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Service Manual Precision balances

KERN PBJ-N

Version 1.0
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GB



PBJ_N-SH-e-1810



KERN PBJ-N

Precision balances
Version 1.0 03/2018
Service manual

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1 Basic Information

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

Instructions about conformity-evaluated scales:

Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval! After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.

Detailed instructions about conformity-evaluated scales:

Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval!

After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.

2 Introduction

-

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

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In this lineup it is an eco product, Therefore, it is not intended to represent the repair manual in detail, since the construction of the balance is very simple. It is therefore only referring to the list of related to disposal spare parts.

3 Appliance overview

Models with readability $d = 0.001$ g:

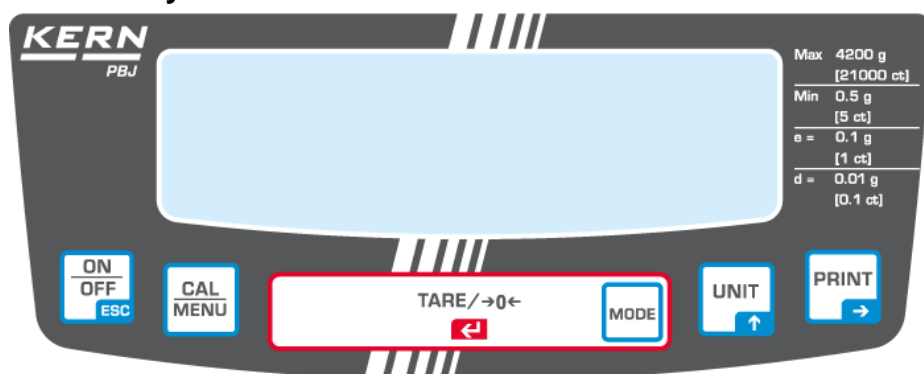


Models with readability $d \geq 0.01$ g:



- Windshield
- Weighing pan
- Display
- Keyboard
- Levelling screw

3.1 Keyboard overview



In weighing mode:






Button	Description	Pressed once and released	Keep pressed for about 3 seconds
	[ON/OFF]	Switches between the operation and standby modes.	Exit menu / Return to weighing mode
	[CAL]	Invokes adjustment or menu selection. (*1)	To display the menu element recently set.
	[TARE]	Taring / Setting to zero	No operation
	[UNIT]	Switch over weighing unit (*3)	No operation
	[PRINT]	Issue of weighing value to external appliances (printer, PC)	Issue of date and time to external appliances.

*1 This key is used to set a value when percent (%), number of pieces (PCS), specific weight



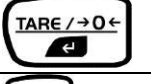

of solids (▼d) or specific weight of liquid (d) is displayed.

*3 Units different than „g” must be first set in the balance, before they can be used for measurements. Only gram (g), percent (%) and number of pieces (PCS) are factory set.

3.2 In menu:

Button	Description	Pressed once and released	Keep pressed for about 3 seconds
	[ON/OFF]	To return to a submenu or weighing mode.	Return to weighing mode
	[CAL]	Moves to the next menu item.	To display the menu element recently set.
	[TARE]	To select or set the menu element recently displayed.	No operation
	[UNIT]	Entering numeric values: Increases the numeric value of flashing digit by 1.	No operation
	[PRINT]	Entering numeric values: To go to the next position.	No operation

3.3 Numeric entry

Button	Description	Function
	Navigation button ↑	Increase flashing digit
	Navigation button →	Digit selection to the right
	Navigation button ←	Confirm entry
	ESC	Cancel input





With numerical input the indicator [#] appears.
„SET“ indicates that the value has been saved successfully.


„ERR“ means that the value could not be saved successfully; back to menu by
and repeat enter.




3.4 Setting the decimal point when entering numerical values

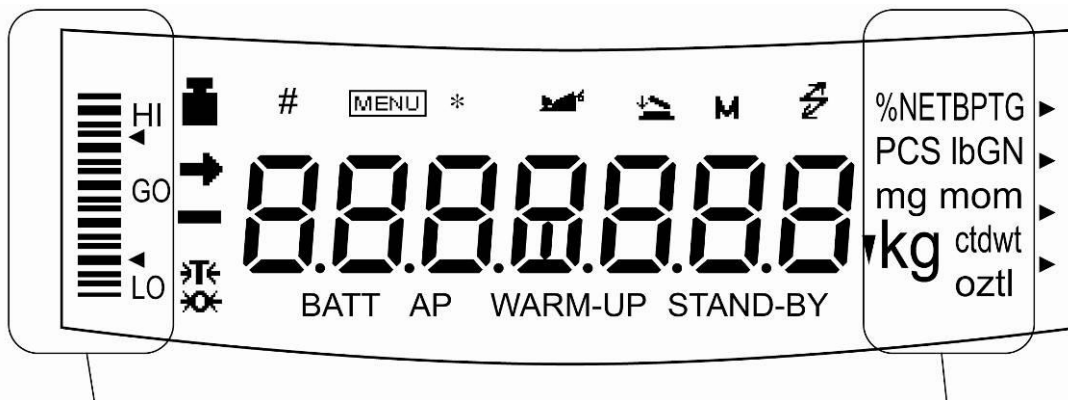
Entering a decimal point is necessary only for determining the specific gravity or if a multiplier shall be defined for the user-defined unit.

Repeat actuating the  button until the last digit flashes. Actuate the  button again in order to call up the decimal point setting mode. The reversed triangle symbol ▼ or the current decimal point flashes.

Actuate the  button in order to move the decimal point to the required position by one digit each.

Actuate the  button to define the position of the decimal point. The message „SEt“ which appears for a short period of time indicates that setting has been completed.

3.5 Overview of display



Capacity display

Display of units

Display	Designation	Description
→	Stability display	Indicates that the weighed value is stable. (*1) It marks the currently selected element during menu element selection.
↔	Tare symbol	Informs about setting an initial tare value.
■	Weight symbol	It is displayed during adjusting the measuring range. It indicates adjusting settings during menu selection. Flashes prior to start of automatic adjustment. Note: If automatic adjusting of measuring range is not activated, a user must perform it when this symbol flashes. <ul style="list-style-type: none"> with built-in weight (PBJ models refer to chapter 9.31.1) with external weight (PBS models refer to chapter Fehler! Verweisquelle konnte nicht gefunden werden.).
[]	Brackets	The non-calibrated value is given in brackets in calibrated scales.
#	Number symbol	Indicates numeric value entry.
MENU	Menu symbol	Appears during menu selection. Always shown when the menu is locked.
*	Asterisk	Indicates that the displayed numeric value is not a mass value.
⚡	Communication symbol	Is lit up during communication with external appliances via RS-232C cable. Shown when communication functions are ON.
▼	Inverse triangle symbol	Indicates the setting of specific weight measurement. It is used as an alternative to the decimal point.
→0←	Zero indicator	
🐾	Animal symbol	Shows the setting of animal weighing function.
📁	Automatic storage and zeroing symbol	Shows the setting of automatic saving and zeroing function.
M	Memory Symbol	Balance is in formula mode
AP	Auto Print symbol	Displays set-up of the Auto Print function.
STAND-BY	Standby mark	Appears when the balance power supply is in stand-by mode. It is also displayed when operational function changes into stand-by mode.

*1 Stabilisation symbol
When the stabilisation symbol is illuminated for a long time, the displayed value may oscillate when a weight is slowly changed or stabilisation detection range is set to high value.

4 Basic Information (General)

4.1 Proper use

The balance you purchased is intended to determine the weighing value of material to be weighed. It is intended to be used as a “non-automatic balance”, i.e. the material to be weighed is manually and carefully placed in the centre of the weighing pan.. As soon as a stable weighing value is reached the weighing value can be read.

4.2 Improper Use

Do not use balance for dynamic add-on weighing procedures, if small amounts of goods to be weighed are removed or added. The “stability compensation“ installed in the balance may result in displaying an incorrect measuring value! (Example: Slowly draining fluids from a container on the balance.)

Do not leave permanent load on the weighing pan. This may damage the measuring system. Impacts and overloading exceeding the stated maximum load (max) of the balance, minus a possibly existing tare load, must be strictly avoided. Balance may be damage by this.

Never operate balance in explosive environment. The serial version is not explosion protected.

The structure of the balance may not be modified. This may lead to incorrect weighing results, safety-related faults and destruction of the balance.

The balance may only be used according to the described conditions. Other areas of use must be released by KERN in writing.

4.3 Warranty

Warranty claims shall be voided in case

Our conditions in the operation manual are ignored

The appliance is used outside the described uses

The appliance is modified or opened

Mechanical damage or damage by media, liquids, natural wear and tear

The appliance is improperly set up or incorrectly electrically connected

The measuring system is overloaded

4.4 Monitoring of Test Resources

In the framework of quality assurance the measuring-related properties of the balance and, if applicable, the testing weight, must be checked regularly. The responsible user must define a suitable interval as well as type and scope of this test. Information is available on KERN's home page (www.kern-sohn.com) with regard to the monitoring of balance test substances and the test weights required for this. In KERN's accredited DKD calibration laboratory test weights and balances may be calibrated (return to the national standard) fast and at moderate cost.

5 Basic Safety Precautions

5.1 Pay attention to the instructions in the Operation Manual

Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN balances.

5.2 Personnel training

The appliance may only be operated and maintained by trained personnel.

6 Transport and storage

6.1 Testing upon acceptance

When receiving the appliance, please check packaging immediately, and the appliance itself when unpacking for possible visible damage.

6.2 Packaging



Keep all parts of the original packaging for a possibly required return.
Only use original packaging for returning.
Prior to dispatch disconnect all cables and remove loose/mobile parts.
Reattach possibly supplied transport securing devices.
Secure all parts such as the glass wind screen, the weighing platform, power unit etc. against shifting and damage.

7 Unpacking, Setup and Commissioning

7.1 Installation Site, Location of Use

The balances are designed in a way that reliable weighing results are achieved in common conditions of use.

You will work accurately and fast, if you select the right location for your balance.

Therefore, observe the following for the installation site:

Operate the device only indoors.

Place the balance on a firm, level surface;

Avoid **extreme heat as well as temperature fluctuation** caused by installing next to a radiator or in the direct sunlight;

Protect the balance against direct draughts due to open windows and doors;

Avoid jarring during weighing;

Protect the balance against high humidity, vapours and dust;

Do not expose the device to extreme dampness for longer periods of time. Non-permitted condensation (condensation of air humidity on the appliance) may occur if a cold appliance is taken to a considerably warmer environment. In this case, acclimatize the disconnected appliance for ca. 2 hours at room temperature.

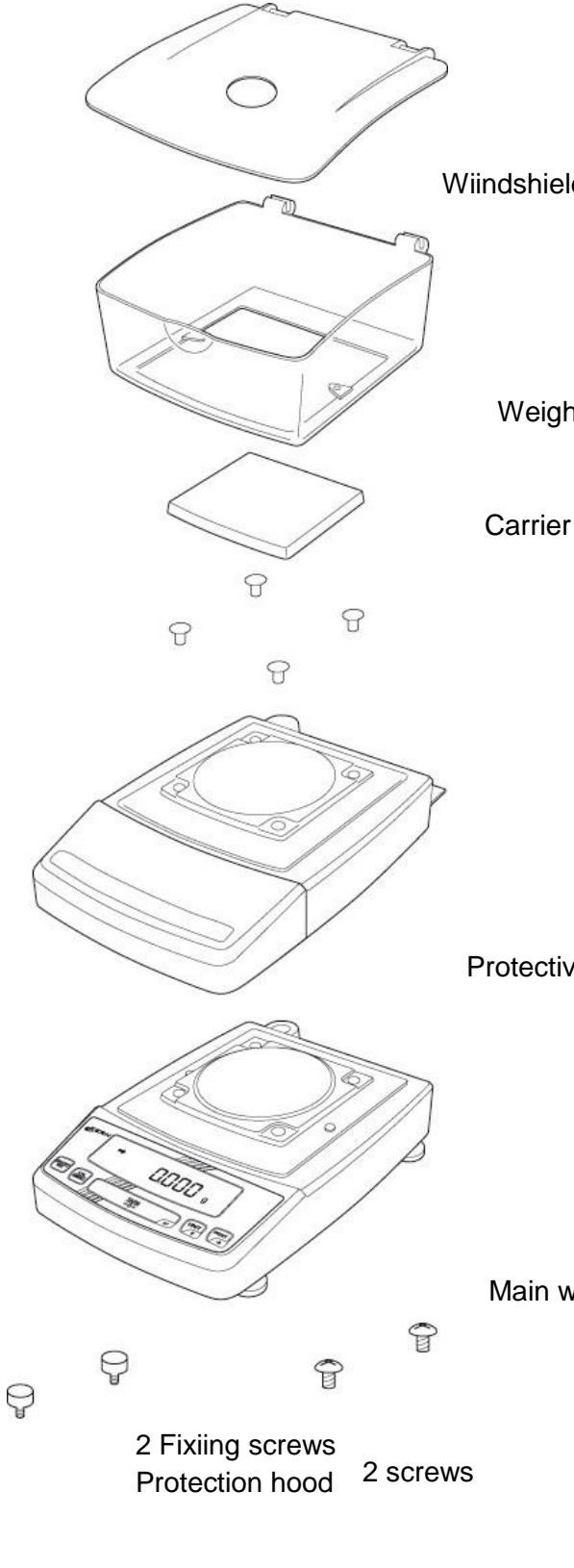
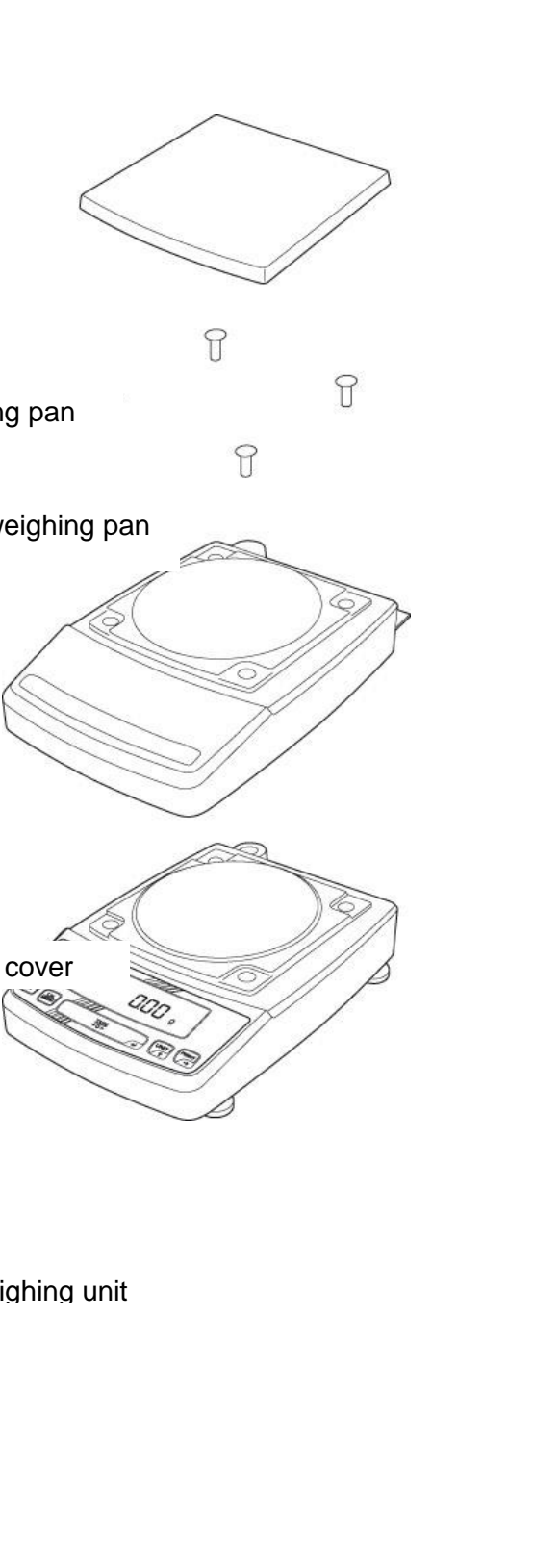
Avoid static charge of goods to be weighed or weighing container.

