Mamiya

REPAIR MANUAL

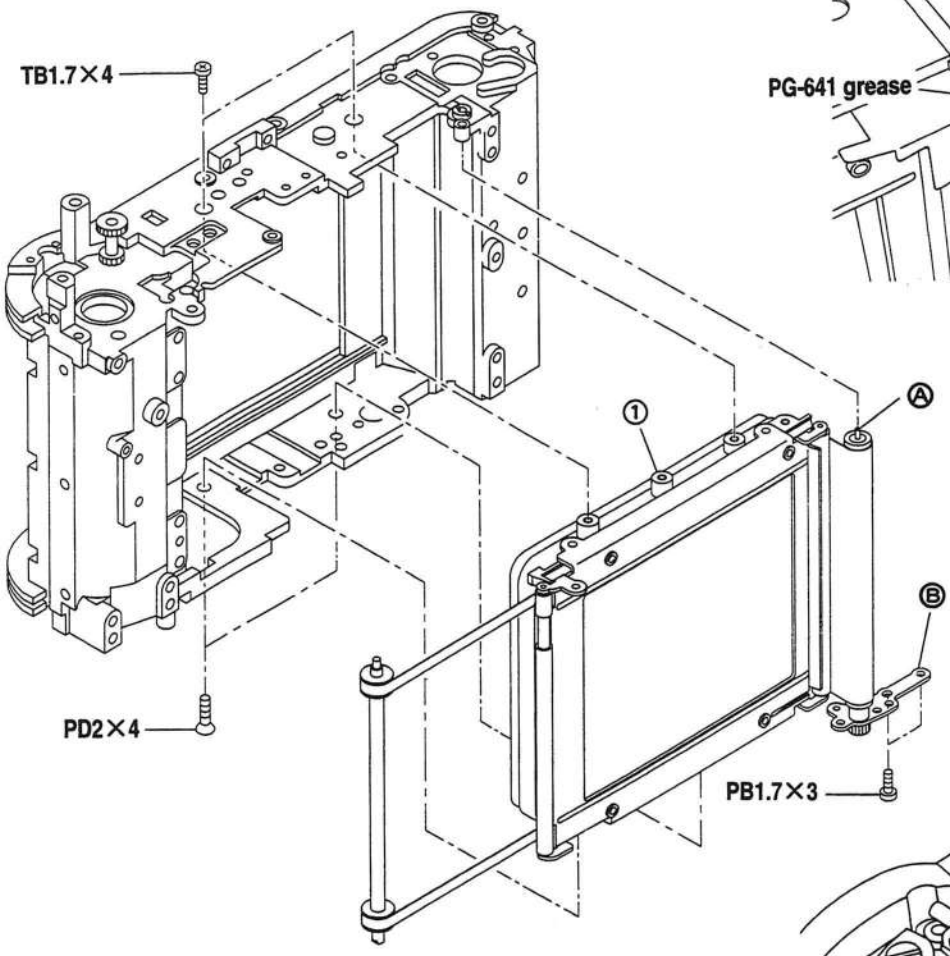
Mamiya 7

Catalog No. 20101157

Dis/Reassembly

Adjustment

1 | Installation of the Light Shield curtain frame unit | 1/1 | 1



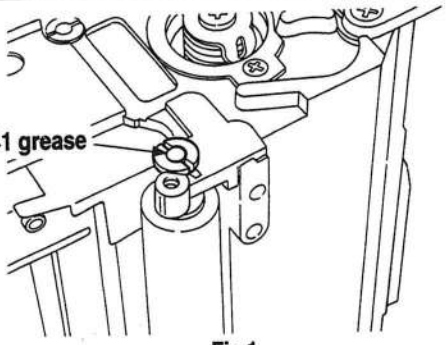


Fig.1

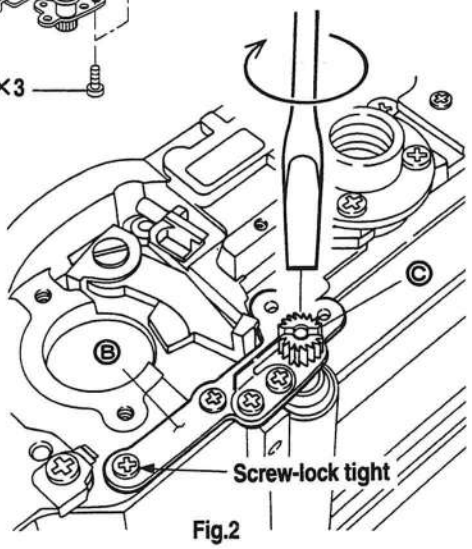


Fig.2

1. Apply the PG-641 grease to the Ⓐ shaft and install the ① curtain frame unit and the Ⓐ curtain shaft into the camera body. (Fig.-1)

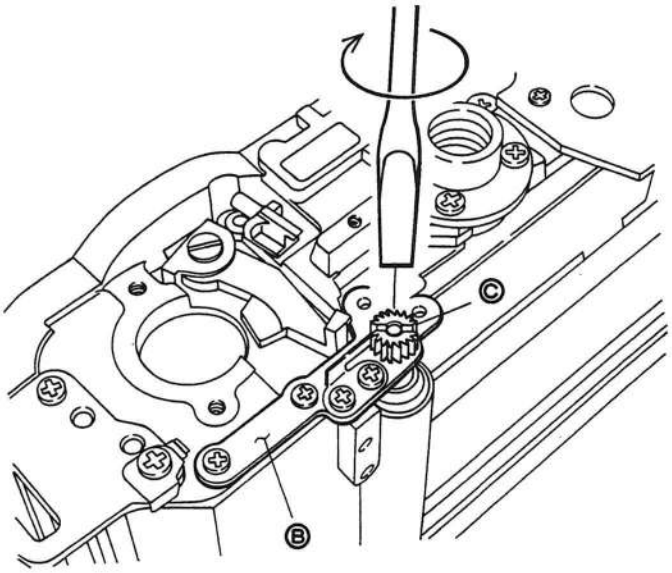
2. First hold the ① curtain frame unit towards the camera body back and fix the curtain frame unit with two TB 1.7 × 4 and two PD 2 × 4 screws from the body top and bottom respectively.

3. Fix the Ⓑ G-base plate of the ① curtain unit frame on the camera body bottom with two PB 1.7 × 3 screws.
Note : Before tightening apply screw-lock tight to the screws. (Fig.-2)

4. Rotate the Ⓒ curtain shaft gear clockwise five turns with a screwdriver (Fig.-2)

2 Charge of the light shield curtain spring 1/1 2

1. Rotate the Ⓒ gear on the Ⓑ G-base plate further two turns.
Note : The stopper Ⓓ must engage between the teeth of the gear. (Fig.-3)



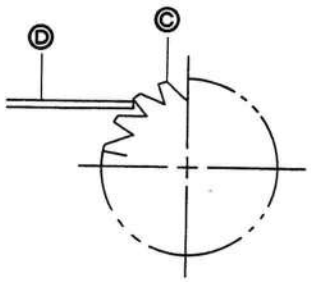


Fig.3

1 Attachment of the light shield curtain closing lever and check and adjustment of the curtain 1/2 3

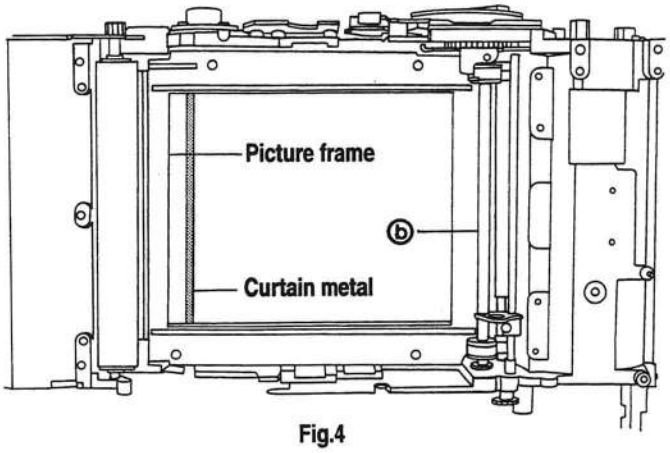
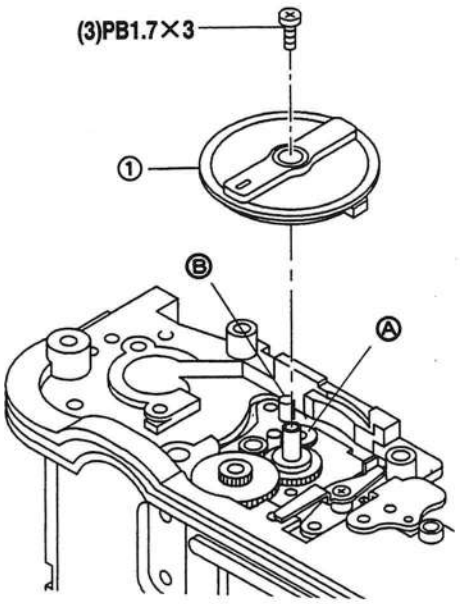


Fig.4



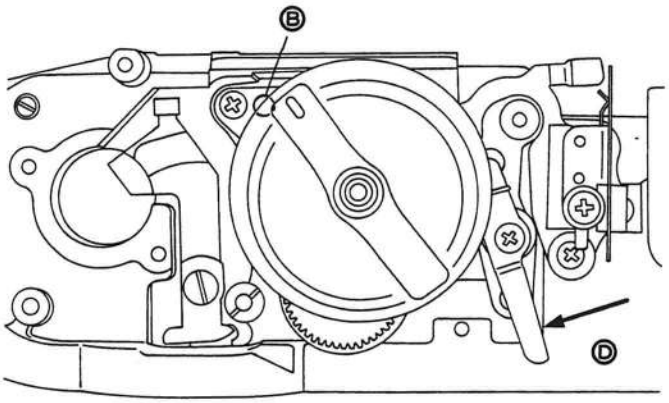
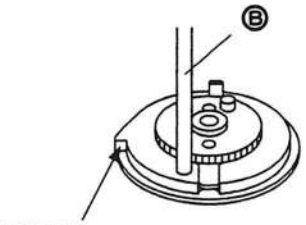


Fig.5



PG-641 grease

1. Apply the PG-641 grease to the pole on the Body bottom for the ① curtain lever disk and the protrusion on reverse side of the ① curtain lever disk as shown in the arrow.

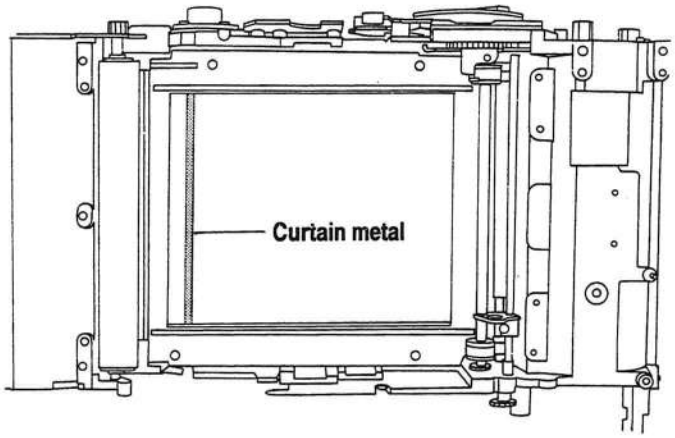
2. Rotate the Ⓐ gear counterclockwise with a screwdriver until the curtain metal disappears just out of the picture frame. And then hold the ⓑ curtain shaft not to run the curtain. (Fig.-4)

   ⚠ **Caution : The curtain metal must not appear in the picture frame.**

3. Set the ① disk of the curtain closing lever to its pole while pushing the Ⓓ lock lever in direction of the arrow.

   Note : The Ⓑ Release bar must be located as shown in the Fig -5.

4. Temporarily tighten the (3) PB 1.7 × 3 screw for the ① disk.



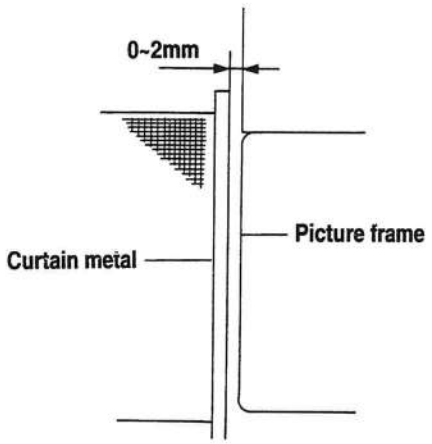


Fig.6

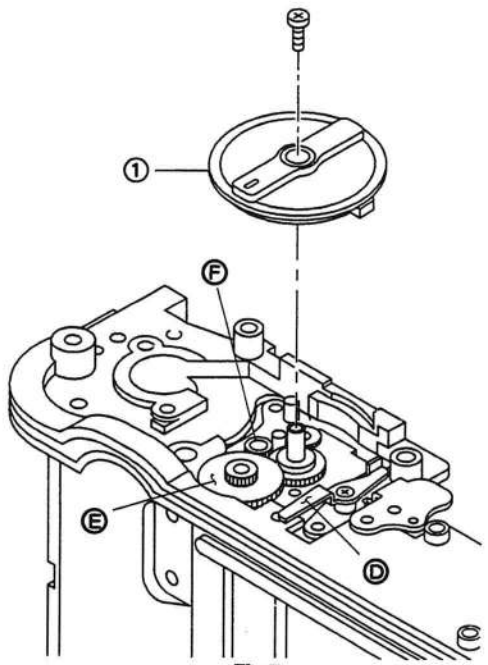


Fig.7

5. Position of the curtain metal :
   1) When the light shield curtain is opened;
   The curtain metal must be located within 2mm recess from the edge of the picture frame. (Fig.-6)
   2) Adjustment :
   Adjustment is made by changing engagement of the Ⓔ gear with the Ⓕ gear after removing the ① curtain closing lever disk. (Fig.-7)

⚠ Caution : ●The curtain metal must not appear inside of the picture frame.
●The curtain metal must be vertical against the picture frame line

6. Check :
   1) Smooth rotation of the ① curtain disk
   2) The ① is certainly locked with Ⓓ lever and the curtain will close smoothly when the Ⓓ lever is unlocked.

2 Setting of the wire

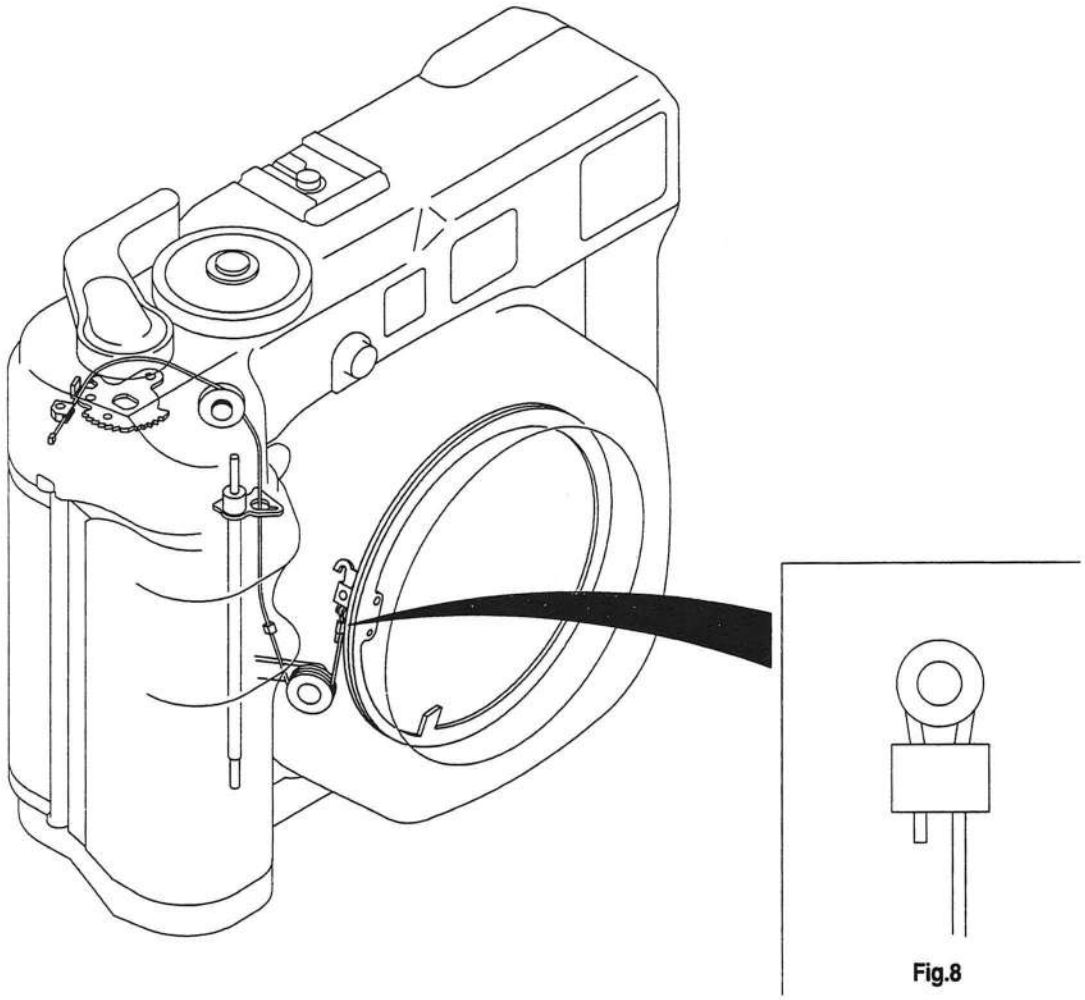
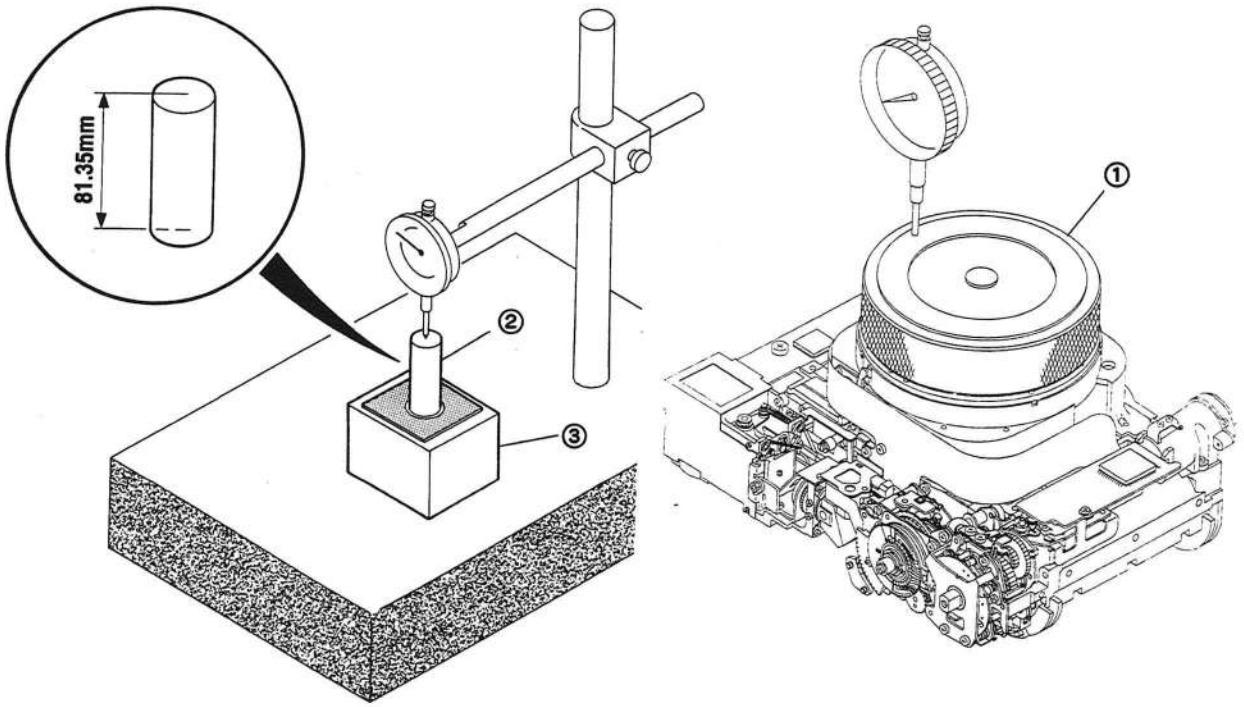
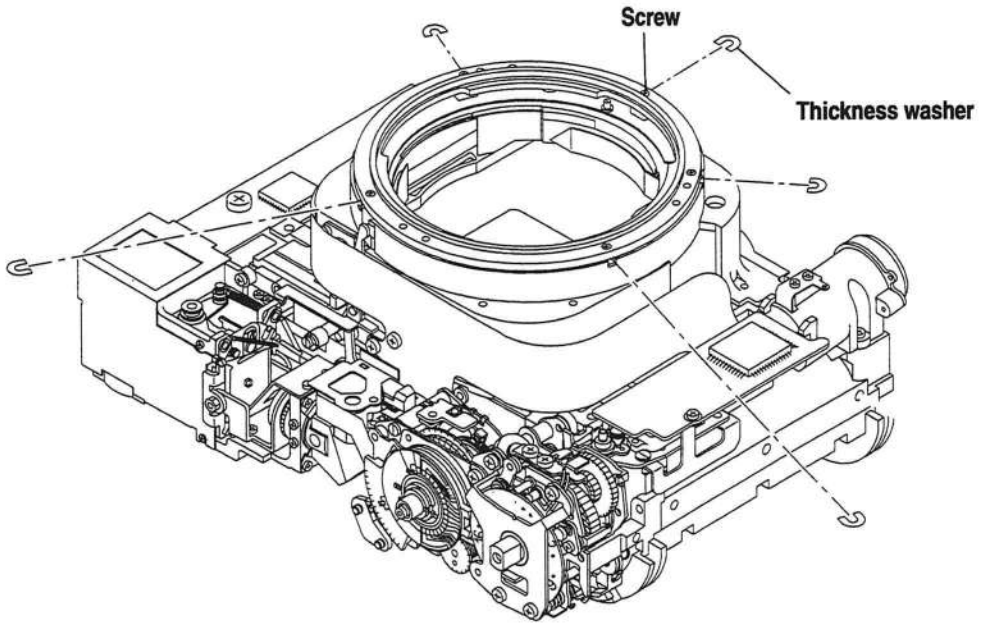


Fig.8

The wire must be set as shown in the Fig.-8.



1. Zero adjustment on the dial Gauge :
   1) Put the ② standard block gauge on the ③ camera body supporter and set the dial gauge to point zero and remove the block gauge.
   2) Mount the ① Mount flatness gauge into the Bayonet mount of the camera body and place the camera body on the ③ camera body supporter.

