

***Nikon* F**

**PHOTOMIC-T<sub>N</sub> FINDER**

(Work No. 20FD5)

**PHOTOMIC FT<sub>N</sub> FINDER**

(Work No. 20FD9)

**NIPPON KOGAKU K.K.**

Tokyo, Japan

**Nikon F**

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(Work No. 20FD5)

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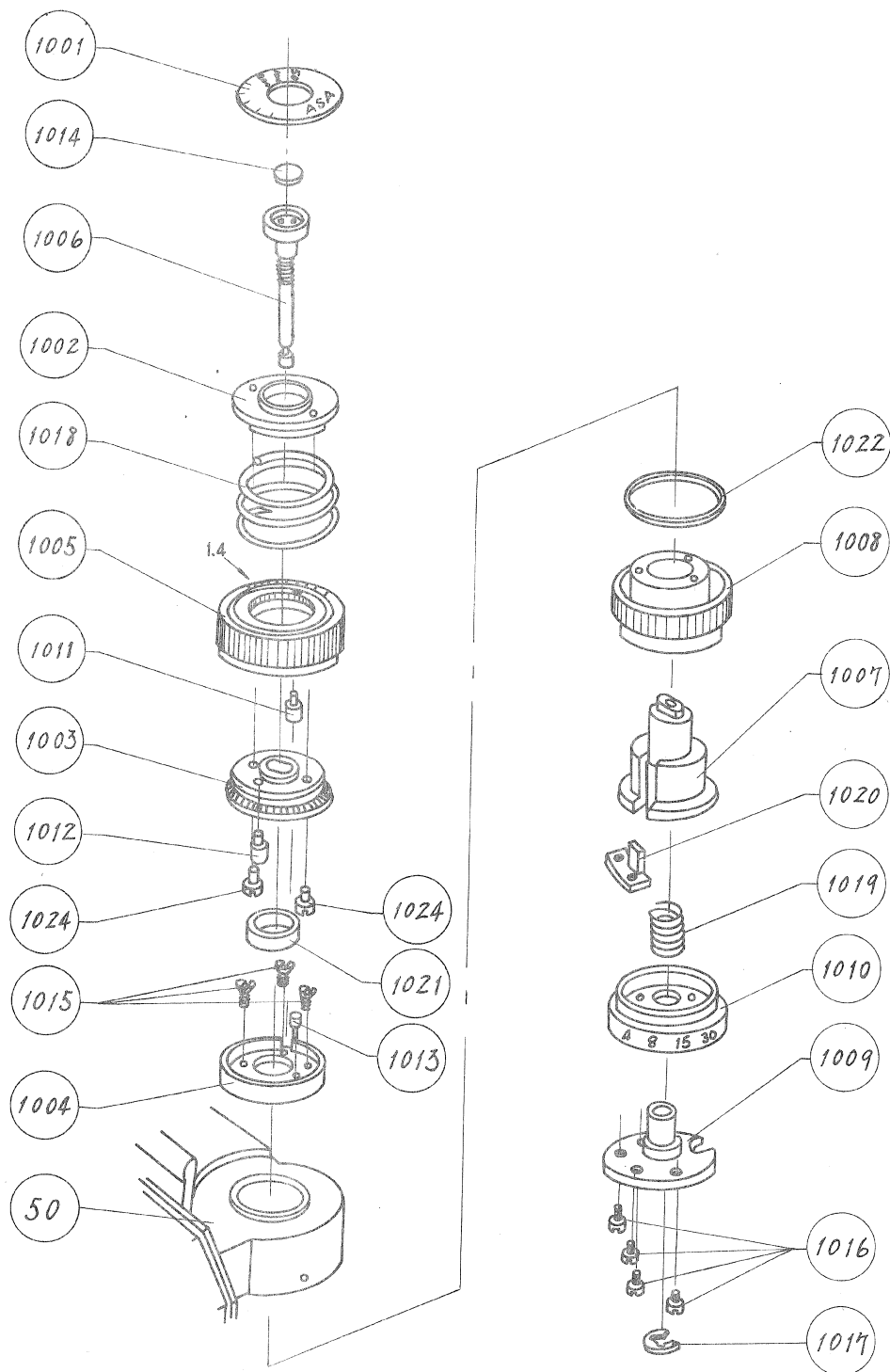
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CONTENTS

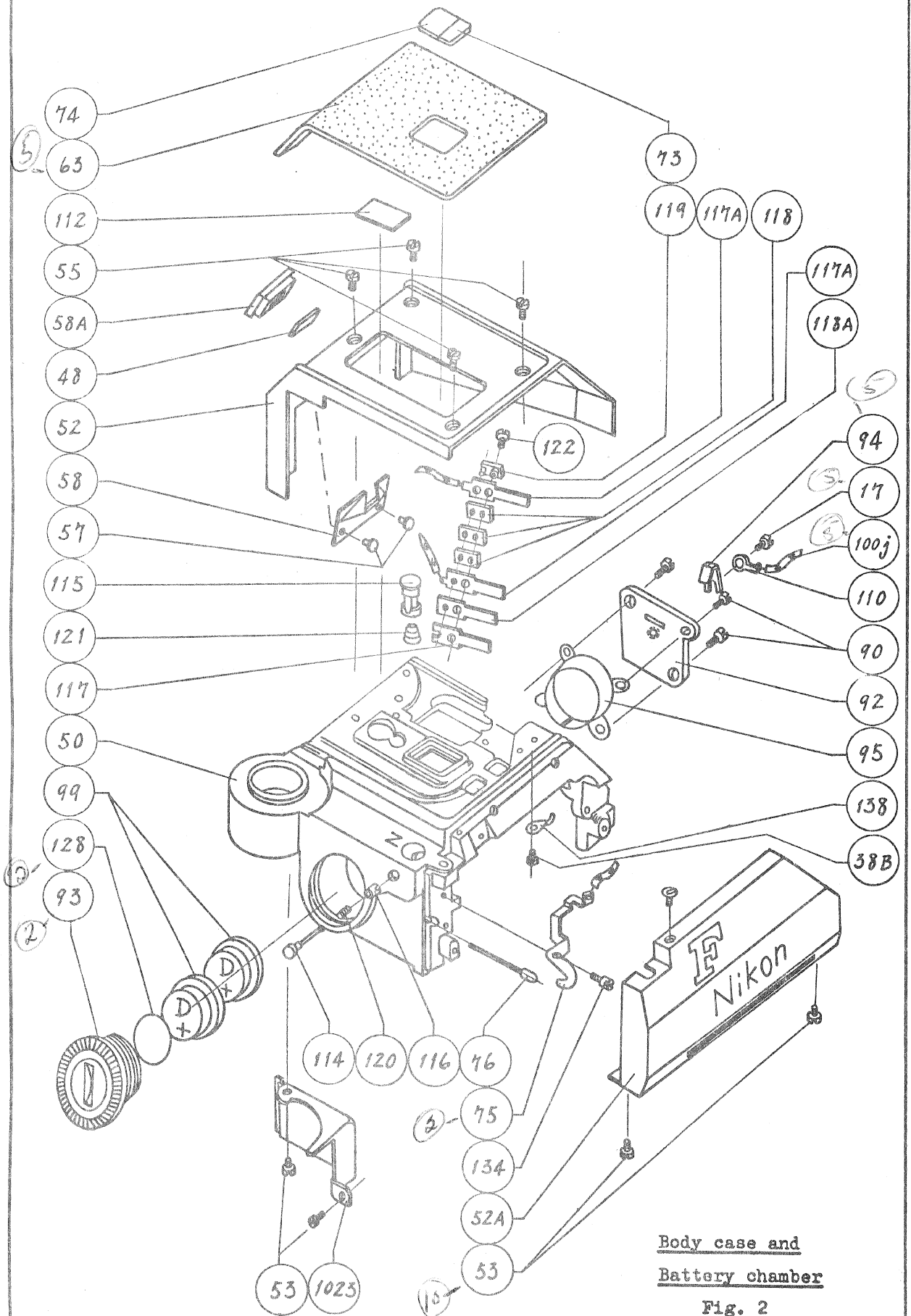
	<u>Page</u>
Partial exploded views (Fig. 1 — Fig. 6) .....	2 - 7
Disassembly and replacement .....	8
§ 1. Replacing ASA (Film speed) scale plate .....	8
§ 2. Replacing T-dial knob #1005 .....	8
§ 3. Replacing T-dial coupling subassembly A10 .....	8
§ 4. Disassembling T-dial gear #1008 .....	8
§ 5. Replacing top cover assembly A1 (#52, #58, #59 x 2) .....	9
§ 6. Malfunction of switch .....	9
§ 7. Replacing mirror base subassembly A6 (#44 and G7) .....	11
§ 8. Aperture coupling subassembly A3 .....	11
§ 9. Replacing meter subassembly B1 (#96, #36, and #100C) .....	13
§ 10. Replacing resistor gear subassembly B3 (#21 and #97) .....	13
§ 11. Replacing semi-fixed resistor #89 .....	14
§ 12. Replacing CdS cells #98 .....	15
§ 13. Adjusting the position of functional resistor .....	15
§ 14. Replacing pentaprism subassembly A8 (G1, G4, G7 x 2) .....	16
§ 15. Replacing the eyepiece subassembly A11 (G5, G6) .....	17
§ 16. Correcting the position of meter pointer needle window in the eyepiece .....	17
§ 17. Cleaning the pentaprism subassembly A8 .....	18
§ 18. Cleaning the eyepiece subassembly A11 .....	19
§ 19. Dusting the meter needle window .....	19
§ 20. Tools to be used for dis- and reassembling .....	19
§ 21. Specifications of main parts .....	19
§ 22. Adjustment .....	22
§ 23. Adjustment of the meter when the following parts replaced ....	25
§ 24. Circuit chart .....	30
§ 25. Trouble chart .....	31
§ 26. Combination of 20FD5 (Photomic-TM Finder) with Nikon F camera .....	34
§ 27. Conditions to be fulfilled for brightness measurement .....	34
§ 28. Tools and testers to be used for repair .....	36



Shutter and ASA dial

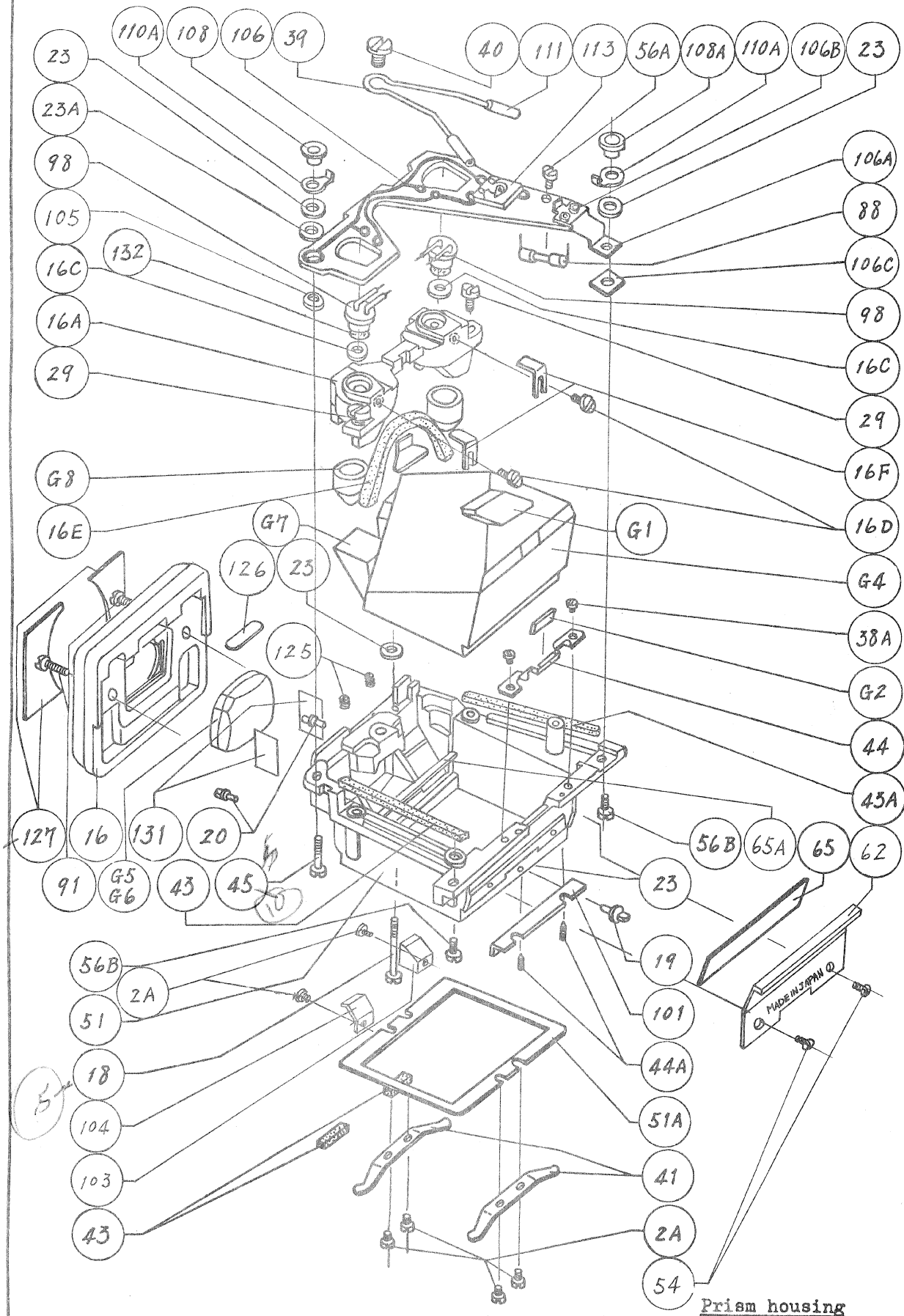
Fig. 1





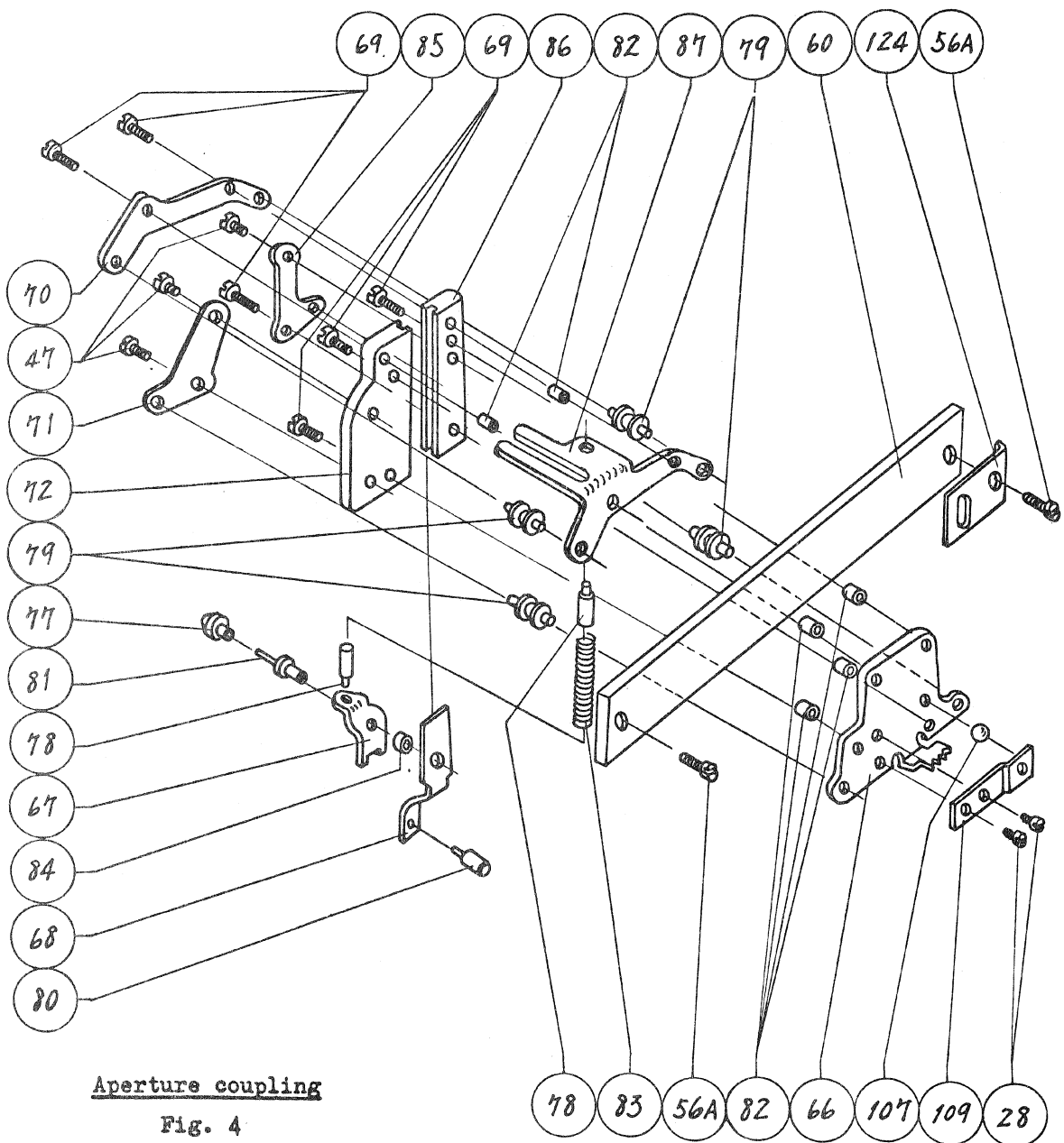
Body case and  
Battery chamber

Fig. 2



Prism housing

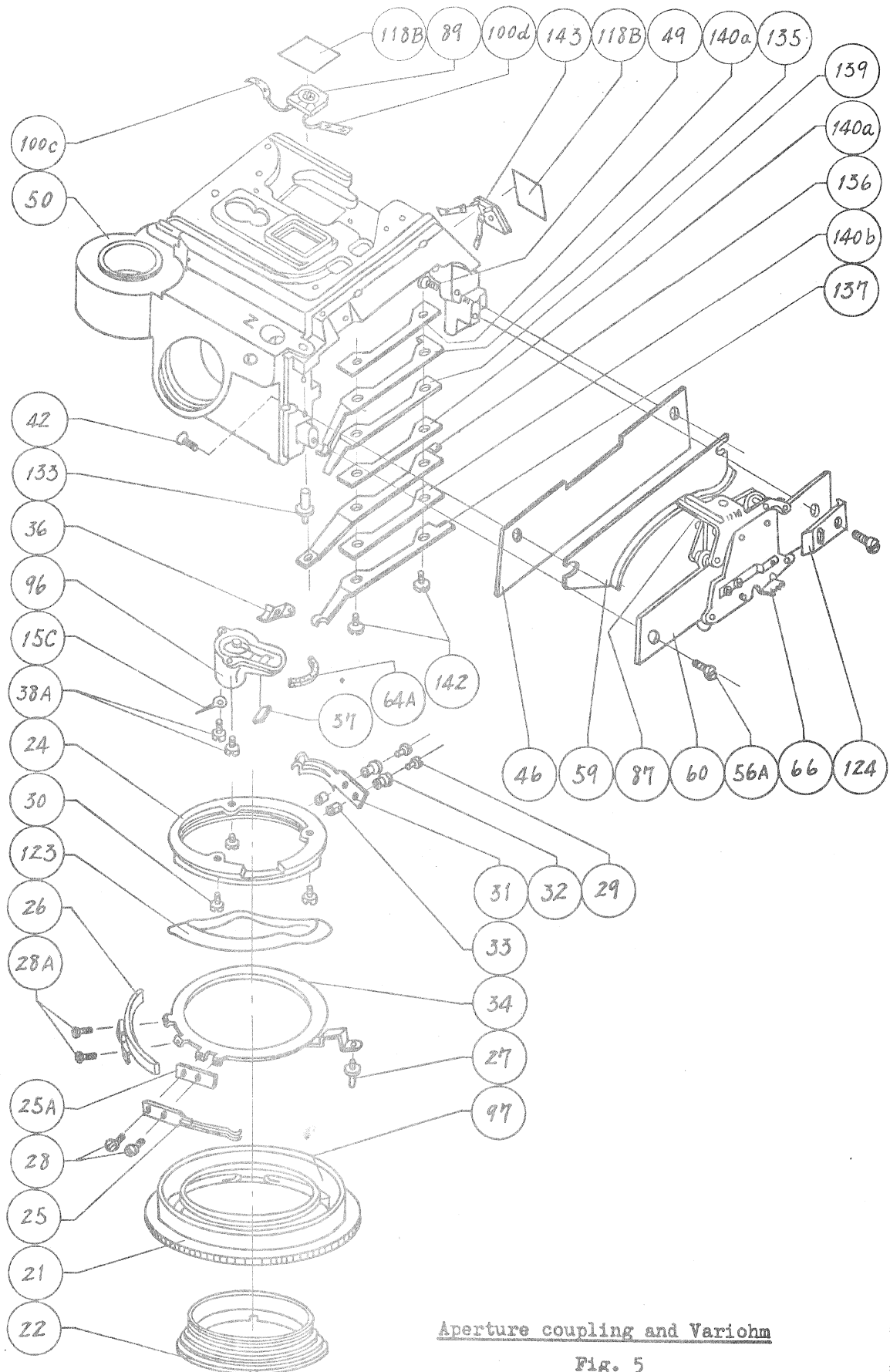
Fig. 3



Aperture coupling

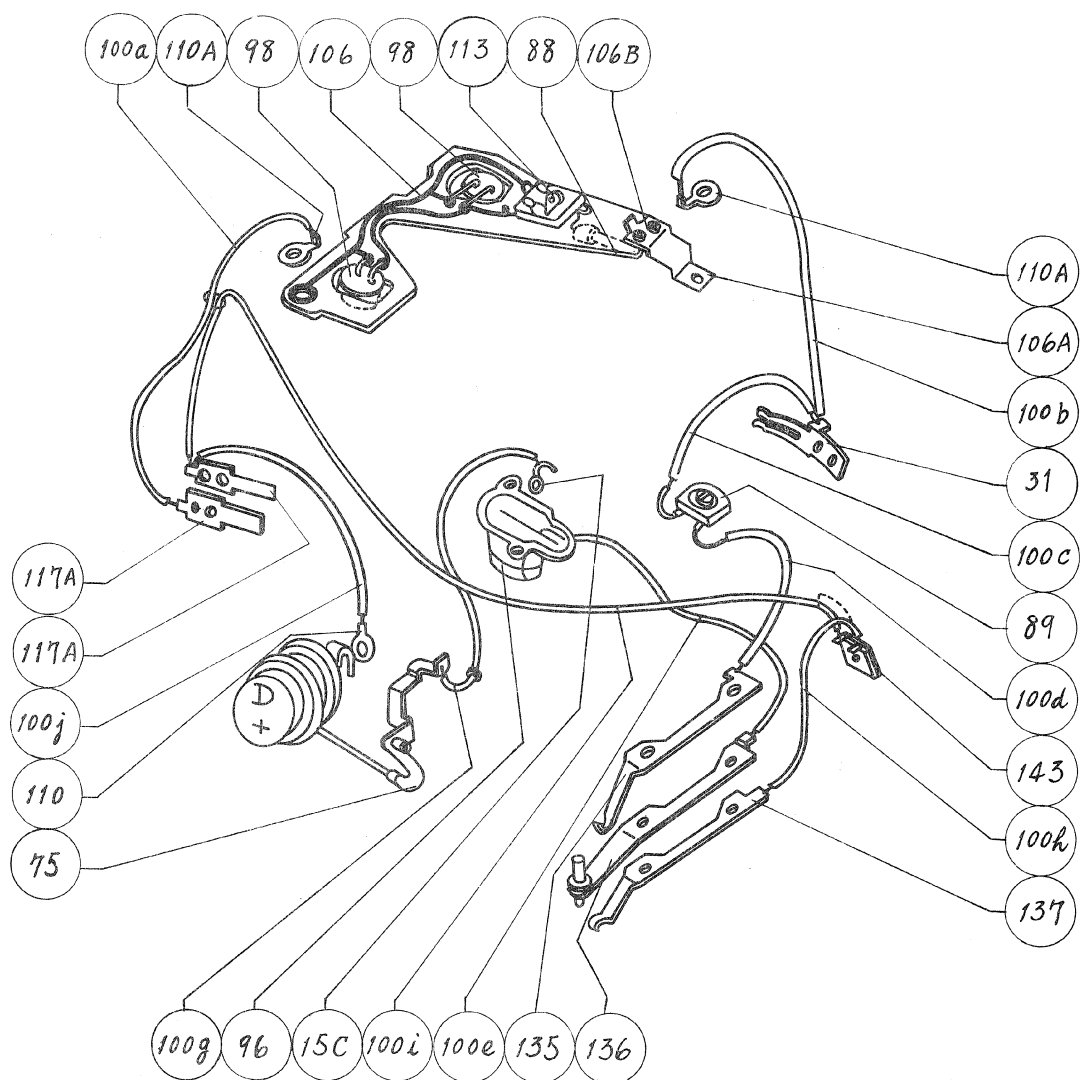
Fig. 4

N.K.K. J-434 A4 1-4 2000 H



Aperture coupling and Variohm

Fig. 5



Wiring diagram

Fig. 6

## Disassembly and Replacement

§ 1. Replacing ASA (Film speed) scale plate. See Fig. 1.