If electro-magnetic fields or static charge occur, or if the power supply is unstable major deviations on the display (incorrect weighing results) are possible. In that case, the location must be changed.

7.2 Unpacking / Scope of delivery

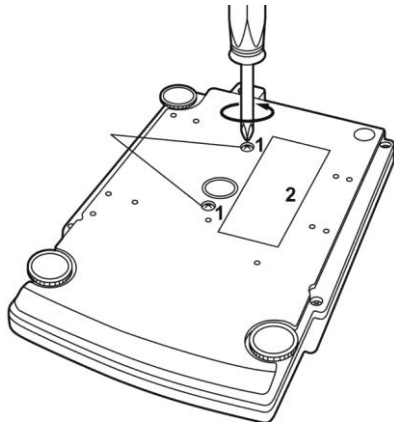
Remove device and accessories carefully from packaging, remove packaging material and place device at the planned work place. Verify that there has been no damage and that all packing items are present.

Scope of delivery / serial accessories:

Models with readability $d = 0.001\text{ g}$:	Models with readability $d \geq 0.01\text{ g}$:
 <p>Wiindshield</p> <p>Weighing pan</p> <p>Carrier weighing pan</p> <p>Protective cover</p> <p>Main weighing unit</p> <p>2 Fixiing screws Protection hood 2 screws</p>	 <p>Weighing pan</p> <p>Carrier weighing pan</p> <p>Protective cover</p> <p>Main weighing unit</p>
<p>Mains adapter</p> <p>Operating instructions</p> <p>Menu overview</p>	

7.3 Placing

Remove transport guard (models PBJ)



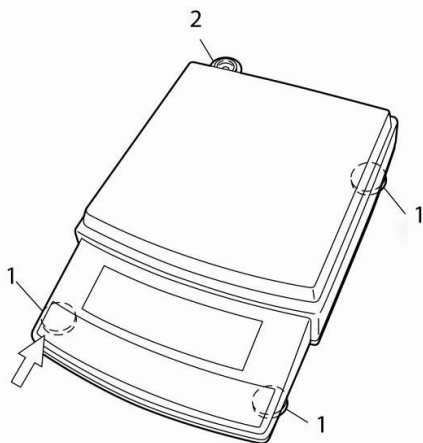
To loosen the transport guard, turn both transport screws [1] anti-clockwise until they are locked (refer to sign [2]).

For transport, turn both transport screws clockwise until they are locked.

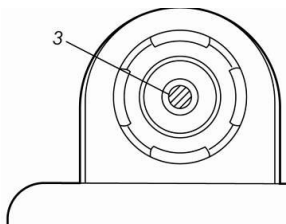
Mount safety hood

Remove protective foil from adhesive strips and mount the safety hood so that it does not contact the weighing plate.

Levelling



Turn in all three foot screws [1] as far as they go.

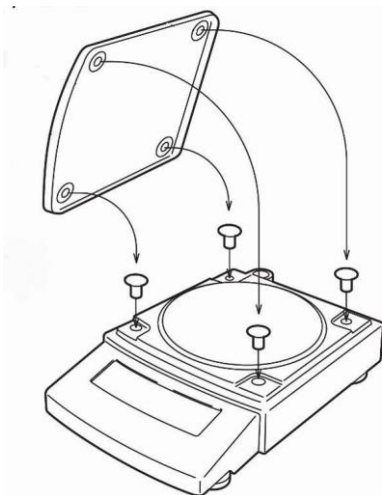


Slightly press down the left front side of the scale and turn out the two front foot screws until the air bubble [3] in the spirit level [2] is within the prescribed circle.

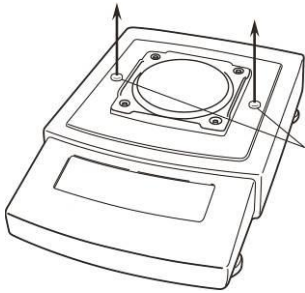
While continuing to exert a slight pressure to the front side of the scale, turn out the rear foot screw until the scale stands in stable position.
Check levelling regularly.

Installation of weighing plate

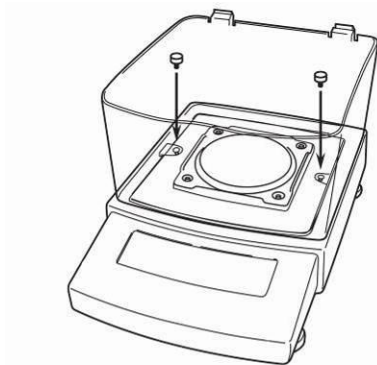
Models with readability $d \geq 0.01$ g:



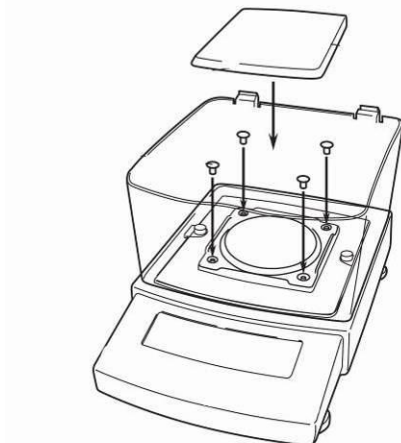
Models with readability = 0.001 g:



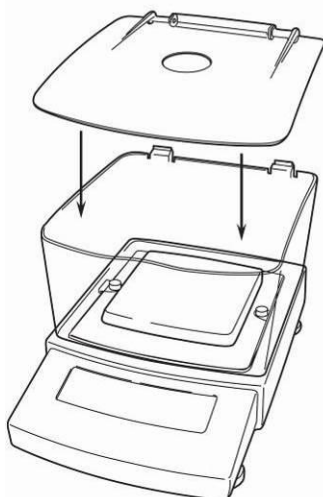
Remove rubber plug as shown in picture.



Attach wind guard and fix it by means of screws.



Install weighing pan as per illustration.
Note the correct position.



Place the wind guard cover.

7.4 Mains connection

Power is supplied via the external mains adapter. The stated voltage value must be the same as the local voltage.

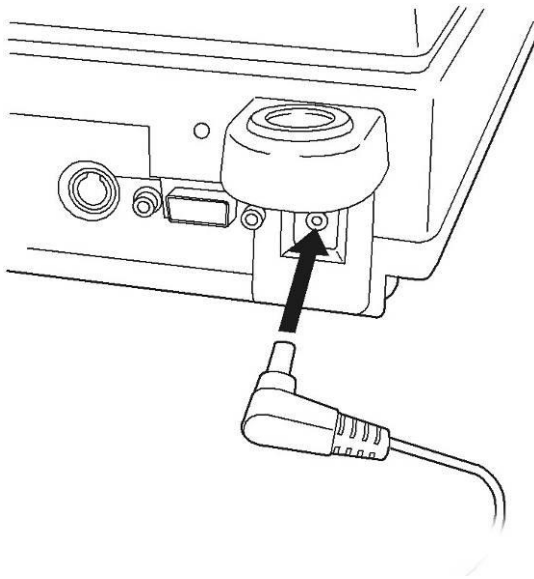
Only use original KERN mains adapters. Using other makes requires consent by KERN.



Models PBJ:

Prior to mains connection, loosen the transport guard screws at the scale according to the sign in any case, see chapter 7.3

7.5 Switch power supply on

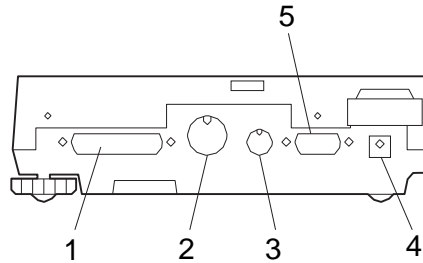


7.6 Connection of peripheral devices

Before connecting or disconnecting of additional devices (printer, PC) to the data interface, always disconnect the balance from the power supply.

With your balance, only use accessories and peripheral devices by KERN, as they are ideally tuned to your balance.

Terminal for external devices:



Interfaces at the balance
back

- RS-232C interface
- DATA IO interface
- AUX interface
- DC-IN connection
- Keyboard interface

7.7 Initial Commissioning

In order to obtain exact results with the electronic balances, your balance must have reached the operating temperature (see warming up time chap. During this warming up time the balance must be connected to the power supply (mains, accumulator or battery).

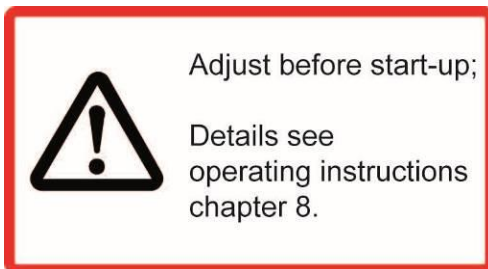
The accuracy of the balance depends on the local acceleration of gravity.
Strictly observe hints in chapter Adjustment.

8 Adjustment

As the acceleration value due to gravity is not the same at every location on earth, each balance must be coordinated - in compliance with the underlying physical weighing principle - to the existing acceleration due to gravity at its place of location (only if the balance has not already been adjusted to the location in the factory). This adjustment process must be carried out for the first commissioning, after each change of location as well as in case of fluctuating environment temperature. To receive accurate measuring values it is also recommended to adjust the balance periodically in weighing operation.



Observe stable environmental conditions. A warming up time (see chapter 1) is required for stabilization. Ensure that there are no objects on the weighing pan.



8.1 Manual adjustment by CAL button

The scales have been set by the manufacturer so that adjustment can be started directly from the weighing mode using the **CAL** button.

Models PBJ: Adjustment with internal weight

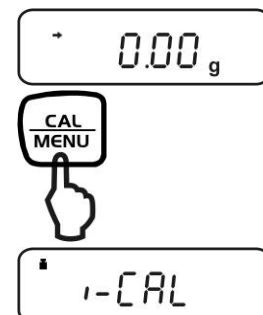
Other adjustment procedures can be activated in the menu.

8.2 Adjustment with internal weight




Condition: Menu setting „I.CAL“ / Menu element 1

In weighing mode press . I-CAL is displayed.



If „I-CAL“ is not displayed, press  to return into weighing mode and activate menu element 1, see menu overview.

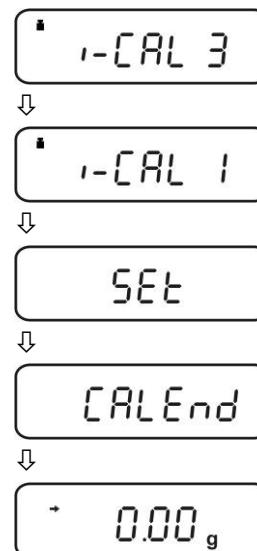
Press the  button and adjustment will take place automatically.

After successful adjustment the balance automatically returns to weighing mode.

In case of an adjustment error (e.g. objects on the weighing plate) the display will show an error message, repeat adjustment.


Fehler! Verweisquelle konnte nicht gefunden werden. When an optional printer is connected and the GLP function is connected, the adjustment log will be edited, see chap. **Fehler!**

Verweisquelle konnte nicht gefunden werden.




9 Adjustment test

Activate function:

Press  3 times in weighing mode.

Menu group 1 „Adjustment“ is displayed, the indicator  flashes.




Acknowledge by , the current setting flashes.


t Adjustment with internal weight „I-CAL“ (only models PBJ, see chap. 8.1.1), Menu element **1**


t Adjustment test with internal weight „I-tEst“ (only models PBJ, see chap. 8.2.2), Menu element **2**

E Adjustment with external weight „E-CAL“ (see chap. 8.1.2), Menu element **3**

Et Adjustment test with external weight „E-tEst“ (see chap. 8.2.1), Menu element **4**

Acknowledge by .

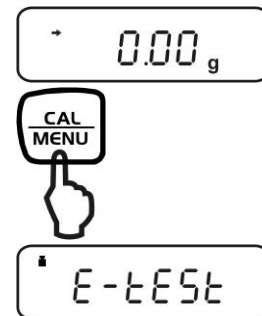
Press  repeatedly or for 3 s and the scale returns into weighing mode

i The saved setting can now be called up directly via .


9.1 Adjustment test with external weight

- i** **Condition:** Menu setting „E-tEst“ / Menu element 4
 At verified balances, the adjustment test is locked by a switch (except accuracy class I). To disable the access lock, destroy the seal and actuate the adjustment switch. **Fehler! Verweisquelle konnte nicht gefunden werden.** Position of the adjustment switch see chap. **Fehler! Verweisquelle konnte nicht gefunden werden.**
Attention:
 After destruction of the seal the balance must be re-verified by an authorised agency and a new verification wire/seal mark fitted before it can be reused for applications subject to verification.


In weighing mode press . E-tEst is displayed.




- i** If „E-tEst“ is not displayed, press  to return into weighing mode and activate menu element 4, see menu overview.

Press , checking is started. The displayed weight value of the recommended adjustment weight (see chapter 1) flashes.




- i** If the weight value shall be changed, press , the active digit flashes. Carry out the desired setting using navigation buttons (see chapter 3.3 „Numeric input“).

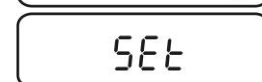
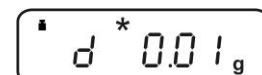
Carefully place adjusting weight in the centre of the weighing plate, press .




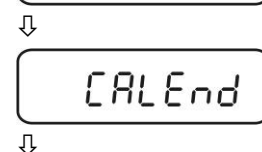
Wait until the zero display flashes.



