling distance of the curtain.

Fig. 4-14

9 When finishing the adjustment, fix the system with 5 screws. Screwing of No. 5(FM1.7x2.5) must be carefully made so as not to damage the screw thread on the body.

4-4-5 A-M Switch (Fig. 4-103)

Refer to Fig. 4-103 for parts locations, oiling points and oils to be used.

Adjustment

Height of Lock pin(B34) and A-M switching pin(B62) from the mount surface must be 0.9 mm and 1.7 mm, respectively, when they are in the original position.
The height of A-M switching pin can be adjusted to the specified level by W43(t=0.1, 0.15, 0.2)

When the switching pin head reaches a height of 1.3mm from the mount surface, A-M SW must turn "on". Switching height is adjusted by Adjusting collar(B46).

For its height check, use calipers as shown in Fig. 4-16.

Fig. 4-15

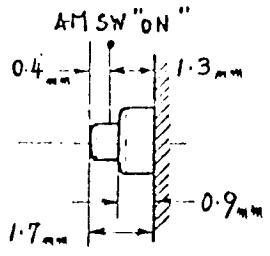
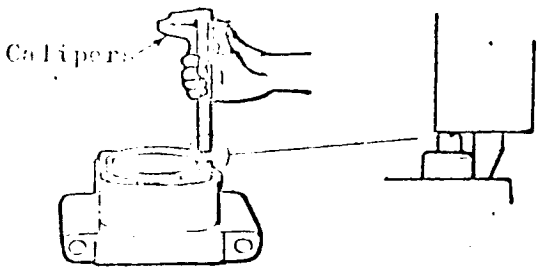


Fig. 4-16



4-4-6 METER COUPLER (Fig. 4-103)

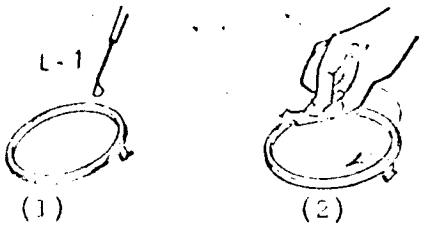
Refer to Fig. 4-103 for parts locations and oiling points, etc..

When installing the chains(B90, B91), avoid a stranded arrangement, which causes derailing. The direction of Coupler slider(B16) must be carefully observed. Close opening of the hooks 1~3 with tweezers, after fixing the chains.

Give a thin layer of L-1 on the surface which faces the mirror housing, of F. coupler ring(B07).

Install Ring retainer plates(B84, B85) with non-glossy surface facing the outside.

The coupler slider and the ring must move smoothly. When the ring returns to its original position after the finger is off the ring at the fully turned position, the chains must function properly. If the chains derail, tight movement of the coupler slider may be its cause.

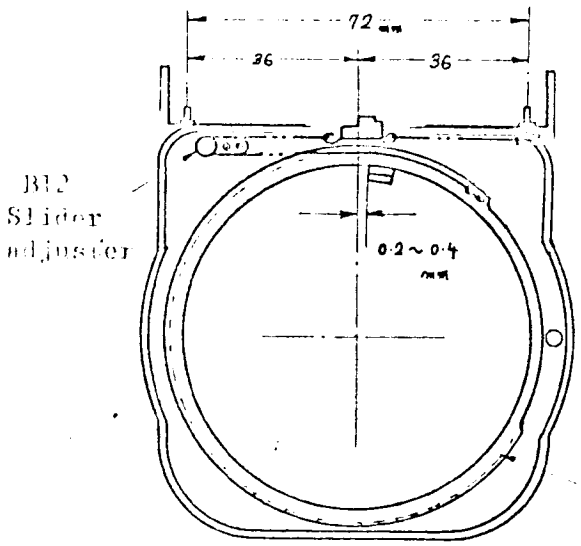


Oiling: F.coupler ring(B06)

Fig. 4-17

Adjustment

The coupler slider's position varies with respect to the adjuster position, adjusted to the right or left. Correct relative location of the coupler slider against the ring, as shown in Fig. 4-18. Estimate the center line of the mirror housing by using calipers.



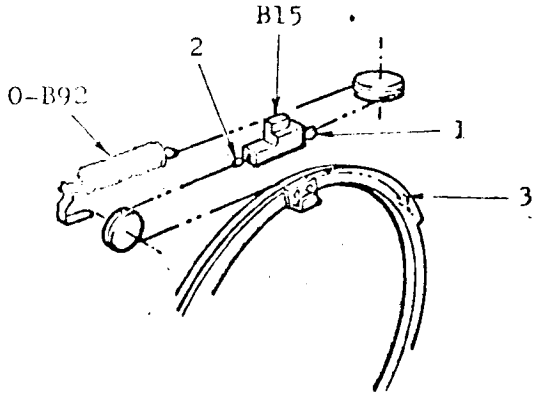


Fig. 4-18

4-4-7 SHUTTER MECHANISM PLATE (Fig. 4-106)

Shutter mechanism on Shutter mecha. plate(D01) can be assembled as a unit. But it is more convenient to put the parts together onto the mecha. plate which is already installed in the mirror housing. Refer to Fig. 4-106 for the followings.

A Shutter mechanism plate (D01)

When installing the shutter mecha. plate(D01)in the mirror housing, arrange the wiring into the groove of the mirror housing wall, and install Mirror actuator arm(D10) beforehand, applying 2~3 drops of L-1 onto the shaft, and G3 onto the mirror actuator pin on the arm.

Also apply G3 onto the mirror sheet coupling part.

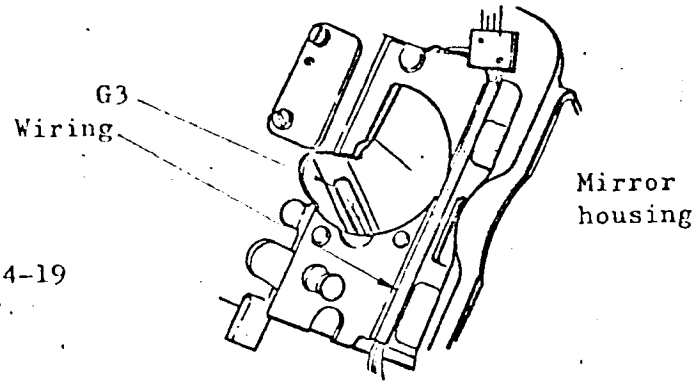


Fig.4-19

B Restoring gear(D24)

With W72, Dia. actuator lever(D28) should be adjusted to have a minimum play. Check the play at the end of the lever, while pressing Spiral spring holder(D26) with fingers. The play must be within the tolerance of 0. 2mm. If a piece of W72 is enough for adjustment, place the washer between the lever and the mecha. plate.

Before installing Restoring gear(D24), Restoring spring(D29) must be assembled into the gear, as shown in Fig. 4-20.

Apply a proper amount of L-5 onto the spring with a small brush, so that the oil lubricates and prevents the spring from rusting.

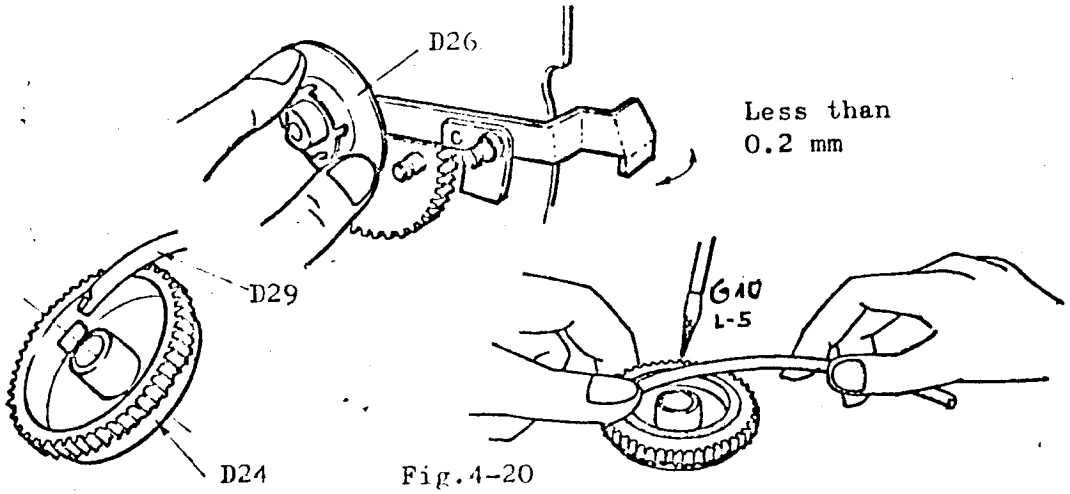


Fig.4-20

C Re-set hook (D66)

Re-set hook(D66) and Actuator charge lever(D69) must be installed in the mecha. plate before Center gear(D14) is assembled.

W15(t=0. 08, 0. 1).

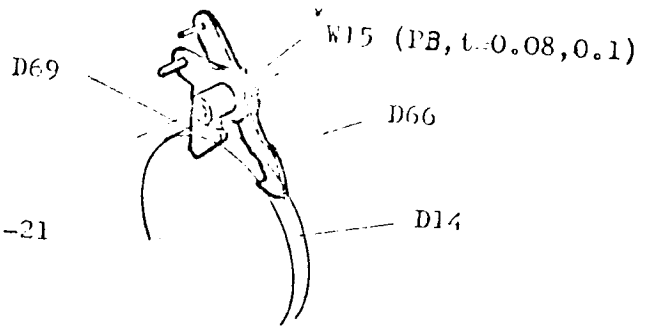


Fig.4-21

D Center gear (D14)

Before installing Center gear(D14), assemble Flip up spring (D 19) into the spring chamber of the gear(D14). Apply a proper amount of L-5 as in the case of the restoring spiral spring.

Apply G4 on the 2 points on the hook receptacle, riveted on the reverse side of the gear, as shown in Fig. 4-22.

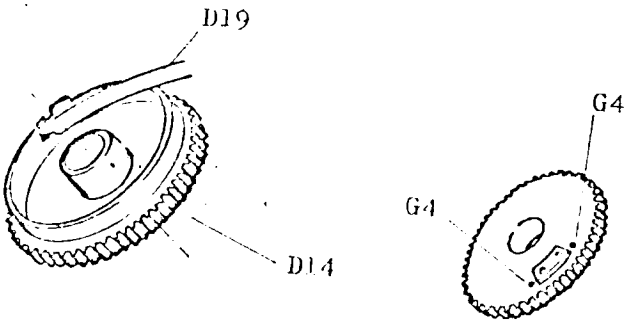


Fig.4-22

Before engaging the center gear(D14) with the restoring gear, turn the restoring gear clockwise about 180~220 degrees and hold it with fingers. Then engage the center gear with the restoring gear, so that the restoring spiral spring is tensioned 180~220 degrees from the original position, when they stop hitting the stopper on the Mecha. plate after the fingers are off. Refer to Fig. 4-23.

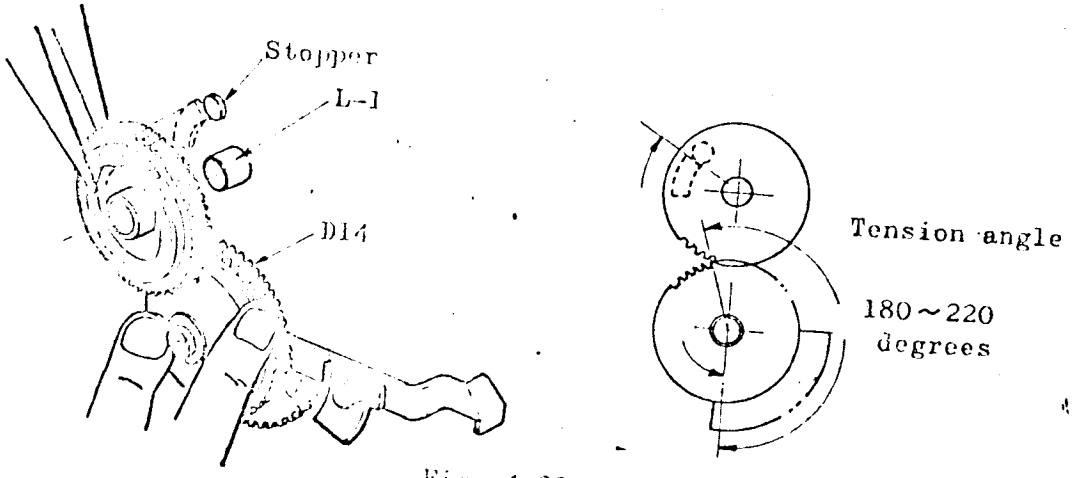


Fig. 4-23

E Mirror actuator disk (D17)

Engaging the slit on the reverse side of Mirror actuator disk (D17) with the end of the flip up spring, turn the disk clockwise,

until the nose of the disk gets over the protrusion of the center gear. Then engage the square hole of the disk with the square-shaped end of the mirror actuator(D10). At which time, the mirror sheet must be placed in its original position. Refer to Fig. 4-24.
Tension angle of the flip up spring must be 90～120 degrees

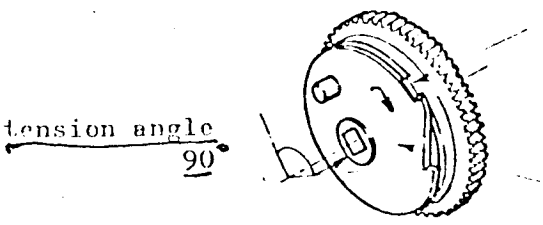


Fig.4-24

Apply a small amount of Aro. to the top threads of the retainer screw(D21). When screwing the retainer screw, hold the mirror actuator arm from the back.

