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Service Manual
Electronic Precision Balances

KERN EW · EW-C · EG (N)(A)

Version 2.3
04/2019
GB

GB

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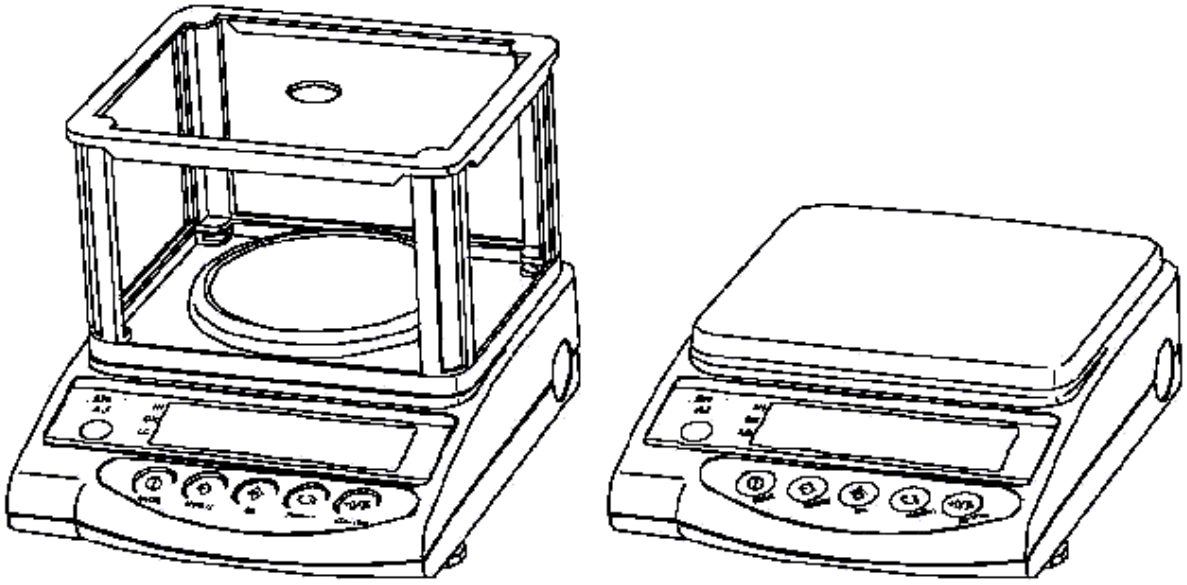
Version 2.3

Service Manual

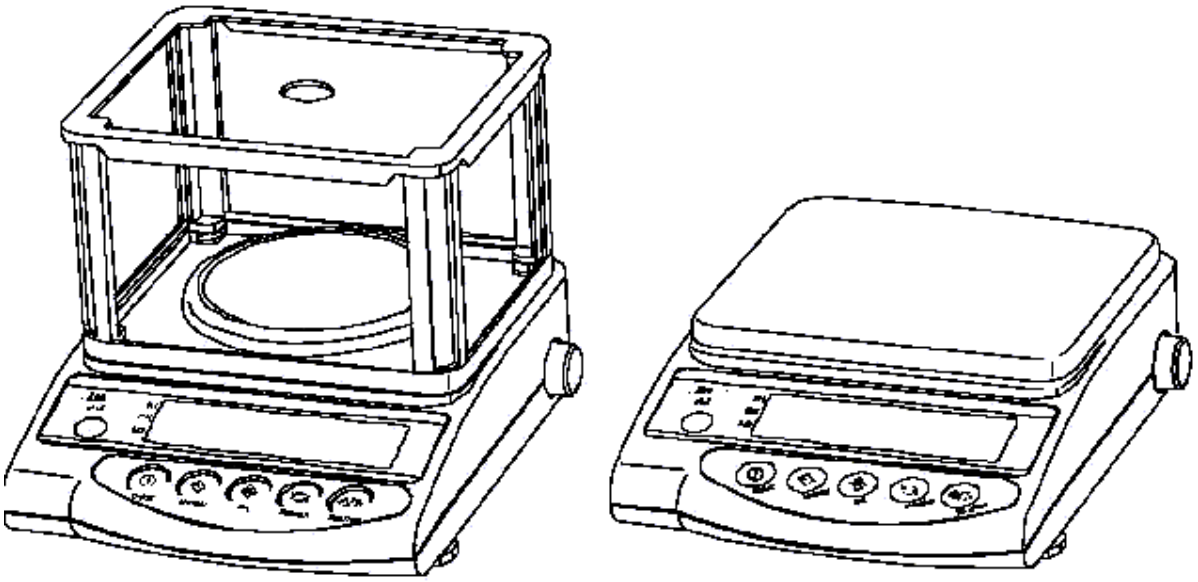
Electronic Precision Balances

1 Total View

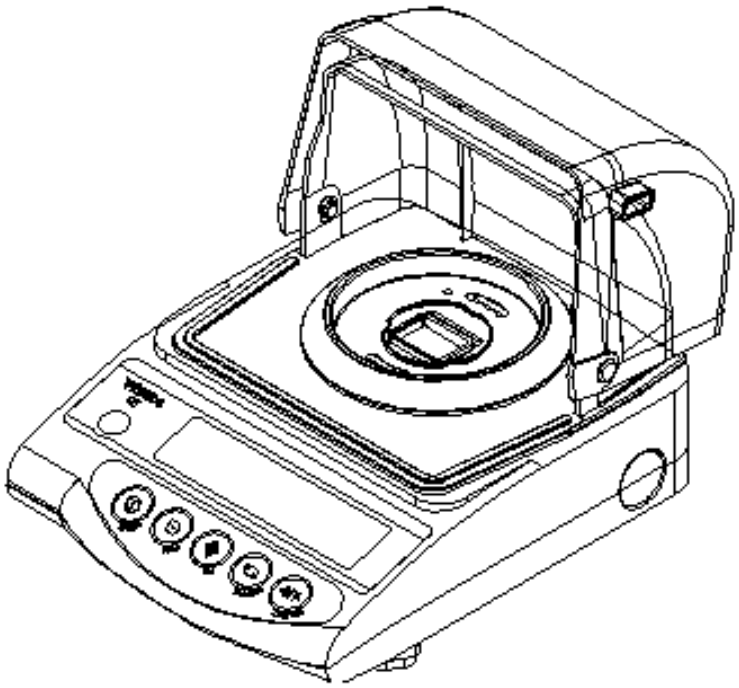
1.1 Total View Of EW Type - 220-12000g



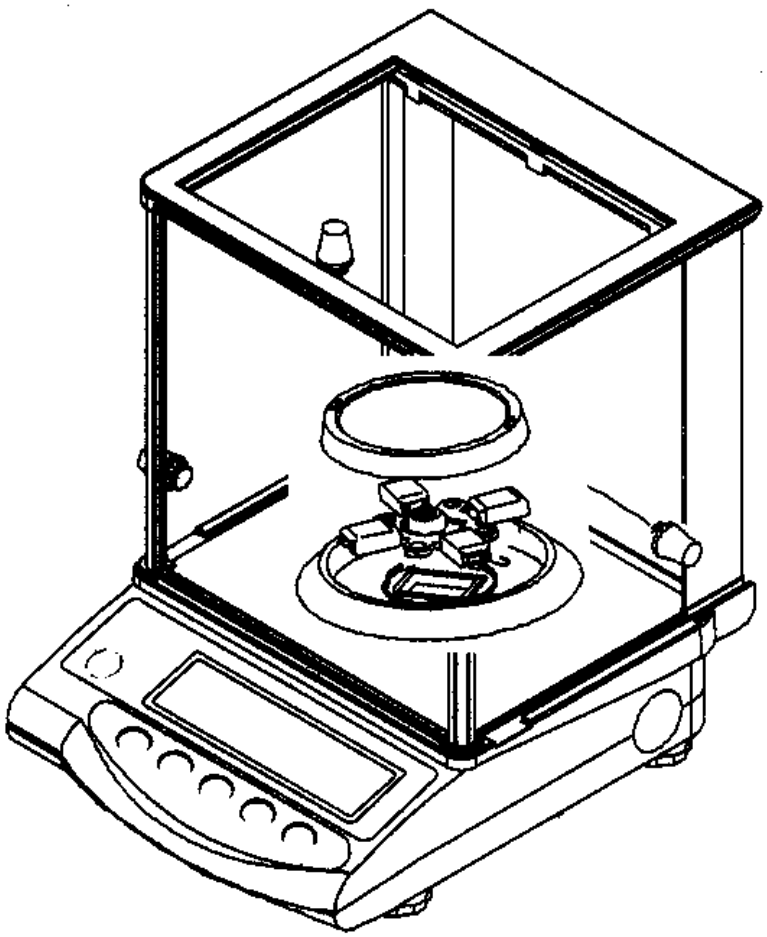
1.2 Total View Of EG Type - 220-620g, 2200g, 4200g