Remove adjustment weight and press . Wait for a short period of time, the difference to the previous adjustment is displayed.




Either press , the d-value is reset to zero. Adjustment of balance by resetting.





or

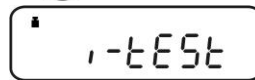
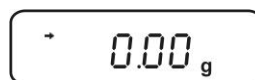
press , the d-value is not reset to zero. No adjustment occurs.




9.2 Adjustment test with internal weight

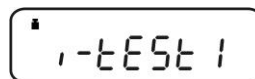
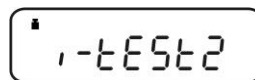
i Condition: Menu setting „I-tEst“/ menu element 2

In weighing mode press . I-tEst is displayed.




i If „I-tEst“ is not displayed, press  to return into weighing mode and activate menu element 2, see menu overview.

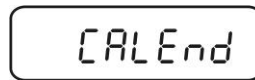
Press , checking is automatic.




Wait for a short period of time, the difference to the previous adjustment is displayed.

Either

Press , the d-value is reset to zero. Adjustment of balance by resetting.



or


Press , the d-value is not reset to zero. No adjustment occurs.



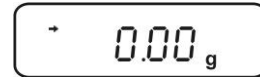
9.3 Automatic adjustment by PSC (Perfect Self Calibration), only models PBJ

The PSC function determines the ambient temperature of the scale at any time. If the tolerance groups are exceeded upwards or downwards, this is signalled and the necessary adjustment is carried out fully automatically. This will ensure that the scale is ready at any time.

Activate function:


Press  3 times in weighing mode.

Menu group 1 „Adjustment“ is displayed, the indicator  flashes.




Acknowledge by , the current setting flashes.




Press  several times until „A“ flashes.



Acknowledge with .



 is used to change-over among the following settings.

„PSC on“ (menu element 5) = function activated


„PSC off“ (menu element 6) = function deactivated

The current setting is marked by the stability display (→).






Acknowledge selection by .



Press  repeatedly or for 3 s and the scale returns into weighing mode.



i The flashing weight symbol  signals that automatic adjustment is imminent. In order to avoid that adjustment is started possibly during a series of measurements, actuate  as soon as the weight symbol flashes. This will interrupt automatic adjustment. If the PSC function has not been activated, the operator has to adjust by means of an internal adjustment weight (chapter 8.2) as soon as the weight symbol  flashes.

9.4 Automatic adjustment by Clock-CAL

With the help of its internal adjusting weight and integrated clock the balance can be set to carry out automatic adjustment at set times (up to three times daily, „ACALt1“, „ACALt2“ und „ACALt3“). Clock-CAL is a very convenient function, when calibration logs are desired to be made for regular calibrations, or when wishing span calibrations during break times to avoid interruption of measurement work.

In order to execute Clock-Cal the following conditions must be met at the defined time. If the conditions are not met within one minute, adjustment is skipped.


The scale must be in weighing or standby mode.

The stability display must be indicated.


The load at the weighing plate must be near zero.

No other adjustment process must be started.

i

The weight symbol  blinks for about two minutes as notification of span calibration before it begins.

In order to avoid that adjustment is started possibly during a series of measurements,

actuate  as soon as the weight symbol flashes. This will interrupt automatic adjustment.

If all three times are set to „00:00“ the function is switched off.

10 Verification

General introduction:

According to EU directive 90/384/EEC or 2009/23EG balances must be officially verified if they are used as follows (legally controlled area):

For commercial transactions if the price of goods is determined by weighing.

For the production of medicines in pharmacies as well as for analyses in the medical and pharmaceutical laboratory.

For official purposes

For manufacturing final packages

In cases of doubt, please contact your local trade in standard.

Verification notes:

An EU type approval exists for balances described in their technical data as verifiable. If a balance is used where obligation to verify exists as described above, it must be verified and re-verified at regular intervals.

Re-verification of a balance is carried out according to the respective national regulations.

The validity for verification of balances in Germany is e.g. 2 years.

The legal regulation of the country where the balance is used must be observed!

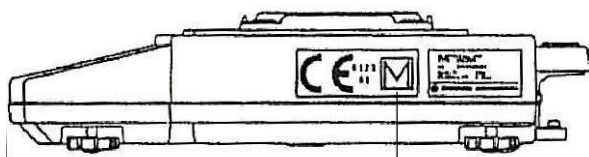
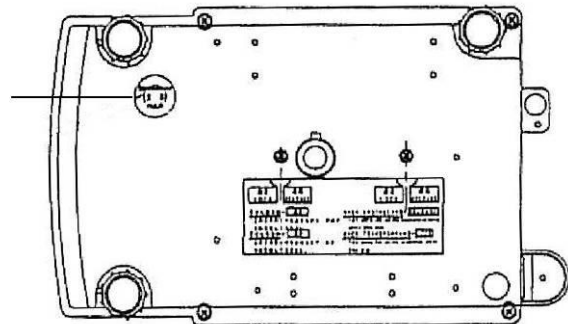


Verification of the balance is invalid without the seal.

The seal marks attached on verified balances point out that the balance may only be opened and serviced by trained and authorised specialist staff. If the seal mark is destroyed, verification loses its validity. Please observe all national laws and legal regulations. In Germany a re-verification will be necessary.

Position of seals and adjusting switch

Seal/Verification switch



Seal of approval


11 The menu

11.1 Navigation in the menu


The menu consists of 7 groups and 4 levels.


The configuration of the menu shows this structure where access to the required functions is facilitated by the numbering of the relevant menu elements.

For navigation in the menu please use the enclosed menu is displayed.



i For navigation in the menu the  symbol is displayed.

Call function:

Press  3 times in weighing mode.

The first menu group „Adjustment“ is displayed, the indicator  flashes.



Select the required menu group by . When pressing , the relevant symbols flashes; refer to the explanation below.



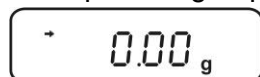
Menu group	Flashing symbol	Description
1		Adjustment
2	Analog display	Capacity display, control and target weighing
3	E	Installation environment and taring
4	A	Application measurements and automatic output
5	U	Conversion of units and specific weight measurement
6	S	Setting of time and generation of an adjustment data set
7		Communication with external devices


Making settings:

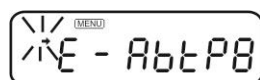
As an example, the condition for evaluating the stability of 1 count (menu element 27) to 4 counts (menu element 29) shall be set.

Use the number and look for the function in the menu overview and make the following settings at the scale.

Call up menu group 3, the symbol „E“ flashes.




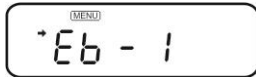
Press , the next menu level is displayed.




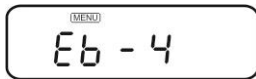
Press  repeatedly until „b“ flashes.




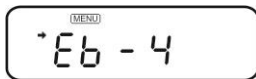
Press , „Eb-1“ (menu element 27) is displayed.
The stability display (→) lights if „Eb-1“ is the current setting.




Repeatedly press , until „Eb-4“ (menu element 29) is displayed.




Save by , „SET“ followed by the current setting „Eb-4“ is displayed, characterized by the stability display (→).



Back to menu or onto weighing mode:

Actuate  for a short time, back to menu.

Actuate  for a long time, back to weighing mode.

12 Service, maintenance, disposal

12.1 Clean

Before cleaning, please disconnect the appliance from the operating voltage.

Please do not use aggressive cleaning agents (solvents or similar agents), but a cloth dampened with mild soap suds. Ensure that no liquid penetrates into the device and wipe with a dry soft cloth.

Loose residue sample/powder can be removed carefully with a brush or manual vacuum cleaner.

Spilled weighing goods must be removed immediately.

12.2 Service, maintenance

The appliance may only be opened by trained service technicians who are authorized by KERN.

Before opening, disconnect from power supply.

12.3 Disposal

Disposal of packaging and appliance must be carried out by operator according to valid national or regional law of the location where the appliance is used.

13 Instant help

In case of an error in the program process, briefly turn off the balance and disconnect from power supply. The weighing process must then be restarted from the beginning.

General display:

Display	Explication
---	Wait for the next display.
-t mE-	Date and time are output.
Abort	The process has been interrupted.
RPL End	Operational measurement is allowed.
d ouEr	Too large error was found during calibration check. (Please contact your sales representative.)
d UndEr	Too large error was found during calibration check. (Please contact your sales representative.)
LoCKEd	Menu lock active
rELeASE	Menu lockout released.
rESEt	The menu has been reset.
SEt	The contents of the new setting and factor have been saved.
oFF	Return in a result of mains failure.
wR it	The built-in weight is moving. Please wait.
All number signs are flashing.	Put the calibration weight being displayed.

13.1 Error message:

Displayed error code	Explication	Remedy
CAL E0	Disturbances in weight loading mechanical elements.	Check transport screws.
CAL E1	Weight on the scale pan is unstable during calibration.	
CAL E2	Large zero point drift during calibration.	Empty the scale pan.
CAL E3	Large drift during the PCAL function.	Use the correct weight.
CAL E4	Large drift during calibration of the measuring range.	Use the correct weight.
CAL E5	Calibration weight is incorrect.	Use the correct weight.
CHE x	Disturbances in the balance (the balance is stopped when this display appears).	*
ComErr	Received command code is incorrect.	Check limiters etc.
dSP oL	Total number of the displayed unit is longer than 7 positions.	Reduce load.
Err 0x	Disturbance in the balance.	*
Err 24	The power voltage is incorrect.	Check the power voltage .

* Please contact your sales representative.

Fault finding Procedures:

Symptom	Possible cause	Remedy
Display is empty.	<ul style="list-style-type: none"> • Mains adapter is not connected. • The room mains circuit-breaker is switched off. • Incorrect voltage. 	Check mains voltage and connect the mains adapter correctly.
„OL” or „-OL” display	<p>The transport screws are not locked.</p> <p>Pads of the scale pan not installed.</p> <p>To large weight on the scale pan.</p>	<p>Turn the screws anticlockwise until they are locked.</p> <p>Install pads of the scale pan.</p> <p>Use the weight within its capacity.</p>
The display does not react after putting a weight on the scale pan.	The weighing pan is displaced.	Place the weighing pan correctly.
The display fluctuates.	<p>Influence of vibrations or air flow.</p> <p>Protective shield is touching the scale pan.</p>	<p>Place the weight at the suitable location.</p> <p>Try to change environment settings.</p> <p>Install the shield on the main unit of the balance.</p>
Incorrect weighing result.	<p>Calibration of the measuring range is not effective.</p> <p>Taring is not effective.</p>	<p>Calibrate the balance correctly</p> <p>Tare the balance before weighing.</p>
The balance does not display the required unit.	The unit has not been set.	First set the unit.
Selection of the menu element is rejected.	Menu lock ACTIVATED.	Remove the menu lock

14 Operating method for the adjustment service

14.1 Gaining entry to the service menu

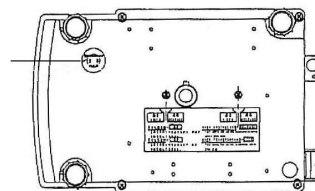
Set balance to mass display mode.

Verified balance

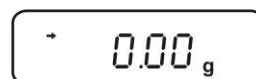
Break the seal on base (bottom side). Set the slide switch on the back of the display board to ON. Connect the AC adapter.



After a short time the display appears "OFF". Press the [ON/OFF] key once. Now you are in weighing mode.

Enter the Service Mode following the same procedure as with standard models




Press the left end of the  and the  together, for more than 3 seconds.




Press  and , together for more than 3 seconds and within 10 seconds after the first step. System will display password entry.



Use the  and the  keys to enter the password.

 to increase the highlight digit

 to highlight the digits from left to right.

Enter the password "000321" (standard)

Press , to confirm the entered password.



14.2 Service menu contents

Version Number: indicates the model code.

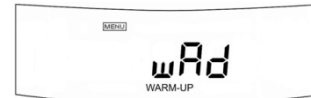
Absolute load value



Load analog digital converter value



Temperature analog digital converter value



Power analog digital converter value



Service CAL (writing in the simple linear coefficient)



Loading an unloading the build-in calibration weight



Initializing the build-in calibration weight value



EEPROM (non-volatile memory) editor



Calculating and writing of the linear coefficient



Calculating and writing of the temperature coefficient



EEPROM initialization



Outputs the contents of the EEPROM



Ends the service menu

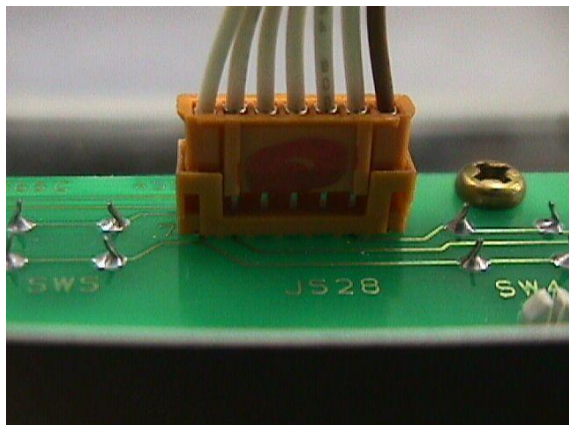


15 Balance assembly / dismantling precautions

15.1 Dismantling / Assembly

Pull the connector out straight when disconnecting it. The connector must not be bent when pulling it out.

Note: Failure to do so will bend the pins at the end and it will not be possible to re-insert the connector.



The Lever fixing jig pin (J1) must be inserted into the lever fixing hole as far as the line position of the pin when dismantling/ assembling the balance.

Note: Insert the pin by lifting the Assy, Lever(U4) up slightly. Be very careful to prevent damage to the elastic support.

Tighten each screw using the managed torque driver.

Screw Type	Tightening Torque [kgf·
M2	2.5
M2.5 Pan head	4
M3 Pan head	10
M3 Hexagon socket-head	15
M4 Pan head	18
M4 Hexagon socket-head	30

15.2 Transporting Balance

Disconnect the AC adaptor and remove the Pan assembly(6), the 4 Pan support caps (5). (UW series only) Turn the balance upside down and lock built-in calibration weight them in accordance with the explanation label.

Note: Turn the balance upside down surely.

Failure to do so will locked built-in calibration weight surely

Screw Type	Tightening Torque [kgf·
Internal weight lock	15

3. Inspection of the balance Interior (detaching the Assy, Case (3) / Assy, Pan support (4))

15.3 DISMANTLING

- Disconnect the AC adaptor and remove the Pan assembly (6) and the 4 Pan support caps (5).(Fig.2).
- Turn the balance upside down.

Note: Place a cushioning material underneath the balance to prevent damage to the case when turning the balance upside down.

