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Service manual
Analytical balance

KERN ABP
Type TABPA
Version 1.2
2021-01
GB



TABPA-SH-e-2112

GB

KERN TABPA

Version 1.2 2021-01

Service manual

Analytical balance

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1 Basic information

The device must be repaired only by trained specialist staff or personnel with professional formation (such as a repair-specialist accredited by law concerning verification). The service manual is obligatory for repair work. After repair, original conditions of the device have to be restored. Only original spare parts should be used.

Instructions about conformity-evaluated scales:

Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval! After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field. The operation and configuration of each scale is described in the accompanying manual of the scale. Any safety information in respect for verification are also described in the accompanying manual.

2 Introdution

This service manual covers the ABP series and is edited for the authorized servicing personnel.

Note all rights are reserved. Copying any part of this manual is prohibited without our permission.

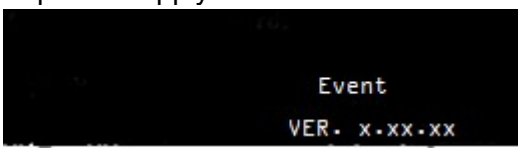
3 Entering the service menu

For general operating instructions, refer to the ABP Series Instruction Manual.

3.1 Entering the Maintenance Mode

Use the following procedure to switch from the usermode to the maintenance mode.

Switch off the scale and disconnect the power supply. Wait for at least 5 sec.
Plug in the power supply and wait until



Press the adjustment button (see Manual CAPXXX) until



1) With either the mass or error messages displayed in the user mode, hold down the [POWER] and [MENU] keys for at least three seconds. Beep sound for confirmation
2) Release the two keys.
3) Hold down the [1d/10d] and [O/T]keys for at least three seconds. Beep sound for confirmation

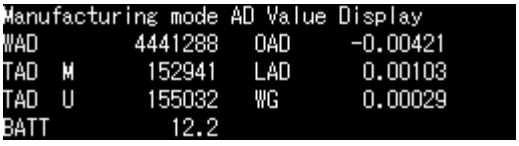
4) The password input/display screen is displayed.



5) Use the arrow keys to input numbers.
Enter "00321" as the password and then press [OK].

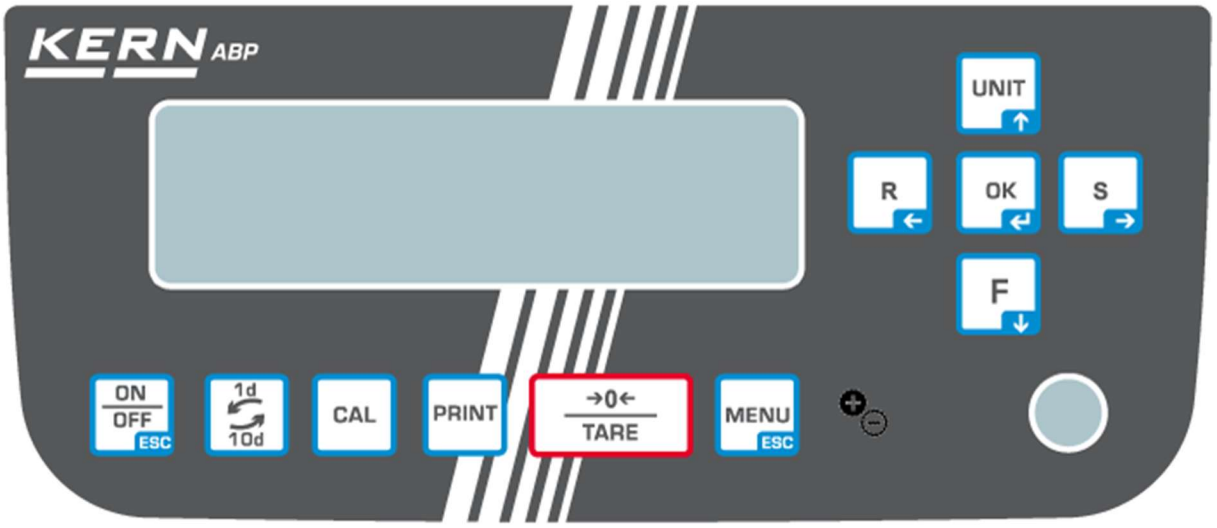


6) When the password is approved, the maintenance mode opens.



Alternately, it is also possible to switch from the user mode to the maintenance mode by entering the command "@SVC=321"from the computer.

3.2 Keyboard



Button	Description	Function		
		Short key pressing	Long key pressing	In menu
ON OFF ESC	**[ON/OFF]**	Switching between operating and standby mode	-	Return to weighing mode
1d 10d	**[1d/10d]**	Readability change		
CAL	**[CAL]**	Start adjustment	Call setup menu "Adjustment"	-
PRINT	**[PRINT]**	Data output to external device (weighing mode)	Call setup menu "Print"	
→0← TARE	**[TARE]**	Taring Zeroing	Call setup "Zero Setting / Taring"	
MENU ESC	**[MENU]**	• Call up menu • Call application specific settings • Call Statistics		
⊕⊖	**[Ionizer]**	Ionizer on/off (Factory option)	Call Setup Menu Ionizer (Factory option)	
OK	**[OK]**	-	-	Confirm input

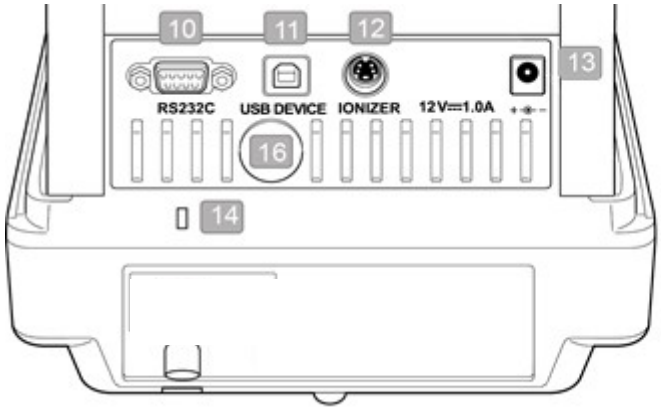
	**[R]** Navigation button ←	Change reaction setting for display		Select menu item.
	**[UNIT]** Navigation button ↑	Weighing mode: Switch-over weighing unit. Counting mode: Display single weight Calculate percentage: Display reference weight	Call setup menu "Units"	Scroll forward in menu
	**[F]** Navigation button ↓	Switch over weighing mode / application mode		Scroll backwards in menu
	**[S]** Navigation button →	Change stability setting of display		Select menu item.

4 Numeric key

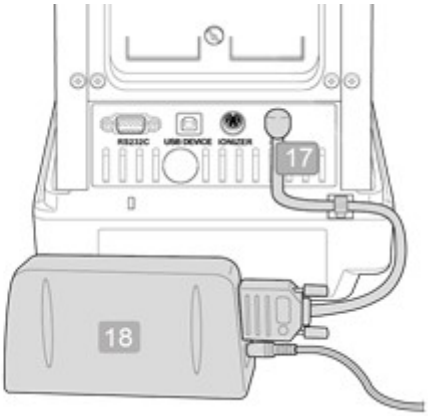
Button	Description	Function
	Navigation button ↑	Flashing digit (0 – 9) or increase character (, [blank], -, A – Z)
	Navigation button ↓	Flashing digit (0 – 9) or reduce character (, [blank], -, A – Z)
	Navigation button →	Digit selection to the right
	Navigation button ←	Digit selection to the left
	Navigation button ↵	Confirm entry
	ESC	Cancel input

Rear view:

Models d = 0.0001 g



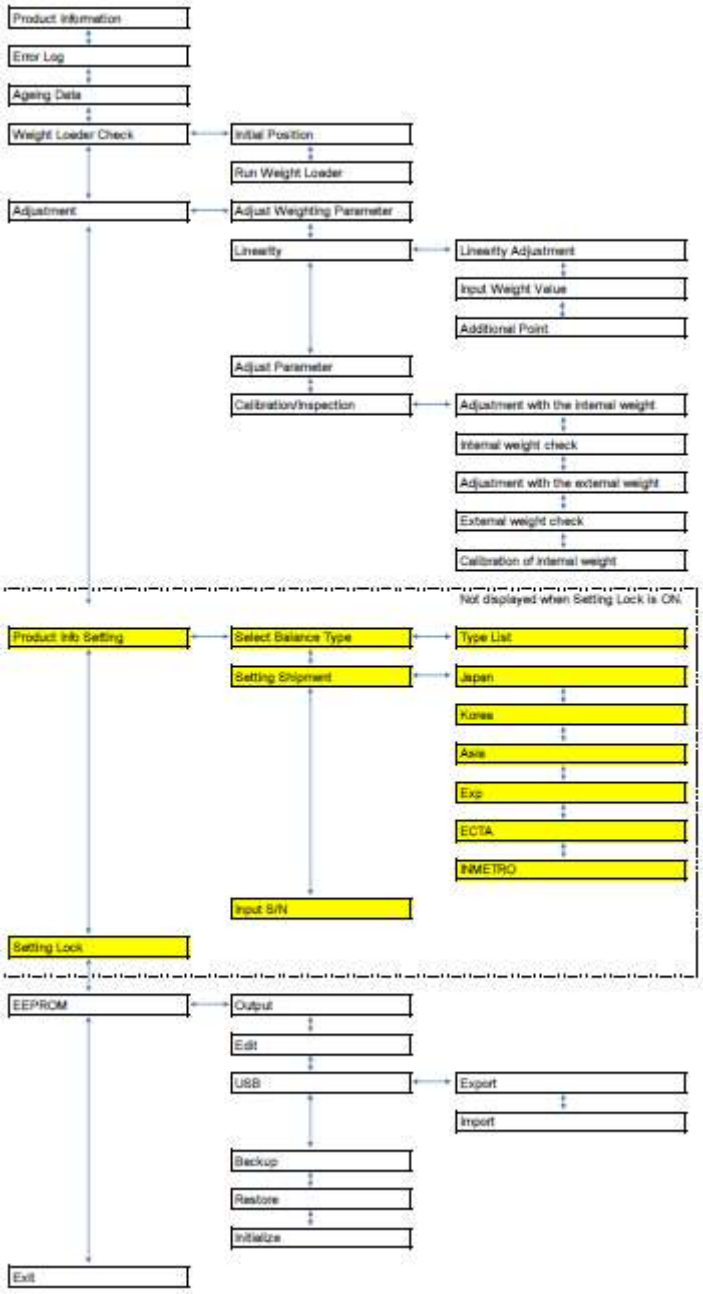
Models d = 0.00001 g/0.0001 g



Pos.	Description
10	Serial interface (RS232)
11	USB device
12	Port for ionizer
13	Connector for AC adapter
14	Fastening point for anti-theft device
16	Adjustment button
17	Port for power pack
18	External electronics box

4.1 Maintenance Mode Menus

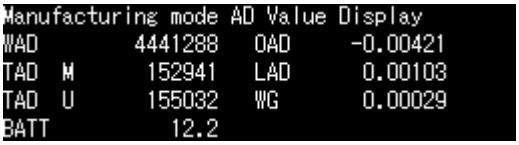
The maintenance mode menu is configured as shown below.



The menu items within the area indicated by a dashed line are not displayed when Setting Lock is ON.

4.2 Maintenance Mode Functions

The following shows an overview of functionality available in the maintenance mode.



Function		Overview
A/D value Display	Mass data display (WAD)	Displays the feedback value output to the coil. (Agentler smoothing function is applied than for displayed weight values.)
	Magnet area temperature display (TADM)	Displays a digital value of the temperature near the magnet.
	Uni Bloc area temperature (TADU)	Displays a digital value of the temperature near the Uni Bloc. (only on 0.01 mg models)
	Temperature - corrected mass data display (OAD)	Displays WAD mass data subjected to temperature correction (averaged data).
	Linearity – corrected mass data display (LAD)	Displays OAD mass data subjected to linearity correction.
	Absolute load data display (WG)	Displays mass values with all correction processes applied, displayed in gram units. Displays mass values not subjected to zero setting or tare weight subtraction.
	Power supply voltage data display (BATT)	Displays the input voltage supplied to the balance (AC adapter output value of about 12V).
Product Information		Displays the model name, software version, serial number, delivery site, type approval models adjustment log counter, and check sum information.
Error log		Displays the type and date/time of the five most recent errors displayed in the user mode.
Ageing data	SPAN	Displays the span temperature coefficient before and after aging.
	Zero	Displays the amount of zero temperature drift before and after aging.
Weight Loader Check	Initial Position	Returns the internal weight loader system to initial position.
	Run Weight Loader	Moves the weight loader arm position one step.

Adjustment	Adjust Weighting parameter		This adjusts the PWM voltage value output base on the weighting parameter resistance.
	Linearity	Linearity Adjustment	Makes adjustments for calculating fifth-order linearity correction coefficient.
		Input weight value	Enters reference weight values used for fifth-order linearity adjustment.
		Additional point	Uses a line are quation to correct any error remaining after fifth-order correction.
	Adjust parameter		Displays coefficients for correcting temperature, linearity, and sensitivity.
	Calibration/Inspection		Sets the type of sensitivity calibration assigned to the [CAL] key in the maintenance mode.
Product Info Setting	Select Balance Type		Selecting the model name automatically sets the basic information for weighing capacity, minimum display, and reference mass for adjustment.
	Setting shipment	Korea	Sets the units users can use, depending on shipping destination. Initial setting = Unit for Japan
		Exp	
		Asia	
		ECTA	
		INMETRO	
	Input S/N		Ten alphanumeric characters can be entered (max.12 characters).
Setting lock			Disables changing product information, including model, OEM, shipment, and serial number settings.When locked, all error checks and the type approval models seal are enabled.
EEPROM	Output		Outputs data saved in NVRAM to an external printer.
	Edit		Edits data saved in NVRAM on balance display unit.
	USB		Exports/imports to/from a USB flash drive (only on APW models with a USB host connector).
	Backup		Of the data saved in NVRAM, backs up temperature correction coefficient, linearity correction coefficient, and model setting status data (EEPROM DATA) to flash memory.
	Restore		Writes to NVRAM the above data (EEPROM DATA) backed up in flash memory.
	Initialize		Initializes all data saved in NVRAM.
Exit			Exits the maintenance mode.

Use the arrow keys to move between items.

Key	Description
[→]	Moves the subordinate menu
[←]	Returns to a superordinate menu.
[↓]	Moves to items in order.
[↑]	Moves to items in reverse order.
[OK]	Applies the setting changes. Moves to the subordinate menu, if any.
[MENU]	Closes the menu.

- For instructions on releasing Setting Lock, see 6.1 Releasing Setting Lock.

Normal setting ranges (guidelines) are indicated below.

Span temperature coefficient before aging (ppm/°C)	± 20 (10~30°C)
Span temperature coefficient after aging (ppm/°C)	± 2 (10~30°C)
Zero temperature drift before aging (mg/°C)	± 10 (10~30°C)
Zero temperature drift after aging (mg/°C)	± 5 (10~30°C)

		Zero	Span
WAD	AP225WD	3,200,000 to 4,800,000	200 g: 22,000,000 to 30,000,000
	AP135W and AP125WD	3,200,000 to 4,800,000	100 g: 11,000,000 to 15,000,000
	0.1 mg model	3,000,000 to 4,100,000	100 g: 8,500,000 to 11,500,000 200 g: 17,000,000 to 23,000,000 300 g: 25,500,000 to 34,500,000
TAD	TAD M TAD U	50,000 to 400,000	
OAD		0 ± 10 (g)	Span ± 30 (g)
LAD			
WG			
BATT		12 ± 0.9 (V)	

5 Basic Balance Disassembly/Assembly Procedures

5.1 Precautions for Disassembling or Reassembling the Balance

1) Disconnect connectors by pulling them straight out. Never pull it out at an angle.
   - **Pulling out at a bent angle could bend the terminal pins, making it difficult to reinsert the connector**

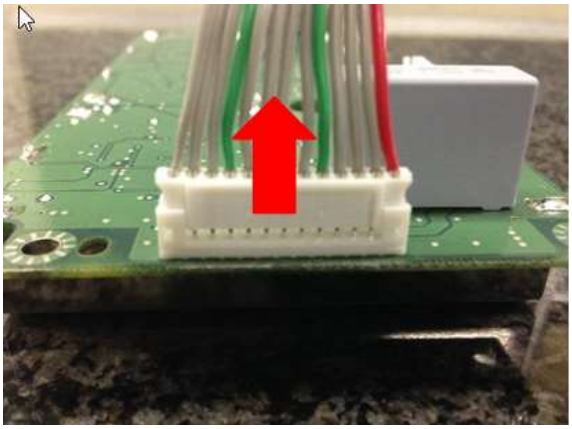


Fig. 5-1

2. Be sure to insert the OPF positioning pin jig (J1)(L=50) into the lever positioning hole on top of the OPF before disassembling or assembling the unit assembly (1).

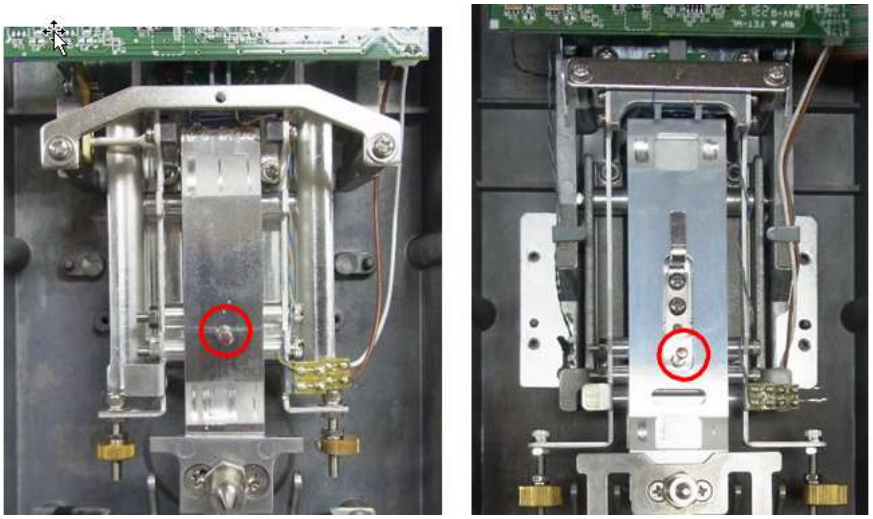


Fig. 5-2

- **Slightly lift up on the <u>lever assembly to insert the pin. Be careful not to scratch the elastic support</u> .**

3. Use a controlled torque driver to tighten the screws to the torque values specified in the table below. (Ref. 10×[kgf•cm] ≒ 1×[cN•m])

Screw	Tightening Torque (kgf·cm)
M2	1
M2.5	2.5
M3 pan head	9
M3 hexagon socket head bolt	15
M4 pan head	18
M4 hexagon socket head bolt	30
M5 hexagon socket head bolt	0.1mg model: 35 0.01mg model: 40
Pan supporter shaft (using J10)	8
Lower pan hook	12

4. Disconnect the bumper (200) from the back of the unit before replacing the main board assembly (40) or interface board assembly (39).

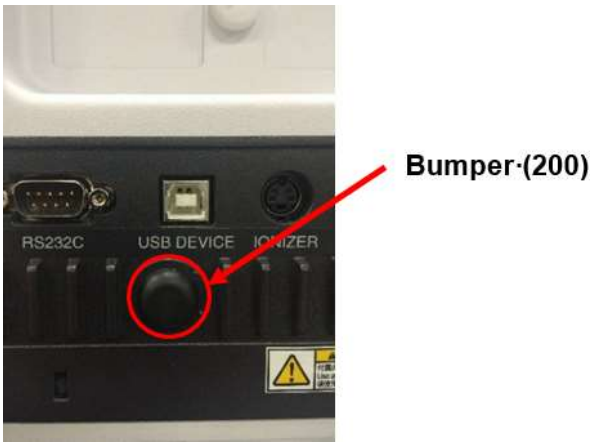


Fig. 5-3

5.2 Inspecting the Balance Interior

Disassembling the Case

1) Disconnect the AC adapter and remove the pan (6), pan supporter assembly (3), and so on.
   On APW models, also remove the cap from the USB host connector (located on the left side of the display unit on the main unit).
2) Remove the four P3 M4 × 16 screws from the bottom of the balance, located toward the front and back



Fig. 5-4

3) Lift up the case assembly (2) and disconnect the connector (13P) from the main board assembly (40) and the two connectors (2P and 3P, but not on the APY model) from the display board assembly (41).