1.3 Total View Of EW-C Type - 600ct (120g)

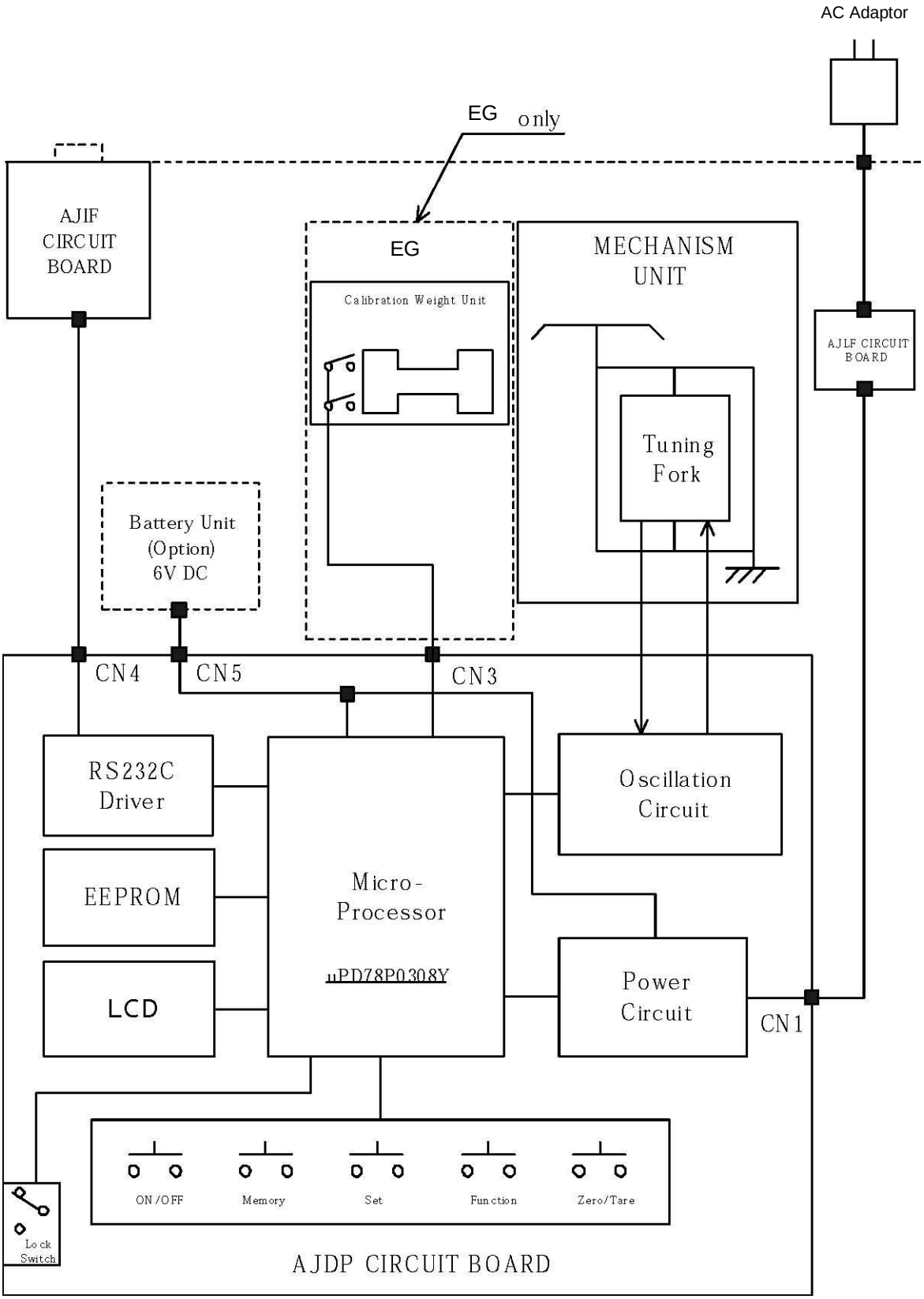


1.4 Total View Of EW Type - 120g/0,0002g

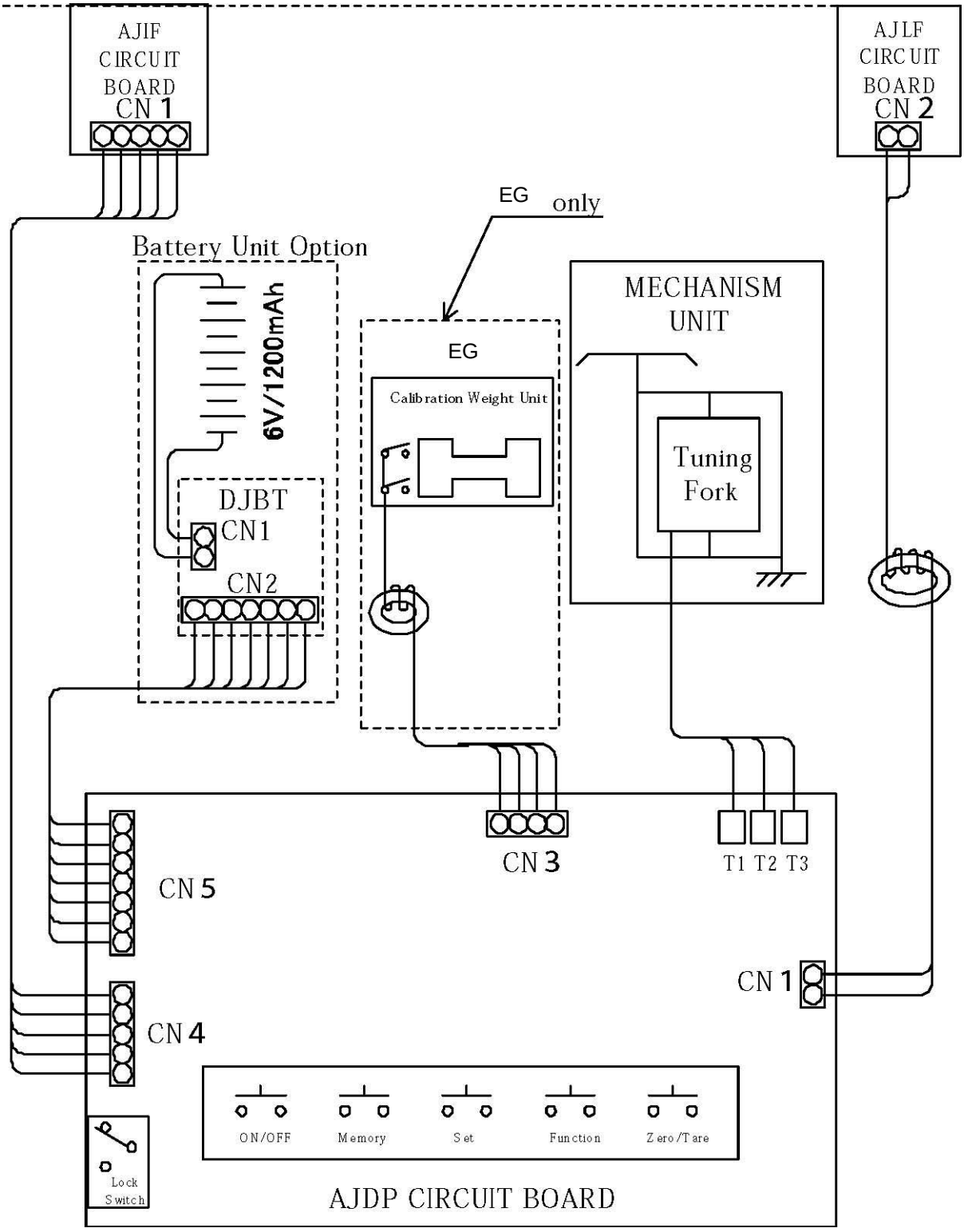


2 Electronic Construction

2.1 Block Diagram

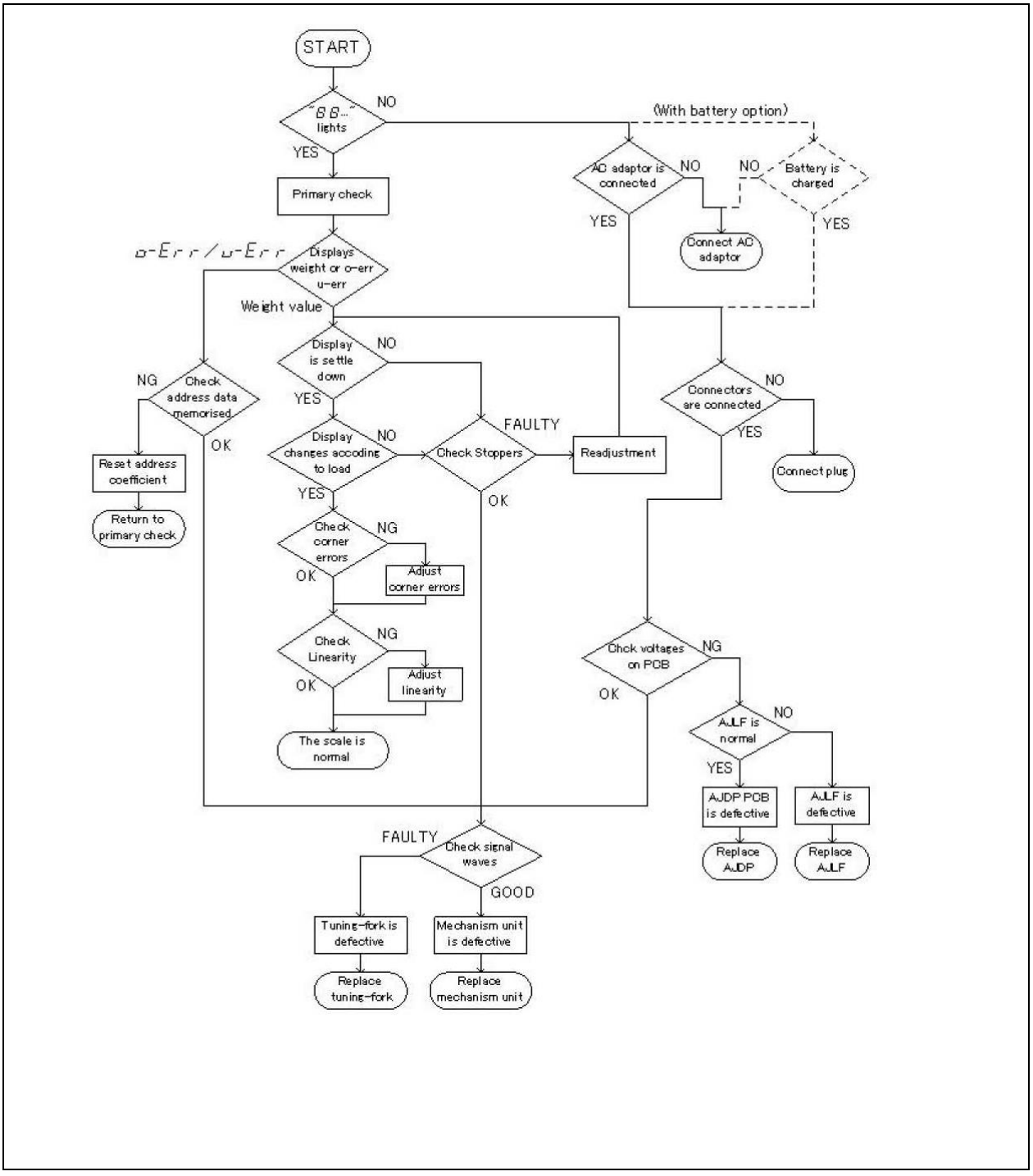


2.2 Whole Wiring



3 Troubleshooting

3.1 Troubleshooting Procedure



3.2 Trouble shooting Table

Symptoms	Causes & Remedy
No display lights on.	1. AJDP board is defective. 2. AC adapter is defective. 3. Wrong connection of connection cords inside. 4. Built-in battery (option) is discharged.
u-Err or *o-Err* appears self test of segments.	1. Wrong weighing pan is applied. 2. Tuning-fork sensor or mechanism unit is defective. 3. AJDP board is defective. 4. Setting of address data has mistake. 5. Coefficient memories (address data) have changed by noises or static electricity. Adjust linearity.
Display dose not get settled down. Display dose not repeat correctly. Zero point drifts.	1. Some parts such as stopper touches others. 2. Weighing pan touches other parts. 3. Foreign substance is in the scale. 4. Tuning-fork sensor or mechanism unit is defective. 5. Affected by a wind or disturbing oscillation. Check environment or working base. Check also setting of stabilization time. See operation manual.
o-Err appears with a net load less than specified capacity (F.S. +9d).	1. Gross weight applied to the scale pan (net weight + tare value) exceeds the scale capacity. 2. Coefficient memories (address data) have changed by noises or static electricity. Adjust linearity. 3. Setting of address data has mistake. 4. Calibration weight is not correct.
Span is out of specified range.	1. Tuning-fork sensor or mechanism unit is defective. 2. AJDP board is defective. 3. Setting of address data has mistake. 4. Coefficient memories (address data) have changed by noises or static electricity.
Linearity is out of specified range.	1. Tuning-fork sensor or mechanism unit is defective. 2. Setting of address data has mistake. 3. Coefficient memories (address data) have changed by noises or static electricity. 4. Calibration weight is not correct.

Symptoms	Causes & Remedy
Corner error is too much.	1. Mechanism unit is defective, such as Roberval plate (Spring) has been bent or twisted. 2. Pan base touches other parts.
Display suddenly disappeared in operation.	1. Built-in battery (option) has been consumed. 2. AJDP board is defective. 3. AC adaptor is defective.
b-Err appears.	1. AJDP board is defective. 2. Coefficient memories (address data) have changed by noises or static electricity. Adjust linearity.
d-Err appears.	1. Address data related to determine the capacity has been destroyed. Contact the shipper. 2. AJDP board is defective.
I-Err appears.	1. The calibration weight is less than ½ F.S.
2-Err appears.	1. The data error exceeds 0.4%. Or perhaps the scale may be defective. Contact the shipper.

3.3 Primary Checks

1. Is any wind around the site?
   Is any oscillation? Is the working table stable.

2. Is anything under the pan base or the weighing pan?

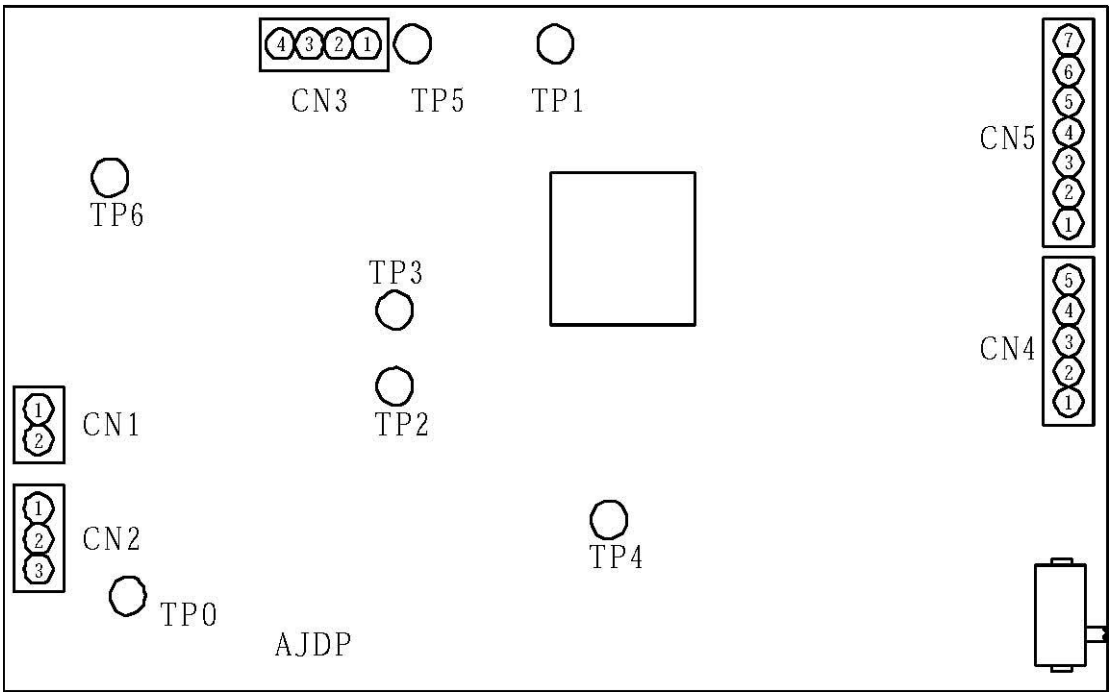
3. Is the weighing pan right one.

4. Is AC adaptor connected both with the scale and with the scale and with the outlet properly?

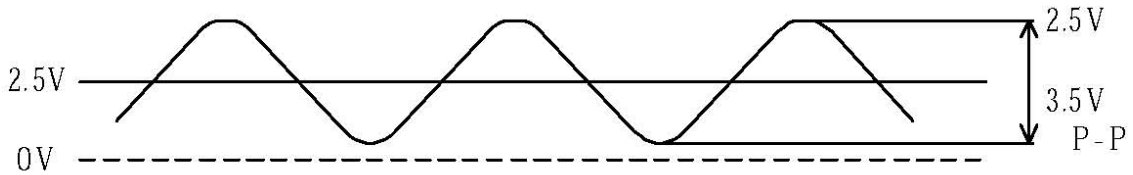
5. Is battery option charged sufficiently?

3.4 Checks For Electric/Electronic Parts -AJDP Circuit board-

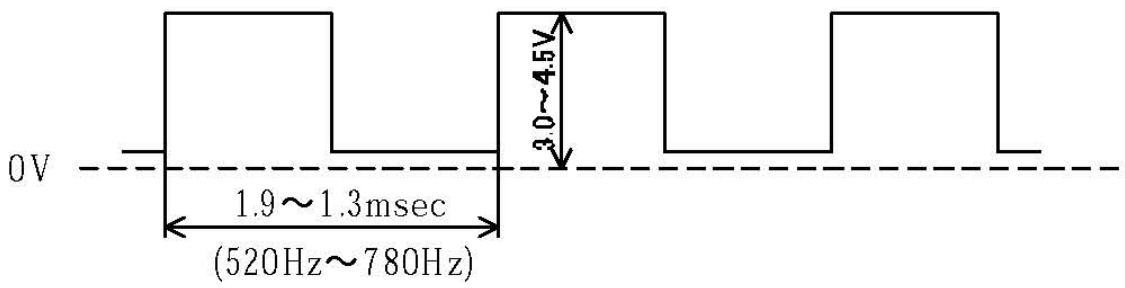
Checks for electric/electronic parts are to be carried out on back of AJDP board after removing the upper case, at test Points and Pins of CN1, CN4, TP4 and TP6.



1. Check of input voltage
   TP0 - (1) of CN1 •••••• +8V ~ +12V
2. Power voltage in the circuit
   TP0 - (2) of CN4 •••••• +4,75V ~ +5,25V
3. Check of signal waves (1)
   TP0 - TP6



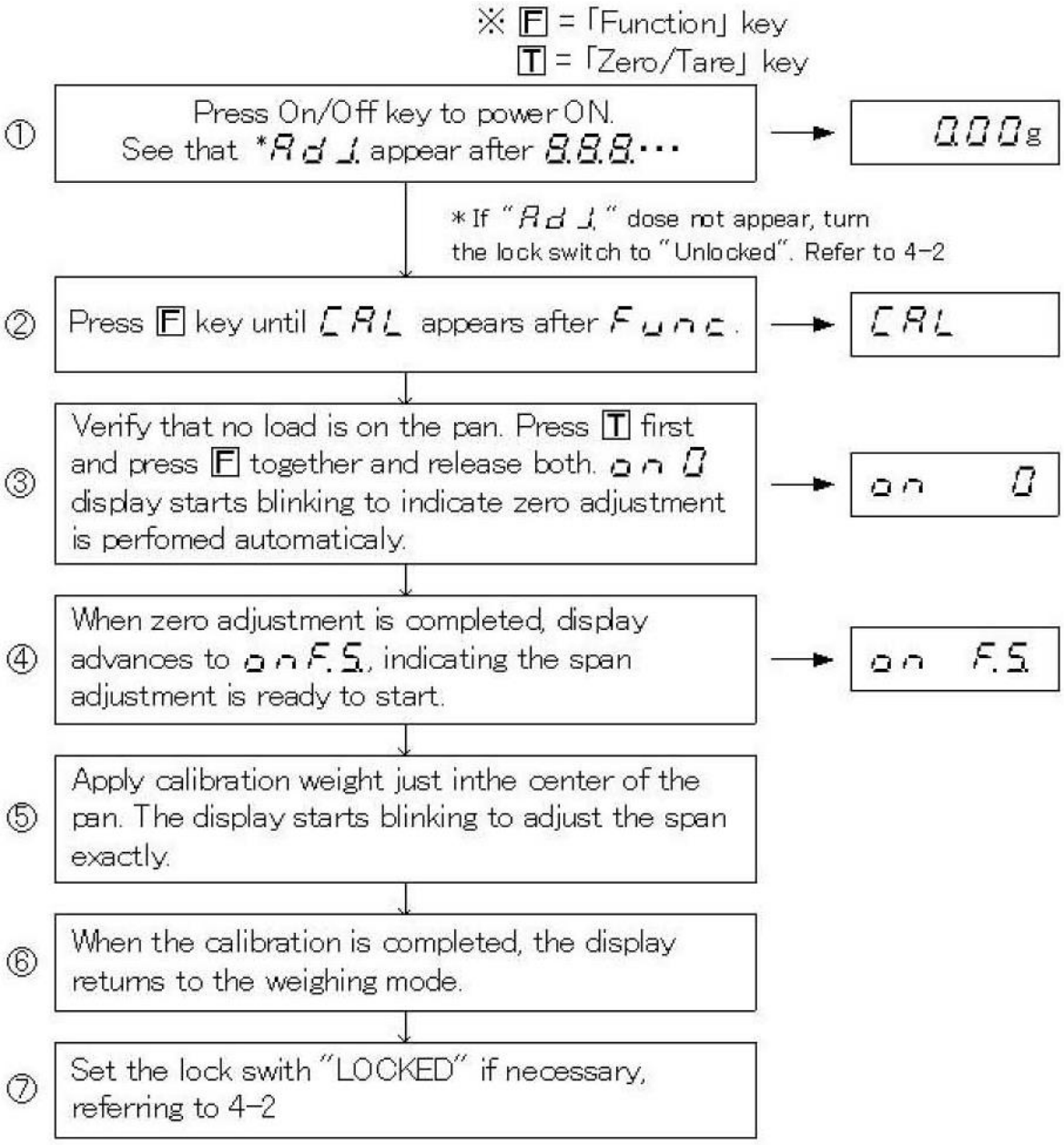
4. Check of signal waves (2)
   TP0 - TP4



4 Adjustments and Settings

4.1 Span Calibration (CAL)

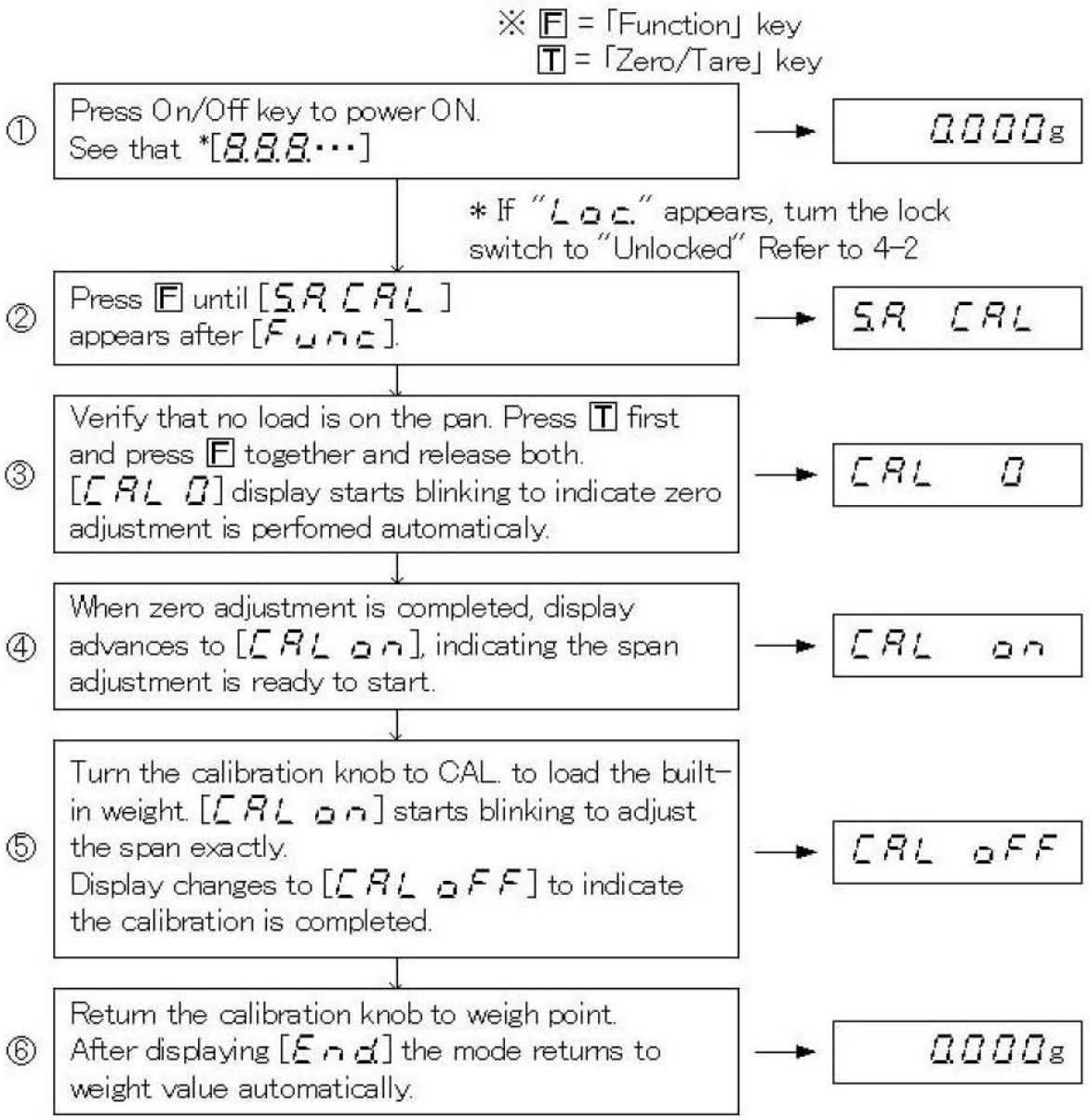
4.1.1 EW and EW-C Type



1. It is recommended to use a calibration weight of better accuracy than the scale.
2. The calibration is available with ½ of F.S. Nevertheless, it is recommend to use weight closer to F.S. for accurate calibration.
3. Error messages:

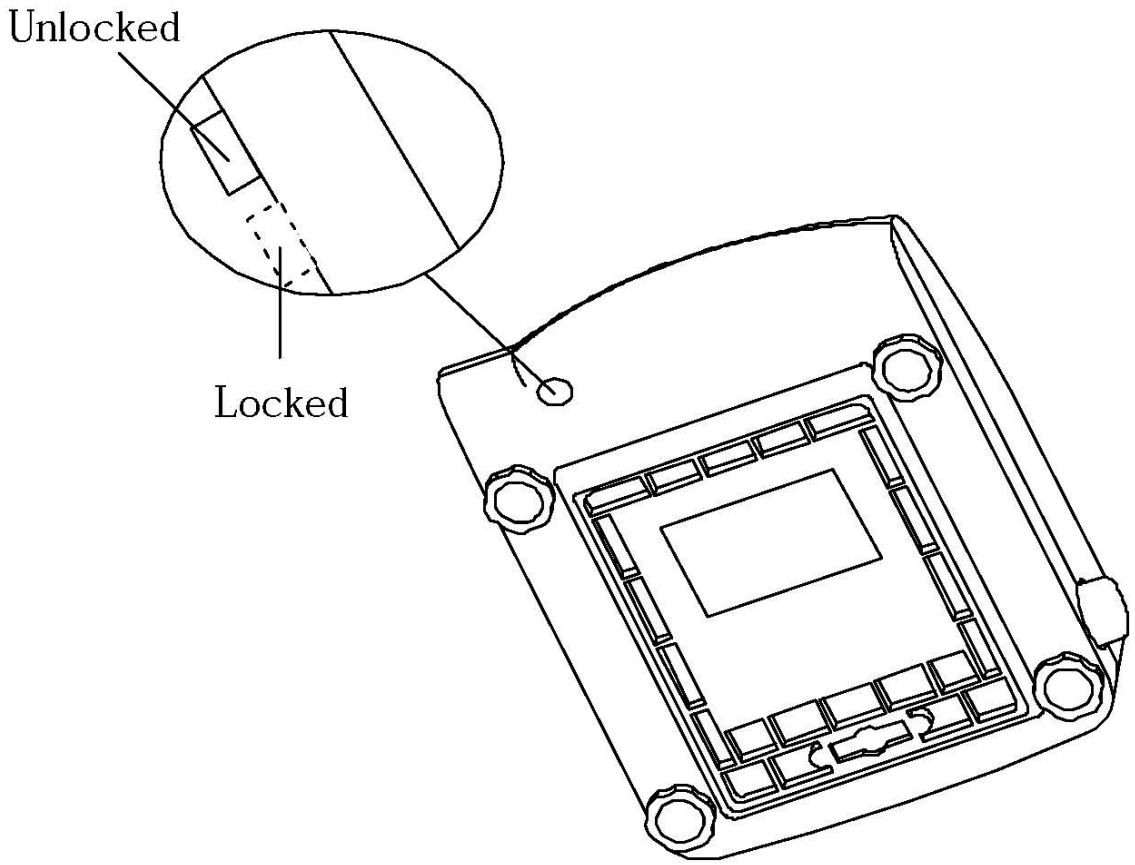
o-Err : The calibration weight is over the full capacity.
I-Err : The calibration weight is less than ½ of the capacity.
2-Err : The data error exceeds 1%. Or perhaps the scale may be defective.

4.1.2 EG Type


※ F = 「Function」 key
T = 「Zero/Tare」 key
① Press On/Off key to power ON. See that *[8.8.8.・・・]
0.000g
* If "Loc." appears, turn the lock switch to "Unlocked" Refer to 4-2
② Press F until [SR CAL] appears after [Func].
SR CAL
③ Verify that no load is on the pan. Press T first and press F together and release both. [CAL 0] display starts blinking to indicate zero adjustment is perfomed automaticaly.
CAL 0
④ When zero adjustment is completed, display advances to [CAL on], indicating the span adjustment is ready to start.
CAL on
⑤ Turn the calibration knob to CAL. to load the built-in weight. [CAL on] starts blinking to adjust the span exactly. Display changes to [CAL oFF] to indicate the calibration is completed.
CAL oFF
⑥ Return the calibration knob to weigh point. After displaying [End] the mode returns to weight value automatically.
0.000g

4.2 Lock Switch

Set the lock switch to “Locked” before stamping or sealing so that the user is unable to change parameters or to calibrate the scale.

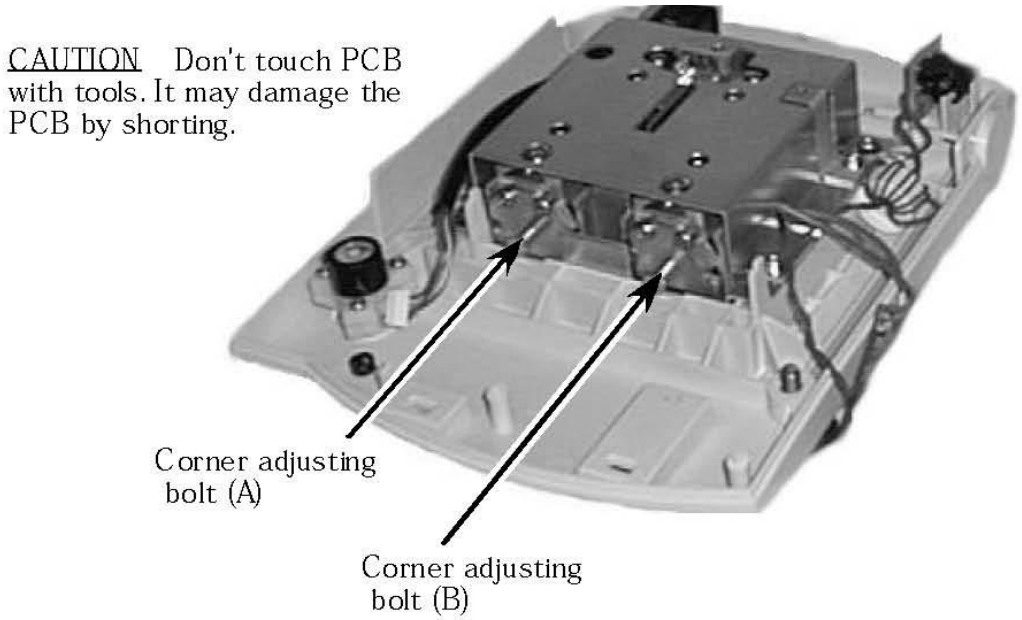


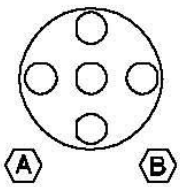
4.3 Corner Error Adjustment

4.3.1 EW – 120-1200 and EW-C Type

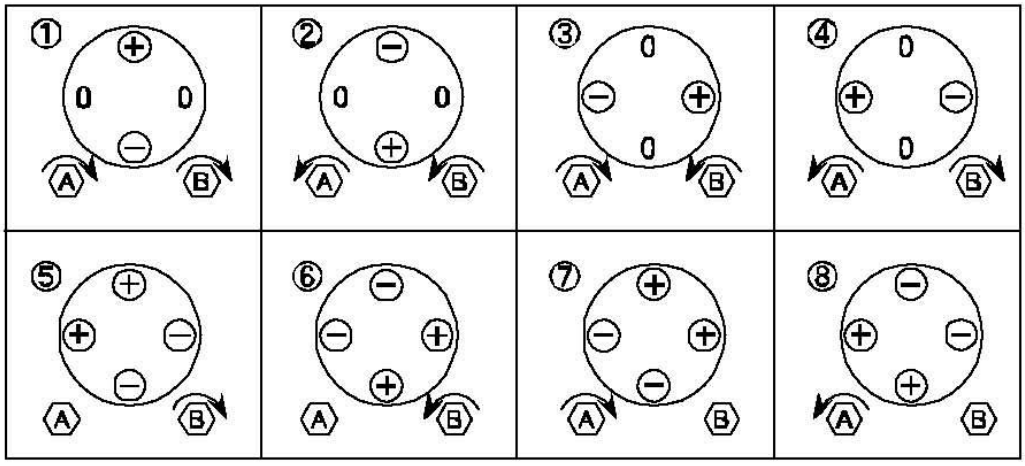
Remove the case referring to 5 – 1.
Place the pan base, then place the weighing pan on the mechanism.
Adjust the level.

Remove fixing screw on AJDP board and unplug connector with CN4 on AJDP board. Adjust corner errors by adjusting bolts referring to following illustrations.

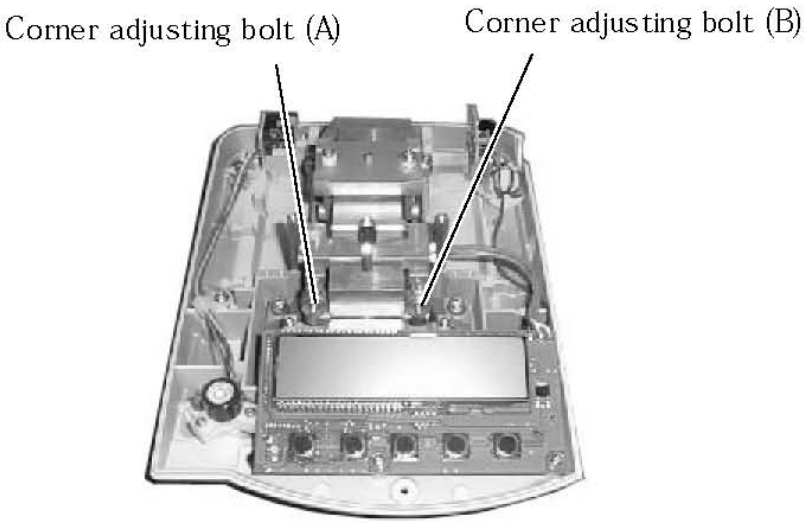


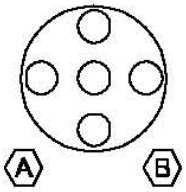


Symbols		For
⊕	:	The error is positive to the center
⊖	:	The error is negative to the center
	:	Drive to the bolt counter-clockwise
	:	Drive to the bolt clockwise

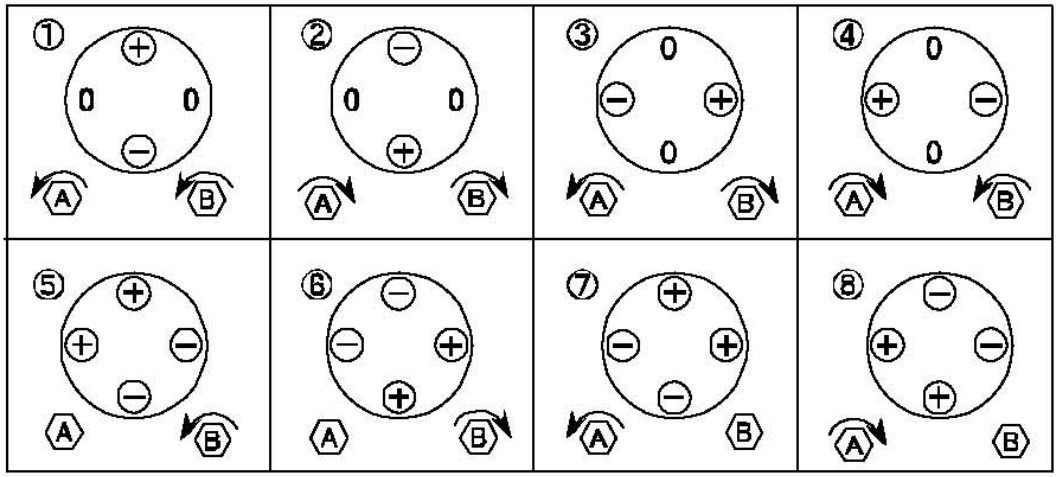


4.3.2 EW – 2200-12K



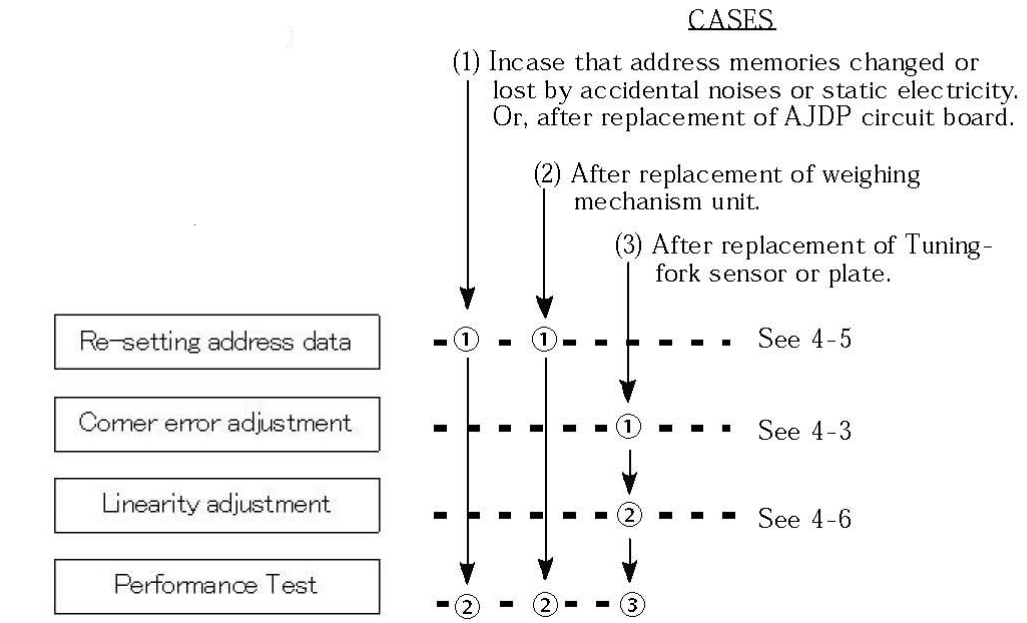


Symbols		For
⊕	:	The error is positive to the center
⊖	:	The error is negative to the center
	:	Drive to the bolt counter-clockwise
	:	Drive to the bolt clockwise

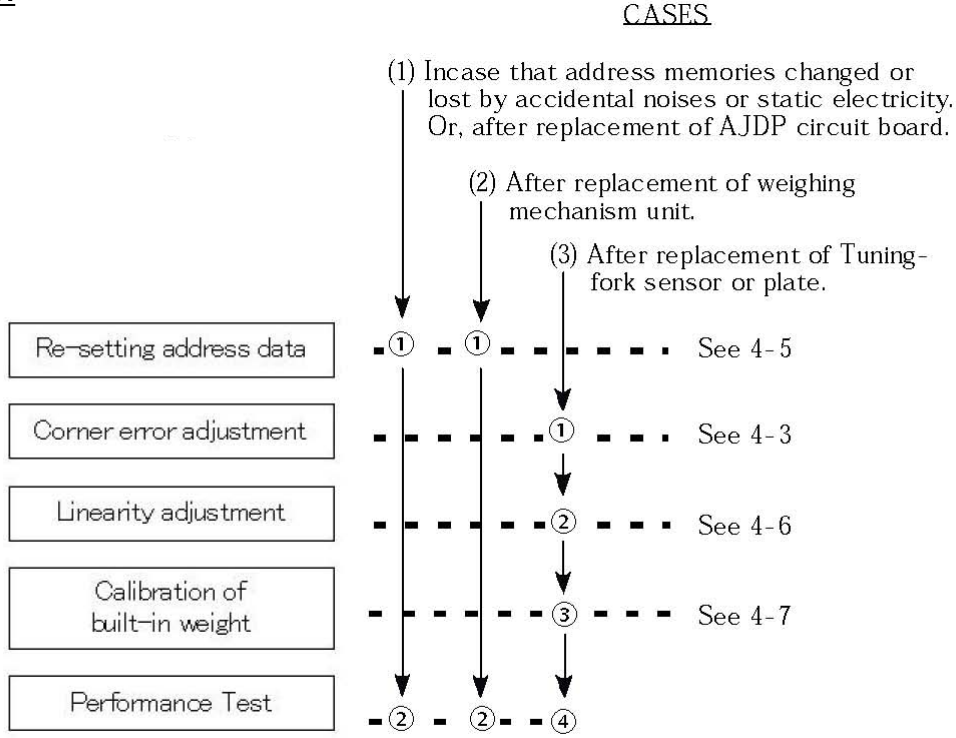


4.4 Adjustment Sequence For Cases

1. EW Type



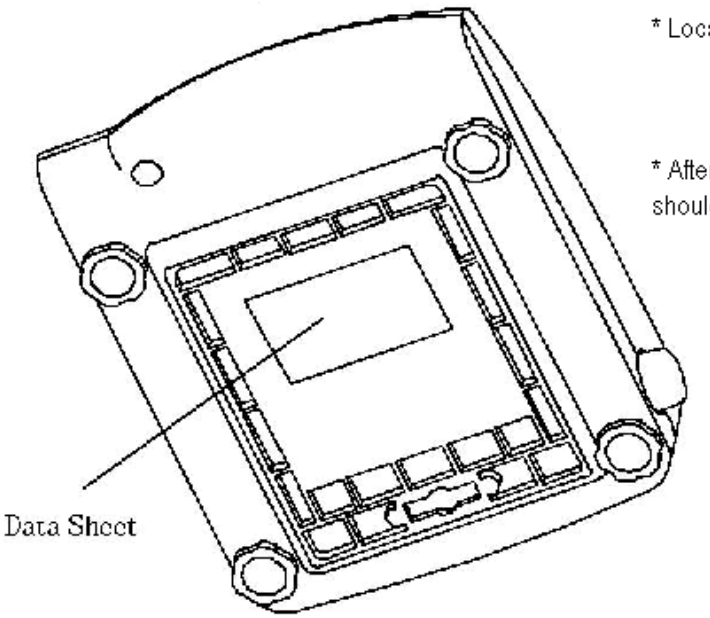
2. EG Type



4.5 Resetting Address Data (Coefficients)

When memories of address data are changed or lost by some reasons, such as by replacement of PCB, or by noises or static electricity, re-set original data by following procedure.