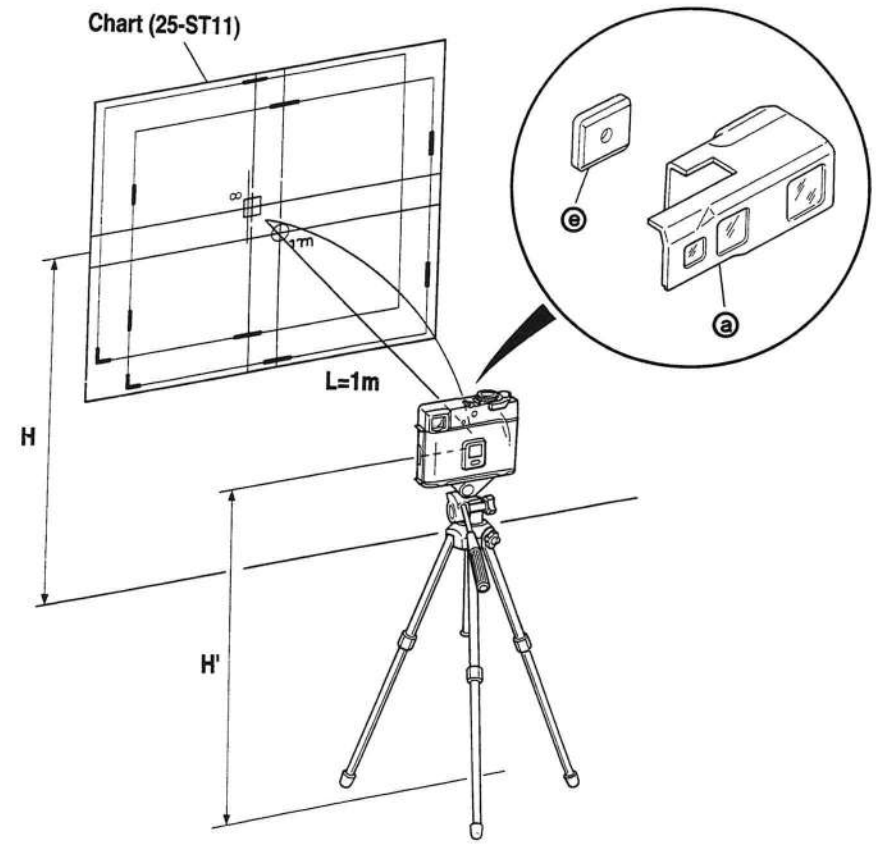


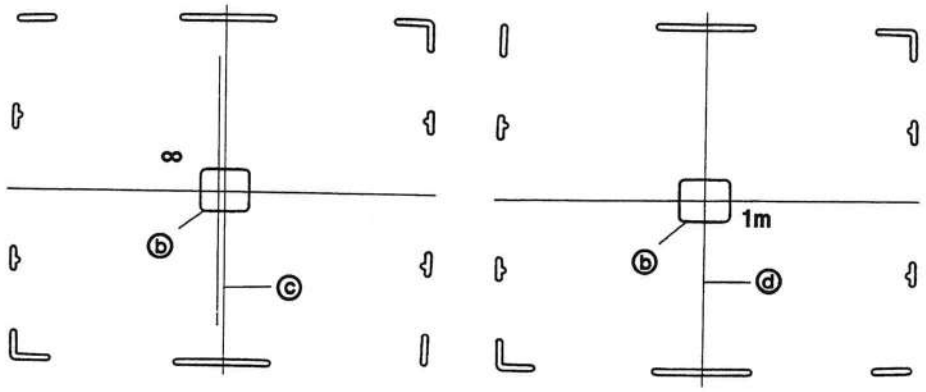
2. Measurement of Bayonet surface :
   Measure five points on the flatness gauge.

   * Flange back : 57.35mm $^{+0}_{-0.04}$

   Note : Zero point on the flatness gauge means the correct flange back 57.35mm.

3. Adjustment
   Adjustment is made by changing a different kind of thickness Washer (t0.02 ~ 0.1) after loosening fixing screws of the Bayonet mount.
   Note : Each point is within the tolerance.





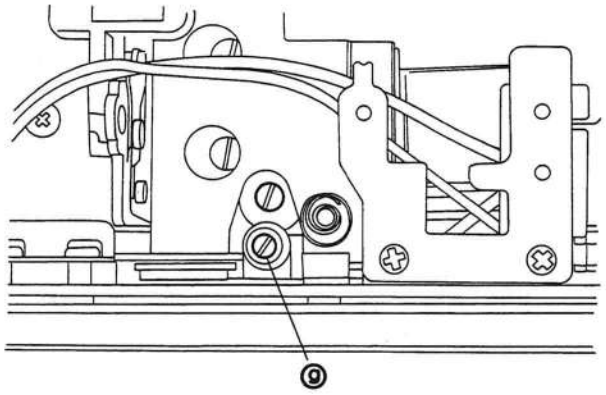
A. Position of chart and camera

1. Put the ⓐ dummy cover on the camera with a 80mm F4 L lens.

2. Position the camera and chart exactly as shown in the figure.
   * H' = H
   * Distance between the image plane on the camera and the center point of the chart : 1m

3. Set the focusing ring on the lens to ∞ position. Coincide the Ⓒ infinity crisscross of the chart with center of the ⓑ Double-image rangefinder zone by moving the camera position.

4. Set the focusing ring on the lens to 1m and coincide the ⓓ 1m crisscross of the chart with center of the ⓑ Double-image rangefinder zone as same as the step #3.



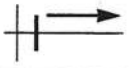
B. Check and adjustment of Rangefinder ∞

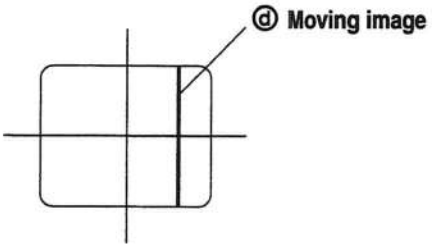
1. Check

1) Attach the ⓔ eyepiece cap (Tool No. Y11-008) on the dummy cover.

Note : Be sure to put the dummy cover and eyepiece cap on the camera when checking and adjusting the rangefinder in order to carry out accurate work.

2) Look at the chart through the rangefinder by slowly rotate the lens focusing ring to ∞ position. Be sure that the vertical line of the ⓓ 1m crisscross (Moving image) coincides with the red line (stationary image) on the chart.

Adjusting screw ⓖ	ⓓ 1m crisscross (Moving image)
	

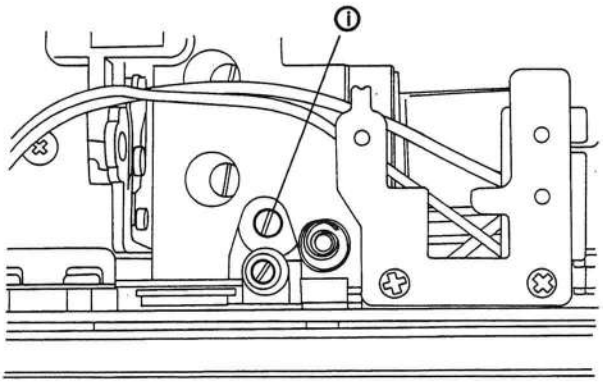


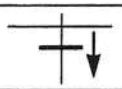
2. Adjustment

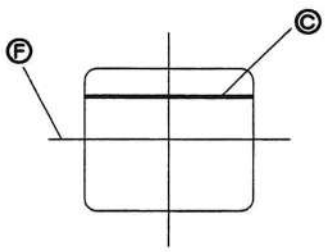
1) Adjustment is made by turning the ⓖ adjusting screw if the lines do not coincide.

⚠ Caution : The ⓖ adjusting screw is tightened with screw-lock tight. So drip one or two drops of solvent (alcohol, ether or thinner) around the screw before turning it.

2) After adjustment carefully rotate the lens focusing ring from 1m side to ∞ side. Check that center of the ∞ mark is in alignment with index mark when the ⓓ 1m crisscross coincides with the red line of the stationary image. If not, adjust again.



Adjusting screw ⓘ	ⓒline
	
	



C. Check and adjustment of Rangefinder horizontal line

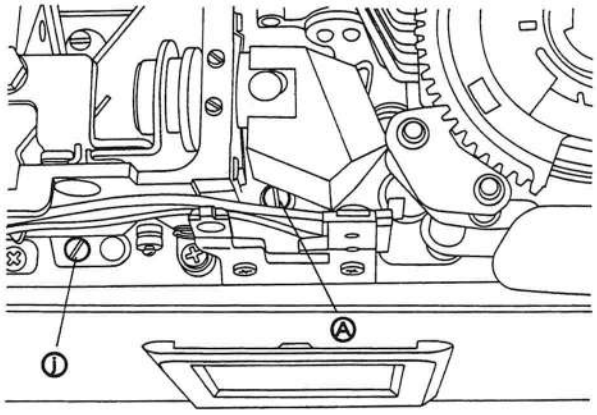
1. Check
   When the lens focusing ring set at the ∞ position, the Ⓒ horizontal line (Moving image) must coincide with the Ⓕ stationary line.

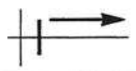
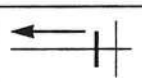
2. Adjustment
   1) Adjustment is made by turning the ⓘ adjusting screw if the two lines do not converge.

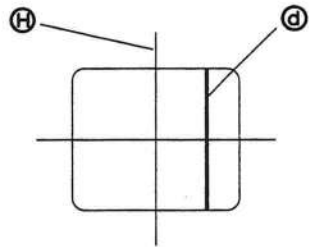
      ⚠ **Caution : Be careful not to turn the adjusting screw too much, otherwise the Ⓒ line will move in opposite direction.**

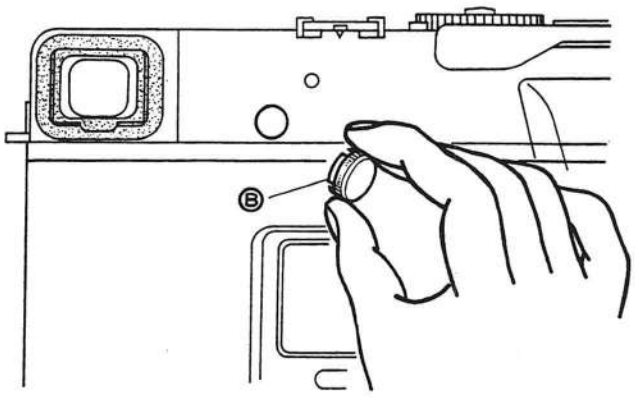
   2) After adjustment, set the lens focusing ring to ∞ position by slowly rotating from 1m side.
      The vertical line of the ⓓ 1m crisscross (Moving image) and the horizontal of the ⓒ crisscross (Moving image) must coincide with the red line and the horizontal line of the ∞ crisscross (stationary image) respectively.

   3) If the lines did not coincide, adjust again.



Adjusting screw ⓖ	ⓓ 1m crisscross (Moving image)
	
	





D. Check and adjustment of rangefinder at 1m

1. Check
When the lens focusing ring is set to 1m position, the both vertical lines of the 1m crisscross for Moving image Ⓓ and Stationary image Ⓗ must coincide.

2. Adjustment
1) Adjustment is made by turning the adjusting screw ⓘ after loosening the lock screw Ⓐ.

⚠ Caution : Always keep in mind to turn the adjusting screw slightly, otherwise the line will move in opposite direction.

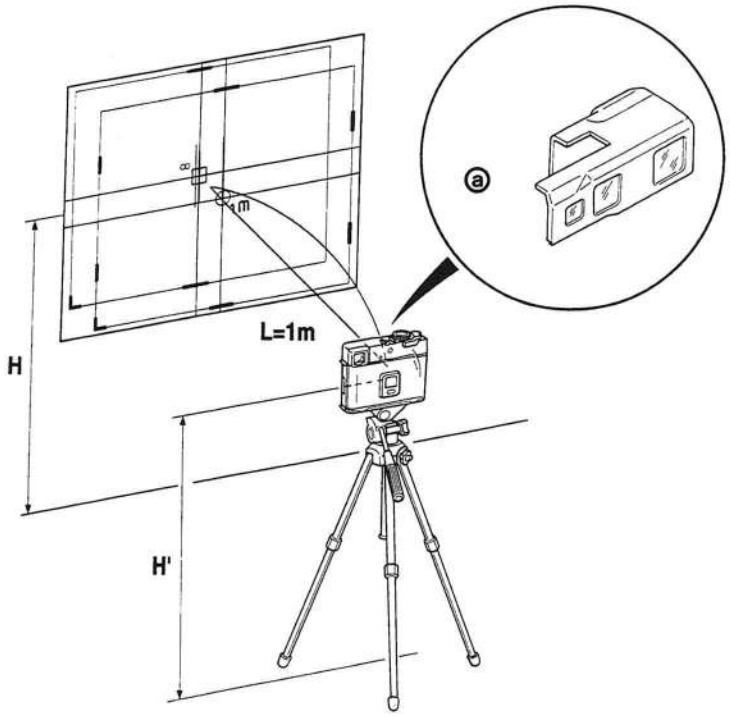
2) After adjustment slowly rotate the lens focusing ring from ∞ side. When the 1m crisscross of moving image coincides with the 1m crisscross of stationary image, the lens focusing scale must indicate 1m distance.

3) Next, set the lens focusing ring to ∞ position. Check that the vertical line of the ⓓ 1m crisscross (Moving image) coincides with the red line (stationary image).

4) After completion of the adjustment apply a couple of drips of screw-lock tight around the adjusting screws ⓖ, ⓘ and the Ⓐ lock screw.

5) In case of requiring a fine adjustment for the image convergence at the ∞ position :
a) Learn deviation between the moving image and the stationary image at the ∞ position.
b) Set the lens focusing ring to 1m distance and make the same extent of the deviation as shown in the ∞ position by turning the 1m adjusting screw ⓘ.
c) Repeat the step B.C.D.

6) Final checking :
After assembling the top cover, check again focusing range.
If further adjustment is necessary at the ∞, remove the Ⓑ cap and make a fine adjustment by turning the ⓖ and ⓘ adjusting screws.



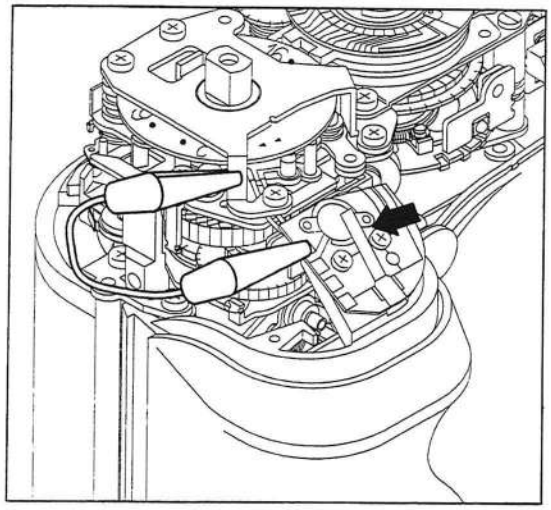
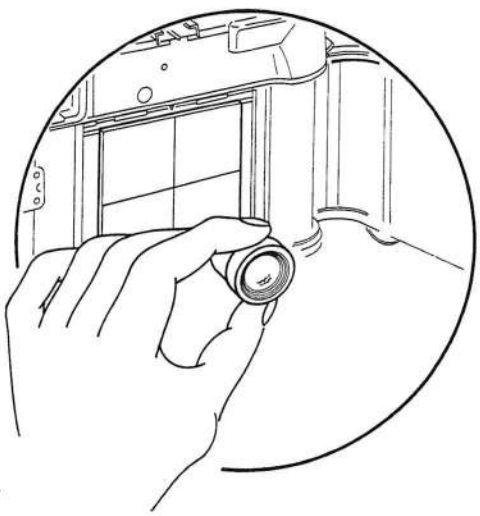


Fig.9



A. Position of chart and camera

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2. Position the camera and chart exactly as shown in the figure.
   * H' = H
   * Distance between the image plane on the camera and the center point of the chart : 1m

3. Open the shutter at Bulb position :
   1) Set the shutter dial at Bulb position.
   2) Wind the film advance lever.
   3) Provide a clip cord and ground the brown cord terminal by using the clip cord (Fig. -9).
   4) Press the shutter release contact to open the shutter by your index finger. Now the shutter will open.
   5) Put the focusing glass (Ground glass) on the film railway and look the chart through the focusing glass with a magnifier 10x.
   6) Adjust the camera position as coinciding the crisscross on the focusing glass with the 1m crisscross of the chart.

⚠ Caution : Check the 1m distance between the chart and camera again.

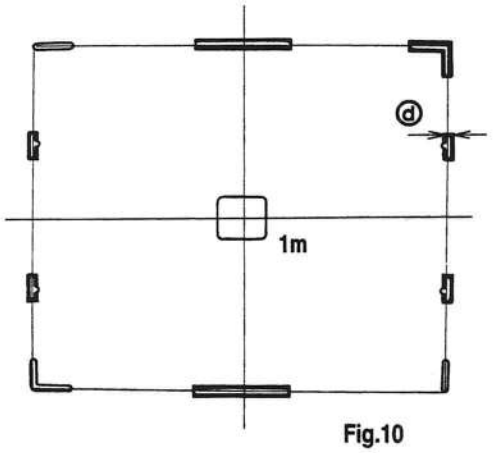


Fig.10

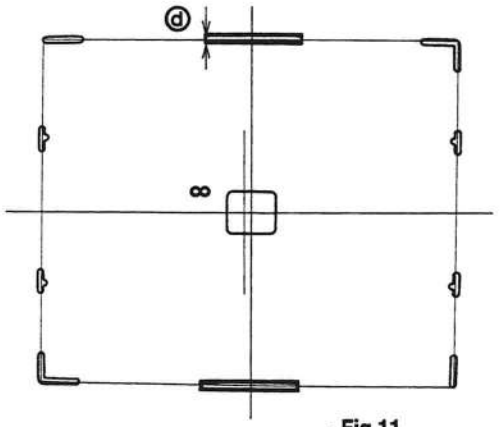


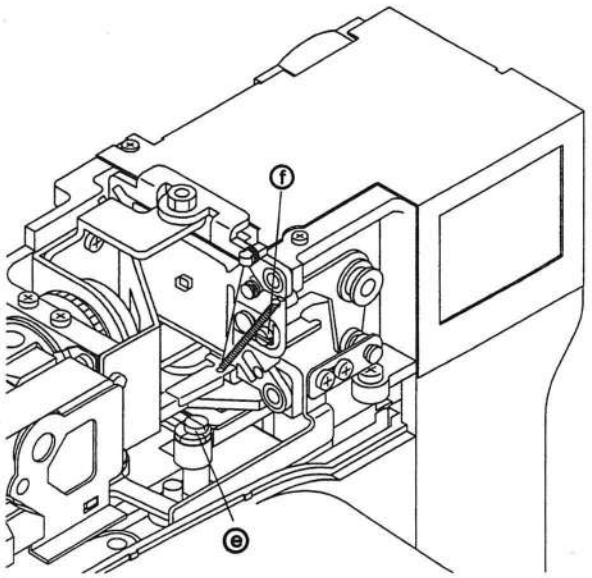
Fig.11

B. Check and adjustment for Parallax

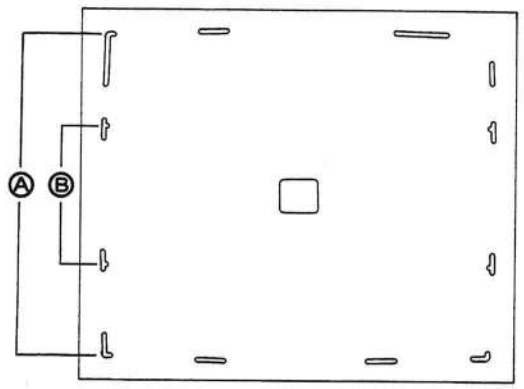
1. Check
   1) When the lens focusing ring is set at 1m position, the bright field of view frame in the viewfinder must touch each frame line ⓓ of the 1m actual field of view frame on the chart. (Fig. -10)

   2) When the lens focusing ring is set at ∞ position, the bright field of view frame must touch the ∞ actual field of view frame on the chart at the top and bottom frame lines ⓓ. (Fig. -11)

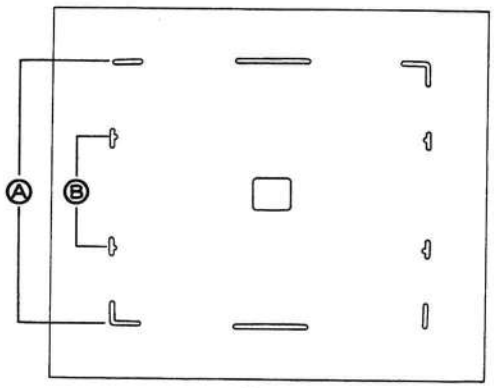
2. Adjustment :
   Adjustment of the parallax will be made by turning the adjusting screw ⓔ and ⓕ.



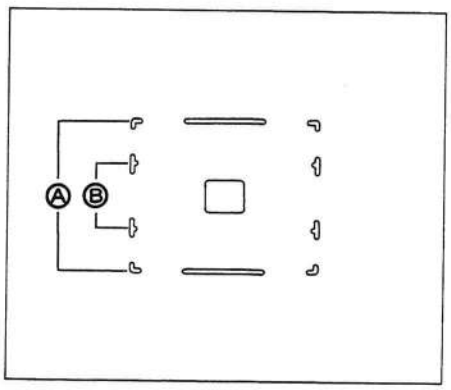
6 Check and adjustment of Bright frame 1/1 14



65mm



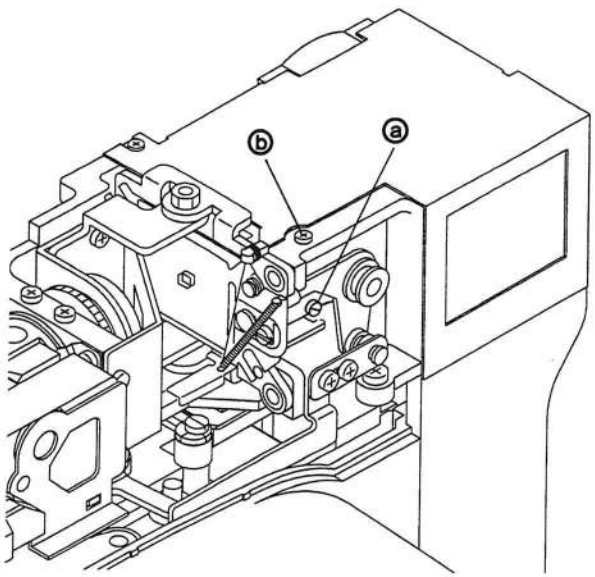
80mm



150mm

1. Check
   The appropriate bright frame area must be automatically indexed upon lens interchange for 65mm, 80mm or 150mm.

   ⚠ Caution : Ⓐ : 6x7 format
   Ⓑ : 135 Panoramic format



2. Adjustment
   1) Adjustment is made by turning the ⓐ adjusting screw.

   2) Mount the 150mm F4.5 L lens to the camera body. Carefully tighten the ⓑ mask lever stopping screw until the bright frame lines wane slightly once and slowly loosen the ⓑ screw until the bright frame lines are completely visible. Loosen the ⓑ screw an additional 1/4 turn.

   3) Apply a couple of drips of a screw-lock tight around the ⓐ and ⓑ screws.

7 Check and Adjustment of shutter release magnet 1/1 15

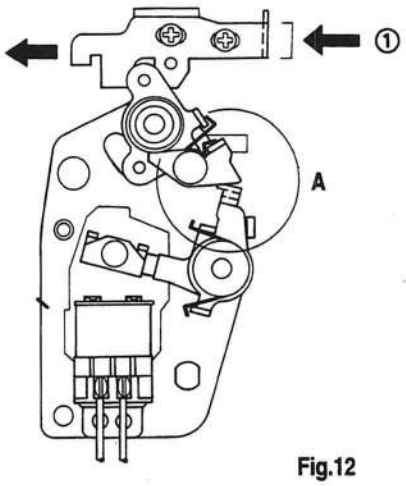


Fig.12

1. Check
   1) Release the SR-magnet by pushing the ① lever in the arrow direction.
   Note : See the Ⓐ part in a circle. (Fig. -12)

   2) Slowly wind the ② film advance lever until the Ⓑ inside face of the advance lever comes into the Ⓒ limit as shown in Fig.-13.
   In this condition the ③ hook must engage with the ④ lever.

