Nikon

PHOTOMIC FT_N FINDER

(Work No. 20FD9)

REPAIR MANUAL

PARTS LIST

(REVISED)-2

NIPPON KOGAKU K.K.

Tokyo, Japan

(70.8. d) H

C O N T E N T S

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 Reapir Manual.
Fig. 1a - Fig. 10a (Fig. 8 and Fig. 9 are unrevised)

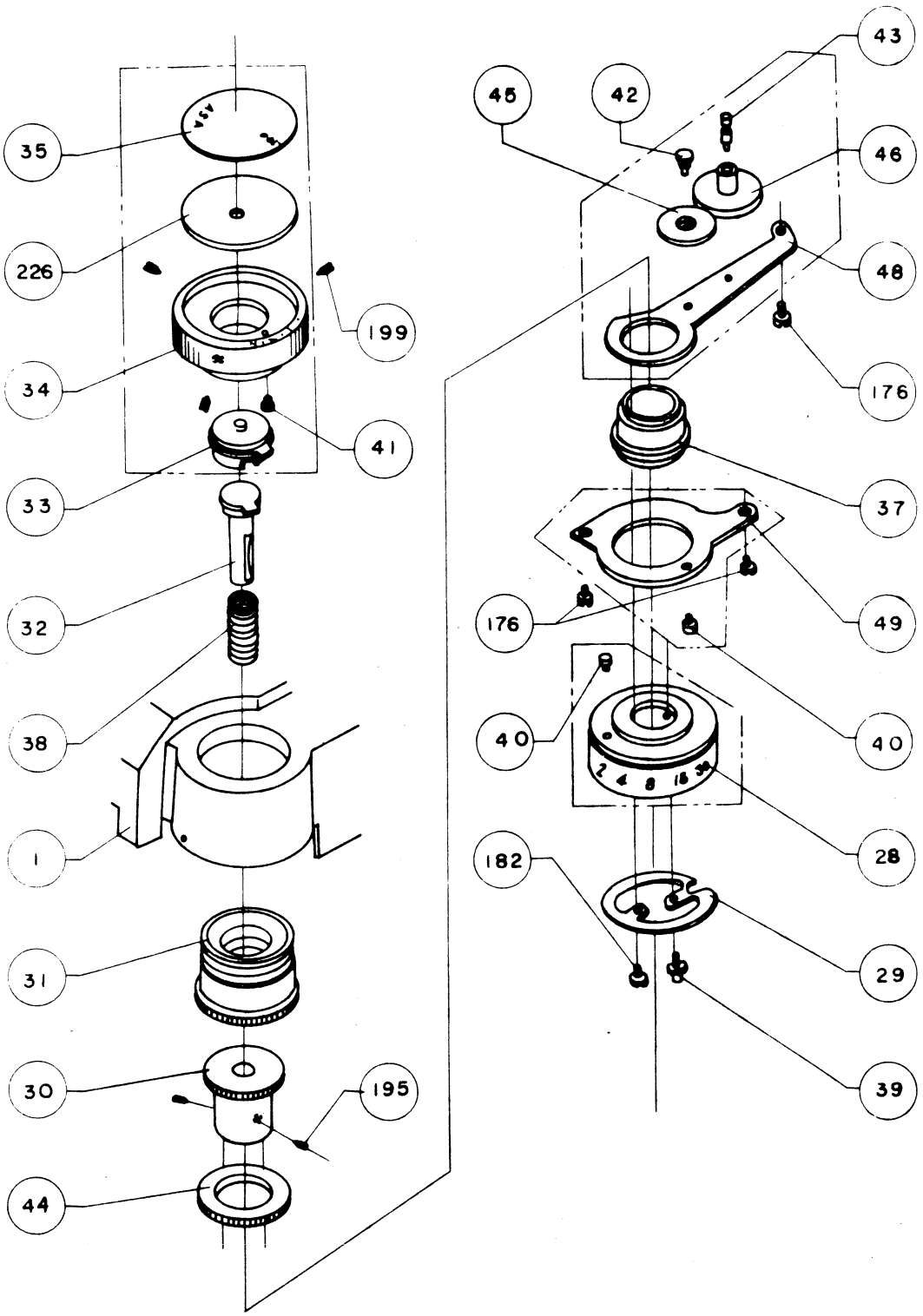
2) The way of repairing is partially changed (marked *), but it is also available to the earlier parts.
(Earlier number of part is, however, used in this Repair Manual)

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.

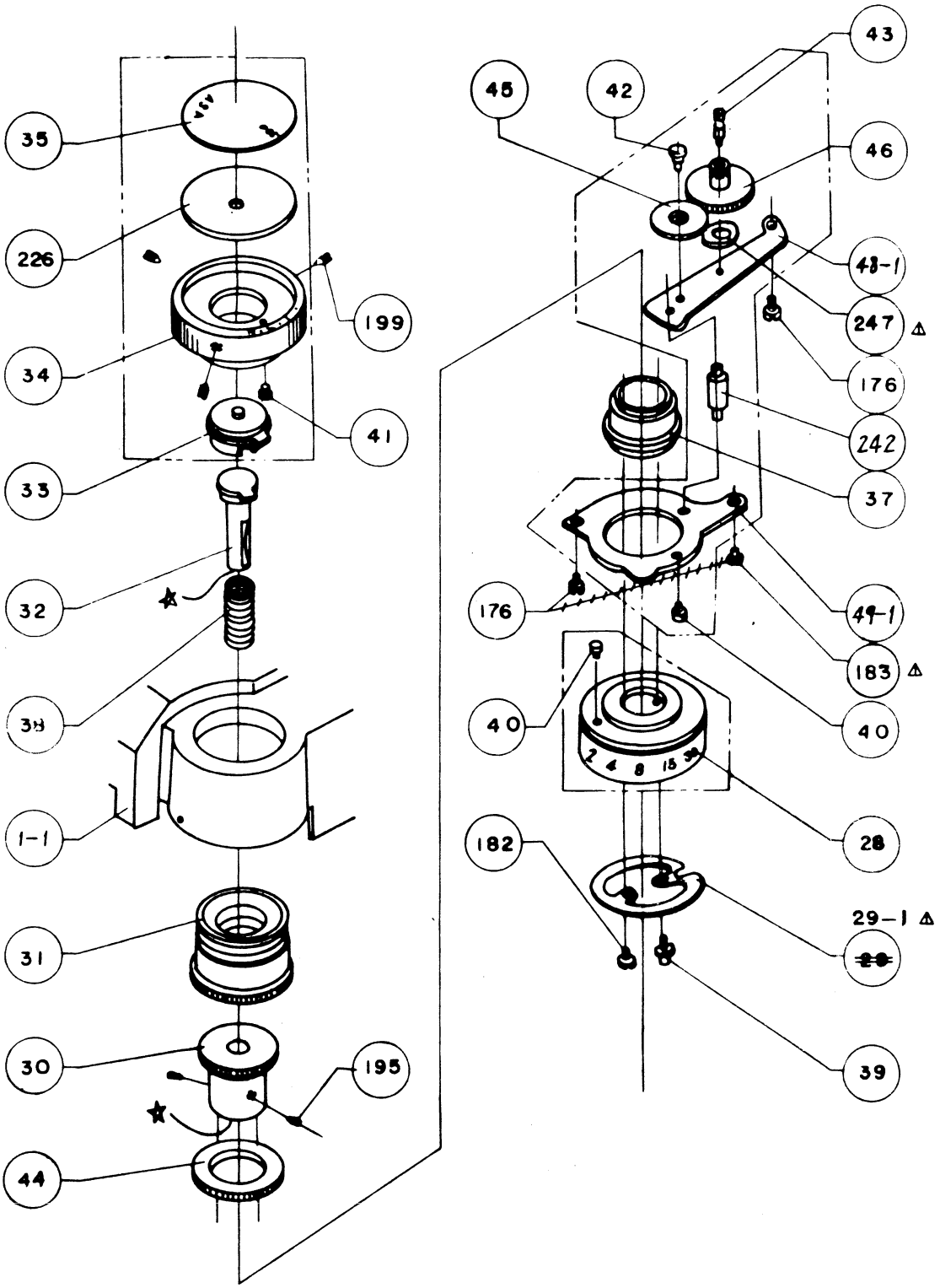
• REVISION-2

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



Shutter and ASA Dial

Fig. 1 (E)

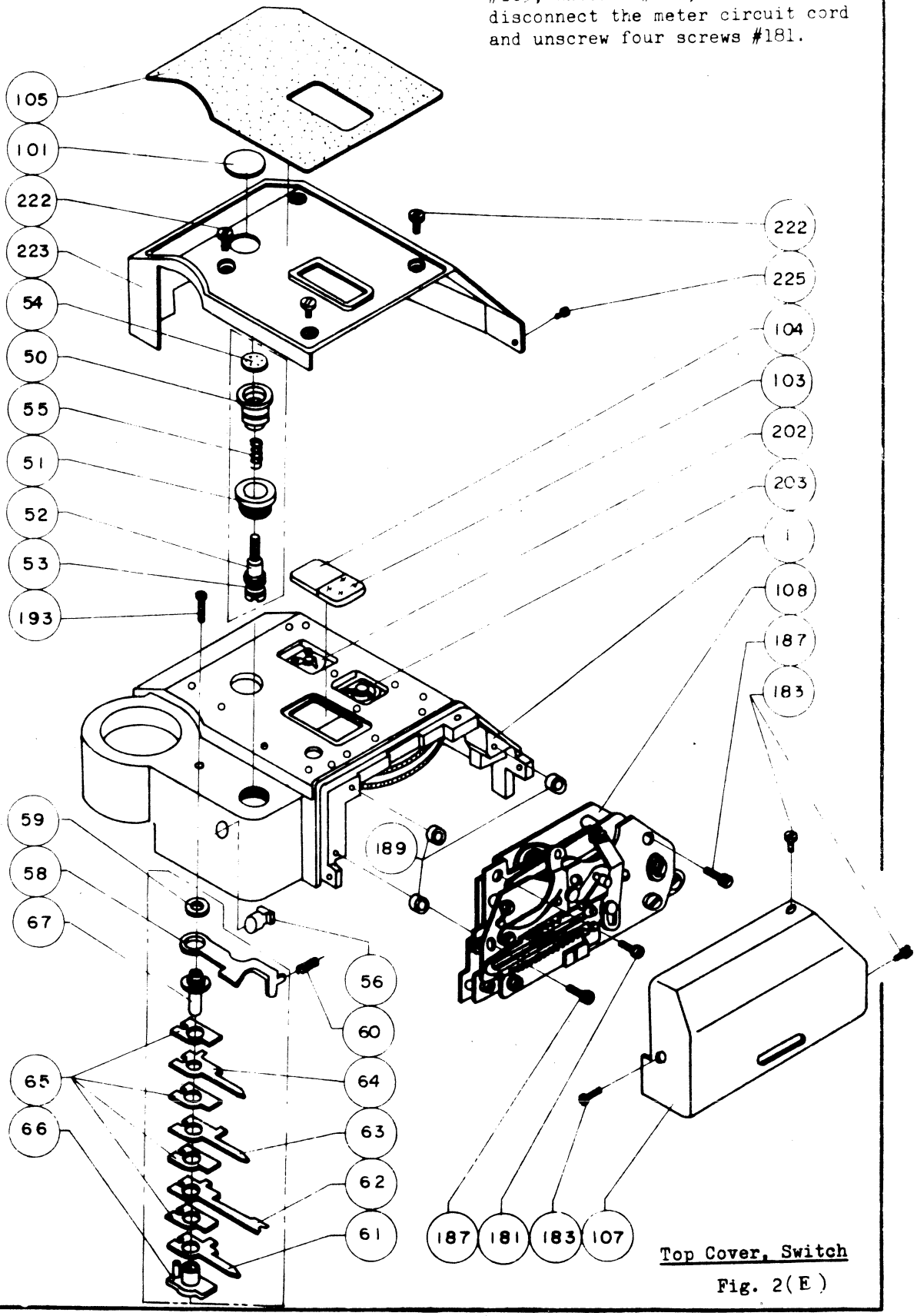


Shutter and ASA Dial

Fig. 1a (N)