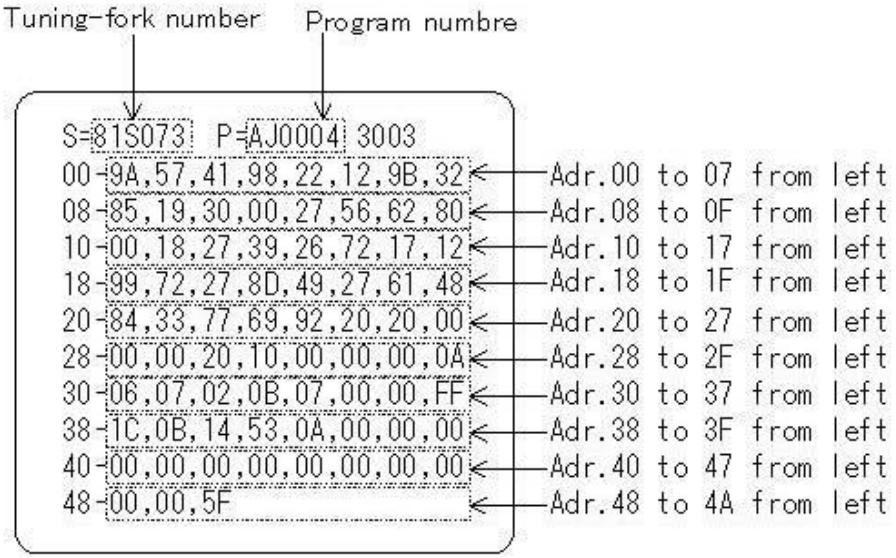
1. Location Of Original Data



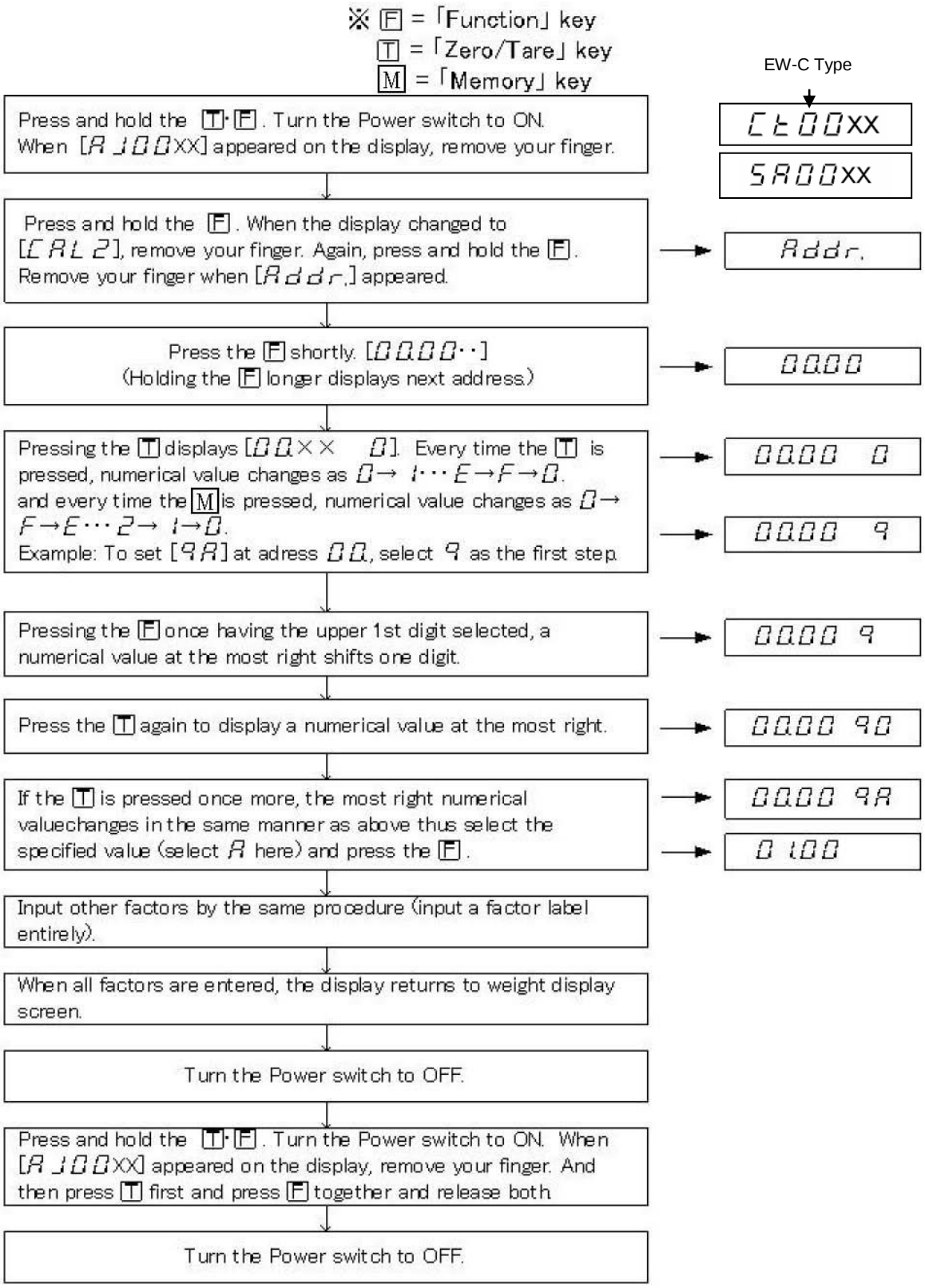
* Locate the original data sheet on the bottom.

* After replacement of mechanism, new data should cover the old one.

2. Contents Of Data Sheet

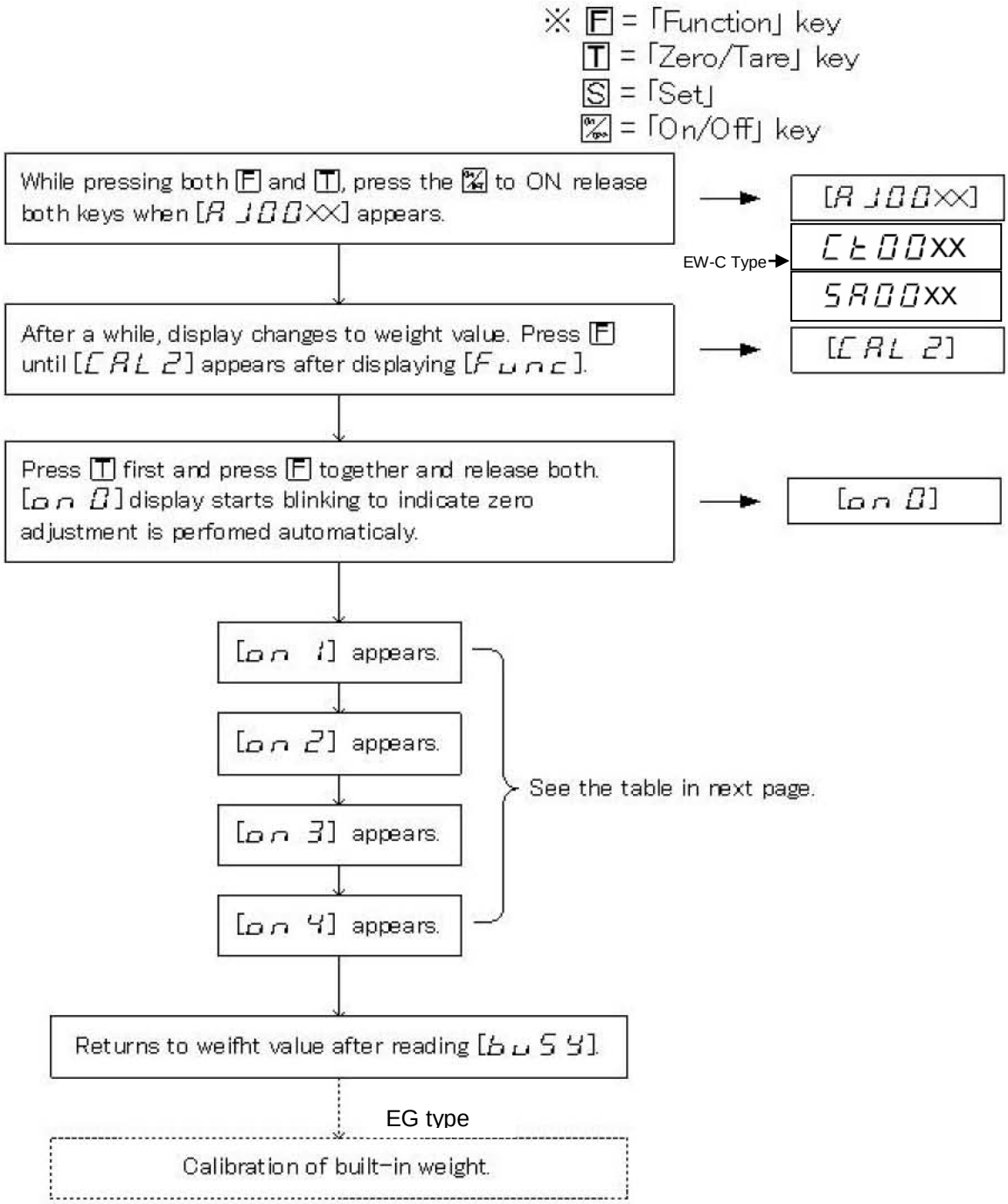


4.6 How To Call Address Mode/How To Re-write Address Data



4.7 Linearity Adjustment

1. How To Adjust Linearity



2. Table Increasing Calibration Weight For Linearity Adjustment

( ) : Cumulative total of weights on the scale

Model / Display	EW 220-3NM EG 220-3NM EG 200-3AM	EW 420-3NM EG 420-3NM EG 400-3AM	EW 620-3NM EG 620-3NM EG 600-3AM	EW 820-3NM
on =	0g (0g)	0g (0g)	0g (0g)	0g (0g)
on 1	50g (50g)	100g (100g)	150g (150g)	200g (200g)
on 2	50g (100g)	100g (200g)	150g (300g)	200g (400g)
on 3	50g (150g)	100g (300g)	150g (450g)	200g (600g)
on 4	70g (220g)	120g (420g)	170g (620g)	220g (820g)
Calibration Weight Required	50g x 4 20g x1	100g x 4 20g x 1	100g x 4 50g x 4 20g x 1	200g x 4 20g x 1

Model / Display	EW 2200-2NM EG 2200-2NM EG 2000-2AM	EW 4200-2NM EG 4200-2NM EG 4000-2AM	EW 6200-2NM	EW12000-1NM
on 0	0g (0g)	0g (0g)	0g (0g)	0g (0g)
on 1	500g (500g)	1kg (1000g)	1,5kg (1500g)	3kg (3000g)
on 2	500g (1000g)	1kg (2000g)	1,5kg (3000g)	3kg (6000g)
on 3	500g (1500g)	1kg (3000g)	1,5kg (4500g)	3kg (9000g)
on 4	700g (2200g)	1,2kg (4200g)	1,7kg (6200g)	3kg (12000g)
Calibration Weight Required	500g x 4 200g x 1	1kg x 4 200g x 1	1kg x 4 500g x 4 200g x 1	2kg x 4 1kg x 4

Please use the weight for F1 (OIML R – 111) or higher class to maintain the accuracy.

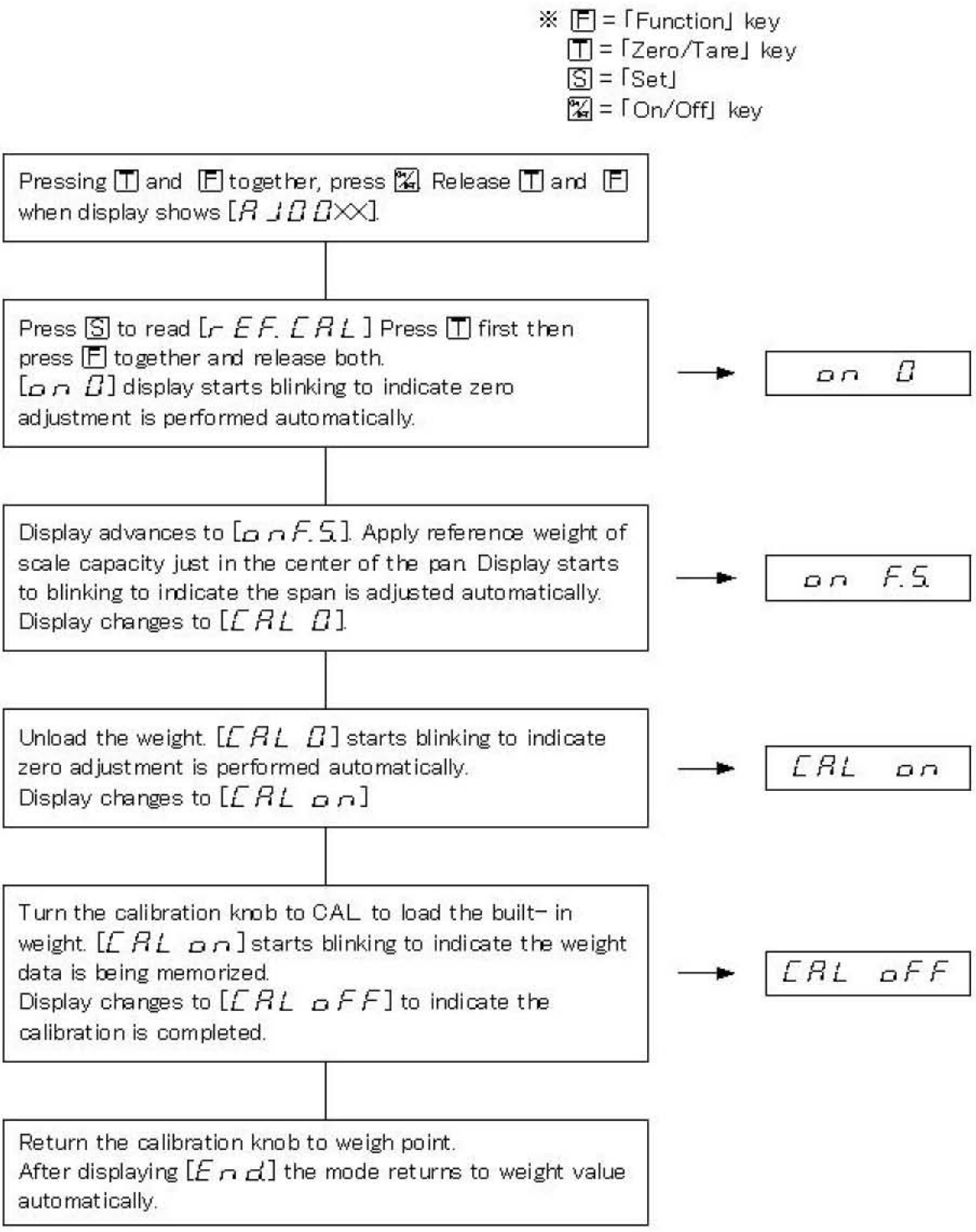
( ) : Cumulative total of weights on the scale

Model / Display	EW 600-C3 NM	EW 120-4 NM
on 0	0g (0g)	0g (0g)
on 1	30g (30g)	30g (30g)
on 2	30g (60g)	30g (60g)
on 3	30g (90g)	30g (90g)
on 4	30g (120g)	30g (120g)
Calibration Weight Required	20g x 4 10g x 4	20g x 4 10g x 4

Please use the weight for E2 (OIML R – 111) or higher class to maintain the accuracy.

