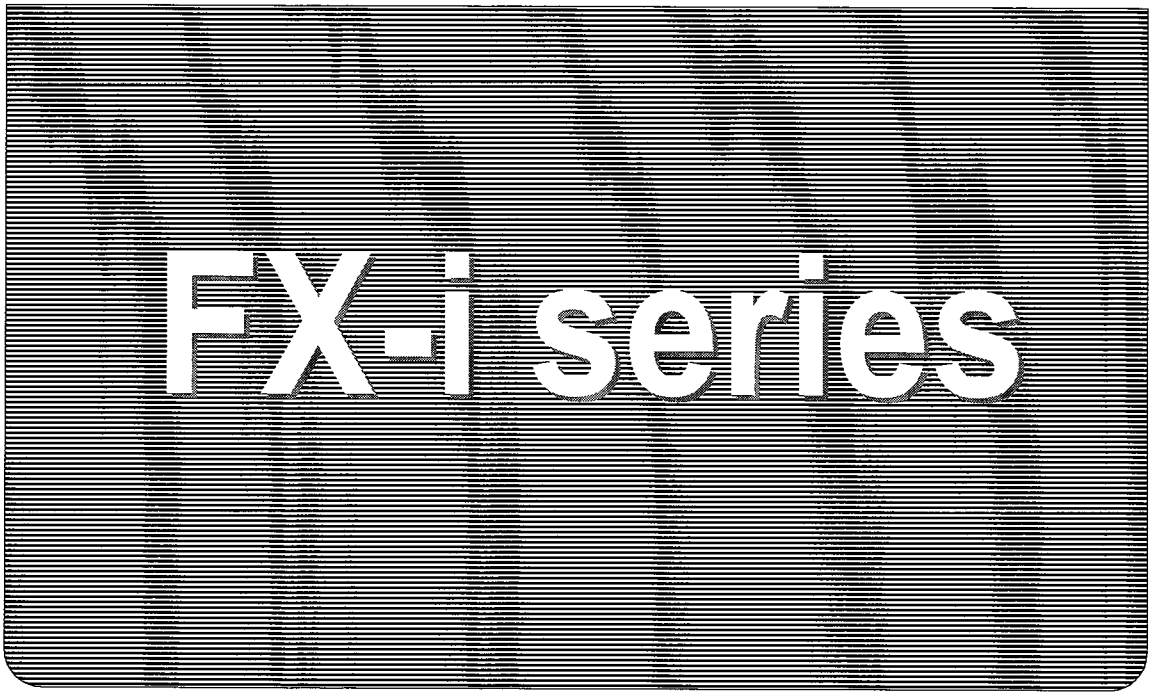


MAINTENANCE MANUAL

FX-i series

(FX-iWP/FX-CT·GD/FZ)

A&D Company, Limited

1WTPD4001679

This manual and Marks

All safety messages are identified by the following, "WARNING" or "CAUTION", of ANSI Z535.4 (American National Standard Institute: Product Safety Signs and Labels). The meanings are as follows:

⚠WARNING	A potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	A potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

⚠ This is a hazard alert mark.

- This manual is subject to change without notice at any time to improve the product.
- The contents of the product specifications and this manual are subject to change without any obligation on the part of the manufacturer.
- Under the copyright laws, the software (program) described in it are copyrighted, with all rights reserved.
  The software may be installed into one computer and may not be installed into other computers without the prior written consent of A&D Company. Copying includes translation into another language, reproduction, conversion, photocopy and offer or loan to another person.
- Microsoft, Windows, Word, Excel is a registered trademark of the Microsoft Corporation.

Contents

1. INTRODUCTION 2

1.1 EQUIPMENT AND TOOLS REQUIRED 2

2. PRINCIPLES OF OPERATION 4

2.1 CORRECTIVE MAINTENANCE OUTLINE 5

3. PERFORMANCE TEST 5

3.1 PERFORMANCE TEST PROCEDURE 5

3.2 TEST DETAILS 6

4. CORRECTIVE MAINTENANCE 8

4.1 TROUBLESHOOTING TABLE 8

4.2 MAINTENANCE FLOWCHART 13

5. FORCE MOTOR DISASSEMBLY AND REASSEMBLY 14

5.1 DISASSEMBLY 15

5.2 ASSEMBLY 19

5.3 CLEANING THE MAGNET ASSEMBLY AND BOBBIN 25

6. ADJUSTMENTS 26

6.1 ADJUSTMENT FLOW CHART 26

6.2 GENERAL PRECAUTIONS 27

6.3 CHECK MODE 28

6.4 CHECK MODE MENUS 29

6.5 INITIALIZATION 30

6.6 MODEL TYPE SELECTION (ONLY FOR MAINTENANCE ELECTRIC BOARD) 31

6.7 COARSE OPERATION CHECK & ADJUSTMENT 32

6.8 COARSE ADJUSTMENT 34

6.9 TEMPERATURE ADJUSTMENT 37

6.10 FINE ADJUSTMENT 38

6.11 PARAMETER SETTINGS 41

6.12 HALF-INITIALIZATION 42

6.13 METHOD OF IDENTIFYING DEFECT LOCATION (ELECTRICAL PART OR MECHANICAL PART) 43

Appendix : FX-i Technical Information

1. Introduction

For smooth maintenance, the products must be technically understood, and the required equipment and tools must be prepared. Since the FX-i series electronic balance is a precision instrument, proper operation cannot be guaranteed if the maintenance is performed under unsatisfactory conditions.

1.1 Equipment and Tools Required

Description	Purpose
(1) A phillips screwdriver 3 mm	For disassembling and reassembling
(2) A torx wrench (T20H)	For disassembling and reassembling
(T25H)	For corner load adjustment
(3) An adhesive tape 8 mm	For cleaning the force motor unit
(4) An allen wrench 4 mm	For securing the magnet support
(5) Round-nose chain pliers	For disassembling guide of the lever
A nipper	
(6)Level block	For assembling the force motor unit
(7) A square	For the tension flexure adjustment
(8) A soldering iron (25-40 W)	For soldering wires on force motor

(9) Masses

F1 class-compliant and cylindrical shape type.

Model	cylinder type Masses	cylindrical shape type Masses
FX-120i,120iWP,120GD	100gx1	50gx2
FX-200i,200iWP,200GD	100gx1, 200gx1	100gx2
FX-300i,300iWP,300GD	200gx1, 300gx1	100gx3
FX-1200i,1200iWP,1200GD	1kgx1	500gx2
FX-2000i,2000iWP,2000GD	1kgx1, 2kgx1	1kgx2
FX-3000i,3000iWP,3000GD	2kgx1, 3kgx1	1kgx3
FX-300CT	50gx1	20gx3
FX-600CT	100gx1	50gx2

(13) Multi-meter (Voltage measurement with 1mV resolution, Resistance measurement for insulation resistance of 20MΩ or more.)

(14) Oscilloscope

(15) AC adapter (Use the AC adapter supplied with the balance)

(16) The balance instruction manual

One set of jig for disassembling or reassembling the Mechanical unit (7PA:FX-i-JIG)

(1) A base jig (FXi-1/11)

(2) A spacer for positioning the beam (1) (FXi -2/11)

(3) A bolt for holding the beam (1) (FXi -3/11)

(4) A plate for positioning the beam (1)-1 (FXi -4/11)

(5) A plate for positioning the beam (1)-2 (FXi -5/11)

(6) A plate for positioning the frame-1 (FXi -6/11)

(7) A plate for positioning the frame-2 (FXi -7/11)

(8) A bolt for holding the frame (FXi -8/11)

(9) A jig for positioning the fulcrum flexure (FXi -9/11)

(10) A jig for positioning the force coil bobbin (FXi -10/11)

(11) A jig for assembling the beam (2) (FXi -11/11)

(12)Screws

Pan head screw M4x8 : 4 pieces

Temperature Controlled Room

A room where the temperature can be maintained at 10 ±2°C and 30 ±2°C for 4 hours or more.

2. Principles of operation

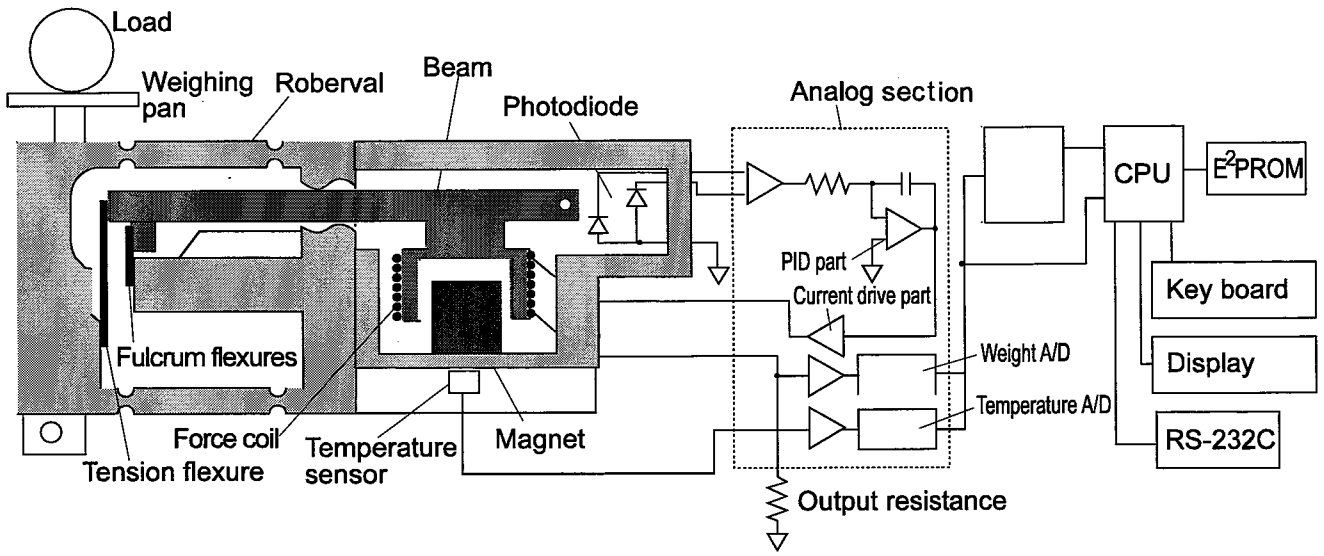
The FX-i balances work on the principle of "Force Restoration". Any change in the load on the weighing pan causes a Position Beam Lever to pivot on two Fulcrum Flexures (refer to diagram below). Attached to this beam is a bobbin (wound with fine wire), called the "Force Coil", which floats in a permanent magnet, called the "Force Motor". At the end of the Position Beam Lever there is a small hole which allows light from a Light-Emitting Diode (LED) to pass through to two Photodiodes (light measuring diodes) as it moves up or down. At zero weight, the light detected by the upper Photodiode is equal to that detected by the lower Photodiode. These three diodes make up the Position Detector.

When the Force Coil is pulled up by the leverage exerted from a mass on the weighing pan, the Position Detector detects a change in the position of the Force Coil as the light reaching the upper Photodiode will be greater than that reaching the lower one. The balance then feeds the force coil with more voltage to pull it back until the light measured by the two Photodiodes is equal again. This is accomplished by the Analog section receiving photocurrent from the Photodiodes, converting it to voltage, and boosting it back to the Force Coil. As the voltage increases, so does the magnetic power, pulling the Force Coil back until the Position Detector reads equilibrium.

The current flowing through the Force Coil generates a voltage proportional to the load weight on the pan. This is read back through the Analog section, first being filtered - then the Analog-Digital (A/D) Converter digitalizes this measuring voltage, the resulting value is counted and then fed to the microprocessor (CPU).