- 1-1 Take off the ASA scale plate, bringing the ASA figure 100 to the index 1.4.
- 1-2 Stick on the new plate in the same position, the figure 100 being set to the index 1.4.

Caution: Be sure that by turning T-dial knob #1005 the ASA figure 20 can be set to the index 1.4 but not to the red index 1.2. This is necessary for placing the specified limit upon the coupling range.

§ 2. Replacing T-dial knob #1005. See Fig. 1.

- 2-1 Pull out C-clip #1017 and then take off the T-dial coupling subassembly A10.
- 2-2 Peel off leatherlet #1014. Unscrew the fastening screw (#1006) (also cemented).
- 2-3 The T-dial knob will be removed together with clutch attaching plate #1002 and clutch #1003.
- 2-4 Release screws #1024. Replace the T-dial knob.

Caution: Do not change its relationship to the T-dial coupling subassembly A10.

§ 3. Replacing T-dial coupling subassembly A10. See Fig. 1.

- 3-1 Perform 2-1.
- 3-2 Releasing screws #1016, replace the T-dial coupling subassembly A10.

§ 4. Disassembling T-dial gear #1008. See Fig. 1, 2, 3 and 5.

- 4-1 Unscrew setting screws #18, #45, #56 and #56B from the prism housing subassembly A2.

Dismount from the body the prism housing together with pentaprism subassembly A8 and eyepiece subassembly A11 and others.

- 4-2 Perform #1, and #2.
- 4-3 Unscrew bottom cover set screws (#53) to remove bottom cover #1023.
- 4-4 Mark the deepest gearing positions on the attaching gear (#21) of the functional resistor B2 and on the T-dial gear (#1008).
- 4-5 Release screws #1015 to remove the T-dial gear.

Cautions in reassembling:

- 4-a Observe the cautions given in §1 and §2.
- 4-b Use oil G8181.
- 4-c To get the accuracy, see #13.

§ 5. Replacing top cover assembly A1 (#52, #58, #59 x 2). See Fig. 2.

- 5-1 While peering off black leatherlet #63, remove aperture window subassembly A13 (frame #58A and acryl window #48).
- 5-2 Unscrew cover setting screws #55 to remove the subassembly A1 (top cover #52, aperture window holder #58 and screws #57).
- 5-3 Replace the top cover subassembly A1.
- 5-4 #63 will also be replaced with the new one.

§ 6. Malfunction of switch. See Fig. 1, 2, 3, and 5.

A. Malfunction of switch change-over plate.

- 6A-1 Perform §4-1.
- 6A-2 Perform §4-3.
- 6A-3 Mark the gearing positions on #21 (resister attaching gear) and #1008 (T-dial gear).

6A-4 Perform §5-1 and §5-2.

6A-5 Unsolder fixed brush #31.

Unscrew meter case setting screws #38A to make free the meter sub-assembly (B1) (#96, #36 and #100C).

Note that the meter subassembly is connected to the body only by lead wire.

6A-6 Unscrew the screws for attaching the functional resistor subassembly (B2).

Taking good care, remove the functional resistor subassembly (B2), (#21, #22, #24, #25, #25A, #26, #27, #28 x 4, #29 x 2, #31, #32 x 2, #34, #97, and #123).

6A-7 Unscrew battery bottom plate setting screws #90 to remove battery bottom plate #92 and polar spring #94.

6A-8 Releasing change-over plate spring setting screws #122, remove switch protecting plate #117, switch contact #117A, switch insulating plate #118, switch insulating plate A #118A and switch retainer #119.

Replacement of #117A requires unsoldering.

#### B. Malfunction of switch button.

6B-1 Perform 6A-1, 6A-2, 6A-3, 6A-4, 6A-5 and 6A-6.

6B-2 Draw out #112, to make free #117, #117A, #118 and #118A.

6B-3 Inserting a screw driver into the slot in the setting nut #116, and holding #114 (change-over button A), release #116 to draw out.

6B-4 #114 will now be taken out together with the spring A (#120).

Also #115 (change-over button B) can be removed, although the spring B (#121) may remain in the hole in the body (#50).

#### Cautions to be taken in reassembling:

6-a Fasten tightly #116 and #114.



6-b Do not change the gearing position of #21 (Resistor attaching gear) to #1008 (T-dial gear).

6-c The bottom surface of #21 is not be brought into contact with #117A and #94 (pole spring).

6-d Take good care in handling the meter (#96).

§ 7. Replacing mirror base subassembly A6 (#44 and G7). See Fig. 3.

7-1 Refer to 4-1.

7-2 Unscrew #38A (mirror base setting screws). Take out mirror base subassembly A6 (#44 and small mirror G2) from the prism housing (#51).

7-3 Replace mirror base subassembly A6.

7-4 The mirror G2 is stucked on the mirror base (#44).

Cautions to be taken in reassembling:

7-a The angle of the mirror base subassembly is to be adjusted by manipulating the adjusting screws (#44A).

7-b Stick the mirror, taking care to avoid bending and detaching.

7-c Mirror base #44 should be mounted after the mirror has perfectly stucked.

§ 8. Aperture coupling subassembly A3. See Fig. 4 and 5.

A. If the movement of vertical slider #68 or the sliding of slider shoe A #72 and of B #86 slider shoe B is not smooth,

8A-1 Unscrew front cover screws #53 to remove front cover #52. See Fig. 2.

8A-2 Unscrew rail setting screws #56A. Take out the aperture coupling subassembly A3, taking care not to let #68, #77 and #83 (slider spring) spring out.

8A-3 Remove #60 (rail), #68 and #83. Be careful that the steel balls

(#107) will not get lost.

- 8A-4 Release three of slider setting screws #69 on #77 and #86.
- 8A-5 Insert #68 into the groove between #72 and #86. By pushing nearer #86 and fastening #69, ensure smooth sliding of #68.
- 8A-6 Release two of screws #69 on #70 (bogie plate). Move #70 and #87 (groove plate) to ensure the smooth operation of #72 and #86.

Cautions to be taken in reassembling:

- 8A-a See that the revolution of the aperture ring (#34) is smooth.
- 8A-b In attaching #60 to #50 (body), hang the roller (#79) on the sliding cam (#56), insert the coupling pin (#27) into the groove on #87 and fasten it with #56 A.
- 8A-c Use oil #G8181.

B. If the revolution of the aperture ring (#34) is not correct,

- 8B-1 Perform 4-1.
- 8B-2 Perform 8A-1 and 8A-2.
- 8B-3 Perform 5-1.
- 8B-4 Perform 4-3.
- 8B-5 Perform 6A-3.
- 8B-6 Perform 6A-5.
- 8B-7 Perform 6A-6.
- 8B-8 Using a screw thread driver, unscrew #22 (retaining ring) and make smooth the revolution of #34.

Cautions to be taken in reassembling:

- 8B-a Reassembling should be done so that #25 (aperture brush) and #31 (fixed brush) come in good contact with #97 (functional resistor).
- 8B-b In attaching the functional resistor subassembly (B2), be careful not to damage the meter (#96).

8B-c Perform 8A-b.

8B-d When attaching the meter, take sufficient caution.

8B-e After the meter has been attached, do not forget to attach #64a (dust protector for the meter).

8B-f Soldering of #31 (fixed brush) is necessary.

§ 9. Replacing meter subassembly (B1) (#96, #36, and #100C). See Fig. 3 and 5.

9-1 Perform 4-1.

9-2 Perform 5-1.

9-3 Unsolder the semi-fixed resistor at one point (connected with the meter).

9-4 Unscrew #38A (meter case setting screws), to remove #96 (galvano meter with case), #36 (back plate), #15C (terminals) and (B1) (meter subassembly).

9-5 Replace the meter subassembly (B1).

Cautions to be taken in reassembling:

9-a Refer to § 21 C and § 23 A.

9-b Perform soldering thoroughly and carefully.

§ 10. Replacing resistor gear subassembly (B3) (#21 and #97). See Fig. 5.

10-1 Perform 4-1.

10-2 Perform 4-3.

10-3 Perform 5-1 and 5-2.

10-4 Perform 6A-3 and 6A-5.

10-5 Perform 6A-6.

10-6 Using a screw thread driver, unscrew retaining ring #22.

The resistor gear #97 with attaching gear #21 will be separated from other parts: aperture ring #34, coupling pin #27, aperture

brush #25, aperture brush axiliary plate #25A, aperture scale #26, screws #32 and #33, attaching metal #24, fixed brush #31, screws #29, bushes #32, collars #33 and wave washer #123.

10-7 Replace the subassembly (B3) (#21 and #97).

Cautions to be taken in reassembling:

10-a When replacing #21 and #97, refer to §21 D and §23 B.

10-b Attaching of the new #21 and #97 should be done on the basis of EV 15. Set the ASA speed to 100 and the shutter speed to 1/250 sec.

10-c #24 is to be attached temporarily by one screw #33. Set the pin (#27) on the aperture ring to the position f/11. This is to be done with the screw #21 (temporarily fixed) disengaged from the gear #15, so that the resistance between two brushes amount to the figure marked in red on the bottom surface of the gear #21. Be careful that at this time setting of the shutter speed, ASA speed and f-number will not be deranged.

10-e Refer to the cautions given in §8, B.

§ 11. Replacing semi-fixed resistor #89. See Fig. 5.

11-1 Perform 5-1.

11-2 Perform 5-2.

11-3 Unsolder #89.

11-4 Replace #89.

Caution to be taken in reassembling:

11-a For the accuracy to be attained after reassembling, refer to §21 G and §23.

§ 12. Replacing CdS cells #98. See Fig. 3.

A. Replacing printed wiring subassembly (C1) (#106, #88, #98x2, #113, #106A and #106B). See Fig. 3.

12A-1 Perform 4-1.

12A-2 Release CdS retaining screws #16D to remove the CdS retaining plates (#16F). Draw out #56A (printed wiring plate setting screws) to remove #106 (printed wiring plate), #98 (CdS cells), #88 (fixed-resistor), #113 (semi-fixed resistor), #106A (auxiliary plate), #106B (auxiliary plate rivet), all as subassembly C1.

12A-3 Replace the printed wiring plate subassembly.

12A-4 To get the accuracy, refer to § 23 C.

B. Replacing #98 (CdS cells) only

12B-1 Perform 4-1.

12B-2 Perform 12A-2.

12B-3 Unsolder the CdS (#98) to be replaced at two points.

12B-4 Replace the CdS (#98).

12B-5 For selection and for accuracy, refer to § 21 A and § 23 D.

Cautions to be taken in reassembling:

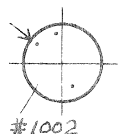
12B-a Refer to § 21 I (with regard to the position of CdS).

12B-b When the printed wiring plate subassembly (C1) is attached to the prism housing subassembly (A2) and mounted on the body, #88 and #113 (variable resistor) on the (C1) should not come in contact with any other things.

12B-c The printed wiring subassembly is to be handled carefully.

§ 13. Adjusting the position of functional resistor. See Fig. 5.

- 13-1 #1002 underneath the ASA dial (#1001) has three punched markings on its surface, the one indicated by the arrow in the illustration



here is the position for ASA 100.

Moving this marking one tooth of the clutch right or left apart from the position of the full-open f-number 1.4 will enable adjustment of the position of the vari-

able resistor corresponding to + or - 1/6 step, respectively.

For more degree of adjustment, it is necessary to change the engagement of #21 to #1008 (gear).

- 13-2 After the relative position of 1.4 to the marking has been determined, stick on the ASA dial (#1001) in such a position that ASA 100 lines up to 1.4.

#### § 14. Replacing pentaprism subassembly A8 (G1, G4, G7x2). See Fig. 3.

- 14-1 Perform 4-1.
- 14-2 Perform 12A-2.
- 14-3 Unscrew #40 (prism retaining screw) to remove #39 (prism retaining spring) and #111 (vinyl tubes) as subassembly A12.
- 14-4 Unscrew #29 (light accepting lens frame screws) to remove #16A (light accepting lens frame), #16C (aperture plate), #16E (pentaprism retaining sponge), G8 (light accepting lens), all as subassembly A7. Remove also #16G (base plate for the sponge).
- 14-5 Replace the pentaprism subassembly A8, taking care of the light accepting lens (G7).

#### Cautions to be taken in reassembling:

- 14-a Clean the polished glass surfaces before replacement.
- 14-b When the pentaprism subassembly is put into #51 (prism housing), be careful that G7 will not touch the eyepiece side light-tight plate (#131) which is cemented to #51.

- 14-c On mounting the light accepting lens subassembly A7, take the same caution as in 4-b, to avoid its touching with #131.
- 14-d When #39 is attached, take care not to scratch the top surface of prism G4.

§ 15. Replacing the eyepiece subassembly All (G5, G6). See Fig. 3.

- 15-1 Perform 4-1.
- 15-2 Perform 12A-2.
- 15-3 Release #125 (eyepiece setting screws) on the rear side of #51 (prism housing).
- 15-4 Peel off leatherlet #127. Unscrew the eyepiece setting screws. Remove #16 (eyepiece frame).
- 15-5 Remove eyepiece subassembly (G5, G6) and eyepiece lens retaining plate #126.
- 15-6 Replace the eyepiece subassembly All.
- 15-7 Mount the new eyepiece subassembly and #126 into #51.
- 15-8 Put on #16 and fasten #91 tightly.
- 15-9 Facing the eyepiece side of #6 downward, drop G5, G6 onto the side of #16. Fasten #125 and G5, G6 will be retained by #126.
- 15-10 Apply lacquer to the head of #125 to avoid loosening.

Caution to be taken in reassembling:

- 15-a Never fasten #91, after #125 has been fastened (to avoid cracking of G5 or G6).

§ 16. Correcting the position of meter pointer needle window in the eyepiece. See Fig. 3 and 6.

A. Vertical correction

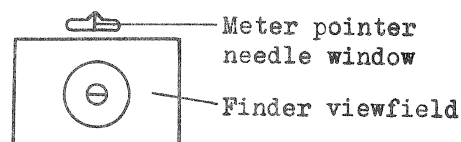
16A-1 Perform 4-1.

16A-2 This correction is made by tilting the small mirror (G2). If the needle window is to be brought farther from the finder viewfield, fasten #44A (adjusting screws).

If it has to be brought nearer, release the same screws.

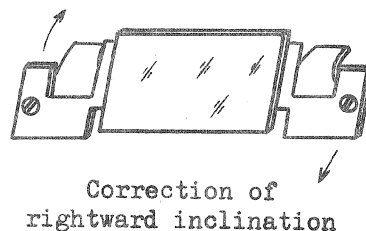
Make the above correction, viewing through the eyepiece.

B. Inclination correction



16B-1 Perform 4-1.

16B-2 This correction is made by twisting the small mirror (G2). Viewing through the eyepiece, correct the leftward inclination by turning the mirror counter-clockwise and



the rightward one by turning the mirror clockwise. See Fig. 7.

C. Lateral correction (See Fig. 5)

16C-1 Perform 4-1.

16C-2 This correction is made

by moving left or right the meter subassembly B1 (#96, #36, #100c).

16C-3 Release #38A (meter setting screws). Viewing through the eyepiece, if the window is found displaced to the left, move the meter leftward and if, to the right, move the meter rightward.

§17. Cleaning the pentaprism subassembly A8. See Fig. 3.

17-1 Perform §14.

17-2 Clean the prism subassembly without taking out from the prism housing (#51).



17-3 Refer to the cautions given in §14.

§ 18. Cleaning the eyepiece subassembly Al. See Fig. 3.

18-1 Perform §15.

18-2 For the procedures and cautions in reassembling, refer to §15.

§ 19. Dusting the meter needle window. See Fig. 5.

19-1 Perform 4-1.

19-2 Unscrew #38A (meter attaching screws) to remove the meter sub-assembly B1. Then, using a feather, clear off dust from the inside of acryl window pane #37.

§ 20. Tools to be used for dis- and reassembling

Refer to Repairing Tool and Apparatus Table (p. 31).

§ 21. Specifications of main parts

A. Resistance of #106 (The total resistance including those of two CdS cells and of adjusting resistors  $R_1$  and  $R_0$ )

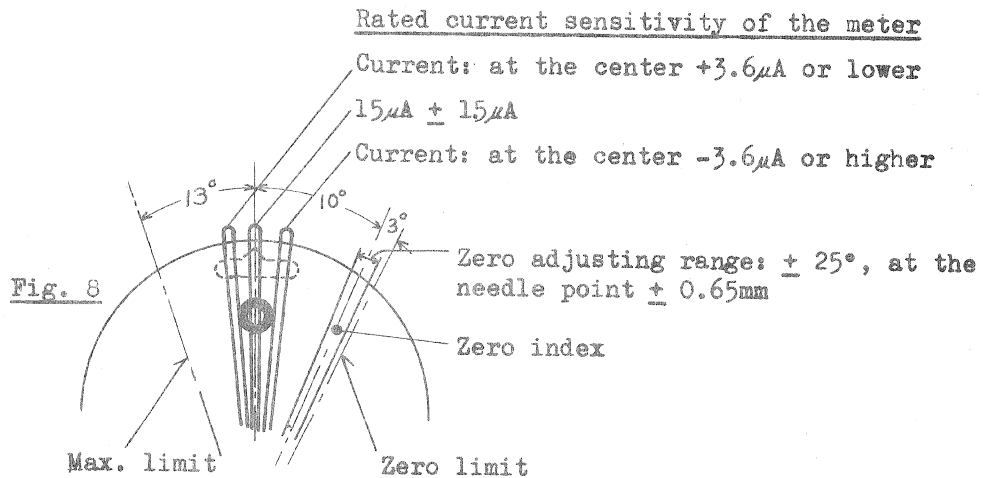
Brightness $\text{cd/m}^2$	2 (EV4)	64 (EV9)	4096 (EV15)
Range of resistance	78 - 63 $\text{k}\Omega$	6.0 - 4.8 $\text{k}\Omega$	0.44 - 0.54 $\text{k}\Omega$

B. ND filters, made of positive film

The transparency difference between ND filters used for the left-side and rightside CdS cells is to be within  $\pm 25\%$ .

## C. Meters (of one same type)

{ Internal resistance:  $3.75 \text{ k}\Omega$   
 { Torque:  $0.32 \text{ mg cm/deg.}$   
 { Weight of moving part:  $270 \text{ mg}$



## D. Functional resistors (one same type)

Table 2

EV	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Upper limit of resistance	Limited	$\text{k}\Omega$ 22.1	$\text{k}\Omega$ 6.22	$\text{k}\Omega$ 2.64	$\text{k}\Omega$ 1.34	$\Omega$ 777	$\Omega$ 416	$\Omega$ 248	$\Omega$ 153	$\Omega$ 97.3	$\Omega$ 63.6	$\Omega$ 42.8	$\Omega$ 27.6	$\Omega$ 21.2	$\Omega$ 15.9	$\Omega$ 12.6
Lower limit	$\text{k}\Omega$ 100	$\text{k}\Omega$ 11.6	$\text{k}\Omega$ 4.0	$\text{k}\Omega$ 1.87	$\Omega$ 980	$\Omega$ 546	$\Omega$ 318	$\Omega$ 192	$\Omega$ 120	$\Omega$ 77.3	$\Omega$ 51.1	$\Omega$ 34.7	$\Omega$ 24.3	$\Omega$ 17.8	$\Omega$ 13.5	$\Omega$ 10.9

E. Semi-fixed resistor ( $R_0$ ) (can be replaced with fixed resistor),  
One same type (#113)Resistances:  $0 - 1.2 \text{ M}\Omega$ F. Fixed resistors ( $R_1$ ), Eight types (#88)Resistances:  $80 \Omega, 100 \Omega, 120 \Omega, 150 \Omega, 160 \Omega, 170 \Omega, 200 \Omega$

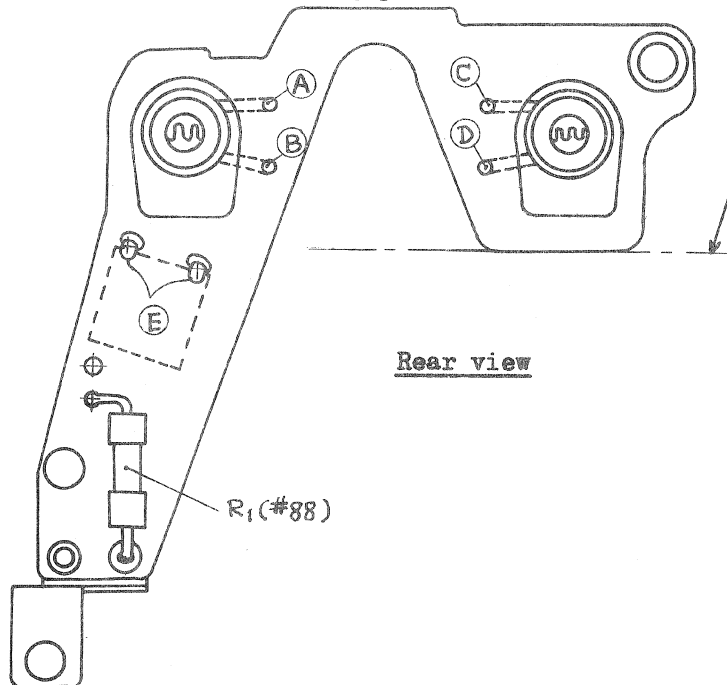
G. Semi-fixed resistor ( $R_2$ ), One same type (#89)

Resistance range: 0 - 10 k $\Omega$

H. Semi-fixed resistor ( $R_{c1}$ ), One same type (#143)

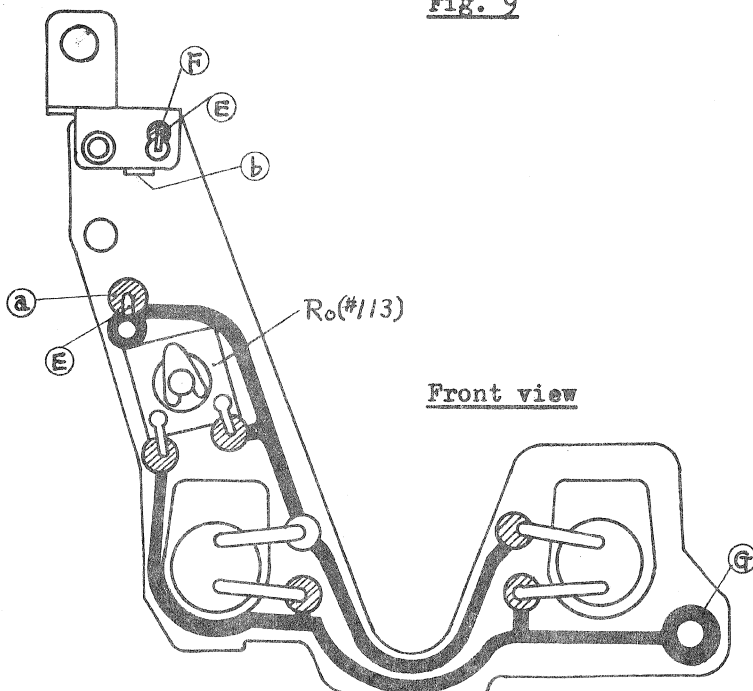
Resistance range: 0 - 250 k $\Omega$

I. Printed wiring plate



Rear view

Fig. 9



Front view

The light accepting part  $\sqrt{\sqrt{V}}$  of CdS cells should not be tilted from this line.