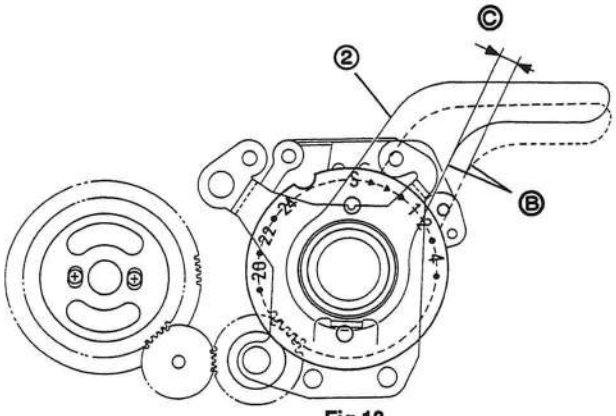
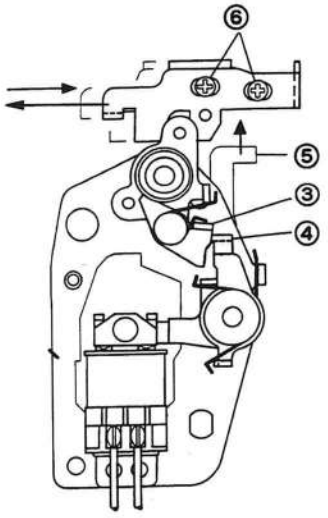


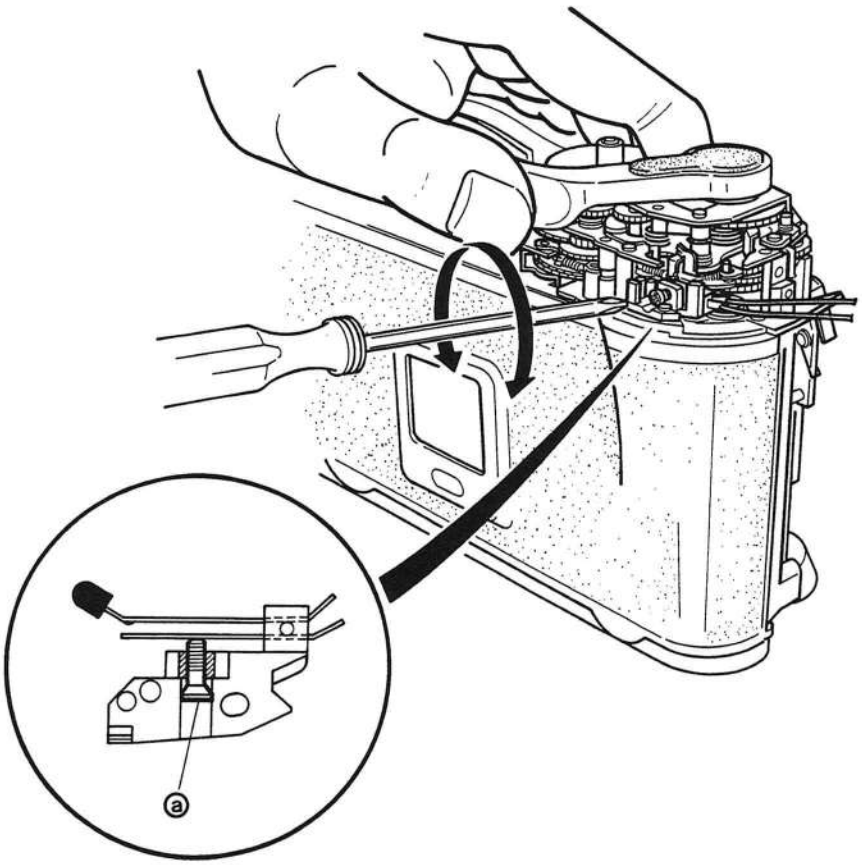
Fig.13

   3) Slowly wind the film advance lever again and when the ⑤ lever moves up slightly, immediately stop winding of the advance lever. When you detach your fingers from the film advance lever, the film advance lever must remain the same position without returning.



2. Adjustment
   1) If the film advance lever returns from the above position, loosen the ⑥ two screws and slightly move the ① lever to left or right side and tighten the two screws.
   2) Repeat the checking steps #1), #2) and #3).
   3) After completion of the adjustment tighten the ⑥ two screws firmly and apply screw-lock tight to the screws.

8 Check and adjustment of dividing device disk switch 1/1 16



1. Check
   1) Load a film and close the back cover. When the shutter release button is depressed without winding the film advance lever, the shutter must not be released.
   2) The shutter also must not be released when the film advance lever is on its way.
   3) Wind the film advance lever until "1" appears in the exposure counter window and depress the shutter release button. At this time the shutter must run.
   4) When the shutter release button is depressed after opening the back cover and winding the film winding lever, the shutter must be released.

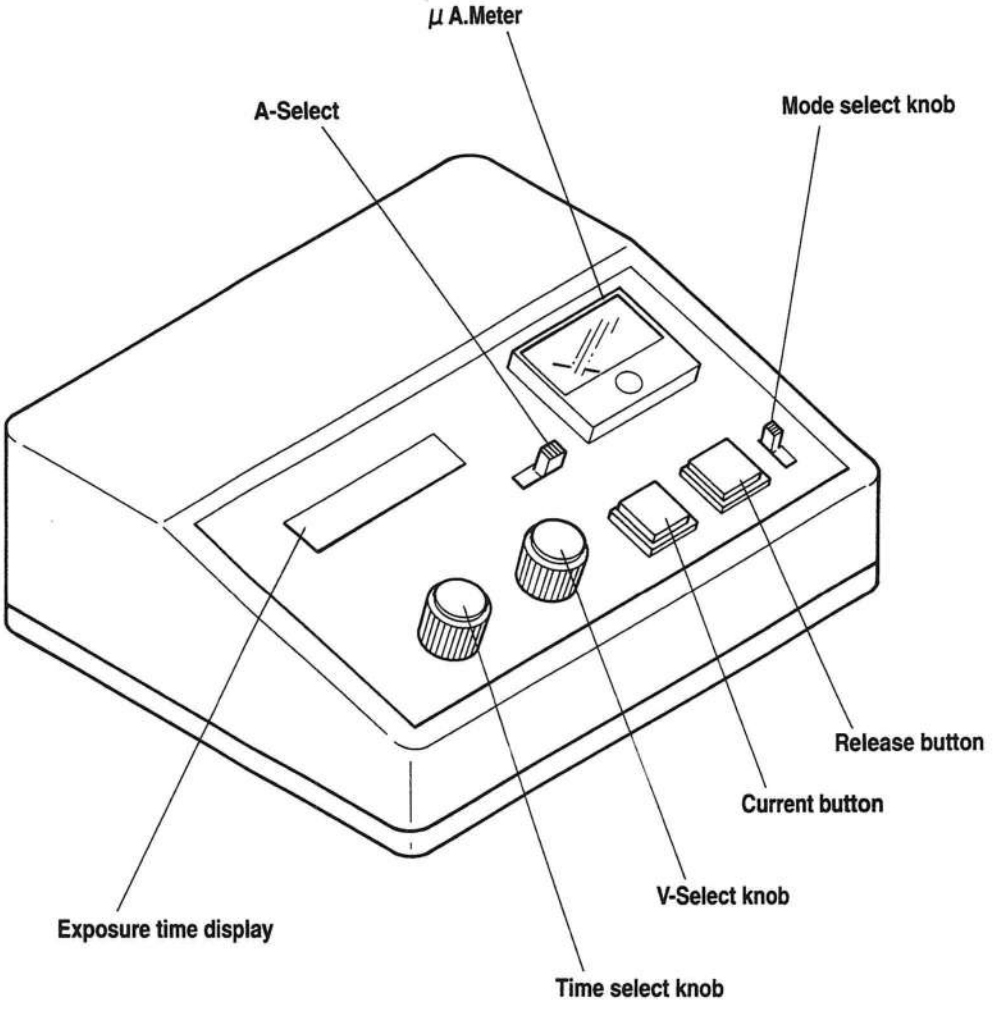
2. Adjustment :
   Adjustment is made by turning the ⓐ adjusting screw.
   1) If the shutter is released after closing the back cover, try to rotate the ⓐ screw clockwise.
   2) If the shutter cannot be released after "1" appears in the film counter window, try to rotate the ⓐ screw counterclockwise.

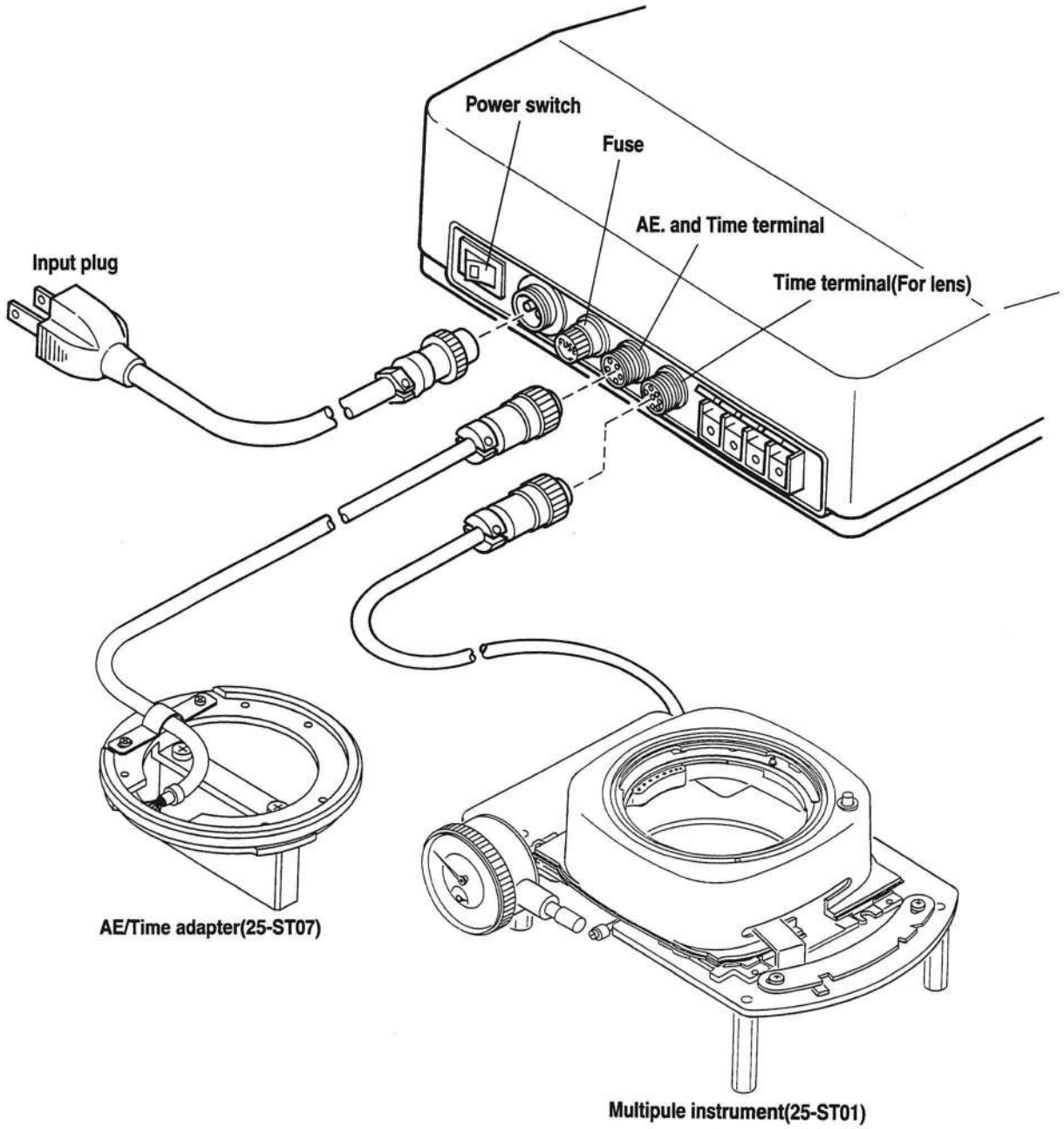
How To Use EE-Tester

Inspection of Electronic circuites

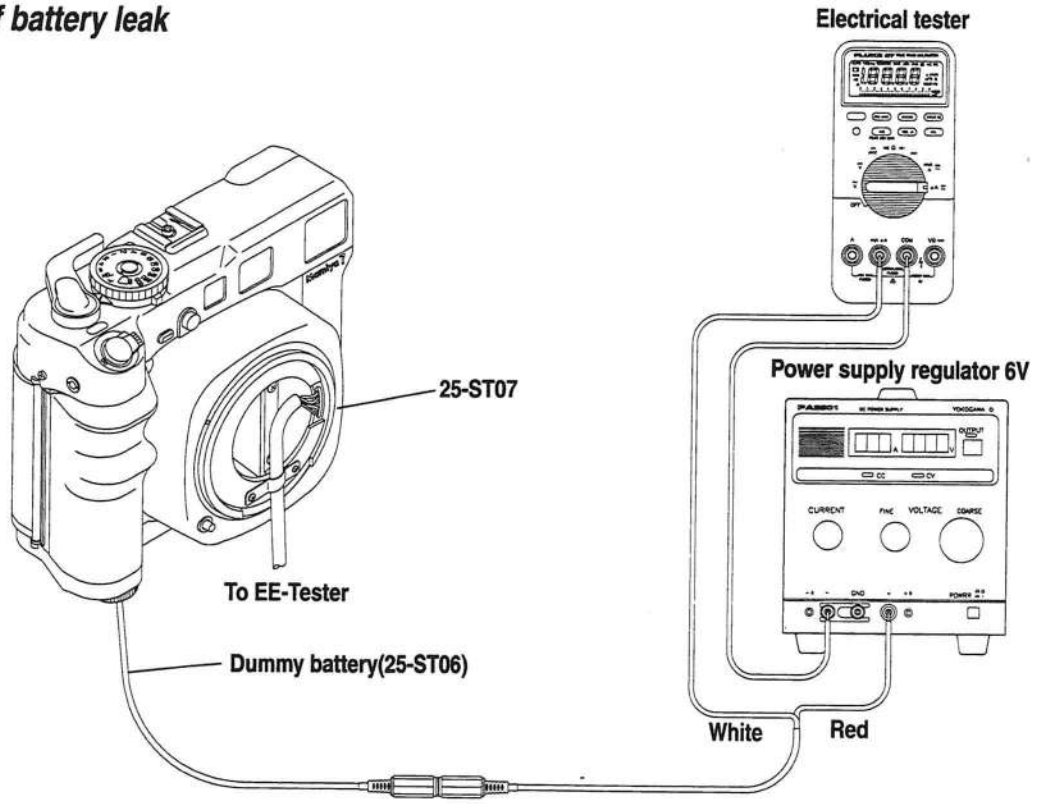
Printed Circuit Boards

1 Name of parts and connecting terminals 1/2 17

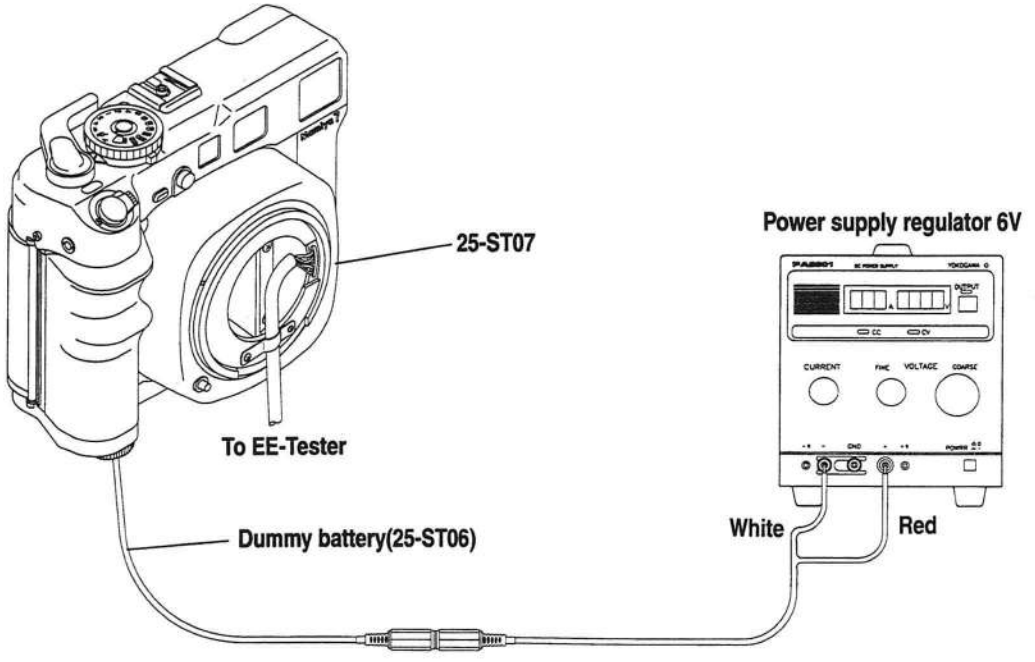


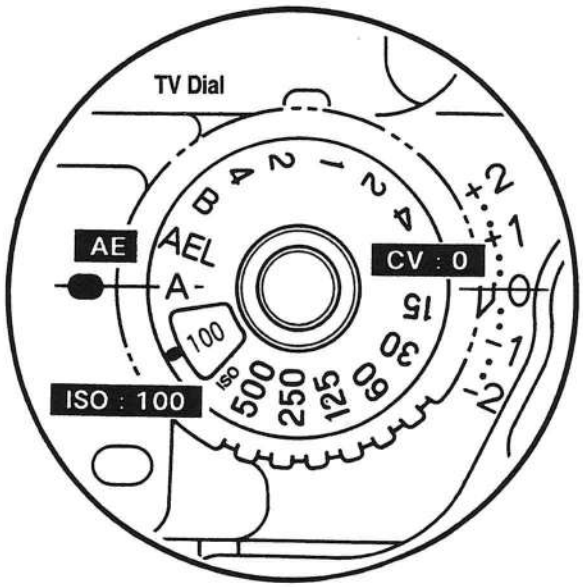

Power switch
Fuse
AE. and Time terminal
Time terminal(For lens)
Input plug
AE/Time adapter(25-ST07)
Multipule instrument(25-ST01)

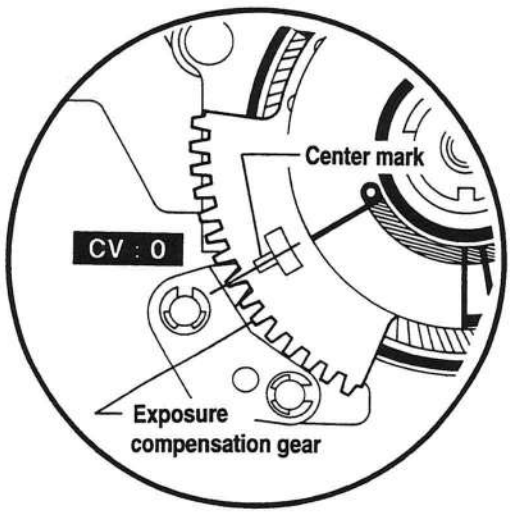
Test of battery leak

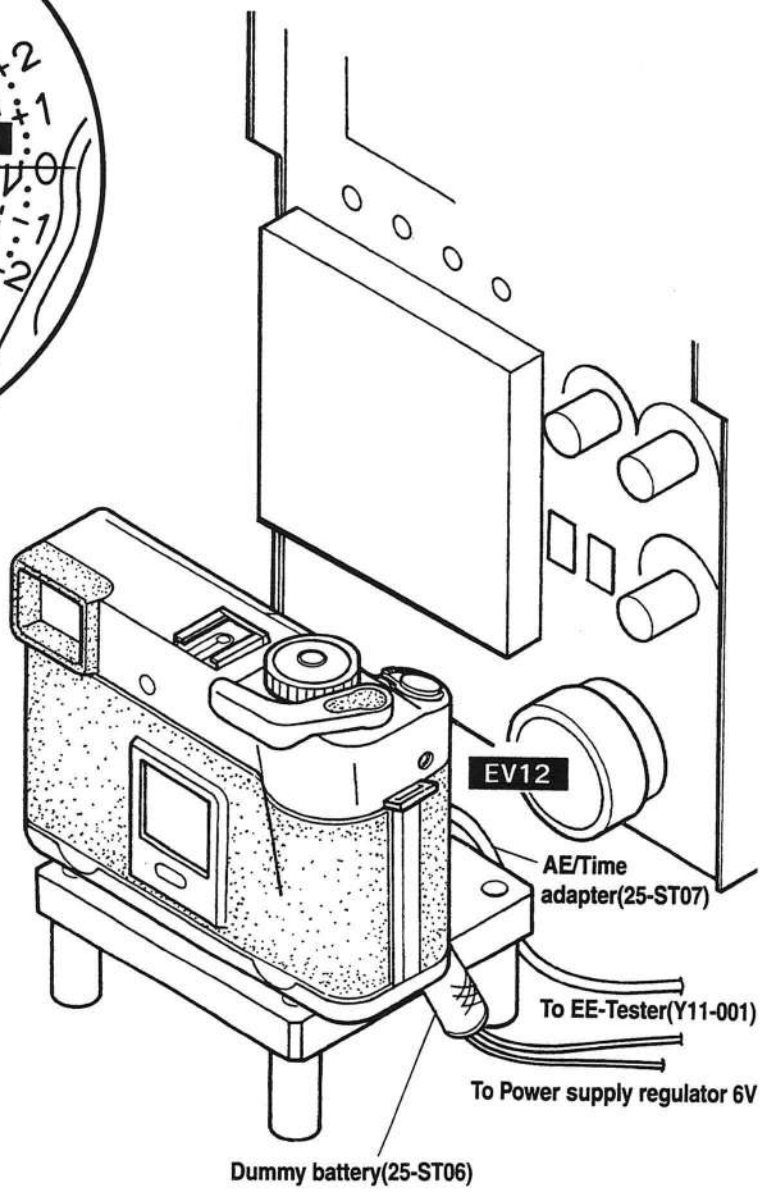


Test of AE




TV Dial
AE
AEL
A-
CV : 0
ISO : 100
100
ISO
500
250
125
60
30
15
+2
+1
0
-1
-2


Center mark
CV : 0
Exposure
compensation gear


EV12
AE/Time
adapter(25-ST07)
To EE-Tester(Y11-001)
To Power supply regulator 6V
Dummy battery(25-ST06)

A. Check and adjustment of exposure time at AE-Mode :

Measuring instrument and tool

* EF-500 AC2 Light source box
* Y1-001 EE-Tester
* 25-ST07 Adapter
* 25-ST06 Dummy battery

* Power supply regulator

A-1. Check and adjustment of exposure time 1/60 sec.

1. Set the TV dial (Shutter speed dial) on the camera body as follows:
   SO : 100
   CV : 0 (Exposure compensation dial)
   TV-dial : A (Auto-mode)
2. Insert the plug of 25-ST07 adapter into the jack of EE-Tester and fix the adapter to the camera and then place the camera body on the light source box.
3. Set the EV dial on the light source box at EV12.
4. Set the EE-Tester as follows :
   * A-select knob : F8
   *Time/Normal knob : Time
5. Power supply for the camera body :
   A/6-volt d-c supply must be arranged with a d-c power supply regulator through the dummy battery as shown in the Fig in page 19.
6. Check of LED display "60" in the viewfinder :
   Check illumination of "60" in the viewfinder when slightly pressing the shutter release button of the camera body (S1-ON).
7. First press the shutter release button of the camera and press the release button on the EE-Tester.
8. Exposure time will be shown in the exposure time display window on the EE-tester.
   Note) 1. It is not necessary to wind the film advance lever of the camera every time for checking.
   2. Press the release button on the EE-tester soon after pressing the shutter release button.
9. Adjustment is made by turning the VR22.

A-2. Check of exposure time by changing over the EV-value in referring the table -1 :

1. Exposure time for each step will be also shown in the display windows on the EE-Tester by pressing the release button on the camera and Tester.
2. Fine adjustment is made by the VR22.

A-3. Check the LED display for the exposure time by changing over the ISO-value.

1. The LED display in the viewfinder must be changed as shown in the table-2 by changing over the ISO-value.
2. You can also check exposure time in the display window on the EE-Tester.

A-4. Check of the LED display for the exposure time at the manual mode.

1. In referring to the table-3, check LED display by changing over exposure time on the shutter speed dial.
2. You can see exposure time in the display window on the EE-Tester by pressing the release button.