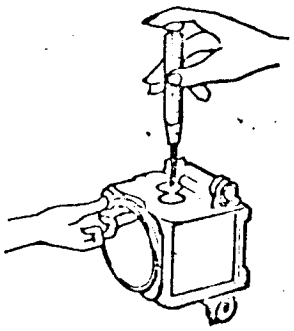
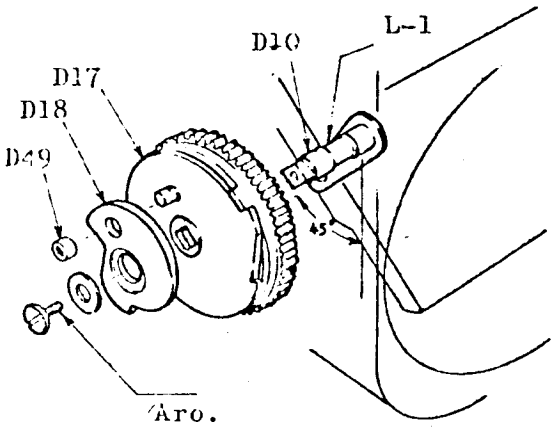


Fig.4-25



F Timing gear (D07)

Engage Timing gear(D07) with the center gear so that the stud-pin of the timing gear positions the spot shown, when the gear train is in its original position. Refer to Fig. 4-26.

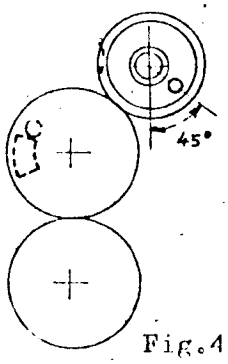
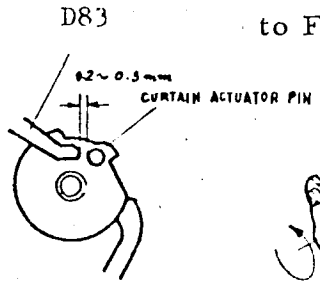


Fig.4-26



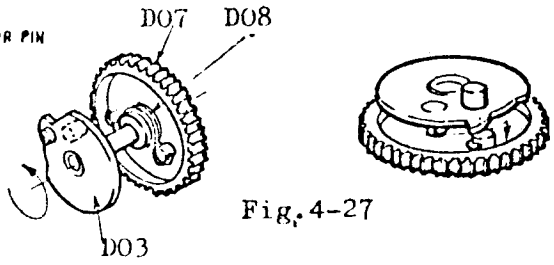


Fig.4-27

Engage the both ends of Timing spring(D08) with the stud-pins of Timing cam(D03)and the timing gear respectively, and turn the cam counterclockwise until the stud-pin of the cam gets over the stud-pin of the gear.

Then push in the cam, and retain it by engaging LW13 with the cam shaft from inside of the mirror housing. Assure that the curtain actuator pin does not contact with the 1st intermediate lever(D83). The optimum clearance is 0.2～0.3 mm.

Reduce the play of the timing cam in the axis direction, to less than 0.1 mm by W6(t=0.15, 0.1).

Apply a small amount of L-1 onto the timing spring and shaft.

G Mirror hook and timing checker lever

Install Mirror hook(D66) and Timing checker lever(D59) with Hook springs(D57 x2). Beware of installing directions of the springs. Oiling is shown in Fig.4-28.

Note: Assure that the checker lever moves smoothly when the shutter is cocked, after assembling. If a wrong operation is observed, file off the portion shown, slightly.

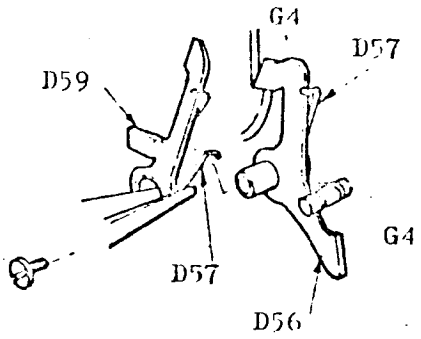
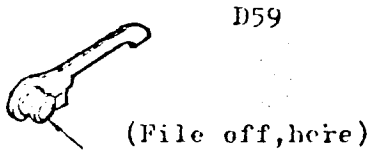


Fig.4- 28



H 2nd curtain actuator (D72)

Assemble the 2nd curtain actuator (D72)with Actuator spring(D76) to the actuator charge lever. Oiling:A proper amount of L-1 to the shaft.

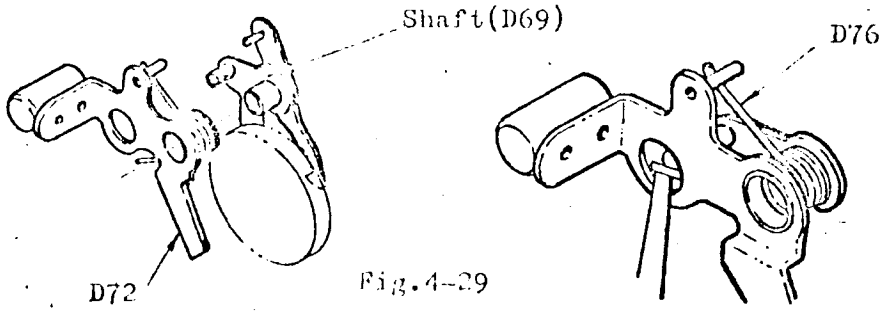


Fig.4-29

I Intermediate levers

Three intermediate lever collarsare the same one after another, and Parts No. are also the same. However, it is recommended to handle each lever and collar coupled, as coupled parts, when disassembling or assembling them. Assure that the each lever moves smoothly after assembling. Oiling: A very small amount of L-1, between each lever and collar.

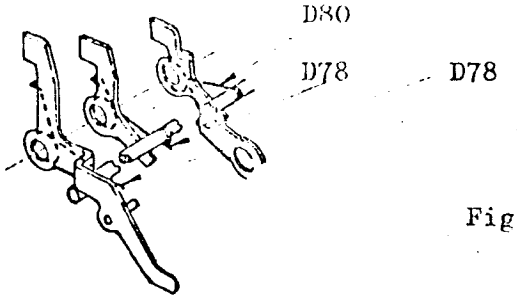


Fig.4-30

J Shutter actuator lever

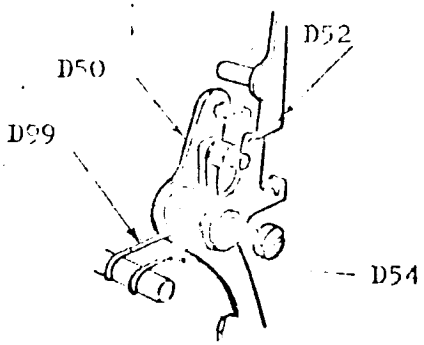


Fig.4-31

Beware of the installing directions of the springs(D54, D99).
Oiling: L-1 to the shafts
G4 to the hooks

K Mirror double gear (D40)

Mirror double gear(D40) determines the relative position of Dia. charge gear(D32) as against Restoring gear(D24).

Install the double gear while pulling the Dia. actuator lever up with a finger, providing 0.3mm clearance at the hook as shown in Fig. 4-40.

Oiling: G 3 on the gear teeth and bearings.

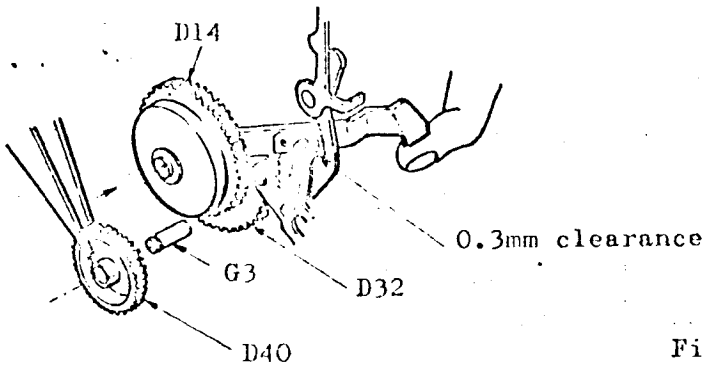


Fig.4-32

L Oiling points

Major oiling points to the shutter mechanism are shown in Fig. 4-34, located in the next page.

4-4-8 WIRINGS

Terminal locations for each wire are shown in Fig. 4-111. Two leads (pink and brown leads) to the rotary SW(E128) must be soldered before the rotary SW is installed. The terminals for the leads are located on the reverse side of the SW plate. Stuff the excess portion of the wirings into the opening under the circuit board or wiring board.

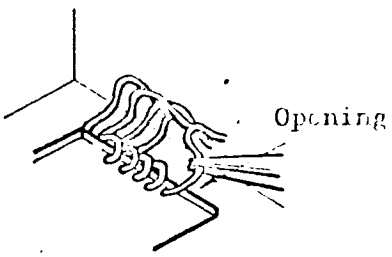


Fig.4-33

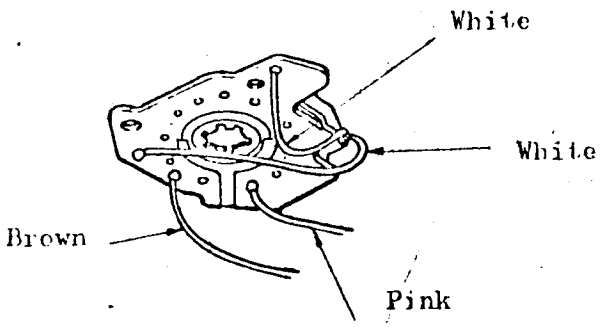
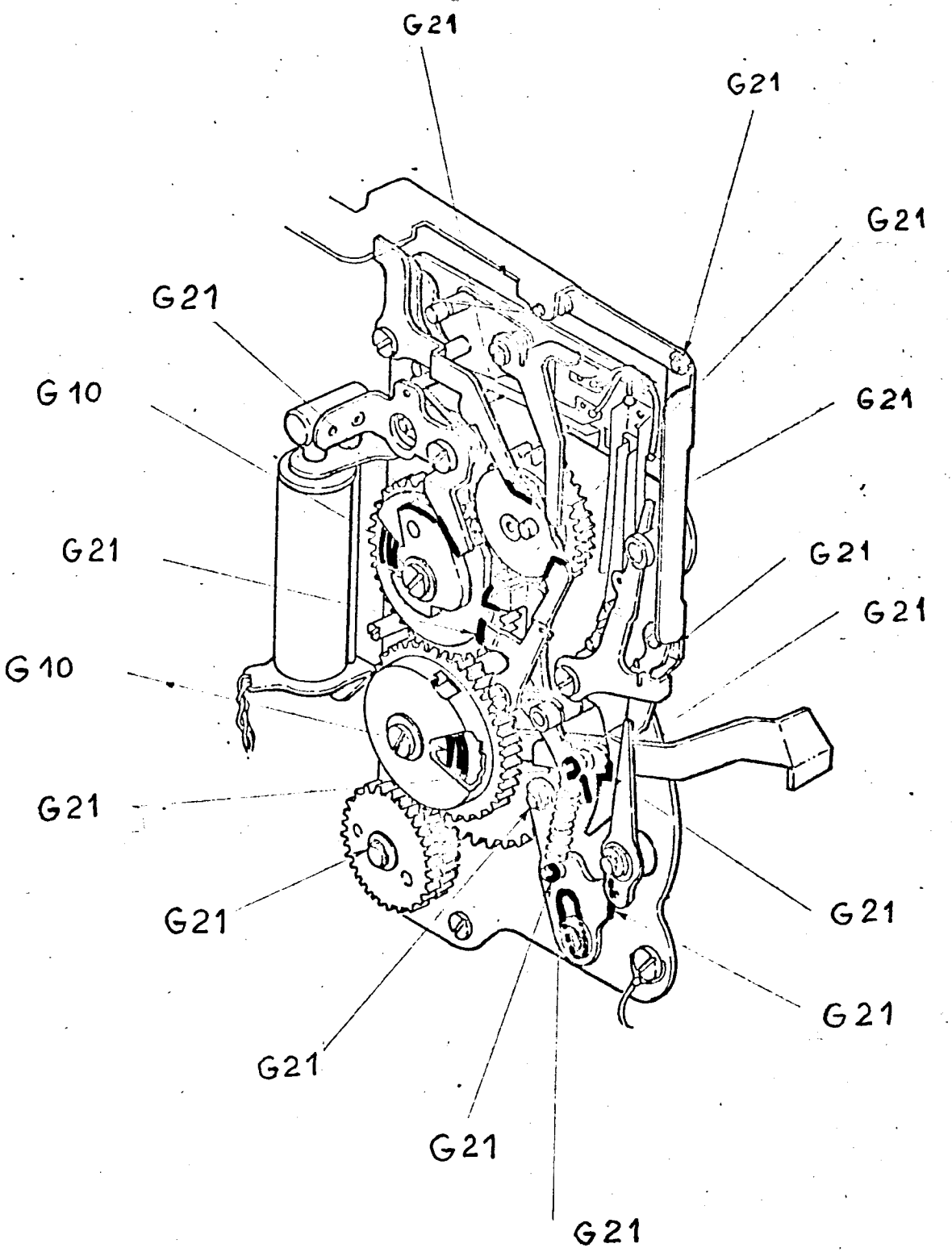


Fig. 4-35 Major oiling points on shutter mechanism

The major oiling points where oiling after assembling is possible.



4-4-9 MAGNET CORE (D75)

When installing Magnet core (D75), clearance adjustment is required. The clearance stabilizes the actuator sustaining force of the electromagnet.

A Adjustment

After the shutter mechanism is cocked (or Re-set hook is engaged), press the core lightly toward the armature with a finger, placing Thickness guage(234J-04012-A) between the armature and the core ends, and hold it. Then fix the core with the screw(SNS 1.7x3).. However, optimum clearance varies case by case.

Refer to Fig. 4-35.