Temperature affects the magnet and weight data. So temperature coefficient for weight is measured and saved beforehand. The balance eliminates the temperature effect by using the present temperature measured by the temperature sensor and the coefficient. The output from the temperature sensor is converted digitally and sent to the CPU by the analog module.

The CPU performs a mathematical operations in connection with each parameters, such as temperature, linearity coefficient, and calibration data. Also, the user can specify how the calculated information should be displayed by using the keyboard. For example: s/he can have the CPU perform special functions such as conversion into other measuring units, or counting of small parts. Finally, the results are displayed on the Fluorescent Display, or sent through the RS-232C interface.



2.1 Corrective Maintenance Outline

Performance test	To perform the corrective maintenance, defects must be located and their cause determined. The easiest way to locate a defect is to perform an operation check.
Corrective maintenance procedure	Corrective maintenance is described by using a flowchart and a trouble-shooting table.
Adjustment details	An adjustment procedure is described for each item.

3. Performance Test

The following test procedures determine whether the balance (FX-i series) works properly. The internal temperature of the balance must be approached to the room (the air) temperature enough, allow half an hour warm-up prior to conducting the performance test.

3.1 Performance Test Procedure

Verify the following points:

External view

1.Adjust the leveling feet to level the balance. Confirm it using the bubble spirit level.
2.The weighing pan should be level. (Check for the correct pan assembly.)
3.Use the breeze break for FX 120i / 200i / 300i

Functions

1.Verify that each key functions correctly:
ON/OFF key
CAL key
MODE key
SAMPLE key
PRINT key
RE-ZERO key

2.Verify that the followings operate correctly:
The minus indicator
The decimal point indicator
A stable weighing data can be obtained
External key inputs function in the RS-232C connector
The RS-232C communication function

Selection of the weighing units
Identifies each of three TLs.

e.g. when "264.555 TL" is displayed,

k =g display / TL display = 10000.0 / 264.555 = 37.799

3.Verify that the TAEL values are within tolerance :

		Weight	Tolerance
Hong Kong (jewelry)	TN	1 TAEL = 37.4290 g	37.428-37.430 g
Hong Kong (general) Singapore	TG	1 TAEL = 37.7994 g	37.798-37.800 g
Taiwan	TT	1 TAEL = 37.5000 g	37.499-37.501 g

3.2 Test Details

External mass calibration

After external mass calibration by pressing CAL key, place the specified mass on the pan and read the displayed value. Verify that the difference between the maximum value and the minimum value is within the specifications.

Model	Masses	Specifications
FX-120i,120iWP,120GD	100g	±0.002g
FX-200i/300i,200i/300i WP,200/300GD	200g	
FX-1200i,1200iWP,1200GD	1kg	±0.02g
FX-2000i/3000i, 2000i/3000i WP,2000/3000GD	2kg	
FX-300CT	50g	±0.002ct
FX-600CT	100g	

Repeatability

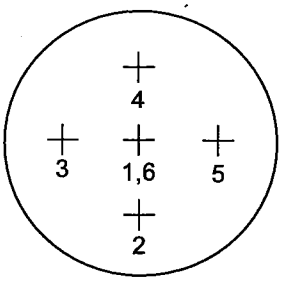
Place the specified mass at the center of the pan and remove. Record the displayed values with and without load. Repeat the test ten times (one set). Get 10 span data with subtracting the displayed value when no load is applied from the displayed value when load is applied. Obtain the standard deviation from the 10 data and verify that it is within the specifications. If not, perform another two sets of test and obtain the standard deviation for each set. Verify that the two standard deviations are within the specifications.

Model	Masses	Specifications
FX-120i,120iWP,120GD	100g	0.001g(standard deviation)
FX-200i,200iWP,200GD	200g	
FX-300i,300iWP,300GD	300g	
FX-1200i,1200iWP,1200GD	1kg	0.01g(standard deviation)
FX-2000i,2000iWP,2000GD	2kg	
FX-3000i,3000iWP,3000GD	3kg	
FX-300CT	50g	0.001ct(standard deviation)
FX-600CT	100g	

Corner load error

Place the specified mass at the center of the pan (1) and record the displayed value. Then place the mass, at positions 2, 3, 4, 5 then 6. Verify that the difference between the values at the center and at each position (the cross marks 2, 3, 4, and 5 are half the distance from the center of the pan to the corner edge) is within the specifications.

Model	Masses	Specifications
FX-120i/200i,120/200GD	100g	±0.003g
FX-300i,300GD	200g	±0.003g
FX-1200i/2000i,1200/2000GD	1kg	±0.03g
FX-3000i,3000GD	2kg	±0.03g
FX-120iWP/200iWP	100g	±0.010g
FX-300iWP	200g	±0.010g
FX-1200iWP/2000i WP	1kg	±0.10g
FX-3000iWP	2kg	±0.10g
FX-300CT	50g	±0.003ct
FX-600CT	50g	±0.003ct



Weighing pan

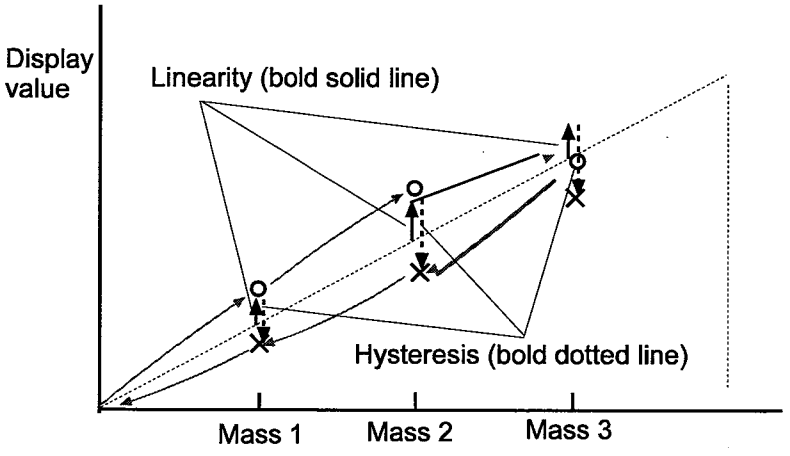
Linearity / Hysteresis

After calibration by using an external weight of almost weighing capacity, place the specified mass one by one on the pan, and check the difference between true value and display value (linearity). After reaching weighing capacity, remove the mass one by one, and check the difference between an increase and decrease (hysteresis).

Model	Masses	Linearity	Hysteresis
FX-120i,120GD	50g×2	±0.002g	±0.002g
FX-200i,200GD	100g×2	±0.002g	±0.002g
FX-300i,300GD	100g×3	±0.002g	±0.002g
FX-1200i,1200GD	500g×2	±0.02g	±0.03g
FX-2000i,2000GD	1kg×2	±0.02g	±0.03g
FX-3000i,3000GD	1kg×3	±0.02g	±0.03g
FX-300CT	20g×3	±0.002ct	±0.003ct
FX-600CT	50g×2	±0.002ct	±0.003ct

Model	Masses	Linearity	Hysteresis
120iWP	50g×2	±0.002g	±0.010g
FX200iWP	100g×2	±0.002g	±0.010g
FX300iWP	100g×3	±0.002g	±0.010g
FX1200iWP	500g×2	±0.02g	±0.10g
FX-2000iWP	1kg×2	±0.02g	±0.10g
FX-3000iWP	1kg×3	±0.02g	±0.10g

Linearity / Hysteresis



4. Corrective Maintenance

Perform corrective maintenance for the FX-i series by referring to the maintenance flowchart and the troubleshooting table. The troubleshooting table describes the possible cause and solution to facilitate corrective maintenance.

Perform corrective maintenance according to the error (the letters refer to nodes on the maintenance flow chart):

Type A: Replacing, disassembling, or assembling the force motor unit
Type B: Replacing or adjusting electrical parts
Type C: Initializing a electric board and inputting specific data
Type D: Adjusting the characteristics of the force motor unit
Type E: Inputting temperature data
Type F: Performance test
Type G: Performing drift check

4.1 Troubleshooting Table

The following troubleshooting table describes the possible cause of, and the solution to problems.

Problem	Cause	Check	Solution	Type
No display, beam is not balanced	AC adapter	Is it the correct AC adapter for the power source used.	Replace with the correct AC adapter.	F
		Is the output voltage correct? Measure the output voltage of the AC adapter with it connected to the balance. The DC output should be at least 14 volts, but no greater than 22 volts.	If the output voltage is not correct, replace the AC adapter.	F
	Power supplies of main board and display board	Is the output of the each power supplies correct? (Refer to Table-1 of page 12) Check the Vdd, Vg, Vcc, Vf+, Vvfd, Vf-.	Check (replace) the main board or display board with substitute items.	H
			Check (replace) a defective power supply part with a substitute item.	F
	Force motor	Check that the connectors are installed correctly. (J10,)	Replace the force motor with a substitute item. (Refer to "5. Force Motor Disassembly and Reassembly")	A
	Main board assembly	Check the performance using the standard main board that works properly.	Replace the main board assembly with a substitute item.	H
	Analog board assembly	Check the performance using the standard analog board that works properly.	Replace the analog board assembly with a substitute item.	E

Problem	Cause	Check	Solution	Type
Unstable weighing data, repeatability error	Force motor, Analog board assembly	Check the operation of weight / temperature offset A/D. (Refer to "6-13 Method of identifying defect location")	Replace the analog board assembly	E
		Then if it is OK, the cause will be the force motor.	Check the force motor	A
	Pan assembly	Check that the pan assembly is correctly installed	Install the pan assembly correctly.	F
		Check for foreign matter between the pan and dust plate.	Clean the area around the pan assembly and the dust plate.	F
		Check that the dust plate does not touch the pan assembly.	Install the dust plate correctly so that it does not touch the pan.	F
	Damage in flexures	Check the condition of tension and fulcrum flexures and lever.	Replace the parts and reassemble the force motor.	A
	Magnet assembly	Check for dust particles between the magnet and the force coil.	Clean the force motor assembly. (Refer to "5. Force Motor Disassembly and Reassembly")	A
	Force motor assembly	Check that the flexures are in good conditions and are correctly installed.	Repair the force motor assembly. (Refer to "5. Force Motor Disassembly and Reassembly")	A
Corner load error	Force motor assembly	Check that the flexures are in good conditions and are correctly installed.	Perform corner load adjustment. If it does not work well, disassemble and reassemble the balance. (Refer to "5. Force Motor Disassembly and Reassembly")	A
Hysteresis error	Tension or Fulcrum flexures	Check the condition of tension and fulcrum flexures for distortion.	Replace with substitute items. disassemble and reassemble the balance. (Refer to "5. Force Motor Disassembly and Reassembly")	A
Linearity error	Force motor assembly	Follow the linearity check procedure.	Input the linearity data. Refer to page 38.	F