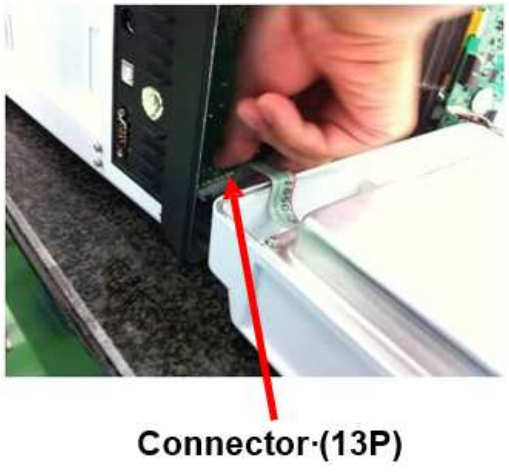


Fig. 5-5

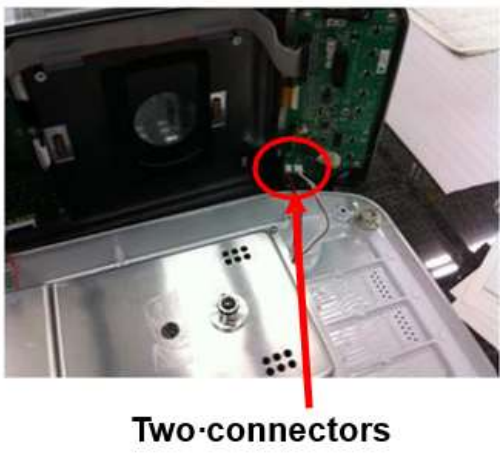


Fig. 5-6

- **To temporarily set the case assembly (2) down, place it upside down, with the top surface facing down.**
  To protect the glass, use bubble wrap or other material to prevent the handle from contacting the table top.
- **Circuit board assemblies, such as the display board assembly (41) and main board assembly (40) can be replaced in the position shown in Fig. 2-7.**



Fig. 5-7

4) Remove the unit cover by removing the seven P4 M3 x 6 screws.
   - **The unit assembly (1), weight loader assembly (16), and other functionality can be inspected in the position shown in Fig. 2-9 and 2-10.**

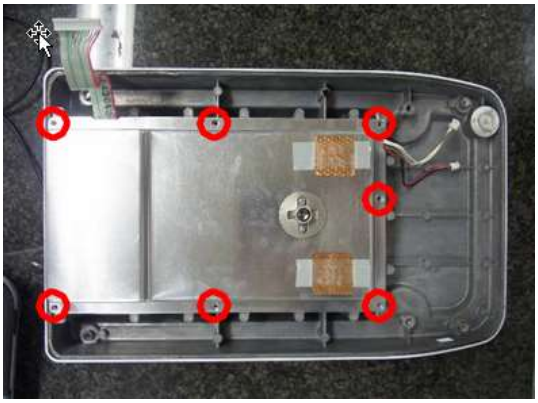


Fig. 5-8

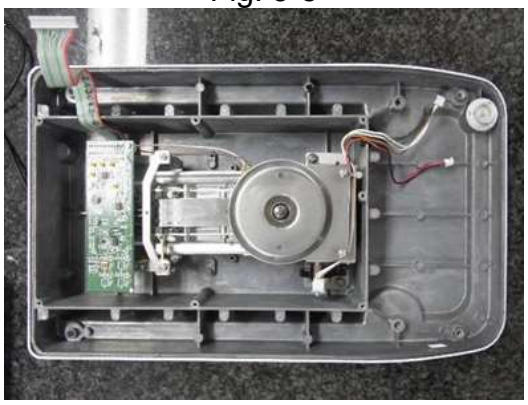


Fig. 5-9

APB
0.1 mg models



0.01 mg model

Fig. 5-10

Assembling the Case

1) Fasten the unit cover to the base with seven P4 M3 x 6 screws.
   When fasten the unit cover, adjust the gap between choke sleeve and shaft with sleeve positioning jig (J9) (two types).
   - **Mount the unit cover so that the cable lays flat.**
   - **Be careful not to pinch any of the cables.**
   - **Make sure the OPF positioning pin jig (J1) is pulled out of the positioning hole.**
   - **Confirm that the unit is assembled without any gap between the unit cover and base assembly.**

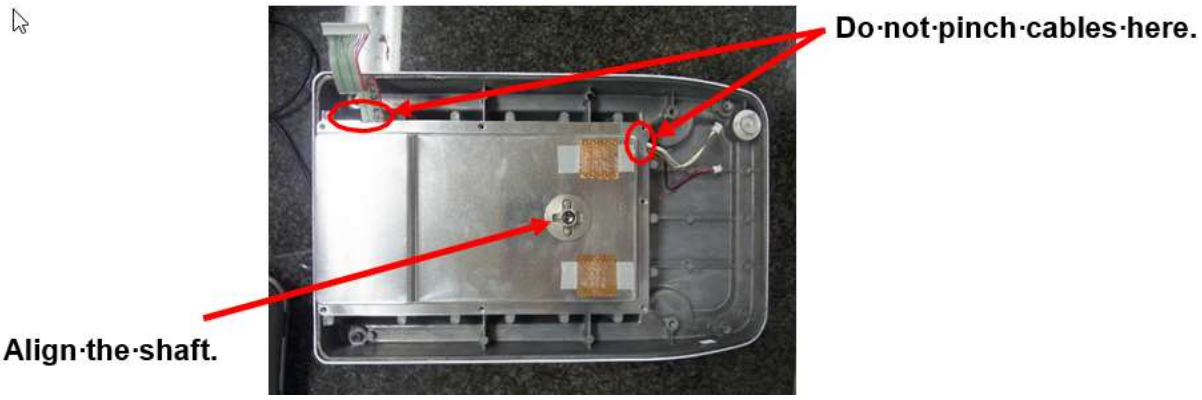


Fig. 5-11

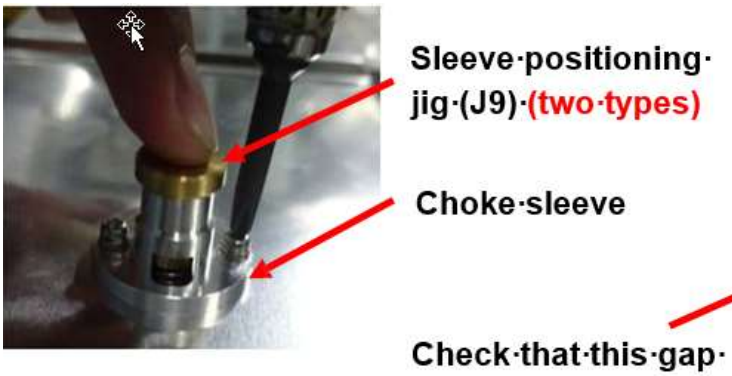


Fig.·2-12



Fig.·2-13

If necessary, reposition the unit cover choke sleeve using a sleeve positioning jig (J9) (two types) and then retighten the choke sleeve.
(Screws used: Two P4 M2.5 x 6 screws).

2) With the case assembly (2) lifted up, connect respective connectors to the main board assembly (40) and display board assembly (41). Then place the case assembly (2) onto the base unit assembly.
   - **Be careful not to damage the cable when placing the case assembly (2) onto the base unit assembly.**
   - **Ensure that the case assembly (2) does not contact the pan supporter shaft when placing the case assembly (2) onto the base unit assembly.**
   - **Especially check the connector connections on the main board assembly (40).**

3) Tighten the four P3 M4 x 16 screws on the bottom of the balance, toward the front and back.
4) Place the pan (6), pan supporter assembly (3), and so on, in position.
5) Level the balance and connect the AC adapter.

5.3 Replacing Parts

5.3.1 Replacing the Front Glass Assembly (24)

1) Disconnect the AC adapter and remove the pan (6), pan supporter assembly (3), and so on.
2) Remove the inside knob (33) and then remove the roof glass assembly (27) and side glass assemblies (25 and 26).
3) Remove the rear plate (12) from the back of the balance.
4) Remove the case roof by loosening and removing the four P3 M4 x 8 bolts from the upper interior side of the rear panel.

   - **<u>After removing the case roof, be careful to prevent the front glass assembly (24) from falling:</u>**

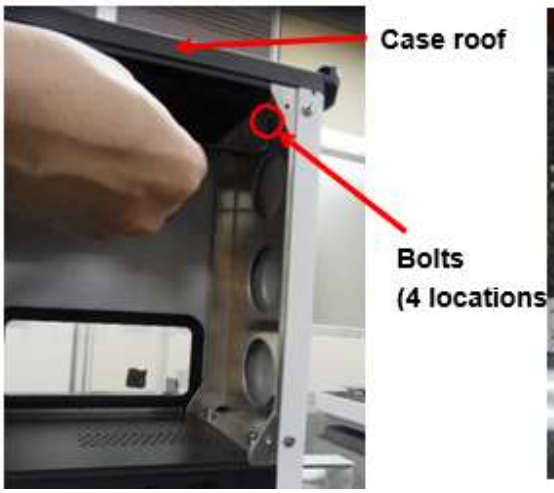
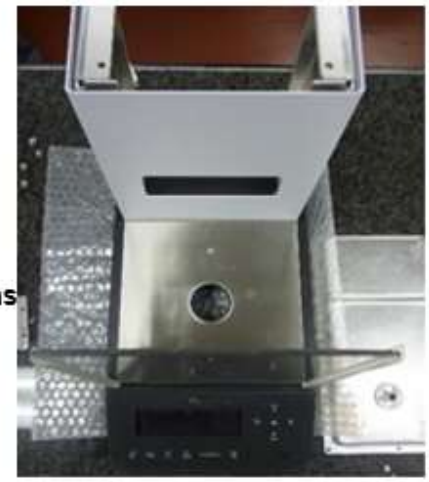


Fig. 5-14


Fig. 5-15

5) Remove the front glass assembly (24) and two front pillars (37).
6) Remove the affixed front glass tape (72) from the groove bottom in the front of the case.

7) Clean out the groove on the front of the case, and apply new front glass tape (72) to the bottom of the groove.
Peel off the backing paper from the upper side of the front glass tape (72).



Fig. 5-16

8) Using the two front pillars (37) as a guide, install the new front glass assembly (24).
   - **Insert the front glass assembly (24) into the case roof groove, so that the cushion faces toward the back.**



Fig. 2-17

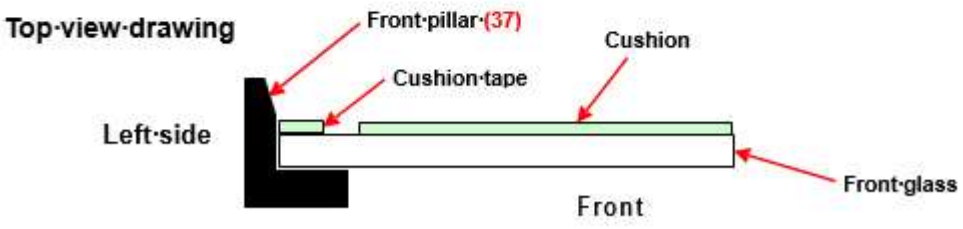


Fig. 2-18

   - **Be careful to confirm the direction of front pillar (37).**

5.3.2 Replacing the Side Glass Assemblies (25 and 26)

1) Remove the inside knob (33).
2) Remove the side glass assemblies (25 and 26).
3) Insert the new side glass assemblies (25 and 26) and install the knob (33).
4) If necessary, open the side glass assemblies (25 and 26) and apply the lubricant (85) on the lower glass edges (up to about 5 cm from the edge).

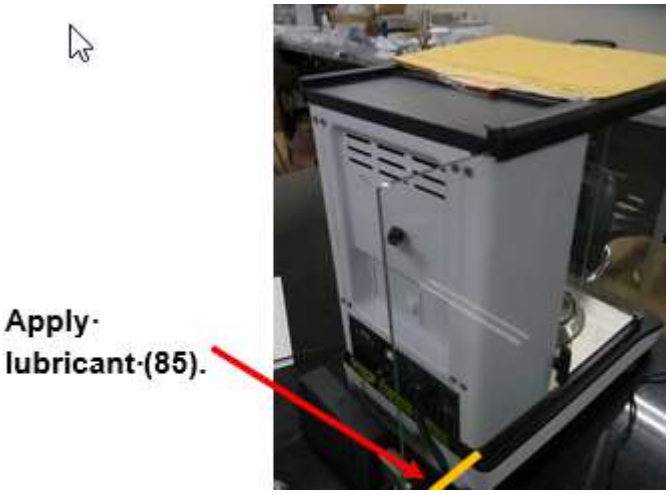


Fig. 5-19

5.3.3 Remove the inside knob (33)

1) Remove the inside knob (33).
2) Remove the roof glass assembly (27).
3) Insert the new roof glass assembly (27) and install the knob (33).

5.3.4 Replacing the Display Board Assembly (41)

1) Remove the case assembly (2) according to the procedure in 2.2 inspecting the Balance Interior.
2) Disconnect the connector from the display board assembly (41).

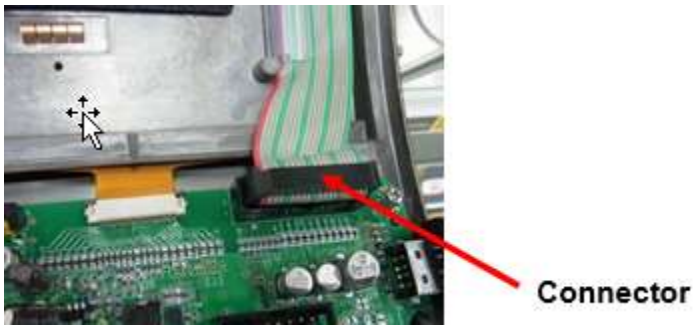


Fig. 5-20

3) Carefully disconnect the OLED assembly (71) connector from the display board assembly (41).
    - **Be sure both connector locks are completely unlocked before carefully disconnecting the connector for the OLED assembly (71).**

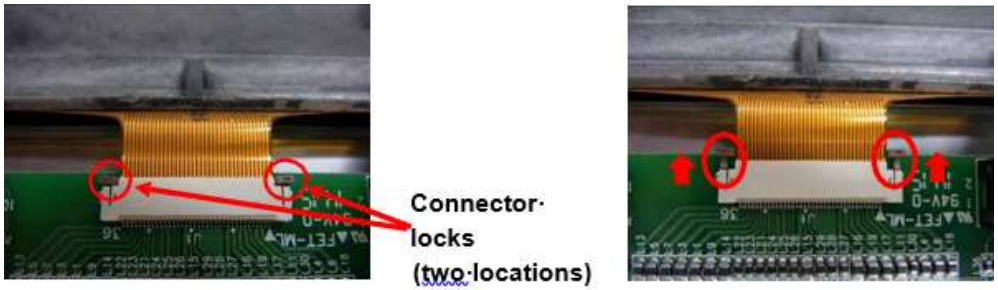


Fig. 5-21

    - **Be careful not to touch the copper foil contacts after disconnecting the OLED assembly (71) connector.**

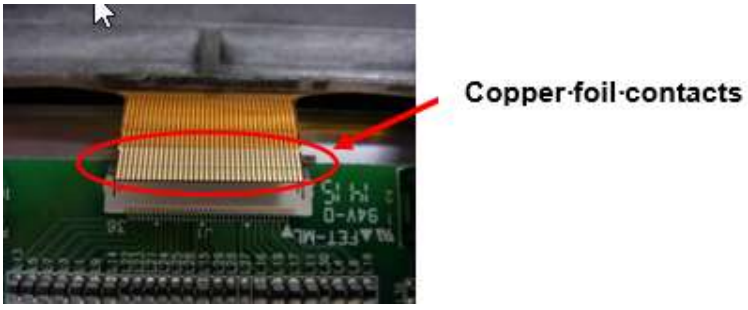


Fig. 5-22

4) Remove the display board assembly (41) by loosening the five P4 M3 x 6 screws that fasten the display board assembly (41).

5) Remove the T8 foam shading (75) from the old display board assembly and attach it to the new display board assembly (41).

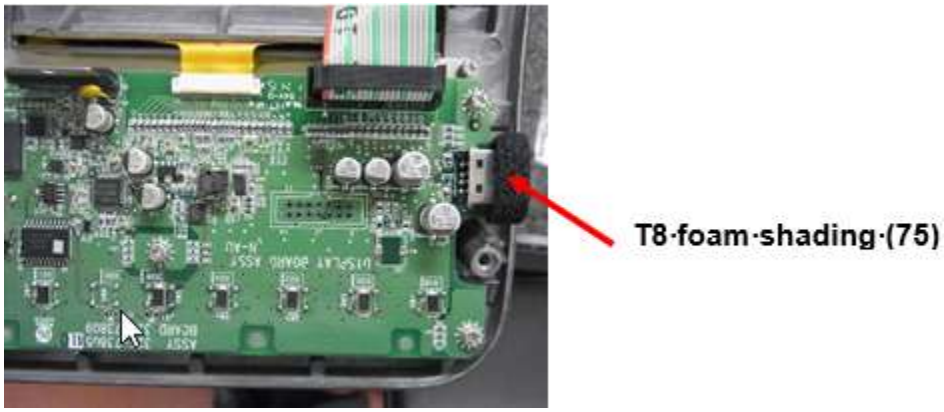


Fig. 5-23

6) Place the new display board assembly (41) in position and fasten it with the five P4 M3 x 6 screws, tightening them in the specified sequence.
   - **The position of the display board assembly (41) is determined by the positioning bosses on the case assembly (2) and the two corresponding positioning holes on the display board assembly (41). Make sure the boss fits properly into the hole.**
   - **Be sure to tighten screws in the order indicted in Fig. 2-26.**

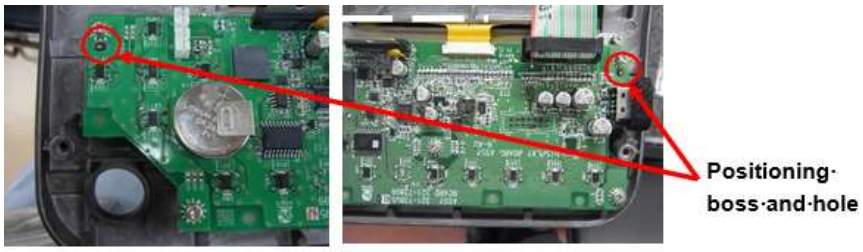


Fig. 2-24 Fig. 2-25

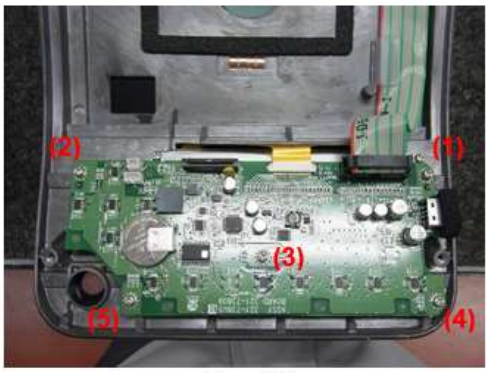


Fig. 2-26

7) Reassemble the balance by reversing the steps above.
   - **After inserting the OLED assembly (71) connector, be sure to carefully and properly lock both connector locks**

5.3.5 Replacing the OLED Assembly (71)

1) Remove the display board assembly (41) according to the procedure in 5.3.4 Replacing the Display Board Assembly (41).
2) Remove the OLED assembly (71) by loosening the three P4 M3 x 6 screws that fasten the OLED holder.

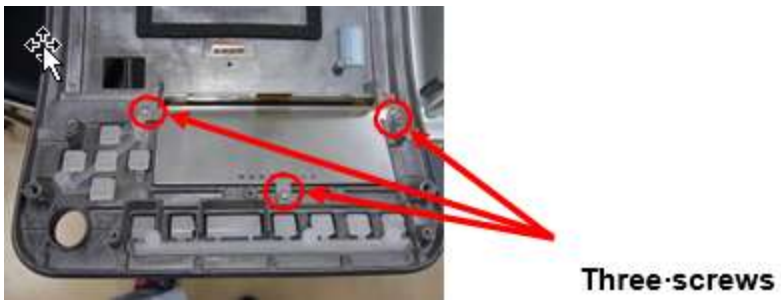


Fig. 5-27

3) Fasten the new OLED assembly (71) using the three P4 M3 x 6 screws.



Fig. 5-28

4) Reassemble the balance by reversing the steps above.
   - **After inserting the OLED assembly (71) connector, be sure to carefully and properly lock both connector locks**

5.3.6 Replacing the Main Board Assembly (40)

1) Remove the case assembly (2) according to the procedure in 5.2 Inspecting the Balance Interior.
2) Loosen the five P4 M3 x 6 screws that fasten the main board assembly (40).
3) Once remove the main board assembly (40) by lifting it up and disconnecting three connectors.

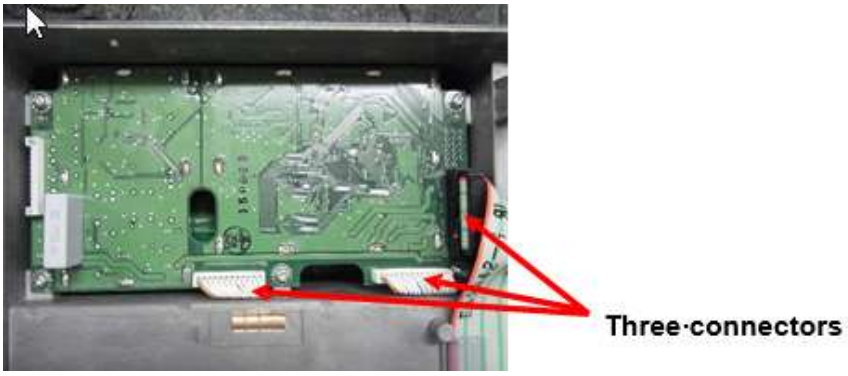


Fig. 5-29

4) Connect the disconnected cables to the new main board assembly (40) and fasten the board using the five P4 M3 x 6 screws.
5) Reassemble the balance by reversing the steps above.
6) Make sure to adjust according to the procedure in 5.5.1 Adjust Weighting Parameter.

5.3.7 Replacing the Interface Board Assembly (39) (on 0.1 mg models)

1) Remove the main board assembly (40) according to the procedure in 5.3.6 Replacing the Main Board Assembly (40).
2) Remove the two P4 M3 x 6 screws that fasten the heat transfer plate and PCB-IF gel pad (76).
3) Remove the P4 M2.5 x 6 screw that fastens the IC element (regulator) on the interface board assembly (39). (There are two IC elements (regulators), but only the left one is fastened.)

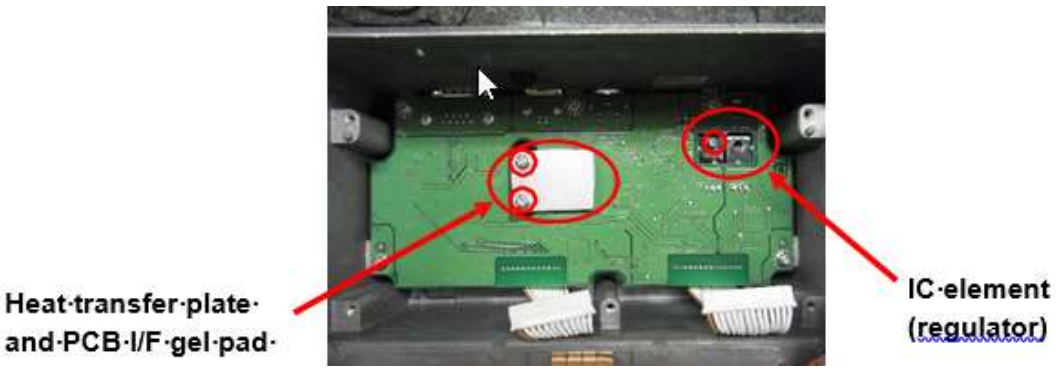


Fig. 5-23

4) Remove the interface board assembly (39) by loosening the five P4 M3 x 6 screws that fasten the interface board assembly (39).
5) Disconnect the 12-067 PH2 (45) and 14-067 PH2 (46) cable assemblies from the old interface board assembly and connect them to the connectors on the new interface board assembly (39).
6) Fasten the new interface board assembly (39) using the five P4 M3 x 6 screws.
7) Fasten the heat transfer plate and PCB I/F gel pad (76) using the two P4 M3 x 6 screws.
   However, also replace the PCB interface gel pad (76) if damaged.
8) Fasten the IC element (regulator) to the interface board assembly (39) using the P4 M2.5 x 6 screw.
9) Reassemble the balance by reversing the steps above.

5.3.8 Replacing the Interface Board Assembly (39) (on 0.01 mg models)

1) Remove the main board assembly (40) according to the procedure in 2.3.6 Replacing the Main Board Assembly (40).
2) Loosen and remove the four P4 M3 x 6 screws that fasten the interface board assembly (39).

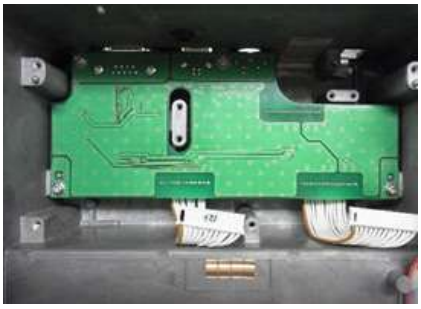


Fig. 5-31

3) Disconnect the power box cable assembly (106) from the old interface board assembly (39).

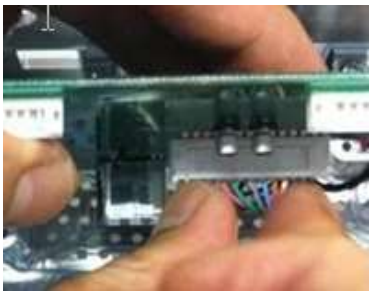


Fig. 5-32

4) Disconnect the 12-067 PH2 (45) and 14-067 PH2 (46) cable assemblies from the old interface board assembly and connect them to the new interface board assembly (39).
5) Connect the power box cable assembly (106) to the new interface board assembly (39).
6) Fasten the new interface board assembly (39) using the four P4 M3 x 6 screws.
7) Reassemble the balance by reversing the steps above.