The wiring plate, when put over #16A, should be so positioned that two CdS cells can smoothly be inserted into the holes in #16A.

Furthermore, the ends of the lead wires A, B, C and D should form no short circuit with #16A. If there is any fear of short circuit, trim slightly the ends.

The legs of E (at four points) are to be bent as shown here.

F part is to be soldered to #106A.

Any non-conducting substance should not be

present on the surface of G.

- \* The resistors  $R_1$  and  $R_0$  should be attached with their almost entire surfaces in contact with the base plate.

#### J. Mercury batteries (#99)

Two batteries, each 1.3V, are used.

### § 22. Adjustment

#### A. Temporary assembling of printed wiring #106 for adjustment

##### 22A-1 Selection of CdS cells #98

Refer to § 21 A.

As a rule, a pair of CdS cells are to be replaced at the same, so every two of them will be delivered for repair.

##### 22A-2 Perform temporary assembly: Attach semi-fixed resistor $R_0$ (#113) without #88 ( $R_1$ ), and connect two lead wires to (a) and (b).

#### Caution!

The positions of #98 (CdS cells) are determined according to those of the light acceptance lens frames (#16A) already mounted.

Attached to #106 (wiring plate), they should be able to be inserted into #16A smoothly.

The light accepting part (∩∩∩) of CdS cells should tilt as little as possible.

##### 22A-3 Perform 23D - 1.5 — 23D - 1.6

#### B. Assembling #50 (body)

##### 22B-1 Line up the point ASA 100 (refer to §13 - 1) on clutch plate #1002 (or ASA 100 on the ASA dial #1001) to the full-open f-number 1.4.

22B-2 Attaching of subassembly #21, #97 is to be performed on the basis of EV 15. Setting ASA speed to 100 and shutter speed to 1/250 sec. Temporarily set #24, using only one of #33 screws.

Set the aperture ring pin #27 to the position of f/11. In this case, disengaging #21 from #1008 (gear), make the resistance between two brushes equal to the figure printed in red on the bottom surface of #21.

Take caution that the shutter speed, ASA speed and aperture diaphragm, all once set will not be out of place.

22B-3 Adjustment of position of the functional resistor

3-1 Fit to the functional resistor the prism housing subassembly (together with pentaprism and eyepiece) except the printed wiring subassembly C<sub>1</sub> for temporary assembling.

3-2 Mount the subassembly on a standard camera with lens (50mm f/1.4) and A-type screen.

3-3 See that for the brightness range EV 12 - 17, the resistance in the fixed brush (#31) and the earth is within the range as shown in Table 2 (§21 D). If not, make adjustment by the method described §13-1.

22B-4 Perform the wiring of fixed brush (#31).

22B-5 After assembling the meter subassembly B<sub>1</sub>, wire and fix it.

22B-6 Completely wire the circuit in the body #50 including the semi-fixed resistor (#89).

22B-7 Deposit two batteries (#99) into the case.

C. Adjustment

22C-1 Assemble all the parts except top cover subassembly A<sub>1</sub>, the lead wire for variable dial resistor being attached to the printed wiring subassembly C<sub>1</sub>.

22C-2 Connect the variable dial resistor  $DR_1$  ( $1\Omega$  —  $1\text{ k}\Omega$ ) with the ② - ⑥ in Fig. 9.

22C-3 Making  $DR_1 = 150\Omega$ , mount it on a standard camera with lens 50mm f/1.4 and A-type screen. Expose the lens to the brightness set to EV 9.

22C-4 Moving #89 (semi-fixed resistor  $R_2$ ), bring the pointer needle to the center.

22C-5 Then, expose the camera to the brightness set to EV 15.

Changing the resistance in  $DR_1$  within the limit not lower than  $100\Omega$ , bring the needle to the center.

Permissible deflection is within  $\pm 1/2$  EV in this case.  $DR_1$  thus obtained is to be taken for  $R_1$  (#88).

(Keeping  $R_1 \geq 80\Omega$  is to avoid the drain of mercury battery which is caused by being exposed to high brightness for a long time.)

22C-6 Exposing the camera to the brightness set to EV 4, bring the needle to the center by moving  $R_0$  ( $1\text{ M}\Omega \geq R_0 \geq 350\text{ k}\Omega$ ).

Permissible deflection is within  $\pm$  EV  $1/2$ .

Note:

If the deflection is not within  $\pm 1/2$  EV in the above procedures 22C-5 and 22C-6, it is necessary to move  $R_2$ , the brightness being set to EV 9 (as in 22C-3 and 22C-4) so that the deflection is obtained within  $\pm 1/2$  EV.

Then, move the position of variable resistor according to S13-1, and  $R_0$  within the range so that the deflection becomes within  $\pm 1/2$  EV when the EV is set to 15, 9 and 4.

22C-7 Mount the adjusted  $R_1$  for reassembling.

22C-8 Setting the full-open f-number to ASA 100, stick the ASA dial (#1001) to #1002.

#### D. Inspection of accuracy

##### (1) Accuracy of the meter

Attaching the meter to a standard camera with lens 50mm f/1.4 and A-type screen, measure the brightness:

The deflection should be within  $\pm 1/2$  EV for EV 4, 9 and 15 and  $\pm 2/3$  EV for the other EVs.

Regarding the selectivity, it should be such a degree that, when the shutter speed or the f-number is changed one step, the needle goes out of the index circle (0.7mm in dia.). Be sure also that the needle moves smoothly when the EV is set to 2 and 17 by adjusting the aperture gradually.

The accuracy inspection should be performed under the measuring conditions described in §27 as far as possible.

It is not possible to make adjustment with the top cover sub-assembly A1 attached.

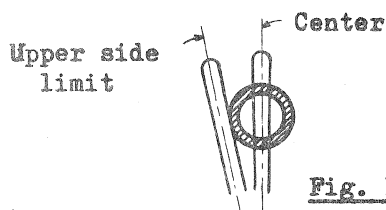


Fig. 10

##### (2) Accuracy of battery checker

Deposit new batteries (2.65 - 2.7V). Adjust the variable resistor (#143) until the needle swings from the center so far as to come into contact with the circle on the upper side (see Fig. 10).

#### § 23. Adjustment of the meter when the following parts replaced

##### A. When replacing the meter subassembly B1 only (refer to §9)

23A-1 Replace the meter subassembly, returning the resistor attaching gear (#21) and the shutter dial gear (#1008) to their original gearing positions.

- 23A-2 Assemble all the parts except top cover subassembly A1.
- 23A-3 Attach the meter to a standard camera with lens 50mm f/1.4 and A-type screen.
- 23A-4 Expose the camera to the brightness set to EV 9. Moving the semi-fixed resistor (#89), bring the needle to the center.  
Be sure that at EV 2.3 and 17.3 neither insulation nor short circuit takes place. For this purpose for the fraction 0.3, the ASA dial can be displaced  $1/3$  step from the position for Photomic-T.)
- 23A-5 See that the deflection is within  $\pm 1/2$  EV for EV 4 and 15.
- 23A-6 If any greater deflection is indicated (refer to §22 D), move the semi-fixed resistor (#89), to keep the accuracy within  $\pm 1/2$  EV for all EV 4, 9 and 15. For EV 9, it is desirable to make the deflection nearly zero.  
Be sure that neither insulation nor short circuit takes place.  
(When EV 2.3 is set by adjusting the aperture nearer, the needle should move smoothly.)
- 23A-7 If no satisfactory accuracy is obtained by the above procedures, it is necessary to make checking and readjustment of the parts (meter subassembly, variable resistor, printed wiring subassembly including CdS, semi-fixed resistor and fixed resistor) or to make replacement of R<sub>1</sub> (#88).

B. When replacing the variable resistor

- 23B-1 Replace only attaching gear #21 and variable resistor #97 (Or replace the functional resistor subassembly B2 in the following order:)
- 23B-1.1 Perform 22B-1.
- 23B-1.2 Perform 22B-2.
- 23B-1.3 Perform 22B-3.
- 23B-1.4 Perform 22B-4.



23B-2 Perform 23A-2 and 23A-7.

C. When replacing the printed wiring subassembly C1

23C-1 Replace the printed wiring subassembly.

23C-2 Perform 23A-2 and 23A-7.

D. When replacing the CdS cells (#98)

23D-1 Replace the CdS (#98) in the following order:

23D-1.1 Remove the CdS cells from the printed wiring subassembly C1.

23D-1.2 Unsolder the fixed resistor  $R_1$  (#88).

23D-1.3 Without #88, connect two lead wires to the (a) and (b) in Fig. 9.

23D-1.4 Attach the CdS cells (#98).

The positions of the cells should be such that attached to the printed wiring plate (#106), they should be put into the light accepting frame (#16A) smoothly.

The light accepting parts ( $\wedge \wedge \wedge$ ) of the CdS cells should be tilted as little as possible.

23D-1.5 Connect variable dial resistor  $DR_1$  ( $1\Omega - 1\text{ k}\Omega$ ) to (a) - (b).

23D-1.6 Adjusting the sensitivity of CdS cells.

Making  $R_0 = 600\text{ k}\Omega$  and  $DR_1 = 150\Omega$ , temporarily assemble all parts except body (#50) and top cover subassembly A1. Put the printed wiring plate (#106) into a standard camera with lens 150mm f/1.4 and A-type screen. Expose the camera to the brightness set to EV 9. At this time the resistance between the terminals on the printed wiring subassembly C1 should be  $4.8\text{ k}\Omega - 6.0\text{ k}\Omega$ . If not and lower than  $2.8\text{ k}\Omega$ , place positive film in front of one or both of the CdS cells to make the resistance within the range  $4.8\text{ k}\Omega - 6.0\text{ k}\Omega$ . The use of up to two sheets of positive film is possible.

## 23D-1.7 Adjustment at EV 4

Then, expose a standard camera to the brightness set to EV 4.

Determine  $DR_1$  (between (a) and (b)) so that the terminal resistance of the printed wiring subassembly (C1) comes within the range 63 k $\Omega$  - 78 k $\Omega$ . Never make  $DR_1$  lower than 80 $\Omega$ . Take the determined value for  $R_1$ .

## 23D-1.8 Final adjustment

The resistance range should be as below for the standard camera with lens 50mm f/1.4 and F-type screen.

EV (ASA 100)	4	9	15
Resistance range	63 - 78 k $\Omega$	4.8 - 6.0 k $\Omega$	440 - 540 $\Omega$

23D-1.9 Solder the  $R_1$  (#88), thus determined, to the printed wiring plate (#106).

23D-1.10 Perform 23A-2 — 23A-7.

23D-2 Replacing one of CdS cells #98.

23D-2.1 Perform 23D - 1.2 — 23D - 1.10.

Note:

When adjusting the CdS cell not including the body (#50) circuit, use the screen type F, and in other cases use the type A.

E. When replacing the semi-fixed resistor (#89)

23E-1 Replace #89.

23E-2 Perform 23A-2 — 23A-7.

F. When replacing #1008 (shutter dial gear) and #25 (aperture brush)

23F-1 Replace #1008 or #25.

- 23F-2 Temporarily assemble the parts except top cover subassembly A1.
- 23F-3 Attach this assembly to a standard camera with lens 50mm f/1.4 and A-type screen.
- 23F-4 Expose the camera to the brightness set to EV 9 (refer to §13).  
Bring the meter needle into the center circle. Be sure that neither insulation nor short circuit takes place at EV 2.3 and 17.3.
- 23F-5 See that the deflection is within  $\pm 1/2$  EV at EV 4 and 1.5.
- 23F-6 If any greater deflection (refer to §22) is indicated, adjust the gearing of #21 at EV 4, 9 and 15. Be sure that neither insulation nor short circuit takes place at EV 2.3 and 17.3.
- 23F-7 If no satisfactory accuracy is obtained, take out the top cover subassembly and manipulate semi-fixed resistor R<sub>2</sub> (#89).  
(Refer to 23A - 4 and 23A - 7).

G. When replacing the semi-fixed resistor #113.

- 23G-1 Replace printed wiring plate Ro (#106).
- 23G-2 Assemble the parts except the top cover subassembly A1.
- 23G-3 Expose the assembly to the brightness set to EV 4.
- 23G-4 Moving Ro, bring the meter needle to the center.  
DRo can also be infinity ( $\infty$ ) (without Ro).
- 23G-5 See the accuracy. The deflection should be within  $\pm 1/2$  EV at EV 4.

H. When replacing the fixed resistor R<sub>1</sub> #88

- 23H-1 Take out the R<sub>1</sub> from the printed wiring plate #106.
- 23H-2 Connect lead wires to the points ( @ - ⑤ in Fig. 9) corresponding to R<sub>1</sub> on the printed wiring plate.
- 23H-3 Connect variable dial resistor DR<sub>1</sub> (1Ω - 1 kΩ) to the lead wires.
- 23H-4 Assemble the parts except top cover subassembly A1.

23H-5 Expose the assembly to the brightness set to EV 15.

23H-6 Moving  $DR_1$  within the limit not lower than  $80\Omega$ , bring the meter needle to the center.

The deflection should be within  $\pm 1/2$  EV. Take this  $DR_1$  for the value of  $R_1$ .

23H-7 Solder  $R_1$  to #106.

23H-8 See the accuracy. The deflection should be within  $\pm 1/2$  EV at EV 15.

#### § 24. Circuit chart

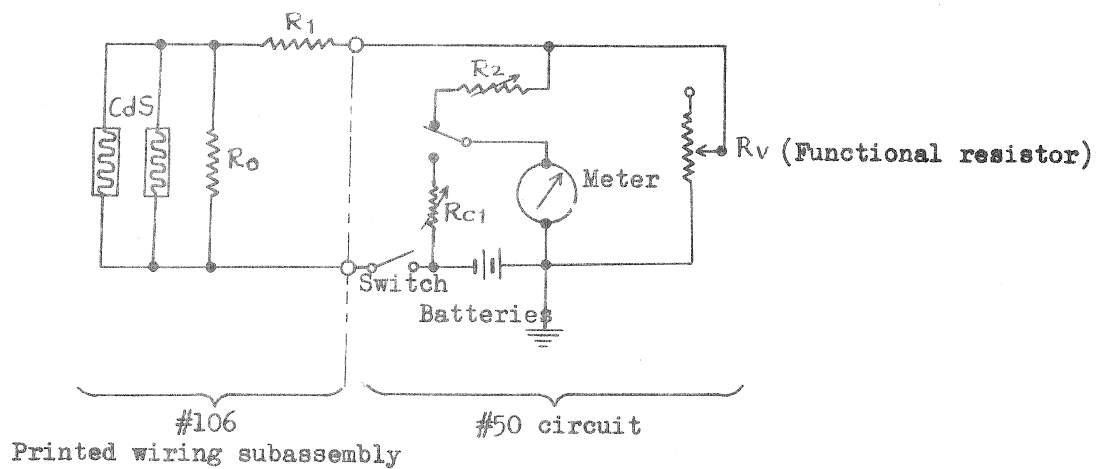


Fig. 11

## § 25. Trouble chart

Trouble	Cause	Examination	Remedy
Pointer needle does not move.	1. Incorrect positions of batteries deposited.	•See the positions of batteries.	•Reset the batteries in the correct position.
	2. Drain of batteries.	•Check the batteries using the battery checker.	•Replace the batteries.
	3. Disconnection.	•Check the circuit using a tester.	•Make connection or replace the disconnecting part.
	4. Short circuit	•Check the circuit.	•Make insulation or replace the part forming short circuit.
	5. Moving part of the meter is caught.	•Circuit is correct. •Needle does not move even when blown, or stops at at indefinite point.	•Remove dust or the like or replace the meter.
	6. Deterioration of CdS cells.	•Circuit is correct. •Meter is correct. •When exposed to EV 4, resistance between the terminals on the battery case (without batteries) is far from 63 - 78 kΩ.	•Replace the printed wiring subassembly or any one or two of CdS cells.
Meter indication is not stable.	1. Disconnection (often)	•Check the circuit using a tester.	•Make connection or replace the disconnecting part.
	2. Short circuit (often)	•Check the circuit using a tester.	•Make insulation or replace the part forming short circuit.
	3. Moving part of meter is caught.	•Circuit is correct. •Meter needle does not move even when blown. •Or stops at an indefinite point.	•Remove dust or the like or replace the meter.

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Trouble	Cause	Examination	Remedy
	4. Too large slack.	Exposing to a particular EV, set the needle from both more and less brightness side; a remarkable setting difference takes place.	Remove mechanical slack causing the slack.
	5. Friction on the meter needle.	The position of the centered needle at EV 9 differs remarkably from that returned to EV 9 after once moved to EV15.	Replace the meter.
	6. Unbalancing of the meter needle.	Needle indication differs remarkably depending on the position of meter.	Replace the meter.
	7. Insufficient selectivity.	By changing EV one step after needle centering, the needle does not move out of the center circle (0.8mm in dia.), for the EV range within 3 - 16.	If the selectivity is not sufficient at EV 4, increase Ro so far as accuracy is maintained. If sufficient at EV 9 but not at EV 15, decrease R <sub>1</sub> so far as accuracy is maintained and resistance becomes not less than 80Ω. If also insufficient at EV 9, check meter, variable resistor and CdS cells.
Keeps no accuracy at EV 4 only.	1. Incorrect adjustment of Ro.	Not accurate at EV 4 only, but accurate at EV 15.	Readjust Ro.
No accuracy at EV 9 only.	1. Incorrect adjustment as a whole.	Inaccurate at EV 9 only, but accurate at EV 4 and 15.	Perform adjustment §23, for replacing the parts from 23A-2 — 23A-7.

Trouble	Cause	Examination	Remedy
No accuracy at EV 15 only.	1. Incorrect functional resistor.	•Inaccurate at EV 15 only but accurate at EV 4 and 9. •Disconnect the wiring to fixed brush. Check the resistance between fixed brush and earth. Compare the results referring to Table 2 in §21-D (Specifications for main parts).	•Replace functional resistor.
	2. Incorrect adjustment of R <sub>1</sub> .	•Inaccurate at EV 15 only but accurate at EV 4 and 9. The resistance measured in 1 (see above) is within the specified range.	•Replace R <sub>1</sub> .
No accuracy at EV 4, 9 and 15, at EV 4 and 9 or at EV 9 and 15.	1. Incorrect adjustment as a whole.	•Inaccurate at EV 4, 9 and 15 or at EV 4 or 9 or at EV 9 and 15.	•Make adjustment when replacing the parts §23 (23A-2 — 23A-7).
	2. Inaccurate position of functional resistor.	•Inaccurate at EV 4, 9 and 15 all to the same extent.	•Readjust the position of variable resistor.
	3. Reduction of the sensitivity of meter.	•Inaccurate at EV 4, 9 and 15 about to the same extent, and the current is out of rated value $15\mu A \pm 1.5\mu A$ .	•Replace the meter.
	4. Incorrect functional resistor.	•Inaccurate at EV 15. •Disconnect wiring to fixed brush and earth, referring to §21, Table 2.	•Replace the functional resistor.

Trouble	Cause	Examination	Remedy
No accuracy at EV 4, 9 and 15, at EV 4 and 9 or at EV 9 and 15.	5. Deterioration of CdS cells.	Inaccuracy is other than the above 1, 2, 3 and 4.	Replace printed wiring subassembly C1, or replace one or two of CdS cells.

Note: Take special caution against the short circuit between the following points:

1. Between #21 (resistor attaching gear) and #94 (pole spring) or #118A (printed wiring subassembly).
2. Between the soldering position of #110 (contact lug plate) and #50 (body) or #21.
3. Between #21 and #31 (fixed brush).

§ 26. Combination of 20FD5 (Photomic-Tw Finder) with Nikon F camera

For fitting the Photomic-Tw Finder to the Nikon F camera with serial number up to 6700001, except those marked with a red dot (0.9mm in dia.) in front of the serial number, it is necessary to make alteration as described in "Technical Information No. 68" (issued on March 6, 1965).

§ 27. Conditions to be fulfilled for brightness measurement

The following conditions should be fulfilled as far as possible:

27-1 Preliminary conditions

(Brightness conditions under which the CdS surface is to be before measurement)



Leaving the CdS surface in darkness longer than 12 hours. Then, illuminate it with about 500 lumens for 30 minutes — two hours. The light source for illumination can be a fluorescent, tungsten or natural light.

For #106 circuit, face the CdS surface toward a 20W fluorescent lamp placed at about 50mm apart.

For Photomic-TN Finder, place it individually on a table with its prism surface facing toward the finder screen made vertical.

Turn the prism surface toward the brighter side of the room, such as a window, for 30 minutes — two hours.

Thereafter, finish brightness measurement within 20 minutes.

- 27-2 Correct order of exposing to the brightness windows and the time required for reading.

After 27-1 has been finished, expose the meter to the brightness, first the brightest and finally the darkest.

The time required for each reading after exposing is as a rule 15 minutes for EV 15, 11 and 9, and 45 minutes for EV 6 and 4.


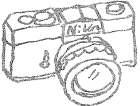

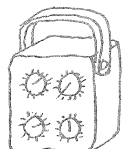

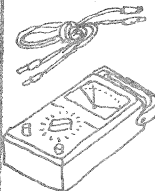
- 27-3 Temperature: 10°C — 30°C as a rule.

- 27-4 Moisture: 50% — 80% as a rule.

- 27-5 Moving direction of moving brush on the variable resistor is to be from the lower to the higher resistance, that is, the needle is to be centered by turning the aperture opening from smaller to larger and the shutter dial from higher to lower speed.

Note: The above conditions have been specified mainly in order to ensure high accuracy and uniform quality of the products.