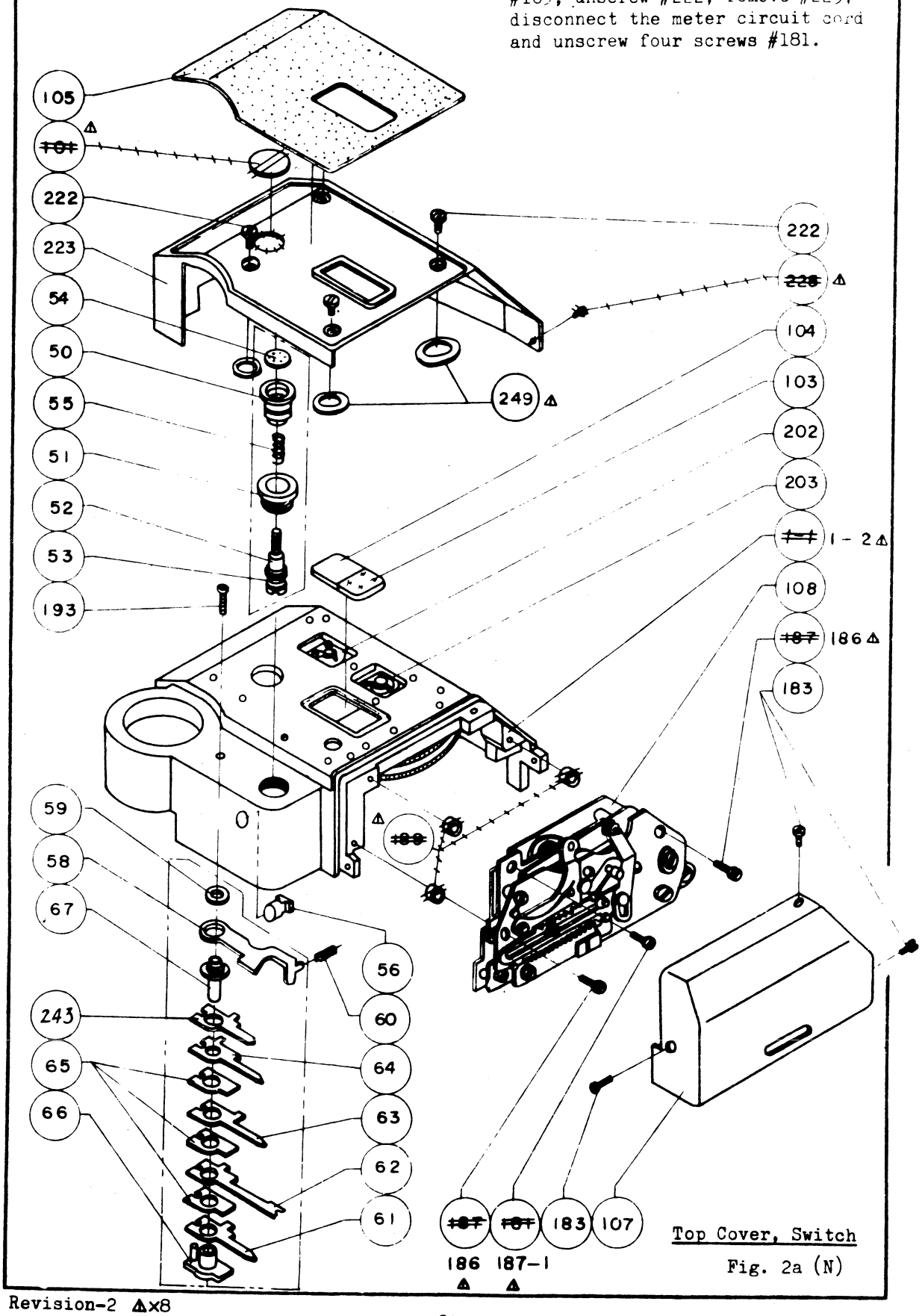
Revision-2 ⚠x3

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



Top Cover, Switch

Fig. 2(E)

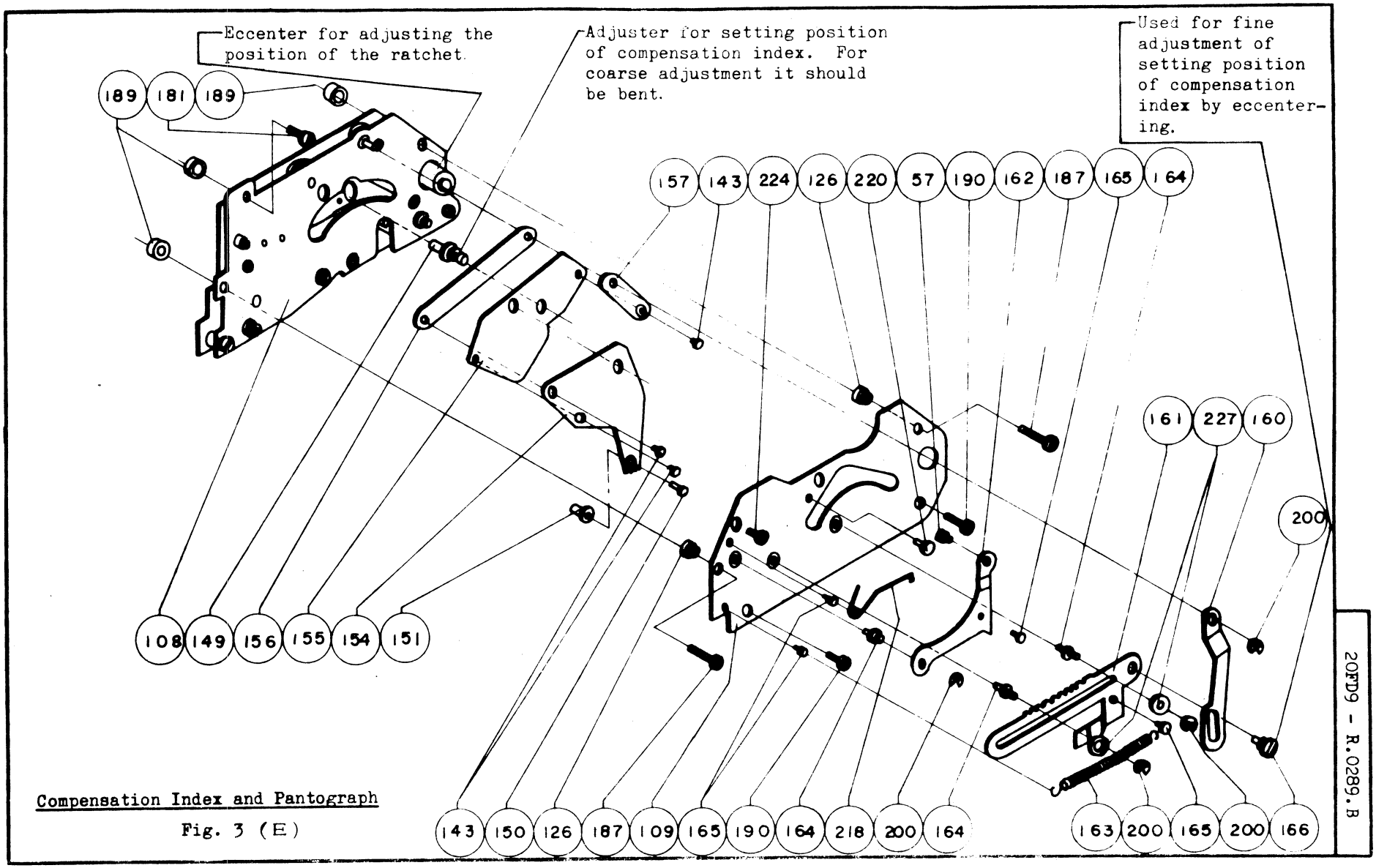


Top Cover, Switch

Fig. 2a (N)