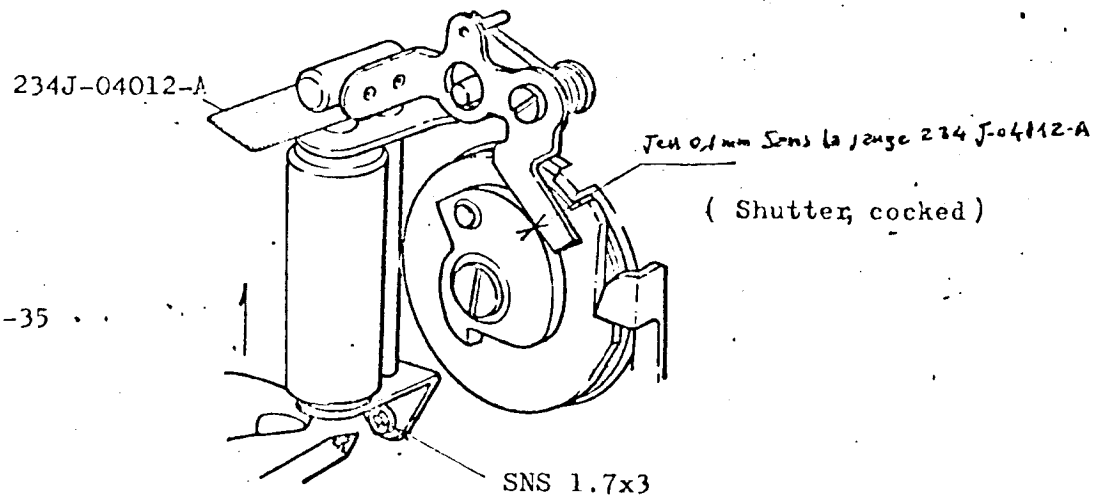


Fig.4-35

B Attractive force check

When the shutter operates at "B" of the shutter dial, the electromagnet must hold the armature until the source voltage drops to 4.9V. If the electromagnet does not hold it at 4.9V, check the attractive force. Procedures are as follows:

After cocking the shutter, push the release plate, holding the mirror actuator disk(D17) with your finger . Stop the rotation of the disk before the disk actuates the timing checker lever. Hold Shutter actuator lever(D52) in "power-SW-ON" position. Then lift the armature from the core ends , as shown in Fig. 4-36.

When the armature leaves the both core ends at the same time, the strongest attractive force is obtained.

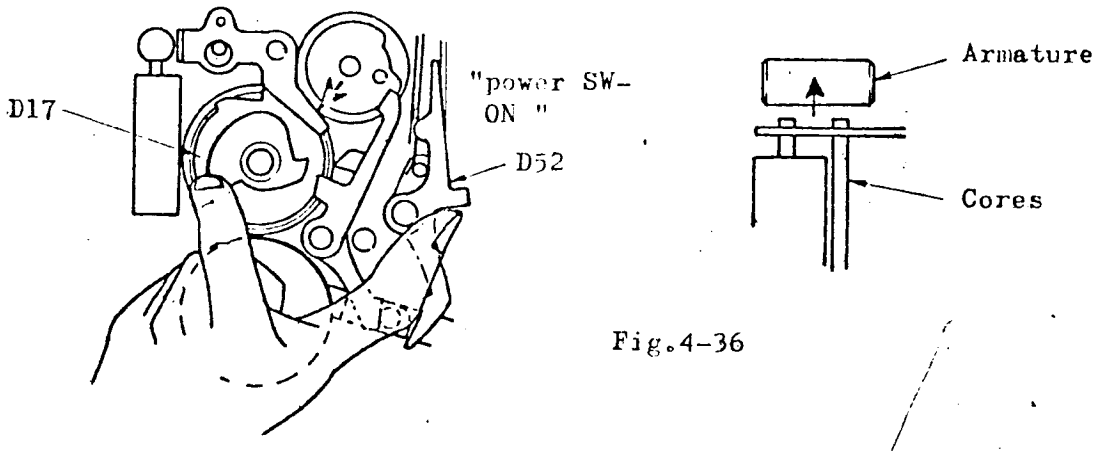


Fig.4-36

4-4-10 SHUTTER DIAL (Fig. 4-108)

When installing Shutter dial(E125), Dial rest (E120), Dial shaft (E119) and Rotary SW(E128) must be put together so that the shutter click is properly coupled with the rotary SW contact point.

Procedures are:

1 Coincide the rotary contact with "B" terminal.

2 Coincide "B" click hole with the click ball. The location of "B" click hole is shown in Fig. 4-37.

3 Install Dial rest to the shaft, holding the dial rest with the protrusion in the front side of the camera.

Now, the protrusion engages with the cut out section nearest to the roary contact on the rotary plate(correct position).

4 Keep the Dial rest in the same direction when installing the Top cover left(A08). Install Shutter dial(E125) to the rest, coinciding "B" with the shutter speed index.

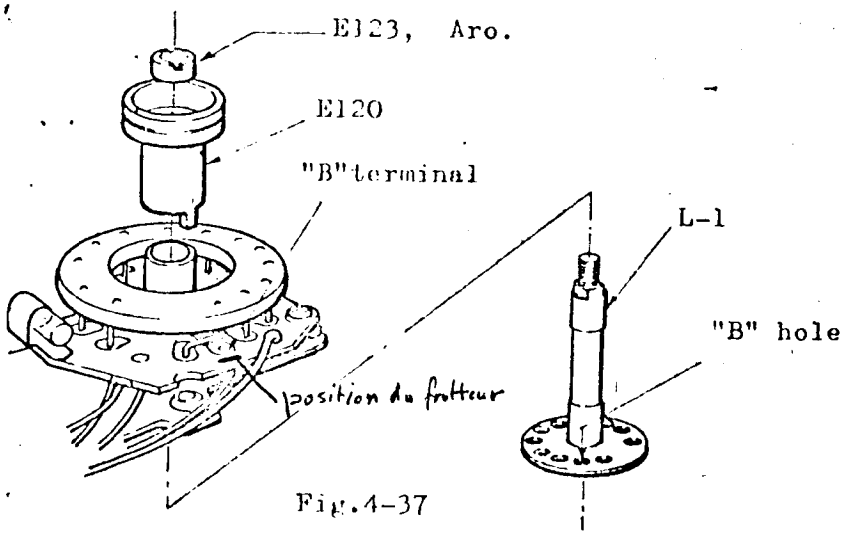


Fig. 4-37

Note:

After the Retainer nut(E123) is in a fixed position, apply Aro. to it. BATT checker indicator lamp is easily replaced. When removing the lamp, use a soldering iron to heat the bonded portion. The adhesive will soften and the lamp can be taken apart.

4-4-11 FILM TRANSPORT AND EXPOSURE COUNTER MECHANISM (Fig. 4-104)

When assembling the transport and exposure counter mechanism, operation check and adjustment are required before Wind shaft(0-C-34) is installed. However, this adjustment and check are required only when the mechanism is disassembled or any faulty operations are observed.

Following parts must be assembled before installing the Wind shaft(0-C 34)

1. Spool shaft(0-C-30) 2. Counter roller(A61) 3. Transport 3-rd gear(C44) 4. Spool stopper(C20) 5. Auto re-set actuator plate (C16) 6. Stopper release lever(C18), etc.

A Spool shaft (0-C30)

Spool shaft(0-C30) is supplied as an assembled parts. The mechanism inside is shown in Fig. 4-110. Before and after installing the Spool shaft, see whether the take up claw turns smoothly throughout 360 revolution by turning it with your finger. (If Anti-reverse spring -E117- and Transport 3rd gear-C44- are already installed, do not turn the claw counterclockwise.)

B Counter roller (A61)

Install counter roller (A61) in the body with the retainer screw (A68)and gear(C93). When screwing the three set screws(SetT 1.4x 2.8), adjust the position of the roller as against the gear, so that it has play about 0.1~0.2 mm in the axis direction.

Oiling: A proper amount of L-1 to the both upper and lower bearings.

Fig.4-38

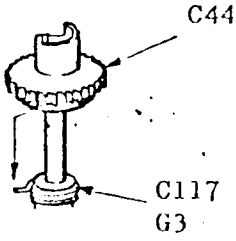
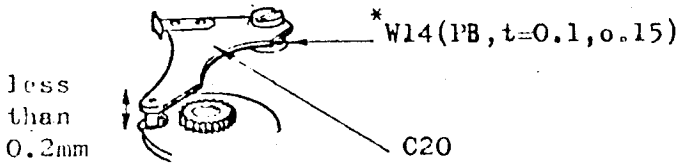


Fig.4-39



C Transport 3rd gear (C44)

When installing Transport 3rd gear (C44), assure that the end portion of Anti-reverse spring(C117)is placed into the slit of the gear. Apply G3 to the shaft and spring.

D Spool stopper (C20)

To stabilize the film transport control function, play of the spool stopper must be minimized. The play must be within 0.2mm at the top, as shown, enabling smooth operation. Use W14 for the adjustment, if it is needed. Apply a very small amount of L-1 to the shaft, but absolutely avoid oiling the lip.

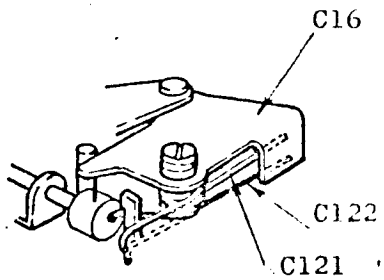


Fig.4-40

E Auto re-set actuator plate (C16)

To ease the assembling operation, the following procedures are recommended. Refer to Fig. 4-40.

1 Install Auto re-set actuator plate(C16), Re-set actuator spring (C121)and Counter gear mount spring(C122) to the installing positions. At which time, do not engage the spring (C122) with the

gear mount.

2 Transfer the spring end of (C122)by tweezers so that it engages with the protrusion of the gear mount.

F Stopper release lever

Install Stopper release lever(C18) and Coupler lever(C19)in the spool shaft, as shown in Fig. 4-41.

Oiling: L-1 to the shaft and G4 to the points shown.

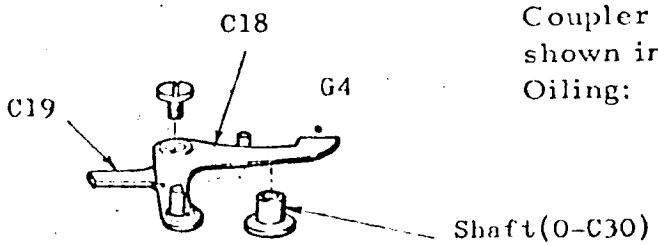


Fig.4-41

G ADJUSTMENT AND OPERATION CHECK

The following adjustment and operation check must be done after the mirror housing and body are coupled to each other. The coupling procedure is described elsewhere.

(1) Spool stopper operation check

With the back cover opened, turn the curtain charge gear (E 80)clockwise about 90° by using the special tool(234J-05080-A). B shows the position when the gear (E80)is wound. C shows the position when the gear has returned.

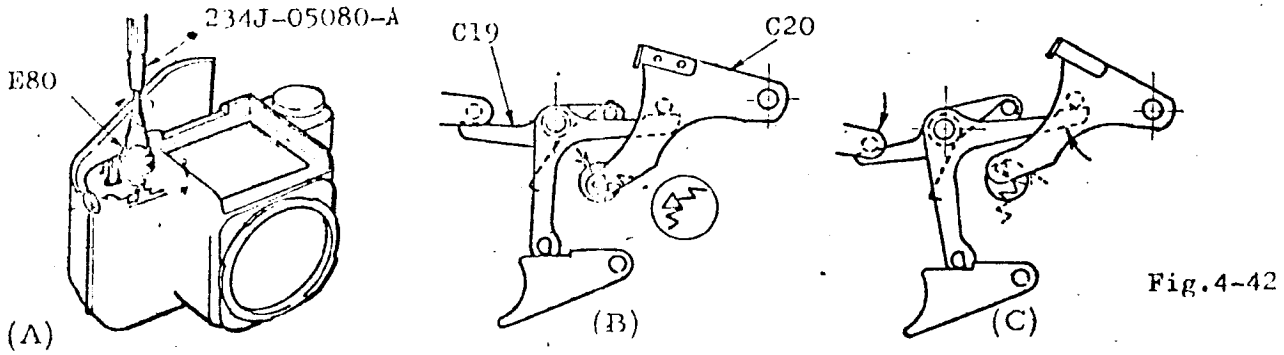


Fig.4-42

In A condition, no clearance between the stopper tooth and stop ratchet is allowed. Check the clearance by pushing the stopper toward " → "marked direction by tweezers. If a clearance is detected, file off the portion of the stud-pin on the stopper. In B condition, the stopper tooth must be off the ratchet.

(2) 1st frame stabilizer operation check

Operation of the 1st frame stabilizer on Auto re-set actuator must be checked as follows:

a When the back cover is opened with the shutter un-cocked, a proper clearance must be maintained between the step of the stabilizer and D-shaped pin on the stopper release lever, as shown in Fig. 4-43.

b With closing the back cover, theD-shaped pin must be firmly caught by the step. *Appui de cliquet*

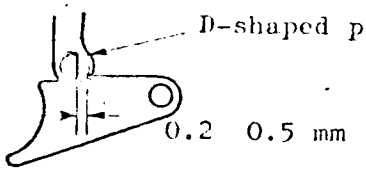


Fig.4-43

c Disengage the 1st frame stabilizer with tweezers(in actual condition, Duality prevention lever-E91-disengages the stabilizer when the first shutter cocking is completed). Then turn the curtain charge gear(E80) and see whether the D-shaped pin moves within the range shown in Fig. 4-44. A surplus distance must be observed at the step.

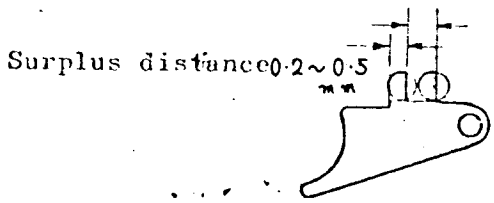


Fig.4-44

d If wrong operations are observed, correct the pin position by bending the stopper release lever slightly.

H Wind shaft (0-C34)

When the operation check and adjustment are over, install Wind shaft(0-C34) to the body. At which time, keep the shutter un-cocked and the back cover opened. Refer to Fig. 4-45.

When installing the shaft, observe the following precautions:

1 Be careful not to press the lip by the transport control wheels.
2 Engage the counter worm gear and wheel properly.
3 Absolutely avoid oiling the transport wheels.
4 Assure that the return spring of the exposure counter dial is tensioned (1~1·1/2 revo. from the free position).
5 Observe the operation of the click spring for the Frame No. control dial.

