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Servicemanual
Analytical balance

KERN TABP-AM-A

Version 1.0
07/2025
GB



GB

KERN TABP-AM-A

Version 1.0 01/2025

Servicemanual

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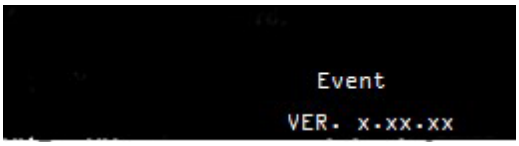
1 Operating Instructions for Adjustment and Maintenance

For general operating instructions, refer to the TABP-A Series Instruction Manual.

1.1 Entering the Maintenance Mode

Use the following procedure to switch from the user mode 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



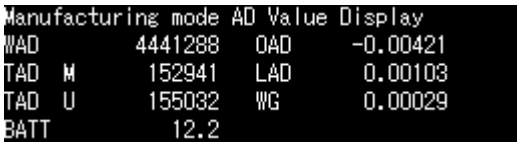
- With either the mass or error messages displayed in the user mode, hold down the [POWER] and [MENU] keys for at least three seconds.
- Release the two keys.
- Hold down the [1d/10d] and [O/T] keys for at least three seconds.
- The password input/display screen is displayed.



- Use the arrow keys to input numbers.
  Enter “00321” as the password and then press [OK] key.



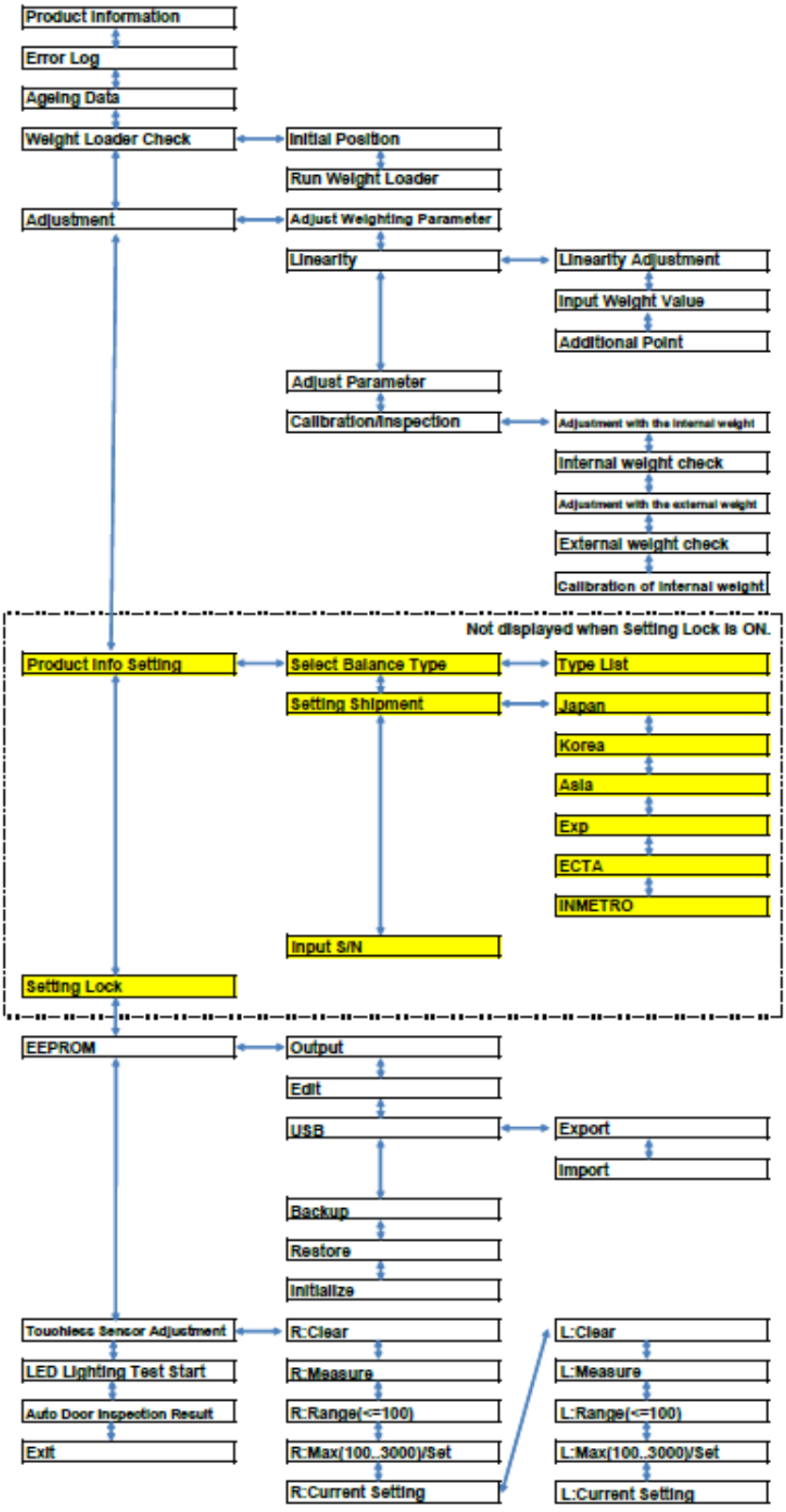
- When the password is approved, the maintenance mode opens.



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

1.2 Maintenance Mode Menus

The maintenance mode menu is configured as shown below.
Menu items indicated within a dashed line are hidden when Setting Lock is ON.



1.3 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. (A gentler smoothing function is applied than for displayed weight values.)
	Magnet area temperature display (TAD M)		Displays a digital value of the temperature near the magnet.
	UniBloc area temperature display (TAD U)		Displays a digital value of the temperature near the UniBloc (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 12 V).
Product Information			Displays the type name, version (main CPU ver. : display CPU ver. : FPGA ver.), serial number, delivery site, type approval model adjustment log counter, and checksum information. 
Error Log			Displays the type and date/time of the five most recent errors.
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		Adjusts the PWM voltage value output based on the weighting parameter resistance.
	Linearity	Linearity Adjustment	Makes adjustments for calculating fifth-order linearity correction coefficient.
		Input Weight Value	Enter reference weight values used for fifth-order linearity adjustment.
		Additional Point	Uses a linear equation 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.
		Japan	

	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 EEPROM to an external printer.
	Edit		Edits data saved in EEPROM on balance display unit.
	USB		Exports data saved in EEPROM to a USB flash drive or imports data saved on a USB flash drive.
	Backup		Of the data saved in EEPROM, backs up temperature correction coefficient, linearity correction coefficient, and model setting status data (EEPROM data) to flash drive.
	Restore		Writes to EEPROM the above data (EEPROM data) backed up in flash drive.
	Initialize		Initializes all data saved in EEPROM.
Adjust Touchless Sensor Sensitivity	R:Clear		Clears the measurement, range, and maximum values displayed for the right touchless sensor and displays “0000.”
	R:Measure		Displays the right touchless sensor measurement value. Place the jig in the sensor position and press the [OK] key to display the measurement value.
	R:Range (≤ 100)		Displays the difference between the maximum and minimum values from multiple right measurement values. The setting value cannot be updated unless this value is 100 or less.
	R:Max(100..3000)/Set		Displays the maximum measurement value by the right touchless sensor. Press the [OK] key to save the displayed value in the EEPROM and write the setting value (response distance adjustment) into the touchless sensor. The setting value cannot be updated unless the measurement values are between 100 and 3000 and the range is 100 or less. If the setting is disabled, then the default value of 100 is set whenever power is supplied. That can result in a wider touchless sensor response range. (The blue LED illuminates in response to touchless sensor checking jig A.)
	R:Current Setting		Displays the sensor output value when the touchless adjustment jig is placed and that is specified as the right touchless sensor setting.
	L:Clear		Clears the measurement, range, and maximum values displayed for the left touchless sensor and displays “0000.”
	L:Measure		Displays the left touchless sensor measurement value. Place the jig in the sensor position and press the [OK] key to display the measurement value.
	L:Range (≤ 100)		Displays the difference between the maximum and minimum values from multiple left measurement values. The setting value cannot be updated unless this value is 100 or less.

	L:Max(100..3000)/Set	Displays the maximum measurement value by the left touchless sensor. Press the [OK] key to save the displayed value in the EEPROM and write the setting value (response distance adjustment) into the touchless sensor. The setting value cannot be updated unless the measurement values are between 100 and 3000 and the range is 100 or less. If the setting is disabled, then the default value of 100 is set whenever power is supplied. That can result in a wider touchless sensor response range. (The blue LED illuminates in response to touchless sensor checking jig A.)
	L:Current Setting	Displays the sensor output value when the touchless adjustment jig is placed and that is specified as the left touchless sensor setting.
LED Lighting Test Start		Illuminates the blue LED used to indicate touchless sensor detection and the red LED used to indicate an error. Each indicator is illuminated for about three seconds.
Auto Door Inspection Result		Displays the results for the automatic door inspection performed automatically during manufacturing. Changes the result display by [↓] key, R(Right), L(Left), U(Upper).
Exit		Exits the maintenance mode.

Use the arrow keys to move between items.

Key	Description
[→]	Moves to a 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.

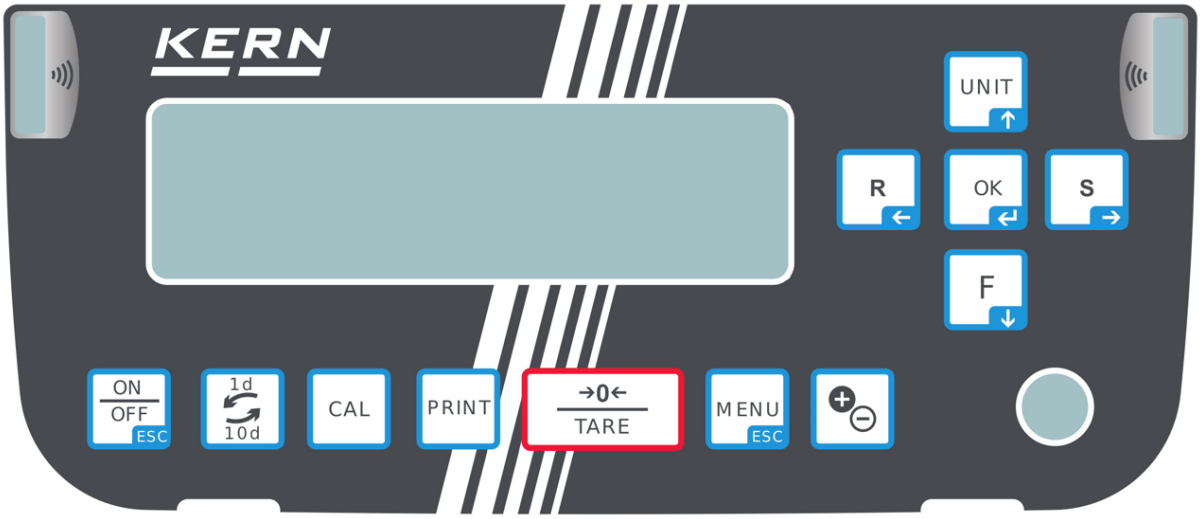
- For instructions on releasing Setting Lock, refer to 6.1 Releasing Setting Lock.

Normal setting ranges (guidelines) are indicated below.

Span Temperature Coefficient before Aging (ppm/°C)	±20 (10 to 30 °C)
Span Temperature Coefficient after Aging (ppm°C)	± 2 (10 to 30 °C)
Zero Temperature Drift before Aging (mg/°C)	±10 (10 to 30 °C)
Zero Temperature Drift after Aging (mg/°C)	±5 (10 to 30 °C)

		Zero	Span
WAD	TABP 220-5AM-A TABP 220-5DAM-A	3,200,000 to 4,800,000	200 g: 22,000,000 to 30,000,000
	TABP 135-5AM-A TABP 120-5DAM-A	3,200,000 to 4,800,000	100 g: 11,000,000 to 15,000,000
	TABP 320-4AM-A TABP 220-4AM-A	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	TABP 220-5AM-A TABP 220-5DAM-A TABP 135-5AM-A TABP 120-5DAM-A	-3.1 to 10.1 (g)	
	TABP 320-4AM-A	0 ± 22.4 (g)	
	TABP 220-4AM-A	0 ± 15.4 (g)	
WG		0 ± 10 (g)	
BATT		12 ± 0.9 (V)	

1.4 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.

3 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

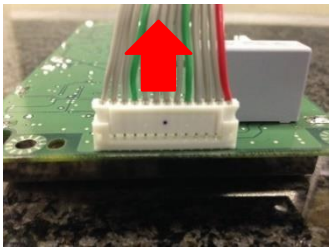
2 Basic Balance Disassembly/Assembly/Procedures

2.1 Precautions for Disassembling or Reassembling the Balance

2.1.1 Disconnecting Connectors

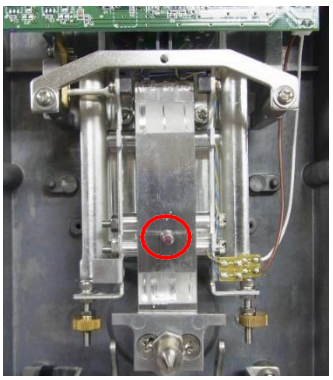
Disconnect connectors by pulling them straight out. Never pull it out at an angle.

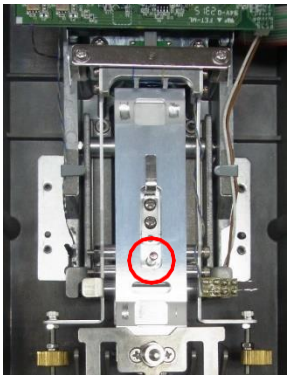
- Pulling out at a bent angle could bend the terminal pins, making it difficult to reinsert the connector.



2.1.2 Assembling and Adjusting the Unit Assembly

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).





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

2.2 Inspecting the Balance Interior

2.2.1 Disassembling the Case

1) Disconnect the AC adapter and remove the pan (6), pan supporter assembly (3), side glass assemblies (25 and 26), top glass assembly (27), and so on. 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 M4 × 16 screws from the bottom of the balance, located toward the front and back.





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) from the display board assembly (41).

Do not pull on the cable from the touchless sensor board assembly or bend the touchless sensor board assembly metal mounting brackets.

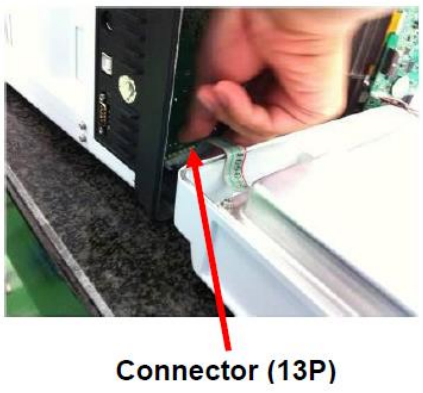


Fig. 2-6

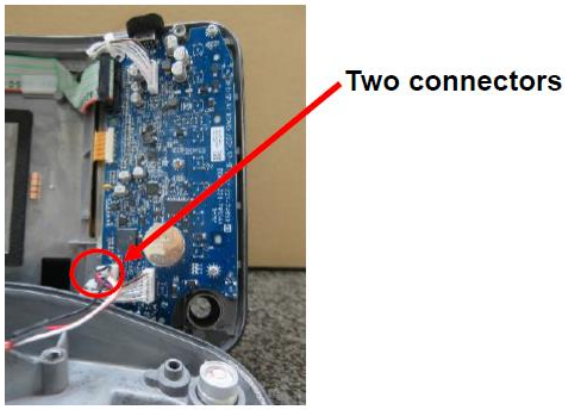


Fig. 2-7

4) Tentatively place the case assembly (2) down oriented upside down.

• Circuit board assemblies, such as the display board assembly (41) and main board assembly (40) can be replaced in the position shown in Fig. 2-8.



Place the case assembly on bubble wrap or other protective material.

Fig. 2-8

5) Remove the unit cover by removing the seven P4 M3 × 6 screws.

• The unit assembly (1), weight loader assembly (16), and other functionality can be inspected in the position shown in Fig. 2-10 and 2-11.

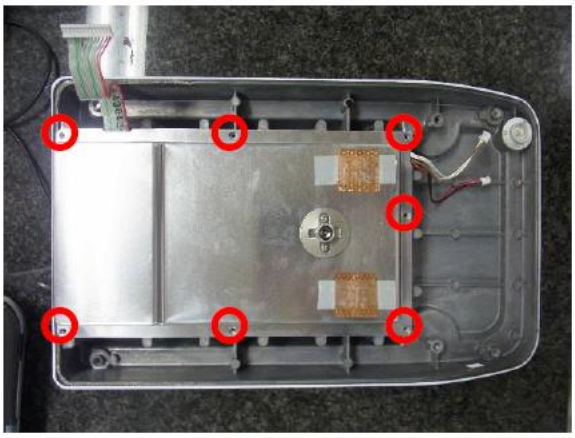
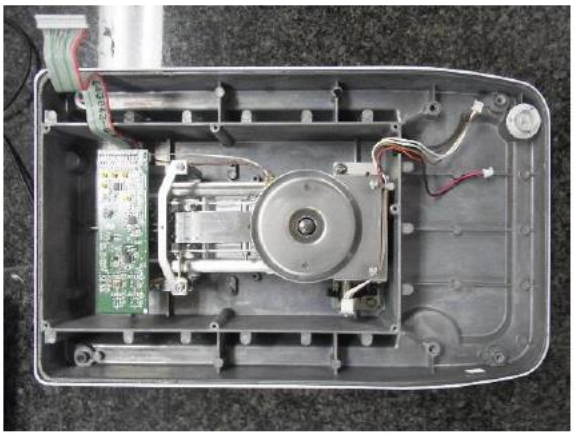
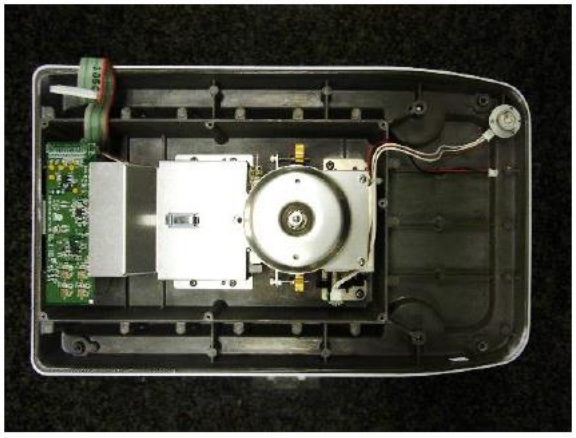


Fig. 2-9



0.1 mg model

Fig. 2-10



0.01 mg model

Fig. 2-11

2.2.2 Assembling the Case

1) Fasten the unit cover to the base with seven P4 M3 × 6 screws. When fasten the unit cover, adjust the gap between choke sleeve and shaft with sleeve positioning jig (J9).

• 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.

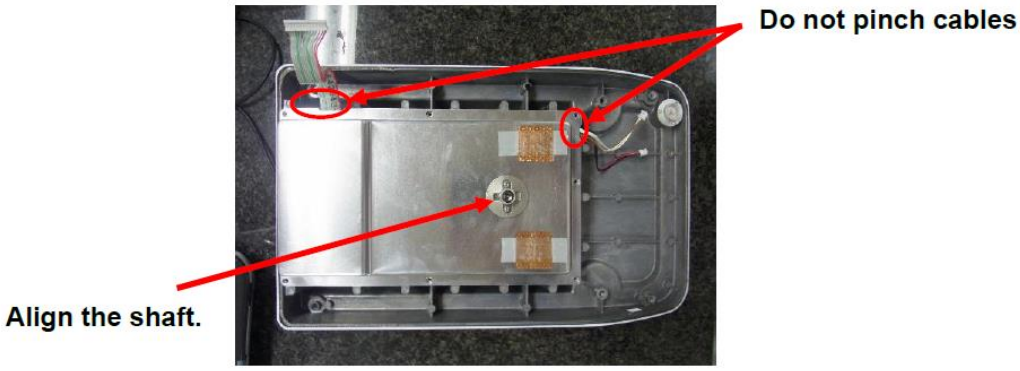


Fig. 2-12

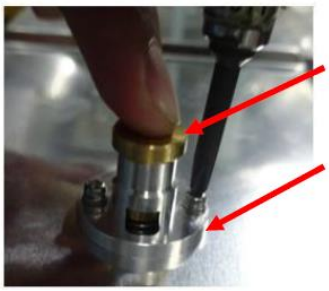


Fig. 2-13



Fig. 2-14

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.

• Do not pinch the touchless sensor cable.

• 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 × 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.

Checking the Case after Assembling

• Be sure to install the knob assemblies (32) on the side glass assemblies (25 and 26) and top glass assembly (27) before supplying power.

• Make sure there are no objects behind the balance, because the side and top glass assemblies will automatically open and close when the balance is switched ON.

2.3 Replacing Parts

2.3.1 Replacing the TABP-A Partition Guide (314)

Replace the guide if a groove is significantly damaged or worn or if the partition does not slide smoothly.

1) Unplug the AC adapters for both the balance and ionizer from the power outlet.

2) Use a box cutter or other tool to detach the 4 hole covers that cover the partition guide screws.

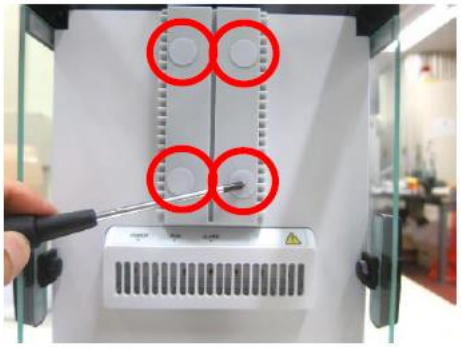


Fig. 2-15

3) Remove the partition guide by loosening the four P4 M4 × 12 socket head bolts.

4) Install the new TABP-A partition guide (314). Make sure it is oriented with the correct end upward. Also, tighten the screws in the order indicated below.

• **Tighten the screws in the order indicated Fig. 2-17.**

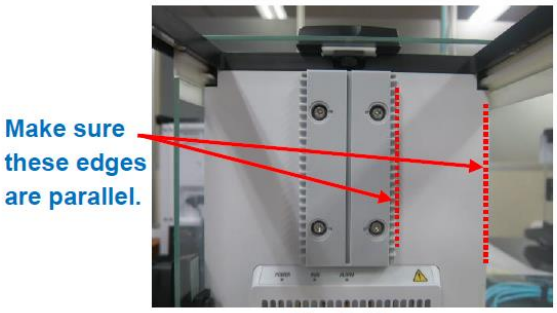


Fig. 2-16

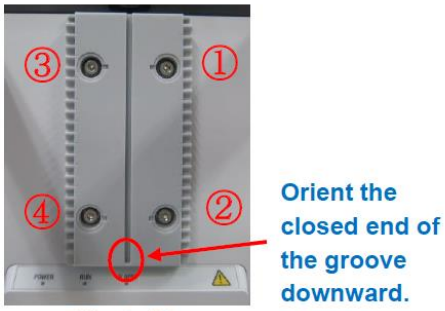


Fig. 2-17

5) Affix 4 new hole covers (included with TABP-A partition guides (314)) over the holes in the partition guide.

6) Wipe away any wear particles with a cloth.

7) Apply lubricant (313) to the 8 parallel pins in the TABP-A partition assembly (312).

• **For lubricant (313) application instructions, refer to 2.1.5.**

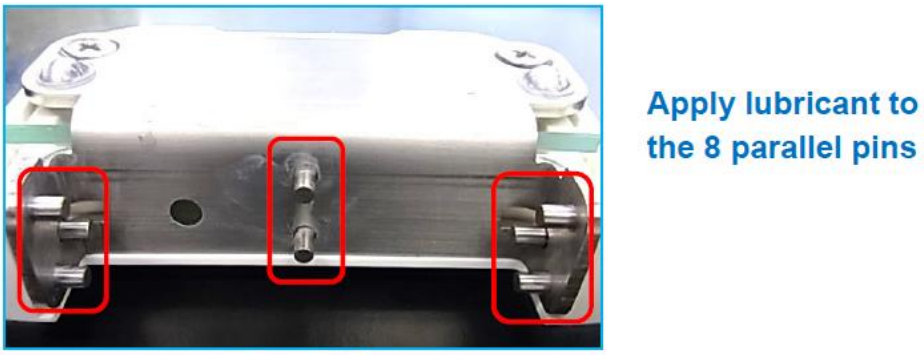


Fig. 2-18

2.3.2 Replacing the Ionizer (318)

1) Unplug the AC adapters for both the balance and ionizer from the power outlet.

2) Disconnect the ionizer cable assembly (301) that connects the ionizer to the balance.

3) Remove the rear plate (12), together with the ionizer, from the back of the balance by loosening the four M3 × 5 binder screws.



Fig. 2-19



Fig. 2-20

4) Loosen the knob to remove the ionizer.

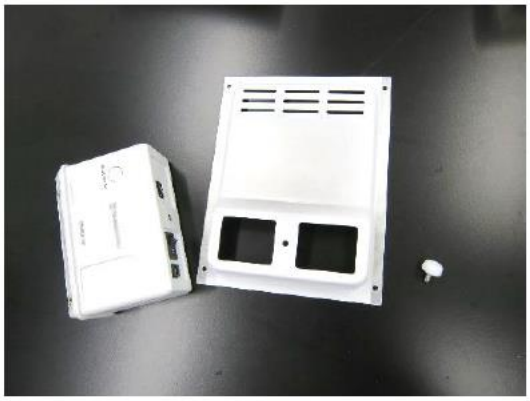


Fig. 2-21

5) Install the new ionizer (318).

6) Reassemble the ionizer by reversing the steps above.

7) Connect the ionizer cable assembly (301) between the ionizer and balance.

8) Plug in the AC adapters for the balance and ionizer. Switch ON the ionizer power switch and confirm the following.

• If the ionizer does not function properly, check the cable or AC adapter connections or other possible causes.

1. The ionizer (318) [POWER] LED is illuminated.
2. The [RUN] LED on the ionizer (318) illuminates when the  key is pressed on the balance.

2.3.3 Replacing the TABP-A Motor Board Assembly (304)

1) Remove the rear plate (12) and ionizer as described in 2.3.2 Replacing the Ionizer (318).

2) Remove the PCB-AD cover plate by loosening the two P4 M3 × 6 screws.

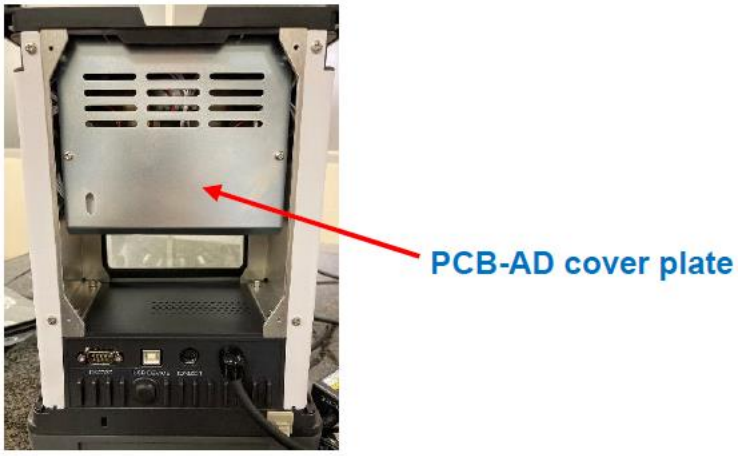


Fig. 2-22

3) Disconnect all 7 cables from the TABP-A motor board assembly (304).



Fig. 2-23

4) Loosen the 2 hexagonal spacers using the jig (J34), and three P4 M3 × 6 screws.

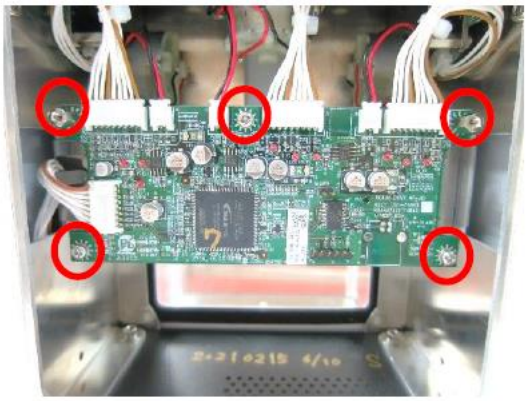


Fig. 2-24

5) Install the new TABP-A motor board assembly (304).

6) Tighten the 2 hexagonal spacers using the jig (J34), and three P4 M3 × 6 screws in the indicated order.

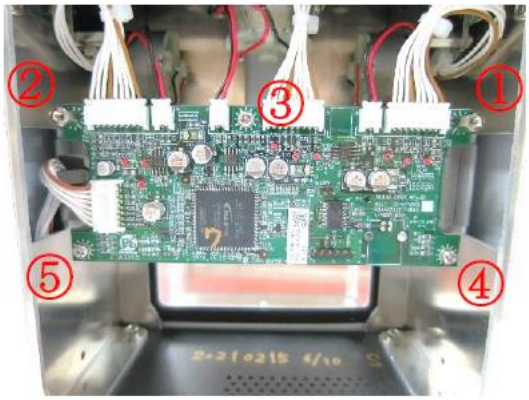
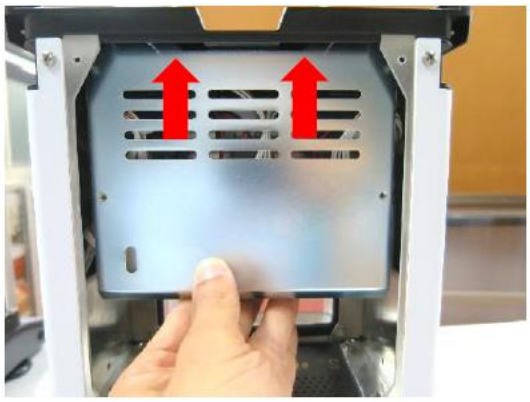


Fig. 2-25

7) Reassemble the balance by reversing the steps above.



After inserting the PCB-AD cover plate, press the cover against the top and fasten it with screws.

Fig. 2-26

2.3.4 Replacing the Right Drive Module (316)

1) Remove the rear plate (12), ionizer (318), and PCB-AD cover plate as described in 2.3.3 Replacing the TABP-A Motor Board Assembly (304).

2) Disconnect the two cables connected to the right drive module (316) from the TABP-A motor board assembly (304).

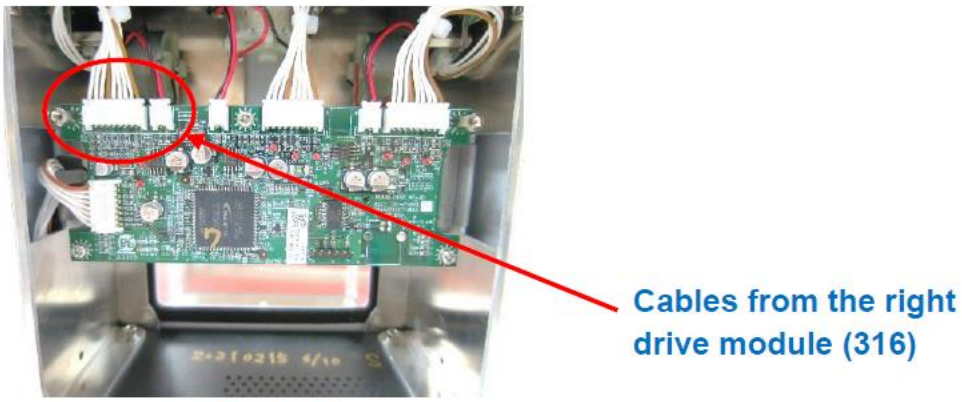


Fig. 2-27

3) Remove the side glass panel, loosen the two P3 M4 × 12 screws, and remove the right drive module (316).



Fig. 2-28

4) Temporarily fasten the new right drive module (316) to the roof with the two P3 M4 × 12 screws.

5) With the right drive module (316) pressed upward against the rib on the roof, tighten the two P3 M4 × 12 screws



Fig. 2-29

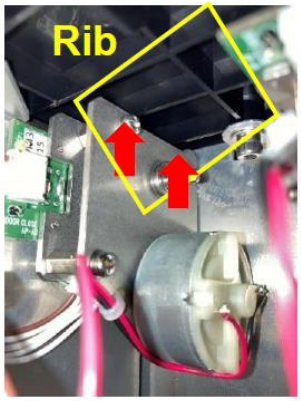


Fig. 2-30

Fasten the module in place with it pressed against the rib at the top of the roof.

6) Reassemble the balance by reversing the steps above.

After fastening the module, move it manually to confirm that it moves easily, does not emit any unusual sounds, and does not catch on anything.
Abnormal symptoms indicate a problem in how the right drive module (316) was installed. If so, repeat the process starting with step 5).

7) Check the door action according to the following procedure.

1. Switch ON the balance and ionizer to start up the balance.
2. Manually open all the doors about 3/4 of fully open.
3. Cover the touchless sensor (right) with a hand to confirm that all the doors close.
4. Continue to cover the touchless sensor (right) with a hand to confirm that all the doors open about 3/4 of fully open.
5. Repeat the open/close operations to confirm that the doors function properly.
6. Perform a final check of door open/close actions by opening and closing the doors automatically and manually about 20 times.

2.3.5 Replacing the Left Drive Module (317)

1) Remove the rear plate (12), ionizer (318), and PCB-AD cover plate as described in 2.3.3 Replacing the TABP-A Motor Board Assembly (304).

2) Disconnect the two cables connected to the left drive module (317) from the TABP-A motor board assembly (304).

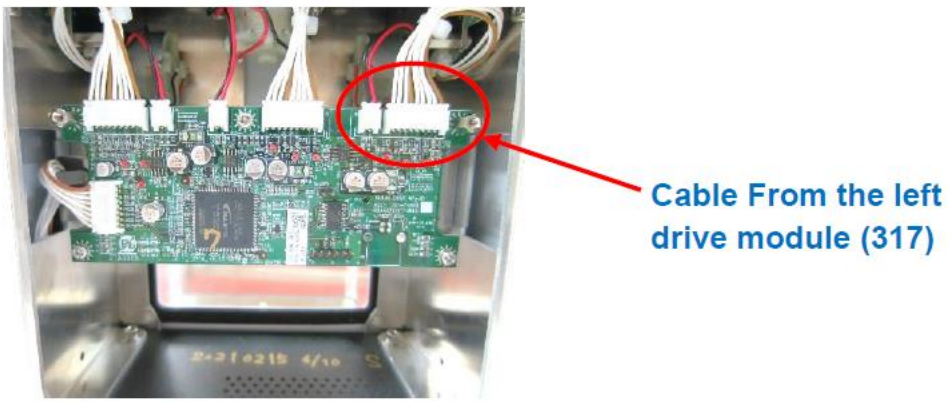


Fig. 2-31

3) Remove the side glass panel, loosen the two P3 M4 × 12 screws, and remove the left drive module (317).



Fig. 2-32

4) Temporarily fasten the new left drive module (317) to the roof with the two P3 M4 × 12 screws.

5) With the left drive module (317) pressed upward against the rib on the roof, tighten the two P3 M4 × 12 screws



Fig.| 2-33

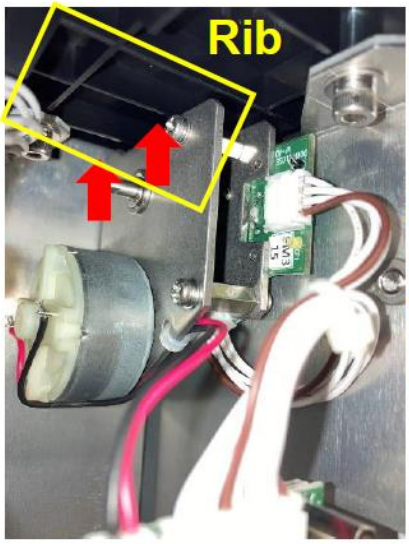


Fig. 2-34

Fasten the drive module with it pressed against the rib at the top of the roof.

6) Reassemble the balance by reversing the steps above.

After fastening the module, move it manually to confirm that it moves easily, does not emit any unusual sounds, and does not catch on anything.
Abnormal symptoms indicate a problem in how the left drive module (317) was installed. If so, repeat the process starting with step 5).

7) Check the door action according to the following procedure.

1. Switch ON the balance and ionizer to start up the balance.
2. Manually open all the doors about 3/4 of fully open.
3. Cover the touchless sensor (right) with a hand to confirm that all the doors close.
4. Continue to cover the touchless sensor (right) with a hand to confirm that all the doors open about 3/4 of fully open.
5. Repeat the open/close operations to confirm that the doors function properly.
6. Perform a final check of door open/close actions by opening and closing the doors automatically and manually about 20 times.

2.3.6 Replacing the Top Drive Module (315)

1) Remove the rear plate (12), ionizer (318), and PCB-AD cover plate as described in 2.3.3 Replacing the TABP-A Motor Board Assembly (304).

2) Disconnect the two cables connected to the top drive module (315) from the TABP-A motor board assembly (304).

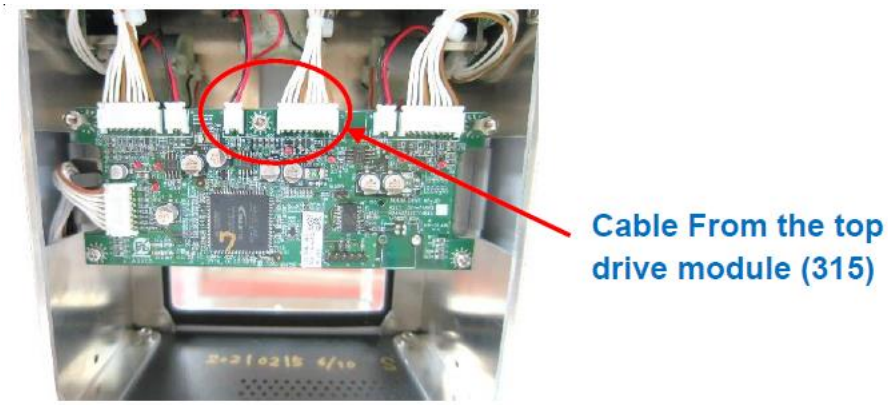


Fig. 2-35

3) Remove the top glass panel, loosen the two P3 M4 × 12 screws, and remove the top drive module (315).

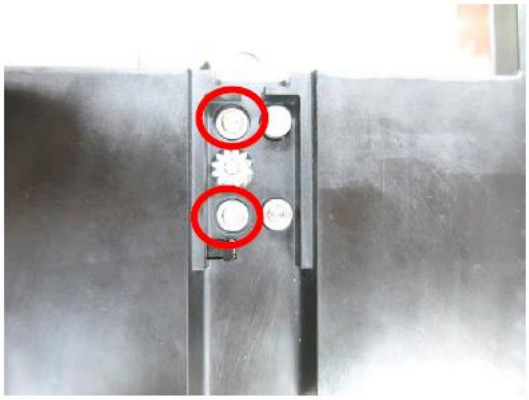
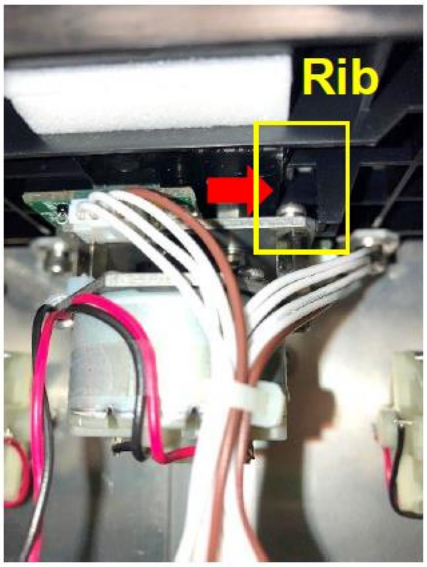


Fig. 2-36

4) Temporarily fasten the new top drive module (317) to the roof with the two P3 M4 × 12 screws.

5) With the top drive module (317) pressed against the right side rib on the roof, tighten the two P3 M4 × 12 screws



Fasten the drive module with it pressed against the right side rib on the roof.

Fig. 2-37

6) Reassemble the balance by reversing the steps above.

After fastening the module, move it manually to confirm that it moves easily, does not emit any unusual sounds, and does not catch on anything.
Abnormal symptoms indicate a problem in how the top drive module (315) was installed. If so, repeat the process starting with step 5).

7) Check the door action according to the following procedure.

1. Switch ON the balance and ionizer to start up the balance.
2. Manually open all the doors about 3/4 of fully open.
3. Cover the touchless sensor (right) with a hand to confirm that all the doors close.
4. Continue to cover the touchless sensor (right) with a hand to confirm that all the doors open about 3/4 of fully open.
5. Repeat the open/close operations to confirm that the doors function properly.
6. Perform a final check of door open/close actions by opening and closing the doors automatically and manually about 20 times.