4.8 Calibration Of Built-In Weight (Ref Cal)
- EG Type -

- Following does not describe the procedure of ordinary span calibration.
- This is the procedure of calibration of the built-in weight with EG scales
- It is necessary to adjust the linearity of the scale beforehand. Refer to 4-7.



Cautions

(1) [ ] must be carried out in following cases:
(1) When built-in weight is added or replaced.
(2) When linearity adjustment is done.
(3) When AJDP board is replaced.

(2) The quality/tolerance of the reference weight determine the accuracy of the scale. Use weights of higher accuracy than the scale.

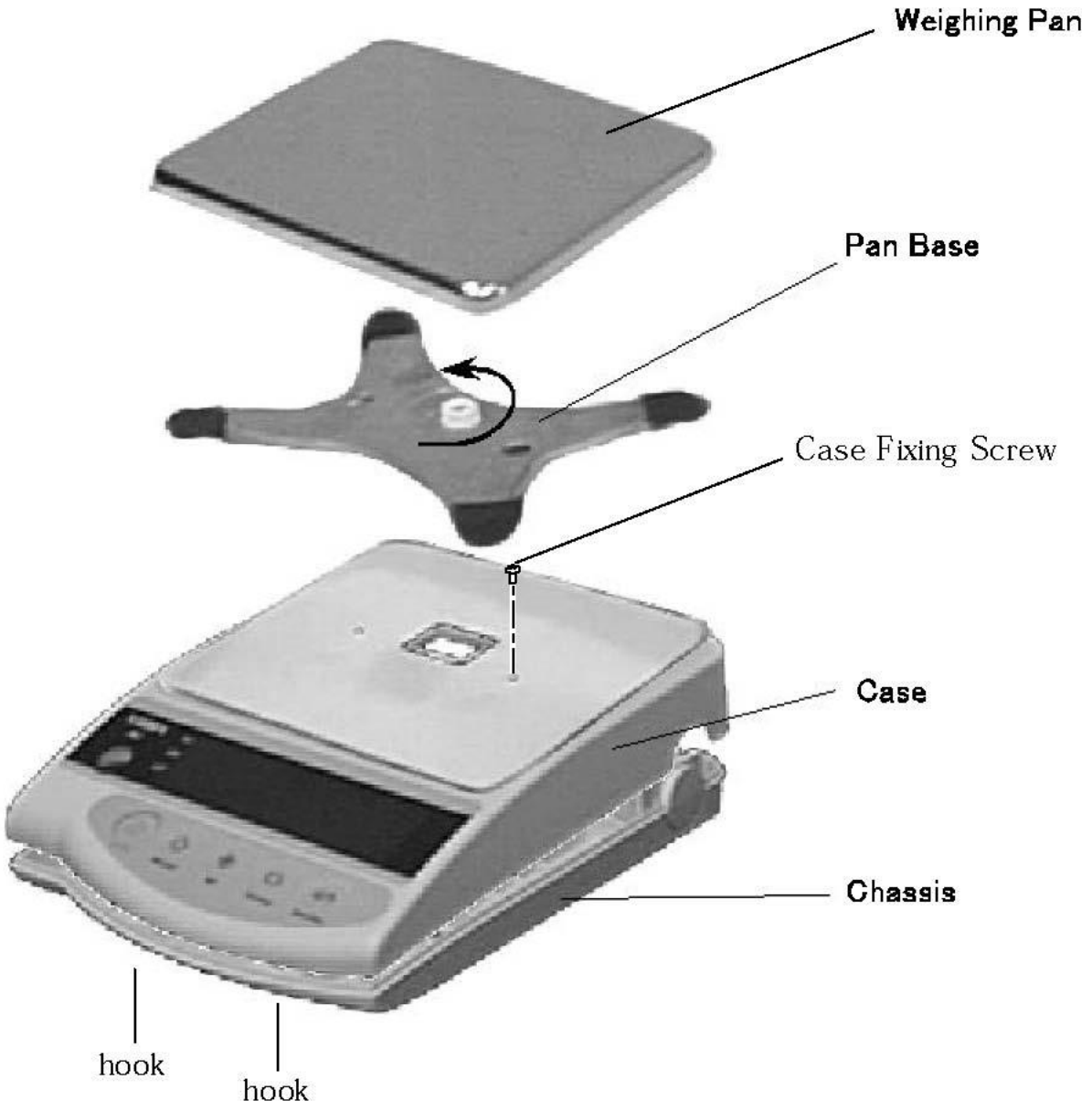
(3) Adjust the level beforehand. The REF CAL must be done in a good environment, no wind, no oscillation, and no temperature changes.
(4) : The reference weight is less than ½ of F.S.
: The data error exceeds 1%. Adjust the linearity.

5 Parts Replacements

5.1 How to remove the case

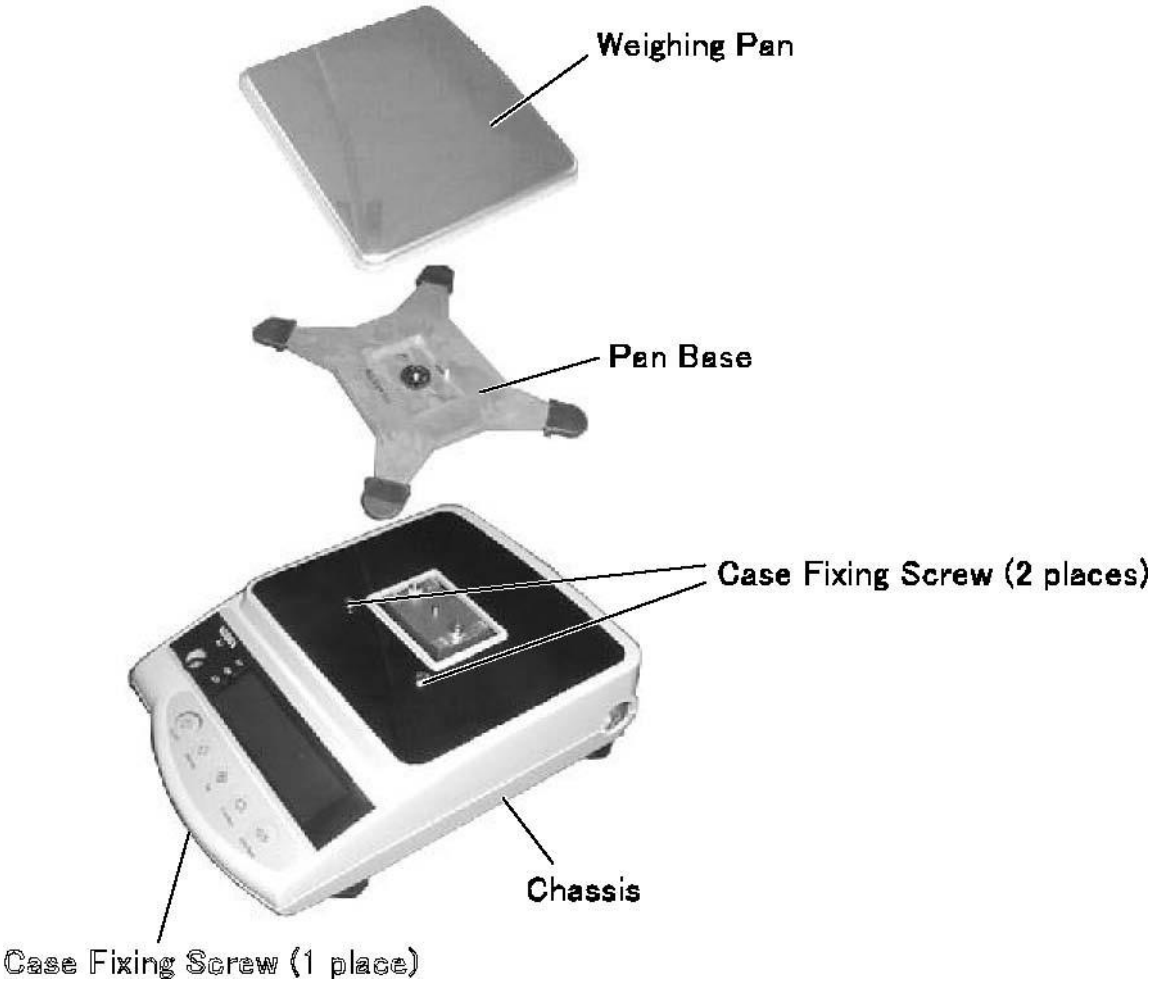
5.1.1 EW 220-1200

(1) Unplug the AC adaptor. Remove the pan and pan base.
(2) Remove case fixing screw with a screwdriver.
(3) Locate two hooks beneath the scale near front. Pull those two hooks toward you to lift the case up, then shift the case to rear to release it from hooks.



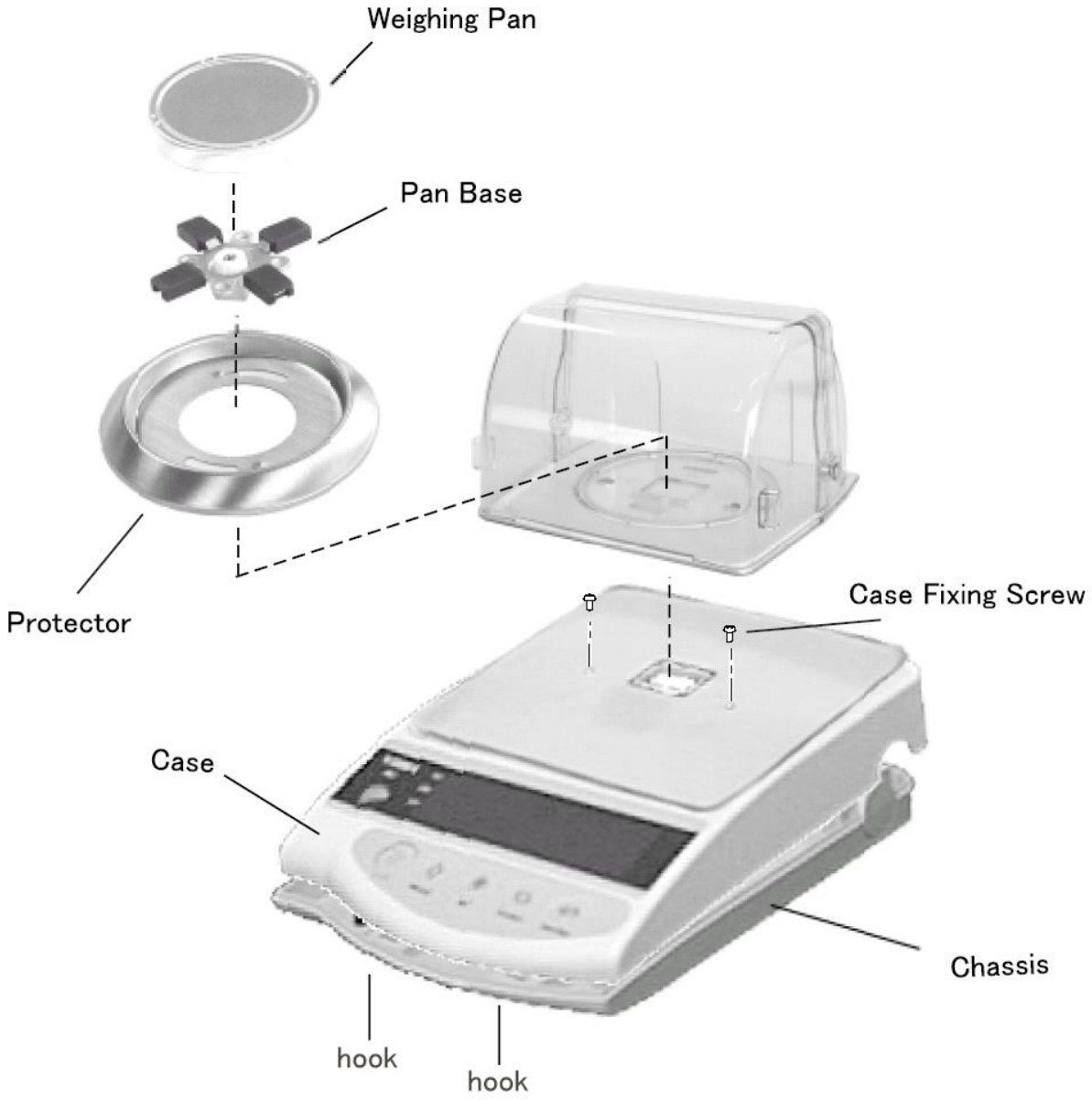
5.1.2 EW 2200-12K

(1) Remove the weighing.
(2) Remove case fixing screw with a (+) screwdriver.(2 places in the top and 1 place in the chassis)

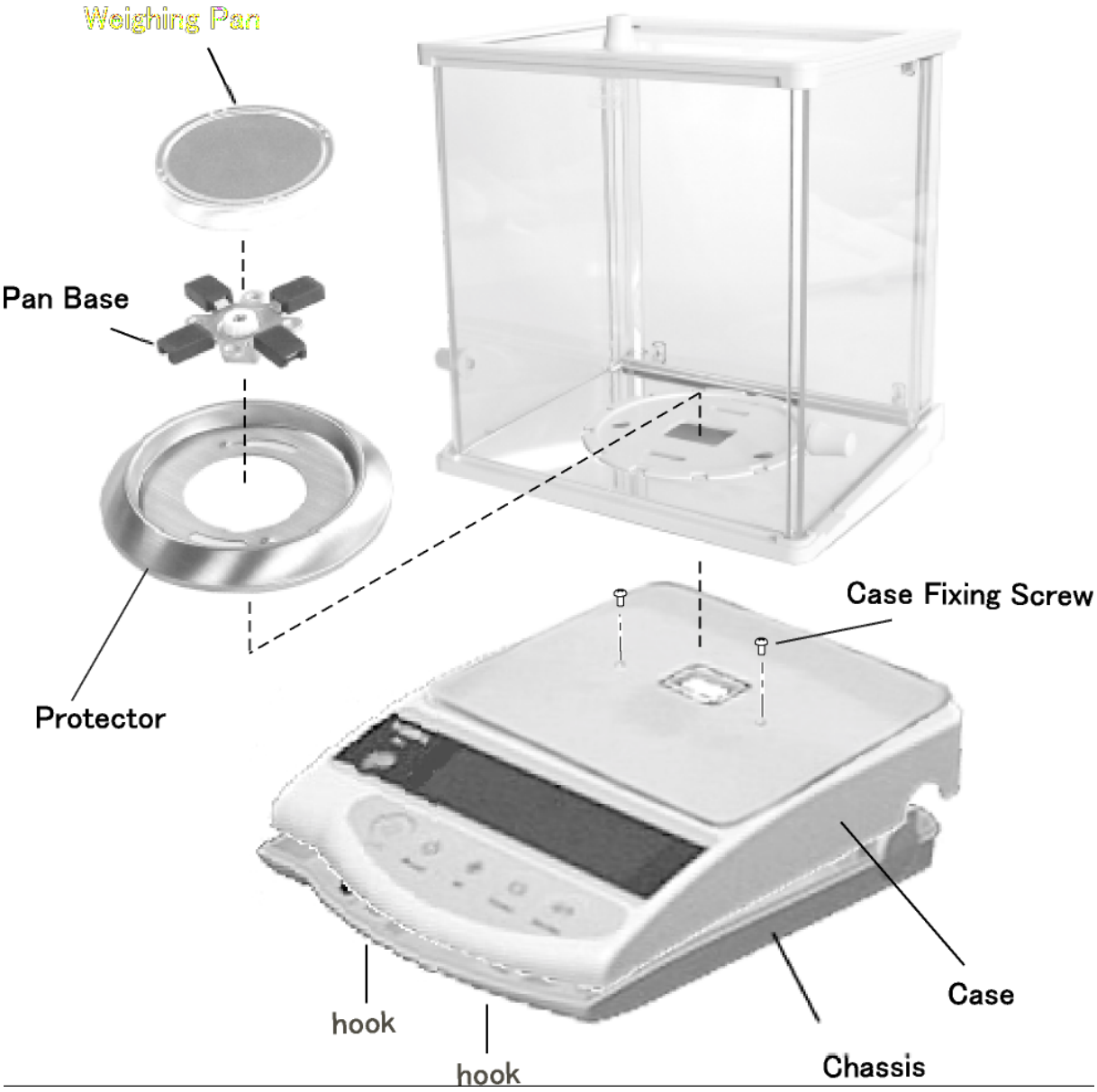


5.1.3 EW-C

(1) Unplug the AC adaptor. Remove the pan and pan base.
(2) Remove case fixing screw with screwdriver.
(3) Locate two hooks toward you to lift the case up, then shift the case to rear to release it from hooks.