## § 28. Tools and testers to be used for repair

No.	Denomination	Division	Chart	Used for part	Use	Remarks
J11018	Screw thread driver	A		#22		Commonly used for Photomic-T
J18008	Standard camera with 50mm lens and type-A finder screen attached	B			A Nikon F Photomic-TN for adjustment described in §22.	
J18009	Tool for assembling functional resistor	B			For assembling #21, #24, #34 and #123 using #22. Provided with a pin to be fitted into the hole in #24, facilitating assembly work by preventing turning of #24.	
J19011	Variable dial resistor (DR <sub>1</sub> )	B		#88	For setting fixed resistance R <sub>1</sub> with the usable range 1Ω - 1 kΩ. Refer to §22 C.	
J19012	Variable dial resistor (DR <sub>0</sub> )	B	"	#113	For setting fixed resistance R <sub>0</sub> with the usable range 1 kΩ - 1 MΩ. Refer to §22 C.	
J19009	Brightness box	B			Measurement with the box should be made after the brightness has been set to a specified value by adjusting voltage and current and a stable brightness obtained.	Commonly used for Photomic-T
J19010	Tester	B			For checking CdS cells, fixed resistor, variable resistor, functional resistor and circuit.	Commonly used for Photomic-T

***Nikon***

**PHOTOMIC FT<sub>N</sub> FINDER**

**(Work No. 20FD9)**

**REPAIR MANUAL**

**PARTS LIST**

**(REVISED)-2**

**NIPPON KOGAKU K.K.**

**Tokyo, Japan**



## C O N T E N T S

	Page
1. Illustrations .....	1 - 10a
2. Adjustment and Reassembly .....	11 - 21a
3. Dynamical Requirments .....	22
4. Lubrication Table .....	23
5. Parts List .....	24 - 40
6. Subassembly List .....	41 - 42a

## NOTE:

Marks in the "Term of Sale" column of the parts list are;

○..... Can be supplied individually

△..... Not supplied individually but only as subassembly

○△..... Supplied either as part or subassembly

×..... Not considered as repair part

⊠..... Delivered as a product from the Sales Department  
(i.e., not supplied as repair part)

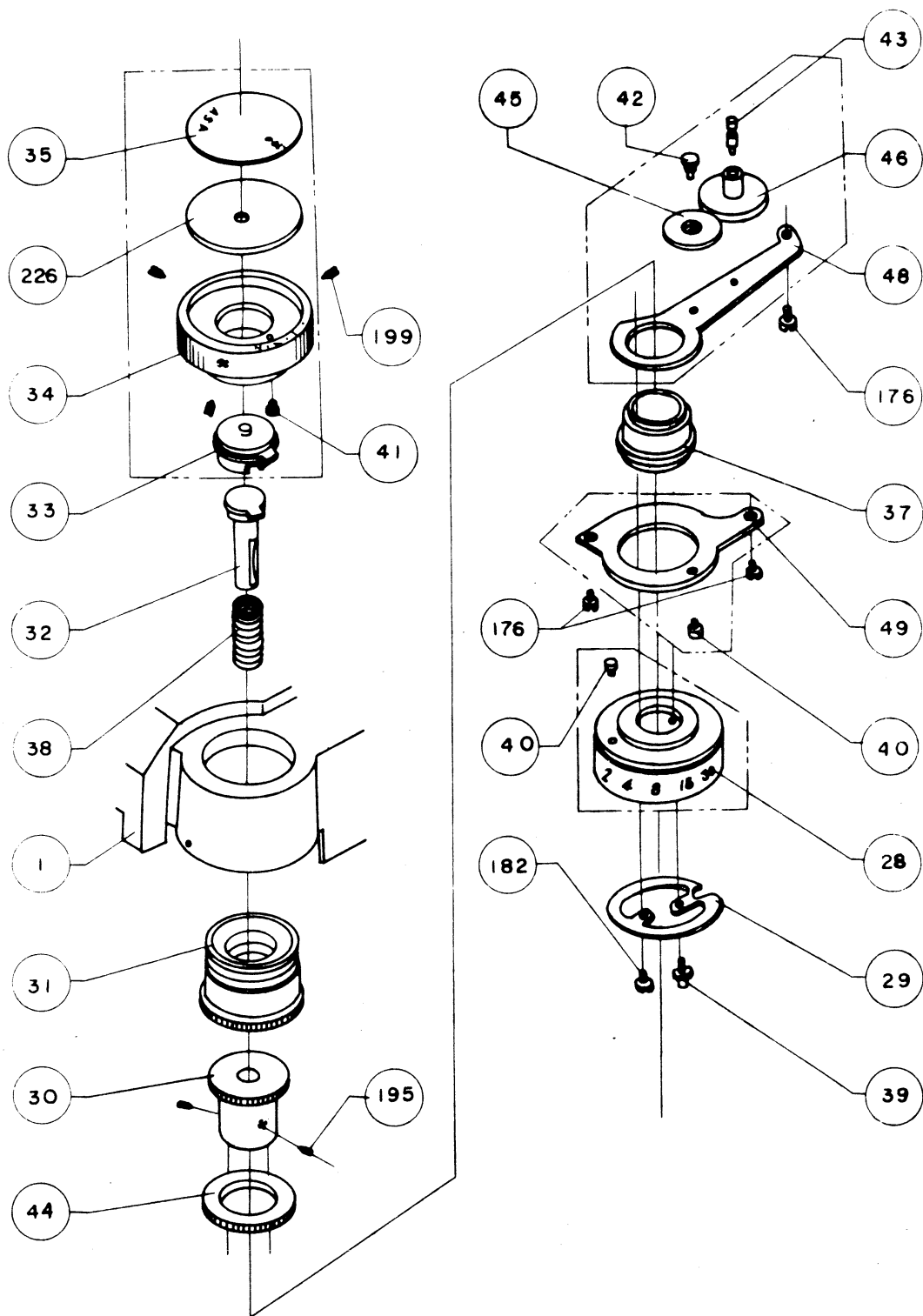
## REVISED REPAIR MANUAL:

## • REVISION-1

- 1) Both Earlier (E) and New (N) illustrations are given in this Repair Manual.  
Fig. 1a - Fig. 10a (Fig. 8 and Fig. 9 are unrevised)
- 2) The way of repairing is partially changed (marked \*), but it is also available to the earlier parts.  
(Earlier number of part is, however, used in this Repair Manual)
- 3) Both (E) and (N) are given in the parts list.  
New parts (#240 - #245) are on page 39a.
- 4) New subassemblies are on page 42a.

## • REVISION-2

Parks marked with △ have been revised as shown by drawings or descriptions and list..



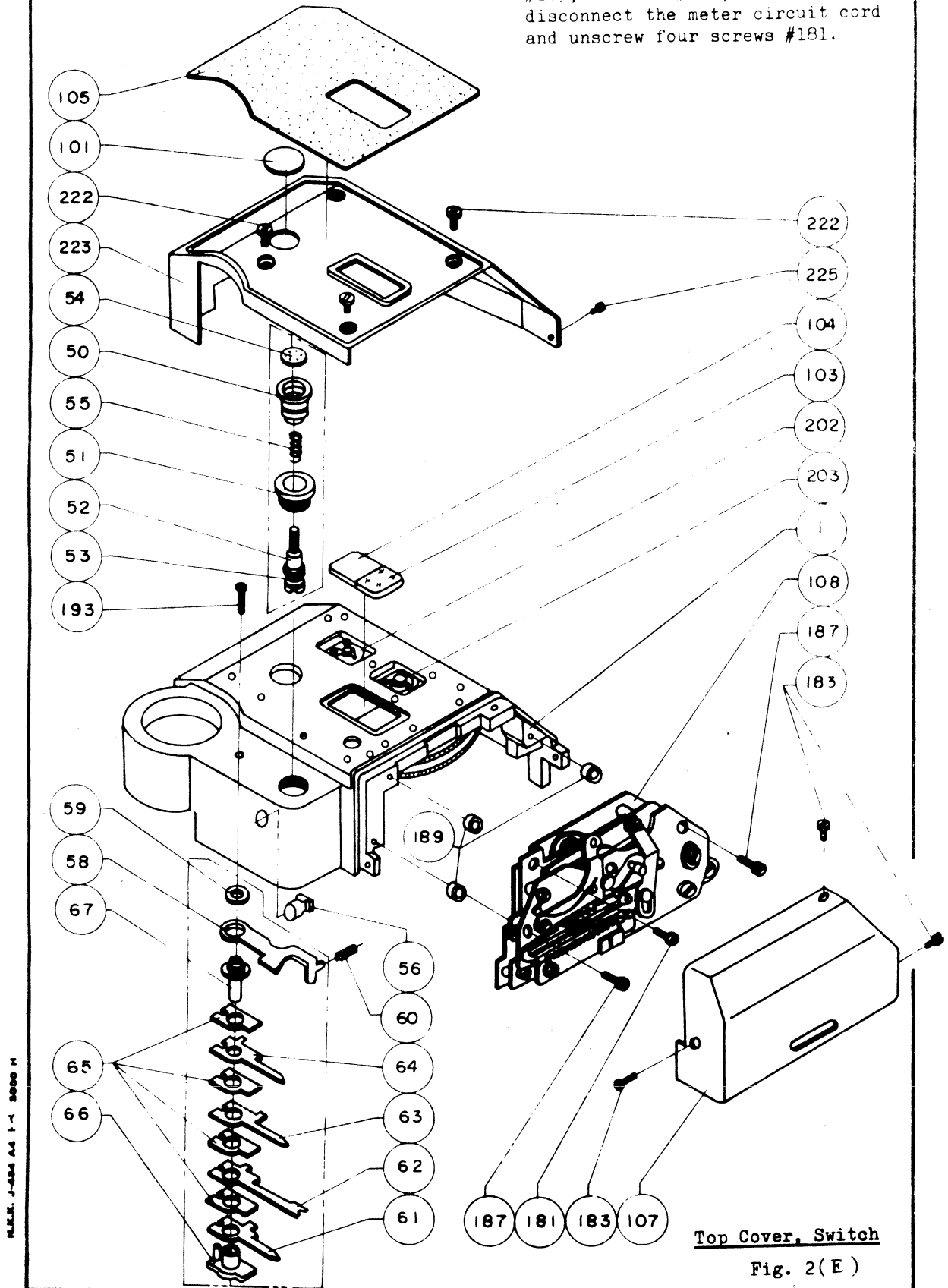
Shutter and ASA Dial

Fig. 1 (E)



Shutter and ASA Dial  
Fig. 1a (N)

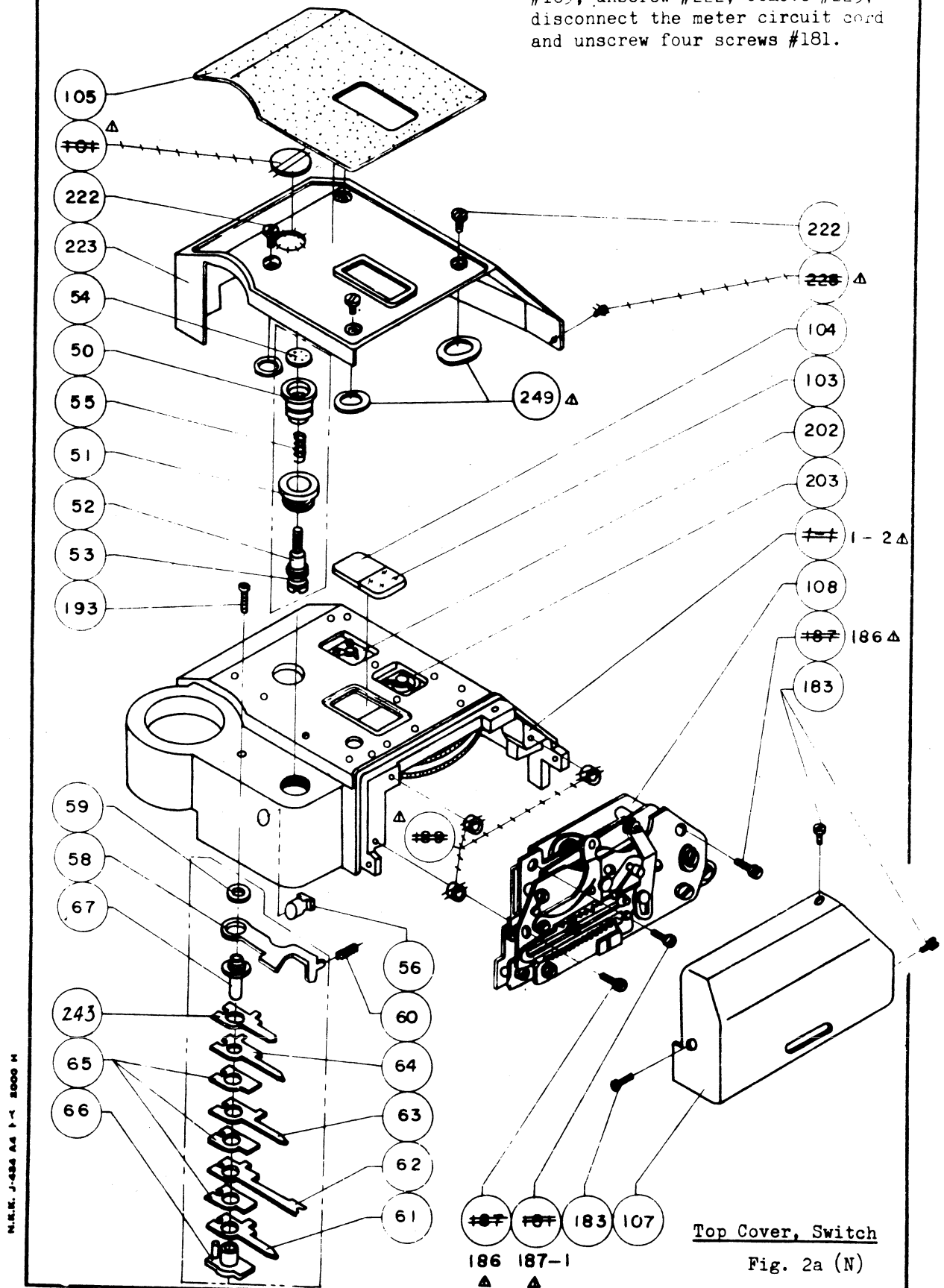
To separate #1 from #2 peel off #105, unscrew #222, remove #223, disconnect the meter circuit cord and unscrew four screws #181.

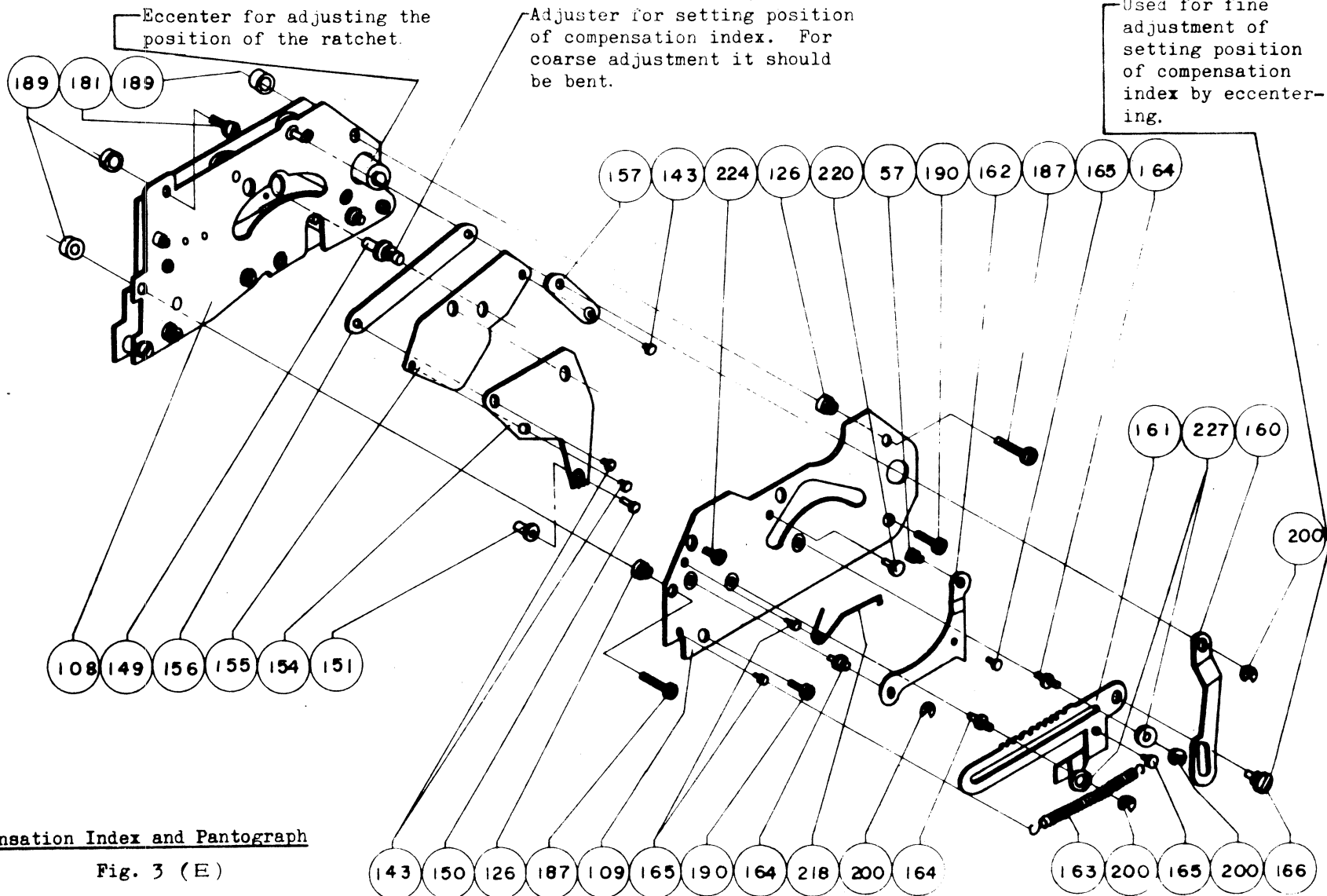


ALLIANCE J-434 Ad 1-1 5000 H



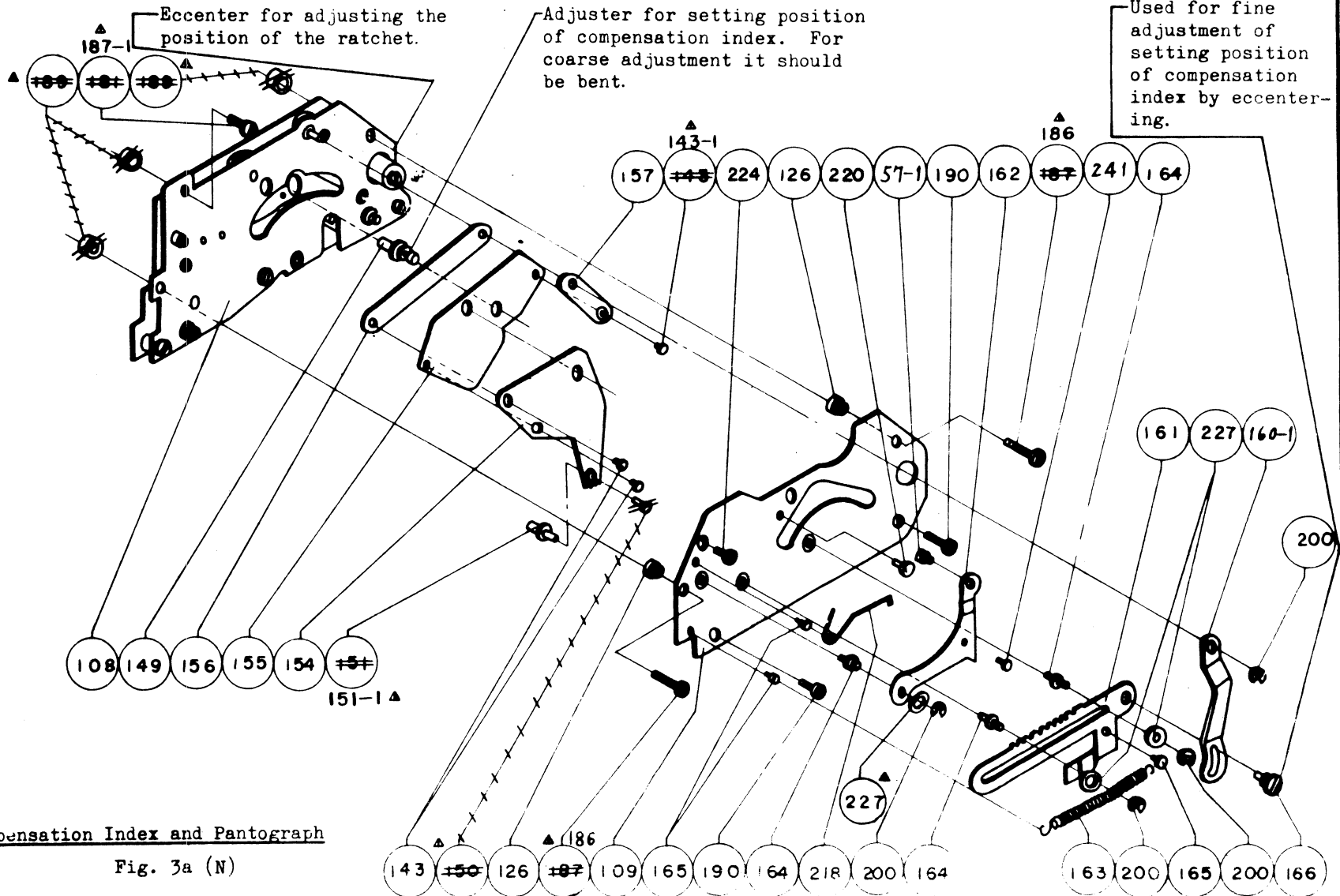
To separate #1 from #2 peel off #105, unscrew #222, remove #223, disconnect the meter circuit cord and unscrew four screws #181.