- (UW series only) If the balance is locked by two P4 M4X25 transportation screws (B11), unlock them in accordance with the explanation label.
- Unscrew the four P4 M4X35 screws (24) and turn the balance so that it is the right way up (Fig.3).



Fig.2

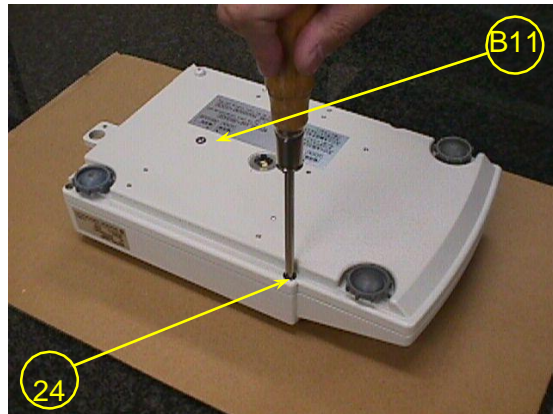


Fig.3

- Detach the Assy,Case (3) from the Assy,Base (2), and disconnect the Cable,L105 connector (14) at the Assy,Display (B4)(Fig.4).
- Remove the Calibration weight (9).
Note: Take care to ensure that the Calibration weight (9) does not get damaged or dirtied when removed.
- Insert the Lever fixing pin (J1) into the lever fixing hole of the Unit assy (1) down to the notch in the pin (Fig.5).
Note: Insert the pin by lifting the Assy,Lever (U4) up slightly. Be very careful to prevent damage to the elastic support.
- Loosen the two M4x10 hexagonal socket-head bolts (26) and Washer conical spring M4 (27) and remove the Assy,Pan support (4). The Unit assy (1), Weight loader assy (10), and Assy,I/F (B5) can now be inspected.

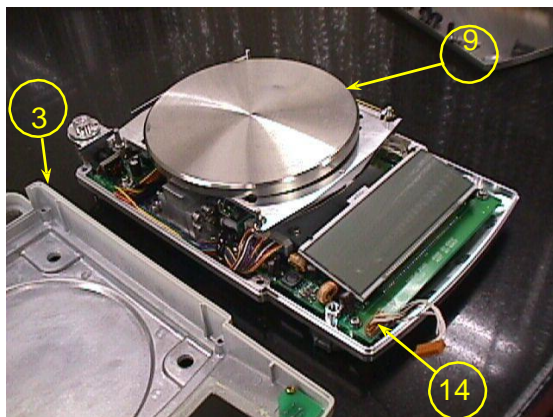


Fig.4

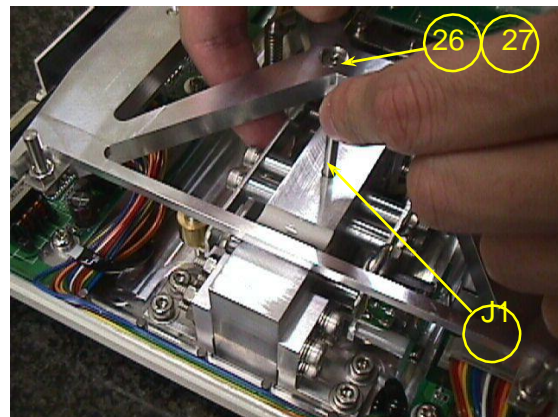


Fig.5

16 ASSEMBLY

- Fix the Assy,Pan support (4) loosely to the Unit assy (1) the two M4x10 hexagonal socket-head bolts (26) and Washer conical spring M4 (27)
- Set the pins of the Pan support positioning jig (J2) into the holes at the 4 corners of the Assy,Base (3). Align the pins of the Assy,Pan support (4) with the holes of the positioning jig to set its position and fix using the two M4x10 hexagonal socket-head bolts (26) and Washer conical spring M4 (27) (Fig.6).
- Pull the Lever fixing pin (J1) out of the lever fixing hole of the Unit assy (1).
Note: Insert the pin by lifting the Assy,Lever (U4) up slightly. Be very careful to prevent damage to the elastic support.
- Ensuring that the push-up pin of the Weight loader assy (10) fits into the groove of the Calibration weight, place the weight gently into the center of the Assy,Pan support (4).
- Connect the Cable,L105 connector (14) to the Assy,Display (B4), and put the Assy,Case (3) over the Assy,Base (2). Take care to ensure that the cable does not get caught in between.
- Turn the balance upside down and fix the Assy,Case (3) and Assy,Base (2) together using the four P4 M4X35 screws (24).
- Reset the balance the right way up and insert the 4 Caps,pan supporter (5) to the 4 pan support pins and place the Pan assembly (6) on top.
- Keep an eye on the level indicator and adjust the level of the balance using the 3 Level adjuster (B2). Connect the AC adaptor to the balance and check the operation of the balance.

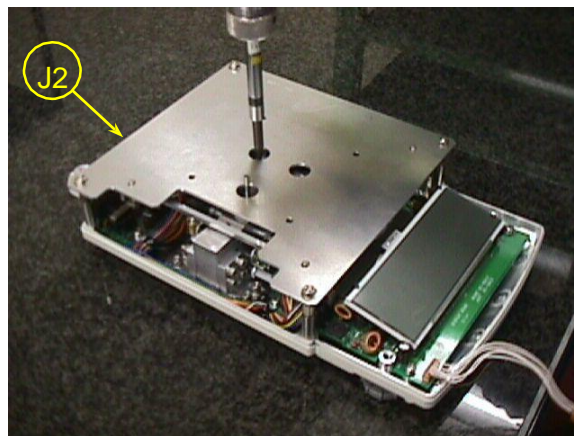


Fig.6

16.1 Replacement of Components

16.1.1 Replacing the Assy,Display (B4)

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Undo the CS-5 clip (15) which secures the Cable,45 (B7) and the Weight loader assy (10) cable, and pull out the connectors of the Weight loader assy (10) and Cable,45 (B7) at the Assy,Display (B4).
- Unscrew the three P4 M4x8 screws (B10) fixing the Assy,Display (B4) in place (Fig.7).
Note: Place the Assy,Display (B4) in a location free of dirt and static.
- Take the EEPROM located at the back of the Assy,Display (B4) out of its socket, taking care to ensure that its feet do not get damaged.
- Fit the EEPROM that has been removed in the new Assy,Display (B4).
- Fit the new Assy,Display (B4) by following steps 2) to 5) outlined above in reverse order.

16.2 Replacing the Assy,Analog (B3)

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Unscrew the three P4 M4x8 screws (B10) fixing the Assy,Display (B4) in place and undo the CS-5 clip (15) which secures the Cable,45 (B7) and the Weight loader assy (10) cable. Next, pull the connectors of the Weight loader assy (10) and Cable,45 (B7) out at the Assy,Display (B4).
Note: Place the Assy,Display (B4) in a location free of dirt and static.

16.3 DETACH THE ASSY,DISPLAY (B4) AND PLACE IT TO THE RIGHT OF THE BALANCE IN A LOCATION FREE OF DIRT AND STATIC.

- Disconnect the connector of Cable,65 (U27) at the Assy,Analog (B3).
- Disconnect the Assy,Relay (U9) connector from the Assy,Analog (B3).
- Loosen the two P4 M4x8 screws (B10) fixing the Shield case (B8) and remove the shield case.
- Loosen the P4 M4x8 screw (B10) and Spacers (B13,B14) fixing the Assy,Analog (B3) to detach it (Fig.8).
- Fit the new Assy,Analog (B3) by following the steps 2) to 7) outlined above in reverse order.

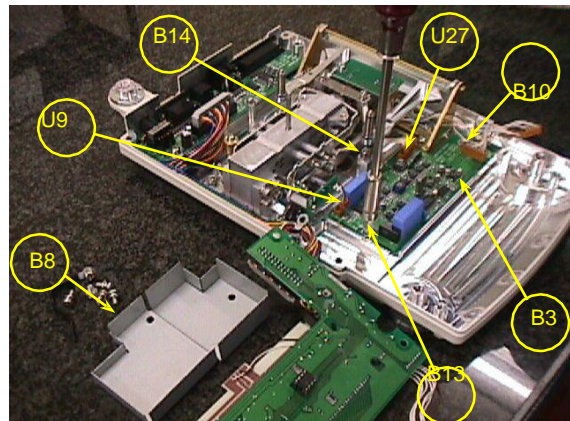
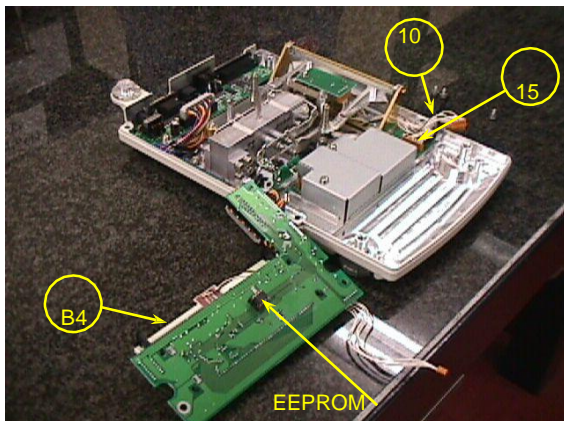


Fig.7

Fig.8

16.4 Replacing the Assy,I/F (B5)

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Undo the CS-5 clip (B15) securing Cable,flat26 (B6).
- Disconnect the Cable,flat26 (B6) connector from the Assy,I/F (B5).
- Unscrew the two P4 M4x8 screws (B10) fixing the Assy,I/F (B5). Loosen the four CDHWE101S00 screws (B9) securing the external key connector (15-pin connector) and the RS-232C (D-Sub25 pin connector) to detach the Assy,I/F (B5) (Fig.9).
- Fit the new Assy,I/F (B5) by following the steps 2) to 4) outlined above in reverse order.

16.5 Replacing the Switch board assy (C3)

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Disconnect the Cable,L105 connector (14) from the Switch board assy (C3).
- Loosen the five M3x6 screws (C7) and detach the Switch board assy (C3).
- Detach the Spacer for switch (C2) from the Switch board assy (C3) (Fig.10).
Note: The Spacer for switch (C2), made of resin, is thin in certain parts. Handle with care to avoid damaging it.
- Fit the new Switch board assy (C3) by following the steps 2) to 4) outlined above in reverse order.

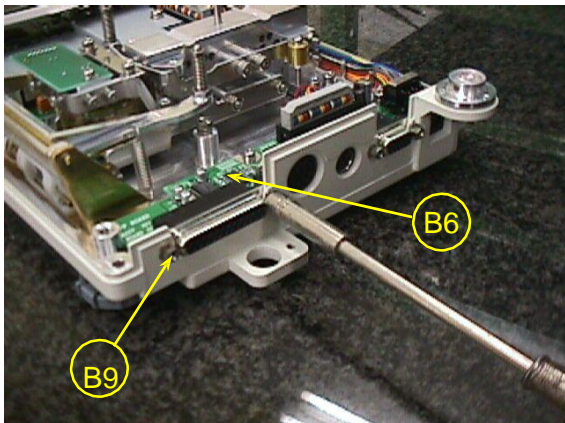


Fig.9

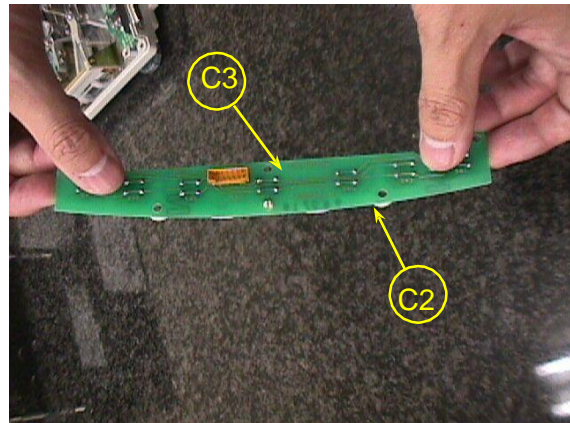


Fig.10

16.6 Replacing the Assy,Detector (U8)

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Disconnect the Cable,65 (U27) connector at the Assy,Analog (B3).
- Remove the two P3 M3x10 hexagonal socket-head bolts (U22) that fixes the Assy,Detector (U8) (Fig.11).
- Remove the soldering of the temperature sensor cable connected to the Assy,Detector (U8).
Note: TP1: Yellow wire, TP2: Blue wire
- Detach the Assy,Detector (U8).
Note: Be very careful when removing it to avoid damaging the elastic support by hitting the Assy,Lever (U4).
- Fit the new Assy,Detector (U8) by following the steps 2) to 5) outlined above in reverse order.
- Conduct “7.1 Adjustment of the Assy,Detector (U8) Height”.

16.7 Replacing the Weight loader assy (10) (UW series only)

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Undo the CS-5 clip (15) securing the Cable,45 (B7) and the Weight loader assy (10) and disconnect the Cable,45(B7) and Weight loader assy (10) connectors at the Assy,Display (B4).
- Loosen the four P4 M4x10 screws (23) fixing the Weight loader assy (10) in place to detach the Weight loader assy (10) (Fig.12).
- Fit the new Assy,Calibration weight loading (10) by following the steps 2) to 3) above in reverse order.
- Perform “6. Adjustment of the Pin Height of the Weight loader assy (10)”.

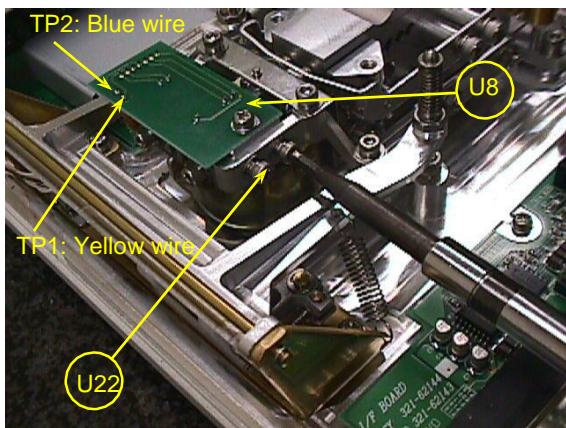


Fig.11

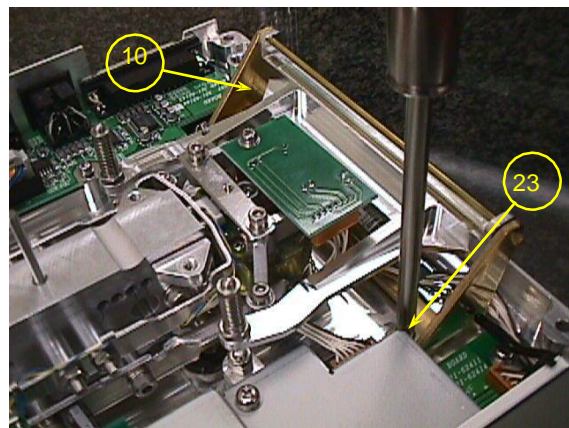


Fig.12

16.8 Replacing the Unit assy (1)

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Disconnect the Cable,65 (U27) connector at the Assy,Analog (B3).
- Disconnect the Assy,Relay (U9) connector from the Assy,Analog (B3).
- Loosen the P3 M4X14 hexagonal socket-head bolt (25) fixing the Unit assy (1) in place to detach the Unit assy (1) (Fig.13).
Warning: Never hold the Unit assy (1) in the parallel guide or/and movable column when lifting it up. Always hold it in the base part. (Refer to Fig.14.)
- Fit the new Unit assy (1) by following the steps 2) to 4) outlined above in reverse order.
Pt-Ni band protector that is attached to the replacement Unit assy (Fig.14) does not have to be removed.