Problem	Location	Check	Solution	Type
Error 0 Temperature data error	Temperature sensor, Analog board assembly, Cables, connectors	Check the operation of weight / temperature offset A/D. (Refer to "6-13, 2 Method of identifying in the internal offset mode")	In the T1 display of check mode menu, check the absolute value and dispersion (Refer to 6-7). If it is NG further, replace and reassemble temperature sensor.	B
		Then if it is NG, the cause will be the analog board assembly.	Replace the analog board.	E
Error 1 Unstable weighing data	Force motor, Analog board assembly	Check the operation of weight / temperature offset A/D. (Refer to "6-13 Method of identifying defect location") If it is OK, the cause is the force motor.	Check the force motor.	A
		Then if it is NG, the cause will be the analog board assembly.	Replace the analog board assembly.	E
	Pan assembly	Check that the pan assembly is correctly installed.	Install the pan assembly correctly.	F
		Check for foreign matter between the pan and dust plate.	Clean the area around the pan assembly and the dust plate.	F
		Check that the dust plate does not touch the pan assembly.	Install the dust plate correctly so that it does not touch the pan.	F
	Damaged flexures	Check the condition of tension and fulcrum flexures and lever.	Replace the parts and reassemble the force motor unit.	A
	Magnet assembly	Check for dust particles between the magnet and the force coil.	Clean the force motor assembly. (Refer to "5. Force Motor Disassembly and Reassembly")	A
	Weighing error relating to calibration	Check if Error 1 appears due to underloading (-E) during automatic zero adjustment after the balance is turned on.	Calibrate.	F
Error 3 Defective EEPROM	Defective EEPROM on the Main board	Bad connection between CPU (U1) and EEROM (U9) Check the soldering around each IC.	Re-solder	F
			Replace the CPU (U1)	F
			Replace the EEPROM (U9)	H
			Note After replacing the CPU or EEPROM, Error 8, Error 9 or Error A may be displayed. To correct the error, see the solution for each error described in this table.	—
Error 4 RAM error in CPU	Defective CPU on the Main board	Defective RAM in CPU.	Replace the CPU (U1).	F

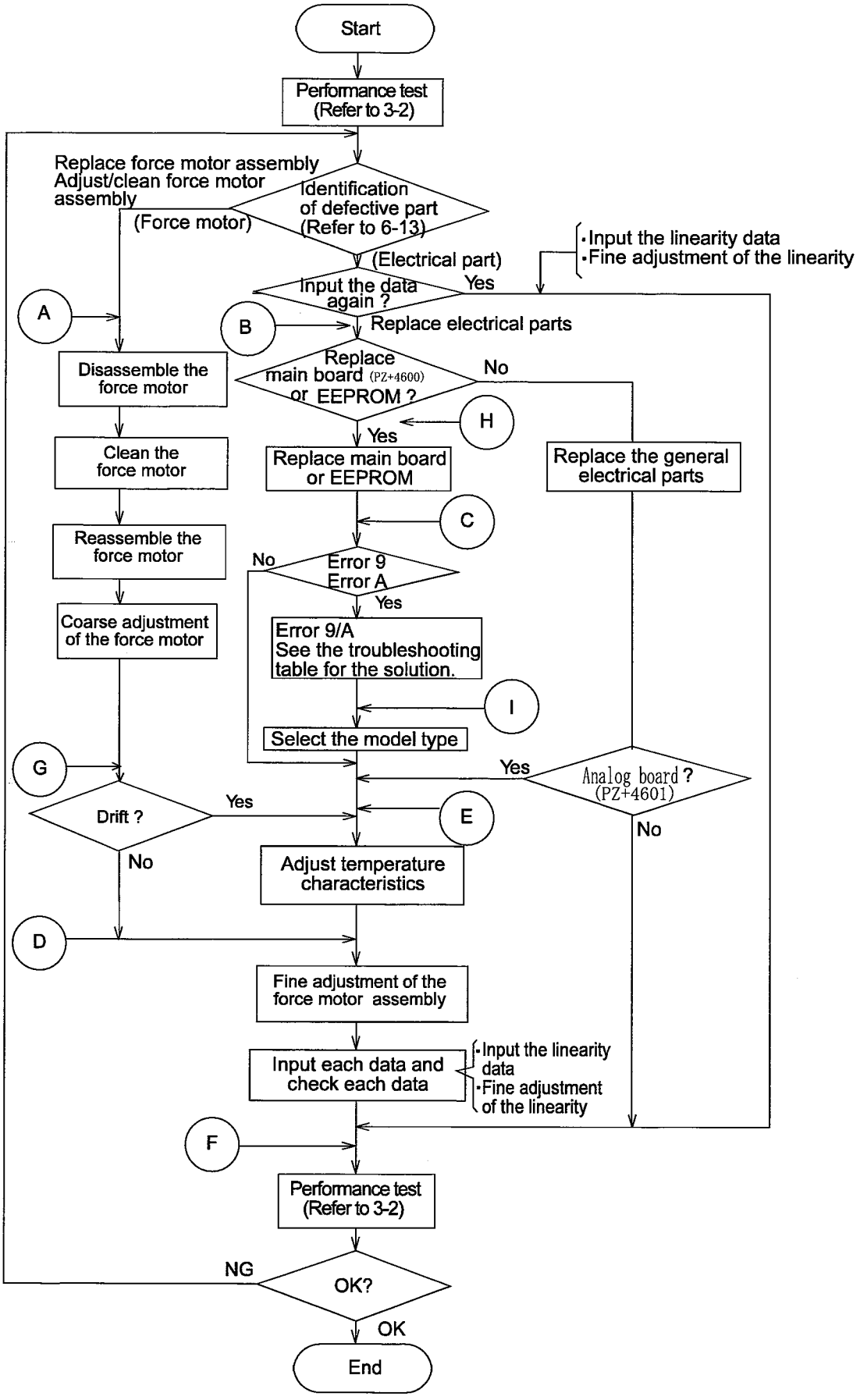
Problem	Cause	Check	Solution	Type
Error 8 EEPROM error	CPU (U1) and EEPROM (U9) on the main board	The EEPROM version is not correct for the newer CPU version.	Press the PRINT key to change the EEPROM version.	F
Error 9 EEPROM format error	CPU (U1) and EEPROM (U9) on the main board	EEPROM has not been initialized.	While holding down the RE-ZERO and MODE keys, press the PRINT key to initialize the EEPROM.	C
Error A EEPROM version error	CPU (U1) and EEPROM (U9) on the main board	The EEPROM version is not correct for the older CPU version.	While holding down the RE-ZERO and MODE keys, press the PRINT key to initialize the EEPROM.	C
CAL E -CAL E Calibration range error	The mass exceeds the calibration range	Check that the correct mass is used for calibration.	Use the correct mass.	F
	Analog board assembly, coil, zero or span	Check the D0 value.	If the D0 value is not within the specifications, replace parts and reassemble. (When the D0 value is correct, perform calibration in check mode)	A
Error C (internal communication error)	CPU (U1) and on the main board , AD board(7PZ4601) and cable(1KO2859)	Check the connection to the cable(1KO2859).	Connect correctly.	F

Problem	Cause	Check	Solution	Type
-E Overload	Weighing error relating to calibration	Check the D0 value	When the D0 value is correct, perform calibration in check mode, then perform calibration in the weighing mode	F
	Damage in flexures	Check the D0 value	If the D0 value is not within the specifications, replace flexures and reassemble	A
-E Underload	Weighing pan	Check if the correct pan is used and that the pan is installed correctly	Use the correct pan and install it correctly	F
	Weighing error relating to calibration	Check the D0 value	When the D0 value is correct, perform calibration in check mode, then perform calibration in the weighing mode	F
	Damage in flexures	Check the D0 value	If the D0 value is not within the specifications, replace flexures and reassemble	A

Table-1 Specifications of each power-supply voltages on the main board and display board

Circuit symbol	Specifications		Check point (Check pad)	Voltage generation element
V_{dd}	3.1V – 3.5V		V_{dd} - LG	U13
V_g	4.7V – 5.3V		V_{gc} - LG	U3, U4
V_{cc}	PC4600A	8.6V – 9.4V	V_{cc} - LG	U3
	PC4600B~	9.6V – 10.4V		
V_{f+}	3.0V – 3.5V		V_{f+} - LG	U2
V_{f-}	0.2V – 0.5V		V_{f--} - LG	U2
V_{vfd}	23V – 25V		V_{vfd} - LG	U11

4.2 Maintenance Flowchart



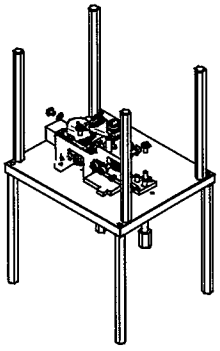
1. Force Motor Disassembly and Reassembly

This chapter describes the procedures and notes for the flexure assembly replacement, bobbin cleaning, and adjustment after reassembling the force motor.

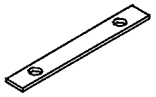
Notes: The disassembly and reassembly should take place in a dust free environment. Adjustments and confirmations are needed after reassembly for linearity, repeatability, creep, hysteresis and corner load error.

Temperature adjustment is also needed since the balance is affected by tightening torque or stress. If you do not have the proper facilities to do the temperature adjustment, do not attempt to adjust the temperature feature.

A set of jig (7PA:FXI-JIG) for FX-I Mechanical unit disassembly and reassembly .



A base jig
(FXI-1/11)

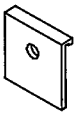


A spacer for positioning the beam(1)
(FXI-2/11)

A bolt for holding the beam(1)
(FXI-3/11)

A plate for positioning the beam(1)-1(FXI-4/11)

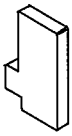
A plate for positioning the beam(1)-2
(FXI-5/11)



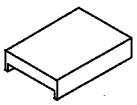
A plate for positioning the frame unit-1
(FXI-6/11)

A plate for positioning the frame unit-2
(FXI-7/11)

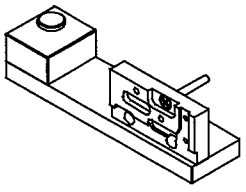
A bolt for holding the frame unit
(FXI-8/11)



A jig for positioning the fulcrum flexure(1)
(FXI-9/11)



A jig for positioning the force coil bobbin
(FXI-10/11)



A jig for assembling the beam(2)
(FXI-11/11)

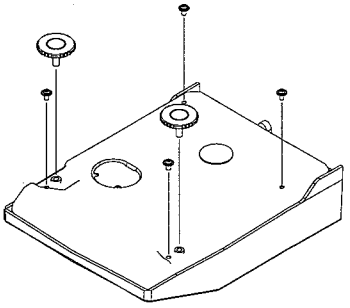
● Other tools required:
A level block M3x8ws (2pcs)
A square
A screwdriver, 3mm ,4mm
An allen wrench, 4mm, 5mm, 6mm
A soldering iron
A wrench (spanner), 7mm, 8mm
A box wrench (screwdriver), 10mm

Pan head screw
M3×8ws(2pcs)
M3×30(1pcs)
M4×8(4pcs)

5.1 Disassembly

1. Removing the lower case

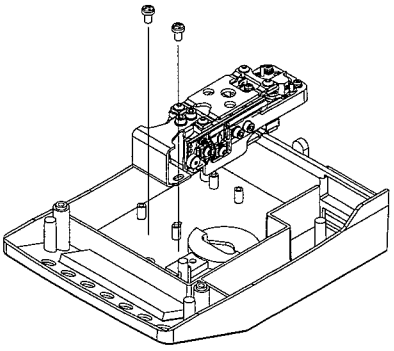
① Remove the weighing pan.
② Remove the pan support.
③ Remove the lower case(TP tappinng screw M4×8,4pcs)



2.Removing the mechanical unit

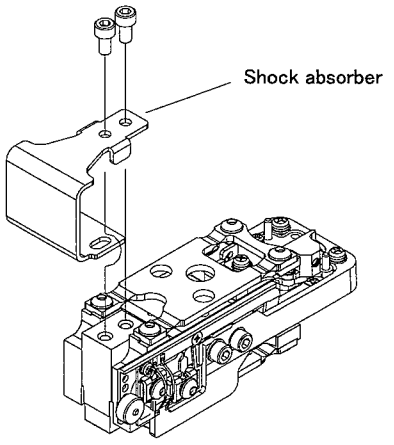
① Disconnect the cable from the A/D board.