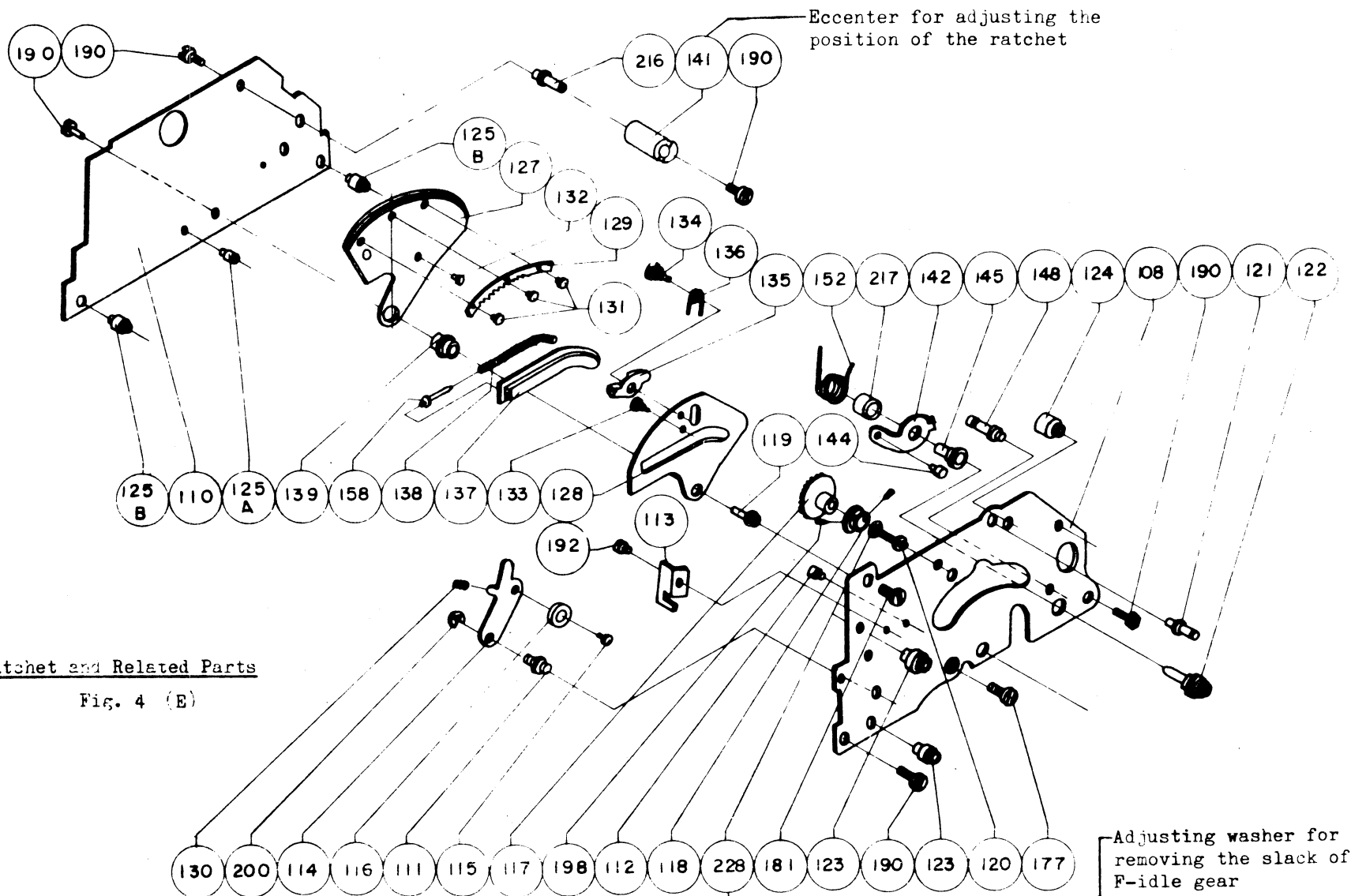
Compensation Index and Pantograph

Fig. 3 (E)



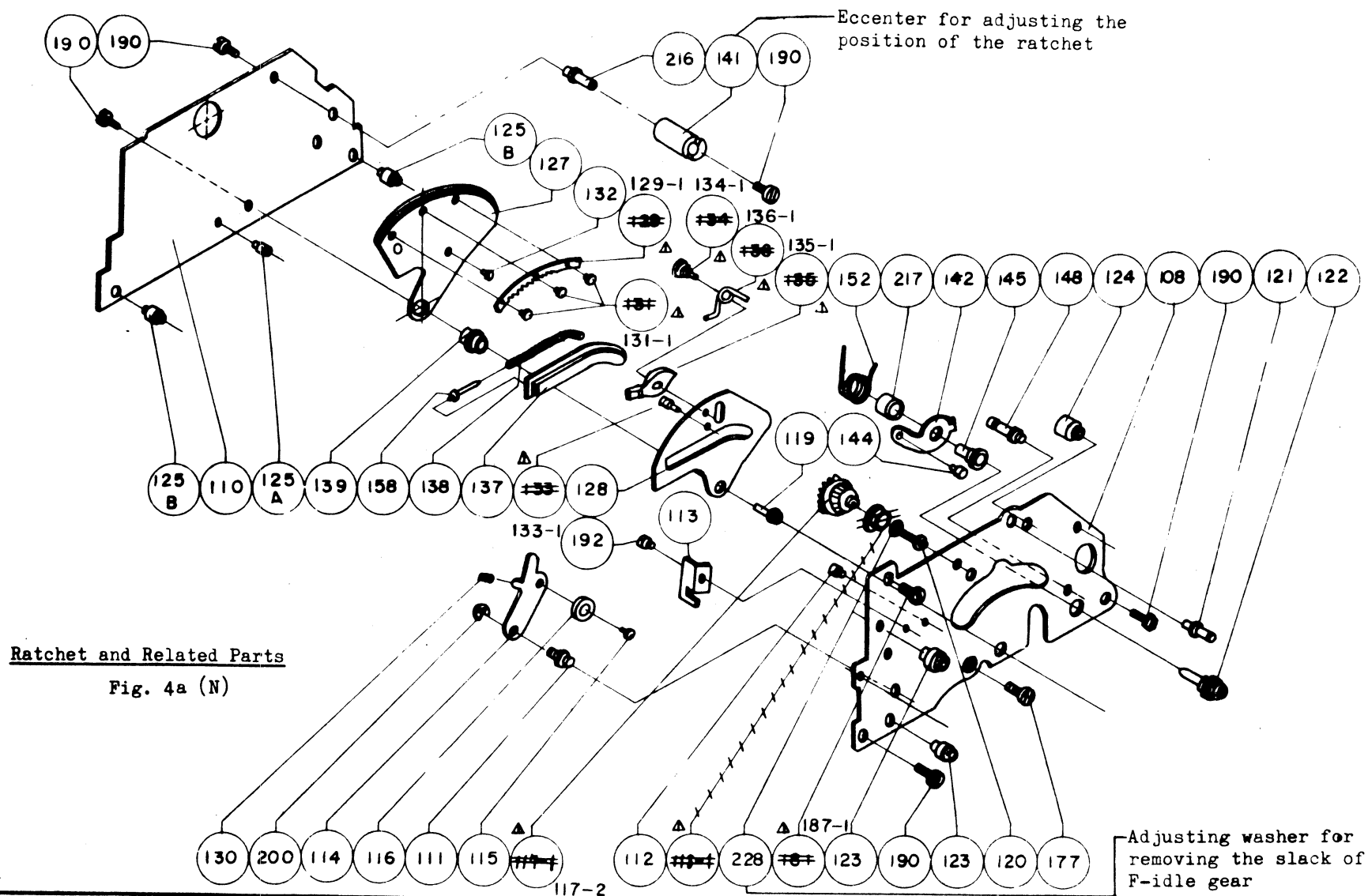
Compensation Index and Pantograph

Fig. 3a (N)



Ratchet and Related Parts

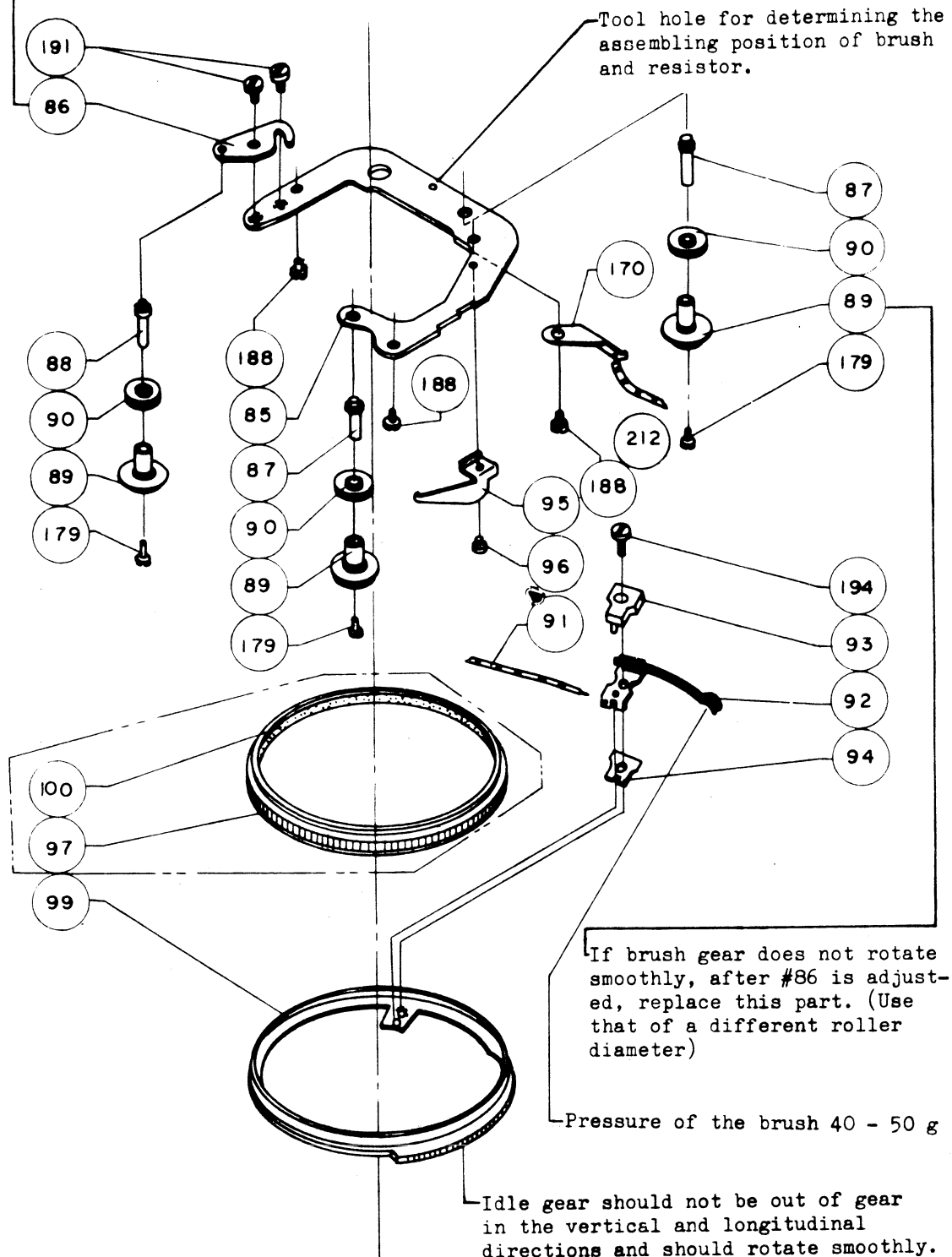
Fig. 4 (E)



Ratchet and Related Parts

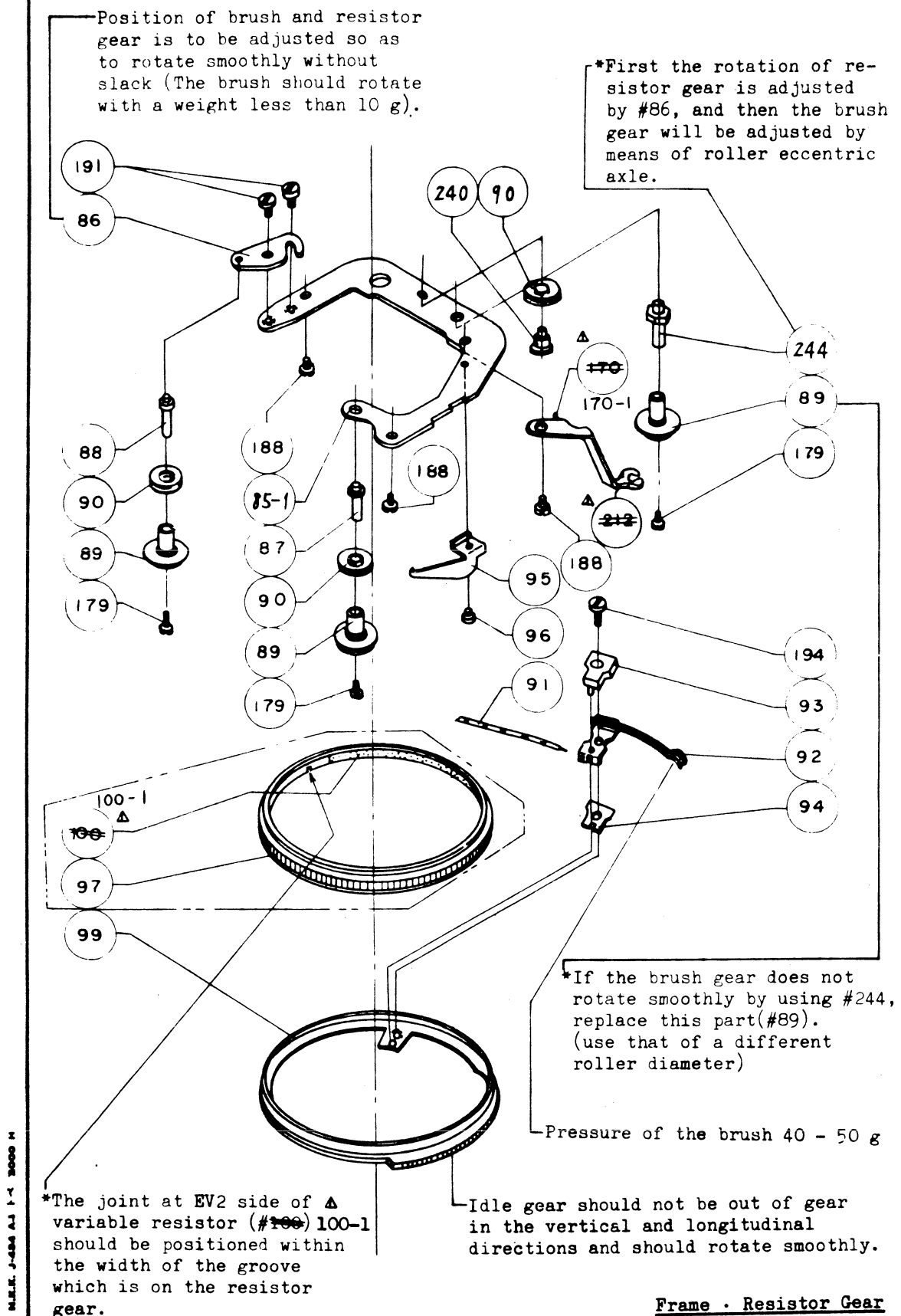
Fig. 4a (N)

Position of brush and resistor gear is to be adjusted so as to rotate smoothly without slack (The brush should rotate with a weight less than 10 g).



Frame - Resistor Gear

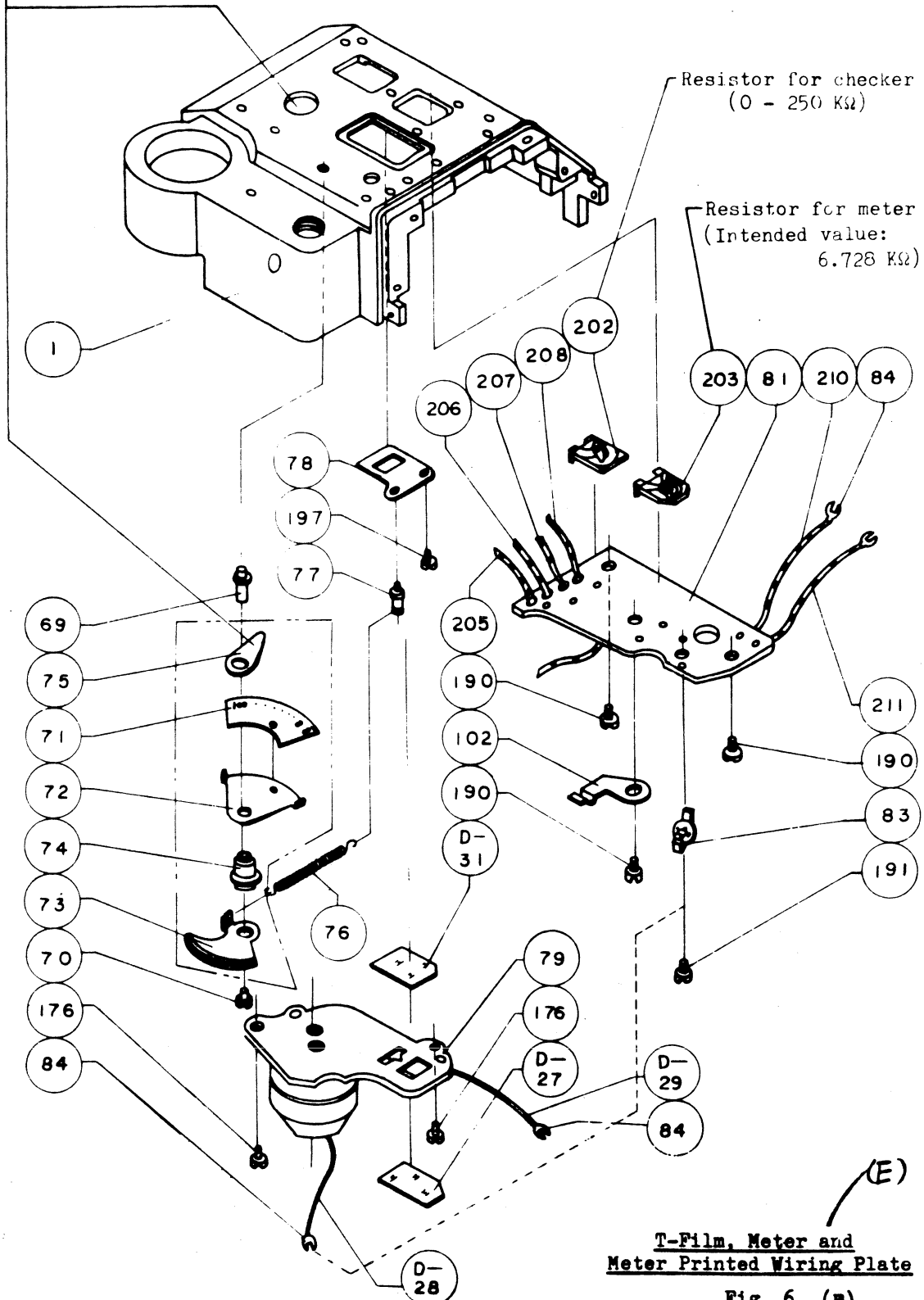
Fig. 5 (E)



Frame - Resistor Gear

Fig. 5a (N)

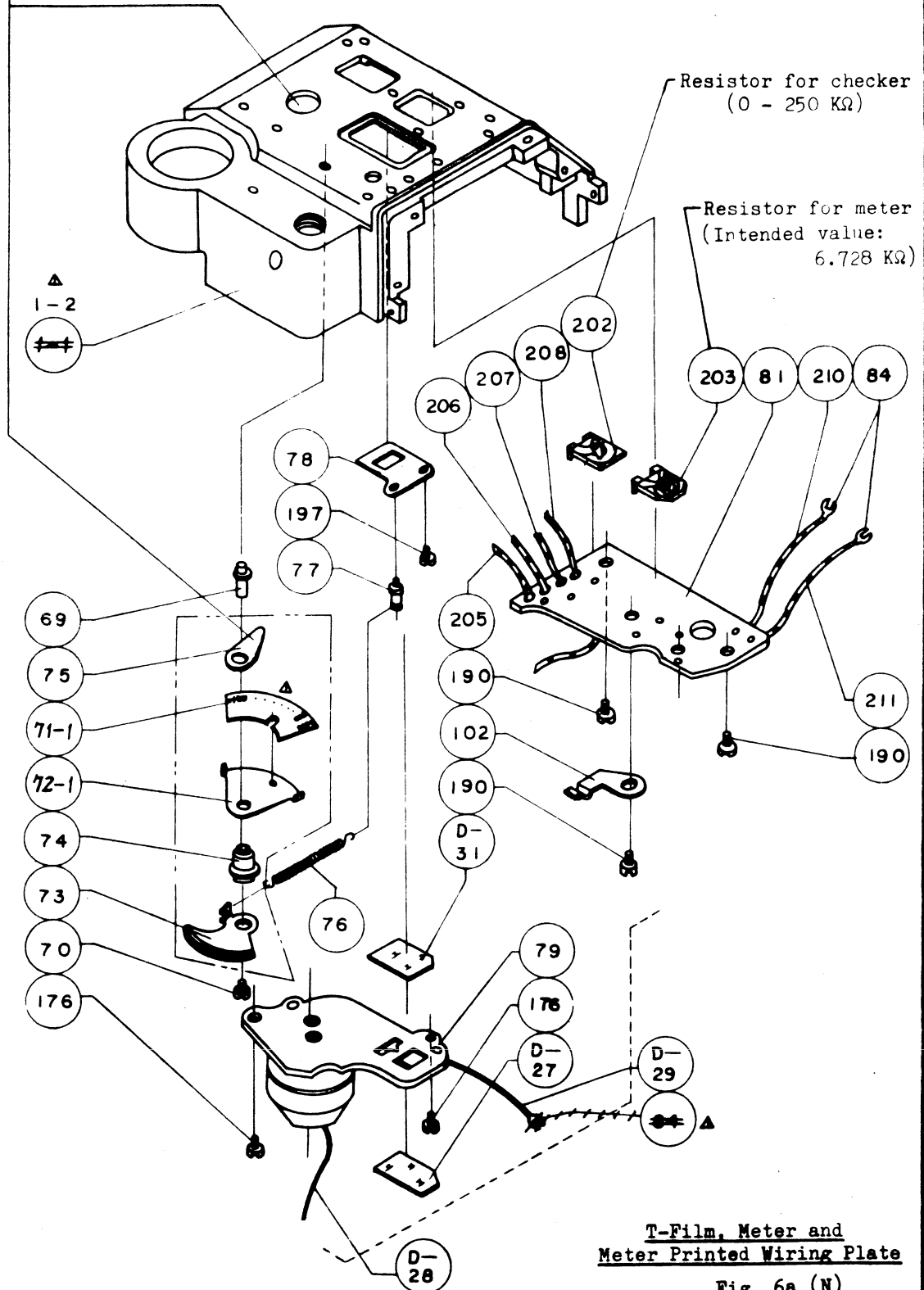
Fine adjustment of T-film is performed directly through the hole in #1. #75, cemented to #71, is to be separated before adjustment and cemented again after adjustment.



N.E.L. J-434 A4 1-1 2000 M



Fine adjustment of T-film is performed directly through the hole in #1. #75, cemented to #71, is to be separated before adjustment and cemented again after adjustment.



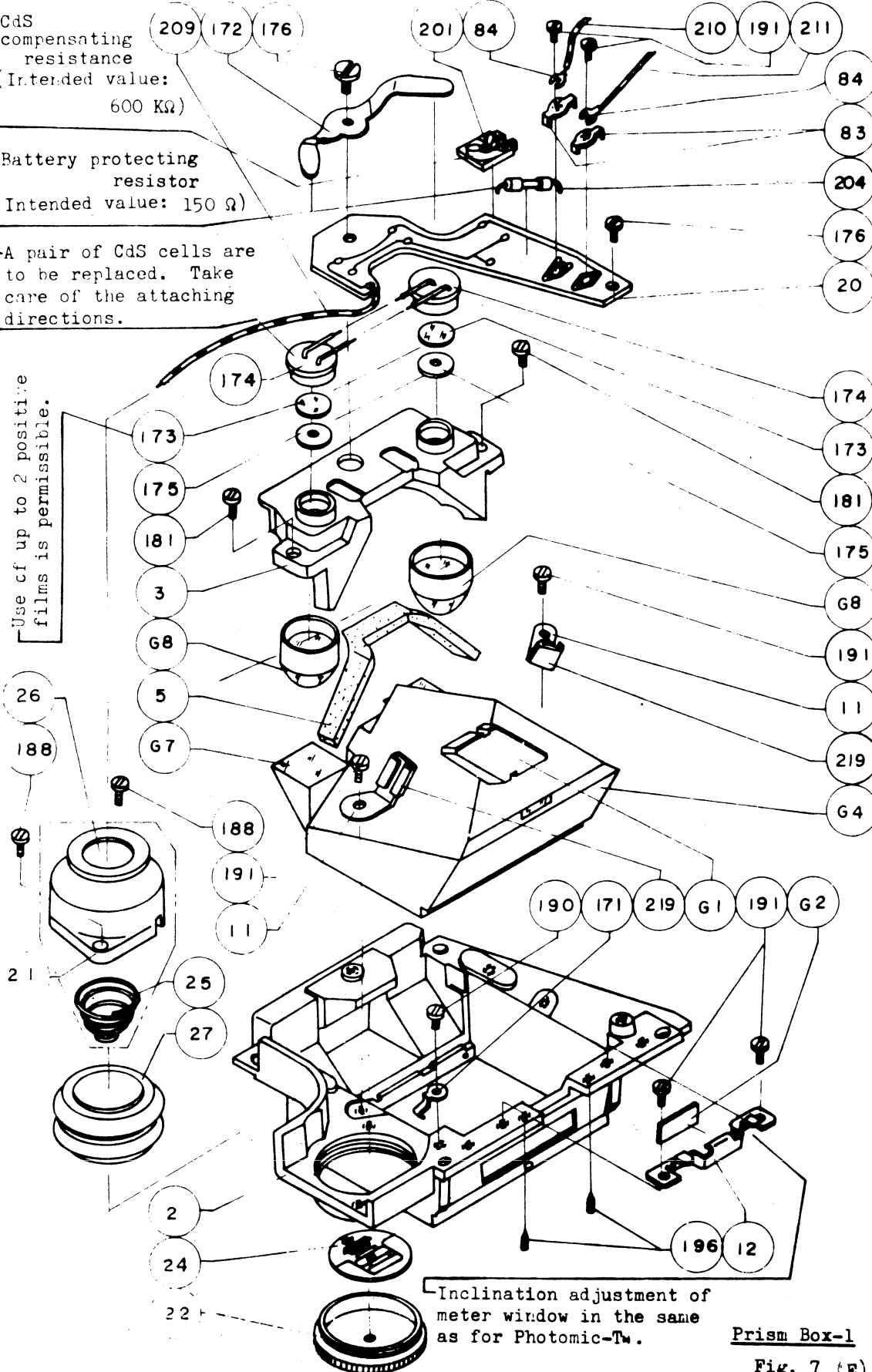
ALL J-400 AS 1-1 00000 N

CdS  
compensating  
resistance  
(Intended value:  
600 K $\Omega$ )

Battery protecting  
resistor  
(Intended value: 150  $\Omega$ )

A pair of CdS cells are  
to be replaced. Take  
care of the attaching  
directions.