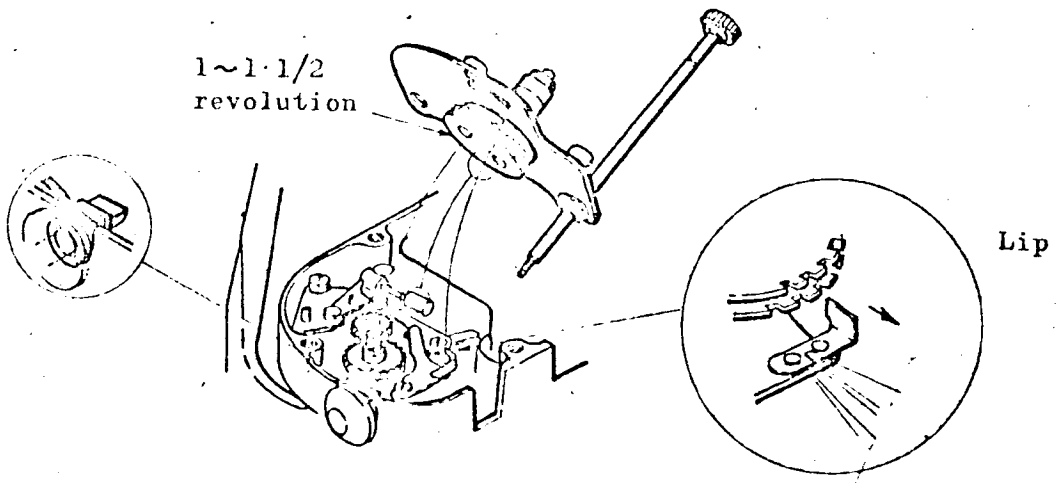
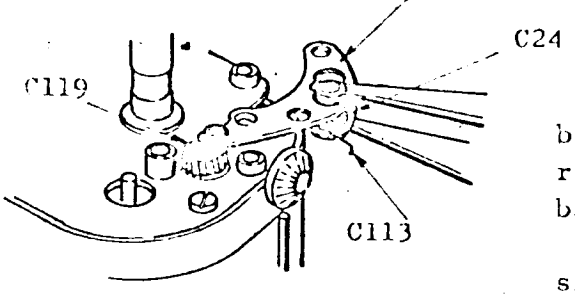


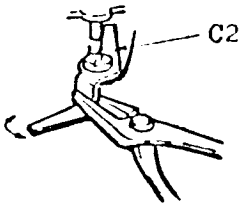
Fig.4-45

I Wind sub-plate (C33)

When installing Wind sub-plate(C33), Shift pawl(C24) and Shift pawl spring (C113) must be assembled at the same time, as shown in Fig. 4-46.

Fig.4-46





Auto re-set coupler lever(C26) must be adjusted so that the exposure counter returns to its starting position, when the back cover is opened.

For this adjustment, bend the lever slightly as shown.

To minimize the play of Shift lever (C23), use W66. Assure that the lever turns smoothly.

J Lever stopper (C27)

When Lever pawl(C28)has changed its direction, a proper clearance must be maintained between the main gear shaft and lever stopper, as shown in Fig. 4-47.

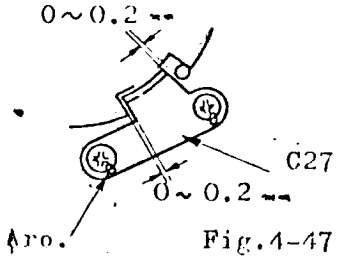


Fig.4-47

For the adjustment, Lever stopper A or B (C27a, C27b) is available. If the clearance of A is too wide, use B.

When the lever stopper is finally assembled, apply a proper amount of Aro. between the screw head and lever stopper, for locking.

4-4-12 COUPLING, BODY AND MIRROR HOUSING

Refer to Fig. 4-48 and the following precautions.

1 Before coupling, Main gear(C01), Duality prevention coupler lever(C25) and Wind sub-plate(C33), etc. must be taken apart from the body, if they are already assembled.

2 To ease the operation, wind up the shutter curtains by turning the curtain charge gear with the special tool(234J-05080-A).

3 Beware of the pin positions of Duality prevention lever(E91) and Re-set actuator(E87) against Stopper release coupler lever (C19) and 1st frame stabilizer respectively, as shown in Fig. 4-48.

4 Pre-fixing of the mirror housing with 2~3 screws is required to allow adjustment, when installing Mirror gear block(C09) and Connecting Gear(C08).

5 After fixing the mirror housing with 10 screws, apply the light seal paint to the place shown, and check the light seal strings whether they are placed in the postion shown in Fig. 4-49.

6 Use proper W3(t=0.1, 0. 15, 0. 2)according to the clearance.

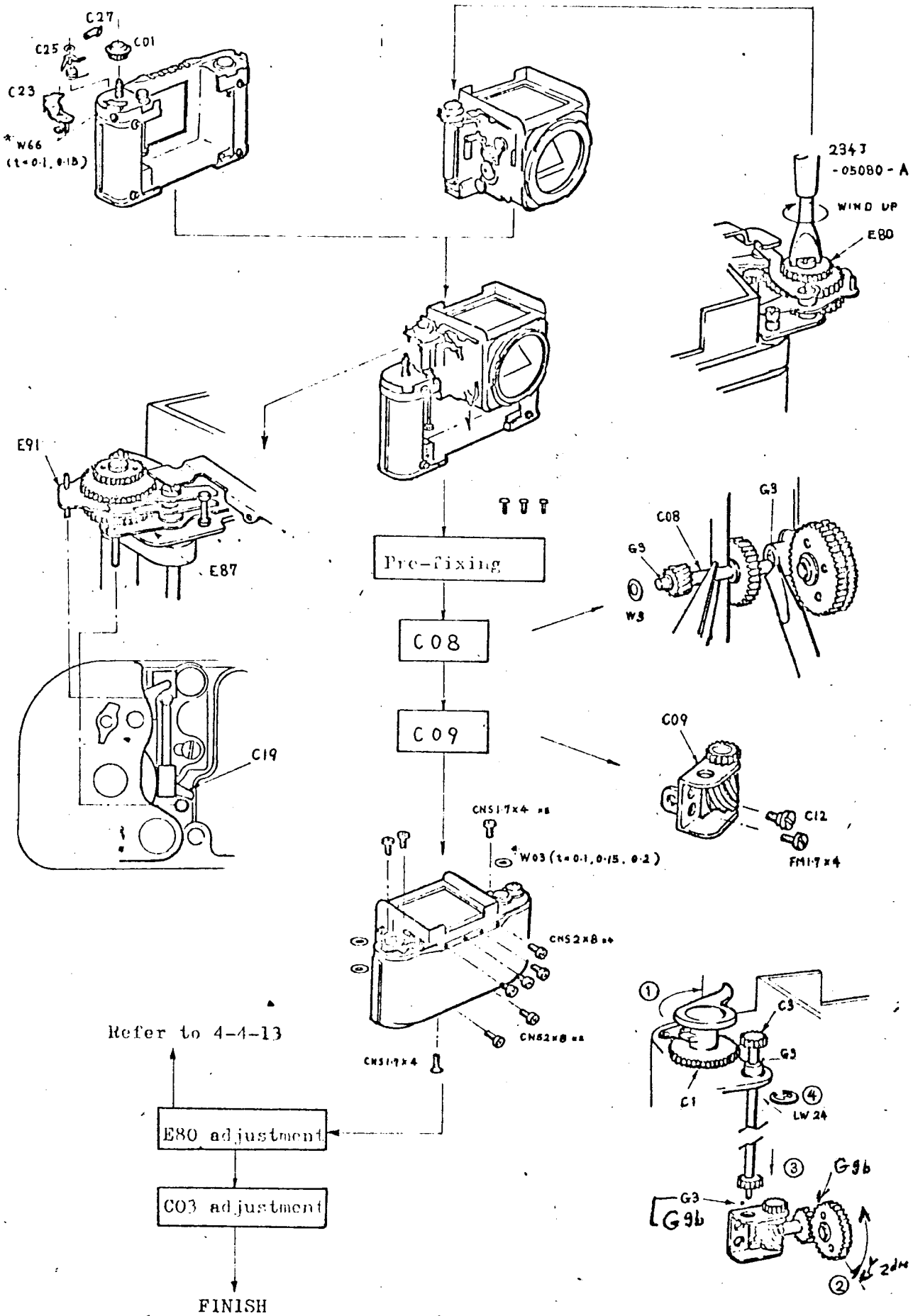
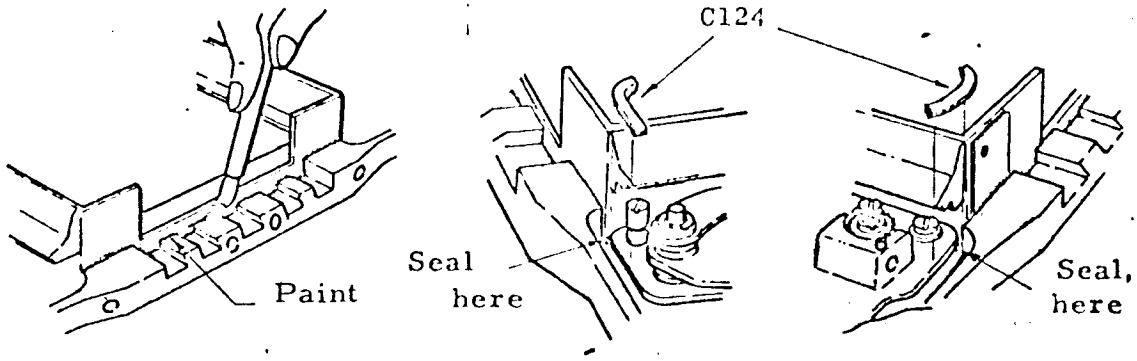


Fig.4-48
COUPLING, BODY AND MIRROR HOUSING

Fig. 4-49 Light seal



4-4-13 CURTAIN CHARGE GEAR ADJUSTMENT

Curtain charge gear(E80) must engage with the main gear so that the lever ratchet pawl(C28) changes its direction just when or momentary after the 2nd selector gear is checked by the checker lever while turning the wind lever.

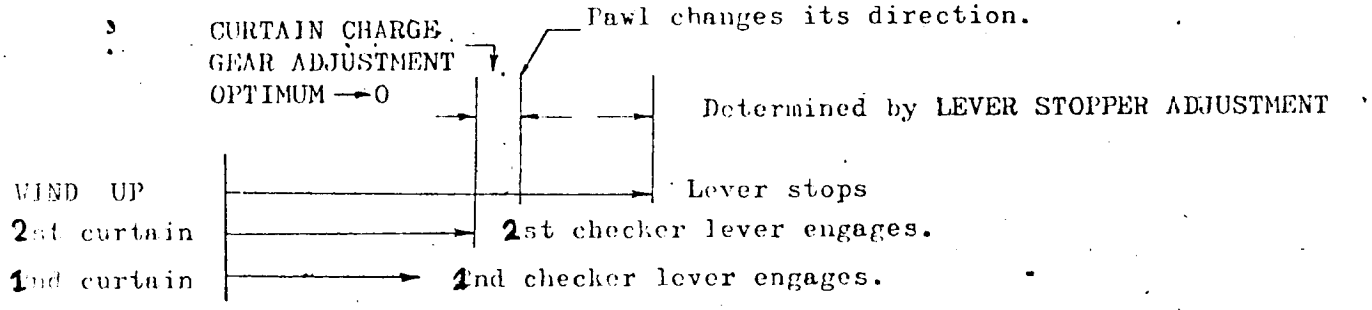


Fig. 4-50

4-4-14 MIRROR COUPLER GEAR

A Assembling

When assembling Mirror coupler gear(C03) and Mirror charge 2nd gear(C04), use the special tool(234J-03004-A)as shown below. Install W66, before assembling.

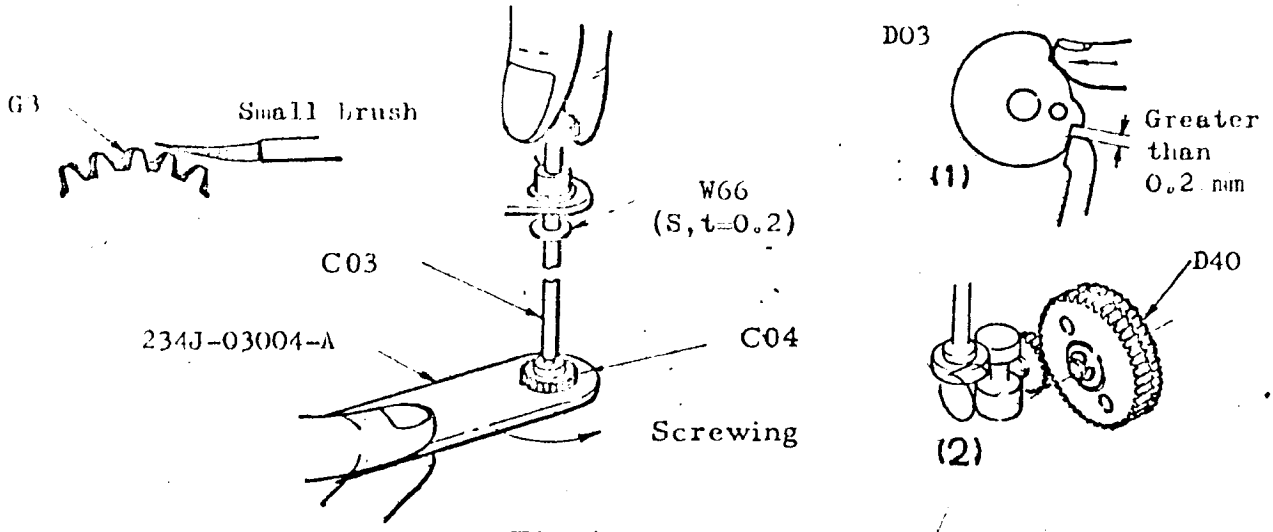


Fig. 4-51

B Adjustment

Matching the cocked points of the shutter curtains and mecha - nism on the mirror housing is the purpose. For the adjustment, change the relative location of the Main gear(C01) against the shutter mechanism.