2.3.7 Replacing the Front Glass Assembly (24)

1) Remove the rear plate (12), ionizer (318), and PCB-AD cover plate as described in 2.3.3 Replacing the TABP-A Motor Board Assembly (304).

2) Disconnect the interface - main cable assembly (305) from the TABP-A motor board assembly (304).

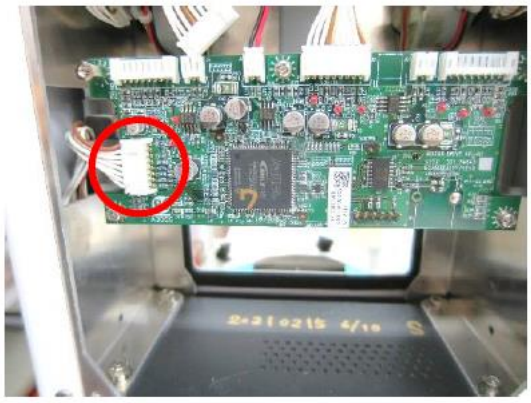


Fig. 2-38

3) Remove the case roof by loosening and removing the four P3 M4 × 8 bolts from the lower rear panel of the balance.

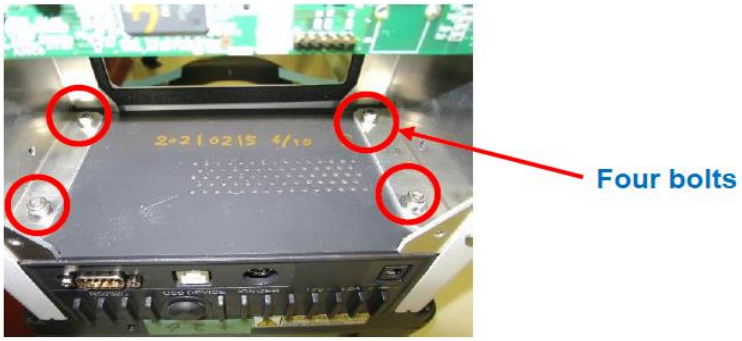


Fig. 2-39



Fig. 2-40

After removing the case roof, be careful to prevent the front glass assembly (24) from falling.

4) Remove the two front pillars (37).

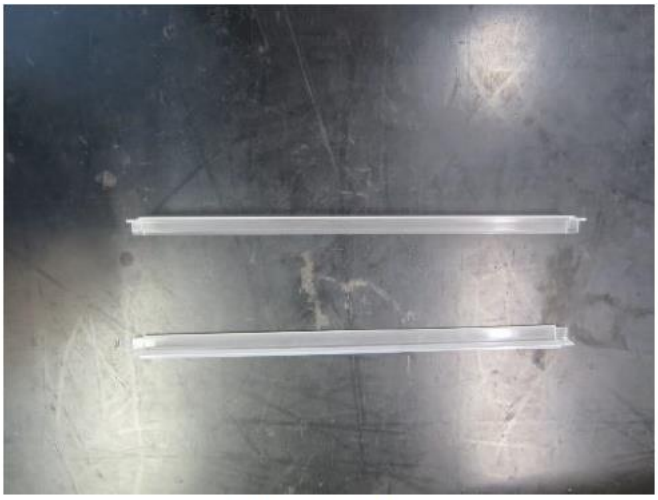


Fig. 2-41

- **Because the front pillars (37) are made of plastic, pull them straight out in the longitudinal direction.**

5) Remove the front glass assembly (24).

- **Be careful not to cut your hand on the glass edges.**

6) Remove the front glass tape (72) affixed to the bottom of the groove in the front of the case.

7) Clean out the groove on the front of the case, and apply the 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. 2-42

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. 2-43

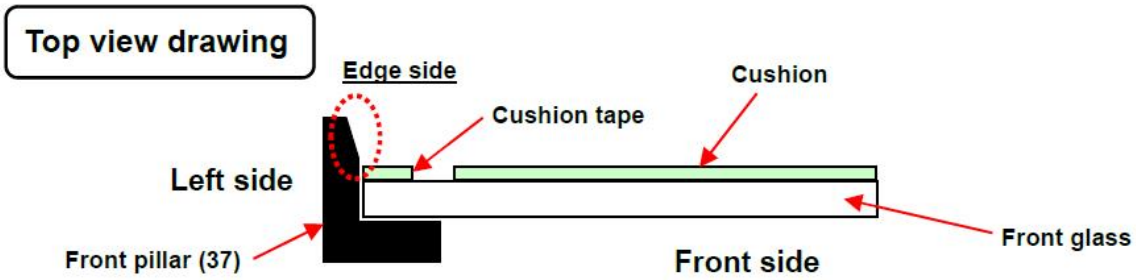


Fig. 2-44

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

9) Remove the front glass tape affixed to the bottom of the groove in the front of the roof.

10) Clean out the groove in the front of the roof.

11) Divide the front glass tape (72) (188mm) into four equal lengths (about 47 mm per piece).

12) Peel off the backing paper from the upper side of the front glass tape and then affix the tape up against the left and right ends of the groove in the front of the roof.

13) Peel off the backing paper and affix another piece of tape on top of the first piece. (Use two pieces per end, for a total of four pieces.)

14) Peel off the backing paper from the upper side of the front glass tape.



Fig. 2-45

15) Attach the roof to the balance. Route the interface - main cable assembly (305) between the cover and balance. Be careful not to pinch the cable.



Fig. 2-46 Fig. 2-47

16) Connect the cable assembly (305).

17) Make sure the joining at the top of roof. Press the roof tightly without gaps.



Fig. 2-48 Fig. 2-49

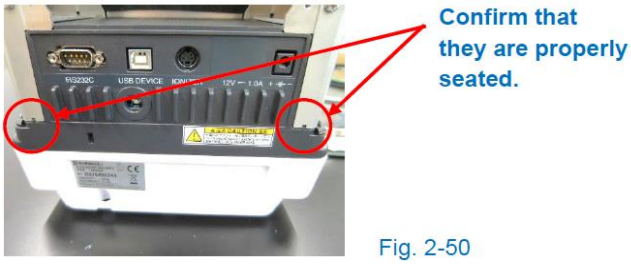


Fig. 2-50

2.3.8 Maintenance and Replacing the glass Assemblies (25, 26 and 27)

1) Remove the broken glass assembly.
2) Replace the new glass assembly according as instruction manual.
3) Make sure that it moves easily,

> Other than replacing the new glass assembly, when it does not move easily or emit any unusual sounds, apply lubricant (313) to the below part.
> In this case, apply lubricant well to enable visually it after drying.
> Around the rack of carriage, apply lubricant along the gear tooth.

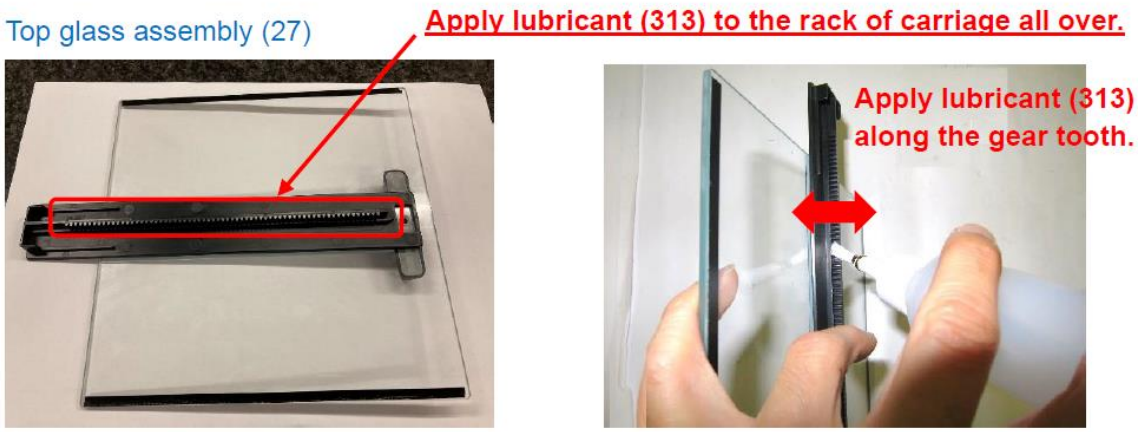


Fig.2-51

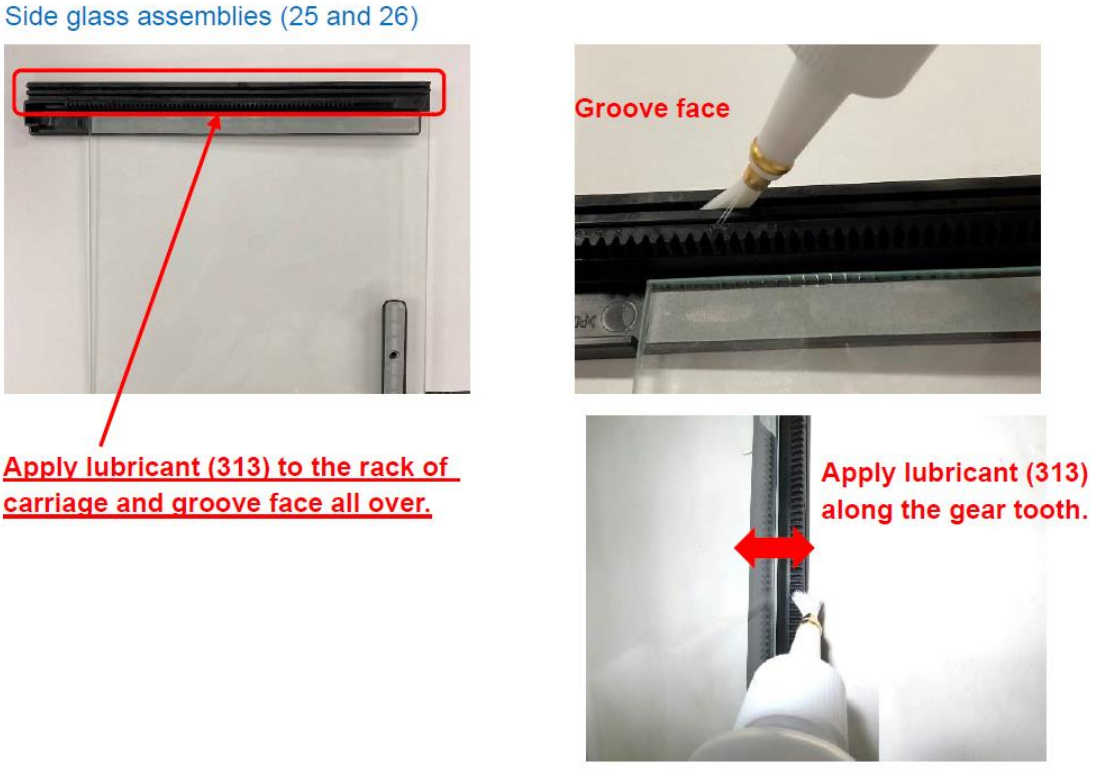


Fig.2-52

2.3.9 Replacing the Rail Assemblies (34 and 35)

1) Remove the rail assemblies (34 and 35) by inserting a box cutter blade.



Fig. 2-53

2) Make sure there is no adhesive remaining on the rail attachment surfaces. Remove any residual adhesive. Wipe the affixing area with alcohol or other suitable solvent.



Fig. 2-54

3) Peel off the backing paper from the new rail assemblies (34 and 35) and affix them. Use the protruding areas toward the rear of the balance as a reference for affixing the rails.



Make sure the rails fit properly onto the protruding areas without being raised up.

Fig. 2-55

4) Reassemble the balance by reversing the steps above.

5) After installing the rails, close the side glass assemblies (25 and 26) to visually confirm that the gap between each assembly and rail is 1 mm or less. Visually confirm that there is a gap between the side glass assemblies (25 and 26) and rails (34 and 35).



Fig. 2-56



Fig. 2-57



About 0.5mm Gap

Fig. 2-58

6) By manually and automatically opening and closing the side glass assemblies (25 and 26) 20 times, confirm that they move easily, do not emit any unusual sounds, and do not catch on anything.

2.3.10 Replacing the TABP-A Sheet Panel (38)

1) Peel off the old TABP-A sheet panel.

2) Make sure there is no old adhesive remaining on the attachment surface for the new TABP-A sheet panel (38). Remove any residual adhesive. Wipe the affixing area with alcohol or other suitable solvent.

3) Affix the new AP-AD sheet panel (38). Align the panel with the lower ledge (left figure below) while also aligning the panel laterally so that the gaps to the left and right of the arrow switches on the left and right (right figure below) are uniform.



Align with the lower ledge
Fig. 2-59



Fig. 2-60

4) Make sure both sensors are operational.

2.3.11 Replacing the Right Touchless Sensor Board Assembly (307)

1) Remove the case assembly (2).

2) Disconnect the connector from the right touchless sensor board assembly (307).
Remove the right touchless sensor board assembly (307) by removing the P4 M3 × 6 screw.

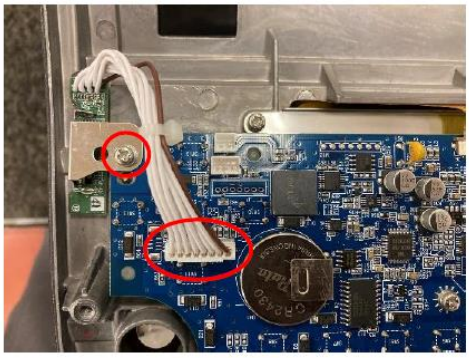


Fig. 2-61

3) Check the gap between the rubber and board on the new right touchless sensor board assembly (307). Eliminate any gap by pressing lightly on the rubber.

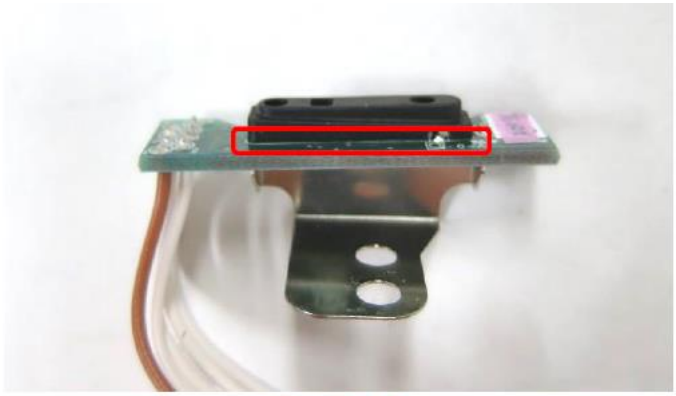


Fig. 2-62

4) Align and insert the bosses on the new right touchless sensor board assembly (307) into the groove in the case assembly (2).
In this case, make sure the new right touchless sensor board assembly (307) is properly inserted into the groove by wiggling the assembly vertically and horizontally.

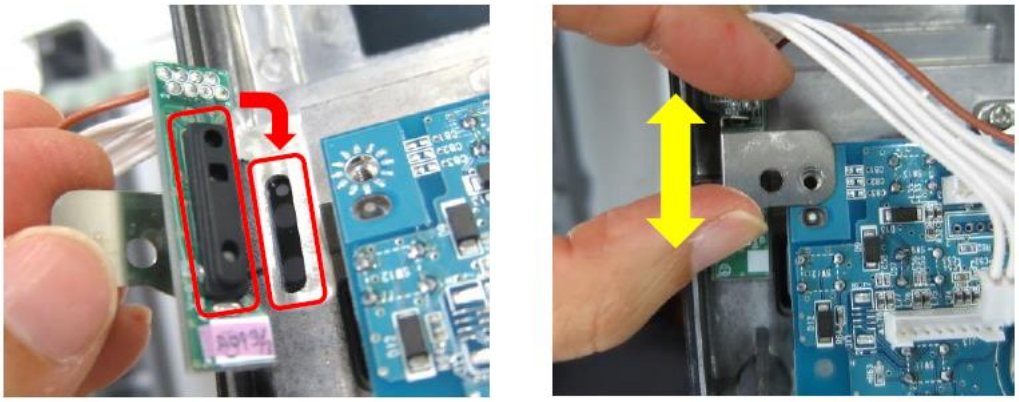


Fig.2-63

5) Press the assembly upward in the groove and fasten it in place.
And make sure the edges indicated by the dashed lines are parallel between board and case.

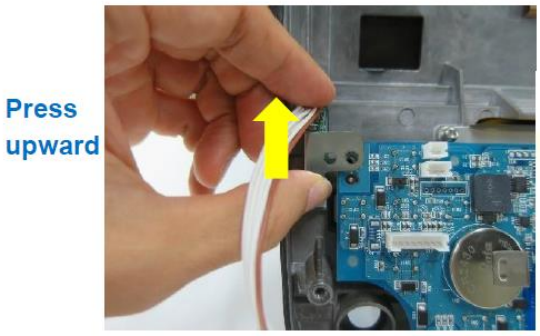


Fig.2-64

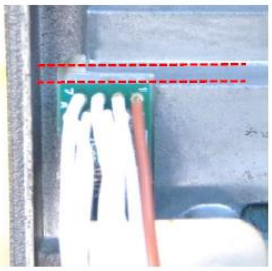
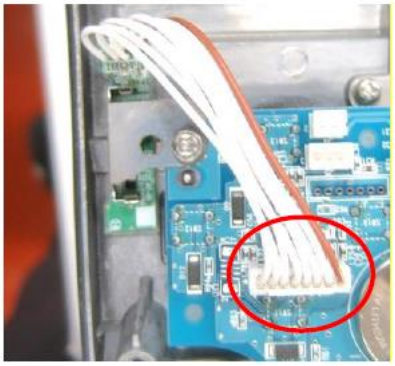

Fig.2-65


Fig.2-66

6) Connect the right touchless sensor board assembly (307) connector.


Fig.2-67

7) Reassemble the balance by reversing the steps above.

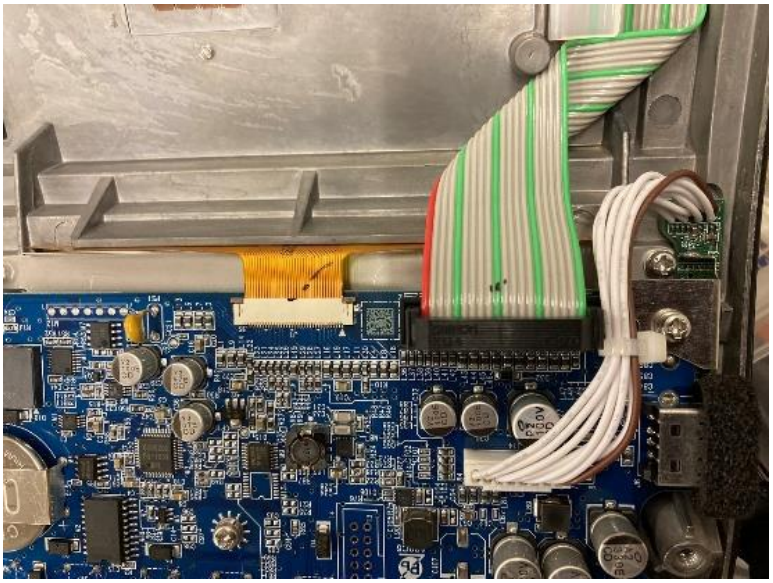
8) Confirm that the blue and red LEDs illuminate properly as described in 5.5. LED Lighting Test Start.

9) Make sure the right sensor is operational.

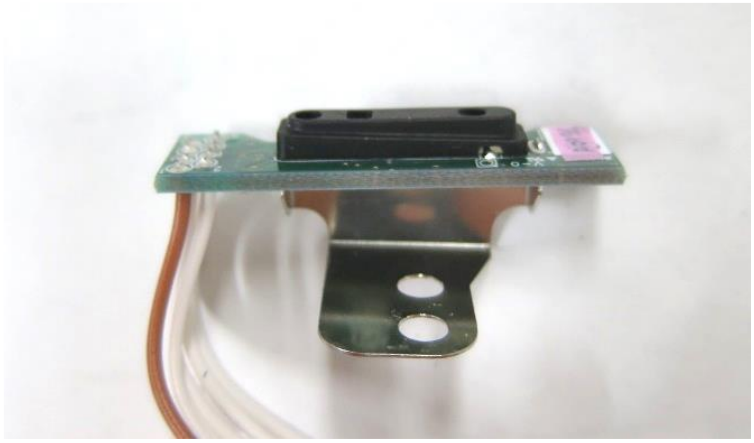
2.3.12 Replacing the Left Touchless Sensor Board Assembly (308)

1) Remove the case assembly (2).

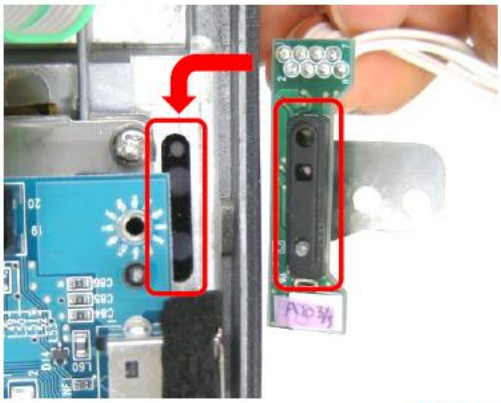
2) Disconnect the connector from the left touchless sensor board assembly (308).
Remove the left touchless sensor board assembly (308) by removing the P4 M3 × 6 screw.



3) Check the gap between the rubber and board on the new left touchless sensor board assembly (308). Eliminate any gap by pressing lightly on the rubber.



4) Align and insert the bosses on the new left touchless sensor board assembly (308) into the groove in the case assembly (2).
In this case, make sure the new left touchless sensor board assembly (308) is properly inserted into the groove by wiggling the assembly vertically and horizontally.



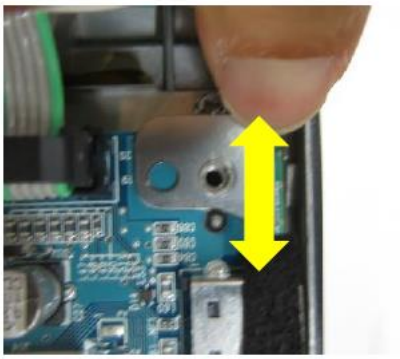


Fig.2-70

5) Press the assembly upward in the groove and fasten it in place.
And make sure the edges indicated by the dashed lines are parallel between board and case.

Press upward

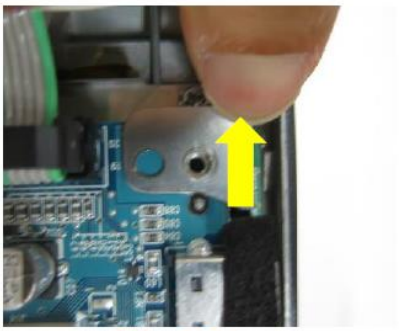


Fig.2-71

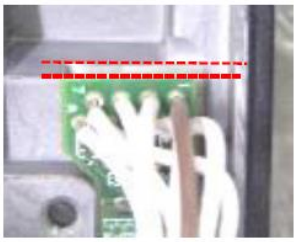


Fig.2-72

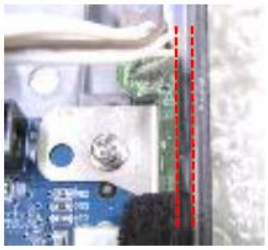


Fig.2-73

6) Connect the right touchless sensor board assembly (308) connector.



7) Reassemble the balance by reversing the steps above.

8) Confirm that the blue and red LEDs illuminate properly as described in 5.5. LED Lighting Test Start.

9) Make sure the left sensor is operational.

2.3.13 Replacing the Display Board Assembly (41)

1) Remove the case assembly (2).

2) Disconnect the connector from the display board assembly (41).

3) Remove touchless sensor board assemblies (307) and (308) as described in 2.3.10 Replacing the Right Touchless Sensor Board Assembly (307) and 2.3.11 Replacing the Left Touchless Sensor Board Assembly (308).

4) 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 OLED assembly (71) connector.

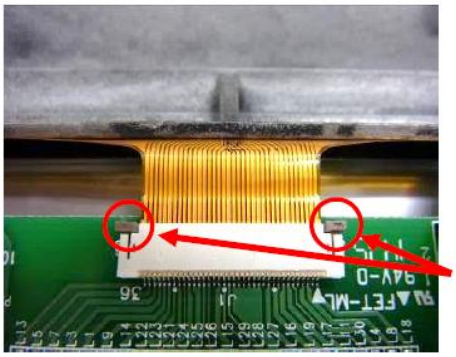


Fig. 2-75 Locked

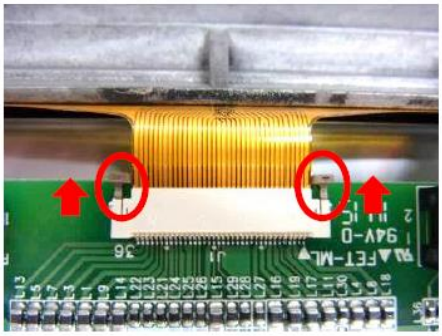


Fig. 2-76 Unlocked

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

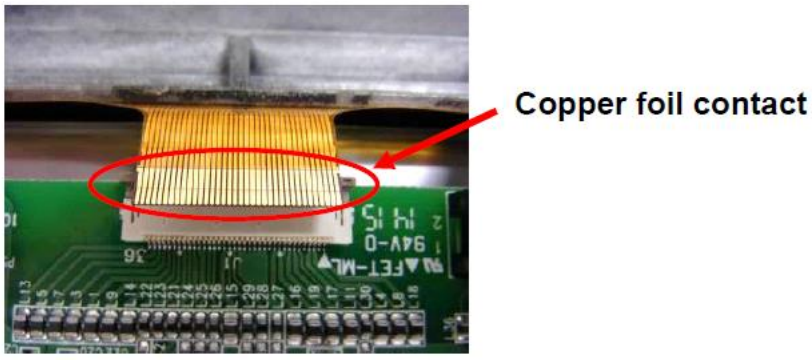


Fig. 2-77

5) Remove the display board assembly (41) by loosening the three P4 M3 × 6 screws that fasten the display board assembly (41).

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

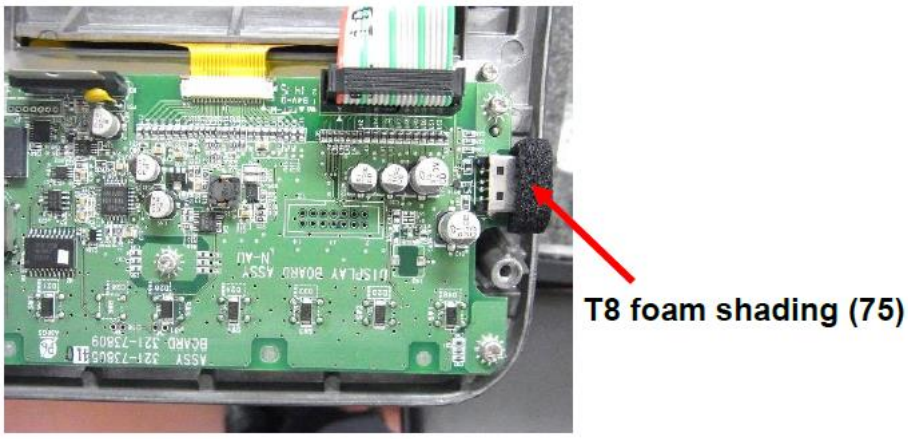


Fig. 2-78

7) Fasten the new display board assembly (41).

8) After finishing the replacement procedure, install the touchless sensors as described in 2.3.10. Replacing the Right Touchless Sensor Board Assembly (307) and 2.3.11. Replacing the Left Touchless Sensor Board Assembly (308).

• Install the left touchless sensor board assembly (308) first.

• **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.

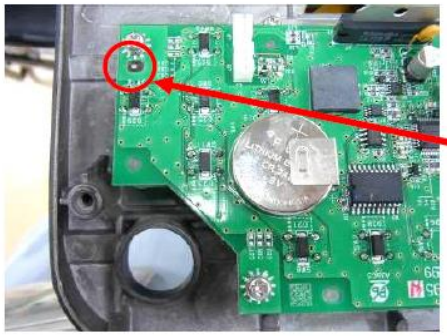


Fig. 2-79

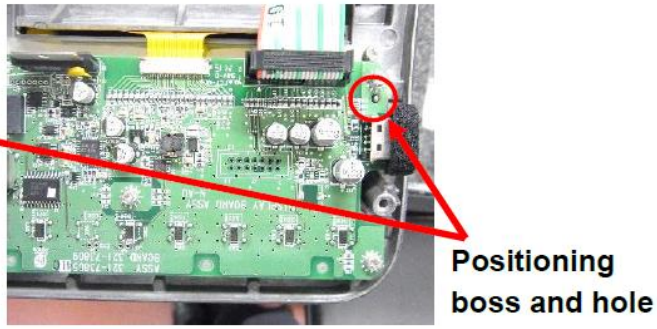


Fig. 2-80

9) Tighten the three P4 M3 × 6 screws in the indicated order.

• **Be sure to tighten the screws in the order indicated** in the figure below**.**

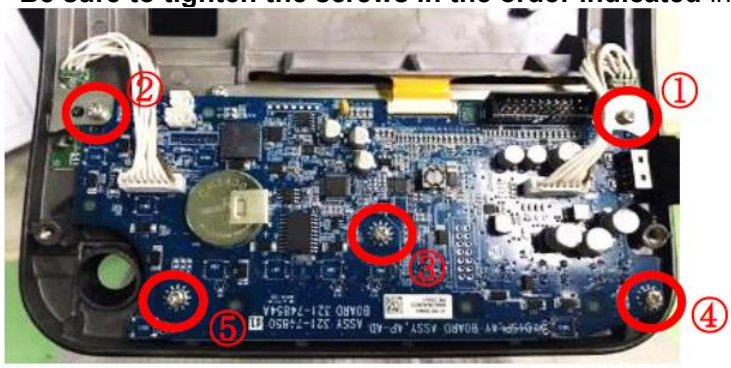


Fig. 2-81

10) 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.**

11) Make sure both sensors are operational.

2.3.14 Replacing the Front Key-Top Cover (309)

1) Remove the display board assembly (41).

2) Remove the front key-top cover (309).

3) Insert the front key-top cover (309) with the holes aligned.

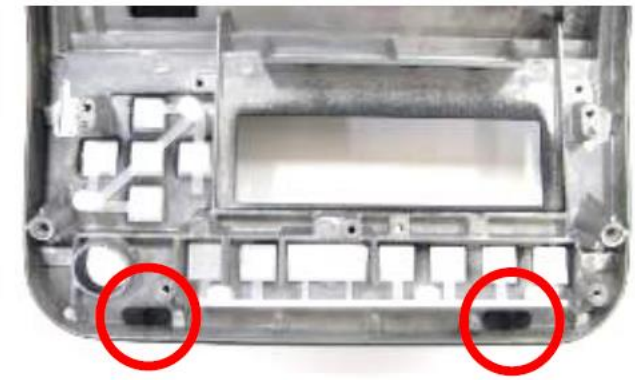


Fig. 2-82

4) Reassemble the balance by reversing the steps above.
• After installing the display board assembly (41), confirm that switches have a clicking sensation.

5) Make sure both sensors are operational.

2.3.15 Replacing the OLED Assembly (71)

1) Remove the display board assembly (41).

2) Remove the OLED assembly (71) by loosening the three P4 M3 × 6 screws that fasten the OLED holder.

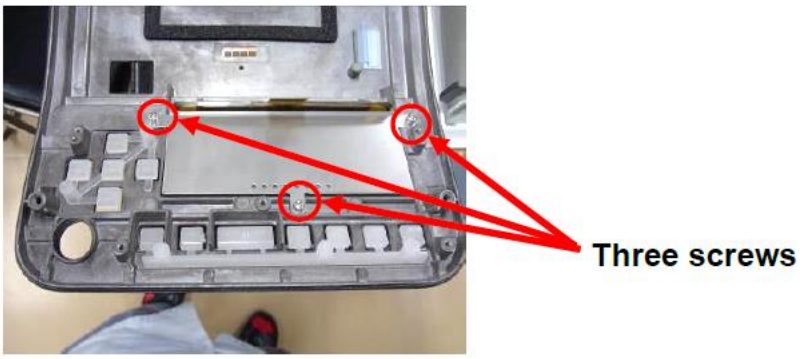


Fig. 2-83

3) Place the new OLED assembly (71) at the downside of the case and fasten it using the three P4 M3 × 6 screws.



Fig. 2-84

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) Make sure both sensors are operational.

2.3.16 Replacing the Main Board Assembly (40)

1) Remove the case assembly (2).

2) Loosen the five P4 M3 × 6 screws that fasten the main board assembly (40).

3) Briefly lift up the main board assembly (40) to disconnect four connectors, and remove the main board assembly (40).

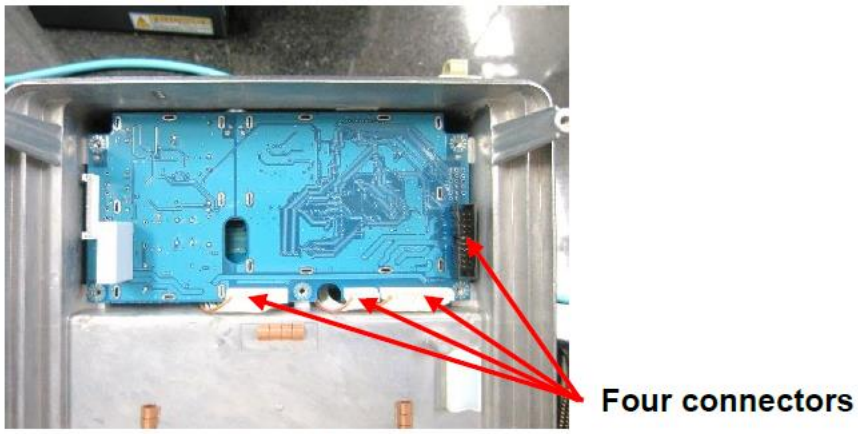


Fig. 2-85

4) Connect the disconnected cables to the new main board assembly (40) and fasten the board using the five P4 M3 × 6 screws.

• The main board assembly (40) position is determined by the positioning bosses on the case assembly (2) and the two corresponding positioning holes on the main board assembly (40).
Make sure the bosses fit properly into the holes.

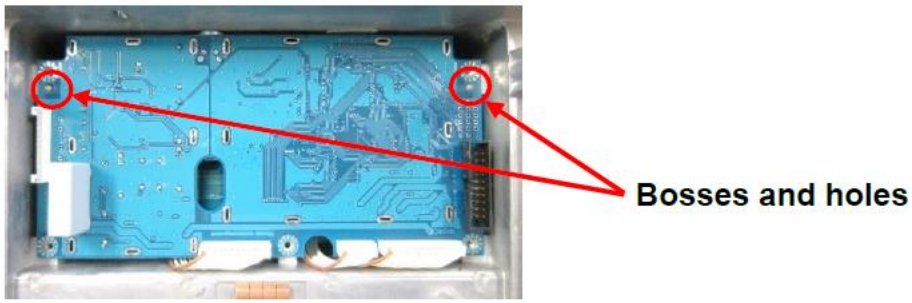


Fig. 2-86

• Tighten the screws in the indicated order.

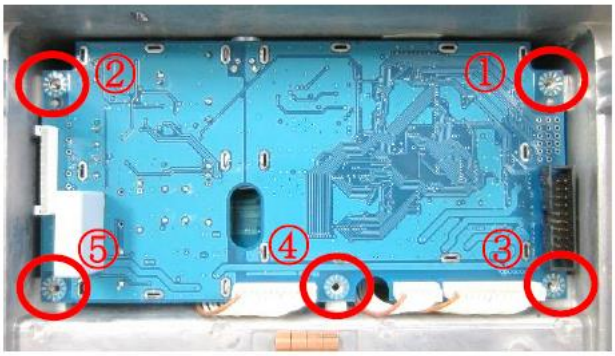


Fig. 2-87

5) Reassemble the balance by reversing the steps above.

6) Make sure to adjust Weighting Parameters.

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

1) Remove the rear plate (12), ionizer (318), and PCB-AD cover plate as described in 2.3.3. Replacing the TABP-A Motor Board Assembly (304).

2) Disconnect the interface - main cable assembly (305) connector from the TABP-A motor board assembly (304).

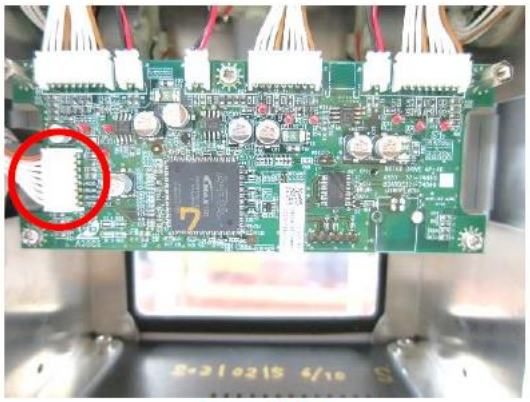


Fig. 2-88

3) Remove the main board assembly (40).

4) Remove the two P4 M3×6 screws that fasten the heat transfer plate and PCB-I/F gel pad (76).

5) Remove the two P4 M2.5 × 6 screws that fasten the IC element (regulator) on the interface board assembly (39). (There are two IC elements (regulators), both are fastened.)

6) Remove the interface board assembly (39) by loosening the five P4 M3 × 6 screws that fasten the interface board assembly (39).

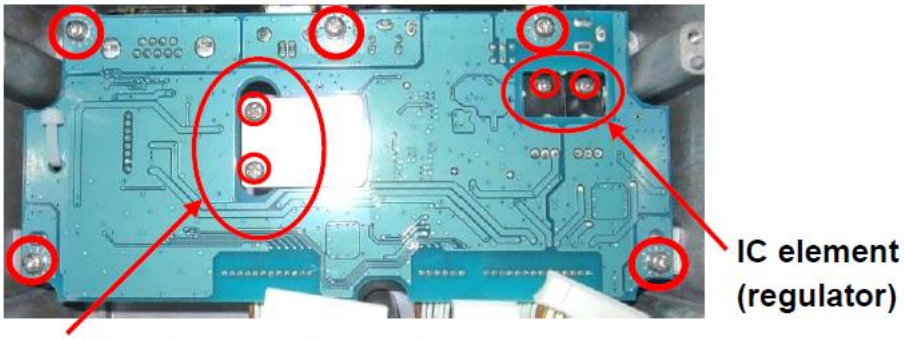


Fig. 2-89

7) Disconnect the 12-067 PH2 cable assembly (45), 14-067 PH2 cable assembly (46), and interface-main cable assembly (305) from the old interface board assembly (39) and connect them to the connectors on the new interface board assembly (39).

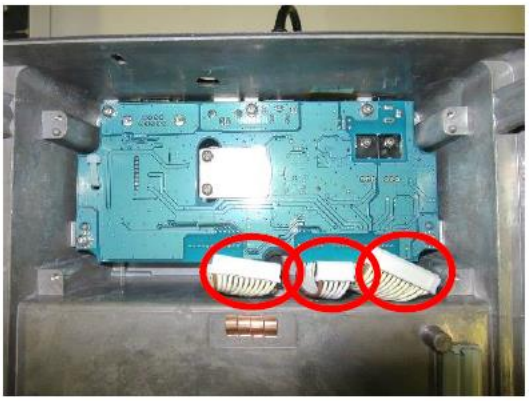


Fig. 2-90

8) Insert the cable from the new interface board assembly (39) through the hole in the case assembly (2).

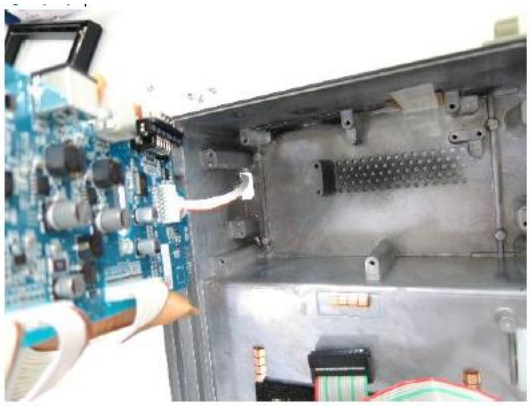


Fig. 2-91



Fig. 2-92

9) Fasten the new interface board assembly (39) using the five P4 M3 × 6 screws.
• The interface board assembly (39) position is determined by the positioning bosses on the case assembly (2)

Make sure the bosses fit properly into the holes.