② Remove the mechanical unit. (allen head screw M5×10 with coned disk washer (small) steel, 4 pcs)

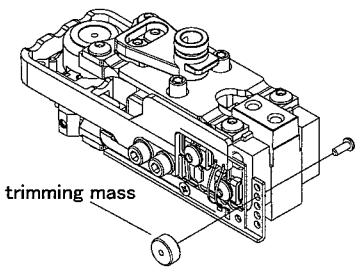


3.Disassembling the mechanical unit

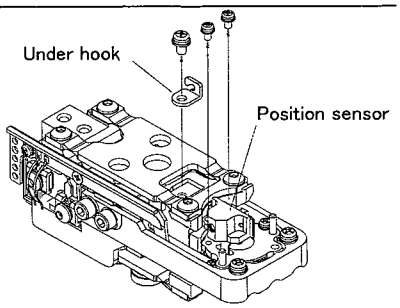
① Remove the shock absorber. (allen head screw M5×10 with coned disk spring,2 pcs)



② Remove the trimming mass.(pan head screw M3×8 with spring and plain washer,1pcs)

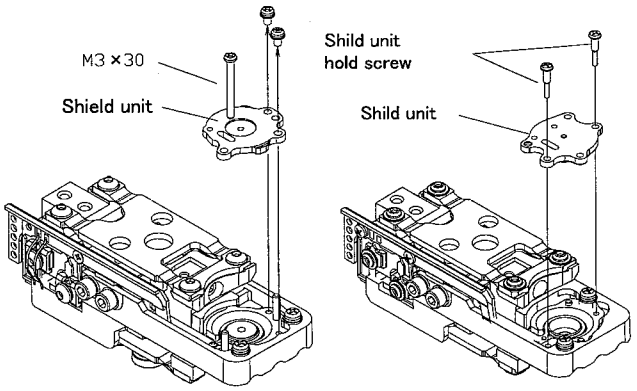


③ Remove the under hook.(pan head screw M4×8 with spring and plain washer,1pcs)

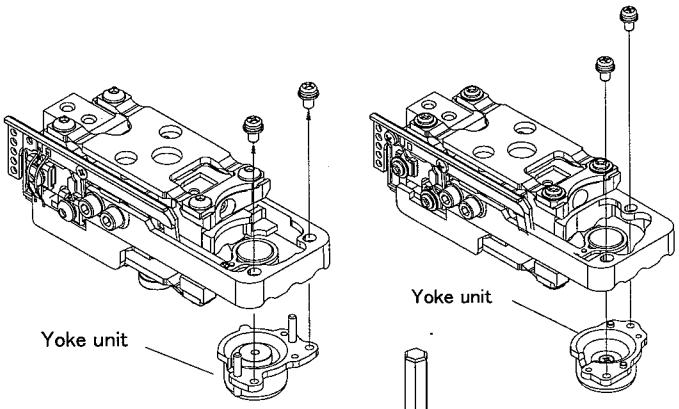


④ Remove the position sensor. (pan head screw M3 × 6 with spring and plain washer,2pcs)

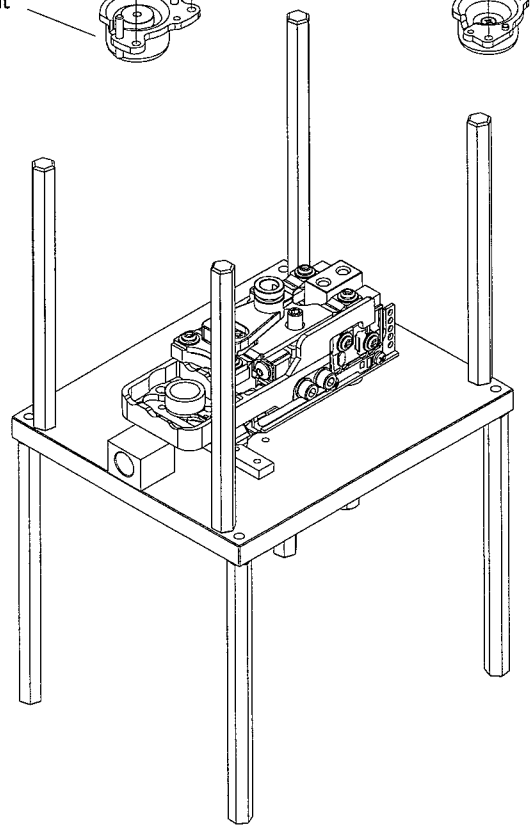
⑤ Remove the shield unit (pan head screw M3x 8 with spring and plain washer , 2 pcs. or shield unit hold screw,2pcs)
＊M3×30 is Jig



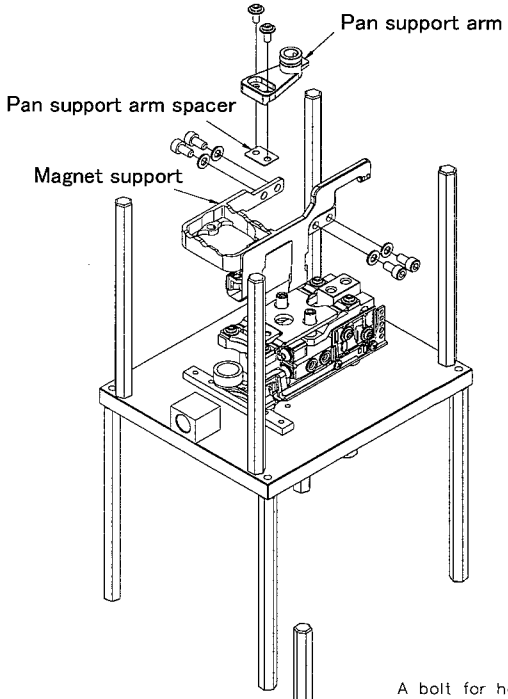
⑥ Remove the yoke unit (pan head screw M4 x 8 with spring and plain washer , 2 pcs)



⑦ Secure the frame and the riser on the base jig.

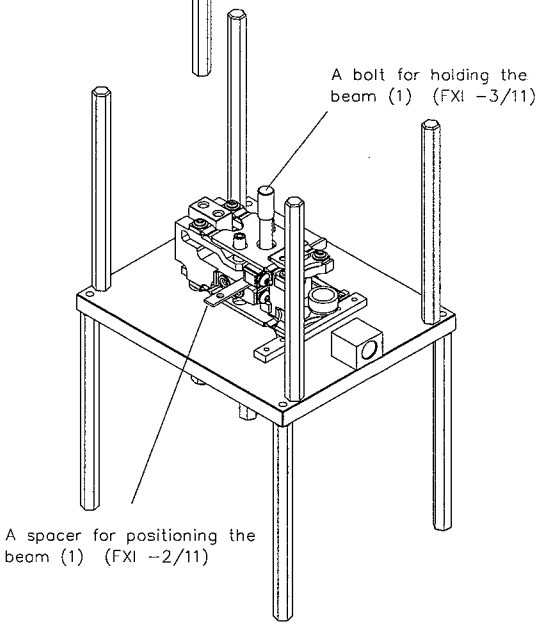


① Remove the pan support arm and pan support arm spacer. (TP torx screw M4 x 10 with spring and plain washer , 2 pcs)

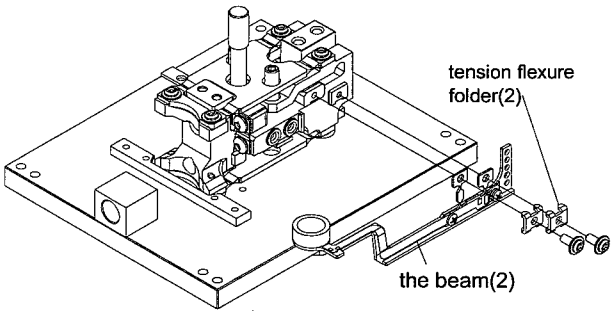


② Remove the magnet support with sensor flexible print circuit.(allen head screw M5× 10 with coned disk spring,4 pcs)

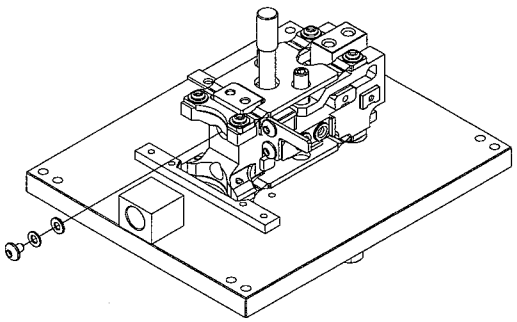
③ Insert the spacer for positioning the Beam (1) between the beam (1) and the frame, and secure the beam (1) with the bolt for holding the beam.



Remove the wires from the bobbin with a soldering iron.

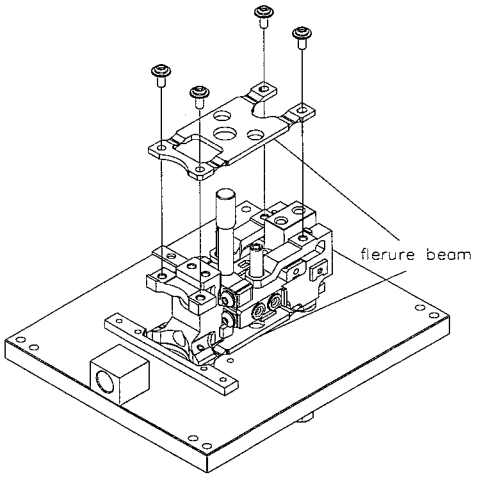


④ Remove the beam(2). (TP torx screw M4 x 10 with the tension flexure folder(2) , 2 pcs)

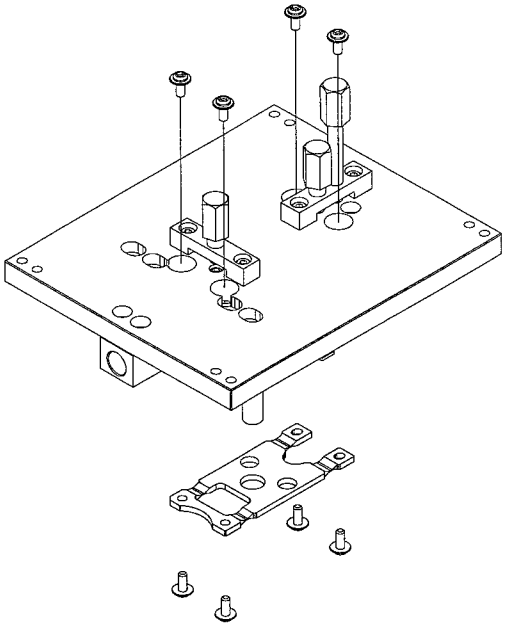


⑤ Remove the screw for holding the beam from the tension flexure. (torx truss screw M4 x 6 with the tension flexure washer , 1 pcs)

⑥ Loosen the screw securing the tension flexure (1) and the riser. (allen head screw M4×20 with coned disk spring .)

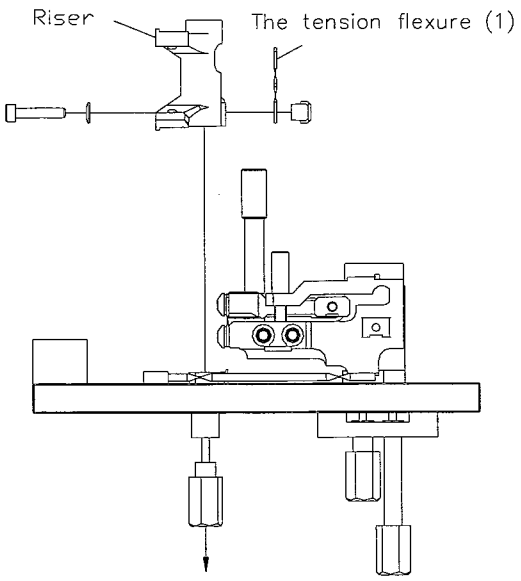


⑦ Remove the flerure beam(upper). (TP torx screw M4 x 10 , 4 pcs)



⑧ Remove the flerure beam(lower). (TP torx screw M4 x 10 , 4 pcs)

⑨ Loosen the screw securing the tension flexure (1) and the riser. (allen head screw M4×20 with coned disk spring .)