Use of up to 2 positive  
films is permissible.



Prism Box-1

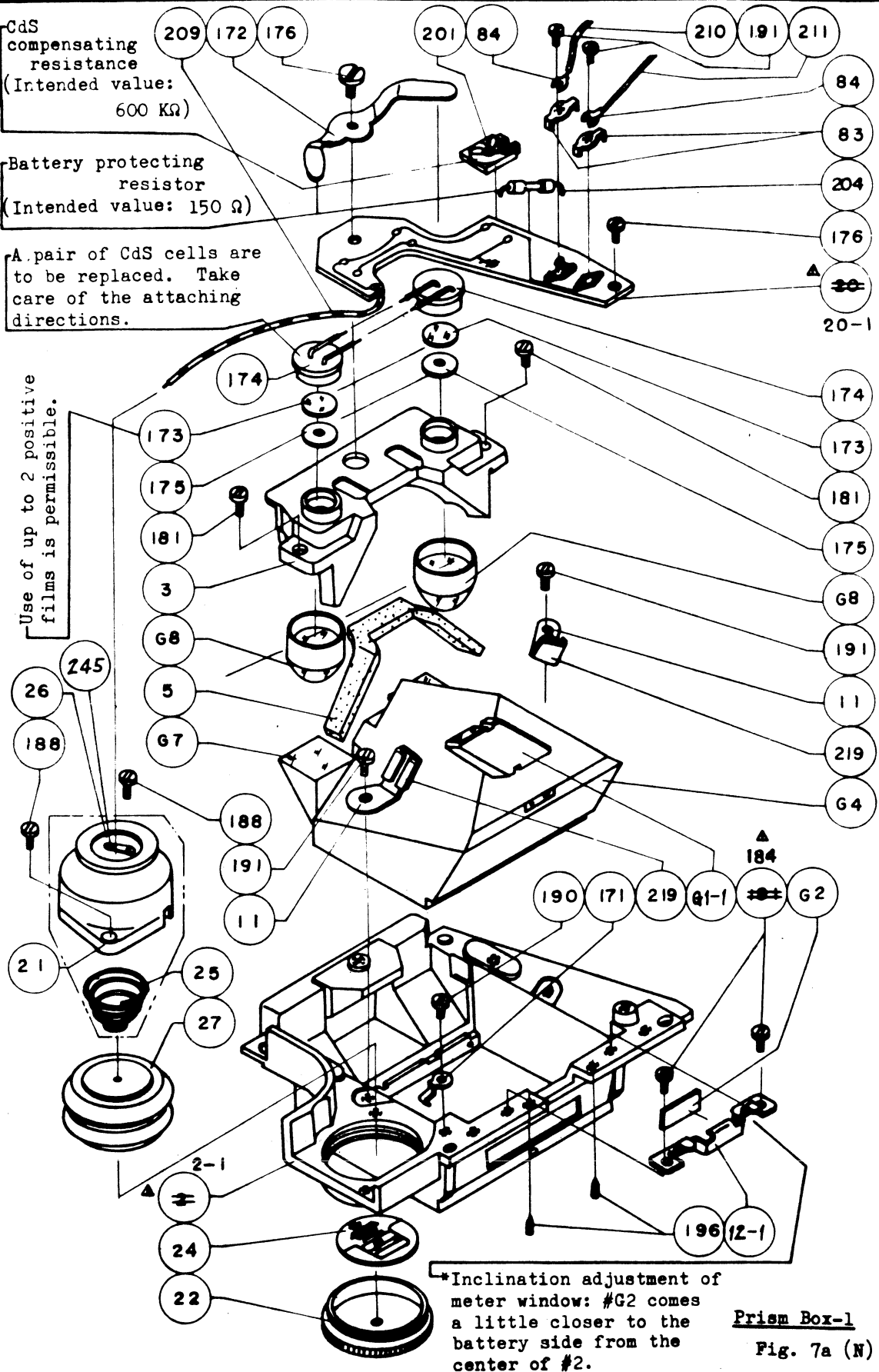
Fig. 7 (E)

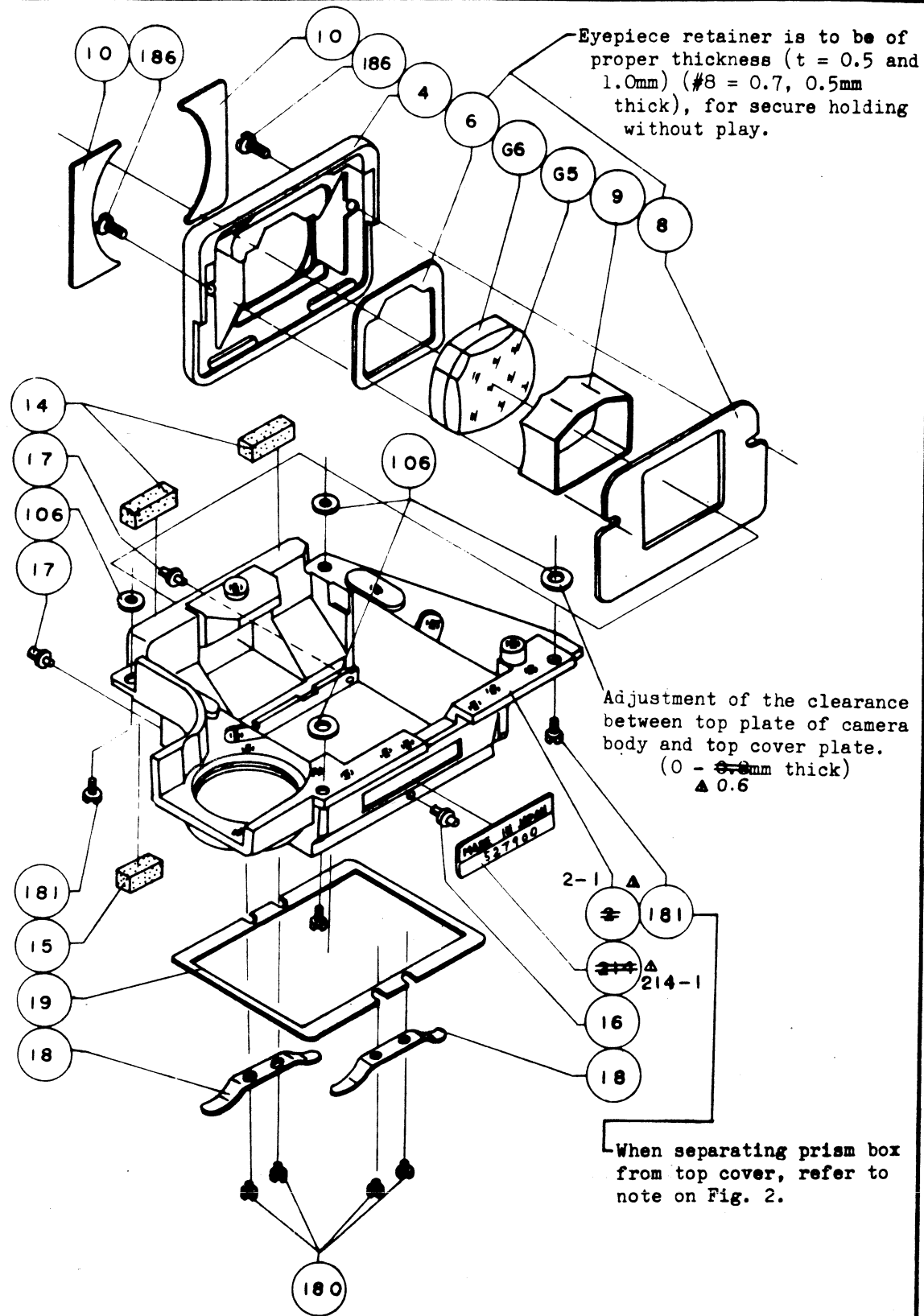
CdS  
compensating  
resistance  
(Intended value:  
600 K $\Omega$ )

Battery protecting  
resistor  
(Intended value: 150  $\Omega$ )

A pair of CdS cells are  
to be replaced. Take  
care of the attaching  
directions.

Use of up to 2 positive  
films is permissible.





Prism Box-2

Fig. 8

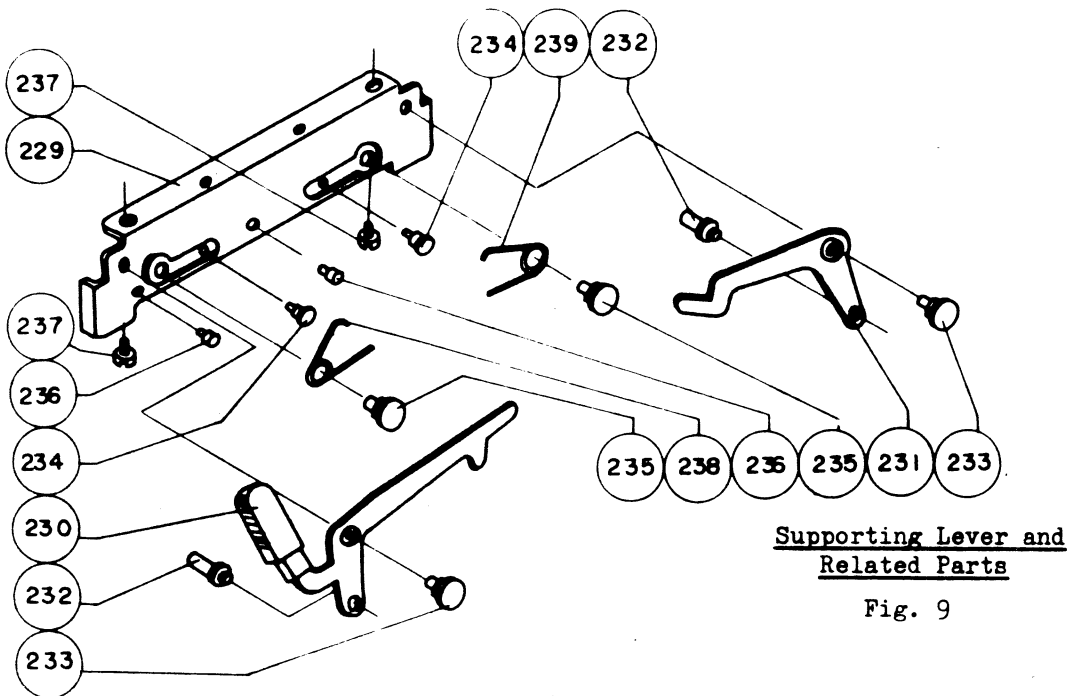


Fig. 9

Ro: CdS compensation resistor #201  
 R<sub>1</sub>: Battery protecting resistor #204  
 R<sub>2</sub>: Meter resistor #203  
 R<sub>a</sub>: Checker resistor #202

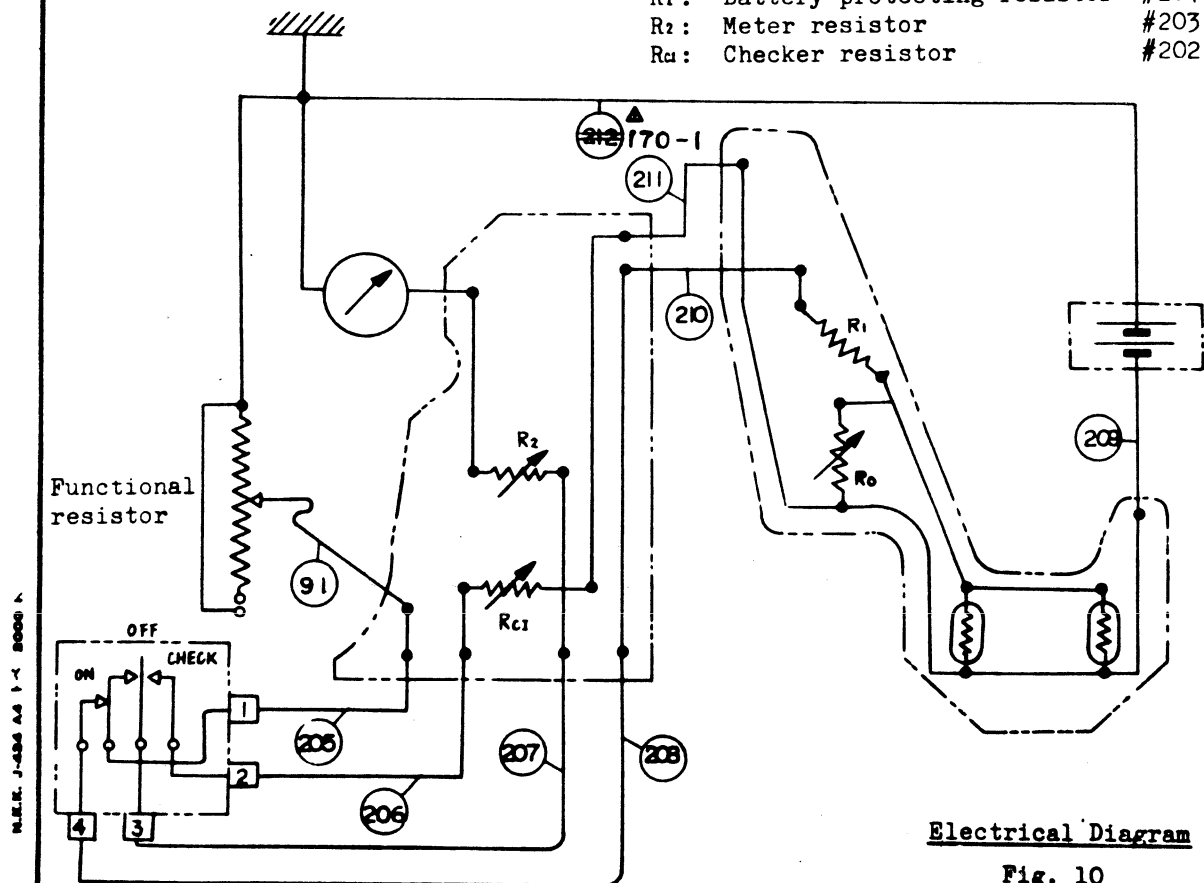
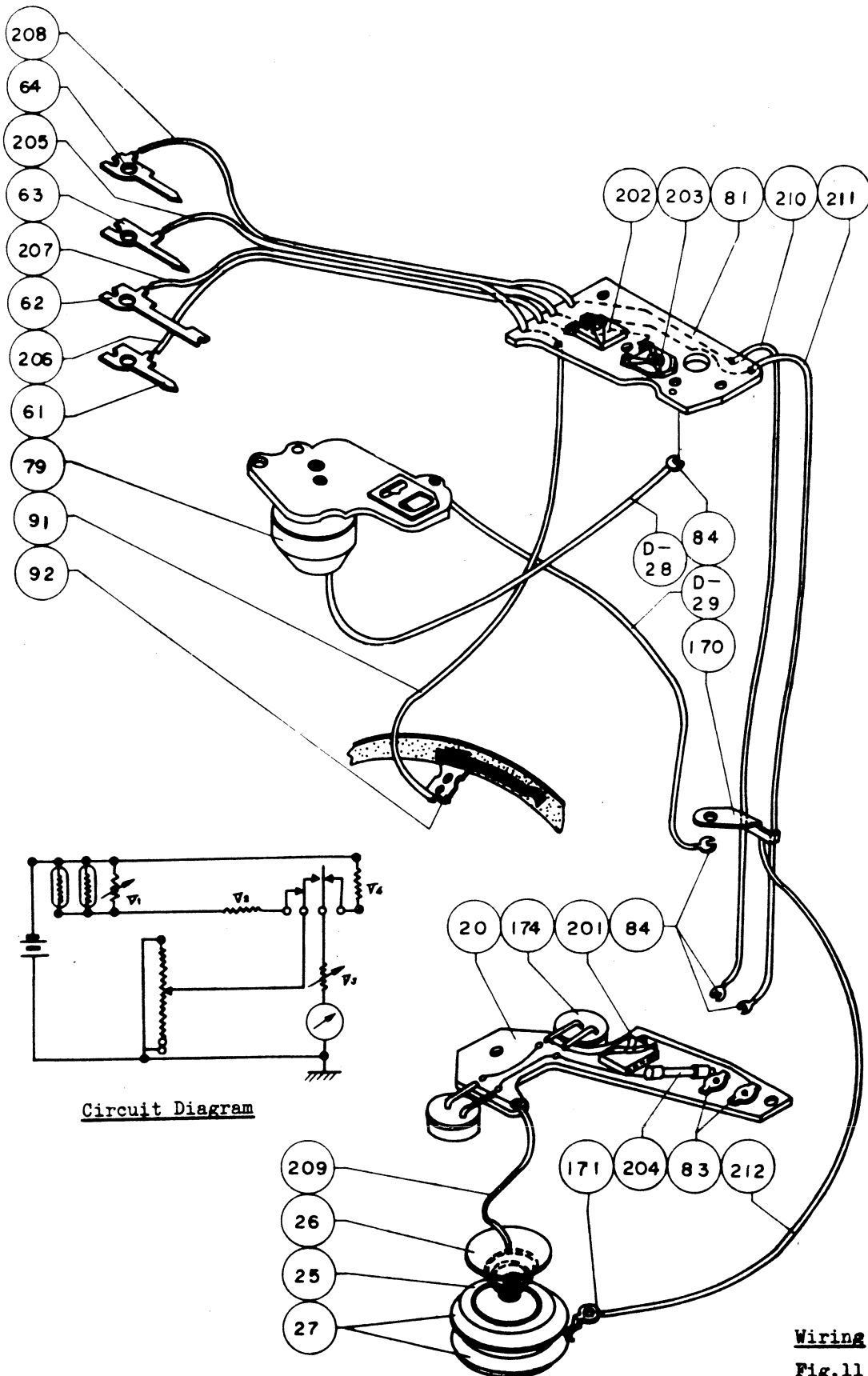


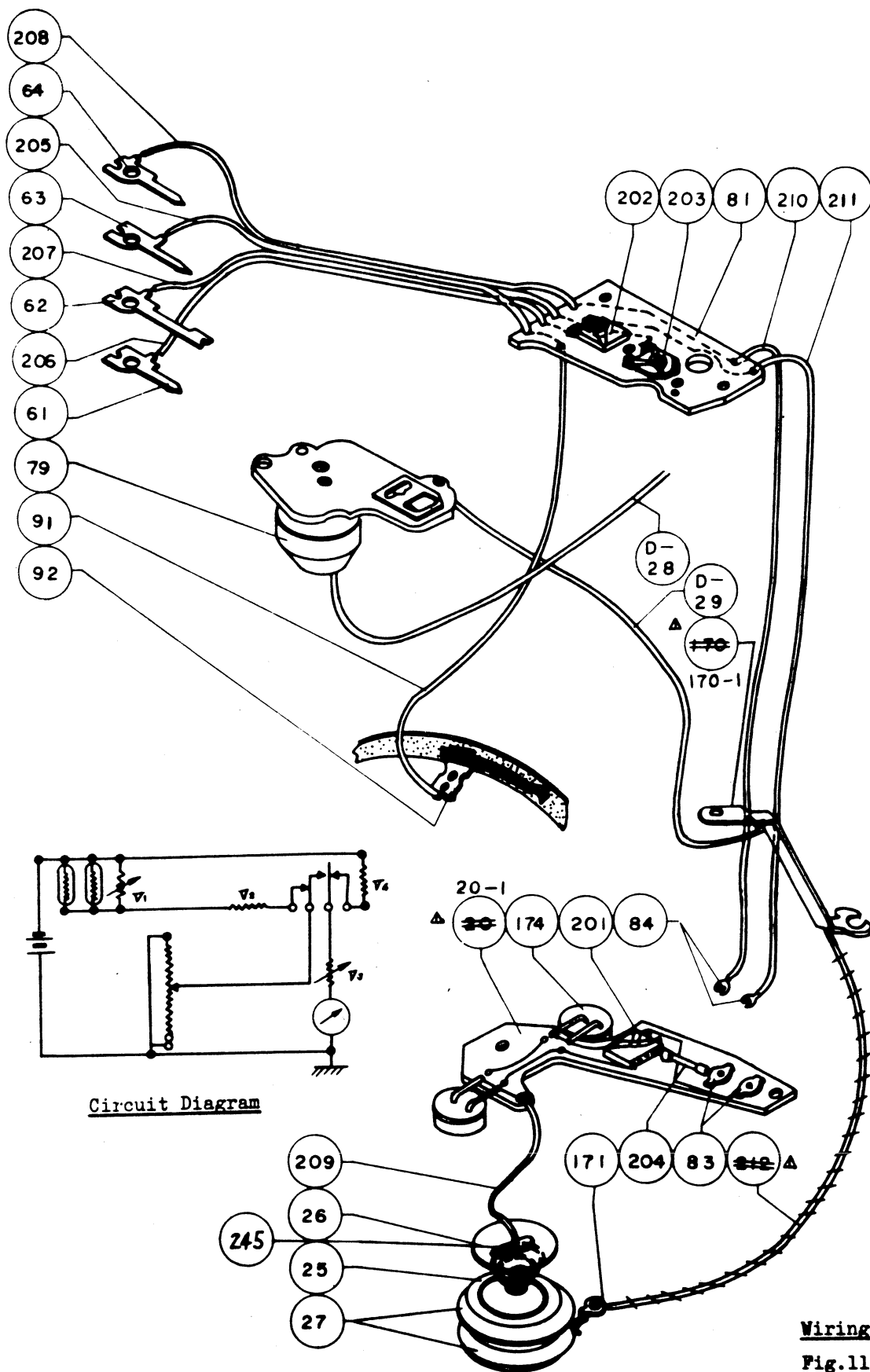
Fig. 10



Circuit Diagram

Wiring  
Fig.11 (B)

DATE: J-400 04 1-1 2000 M



Wiring  
Fig.11a (N)

## ADJUSTMENT AND REASSEMBLY

## §1. ASA Scale (Fig. 1, 1a)

- 1-1. When cementing the ASA scale #35 onto #226 in replacement, be careful to keep the correct angle so that the index 6 makes an angle of  $13^{\circ} 20' \pm 10'$  from the center of the notch found on ASA stopper #33, as shown in Fig. 12.