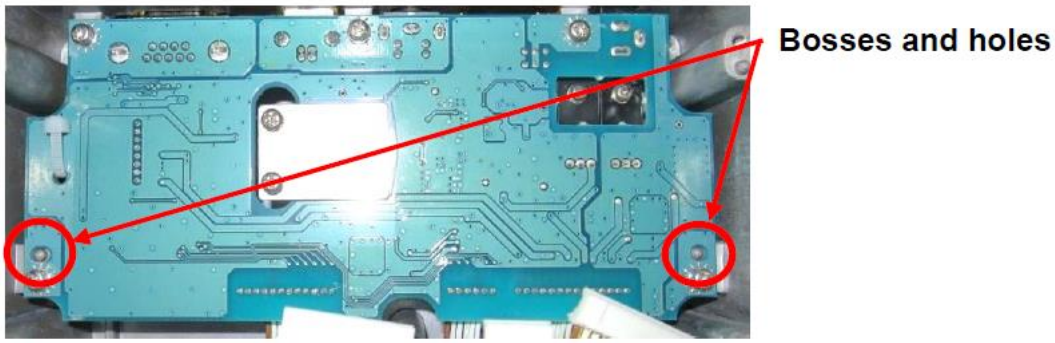


Fig. 2-93

• Tighten the screws in the indicated order.

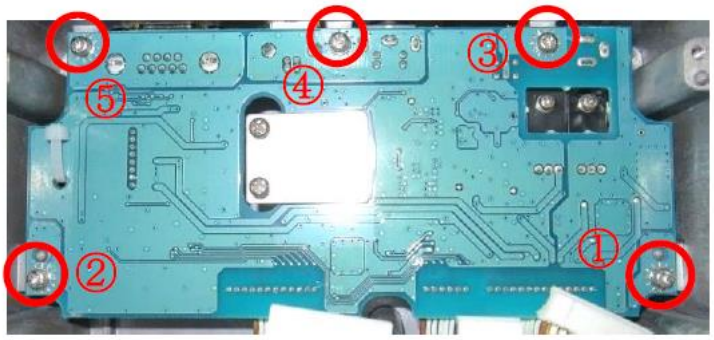


Fig. 2-94

10) Fasten the heat transfer plate and PCB-I/F gel pad (76) using the two P4 M3 × 6 screws. However, also replace the PCB-I/F gel pad (76) if damaged.

11) Fasten the IC element (regulator) to the interface board assembly (39) using the two P4 M2.5 × 6 screws.

12) Reassemble the balance by reversing the steps above.

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

1) Remove the rear plate (12), ionizer (318), and PCB-AD cover plate as described in 2.3.3. Replacing the TABP-A Motor Board Assembly (304).

2) Disconnect the interface-main cable assembly (305) connector from the TABP-A motor board assembly (304).

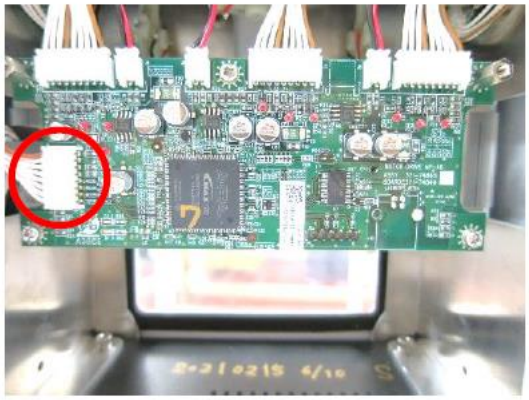


Fig. 2-95

3) Remove the main board assembly (40).

4) Remove the interface board assembly (39) by loosening the four P4 M3 × 6 screws that fasten the board.

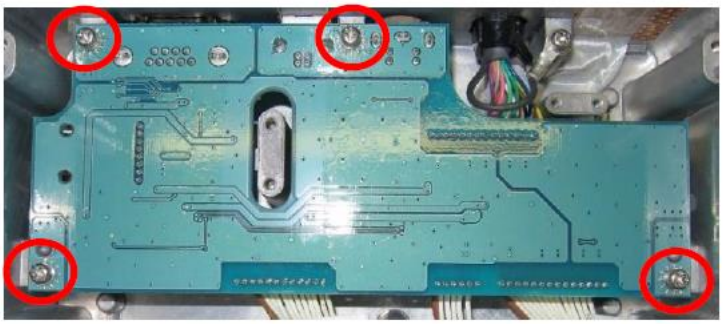


Fig. 96

5) Disconnect the power supply box cable assembly (106), 12-067 PH2 cable assembly (45), 14-067 PH2 cable assembly (46), and the interface - main cable assembly (305) from the old interface board assembly (39) and connect it to the connector on the new interface board assembly (39).

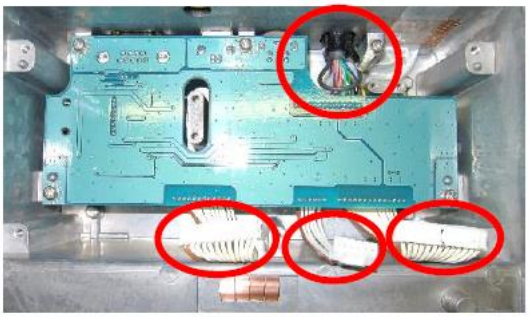


Fig. 2-97

6) Insert the cable from the new interface board assembly (39) through the hole in the case assembly. Refer to the figures below.

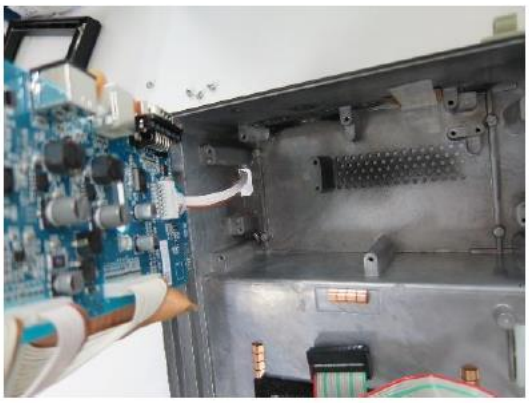


Fig. 2-98

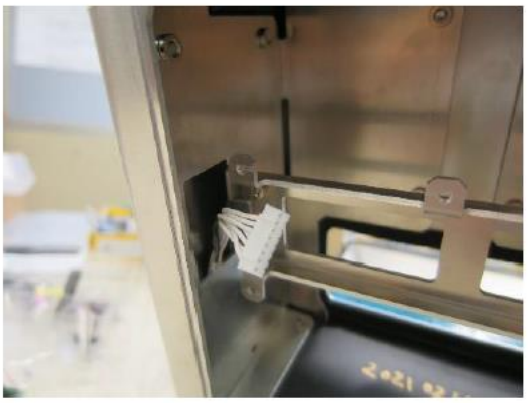


Fig. 2-99

7) Fasten the new interface board assembly (39) using the four P4 M3 × 6 screws.

• The interface board assembly (39) position is determined by the positioning bosses on the case assembly (2)

Make sure the bosses fit properly into the holes.

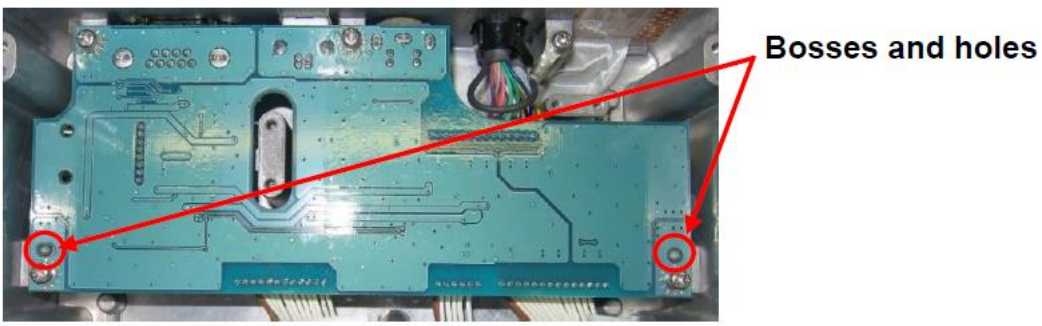


Fig. 2-100

• Tighten the screws in the indicated order.

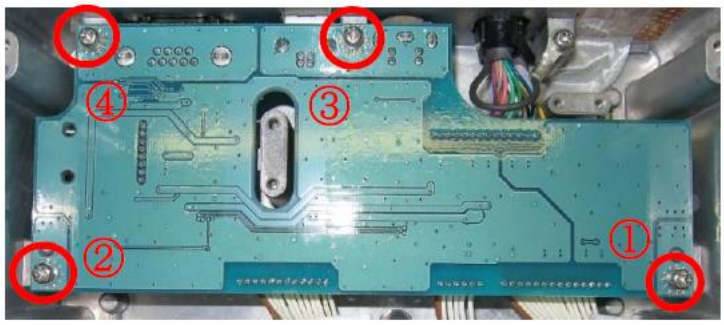


Fig. 2-101

8) Reassemble the balance by reversing the steps above.

2.3.19 Replacing the Weight Loader Assembly (16)

1) Remove the unit cover.
2) Remove the weight stopper and weights (59 to 63) by loosening the two P4 M3 × 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).**

• When reassembling, be careful not to let dust settle on 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.

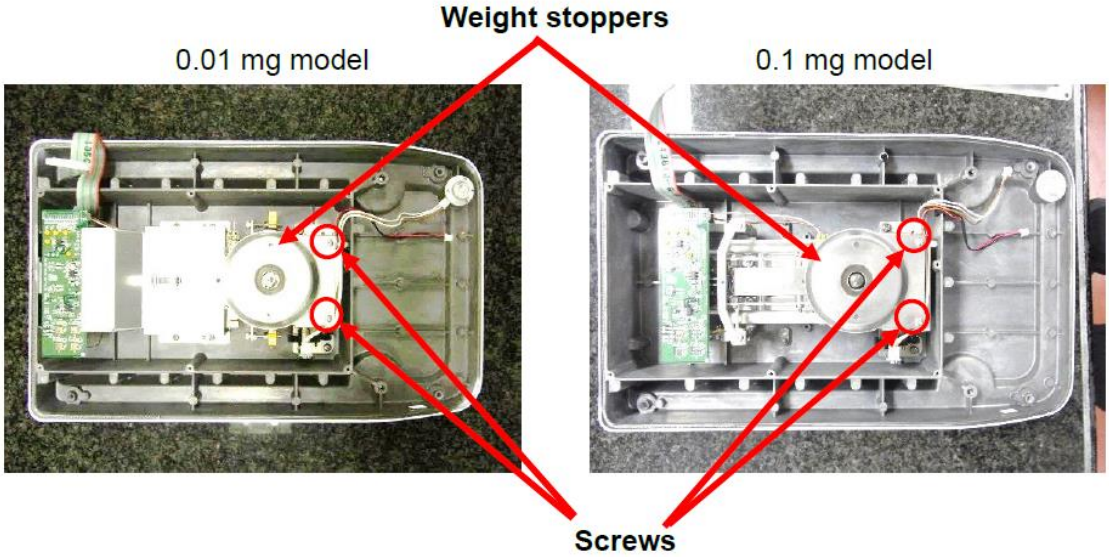


Fig. 2-102

3) Insert the OPF positioning pin jig (J1) into the lever positioning hole on the top of the OPF.
• Slightly lift up on the lever assembly to insert the pin.

Be careful not to scratch the elastic support.

4) Remove the weight loader assembly (16) by loosening the two P3 M4 × 8 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.

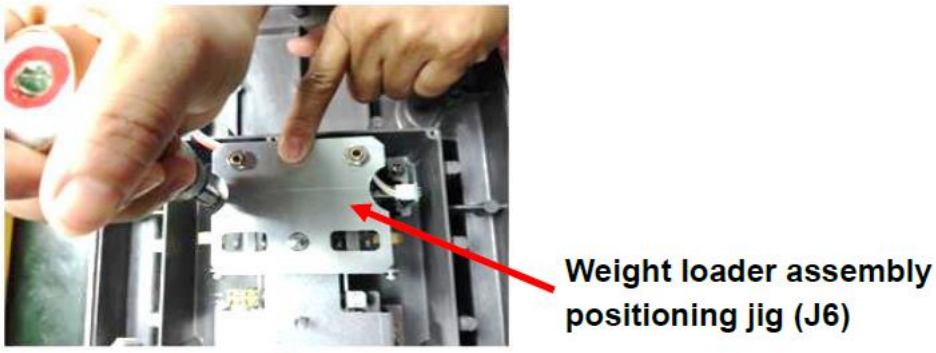


Fig. 2-103

6) Reassemble the balance by reversing the steps above.

2.3.20 Replacing the Unit Assembly (1)

1) Remove the weight stopper and weights (59 to 63).

2) Insert the OPF positioning pin jig (J1) into the lever positioning hole on the top of the OPF.

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

3) Remove the upper lever cover by loosening the four M3 × 6 pan head screws (only on 0.01 mg models).

• **Be careful not to scratch it by contacting the Pt-Ni band during removal.**

0.01 mg model

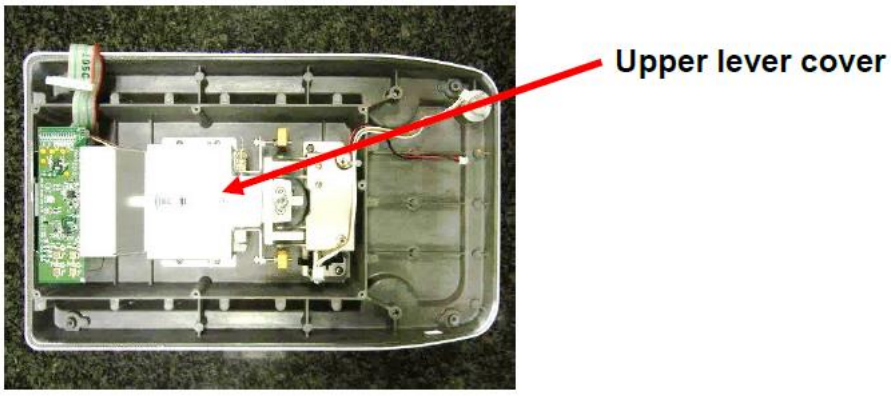


Fig. 2-104



Fig. 2-105

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 × 12 bolts on the bottom of the base assembly.

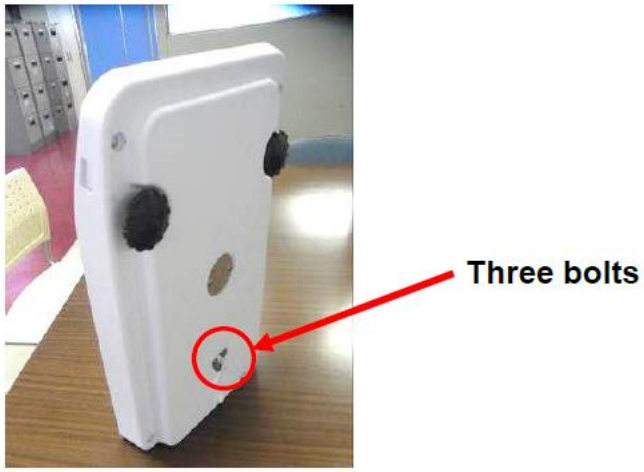


Fig. 2-106

5) Place the new unit assembly (1), with the OPF positioning pin jig (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 × 12 bolts. After adjusting its position using the positioning plate on the unit assembly positioning jig (J3), finish tightening the bolts

• 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).

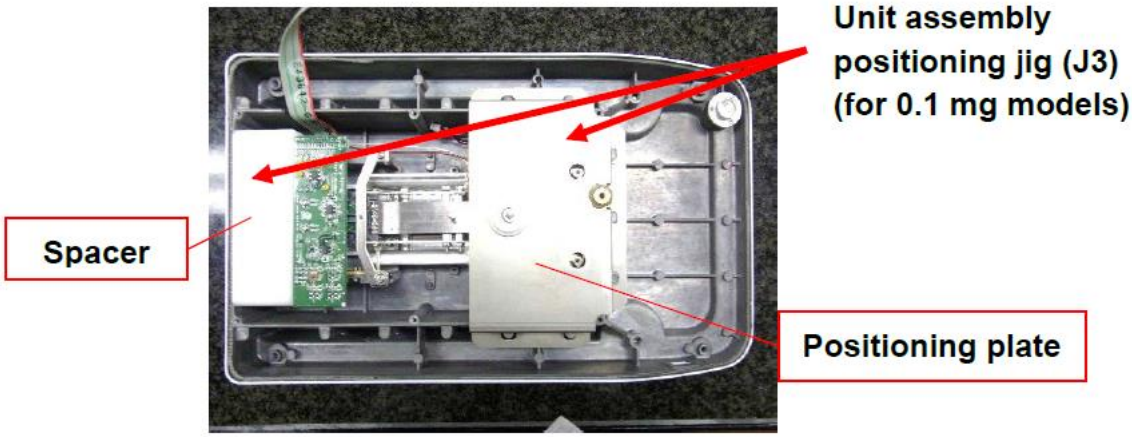


Fig. 2-107



Fig. 2-108

6) Install the upper lever cover using four M3 × 6 pan head 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 AP jig cable (J11).

9) Supply power to the balance and check the repeatability and cornerload error. Then adjust linearity, calibrate internal weights (excluding APY models), and adjust sensitivity.
(Refer to 4.5. Adjusting the Cornerload Error, 5.7.2. Linearity, 5.7.8. Calibration of Internal Weight (P-CAL), 5.7.6. Using Internal Weights to Adjust Sensitivity (i-CAL), and 5.7.7. 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. Then use EEPROM-ReWriter to load the data into the balance.
(Refer to 7. EEPROM Data Editing Software and 7.5. Writing Temperature Coefficients (when replacing the unit assembly (1)).)

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

1) Remove the unit assembly (1).

2) Unsolder the two temperature sensor cables connected to the detector assembly (43).

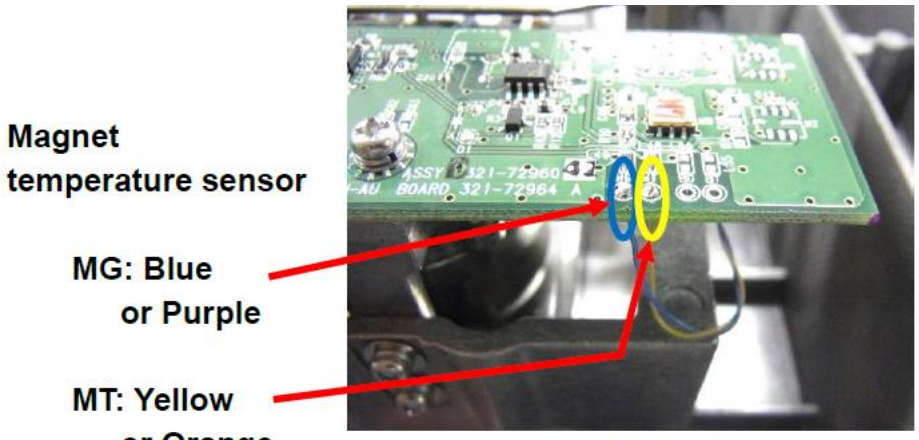


Fig. 2-109

3) Remove the detector assembly (43) by loosening the two P3 M3 × 8 screws.



Fig. 2-110

4) Install the new detector assembly (43) by reversing the steps above. Be sure to install the temperature sensor as well.

5) Adjust the detector assembly height.

6) Reassemble the balance by reversing the steps above.

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

1) Remove the unit assembly (1).

2) Unsolder the four temperature sensor cables connected to the detector assembly (43).

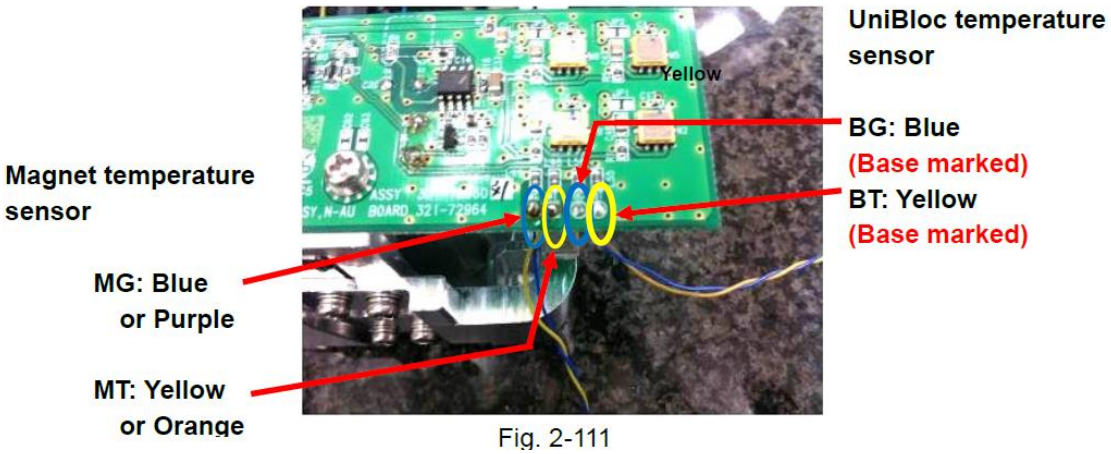


Fig. 2-111

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

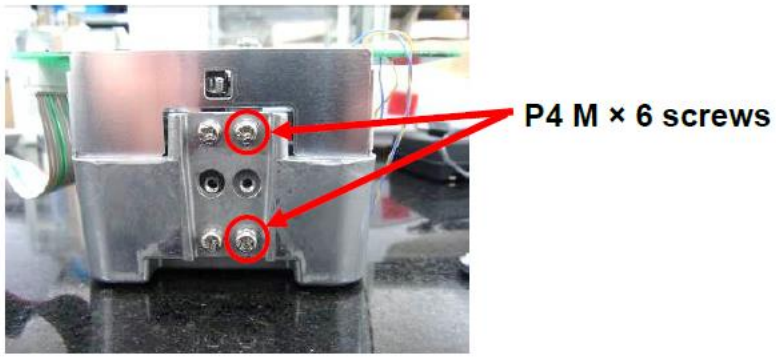


Fig. 2-112

4) Install the new detector assembly (43) by reversing the steps above. Also install the temperature sensor correctly.

5) Adjust the detector assembly height.

6) Reassemble the balance by reversing the steps above.

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

1) Remove the unit cover.

2) Remove the stopper plate (64) by loosening the two M3 × 6 pan head screws and two M3 flat washers.

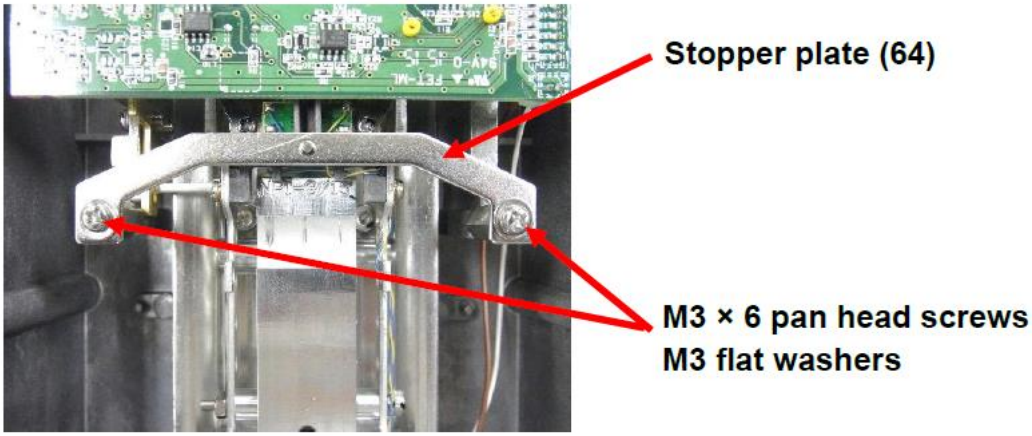


Fig. 2-113

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

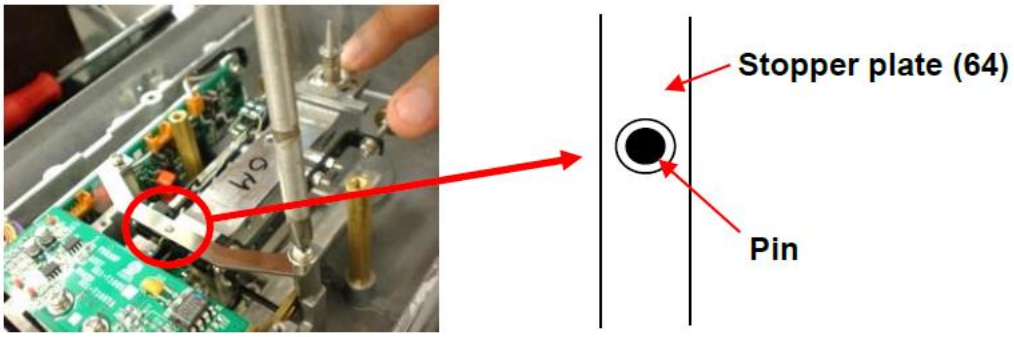


Fig. 2-114

4) Reassemble the balance by reversing the steps above.

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

1) Remove the upper lever cover.

2) Remove the stopper plate (64) by loosening the two M3 × 6 pan head screws and two M3 flat washers.

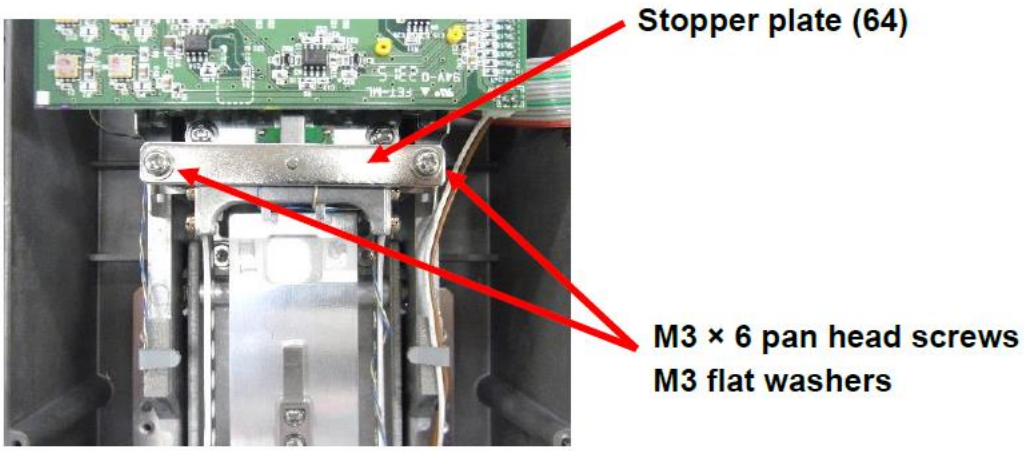


Fig. 2-115

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

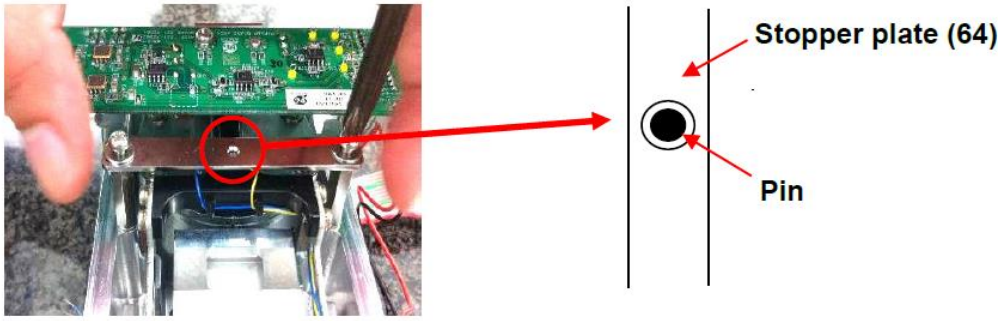


Fig. 2-116

4) Reassemble the balance by reversing the steps above.

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

1) Remove the upper lever cover.

2) Remove the OPF stopper (100) by loosening the two M3 × 6 pan head screws and two M3 disc spring washers.

3) Carefully insert the OPF retainer pin assembly jig (J2) into the lever positioning hole on the OPF side.

• If it is difficult to insert the OPF retainer pin assembly jig (J2), temporarily remove the OPF positioning pin jig (J1), insert the OPF retainer pin assembly jig (J2) to secure the lever neutral position, and then reinstall the OPF positioning pin jig (J1).

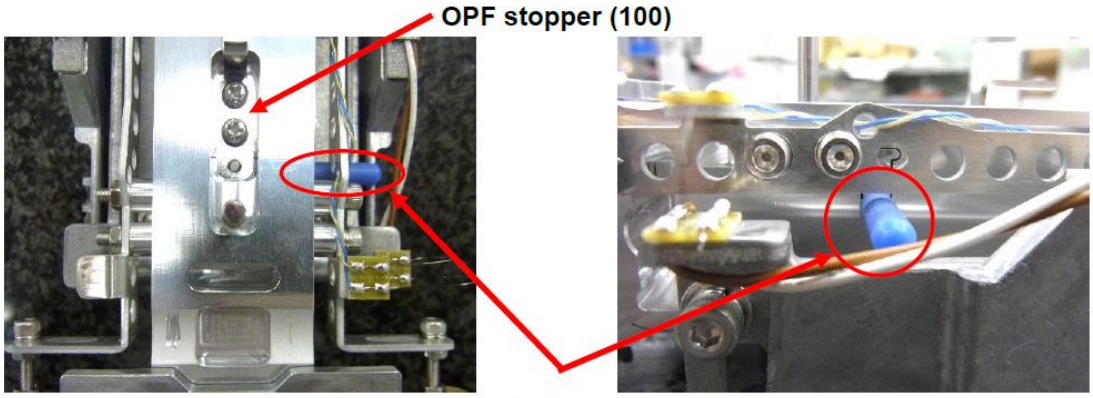


Fig. 2-117 **OPF retainer pin assembly jig (J2)** Fig. 2-118

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

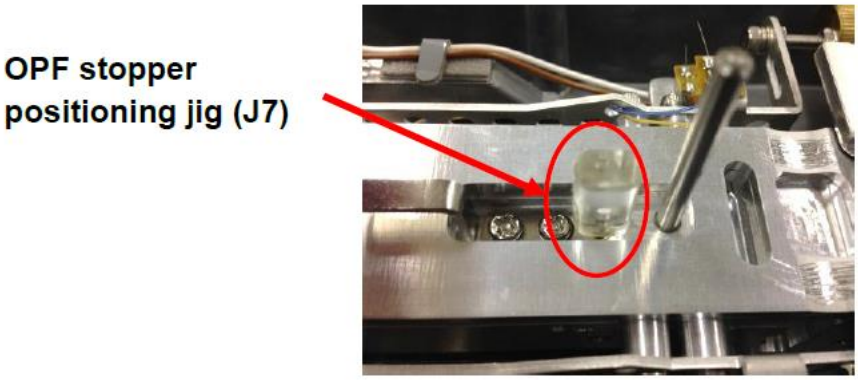


Fig. 2-119

5) Reassemble the balance by reversing the steps above.

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

1) Remove 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).

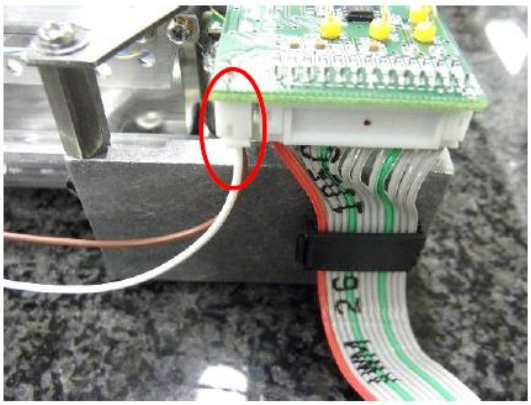


Fig. 2-120

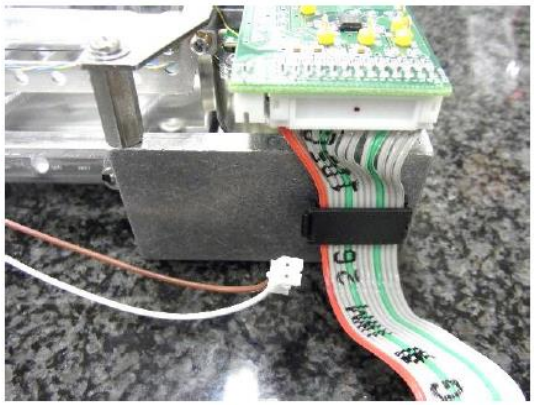


Fig. 2-121

3) Temporarily connect the 13-200_PH2 cable assembly (49) from the detector assembly (43) to the case assembly (2) with AP 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.

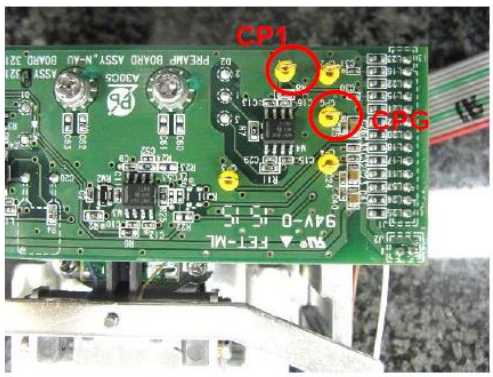


Fig. 2-122



Fig. 2-123

5) Remove the stopper lever (65) by loosening the two P3 M3 × 8 screws that fasten the lever.

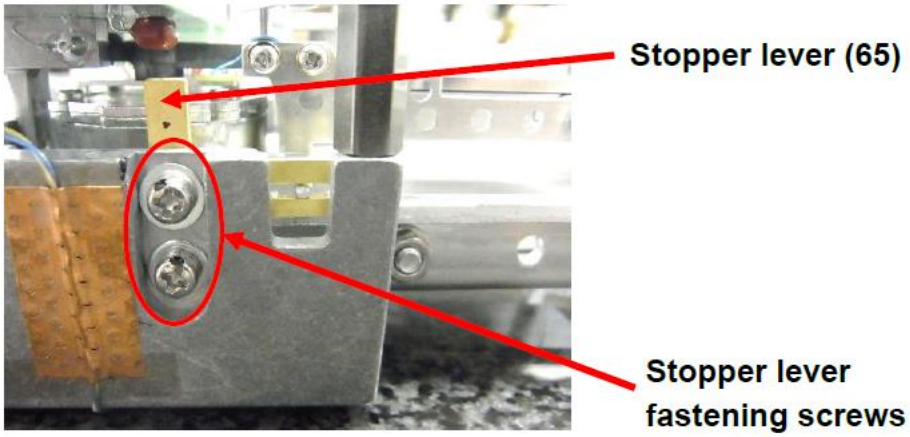


Fig. 2-124

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

• Slightly lift up on the lever assembly to pull out 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 × 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, press carefully and 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 -2.5 V

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

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

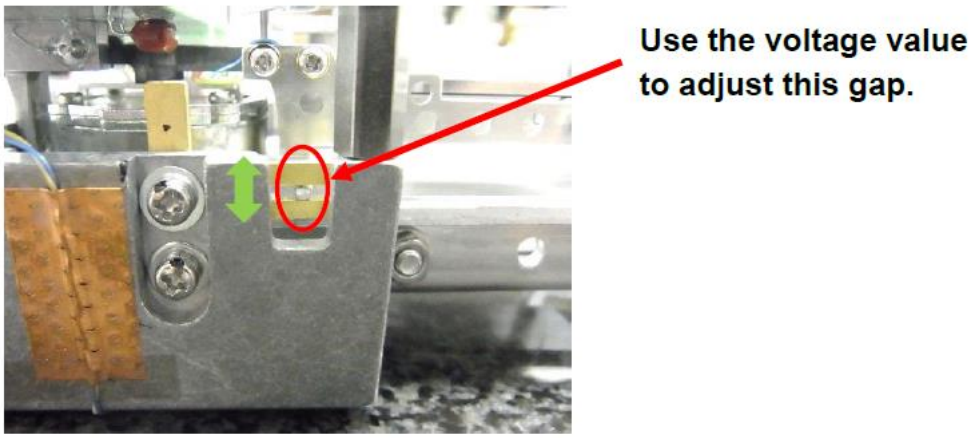


Fig. 2-125

9) Unplug the AC adapter.

10) Insert the OPF positioning pin jig (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.**

11) Reassemble the balance by reversing the steps above.

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

1) Remove 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).

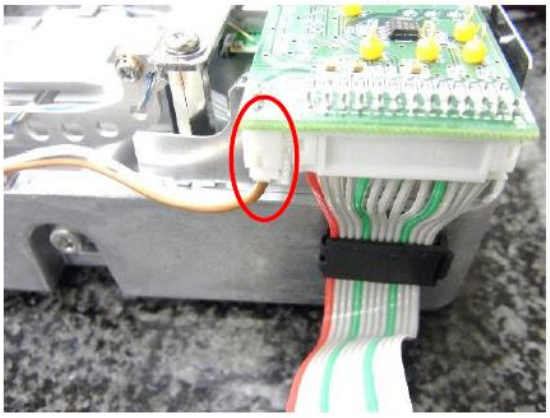


Fig. 2-126



Fig. 2-127

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

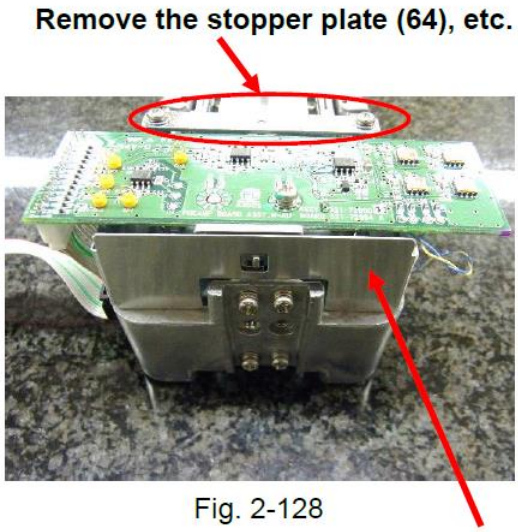


Fig. 2-128



Fig. 2-129

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.

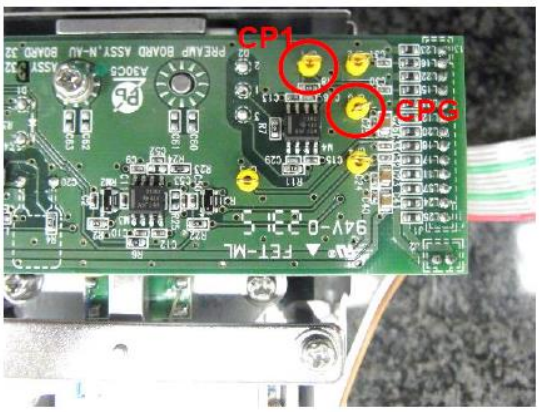


Fig. 2-130

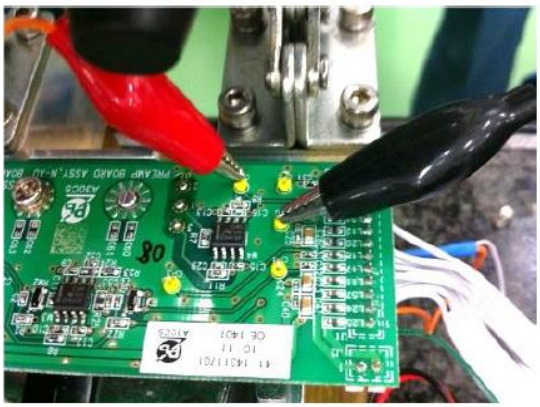


Fig. 2-131

6) Remove the stopper lever (65) by loosening the two P3 M3 × 8 screws that fasten the lever on the left side.



Fig. 2-132

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

- **Slightly lift up on the lever assembly to pull out 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 × 8 fastening screws slightly loosened, install the M3 × 5 flat head screw jig (J8).



Fig. 2-133



Fig. 2-134

-

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

- **Voltage adjustment ranges are indicated below.**

The stopper lever (65) moves upward by tightening the flat head screw jig (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 M3 × 8 screws.

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 jig (J8) and confirm that the indicated voltage value is within the adjustment range.

11) Unplug the AC adapter.

12) Insert the OPF positioning pin jig (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.

3 Electronic Circuit Board Check List

The TABP-A series circuit boards and their signals are summarized below.