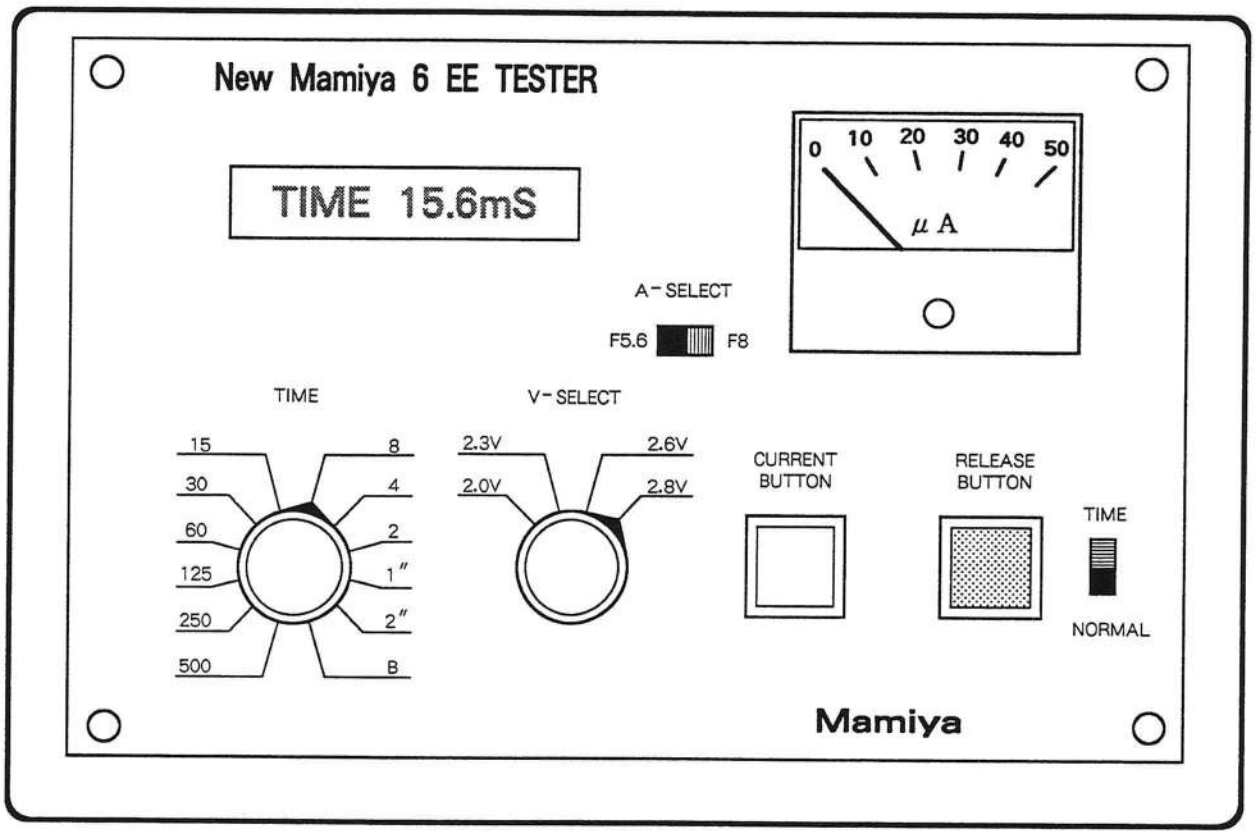


Table-1 : By EV-change

TV Dial	LV	ISO	Aperture	CV	Finder disply	Exposure Time	Adjustment
A	12	100	8	0	60	15~16mS	VR22
↓	14	↓	↓	↓	250	2.7~5.2mS	
↓	15	↓	↓	↓	500	1.7~2.7mS	
↓	9	↓	↓	↓	8	157~92mS	
↓	7	↓	↓	↓	2	373~623mS	
AEL	12	↓	↓	↓	60		
↓	9	↓	↓	↓	60	15~16mS ± 10%	
125	12	↓	↓	↓	125 60Flashing	7.6~8.0nS	
1	12	↓	↓	↓	1 60Flashing	990~1100mS	

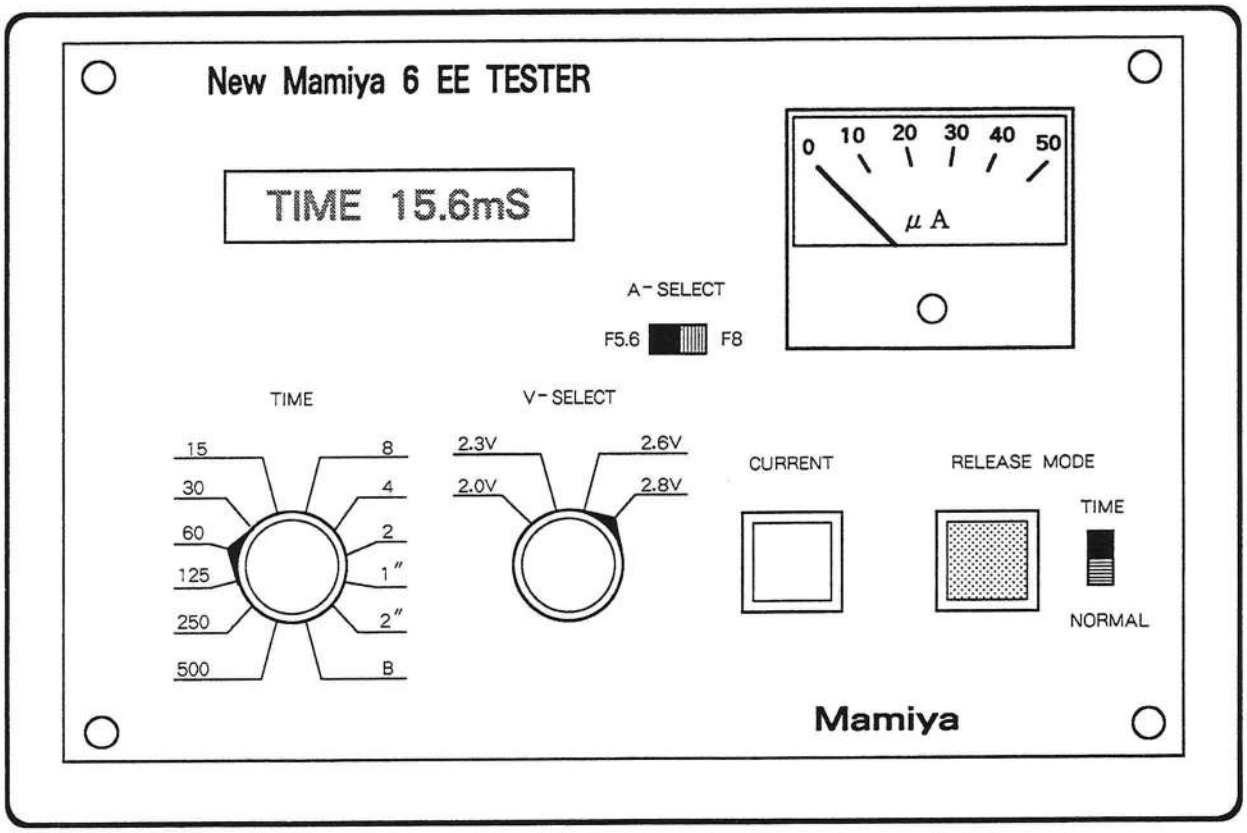
Table-2 : By ISO-change

TV Dial	LV	ISO	Aperture	CV	Finder disply
A	LV 9	25	8	0	2
↓	↓	50	↓	↓	4
↓	↓	100	↓	↓	8
↓	↓	200	↓	↓	15
↓	↓	400	↓	↓	30
↓	↓	800	↓	↓	60
↓	↓	1600	↓	↓	125

Table-3 : By Manual mode

TV Dial	LV	ISO	Aperture	CV	Finder disply
500	LV 12	100	8	0	60 500
250	↓	↓	↓	↓	250
125	↓	↓	↓	↓	125
60	↓	↓	↓	↓	60
30	↓	↓	↓	↓	30
15	↓	↓	↓	↓	15
8	↓	↓	↓	↓	8
4	↓	↓	↓	↓	4
2	↓	↓	↓	↓	2
1	↓	↓	↓	↓	1
2	↓	↓	↓	↓	LT
4	↓	↓	↓	↓	LT
B	↓	↓	↓	↓	B

4 | Check of the Shutter speed for lens unit | 1/1 | 24

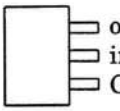


Measuring instrument and tool
* Y11-001 EE-Tester
* 25-ST01 Multiple instrument

1. Insert the plug of the multiple instrument into the jack of the EE-Tester.
2. Mount the lens on the multiple instrument.
3. Set the EE-Tester as follows :
   * Time / Normal knob : Normal
   * V-select knob : 2.8V
   * Time Dial : Changeover
4. Cock the shutter by the cocking lever of the multiple instrument.
5. Check exposure time by pressing the release button on the EE-Tester.

1. TV LED and Red warning LED do not illuminate.

Control P.C.B.

1) BP ~ GND : Approx 6V	Check Point * Battery capacity * Battery pole (+,-)
2) IC2  output : No output input GND	* Poor soldering - IC2 and leadwires for SO switch
3) S1 or IC1-52 pin ~ GND : Approx 3V	* Poor soldering-IC1
4) A coupling P.C.B. between control and measuring P.C.B.	* Poor connection

2. LED display does not correspond correctly to TV-dial indication.

1) The coupling P.C.B. to TV-Dial	* Imperfect soldering
2) A coupling P.C.B. between control and measuring P.C.B.	* Poor connection
3) C0, C01, C02, C3 in measuring P.C.B. ~ C0, C01,C2, C3 in control P.C.B.	* No continuity

3. Malfunction of Release magnate (No illumination of Red warning LED):

Control P.C.B.

1) S2 ~ GND : Zero volt/S2-ON	* Poor soldering
2) IC1-60(LATMG) ~ GND : Zero Volt by an oscilloscope	
3) TG ~ GND : Zero Volt / When winding IC1-8(S3) ~ GND : Zero Volt	

Measuring P.C.B.

4) Make short of each anode : Release MG C22 and C24 ~ GND functions	* Broken leadwires of MG (21Ω) * Broken Q23 or poor soldering

4. Shutter runs so quickly

1) Q23 or Q29	*Imperfect soldering
2) Shutter MG	*Broken leadwire

Measuring P.C.B.

MT ~ GND : Approx 2V / While releasing in LT

5. Some LEDs do not illuminate

1) A coupling P.C.B. ~ measuring P.C.B.	* Imperfect soldering
2) LEDs ~ measuring P.C.B.	* Imperfect soldering
3) LEDs	*Broken leadwire

6. Self-timer does not work. (Red Warning LED does not illuminate)

Control P.C.B.

1) IC1 ~ GND : Zero Volt/When pressing self-timer button	
2) Self-timer lamp does not illuminate.	*Broken leadwires of LED *R8 (120Ω) - poor soldering

7. Only LED(Over-Exposure) or LT LED (Under-exposure) blinks at AE-mode (S1-On) :

Measuring P.C.B.

1) IC21-6 pin or 25 pin ~ : Approx 3 Volt ~ IC21-17 or 39 pin (GND)	* Imperfect soldering
2) VR ~ GND : Approx 1.1V	*Poor soldering of VR2, R32 and R35
3) VK ~ VR : Approx 153mV	*Poor soldering of VR2, R38 and R35
4) SV ~ VR : Approx 108m V at ISO 100	*Imperfect soldering between the coupling P.C.B. and TV P.C.B.
5) IC21-2 pin : Approx 150mV ~ VR at BV12	*Imperfect soldering or broken of C29, R33, TH21 or VR2
Note) Output voltage must be changed by brightness.	
6) CV ~ VR : Approx 76.5mV at CV-zero	*Poor contact of brush *Imperfect soldering of the coupling P.C.B.
7) SV ~ VR : Approx 108mV	*The same as above
8) FV-VR : Approx 66mV	*Imperfect soldering of the coupling P.C.B. *Poor contact efficiency of the contact (#1758) and its spring(#1759)
9) C30	*Imperfect soldering
10) VAD ~ VR : Approx 288mV	*Imperfect soldering of VR23 or R36

8. Film winding is impossible after releasing shutter

Control P.C.B.

MG-Terminal ~ GND : MG does not work	*Broken leadwires *Imperfect soldering of D1 R1 and C10

Note) When the shutter is closed, a signal is sent to the MG, so that the MG is energized.
At that time the S7 switch will go off to provide for next film winding.

9. Red Warning LED lights up

AT S1-ON

1) When the shutter is not cocked.
2) When the light shield curtain is closed.
3) When the film is not loaded.
4) When the lens is not attached.
5) While the film winding lever is wound.
6) When the self-timer is pushed at bulb.
7) When the battery power is dropped approximately 4.3 volt.

10. LED does not blink at 2HZ when the battery power drops to 4.7V + 0.2V :

Control P.C.B.

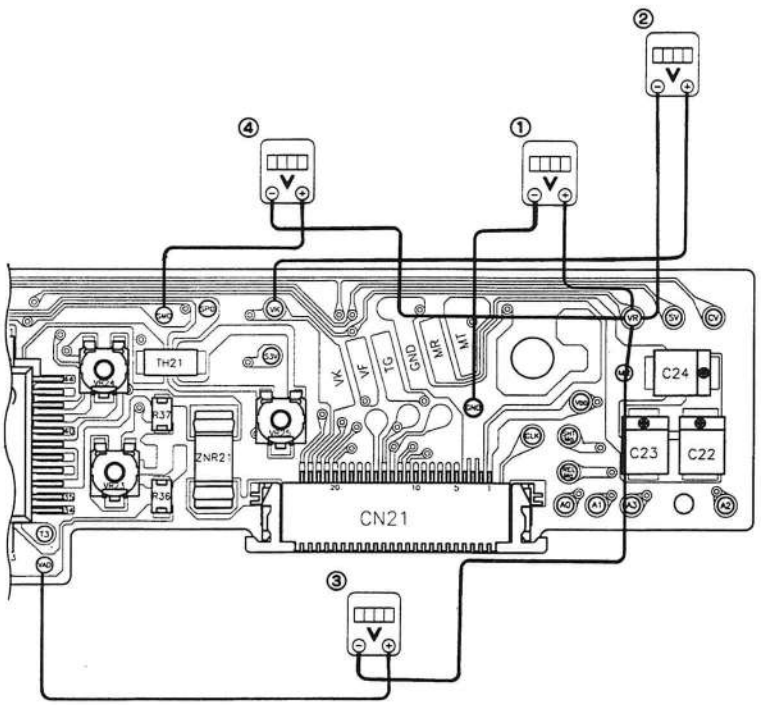
VR1, R15, R16 and IC4	* Broken or imperfect soldering

11. AE adjustment is impossible.

Measuring P.C.B.

1) VR output
   VR ~ GND : 1.08 ~1.12 V * By VR24
2) VK output
   VKÅ ~ : 151~155mV * By VR21
3) VS step output
   SMO ~ VR : Difference voltage between LV6 and LV14(LV7~LV15) Approx 144mV (Every 1EV : 18mV) * By VR25
4) VAD output
   VAD ~ VR: Approx 286~288mV *By VR23
5) Exposure time level
   Set to : LV12, ISO : 100, F : 8 and CV :0
   When pressing the shutter release button of the camera and the release button on the camera and the release button on the EE-tester, 15.6m second output voltage will appear.
   Adjustment : By VR22

	DCV-Meter Connection [+]Red [-]Black	Output	Adjustment	Remarks
1	VR — GND	1.1V ± 0.05	VR24	If this output does not appear the correct step inter vals of CV and ISO will not be available
2	VK — VR	153mV ± 2mV	VR21	
3	VAD — VR	288mV ± 2mV	VR23	
4	SMO — VR	Difference Voltage 144mV (LV7~LV15)	VR25	Output voltage of 1EV should be 18mV



5. Check of the LEDs Warning function by drop of the battery capacity

Drop the battery capacity to 4.3volt by adjusting the power supply regulator.

a) At that time the LEDs are put out and the red warning LED in the viewfinder should start to blink at 2HZ. If not, adjust it by the VR1.

b) Further check :

1) 4.7 Volt - 4.4 Volt : LEDs blink at 2HZ

2) 4.3 Volt - 4.2 Volt : LEDs are put out and the red warning LED blinks at 2HZ and then a release lock signal is given to block the shutter release.

* Sometimes the same phenomenon with above step #2) will occur at 4.4 volt.

6. Exposure time level :
Set to : LV12, ISO : 100, F : 8 and CV : 0
When pressing the shutter release button of the camera and the release button on the EE-Tester, 15.6m second output voltage will appear.
Adjustment : By VR22

7. Check of the power timer :
* S1 ON → OFF
1) The LED display must be put out within 9 to 11 sec. since the S1 is turned off.
2) LED display must be not put out for 10 sec by turning the TV-dial.
Note) The power timer does not work while the red warning LED illuminates.

8. Check of remaining current in the circuit board :

Fig. in page 19.

1) When the S1 and S2 (Shutter release button) switch is depressed, the ammeter should indicate less than 8μA.
2) Then the S1 and S2 switches are turned off, the ammeter should indicate zero.

9. Check of the self-timer :
1) The self-timer must start when the self-timer button is pressed and must cancel when the button is pressed again.
2) The self-timer LED must illuminate for 8 sec ± 1, then blinks 2 sec ± 1 and then the shutter is released.
3) When the TV-dial is set at "B", the red warning LED illuminates and the self-timer does not operate.

10. Check of the safety device :
The red warning lamp must illuminate :
1) After the shutter is released.
2) On way of winding the film.
3) When the shutter shield curtain is closed.
4) When a film is unloaded in the camera.

But the red warning lamp will be put out when the back cover of the camera is opened after the film advance lever is wound without loading the film in the camera.

11. Contact efficiency :

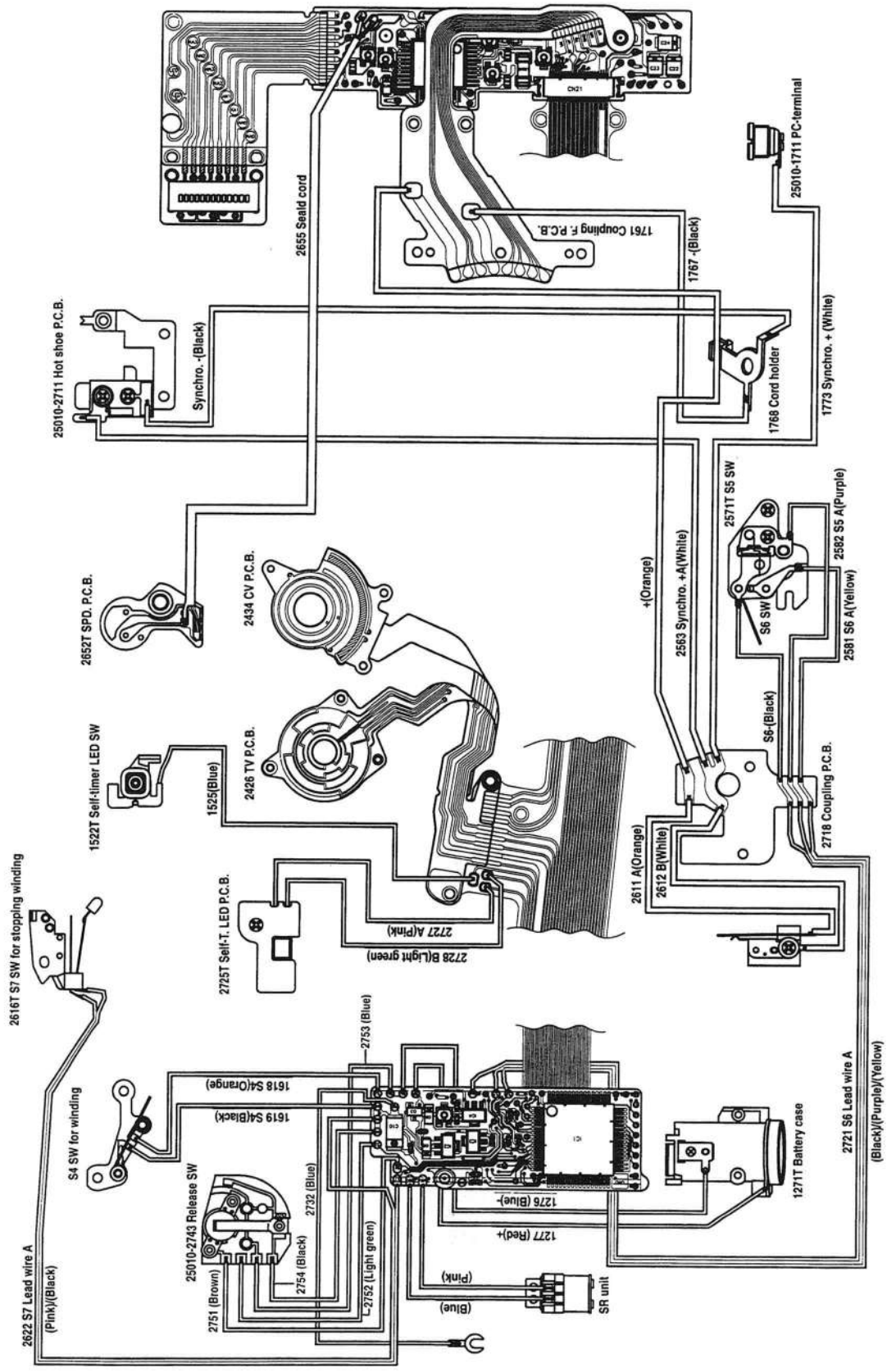
1) Set of the contact efficiency tester :
· Auto/Manual knob : Auto
· Interval knob : 1m sec.

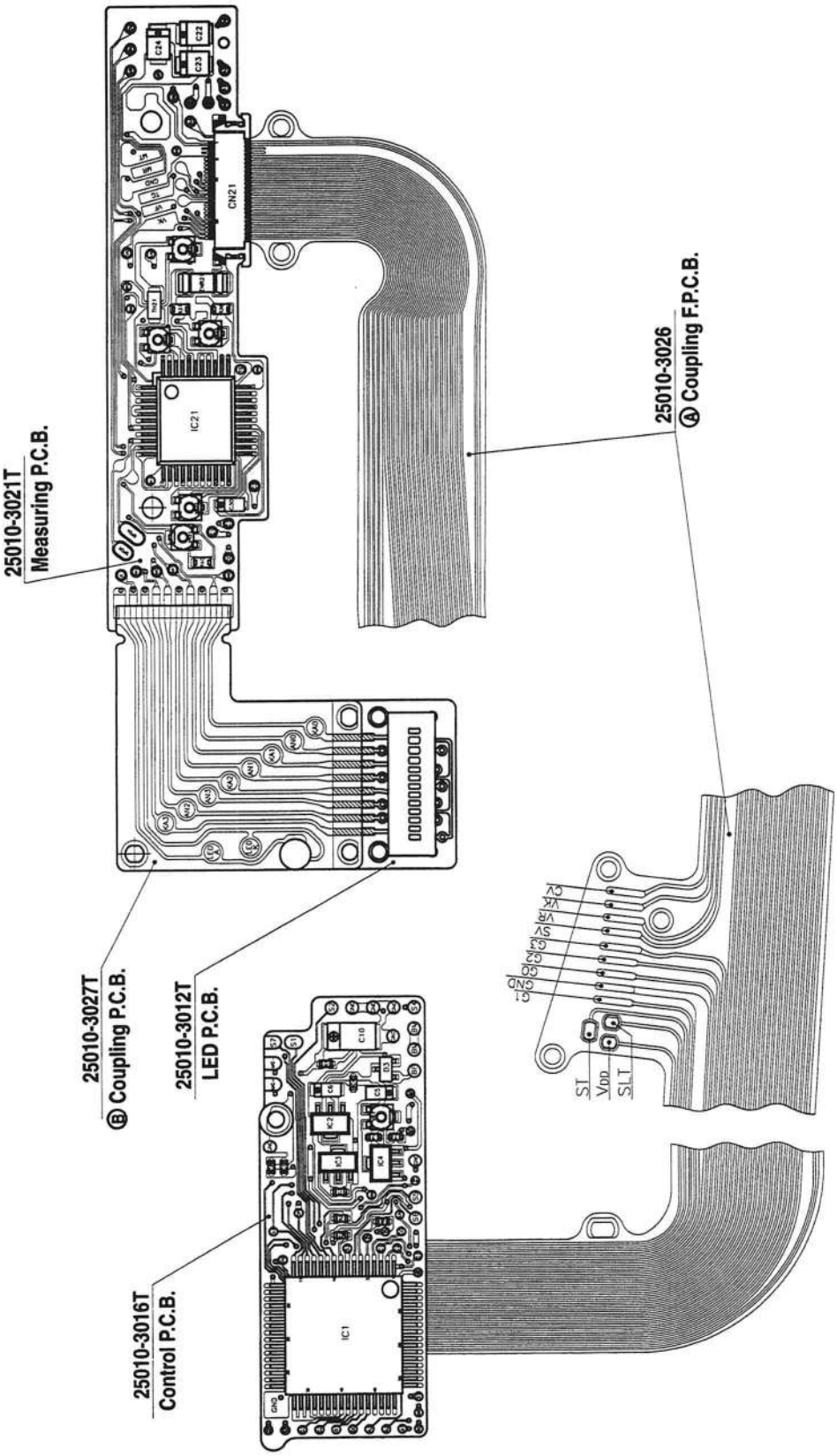
When shutter is released at 1/500 sec;
* Contact efficiency : Over 60%
* Insulation : Over 100M

2) Set of the contact efficiency tester :
· Auto/Manual knob : Manual
When shutter is released at 1 sec ~ 4 sec :
* Insulation : Zero
Note) This is check of proper work of the shutter magnet. If the magnet is no good, the shutter will run extremely fast.