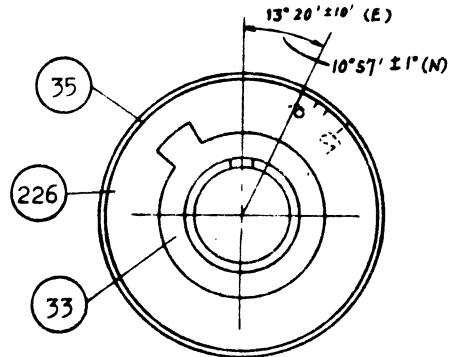


Fig. 12

- 1-2. The compensation indices to be used practically according to the type of finder screen ranges between  $+1/2$  and  $-1 1/2$  steps. ASA 6400 cannot be brought to the figure 2 on the compensation indices.

## §2. Clutch and Clutch Shaft (Fig. 1, 1a)

Clutch #30 is set to clutch shaft #32 by means of two screws #195 in such a position that the bottom surfaces marked ☆ are flush with each other and at the same time one of the screws #195 falls into the rotation preventing groove on #32.

## §3. T-Dial (Fig. 1, 1a)

In assembling T-Dial #28 note that the distances of the attaching hole of T-Dial pin #39 and of T-Dial screw #182 from the center are slightly different.

## §4. Switch-off Button commonly used for Battery Checking (Fig. 2, 2a)

The button subassembly is removed by unscrewing bush #51. In this case the subassembly consisting of dial knob #34, T-bottom



plate #49, racket plate #48 and switch mold #66 should be removed  
 49-1 48-1  
 for replacement.

Bush #51 is to be fastened firmly, otherwise the operation of the switch will not be correct and will give adverse influences to other parts.

§5. Top Cover of the Compensation Base Plate Subassembly (Fig. 2, 2a)

When the base plate subassembly is attached to top cover #1 provided with brush gear #99, take care of the relative angular positions of brush gear, ratchet inside the base plate and connecting pin for pantagraph.

5-1. When base plate #108 is attached to top cover #1 by means of screws #187 and #181, the ratchet is connected with the pantagraph in the following way:

- 1) Move connecting pin #151 rightward using the finger or a screw driver until a tooth of ratchet #129 engages with pawl #135 at the position of f/1.4.

After making sure of this engagement, bring back #151 carefully to the position of f/5.6 (Fig. 2, 3 and 4).

The correct engagement may be confirmed by hearing a sound produced when #135 sets into #129, while moving #151 after the compensation index plate (#161) has been brought to the position of f/1.2. The position of f/1.4 is found by the seventh setting after the setting to f/5.6 is started. (For reference, the fourth is for f/2.8 and the eighth for f/1.2)

- 2) F-idle gear #117 is attached to the base plate subassembly which is assembled up to the state of 1).

- 5-2. \*The gearing position of the above mentioned F-idle gear is adjusted so that it comes to the center of the gear part of brush gear (#99) as shown in Fig. 13. (Refer to Fig. 2a and Fig. 5a)

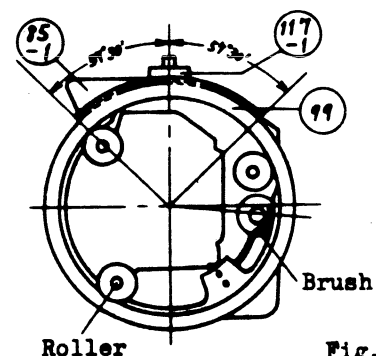


Fig. 13

- 5-3. Keeping the states 5-1 and 5-2, make engagement of #117 with #99.  
 In this case, make sure of #99 geared without slack, <sup>117-1</sup> because this  
 may cause defective engagement in the vertical and longitudinal  
 directions. (Fig. 2 and 4)  
 2a, 4a

#### §6. Compensation Index Plate (Fig. 3, 3a)

Adjustment of this plate should be made after that of the ratchet  
 (#129) has been finished.

Attach this plate to the standard camera body with the front cover  
 (#107) removed.

Using a go- and not-go gages, see the setting condition of pawl #162  
 provided for holding the compensation index in the positions of  $f/2.8$   
 and  $f/1.2$ .

- 6-1. For fine adjustment, make use of eccentering of lever pin #166  
 for moving the index plate.
- 6-2. For coarse adjustment, in addition to the above fine adjustment,  
 it will be required to bend stud #149 on the pantagraph B.
- 6-3. In adjustment the ratchet should be set in such a sequence that  
 the compensation index holder pawl (#162) sets into #161 at the  
 same time or after the pawl (#135) sets into #129, special care  
 should be taken of setting in at the position of  $f/2.8$  and  $f/1.2$ .

#### §7. Segment Gear (Fig. 3 and 4) 3a 4a

- 7-1. The rotating limits of segment gear #127 should be adjusted so as  
 to ensure the correct compensation performed according to the  
 type of lens being attached to the camera.

This adjustment is carried out by eccentering the segment adjust-  
 ing sleeve (#141), that is, by adjusting the setting-in position  
 of the tooth of the ratchet (#129) into the pawl (#135) of  $f/2.8$ ,  
 using a go- and not-go gages, as follows:

- 1) Mount the FTM finder on the standard camera body, with its front  
 cover removed.

- 2) Attach the gage lens to the camera body. Holding the milled ring on the lens, turn the lens until the locking pin sets into the groove on the lens.
- 3) Turn the aperture ring of the lens in the stop-down direction over  $f/5.6$ .
- 4) Moving the compensation index plate (#161) with the fingers, set the compensation index holder pawl (#162) into the tooth for  $f/1.2$ .
- 5) Holding the aperture ring of the lens, carefully turn the ring until the aperture is fully opened.  
Counting the number of sounds with which the pawl (#135) is set into the ratchet. (#129)
- 6) The position for  $f/2.8$  is reached when the fourth sound is heard, after the #135 has been set into the position for  $f/5.6$ .
- 7) At the position for  $f/2.8$  make adjustment using go- and not-go gages.

#### §8. Assembling the Frame, Resistor and Brush Gear (Fig. 5, 5a)

Resistor gear #97 and brush gear #99 should be attached to frame #85 so correctly as to make their rotations smooth and to give rise to no vertical and longitudinal slack. If their rotations are too heavy, the rotation of the segment will not be get smooth. If the slack is large, the engagement with the F-idle gear will not be right.

##### 8-1. Assembling the resistor gear (#97)

Moving frame adjustor #86, make the resistor gear perfectly fitted to the groove on the roller #90.

Make adjustment of the brush gear (#99) at the same time.

- 8-2. If the adjustment of the brush gear cannot sufficiently be accomplished with that of the resistor gear, and the rotation is not smooth, replace roller #89. The rollers of different diameters are available or it is adjusted by means of roller eccentric axle (#244).

§9. Combination of Shutter Speed, f-number (EV), ASA Film Speed is to be as follows:

\*When set the shutter speed at T, f-number at f/5.6 (when using f/1.2 lens), ASA film speed at 400, the contact position of the variable brush should be adjusted so that it comes to the short circuit position of the variable resistor i.e. the groove on the brush gear. Such a combination will be obtained by adjusting the engaging position of segment gear (#127) with brush gear (#99), and the engagement of resistor gear (#97) with ASA scale (#35) and shutter speed dial (#28).

9-1. For engaging the segment gear with the brush gear, refer to §5.

9-2. Line up the figure 1/1000 on the T-dial (#28) to the index (Fig. 1).  
1a

9-3. \*Bring the groove (ㄣㄣㄣ) on the resistor gear (#97) opposite the contact position of variable brush (#92). (Fig. 14)

Make this adjustment by turning the dial ring (#34) while being lifted up. If it cannot be made, releasing three dial set screws #199 on #34 shift the ring and reset it.

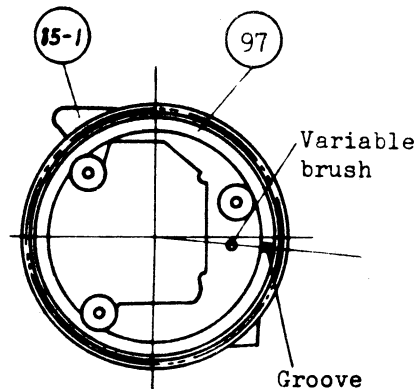


Fig. 14

9-4. To adjust the ASA scale, release three set screws #199 on #34, and line up the position of the figure 400 on the ASA scale to the index ▼ engraved on #34 and then set the scale in position. (Fig. 1, 1a)

§10. T-Film (Fig. 1 and 6)  
1a, 6a

T-film #71 is to be adjusted in such a way that, when the shutter speed dial is rotated while being coupled with the shutter speed dial on the camera body, no figure appear in the finder except a necessary figure, no matter in whatever direction the shutter speed dial is turned.

10-1. Fine adjustment

Detach T-film #71 from film holder #75. Move the T-film, using a pin through the tool hole in the top of the top cover (#1). After adjustment, fix the T-film with the film holder using cementing agent.

#### 10-2. Coarse adjustment

Release T-dial pin #39 and T-dial screw #182, inside the T-dial (#28). Now T-dial gear #44 held by clutch #30 and clutch sleeve #37 can be rotated freely. Then, make adjustment by moving T-dial 2nd gear #46 or film underlay #72. (Fig. 1, 1a)

#### §11. Meter (Fig. 6, 6a)

For replacement of the meter, only unscrew screws #176. When reattaching, however, take care of the relative position of the T-film to the position of the window, especially of the spaces at the ends of the T-film figures.

#### §12. Meter Printed Wiring Plate (Fig. 6, 6a)

The meter printed wiring plate is provided with semi-fixed resistors for checker #202 and meter #203, each of them being adjusted through the top cover from above.

For the accuracy adjustment refer to §21 (C).

#### §13. CdS Printed Wiring Plate (Fig. 7, 7a)

CdS #174, CdS auxiliary resistor #201 and battery protecting resistor #204 constitute a subassembly so that they are to be adjusted or replaced as a whole. For the accuracy adjustment refer to §21 (A).

#### §14. Mirror Plate (Fig. 7, 7a)

Mirror G2 should be cemented to the mirror plate with neither bend

nor the possibility of separation.

Mirror adjusting screws #196 are to be screwed in, after the mirror has been completely stucked. The angular adjustment of the mirror is performed by means of set screws #196.

#### §15. Meter Needle Window inside the Eyepiece

Vertical, inclination and lateral adjustments are to proceed in the same way as with the Photomic-Tw.

#### §16. Eyepiece Cup #4 (Fig. 8)

The eyepiece cup is to be attached securely so as not to cause loosening to the eyepiece lens. Choose a neoplane (#6) of proper thickness according to the thickness of the eyepiece lens.

#### §17. Clearance between Top Cover Plate #223 and Top Plate of Camera Body (Fig. 8)

The clearance is adjusted by changing the thickness of washer #106. In this adjustment the front side being fixed by the base plate (#229), the thickness at four positions of #106 is not always the same. The thickness of the washer ranges between 0 (without washer) and 0.8mm (the designed thickness: 0.4mm).

In assembling take care of the following points:

- 1) The refracting edge of G1 does not come into contact with the brush gear (#99).  
G1-1
- 2) The operation of the ratchet and of the pantagraph coupling pin (#151) must be positive. (There are three types of prongs on the lens)

#### §18. Base Plate (Fig. 9)

This plate (#229) should be kept in a constant position to ensure the correct signal transmission from the camera body to the internal mechanism of the finder. Therefore, make sure of the attaching

position as follows:

- 1) The position of the base plate attached to the prism box (#2) should be symmetrical with respect to the center of the prism box.
- 2) No inclination of the base plate is permissible.
- 3) When the base plate, prism box (#2) and top cover (#1) are attached or detached, check for the correct engagement of the ratchet.

#### §19. Circuit of Exposure Meter

The circuit of the meter in this type of finder is the same as that of the Photomic-Tw except the following points, so that the resistors, CdS, functional resistors, etc. are all commonly specified with those for Photomic-Tw:

- 1) Construction and specifications of the meter
- 2) Shape of the printed wiring plates
- 3) Construction of the switch and battery check

#### §20. Specifications of Main Parts

(Refer to "Repair Manual for Photomic-Tw" so for the parts commonly used)

- (A) Resistance of ~~#20~~<sup>▲</sup>  
#20-1

Total resistance of two CdS cells and of adjusting resistors #201 and #204:

Brightness Cd/m <sup>2</sup>	2(EV4)	64(EV9)	4096(EV15)
Range of resistance	77.9-62.9 kΩ	5.9-4.7 kΩ	0.42-0.36 kΩ

- (B) ND filter (positive film)

Common with that for Photomic-Tw:

See §21 (B)

- (C) Meter (one same type)

Internal resistance: 1.80 KΩ

Torque: 0.32mg cm/deg.

\*0.23

$$\frac{\text{Torque}}{(\text{Weight of moving part})^{1.5}} \times 10^5 = 1.348$$

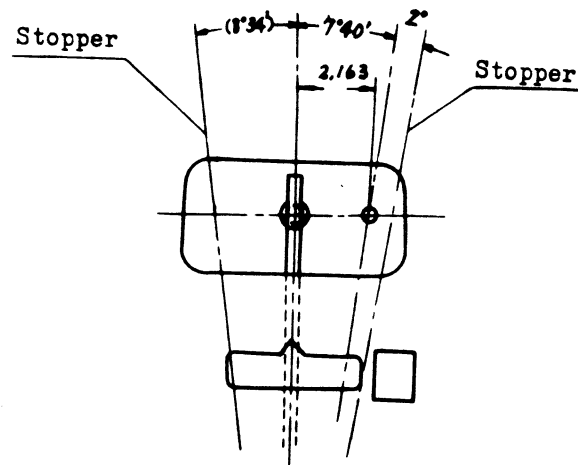


Fig. 15

Meter Needle

(D) Functional resistor (#100)

▲ #100-1

Table 2.

EV	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Upper limit of resistance	Not infinite	kΩ 30	kΩ 7.1	kΩ 2.9	kΩ 1.48	Ω 790	Ω 480	Ω 260	Ω 156	Ω 97	Ω 61	Ω 40	Ω 27	Ω 18.5	Ω 13.0	Ω 9.5
Lower limit	kΩ 100	kΩ 9.7	kΩ 3.7	kΩ 1.75	Ω 960	Ω 530	Ω 305	Ω 182	Ω 113	Ω 71	Ω 46.5	Ω 30.0	Ω 20.5	Ω 14.3	Ω 10.3	Ω 7.7

(E) CdS auxiliary resistor (#201) (R<sub>0</sub>)

▲ Designation Resistance: 600kΩ (Used value 500kΩ - 1MΩ)

(F) Battery protecting resistor (#204) (R<sub>1</sub>)

▲ Designation Resistance: 50Ω (Used value 10Ω - 100Ω)

Provided Resistances: 10Ω, 20Ω, 30Ω, 40Ω, 50Ω, 80Ω

**Note:**

The new type is indicated by the following discriminations against the earlier:

For #20 unit, CdS lead wire is colored green

For #100-1, a red dot is provided on the inside of resistor holder



(G) Meter internal resistor (#203) ( $R_2$ )

Resistance: 0 — 10 K $\Omega$

(H) Battery checking resistor (#202) ( $R_{C1}$ )

Resistance: 0 — 250 K $\Omega$

Note: (E) - (H) are common with  
Photomic-Tw. Refer to §21 (E) - (H).

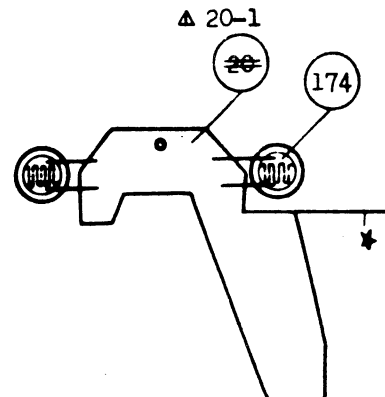


Fig. 16

(I) CdS printed wiring plate (Fig. 16)

The light receiving parts of CdS cells  
#174 should not be placed slantwise  
to the line ★.

When it is placed over #3, two CdS cells should be located so as  
to be put into the hole in #3 smoothly.

(J) Two batteries #27

1.3 V each.

## §21. Adjustment

(A) Temporary assembly and adjustment of CdS printed wiring plate  
subassembly #3

21A-1. Selection of CdS cells #174

Refer to §20 (A).

As the repair parts, request delivery of a pair of CdS cells.

21A-2. For temporary assembling, first attach #201 ( $R_o$ ) to the printed  
wiring plate, without #204 ( $R_1$ ).

Then, connect lead wires to the positions ① and ② on the printed  
wiring plate.

21A-3. Connect the dial adjustable rheostat ( $DR_1$ )

(1  $\Omega$  - 1 K $\Omega$ ) to ① and ② lead wires.

(Fig. 17)

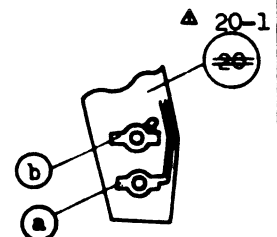


Fig. 17

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## 21A-4. Adjustment of sensitivity of CdS cells

Make the resistance of  $R_o = 600 \text{ K}\Omega$  and of  $DR_i = 150 \text{ K}\Omega$ .

Temporarily assemble the top cover subassembly.

Fit the CdS printed wiring plate (~~#20~~) into the standard camera with 50mm f/1.4 lens and A-type screen.  <sup>$\Delta$  #20-1</sup> Expose this camera to the brightness box with EV9 brightness. In this case, the terminal resistance of ~~#20~~ should be  $4.8 \text{ K}\Omega - 6.0 \text{ K}\Omega$ .  <sup>$\Delta$  #20-1</sup>

If it is under  $4.8 \text{ K}\Omega$ , place the positive film in front of either or both of the CdS cells, so as to make the resistance between  $4.8 \text{ K}\Omega - 6.0 \text{ K}\Omega$ .

The use of the positive film up to 2 pieces is permitted.

(B) Assembling top cover subassembly #1  
1-1

## 21B. Adjustment of position of functional resistor

21B-1. Assemble temporarily the prism box together with pentaprism and eyepiece lens system, without the CdS printed wiring plate.

21B-2. Fit this into the standard camera with 50mm f/1.4 lens and A-type screen.

21B-3. See that the resistance between the terminal (#91) and the earth for EV2 — 17 is within the range given in Table 2 in §20 (D).

## (C) Adjustment

Refer to §22C for Photomic-TN, except §22C-8.

## (D) Inspection of metering accuracy

Refer to §22, D (1) for Photomic-TN.

## (E) Inspection of battery check

Refer to §22, D (2) for Photomic-TN.

## §22. If the accuracy is not sufficient,

Refer to "Trouble Chart", §25 for Photomic-TN.

## §23. Conditions for brightness measurement

Refer to §27 for Photomic-TN.

\*§24. Additional note

- 6-4. Releasing order of compensation index holder pawl (#162)  
and ratchet pawl(#135)

When the lens is inserted into body, the ratchet pawl and compensation index holder pawl are released by the movement of the pantograph A whose pin is moved by the coupling prong of lens, and the order of their movements should be such that first #135 is released and then #163 is done.

The adjustment will be made by means of eccentric pin (#57-1 in Fig. 3a).

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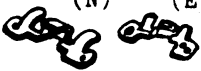


## DYNAMICAL REQUIREMENTS















Item	Measuring method	Requirement
Rotating torque of dial ring	Measure the rotating torque, all the gears being attached	Within 350 g - cm
Lifting force for ASA clutch	Measure the force for lifting the dial ring	$750 \pm 100$ g
Force for on-and-off of switch	Measure the force for pushing the button	Within about 500 g
Force for coupling pin	Measure the returning force of the coupling pin in the position of f/1.2	Not more than 100 g at f/1.2
Lifting force for coupling pin	Measure the force for lifting the pin at f/5.6	
Force for click roller of segment	Measure the pushing force for the coupling pin for movement from the position f/5.6 to f/8	300 — 500 g
Pressure of sliding brush	Measure the pressure, when the brush is in contact with the functional resistor	Pressure of brush 40 — 50 g
Torque of brush ring	Measure the rotating torque, the resistor gear and brush gear being attached to the frame and adjusted.	Take measurement by hanging a balance, on the tooth of brush gear. Not more than 10 g















## LUBRICATION TABLE

Surface to be lubricated of part #	Lubricant	Refer to
Fitting surfaces of top cover #1 and ASA gear #31 1-1		Fig. 1 1a
Fitting surfaces of F-idle gear shaft #120 and F-idle gear #117 117-1		Fig. 4 4a
Fitting surfaces of pawl shaft #134 and pawl spring #136		Fig. 4 4a
Sliding surfaces between segment #128 and rocker pin #144		Fig. 4 4a
Sliding surfaces of rocker spring bush #217 and rocker spring #152 and the inside surface of bush		Fig. 4 4a
Fitting surfaces of rocker shaft #122 and rocker lever #145		Fig. 4 4a
Fitting surfaces of click shaft #111 and click lever #114		Fig. 4 4a
Sliding surfaces of segment #128 and click roller #116		Fig. 4 4a
Fitting surfaces of segment shaft #119 and segment collar #139 and segment gear #127		Fig. 4 4a
Sliding surfaces of compensation index coupling lever #160 and compensation index plate #161 160-1		Fig. 3 3a



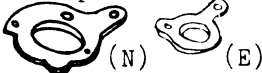








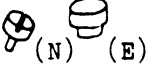



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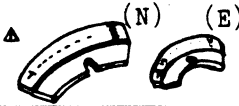
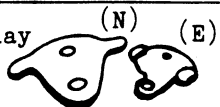



No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-1	Top cover (N) (E) 	1		1, 2, 6	X	
<del>1</del> 2				1a, 2a 6a		
2-1 <del>2</del>	Prism box 	1	A2	7, 7a 8	△	
3	CdS holder base 	1	A4	7, 7a	△	
4	Eyepiece cup 	1		8	○	
5	Dust tight piece 	1	A4	7, 7a	○△	
0.5 6 1.0	Eyepiece neoplane t=0.5, 1.0 	1		8	○	
0.3 8 0.5 0.7	Eyepiece washer t=0.5, 0.7 	1		8	○	
9	Eyepiece sleeve 	1		8	○	
10	Eyepiece leatherette 	2		8	○	
11	Prism holder 	2	A8x2	7, 7a	△	
12	Mirror plate (N) (E) 	1	A3	7	△	
12-1			A3-1	7a		
14	Dust tight piece B 	2	A2x2	8	○△	
15	Dust tight piece A 	2	A2x2	8	○△	

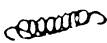







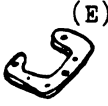





No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-16	Lock pin A 	1	A2	8	△	
17	Lock pin B 	2	A2x2	8	△	
18	Fresnel spring holder 	2	A2x2	8	○△	
19	Prism mask 	1	A2	8	○△	
<del>20-1</del> 20-1	CdS printed wiring plate 	1	C1	7, 7a 10, 10a	△	
21	Battery case 	1	A14	7, 7a	△	
			A14-1			
22	Battery case cap 	1	A15	7, 7a	△	
24	Marking 	1	A15	7, 7a	△	
25-1	Battery spring 	1	A14	7, 7a	○△	
			A14-1			
26	Lug 	1	A14	7, 7a	△	
			A14-1			
27	Mercury battery 	2		7, 7a 10, 10a	⊗	
28	T-dial 	1	A7	1, 1a	△	
<del>29-1</del> 29-1	T-dial spring 	1		1, 1a	○	
30	Clutch 	1		1, 1a	○	