3.1 Main Board Assembly (40)

Main Board Assembly	
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 DATA Beam PID control calculation ● USB control circuit ● Coil current control circuit ● Magnet temperature correction circuit ● Displacement sensor A/D circuit

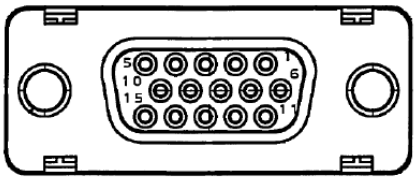
3.2 TABP-A Display Board Assembly (41)

Display Board Assembly	
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 ● USB control circuit (A-connector) ● Touchless sensor control circuit
Check Voltage	Touchless Sensor Functionality Check (For right touchless sensor) J13 No. 8 PIN Signal J13 No. 3 PIN GND (For left touchless sensor) J14 No. 8 PIN Signal J14 No. 3 PIN GND ➢ With the balance power ON, the voltages across J13 pins No. 8 and 3 are as follows. With object close to touchless sensor: 0 V Without object close to touchless sensor: 3.3 V Voltages are the same for the left touchless sensor (J14). Weight Loader Sensor Functionality Check J5 No.2 PIN Weight detection signal J7 No.5 PIN GND During internal weight loading, the weight position detection signal repeatedly switches between 0 V and about 3 V vs GND. Normally (not during internal weight loading), the weight position detection signal vs GND is 0 V.

3.3 PREAMP Board Assembly

PREAMP Board Assembly	
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

3.4 Power Board Assembly (105) (only on 0.01 mg moels)

Power Board Assembly P/N	321-73825-41
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 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 Power supply from AC adapter 

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

Interface Board Assembly	
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.

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

Interface Board Assembly	
Circuits Mounted	Includes USB B-connector, D-sub 9-pin connector, and ionizer communication connector.

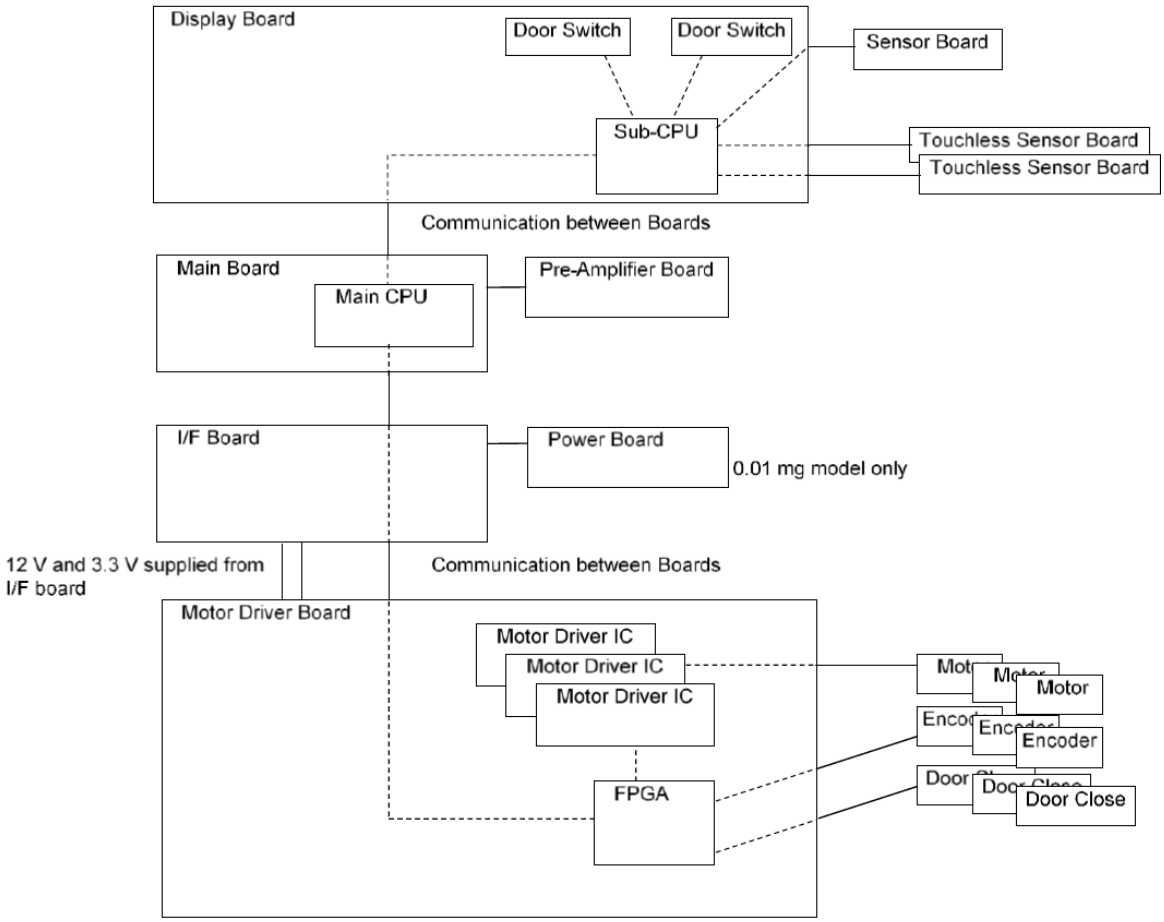
3.7 Touchless Sensor Board Assemblies (307 and 308)

Touchless Sensor Board Assembly	
Circuits Mounted	• Includes touchless sensor devices (infrared photodetector and light-emitting devices). • Includes blue and red LEDs.

3.8 TABP-A Motor Board Assembly (304)

Motor Board Assembly	
Circuits Mounted	• Door drive motor control based on instructions from main board CPU • Detection of door close signal • Detection of door position signal

3.9 Block Diagram



4 Adjusting the Hardware

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

Adjustment Required \ Replacement Process			Unit ASSY Replacement	Detector ASSY Replacement	Main Board ASSY Replacement	Display Board ASSY Replacement	Weight Loader ASSY Replacement	Software Ver. Update	Cornerload Error Adjustment	Drive Module Replacement	Touchless Sensor Board Replacement
1	Initialize EEPROM					✓					
2	Adjust Detector ASSY Height			✓							
3	Restore EEPROM					✓					
4	Adjust Tilt Error		✓								
5	Release Setting Lock		✓	✓	✓		✓		✓		
6	Write Temperature Coefficient (*1)		✓ (*1)								
7	Adjust Weighting Parameter				➢						
8	Adjust Linearity		✓	✓	✓				✓		
9	Calibrate Internal Weight (P-CAL)		✓	✓	✓		✓		✓		
10	Enable Setting Lock		✓	✓	✓		✓		✓		
11	Adjust Sensitivity (i-CAL, E-CAL)		✓	✓	✓		✓		✓		
12	Delete Error Log		✓	✓	✓	✓	✓	✓	✓		
13	Back up EEPROM		✓	✓	✓		✓	✓	✓		
14	Adjust Touchless Sensors					➢ (*2)					➢ (*2)

(*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. Writing Temperature Coefficients (when replacing the unit assembly (1)).

(*2) The touchless sensor board assembly must be readjusted. Adjusting Touchless Sensors and

After adjustment, turn the power OFF, unplug the AC adapter, and plug it again.
Check the final performance after sufficiently warming up the balance.

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

1) Remove the unit assembly (1). 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).

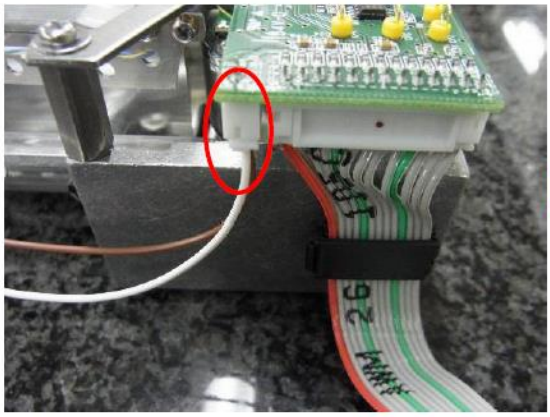


Fig. 4-1

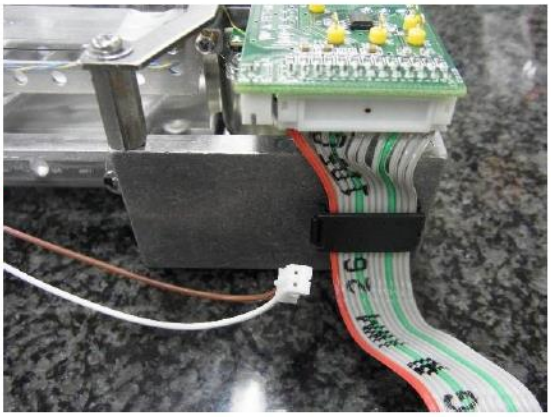


Fig. 4-2

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.

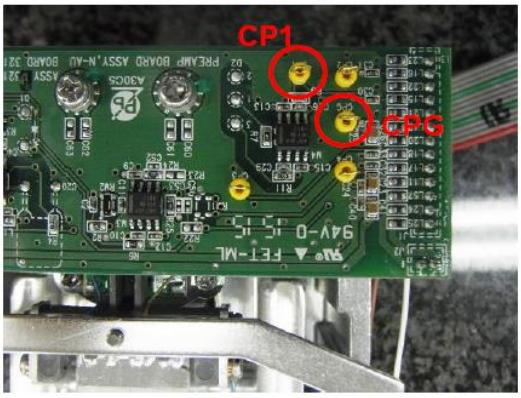


Fig. 4-3



Fig. 4-4

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

• Slightly lift up on the lever assembly to pull out 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 × 8 fastening screws for the detector assembly (43) slightly loosened, raise and lower the lever assembly until it lightly contacts the stopper lever (65).

• To move the lever assembly up and down, press carefully and 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.

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.

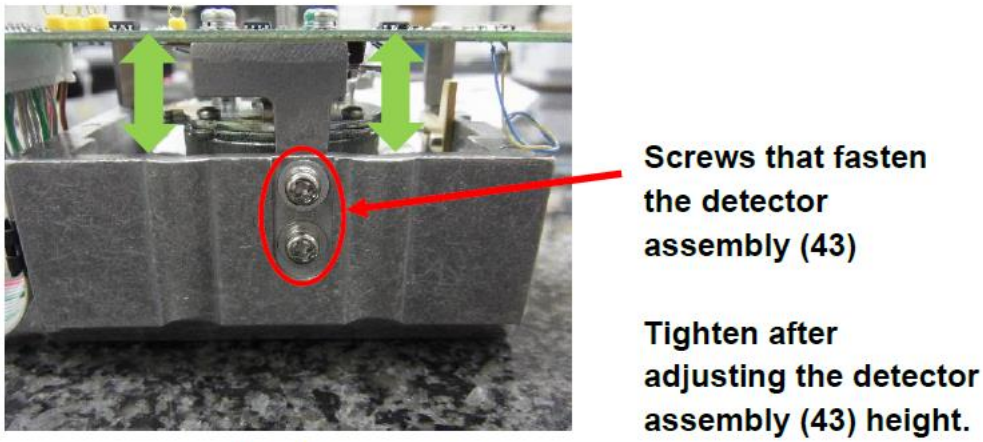


Fig. 4-5

8) Unplug the AC adapter.

9) Insert the OPF positioning pin jig (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.

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

1) Remove the unit assembly (1). 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).

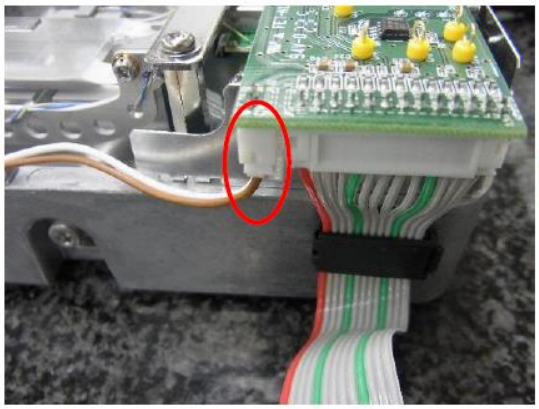


Fig. 4-6



Fig. 4-7

3) Temporarily connect the 13-200_PH2 cable assembly (49) from the detector assembly (43) to the case assembly (2) with AP 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.

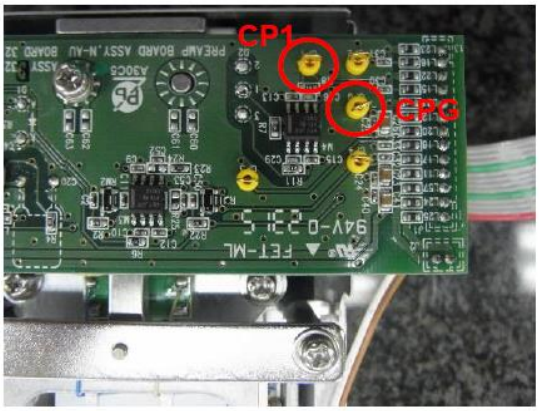


Fig. 4-8



Fig. 4-9

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

• Slightly lift up on the lever assembly to pull out 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 × 8 fastening screws for the detector assembly (43) slightly loosened, install the M3 × 5 flat head screw (J8). Tightening the flat head screw (J8) moves the detector assembly (43) upward.



Fig. 4-10

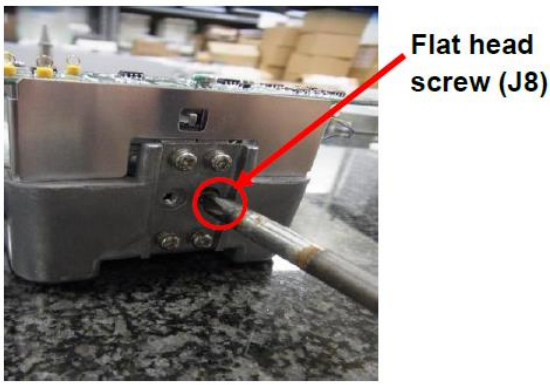


Fig. 4-11

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

• Voltage adjustment range: The difference between the absolute values on positive and negative sides should be within 0.1 V.

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.

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 jig (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.

4.3 Adjusting the Balance

1) Remove the weights (59 to 63). Replacing the Weight Loader Assembly (16).

2) Pull out the OPF positioning pin jig (J1) from the lever positioning hole on unit assembly (1) and place the pan supporter assembly (3) and pan (6) of the product 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. (Refer to 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 jig (J1) into the lever positioning hole, located on top of the unit assembly (1), and loosen the M3 nuts that fasten the lever assembly balance weight and the eccentric balance weight.

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

• Slightly lift up on the lever assembly to insert the OPF positioning pin jig (J1). 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.

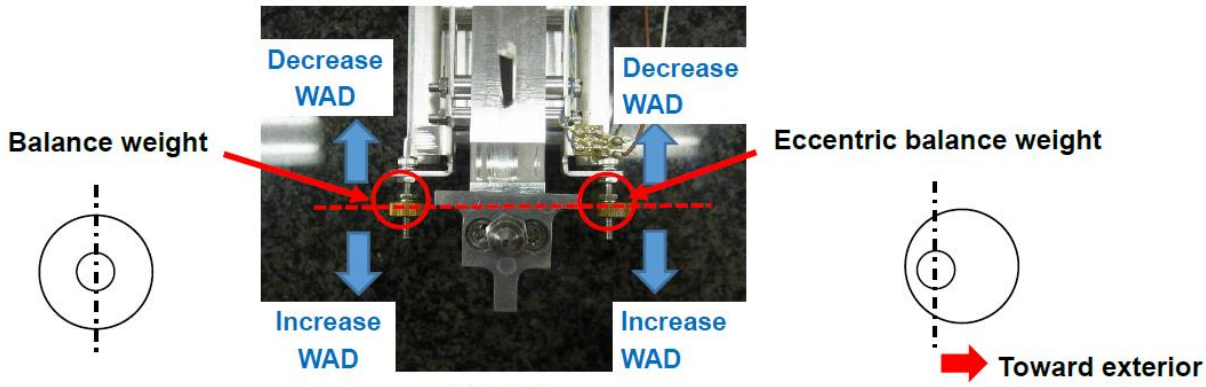


Fig. 4-12

• Attach the balance weight and eccentric balance weight in approximately the same position.

• Attach the eccentric balance weight so that the eccentricity is oriented toward 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.

9) Reassemble the balance by reversing the steps above.

4.4 Adjusting the Tilt Error

1) Remove the weights (59 to 63). Replacing the Weight Loader Assembly (16).

2) Pull out the OPF positioning pin jig (J1) from the lever positioning hole on unit assembly (1) and place the pan supporter assembly (3) and pan (6) of the product 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.

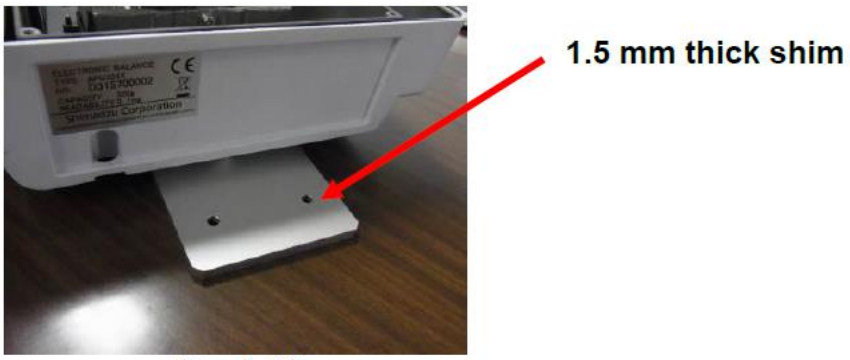


Fig. 4-13

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

0.1 mg models:	Within ±0.0050 g
0.01 mg models:	Within ±0.00300 g

Slightly lift up on the lever assembly to insert the OPF positioning pin jig (J1). 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.

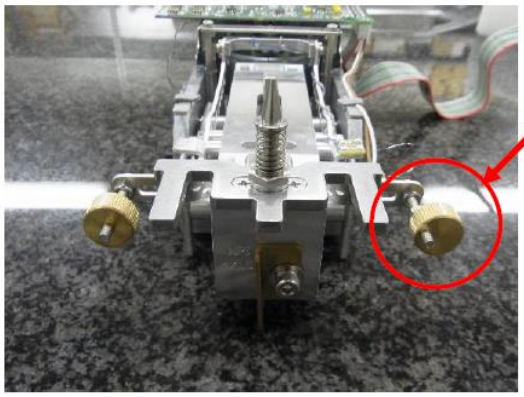


Fig. 4-14

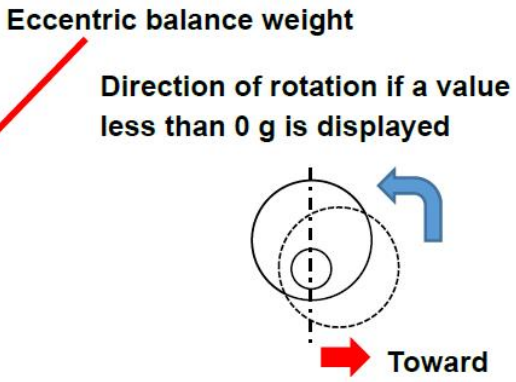


Fig. 4-15

Attach the eccentric balance weight so that the eccentricity is oriented toward the exterior of the balance.

7) Repeat the above steps 4) to 6) to adjust and check. When properly adjusted, tighten the M3 nut.

8) Adjust and check the cornerload error.

9) Reassemble the balance by reversing the steps above.

4.5 Adjusting the Cornerload Error

1) Remove the weights (59 to 63).

2) Pull out the OPF positioning pin jig (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.

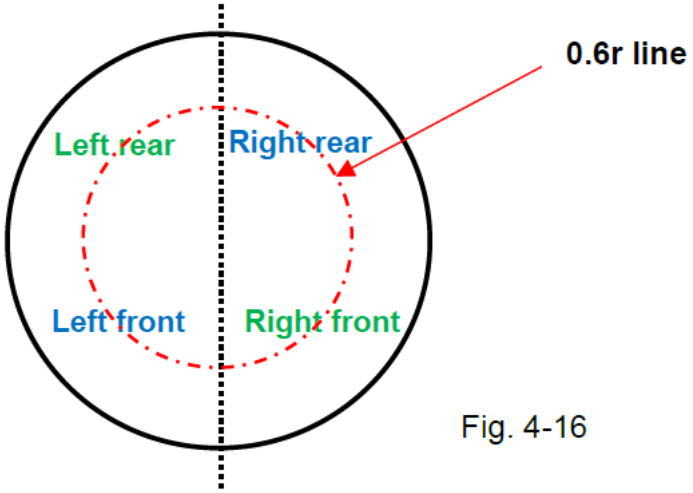


Fig. 4-16

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.

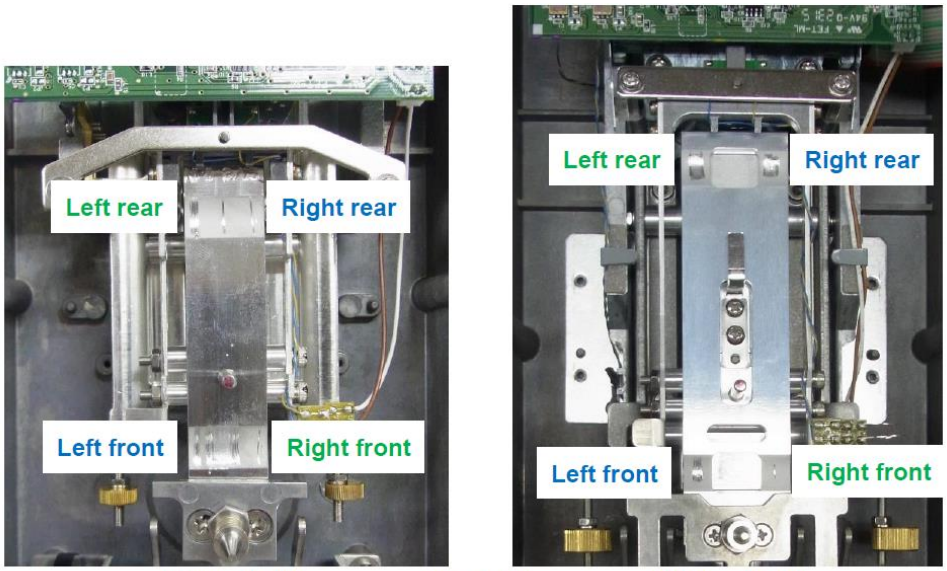
8) Use the corner adjustment jigs (J4 and J5) to shave the parallel guide strain element corresponding to the corner with the heavier weight indicated in each direction.

• 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. 4-17 0.01 mg Model

9) The cornerload error adjustment criteria are indicated below.

TABP 320-4AM-A:	±0.0003 g (Load 150 g)
TABP 220-4AM-A:	±0.0003 g (Load 100 g)
TABP 220-5AM-A:	±0.00015 g (Load 100 g)
TABP 135-5AM-A:	±0.00010 g (Load 50 g)
TABP 220-5DAM-A:	±0.00030 g (Load 100 g)
	±0.00010 g (Load 50 g)
TABP 120-5DAM-A:	±0.00030 g (Load 50 g)
	±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.

5 Maintenance Menu

5.1 Product Information

Used to check the following information.

1) Model name
2) Software versions Main CPU ver. : Display CPU ver. : FPGA ver.
3) Balance serial number
4) Shipping destination setting

5.2 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 [↓] key until a beep sound is emitted. Return to the maintenance menu and select [Error Log] to confirm that the error log is deleted.

5.3 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)

5.4 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	AP225WD-AD AP225W-AD	AP125WD-AD AP135W-AD	AP324W-AD AP224W-AD
Internal Weight 1 (Inside)	Approx. 100 g	Approx. 60 g	Approx. 200 g
Internal Weight 2 (Outside)	Approx. 100 g	Approx. 60 g	-

5.5 LED Lighting Test Start

Confirms that the blue LED illuminates when the touchless sensor detects an object and the red LED illuminates when an error occurs.

Used to confirm LED illumination failures or to confirm that LEDs illuminate after a touchless sensor board was replaced.

1) Move the cursor to [LED Lighting Test Start] position and press the [OK] key.

2) The left and right blue LEDs illuminate for about 3 seconds and the left and right red LEDs illuminate for about 3 seconds.

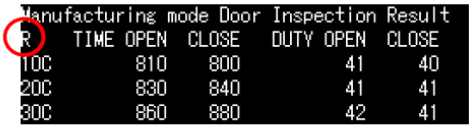
3) A beep is emitted to indicate the test is finished.

5.6 Door Inspection Results Display

Allows viewing the factory inspection results for left, right, and top door actions.
[TIME OPEN CLOSE] indicate time required for corresponding actions in msec units.
[DUTY OPEN CLOSE] indicates duty cycle during door drive output in percent

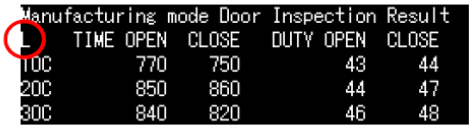
Right door inspection results display

↓ Press the ▼ key.

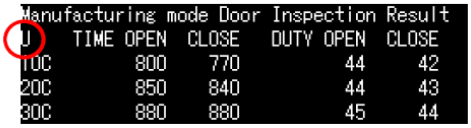


Left door inspection results display

↓ Press the ▼ key.



Top door inspection results display



5.7 Adjustment

5.7.1 Adjusting Weighing Parameters

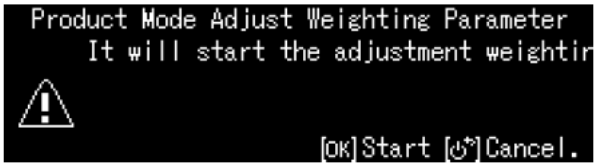
This adjusts the PWM voltage value output to the coil based on the weighting parameter resistance.

• 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] on the maintenance menu.

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.

5.7.2 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] on the maintenance menu.

2) Follow the instructions on the display to place the reference weights, wait for the 30 seconds after closing the door, and then press the [OK] key to start adjustment.



If the indicated weight value is incorrect, reenter the weight value.

3) When the adjustment is finished, a correction coefficient is calculated and automatically saved in the EEPROM data area of NVRAM. In addition, a backup of correction coefficients is automatically saved in the EEPROM backup area of flash drive.

4) The A/D screen is displayed again.

5.7.3 Inputting Weight Values

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] on the maintenance menu.

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 220-5DAM-A TABP 220-5AM-A	TABP 120-5DAM-A TABP 135-5AM-A	TABP 320-4AM-A	TABP 220-4AM-A
Reference Weight	50 g	30 g	50 g	50 g
	100 g	60 g	100 g	100 g
	150 g	90 g	200 g	150 g
	200 g	120 g	300 g	200 g
	250 g	150 g	350 g	250 g

5.7.4 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. Linearity is finished.
For larger error values, record the weight and LAD values. Linearity can be corrected at up to 6 points.

Perform additional point correction immediately after the procedure in 5.7.2. 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 finishing the procedure in 5.7.2. Linearity, additional point correction is all cleared. Additional point adjustment is done only for 0.01 mg models in factory, additional point is below.

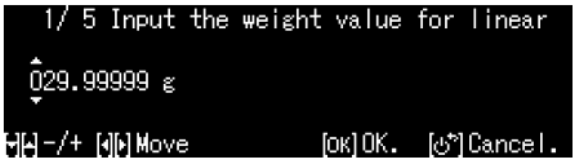
Model	TABP 220-5DAM-A	TABP 120-5DAM-A	TABP 220-5AM-A	TABP 135-5AM-A
Point 1	20 g	10 g	20 g	10 g
Point 2	40 g	20 g	80 g	20 g
Point 3	60 g	40 g	120 g	50 g
Point 4	80 g	50 g	180 g	80 g
Point 5	120 g	70 g	220 g	100 g
Point 6	-	-	-	130 g

The additional point correction procedure is indicated below.

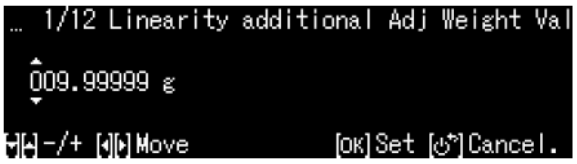
1) Enter the maintenance mode and select [Adjustment] - [Linearity] - [Additional Point] on the maintenance menu.

2) Follow instructions on the display to alternately enter corresponding recorded weight and LAD values. Values can be entered for up to 6 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. The maximum points that can be corrected is 6, but if the number of points to be corrected is less than 6, the weight and LAD values should be set to zero grams for the points not to be corrected, and be sure to

complete the procedure up to 12/12. After that, linearity is corrected based on the entered weight and LAD values.

5.7.5 Adjusting Parameters

Displays coefficients for correcting temperature, linearity, and sensitivity.

The procedure is indicated below.

1) Enter the maintenance mode and select [Adjustment] - [Adjust Parameter] on the maintenance menu.

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
	Intermediate correction (arbitrary point) n = 1 to 6 One point between each of 6 reference weight values	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	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)

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

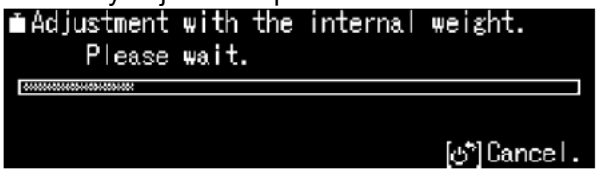
Confirm that nothing is on the pan.

The adjustment procedure is indicated below.
1) Enter the maintenance mode and select [Adjustment] - [Calibration/Inspection] - [Adjustment with the internal weight] on the maintenance menu.

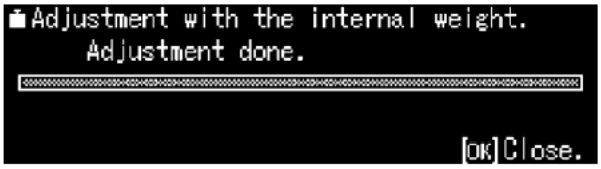
2) Press the [MENU] key to return to the A/D screen.

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 data area of NVRAM.

5) The A/D screen is displayed again.

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

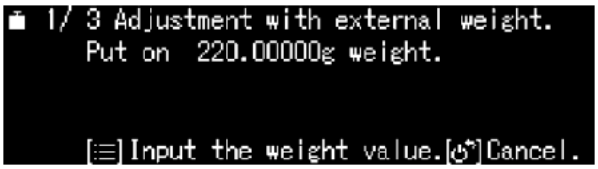
Confirm that nothing is on the pan.
The adjustment procedure is indicated below.

1) Enter the maintenance mode and select [Adjustment] - [Calibration/Inspection] - [Adjustment with the external weight] on the maintenance menu.

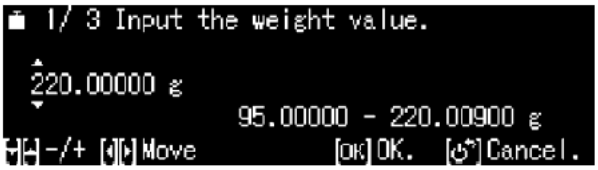
2) Press the [MENU] key to return to the A/D screen.

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 data area of NVRAM.

6) The A/D screen is displayed again.

Reference Weight Used for Adjustment Using External Weight

Model	TABP 220-5DAM-A TABP 220-5AM-A	TABP 120-5DAM-A TABP 135-5AM-A	TABP 320-4AM-A	TABP 220-4AM-A
Reference Weight	200 g	100 g	300 g	200 g

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

5.7.8 Calibrating Internal Weights (P-CAL)

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

Reference Weights Used for Calibrating Internal Weights

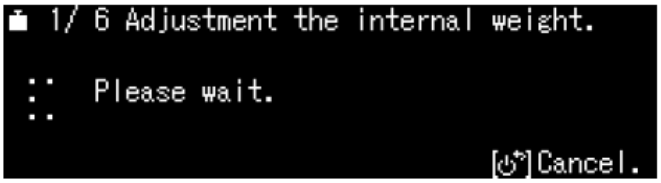
Model	TABP 220-5DAM-A TABP 220-5AM-A	TABP 120-5DAM-A TABP 135-5AM-A	TABP 320-4AM-A	TABP 220-4AM-A
Internal Weight 1	100 g	50 g	300 g	200 g
Internal Weight 2	200 g	100 g	-	-

Confirm that nothing is on the pan.

The adjustment procedure is indicated below.

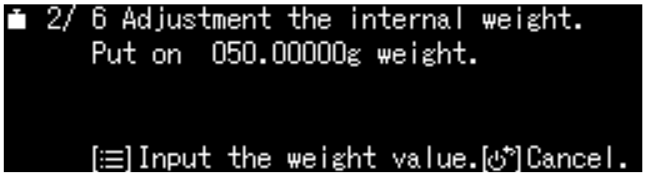
1) Enter the maintenance mode and select [Adjustment] - [Calibration/Inspection] - [Calibration of internal weight] on the maintenance menu.

2) The P-CAL adjustment starts. When the measurement value stabilizes, the zero point is measured.

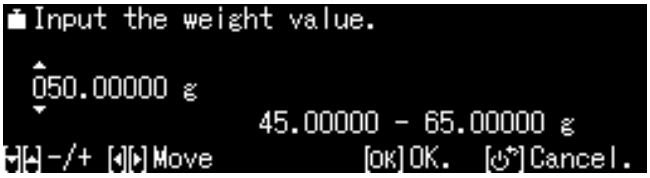


3) The reference weight value is displayed flashing. If a weight value is different than the values indicated above in the list of reference weights for internal weight calibration, press the [MENU] key to specify the weight value manually. If the weight values are correct, place the specified weight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

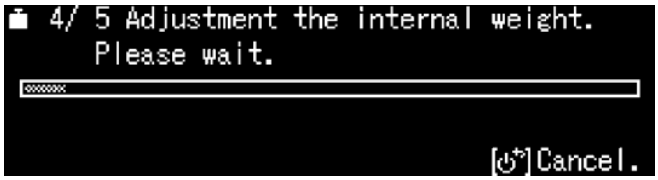
Screen displayed while loading reference weights



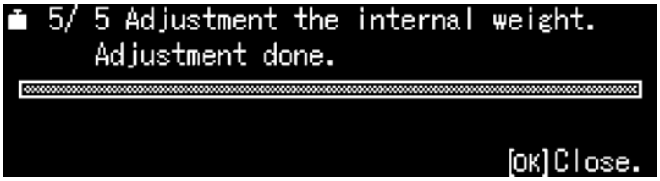
Reference weight value input screen



4) Continue calibration by following the instructions on the screen.
5) Internal weights are calibrated based on the reference weights.



6) The internal weights are used to adjust sensitivity.



7) When the adjustment is finished, a sensitivity correction coefficient is calculated and automatically saved in the EEPROM data area of NVRAM.

8) The A/D screen is displayed again.

5.7.9 Adjusting Touchless Sensors

Adjust the touchless sensor output. The following describes the adjustment procedure for the right sensor. Use the same procedure for the left sensor by replacing the word “right” with “left.

1) Enter the maintenance mode and select [Touchless Sensor Adjustment] on the maintenance menu.



2) Place the touchless sensor positioning jig (J35) on the balance.
Either with or without the protective cover, perform adjustments in the state used by the user.

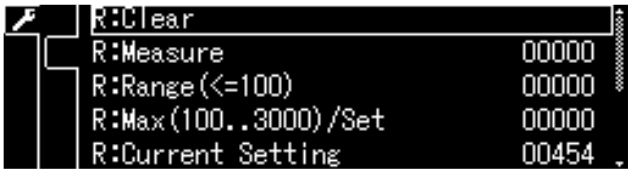


Insert the touchless sensor positioning jig in the gap between the glass and case.

Fig. 5-1

• If there is the protective cover, use the one that you send back to the user finally.

3) Select [R:Clear] on the menu and press [OK]. Confirm that “0000” is displayed for [R:Measure], [R:Range(<=100)], and [R:Max(100..3000)/Set].



4) Place the touchless sensor adjustment jig (J31) aligned with the hole in the touchless sensor positioning jig (J35). Position the touchless sensor adjustment jig (J31) closely against the protective cover. Do not touch the top (the flat surface on the cylinder) of the touchless sensor adjustment jig (J31).

• If the flat surface is bend, measure values incorrectly.



Fig. 5-2



Fig. 5-3

5) Select [R:Measure] on the menu and press [OK]. A beep is emitted when the measurement starts. A double-beep is emitted when the measurement is finished.

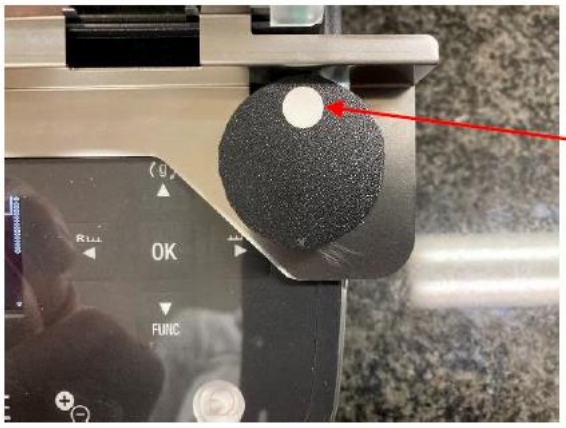


Fig. 5-4

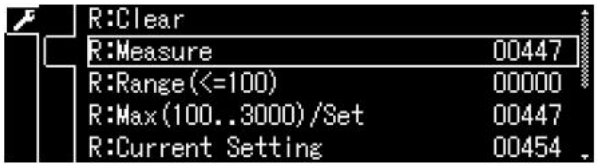


Fig. 5-5

When the measurement is finished, the [R:Measure], [R:Range(<=100)], and [R:Max(100..3000)/Set] values are updated.

Menu Items	Description
R:Measure	Right touchless sensor measurement value
R:Range(≤ 100)	Difference between maximum and minimum values from multiple right touchless sensor measurements
R:Max(100..3000)/Set	Maximum right touchless sensor measurement value

If a single long beep is emitted after a measurement is finished, it means that the measurement value failed for one of the following reasons.

- The right **measurement range exceeded 100.**
- The right **maximum value was less than 100 or was 3001 or higher**.

6) When measurements are finished, turn the touchless sensor adjustment jig (J31) orientation 90 degrees and measure values.

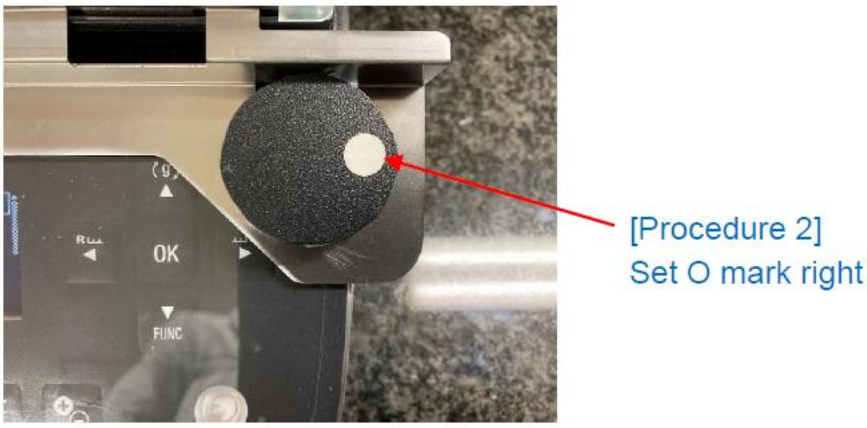


Fig. 5-6

7) When measurements are finished, turn the touchless sensor adjustment jig (J31) orientation 90 degrees and measure values.

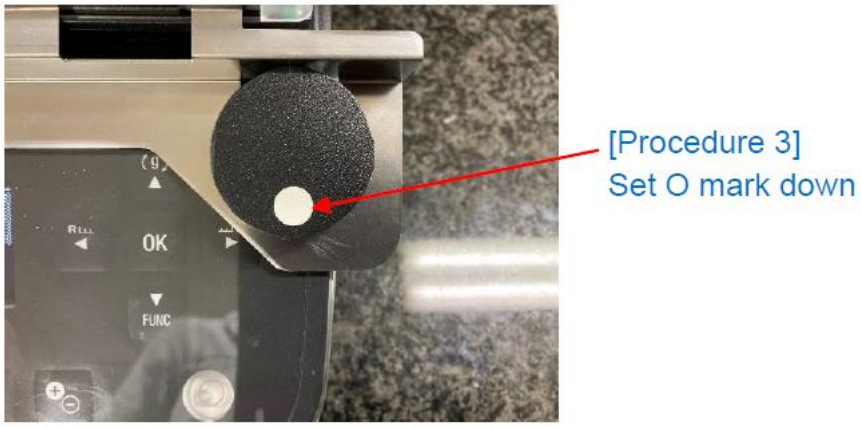
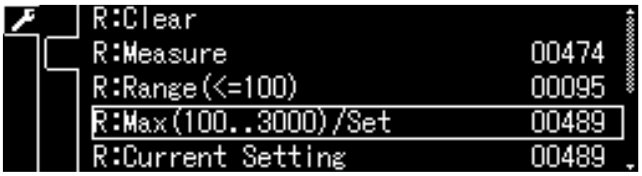


Fig. 5-7

8) If an error does not occur for all three measurements, select [R:Max(100..3000)/Set] on the menu and press [OK]. A beep is emitted to indicate it has started updating settings. A double-beep is emitted to indicate it has finished updating settings. Confirm that the [R:Max(100..3000)/Set] and [R:Current Setting] values are consistent.