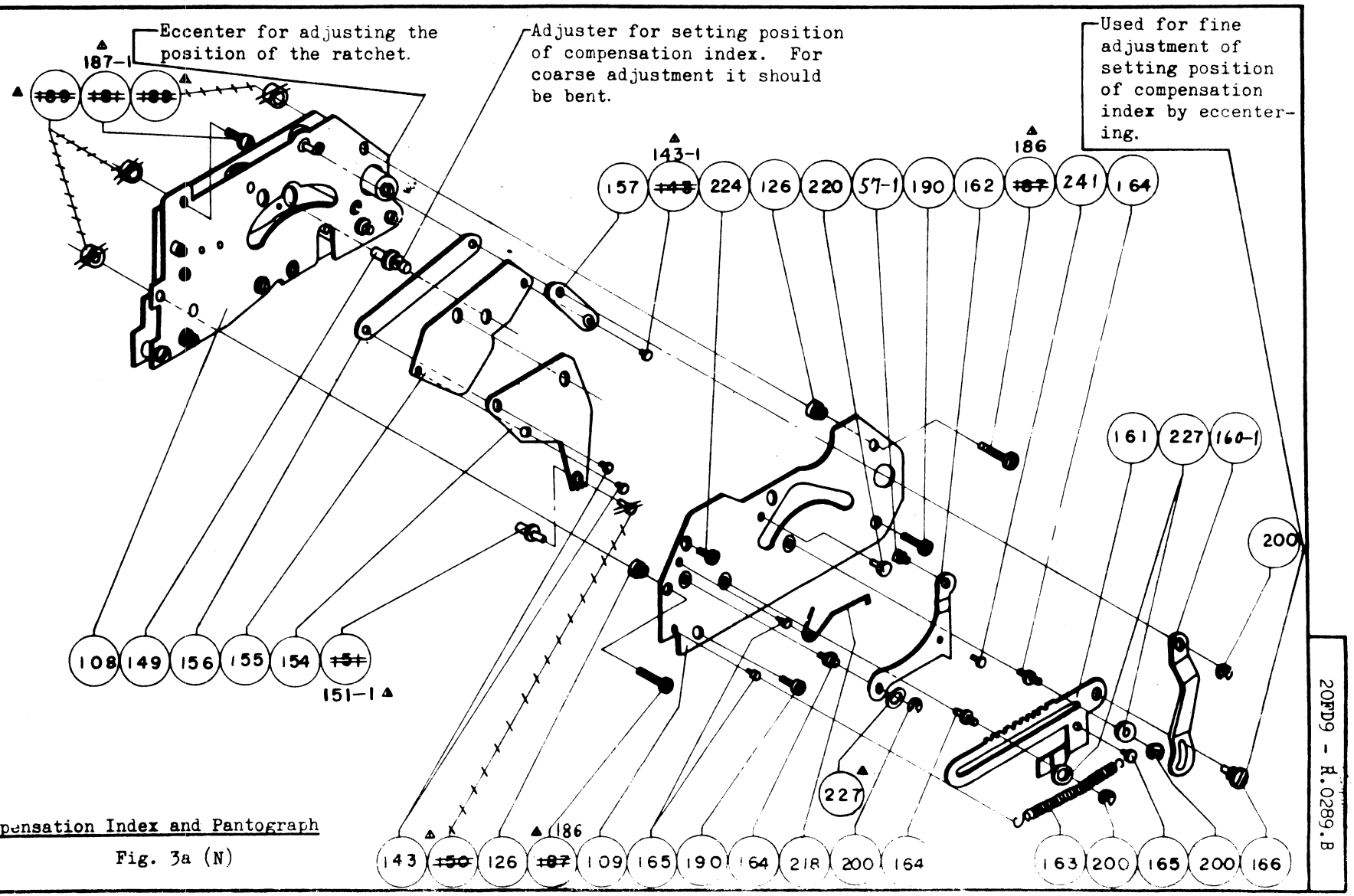
N.E.K. J-434 A4 1-Y 2000 M

Revision-2 ⚠x8



Compensation Index and Pantograph

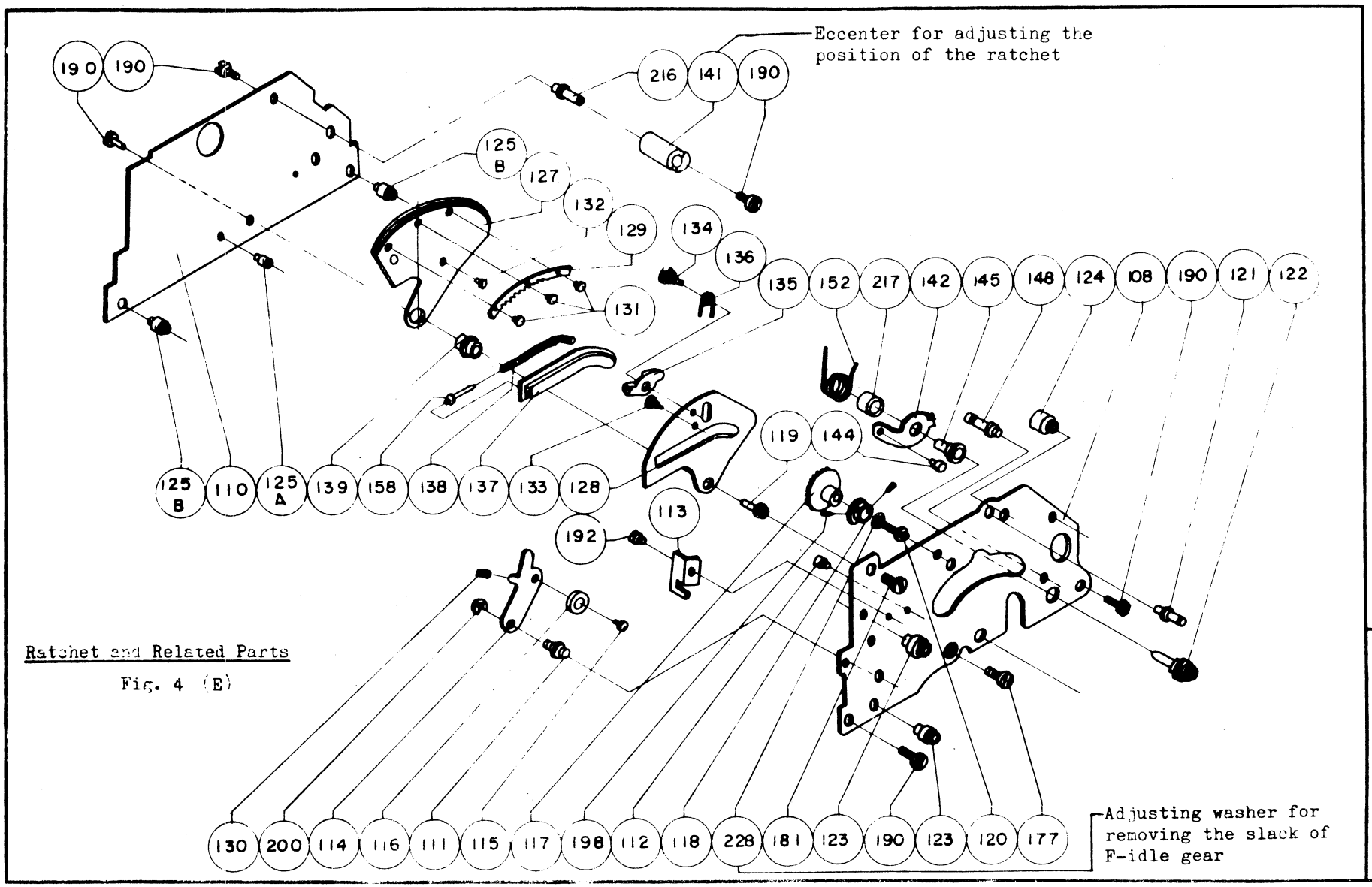
Fig. 3 (E)



Compensation Index and Pantograph

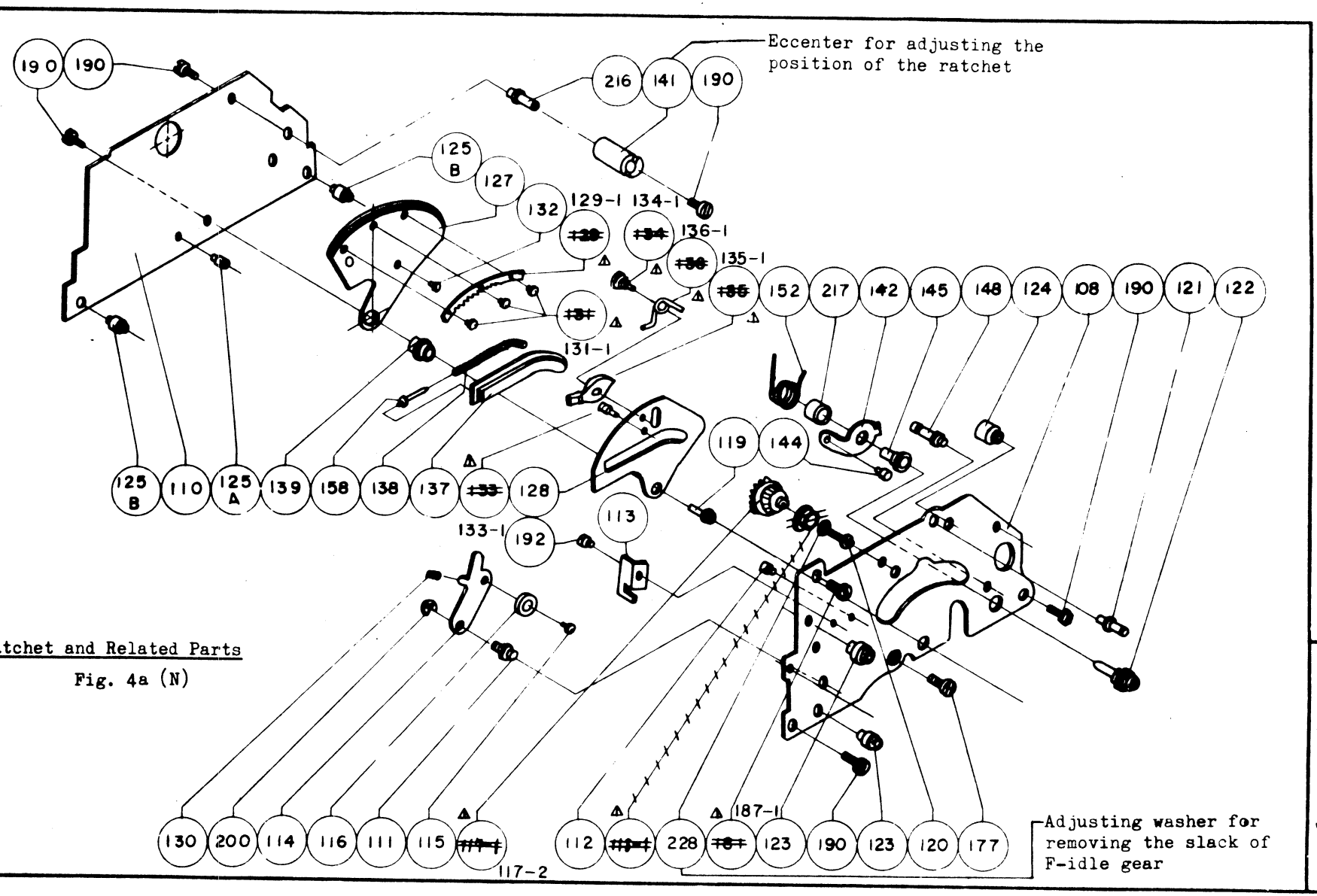
Fig. 3a (N)