Procedures:-

1 Release the whole shutter system, and return the wind lever to the original position.

2 Rotate the Mirror intermediate gear(D43) counterclockwise with tweezers, until it stops. And reverse the gear slightly (1~2 pitches of the gear) and hold it.

3 Engage the coupler gear to its position.

4 Adjustment check 1:

Turn the wind lever until it stops and hold it. (Curtain charge gear adjustment must be finished. Otherwise, it might damage the curtain or curtain tapes.) Then, turn the Timing cam(D03) counterclockwise with your finger. More than 0.2 mm clearance must be observed at the top of the Timing checker lever(D40) as shown in Fig. 4-51.

Adjustment check 2:

While returning the wind lever, the rotation of the Mirror double gear(D40) must be observed, after the 2nd selector gear is checked by the checker lever.

5 Even the amount of the clearance and the rotation.

6 Finishing the adjustment, install the LW24 to the shaft. Apply sufficient G3 to the mirror charge 4th gear with a small brush, as shown in Fig. 4-51.

7 If the tight rotation of the wind lever is observed, adjust the installing positions of the Mirror gear block(C08) and mirror housing.

4-4-15 DUALITY PREVENTION COUPLER LEVER

Bend "※" marked portion of the lever, so that it performs the following operation.

1 When the shutter is cocked, the coupler lever(C25) keeps the lever pawl in the same direction, thereby enabling the wind lever to lock.

2 When only the 2nd curtain is released(when the safety system operates), the lever does not disturb the pawl. The lever pawl changes its direction.

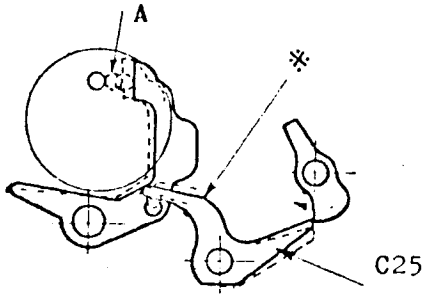


Fig.4-52

A: 2nd selector gear stud-pin position, when only the 2nd curtain is released.

4-4-16 SW adjustment

The operation of the power SW and "B" SW is shown in Chapter 2. Adjustment of the contact points (power SW, "B" SW, FP SW and X SW) is explained here.

Cleaning of the contact points

Use the solution (ether 70%, alcohol 30%) for the cleaning, and apply very small amount of Electro Lube (mentioned elsewhere) to the contact points after cleaning. Avoid touching these contact points with your finger.

A Power SW

1 Power SW must be turned "ON" as soon as the Release plate (B70) has been pushed. This adjustment process is not usually required.

2 SW actuator pin on Diaphragm checker hook(D50) must turns "ON" the SW, when the hook receptacle slips off the hook and reaches the range shown in Fig. 4-53. For the adjustment, bend the "*" marked portion of the SW plate.

3 Whenever your finger is off the release plate, the power SW must turn "OFF", if the hook receptacle has not slipped off the hook.

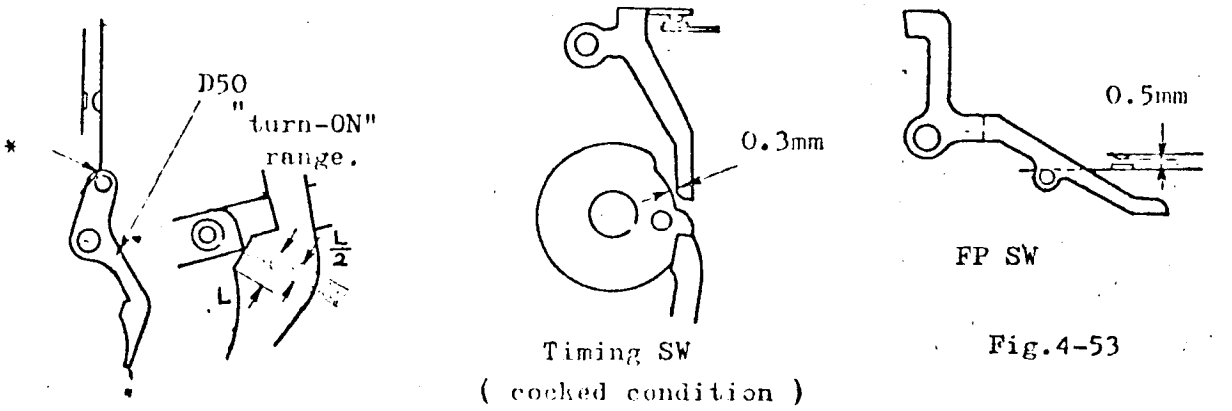


Fig.4-53

B "B" SW

"B" SW must be turned "OFF", as soon as the Release plate has been pushed, and must be turned "ON" firmly when your finger is off the plate. Assure that a more than 0.5mm clearance remains on the contact in OFF-condition.

C Timing SW

Adjust the timing SW contact plate, so that 0.2~0.3 mm clearance remains between the lever and cam of the timing SW, when the shutter is cocked. Refer to Fig. 4-53.

D FP SW

Lower SW plate must contact the actuator pin on the 1st intermediate lever. Adjust the clearance of the contact points to 0.5mm. However, optimum clearance varies case by case, according to Time-lag-adjustment. Refer to Fig. 4-53.

E X SW

Assure that the SW turns "ON" or "OFF" firmly.

4-4-17 OPERATION CHECK (Transport and exposure counter)

This is the final check of the film transport and exposure counter mechanism, before the stage of shutter speed adjustment and installing covers. For the check, following parts must be installed.

Wind lever(C13), Exposure counter housing(C26), Exposure counter dial(C52), Shift pawl(C24), Shift lever(C26), etc.

Load the camera with film, and operate it. Then observe the followings:- (The transport control wheels and lip, and the shift pawl can be seen through the cut out section of the body.)

1 Lip
While winding up, lip must be pushed against the control wheels, and it drops into the space of Wheel A.

2 Transport control wheels
When the lip is off the wheel A, spaces of the wheel A must be blocked by the teeth of the wheel B.

3 Shift pawl
When the exposure counter shows approx. No. 1 marking, the shift pawl must switch the claw clutch to "operational".
When the counter shows the figure set on the frame No. control dial, the pawl must switch the clutch to "non-operational".

4 Exposure counter dial
The dial must stop at each marking. (Proper film transport control)

Check the operation of the friction shaft system as follows:

1 Unload the camera and open the back cover.
2 Place the coin plate into the position.
3 Turn the counter roller forward until the dial stops at No. 1 marking. (Never turn the roller backward or after the dial has stopped. Otherwise, the lip will be damaged.
4 Turn the wind lever, holding the take up claw with your thumb. The take up claw must stop while you are turning the lever.

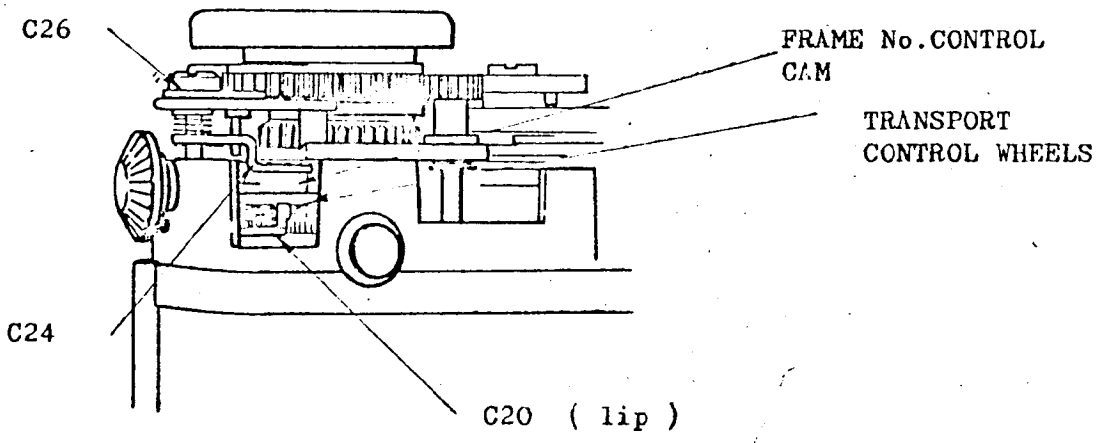


Fig.4-54

4-4-18 SHUTTER SPEED ADJUSTMENT

A Specifications

Curtain speed 22.9 ± 0.3 ms. (both 1st & 2nd, at 1/1000 sec.)

Exposure time

1/1000	1ms	1/15	60ms
1/500	2ms	1/8	125ms
1/250	4ms	1/4	250ms
1/125	8ms	1/2	500ms
1/60	16ms	1	1000ms
1/30	30ms		

Synchronization FP → 11 ± 2 ms

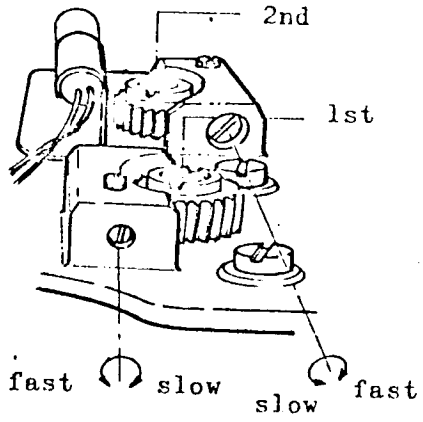
X A → 1.2 B → 3.3 C → 4.5 ms

2.39

B. Curtain speed adjustment

Perform the bounce prevention adjustment first, if it is out of adjustment. Refer to 4-4-20.

Operating the shutter at "B", adjust each curtain speed to 22.9 ± 0.3 ms by adjusting Worms(E64). Perform the bounce prevention adjustment again and check the curtain speed. If the curtain speed shows considerable change, correct it.



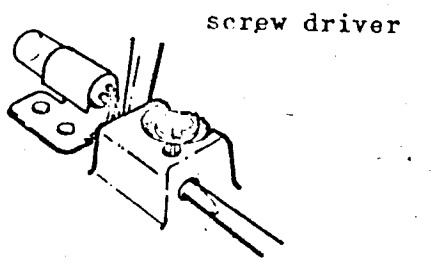


Fig.4-55

Note: When turning the worm(E64)of the 1st curtain, hold it from the back with a screw driver, in order to prevent the dropping off of the screw.

C Shutter speed adjustment

1 Operate the shutter with the shutter dial set at "1", and adjust VR1 so that the exposure tester indicates 1000ms.

2 Operate the shutter at "1000", and adjust VR2 so that the exposure tester indicates 1ms. At the same time, adjust the curtain speed to 22.9 ms(center), minimizing uneven exposure on the 3 points measured. (Final adjustment of the curtain speed)

After finishing the above adjustment, apply a proper amount of paint to the set screws of the worms, adjustable resistors VR1 and VR2, and lock screws of the damper disks, for locking.

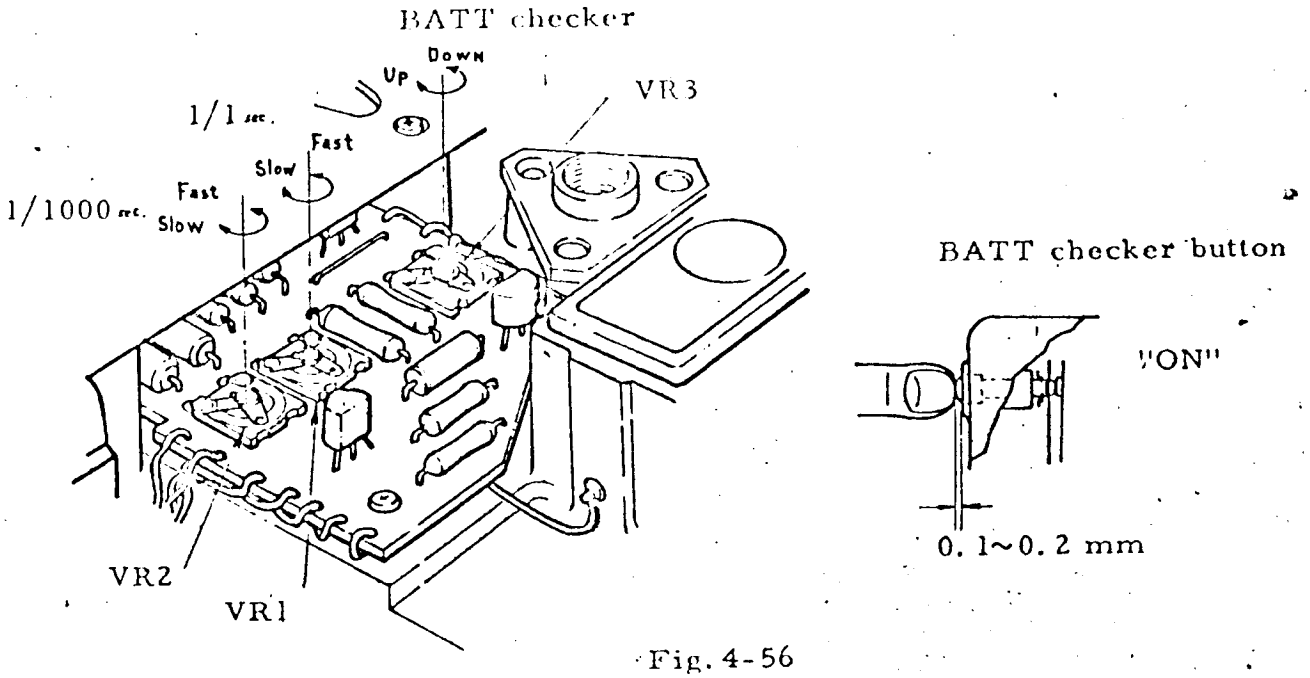


Fig. 4-56

4-4-19 BATT CHECKER ADJUSTMENT

Adjust VR3 so that the lamp glows at 5.0 V and dies out at 4.9 V of the source voltage.

To prevent unnecessary consumption of the battery, BATT checker SW must be adjusted, so that the checker circuit operates when the checker button is pushed in to the position shown above.