5.1.4 EW 120-4 NM



5.2 How To Cover The Case

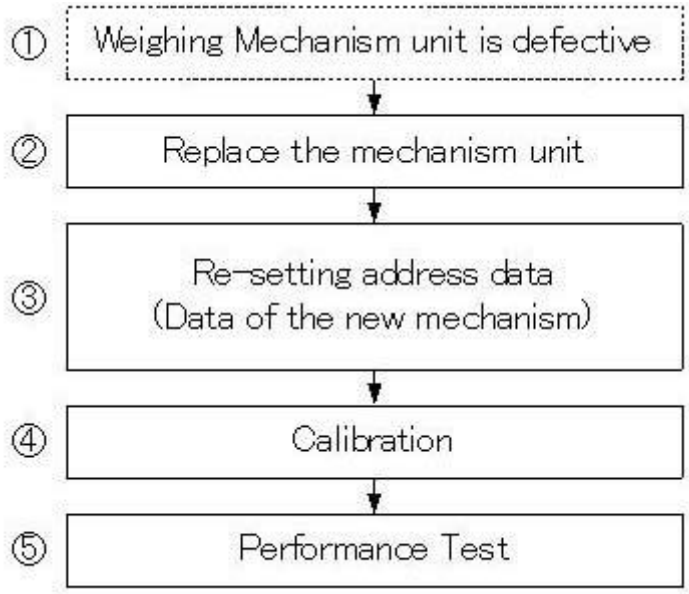
5.2.1 EW 120-1200 and EW-C

(1) Cover the scale with the case, seeing cables are just stored inside properly. Insert the rear hooks first, then press the upper case gently until two front hooks are set securely.
(2) Drive in case fixing screw securely.
(3) Set pan base and then weighing pan on the scale.

5.2.2 EW 2200-12K

(1) Put the case on properly catching connection codes.
(2) Insert the case fixing screw with a (+) screwdriver. (2 places in top and 1 place in the chassis).
(3) Install the pan base and put the weighing pan on.

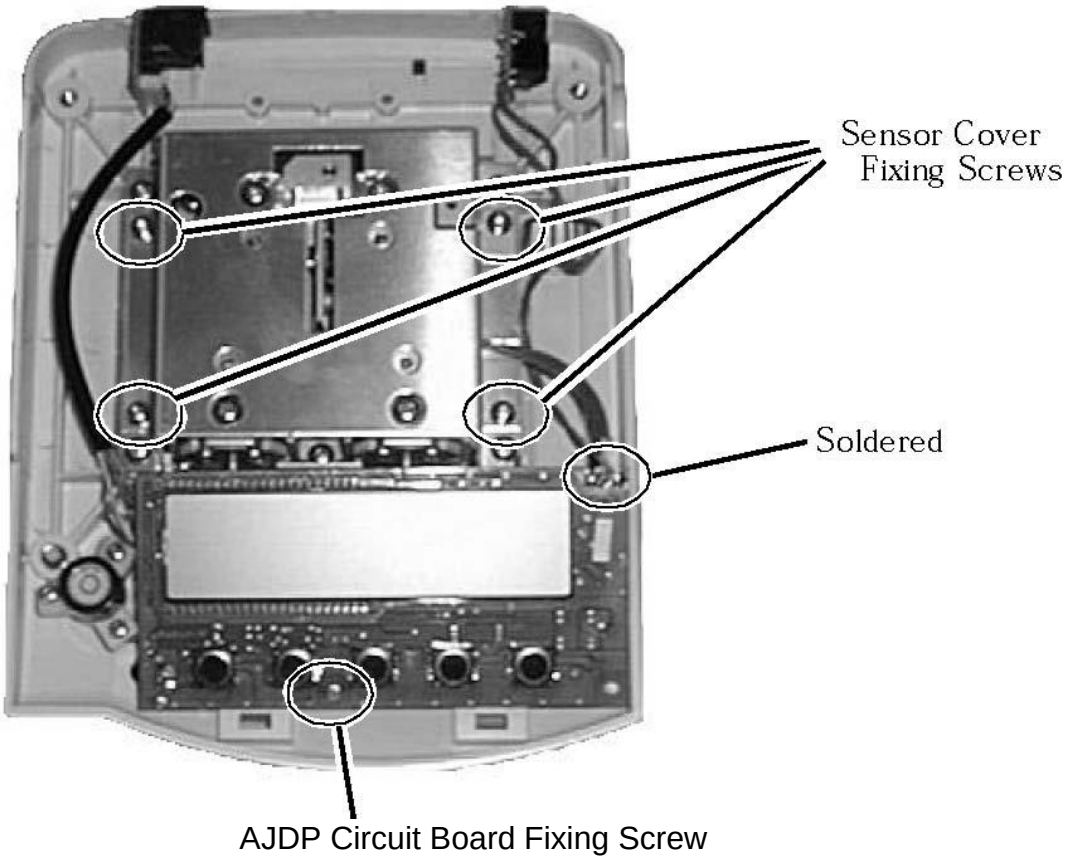
5.3 Sequence Of Mechanism Unit Replacement



5.3.1 How To Remove The Weighing Mechanism Unit

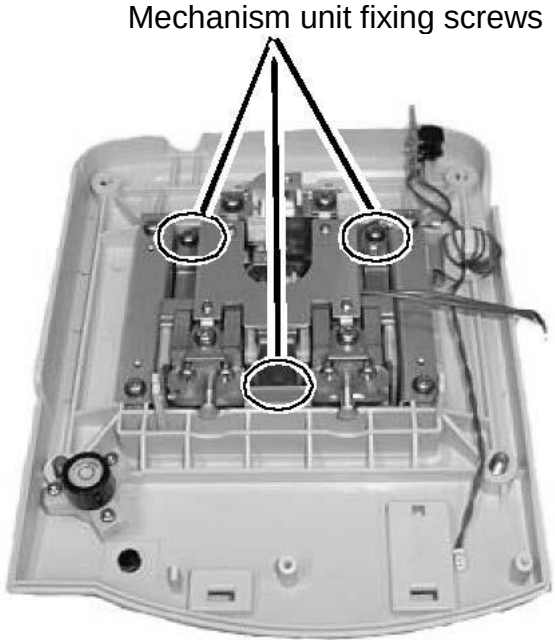
5.3.1.1 EW 120-1200 and EW-C

(1) Remove the case referring to 5-1.
(2) Remove four sensor cover fixing screw.
(3) Remove wires to the tuning-fork sensor, by welding solders at AJDP circuit board
(4) Remove the AJDP circuit board fixing screw.



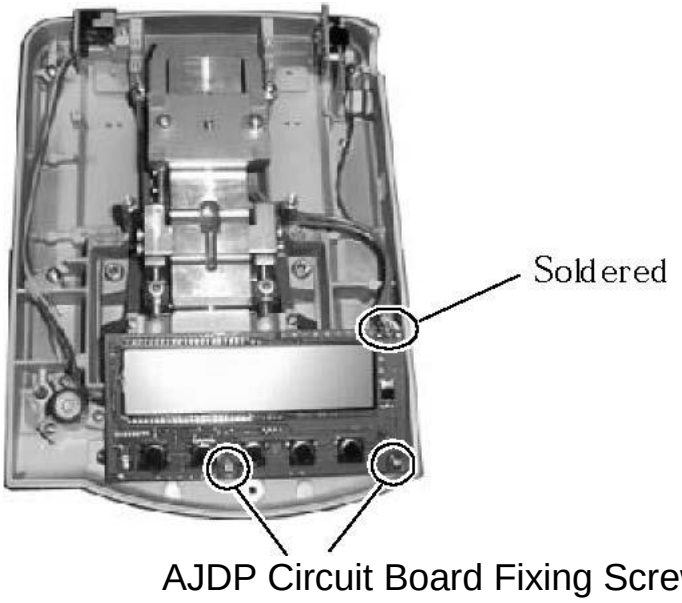
* For EG series (With-internal-calibration type), refer to section 5-6.

(5) Remove three mechanism unit screws.
(6) Remove the mechanism unit by holding the chassis.



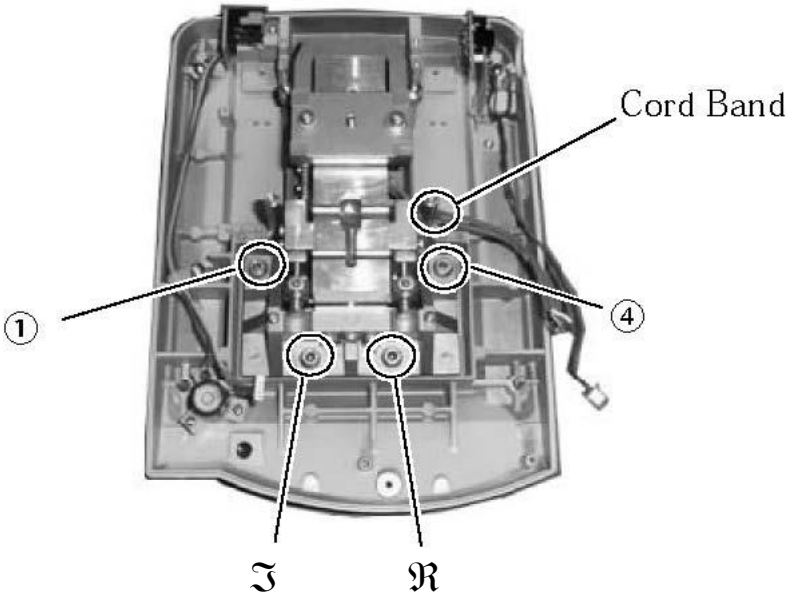
5.3.1.2 EW 2200-12K

(1) Remove the case referring to 5-1.
(2) Remove wires to the Tuning-fork sensor, by welding solders at AJDP circuit board.
(3) Remove the AJDP circuit board fixing screw and AJDP circuit board.



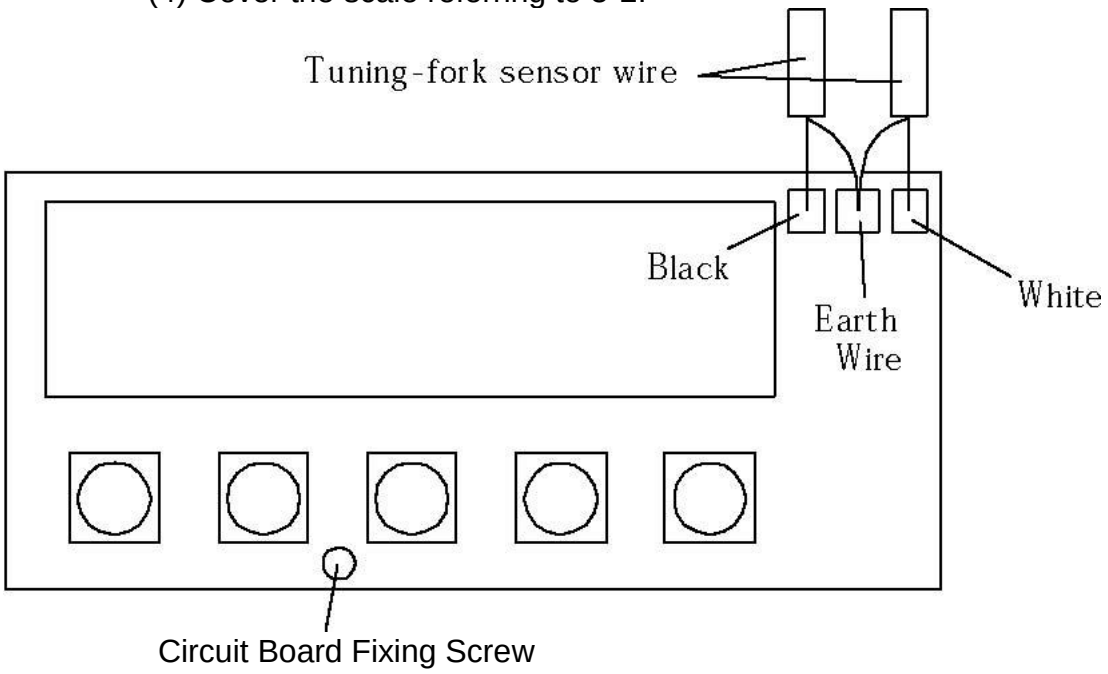
* For EG series (With-internal-calibration type), refer to section 5-6.

(4) Remove four mechanism unit fixing screws
(5) Remove (cut) the board band.
(6) Remove the mechanism unit by holding at the chassis.

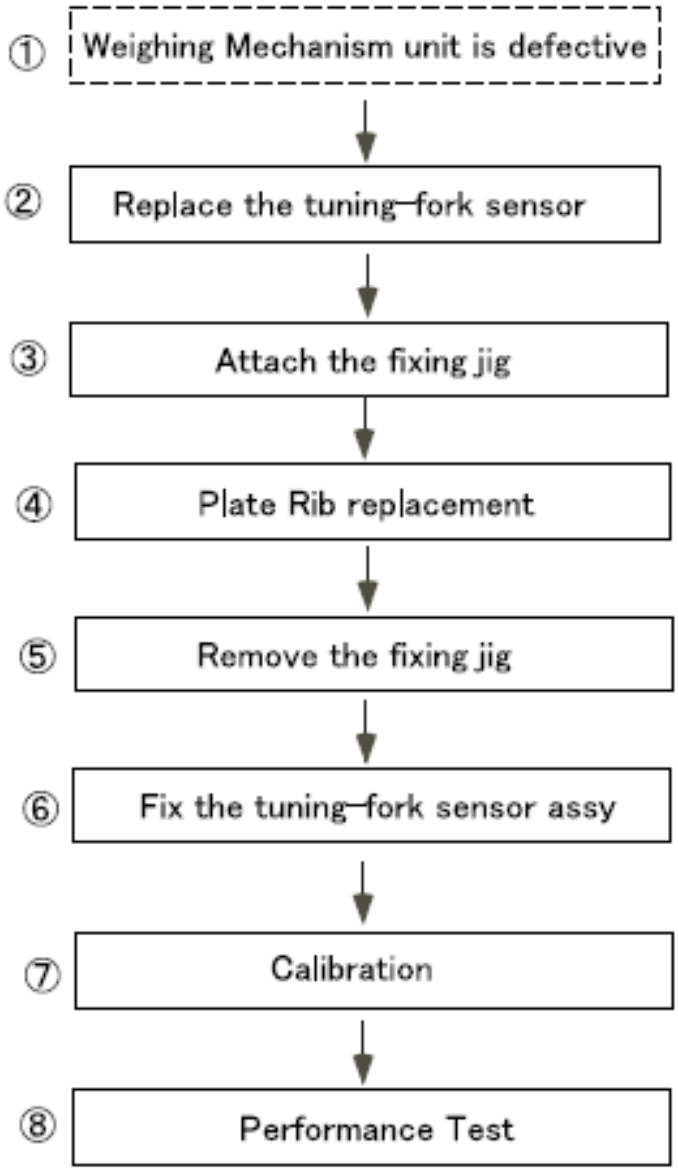


5.3.2 How To Install Weighing Mechanism

(1) Place the mechanism on the chassis. Fit it with the fixing screws.
(2) Solder wires of the Tuning-fork sensor to the AJDP circuit board.
(3) (1)Cover the mechanism unite with the sensor cover. Fit it with four fixing screw. (EW 120-1200).
(2)Fix the Tuning-fork sensor wire to hexagon pillar with cord band. (EW2200-12K)
(4) Cover the scale referring to 5-2.