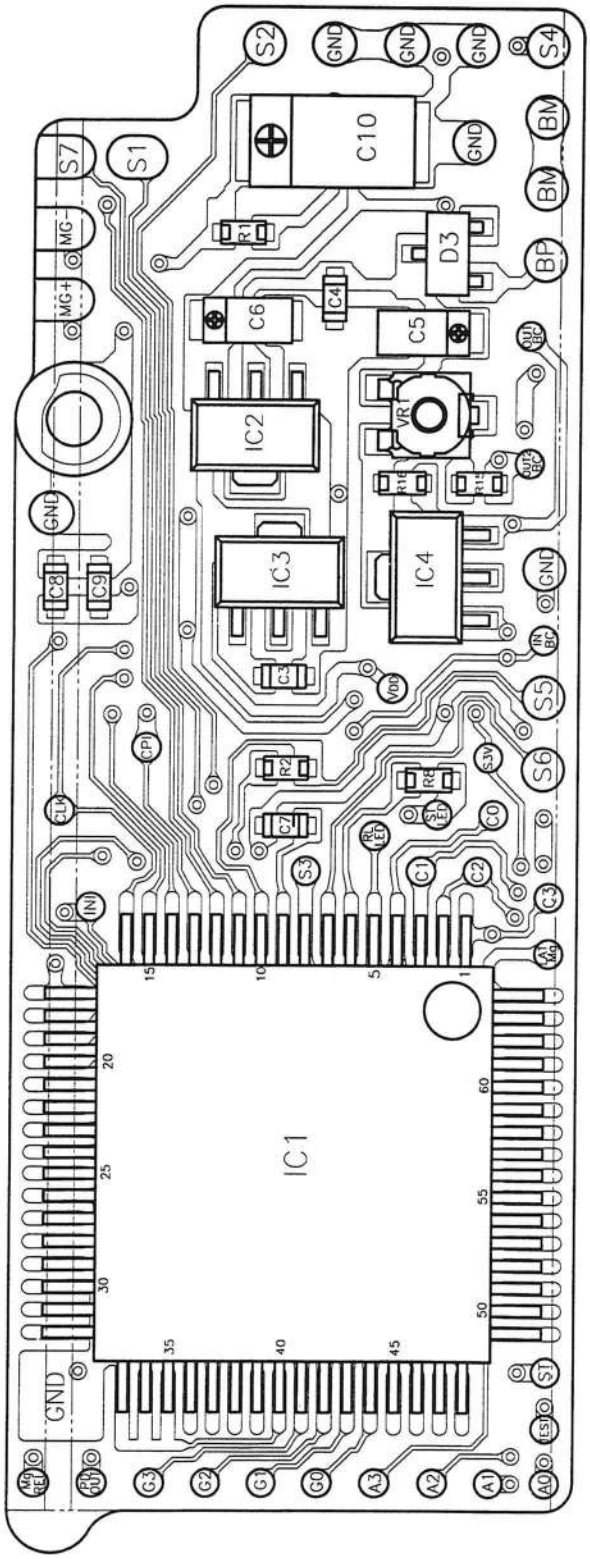
1 Winding diagram

1/1 | 30

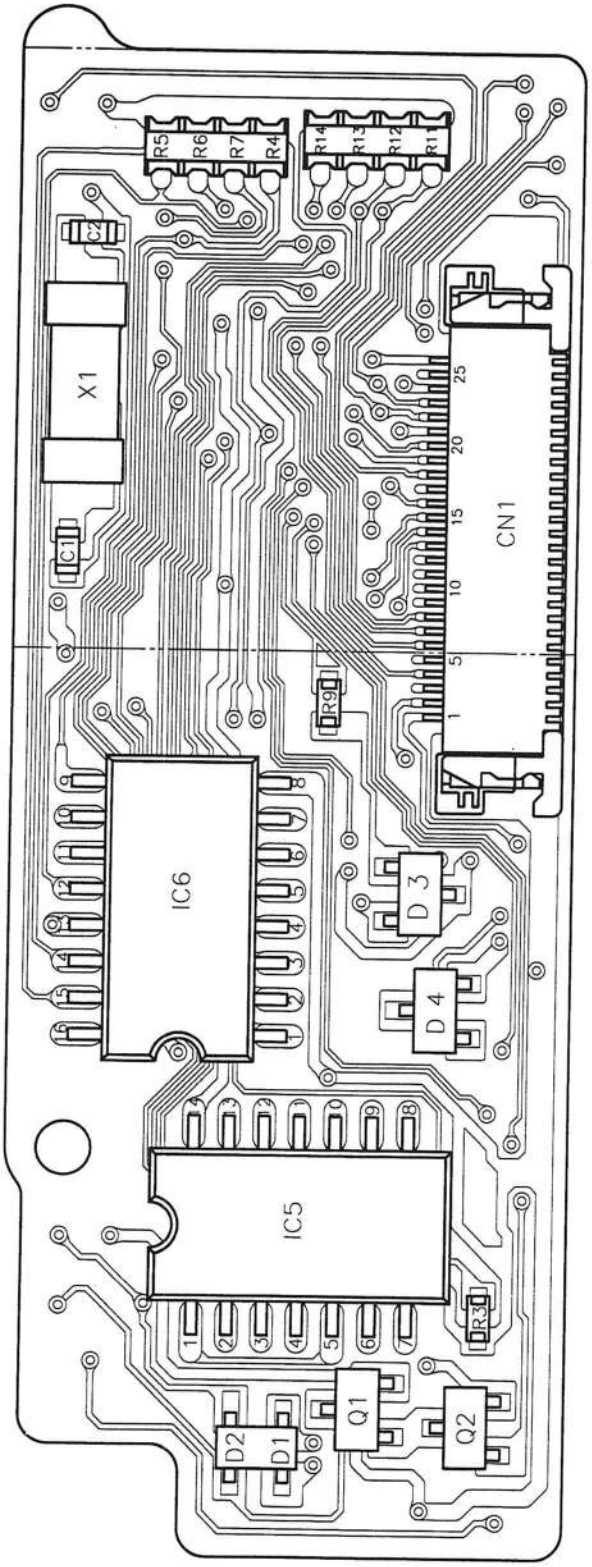


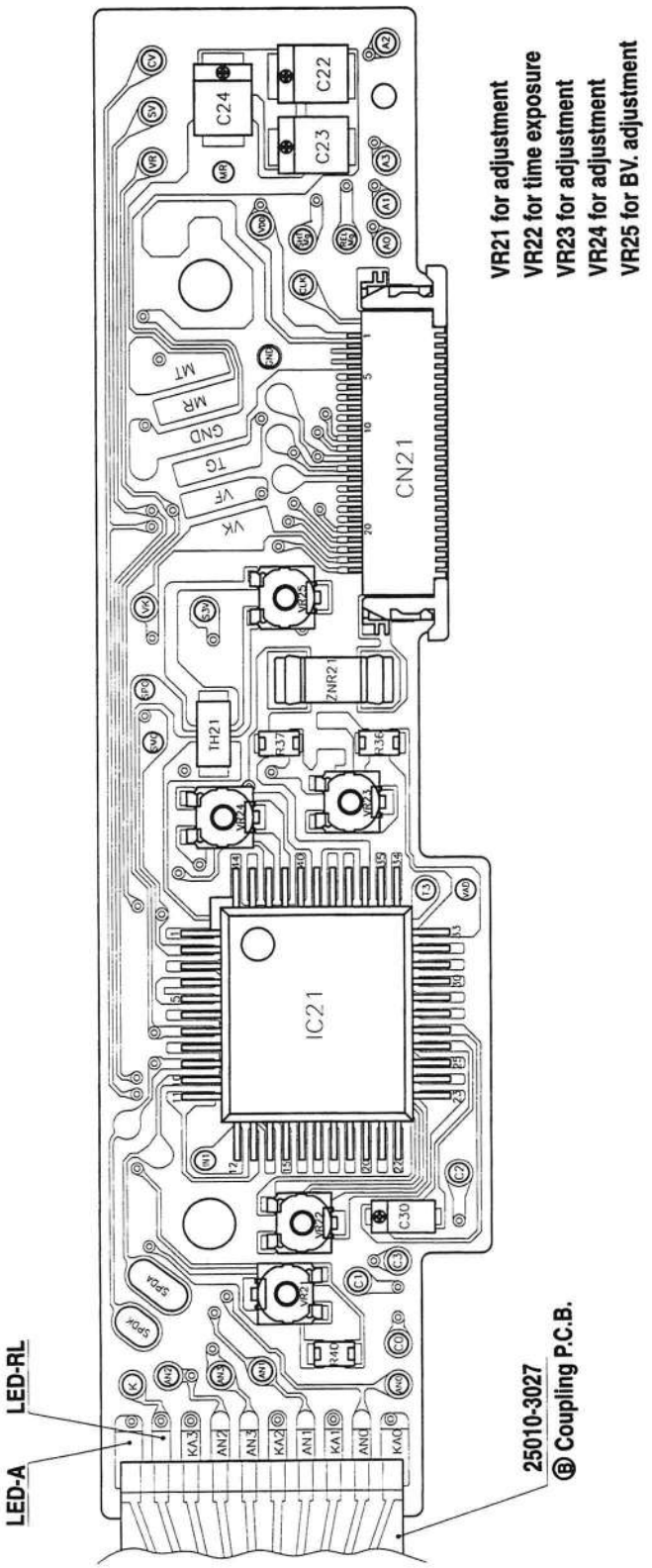

25010-3021T
Measuring P.C.B.
25010-3026
Ⓐ Coupling F.P.C.
25010-3027T
Ⓑ Coupling P.C.B.
25010-3012T
LED P.C.B.
25010-3016T
Control P.C.B.
CN21
IC21
IC1
ST
VDD
SLT

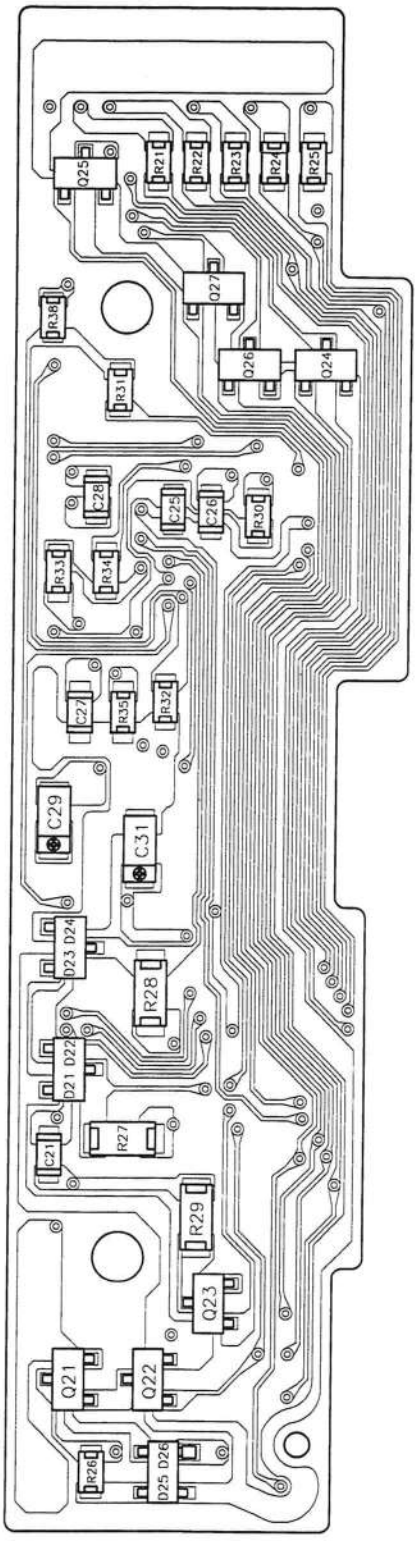
3 Control P.C.B.



VR1 for Battery check


R5
R6
R7
R4
R14
R13
R12
R11
C2
X1
C1
CN1
25
20
15
10
5
1
R9
IC6
D 3
D 4
IC5
9
8
1
2
3
4
5
6
7
R3
Q1
Q2
D2
D1


VR21 for adjustment
VR22 for time exposure
VR23 for adjustment
VR24 for adjustment
VR25 for BV. adjustment
LED-RL
LED-A
25010-3027
Ⓑ Coupling P.C.B.
CN21
IC21
C22
C23
C24
TH21
ZNR21
C30


Q25
R21
R22
R23
R24
R25
Q27
R38
Q26
Q24
R31
C28
C25
C26
R30
R33
R34
C22
R35
R32
C29
C31
D23 D24
R28
D21 D22
C21
R27
R29
Q23
Q21
Q22
R26
D25 D26

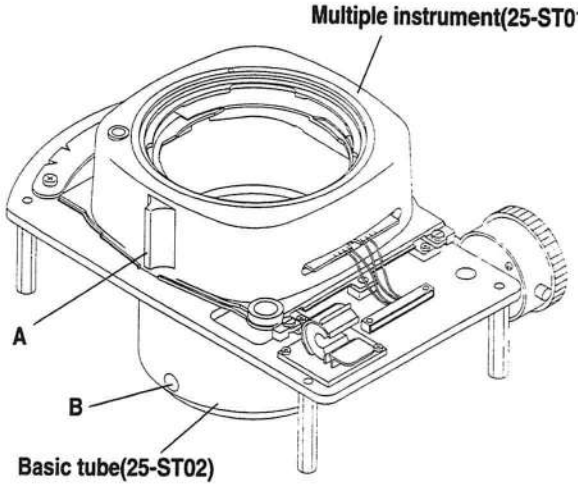
How To Use Multiple instrument

Dis/Reassembly(N80mm f/4L)

Dis/Reassembly(N43mm f/4.5L)

Dis/Reassembly(N65mm f/4L)

Dis/Reassembly(N150mm f/4.5L)

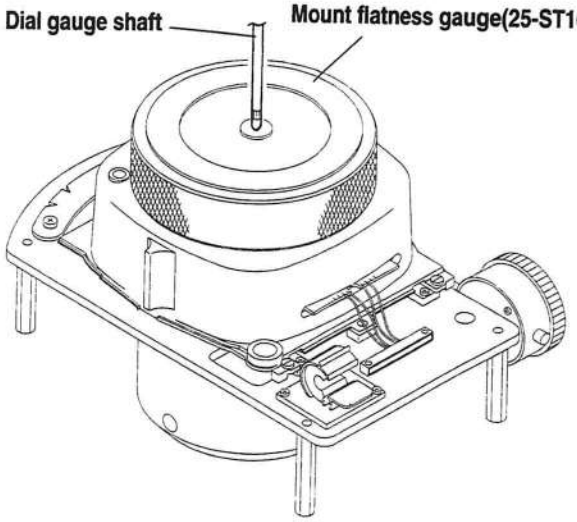


1. Adjustment of mirror position in 25-ST02 basic tube (Adjustment of lens flange-back)

A. Check

1) Set 25-ST01 Multiple instrument on 25-ST02 Basic tube for lens infinity focusing check.

2) Align the A line on the side of the multiple instrument with center of the B hole on the 25-ST02 Basic tube.

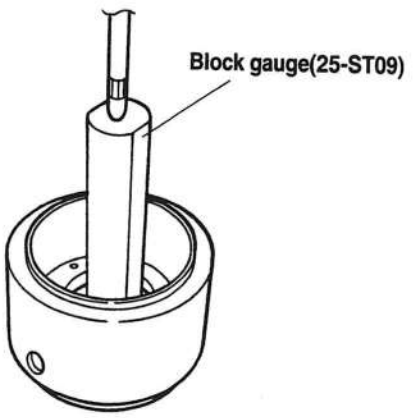


3) Set the 25-ST10 Mount flatness gauge into the bayonet mount of the 25-ST01 Multiple instrument.

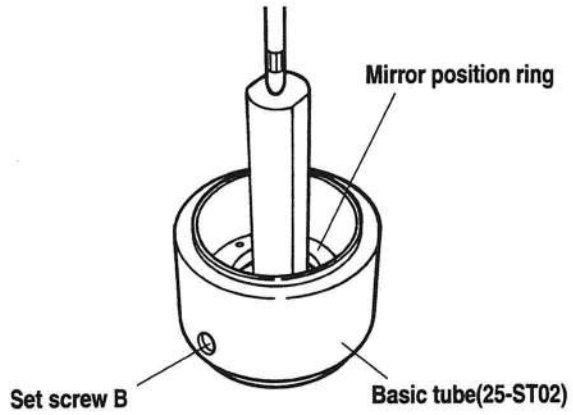
4) Put the point of the dial gauge shaft on the center of the 25-ST10 Mount flatness gauge and adjust the gauge scale to Zero.

5) Remove the Multiple instrument together with the mount flatness gauge and carefully set the Block gauge (81.35mm) on the mirror of the 25-ST02 Basic tube.

⚠ Caution : Be careful not to scratch or blur the mirror surface.



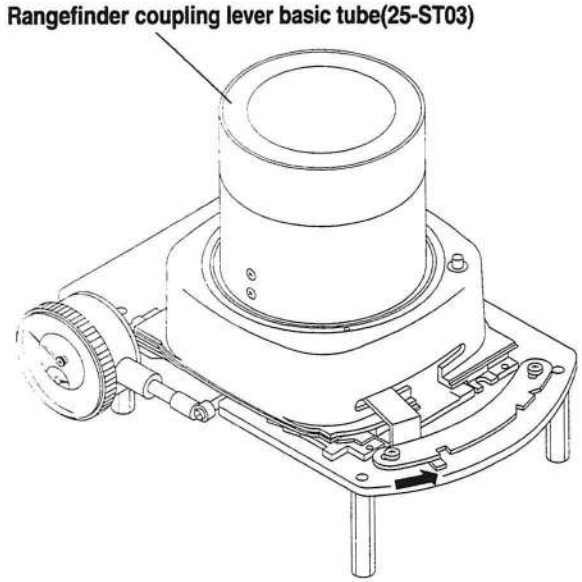
6) Measure the 25-ST09 Block gauge with the dial gauge. The dial gauge indicator must be in the limit +0.34～+0.36 from zero point. If not, adjust it as follows.



B. Adjustment

Loosen the set screw B of the 25-ST02 Basic Tube. Adjust the mirror position as the dial indicator points the correct limit by turning the mirror position ring in the 25-ST02 Basic tube.
After adjustment tighten the set screw.

Note: Be careful that the flange-back is not the same between camera body and lens.
Body flange back : 57.35mm − 0.04
Lens flange back : 57.0mm ± 0.01



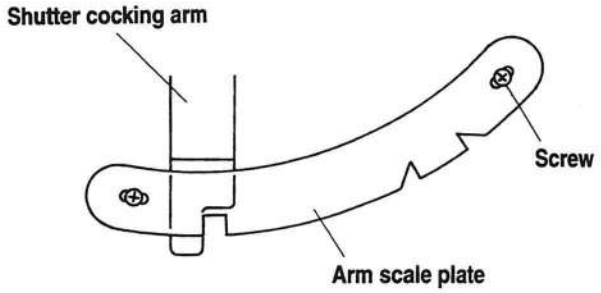
2. Check and adjustment of shutter cocking angle

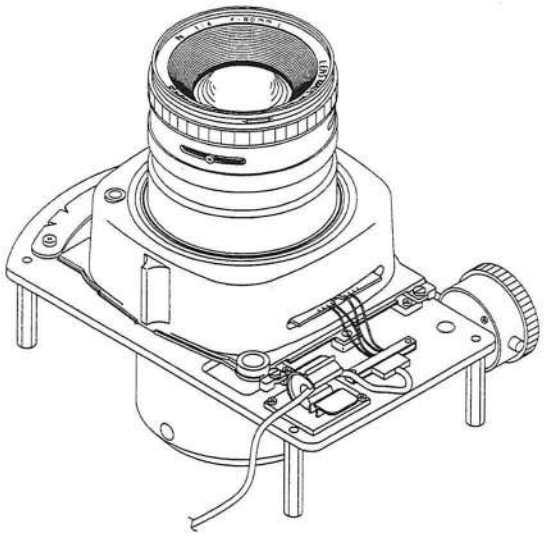
A. Check

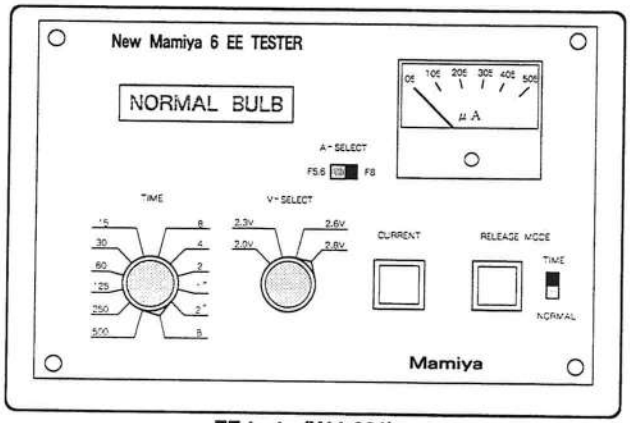
1) Insert the 25-ST03 Rangefinder coupling lever basic tube into the 25-ST01 Multiple instrument by aligning the alignment dots. Then turn the Basic tube clockwise until it clicks to lock into place.
2) Slightly push the shutter cocking arm in direction of the arm with your finger.
3) The shutter cocking arm must stop at the position.

B. Adjustment

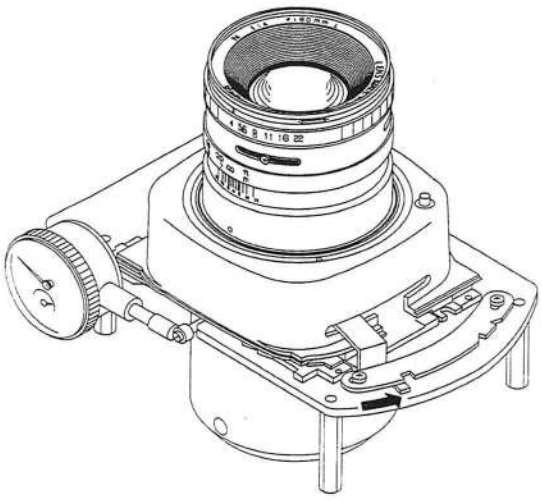
Adjustment is made by moving the arm scale plate after loosening its two screws.







EE-tester(Y11-001)



1. Adjustment of lens infinity focusing

1) Remove or peel off the rubber band on the focusing ring until the three fixing screws appear (six A type screws for 150mm lens).

2) Clearly remove the DB-bond in the slots of the fixing screws by a pair of tweezers or a cutter and drip one or two drops of ketone into the slots for the fixing screw (six holes for 150mm lens). Loosen the three fixing screws (six for 150mm lens) and tentatively tighten one of them.

3) Insert the lens into the 25-ST01 Multiple instrument by aligning the alignment dots. Then turn the lens clockwise until it clicks and locks into place.

4) Set the aperture ring to the maximum aperture and connect the multiple instrument with the EE-tester (Y11-001).

5) Cock the shutter by pushing the shutter cocking lever on the Multiple instrument and set the time dial on the Y11-001 EE-Tester to bulb. And then release the shutter by pressing the shutter release button on the EE-Tester.

6) Carefully turn the focusing ring while looking through an auto-collimator and get the sharpest focusing point on the collimator.

7) Loosen the tentatively tightened screw for focusing ring and set the focusing ring to the infinity position without turning the lens helical ring.