5.3.9 Replacing the Weight Loader Assembly (16)

1) Remove the unit cover according to the procedure in 5.2 Inspecting the Balance Interior.
2) Remove the weight stopper and weights (59 to 63) by loosening the two P4 M3 x 6 screws.
   - **Be careful not to scratch the removing weights (59 to 63).**
   - **Be careful not to damage the unit assembly (1) when removing the weights (59 to 63)**
     Be careful not to let the weight stopper contact the pan supporter shaft when it rotates together with the screw or during removal
   - **When reassembling, be careful not to let dust settle on the weights (59 to 63).**

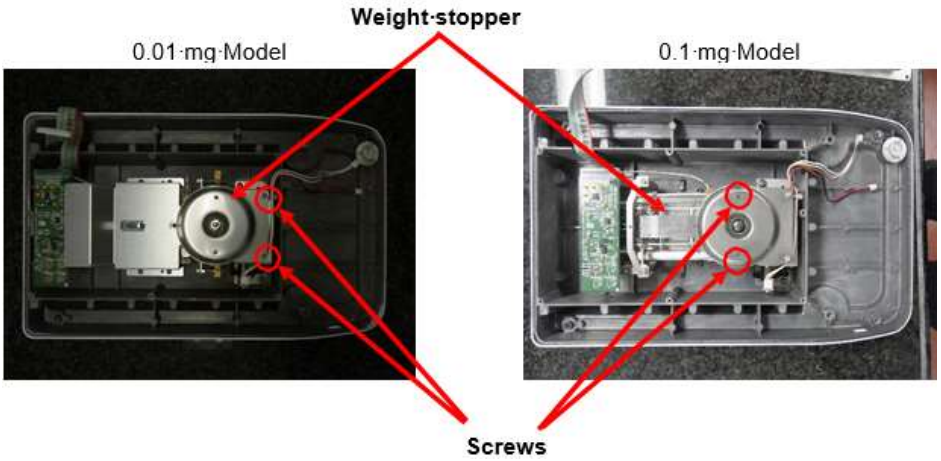


Fig. 5-33

3) Insert the OPF positioning pin (J1) into the lever positioning hole on the top of the OPF.
   - **Slightly lift up on the lever assembly to in sert the pin**
     Be careful not to scratch the elastic support .

4. Remove the weight loader assembly (16) by loosening the two P3 M4x8 screws.
5. Reverse the steps above to install the new weight loader assembly (16) using the weight loader assembly positioning jig (J6).
   - **Be careful not to let the weight loader system come into contact with the lever.**



Fig. 5-34

6. Reassemble the balance by reversing the steps above.

5.3.10 Replacing the Unit Assembly(1)

1. Remove the weight stopper and weights (59 to 63) according to the procedure in 5.3.9 Replacing the Weight Loader Assembly(16).
2. Insert the OPF positioning pin (J1) into the lever positioning hole on the top of the OPF.
   - **Slightly lift upon the leverassembly to insert the pin .**
     Be careful not to scratch the elastic support .
3. Remove the upper lever cover by loosening the four M3x6 pan head screws (only on 0.01 mg models).
   - **Be careful not to scratch it by contacting the Pt-Niband during removal**

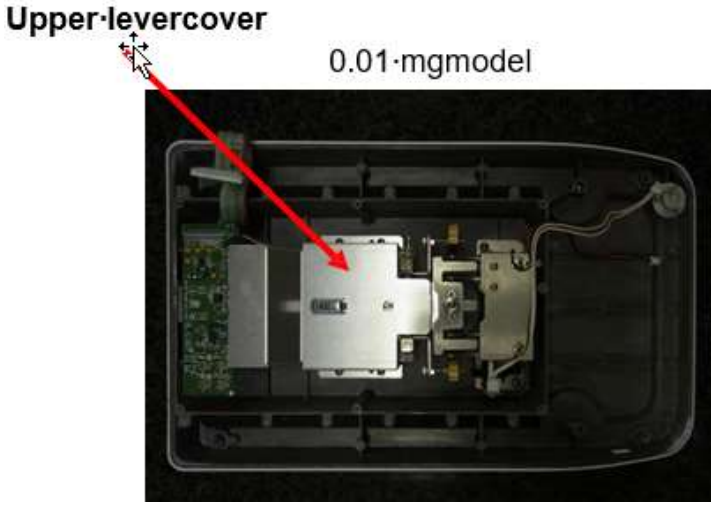


Fig. 5-35

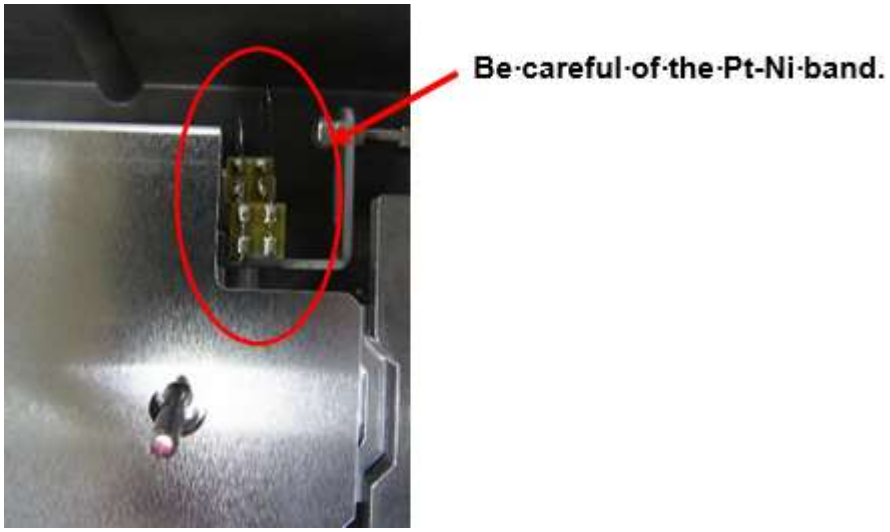


Fig. 5-36

4. Stand the base assembly up with the back side at the bottom and remove the unit assembly (1) by loosening the three P3 M5 x 12 bolts on the bottom of the base assembly.

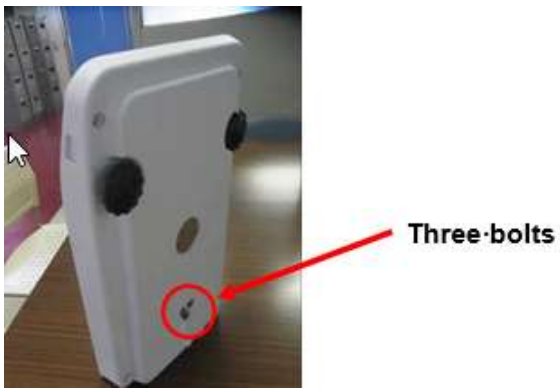


Fig. 5-37

5. Place the new unit assembly (1), with the OPF positioning pin (J1) inserted, on the base assembly using the spacer on the unit assembly positioning jig (J3). Then loosely fasten the unit assembly (1) to the bottom of the base assembly with three P3 M5 x 12 bolts.
   After adjusting its position using the positioning plate on the unit assembly positioning jig (J3), finish tightening the bolts
   (0.1mg model: 35 kgf·cm, 0.01 mg model: 40 kgf·cm).

- **When lifting up the new unit assembly (1), do not hold it by the parallel guide or movable pillar portions.**
- **Be careful not to damage the unit assembly (1) when placing the unit assembly positioning jig (J3).**

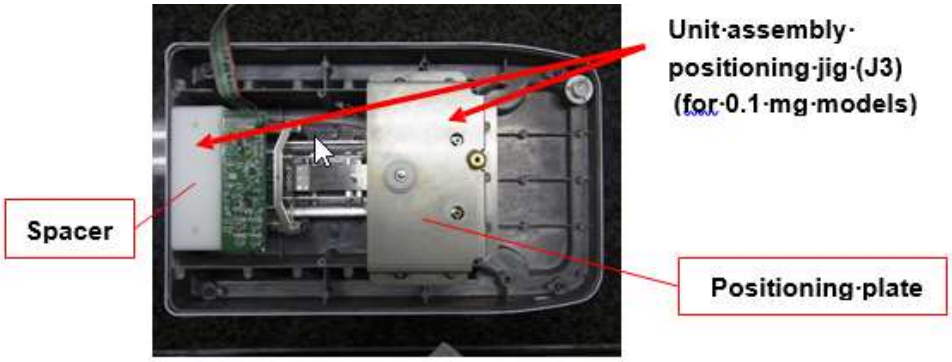


Fig. 5-38



Fig. 5-39

6. Install the upper lever cover using four M3 x 6 screws (only on 0.01 mg models).
    - **Be careful not to scratch it by contacting the Pt-Ni band during installation .**
7. Install the weight stopper, weights (59 to 63), and unit cover.
8. Temporarily connect it to the case assembly (2) with jig cable (J11).
9. Supply power to the balance and check the repeatability and corner load error. Then adjust linearity, calibrate internal weights and adjust sensitivity. (See 4.5 Adjusting the Corner load Error, 5.5.2 Linearity, 5.5.8 Calibration of Internal Weight (P-CAL), 5.5.6 Using Internal Weights to Adjust Sensitivity (i-CAL), and 5.5.7 Using External Weights to Adjust Sensitivity (E-CAL).)
10. When finishing checking and adjustment, reassemble the balance by reversing the steps above.
11. Save the temperature text data from the USB flash drive included with the unit assembly (1) on the computer.

5.3.11 Replacing the Detector Assembly (43) (on 0.1 mg models)

1. Remove the unit assembly (1) according to the procedure in 5.3.10 replacing the Unit Assembly (1).
2. Unsolder the two temperature sensor cables connected to the detector assembly (43).

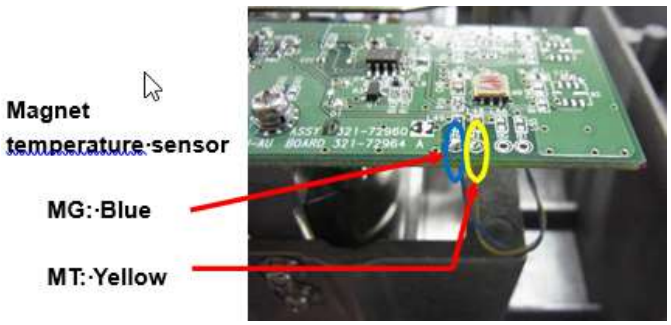


Fig. 2-40

3. Remove the detector assembly (43) by removing the two P3 M3 x 8 screws.



Fig. 2-41

4. Install the new detector assembly (43) and temperature sensor by reversing the steps above.
5. Adjust the detector assembly height according to the procedure in 4.1 Adjusting the Detector Assembly (43) Height (on 0.1 mg models).
6. Reassemble the balance by reversing the steps above.

5.3.12 Replacing the Detector Assembly (43) (on 0.01 mg models)

1. Remove the unit assembly (1) according to the procedure in 5.3.10 Replacing the Unit Assembly (1).
2. Unsolder the four temperature sensor cables connected to the detector assembly (43).

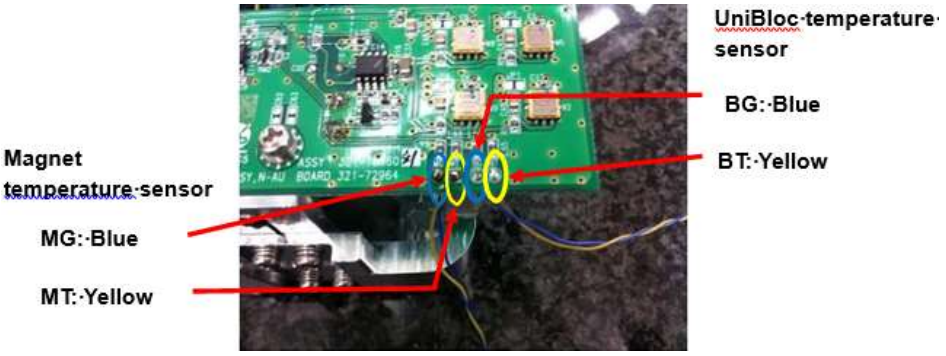


Fig. 5-42

3. Remove the detector assembly (43) by removing the two P4 M3 □ 6 screws on the right side.

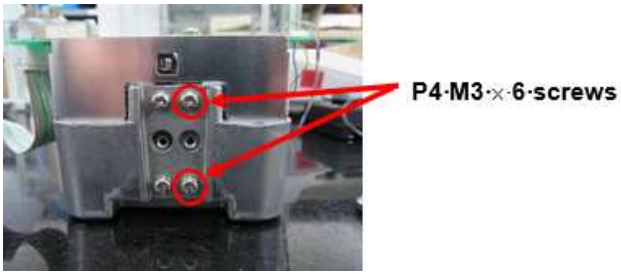


Fig. 5-43

4. Install the new detector assembly (43) and temperature sensor by reversing the steps above.
5. Adjust the detector assembly height according to the procedure in 4.2 Adjusting the Detector Assembly (43) Height (on 0.01 mg models).
6. Reassemble the balance by reversing the steps above.

5.3.13 Replacing the Stopper Plate (64) (on 0.1 mg models)

1. Remove the unit cover according to the procedure in 5.3.10 Replacing the Unit Assembly (1).
2. Remove the stopper plate (64) by loosening the two M3 x 6 pan head screws and two M3 flat washers.

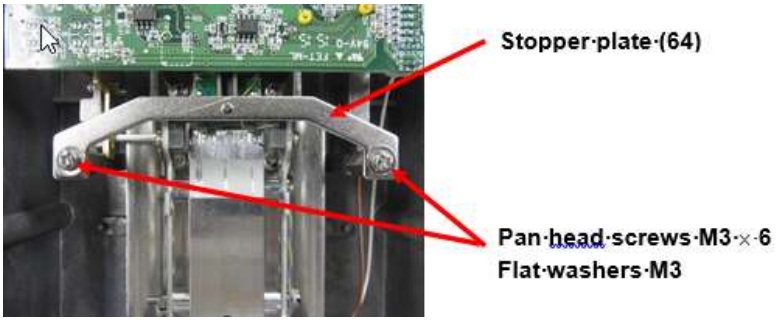


Fig. 5-44

3. With the new stopper plate (64) in a position aligned to the center of the force lever assembly pin, use the two M3 x 6 pan head screws and two M3 flat washers to fasten the plate.

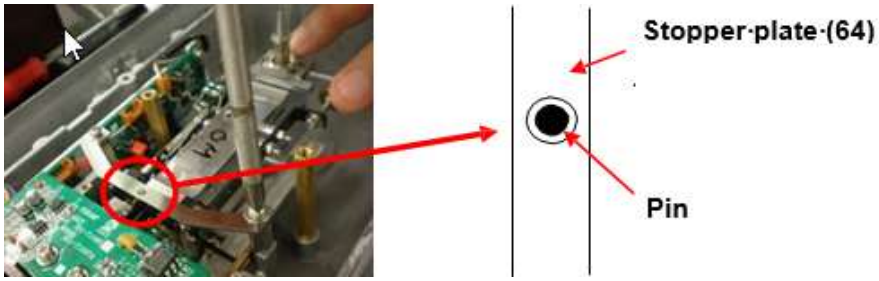


Fig. 5-45

4. Reassemble the balance by reversing the steps above.

5.3.14 Replacing the Stopper Plate (64) (on 0.01 mg models)

1. Remove the upper lever cover according to the procedure in 2.3.10 replacing the Unit Assembly (1).
2. Remove the stopper plate (64) by loosening the two M3 x 6 pan head screws and two M3 flat washers.

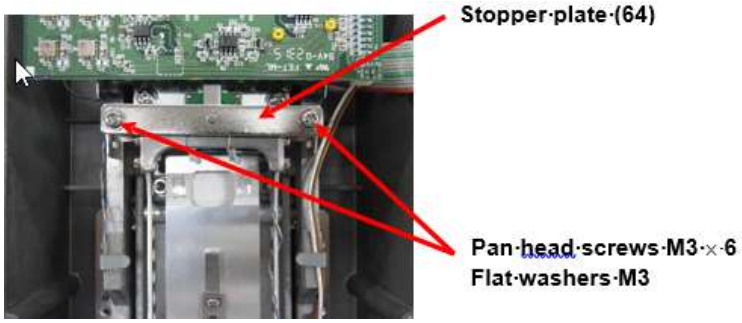


Fig. 5-46

3. With the new stopper plate (64) in a position aligned to the center of the force lever assembly pin, use the two M3 x 6 pan head screws and two M3 flat washers to fasten the plate.

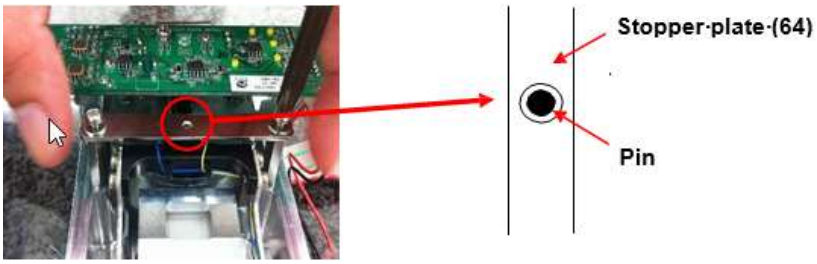


Fig. 5-47

4. Reassemble the balance by reversing the steps above.

5.3.15 Replacing the OPF Stopper (100) (on 0.01 mg models only)

1. Remove the upper lever cover according to the procedure in 2.3.10 replacing the Unit Assembly (1).
2. Remove the OPF stopper (100) by loosening the two M3 x 6 pan head screws and two M3 disc spring washers.
3. Carefully insert the OPF retainer pin assembly (J2) into the lever positioning hole on the OPF side.
    - **Onces lightly lift up on the lever assembly and keep it the balance position, insert the OPF retainer pin jig (J2). After then, insert the O F positioning pin jig (J1).**

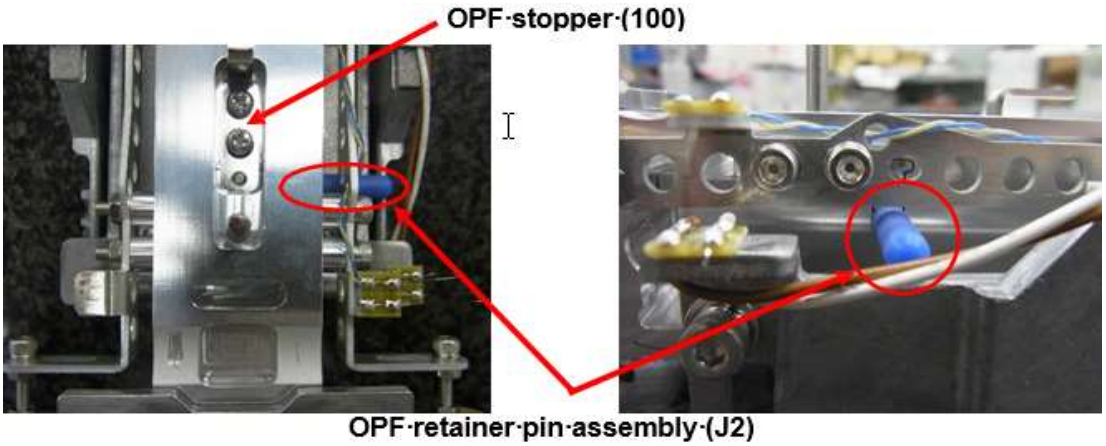


Fig. 5-48 Fig. 5-49

4. Insert the OPF stopper positioning jig (J7) in advance, and fasten the new OPF stopper (100) with the two M3 x 6 pan head screws and two M3 disc spring washers.

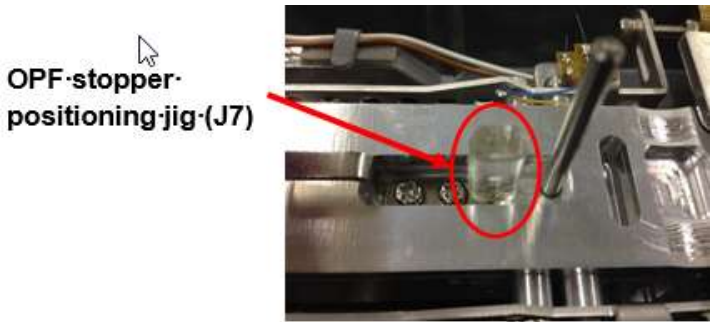


Fig. 5-50

5. Reassemble the balance by reversing the steps above.

5.3.16 Replacing the Stopper Lever (65) (on 0.1 mg models)

1. Remove the unit assembly (1) according to the procedure in 5.3.10 replacing the Unit Assembly (1).
2. Remove the C (2P)-1_PH cable assembly (48), which comes from the unit assembly (1), from the detector assembly (43).

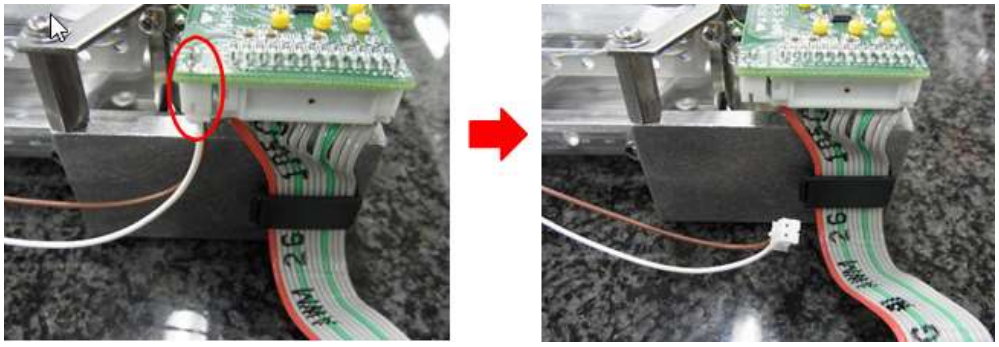


Fig. 5-51 Fig. 5-52

3. Temporarily connect the 13-200_PH2 cable assembly (49) from the detector assembly (43) to the case assembly (2) with jig cable (J11)
4. On the detector assembly (43), connect the (+) terminal of an electrical tester to the CP1 pin and the (-) terminal to the CPG pin.