If they are not consistent, press [OK] for the [R:Max(100..3000)/Set] again. If a single long beep is emitted when [OK] is pressed, it means settings cannot be configured because the measurement failed. In that case, repeat the measurement starting over from step 3).

5.7.10 Inspecting Touchless Sensors

Inspect the touchless sensor output. The following describes the inspection procedure for the right sensor. Use the same procedure for the left sensor by replacing the word “right” with “left.

1) Place the touchless sensor checking jig B (J37) (Short length) on the balance. Orient the touchless sensor checking jig B (J37) so the side with two feet is oriented toward the front and the notches in the back edge and the right side of the acrylic panels are positioned closely against the front glass and front pillars.

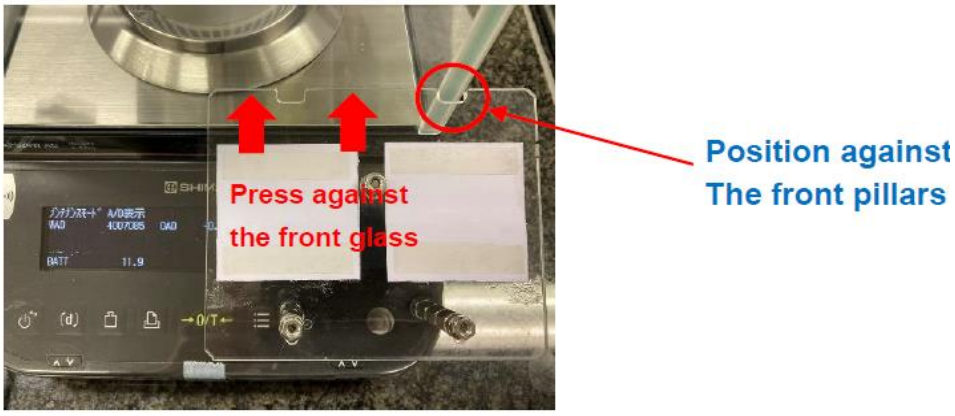


Fig. 5-8

2) Confirm that the blue LED for the right touchless sensor illuminates in this state.

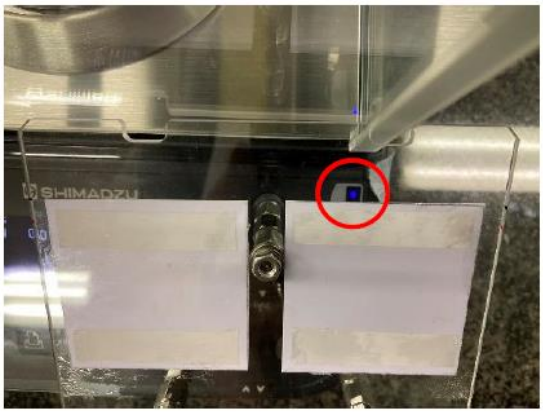


Fig. 5-9

3) Place the touchless sensor checking jig A (J36) (Long length) on the balance. Orient the touchless sensor checking jig A (J36) so the side with two feet is oriented toward the front and the notches in the back edge and the right side of the acrylic panels are positioned closely against the front glass and front pillars.

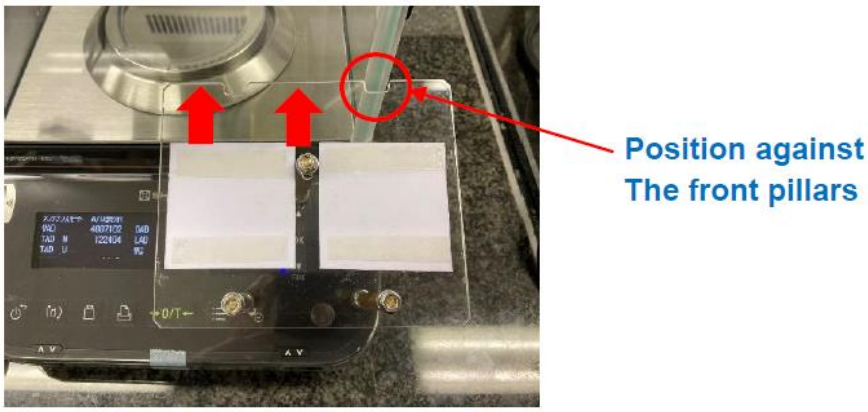


Fig. 5-10

4) Confirm that the LED for the right touchless sensor does not illuminate in this state.



Fig. 5-11

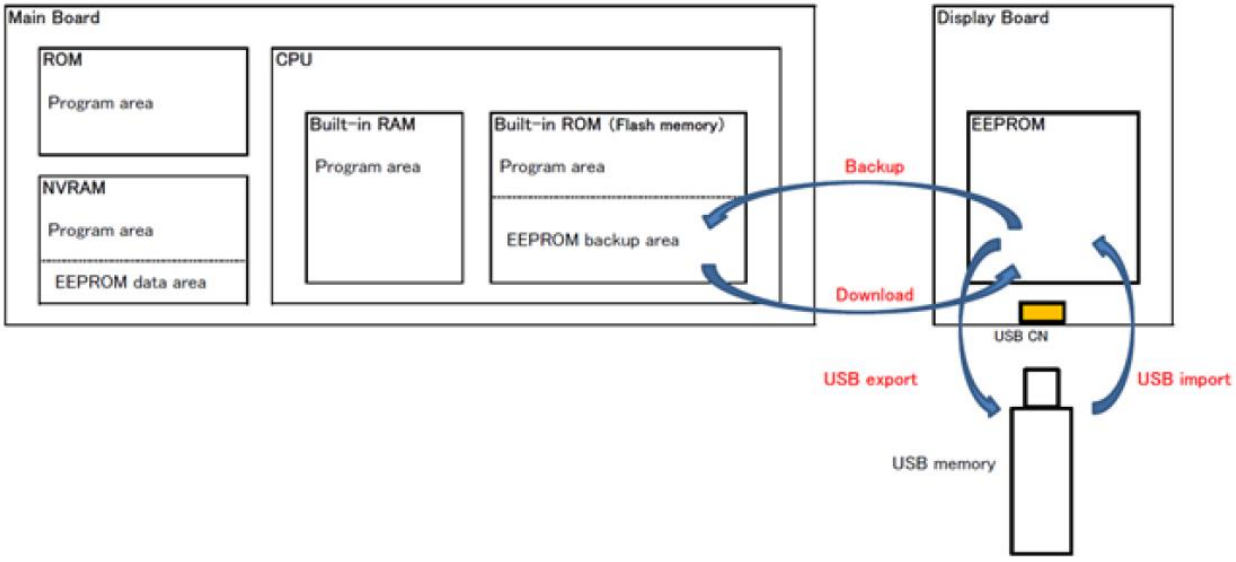
If it fails even after repeating, check for a connection problem between the sensor and touchless sensor board, as described in 2.3.10. and 2.3.11.
Replacing the Right/Left Touchless Sensor Board Assemblies (307 and 308).

5.8 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 input from a USB flash drive
- Back up EEPROM data in a ROM area
- Write data in a ROM backup area to EEPROM
- Initialize EEPROM

The EEPROM is configured as follows.



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 ON 00A2: XX01 Setting Lock OFF 00A2: 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.

Never edit any addresses other than those above.

Never edit an address not indicated in this service manual.

5.8.1 Outputting Data

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] on the maintenance menu. 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-AD
S/N D332200001
VER HSX.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.

5.8.2 Editing Data

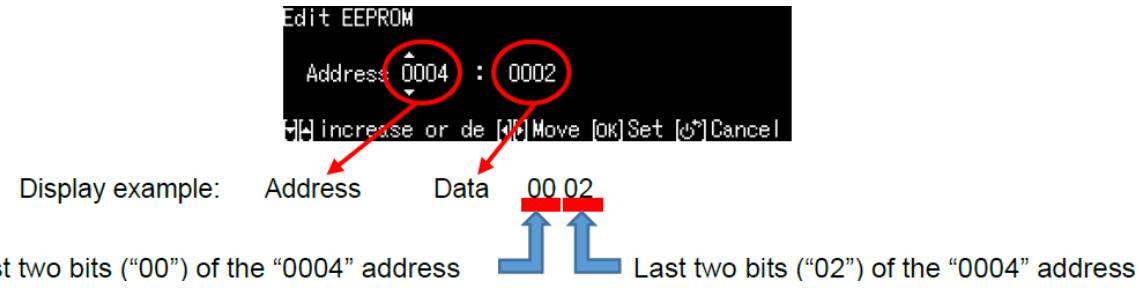
Saved EEPROM data can be edited on the display screen.

The procedure is indicated below.

1) Enter the maintenance mode and select [EEPROM] - [Edit] on the maintenance menu.

2) Data is displayed with the EEPROM address, as shown below.

The up/down arrows (▲▼) indicate the digits that can be changed.



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. ▲▼ symbols are also displayed in the right data area to enable editing.

6) Change the data.

7) Press the [OK] key to confirm and save the data by writing it to the corresponding address. Address values on the left are shown automatically updated to the following address values. ▲▼ symbols are also displayed in the left address area.

8) To continue editing, repeat the procedure from step 3).

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

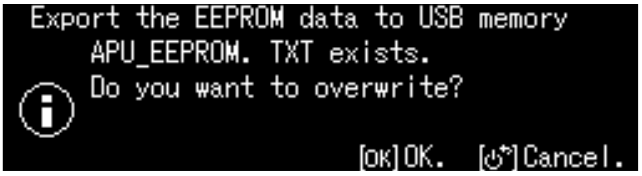
5.8.3 USB (Export)

1) To export data, insert a USB flash drive into the USB connector on the left side of the balance.

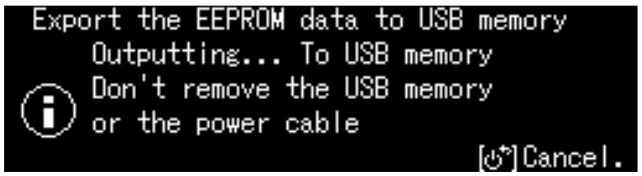
2) On the maintenance menu, select [EEPROM] - [USB] - [Export]. The menu item is not displayed if nothing is inserted in the USB port.

3) If the USB flash drive already contains an output file (with a file name in the form “AP_EEPROM.TXT”), then a warning is displayed.

If the file already in the USB flash drive memory is required, then save it with a new file name.



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.
To cancel the process, press the [POWER] key.



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

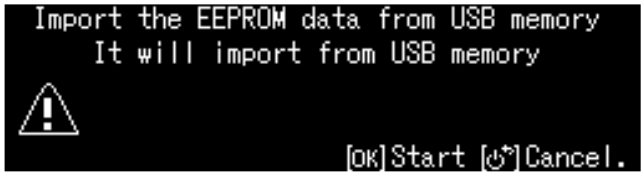
Only FAT32 format USB flash drives can be used.

5.8.4 USB (Import)

1) Insert a USB flash drive into the USB connector on the left side of the balance. **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.



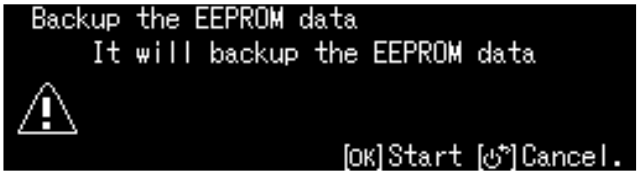
4) Press the [OK] key to read the “AP_EEPROM.TXT1” file from the USB flash drive and write it in the EEPROM.

5) When the import is finished, the menu is displayed again.

5.8.5 Backup

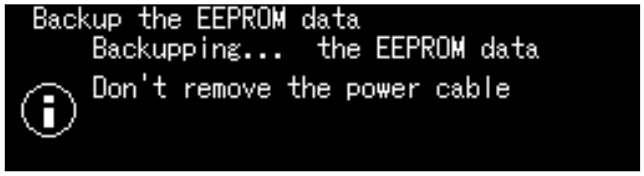
1) On the maintenance menu, select [EEPROM] - [Backup].

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 drive.

4) A backup progress message is displayed.



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

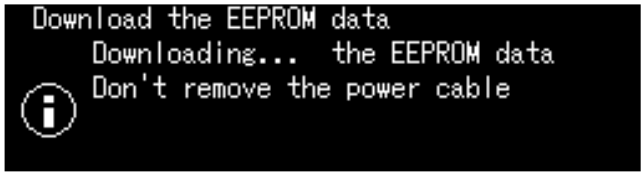
5.8.6 Restore

1) On the maintenance menu, select [EEPROM] - [Restore].

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 drive is transferred to the EEPROM.

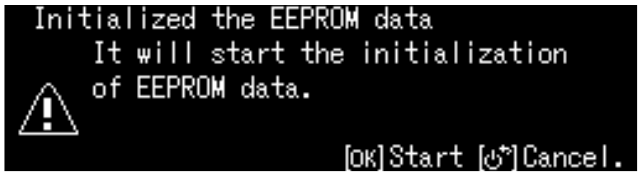


4) When the download is finished, the maintenance menu A/D screen is displayed again.

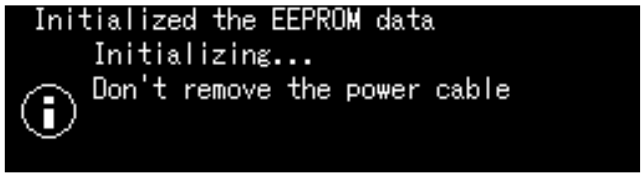
5.8.7 Initializing

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

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



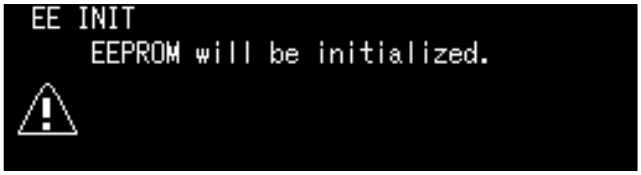
(3) Press the [OK] key to start the process.
(4) The initializing progress display appears.



Never disconnect the power supply during initialization.

The interface is displayed in English after initialization.

[Method 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. (Hold down the [POWER] and [MENU] keys until the 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.



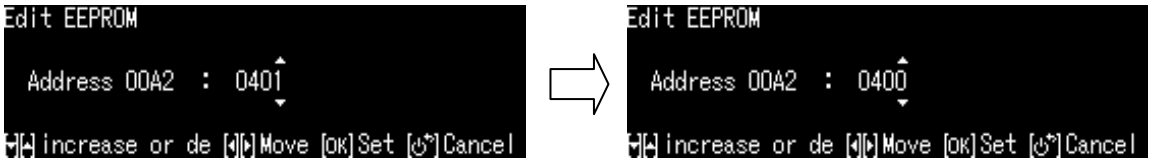
The interface is displayed in English after initialization.

6 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.

6.1 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 (XX01) from “01” to “00”.



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

6.2 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.

7 EEPROM Data Editing Software

7.1 Introduction

The following describes preparations for using the data editing software.
(1) Before the edit, write down the following user settings in user menu.
(2) On the user menu, select [Communication setting] - [RS-232C] - [User setting].

- [Communication setting] - [RS-232C]
- [Communication setting] - [RS-232C] - [User setting]

(3) Specify the following user settings.

- Communication speed 38.4 kbps
- Parity None
- Stop bit 1
- Handshake OFF
- Data format Format 1
- Delimiter CR + LF

(4) On the user menu, select [Communication setting] - [USB] - [User setting].

- [Communication setting] - [USB]
- [Communication setting] - [USB] - [User setting]

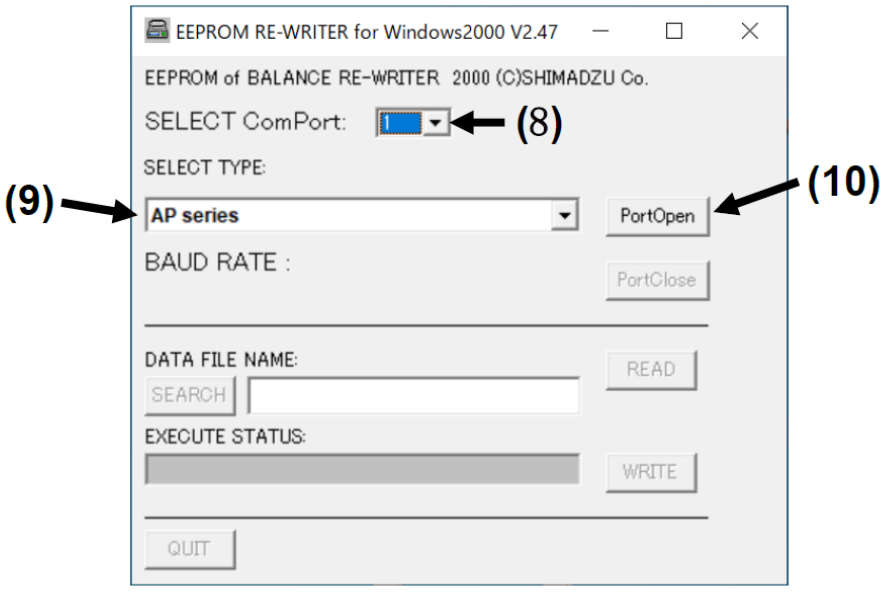
(5) Specify the same settings as for (3) above.

Make sure to specify the settings for RS-232C and USB as indicated above.

(6) Enter the maintenance menu to display. (Refer to 1.1. Entering the Maintenance Mode.)

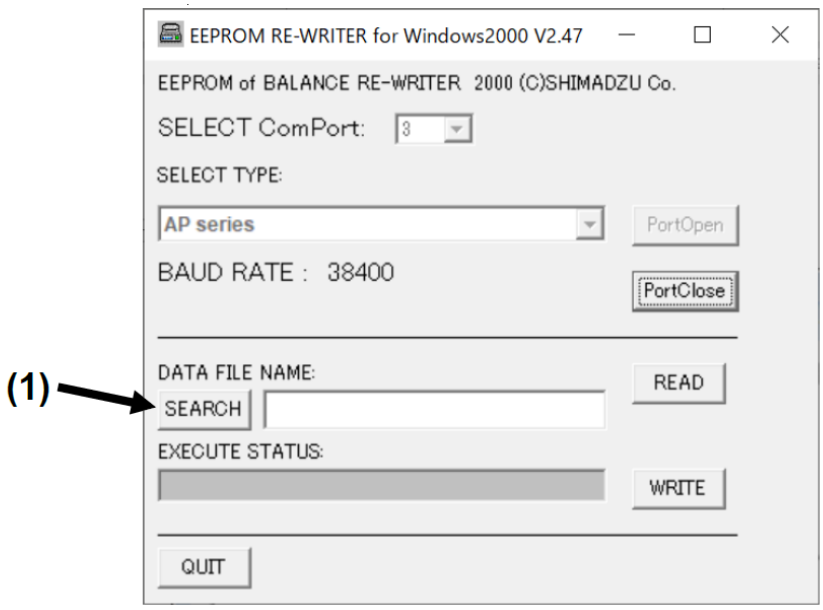
Make sure to enter the maintenance menu.

(7) Launch EEPROM-ReWriter (Ver. 2.47 or later) on the computer.
(8) Select the COM port on the connected computer.
(9) Select [AP series].
(10) Click [PortOpen].

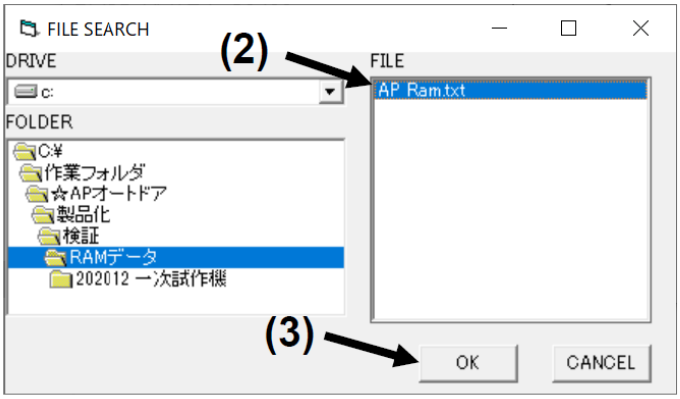


7.2 Reading Data from the EEPROM

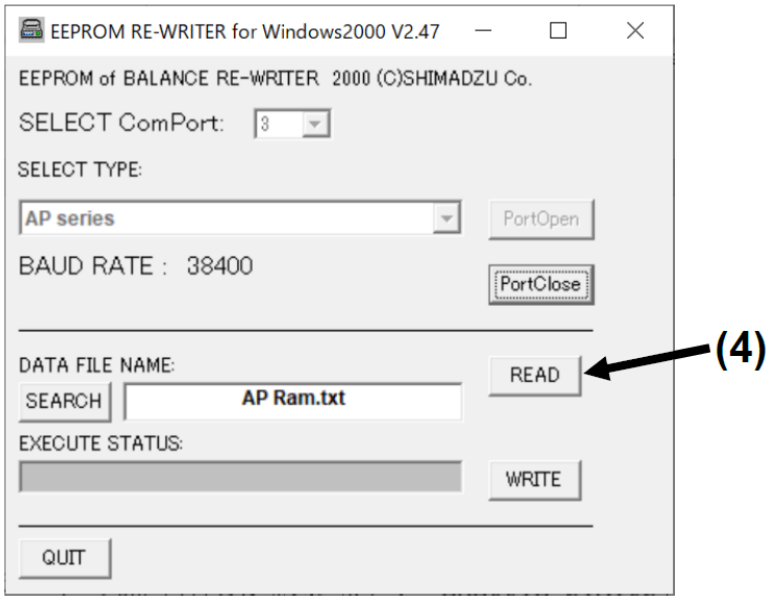
(1) Click [SEARCH].



(2) Specify the folder and file for saving EEPROM data.
(3) Click [OK].



(4) Click [READ].



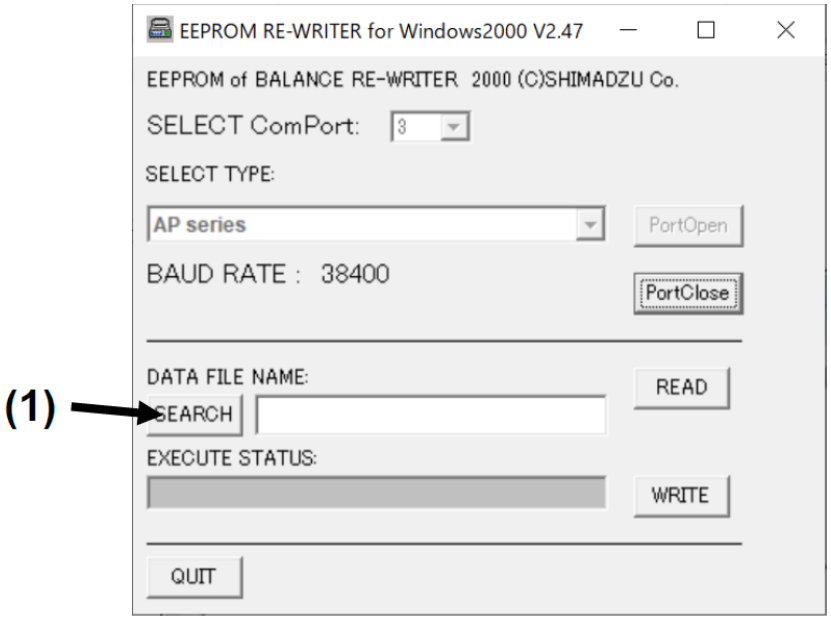
(5) When finished reading the EEPROM data, “FINISHED!!” is displayed in the [EXECUTE STATUS] field.

7.3 Editing EEPROM Data

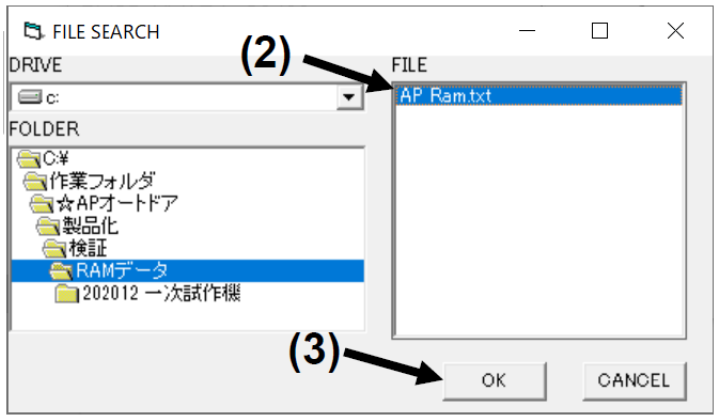
Open the file read using the procedure in 7.2. Reading Data from the EEPROM in Notepad or other software and edit the data for the addresses that need editing.
Be sure to save the edited file with a new name.

7.4 Writing Data to the EEPROM

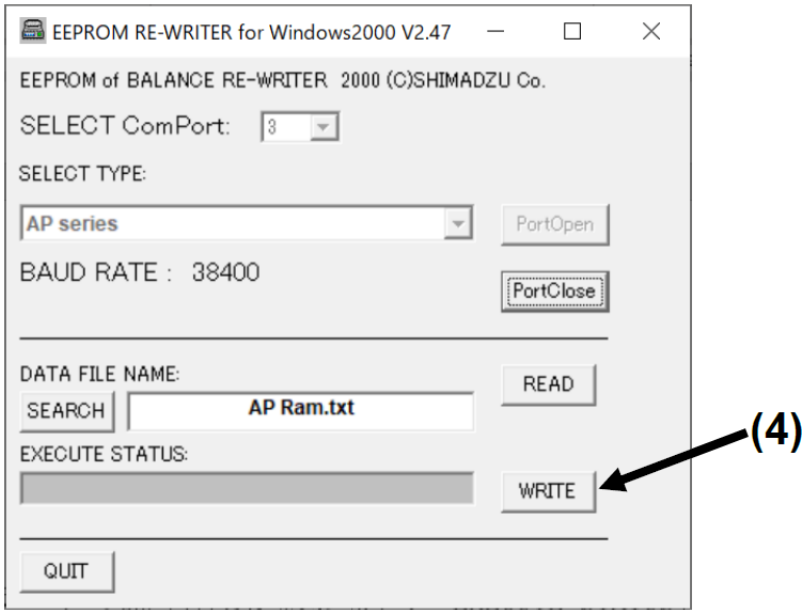
(1) Click [SEARCH].



(2) Specify the folder and file for the EEPROM data to write.
(3) Click [OK].



(4) Click [WRITE].



(5) When finished writing the EEPROM data, “FINISHED!!” is displayed in the [EXECUTE STATUS] field.

(6) After writing EEPROM data, be sure to disconnect and reconnect the AC adapter, confirm that communication settings are restored to the customer settings written down at the beginning of 7.1. step (1).

7.5 Writing Temperature Coefficients (when replacing the unit assembly (1)

If the unit assembly (1) was replaced, be sure to write the temperature coefficient according to the following procedure.
(1) Open the file read using the procedure in 7.2. Reading Data from the EEPROM in Notepad or other software.
(2) Open the EEPROM data file saved in the USB flash drive provided with the unit assembly (1) in Notepad or other software.

Address No. 0110-01B7
Address No. 04E8-0527

Copy the above data and save it with a new name at the same address as the file opened in step (1).
(3) Write the EEPROM data from the file created in step (2).

8 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.

- **All performance inspections must be done under following condition.**

- On the 0.1 mg model, inspect the display value based on the value displayed about 20 seconds after the door is closed.
- On the 0.01 mg model, inspect the display value based on the value displayed about 30 seconds after the door is closed.
- Open/close the side glass panels with each side set to open 3/4 of fully open (use the learning mode).
- For the 0.01 mg model, use the shield plate for 0.1mg model with the adjustable windbreak plate at its lowest level.

8.1 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.

$$R_x = X_{\max} - X_{\min} \qquad : X_{1,} X_2 \qquad \cdots X_5$$

$$R_y = Y_{\max} - Y_{\min} \qquad : Y_1, Y_2 \qquad \cdots Y_5$$

(The subscript “max” indicates the maximum value and “min” the minimum value.)

8.2 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 Fig. 10-1, 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.

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.

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.

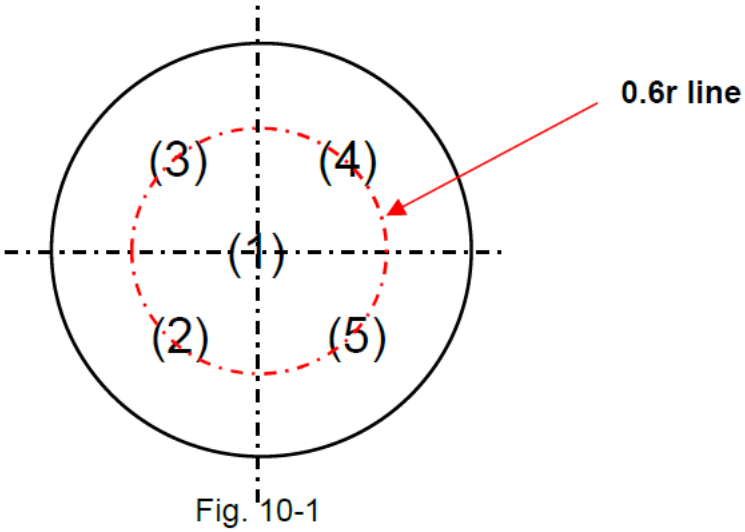


Fig. 10-1

8.3 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 in the order indicated in Attached Table 1. Wait about 20 seconds after closing the door for convection to stop before recording the indicated value for the 0.1 mg model or about 30 seconds for the 0.01 mg model, and 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 linearity errors.

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

8.4 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.

Attached Table 1 Inspection Criteria

0.01 mg Model		TABP 220-5AM-A	TABP 135-5AM-A	TABP 220-5DAM-A		TABP 120-5DAM-A	
Weighing Capacity (g)		220	135	220	102	120	52
Minimum Display (mg)		0.01	0.01	0.1	0.01	0.1	0.01
Repeatability (Rx, Ry)	Criterion (mg)	0.03	0.05	0.1	0.05	0.1	0.02
	Weight (g)	100	120	200	100	120	50
Cornerload Error	Criterion (mg)	±0.15	±0.10	±0.3	±0.10	±0.3	±0.10
	Weight (g)	100	50	100	50	50	20
Linearity	Criteria (mg)	±0.10	±0.10	±0.2	±0.10	±0.2	±0.05
	Weight (g)	0 220 0 20 50 100 150 200 0 220 0	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		TABP 320-4AM-A	TABP 220-4AM-A
Weighing Capacity (g)		320	220
Minimum Display (mg)		0.1	0.1
Repeatability (Rx, Ry)	Criterion (mg)	0.15	0.1
	Weight (g)	300	200
Cornerload Error	Criterion (mg)	±0.3	±0.3
	Weight (g)	150	100
Linearity	Criteria (mg)	±0.3	±0.2
	Weight (g)	0 320 0 50 100 200 300 0 320 0	0 220 0 50 100 150 200 0 220 0

9 Troubleshooting

9.1 General Problems and Measures

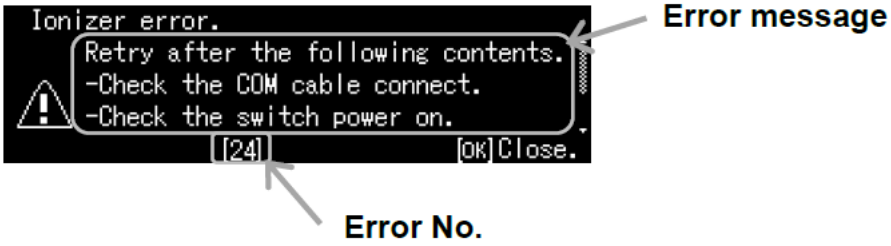
Problem	Cause	Measures
Part of displayed numbers or symbols does not appear.	1) OLED assembly (71) failure	Replace the OLED assembly (71).
"OL" or "-OL" is displayed.	1) 0.1 mg model: Contact between stopper plate (64) and stabilizer pin 0.01 mg model: Contact between stopper plate (64) or OPF stopper (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).
	5) Unit assembly (1) failure. Coil failure, coil current wire failure, etc.	Replace and readjust the unit assembly (1).
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.	Refer to 12.1 Display won't Appear.	
Key operation disabled	Refer to 12.2 Key Operation does Not Work.	
Check process does not finish when power is switched ON.	Refer to 12.4 Check Process does Not Finish when Power is Switched ON.	
Error is displayed. Errors are displayed in error log display.	Refer to 11.2 Error Display.	
Nothing happens when the touchless sensor is covered with a hand. (Blue LED illuminates.)	No touchless sensor function is assigned.	Use the touchless sensor menu to assign the door key or other function.
	The key function assigned for the touchless sensor is disabled. Example: When the door open/close key is specified, no action will occur if a door error is active.	Enable the specified key function, such as by manually closing the door before pressing the door key.
	The menu is displayed.	Display the weight value.
	The display is OFF or in standby mode.	Display the weight value.

	The multi-function mode is disabled (no response even after covering sensor for a long time).	Set the multi-function mode to ON.
Nothing happens when the touchless sensor is covered with a hand. (Blue LED does not illuminate.)	Touchless sensor device failed.	Replace the touchless sensor board assembly.
	Touchless sensor device has deteriorated from age.	Replace the touchless sensor board assembly.
	Bad connection at connector	Reconnect the cable from the touchless sensor board assembly to the display board and switch the power OFF and ON.
	Broken or short circuit in cable	Replace the touchless sensor board assembly as described in 2.3.12 or 2.3.13.
	Touchless sensor adjustment failure	Readjust the sensor as described in 5.7.9 Adjusting the Touchless Sensor Board Assembly.
Blue LED remains illuminated. ● Keys do not function. ● Touchless sensor functions at unintended times. ● Blue LED illuminates even when the touchless sensor is not covered by a hand.	Touchless sensor is responding to unintended reflective object near the sensor.	Remove the reflective object.
	Touchless sensor is responding to dirty protective cover or membrane switch panel.	Clean off the cover or membrane. Replace the protective cover.
	System is unexpectedly responding to touchless sensor due to a raised protective cover.	Reinstall the protective cover so it is not raised.
	Touchless sensor adjustment failure	Readjust the sensor as described in 5.7.9 Adjusting the Touchless Sensor Board Assembly.
	The multi-function mode ON/OFF setting is not the expected setting.	Reset the multi-function mode to the expected settings.
	Cable has short-circuited.	Replace the touchless sensor board assembly as described in 2.3.12 or 2.3.13.
Blue LED does not illuminate when the touchless sensor is covered with a hand.	Blue LED failure	➢ Reconnect the cable from the touchless sensor board assembly to the display board and then switch the power OFF and ON. ➢ Replace the touchless sensor board assembly as described in 2.3.12 or 2.3.13.
	Bad connection at connector	Reconnect the cable from the touchless sensor board assembly to the display board and switch the power OFF and ON.

	Broken or short circuit in cable	Replace the touchless sensor board assembly as described in 2.3.12 or 2.3.13.
Red touchless sensor LED is illuminated.	Bad cable connection on the touchless sensor board	Reconnect the cable from the touchless sensor board assembly to the display board and switch the power OFF and ON.
	Touchless sensor failed or cable short-circuited	Replace the touchless sensor board assembly as described in 2.3.12 or 2.3.13.
Doors do not function even when the door key or touchless sensor is operated.	The close position is not detected correctly.	Briefly open and close the door and then properly close the door before operating the door key.
		Reconnect all 7 cables connected to the motor board assembly (three 2-pin, three 9-pin, and one 8-pin connectors) and then switch the power OFF and ON.
Doors do not function even when the door key or touchless sensor is operated.		Replace the drive module.
		Replace the motor board assembly.
	Learning was not specified for the door to be opened/closed.	Open the door to be operated and then use the door key or touchless sensor to close the door so it learns the action.
	The touchless sensor function was not assigned to the door key.	Use the touchless sensor setting menu to assign the function to the door key (left or right).
	Bad drive module cable connection	Reconnect all 7 cables connected to the motor board assembly (three 2-pin, three 9-pin, and one 8-pin connectors) and then switch the power OFF and ON.
	Drive module or motor board assembly failure	Replace the drive module.
		Replace the motor board assembly.
	Touchless sensor failure	● Replace the touchless sensor assembly.
	Door key failure.	➢ Replace the front key-top cover or the display board assembly.
Door does not fully open.	How far it opens is specified by the learning function.	➢ Manually fully open the door and then use the door key or touchless sensor to close the door.
	Bad drive module cable connection	Reconnect all 7 cables connected to the motor board assembly (three 2-pin, three 9-pin, and one 8-pin connectors) and then switch the power OFF and ON.
	Drive module or motor board assembly failure	Replace the drive module.
		Replace the motor board assembly.
The manual start function does not function.	The manual start setting is OFF.	Use the manual start menu to switch the setting to ON.
	It did not function because it was operated immediately after the previous action.	Wait about one second after the previous action before operating the function.
	Manual operation opened the door too much.	Release the door after moving it only a little (about 2 cm or less) when opening or closing the door manually.

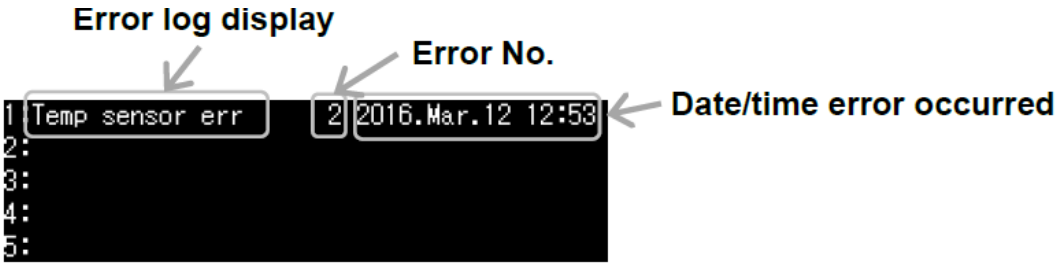
9.2 Error Display

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.
TABP-A 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. ● Detector cable (49) connector insertion failure	**12.3. Temperature Sensor Error**
	Memory error. Contact a service representative. (4)	4	EEPROM data err	➢ Abnormal EEPROM data ➢ Firmware version writing error (incorrect 0.01 mg or 0.1 mg version or downgraded)	**12.6. EEPROM Data Error**
	Internal weight loader error Contact a service representative. (5)	5	Weight Loader err	➢ Problem with the internal weight loader unit ➢ Display board failure	**12.5. Weight Loader Malfunction**
	Inner communication error Contact a service representative. (6)	6	Disp CPU com err	Communication error with display board CPU	**12.7. 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.	**12.9. 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.	**12.9. 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.	**12.9. 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)	**12.9. 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)	**12.9. Sensitivity Adjustment Error (E-CAL)**
Door error	Door is detached. Install the door and stopper and then switch the power ON again.	-	-	➢ Door is detached. ➢ The encoder count indicates movement beyond the fully-open position.	
	No error is displayed. Door does not function.	123 124 125	DOOR:Encorder err	Operation was executed, but encoder count does not change after a given time has elapsed (motor failure, door does not function, or encoder failure). 123 right door, 124 left door, or 125 top door	

Type	Error Message	Error No.	Error Log Display	Description	Reference
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.	**12.9. 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	**12.9. 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.	**12.10. 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.)	**12.10. 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.	**12.11. Initial Zero Point Error (only for type approval models)**

Type	Error Message	Error No.	Error Log Display	Description	**Reference**
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.	-
	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.	**12.12. 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.	-

9.3 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	Reads data from EEPROM.
50 % or more	Initializes weighting parameters and P and I parameters.
52 % or more	Specifies manual trigger setting. Writes manual trigger enable/disable setting to FPGA.
53 % or more	Initializes doors. Fully opens and closes all three doors to detect origin positions.
55 % or more	Initializes touchless sensors. Writes photodetector IC initialization settings and EEPROM threshold values (adjustment values).
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.

10 Troubleshooting

Troubleshoot touchless sensor malfunctions based on Table 12.1 and door malfunctions based on Table 12.2.
Also refer to 12.13 and 12.14.