20FD9 - R.0289.B



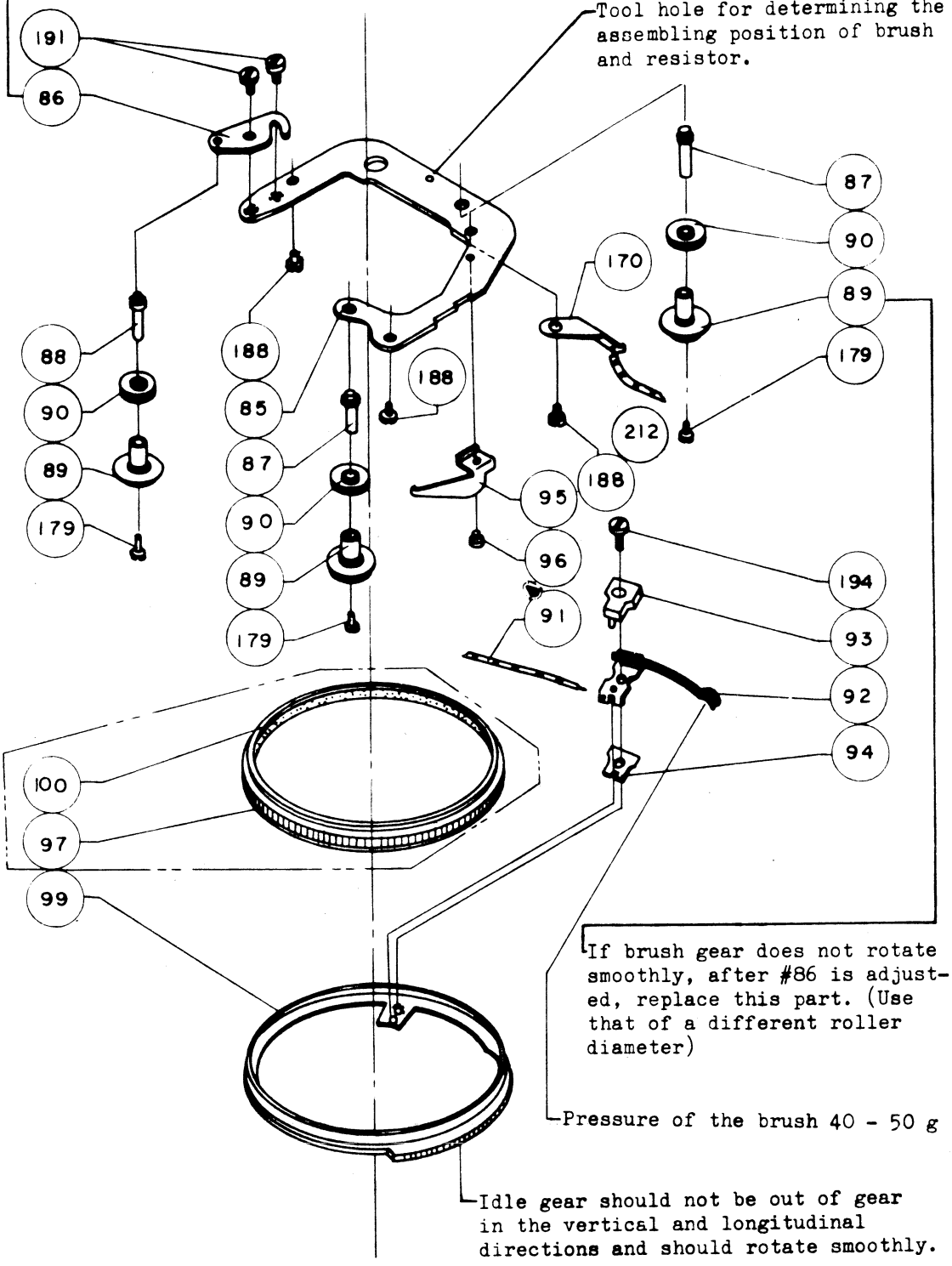
Ratchet and Related Parts

Fig. 4 (E)



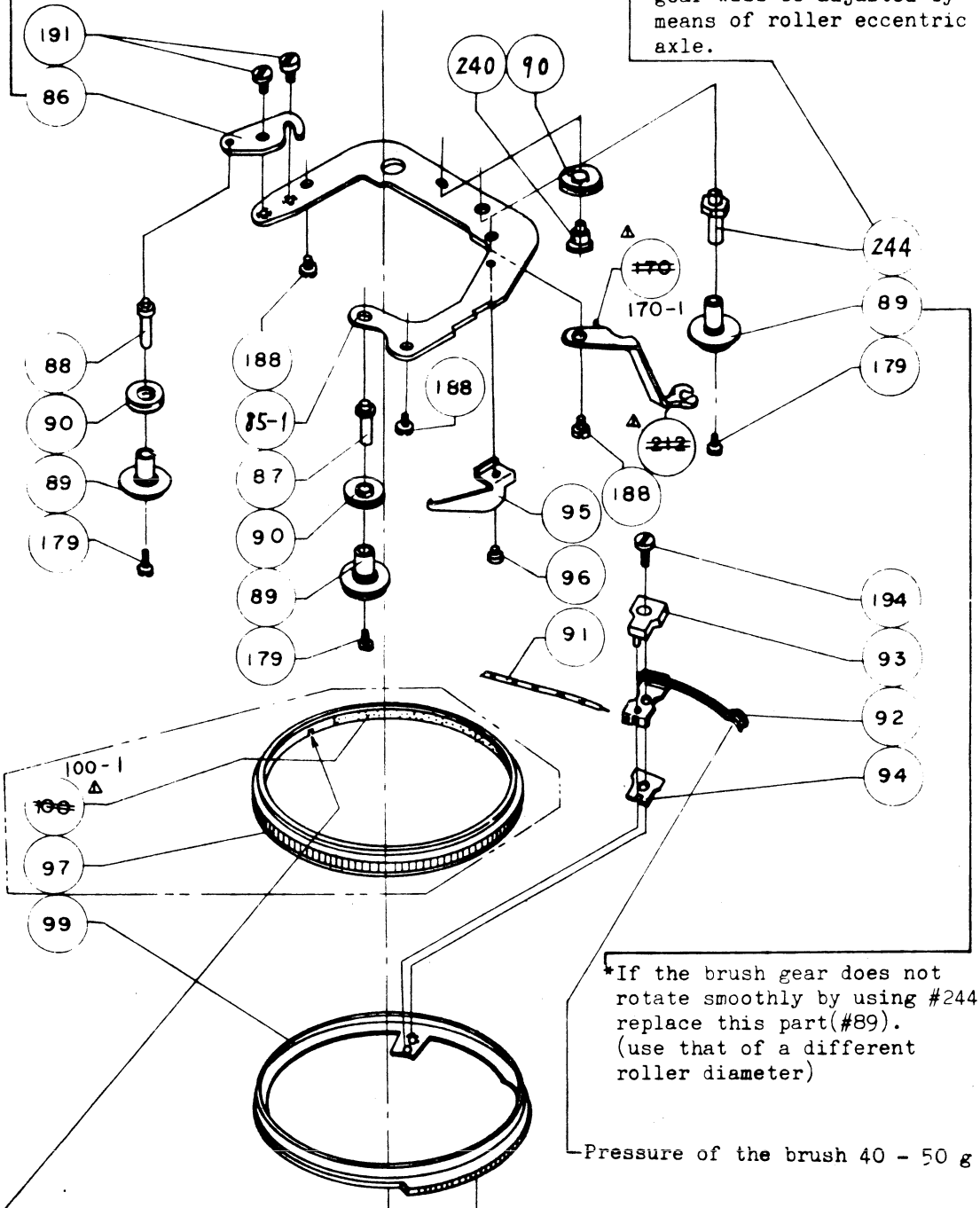
Ratchet and Related Parts

Fig. 4a (N)



Frame · Resistor Gear

Fig. 5 (E)

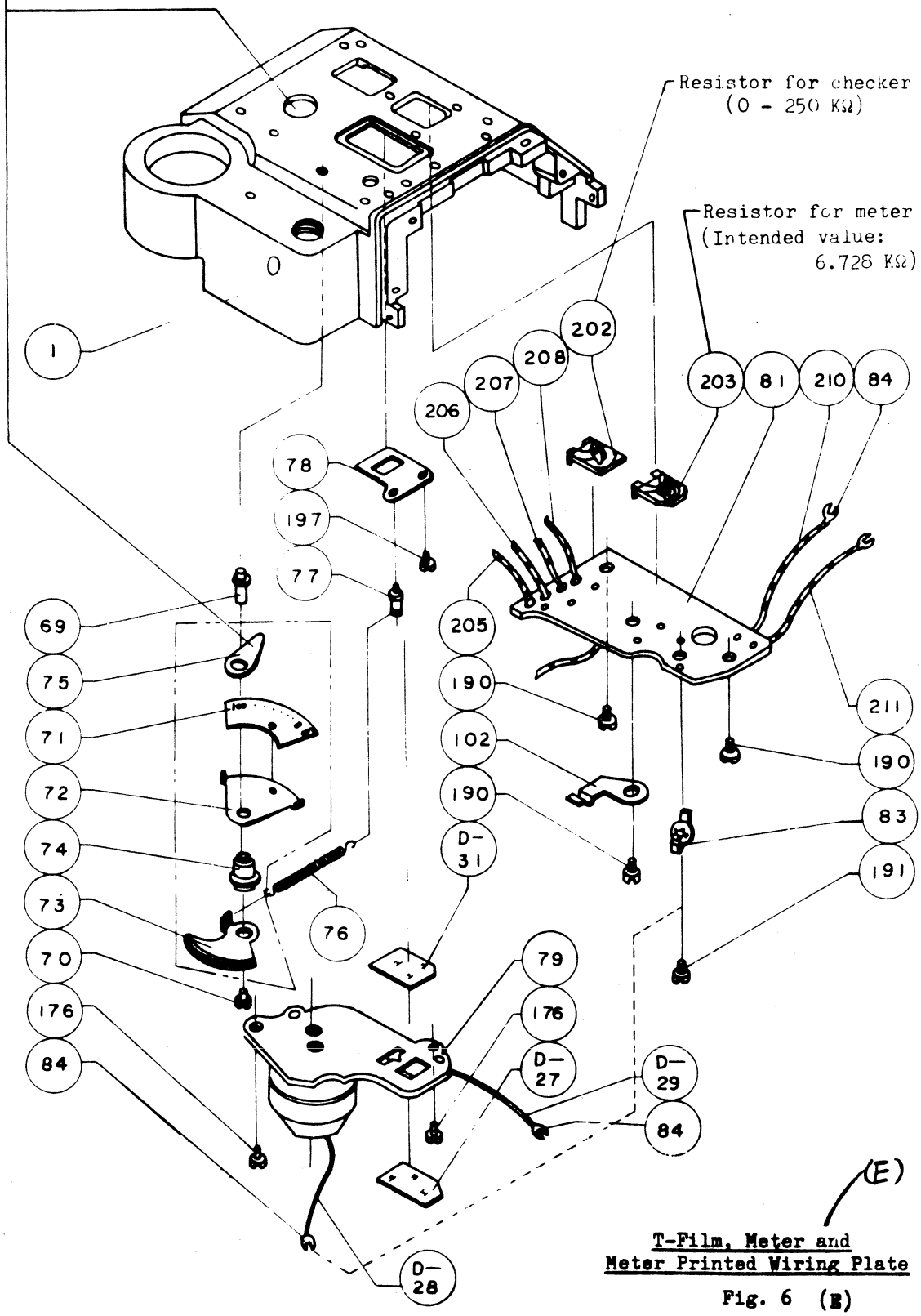


Frame · Resistor Gear

Fig. 5a (N)