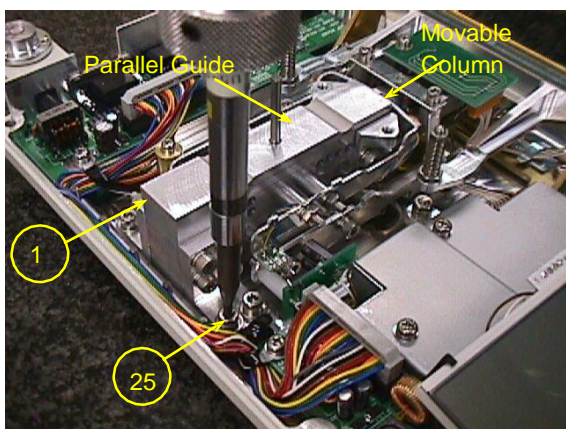


Fig.13

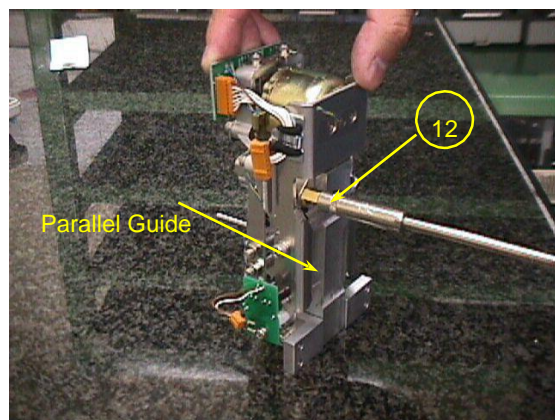


Fig.14

16.9 Input of temperature coefficient data

- Prepare the EEPROM data print out that is attached to the new Unit Assy for replacement.
- Copy the print-out data of addresses 00 to 0E into the same addresses of the existing EEPROM using “Edit” in the service menu.

16.10 Replacement of the level

- Detach the Assy,Case (3) in accordance with the steps outlined in “3. Inspection of the Balance Interior”.
- Place the balance on a level surface with the four feet including the fixed one at even lengths.
- Loosen the three set screws and remove the level from the mount by unscrewing it.
- Screw the level into the mount until it stops, then unscrew it about one turn.
- Screw down one of the three set screws of the level until it slightly tightens against the mount surface.
- Screw down the other two set screws and tighten them until the bubble of the level comes into the red circle.

17 Replacing the Force coil assy (L1)

17.1 Dismantling

- Detach the Unit assy (1) in accordance with the procedures outlined in steps 1) to 5) of “4.7 Replacing the Unit assy(1)”.
- Remove the soldering of the two PT-NI bands (U14) on the Assy,Lever (U4).
Note: Do not break or damage the PT-NI band.
- Loosen the P4 M3x25 screws (U16) and remove the Assy,Relay (U9) and Spacer (U15) (Fig.15).
- Loosen the P3 M3x10 hexagonal socket-head bolt (U22) fixing the Detector frame (U7) in place to remove it (Fig.16).
- Loosen the four M2.5x6 screws (U25) fixing the four Magnet lids in place (U13) and pull the Magnet lids (U13) out horizontally to detach it (Fig.16).

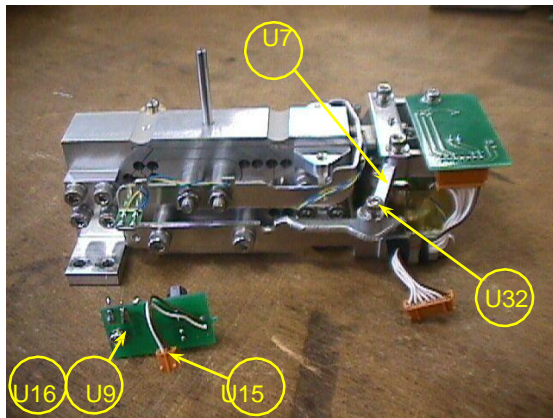


Fig.15

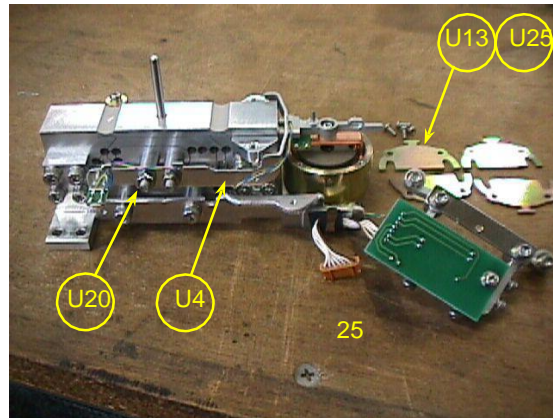


Fig.16

- Loosen the two M4x55 hexagonal socket-head bolts (U20) fixing the Assy,Lever (U4) in place to remove the Assy,Lever (U4) from the top of the unit.
- Remove the soldering of the Twisted wire (U7) connected to the Force coil assy (L1).
- Loosen the M2.5X6 screw (U25) and washer PB SPG M2.6 (U26) fixing the Force coil assy (L1) in place to detach it (Fig.17).

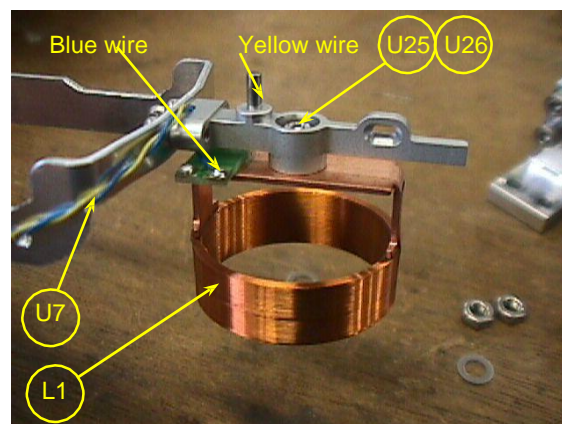


Fig.17

18 Assembly

- Fix the new Force coil assy (L1) loosely to the Assy,Lever (U4) using the M2.5x6 screw (U25) and washer PB SPG M2.6 (U26), and solder the Twisted wire (U7) onto the Force coil assy (L1).
Note: Left hand side of Force coil assy (L1): Yellow wire; Right hand side of Force coil assy (L1): Blue wire (Fig.17)
- Insert the Assy,Lever (U4) from the top of the unit and fix it loosely using the two M4X55 hexagonal socket-head bolts (20).
- Pass the Lever stopper (U12) and the Stopper plate (U11) of the Detector frame (U7) through the Assy,Lever (U4) and fix loosely using the P3 M3X12 hexagonal socket-head bolt (U32).
- Insert the Gap setting shim (J3) between the Assy,Lever (U4) and the Lever stopper (U12) to set the position of the Assy,Lever (U4), and fix the Assy,Lever (U4) using the two M4x55 hexagonal socket-head bolts (20) (Fig.18).
- Loosen the P3 M3X12 hexagonal socket-head bolt (U32) and detach the loosely fixed Detector frame (U7).
- Look in from the top of the Unit assy (1), and fix the Force coil assy (L1) into place where the center of the Force coil assy (L1) is aligned with the Assy,Magnet (U6) (Fig.19).

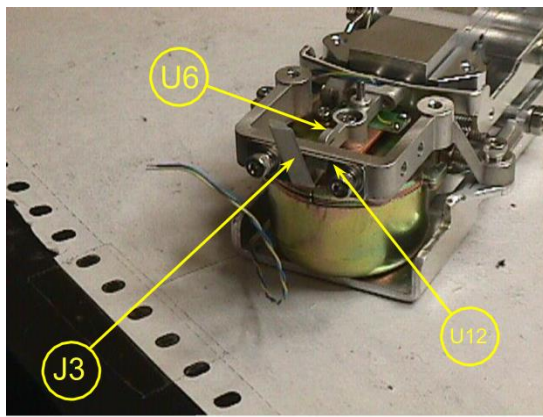


Fig.18

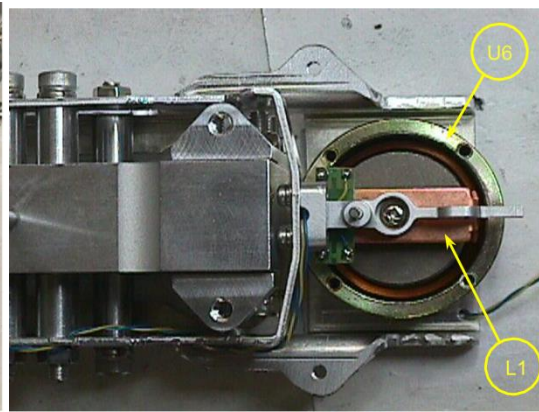


Fig.19

- Slide the four Magnet lids (U13) in horizontally and fix into place with the four M2.5x6 screws (U25).
- Pass the Lever stopper (U12) and the Stopper plate (U11) of the Detector frame (U7) through the Assy,Lever (U4) again and fix into place using the P3 M3X12 hexagonal socket-head bolt (U32).
- Fix the Assy,Relay (U9) and the Spacer (U15) to the Magnet frame (U5) using the P4 M3x25 screw (U16).
Note: The components turn with the screw so screw fix by holding the top right of the Assy,Relay (U9) with your hands.
- Solder the two PT-NI bands (U14) to the Assy,Lever (U4) (Fig.20).
Note: Solder them with the PT-NI band (U14) facing upwards at an angle to avoid touching the Assy,Lever (U4).
- Fix the Stopper plate (U11) when the centers of the stopper plate and the pin of the Assy,Lever (U4) is aligned together using the M3x6 hexagonal socket-head bolts (U31) Washer M3 (U30) (Fig.21).

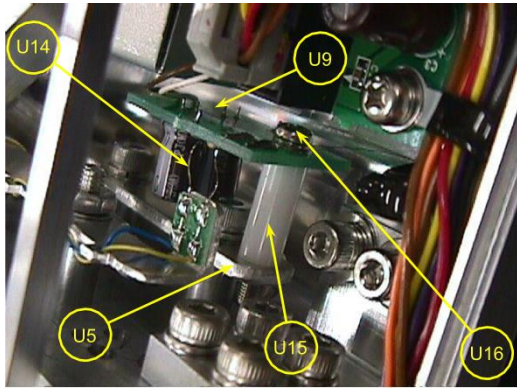


Fig.20

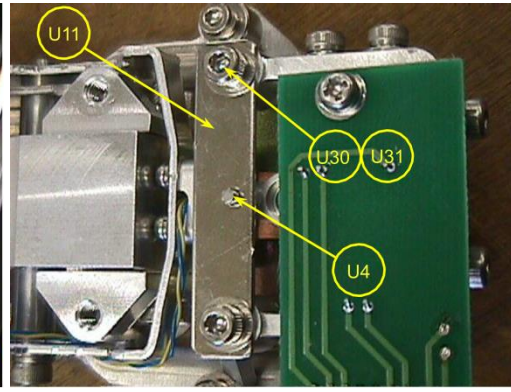


Fig.21

- Pull the Lever fixing pin (J1) out of the lever fixing hole of the Unit assy (1). And shake the Unit assy (1) gently. Assembly is complete if the Assy,Lever (U4) goes up and down and hits the Lever stopper,(U12) making a clear sound in the process.
Note: If a clear sound is not heard, either the Assy,Lever (U4) pin and the Stopper plate(U11), or the Force coil assy (L1) and the Assy,Magnet (U6), may be touching. In both cases, adjust the positions of the respective components in accordance with sections 6) and 11).
- Attach the Unit assy (1) by following steps 1) to 5) of “4.7 Replacing the Unit assy (1)” in reverse order.
- Fit Assy,Pan support (4) by following steps 1) to 3) of the 【 Assembly 】 procedure in “3. Inspection of the Balance Interior”.
- Perform “7.2 Adjustment of Tilt Errors”.

19 Dismantling/ Assembling the Weight loader assy (10)

19.1 Dismantling

- Detach the Weight loader assy (10) in accordance with steps 1) to 3) in “4.6 Replacing the Weight loader assy (10)”.
- Detach the pulling spring (W7) at the Lever calibration weight support (W1).
- Detach the Snap ring D2 (W9), pull out the Shaft (W12), and detach the Lever calibration weight support (W1) by pushing down the Hooking shaft (W6) hooked onto the Lever calibration weight support (W1)(Fig.22). At this point the Nut (W14) can be loosened to detach the Assy,Push-up stick(W28). In addition, the Pull screw for the lever (W5), the Washer,M2 (W20), the Compression spring (W24), the Washer,M2(Small) (W11), the Hooking shaft (W6) (bonded to the pull screw for the lever of the Detector lever (W3)) can be detached from the Lever calibration weight support (W1).
Note: The Assy,Push-up stick(W28) and Hooking shaft (W6) etc. must not be detached unless necessary.
- Unscrew the two M3x8 self-binding screws (W13) and the two M1.4 screws (W10) fixing the Assy, Photo interrupter (W25). Then, remove Plate, motor case (W34). Next, undo the clamp securing the mini-motor and Photo interrupter cables to detach the Assy,Photo interrupter(W25) and Bottom board (W22).
- Detach the Binding spring (W17) and the Fixed ring (W27) using tweezers and split the Drive case assy,cal wt (W15,W16) into two. Detach the mini-motor (with gear head), Nut,clamp (W18) and Screw,clamp (W19)(Fig.23).
Note: The mini-motor gear head and Screw,clamp (W19) are coated with Pure seal grease 2H(W26), whose viscosity barely changes with the temperature. Take care when handling these. When re-assembling, apply a slightly generous amount of the Pure seal grease 2H(W26) onto the gears and shaft bearing of the gear head and the thread of the Screw,clamp (W19) (do not use any other kind of grease).
- Remove the Snap ring D3 (W8) and detach the Detector lever (W3).
- Detach the Detector lever shaft (W4) from the Calibration weight loading stand (W2).