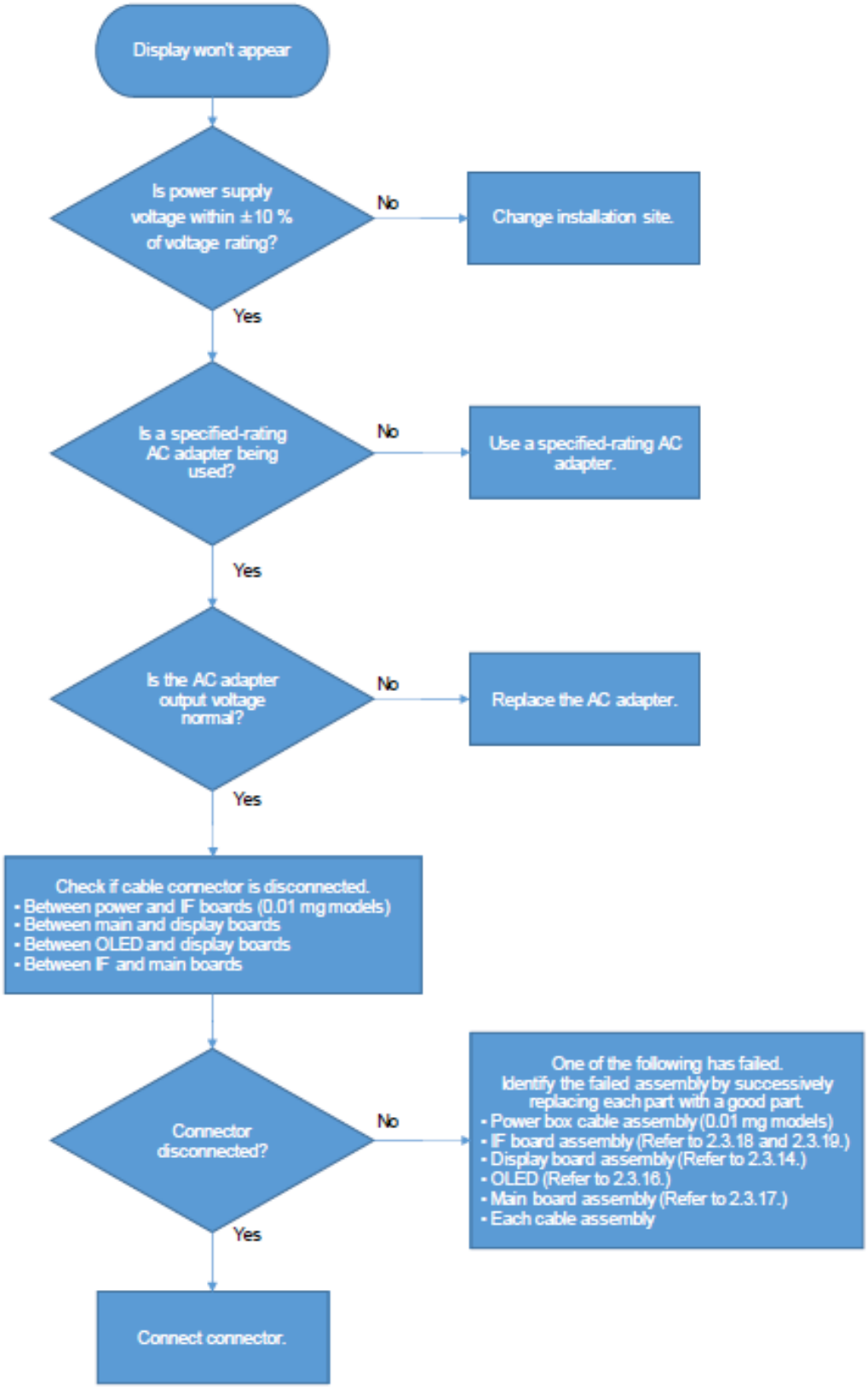
Table 12.1 Touchless Sensor Troubleshooting

Problem	Cause	Measures
A: Nothing happens. Blue LED illuminates.	• No touchless sensor function is assigned. • Does not function because menu is displayed in OFF, Standby, or ICAL modes. • Function was assigned to long hand-cover in multi-function settings. • Function was assigned to door function, but door does not function because a door error occurred.	➢ Change the touchless sensor function assignment. ➢ Check the function assignment and verify the function on the weight display. ➢ Hold the hand over the sensor for a long time to verify the response/action. If necessary, change the setting to specify the short hand-cover. ➢ Check the function assignment and manually open and close the door to verify the action.
B: Nothing happens. Blue LED does not illuminate.	➢ Abnormal touchless sensor adjustment value ➢ Connector insertion failure ➢ Touchless sensor photodetector IC failure ➢ Blue LED failure ➢ Touchless sensor board assembly failure ➢ Display board failure	➢ Readjust the touchless sensor adjustment value, as described in 5.7.9 Adjusting the Touchless Sensor Board Assembly, because it might be abnormally high. ➢ Reconnect cables connected to the touchless sensor board assembly. (3), (4), and (5) Replace the board as described in 2.3.12 or 2.3.13 Replacing the Touchless Sensor Board Assembly. After replacing the board, adjust the sensors as described in 5.7.9 Adjusting the Touchless Sensor Board Assembly. (6) Replace the display board.
C: Blue LED remains illuminated.	➢ Protective cover is raised up or dirty. ➢ Touchless sensor adjustment failure ➢ Touchless sensor board assembly failure ➢ Display board failure	➢ Reinstall the protective cover so it is not raised. Replace the protective cover. ➢ Readjust the touchless sensor adjustment value, as described in 5.7.9 Adjusting the Touchless Sensor Board Assembly, because it might be abnormally low. ➢ Replace the board as described in 2.3.12 or 2.3.13 Replacing the Touchless Sensor Board Assembly. After replacing the board, adjust the sensors as described in 5.7.9 Adjusting the Touchless Sensor Board Assembly. ➢ Replace the display board.
D: Red LED illuminates	➢ Touchless sensor initialization error when the power is switched ON ➢ Communication failure between touchless sensor and display board	➢ and (2) Switch the main unit power OFF and ON. If that does not resolve the problem, reconnect the touchless sensor board assembly cable and then switch the power ON. If that still does not resolve the problem, replace the board as described in 2.3.12 or 2.3.13 Replacing the Touchless Sensor Board Assembly. After replacing the board, adjust the sensors as described in 5.7.9 Adjusting the Touchless Sensor Board Assembly.

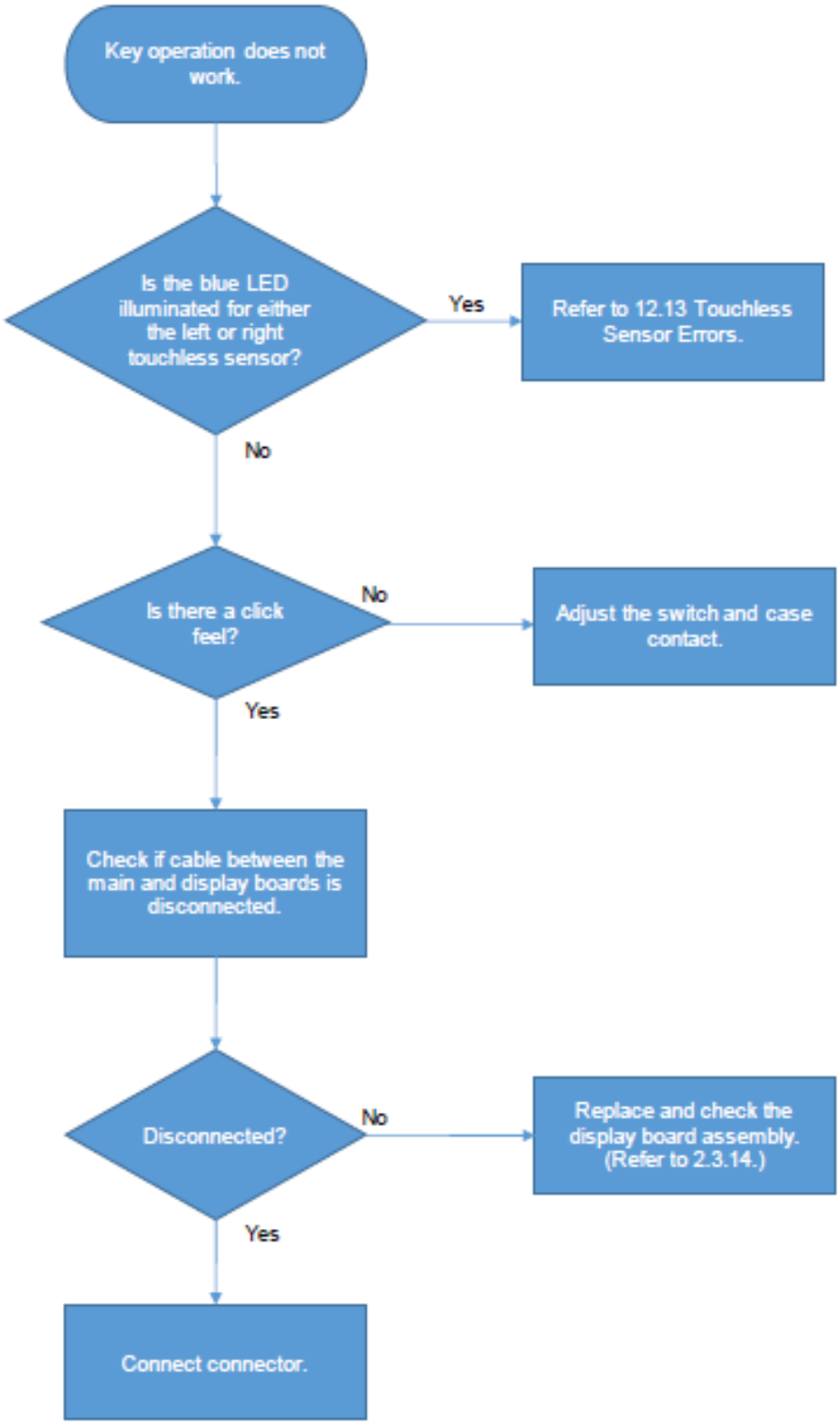
Table 12.2 Door Troubleshooting

Problem	Cause	Measures
E: Does not fully open or close after switching power ON.	• **If nothing happens, a drive module and motor board assembly power cord connection failure occurred.** • **If it moves a little and then stops, a drive module and motor board assembly power cord connection failure occurred.** • **Motor board assembly failure** • **Drive module failure**	➢ **Remove the rear cover, reconnect the 2-pin cable on the failed drive module, switch ON the power, and confirm that it functions properly.** ➢ **Remove the rear cover, reconnect the 9-pin cable on the failed drive module, switch ON the power, and confirm that it functions properly.** ➢ **and (4)** **Check the door-close signal voltage and door position signal voltage as described in 3.8** TABP-A **Motor Board Assembly (304). If the proper voltage is not output, replace the motor board assembly (as described in 2.3.3 Replacing the** TABP-A **Motor Board Assembly (304)), then replace the drive module (as described in 2.3.4 to 2.3.6 Replacing Drive Modules), and then check functionality.**
F: Nothing happens when the door key is pressed.	➢ **The close position signal is not being detected.** ➢ **Door position signal error occurred, such as due to the door hitting something that prevents door movement.**	➢ **Reinitialize door actions by switching the power OFF and ON.** ➢ **Manually open and close the door, properly close the door, and then verify door function using the door open/close key or touchless sensor.** **If that does not resolve the problem, perform "E" corrective measures (1) to (4).**
G: Nothing happens when touchless sensors are operated.	➢ **The touchless sensor function was not assigned to the left and right door open/close keys.** ➢ **Same causes as for "E" and "F".**	➢ **Check the touchless sensor function assignments, assign them to left and right door open/close keys, and check functionality.** ➢ **Perform corrective measures for "E" and "F".**
H: Learning settings cannot be set.	➢ **Door movement was stopped by hand. Door movement stopped due to hitting or pinching something.** ➢ **Distance is too close (about ±6 mm) to the preceding learning position.** ➢ **Distance is too close (about 15 mm) to close position.** ➢ **Close position signal is not being detected.**	➢ **Tentatively close the door automatically or manually to specify the learning position again.** ➢ **and (3)** **Move to a distance that allows updating the position and then specify the learning position again.** **(4) Perform corrective measures for "E" and "F".**
I: Movement is slow (normally about 1 sec). **Action is loud or emits unusual sound.**	➢ **Sliding surface is dirty/contaminated or deteriorated.** ➢ **Drive module failure**	➢ **Remove the side and top glass panels, remove any contamination from rail areas and motor gears, and apply the lubricant. If there is significant deterioration, replace the side and top glass assemblies.** ➢ **Replace the drive modules as described in 2.3.4 to 2.3.6 Replacing Drive Modules.**

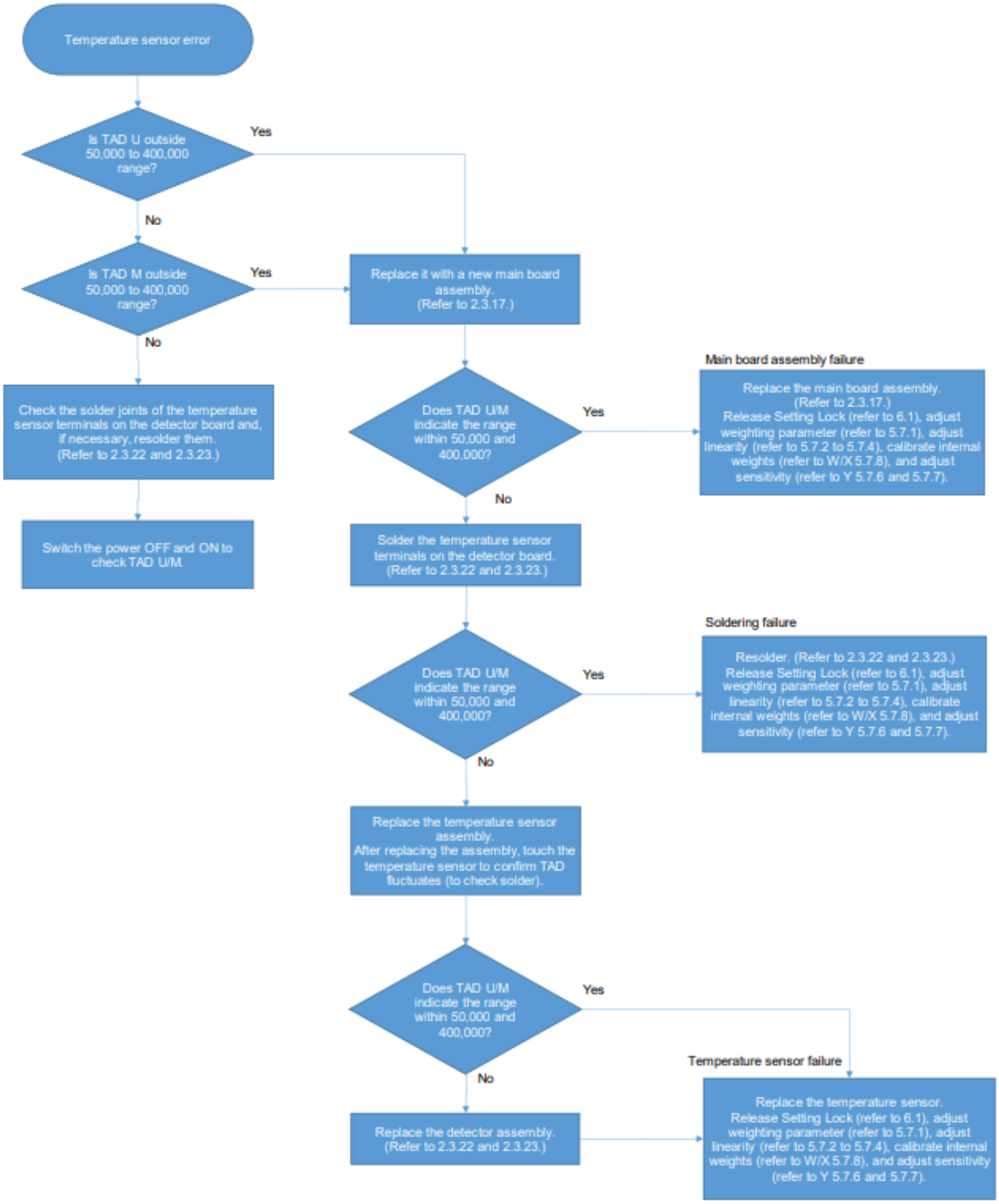
10.1 Display won´t Appear



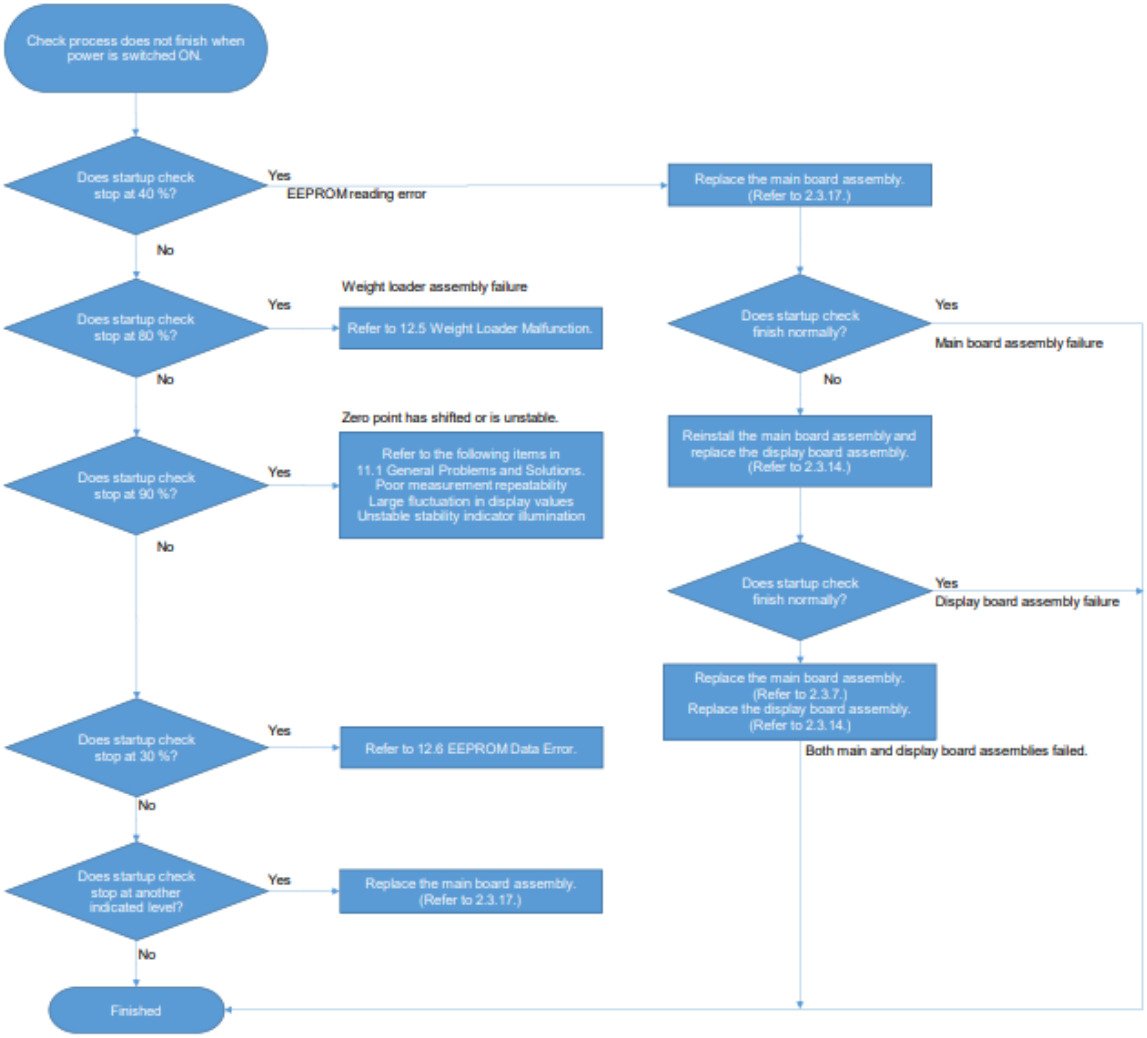
10.2 Key Operation does Not Work



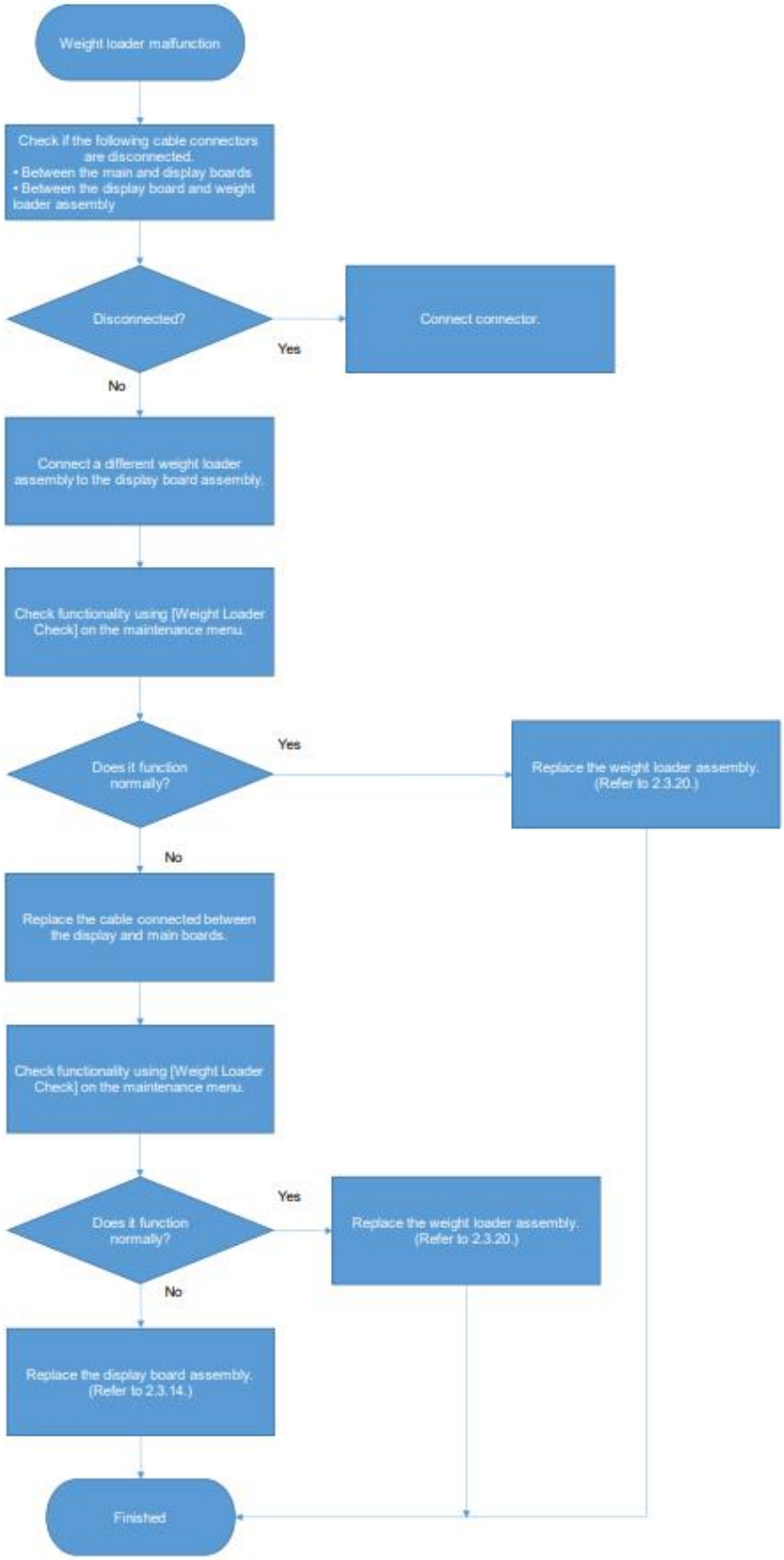
10.3 Temperature Sensor Error



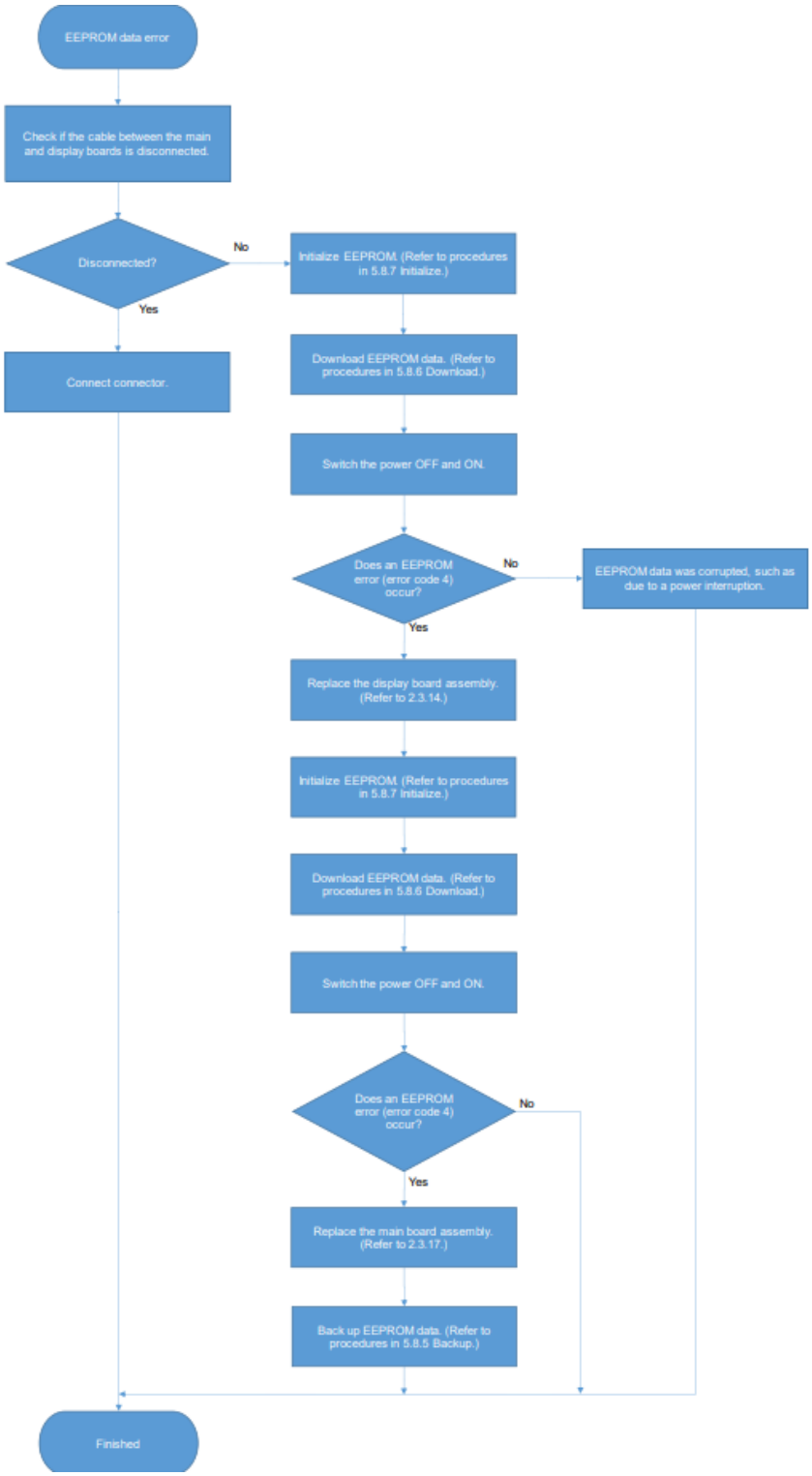
10.4 Check Process does Not Finish when Power is Switched ON



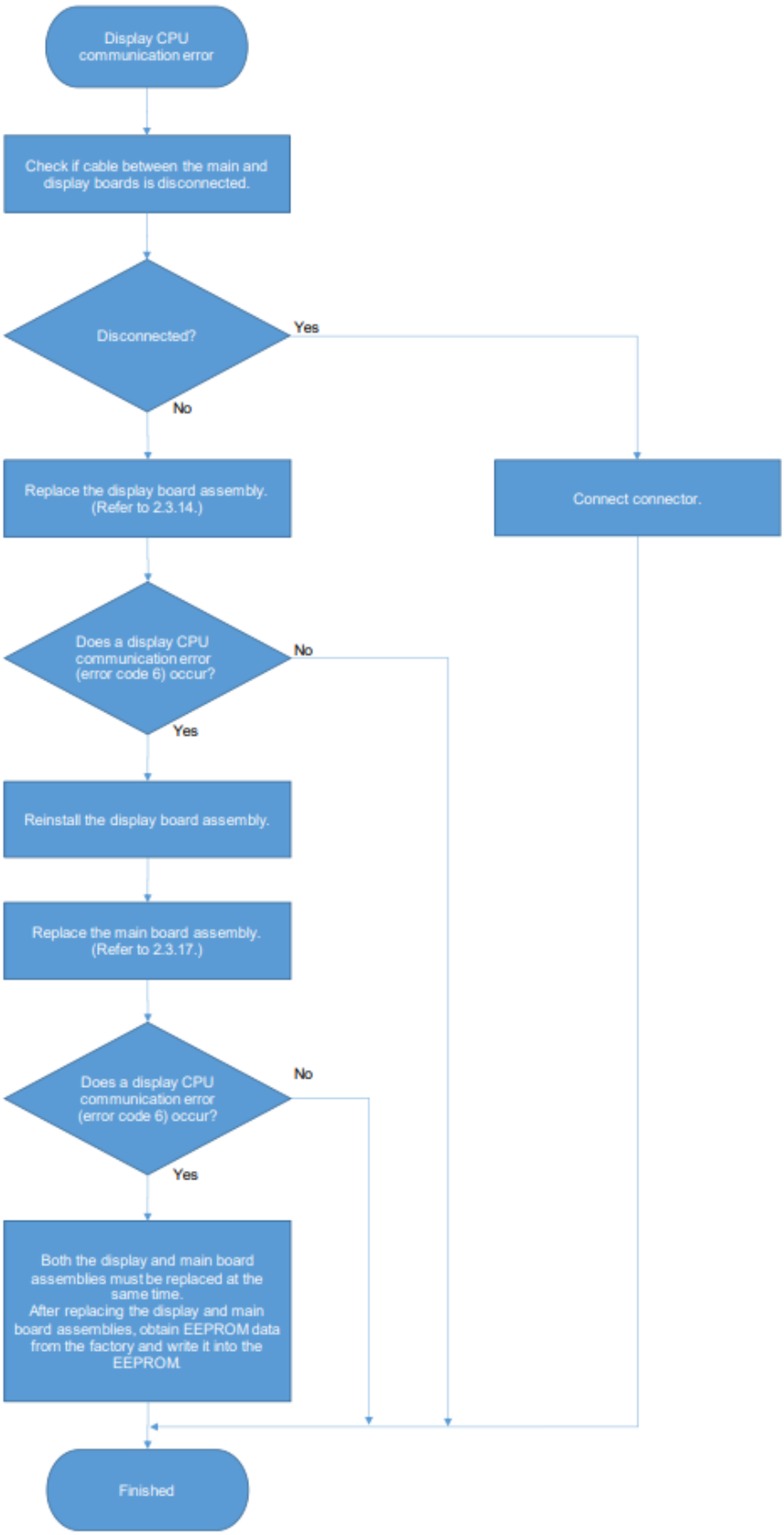
10.5 Weight Loader Malfunction



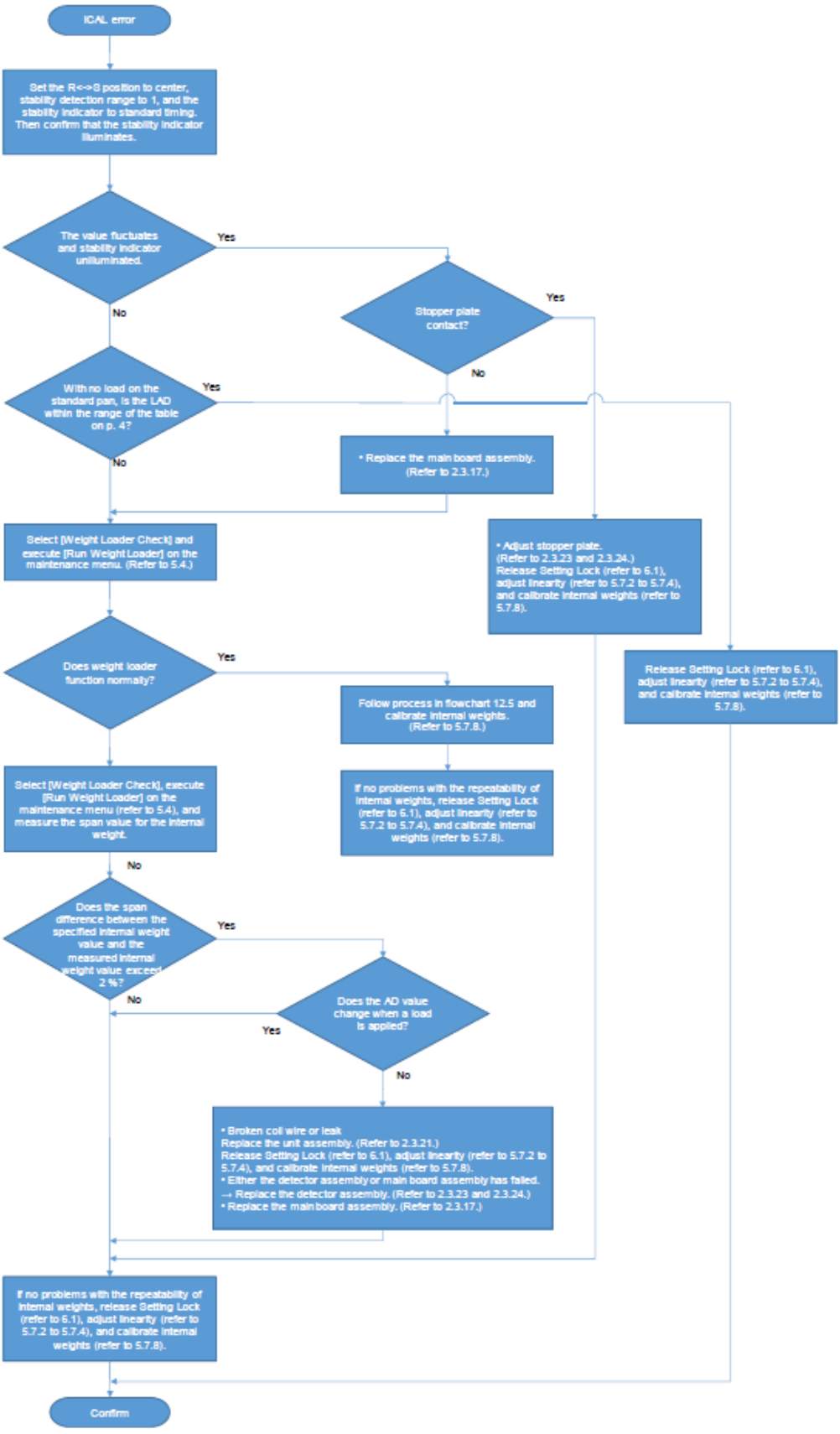
10.6 EEPROM Data Error



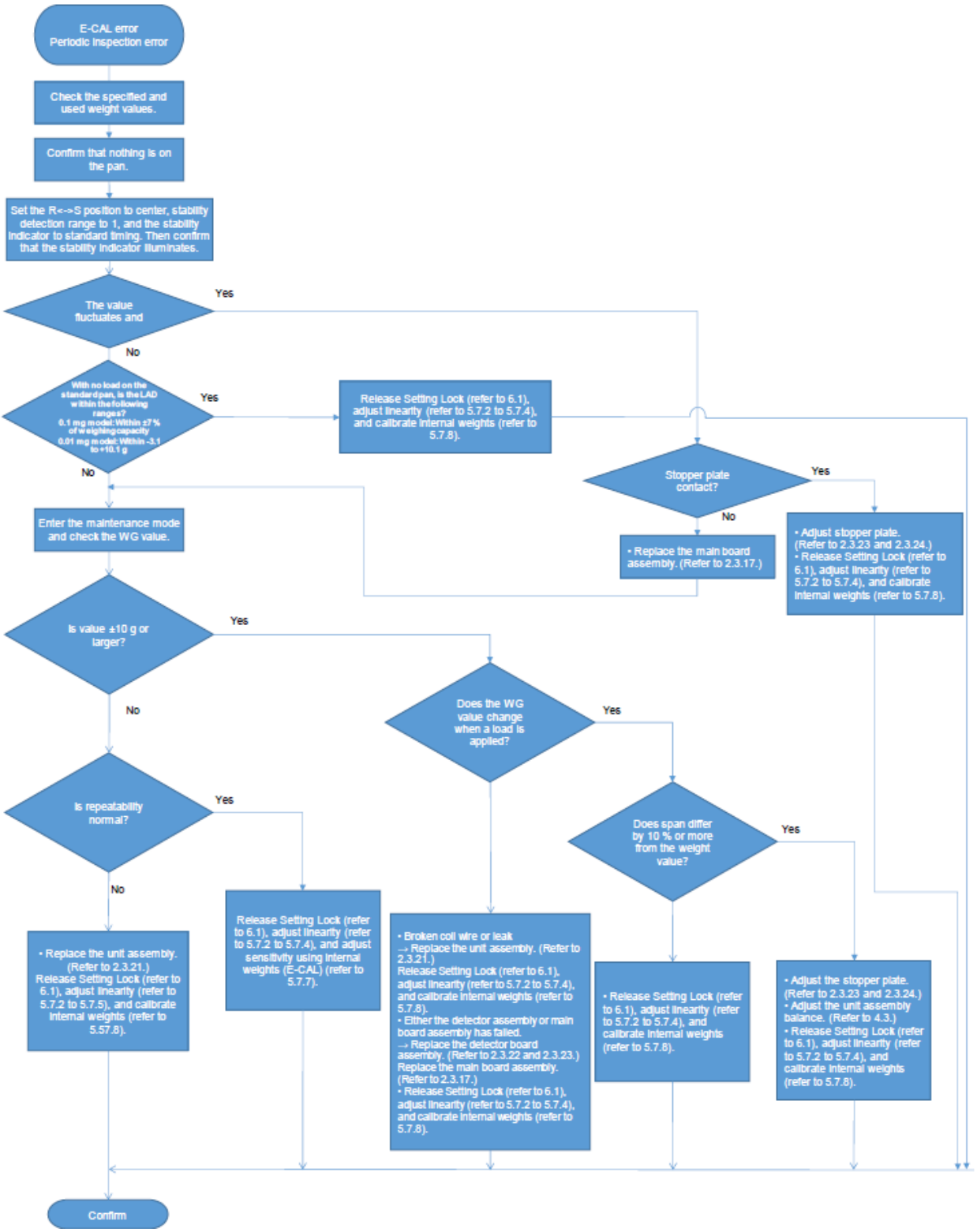
10.7 Display CPU Communication Error



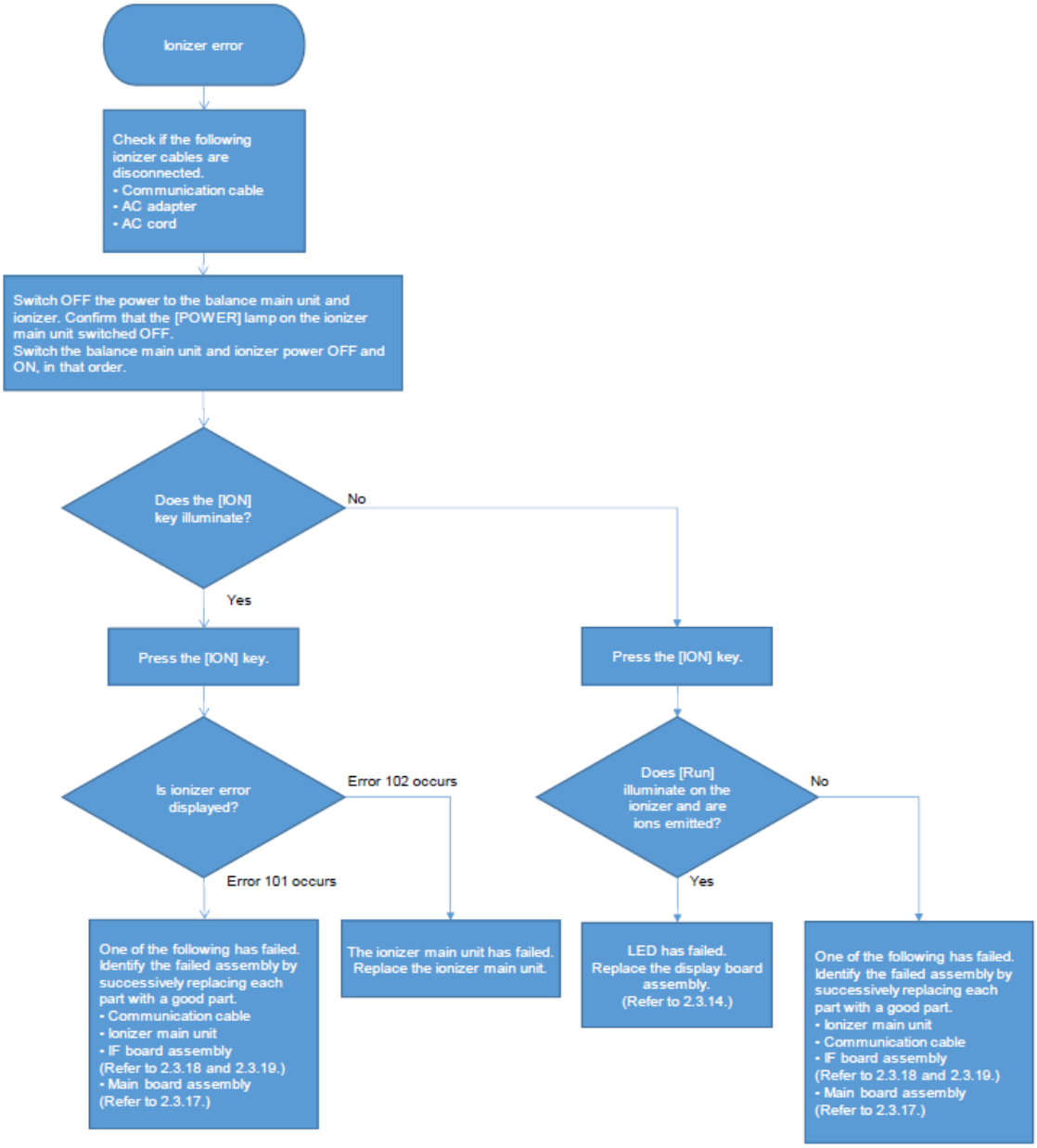
10.8 Sensitivity Adjustment Error (i-CAL)