5.2 Assembly

1.Assembling the beam (2) unit

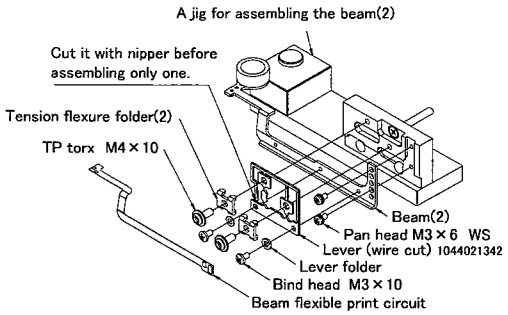
① The first cut it with nipper.

② Secure the beam(2) to the jig for assembling the beam(2).In so doing fit the beam(2)'s hole(Φ4.2) and the jig's M4 tap.

③ Secure the lever(wire cut) 1044021342 to the beam(2) with tension flexure folder (2).(Binding head M3×10 2pcs)

④ Attach the beam flexible print circuit to the beam(2).

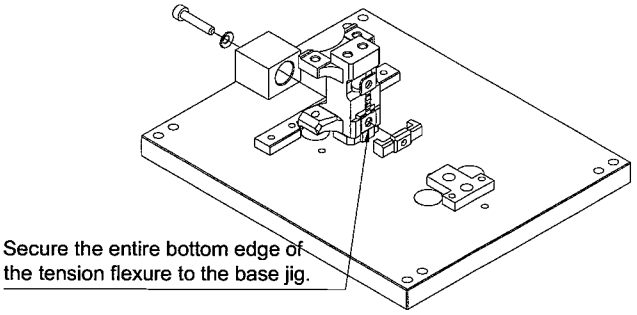
⑤ Solder the bobbins wires to the bobbin. The wire must be glued to the beam flexible print circuit. If old version of the yoke, attach the filament tape to the soldered portion.



2. Assembling the riser unit

① Secure the riser to the base jig.

② Secure the entire bottom edge of the tension flexure to the base jig with thetension flexure folder (1).(Allen head screw with coned disk washer M4×20 25kgf・cm)



3. Assembling the flame unit

① Secure the frame to the base jig.

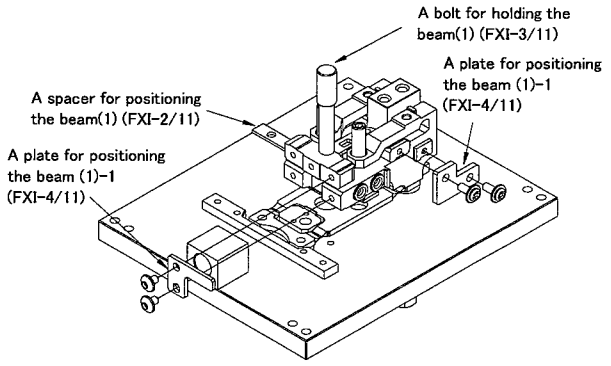
② Assemble the beam (1) temporarily using the spacer for positioning the beam (1) and the bolt for holding the beam (1).

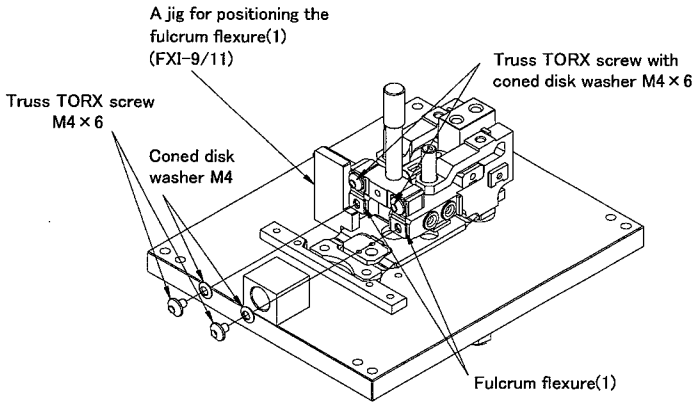
③ Fit the frame with the plate for positioning the beam(1)-1 and the plate for positioning the beam(1)-2.

④ Tighten the bolt for holding the beam (1).

⑤ Remove the plate for positioning the beam(1)-1 and the plate for positioning the beam(1)-2.

⑥ Tighten the screw on the upper side of the flucrum flexure (1) using the jig for positioning the fulcrum flexure. Truss head TORX screw M4 x 6 with coned disk washer (small) 4pcs)
Tightening torque…25kgf・cm



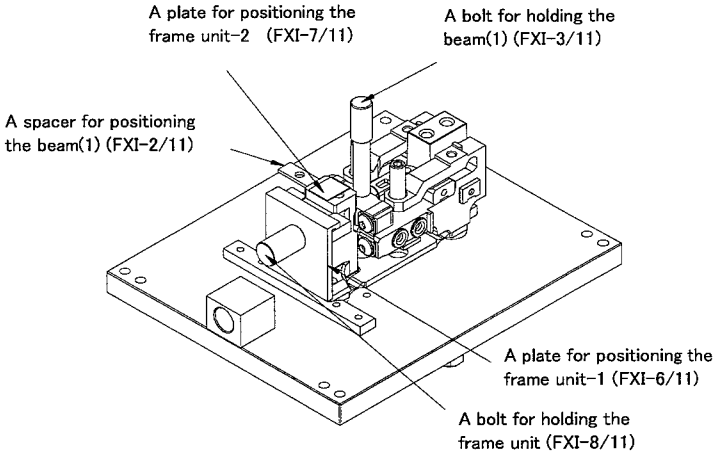


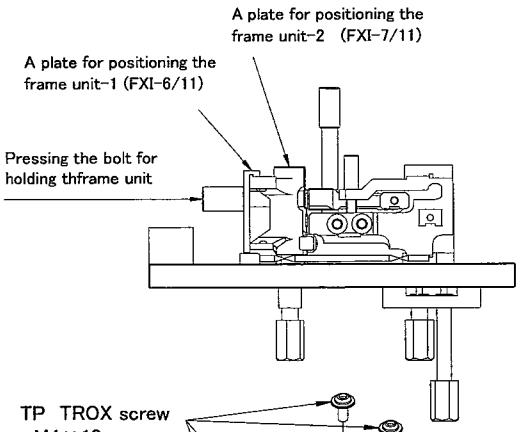
4. Assembling the mechanical

① Place the flexure beam on the base jig and fix the riser.

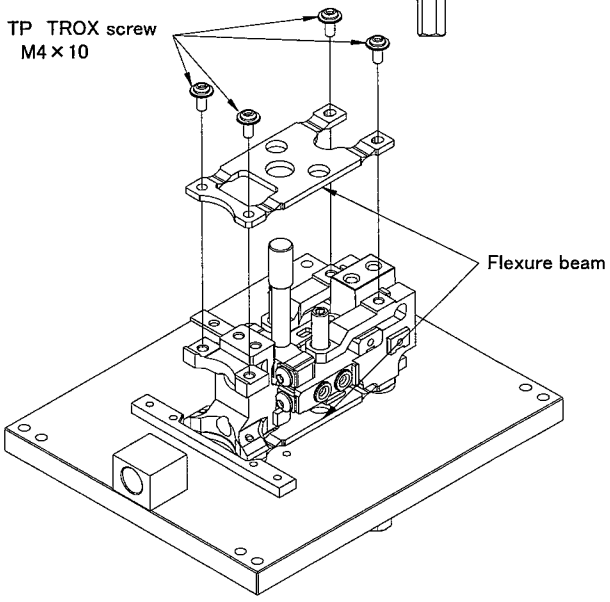
② Secure the plates for positioning the frame unit to the riser and pull the frame unit using the bolt for holding the frame unit.

③ As there is a gap between the bolt for holding and the plates for positioning the frame unit, fix the frame unit to the base jig while pressing the bolt for holding the frame unit. In so doing, make sure that the holes of the tension flexure (upper side) and the M4 taps of the beam(1) are at the same position.

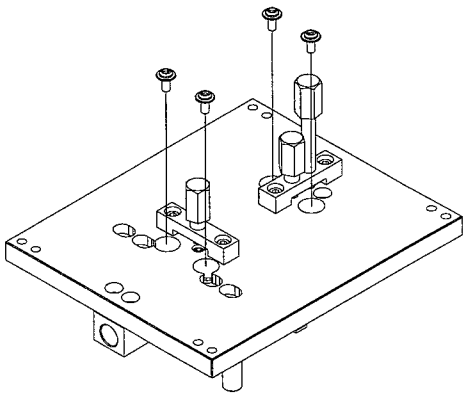




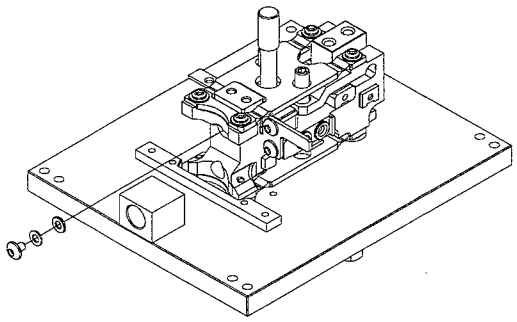
④ Secure the upper side of the flexure beam. (TP TORX screw M4×10, 30kgf・cm).



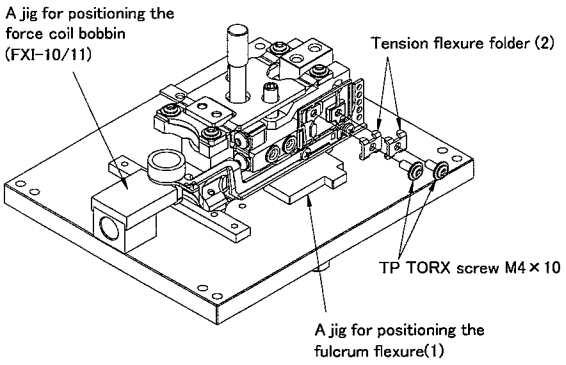
⑤ Secure the lower side of the flexure beam. (TP TORX screw M4×10, 30kgf・cm)



⑥ Secure the upper side of the tension flexure.(Truss TORX screw with coned disk washer and the tension flexure washer. M4×6 25kgf・cm, 1 pcs)

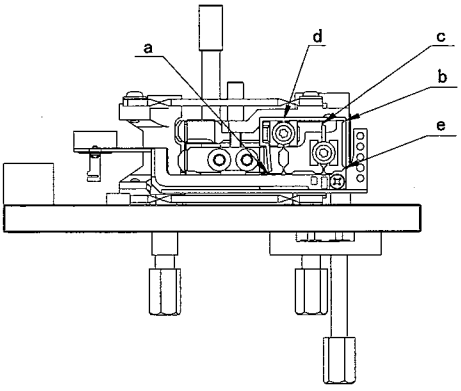


⑦ Place the jig for positioning the force coil bobbin on the base jig, insert the jig for positioning the fulcrum flexure(1) under the beam(2) unit, and secure the beam(2) unit using the tension flexure folder(2). (TP TORX screw M4×10, 25kgf・cm, two pcs)

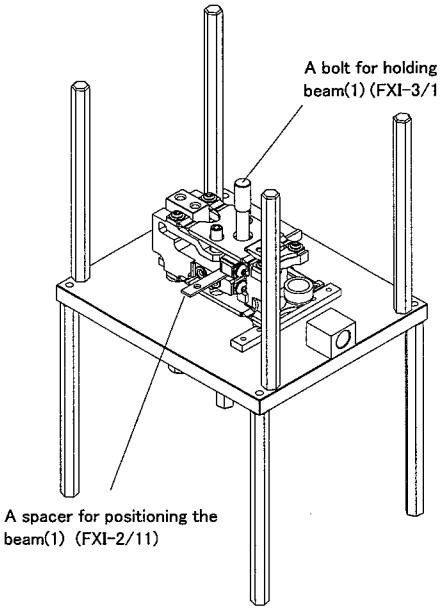


⑧ Cut the reinforcement of the beam(2) unit.