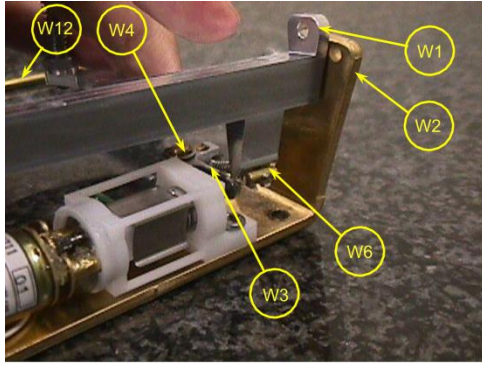


Fig.22

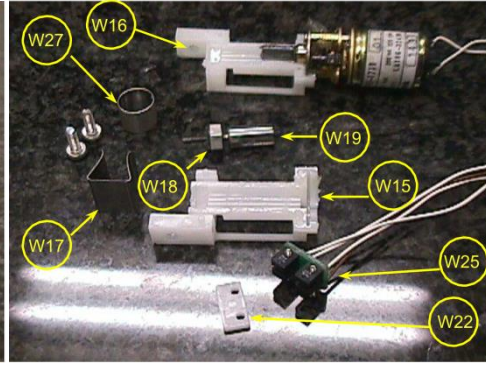


Fig.23

19.2 Assembly

- Replace the faulty component with a new one and screw fix it into place.
- Hook the Hooking shaft (W6) onto the Lever calibration weight support (W1), pass the Shaft (U12) through and insert the Snap ring D2 (W9).
- Fix the Assy, Push-up stick (W28) loosely to the Lever calibration weight support (W1) using the Nut (W14).
- Hook the Pulling spring (W7) onto the Lever calibration weight support (W1).
- Turn and adjust the Hooking shaft (W6) at the Lever calibration weight support (W1) so that the Lever calibration weight support (W1) becomes horizontal (Fig.24).
- Fit the Weight loader assy by following steps 1) to 3) of "4.6 Replacing the Weight loader assy (10)" in reverse order.
- 7) Fit the Assy, Pan support(4) in accordance with the procedures of "3. Inspection of the Balance Interior".

19.3 Adjustment of the pin height of the calibration weight loading

- Unlock the Transportation screws (B11) in accordance with the explanation label.
- Connect the Weight loader assy (10) connector to the Assy, display (B4).
- Connect the balance to the AC adaptor and turn on the power.
- Select "Ld_w" (built-in calibration weight raised) in the Service menu by following the procedures in "1. Operating Method for the Adjustment Service".
- While the calibration weight is raised, adjust the height of the Assy, Push-up stick (W28) so that its tip sticks out above the top of the Assy, Pan support (4) by the amount stated below, and lock it in place using the Nut (W14) (Fig.25).

Note : Adjustment height of the Assy, Push-up stick (W28)

Small pan= $5.2 \pm 0.3 \text{mm}$, Large pan= $5.7 \pm 0.3 \text{mm}$

In this adjustment, check the height by below jig.

Pan support height check jig (J10) and Height gauge (J11).

- Raise and lower the built-in calibration weight repeatedly from the Service menu to ensure that there are no problems.

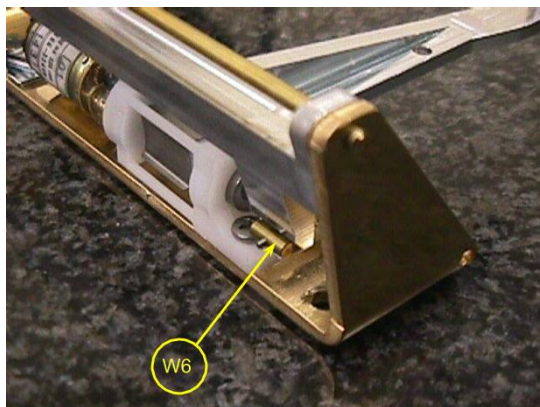


Fig.24

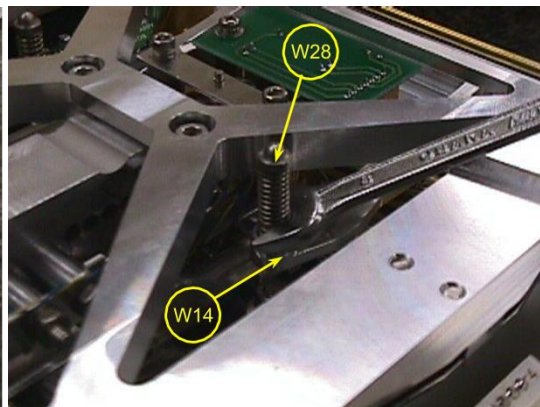


Fig.25

20 Balance Adjustment

20.1 Adjustment of the Assy,Detector (U8) Height

- Detach the Assy,Case (3) / Assy,Pan support (4) in accordance with “3. Inspection of the Balance Interior”.
- Disconnect the Assy,Relay (U9) connector from Assy,Analog (B3) and adjust the height of the Assy,Detector (U8).
- Connect the (+) terminal of the voltmeter to the TP1 pin of the Assy,Analog (B3) and the (-) terminal to the TPG pin.
- Connect the AC adaptor to the balance and turn on the power.
- Slightly loosen the two P3 M3x10 hexagonal socket-head bolts (U22) fixing the Assy,Detector (U8). Gently raise/ lower the lever of the Assy,Lever (U4) until it touches the Lever stopper (U12), and adjust the Assy,Detector (U8) to a height where the voltmeter display inverts (+) (-).(Fig.26).
Note : Adjustment target and guidance

The absolute values of Assy,Detector (U8) output : $3.5\pm 0.5V$ (both positive/negative sides)

First, balance the voltage by adjusting the height of Assy, Detector (U8).

(U8) movement	Voltage balance
Upwards	Positive side gains
Downwards	Negative side

Then, adjust gain (positive and negative sides at the same time) by rotating the adjuster with a plus screw driver through the center hole of the shield case of Assy, Analog (B3).

Adjuster rotation	Voltage
Clockwise	Gains
Anti-clockwise	decreases

- Once adjustment is complete, use the two P3 M3x10 hexagonal socket-head bolts (U22) to fix the Assy,Detector (U8).
- Remove the voltmeter terminals from the Assy,Analog (B3).
- Disconnect the AC adaptor of the balance and connect the Assy,Relay (U9) connector to the Assy,Analog (B3).

20.2 Adjustment of tilt errors

- Detach the Assy,Case (3) in accordance with “3. Inspection of the Balance Interior”.
- Adjust the level of the balance using the 3 Level adjusters (B2) while referring to the level indicator, and then connect the AC adaptor to the balance.
- Insert the Pan support cap (5) into the Assy,Pan support (4), and place the Pan assembly (6) on top.
- Load the following weights onto the Pan assembly (6) and press the \rightarrow 0/T \leftarrow key.

Model	Weight
UW / UX (Small pan)	250g
UW / UX (820H,1020H)	400g
UW /UX (Large pan)	4000g

- Insert a 1mm thick board under the two feet on the right hand side of the balance at the front and rear. Read off the display while the balance is grounded like this (the right hand side of the balance will be raised).
- Loosen the M3 nut (L9) of the Assy,Lever (U4) if it does not meet the specification.(See “Table 1 of 8.Performance Inspection”)
- If the display is (+), turn the P4 M3x25 screw (L12) of the Assy,Lever (U4) in a clockwise direction. If the display is (-), turn the P4 M3x25 screw (L12) of the Assy,Lever (U4) counterclockwise.
- Once adjustment is complete, lock the P4 M3x25 screw (L12) with the M3 nut (L9)(Fig.27).

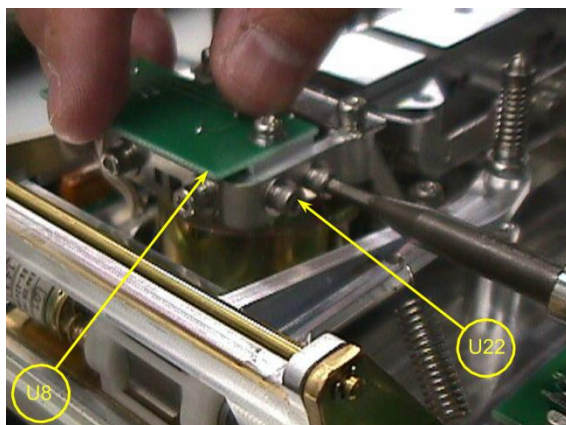


Fig.26

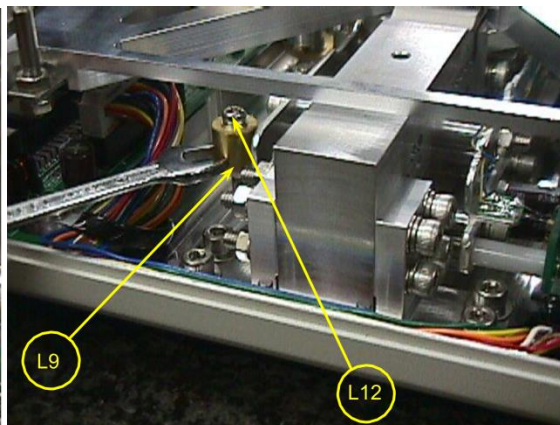


Fig.27

20.3 Adjustment of Corner Load

Warning: Perform corner load adjustment only when corner load error is within the below-listed amount. When corner load error is larger than this amount, replace Unit Assy (1).

Adjustable corner load error limit : models with small pan, $\pm 15\text{mg}$,
models with small pan, $\pm 30\text{mg}$, models with large pan, $\pm 150\text{mg}$,
models with large pan, $\pm 300\text{mg}$

- Dismount ASSY, CASE (3) following "3. Inspection of the Balance Interior.
- Adjust the level so that the bubble of level indicator comes in the red circle, and connect the balance to power.
- Insert CAP, PAN SUPPORTER (5) to PAN SUPPORTER ASSY(4) and Install PAN ASSY(6).
- Place the calibration weight (Refer to Corner error, Table 1, Chapter 8) and press [O/T] key to zero the display.
- Move the weight in the order of "□ L □ R □ F □ B □ Center(1)" (off-center positions are shown in Fig.28) and record the reading of each position.
- Grind slightly with the corner load adjustment tool (J4, J5) the parts of the flexures corresponding to the off-positions of the pan showing plus errors. Note: First adjust L-R direction as this direction is relatively less sensitive than the F-B direction. For L-R adjustment, grind the center of the flexure part. (Fig.29) For F-B adjustment, grind the parts of flexure just off the edge (Fig.29).
- Repeat steps 5) and 6) and when corner load errors are reduced, place the calibration weight at the "2", "3", "4" and "5" positions and further adjust until the adjustment criteria (Refer to Table 1, Chapter 8) is met.

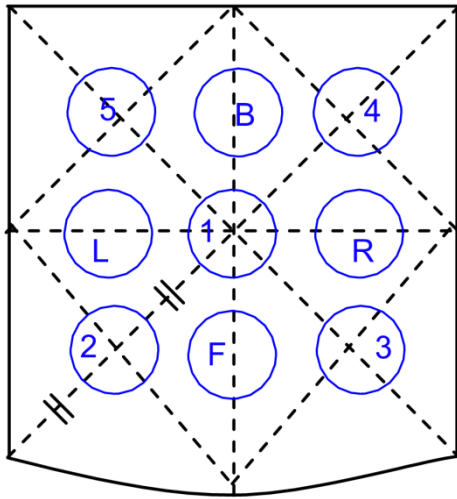


Fig.28

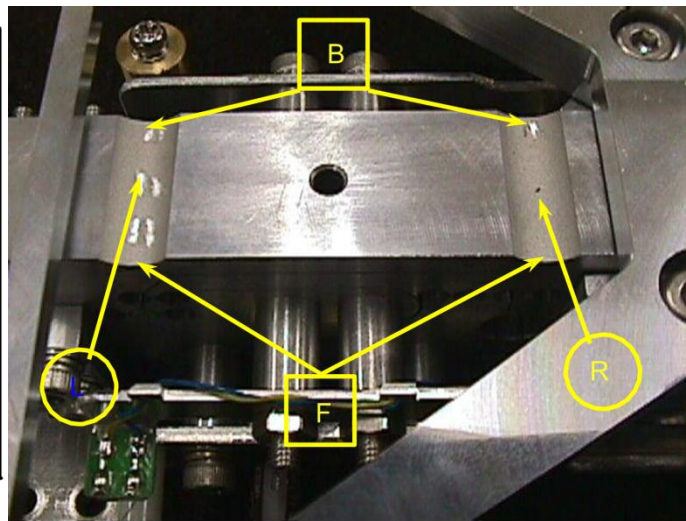


Fig.29

21 Performance Inspection

Performance inspections are to be conducted after at least 2 hours have passed since turning on the power and “g” display (back-light turn on), in a location where there is no air movement, vibrations, or sudden temperature changes.

Fit the supplied windbreak set onto models capable of minimum readings of 0.001g.

21.1 Repeatability

- A mass close to the half of weighing capacity (a calibration weight is desirable) is loaded and unloaded 5 times onto the center of the pan. The repeatability at zero and weighing capacity is calculated.

$$R_x = X_{\max} - X_{\min} \quad : X_1, X_2 \quad \dots X_5$$

$$R_y = Y_{\max} - Y_{\min} \quad : Y_1, Y_2 \quad \dots Y_5$$

21.2 Corner load error

- Prepare a weight as shown in “ table 1 ”.
- Load the weight in turn on center of the pan “1” and positions “2”, “3”, “4”, “5” located off center of the pan and finally center “1” as shown in Fig.30, and take readings.
- Operation is normal if the difference between the value obtained in the position away from the center and the value obtained in the center (the corner load error) is below the specification value.

Example : (Corner load error of “3” position) = (“3” value) - (average of “1” values)

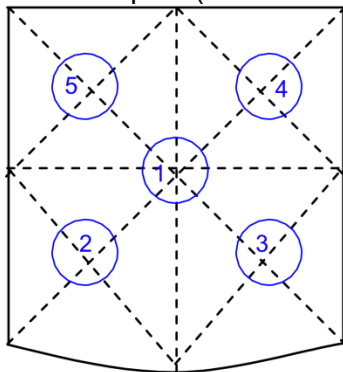


Fig. 30

21.3 Built-in weight calibration

- Calibrate the span using the built-in calibration weight.
- Load a calibration weight close to the weighing capacity and take a reading.
- Repeat steps 1) to 2) 2 times.
- Obtain the average error of the 2 measurements. (error) = (average of reading values) - (actual weight)
- Operation is normal if the error is less than the specification value.

- If the error is large, perform PCAL (calibration of the built-in weight). For information, refer to the section on calibration of the built-in weight in the instruction manual.