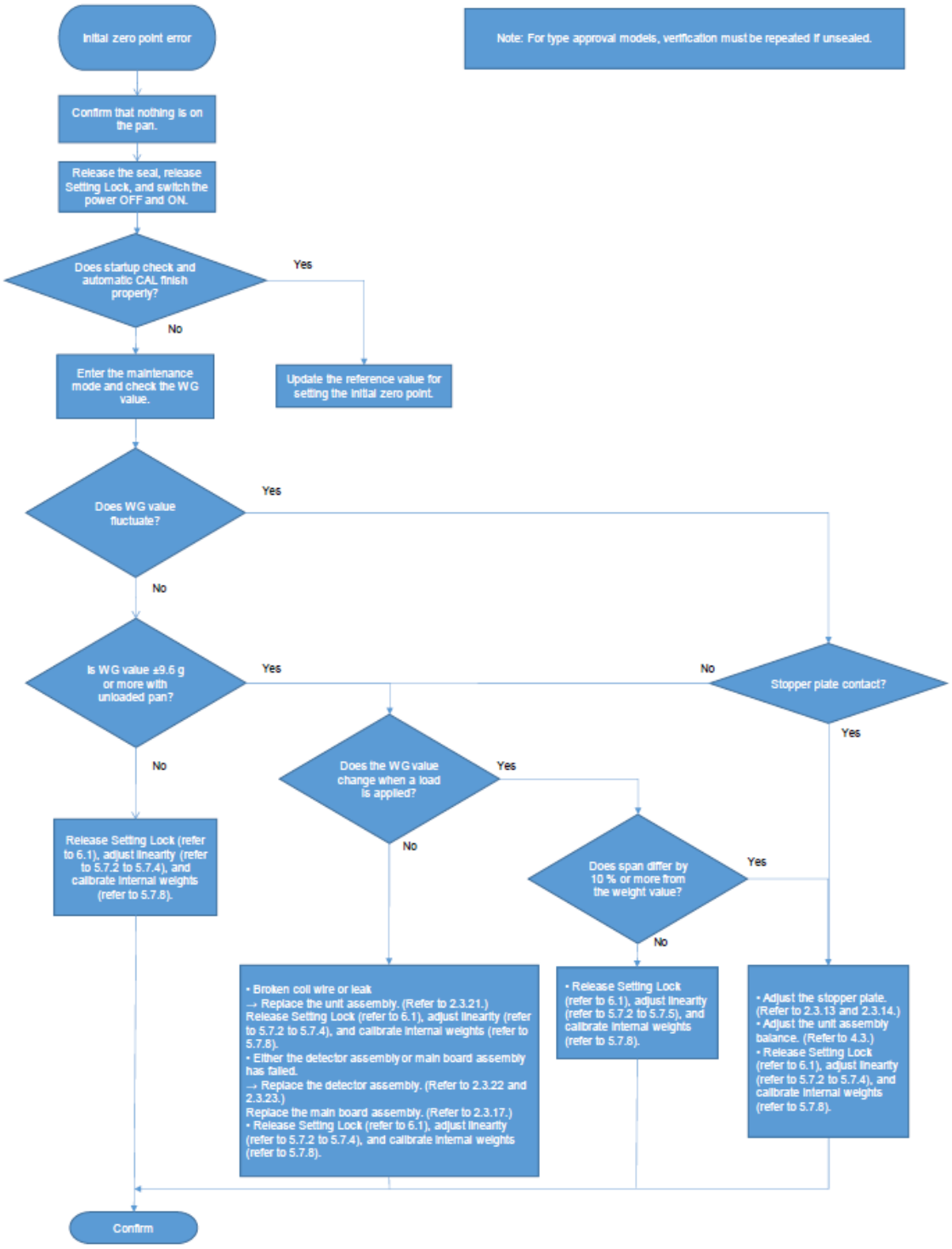
10.9 Sensitivity Adjustment Error (E-CAL)



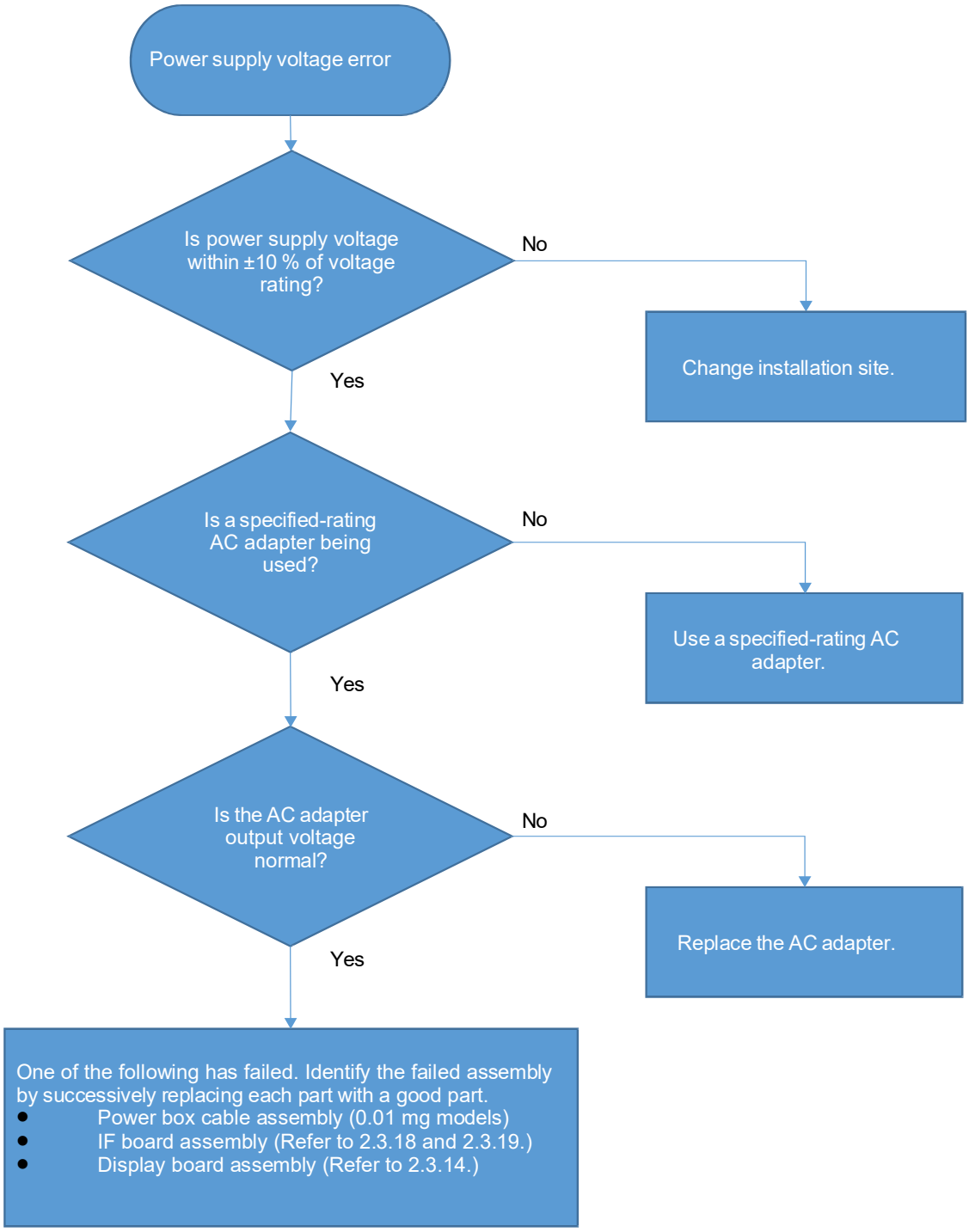
10.10 Ionizer Error



10.11 Initial Zero Point Error (Only for type approval models)

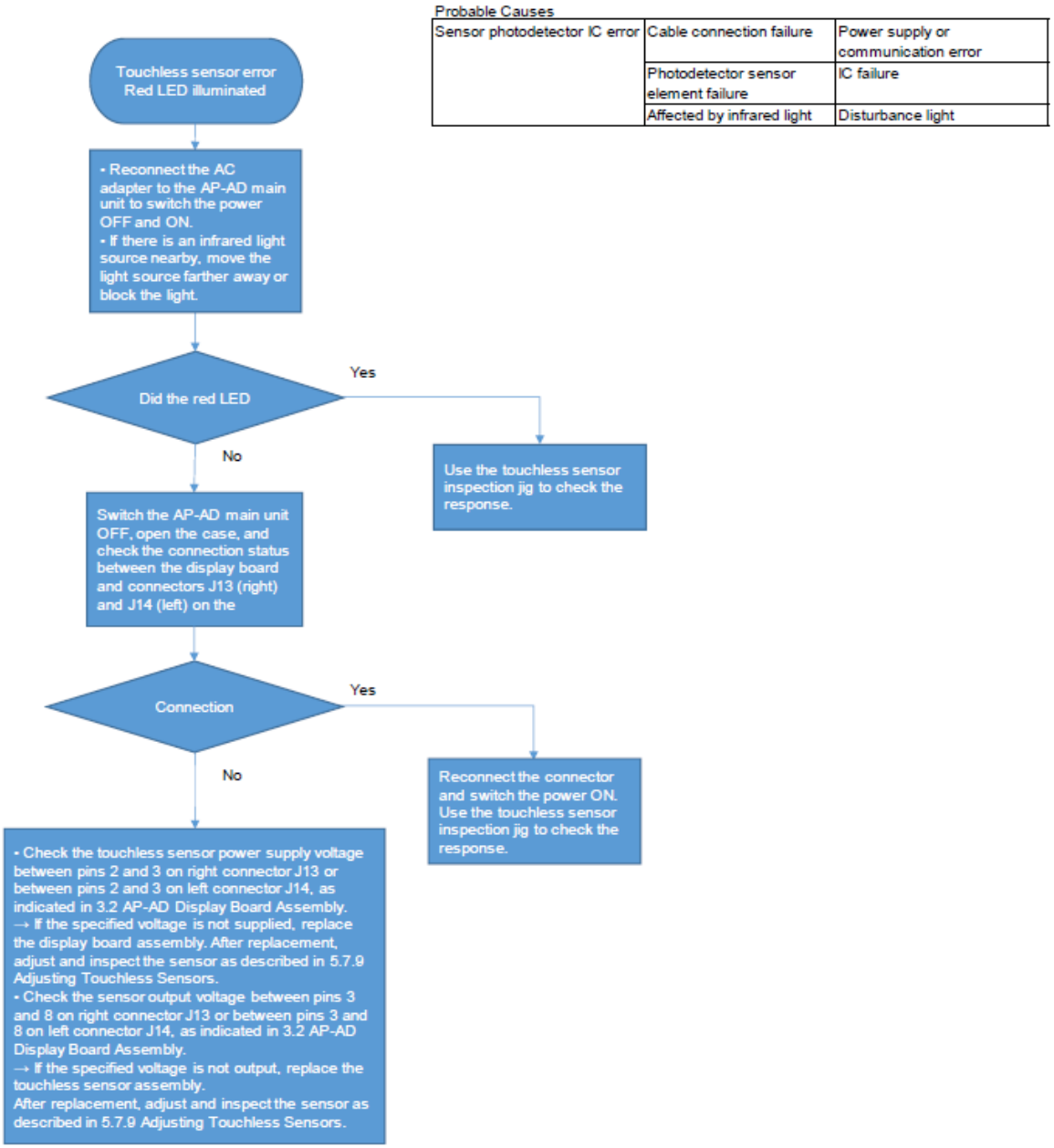


10.12 Power Supply Voltage Error



10.13 Touchless Sensor Mafunctions

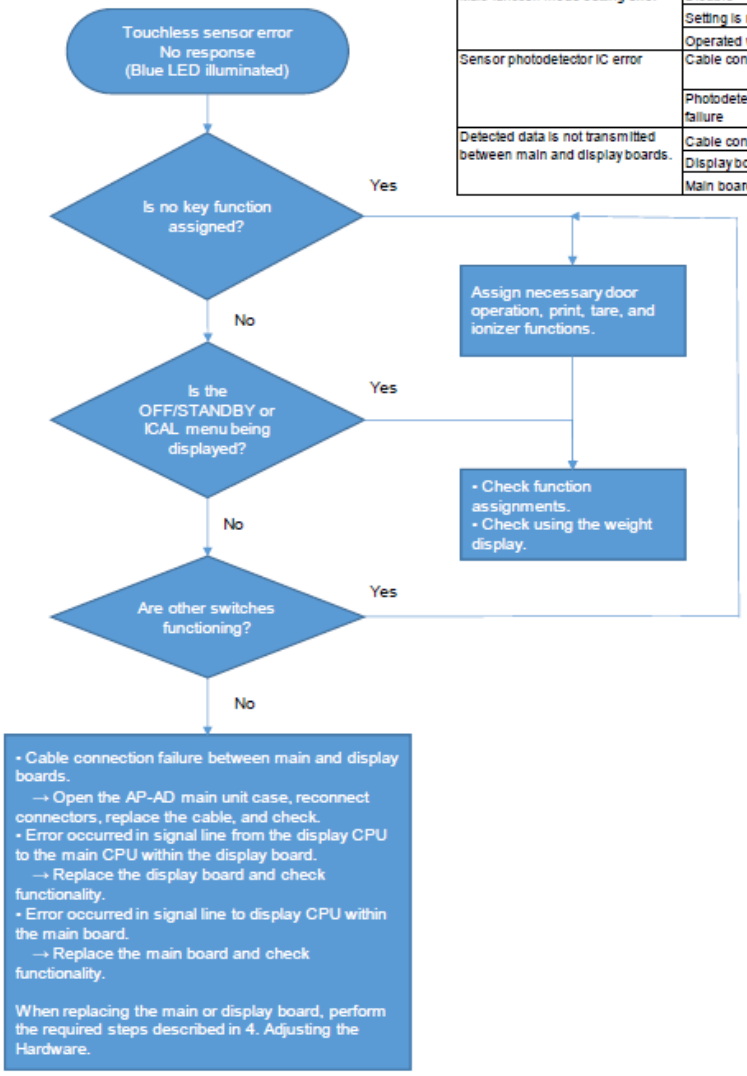
10.13.1 Red LED illuminates



Probable Causes

Sensor photodetector IC error	Cable connection failure	Power supply or communication error
	Photodetector sensor element failure	IC failure
	Affected by infrared light	Disturbance light

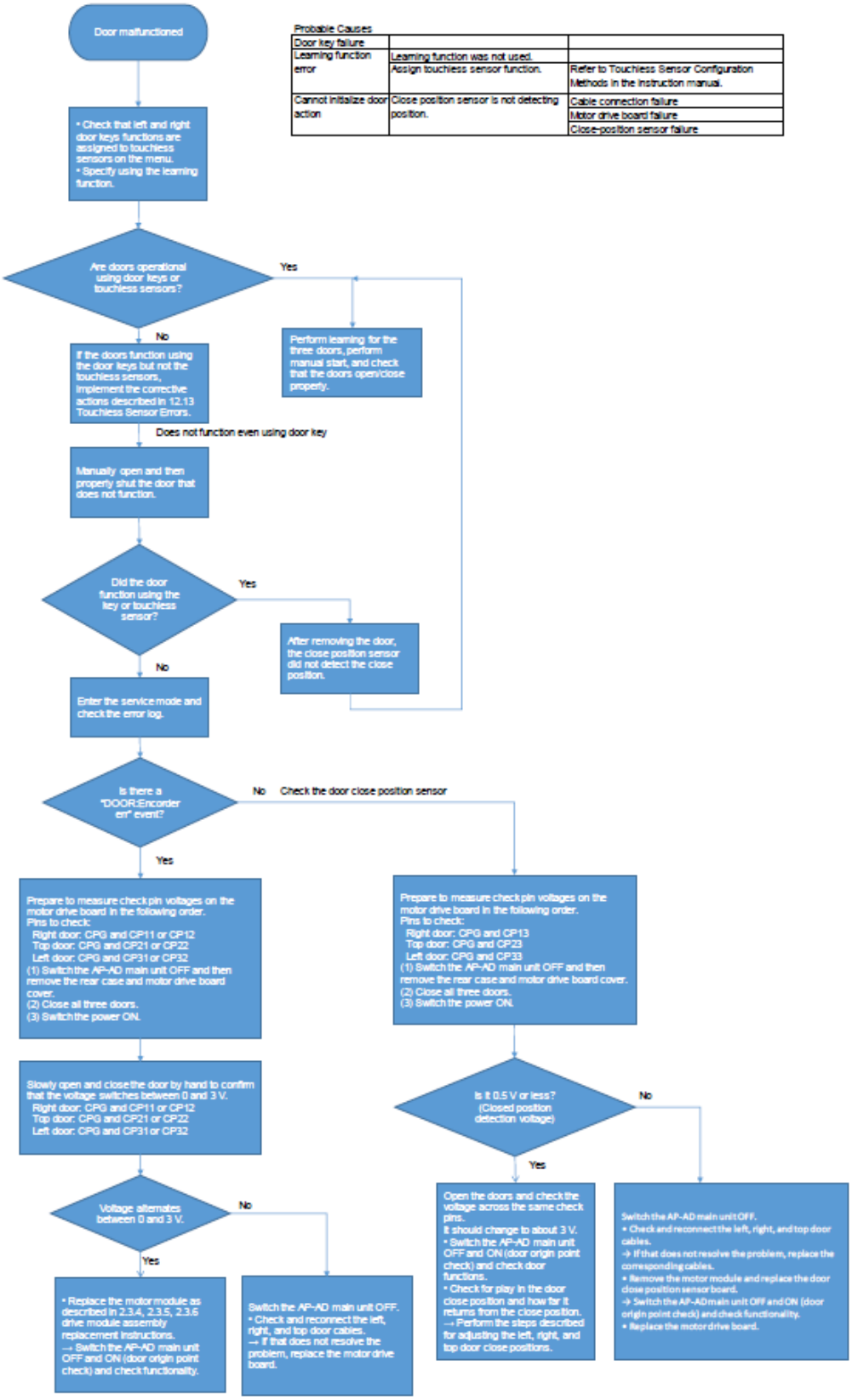
10.13.2 No Response (Blue LED illuminates)



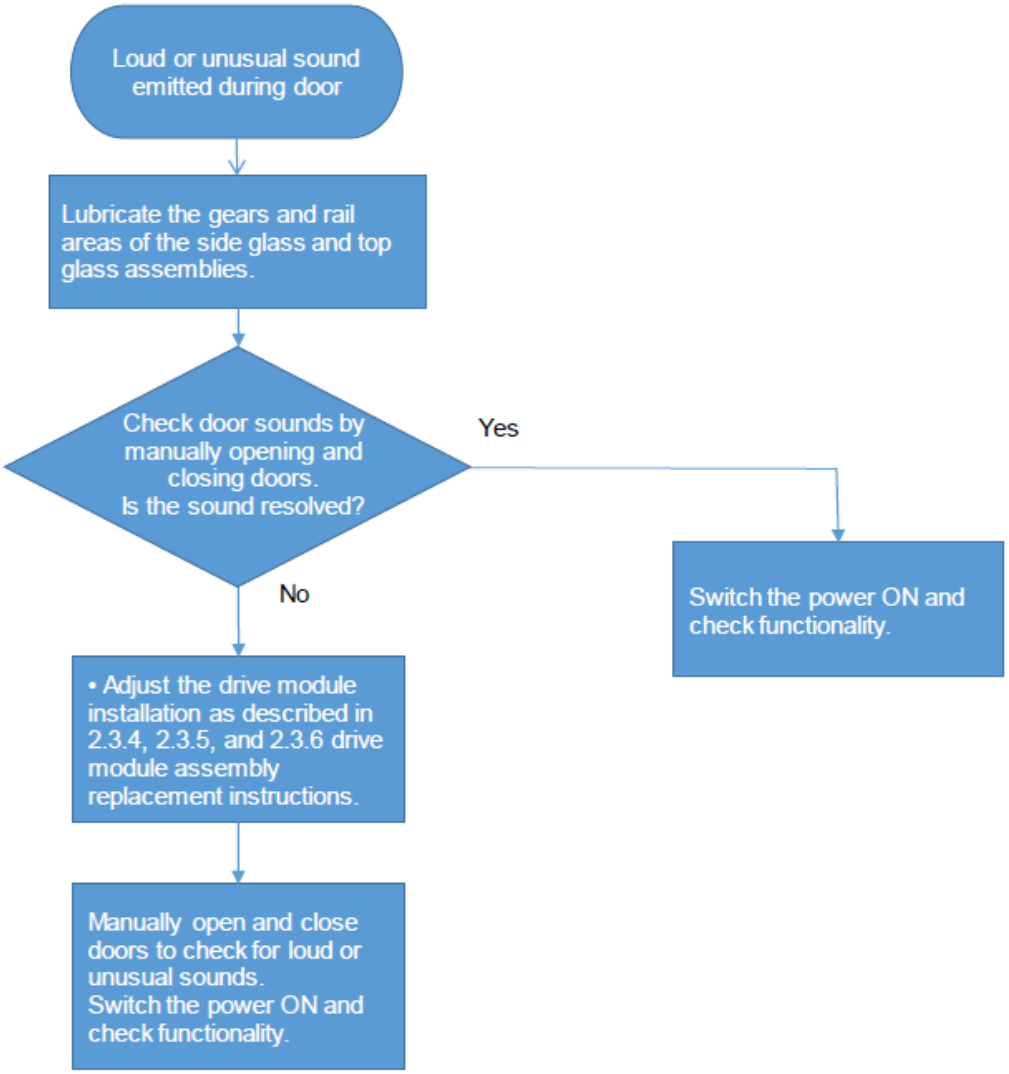
Probable Causes

Multi-function mode setting error	Disable	
	Setting is not for door operation.	
	Operated when OFF, in standby mode, or while menu is displayed.	
Sensor photodetector IC error	Cable connection failure	Power supply or communication error
	Photodetector sensor element failure	IC failure
Detected data is not transmitted between main and display boards.	Cable connection failure between main and display boards	
	Display board failure	
	Main board failure	

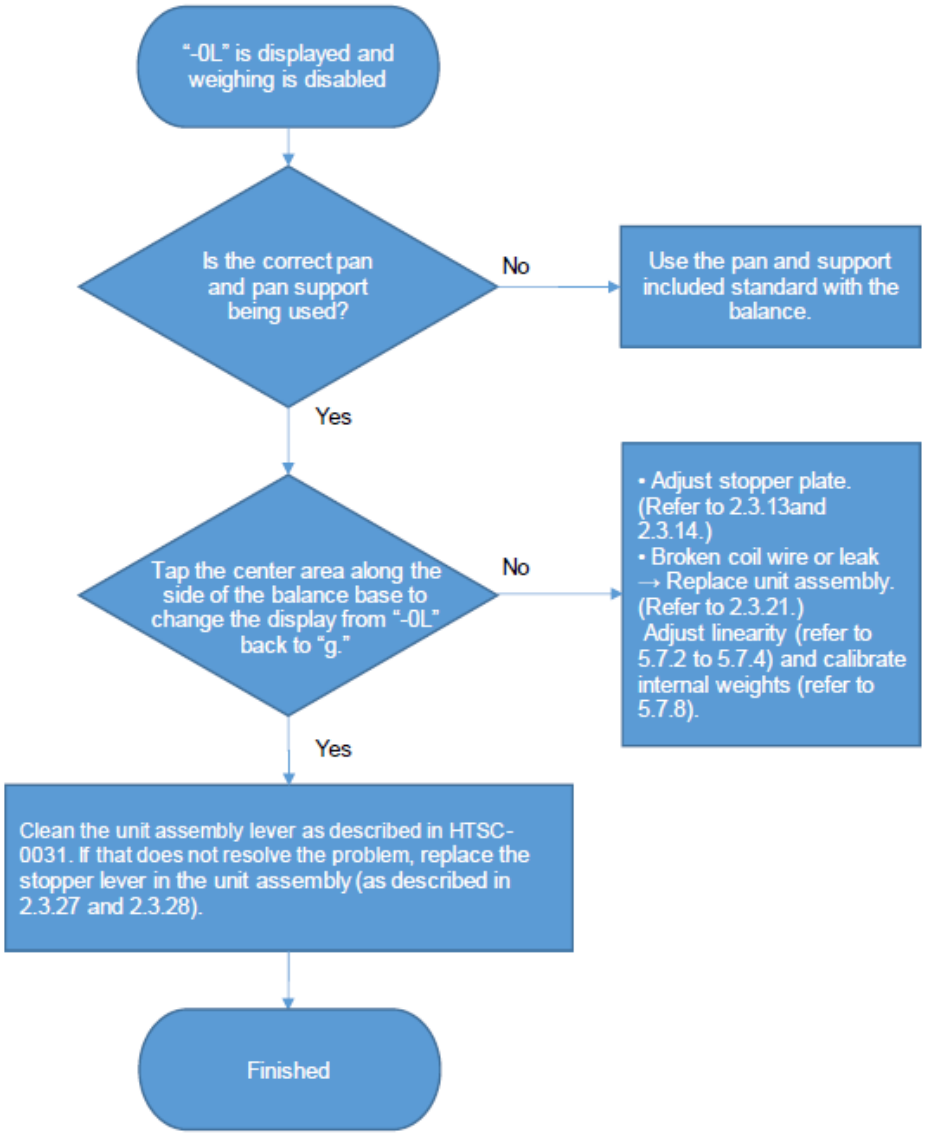
10.14 Automatic Door Malfunction



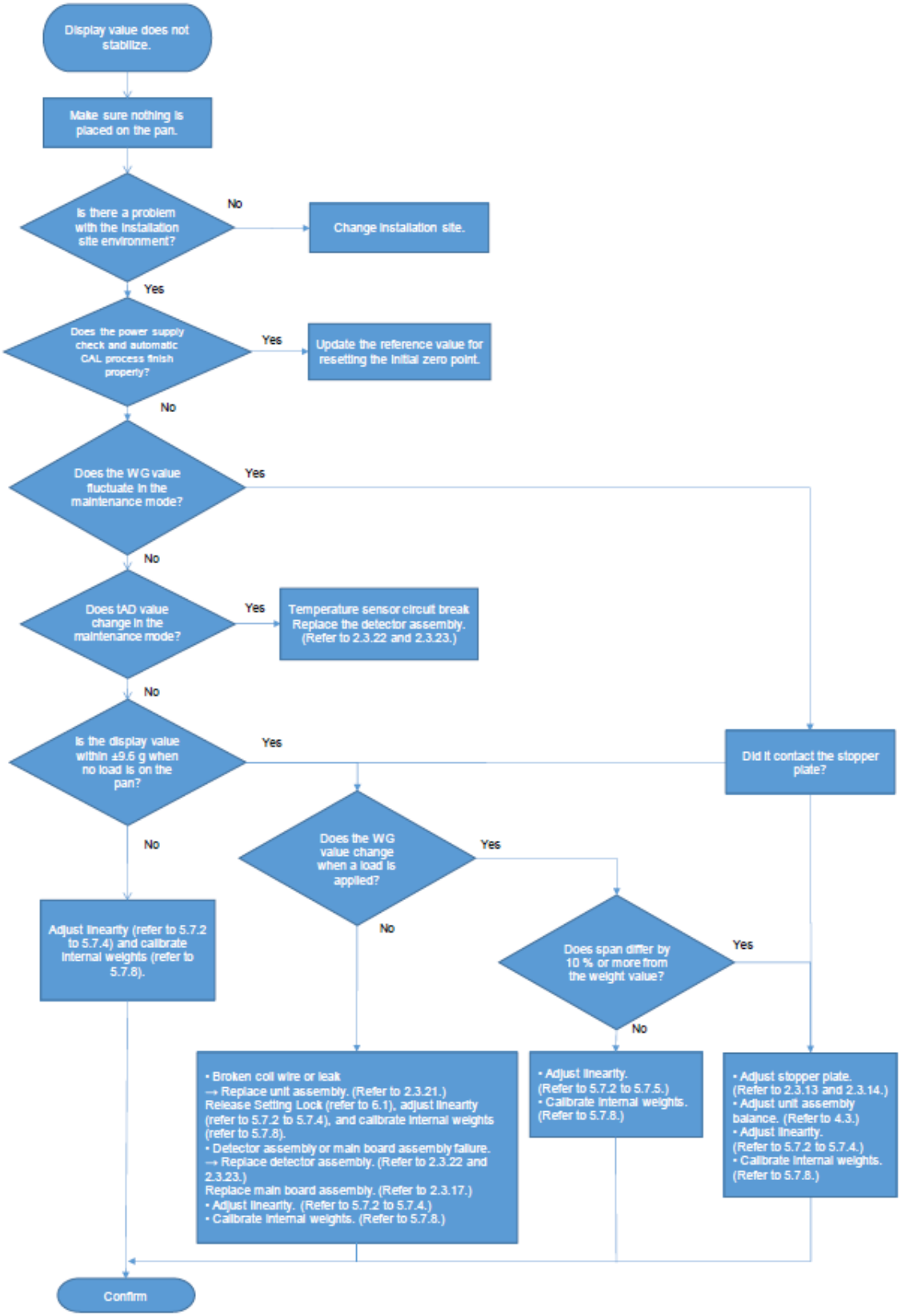
10.15 Loud or Unusual Sound Emitted during Automatic Door Open/Close Action



10.16 “-0L” is Displayed and Weighing is Disabled



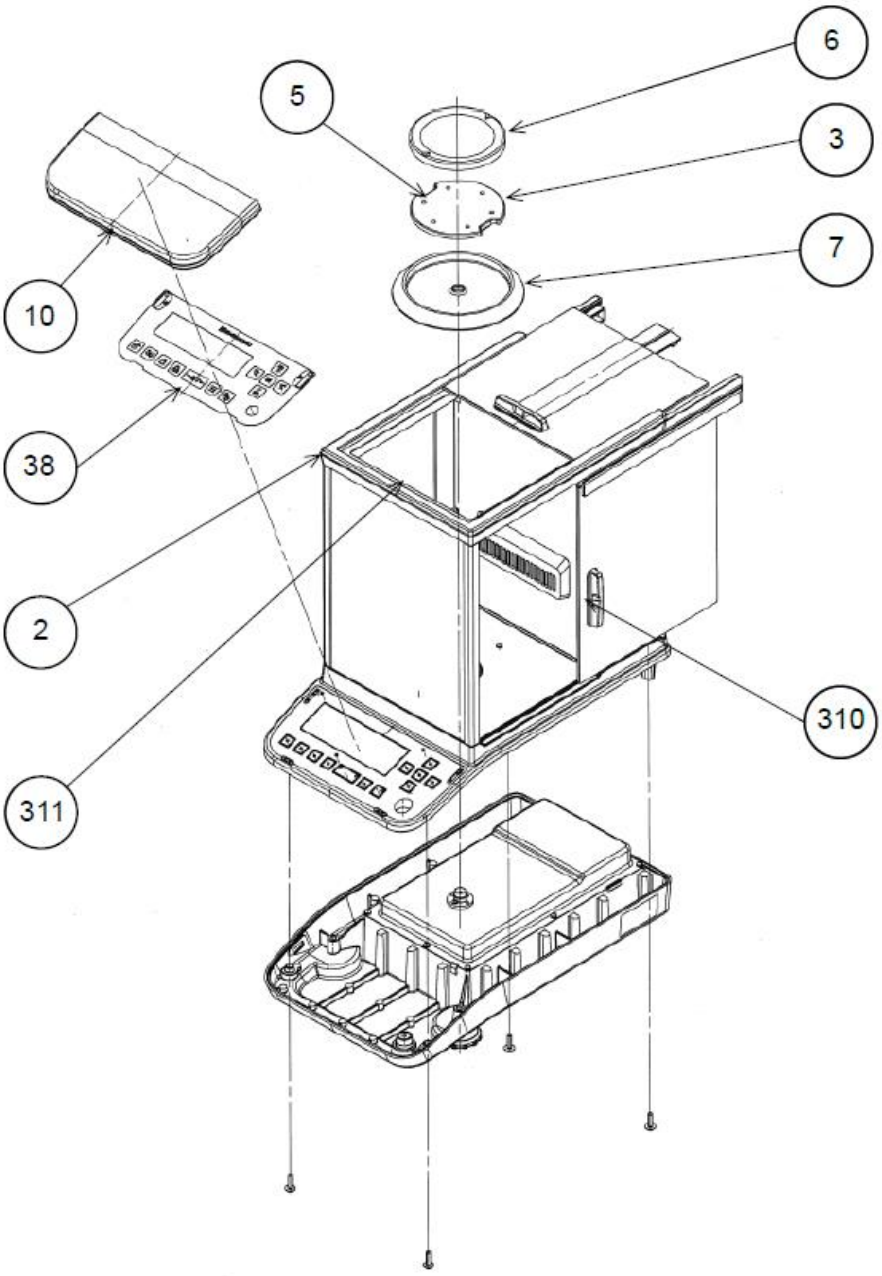
10.17 Display Value does Not Stabilize

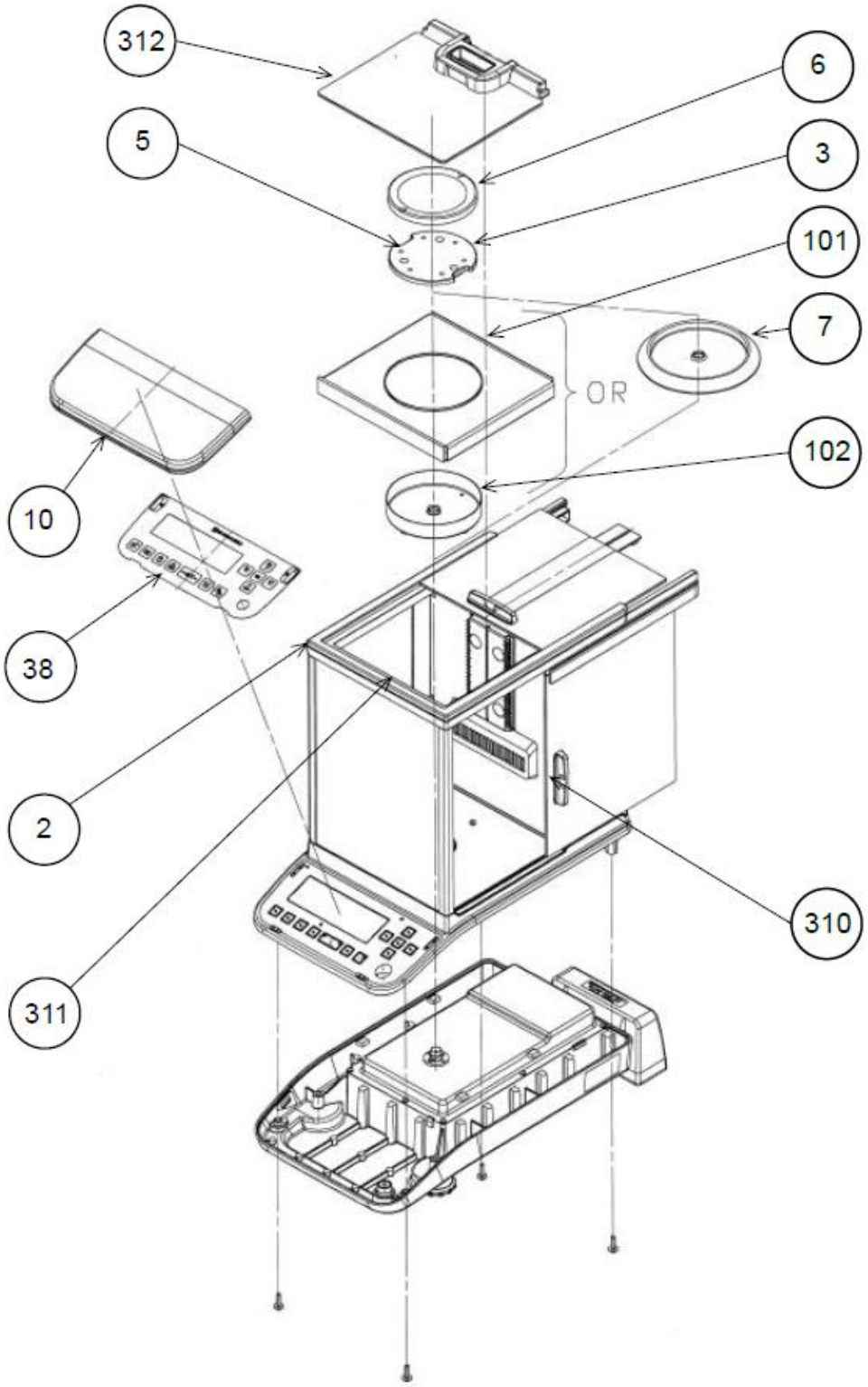


11 Parts List

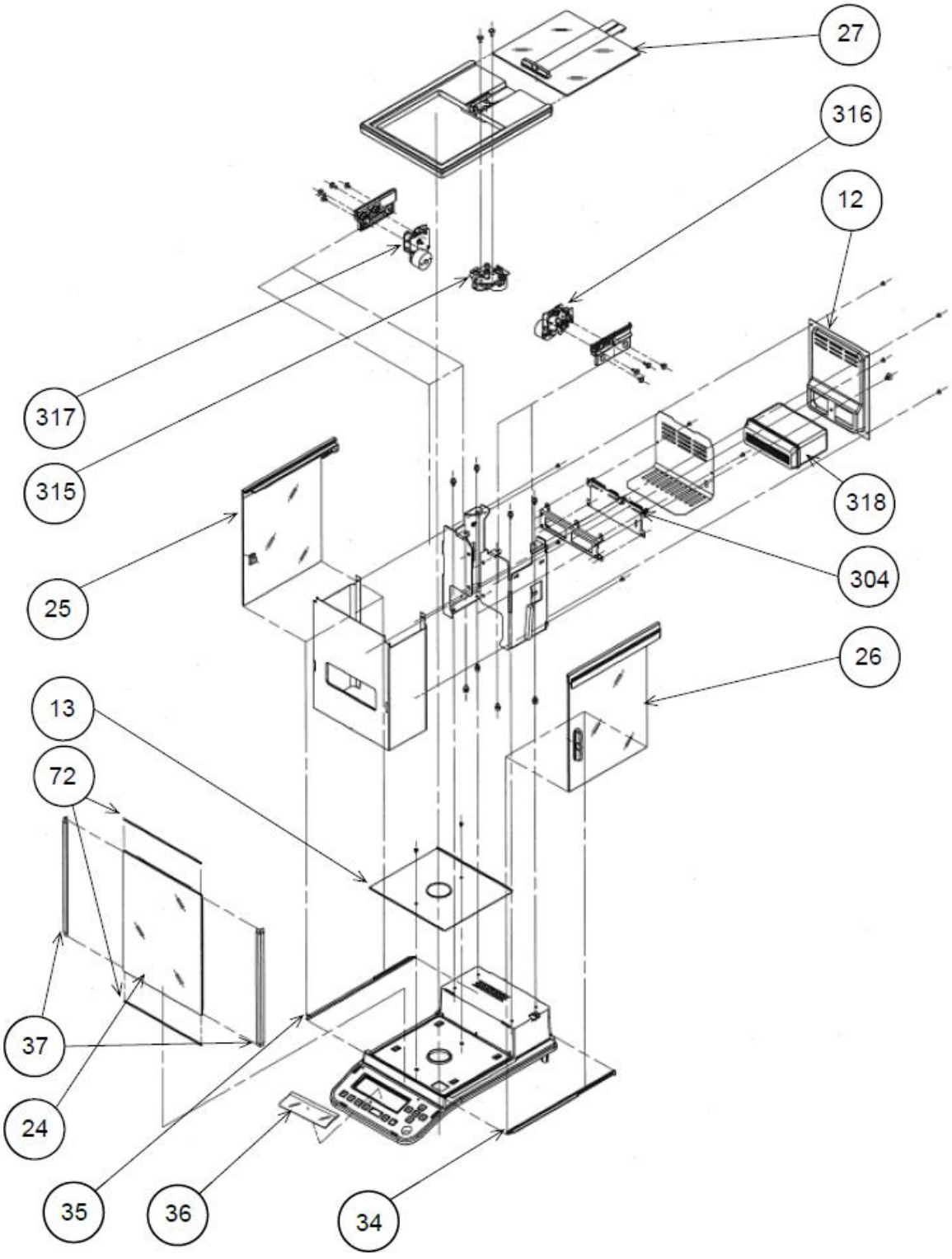
11.1 TABP-A Series Exploded View

TABP-A Series (0.1 mg Models)