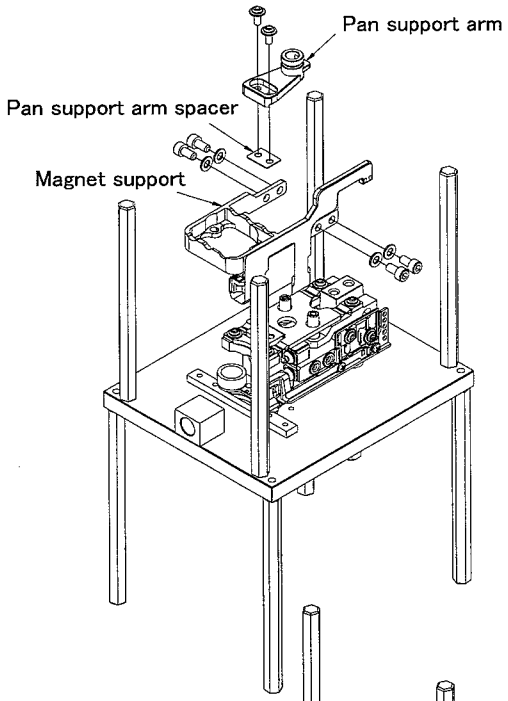
a) Cut it when assembling the beam(2) unit.
b) Cut it with a nipper.
c) Cut it with a nipper.
d) Pinch it with longnose pliers from the upper side and lightly apply force in the torsional direction several times to cut it
e) Pinch it with longnose pliers from the upper side and lightly apply force in the longer direction of the sensor (scored direction) to cut it. (In so doing, hold the force coil and avoid the force applied to the thin wall part.)



⑨ Remove the bolt for holding the beam(1) and the spacer for positioning the beam(1).

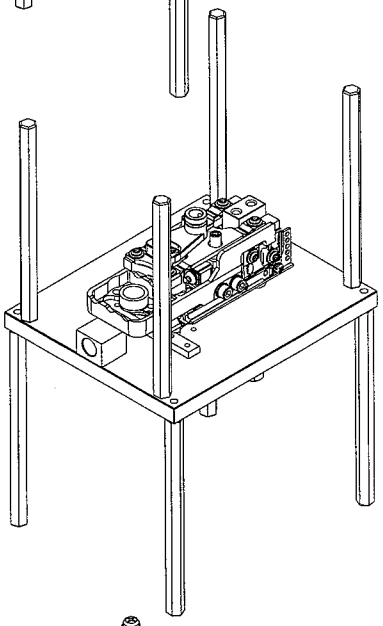


⑩ Secure the magnet support by pressing it against the base jig and the frame. (CAP M5 × 10 + pan spring, four points, 60kgf・cm)

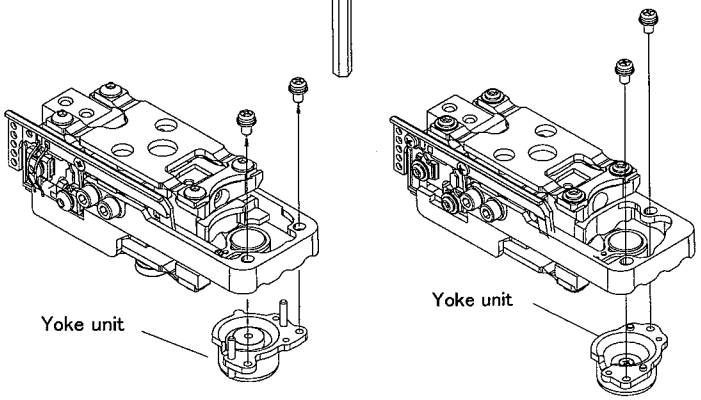


⑪ Secure the pan support arm over the pan support arm spacer. (TP TORX M4×10, 25kgf・cm, 2 pcs)

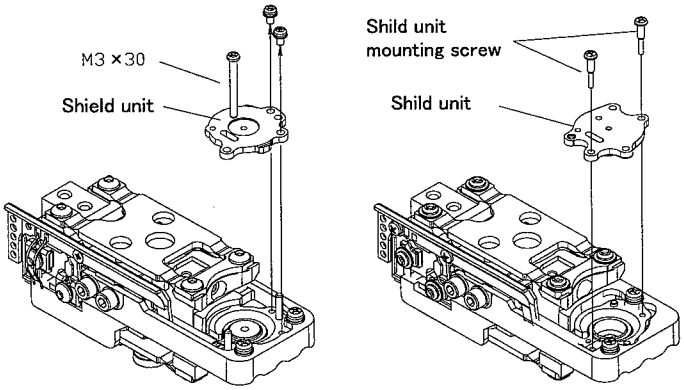
⑫ Remove from the base jig.



⑬ Secure the yoke unit (pan head screw M4×8 WS, 12kgf・cm, 2 pcs)



⑭ Secure the shield unit (pan head screw M3×8 WS, 2 pcs)



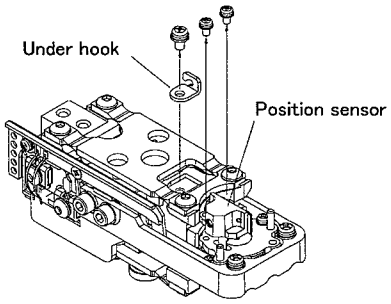
⑮ Secure the position sensor (pan head screw M3×8 WS, 2 pcs)

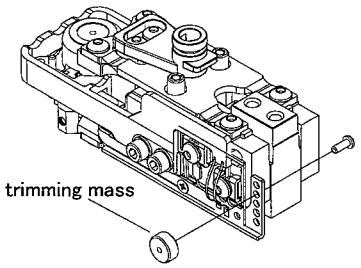
⑯ Secure the under hook to the riser. (pan head screw M4 × 8 WS, 1 piece)

⑰ Secure the trimming mass to the second hole from the top on the beam(2). (pan head screw M3 × 8 WS, 1 piece)

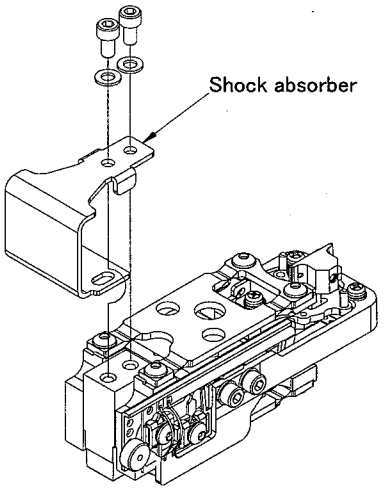
⑱ Connect the beam flexible print circuit and the sensor flexible print circuit with two wires.

* Make sure that the two soldered wires do not touch the TORX truss screws that secure the lever(2). (Keep more than 1mm between the screws and the wires.)



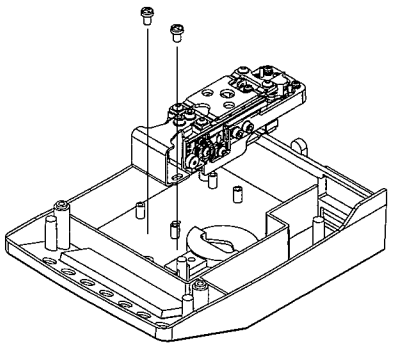


⑲ Secure the shock absorber. (Allen head screw with coned disk washer M5×10 60kgf・cm,2 pcs)



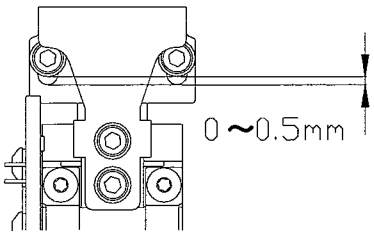
5.Installing the mechnical unit to the upper case

① Check the insulation of the beam(2) unit (the mechanical unit alone) Measure with a multimeter the resistance between one end of the force coil and the frame. Confirm that the measured value is the same as that of when the electrodes of the multmeter are open. Confirm it without connecting the J10 connector. If it is connected, the resistance can become around 2.2MΩ



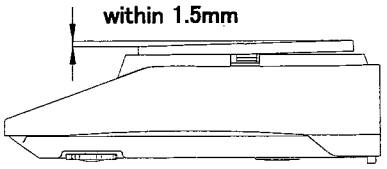
② Secure the mechanical sensor unit to the upper case. (Allen head screw with coned disk washer M5 × 10 60kgf・cm , 2 pcs)

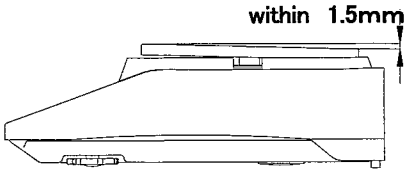
When tightening the screws, take care not to touch the beam(2) unit of the sensor. To position it appropriately, leave 0 ~ 0.5mm of the long holes of the shock absorber from the screws.



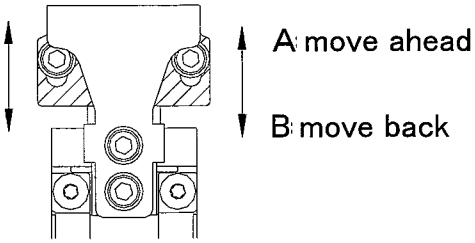
③ Secure the pan support and check the inclination of the pan. The inclination must be within ±1.5mm between the front and the rear of the pan

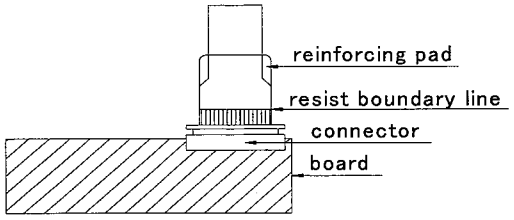
* In case that the inclination is larger than specified, A: If the front is lower, slide the basal plane of the shock absorber (shaded area in the right figure) toward the front and fix it as shown by the right figure. B: If the rear is lower , slide the basal plane of the shock absorber toward the rear and fix it



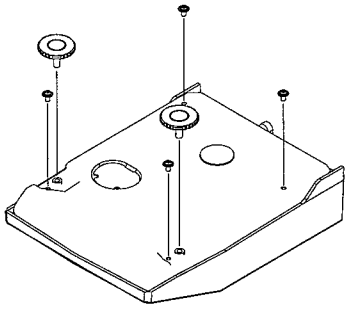


④ Secure the sensor flexible print circuit on the analog board. Insert the sensor flexible print circuit all the way and push in the stopper so that the sensor flexible print circuit will be vertically fixed. (Contact failure may occur if it is obliquely fixed.) Visually confirm that the upper end of the connecter and the resist boundary line of the sensor flexible print circuit are horizontal.