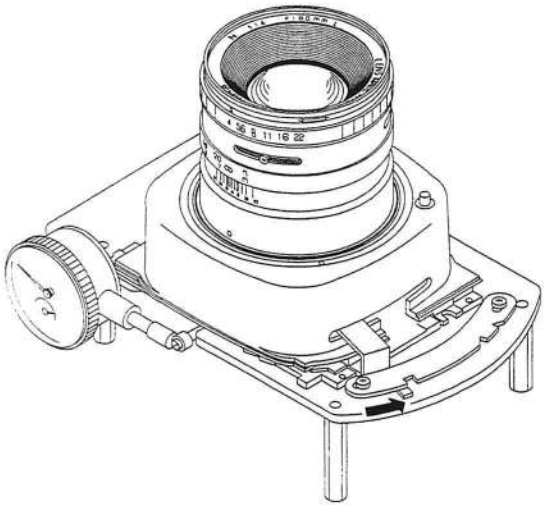
⚠ Caution : If the helical ring moves even slightly during setting of the focusing ring to the infinity position, again adjust the sharpest focusing point.

8) Tighten the three fixing screws (six for 150mm lens).

9) Check the infinity focusing again through the collimator and apply DB-bond or appropriate adhesive around the fixing screws.

10) Put and arrange the rubber band on the focusing ring.

Note : Do not forget to sometimes check and adjust the mirror position in 25-ST02 basic tube with the Multiple instrument because it is very essential.

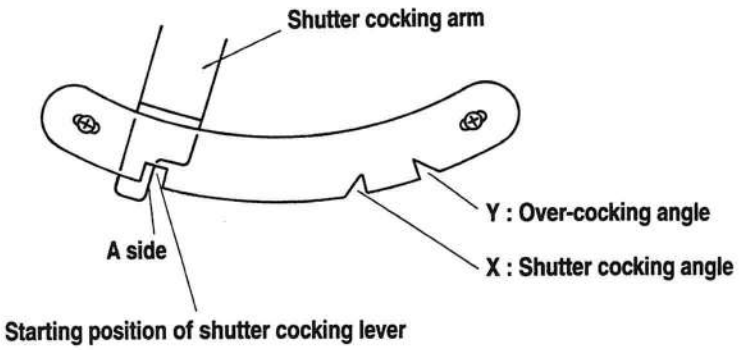


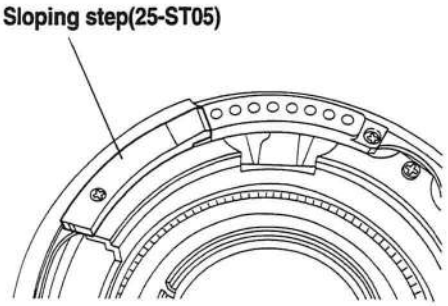
A. Check

1) Starting position of shutter cocking lever.
   a) Set a lens on the Multiple instrument.
   b) Slightly push the shutter cocking arm in the direction of the arrow and remove your fingers slowly from the arm. The A side of the shutter cocking arm must be located within of the scale plate.

2) Shutter cocking angle.
   The shutter must be completely cocked. When the shutter cocking arm is pushed until the "X" notch on the arm scale plate. Finish of the shutter cocking is inspected by releasing shutter with the Y11-001 EE-Tester.

3) Over-cocking angle.
   The shutter cocking arm must be reached to the "Y" notch over the "X" notch.

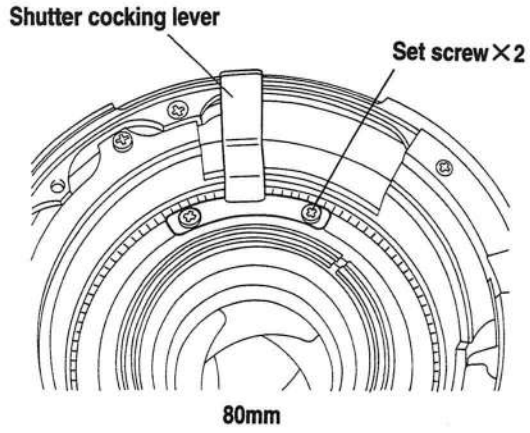




B. Adjustment

1) Remove the mount cover by unscrewing its four screws.

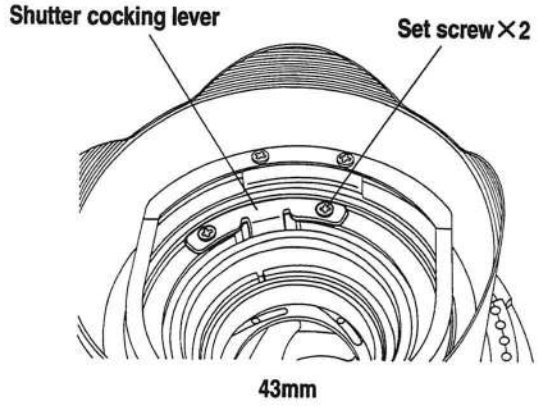
2) Temporarily attach the 25-ST05 sloping step on the bottom of the lens.

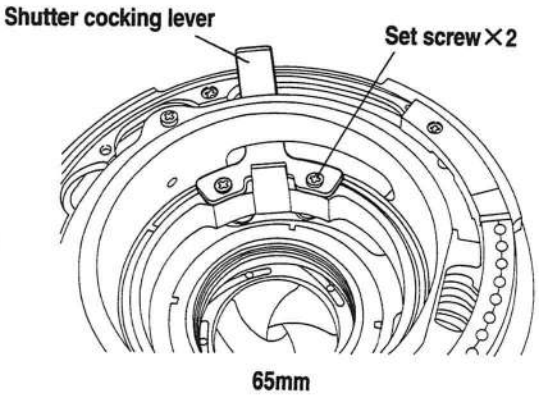


3) Adjustment
Adjustment is made by slightly moving the shutter cocking lever right or left after loosening its two screws.

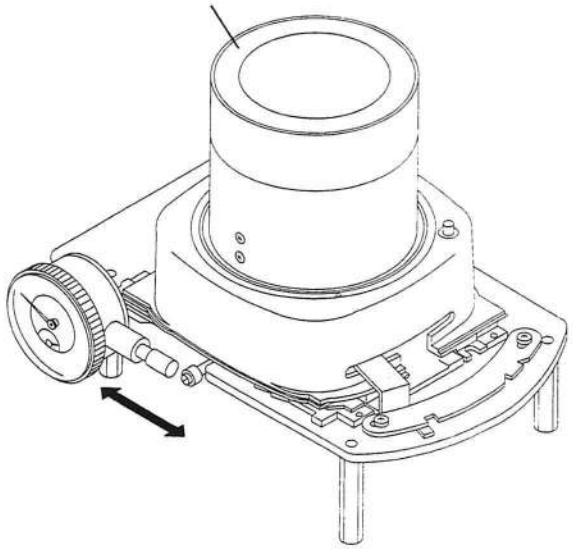
4) After adjustment apply DB-bond around the screws.

Note : Be careful not to mount a lens without the sloping step on the Multiple instrument, otherwise electronic contacts on the Multiple instrument may be damaged.



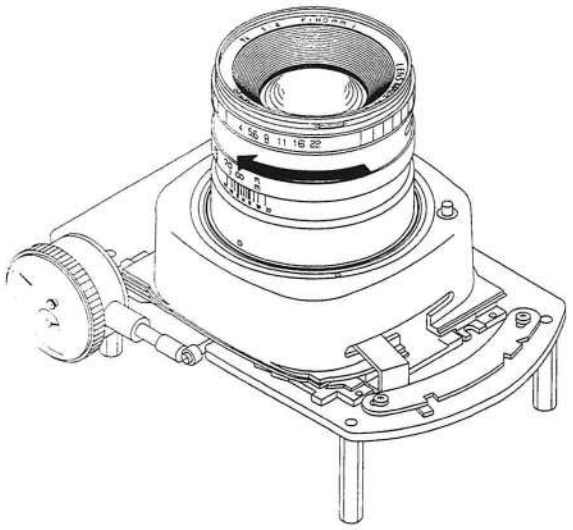


Rangefinder coupling lever basic tube(25-ST03)



A. Check

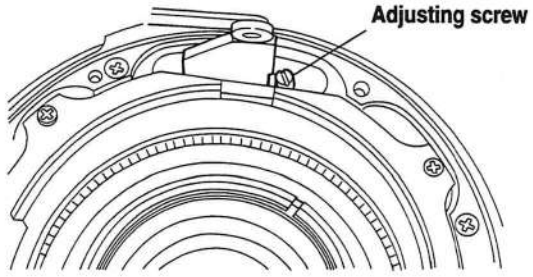
1) Set the 25-ST03 Rangefinder coupling lever basic tube for lens infinity focusing check on the Multiple instrument.
Hold the top of the dial gauge measuring shaft with your fingers and carefully pull out the measuring shaft.
Then slowly pull in the measuring shaft until the measuring shaft touches to the range-finder coupling lever pin.
2) Set the dial gauge indicator on the Multiple instrument to zero and remove the range-finder coupling lever basic tube.
3) Mount the lens on the Multiple instrument and slowly rotate the focusing ring from the nearest distance to ∞ and read the dial gauge at ∞ position. Repeat it several times. Remember average value shown by the dial gauge indicator.



B. Adjustment

1) Remove the mount cover from a lens bottom and tentatively attach the 25-ST05 sloping step.
2) Mount the lens on the Multiple instrument and slowly rotate the focusing ring from the nearest distance to ∞.
3) Adjustment is made by turning the adjusting screw of the coupling lever to set the dial gauge to zero.

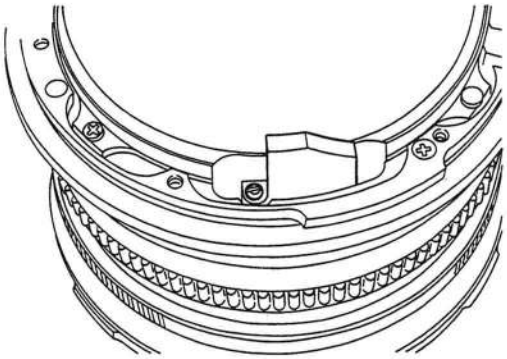
⚠ Caution : Carefully turn the adjusting screw not to damage the screw because the screw is tightened with a strong screw-lock tight. If it is difficult to turn the adjusting screw, remove the coupling lever unit after removing the bayonet ring by referring to the part catalogue.
Heat the part of the screw with a cigarette lighter to make easy loosening.
If it is still no good, replace the coupling lever unit with a new one.



80mm

4) After adjustment carefully apply a very little amount of the screw-lock tight #408 on the screw threads.

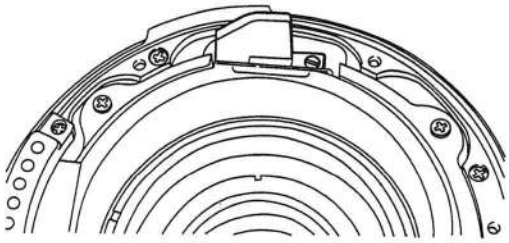
⚠ Caution : Never drip the screw-lock tight on other parts. If the screw-lock tight penetrates into the middle helicoid ring, momentum of the coupling lever will be restricted. So correct operation of the rangefinder will not be performed.



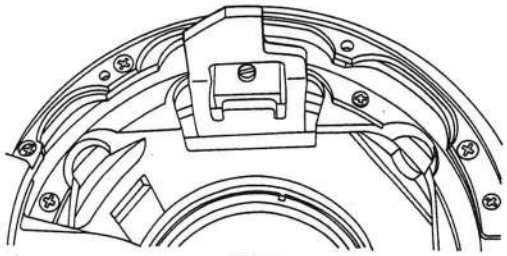
43mm

C. Momentum of the rangefinder coupling lever :

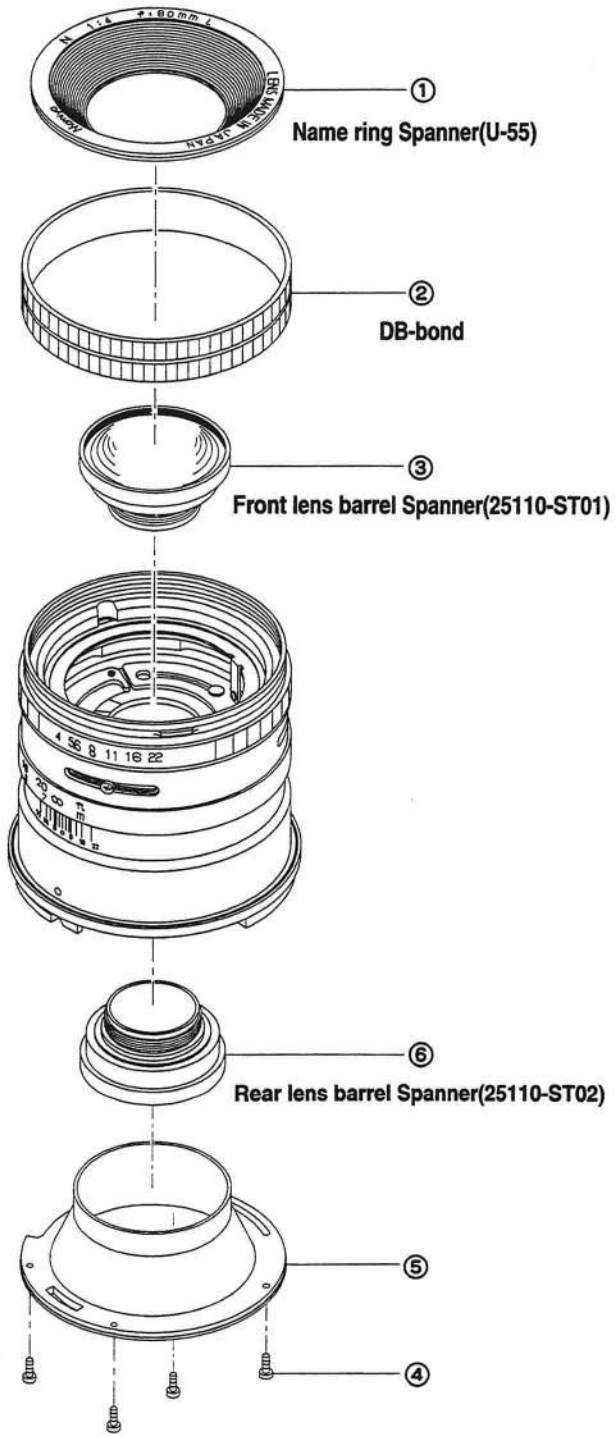
When the lens focusing ring is rotated from the nearest distance to infinity point, momentum of the coupling lever should be 4.1mm for 80mm, 65mm and 43mm lenses and 2.1mm for 150mm lens.
It can be possible to measure by slide calipers or digital micrometer.



65mm



150mm



★Only important procedures for dis/reassembling and adjusting steps will be shown herein.

A. Disassembling

The arabic numeral in a circle indicates the procedure of disassembling.

Tools

U-55	Name ring Spanner
25110-ST01	Front lens barrel Spanner
25110-ST02	Rear lens barrel Spanner

B. Reassembling

1) Reassembling is generally the reverse of the disassembling procedure.
2) Before reassembling the front and rear lenses, sparingly apply X-1 grease on the threads once and wipe up the grease with tissue paper or a piece of cloth.

2 How to remove the shutter unit 1/1 44

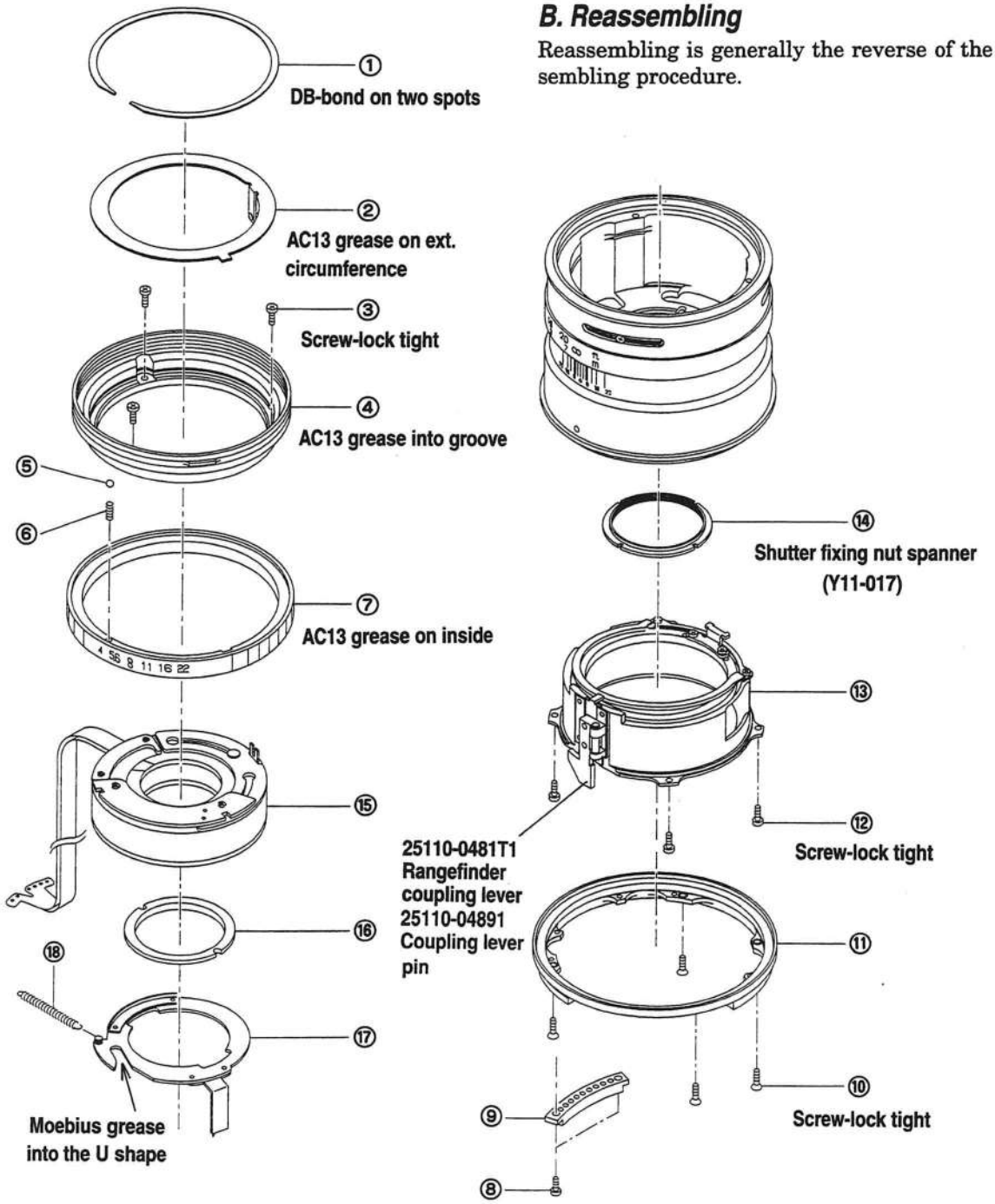
A. Disassembling

The arabic numeral in a circle indicates the procedure of disassembling.

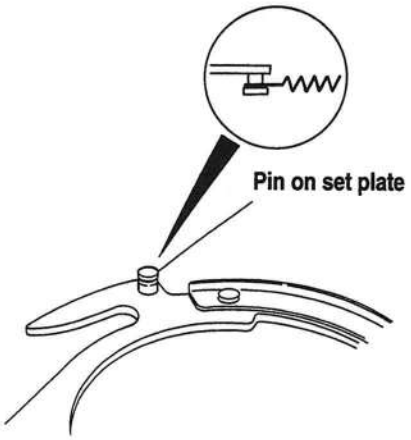
Tool
Y11-017 Shutter fixing nut spanner

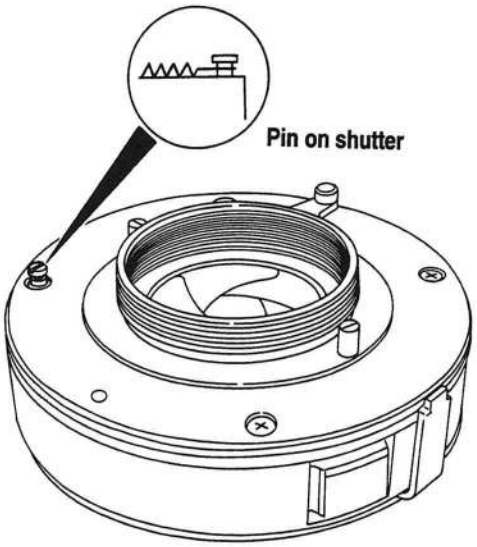
B. Reassembling

Reassembling is generally the reverse of the disassembling procedure.

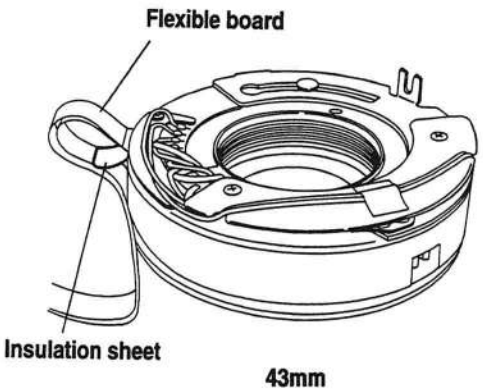


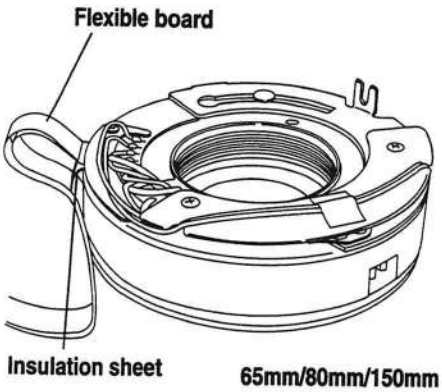
1. Setting direction for the 395-321001 spring for set plate :
Hung the spring as shown in the figures.





2. How to stow away the flexible board with the insulation sheet :
When stowing away the flexible board, make proper slackness.





1 Dis/Reassembling of Front and Rear lens group 1/1

★Only important procedures for dis/reassembling and adjusting steps will be shown herein.

A. Disassembling

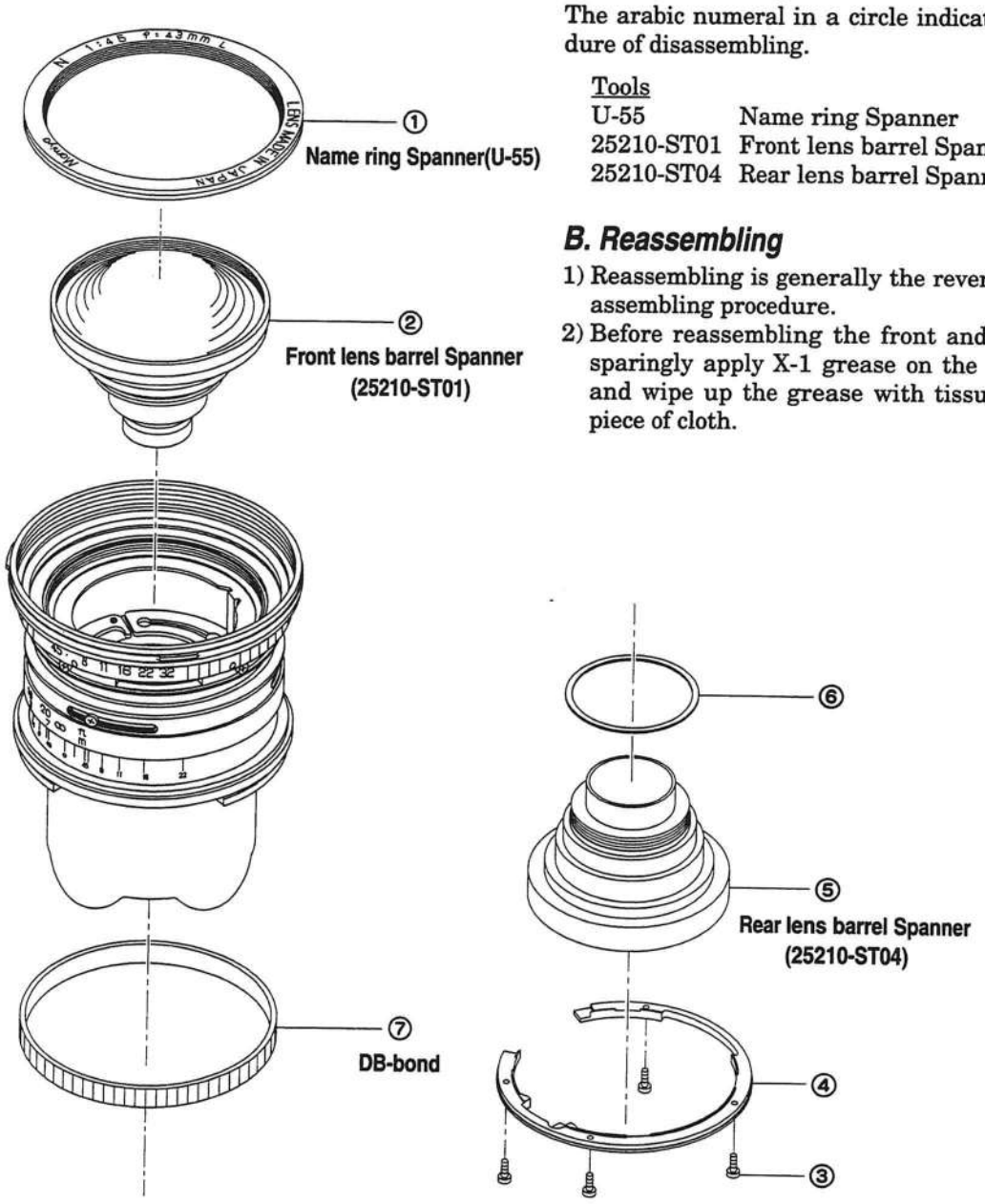
The arabic numeral in a circle indicates the procedure of disassembling.