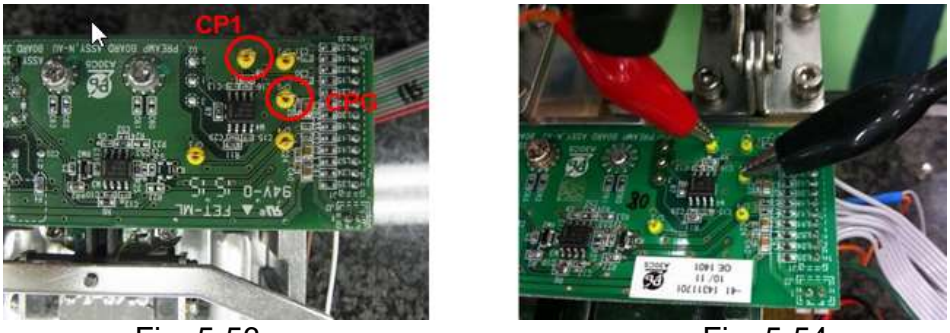


Fig. 5-53 Fig. 5-54

5. Remove the stopper lever (65) by loosening the two P3 x 8 screws that fasten the lever.

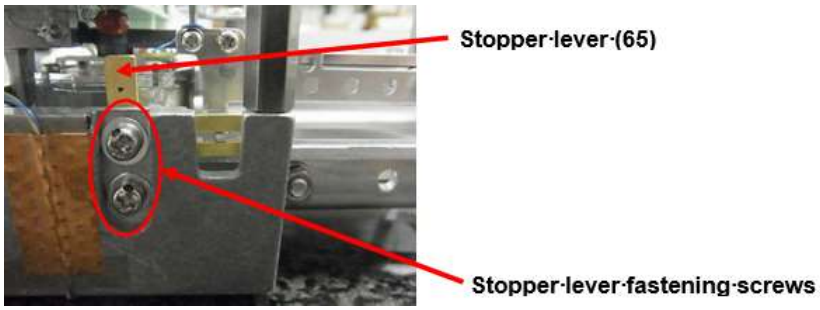


Fig. 5-55

6. Pull out the OPF positioning pin (J1) from the lever positioning hole on the unit assembly (1).
   - **Slightly lift up on the lever assembly to insert the pin .**
     Be careful not to scratch the elastic support.

7. Supply power to the balance by connecting the AC adapter.
8. Place the new stopper lever (65) in position and slightly loosen the two P3 M3 x 8 fastening screws. Then raise and lower the lever assembly until it lightly contacts the stopper lever (65).
   Record the voltage indicated on the electrical tester at the upper and lower contact points. Adjust the stopper lever (65) position so that the absolute values of the voltage are the same when contacting the upper and lower contact points, with the polarity reversed. Then fasten the stopper lever in place.

   - **To move the lever assembly up and down, very carefully press lightly against the balance weights.**

   - **Voltage adjustment ranges are indicated below.**
     When the lever assembly contacts the upper side of the stopper lever (65): -1.5 to -2.5V

     When lever assembly contacts the lower side of the stopper lever (65) :
     -1.5 to -2.5V

     The difference between the absolute values on positive and negative sides should be within 0.2V.

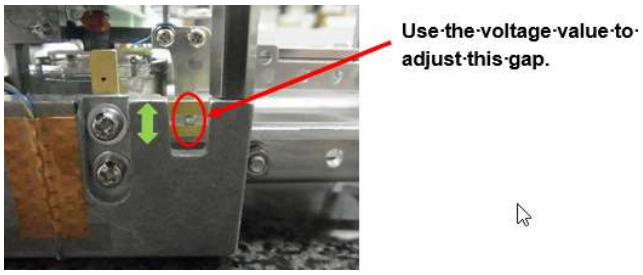


Fig. 5-56

9. Unplug the AC adapter.
10. Insert the OPF positioning pin (J1) into the lever positioning hole on the unit assembly (1).
    - **Slightly lift upon the lever assembly to insert the pin. Be careful not to scratch the elastic support.**
11. Reassemble the balance by reversing the steps above.

5.3.17 Replacing the Stopper Lever (65) (on 0.01 mg models)

1. Remove the unit assembly (1) according to the procedure in 2.3.10 Replacing the Unit Assembly (1).
2. Remove the C(2P)-1_PH cable assembly (48), which comes from the unit assembly (1), from the detector assembly (43).

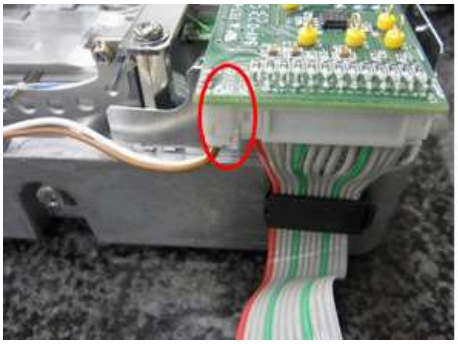


Fig. 5-57

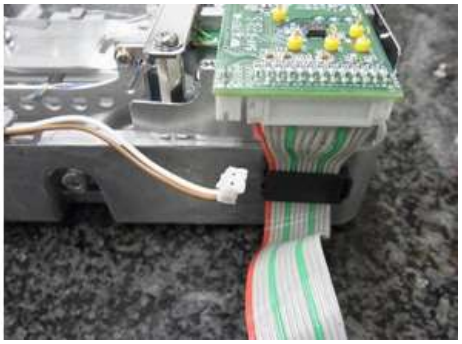


Fig. 5-58

3. Remove the stopper plate (64), fastening screws, hexagonal spacers, and the side lever cover.

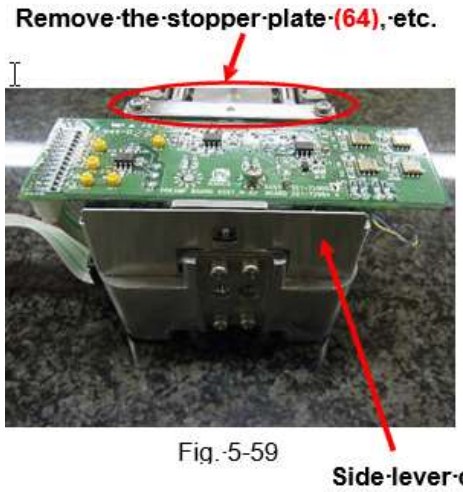


Fig. 5-59



Fig. 5-60

4. Temporarily connect the 13-200_PH2 cable assembly (49) from the detector assembly (43) to the case assembly (2) with jig cable (J11).
5. On the detector assembly (43), connect the (+) terminal of an electrical tester to the CP1 pin and the (-) terminal to the CPG pin.

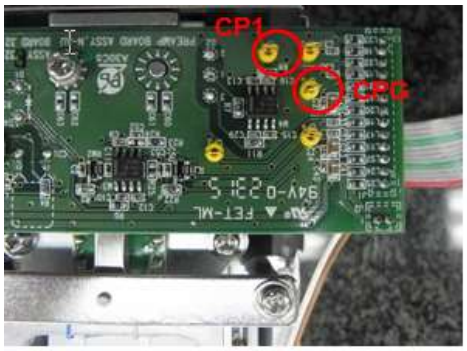


Fig. 5-61



Fig. 5-62

6. Remove the stopper lever (65) by loosening the two P3 □ 8 screws that fasten the lever on the left side.



Fig. 5-63

7. Pull out the OPF positioning pin (J1) from the lever positioning hole on the unit assembly (1).

   - **Slightly lift up on the lever assembly to insert the pin.**
     Be careful not to scratch the elastic support.

8. Supply power to the balance by connecting the AC adapter.
9. Place the new stopper lever (65) in position. With the two P3 M3 x 8 fastening screws slightly loosened, install the M3 x 5 flat head screw (J8).



Fig. 5-64



Fig. 5-65

The stopper lever (65) moves upward by tightening the flat head screw (J8) with the lever assembly pressed against the lower side of the stopper lever (65).
Use this to record the voltage indicated on the electrical tester at the upper and lower contact points. Adjust the stopper lever (65) position so that the absolute values of the voltage are the same when contacting the upper and lower contact points, with the polarity reversed. Then tighten the stopper lever fastening two P3 x 8 screws.

- **To move the lever assembly up and down, very carefully press lightly against the balance weights.**
- **Voltage adjustment ranges are indicated below.**
  When the lever assembly contacts the upper side of the stopper lever (65):
  -0.2 to -0.8 V
  When the lever assembly contacts the lower side of the stopper lever (65):
  +0.2 to +0.8 V
  The difference between the absolute values on positive and negative sides should be within 0.1 V.

10. Remove the flat head screw (J8) and confirm that the indicated voltage value is within the adjustment range.
11. Unplug the AC adapter.
12. Insert the OPF positioning pin (J1) into the lever positioning hole on the unit assembly (1).

    - **Slightly lift up on the lever assembly to insert the pin.**
      Be careful not to scratch the elastic support.

13. Reassemble the balance by reversing the steps above.

6 Electronic Circuit Board Check List

The AP series circuit boards and their signals are summarized below.

6.1 Main Board Assembly (40)

Main Board Assembly P/N	321-73849-XX with a shield case
Circuits Mounted	・Main control circuit (CPU) Measurement data calculation Correction calculation (temperature, linearity, and sensitivity) OLED display control Reads/writes data to/from the EEPROM Beam PID control calculation ・USB control circuit ・Coil current control circuit ・Magnet temperature correction circuit ・Displacement sensor A/D circuit

6.2 Display Board Assembly (41)

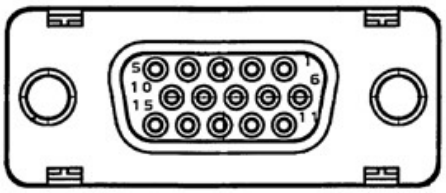
Display Board Assembly P/N	321-73805-XX
Circuits Mounted	・Sub CPU Weight loader motor control Key switch control ・EEPROM ・Weight loader motor control circuit ・Calendar function IC chip ・OLED control circuit ・Buzzer ・Key switches ・LED ・USB control circuit (A-connector)

6.3 PREAMP Board Assembly

PREAMP Board Assembly P/N	321-72960-XX (For maintenance parts, refer to 321-74020-XX detector assembly (with hardware holder) (43).)
Circuits Mounted	・Displacement sensor signal amplification ・Includes reference power supply IC chip ・Magnet temperature sensor signal amplification

Check Voltage	Check Pins CP1 Displacement sensor signal output +1.5 V to +2 V -1.5 V to -2 V CP2 Reference power voltage (+5 V) CPG GND (0 V) CP3 Magnet temperature sensor signal output 0 V to +5 V CP4 Mechanical temperature sensor signal output 0 V to +5 V (only on 0.01 mg models) J1 Connector Pins J1 No. 3 PIN Power supply +6 V J1 No. 4 PIN Power supply -12 V J1 No. 8 PIN Power supply +12 V J1 No. 7, 9, 11,13 PIN GND (0 V)(= CPG) J1 No. 10 PIN = CP1 J1 No. 12 PIN = CP2 J1 No. 6 PIN = CP3 J1 No. 5 PIN = CP4

6.4 Power Board Assembly (105) (only on 0.01 mg models)

Power Board Assembly P/N	321-73825-XX
Circuits Mounted	Converts +12 V power output from the AC adapter into +15 V, -15 V, +12 V, -12 V, +3.3 V, +5 V, and +6 V power supplies.
Check Voltage	D-Sub 15-Pin Connector Pins No. 3 and 13 PIN GND (0 V) No. 14 PIN +12 V Power supply from AC adapter No. 1 PIN +6 V No. 4 PIN +5 V No. 5 PIN +3.3 V No. 6 PIN -12 V No. 9 and 10 PIN +5 V No. 11 PIN +12 V No. 15 PIN +15 V 

6.5 Interface Board Assembly (39) (on 0.1 mg models)

Interface Board Assembly P/N	321-73820-XX
Circuits Mounted	Converts +12 V power output from the AC adapter into +15 V, -15 V, +12 V, -12 V, +3.3 V, +5 V, and +6 V power supplies. Includes USB B-connector, power supply jack, D-sub 9-pin connector, and ionizer communication connector

6.6 Interface Board Assembly (39) (on 0.01 mg models)

Interface Board Assembly P/N	321-73815-XX
Circuits Mounted	Includes USB B-connector, D-sub 9-pin connector, and ionizer communication connector.

7 Adjusting the Hardware

When replacing the following components, balance performance may be changed. After replacement, check the performance and make sure to do adjustments in order

Replacement Process / Adjustment Required		Reference	Unit Assy Replacement	Detector Assy Replacement	Main Board Assy Re-placement	Display Board Assy Re-placement	Weight Loader Assy Replacement	Software Ver. Up-date	Cornerload Error Ad-justment
			2.3.10.	2.3.11. 2.3.12.	2.3.6.	2.3.4.	2.3.9.	8.	4.5
1	Initialize EEPROM	5.6.7.				✓			
2	Adjust Detec-tor Assy Height	4.1. 4.2.		✓					
3	Restore EEPROM	5.6.6.				✓			
4	Adjust Tilt Error	4.4.	✓	✓					
5	Release Setting Lock	6.1.	✓	✓	✓		✓		✓
6	Write Temperature Coefficient (*1)	7.5.	✓ (*1)						
7	Adjust Weighting Parameter	5.5.1.			✓				
8	Adjust Linearity	5.5.2. to 5.5.5.	✓	✓	✓				✓
9	Calibration of Internal Weight (P-CAL)	5.5.8.	✓	✓	✓		✓		✓
10	Enable Setting Lock	6.2.	✓	✓	✓		✓		✓
11	Adjust Sensitivity (i-CAL, E-CAL)	5.5.6. 5.5.7.	✓	✓	✓		✓		✓
12	Delete Error Log	5.2.	✓	✓	✓	✓	✓	✓	✓
13	Back Up EEPROM	5.6.5.	✓	✓	✓	✓	✓	✓	✓

(*1)Writes the temperature coefficient data from the provided USB flash drive to the balance.
Temperature coefficient data is located at address numbers 0110-01B7 and 04E8-0527.
For more details, see 7.5 Writing Temperature Coefficients (when replacing the unit assembly (1)).

7.1 Adjusting the Detector Assembly (43) Height (on 0.1 mg models)

1. Remove the unit assembly (1) according to the procedure in 5.3.10 replacing the Unit Assembly (1).
2. Remove the C(2P)-1_PH cable assembly (48), which comes from the unit assembly (1), from the detector assembly (43).

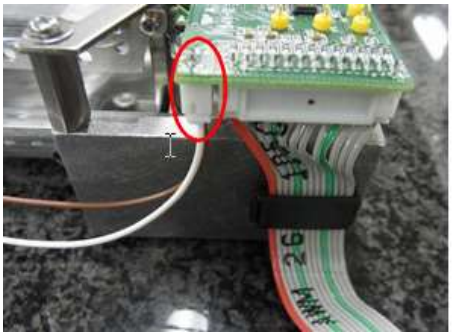


Fig. 7-1

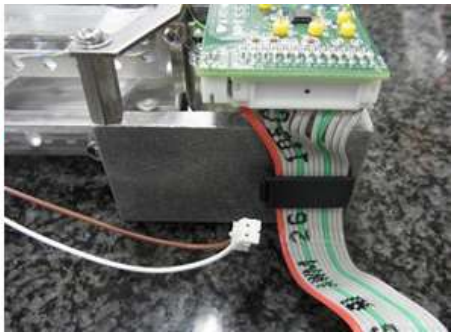


Fig. 7-2

3. Temporarily connect the 13-200_PH2 cable assembly (49) from the detector assembly (43) to the case assembly (2) with jig cable (J11).
4. On the detector assembly (43), connect the (+) terminal of an electrical tester to the CP1 pin and the (-) terminal to the CPG pin.

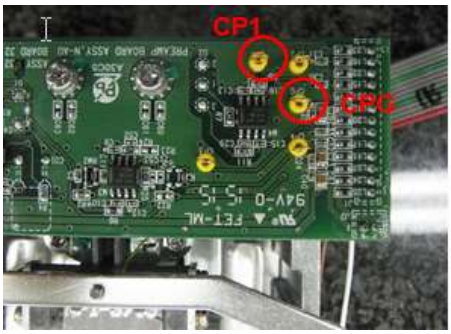


Fig. 7-3



Fig. 7-4

5. Pull out the OPF positioning pin (J1) from the lever positioning hole on the unit assembly (1).
   - **Slightly lift up on the lever assembly to insert the pin.**
     Be careful not to scratch the elastic support.
6. Supply power to the balance by connecting the AC adapter.
7. With the two P3 M3 x 8 fastening screws for the detector assembly (43) slightly loosened, raise and lower the lever assembly until it lightly contacts the stopper lever (65).
   Record the voltage indicated on the electrical tester at the upper and lower contact points. Adjust the detector assembly (43) height so that the absolute values of the voltage are the same when contacting the upper and lower contact points, with the polarity reversed. Then fasten the detector assembly in place.
   - **To move the lever assembly up and down, very carefully press lightly against the balance weights**
   - **Voltage adjustment range: The difference between the absolute values on positive and negative sides should be within 0.2 V**



Fig. 7-5

8. Unplug the AC adapter.
9. Insert the OPF positioning pin (J1) into the lever positioning hole on the unit assembly (1).
    - **Slightly lift up on the lever assembly to insert the pin.**
      Be careful not to scratch the elastic support.
10. Reassemble the balance by reversing the steps above.

7.2 Adjusting the Detector Assembly (43) Height (on 0.01 mg models)

1. Remove the unit assembly (1) according to the procedure in 2.3.10 replacing the Unit Assembly (1).
2. Remove the C(2P)-1_PH cable assembly (48), which comes from the unit assembly (1), from the detector assembly (43).

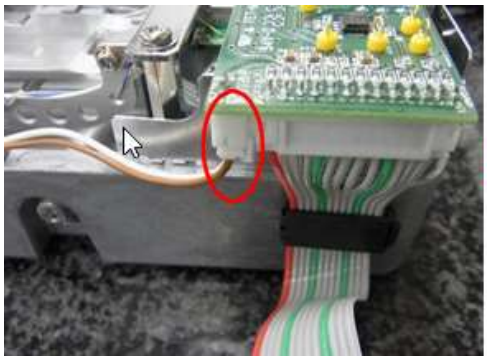


Fig. 7-6

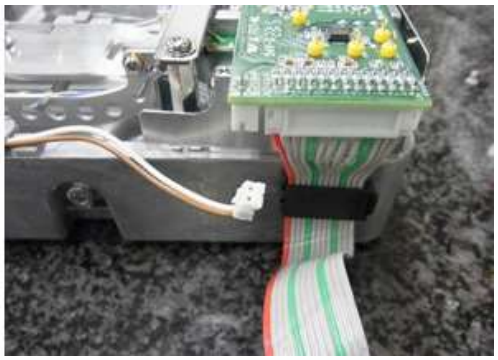


Fig. 7-7

3. Temporarily connect the 13-200_PH2 cable assembly (49) from the detector assembly (43) to the case assembly (2) with jig cable (J11).
4. On the detector assembly (43), connect the (+) terminal of an electrical tester to the CP1 pin and the (-) terminal to the CPG pin.

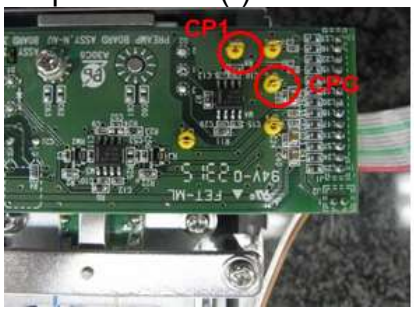


Fig. 7-8



Fig. 7-9

5. Pull out the OPF positioning pin (J1) from the lever positioning hole on the unit assembly (1).

    - **Slightly lift up on the lever assembly to insert the pin.**
      Be careful not to scratch the elastic support.

6. Supply power to the balance by connecting the AC adapter.
   With the two P3 M3 x 8 fastening screws for the detector assembly (43) slightly loosened, install the M3 x 5 flat head screw (J8). Tightening the flat head screw (J8) moves the detector assembly (43) upward.



Fig. 7-10

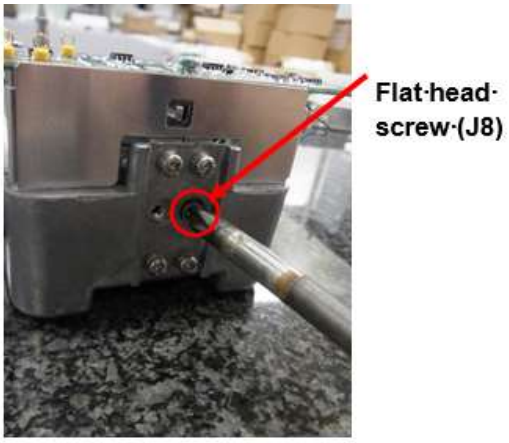


Fig. 7-11

Raise and lower the lever assembly until it lightly contacts the stopper lever (65). Record the voltage indicated on the electrical tester at the upper and lower contact points. Adjust the detector assembly (43) height so that the absolute values of the voltage are the same when contacting the upper and lower contact points, with the polarity reversed. Then tighten the detector assembly fastening screws.

- **To move the lever assembly up and down, very carefully press lightly against the balance weights**
- **Voltage adjustment range: The difference between the absolute values on positive and negative sides should be within 0.2 V**

7. Remove the flat head screw (J8) and confirm that the indicated voltage value is within the adjustment range.
8. Unplug the AC adapter.
9. Insert the OPF positioning pin (J1) into the lever positioning hole on the unit assembly (1).

    - **Slightly lift up on the lever assembly to insert the pin.**
      Be careful not to scratch the elastic support.

10. Reassemble the balance by reversing the steps above.

7.3 Adjusting the Balance

1. Remove the weights (59 to 63) according to the procedure in 2.3.9 replacing the Weight Loader Assembly (16).
2. Pull out the OPF positioning pin (J1) from the lever positioning hole on unit assembly (1) and place the product's pan supporter assembly (3) and pan (6) on the pan supporter shaft in the unit assembly (1).
3. Use the two level adjusters to level the balance so that the air bubble in the level gauge is centered between the red lines. Then connect the AC adapter to supply power.
4. Use the maintenance menu to display the A/D screen. (See 1.1 Entering the Maintenance Mode.)
5. The WAD value adjustment criteria are indicated below.
   If the value is outside the specified adjustment range, insert the OPF positioning pin (J1) into the lever positioning hole, located on top of the unit assembly (1) OPF, and loosen the M3 nuts that fasten the lever assembly balance weight and the eccentric balance weight.

   0.1 mg model: Zero WAD value 3,300,000 to 3,800,000
   0.01 mg model: Zero WAD value 3,600,000 to 4,400,000

   - **Slightly lift up on the lever assembly to insert the pin.**
     Be careful not to scratch the elastic support.

6. To increase the WAD value, move both the balance weight and eccentric balance weight toward the front of the balance. To decrease the WAD value, move them both toward the rear of the balance.

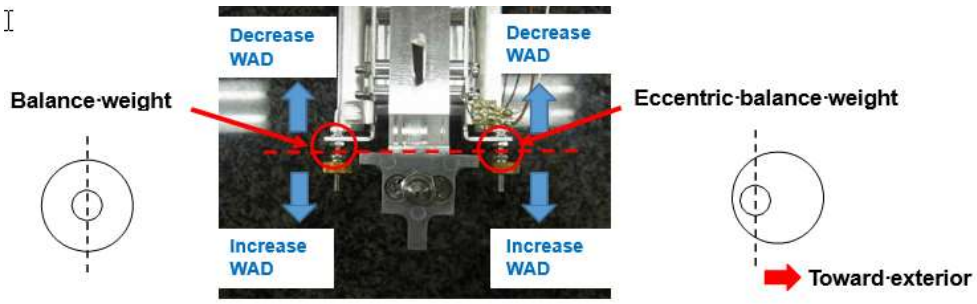


Fig. 7-12

   - **Attach the balance weight and eccentric balance weight in approximately the same position**
   - **Attach the eccentric balance weight so that the eccentric is oriented to ward the exterior of the balance**

7. Repeat steps 4) to 6) above to adjust and check the error. When properly adjusted, tighten the M3 nuts.
8. Adjust and check the tilt error according to the procedure in 7.4 Adjusting the Tilt Error.
9. Reassemble the balance by reversing the steps above

7.4 Adjusting the Tilt Error

1. Remove the weights (59 to 63) according to the procedure in 2.3.9 replacing the Weight Loader Assembly (16).
2. Pull out the OPF positioning pin (J1) from the lever positioning hole on unit assembly (1) and place the product's pan supporter assembly (3) and pan (6) on the pan supporter shaft in the unit assembly (1).
3. Use the two level adjusters to level the balance so that the air bubble in the level gauge is centered between the red lines. Then connect the AC adapter to supply power.
4. After subtracting tare weight, insert a 1.5 mm thick shim under the fixed center foot at the back of the balance and check the display.