⑤ Adjust the D0 value.
Adjust it so that it satisfies the below specifications for JP2, JP3.
FX-300i : 500～5400 dig
FX-3000i : 500～5400 dig

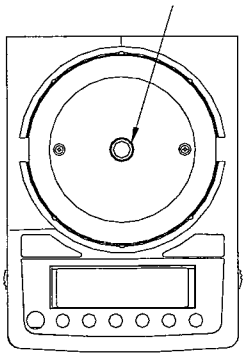


⑥ Secure the lower case. (TP DEL TITE M4×8, 4 pcs)。

⑦ Secure the foots. (2 pcs)

⑧ Adjust the position of the dust plate so that the gap between the dust plate and the pan support boss is equally spaced.

The gap is equally spaced.



5.3 Cleaning the Magnet Assembly and Bobbin

The magnet assembly and the bobbin will require cleaning if the balance has a repeatability problem. Particles of metal, dust or other foreign material can collect around the bobbin. If such material touches the bobbin, the bobbin will not move correctly. Metal particles are attracted to the magnet and tend to stand straight out. The gap for the bobbin is very narrow, so be very cautious while removing particles.

Note: Do not use compressed air to blow out the magnet well. There may be particles of magnetic material stuck to the bottom of the magnet.
The tools that you use near the magnet should be free of plating and non-magnetic. A flake of plating or a metal particles will be attracted to the magnet.
The screws used in this balance are non-magnetic. Do not substitute screws made of magnetic material.

① Prepare a 5 cm-long adhesive tape for cleaning. Use a paper backed or cloth tape (do not use a tape that can be torn easily, such as cellophane tape, it may stick to the magnet and be very difficult to remove).

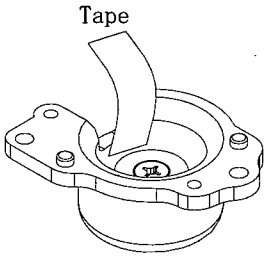
② Clean around the inner and outer surfaces of the magnet well using the adhesive tape.

③ Clean the inner and outer surfaces of the bobbin using the adhesive tape.

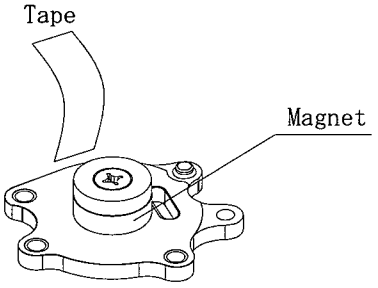
④ Inspect the magnet well and bobbin using a very strong light. Look for any particles stuck to the surfaces. Metal particles may be shinny or dark. Look for anything stuck out from the sides of the magnet.

⑤ Reassemble the force motor and test it for repeatability. Corner load error can often be traced to a repeatability problem.

If there is still a problem, disassemble the force motor and check closely for particles in the magnet gap.



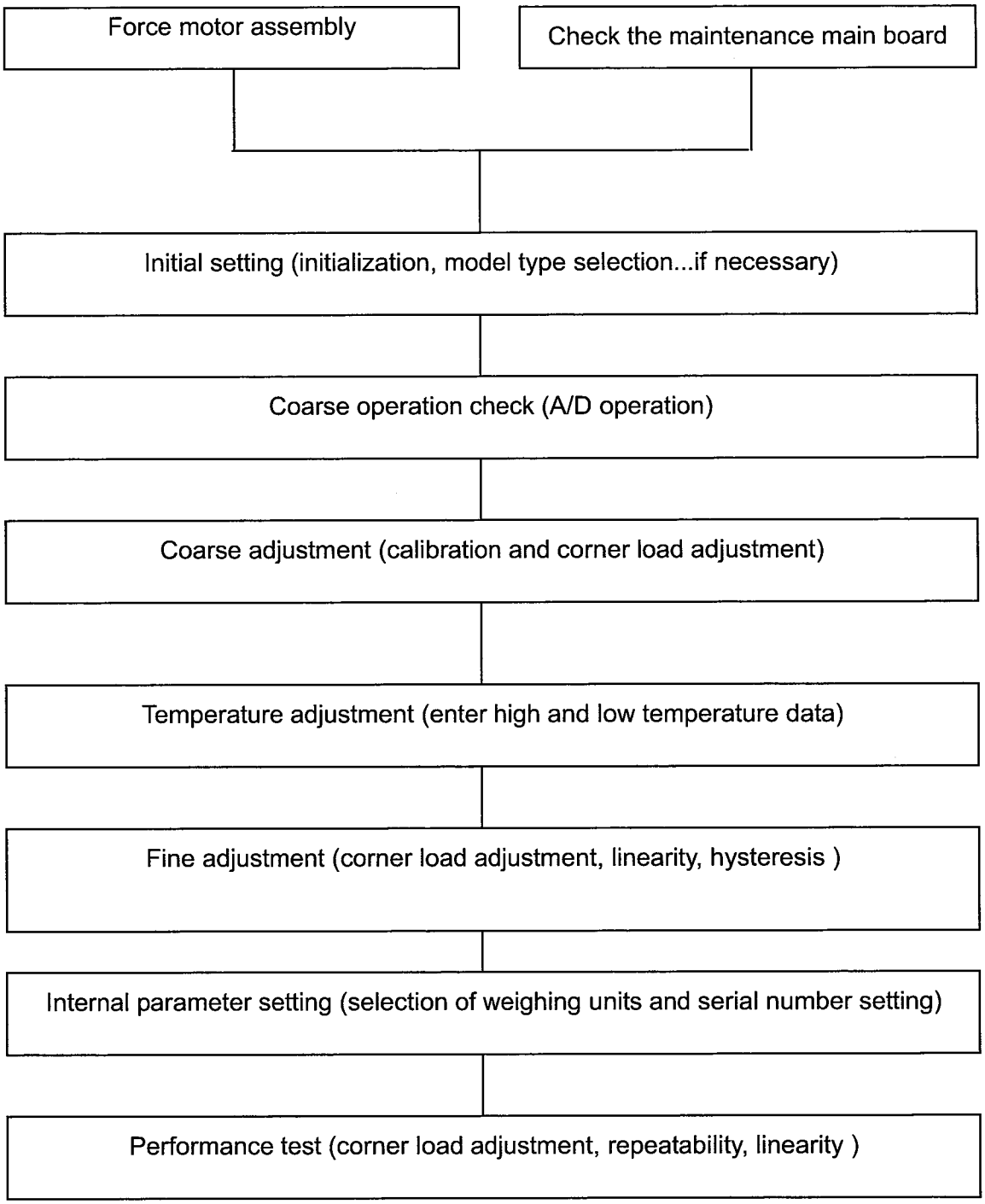
Yoke unit



Shield unit

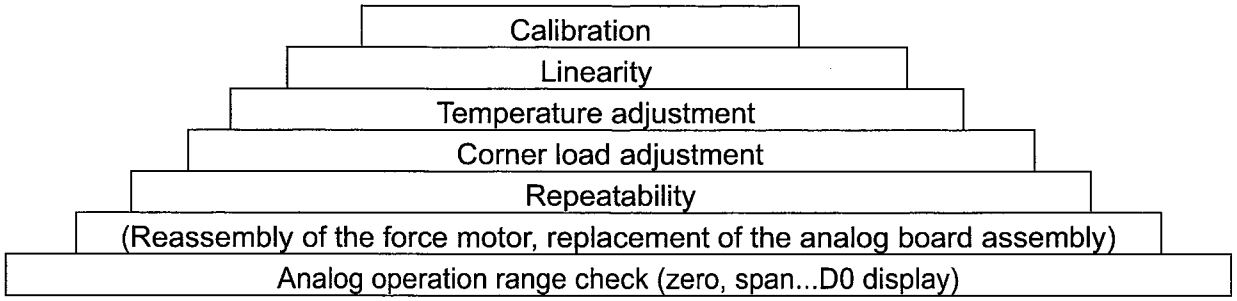
6. Adjustments

6.1 Adjustment Flow Chart



6.2 General Precautions

The data structure is shown below. Functions listed nearer to the bottom are more basic. If the specific data is adjusted, all data listed above the adjusted data must also be adjusted.



6.3 Check Mode

Check mode consists of three modes: Data adjustment mode, function setting mode and basic setting mode.

1. Entering the check mode

Step 1. Verify that the display is OFF.

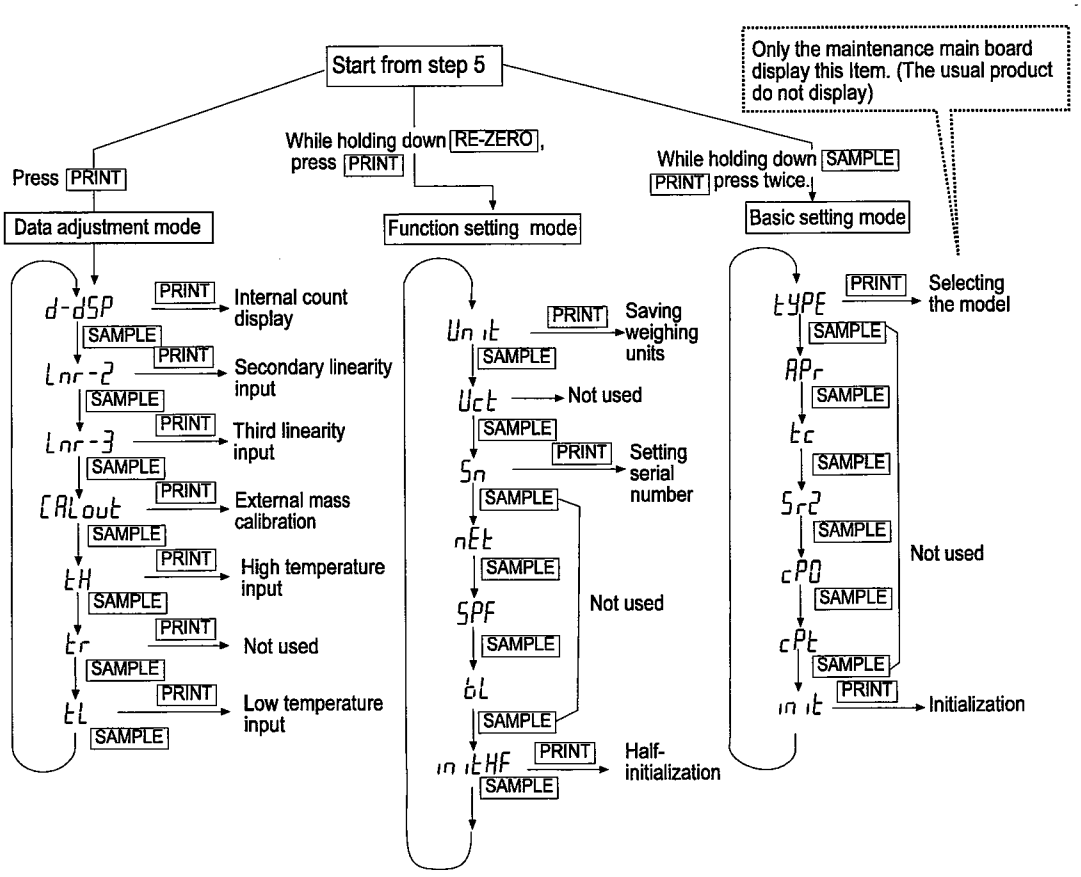
Step 2. Press and hold the RE-ZERO and PRINT keys and press the ON/OFF key. Release the PRINT and ON/OFF keys while still holding the RE-ZERO key. Immediately press the PRINT key twice. Perform this procedure within 2 seconds.

Step 3. The software version will be displayed for about 1 second [P- X.XX].

Step 4. The balance model type will be displayed [FX2000i]. (The model type displayed depends on each actual model.)

Step 5. All of the display segments will turn on.