Tools

U-55	Name ring Spanner
25210-ST01	Front lens barrel Spanner
25210-ST04	Rear lens barrel Spanner

B. Reassembling

1) Reassembling is generally the reverse of the disassembling procedure.
2) Before reassembling the front and rear lenses, sparingly apply X-1 grease on the threads once and wipe up the grease with tissue paper or a piece of cloth.



2 How to remove the shutter unit

1/1 | 47

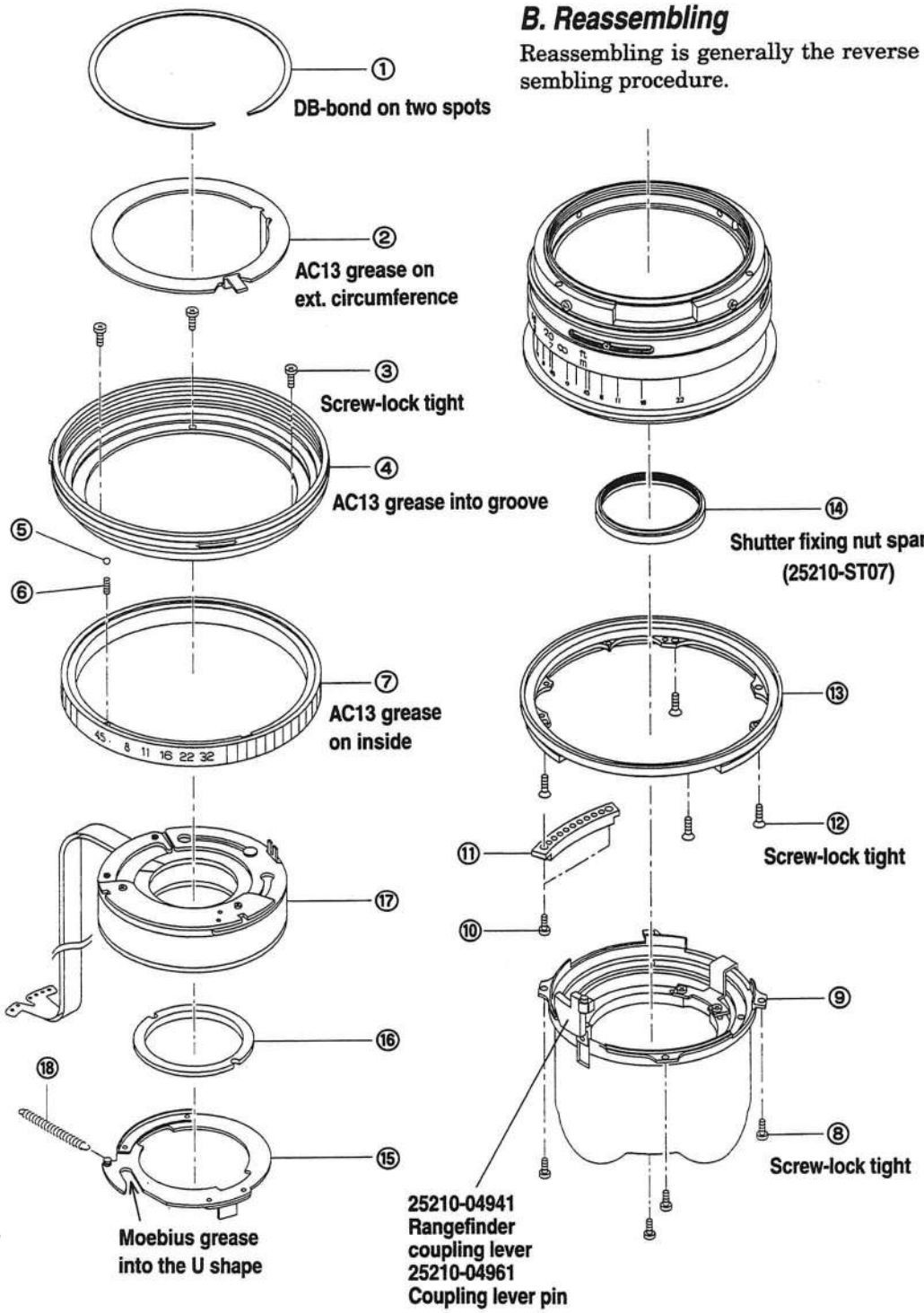
A. Disassembling

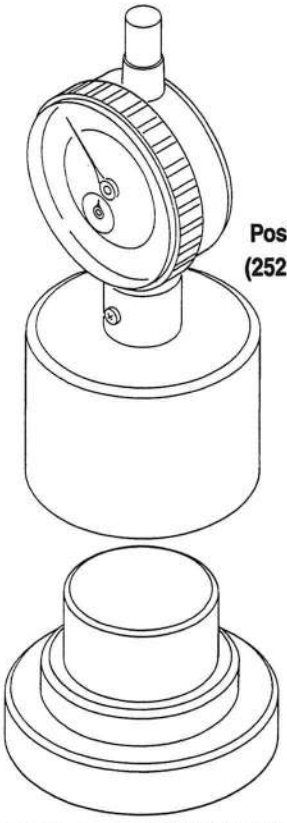
The arabic numeral in a circle indicates the procedure of disassembling.

Tools
25210-ST07 Shutter fixing nut spanner

B. Reassembling

Reassembling is generally the reverse of the disassembling procedure.





Position gauge (25210-ST02-A)

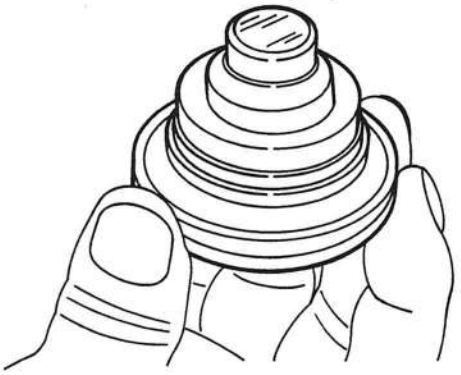
Basic gauge(25210-ST02-B)

1. Set the 25210-ST02-A Position gauge on its Basic gauge B and set the dial gauge indicator to zero by turning the scale ring.
2. Hold the front lens group with your left hand. Carefully set the position gauge A on the front lens group and gently press it down. Read scale of the dial gauge pointed by the indicator and write it down.

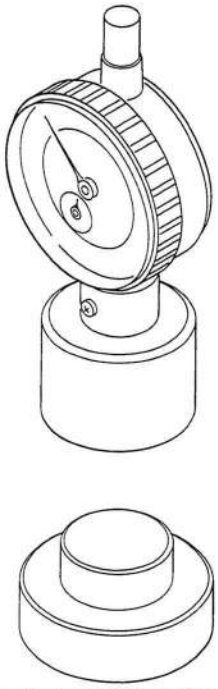
⚠ Caution : ★ Be sure to hold the front or rear lens group with your hand when measuring, but never put it on working table.

★ As the point of the dial gauge shaft directly hits on lens surface, carefully set the position gauge on the lens.

Front lens group



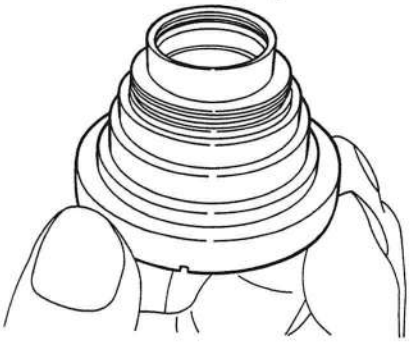
3. Measure the rear lens group as the same way with the front lens group by using the position gauge C and D.

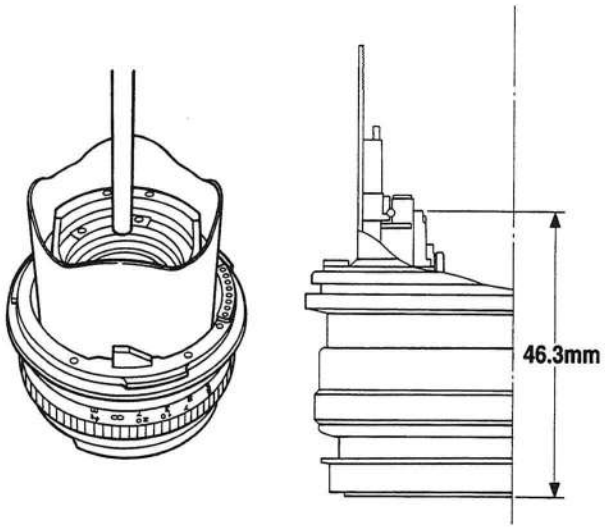


Position gauge (25210-ST05-C)

Basic gauge(25210-ST05-D)

Rear lens group





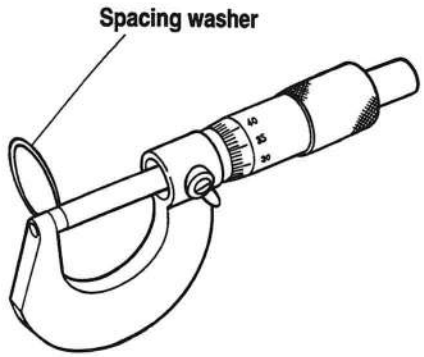
4. Measurement of Helicoid ring
1) Remove the aperture ring (25210-04511) and filter ring (25210-04611).
2) Set the lens focusing ring to ∞ position and place the lens on a flatness stand. Measure height of the helicoid ring at the ∞ by a digital micrometer.
3) The standard height of the helicoid ring is 46.3mm at the ∞. Take the measured value at the above step #2) from the standard height 46.3mm and write it down.

5. Selection of appropriate spacing washer :
An appropriate spacing washer should be calculated as follows :
D : appropriate spacing washer
Y : Base washer 0.5mm
A : Front lens group difference value (#3-2)
B : Rear lens group difference value (#3-3)
C : Helicoid ring height difference (#3-4-3)

$D = Y(0.5) + (A+B) - C$

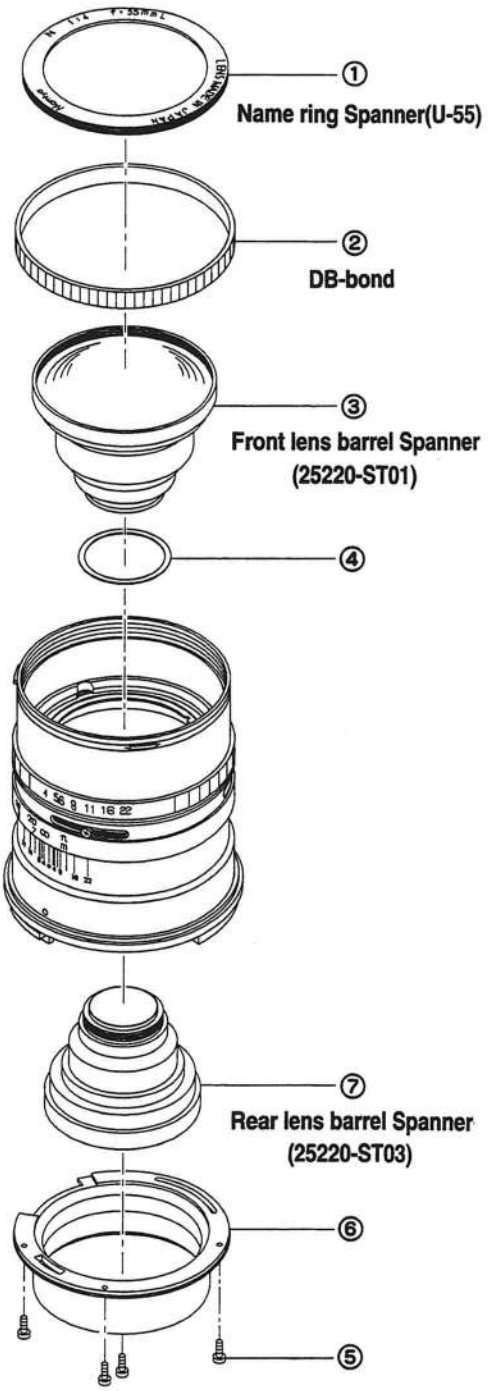
Example	a	b
Y :	0.5	0.5
A :	-0.04	+0.05
B :	-0.02	+0.03
C :	-0.05	+0.02
D :	0.49	0.56

● Select the calculated thickness washer by measuring with a digital micrometer and put it on the rear lens group.
Tolerance of the spacing washer : +0.01



1 | Dis/Reassembling of Front and Rear lens group | 1/1 | 50

★Only important procedures for dis/reassembling and adjusting steps will be shown herein.



A. Disassembling

The arabic numeral in a circle indicates the procedure of disassembling.

Tools

U-55	Name ring Spanner
25220-ST01	Front lens barrel Spanner
25220-ST03	Rear lens barrel Spanner

B. Reassembling

1) Reassembling is generally the reverse of the disassembling procedure.
2) Before reassembling the front and rear lenses, sparingly apply X-1 grease on the threads once and wipe up the grease with tissue paper or a piece of cloth.

2 How to remove the shutter unit 1/1 51

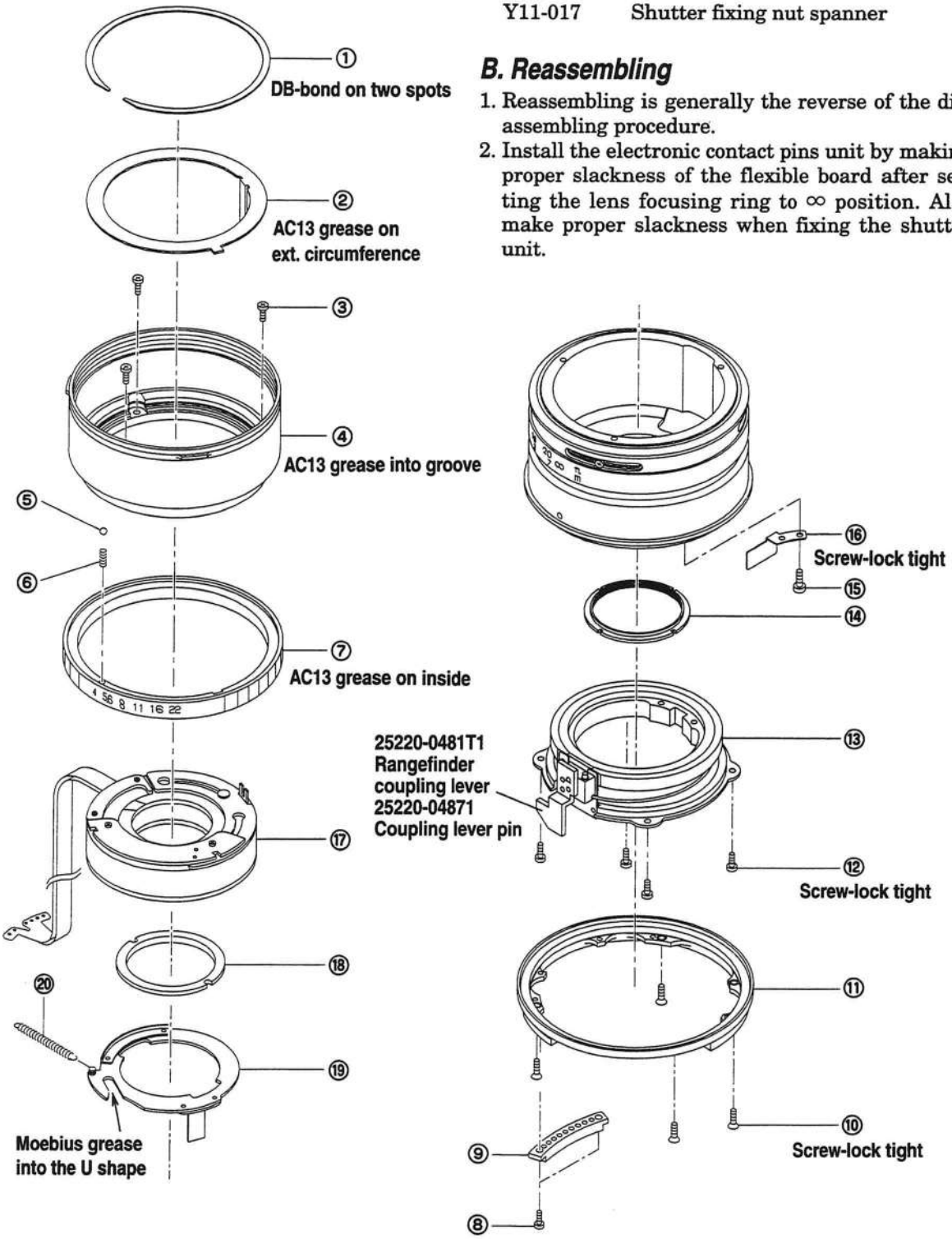
A. Disassembling

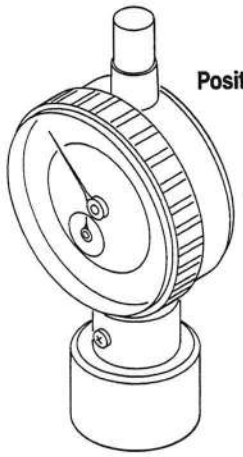
The arabic numeral in a circle indicates the procedure of disassembling.

Tool
Y11-017 Shutter fixing nut spanner

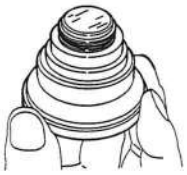
B. Reassembling

1. Reassembling is generally the reverse of the disassembling procedure.
2. Install the electronic contact pins unit by making proper slackness of the flexible board after setting the lens focusing ring to ∞ position. Also make proper slackness when fixing the shutter unit.

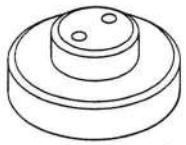




Position gauge(25220-ST05-A)



Front lens group



Basic gauge(25220-ST05-B)

1. Set the 25220-ST05-A Position gauge on its Basic gauge B and set the dial gauge indicator to zero by turning the scale ring.
2. Hold the front lens group with your left hand. Carefully set the 25220-ST05-A position gauge on the front lens group and gently press it down. Read scale of the dial gauge pointed by the indicator and write it down.

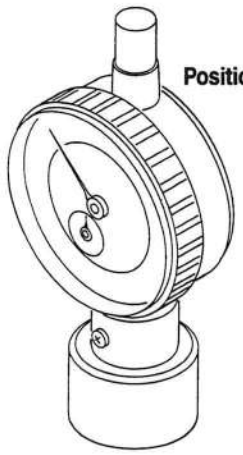
⚠ Caution : ★ Be sure to hold the front or rear lens group with your hand when measuring, but never put it on working table.

★ As the point of the dial gauge shaft directly hits on lens surface, carefully set and press it down on the lens.

3. Measure the rear lens group as the same way with the front lens group by using the position gauge C and D.
4. Selection of appropriate spacing washer :
   An appropriate spacing washer should be calculated as follows :
   D : appropriate spacing washer
   Y : Base washer 0.3mm
   A : Front lens group difference value (#3-2)
   B : Rear lens group difference value (#3-3)

   $D = Y(0.3) + (A+B)$

Example	a	b
Y :	0.3	0.3
A :	-0.03	+0.05
B :	-0.02	+0.03
D :	0.25	0.38



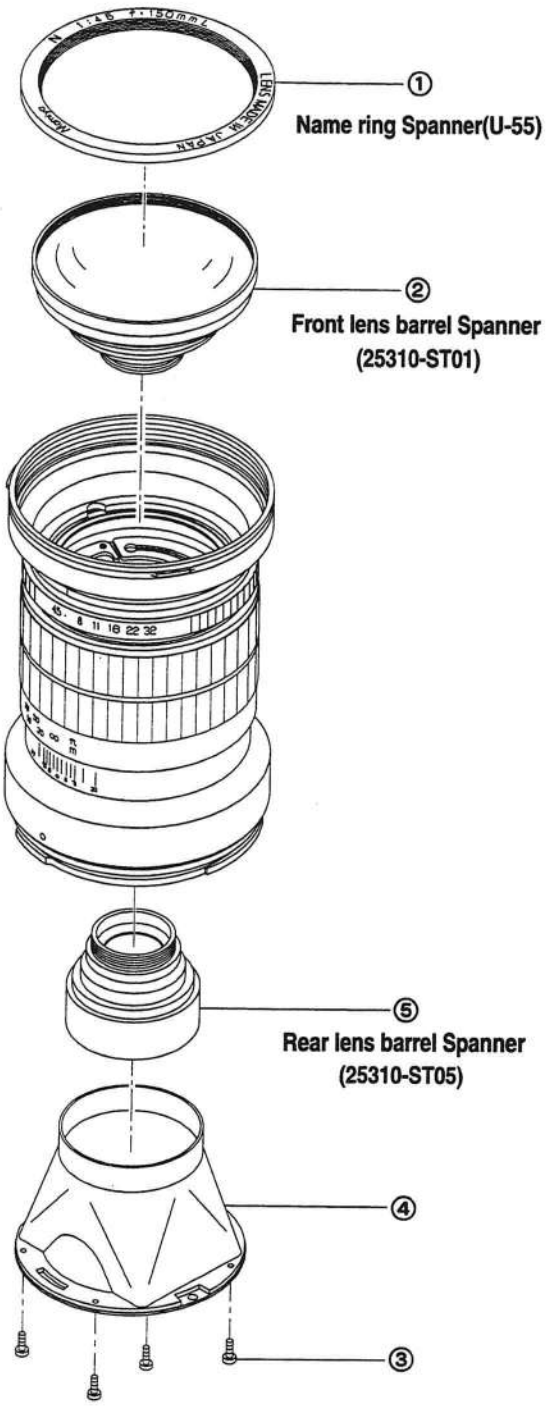
Position gauge(25220-ST06-C)

Rear lens group

Basic gauge(25220-ST06-D)

● Put the calculated thickness washer on the rear lens.
Tolerance of the spacing washer : +0.03

1 Dis/Reassembling of Front and Rear lens group 1/1



★Only important procedures for dis/reassembling and adjusting steps will be shown herein.

A. Disassembling

The arabic numeral in a circle indicates the procedure of disassembling.

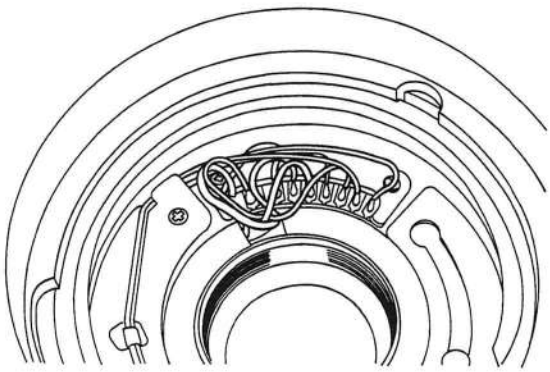
Tools

U-55	Name ring Spanner
25310-ST01	Front lens barrel Spanner
25310-ST05	Rear lens barrel Spanner

B. Reassembling

1) Reassembling is generally the reverse of the disassembling procedure.
2) Before reassembling the front and rear lenses, sparingly apply X-1 grease on its threads once and wipe up the grease with tissue paper or a piece of cloth.