No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-31	ASA gear 	1		1, 1a	○	
32	Clutch shaft 	1		1, 1a	○	
33	ASA stopper 	1	A9	1, 1a	△	
34	Dial ring 	1	A9	1, 1a	△	
35	ASA scale 	1	A9	1, 1a	○△	
37	Clutch sleeve 	1		1, 1a	○	
38	Clutch spring 	1		1, 1a	○	
39	T-dial pin 	1		1, 1a	○	
40	T-dial stopper pin 	2	A7, A11 A10-1	1, 1a	○△	
41	ASA stopper pin 	1	A9	1, 1a	○△	
42	T-dial idle axle 	1	A10 A10-1	1, 1a	○△	
43	T-dial 2nd gear axle 	1	A10 A10-1	1, 1a	○△	
44	T-dial gear 	1		1, 1a	○	
45	T-dial idle gear 	1	A10 A10-1	1, 1a	○△	































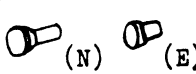

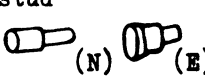

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-46	T-dial 2nd gear 	1	A10 A10-1	1, 1a	△	
48	Racket plate (N) (E) 	1	A10 A10-1	1 1a	△	
48-1						
49	T-dial bottom plate 	1	A11 A10-1	1 1a	△	
49-1						
50	Top button 	1	A16	2, 2a	△	
51	Button sleeve 	1	A16	2, 2a	△	
52	Button axle 	1	A16	2, 2a	△	
53	Switch collar 	1	A16	2, 2a	△	
54	Top button leather 	1	A16	2, 2a	○△	
55	Button spring 	1	A16	2, 2a	△	
56	Side button 	1		2, 2a	○	
<del>57</del>	Compensation release pin 	1	D1, D12 D1-1, D12-1	3 3a	○△	
57-1	" (eccentric) (N) (E) 					
58	Switch lever 	1	A12 A12-1	2, 2a	△	
59	Switch lever washer 	1	A12 A12-1	2, 2a	△	
60	Switch lever spring 	1		2, 2a	○	

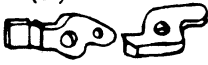
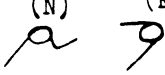





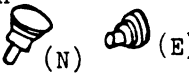





No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	• Remarks
20FD9-61	Lead terminal (green) 	1	A12 A12-1	2, 2a	△	
62	Lead terminal (white) 	1	A12 A12-1	2, 2a	△	
63	Lead terminal (red) 	1	A12 A12-1	2, 2a	△	
64	Lead terminal (yellow) 	1	A12 A12-1	2, 2a	△	
65	Switch insulating plate 	4 3	A12x4 A12-1x3	2, 2a	△	
66	Switch mold 	1	A12 A12-1	2, 2a	△	
67	Switch center shaft 	1	A12 A12-1	2, 2a	△	
69	Film shaft 	1		6, 6a	○	
70	Film shaft screw 	1		6, 6a	○	
71	T-film 	1	A13 A13-1	6 6a	△	
71-1						
72	Film underlay 	1	A13 A13-1	6 6a	△	
72-1						
73	Film gear 	1	A13 A13-1	6, 6a	△	
74	Film boss 	1	A13 A13-1	6, 6a	△	
75	Film holder 	1	A13 A13-1	6, 6a	△	








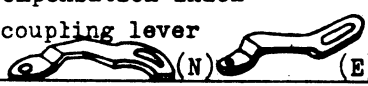


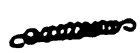


No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-76	Film spring 	1		6, 6a	○	
77	Film spring stud 	1		6, 6a	○	
78	Meter window mask 	1		6, 6a	○	
79	Meter 	1	B1	6, 6a	△	
81	Meter printed wiring plate 	1	C2	6, 6a	△	
83	Terminal 	3	C1x2, C2	6, 6a	○△	
		2	C1x2			
84	Lug 	4	B1x2, C2x2	6, 6a, 7 7a, 10 10a	○△	
		2 <del>3</del> <sup>△</sup>	<del>B1</del> <sup>△</sup> , C2x2			
85	Frame  	1	B2, B3	5	△	
85-1			B2-1, B3-1	5a		
86	Frame adjustor 	1	B2, B3	5, 5a	△	
			B2-1, B3-1			
87	Roller shaft 	2	B2x2, B3x2	5, 5a	○△	
		1	B2-1, B3-1			
88	Roller adjusting axle 	1	B2, B4	5, 5a	○△	
			B2-1, B4			
89 ?	Roller D=8.4, 8.8 	3	B2x3	5, 5a	○△	
			B2-1x3			
90	Plastic roller 	3	B2x3	5, 5a	○△	
			B2-1x3, B3-1			

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-91-1	Lead wire (gray) 	1	B2	5, 5a	○△	
			B2-1			
92	Brush 	1	B2	5, 5a	○△	
			B2-1			
93	Brush mold 	1	B2	5, 5a	○△	
			B2-1			
94	Brush insulating piece 	1	B2	5, 5a	○△	
			B2-1			
95	Earth brush 	1	B2, B3	5, 5a	○△	
			B2-1, B3-1			
96	Brush rivet 	1	B2, B3	5, 5a	○△	
			B2-1, B3-1			
97	Resistor gear 	1	B2, B5	5, 5a	△	
			B2-1, B5			
99	Brush gear 	1	B2	5, 5a	○△	
			B2-1			
100	Functional resistor 	1	B2, B5	5, 5a	△	
			B2-1, B5			
<del>101</del>	Meter cap 	1		2, 2a	○	
102	Lead holder 	1		6, 6a	○	
103	Window plate (clear) 	1		2, 2a	○	
104	Window plate (opal) 	1		2, 2a	○	
105	Top cover leatherette 	1		2, 2a	○	













No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-106	Adjusting washer T t=0.2, 0.3, 0.4 0.5, 0.6 	4		8	○	
107	Front cover  CHROME & BLACK 	1		2, 2a	○	
108	Base plate B 	1	D1, D2 D1-1, D2	3, 3a 4, 4a	△	
109	Base plate C 	1	D1, D3 D1-1, D3-1	3, 3a	△	
110	Base plate A 	1	D1, D4 D1-1, D4	4, 4a	△	
111	Click shaft 	1	D1, D2 D1-1, D2	4, 4a	○△	
112	Stopper pin 	1	D1, D2 D1-1, D2	4, 4a	○△	
113	Click spring stopper 	1	D1, D2 D1-1, D2	4, 4a	○△	
114	Click lever 	1	D1, D5 D1-1, D5	4, 4a	△	
115	Click roller axle 	1	D1, D5 D1-1, D5	4, 4a	○△	
116	Click roller 	1	D1, D5 D1-1, D5	4, 4a	○△	
117	F-idle gear  (N)  (E)	1	D1, D6 D1-1, D6-1	4 4a	△	
<del>118-1</del> 118	F-pinion  (N)  (E)	1	D1, D6 D1-1, D6-1	4 4a	△	
119	Segment shaft 	1	D1, D2 D1-1, D2	4, 4a	○△	
120	F-idle gear shaft 	1	D1, D2 D1-1, D2	4, 4a	○△	















No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9- 121	Pantograph shaft 	1	D1, D2 D1-1, D2	4, 4a	○△	
122	Rocker shaft 	1	D1, D2 D1-1, D2	4, 4a	○△	
123	Base plate front stay 	2	D1x2, D2x2 D1-1x2, D2x2	4, 4a	○△	
124	Base plate rear stay 	1	D1, D2 D1-1, D2	4, 4a	○△	
125A	Back plate stay A 	1	D1, D4 D1-1, D4	4, 4a	○△	
125B	Back plate stay B 	2	D1x2, D4x2 D1-1x2, D4x2	4, 4a	○△	
126	Base plate C collar 	2	D1x2, D3x2 D1-1x2 D3-1x2	3, 3a	○△	
127	Segment gear 	1	D1, D7 D1-1, D7	4, 4a	△	
128	Segment 	1	D1, D8 D1-1, D8	4, 4a	△	
<del>129</del> 129-1	Ratchet 	1	D1, D7 D1-1, D7	4, 4a	△	
130	Click spring 	1	D1 D1-1	4, 4a	○△	
<del>131</del> 131-1	Ratchet rivet 	3	D1x3, D7x3 D1-1x3, D7x3	4, 4a	○△	
132	Segment spring stud 	1	D1, D7 D1-1, D7	4, 4a	○△	
<del>133</del> 133-1	Pawl spring stud 	1	D1, D8 D1-1, D8	4, 4a	○△	
<del>134</del> 134-1	Pawl shaft 	1	D1, D8 D1-1, D8	4, 4a	○△	
















No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9- <del>Δ 135</del> 135-1	Pawl (N) (E) 	1	D1, D8 D1-1, D8	4, 4a	○△	
<del>Δ 136</del> 136-1	Pawl spring (N) (E) 	1	D1, D8 D1-1, D8	4, 4a	○△	
137	Segment spring case 	1	D1 D1-1	4, 4a	○△	
138	Segment spring 	1	D1 D1-1	4, 4a	○△	
139	Segment collar 	1	D1, D7 D1-1, D7	4, 4a	○△	
141	Segment adjusting sleeve 	1	D1 D1-1	4, 4a	○△	
142	Rocker 	1	D1, D9 D1-1, D9	4, 4a	△	
<del>Δ 143</del> 143-1	Pantograph pin (N) (E) 	3	D1x3, D10x3 D1-1x3 D10x3	3, 3a	○△	
144	Rocker pin 	1	D1, D9 D1-1, D9	4, 4a	○△	
145	Rocker lever 	1	D1, D9 D1-1, D9	4, 4a	○△	
148	Rocker spring stud 	1	D1, D2 D1-1, D2	4, 4a	○△	
149	Pantograph B stud 	1	D1, D10 D1-1, D10	3, 3a	○△	
<del>Δ 150</del>	Rivet 	1	D1, D10 D1-1, D10	3, 3a	○△	



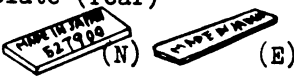


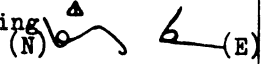






No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9- <del>Δ 151</del> 151-1	Coupling pin 	1	D1, D10 D1-1, D10	3, 3a	○△	
152	Rocker spring 	1	D1, D1-1	4, 4a	○△	
<del>Δ 154</del> 154-1	Pantograph A 	1	D1, D10 D1-1, D10	3, 3a	△	
155	Pantograph B 	1	D1, D10 D1-1, D10	3, 3a	△	
156	Pantograph C 	1	D1, D10 D1-1, D10	3, 3a	△	
157	Pantograph D 	1	D1, D10 D1-1, D10	3, 3a	△	
158	Segment spring shaft 	1	D1 D1-1	4, 4a	○△	
160	Compensation index coupling lever 	1	D1, D11 D1-1, D11-1	3 3a	△	
160-1						
161	Compensation index plate 	1	D1 D11 D1-1, D11-1	3, 3a	△	
162	Compensation index holder pawl 	1	D1, D12 D1-1, D12-1	3, 3a	△	
163	Compensation index plate spring 	1	D1 D1-1	3, 3a	○△	
164	Compensation index plate pin 	3	D1x3, D3x3 D1-1x3 D3-1x3	3, 3a	○△	
165	Compensation index spring stud 	4 3	D1x4, D3x2 D11, D12 D1-1x3, D3-1 D11-1, D12-1	3, 3a	○△	



























No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-166	Index coupling lever pin 	1	D1, D11 D1-1, D11-1	3, 3a	○△	
<del>170</del> 170-1	Lug plate A  	1		5, 5a	○	
171	Battery case terminal 	1		7, 7a	○	
172	CdS holder 	1		7, 7a	○	
173	Filter (film) 	1 - 4		7, 7a	○	
174	CdS cell 	2	C1x2	7, 7a	○△	
175	Diaphragm 	2	A4x2	7, 7a	○△	
176	Racket plate screw 	<del>6</del> 6		1, 1a 7, 7a	○	
177	Back plate stay A screw 	1	D1 D1-1	4, 4a	○△	
179	Roller shaft screw 	3	B2x3 B2-1x3	5, 5a	○△	
180	Fresnel holder screw 	4	A2x4	8	○△	





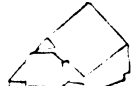

















No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-181	Prism box screw 	$\Delta$ <del>7</del> 6		4, 4a, 7 7a, 8	○	
182	T-dial screw 	1		1, 1a	○	
183	Front cover screw 	$\Delta$ <del>7</del> 4		2, 2a	○	
$\Delta$ 184	Prism holder screw 	$\Delta$ 2		7a	○	
186	Eyepiece cup screw 	$\Delta$ <del>7</del> 4		8	○	
$\Delta$ <del>187</del> 187-1	Base plate screw  $\Delta$ B	$\Delta$ <del>7</del> 1		3, 3a	○	
188	Frame screw 	5		5, 5a 7, 7a	○	
$\Delta$ <del>189</del>	Base plate B collar 	<del>7</del>		3, 3a	○	
190	Base plate stay screw 	$\Delta$ <del>7</del> 11	D1x7 D1-1x7	4, 4a, 6 6a, 7 7a	○ $\Delta$	
191	Mirror plate screw 	$\Delta$ <del>7</del> 6	B2x2 B2-1x2	7, 7a	○ $\Delta$	
192	Click spring stopper rivet 	1	D1, D2 D1-1, D2	4, 4a	○ $\Delta$	
193	Switch screw 	1		2, 2a	○	
194	Brush stopper screw 	1	B2 B2-1	5, 5a	○ $\Delta$	
195	Clutch shaft set screw 	2		1, 1a	○	

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-196	Mirror adjusting set screw 	2	A2x2	7, 7a	○△	
197	Window mask screw 	1		5, 6a	○	
<del>198</del>	F-pinion set screw 	2	D1x2 D6x2	4, 4a	○△	
199	Dial ring set screw 	3		1, 1a	○	
200	E-ring 	5	D1x5 D1-1x5	3, 3a	○△	
201	CdS auxiliary resistor 0 - 1.2MΩ 	1	C1	7, 7a 10, 10a	○△	
202	Battery checking resistor 0 - 250KΩ 	1	C2	6, 6a	○△	
203	Meter internal resistor 0 - 10KΩ 	1	C2	6, 6a	○△	
204	Battery protecting resistor <del>80Ω, 100Ω, 120Ω</del> <del>150Ω, 140Ω, 160Ω</del> <del>170Ω, 200Ω</del> 10, 20, 30, 40, 50 	1	C1	7, 7a 10, 10a	○△	10, 20, 30, 40 50, 60, 70, 80 100, 120, 140 150, 160, 170 180, 200 Ω
205	Cord (red) 	1	A12 A12-1	10, 10a	○△	
206	Cord (green) 	1	A12 A12-1	10, 10a	○△	
207	Cord (white) 	1	A12 A12-1	10, 10a	○△	
208	Cord (yellow) 	1	A12 A12-1	10, 10a	○△	
209	Cord (brown) 	1	A14 A14-1	10, 10a	○△	
210	Cord (blue) 	1	C2	10, 10a	○△	

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-211	Cord (black) 	1	C2	10, 10a	○△	
<del>212</del>	Cord (gray) 	1		10, 10a	○	
<del>214</del> 214-1	Name plate (rear) 	1	A2	8	○△	
216	Segment adjusting shaft 	1	D1, D4 D1-1, D4	4, 4a	○△	
<del>217</del> a, b	Rocker spring bush #217a $l=1.9$ #217b $l=1.7$ 	1	D1 D1-1	4, 4a	○△	
218	Compensation index holder pawl spring 	1	D1 D1-1	4, 4a	○△	
219	Tin leaf 	2	A8x2	7, 7a	○△	
220	Pawl pin 	1	D1, D3 D1-1, D3-1	3, 3a	○△	
222	Top cover plate screw 	4		2, 2a	○	
223	Top cover plate 	1		2, 2a	○	
224	Compensation index holder pawl spring stud 	1	D1 D1-1	3, 3a	○△	
<del>225</del>	Top cover plate side screw 	1		2, 2a	○	

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-226	ASA dial 	1	A9	1, 1a	△	
227	Compensation index plate washer 	△ 3	D1x2	3, 3a	○△	
			D1-1x2			
228	F-idle adjusting washer 	△ 3 0 - 3	D1	4, 4a	○△	
			D1-1			
229	Lock lever base plate 	1	E1 E2	9	△	
230	Lock lever (left) 	1	E1 E3	9	△	
231	Lock lever (right) 	1	E1 E4	9	△	
232	Securing pin 	2	E1x2, E3 E4	9	○△	
233	Lock lever axle 	2	E1x2	9	○△	
234	Lock lever spring stud 	2	E1x2 E2x2	9	○△	
235	Lock lever spring axle 	2	E1x2 E2x2	9	○△	
236	Lock lever stopper 	2	E1x2 E2x2	9	○△	
237	Lock lever base plate screw 	2		9	○	
238	Lock lever spring B △  (N)  (E)	1	E1 E2	9	○△	
239	Lock lever spring A △  (N)  (E)	1	E1 E2	9	○△	

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-240	Plastic roller axle 	1	B2-1 B3-1	5e	○△	
241	Compensation index pawl spring stud B 	1	D1-1 D3-1	3a	○△	
242	Racket plate pole 	1	A10-1	1a	△	
243	Lead insulating paper 	1	A12-1	2a	△	
244	Roller eccentric axle 	1	B2-1 B3-1	5a	○△	
245	Lead terminal 	1	A14-1	7a	△	
247	Second gear adjusting washer t = 0.2 	0 - 1		1a	○	
249	Top cover plate washer t = 0.1 	0 - 4		2a	○	

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-G1	Prism 	1	A5	7		
G1-1			A5-1	7a		
G2	Mirror 	1	A3	7, 7a		
			A3-1			
G4	Pentagonal prism 	1	A5	7, 7a		
			A5-1			
G5	Eyepiece lens (convex) 	1	A6	8		
G6	Eyepiece lens (concave) 	1	A6	8		
G7	Light acceptance prism 	2	A5x2	7, 7a		
			A5-1x2			
G8	Light acceptance lens 	2	A4x2	7, 7a		
D-27	Meter window lower plate 	1	B1	6, 6a		
D-28	Lead wire (white) 	1	B1	6, 6a		
D-29	Lead wire (violet) 	1	B1	6, 6a		
D-31	Meter window upper plate 	1	B1	6, 6a		

No. of Sub-assembly	Name	Pcs. per Unit	No. of Constituent Part (*: Main parts)	Ref. Fig. No.	Remarks
20FD9-A2	Prism box	1	*2, 14x2, 15x2, 16, 17x2 18x2, 19, 180x4, 196x2 214	7, 8 7a	
A3-1	Mirror plate	1	*12, G2	7	
A4	Light acceptance lens	1	*3, 5, 175x2, G8x2	7, 7a	
A5	Pentagonal prism	1	*G4, G1, G7x2	7	
A6	Eyepiece lens	1	*G5, G6	8	
A7	T-dial	1	*28, 40	1, 1a	
A8	Prism holder	2	*11, 219	7, 7a	
A9	Dial ring	1	*34, 33, 35, 41, 226	1, 1a	
A10-1	Racket plate	1	*48, 42, 43, 45, 46	1	
A11	T-dial bottom plate	1	*49, 40	1, 1a	
A12-1	Switch	1	*67, 58, 59, 61, 62, 63 64, 65x4, 66, 205, 206 207, 208	2, 10	
A13-1	T-film	1	*74, 71, 72, 73, 75	6	
A14-1	Battery box	1	*21, 25, 26, 209	7, 10	
A15	Battery case cap	1	*22, 24	7	
A16	Switch button	1	*51, 52, 53, 54, 55, 50	2	
B1	Meter	1	*79, 84x2, D-27, D28 D-29, D-31	6, 6a, 7 7a, 10 10a	
B2-1 B2-2	Resistor	1	*99, 89x3, 90x3, 91, 92 93, 94, 179x3, 191x2, 194 B3, B4, B5	5, 7	
B3-1 B3	Frame	1	*85, 87x2, 95, 96	5	
B4	Frame adjustor	1	*86, 88	5, 5a	
B5-1 B5	Resistor gear	1	*97, 100	5, 5a	
C1 <del>C1</del> C1-1	CdS printed wiring plate	1	*20, 83x2, 174x2, 201 204	6, 6a, 7 7a, 10 10a	
C2	Meter printed wiring plate	1	*81, 83, 84x2, 202, 203 210, 211	6, 6a, 7 7a, 10 10a	
D1-1	D subassembly	1	*130, 137, 138, 141, 152 158, 163, 177, 190x7 200x5, 218, 224, 227x2	3, 4 6, 7	

M.E.E. J-454 A4 1-7 2000 X



No. of Sub-assembly	Name	Pcs per Unit	No. of Constituent Part (*: Main parts)	Ref. Fig. No.	Remarks
20FD9-			228, 217, D2 - D12		
D2	Base plate B	1	*108, 111, 112, 113, 119 120, 121, 122, 123x2 124, 148, 192	3, 4 3a, 4a	
D3-1	Base plate C	1	*109, 126x2, 164x3, 165 x2, 220	3	
D4	Base plate A	1	*110, 125A, 125Bx2, 216	4, 4a	
D5	Click lever	1	*114, 115, 116	4, 4a	
D6-1	F-idle gear	1	*117, 118, 198x2	4	
D7	Segment gear	1	*127, 129, 131x3, 132 139	4, 4a	
D8	Segment	1	*128, 133, 134, 135, 136	4, 4a	
D9	Rocker	1	*142, 144, 145	4, 4a	
<del>D10</del> D10-1	Pantograph	1	*154, 143x3, 149, 150 151, 155, 156, 157	3, 3a	
D11-1	Compensation index	1	*161, 160, 165, 166	3	
D12-1	Compensation index holder pawl	1	*162, 57, 165	3	
E1	E subassembly	1	233x2, E2, E3, E4	9	
E2	Lock lever	1	*229, 234x2, 235x2, 236 x2, 238, 239	9	
E3	Lock lever (left)	1	*230, 232	9	
E4	Lock lever (right)	1	*231, 232	9	

M.H.E. J-484 A4 1-1 8000 X

No. of Sub-assembly	Name	Pcs. per Unit	No. of Constituent Part (*: Main parts)	Ref. Fig. No.	Remarks
20FD9-A3-1	Mirror plate	1	*12-1, G2	7a	
A5-1	Pentagonal prism	1	*G4, G1-1, G7x2	7a	
A10-1	Racket plate	1	*48-1, 40, 42, 43, 45 46, 49-1, 242	1a	
A12-1	Switch	1	*67, 58, 59, 61, 62, 63 64, 65x3, 66, 205, 206 207, 208, 243	2a, 10a	
A13-1	T-film	1	*74, 71-1, 72-1, 73, 75	6a	
A14-1	Battery box	1	*21, 25, 26, 209, 245	7a	
B2-1	Resistor	1	*99, 89x3, 90x2, 91, 92 93, 94, 179x3, 191x2 194, B3-1, B4, B5	5a, 7a	
B3-1	Frame	1	*85-1, 87, 90, 95, 96 240, 244	5a	
D1-1	D subassembly	1	*130, 137, 138, 141, 152 158, 163, 177, 190x7 200x5, 218, 224, 227x2 228, 217, D2, D3-1, D4 D5, D6-1, D7, D8, D9 D10, D11-1, D12-1	3a, 4a 6a, 7a	
D3-1	Base plate C	1	*109, 126x2, 164x3, 165 220, 241	3a	
D6-1	F-idle gear	1	*117-1, 118-1	4a	
D11-1	Compensation index	1	*161, 160-1, 165, 166	3a	
D12-1	Compensation index holder pawl	1	*162, 57-1, 165	3a	