21.4 Linearity

- Select menu " E-CAL " and calibration the span using the calibration weight.
- Load the weight as shown in " table 1 " in turn and finally unload and take a reading.
- Obtain the average error of each measurement. (error) = (reading values) - (actual weight) - (average of unloaded reading values)
- Operation is normal if the error is less than the specification value.
- If the error is large, perform Writing in regular linear coefficients

21.5 Tilt error

- Load the weight as shown in " table 1 " and press the -->O/T<-- key.(□ A)
- Insert a 1mm thick board under the two feet on the front side of the balance and take a reading.(□ B) (error) = (B) - (A)
- If the error is large, perform Adjustment of tilt errors.

TYPE		PBJ 620-3NM	PBJ 4200-2NM	PBJ 6200-2NM	PBJ 8200-1NM
CAPACITY	[g]	620	4200	6200	8200
Readability	[mg]	1	10	10	100
Repeatability(Rx,Ry) weight	[mg]	2	20	20	200
	[g]	300	2000	3000	4000
Corner load error weight	[mg]	±5	±30	±50	±200
	[g]	200	1000	2000	2000
Linearity weight	[mg]	±2	±20	±20	±100
	[g]	100	1000	1000	2000
		200	2000	2000	4000
		400	3000	4000	6000
		600	4000	6000	8000
		620	4200	6200	8200
Built-in Calibration(*1) weight	[mg]	±5	±30	±50	±200
	[g]	600	4000	6000	8000
Tilt error weight	[mg]	±30	±300	±300	±3000
	[g]	250	4000	4000	4000

Table 1 Adjustment Specification

22 Component Replacement Precautions

The balance performance may change if the following components are replaced. Therefore, check the performance of the balance after replacement and make adjustments if necessary.

Service act Required adjustments and order	Service manual reference	Replacing Unit assy	Replacing Force coil assy	Replacing Assy, Display	Replacing Assy, Detector	Replacing Assy, Analog	Replacing Weight loader assy	Adjustment of Corner Load	Items to be prepared
		4.7	5	4.1	4.5	4.2	4.6	7.3	
1 Height adjustment of Assy, Detector	7.1		X		X				Digital multimeter (DC +/- 5.00V) Check wire set (321-
2 Adjustment of tilt errors	7.2		X						
3 Replacing EEPROM IC				X					
4 Inputting temperature coefficient into	4.8	X							EEPROM-ReWriter(When using a computer)
5 Adjustment of linearity	13	X	X		X	X		X	UX-TOOL (When using a computer) Standard weights
6 "CAL wt" in the service menu (for UW only)	1.2	X	X		X	X		X	
7 PCAL (for UW only)		X	X		X	X	X	X	Standard weights
8 i-CAL(UW) or E-CAL		X	X	X	X	X	X	X	(Standard weights)

23 Drawing

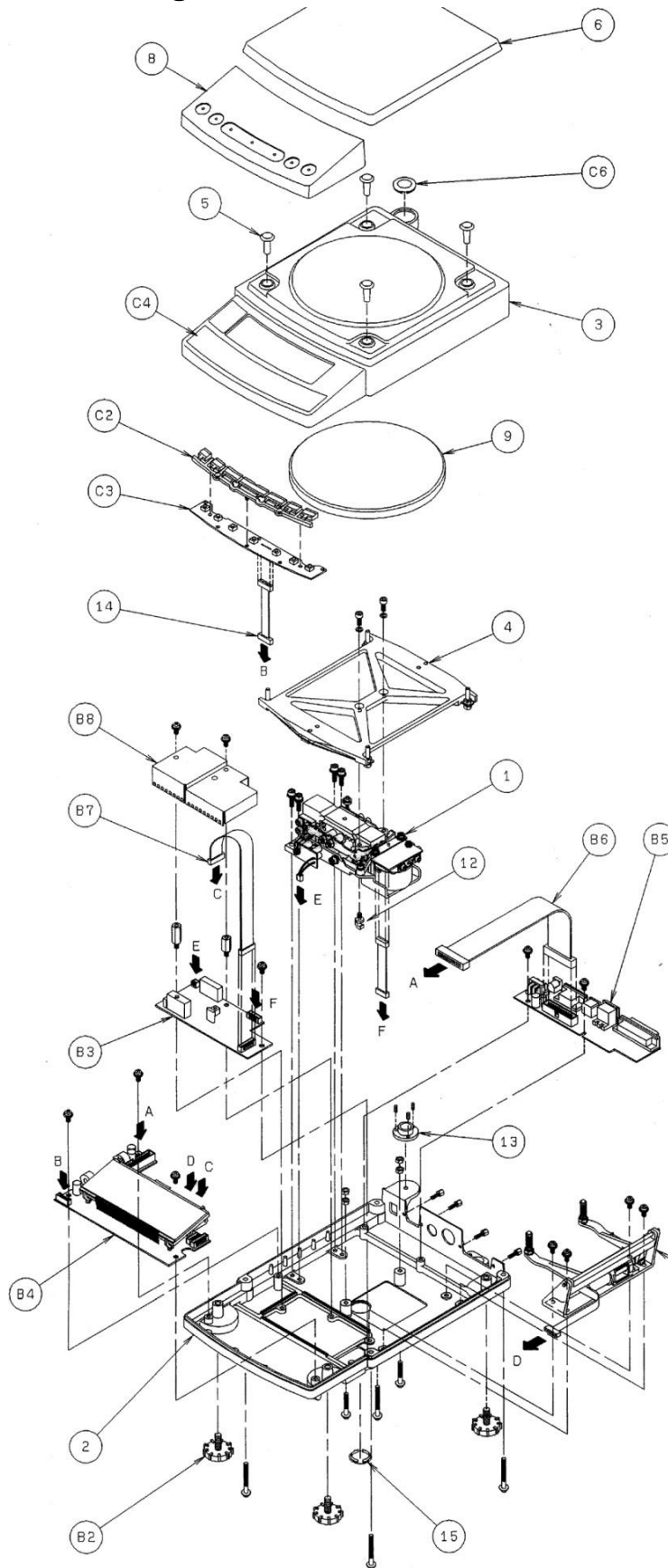
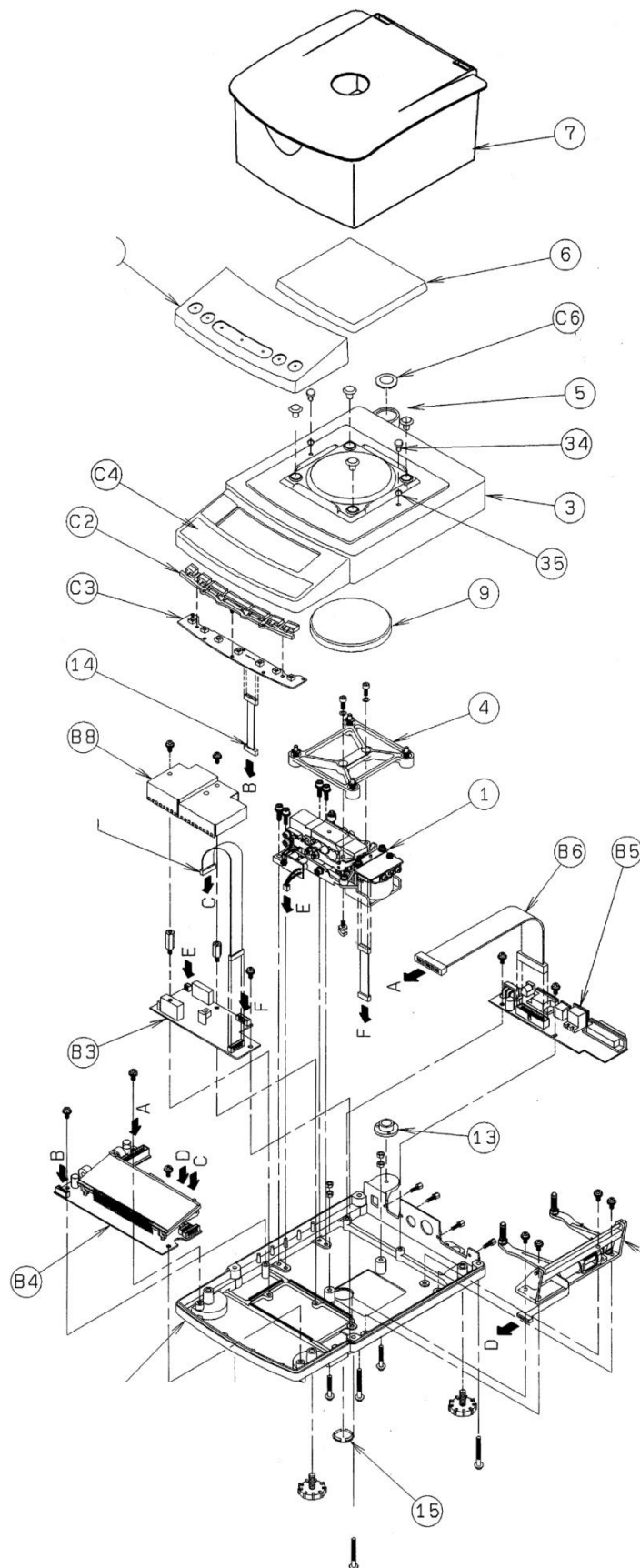