4-4-20 BOUNCE PREVENTION ADJUSTMENT

This adjustment has an intimate relation with the shutter curtain speed adjustment; the intensity of the bounce prevention system is determined by the curtain speed, and the curtain speed check must be performed after the proper intensity of the bounce prevention is given. Therefore, preliminary or approximate , and final adjustment are required.

1st and 2nd damper disks require the respective adjustment.

Adjusting steps

1 Screw in (counterclockwise)the both adjusting nut(E24) of the damper disks, so that the each damper disk stops before it hits the stopper when the shutter is operated at "15" of the shutter dial.

2 Operating the shutter, unscrew(clockwise) the each nut gradually. The clearance between the damper disk and stopper will decrease.

3 Stop unscrewing when the disk starts hitting the stopper. Then, unscrew the nut for another 1-revo. Lock the nuts with the lock screws (E28).

How to check the curtain bounce

1st curtain:

The bounce will be observed when you operate the shutter at low shutter speed, lower than 1/30 sec.

2nd curtain:

The bounce will be observed, at high shutter speed such as 1/1000 sec.

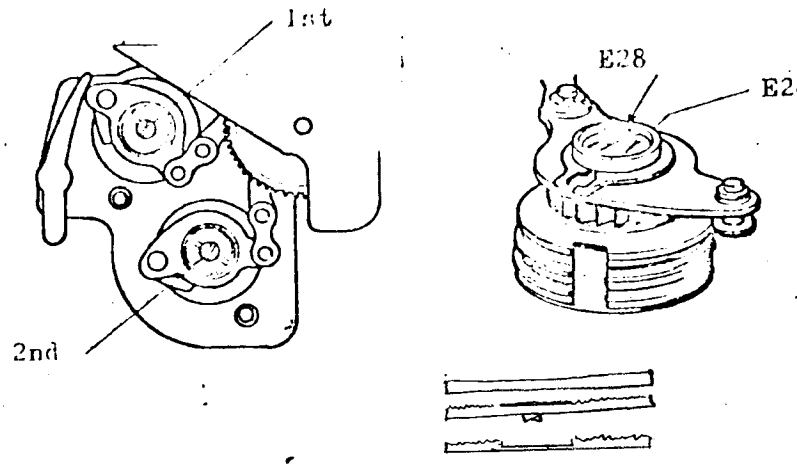


Fig.4-57

4-4-21 VIEWFINDER

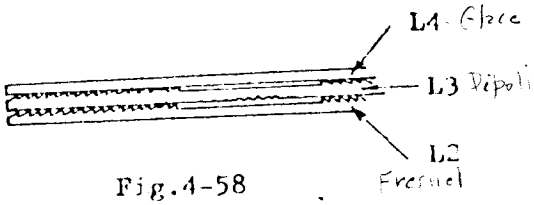


Fig.4-58

Clean the optical parts with the solution (70% ether, 30% alcohol), before installing them.

Installing directions of the Fresnel lens and ground glass must be carefully observed. Refer to Fig. 4-58.

4-4-22 WIND LEVER AND EXPOSURE COUNTER DIAL

A Dial housing (C54)

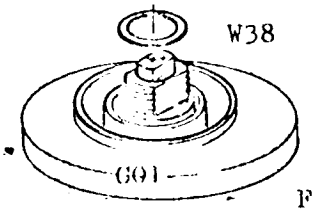


Fig.4-59

If the wind lever turns hard, when Dial housing is fixed by Nut(C127), use W38(t=0.1, 0.15) beneath the housing(C54).

B Lever restoring spring (C58)

When installing the restoring spring(C58), one side of the spring ends must firmly engage with the hole on the main gear(C01).

Place the spring into the position aligning the spring end and the hole, and press down the spring with a screw driver lightly.

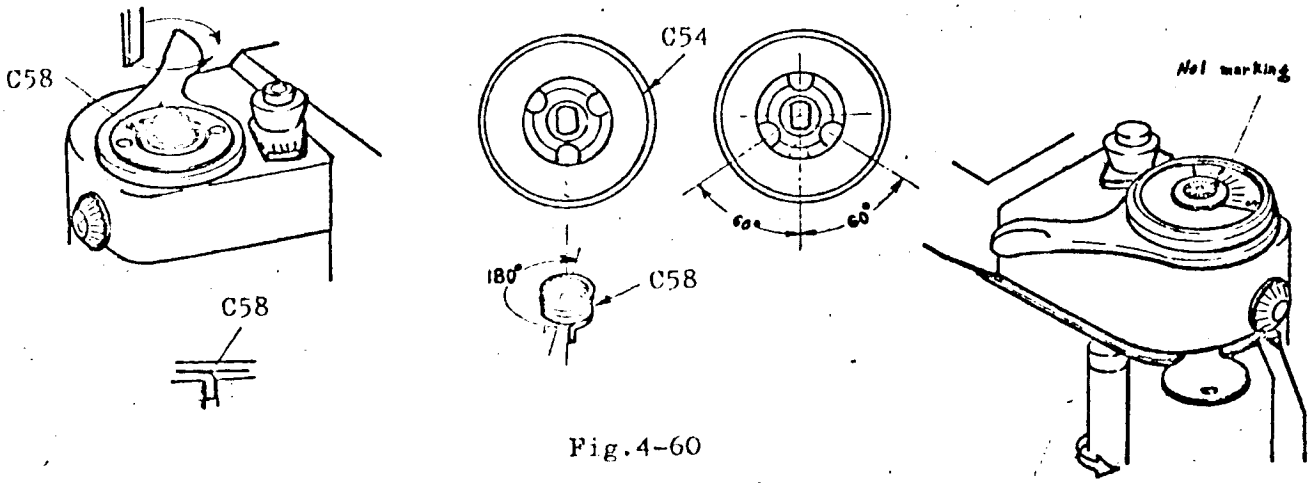


Fig.4-60

Standard tension angle of the spring(C58) is 180 degrees. For fine adjustment, decide the installing direction of the housing(C54).

If 60 degrees more tension or less tension is required, turn the housing around 180 degrees, refer to Fig. 4-60.

The tension angle must be less than "180+60 "degrees. Otherwise, the spring will be damaged.

C Exposure counter dial covering(C50)

Dial covering(C50)must be fixed when the counter dial stops at No. 1 marking, as follows.

Release the shutter and open the back cover. Place a coin plate (mentioned elsewhere) into the position, and turn the counter roller forward until the exposure dial stops. (Absolutely avoid to turn it backward or to keep turning after the dial has stopped.) Then, fix the covering(C50), coinciding the index with No. 1 marking of the dial. Refer to Fig. 4-60.

4-4-23 MECHANICAL BACK ADJUSTMENT

Mechanical back must be: 84.95 ± 0.04 mm

Use W5(t=0.03, 0.05, 0.07, 0.1, 0.2) for adjustment, with G1. Check, at 4 points as shown in Fig. 4-61.

When removing or installing Bayonet seat(B02), pull F. coupler ring(B06) and hold it with your finger as shown. Bayonet seat must be installed to the place where the F. coupler ring turns smoothly.

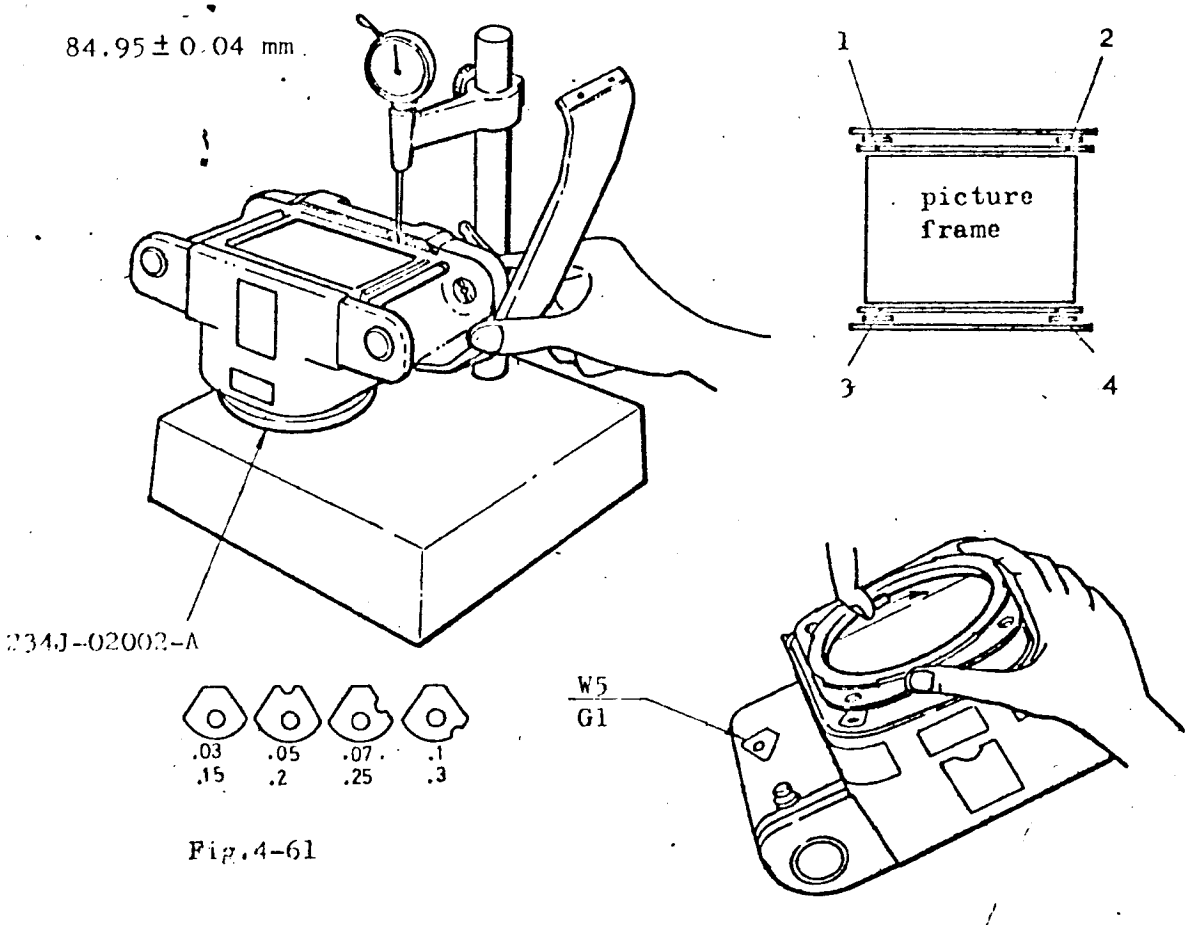
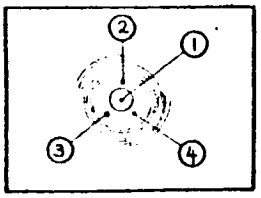


Fig. 4-61

4-4-24 GROUND GLASS ADJUSTMENT

Use a collimator or select objects further than 2 Km(standard lens f=105mm) for focusing. Check at 4 points shown in Fig. 4-62, with a magnifier (x10). At which time, be careful not to press the magnifier, as it might affect the accuracy of the adjustment.

For adjustment, turn the 3 adjusting screws(CNS1.7x4). Apply Pliobond on each screw for locking.



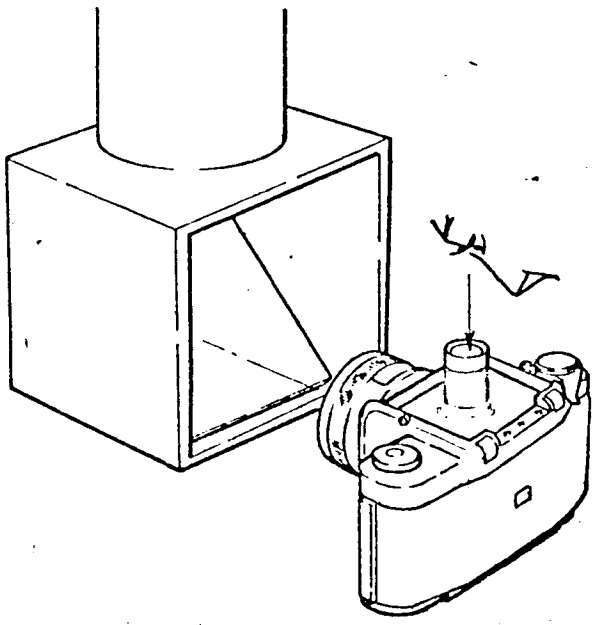


Fig. 4-62

4-4-25 MIRROR ANGLE ADJUSTMENT

The angle of the mirror is determined by setting Damper setting screw(D148) in mirror actuator arm side.

The setting screw on the other side must be adjusted so that 0.3 mm clearance is observed when the mirror sheet is in its returned position. After the adjustment, apply Aro. on Lock nut(B 83).

Reference

ARONTITE

Arontite is a kind of adhesive which starts to solidify when the air is shut off from its surface. (anaerobic adhesive) It has so strong permeation ability that it can reach the screw thread even if applied on the screw already fixed.

When applying it on the screw thread beforehand, use a small amount, enough to cover 1~2 threads, to the top portion.

About 1 hour is needed for getting effectiveness of locking. There is no solvent for solidified Arontite, but it softens under the temperature of 250° C.

COIN PLATE

The shutter can not be cocked, if the back cover is opened, since the Pentax 6x7 is fitted with an auto-loading system. By placing the coin plate into the position, the film transport and exposure counter system, and auto-loading system are brought to a condition "back cover closed".

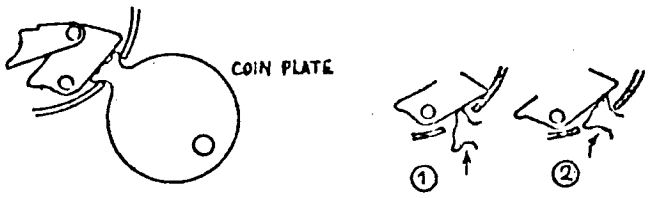
For operating the shutter:

1 Open the back cover and release the shutter if it is cocked.
2 Push in the exposure dial handle and turn it clockwise further than No. 1 marking (No. 1 ~ 9marking), and hold it.
3 Place a coin plate into the position shown.
4 Turn the lever for cocking the shutter.
5 Remove the coin plate and close the back cover.