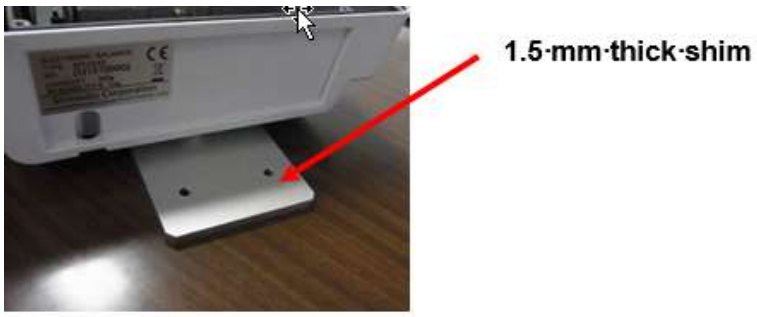


Fig.·7-13

5. The adjustment criteria are indicated below.
   If the value is outside the specified adjustment range, insert the OPF positioning pin (J1) into the lever positioning hole, located on top of the unit assembly (1) OPF, and loosen the M3 nut that fastens the lever assembly eccentric balance weight.

0.1 mg model:	within ± 0.0050 g
0.01 mg model:	within ± 0.00300 g

- **Slightly lift up on the lever assembly to insert the pin.**
  Be careful not to scratch the elastic support.

6. If a value more than 0 g is displayed, shift the eccentricity of the eccentric balance weight downward by rotating it slightly toward the right. If a value less than 0 g is displayed, shift it upward by rotating the eccentricity of the eccentric balance weight slightly toward the left.

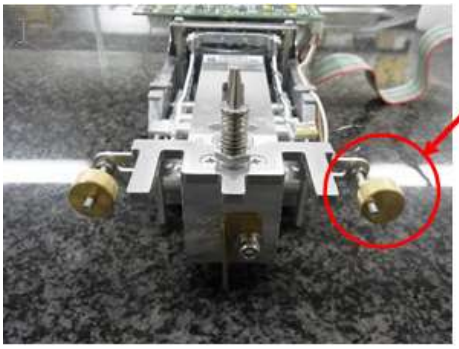


Fig.·7-14

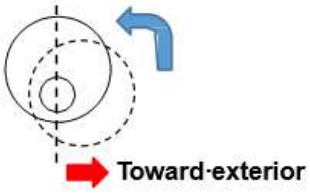


Fig.·7-15

- **<u>Attach the eccentric balance weight so that the eccentricity is oriented toward the exterior of the balance .</u>**

7. Repeat the above steps 4) to 6) to adjust and check. When properly adjusted, tighten the M3 nut.
8. Adjust and check the corner load error according to the procedure in 4.5 Adjusting the Corner load Error.

7.5 Adjusting the Cornerload Error

1. Remove the weights (59 to 63) according to the procedure in 2.3.9 Replacing the Weight Loader Assembly (16).
2. Pull out the OPF positioning pin (J1) from the lever positioning hole on unit assembly (1) and place the pan supporter assembly and pan of the product (or for adjustment) on the pan supporter shaft in the unit assembly (1).
3. Use the two level adjusters to level the balance so that the air bubble in the level gauge is centered between the red lines. Then connect the AC adapter to supply power.
4. Place the adjustment weight (about half of weighing capacity) on the left front area of the pan.
   Then press the (TARE) key so that “0 g” is displayed

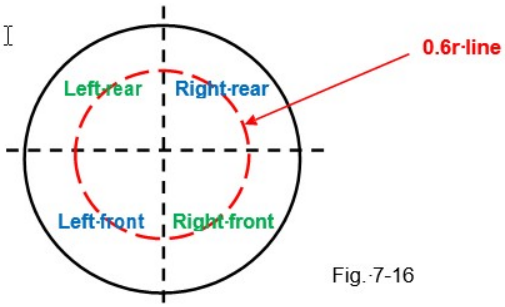
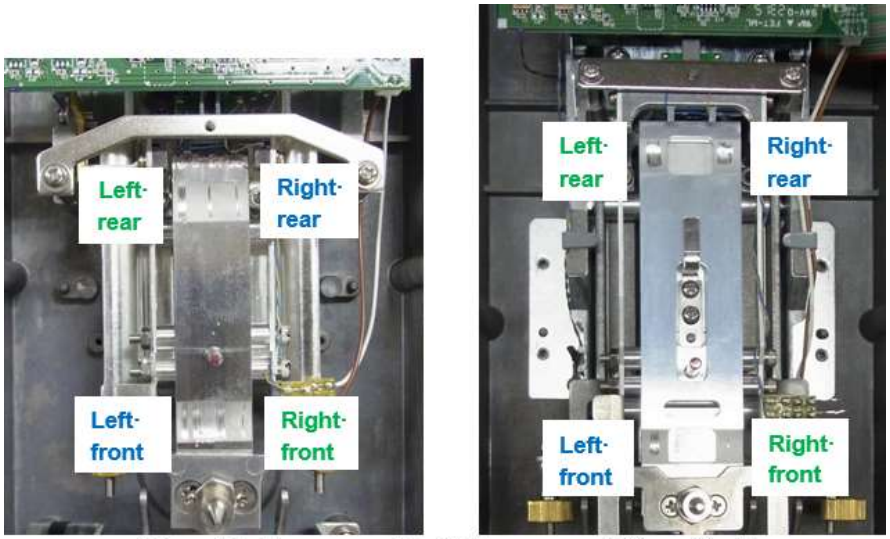


Fig.·7-16

5. Place the weight on the right rear area of the pan and record the display value.
6. Place the adjustment weight (about half of weighing capacity) on the right front area of the pan. Then press the [TARE] key so that "0 g" is displayed.

7. Place the weight on the left rear area of the pan and record the display value.
8. Use the corner adjustment jigs (J4 and J5) to shave the parallel guide strain element corresponding to the corner with the heavier weight indicated in each direction.
    - **To adjust and check the performance at positions located 0.6r line.**
    - **To prevent deformation, keep the shaving adjustments within the following ranges.**
      Never shave the area within 3 mm of the parallel guide ends on 0.1 mg models.
      Never shave the area within 2 mm of the parallel guide ends on 0.01 mg models.
    - **Be sure to remove the shavings, such as by vacuuming, wiping with a dry cloth or dust-free paper.**
      Never blow on them or wipe them with alcohol:



0.1 mg Model Fig. 7-17 0.01 mg Model

9. The cornerload error adjustment criteria are indicated below.

TABP 300-4M-A	±	0.0003 g	(Load 150 g)
TABP 200-4M-A	±	0.0003 g	(Load 100 g)
TABP 100-4M-A	±	0.0003 g	(Load 50 g)
TABP 200-5DM-A	±	0.00030 g	(Load 100 g)
	±	0.00010 g	(Load 50 g)
TABP100-5DM-A	±	0.00030 g	(Load 50 g)
TABP100-5M-A	±	0.00010 g	(Load 20 g)

10. Repeat steps 4) to 8) above to adjust and check the error.
11. Reassemble the balance by reversing the steps above.

8 Maintenance Menu

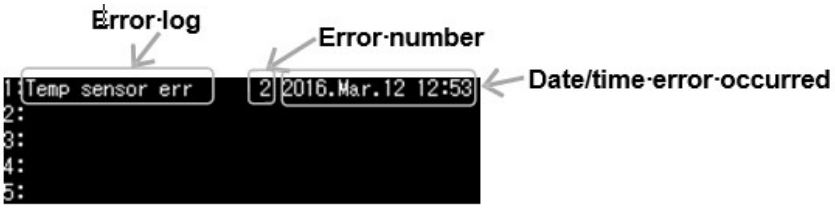
8.1 Product Information

1. Used to check the following information.
2. Model name
3. Software version
4. Balance serial number
5. Shipping destination setting

8.2 Error Log

Used to check the history of errors that occurred in the user menu mode.

1. Information displayed
   Select [Error Log] on the maintenance menu.
   It displays an error log of the five most recent errors, with their error numbers and the date/time they occurred.



Information about the error numbers and their meaning is summarized in 10.2 Error Display.

2. Deleting the error log
   With the error log screen displayed, hold down the [FUNC] key.
   Return to the maintenance menu and select [Error Log] to confirm that the error log is deleted.

8.3 Ageing Data

Used to check the following information.

1. Temperature correction date
2. Span temperature coefficient (before and after correction)
3. Zero point temperature drift (before and after correction)

8.4 Weight Loader Check

Used to return the internal weight loader unit to its initial position and load or unload weights manually.

1. Select [Weight Loader Check] and then select [Initial Position] or [Run Weight Loader].
2. If [Initial Position] is selected, it resets the weight loader to the initial position (with no weights applied) and displays the A/D screen.
3. Each time [Run Weight Loader] is selected, it successively changes from applying internal weight 1, applying weights 1 and 2, or the initial position of applying no weights, and then displays the A/D screen. Since 0.1 mg models do not include a second internal weight, internal weight 1 remains applied.

The approximate weight value of internal weights are indicated below.

Model	TABP 200-5DM-A	TABP 100-5DM-A TABP 100-5M-A	TABP300-4M-A TABP 200-4M-A TABP 100-4M-A
Internal weight 1 (Inside)	Approx.100 g	Approx.60 g	Approx.200 g
Internal weight 2 (Outside)	Approx.100 g	Approx.60 g	-

8.5 Adjustment

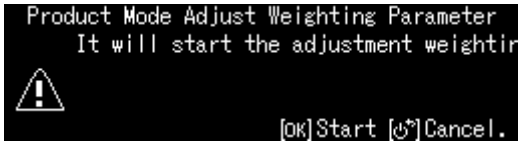
8.5.1 Adjust Weighing parameter

This adjusts the PWM voltage value output to the coil based on the weighting parameter resistance.

- **Be sure to implement this adjustment after replacing the main board assembly (40).**

The adjustment procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Adjust Weighting Parameter].
2. The adjustment start confirmation screen is displayed.



3. Press the [OK] key to start adjusting the weighting parameter.
4. This process takes about 4 to 5 minutes to finish.
   During that time, close the door and do not touch the balance.
5. The A/D screen is displayed again when the adjustment process is finished.

8.5.2 Linearity

To satisfy linearity specifications, calculate the coefficient for correcting hardware linearity errors.
The adjustment procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Linearity] - [Linearity Adjustment].
2. Follow the instructions on the display to place the reference weights, wait for the 30 seconds after closing the door, and then press [OK] to start adjustment.



If the indicated weight value is incorrect, reenter the weight value according to the procedure in 8.5.3 Input Weight Value.

3. When the adjustment is finished, a correction coefficient is calculated and automatically saved in the EEPROM area of NVRAM.
   In addition, a backup of correction coefficients is automatically saved in the EEPROM backup area of flash memory.
4. The A/D screen is displayed again.

8.5.3 Input Weight Value

Before implementing linearity adjustment, input the reference weight values to be used.
The procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Linearity] - [Input Weight Value].
2. Determine the reference weights required for linearity adjustment depending on the model setting.
   Linearity adjustment uses five loads. Use the reference weight value list below to select the reference weights.
3. Enter the reference weight values (including the certified values).

Reference weights used for linearity adjustment

Model	TABP 200-5DM-A	TABP 100-5DM TABP 100-5M-A	TABP 300-4M-A	TABP 200-4M-A TABP 100-4M-A
Reference weight	50g	30 g	50g	50g
	100g	60 g	100g	100g
	150g	90 g	200g	150g
	200g	120 g	300g	200g
	250g	150 g	350g	250g

8.5.4 Additional Point

Correction is applied to the points where linearity is adjusted with reference weights, but error levels might be larger at intermediate points between the adjusted points, where less correction is applied.
Therefore, this function is provided for correcting such intermediate points.
When using this correction function, measure the error level at intermediate points after linearity adjustment according to the procedure in 5.5.2 Linearity is finished.
For larger error values, record 8.5.2 the weight and LAD values. Linearity can be corrected at up to six points.

- **Perform additional point correction immediately after the procedure in 8.5.2. Linearity.**
  Additional point correction cannot be performed properly if the zero point shifts from when it was adjusted, due to the elapsed time after adjusting linearity.
- **After finish the procedure in 5.5.2. Linearity, additional point correction is all cleared. Additional point adjustment is done only for 0.01mg models in factory, additional point is below.**

Model	TABP 200-5DM-A	TABP 100-5DM-A	TABP 100-5M-A
Point1	20g	10 g	10g
Point2	40g	20 g	20g
Point3	60g	40 g	50g
Point4	80g	50 g	80g
Point5	120g	70 g	100g
Point6	-	-	130g

The additional point correction procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Linearity] - [Additional Point].
2. Follow instructions on the display to alternately enter corresponding recorded weight and LAD values. Values can be entered for up to six points.
   Weight values do not need to be entered in ascending order. Also note that correction does not occur if the reference weight values are set to zero grams.

Example of weight value input screen



Example of LAD value input screen



3. After entering the values for each point, the setting process is finished.
   There are six points for additional, but even if need not six point, the res need to be entered zero grams and be finished to procedure 12/12. After finished to procedure 12/12, linearity is corrected based on the entered weight and LAD values.

8.5.5 Adjust Parameter

Displays coefficients for correcting temperature, linearity, and sensitivity.

The procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Adjust Parameter].
2. The following information is displayed.

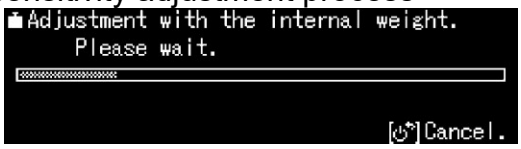
Coefficient			Description
Temperature correction	Span	A	Quadratic term for quadratic approximation of span temperature properties
		B	Linear term for quadratic approximation of span temperature properties
		C	Constant term for quadratic approximation of span temperature properties
	Zero	A	Quadratic term for quadratic approximation of zero temperature properties
		B	Linear term for quadratic approximation of zero temperature properties
		C	Constant term for quadratic approximation of zero temperature properties
Linearity correction	Correction coefficient	A	Fifth-order term in fifth-order approximation for linearity correction
		B	Fourth-order term in fifth-order approximation for linearity correction
		C	Cubic term in fifth-order approximation for linearity correction
		D	Quadratic term in fifth-order approximation for linearity correction
		E	Linear term in fifth-order approximation for linearity correction
		F	Constant term in fifth-order approximation for linearity correction
		En	Correction amount for weight value n
		An	Linear term for linear approximation between previous reference weight and weight value n
		Bn	Constant term for linear approximation between previous reference weight and weight value n
		An'	Linear term for linear approximation between weight value n and the next reference weight
		Bn'	Constant term for linear approximation between weight value n and the next reference weight
		Wn	Weight value n ("1000.000000" is displayed if no weight value was entered.)
Sensitivity	Correction coefficient	K	Sensitivity correction
	Internal weight value	1	Internal weight value 1
		2	Internal weight value 2 (value disabled on 0.1 mg models)

8.5.6 Using Internal Weights to Adjust Sensitivity (i-CAL)

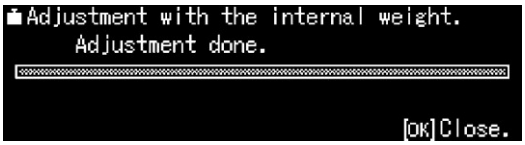
Confirm that nothing is on the pan.
The adjustment procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Calibration/Inspection] - [Adjustment with the internal weight].
2. Press the [MENU] key to return to the A/D screen.
3. Press the [CAL] key to start the sensitivity adjustment using internal weights.

Screen displayed during sensitivity adjustment process



Screen displayed when sensitivity adjustment process is finished



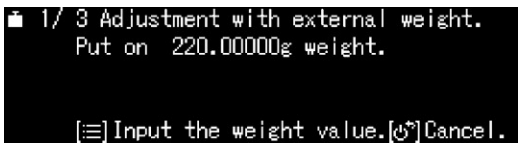
4. When the adjustment is finished, a sensitivity correction coefficient is calculated and automatically saved in the EEPROM area of NVRAM.
5. The A/D screen is displayed again.

8.5.7 Using External Weights to Adjust Sensitivity (E-CAL)

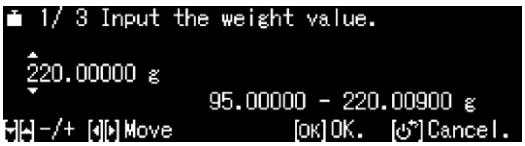
Confirm that nothing is on the pan.
The adjustment procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Calibration/Inspection] - [Adjustment with the external weight].
2. Press the [MENU] key to return to the A/D screen.
3. Press the [CAL] key to start the sensitivity adjustment using external weights. If a weight value is incorrect, press the [MENU] key to specify the weight value manually. If the weight values are correct, place the specified weight on the pan.

Screen displayed while loading weights



Weight value input screen



4. Continue adjusting sensitivity by following the instructions on the screen.
5. When the adjustment is finished, a sensitivity correction coefficient is calculated and automatically saved in the EEPROM area of NVRAM.
6. The A/D screen is displayed again.

Reference weight used for adjustment using external weight

Model	TABP 200-5DM-A	TABP100-5DM-A TABP100-5M-A	TABP 300-4M-A	TABP 200-4M-A	TABP 100-4M-A
Reference weight	200g	100g	300g	200 g	100g

- **Only one weight value is used for 0.01 mg models also.**

8.5.8 Calibration of Internal Weight (P-CAL)

Calibrates the internal weights.
The reference weights used for P-CAL are listed below.

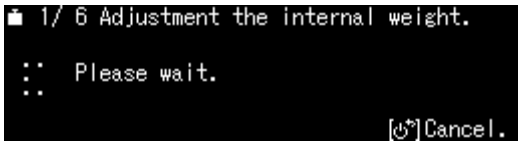
Reference weights used for calibrating internal weights

Model	TABP 200-5DM-A	TABP100-5DM-A TABP100-5M-A	TABP 300-4M-A	TABP 300-4M-A	TABP 100-4M-A
Internal weight1	100g	50g	300g	200 g	100g
Internal weight2	200g	100g	-	-	-

Confirm that nothing is on the pan.

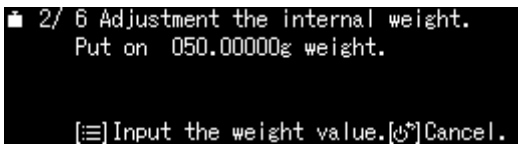
The adjustment procedure is indicated below.

1. Enter the maintenance mode and select [Adjustment] - [Calibration/Inspection] - [Calibration of internal weight].
2. The P-CAL adjustment starts. When the measurement value stabilizes, the zero point is measured

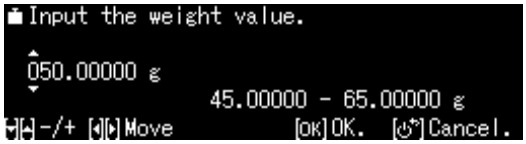


3. The reference weight value is displayed flashing.
   If a weight value is different than the values indicated above in the list of reference weights for internal weight calibration, press the [MENU] key to specify the weight value manually.
   If the weight values are correct, place the specified weight on the pan.

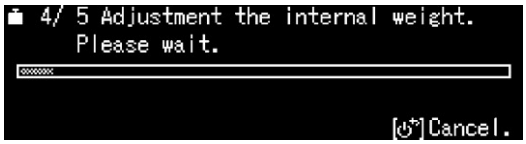
4. Screen displayed while loading reference weights



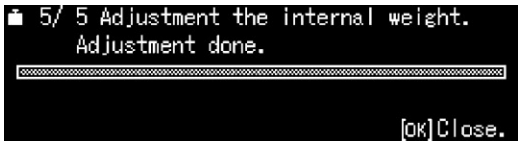
5. Reference weight value input screen



6. Continue calibration by following the instructions on the screen.
7. Achtung bei Softwareversion D1.01.22 steht bei 4/6 100g/200g aufstellen. Hier meint das Gerät aber, Wiegeplatte entlasten.
8. Internal weights are calibrated based on the reference weights.



9. The internal weights are used to adjust sensitivity.

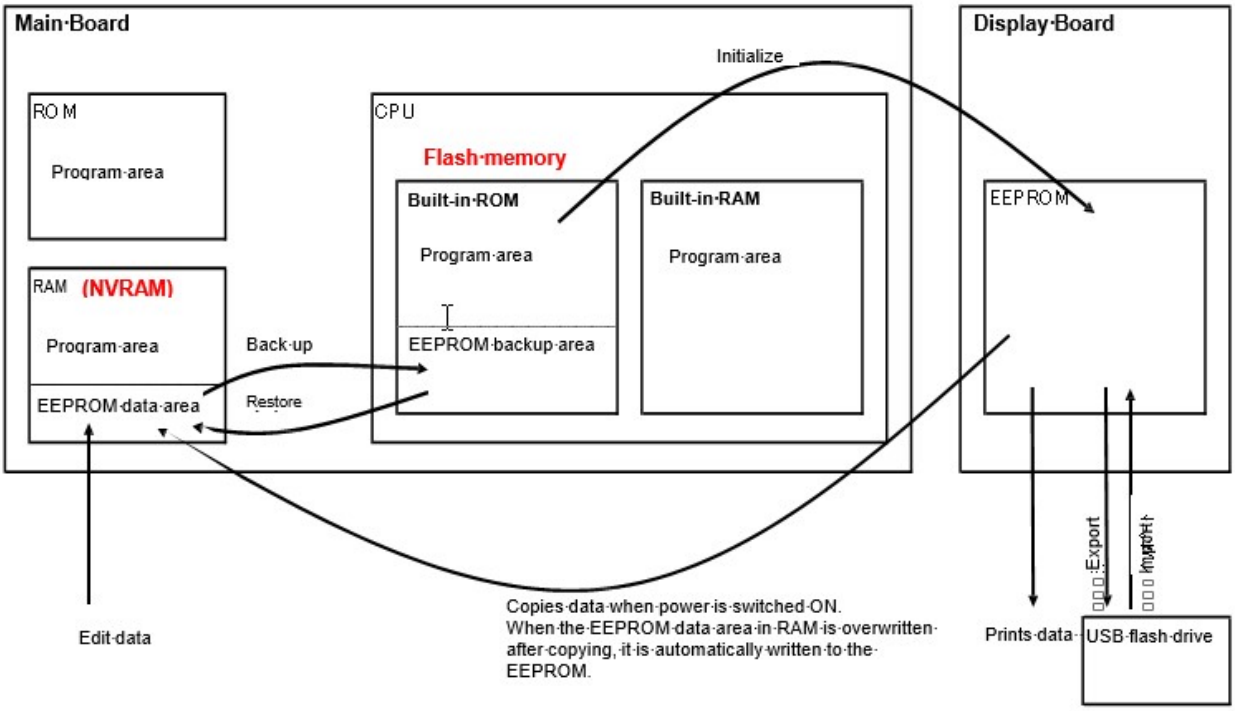


10. When the adjustment is finished, a sensitivity correction coefficient is calculated and automatically saved in the EEPROM area of NVRAM.
11. The A/D screen is displayed again.