Revision-2 △×4

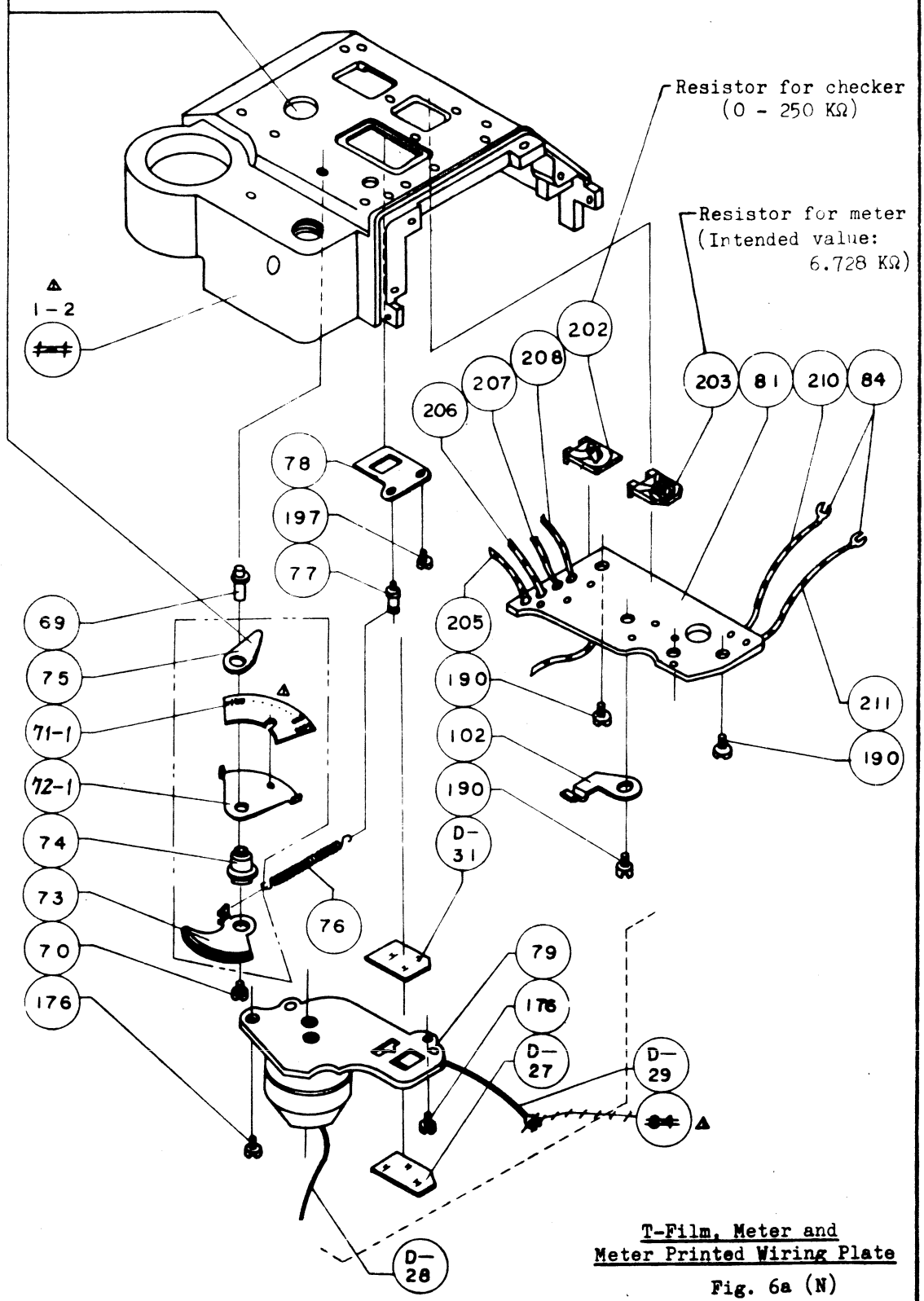
Fine adjustment of T-film is performed directly through the hole in #1. #75, cemented to #71, is to be separated before adjustment and cemented again after adjustment.



(E)

T-Film, Meter and Meter Printed Wiring Plate

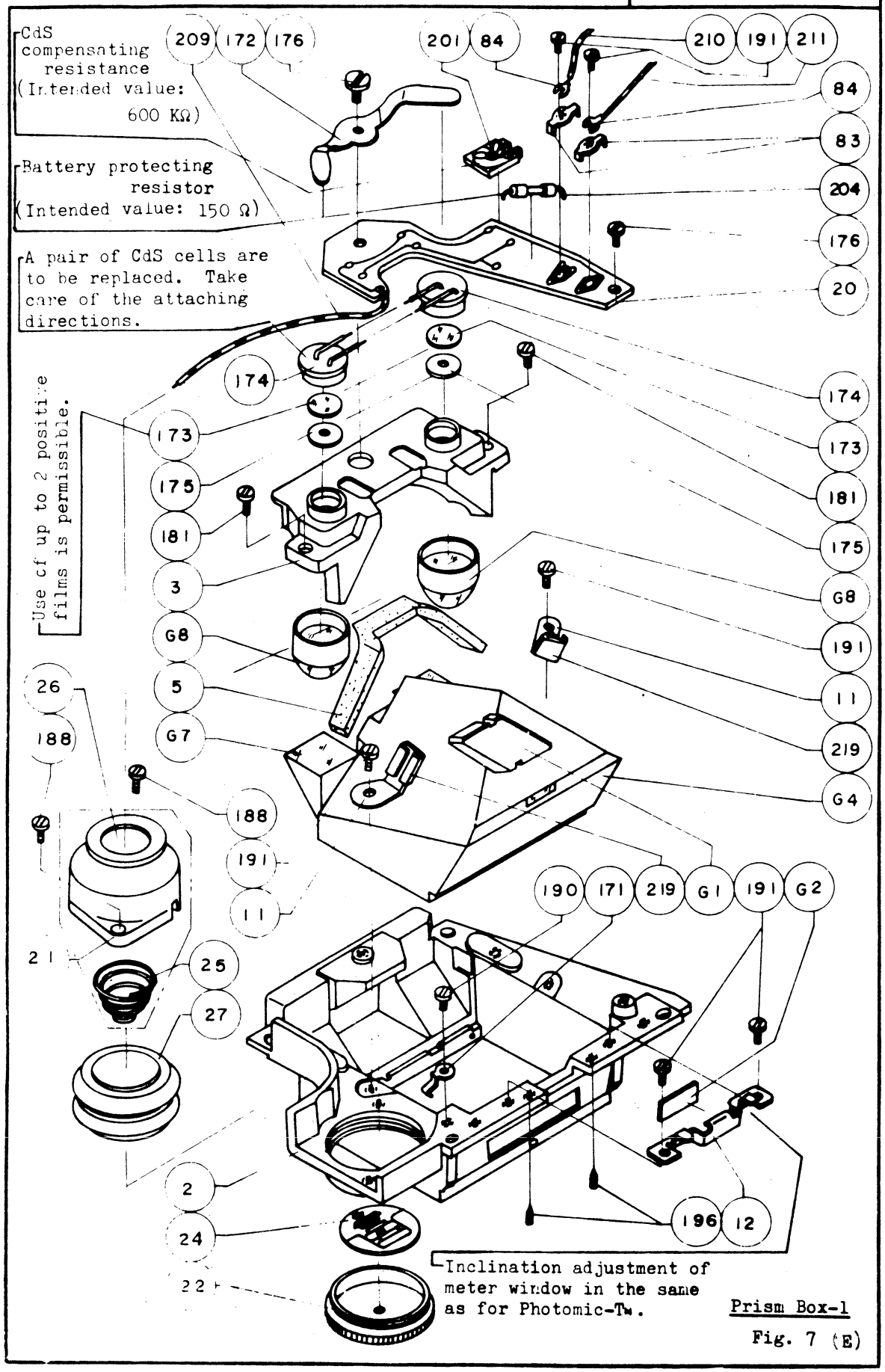
Fig. 6 (E)



T-Film, Meter and Meter Printed Wiring Plate

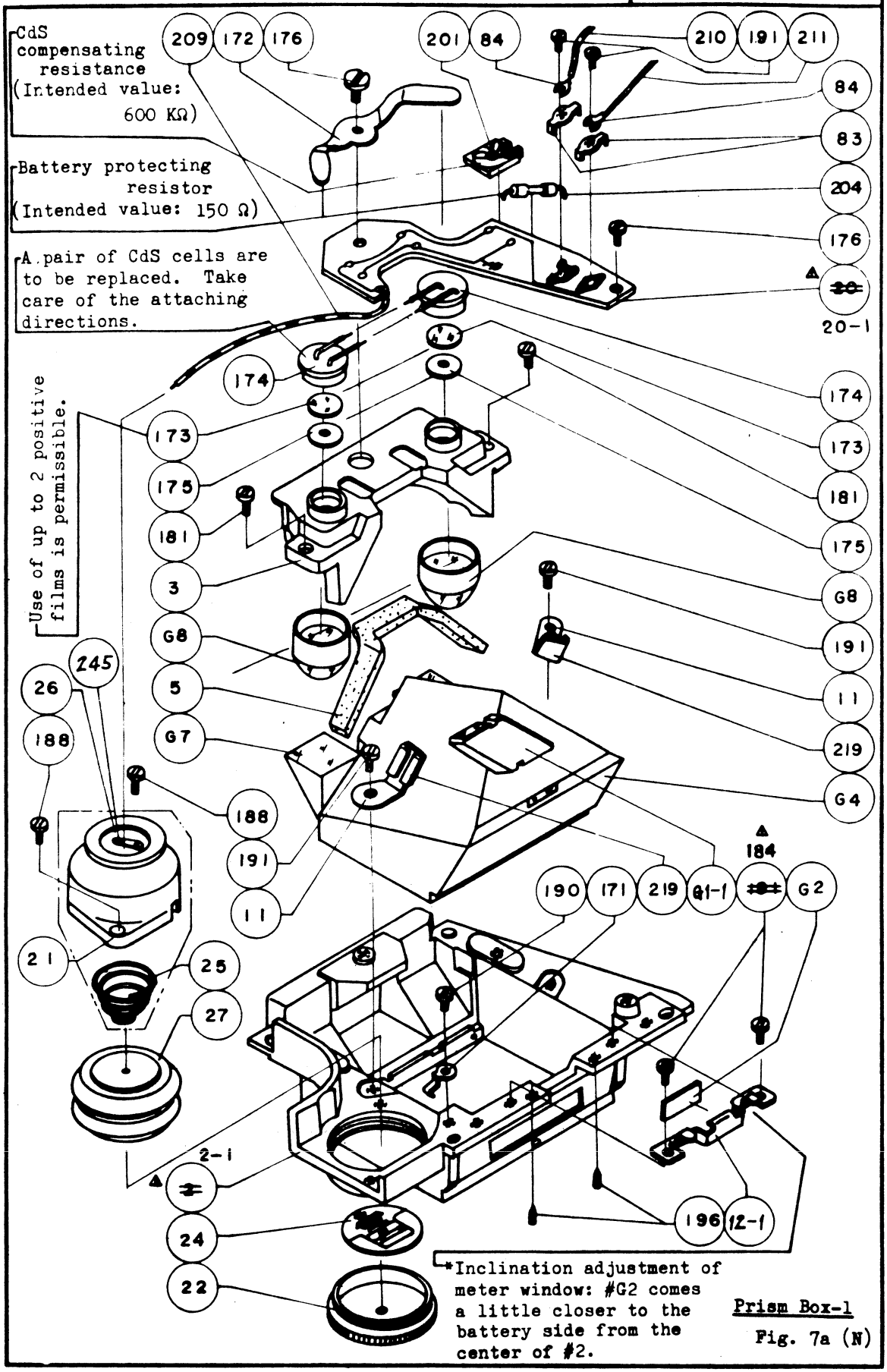
Fig. 6a (N)