Now, you can operate the shutter, however, its exposure counter does not advance.

Notice:

1 Do not turn the counter roller when the shutter is either fully or half-way cocked. Only when performing the operation check, you can turn the counter roller under the proper steps, as explained in 4-4-17.
2 After placing the coin plate into the position, absolutely avoid to turn the roller backward.



ELECTRO LUBE.

A kind of protection liquid for electrical contact points, which prevents contacts from rusting and being damaged by sparks.

No sparks will be observed when contact opens cutting current, if the Electro lube. is used. Thin layer on the contact points is enough for protection. Excess amount of the liquid will attract dust.

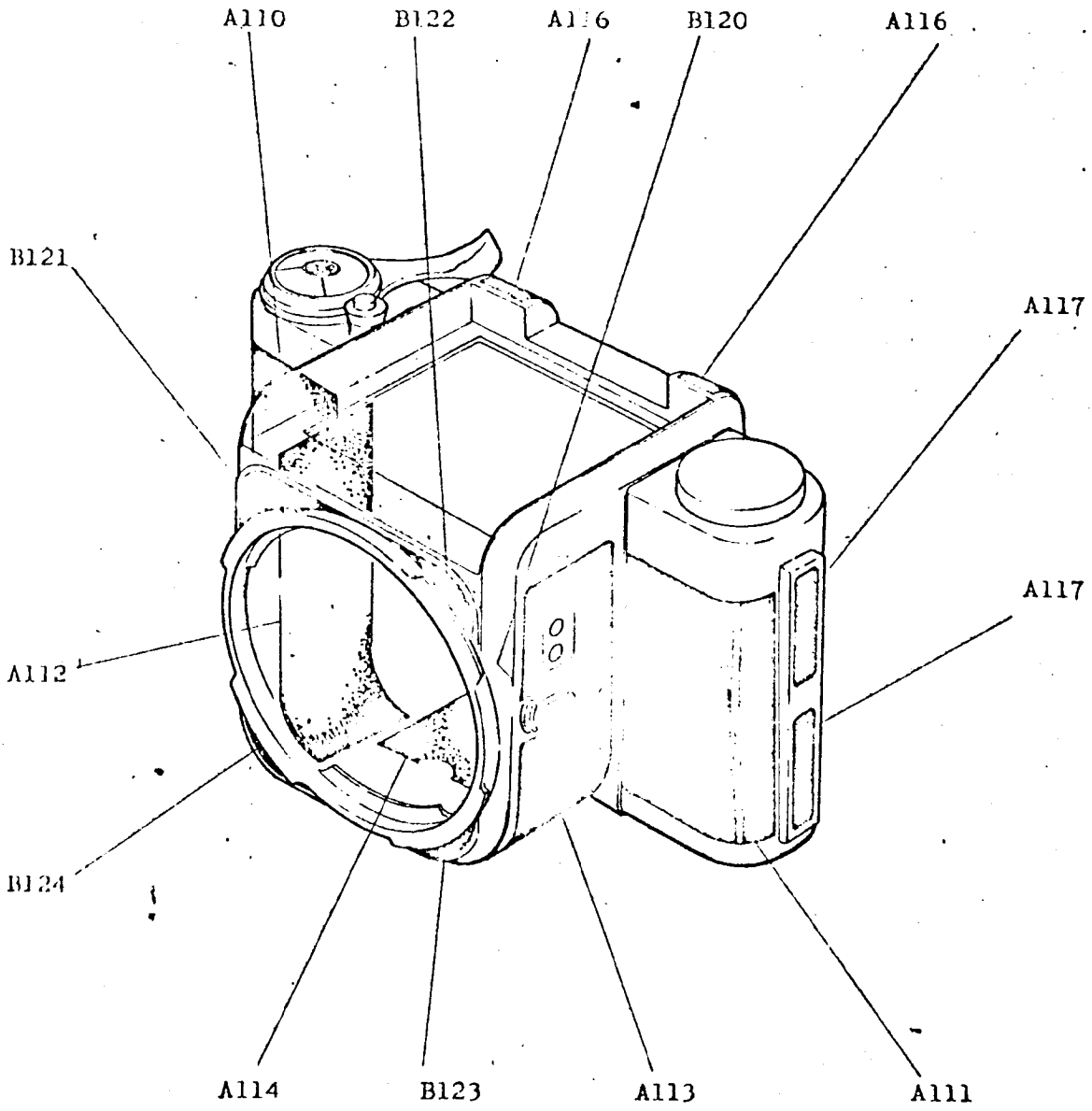
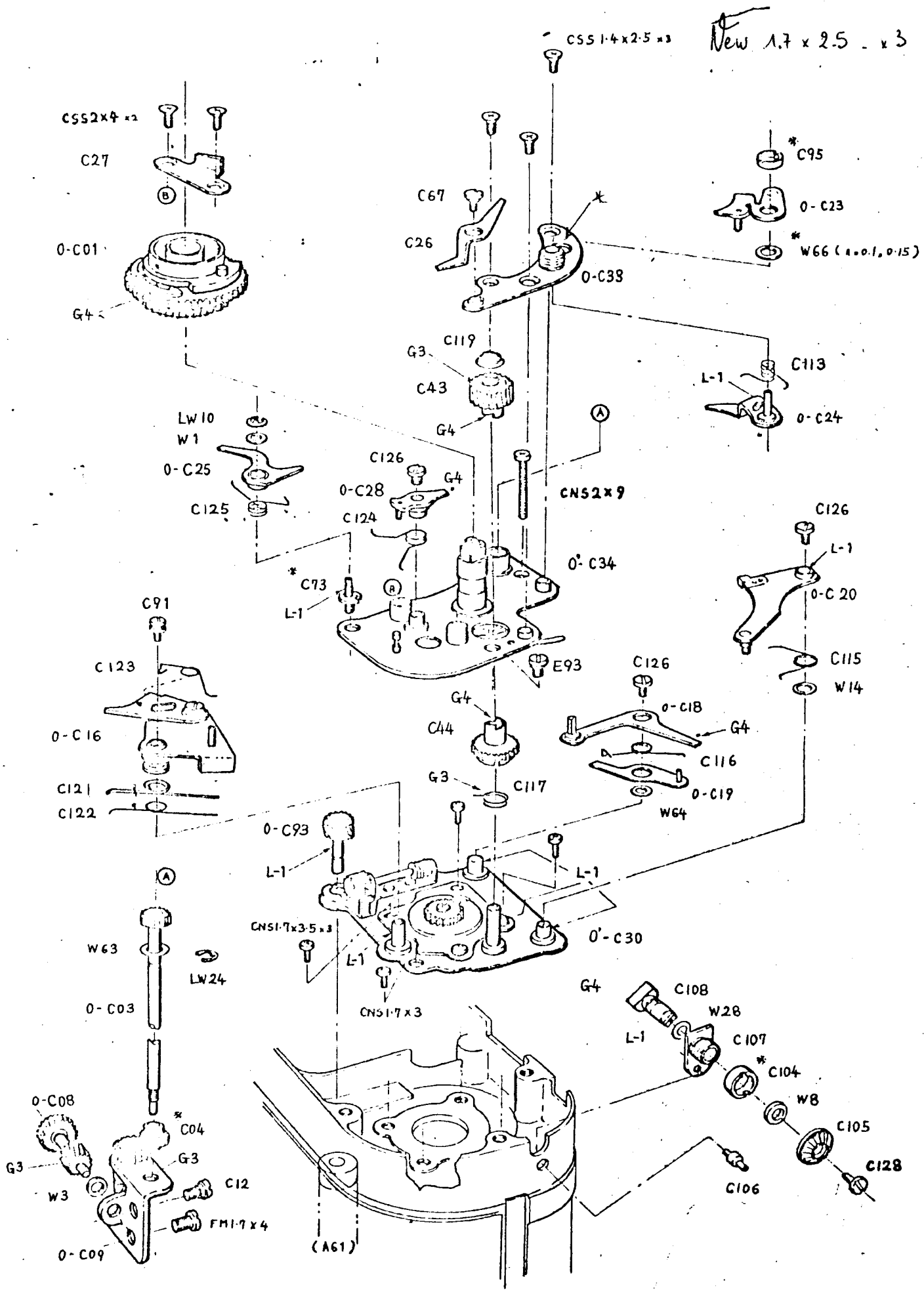