8.6 EEPROM

The following actions are available for data in the EEPROM.

- Output EEPROM data
- Edit EEPROM data
- Save output on a USB flash drive and write data output from a USB flash drive
- Back up EEPROM data
- Write backup data to EEPROM
- Initialize EEPROM


Main·Board
Display·Board
Initialize
ROM
Program·area
CPU
Flash·memory
Built-in·ROM
Program·area
Built-in·RAM
Program·area
EEPROM
RAM (NVRAM)
Program·area
EEPROM·data·area
Back·up
Restore
EEPROM·backup·area
Export
Edit·data
Copies·data·when·power·is·switched·ON.
When·the·EEPROM·data·area·in·RAM·is·overwritten·
after·copying,·it·is·automatically·written·to·the·
EEPROM.
Prints·data
USB·flash·drive

Addresses and data for important areas of the EEPROM are indicated below.

Data	Address No.	Remarks
Temperature data	0110-01B7	
Aging effect	04E8-0527	
Setting Lock (model-specific)	00A2	Setting Lock ON00A2: XX01 Setting Lock OFF00A2: XX00
Administrator password	1796-1799	1796: 270F 1798: 0001 If these values are specified, the administrator password can be set to "9999" when shipped from the factory. This can be used if a user forgets their password.
Weighting parameter	0100-010F	
Control (P) parameter	04E0-04E3	
Control (I) parameter	04E4-04E7	

- **Never edit addresses other than those above .**
- **Never edit an address not indicated in this service manual.**

8.6.1 Output

Saved EEPROM data can be output to a dedicated printer or computer.

The procedure is indicated below.

1. Enter the maintenance mode and select [EEPROM] - [Output].
   The output starts automatically as soon as [Output] is selected.
2. After printing a header with the model name, serial number, and software version, the data is printed with their EEPROM addresses.

Sample output

TYPE	AP224W
S/N	D315300001
VER	X.XX.XX.XX
0000:	AB07
0002:	ABAC
0004:	0003
0006:	0000
0008:	0000
000A:	0000
…	…
…	…

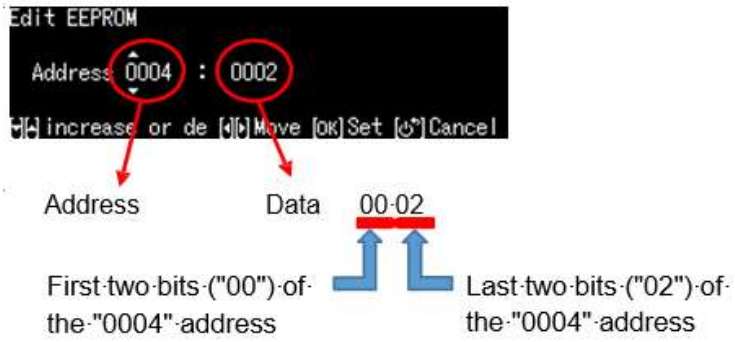
3. When all data is printed, the A/D screen is displayed again.

8.6.2 Edit

Saved EEPROM data can be edited on the display screen.
The procedure is indicated below.

1. Enter the maintenance mode and select [EEPROM] - [Edit].
2. Data is displayed with the EEPROM address, as shown below.
   The up/down arrows (▲▼) indicate the digits that can be changed.

Display example:

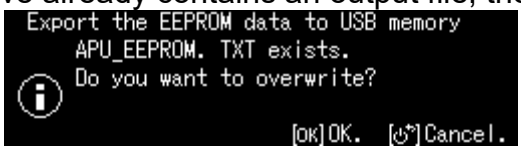


3. Input the address of the data to be edited.
4. Press the [OK] key to determine the address to be edited.
5. The address data to be edited is displayed on the right with editing enabled.
6. Edit the data.
7. Press the [OK] key to confirm and save the data by writing it to the corresponding address.
8. To continue editing, repeat the procedure from step 1).

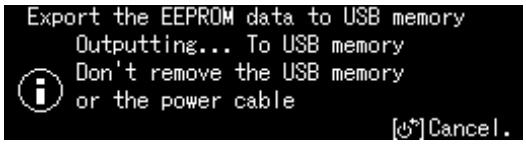
To quit editing, press the [POWER] key in the EEPROM editing screen to return to the maintenance menu.

8.6.3 USB (Export)

1. To export data, insert a USB flash drive into the USB connector on the left side of the balance (only on APW models).
2. On the maintenance menu, select [EEPROM] - [USB] - [Export].
   The menu item is not displayed if nothing is inserted in the USB port.
3. If the USB flash drive already contains an output file, then a warning is displayed.



4. Press the [OK] key to start the export.
   The EEPROM information is output as an "AP_EEPROM.TXT" file in the USB flash drive.

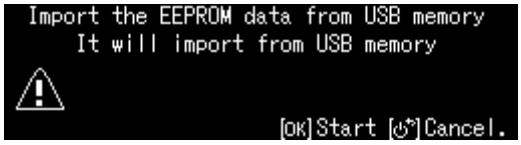


5. When the export is finished, the maintenance menu is displayed again.

- **Apply FAT32 format type USB memory only.**

8.6.4 USB (Import)

1. Insert a USB flash drive into the USB connector on the left side of the balance (only on APW models).
   Name the import file "AP_EEPROM.TXT1."
2. On the maintenance menu, select [EEPROM] - [USB] - [Import].
   The menu item is not displayed if nothing is inserted in the USB port.
3. An import confirmation message is displayed.



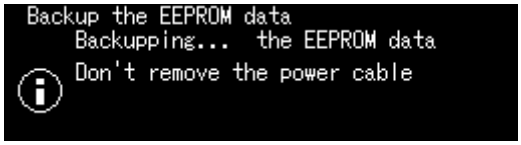
4. Press the [OK] key to read the "AP_EEPROM.TXT1" file from the USB flash drive and write it in the EEPROM.
5. When the import is finished, the menu is displayed again.

8.6.5 Backup

1. On the maintenance menu, select [EEPROM] - [Backup].
2. A backup confirmation message is displayed.



3. Press the [OK] key to save a backup of EEPROM data in the EEPROM backup area of flash memory.
4. A backup progress message is displayed.



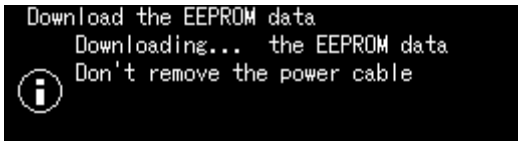
5. When the backup is finished, the maintenance menu A/D screen is displayed again.

8.6.6 Download

1. On the maintenance menu, select [EEPROM] - [Download].
2. A download confirmation message is displayed.



3. Pressing the [OK] key displays a message indicating data is being downloaded and the backup data saved on the computer flash memory is transferred to the EEPROM.



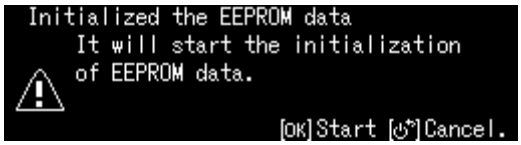
4. When the download is finished, the maintenance menu A/D screen is displayed again.

8.6.7 Initialize

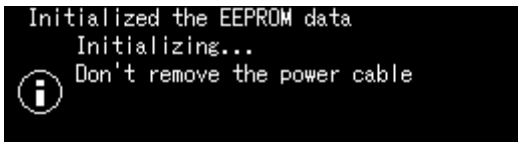
There are two methods available for initializing EEPROM data, described in the procedures below.

1. Initializing EEPROM data from the maintenance menu

(1) On the maintenance menu, select [EEPROM] - [Initialize].
(2) An initialization confirmation message is displayed.



(3) Press the [OK] key to start the process.
(4) The initializing progress display appears.



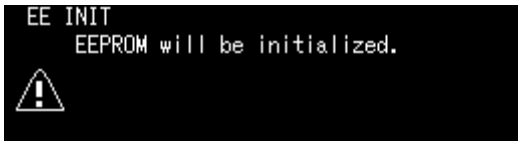
- **<u>Never disconnect the power supply during initialization</u>**

The interface is displayed in English after initialization.

2. Initializing EEPROM data when switching ON the power

(1) Hold down the [POWER] and [MENU] keys as the power is switched ON.

(2) An initialization confirmation message is displayed.



(3) Hold down the [OK] key to initialize all EEPROM data.
(To avoid initializing the data, unplug the power supply again.)

(4) After initialization, the password input screen appears for switching to the maintenance mode.



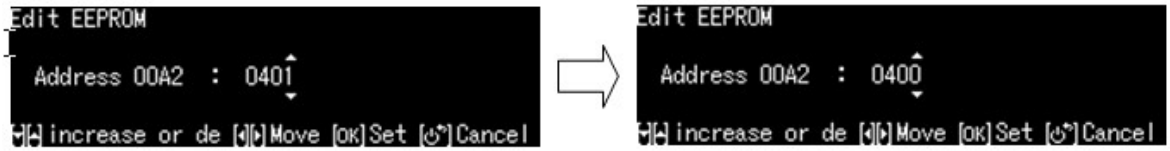
The interface is displayed in English after initialization.

9 Product Info Setting

In some cases, such as when replacing parts or a calibration error occurs, it may be necessary to release Setting Lock to adjust the settings.
Use the procedure below to release and enable Setting Lock.

9.1 Releasing Setting Lock

1. On the maintenance menu, select [EEPROM] - [Edit].
2. Enter the address "00A2" and then edit the last two bits of the data from "01" to "00".



3. Return to the maintenance menu and confirm that the [Product Info Setting] and [Setting Lock] menu items are displayed.

9.2 Enabling Setting Lock

1. On the maintenance menu, select [Setting Lock].



2. Change the setting from [off] to [on] and press the [OK] key.

- **Calibration error checking functions only when Setting Lock is enabled.**
  Therefore, if Setting Lock is released, even if an inappropriate weight is used during sensitivity calibration , or if an inappropriate calibration operation is performed , an inappropriate sensitivity calibration coefficient is calculated, which could affect the indicated measurement data.

10 Performance Inspection

Inspect the performance in an environment with no wind, vibration, or sharp temperature changes and after switching ON the power and letting the balance warm up in the mass measurement mode for at least one hour for 0.1 mg models or at least four hours for 0.01 mg models.
Be sure to confirm the performance by reading data after closing the door and waiting 30 seconds.

10.1 Repeatability Inspection

Place and remove weights indicated in Attached Table 1 in the center of the pan six times to determine the variability (Rx,Ry) in the zero point and weighing capacity.

$$R_x = X_{max} - X_{min} \quad : \quad X_1 , X_2 \ \ldots \ X_5$$
$$R_y = Y_{max} - Y_{min} \quad : \quad Y_1 , Y_2 \ \ldots \ Y_5$$

The subscript ("max" indicates the maximum value, and "min" the minimum value.)

10.2 Cornerload Error Inspection

1. Prepare the weights specified in Attached Table 1 for each model.
2. Successively place the weight in position 1, at the center of the pan shown in Figure 9-1, and at positions 2, 3, 4, and 5, located 0.6r line from the center (where "r" is the pan radius). Then place the weight in the center position 1 again and record the indicated value. (See Fig. 9-1.)
3. If the differences (cornerload error) between the values indicated at positions 2, 3, 4, and 5, and at the center position 1 are all within the specified criteria, the cornerload error is considered normal.
   Ex.
   (Error at position 3) = (Indicated value at position 3) - (Average of two indicated values at position 1)
4. Adjust minor errors according to 4.5 Adjusting the Cornerload Error.

- **Only adjust cornerload error for minor errors (within ± 30 counts of the criteria values). If the error is larger, replace the unit assembly (1).**
  Inspect the cornerload error at positions located 0.6r line from the center.

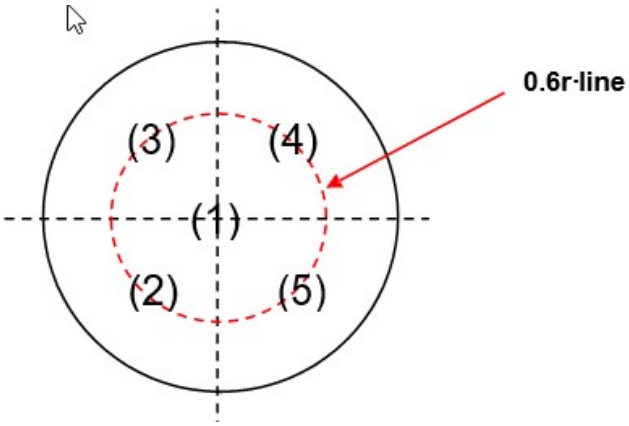


Fig. 11-1

10.3 Linearity Inspection

1. On the sensitivity calibration menu, select either [ADJ w/ INT weight] or [ADJ w/ EXT weight] and calibrate sensitivity one time.
2. Successively place weights at the observation points indicated in Attached Table 1, close the door, and wait about 30 seconds, until convection stops. Then record the indicated value. Wait the same amount of time for each load applied.
3. Calculate the error at each load.
   Error = (Display value at each load) - (Average of zero point display values) - (Weight certified value)
4. Adjust minor errors according to 5.5.2 Linearity.

- **Only adjust linearity for minor errors (within ± 10 counts of criteria values). If the error is larger, replace the unit assembly (1).**

10.4 Tilt Error

1. Remove any loads from the pan and press the [TARE] key so that "0 g" is indicated on the display. (A)
2. Insert a 1.5 mm thick shim under the fixed center foot at the back of the balance and record the indicated value after the value stabilizes. (B)
   Error = (B) - (A)
3. For errors levels greater than the criteria values, adjust the error according to 4.4 Adjusting the Tilt Error.

Attached Table 1 Inspection Criteria

0.01 mg Model		TAPB 100-5M-A	TAPB 200-5DM-A		TAPB 100-5DM-A	
Weighing capacity (g)		135	220	102	120	52
Minimum display (mg)		0.01	0.1	0.01	0.1	0.01
Repeatability (Rx, Ry)	Criterion (mg)	0.3	1	0.3	0.5	0.2
	Weight (g)	60	100	50	50	20
Cornerload error	Criterion (mg)	± 0.3	± 1	± 0.3	± 0.5	± 0.2
	Weight (g)	50	100	50	50	20
Linearity	Criteria (mg)	≤5 g: ± 0.1 ≤20 g: ± 0.2 20 g <: ± 0.3	≤50 g: ± 0.5 50 g <: ± 1.0	≤5 g: ± 0.1 ≤20 g: ± 0.2 20 g <: ± 0.3	≤50 g: ± 0.5 50 g <: ± 1.0	≤5 g: ± 0.1 ≤20 g: ± 0.2 20 g <: ± 0.3
	Weight (g)	0 130 0 5 20 50 70 100 0 130 0	0 220 0 50 100 150 200 0 220 0	0 100 0 5 20 50 70 0 100 0	0 120 0 20 50 70 100 0 120 0	0 50 0 5 10 20 30 0 50 0

0.1 mg model		TAPB 300-4M-A	TAPB 200-4M-A	TAPB 100-4M-A
Weighing capacity (g)		320	220	120
Minimum display (mg)		0.1	0.1	0.1
Repeatability (Rx, Ry)	Criterion (mg)	1	1	1
	Weight (g)	150	100	50
Cornerload error	Criterion (mg)	± 1	± 1	± 0.5
	Weight (g)	100	100	50
Linearity	Criteria (mg)	≤50 g: ± 0.5 ≤200 g: ± 1.0 200 g <: ± 1.5	≤50 g: ± 0.5 ≤200 g: ± 1.0 200 g <: ± 1.5	≤50 g: ± 0.5 50 g <: ± 1.0
	Weight (g)	0 320 0 50 100 200 300 0 320 0	0 220 0 50 100 150 200 0 220 0	0 120 0 20 50 70 100 0 120 0

11 Troubleshooting

11.1 General Problems and Solutions

Problem	Cause	Measures
Part of displayed numbers or symbols does not appear.	1) OLED assembly (71) failure	Replace the OLED assembly (71).
"OL" or "-OL" is displayed.	1) 0.1 mg model: Contact between stopper plate (64) and stabilizer pin 0.01 mg model: Contact between stopper plate (64) or OPF stopper (100) and stabilizer pin	Realign the stopper.
	2) Pt-Ni band (86) failure	Check the Pt-Ni band (86) and connect it correctly.
	3) Detector assembly (43) failure	Replace the detector assembly (43).
	4) Main board assembly (40) failure	Replace the main board assembly (40).
Large zero or span drift	1) Inadequate warmup time	Warm up the balance.
	2) Instrument exposure to direct sunlight or draft from an air conditioner	Relocate the balance.
Span is incorrect.	1) P-CAL changed.	Adjust P-CAL and, if necessary, linearity.
	2) OPF damage	Replace the unit assembly (1).
Large cornerload error (±30 counts or more)	1) OPF damage	Replace and readjust the unit assembly (1).
Poor measurement repeatability Large fluctuation in display values Unstable stability indicator illumination	1) 0.1 mg model: Contact between stopper plate (64) and stabilizer pin 0.01 mg model: Contact between stopper plate (64) or OPF stopper (100) and stabilizer pin	Realign the stopper.
	2) Temperature sensor failure	Re-solder the temperature sensor wire to the detector assembly (43).
	3) Main board assembly (40) failure	Replace the main board assembly (40).
	4) Detector assembly (43) failure	Replace the detector assembly (43).
Large linearity error	1) Linearity adjustment failure	Readjust linearity. If ± 10 counts or more, replace the unit.
	2) OPF damage	Replace the unit assembly (1).
Nothing is displayed on the display unit.	See 11.1 Display Won't Appear.	
Key operation disabled	See 11.2 Key Operation Does Not Work.	
Check process does not finish when power is switched ON.	See 11.4 Check Process Does Not Finish When Power Is Switched ON.	
Error is displayed. Errors are displayed in error log display.	See 10.2 Error Display.	

11.2 Error Display

When an error occurs, the following type of error message is displayed. Important errors include an error number, displayed at the end of the message.



Numbered errors are also recorded in the error log, which can be viewed by clicking [Error Log] on the maintenance menu. An example of a displayed error log is shown below.



During maintenance, use these error numbers to identify and resolve errors that have occurred. AP-series error numbers are listed in next page.

If an error occurs, use the corresponding error number to reference the corresponding information in the table below.

Type	Error Message	Error No.	Error Log Display	Description	Reference
System error	Temperature sensor error. Contact a service representative. (2)	2	Temp sensor err	Caused by a signal failure from the temperature sensor installed on the unit.	**14.3. Temperature Sensor Error**
	Memory error. Contact a service representative. (4)	4	EEPROM data err	Abnormal EEPROM data	**14.6. EEPROM Data Error**
	Internal weight loader error Contact a service representative. (5)	5	Weight Loader err	Problem with the internal weight loader unit.	**14.5. Weight Loader Malfunction**
	Inner communication error Contact a service representative. (6)	6	Disp CPU com err	Communication error with display board CPU	**14.7. Display CPU Communication Error**
Sensitivity calibration error	Adjustment with external weight Weight load is undetectable. Please retry adjustment. (35)	35	CAL:Ref weight err	Calibration weight not placed on the pan.	**14.9. Sensitivity Adjustment Error (E-CAL)**
	Zero point shift is large. Please remove items from the pan. Or, reconnect AC adapter.	-	-	The load on the pan before starting calibration (zero point) exceeds 20 % of the weighing capacity.	-
	Adjustment of the internal weight. Retry after the following contents. - Don't touch the Balance. (34)	34	CAL:Ref weight err	The calibration weight is wrong.	**14.9. Sensitivity Adjustment Error (E-CAL)**
	Adjustment with external weight Retry after the following contents. - Remove items from the pan.	32	CAL:Zero point err	The zero point has deviated by ±2 g or more since the previous sensitivity calibration.	**14.9. Sensitivity Adjustment Error (E-CAL)**
	Adjustment with external weight Retry after the following contents. - Check the weight value. - Don't touch the Balance. (34)	34	CAL:Span err	The span has deviated since the previous sensitivity calibration. (Equivalent to CAL E4 on AT-series models.)	**14.9. Sensitivity Adjustment Error (E-CAL)**
	Adjustment with external weight Retry after the following contents. - Don't touch the Balance. - Choose a position which is stable, free from vibration and drafts. (31)	31	CAL:Unstable err	Instability error (Equivalent to CAL E1 on AT-series models.)	**14.9. Sensitivity Adjustment Error (E-CAL)**
Periodic inspection error	Zero point shift is large. Please remove items from the pan. Or, reconnect AC adapter.	-	-	The load on the pan before starting calibration exceeds 20 % of the weighing capacity.	-
	Retry after the following contents. - Check the weight value. - Don't touch the Balance. (53)	53	INS:Ref weight err	The weight is wrong.	**14.9. Sensitivity Adjustment Error (E-CAL)**

	Retry after the following contents. - Don't touch the Balance. - Choose a position which is stable, free from vibration and drafts. (51)	51	INS:Unstable err	Instability error	**14.9. Sensitivity Adjustment Error (E-CAL)**
Ionizer error	Ionizer error. Retry after the following contents. - Check the COM cable connect. - Check the switch power on. - Check the AC adapter connect. (101)	101	Ionizer error	Cannot communicate with connected optional ionizer.	**14.10. Ionizer Error**
	Turn off the power and stop use. Contact a service representative.	102	Ionizer error	The connected optional ionizer has failed. (Error occurred during ion emission.)	**14.10. Ionizer Error**
Number entry error	Password error. Password incorrect.	-	-	If a function that requires a password is used, the entered password is not approved.	-
	Wrong value setting error The inputted value is out-of-range. Please input the value again after confirming the input range.	-	-	The comparator/target measurement value entered is incorrect. Out of range, upper/lower limits are opposite, etc.	-
	Unit conversion coefficient error Zero '0' can not be set.	-	-	The user unit conversion coefficient is set to zero.	-
	mol conversion coefficient error Zero '0' can not be set.	-	-	The mol conversion coefficient is set to zero.	-
Operating error	(No message is displayed, but lack of sound emitted when keys are operated indicates the operation was disabled.)	-	-	Operating error in specific gravity, loading, formulation, or other modes.	-
External input error	(No message is displayed, but the icon changes to indicate an error.)	-	-	Unrecognizable command code was received.	-
Overload	("OL" or "-OL" is displayed.)	-	-	A load exceeding the weighing capacity was applied. The weighing pan is removed.	-
Initial zero point error	Zero point error. Some loads are applied. Retry after the following contents. - Remove items from the pan. - Reconnect AC adapter.	70		Initial zero point on the type approval model is out of range.	**14.11. Initial Zero Point Error (only for type approval models)**
USB flash drive error	USB memory error Available memory is low.	-	-	The USB flash drive contains no free space.	-
	USB flash drive write error Unable to write to USB flash drive.	-	-	Cannot write to USB flash drive, due to insufficient memory capacity, write protection, no connection, or other reason.	-
	USB flash drive write protect error USB flash drive is write protected.	-	-	USB flash drive is write protected.	-