Revision-2 △x3



Prism Box-1

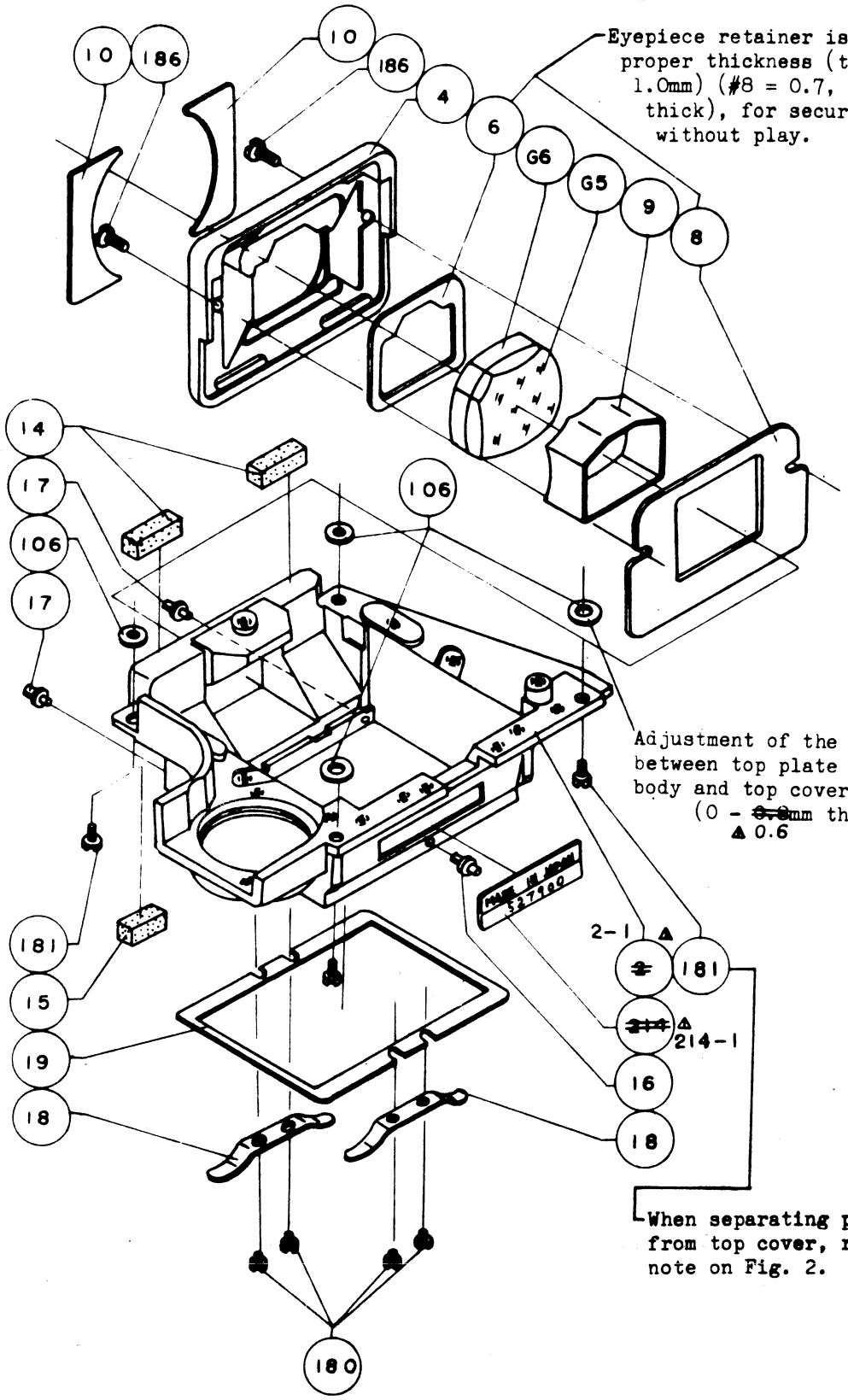
Fig. 7 (E)



Prism Box-1

Fig. 7a (N)