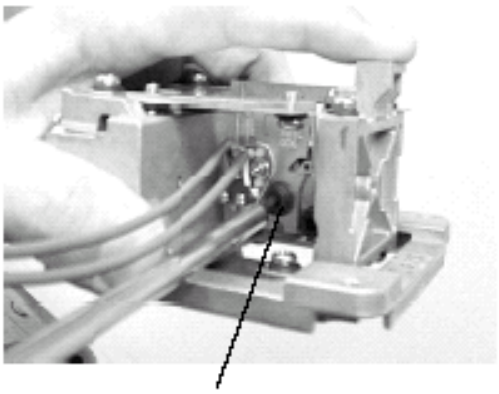


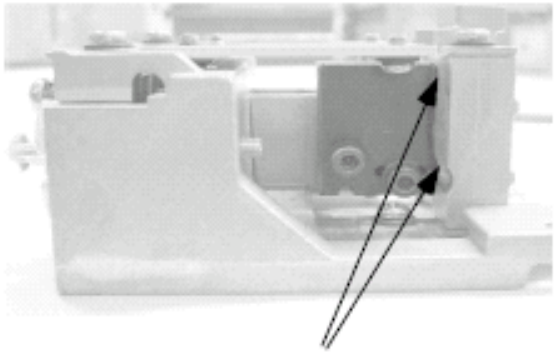
5.4 Plate Rib Replacement

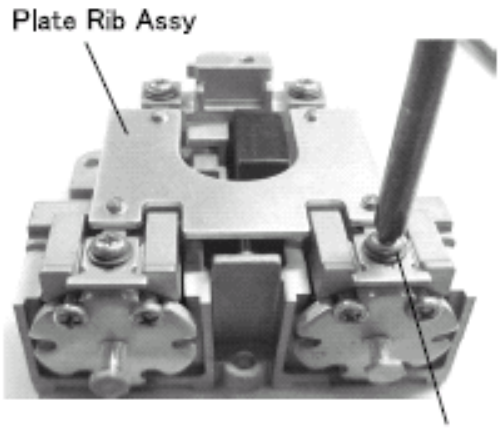


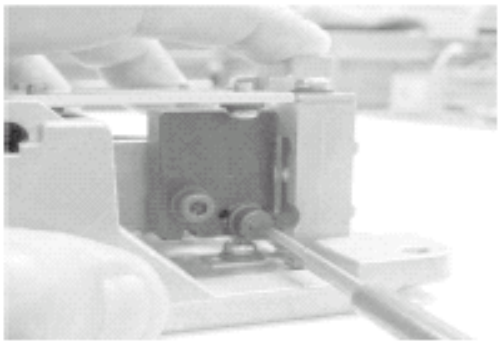
5.4.1 Plate Rib Replacement Procedure

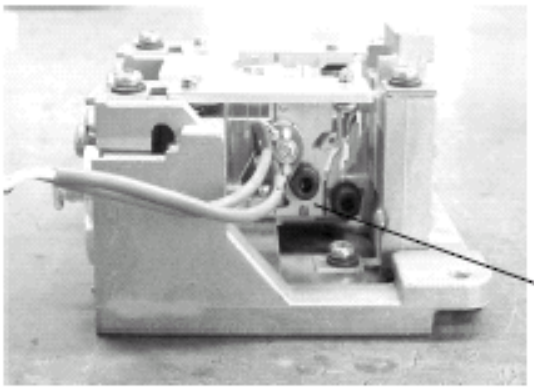
(1) Remove the mechanism unit from the chassis. (5-3)
(2) Replace the tuning-fork sensor.
(3) Attach the fixing jig with fixing screws for the tuning-fork sensor assy.
*The fixing jig should be attacked to the guide link.
(4) Remove the damaged plate rib by unscrewing and fix the new one.
(5) Remove the fixing jig.
(6) Fix the tuning-fork sensor assy. (torque 20kgfcm)



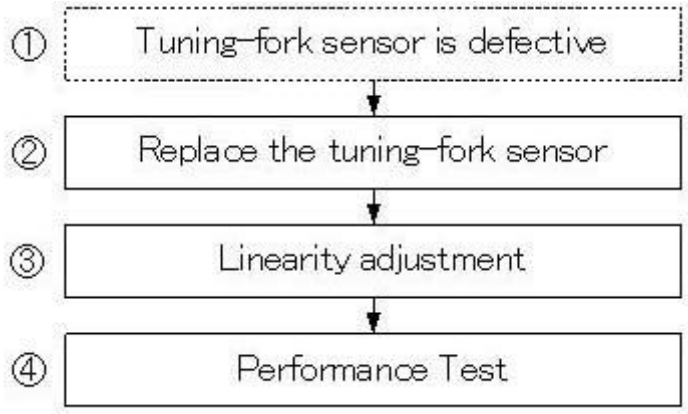






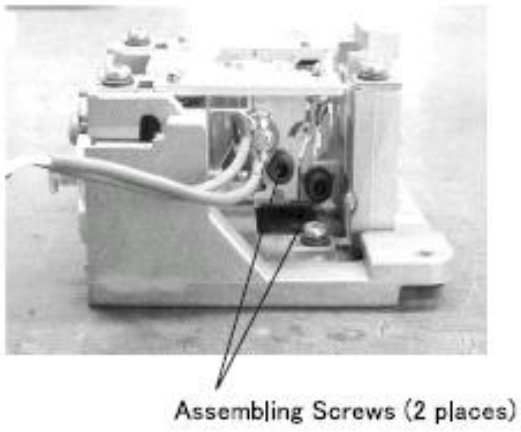


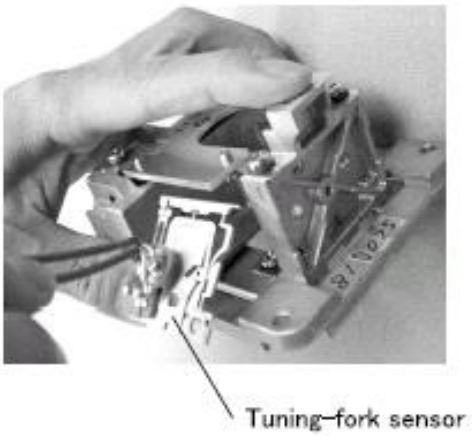
5.5 Sequence Of Tuning-Fork Sensor Replacement

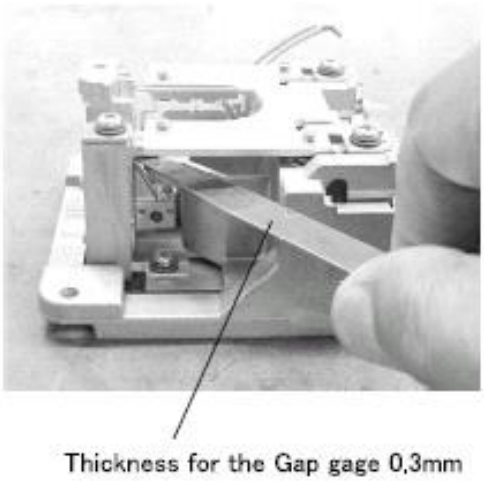


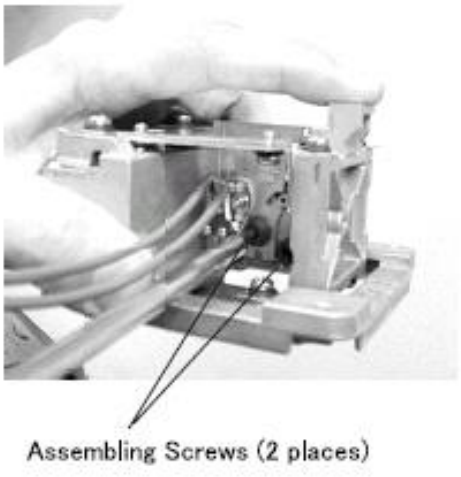
5.5.1 How to uninstall Tuning-fork assy

(1) Remove the mechanical unit from the chassis.
(2) Replace the tuning-fork sensor.
(3) Insert shim at stopper.
(4) While holding guide link down to under direction, tighten screws.
(Need the torque 25kgfcm)

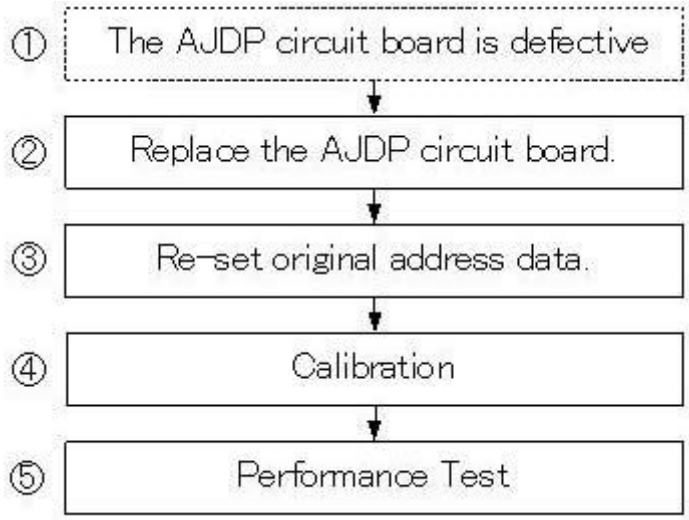






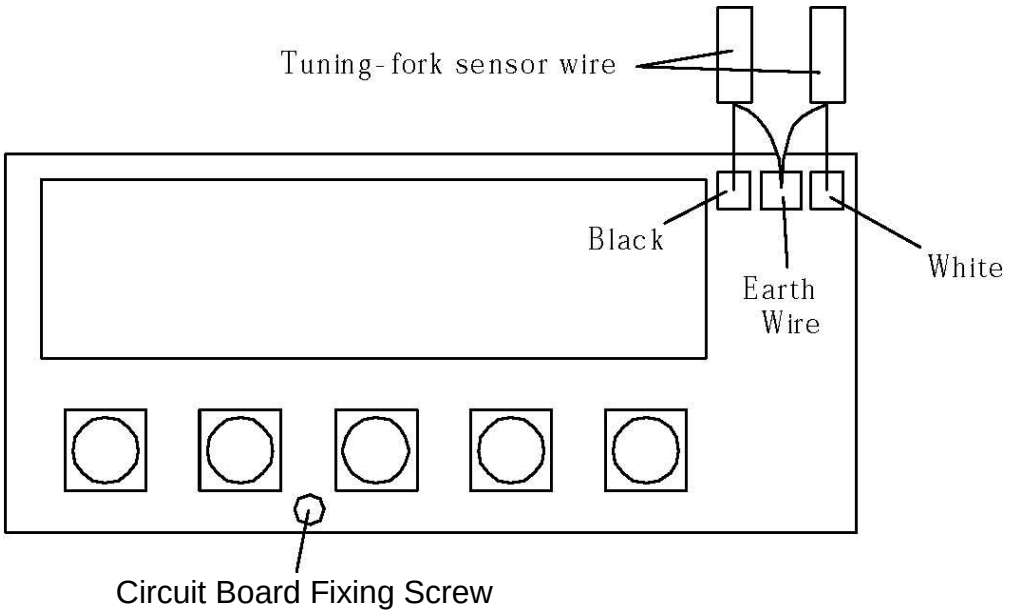


5.6 Sequence Of The AJDP Circuit Board Replacement



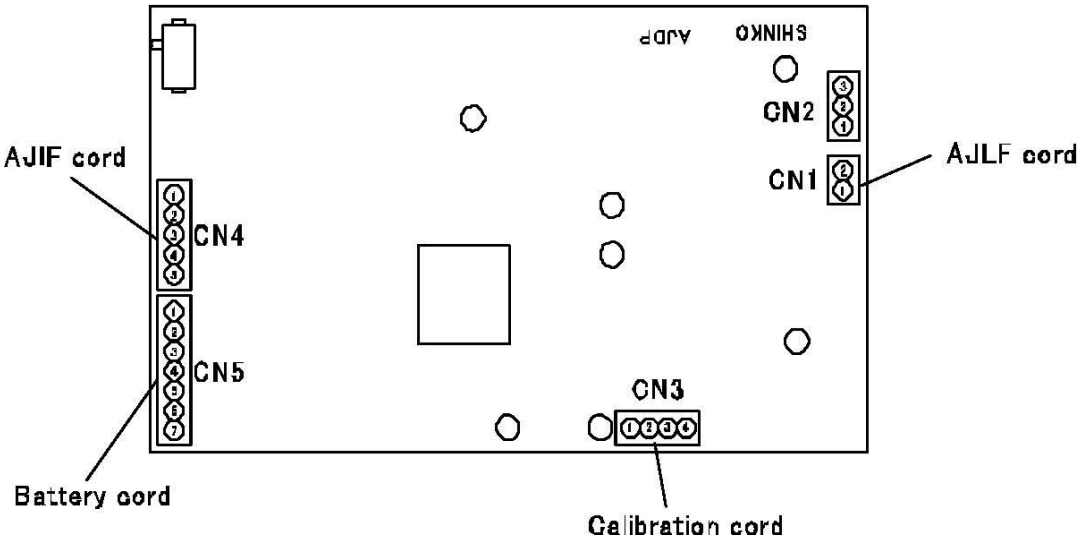
5.6.1 How To Remove AJDP Circuit Board

(1) Remove the case referring to 5-1.
(2) Remove wires to the Tuning-fork sensor, by welding solders at AJDP circuit board.
(3) Remove the AJDP circuit board fixing screw.
(4) Unplug connectors at CN1, CN4, (and CN3 with AJH-CE) on AJDP board. With battery option, unplug CN5, in addition.



5.6.2 How To Install AJDP Circuit Board

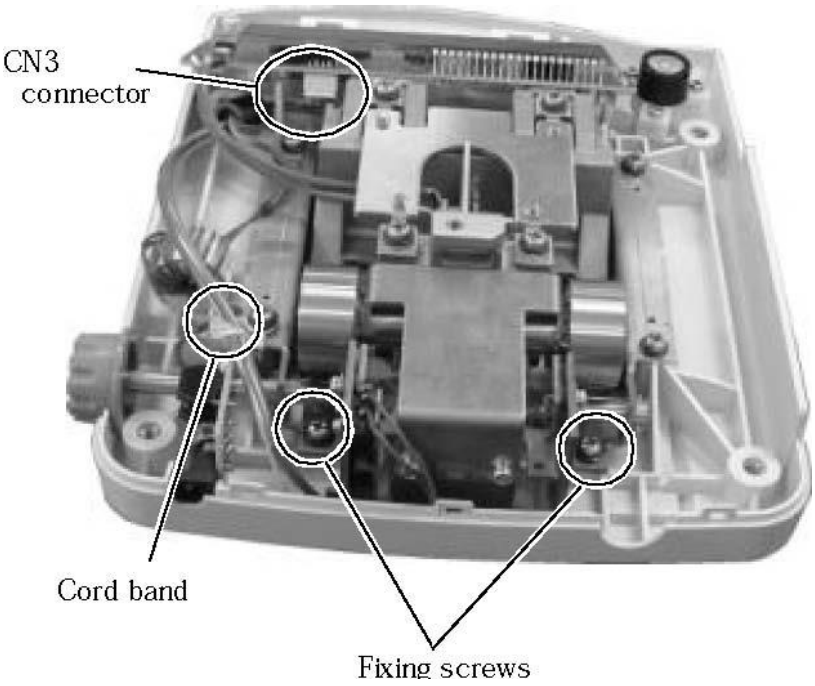
(1) Solder wires of the Tuning-fork sensor to the new AJDP board
(2) Plug connectors.
CN1 : AJLF cord
CN3 : Calibration cord
CN4 : AJIF cord
CN5 : Battery cord
(3) Place the AJDP board on the chassis. Fix it with a fixing screw.
(4) Cover the scale referring to 5-2.



5.7 How To Remove Calibration Weight Unit

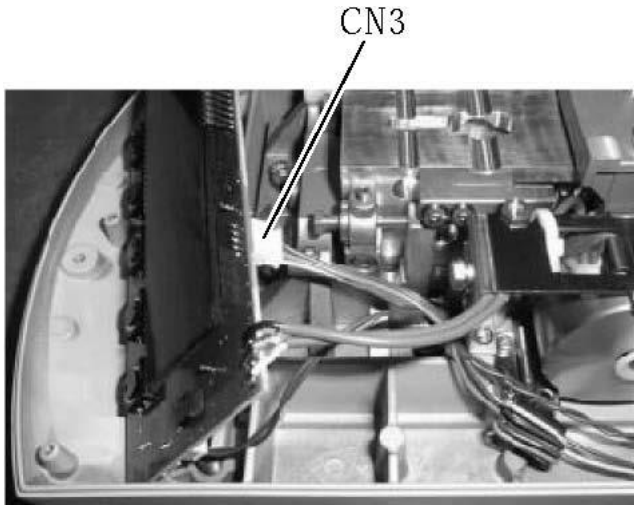
5.7.1 EG 220-620

1. Remove the CN3 connector. (Removing AJDP P.C.B. in advance makes it easy to do it.)
2. Remove (cut) the cord band.
3. Unscrew at two points.