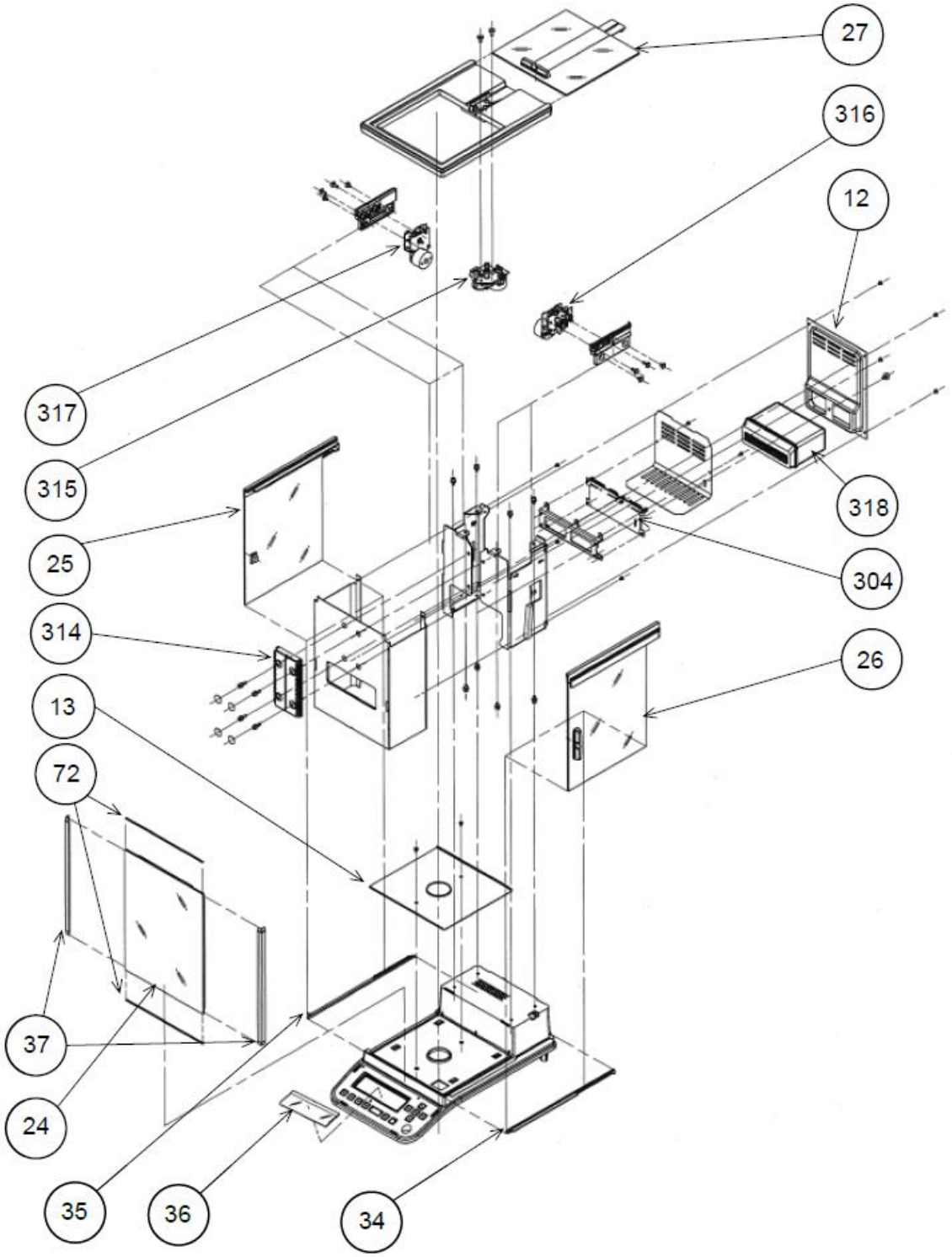



312
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OR
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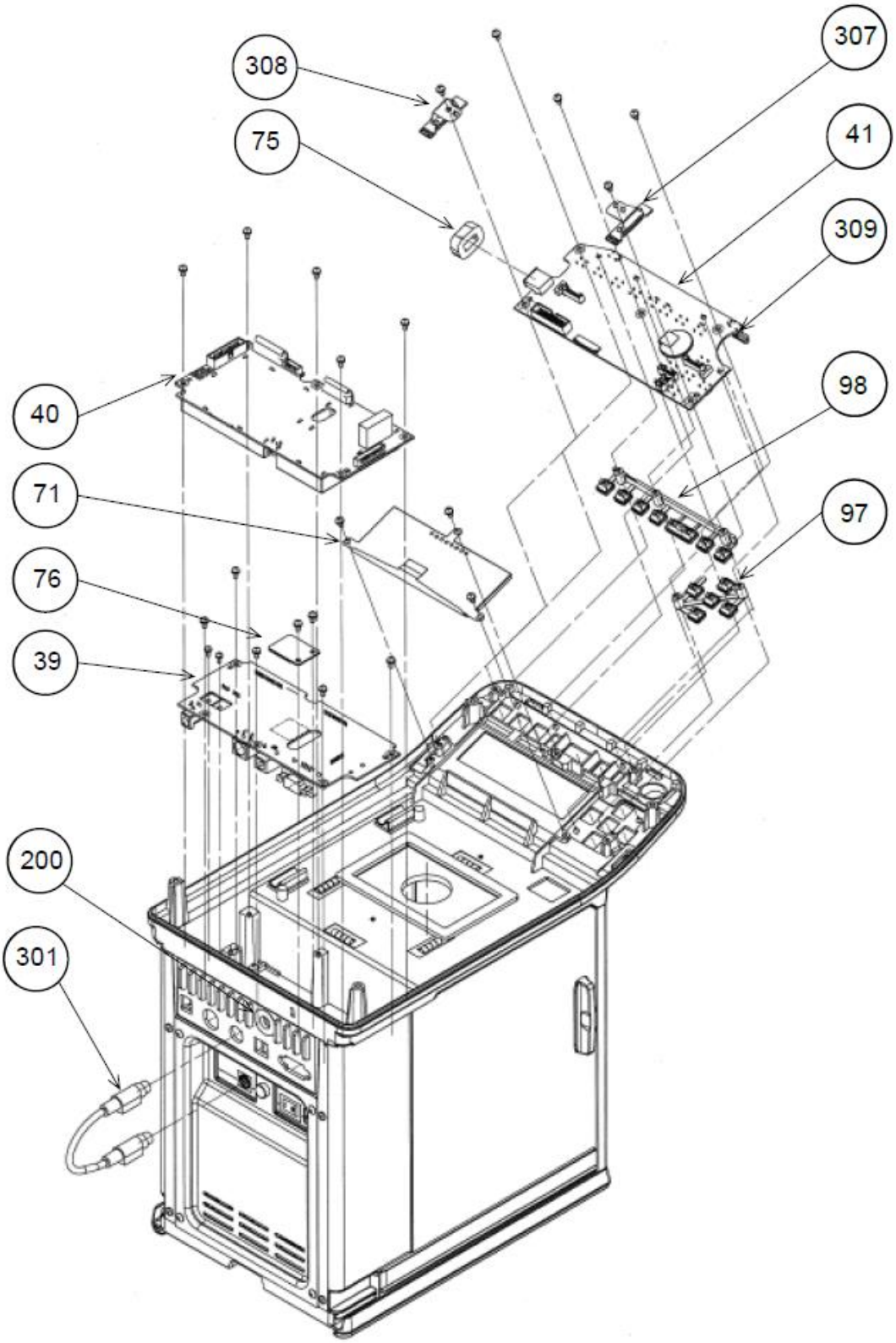
TABP-A Series (Case Assembly for 0.1 mg Models)



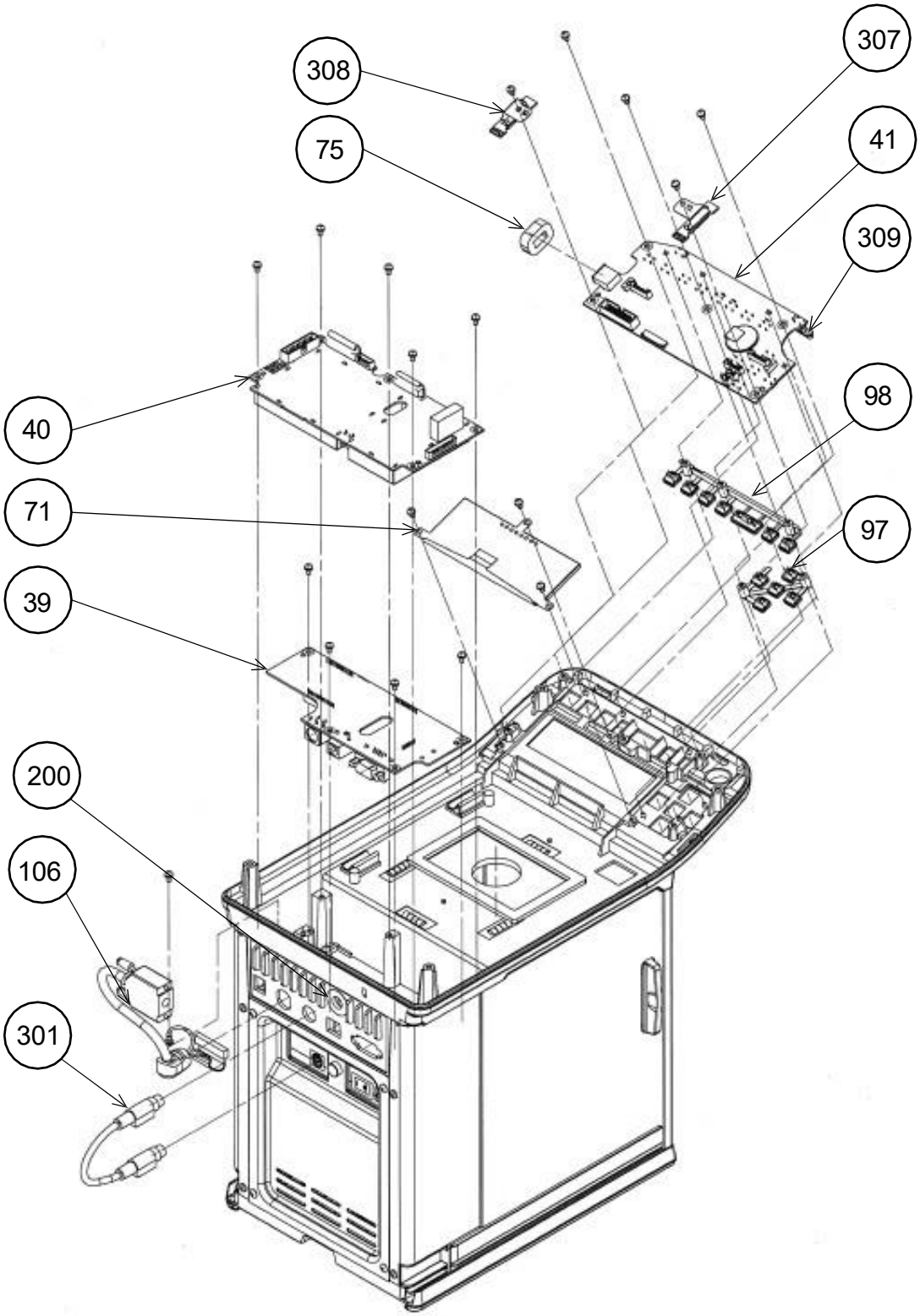
TABP-A Series (Case Assembly for 0.01 mg Models)



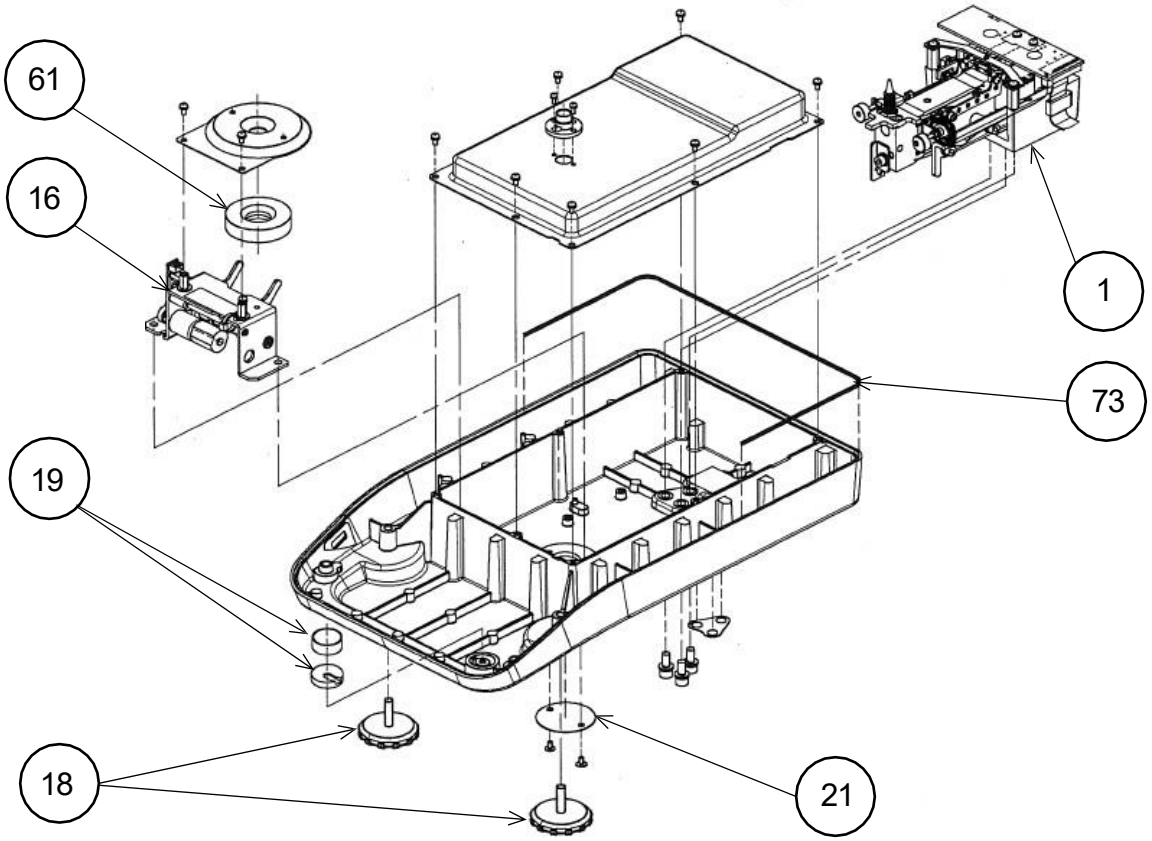
TABP-A Series (Case Assembly for 0.1 mg Models)



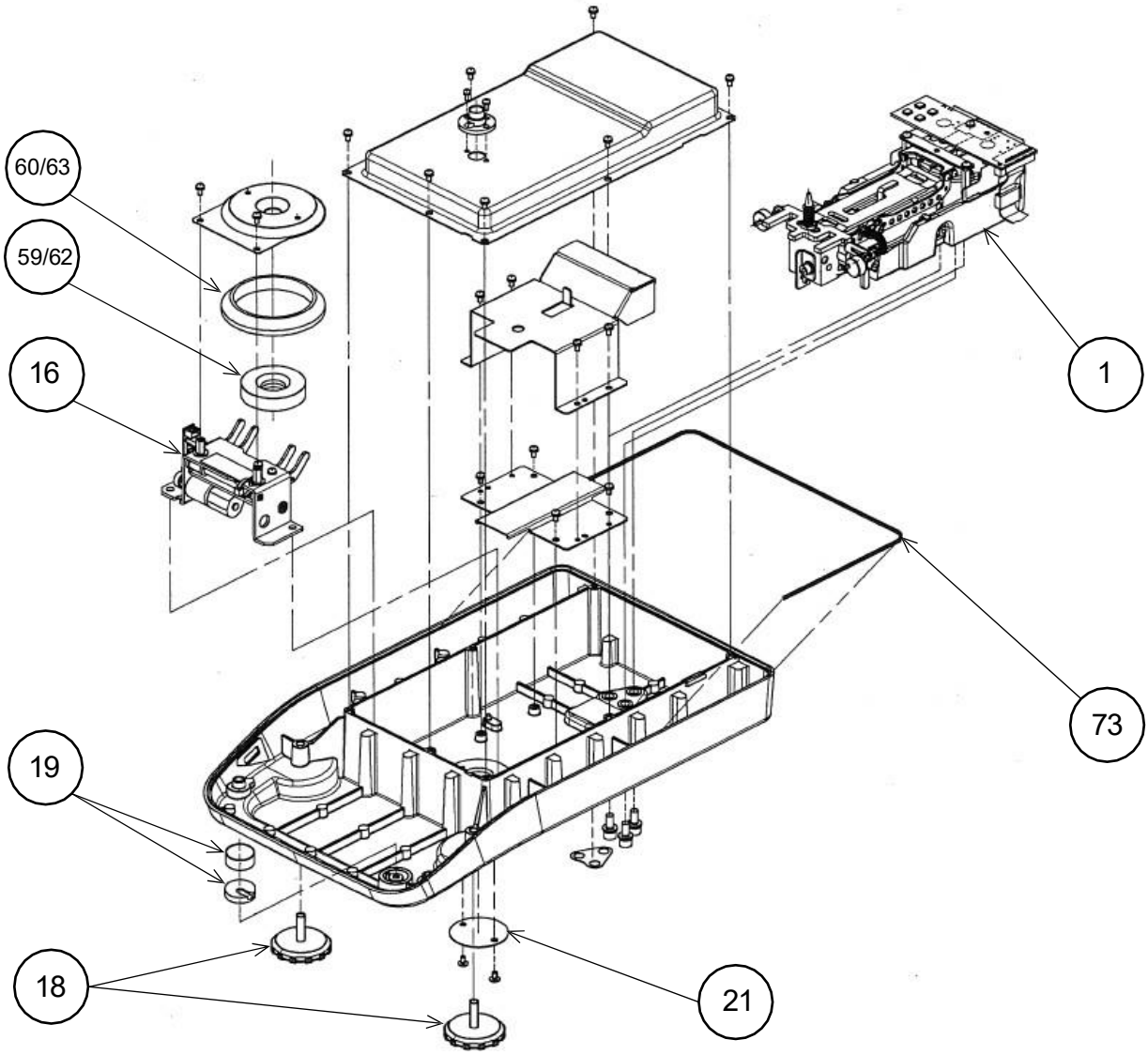
TABP-A Series (Case Assembly for 0.01 mg Models)

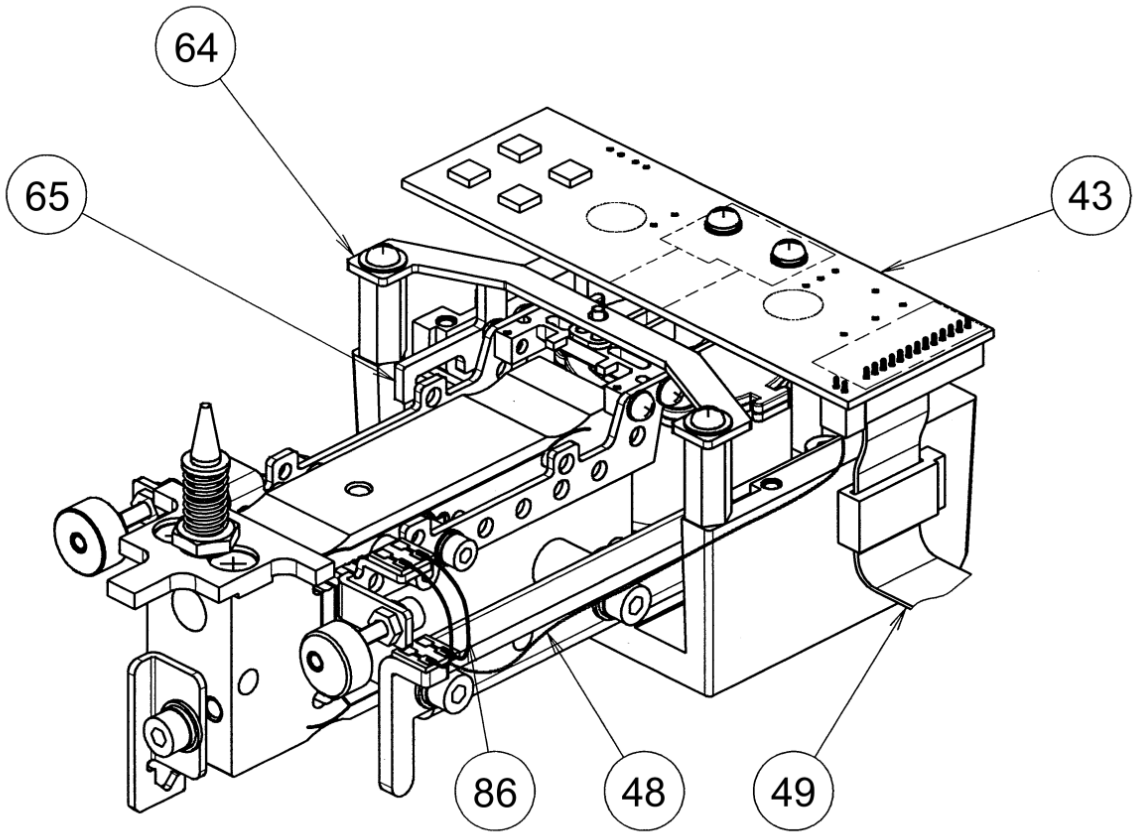


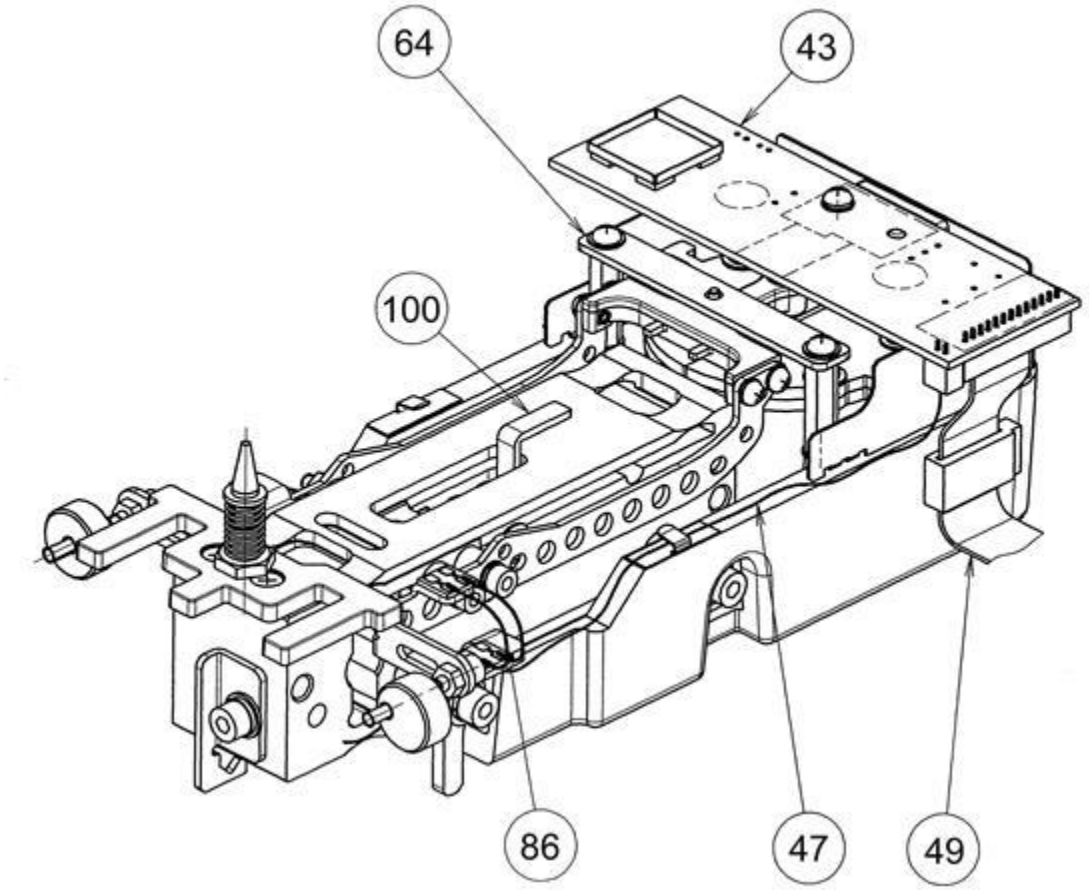
TABP-A Series (Base Unit Assembly for 0.1 mg Models)



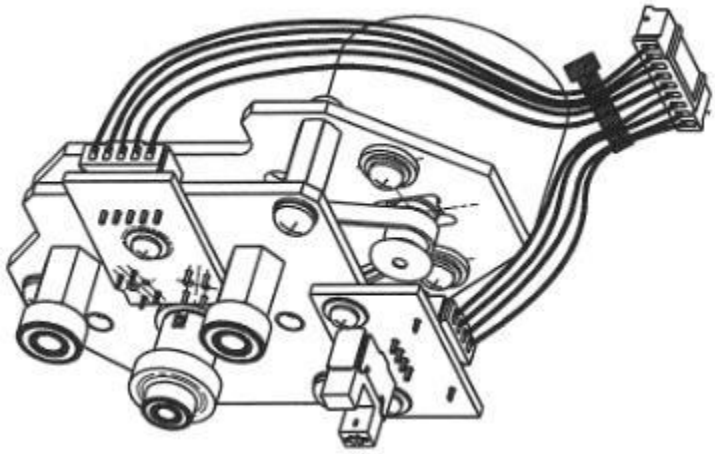
TABP-A Series (Base Unit Assembly for 0.01 mg Models)



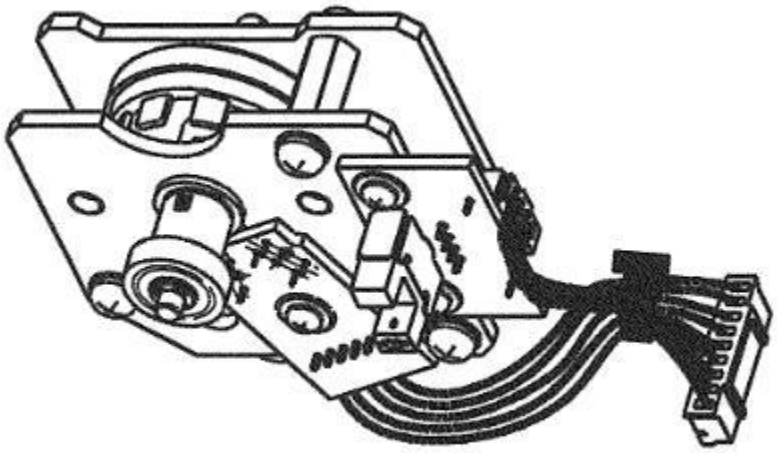

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TABP-A Series (Top Drive Module 315)



TABP-A Series (Right Drive Module 316)
TABP-A Series (Left Drive Module 317)



Right and left are symmetrically opposite.

11.2 TABP-A Series Service Parts List

No.	Description	P/N	Remarks
1	UNIT ASSY (S), SERVICE	-	
	UNIT ASSY (135W), SERVICE	-	
	UNIT ASSY (225WD), SERVICE	-	
	UNIT ASSY (225W), SERVICE	-	
2	ROOF ASSY, SERVICE	RTABP-A-8020	
3	PAN SUPPORT ASSY	RTABP-A-6002	
5	CUSHION RUBBER SET	RTABP-A-6003	Rubber, set of 6
6	PAN	RTABP-A-6001	
7	SHIELD PLATE	RTABP-A-8001	
9	CLAMP, CKN-07	-	AC adapter holder for 0.1 mg models
10	PROTECTIVE COVER, AP	TYBA-A06-A	Protective cover
12	REAR PLATE (W)	-	
13	COVER PLATE ASSY	-	
16	WEIGHT LOADER ASSY (S)	RTABP-A-9002	For 0.1 mg models
	WEIGHT LOADER ASSY (D)	RTABP-A-9003	For 0.01 mg models
18	LEVEL ADJUSTER ASSY, N-AX	RTABP-A-8010	1 pc
19	LEVEL ASSY	RTABP-A-8009	Requires separate Araldite Rapid adhesive (Refer to Tech. Info. HTSC-0060)
21	LID, BASE	RTABP-A-8012	
24	FRONT GLASS ASSY	RTABP-A-8002	With cushion tape and cushion Requires Tape, front glass (72) 2pcs
25	SIDE GLASS ASSY (LEFT)	RTABP-A-8013	Left glass door with knob (32), applied lubricant
26	SIDE GLASS ASSY (RIGHT)	RTABP-A-8012	Right glass door with knob (32), applied lubricant
27	TOP GLASS ASSY	RTABP-A-8015	with knob (32)
32	KNOB ASSY SET	RTABP-A-8006	Parts for one knob
34	RAIL (RIGHT)	RTABP-A-8016	Right glass door rail with double-sided adhesive tape
35	RAIL (LEFT)	RTABP-A-8017	Left glass door rail with double-sided adhesive tape
36	PANEL WINDOW DISP NAU	RTABP-A-9001	
37	FRONT PILLAR	RTABP-A-8018	1 pc
38	SHEET PANEL, AP-AD	RTABP-A-4002	
39	IF D ASSY, AP-AD	RTABP-A-2004	For 0.01 mg models
39	IF D ASSY, AP-AD	RTABP-A-2005	For 0.1 mg models
40	MAIN BOARD ASSY, AP-AD D (C)	RTABP-A-2007	For 0.01 mg models
	MAIN BOARD ASSY, AP-AD S (C)	RTABP-A-2006	For 0.1 mg models
41	DISPLAY BOARD ASSY, AP-AD	RTABP-A-2008	
43	DETECTOR ASSY (S)	-	For 0.1 mg models, with hardware holder
	DETECTOR ASSY (D)	-	For 0.01 mg models, with hardware holder
44	CABLE ASSY, 20-275_MIL	-	About 275 mm long with 20-pin connectors (for connecting the AP-AD main board assembly (40) to the AP-AD display board assembly (41))
45	CABLE ASSY, 12-067_PH2	-	About 67 mm long with 12-pin connectors (for connecting the AP-AD interface-D board assembly (39) to the AP-AD D main board assembly (40))
46	CABLE ASSY, 14-067_PH2	-	About 67 mm long with 14-pin connectors (for connecting the AP-AD interface-D board assembly (39) to the AP-AD D main board assembly (40))
47	CABLE ASSY, 02-135_PH1	-	2 pin, 135 mm
48	CABLE ASSY, C(2P)-1_PH	-	2 pin, 100 mm
49	CABLE ASSY, 13-200_PH2	-	13 pin, 200 mm
59	WEIGHT INSIDE	-	For TABP 220-5DAM-A and TABP 220-5AM-A, 100 g
60	WEIGHT OUTSIDE	-	For TABP 220-5DAM-A and TABP 220-5AM-A, 100 g
61	WEIGHT LARGE	-	For 0.1 mg models, 200 g
62	WEIGHT INSIDE LIGHT TYPE	-	For TABP 120-5DAM-A and TABP 135-5AM-A, 60 g

63	WEIGHT OUTSIDE LIGHT TYPE	-	For TABP 120-5DAM-A and TABP 135-5AM-A, 60 g
64	STOPPER PLATE	-	For 0.1 mg models
	STOPPER PLATE	-	For 0.01 mg models
65	STOPPER, LEVER, NAX	-	For 0.1 mg models
	STOPPER LEVER	-	For 0.01 mg models
71	OLED ASSY	RTABP-A-2003	With holder and double-sided adhesive tape
72	TAPE, FRONT GLASS	-	188 mm
73	ELAST MESH, AP	-	For 0.1mg models, 400 mm
74	ELAST MESH, AP	-	For 0.01mg models, 200 mm
75	FOAM SHADING, T8	-	
76	PAD, GEL, PCB-IF	-	
83	PACKING BOX ASSY, AP-D	-	For both 0.1 mg and 0.01 mg models, with cushioning materials
86	PT-NI BAND, 1MT	-	1 m total length, with two 50 mm lengths used for AP-AD series models
87	GREASE, GP-837DE 2KG	-	For level adjuster
97	KEY-TOP CURSOR NAU	-	
98	KEY-TOP FUNCTION NAU	-	
100	STOPPER OPF	-	For 0.01 mg models
101	STAGE	RTABP-A-8019	For 0.01 mg models
102	SHIELD CASE	RTABP-A-6005	For 0.01 mg models
103	MULTIPURPOSE STAND	-	For 0.01 mg models
104	FIXED PAN FOR MULTIPURPOSE STAND	-	For 0.01 mg models
105	POWER BOARD ASSY, NAU D	-	For 0.01 mg models
106	POWER BOX CABLE ASSEMBLY	-	Without cable clamp
107	AP HOLDER	-	
200	BUMPER	-	Rubber cap
304	MOTOR BOARD ASSY, AP-AD	RTABP-A-2009	
305	CABLE ASSY, INTERFACE - MAIN	-	(For connecting the AP-AD interface-board assembly (39) to the APAD-D main board assembly (40))
306	CABLE ASSY, MOTOR DRIVE	-	(For connecting the AP-AD interface-board assembly (39) to the motor board assembly (304))
307	TOUCHLESS SENSOR BOARD ASSY, RIGHT	RTABP-A-5001	
308	TOUCHLESS SENSOR BOARD ASSY, LEFT	RTABP-A-5002	
309	FRONT KEY-TOP COVER	RTABP-A-5003	For automatic door hardware switches
310	CUSHION, KNOB	-	Used to cushion side glass knob contact surface
311	PAD, TOP GLASS	-	Used to cushion contact surface between top glass and roof
312	PARTITION ASSY, APAD, SERVICE	RTABP-A-8022	Adjustable windbreak plate
313	LUBRICANT, HANARL WHITE	-	Used to lubricate side glass assembly (Right, Left, Top), partition assembly for maintenance. About 40 g of liquid grease (volatile), including container with brush applicator, with expiration date

314	GUIDE PARTITION, AP-AD (SERVICE)	-	Parts for guiding movable glass partition. Includes privacy stickers.
315	DRIVE MODULE, TOP	RTABP-A-9005	Set of drive parts for top glass. Includes cable and circuit board.
316	DRIVE MODULE, RIGHT	RTABP-A-9006	Set of drive parts for right (R) side glass. Includes cable and circuit board.
317	DRIVE MODULE, LEFT	RTABP-A-9007	Set of drive parts for left (L) side glass. Includes cable and circuit board.
318	IONIZER	RTABP-A-2010	Main unit only

11.3 TABP-A Series Dedicated Jigs

Following are common jigs for TABP-A series.

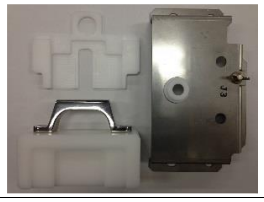
No.	Description	P/N	Remarks
-	AP STANDARD JIG SET	775-22450-01	Set of all J1 to J11
J1	OPF POSITIONING PIN JIG	321-70258-12	50 mm length, inserted from above OPF
J2	OPF FIXED PIN ASSY	321-74045-01	50 mm length, for 0.01 mg models
J3	UNIT ASSY POSITIONING JIG	775-22438-05	Set for 0.1 mg and 0.01 mg models (775-22438-04 is only for 0.1 mg models.) (775-22438-03 is only for 0.01 mg 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 and 0.01 mg models (Dia. 9.4)
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 length

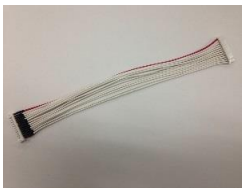
Following are dedicated jigs for TABP-A series.

No.	Description	P/N	Remarks
J21	USB CABLE SET	321-71730-42	Includes USB driver CD and ferrite core.
J31	TOUCHLESS SENSOR ADJUSTMENT JIG	775-22602-01	
J32	FPGA PROGRAMMING CABLE	321-74873-41	
J33	USB BLASTER	321-74874	
J34	BOX BIT	086-10601-41	For hexagon spacer
J35	TOUCHLESS SENSOR POSITIONING JIG	775-22611-01	Used simultaneously with J31
J36	TOUCHLESS SENSOR CHECKING JIG A	775-22610-01	Foot length 55mm
J37	TOUCHLESS SENSOR CHECKING JIG B	775-22610-02	Foot length 40mm
313	LUBRICANT, HANARL WHITE	321-75868-01	About 40 g of liquid grease (volatile), including container with brush applicator, with expiration date

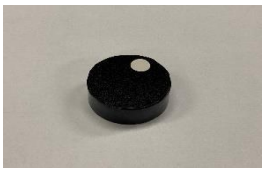
Photos of the actual jigs are listed below. (The photos may look different from the actual jigs due to improvements, etc.)

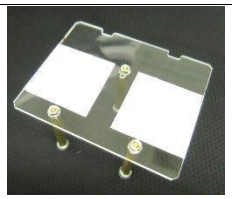
・Common jigs for TABP-A series.

No.	Description	P/N	Photo	Remarks
J1	OPF POSITIONING PIN JIG	321-70258-12		
J2	OPF FIXED PIN ASSY	321-74045-01		
J3	UNIT ASSY POSITIONING JIG	775-22438-05		
J4	HANDLE FOR CORNER ADJUSTMENT	321-69205		
J5	GRID STONE	321-69206		
J6	LOCATION LOADER ASSY	775-22444-01		
J7	JIG, OPF STOPPER LOCATING	321-72673-01		

J8	SCREW, SST FLAT HEAD M3X5	020-12103		
J9	SLEEVE POSITIONING JIG	775-22448-01		Printed “9.4” indicating diameter on the top
J10	SHORTING SOCKET	774-41795-01		
J11	JIG CABLE	775-22349-41		

・Dedicated jigs for ABP-A series

No.	Description	P/N	Photo	Remarks
J21	USB CABLE SET	321-71730-42		Includes USB driver CD and ferrite core.
J31	TOUCHLESS SENSOR ADJUSTMENT JIG	775-22602-01		
J32	FPGA PROGRAMMING CABLE	321-74873-41		
J33	USB BLASTER	321-74874		

J34	BOX BIT	086-10601-41		
J35	TOUCHLESS SENSOR POSITIONING JIG	775-22611-01		
J36	TOUCHLESS SENSOR CHECKING JIG A	775-22610-01		Foot length 55mm
J37	TOUCHLESS SENSOR CHECKING JIG B	775-22610-02		Foot length 40mm
313	LUBRICANT, HANARL WHITE	321-75868-01		Container with brush applicator