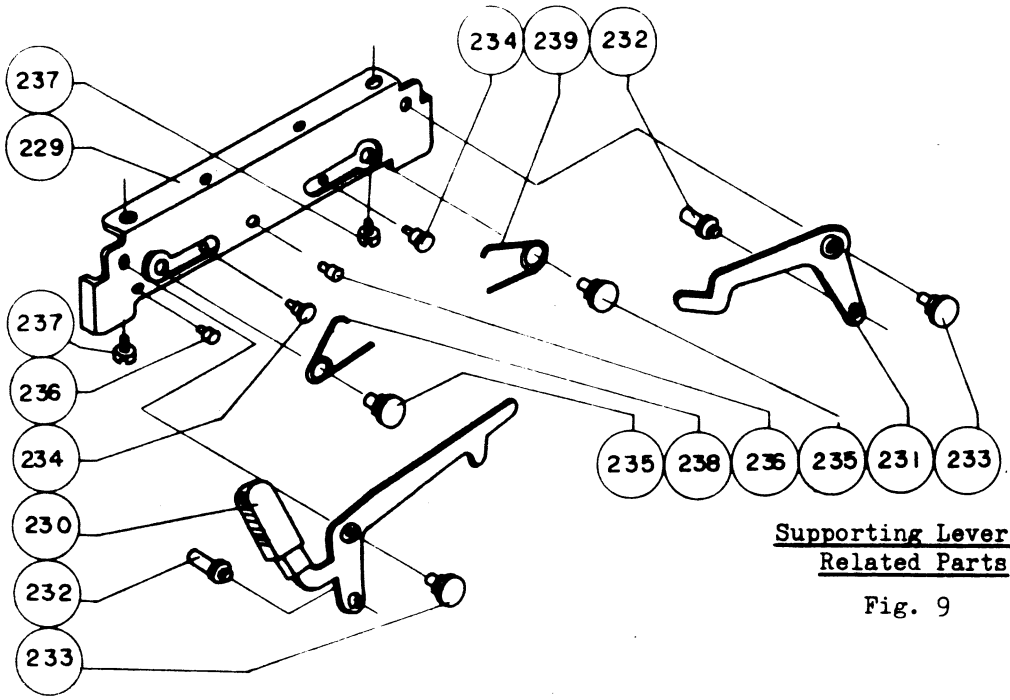
Revision-2 ▲×3



Prism Box-2

Fig. 8

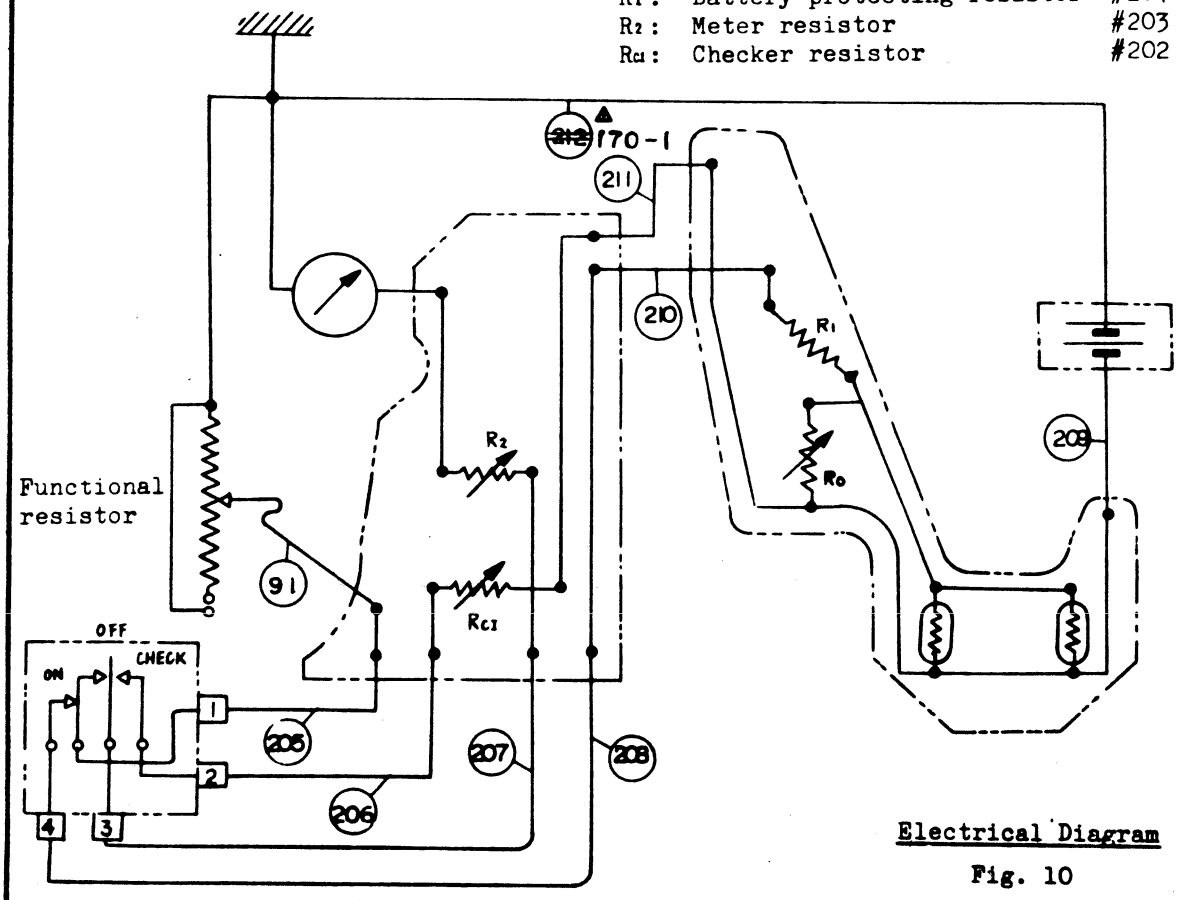
Revision-2 ▲x3



Supporting Lever and Related Parts

Fig. 9

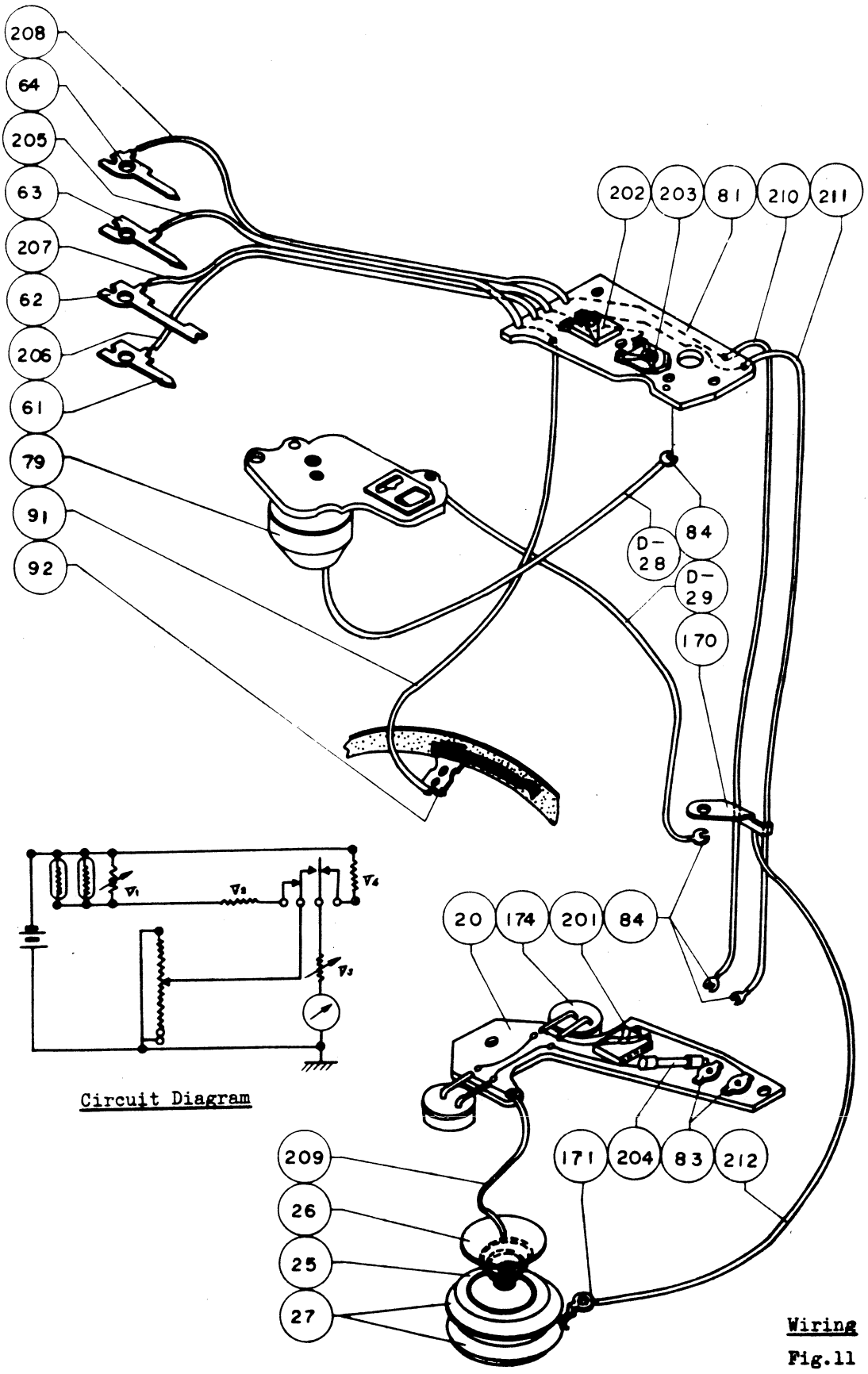
Ro: CdS compensation resistor #201
R1: Battery protecting resistor #204
R2: Meter resistor #203
Rc1: Checker resistor #202



Electrical Diagram

Fig. 10

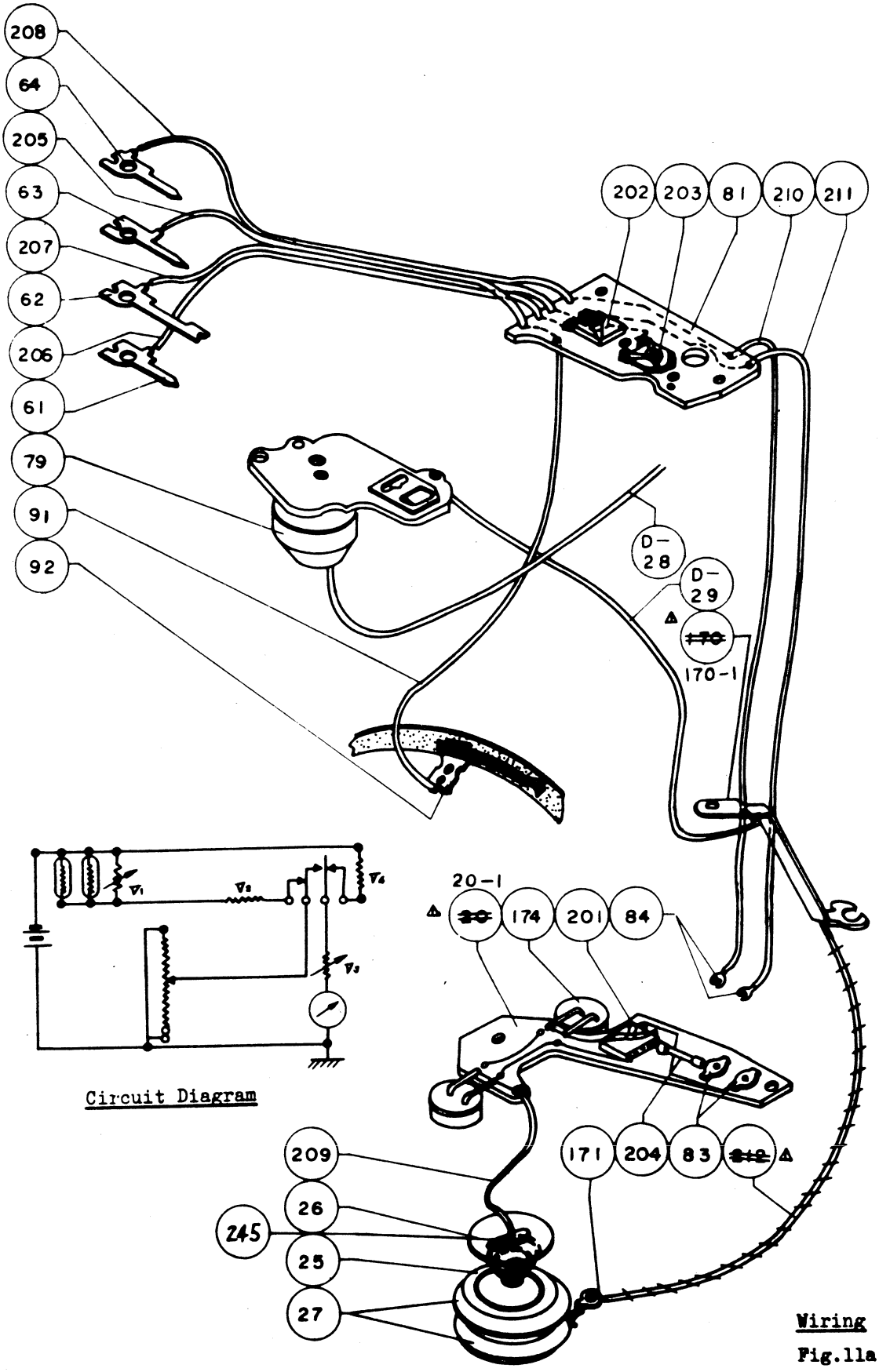
Revision-2 ▲x1



Circuit Diagram

Wiring

Fig.11 (E)



Wiring
Fig.11a (N)

Revision-2 ▲x3

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 $10^{\circ}\ 57' \pm 1^{\circ}$ the center of the notch found on ASA stopper #33, as shown in Fig. 12.

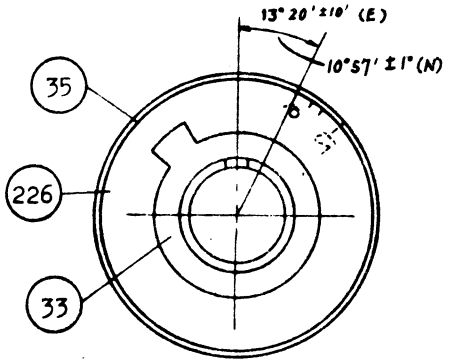


Fig. 12

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
1-1
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
1-1
#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).
2a, 3a, 4a
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
117-1
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 Gig. 13. (Refer to Fig. 2a and Fig. 5a)

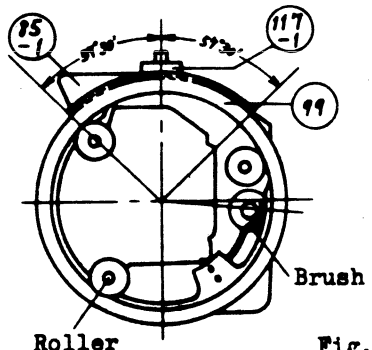


Fig. 13

5-3. Keeping the states 5-1 and 5-2, make engagement of #117 (117-1) with #99. In this case, make sure of #99 geared without slack, 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 adjusting 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 FTn 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 scund 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 85-1
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 enagaging 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 (▨) 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.

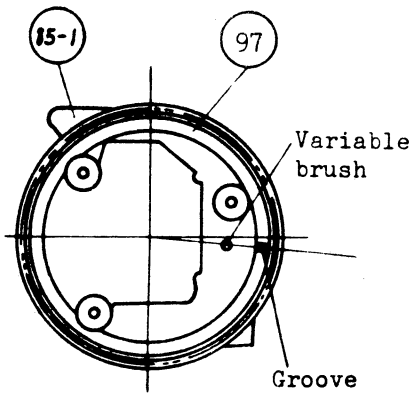


Fig. 14

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 (71-1) 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 #71-1 from film holder #75. Move the T-film, using a pin through the tool hole in the top of the top cover (#1-1). 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 #72-1. (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 sticked. 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-Tn.

§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.
   1-1

§19. Circuit of Exposure Meter

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

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-TN" so for the parts commonly used)

(A) Resistance of ~~#20~~ ▲ #20-1

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

Brightness Cd/m²	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-TN:

See §21 (B)

(C) Meter (one same type)

Internal resistance: 1.80 KΩ

Torque: 0.32mg cm/deg.
*0.23

Revision-2 ▲x2

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

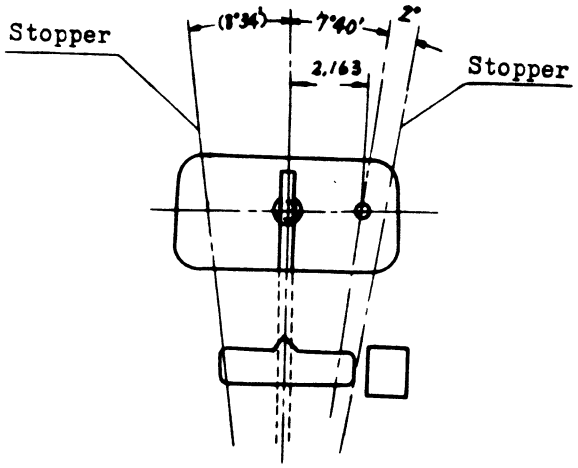


Fig. 15

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 1.45	Ω 790	Ω 450	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) (Ro)

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

(F) Battery protecting resistor (#204) (R_1)

▲ 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 KΩ

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

Resistance: 0 — 250 KΩ

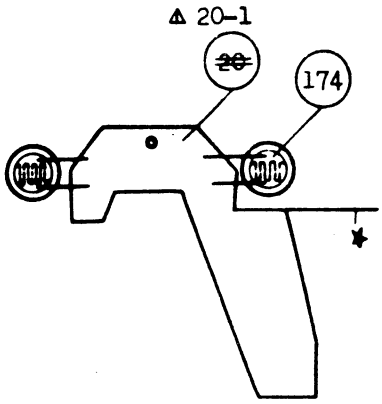


Fig. 16

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

(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 (Ro) to the printed wiring plate, without #204 (R_1).