Fig.31



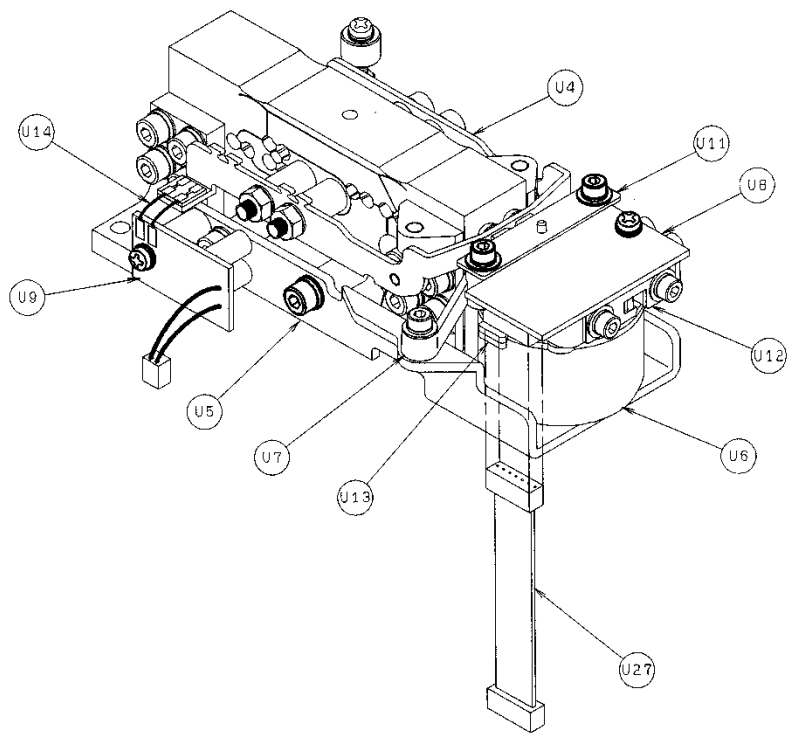


Fig.33

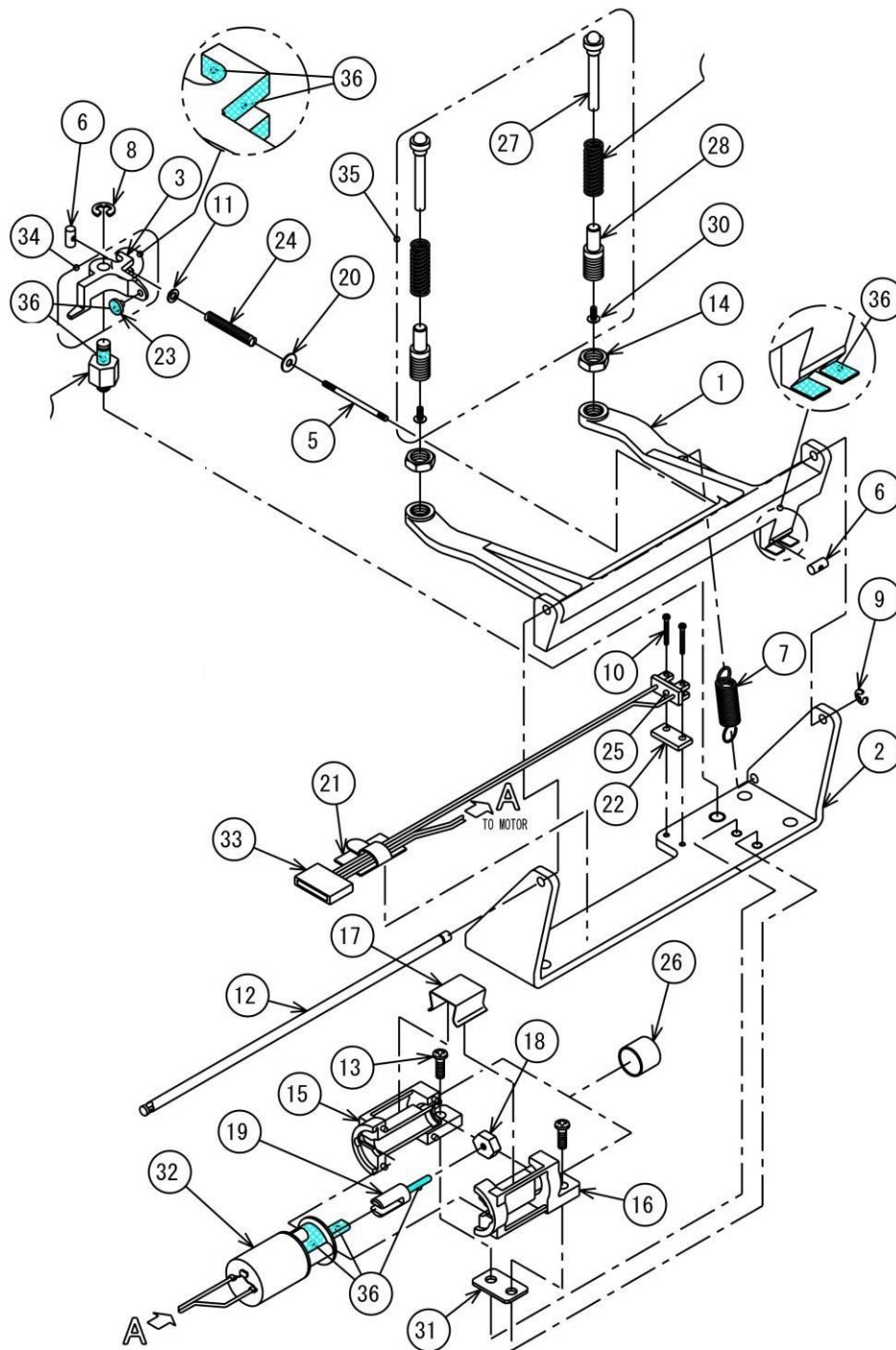


Fig.34

24 11. Trouble shooting

11.1 General trouble shooting

Symptom	Probable cause	Remedy
(a) Nothing appears in the display.	Correct power is not supplied.	Check the power supply and connect correctly.
	Wrong AC adapter or failure	Replace the AC adapter.
	Cable, Flat26 (B6) is disconnected.	Connect Cable, Flat (B6) correctly.
	Assy, Display (B4) is failed.	Replace Assy, Display (B4).
(b) Missing numbers, symbols in the display.	Assy, Display (B4) is failed.	Replace Assy, Display (B4).
(c) Keys do not operate	Cable, L105(14) is disconnected.	Connect Cable, L105(14) correctly.
	Switch board assy(C3) is failed.	Replace Switch board assy(C3).
	Assy, Display(B4) is failed.	Replace Assy, Display(B4).
(d) "oL" or "-oL" is displayed.	Pan assembly(6) and/or Cap, Pan supporter(5) are not installed.	Install Pan assembly(6) and Cap, Pan supporter(5) correctly.
	Protect cover assy(8) and Pan assembly(6) are in contact.	Install Protect cover assy(8) with double-sided tapes firmly when used.
	Pan assembly(6) is not installed correctly.	Install Pan assembly(6) correctly.
	Pan is loaded exceeding the weighing capacity.	Use the balance within its capacity.
	Cable, L65(U27) is disconnected.	Connect Cable, L65(U27) correctly.
	Pt-Ni band(U14) is twisted/bent/badly soldered.	Replace Pt-Ni band(U14) / Solder Pt-Ni band(U14) correctly.
	The hole of Stopper plate(U11) is contacting with the pin of Lever Assy.	Position and lock Stopper plate(U11) correctly without contacting with the lever pin.
	Stopper, Lever (U12) and/or Assy, Detector(U8) are not correctly positioned.	Position Stopper, Lever (U12) correctly and adjust the height of Assy, Detector(U8) correctly.
	Assy, Analog(B3) is failed.	Replace Assy, Analog(B3).
	Force coil assy(L1) wire break/ earth leak	Replace Force coil assy(L1).
	Force coil assy(L1) and Magnet assy(U6) are contacting directly or with dusts.	Remove dusts and position Force coil assy(L1) correctly.
	Unit assy(1) is damaged.	Replace Unit assy(1).
	(e) Large linearity error	Linearity adjustment was incorrect. Inputted calibration weight value was not correct in linearity adjustment.
Essentially poor repeatability is		Check repeatability and refer to (i) (Repeatability)
Essentially large drift is causing the symptoms.		Check drift and refer to (f) (Drift)
Essentially large corner load error is causing the symptoms.		Check corner load performance and refer to (h) (Corner load error)
Span calibration has not been		Perform span calibration.
Damaged EEPROM data.		Input the data with the Adjustment SW.
Unit assy(1) is damaged.		Replace Unit assy(1).
(f) Zero drift, sensitivity drift are large.	Warm up is insufficient.	Warm up the balance sufficiently.
	Direct sunlight, or air current from heater or cooler exist.	Change the balance installation site. Remove sunlight / air current.
	The installation site has been	Warm up sufficiently and perform span calibration.
	Temperature sensor is failed.	Replace temperature sensor.
	Damaged EEPROM data.	Input the data with the Adjustment SW.
	Unit assy(1) is damaged.	Replace Unit assy(1).

(g) Sensitivity is not correct.	Span calibration has not been	Perform span calibration.
	Warm up is insufficient.	Warm up sufficiently.
	Level adjustment has not been done.	Adjust level correctly.
	The installation site has been	Warm up sufficiently and perform span calibration.
(h) Large corner load error	(UW only) Dust or dirt is stuck to Weight(9) (built-in calibration weight).	Clean Weight(9).
	Unit assy(1) is damaged.	Perform corner load adjustment Otherwise replace Unit assy(1).
(i) Poor measurement repeatability / large display value fluctuation / The stability mark does not readily appear.	Effects of air current / vibration / movement of persons.	Change the balance installation site. Remove air current / vibration / movement of persons. Set High-stability mode.
	The sample or sample container is charged with static electricity.	Cover the sample with metal, such as foil.
	The sample or sample container is magnetically charged.	Demagnetize the sample and container.
	Essentially large corner load error is causing the symptoms.	Check corner load performance and refer to (h) (Corner load error)
	Essentially large drift is causing the symptoms.	Check drift and refer to (f) (Drift)
	Cable,L65(U27) is disconnected / damaged.	Connect Cable,L65(U27) correctly / Replace Cable,L65(U27).
	Pt-Ni band(U14) is twisted/bent/badly soldered.	Replace Pt-Ni band(U14) / Solder Pt-Ni band(U14) correctly.
	Temp sensor assy(M6) cable is badly soldered.	Solder Temp sensor assy(M6) cable correctly.
	The hole of Stopper plate(U11) is contacting with the pin of Lever Assy. Dusts exist between them.	Clean the hole of Stopper plate(U11) and lever pin and position and lock Stopper plate(U11) correctly.
	Stopper, Lever (U12) is contacting the lever end section. Dusts	Clean Stopper, lever () and the lever end section and adjust the height of Assy,Detector(U8).
	Force coil assy(L1)wire is broken/earth leak.	Replace Force coil assy(L1) .
	Assy,Detector(U8) is failed.	Replace Assy,Detector(U8).
	Assy,Analog(B3) is failed.	Replace Assy,Analog(B3).
	Force coil assy(L1) and Magnet assy(U6) are contacting directly or with dusts.	Remove dusts and position Force coil assy(L1) correctly.
	Damaged EEPROM data.	Input the data with the Adjustment S/W.
Unit assy(1) is damaged.	Replace Unit assy(1).	
(j) Display holds at "CHE 0" after plugging on.	Connector(s) is not properly	Insert connectors properly.
	Poor soldering of CPU (M201, M202)	Re-solder CPU.
	Poor wiring of temperature sensor	Re-solder temperature sensor cable.
	Leakage of temperature sensor	Replace temperature sensor.

24.1 Information for Inferring the Cause of Board Failure

(All of these balances use only a few boards and the varied functions work in tandem with each other. It is therefore difficult to determine the failed board from a single breakdown mode. An educated guess to determine the failed board can be made by understanding the functions performed by each board.)

24.2 1Assy,Display (B4)

- Function <controls every function>
Its main functions are: (1) To supply power to everything except the I/F board (logic 5V, analog $\pm 12V$, and LCD backlight power) (2) Display function (3) Clock function (4) Storage of balance constants (5) Man-machine key input (6) Weight loading control (7) RS232C communication control (8) Other external communication (printer, external input/output, extended communication) functions (9) Control to the Analog board.

Detailed Contents

- Supplying power: the Assy,Display (B4) logic power 5V. Power supplied to the Assy,Analog (B3) is $\pm 12V$. 16V/100mA power is supplied for the backlight.
- Display: Displays the weight values etc. on the basis of signals coming directly from the CPU. (3) Clock: The IC for the clock (driven by the backup battery) is directly controlled by the CPU.
- Memory: Stores the balance constants and the user's balance usage modes.
- Man-machine key input: A series of man-machine interfaces including power ON/OFF. For setting the balance environment status modes and setting the clock etc.
- Calibration weight loading control: Controls the position, working together with the calibration weight loading device. Also controls the drive torque.
- RS232C communications control: Controls communication with PCs as an external peripheral (via IC M105).
- The I/O port controls communication with external printers. It controls communication with external keys (e.g. AKB301) for key port, as well as having an external contact output function. Other multi-purpose communications ports are controlled directly by the CPU as extension ports.
- Controls the balance weight value A/D and the communication of temperature measurement A/D with respect to the Analog board and receives data.

24.3 Assy,Analog (B3)

- A) Function <mainly weight measurement>
- (PID control (mechanical control) (2) Load value A/D control (3) Temperature A/D control (4) Magnet temperature correction (span calibration) (5) Generation of reference voltage.
- Detailed Contents
- Mechanically controlled servo: Controls the static balance of the load and the electromagnetic force for measurement with respect to the weighing capacity measurement mechanism.
- (Load measurement A/D: Reads the electrical current of the coil generating the electromagnetic force for measurement to calculate the raw data value (wAd).
- Temperature measurement A/D: Calculates the A/D and value (tAd) which measures the temperature inside the magnet generating the electromagnetic force. Corrects the displayed load.
- Magnet temperature correction: Temperature correction of the magnetic flux density.
- Reference voltage generation: Used mainly as the reference voltage of the A/D converter (the voltage which determines the span etc. of the displayed load).

24.4 Voltages of each part (reference values)

1. J25 connector; reference electrode ((4), (6): 0V) (pin number in brackets ())
(3)-(4): 2 to 3V ((4); -pole)
(1)-(2): 0.9 to 1.3V ((2); -pole)
(5)-(6): 0V ((6); -pole)
(7)-(6): 0V ((6); -pole)

(If there is a J25 voltage fault, replace the Assy,Detector (U8).)

2. J24 Connector;
(1)-(2): -6V to 6V ((2); -pole)
3. J12 Connector;
(1)-(2): -12V ((2); -pole) (1)-(3): +12V ((3); -pole)
(4) to (9): 0 to 5V <Logic signal>
TP1-TP0:0V <Beam signal>

24.5 Assy,I/F (B5)

Function <link between the balance and external devices>

Detailed Contents

1. (Power supply port: Port for receiving DC 12V power (AC adaptor) from an external source.
2. (RS232C communication port: D-sub25 pole female connector. Cable connection port for communicating with external PCs etc.
3. Printer port: Mainly EP-80, EP-90.
4. External input/ output port: Input/ output dual-use port. The AKB-301 is usable during input mode. Can be used as the contact output for the comparator during output mode. Output is open collector TR.
5. Extended communication port: External communication port for future expansion options. At present the RDB-201/-202 can be connected.


24.6 Voltages of each part (reference values)


1. J11 Connector
(1)-(3): 12V ((3); -pole)/ <AC adaptor input voltage>
2. J2 Connector (15 pole D-sub); open
5) to (9)-(1): 5V ((1); -pole) (
2), (3)-(1): 0V
(10) to (13)-(1): 0V
3. J3 Connector (25 pole D-sub); open
(2), (20)-(7): 0 to 5V <RS232C_Logic signal>
4. J4 Connector (6 pole Min-Din); open
(5)-(3): 5V ((3); -pole)
(2)-(3): 0V ((3); -pole)
(1), (6)-(3): 0 to 5V <Logic signal>
5. J5 Connector (8 pole Din); open
(8)-(2): 5V ((2); -pole)
(7), (4)-(2): 5V
(6), (1)-(2): 0 to 5V <Logic signal>

24.7 Writing in Simple Linear Coefficients (temporary, rough adjustment of linearity)

This procedure readies the balance for measurement for the time being after devices have been reassembled etc.

- Display "SvC_CAL" in the Service menu.

- Press . The balance will enter a "B" state that allows the setting of provisional linear constants (Ld30000 will flash).

- Place a 30g weight for a small pan and 300g for a large pan and press  when the stability mark (➔) illuminates (Ld 0 flashes).

- Take the weight off the pan, and press  when the stability mark (➔) appears. With this, the setting of a simple linear coefficient is finished.

25 Adjustment of Linearity

Go into Service menu and set the balance so that wAd and tAd are usable.

After the balance has been turned on for a sufficient amount of time at a stable room temperature, repeat the loading/ unloading of the following weights.

The count data values are obtained by converting the absolute value of the weight used into the number of digits required.

The values of the weights to be prepared and the count data values are stated below.

For PBJ 620-3NM

	Value of Weight	Count Data Value
Weight 1	100g	00100000
Weight 2	200g	00200000
Weight 3	300g	00300000
Weight 4	400g	00400000
Weight 5	500g	00500000
Weight 6	620g	00620000

For PBJ 4200-2NM

	Value of Weight	Count Data Value
Weight 1	500g	00050000
Weight 2	1000g	00100000
Weight 3	2000g	00200000
Weight 4	3000g	00300000
Weight 5	4000g	00400000
Weight 6	4200g	00420000

For PBJ 6200-2NM

	Value of Weight	Count Data Value
Weight 1	1000g	00100000
Weight 2	2000g	00200000
Weight 3	3000g	00300000
Weight 4	4000g	00400000
Weight 5	5000g	00500000
Weight 6	6200g	00620000




For PBJ 8200-1NM



	Value of Weight	Count Data Value
Weight 1	1000g	00100000
Weight 2	2000g	00200000
Weight 3	4000g	00400000
Weight 4	6000g	00600000
Weight 5	7000g	00700000
Weight 6	8200g	00820000












- Record the data of the temperature data tAd (E.g: 00031627). (The Ad value is recorded as 8 digits. If the value does not amount to 8 digits, fill in the higher digits with "0".)
- Record in turn the wAd values of weights 1 to 6 corresponding to each weighing capacity (If the value does not amount to 8 digits, fill in the higher digits with "0").
- The data obtained in step (2) above (wAd, count data values) are written into storage registers 40 to 5B using Edit in the Service menu. 1 item of data requires 4 storage registers. The upper and lower digits of the count data values are stored in the first two storage registers, and the upper and lower digits of the wAd value of the actually measured "L*" are stored in the next two registers.

26 Editing EEPROM data

26.1 Using “Edit”

Edit is displayed through the Service menu mode (by repeatedly turning the  key , and the Edit mode is selected with the  key (the contents of the EEPROM will be displayed); at the same time, the storage register 10 will flash.

- Repeatedly turn the   to select 4 (flashes) : registers numbered in the 40s are selected.

- Press the  to go to the single digit : The “0” of “40” will flash.
- Press the  to select 1 (flashes) : Register 41 is selected.
- Press the  to provisionally set the data in register 41 : the contents of register 41 are displayed (the contents of the EEPROM will not be altered at this point).
- Manipulate the  and  keys to change the data flashing currently to the desired value. Press the  key after the change is established to save the data. At the same time, the storage register will move up one location, and the “4” of register “42” will flash. By pressing the  key at this point you will enter the register 42 data edit mode. To alter the register, repeat steps (1) (2) (3) above, select the register with step (4) and change the data with step (5). Repeat this as necessary.
- To renew the EEPROM (non-volatile memory) data, press the  key down for more than 3 seconds until “- - -” is displayed. “SET” will appear after this and the data will be renewed. To leave this section without renewing the data, press the  key. “Abort” will be displayed and the EEPROM data will not be renewed.
- How to initialize the EEPROM (performed only when “Err 00” or “Err 05” is shown)
 (From “Err 00” or “Err 05” display) Keep pressing the left end of  and  key simultaneously until “rESET” is displayed. The EEPROM is then initialized.