⚠ Caution : When installing the front lens group, pay your attention not to cut or pinch leadwires of the shutter. Put the leadwires in order first and then install the front lens.



2 Adjustment of Range-lever cam ring 1/1 54

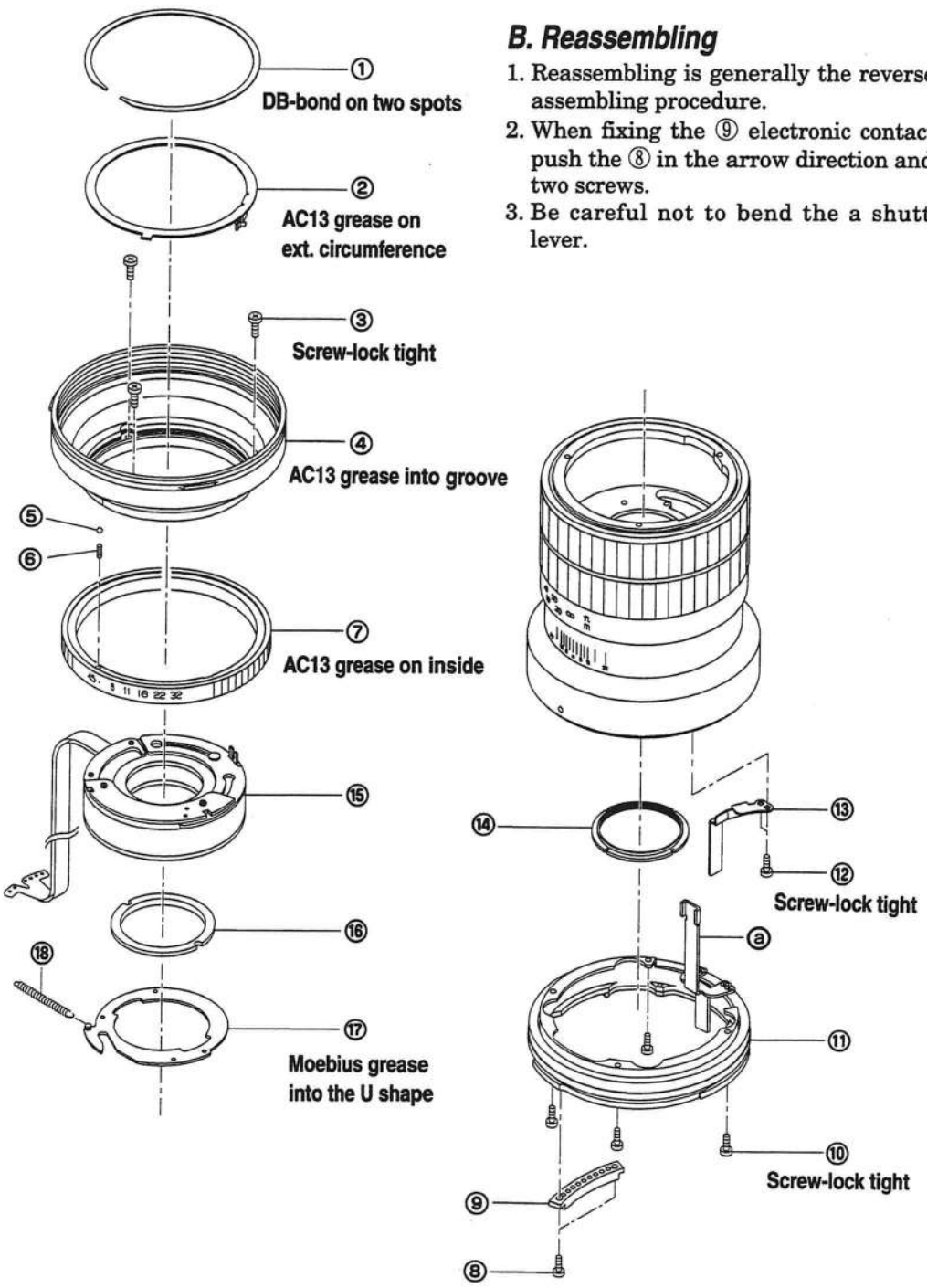
A. Disassembling

The arabic numeral in a circle indicates the procedure of disassembling.

Tool
Y11-017 Shutter fixing nut spanner

B. Reassembling

1. Reassembling is generally the reverse of the disassembling procedure.
2. When fixing the ⑨ electronic contact pins unit, push the ⑧ in the arrow direction and tighten its two screws.
3. Be careful not to bend the a shutter cocking lever.



If it is difficult to turn the adjusting screw, remove the coupling lever unit.

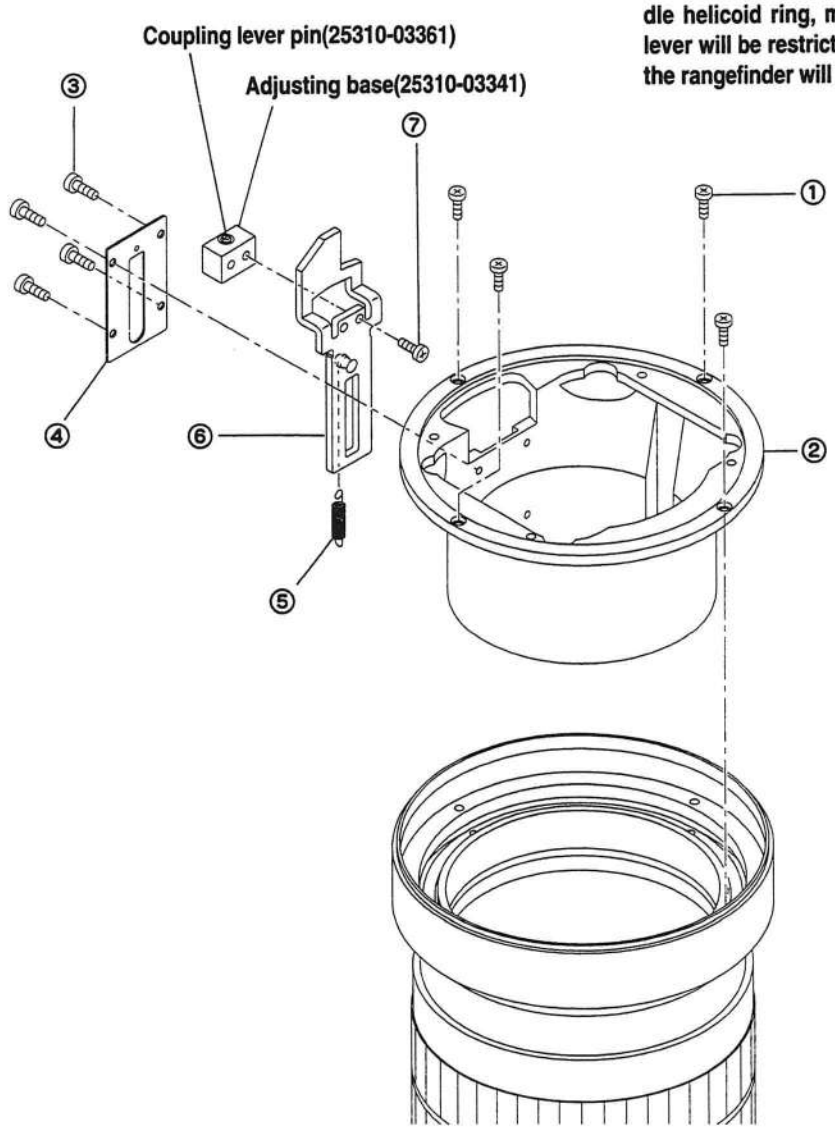
A. Disassembling

1. The arabic numeral in a circle indicates the procedure of disassembling.
2. Remove 25310-03341 adjusting base and 25310-03361 coupling lever pin.

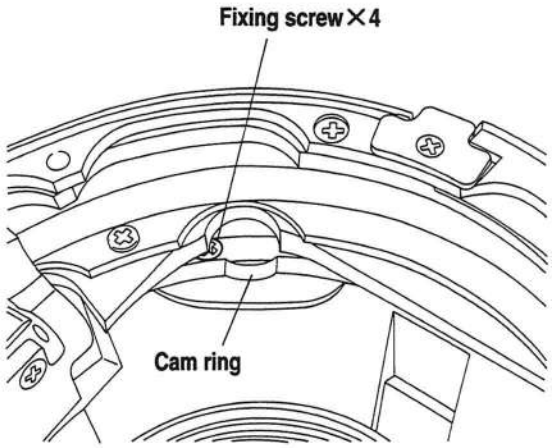
B. Reassembling

1. Reassembling is generally the reverse of the disassembling procedure.
2. After adjusting infinity position of the coupling lever, carefully apply a very little amount of the screw-lock tight #408 on the screw threads.

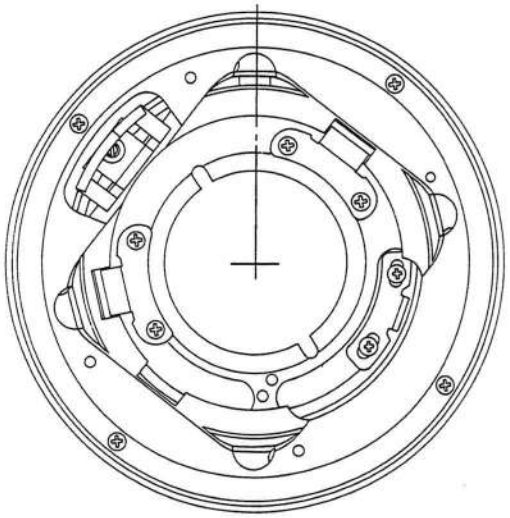
⚠ Caution : Never drip the screw-lock tight on other parts. If the screw-lock tight penetrates into the middle helicoid ring, momentum of the coupling lever will be restricted. So correct operation of the rangefinder will not be performed.



4 How to remove the shutter unit

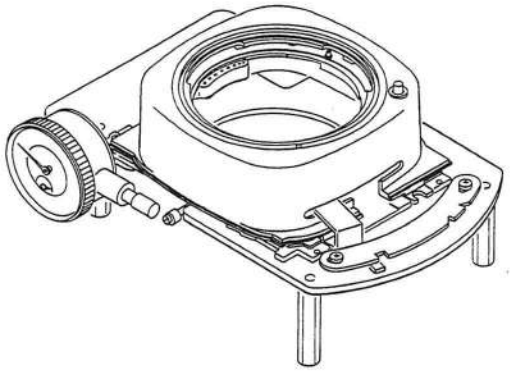
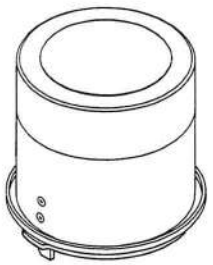


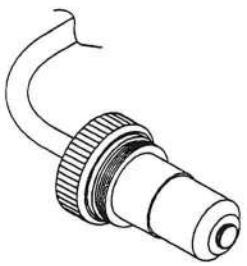
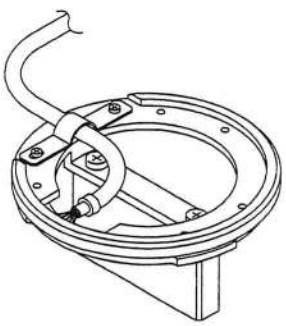
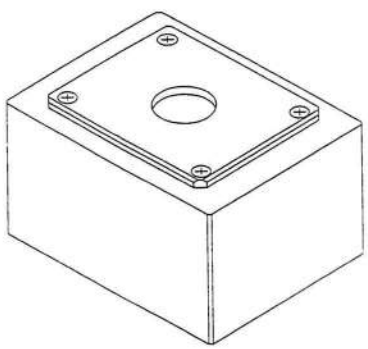
1. First carry out adjustment of the lens infinity focusing (Chapter #2) and ∞ position of the rangefinder coupling lever (Chapter #4).
2. Set the lens focusing ring to ∞ position. Adjust the cam ring as shown in the Fig. - after loosening the four fixing screws.

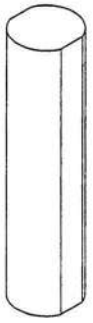
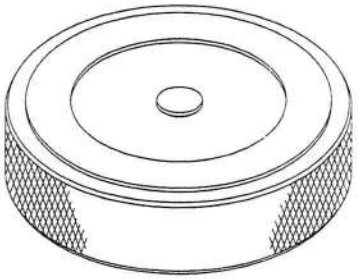
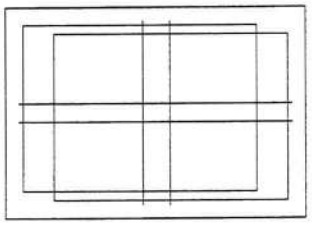
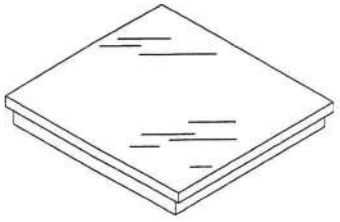


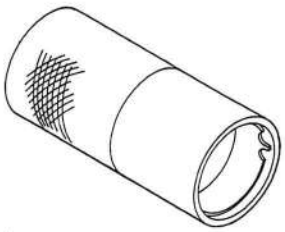
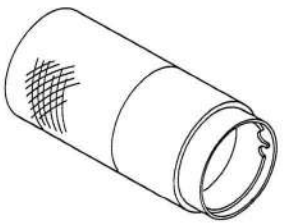
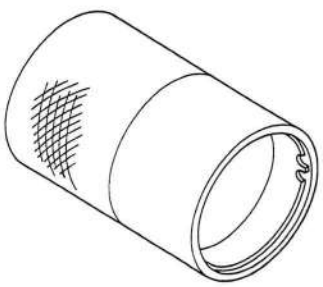
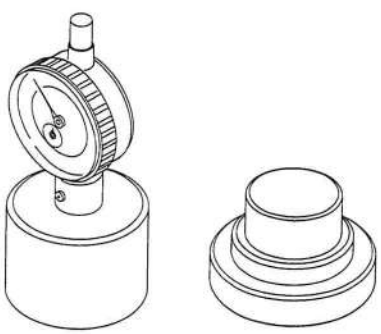
Tool

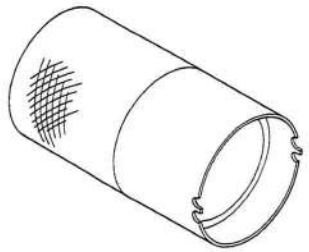
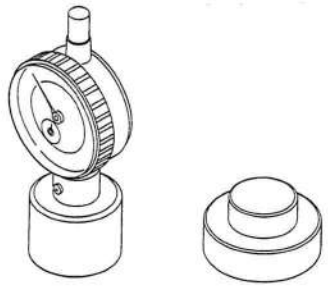
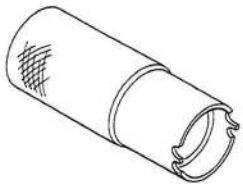
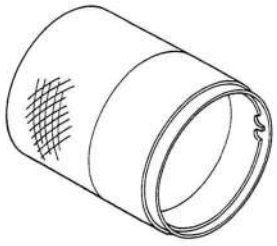
1 | Special instruments and hand tools | 1/7 | 57

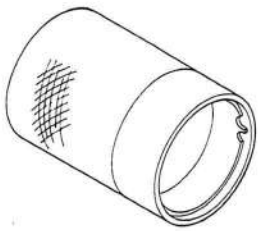
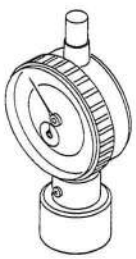
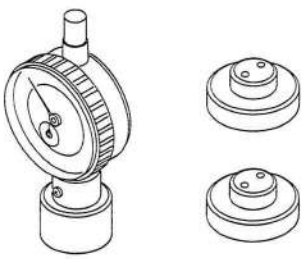
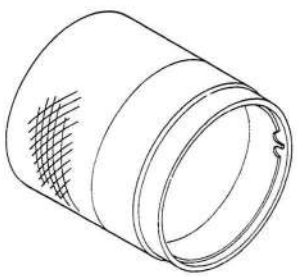
Tool No.	Description	Sketch
25-ST01	Multiple instrument * Lens focusing adjustment * Shutter cocking angle adjustment * Rangefinder coupling lever adjustment at ∞ * In connecting with the EE tester (Y11-001)	
25-ST02	Basic tube for lens infinity focusing check * with 25-ST01 multiple instrument	
25-ST03	Rangefinder coupling lever Basic tube : * Use as the shutter cocking angle gauge or zero point gauge for the rangefinder coupling lever ∞ position with 25-ST01 multiple instrument.	
25-ST04	Working stand for lens * For protecting the rangefinder coupling lever and shutter cocking lever	

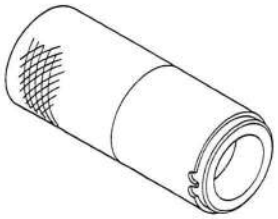
Tool No.	Description	Sketch
25-ST05	Sloping step * In order to protect the electronic contacts on lens bottom, temporarily put the sloping step after removing the mount cover.	
25-ST06	Dummy battery * Use for battery leakage test.	
25-ST07	AE/Time Adapter * For AE-exposure time with EE-Tester. (Y11-001)	
25-ST08	Camer body supporter	

Tool No.	Description	Sketch
25-ST09	Block gauge for Camera body flange-back(81.35mm)	
25-ST10	Bayonet mount flatness gauge	
25-ST11	Chart for Rangefinder	
25-ST12	Focusing glass(Ground glass) * For checking parallax	

Tool No.	Description	Sketch
25110-ST01	Front lens barrel Spanner / N 80mm F4	
25110-ST02	Rear lens barrel Spanner / N 80mm F4	
25210-ST01	Front lens barrel Spanner / N 43mm F4.5	
25210-ST02-A 25210-ST02-B	Position gauge / N 43mm F/4.5 front lens Basic gauge / N 43mm F/4.5 front lens	

Tool No.	Description	Sketch
25210-ST04	Rear lens barrel spanner / N 43mm F/4.5	
25210-ST05-C 25210-ST05-D	Position gauge / N 43mm F/4.5 rear lens Basic gauge / N 43mm F/4.5 rear lens	
25210-ST07	Shutter fixing nut spanner / N 43mm F/4.5 lens	
25220-ST01	Front lens barrel spanner / N 65mm F4	

Tool No.	Description	Sketch
25220-ST03	Rear lens barrel spanner / N 65mm F4	
25220-ST05-A 25220-ST05-B	Position gauge / N 65mm F4 front lens Basic gauge / N 65mm F4 front lens	
25220-ST06-C 25220-ST06-D	Position gauge / N 65mm F4 rear lens Basic gauge / N 65mm F4 rear lens	
25310-ST01	Front lens barrel spanner / N 150mm F4.5	

Tool No.	Description	Sketch
25310-ST05	Rear lens barrel spanner / N 150mm F4.5	

	For clearer bright frame	1/1	TB95002

In order to make the bright frame clearer following has been done.

1) Shape and material of the 25010 18851 reflector were changed.
   color of reflecting surface became champagne gold.

2) 25010 26781 frame for reflector was newly added.

Attachment step of the new reflector

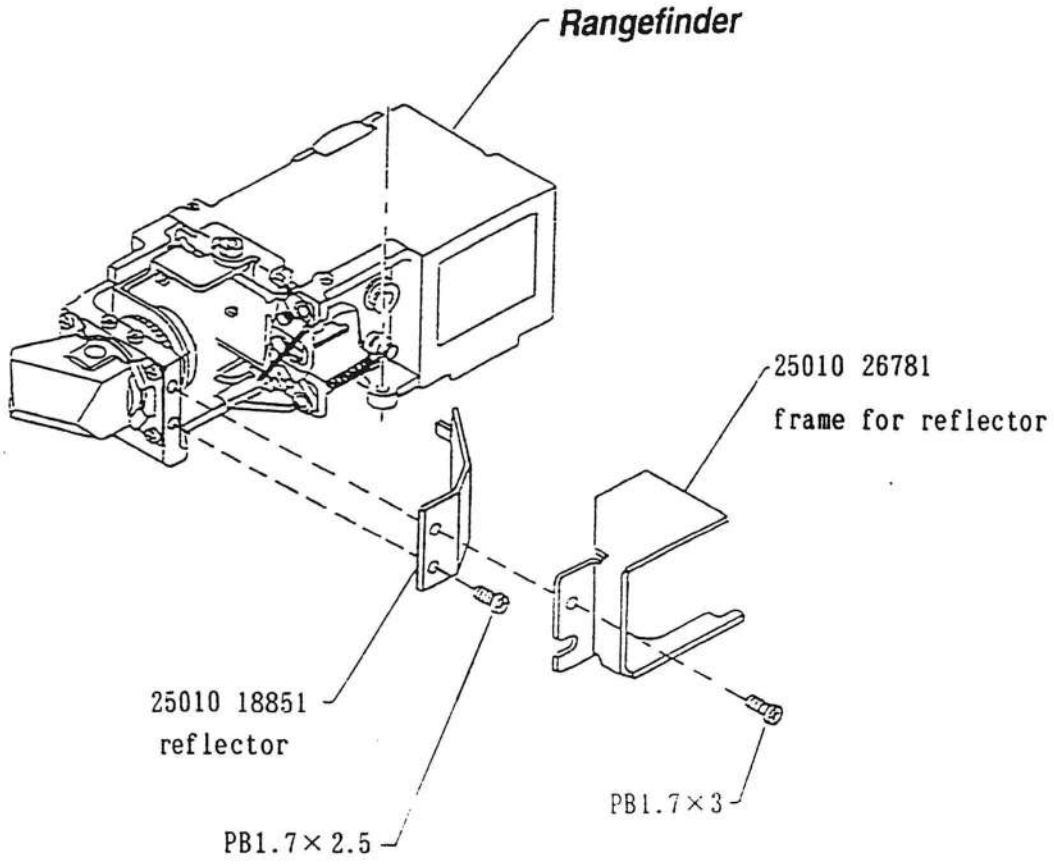
1. Remove the old type reflector after removing the top cover.

2. Attach the new type reflector with a PB1.7×2.5 screw.

3. Attach the 25010 26781 frame for reflector with a PB1.7×3 screw.

Note : This modification will be done at our factory from production lot in October 1995.

Identification serial No. : on and from



7	TECHNICAL BULLETIN

	Modification of the cam lever	1/1	TB95003

In order to make on easy adjustment of the rangefinder the cam lever will be modified.

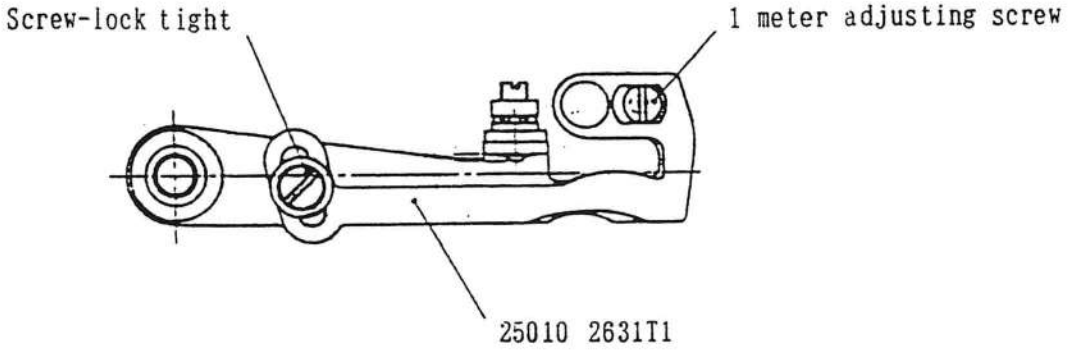
1. Main modification :
   - Change of location of the 1 meter adjusting screw.
   - Abolition of the locking screw.

2. Replacement :
   It can be possible to replace an old cam lever with a new one without any change.

3. Execution time of the new cam lever :
   The new cam lever will be fixed into the rangefinder unit from November production lot 1995.

   ※ Identification serial No. : on and from " OK 1001 "

OLD TYPE



NEW TYPE