Then, connect lead wires to the positions ⓐ and ⓑ on the printed wiring plate.

21A-3. Connect the dial adjustable rheostat (DR_1) (1 Ω - 1 KΩ) to ⓐ and ⓑ lead wires. (Fig. 17)

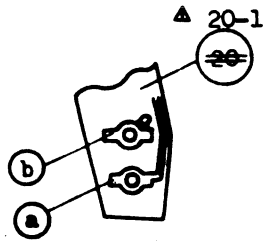


Fig. 17

21A-4. Adjustment of sensitivity of CdS cells

Make the resistance of Ro = 600 KΩ and of DR_1 = 150 KΩ.
Temporarily assemble the top cover subassembly.
Fit the CdS printed wiring plate (~~#20~~ Δ#20-1) into the standard camera with 50mm f/1.4 lens and A-type screen. Expose this camera to the brightness box with EV9 brightness. In this case, the terminal resistance of ~~#20~~ Δ#20-1 should be 4.8 KΩ — 6.0 KΩ.
If it is under 4.8 KΩ, place the positive film in front of either or both of the CdS cells, so as to make the resistance between 4.8 KΩ — 6.0 KΩ.
The use of the positive film up to 2 pieces is permitted.

(B) Assembling top cover subassembly #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-T_N, except §22C-8.

(D) Inspection of metering accuracy

Refer to §22, D (1) for Photomic-T_N.

(E) Inspection of battery check

Refer to §22, D (2) for Photomic-T_N.

§22. If the accuracy is not sufficient,

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

§23. Conditions for brightness measurement

Refer to §27 for Photomic-T_N.

*§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 co 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.

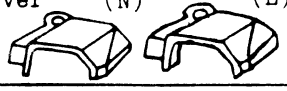
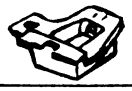
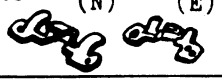
The adjustment will be mode by means of eccentric pin (#57-1 in Fig. 3a).

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 ± 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

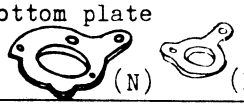
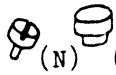
No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-1	Top cover (N) (E) 	1		1,2.6	×	
⚠ 1→2				1a, 2a 6a		
⚠ 2-1	Prism box 	1	A2	7, 7a 8	△	
3	CdS holder base 	1	A4	7, 7a	△	
4	Eyepiece cup 	1		8	○	
5	Dust tight piece 	1	A4	7, 7a	○△	
6 0.5 1.0	Eyepiece neoplane t=0.5, 1.0 	1		8	○	
8 0.3 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	○△	

RB1 Revision-2 ⚠×2

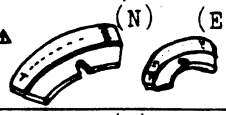
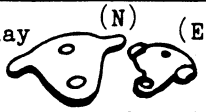
No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-16	Lock pin A 	1	A2	8	△	
17	Lock pin B 	2	A2x2	8	△	
18	Fresnel spring holder 	2	A2x2	8	○△	
19	Prism mask 	1	A2	8	○△	
▲ 20-1 ~~20~~	CdS printed wiring plate 	1	C1	7, 7a 10,10a	△	
21	Battery case 	1	A14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

RB1 Revision-2 ▲x2

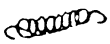
No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-31	ASA gear 	1		1, 1a	○	
32	Clutch shaft 	1		1, 1a	○	
33	ASA stopper 	1	A9	1, 1a	△	
34	Dial ring 	1	A9	1, 1a	△	
35	ASA scale 	1	A9	1, 1a	○△	
37	Clutch sleeve 	1		1, 1a	○	
38	Clutch spring 	1		1, 1a	○	
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 / 48-1	Racket plate (N) (E) 	1	A10 / A10-1	1 / 1a	△	
49 / 49-1	T-dial bottom plate  (N) (E)	1	A11 / A10-1	1 / 1a	△	
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	○	
~~57~~ / 57-1	Compensation release pin / " (eccentric)  (N) (E)	1	D1, D12 / D1-1, D12-1	3 / 3a	○△	
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	○	

RB1

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 / 71-1	T-film ▲ (N) (E) 	1	A13 / A13-1	6 / 6a	△	
72 / 72-1	Film underlay (N) (E) 	1	A13 / A13-1	6 / 6a	△	
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	△	

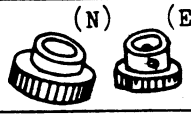
RB1 Revision-2 ▲x1

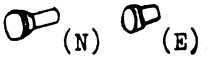
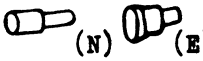
No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-76	Film spring 	1		6, 6a	○	
77	Film spring stud ▲ 	1		6, 6a	○	
78	Meter window mask 	1		6, 6a	○	
79	Meter 	1	B1	6, 6a	△	
81	Meter printed wiring plate 	1	C2	6, 6a	△	
83	Terminal 	3	C1x2, C2	6, 6a	○△	
		2	C1x2			
84	Lug 	4	B1x2, C2x2	6,6a,7 7a,10 10a	○△	
		2~~3~~ ▲	~~B1~~ ▲, C2x2			
85	Frame (N)  (E) 	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			

RB1 Revision-2 ▲x3

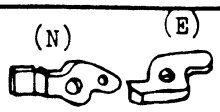
No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-91-1	Lead wire (gray) 	1	B2 / B2-1	5, 5a	○△	
92	Brush 	1	B2 / B2-1	5, 5a	○△	
93	Brush mold 	1	B2 / B2-1	5, 5a	○△	
94	Brush insulating piece 	1	B2 / B2-1	5, 5a	○△	
95	Earth brush 	1	B2, B3 / B2-1, B3-1	5, 5a	○△	
96	Brush rivet 	1	B2, B3 / B2-1, B3-1	5, 5a	○△	
97	Resistor gear 	1	B2, B5 / B2-1, B5	5, 5a	△	
99	Brush gear 	1	B2 / B2-1	5, 5a	○△	
100	Functional resistor 	1	B2, B5 / B2-1, B5	5, 5a	△	
▲ ~~101~~	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	○	

RB1 Revision-2 ▲x1

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 ▲117-2	F-idle gear (N) (E) 	1	D1, D6 D1-1, D6-1	4 4a	△	
118 ~~▲118-1~~	F-pinion (N) (E) F-pinion gear 	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	△	
△ ~~129~~ 129-1	Ratchet 	1	D1, D7 D1-1, D7	4, 4a	△	
130	Click spring 	1	D1 D1-1	4, 4a	○△	
△ ~~131~~ 131-1	Ratchet rivet  (N) (E)	3	D1x3, D7x3 D1-1x3, D7x3	4, 4a	○△	
132	Segment spring stud 	1	D1, D7 D1-1, D7	4, 4a	○△	
△ ~~133~~ 133-1	Pawl spring stud  (N) (E)	1	D1, D8 D1-1, D8	4, 4a	○△	
△ ~~134~~ 134-1	Pawl shaft 	1	D1, D8 D1-1, D8	4, 4a	○△	

RB1 Revision-2 △×4

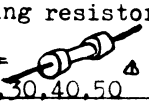
No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9- △ ~~135~~ 135-1	Pawl (N) (E) 	1	D1, D8 D1-1, D8	4, 4a	○△	
△ ~~136~~ 136-1	Pawl spring (N) (E) 	1	D1, D8 D1-1, D8	4, 4a	○△	
137	Segment spring case 	1	D1 D1-1	4, 4a	○△	
138	Segment spring 	1	D1 D1-1	4, 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	△	
△ ~~143~~ 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	○△	
△ ~~150~~	**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- △ ~~151~~ 151-1	Coupling pin  (N) (E)	1	D1, D10 D1-1, D10	3, 3a	○△	
152	Rocker spring 	1	D1, D1-1	4, 4a	○△	
△ ~~154~~ 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	○△	
160 160-1	Compensation index coupling lever  (N) (E)	1	D1, D11 D1-1, D11-1	3 3a	△	
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	○△	

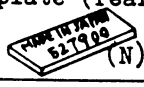
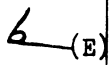
No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-166	Index coupling lever pin 	1	D1, D11 D1-1, D11-1	3, 3a	○△	
▲ ~~170~~ 170-1	Lug plate A  (N) (E)	1		5, 5a	○	
171	Battery case terminal 	1		7, 7a	○	
172	CdS holder 	1		7, 7a	○	
173	Filter (film) 	1 - 4		7, 7a	○	
174	CdS cell 	2	C1x2	7, 7a	○△	
175	Diaphragm 	2	A4x2	7, 7a	○△	
176	Racket plate screw 	▲~~5~~ 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	○△	

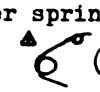
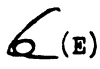
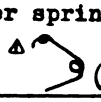
RB1 Revision-2 ▲x2

No. of Part	Name and Shape	Pcs. per Unit	No. of Subassembly	Ref. Fig. No.	Term of Sale	Remarks
20FD9-181	Prism box screw 	⚠ ~~7~~ 6		4,4a,7 7a,8	○	
182	T-dial screw 	1		1, 1a	○	
183	Front cover screw 	⚠ ~~3~~ 4		2, 2a	○	
⚠ 184	Prism holder screw 	⚠ 2		7a	○	
186	Eyepiece cup screw 	⚠ ~~8~~ 4		8	○	
⚠ ~~187~~ 187-1	Base plate screw ⚠ B 	⚠ ~~21~~		3, 3a	○	
188	Frame screw 	5		5, 5a 7, 7a	○	
⚠ ~~189~~	Base plate B collar 	~~3~~		3, 3a	○	
190	Base plate stay screw 	⚠ ~~11~~	D1x7 / D1-1x7	4,4a,6 6a, 7 7a	○△	
191	Mirror plate screw 	⚠ ~~8~~ 6	B2x2 / B2-1x2	7, 7a	○△	
192	Click spring stopper rivet 	1	D1, D2 / D1-1, D2	4, 4a	○△	
193	Switch screw 	1		2, 2a	○	
194	Brush stopper screw 	1	B2 / B2-1	5, 5a	○△	
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	○	
△ ~~198~~	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 80Ω, ~~100Ω, 120Ω 150Ω, 140Ω, 160Ω 170Ω, 200Ω~~ 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	○△	

RB1 Revision-2 △×2

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	○△	
△ ~~212~~	Cord (gray) 	1		10, 10a	○	
△ ~~214~~ 214-1	Name plate (rear)  (N)  (E)	1	A2	8	○△	
216	Segment adjusting shaft 	1	D1, D4 D1-1, D4	4, 4a	○△	
△ 217 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 △ (N)   (E)	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	○△	
△ ~~205~~	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~~ 3	D1x2 D1-1x2	3, 3a	○△	
228	F-idle adjusting washer 	▲ ~~1~~ 0 - 3	D1 D1-1	4, 4a	○△	
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 eccentering 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	○△	

RB1

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 ~~X~~ 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	

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	
~~D10~~ 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	

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	