Unit weight value or reference value error	Unit weight error. Unit weight is too light.	-	-	Unit weight value is less than the minimum display value.	-
	Reference weight error. Reference weight is too light.	-	-	Reference mass is zero.	-
No registered recipe error	Recipe error Element are not registered. Please register elements.	-	-	No elements are registered in recipe.	-
PSC start	Automatic adjustment. Adjustment starts. Remove items from the pan and wait.	-	-	Start automatic sensitivity	-
	Adjustment with external weight Use the standard weight.	-	-	Start manual sensitivity adjustment.	-
Timer calibration start	Clock adjustment. Remove item from the pan and wait for a while. If adjustment doesn't start, reconnect AC adapter.	-	-	Indicates that timer calibration has started.	-
Calibration command (only for APY and type approval models)	Adjustment with external weight Use the standard weight.	-	-	Indicates that measurement cannot be continued unless sensitivity is adjusted.	-
Low power supply voltage	(No message is displayed, but battery indicator illuminates while voltage is too low or high.)	3	Power voltage err	Power supply voltage is low.	**14.12. Power Supply Voltage Error**
USB overcurrent	USB over current error USB device over current status detected.	-	-	USB device consumes excessive power.	-
Waiting for operating permission	Example: Saving. Please wait.	-	-	Waiting for operation permission to prevent unnecessary key operations while writing sensitivity correction coefficients to NVRAM, for example.	-
Action aborted	Example: Adjustment with an external. Adjustment abort.	-	-	The sensitivity adjustment or reference value setting action was aborted.	-
Low free space in USB flash drive	(No message is displayed, but icon illuminates to indicate error.)	-	-	Free space in USB flash drive is less than 1 MB.	-
Confirmation of settings output	Setting information output Output information?	-	-	Confirm whether it is OK to output settings.	-
Menu reset confirmation	Menu reset. Return the settings to the default settings.	-	-	Confirm whether it is OK to reset the menu.	-
Number entry error	Date set error. The input date is wrong.	-	-	The date setting is incorrect.	-
	Time set error. The input time is wrong.	-	-	The time setting is incorrect.	-

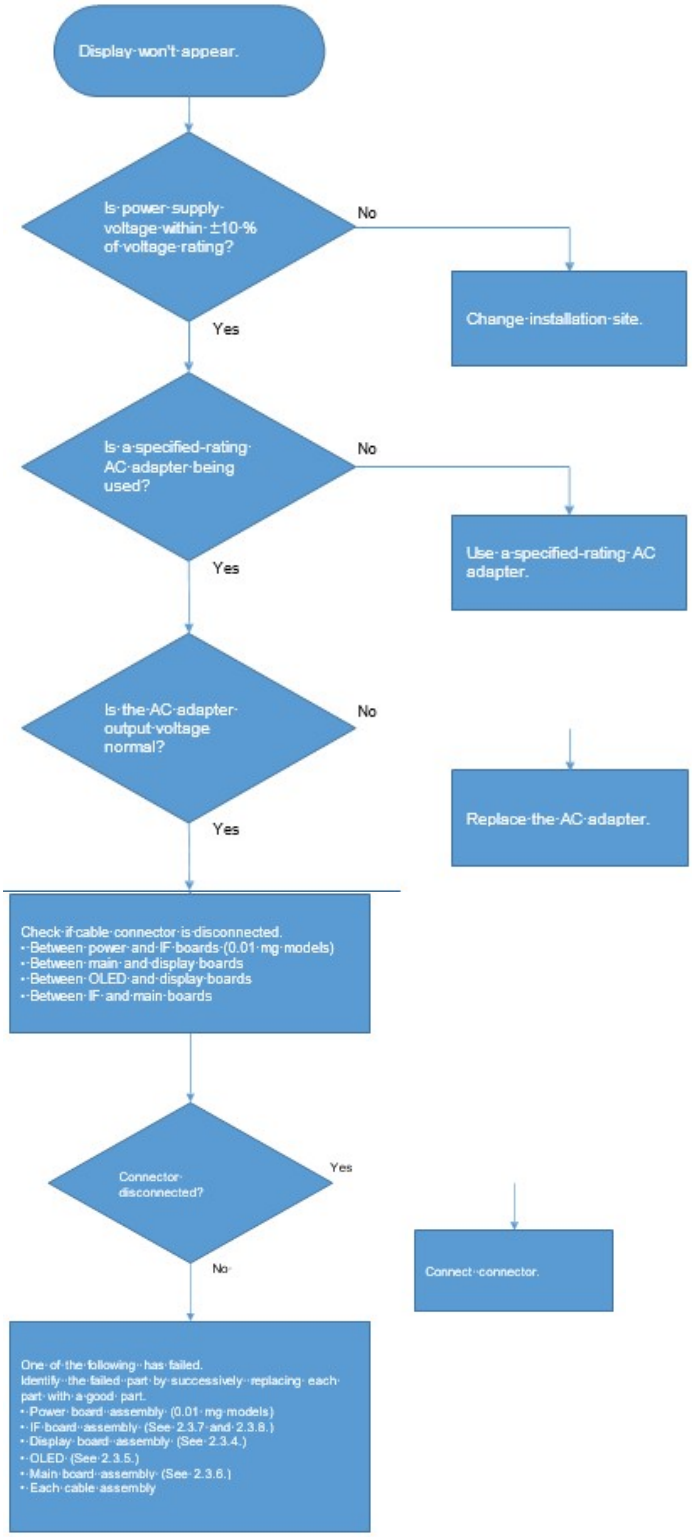
11.3 Items Checked When Switching the Power ON

The following items are checked when switching the power ON.

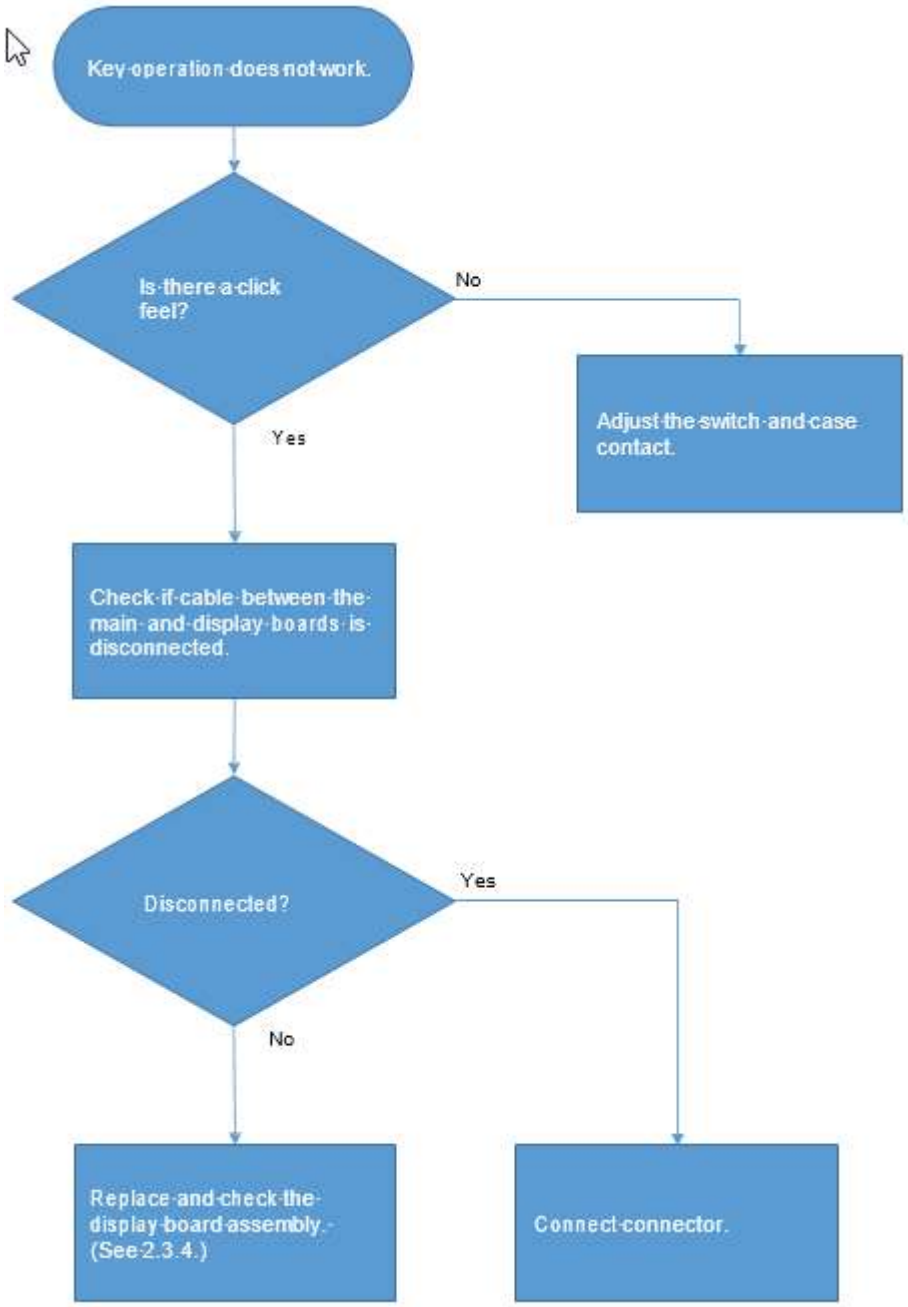
Bar Progress	Description
30 % or less	Launches the software. Sets the volume and brightness levels.
30 % or more	Read data from EEPROM.
50 % or more	Initializes weighting parameters and P and I parameters.
60 % or more	Resets internal weights to origin point.
70 % or more	Finishes and checks resetting internal weights to origin point. Checks initial zero point for type approval models.
90 % or more	Sets initial zero point.

12 Troubleshooting Flowchart

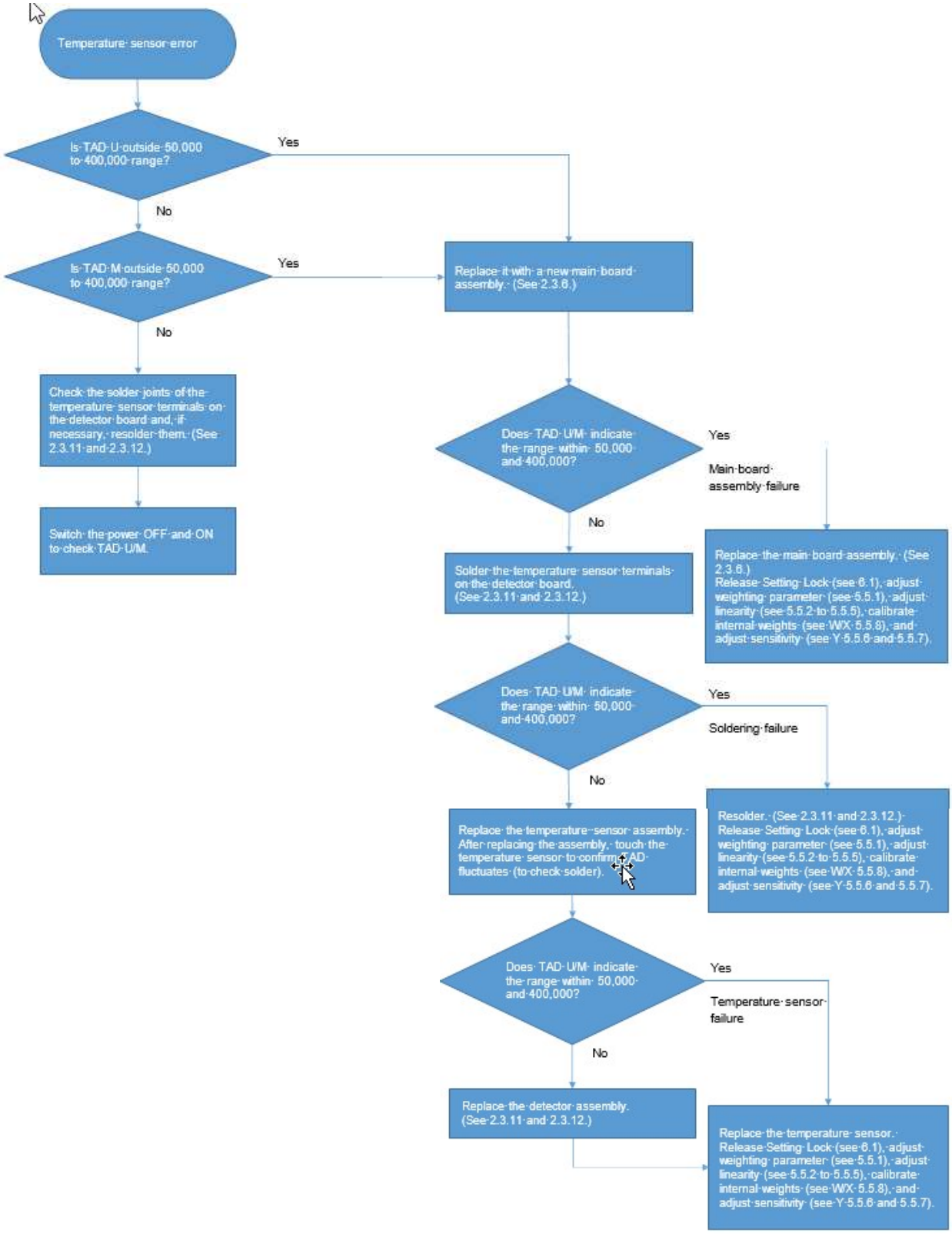
12.1 Display Won't Appear



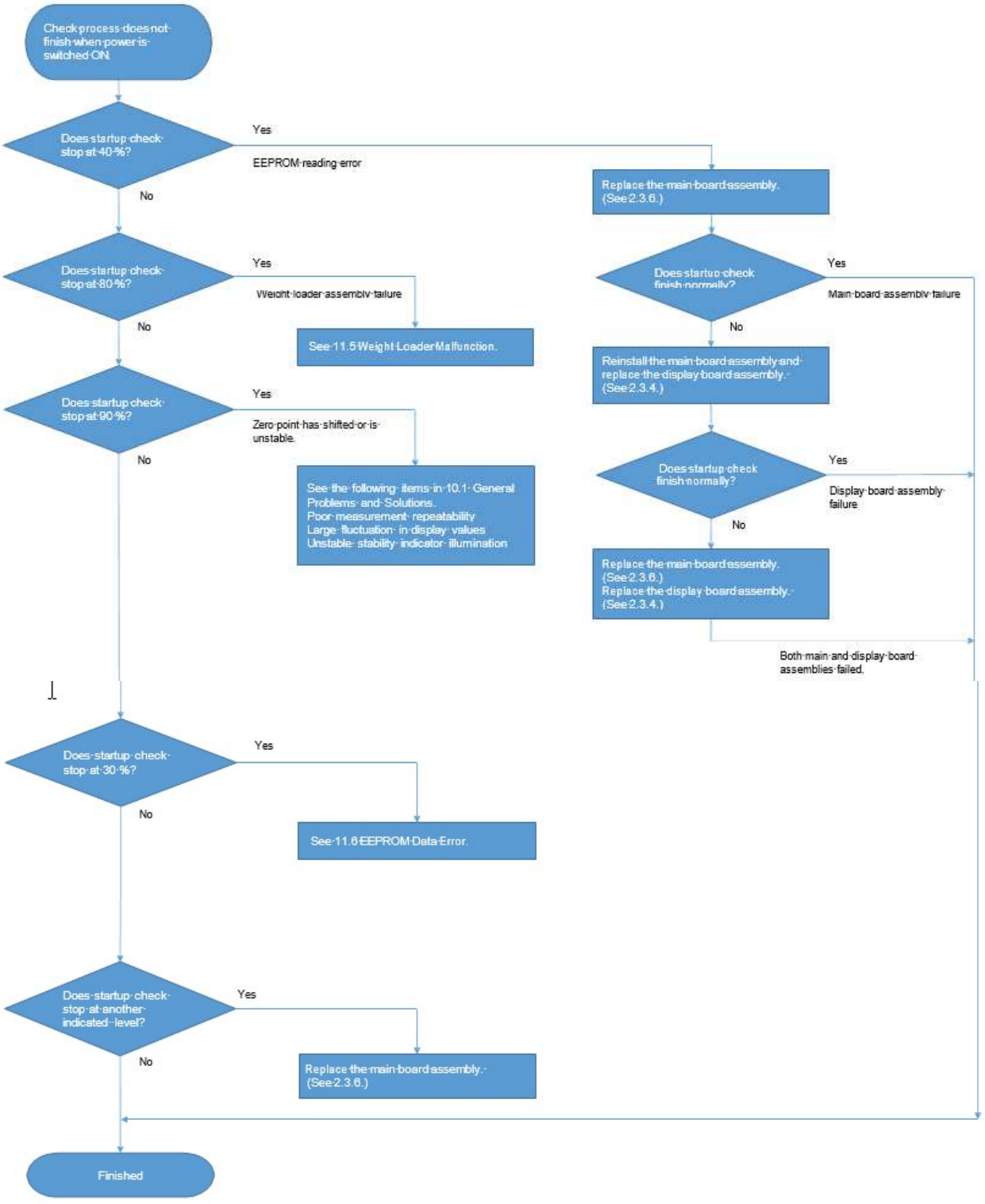
12.2 Key Operation Does Not Work



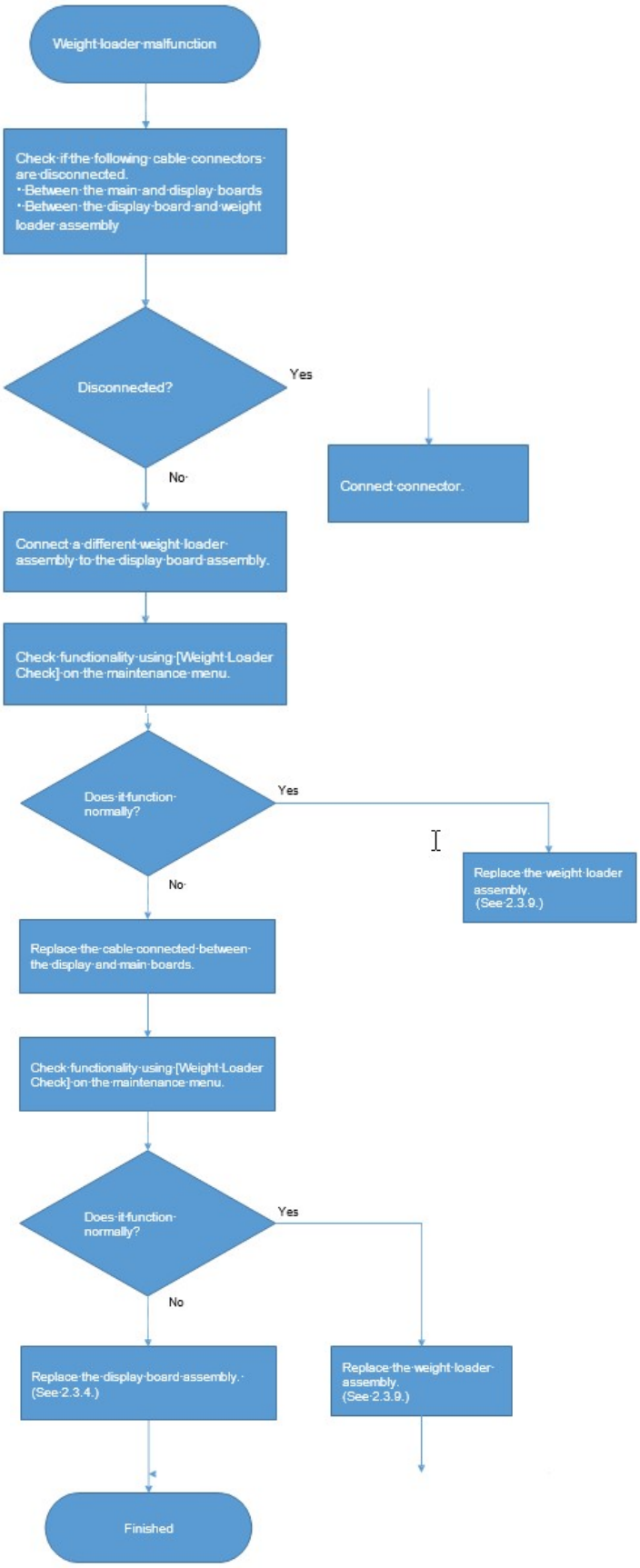
12.3 Temperature Sensor Error



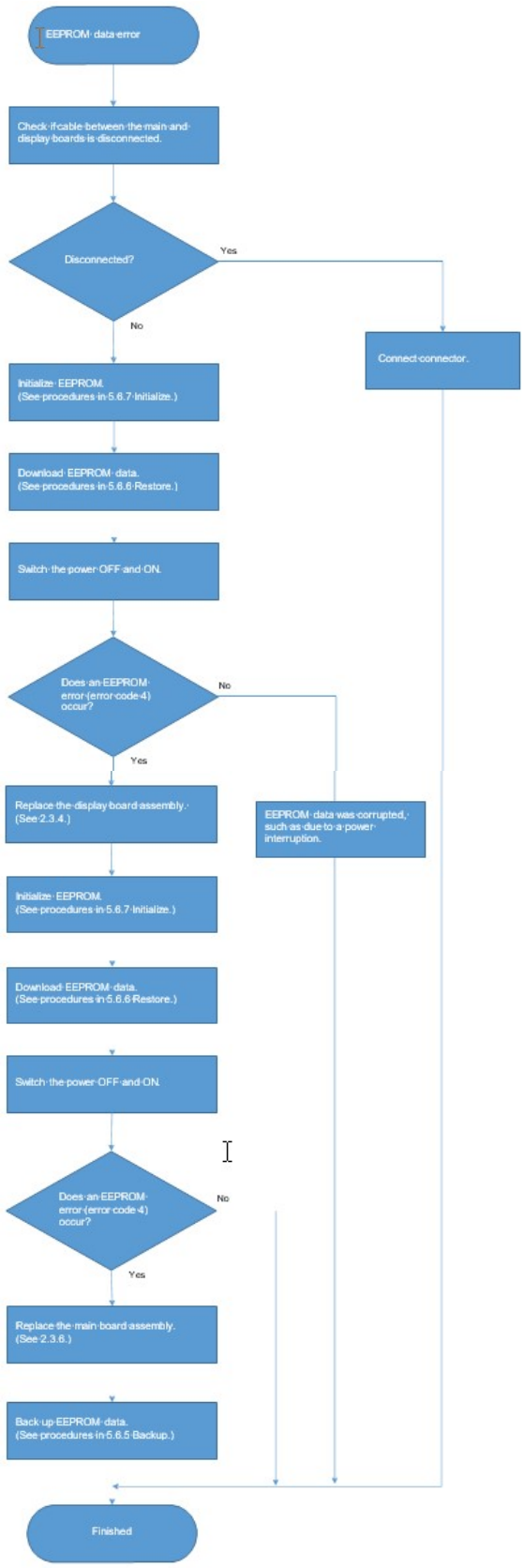
12.4 Check Process Does Not Finish When Power Is Switched ON