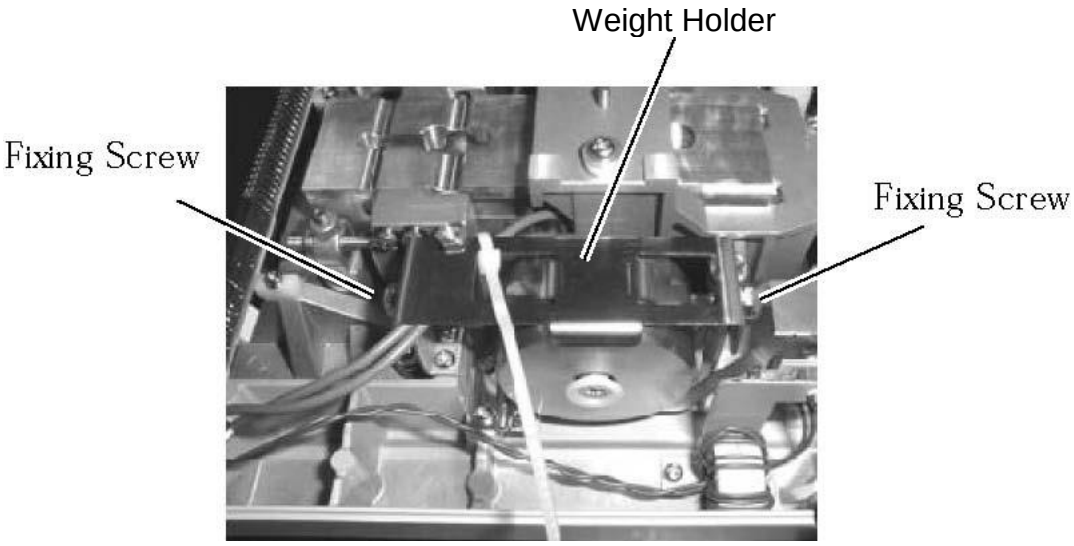


5.7.2 EG 2200-4200

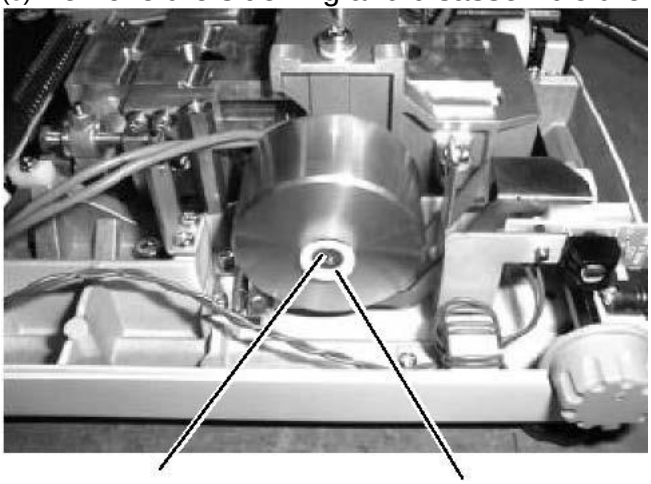
(1) Remove SW cord assy from AJDP circuit board



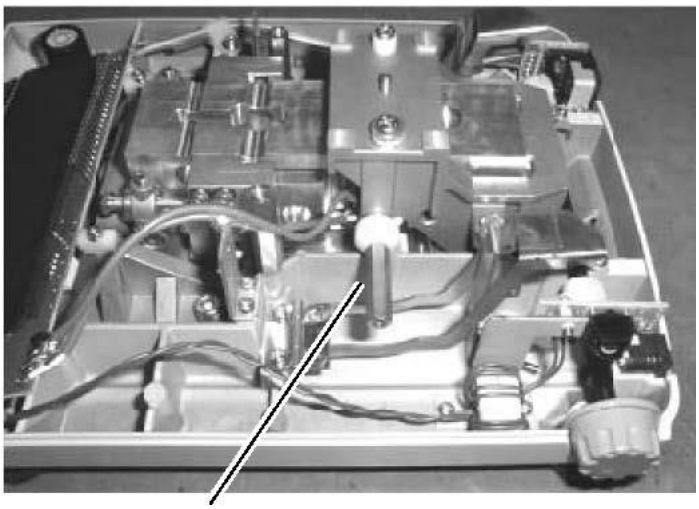
(2) Remove the weight holder



(3) Remove the side ring and disassemble the weight



(4) Remove the weight shaft from the mechanical main unit



5.8 How To Install Calibration Weight Unit

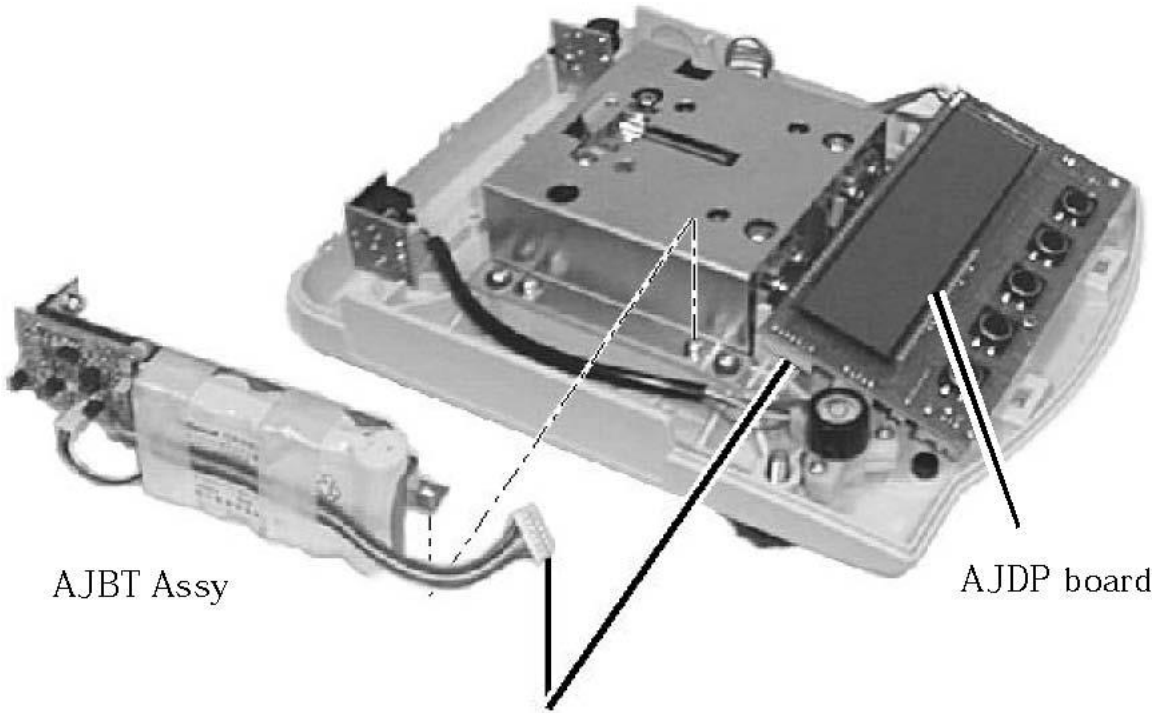
Follow the instruction in 5-7 by the opposite order.
Refer to the position for the installation below.

6 Installation Options

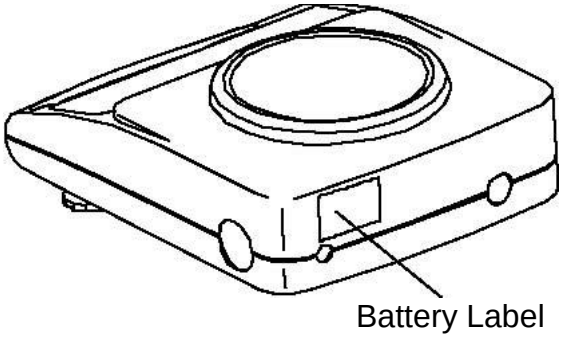
6.1 Installation Of Battery Option

6.1.1 EW 120-1200 and EW-C

(1) Remove the case referring to 5-1.
(2) Plug AJ battery cord to CN5 on AJDP board.
(3) Install AJ battery holder assy.

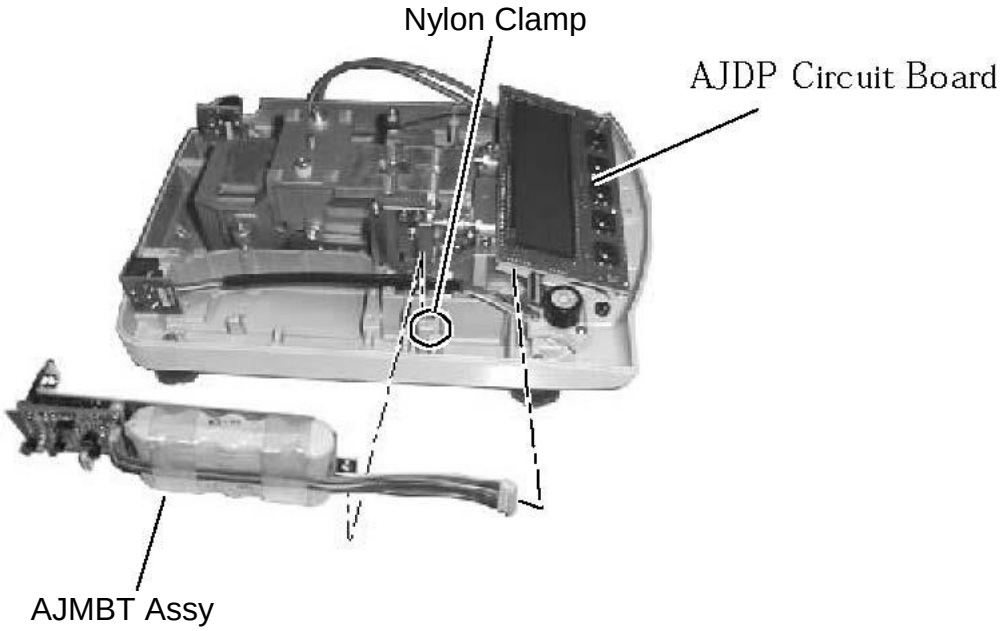


(4) Cover the scale and stick battery label above power jack on the rear panel.

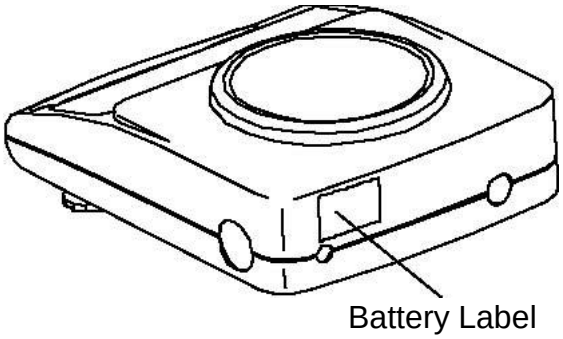


6.1.2 EW 2200-12K

(1) Remove the case referring to 5-1.
(2) Plug AJ battery cord to CN5 on AJDP board.
(3) Fasten the AJM battery held together into the nylon-clamp which has holed the cord of the AJMIF circuit board assy.

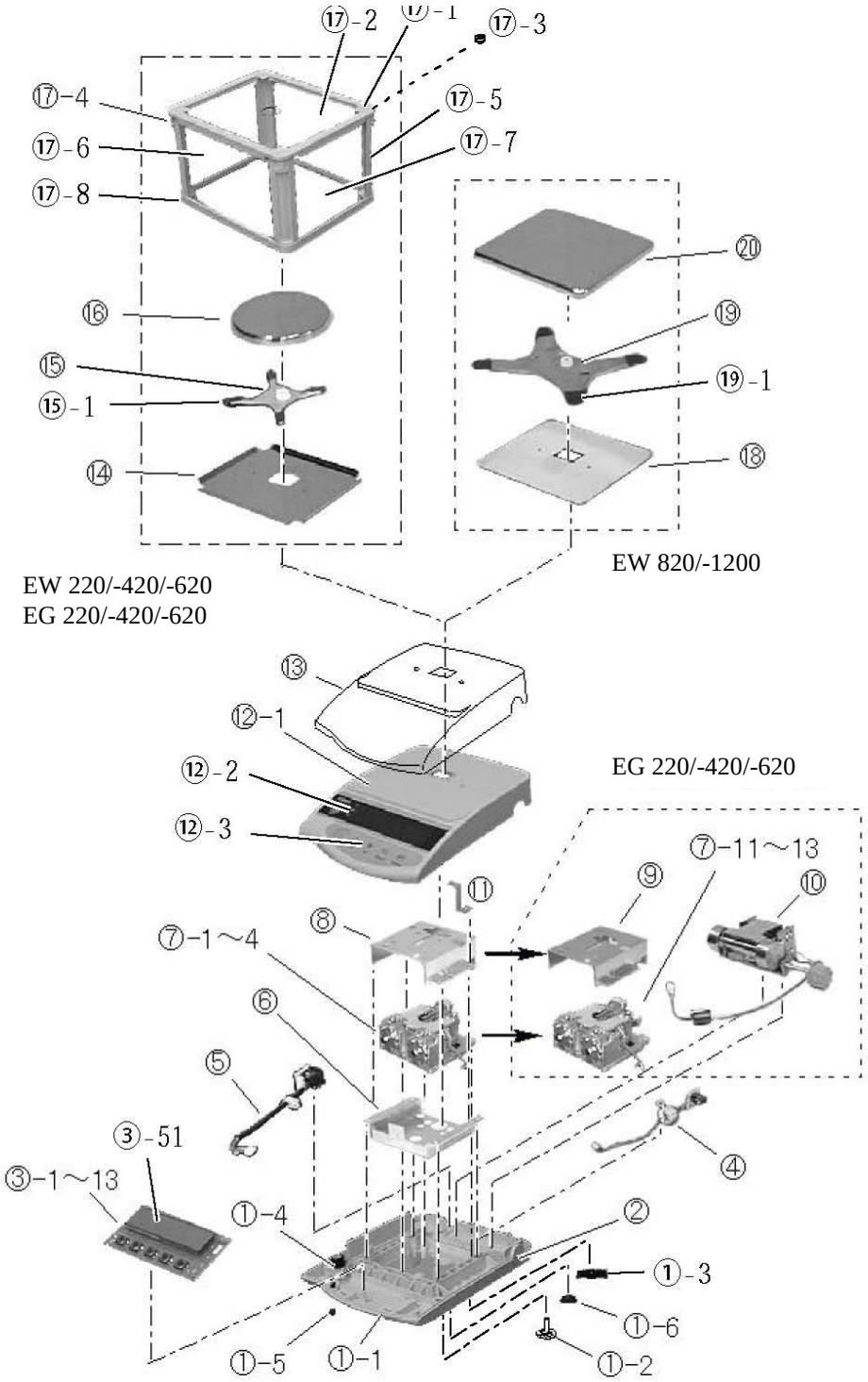


(4) Cover the scale and stick the battery label above power jack on the rear panel.

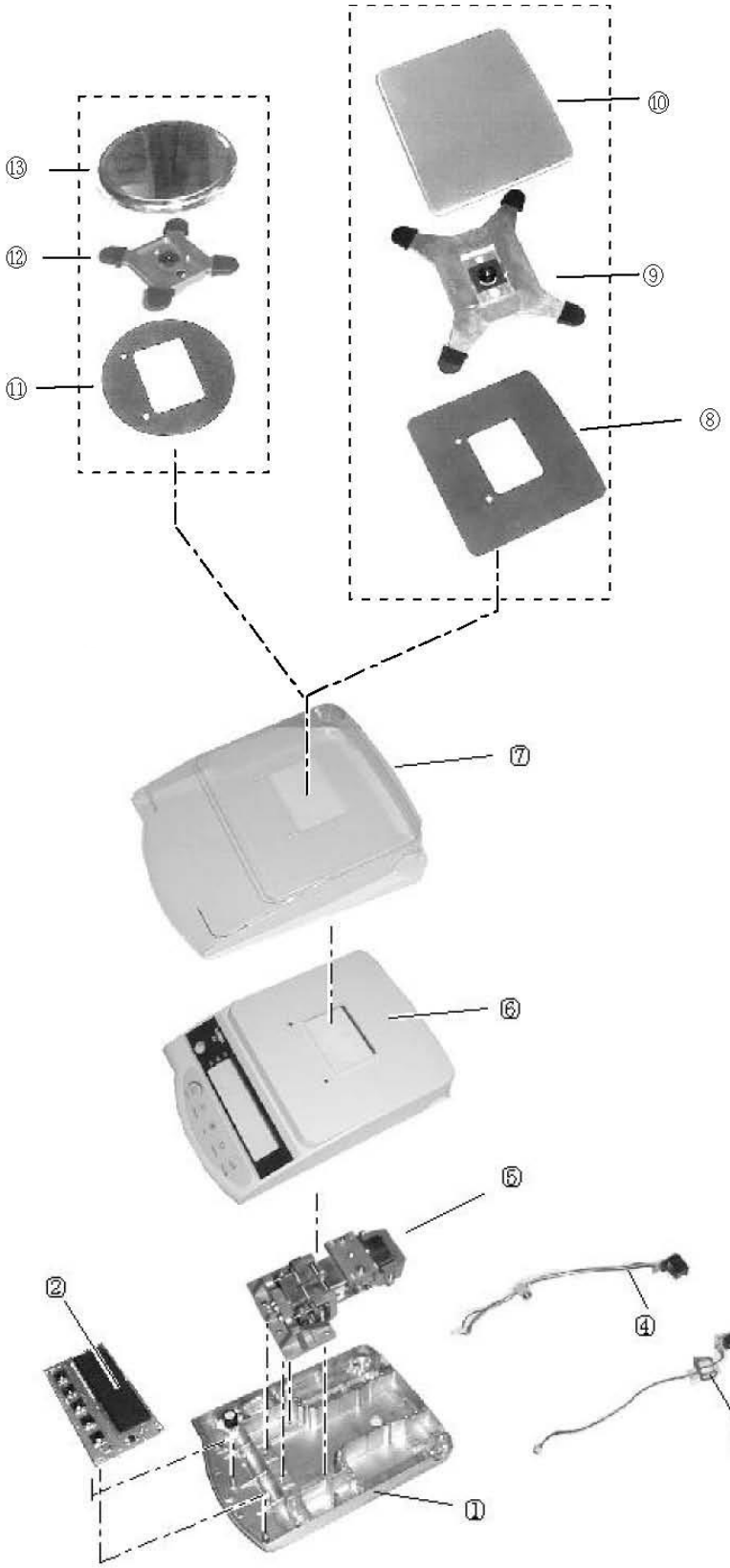


7 Parts List

7.1 EW 220-1200



7.2 EW 2200-12K



7.3 EW-C / EW 120-4 NM