Fig.4-100 COVERINGS

Fig.4-104 TRANSPORT & EXPOSURE COUNTER MECHANISM



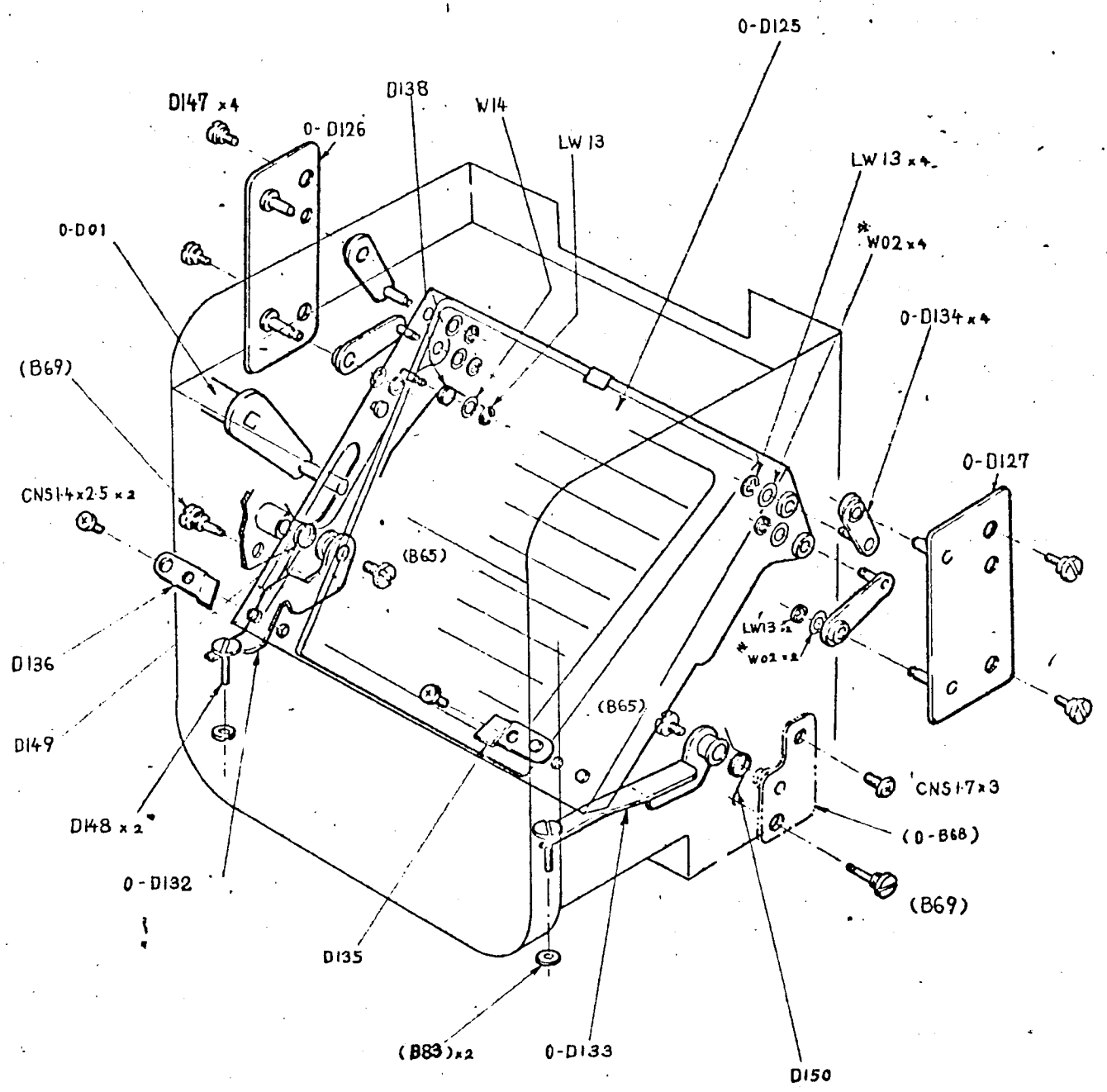
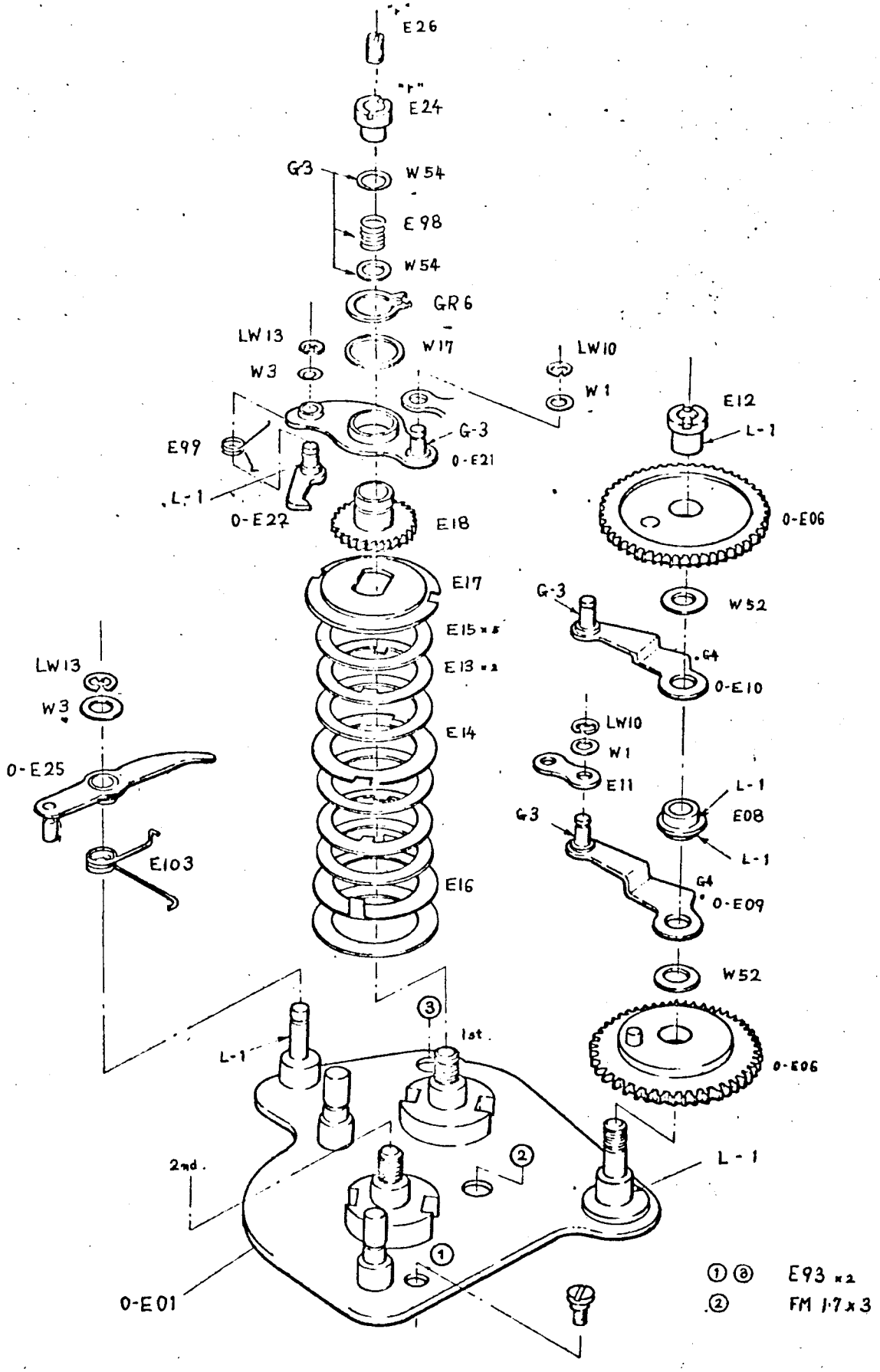
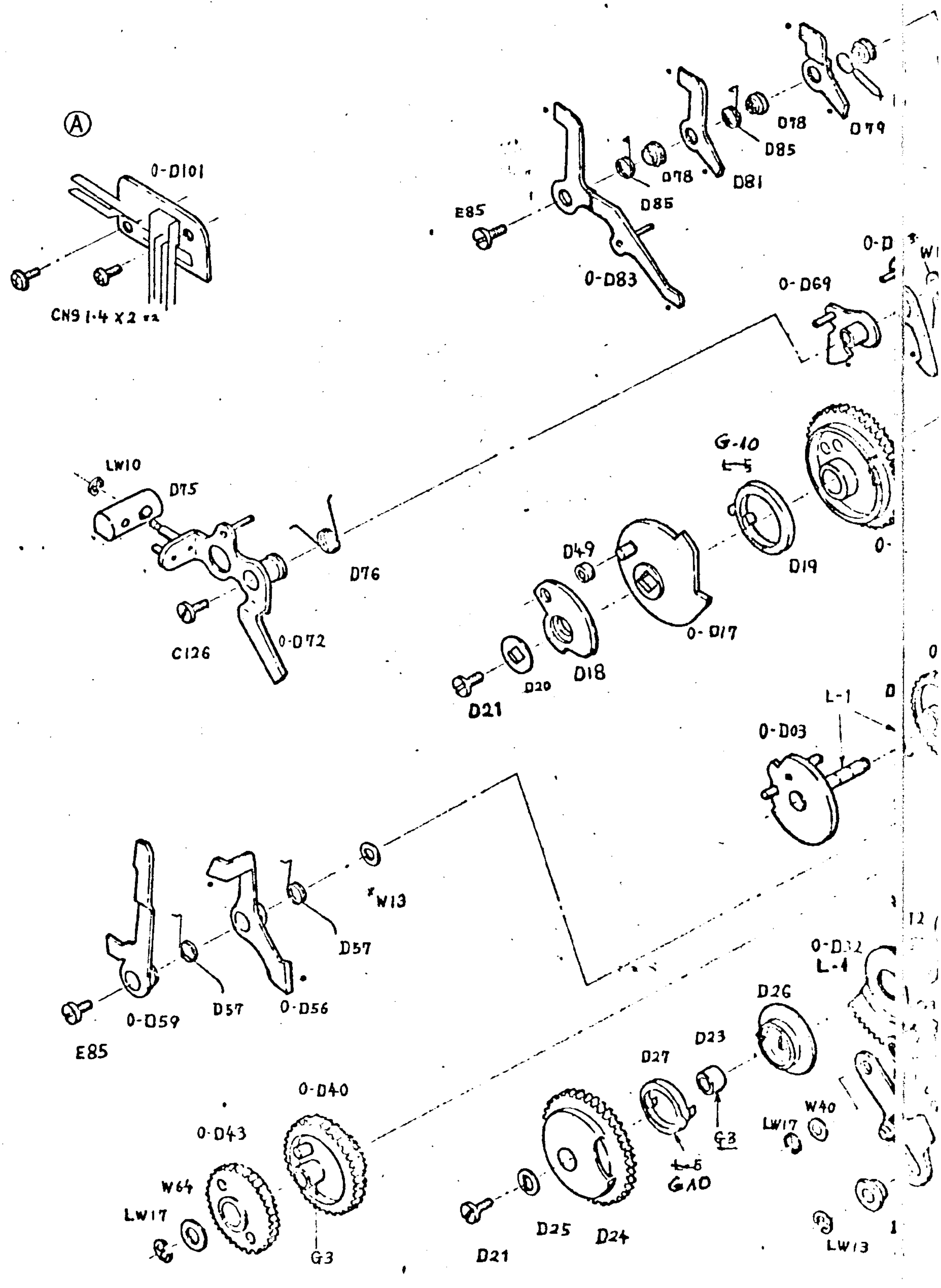


Fig.4-105 MIRROR SHEET

Fig.4-107 BOUNCE PREVENTION SYSTEM





A
0-D101
CN9 1-4 X 2
E85
0-D83
D86
D78
D81
D85
D78
D79
0-D69
LW10
D75
D76
C126
0-D72
G-10
D19
D49
0-D17
D18
D20
D21
L-1
0-D03
W13
D57
D57
0-D56
0-D59
E85
0-D32
L-4
D26
D23
D27
G3
G10
W40
LW17
0-D40
0-D43
W64
LW17
G3
D21
D25
D24
LW13

• OILING , G4

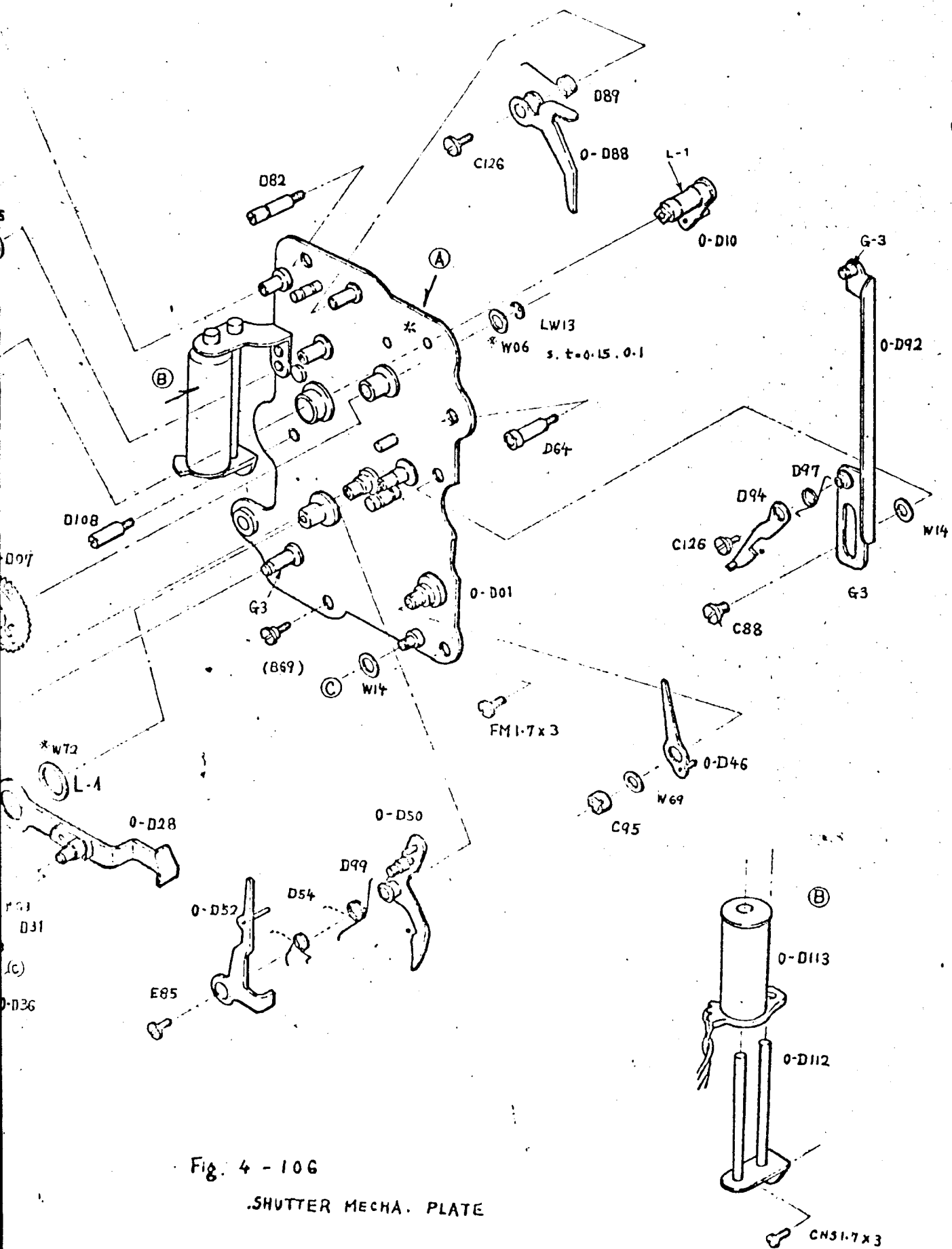


Fig. 4 - 106

.SHUTTER MECHA. PLATE

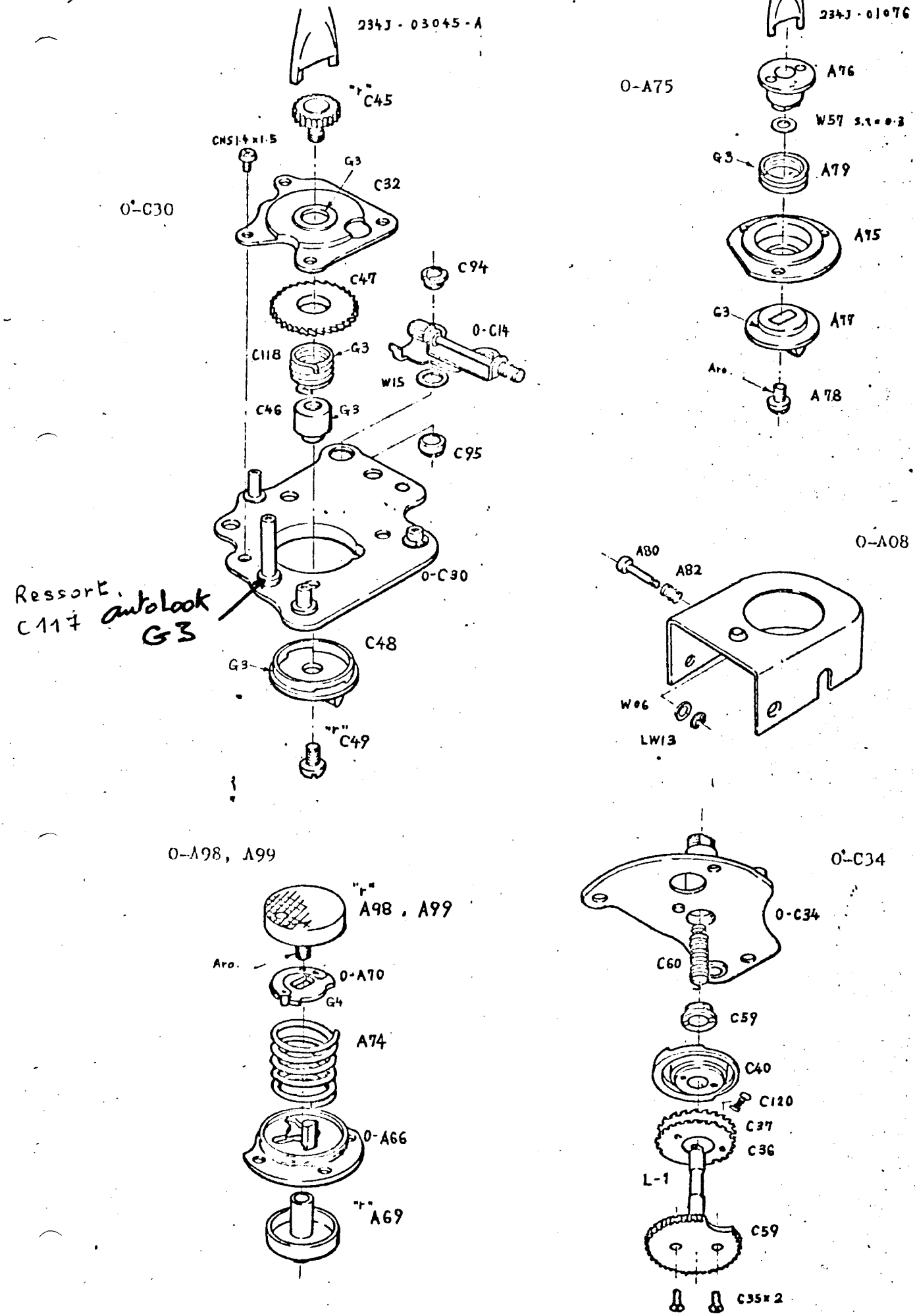


Fig.4-110 ASSEMBLED PARTS

Fig. 4-112 Schematic Diagram -