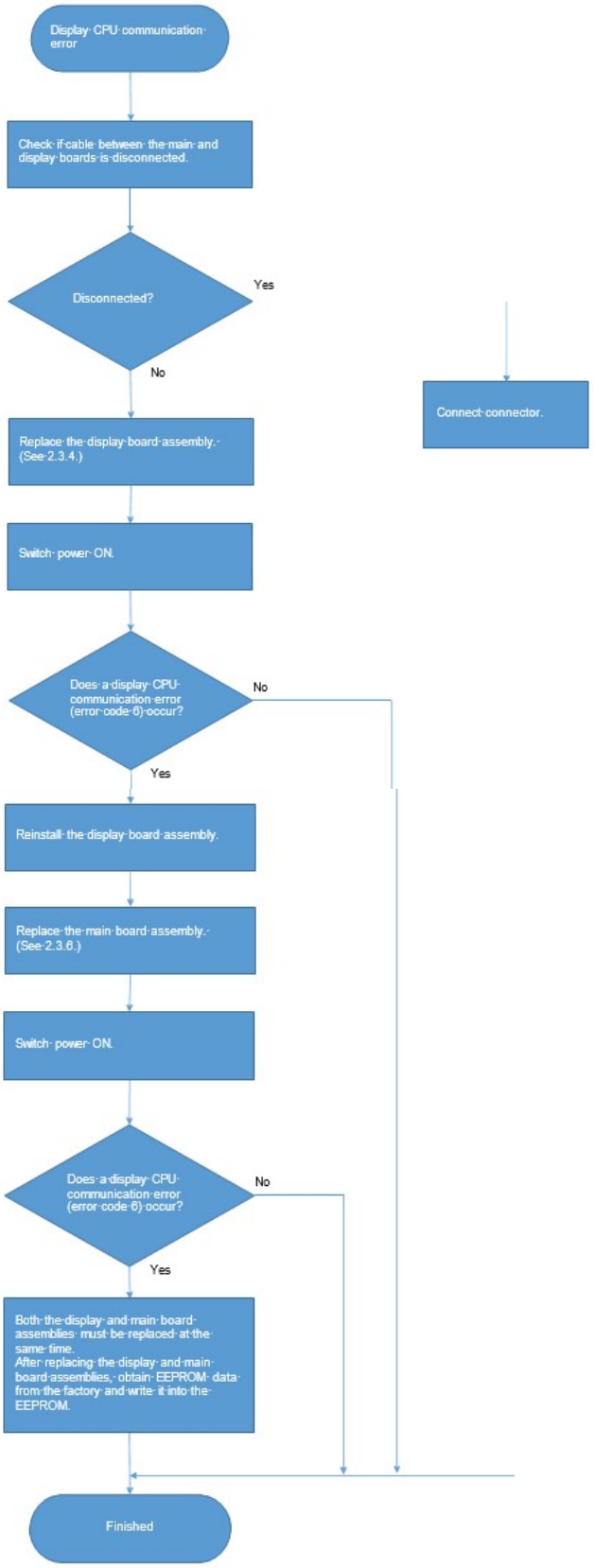
12.5 Weight Loader Malfunction



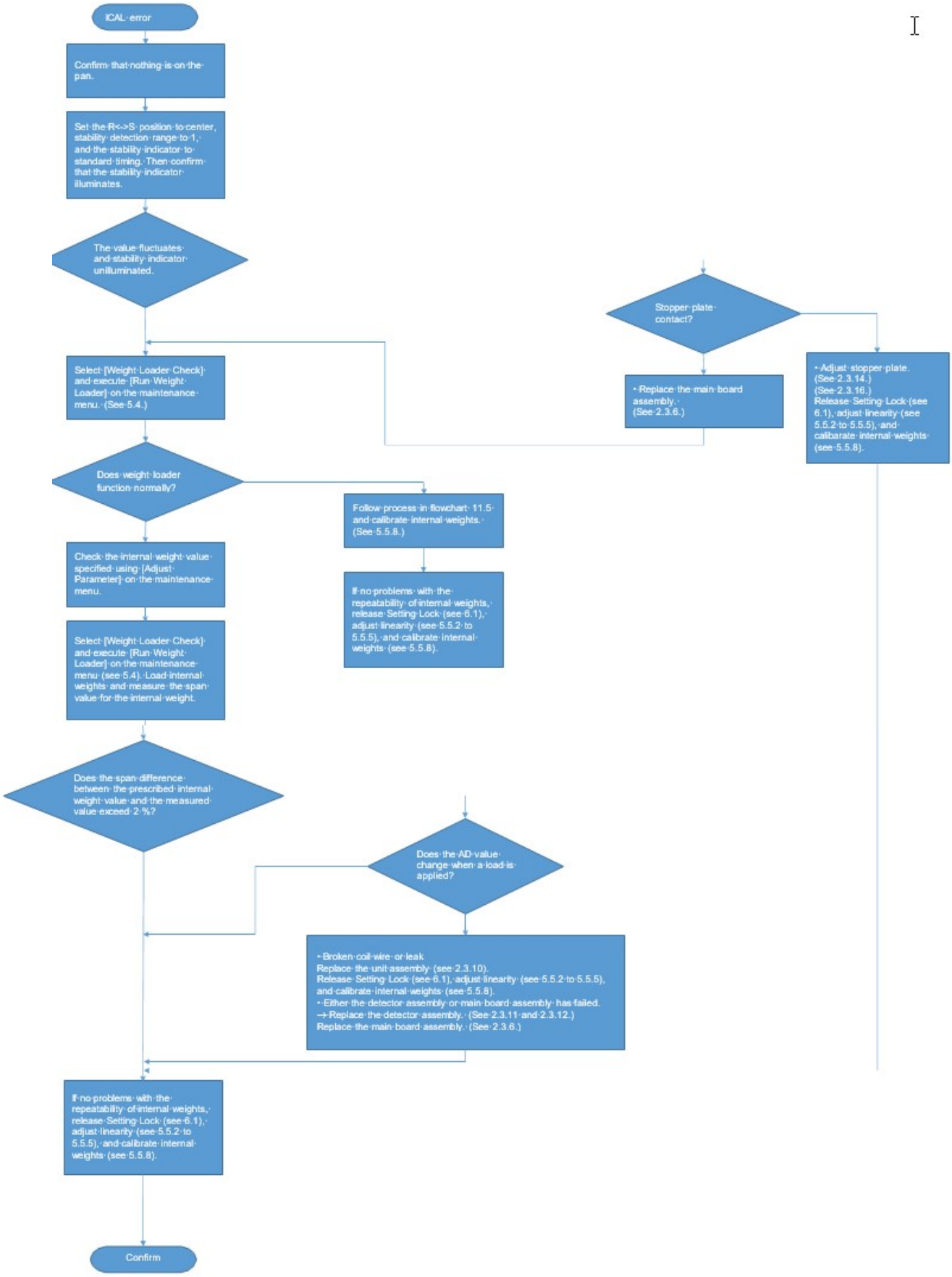
12.6 EEPROM Data Error



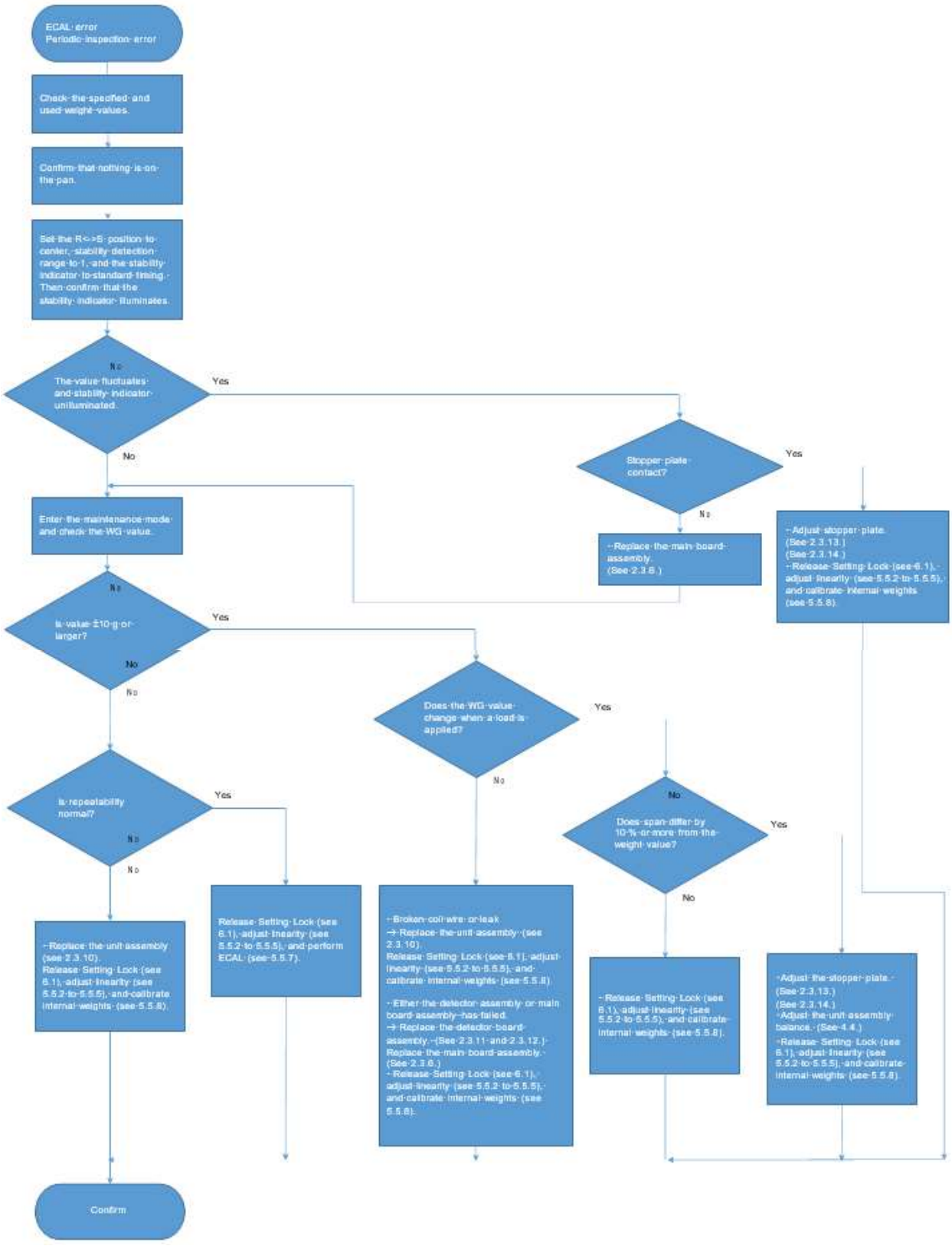
12.7 Display CPU Communication Error



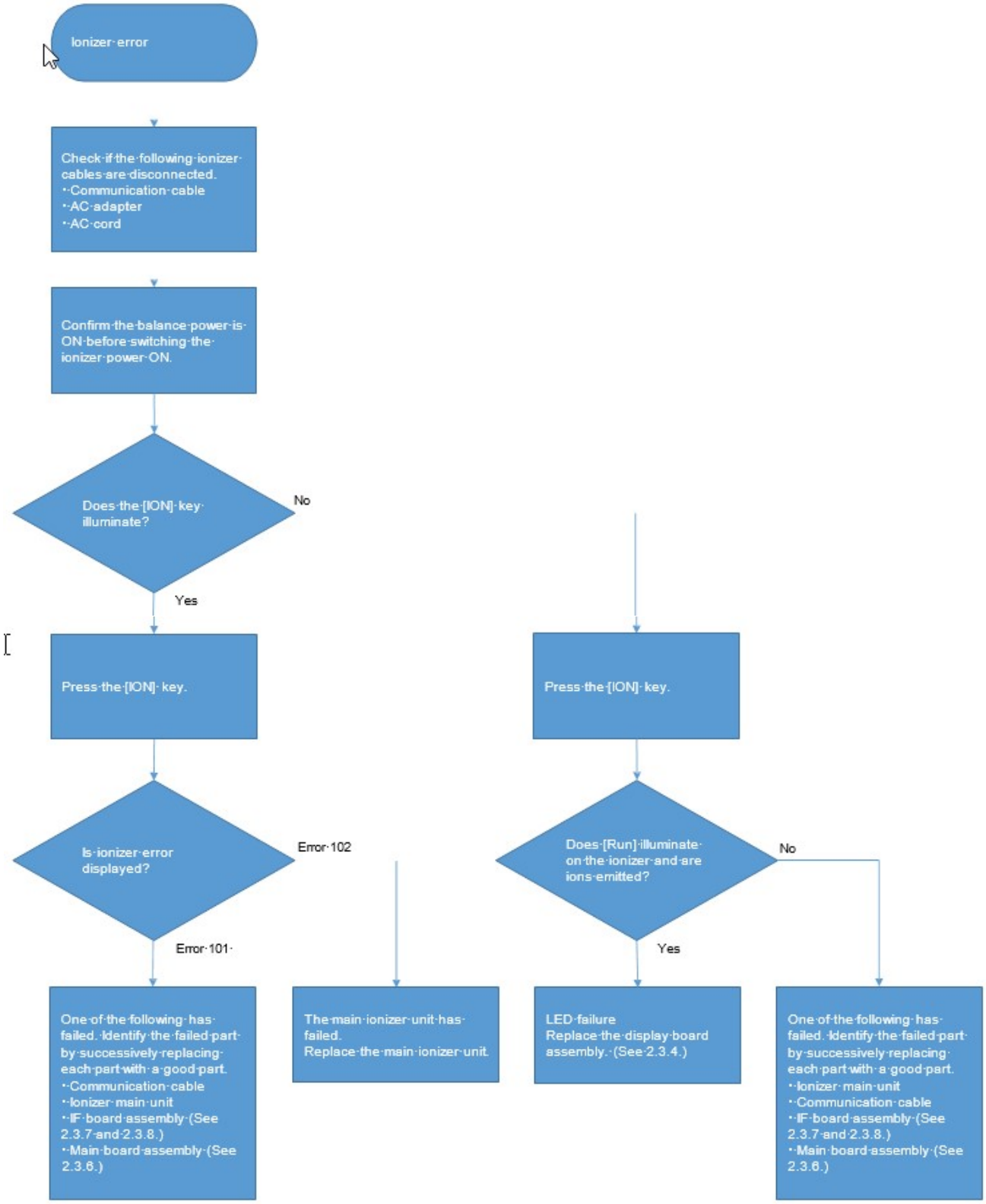
12.8 Sensitivity Adjustment Error (i-CAL)



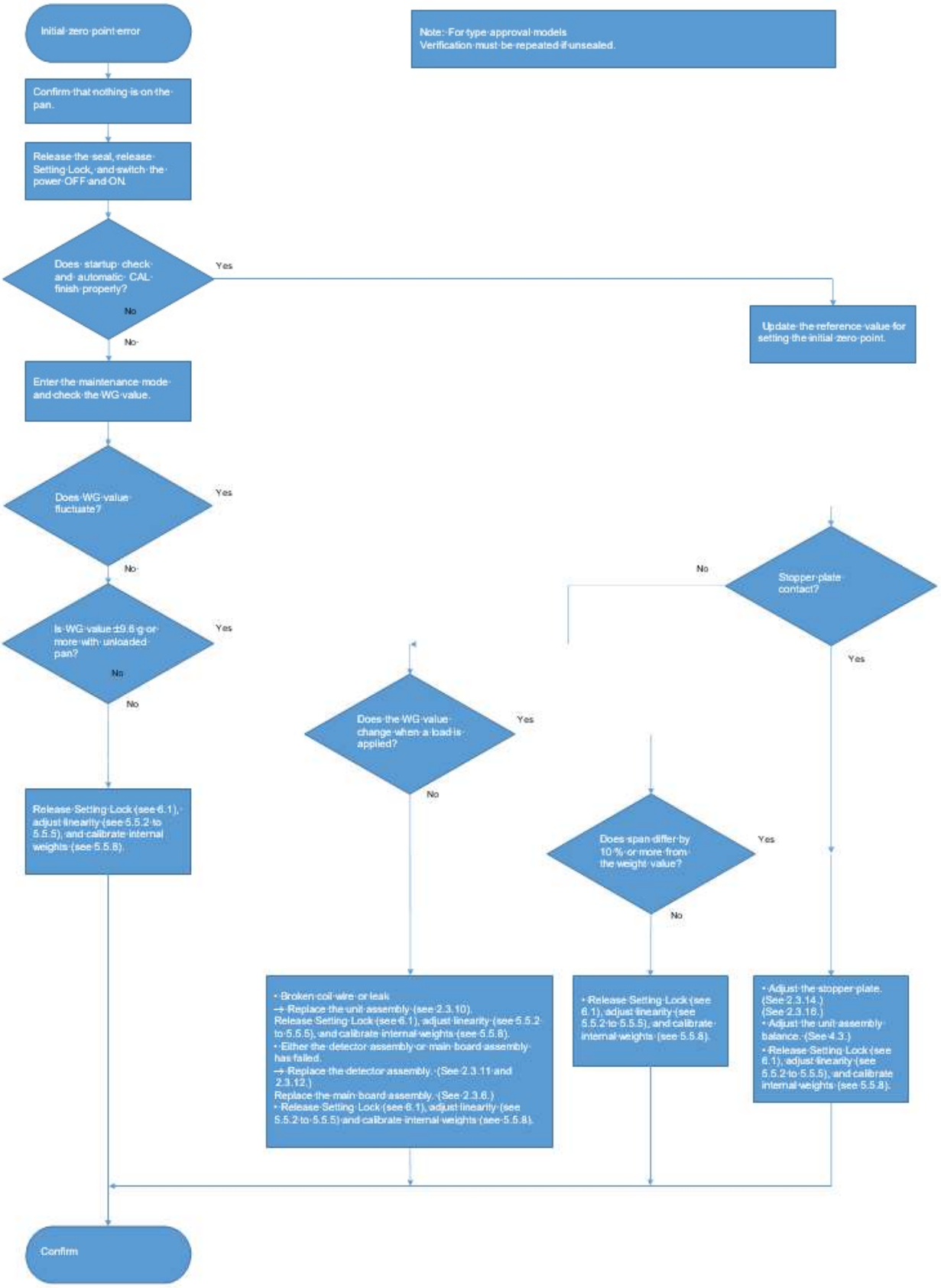
12.9 Sensitivity Adjustment Error (E-CAL)



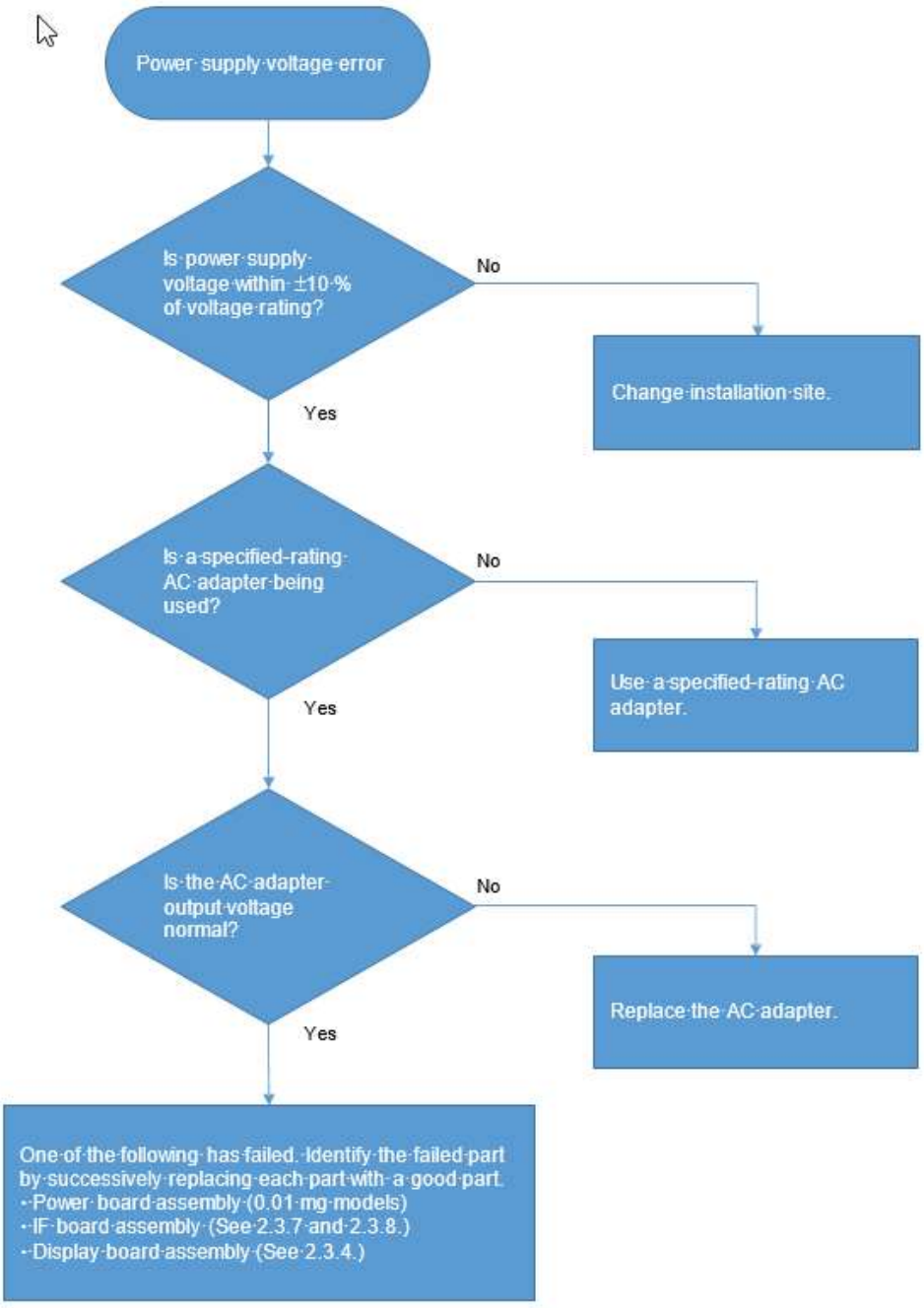
12.10 Ionizer Error



12.11 Initial Zero Point Error (Only for Type Approval Models)



12.12 Power Supply Voltage Error



12.13 AP Series Dedicated Jigs

No.	Description	P/N	Remarks
J1	OPF POSITIONING PIN JIG	321-70258-12	50 mm long, inserted from above OPF
J2	OPF FIXED PIN ASSY	321-74045-01	50 mm long, for 0.01 mg models
J3	UNIT ASSEMBLY POSITIONING JIG	775-22438-05	Set for 0.1mg and 0.01mg models 775-22438-04 is only for 0.1 mg models 775-22438-03 is on;y for 0.01mg models
J4	HANDLE FOR CORNER ADJUSTMENT	321-69205	Common for UniBloc models
J5	GRIND STONE	321-69206	Common for UniBloc models
J6	LOCATION LOADER ASSY	775-22444-01	
J7	JIG, OPF STOPPER LOCATING	321-72673-01	For 0.01 mg models
J8	SCREW, SST FLAT HEAD M3X5	020-12103	For 0.01 mg models
J9	SLEEVE POSITIONING JIG	775-22448-01	For 0.1 mg models in initial lot
		775-22448-02	For 0.1 mg and 0.01 mg models
J10	SHORTING SOCKET	774-41795-01	Hexagonal bit, with 10 mm diagonal, for tightening pan supporter shaft
J11	JIG CABLE	775-22349-41	Extension cable, 13 pin, 200 mm
-	AP STANDARD JIG SET	775-22450-01	Set of all J1 to J11
J21	USB CABLE SET	321-71730-41	With USB driver CD