2. Check mode menu



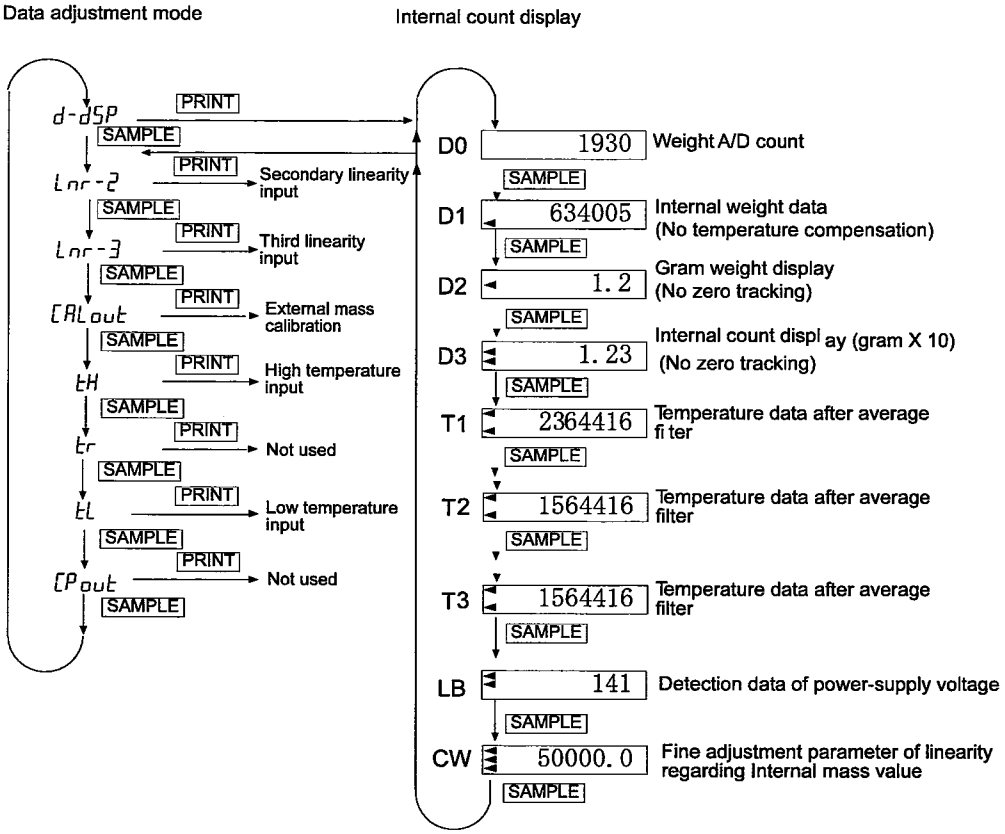
Note: In the above content, the way of displaying may differ depending on the each software version.

6.4 Check Mode Menus

Internal count display

While in the [d-dSP] display, press the [PRINT] key to display the internal count.

Use the [SAMPLE] key to go to the next data.



- Digital offset
  While in the D0, D1 display, while holding down the [RE-ZERO] key and [MODE] key, the balance enters the digital offset input mode.

  (In this input mode, the load sensor is disconnected internally. And certain electric signals are input in A to D converter. Refer to "6-13 Method of identifying defect location")

6.5 Initialization

<CAUTION> · **Do not proceed to this initialization if you can not prepare a room controlled with temperature. (Because it is necessary to adjust temperature data after this initialization)**

Note that the following data is initialized by this operation.

- Temperature compensation data for each unit (Then some fixed data is input compulsorily)
- Linearity compensation data (The data is cleared), serial number, weighing units
- Internal parameter settings (Certain values are input compulsorily)

Initialization procedure

Follow the procedure below to completely initialize the data stored in the non-volatile memory.

Step 1. See the check mode menu flowchart on page 26 to display basic setting mode [tYPE] or [APr].

Step 2. Press the [SAMPLE] key several times. [in it] will be displayed.

Step 3. Press the [PRINT] key. [ALL no] will be displayed. To cancel the operation, press the [CAL] or [PRINT] key. The next item will be displayed.

Step 4. Press the [RE-ZERO] key. [ALL Go] will be displayed. To cancel the operation, press the [CAL] key. The next item will be displayed

Step 5. Press the [PRINT] key. [< ALL Go], then [End] will be displayed. The next item will be displayed. Change the other items as necessary.

Step 6. To quit the operation, press the [ON/OFF] key. The display will be turned OFF.

6.6 Model type Selection (Only for maintenance electric board)

Model type selection is available for the maintenance board only.

Model selection procedure

Follow the procedure below to select the balance model type.

Step 1. Verify the following item of the 7PZ-4600K/L/E/F/H (Main board for the maintenance).

☐ Verify the type of the board

- To the each type (K/L/E/F/H), verify the jumper setting are correct. (Refer to the Technical information "4. Parts Layout of Circuit Diagrams")

☐ For the main board unit, verify if it is adjusted completely

- Connect the AC adapter to the main board unit. If [Error 9] is displayed, the main board is not adjusted yet and it should be adjusted for a maintenance board.

Step 2. See the check mode menu flowchart on page 30 to display basic setting mode [tYPE].

Step 3. Press the [PRINT] key. Confirm the type on the display as follows.

Type of board	Model type which can be set	Type displayed initially
7PZ-4600K	FX-120i/200i/300i, 120i/200i/300i -WP	FX-300i
7PZ-4600L	FX-1200i/2000i/3000i, 1200i/2000i/3000i -WP	FX-3000i
7PZ-4600E	FX-300/600CT	FX-600CT
7PZ-4600F	FX-120/200/300GD	FX-300GD
7PZ-4600G	FX-1200/2000/3000GD	FX-3000GD

Use the following keys to select the model type

[RE-ZERO] key: changes the model type. (Change the model type according to the kinds of PZ)

[PRINT] key: saves the final model type.

[CAL] key: cancels the data.

When the model after change is the same as that before change, the stabilization indicator illuminates.

Step 4. Press the [PRINT] key. [End] appears. Then, the next item appears.

6.7 Coarse Operation Check & Adjustment

1. A/D count check

The A/D count can be checked in the check mode.

Follow the procedure below to verify the A/D values for weight data (D0) and temperature data (T1).

Step 1. Display the data adjustment mode [d-dSP] after getting into check mode shown on page 26.

Step 2. Press the [PRINT] key to display [XXXX] . (D0 data, weight A/D count)

Step 3. Check that the pan assembly is installed properly. Verify that the count without load (zero point) is within the range shown in the table below.

Note: If the zero point is not within the specification, adjust it by jumpers (JP2, JP3 on the main board).

Opening JP2 makes Zero point +1200(D0) and opening JP3 makes Zero point +1200(D0). [PC4600A]

Opening JP2 makes Zero point +2500(D0) and opening JP3 makes Zero point +2500(D0). [PC4600B～]

Step 4. Place the mass in the table below on the pan. Read the count with load(full). Subtract the count without load from the count with load to obtain the span value. Verify that the span value and full value is within the range shown in the table below.

In the D0 data mode (Weight A/D count), press the [SAMPLE] key twice to display [X.XX] (D2 data). Verify that the dispersion is within the specifications as below when the mass is placed on the pan.

<table>
<tr><th>Main board</th><th>Model</th><th>Masses</th><th>Zero point (D0)</th><th>Full (D0)</th><th>Span (D0)</th><th>Dispersion (D2)</th></tr>
<tr><td rowspan="4">PC4600A</td><td>FX-120i/200i, 120iWP/200iWP</td><td>200g</td><td>500～5400</td><td rowspan="4">～8500</td><td>3000～4000</td><td rowspan="2">MAX-MIN: 0.002g/5seconds</td></tr>
<tr><td>FX-300i,300i WP</td><td>300g</td><td>500～3600</td><td>4500～6000</td></tr>
<tr><td>FX-1200i/2000i, 1200iWP/2000iWP</td><td>2kg</td><td>500～5400</td><td>3000～4000</td><td rowspan="2">MAX-MIN: 0.02g/5seconds</td></tr>
<tr><td>FX-3000i,3000iWP</td><td>3kg</td><td>500～3600</td><td>4500～6000</td></tr>
<tr><td rowspan="5">PC4600B ～</td><td>FX-120i/200i,120GD /200GD,120iWP/200iWP</td><td>200g</td><td>1100～5500</td><td rowspan="4">～8500</td><td rowspan="4"></td><td rowspan="2">MAX-MIN: 0.002g/5seconds</td></tr>
<tr><td>FX-300i,300GD,300iWP</td><td>300g</td><td>1100～4300</td></tr>
<tr><td>FX-1200i/2000i, 1200GD/2000GD 1200iWP/2000iWP</td><td>2kg</td><td>1100～5500</td><td rowspan="2">MAX-MIN: 0.02g/5seconds</td></tr>
<tr><td>FX-3000i,3000GD,3000iWP</td><td>3kg</td><td>1100～4300</td></tr>
<tr><td>FX-300CT/600CT</td><td>100g</td><td>1100～5500</td><td>～7950</td><td></td><td>MAX-MIN: 0.002g/5seconds</td></tr>
</table>

Step 5. In the D2 data mode, press the SAMPLE key three times to display XXXXXX . (T1 data)

Step 6. Verify that the count at room temperature (15-25°C) is within the range shown in the table below.

Model	Absolute value (T1 /T2 data)	Dispersion (T1/T2 data)
FX-120i/200i/300i, FX-120i/200i/300iWP, FX-120/200/300iGD	2200000-2600000	MAX-MIN: 40 counts/5 seconds
FX-1200i/2000i/3000i, FX-1200i/2000i/3000iWP, FX-1200/2000/3000GD		
FX-300/600CT		

2. Insulation check of force coil

By using a multimeter which can measure 20MΩ or more, measure the resistance between one end of the force coil and the frame.

Verify that the measurement result is the same as when the terminal of multimeter is opened.

Note: Separate connector10 from the board. (Resistance value of the 2.2MΩ degree display if in condition to have been connected.)

6.8 Coarse Adjustment

1. Calibration

With nothing placed on the pan, warm up the balance for at least half an hour. Calibration is performed in the check mode [CALout] display. Follow the procedure below to calibrate.

Step 1. Display the data adjustment mode [d-dSP] after getting into check mode shown on page 30.

Step 2. Press the [SAMPLE] key three times. [CALout] is displayed.

Step 3. Press the [PRINT] key.

Step 4. [CAL 0] is displayed. Check the standard mass for calibration in table below.

Model	Standard masses
FX-120i/200i/300i ,120i/200i/300i WP, 120/200/300GD	200g
FX-1200i/2000i/3000i ,1200i/2000i/3000i WP, 1200/2000/3000GD	2kg
FX-300CT	50g
FX-600CT	100g

Step 5. With nothing placed on the pan, press the [PRINT] key. [< CAL 0] is displayed.

Step 6. After it stabilized, [200] is displayed. (Example of the FX-300i)

Step 7. Place the calibration mass specified in step 4 on the pan. Press the [PRINT] key. [< 200] is displayed. (Example of the FX-300i)

Step 8. After it stabilized, [End] is displayed.

Step 9. Remove the mass.

2. Corner load adjustment

Corner load is adjusted in the check mode D2 display.

Coarse adjustment

Step 1. Display the data adjustment mode [d-dSP] after getting into check mode referring to Check mode procedure.

Step 2. Press the [PRINT] key to display [XXXX] . (D0 data-weight A/D count)

Step 3. In the D0 data mode (weight A/D count), press the [SAMPLE] key twice to display [X.XXX] . (D2 data as gram weight display).

Step 4. In the D2(CT is D4) display, place an external mass on the center of the pan and at four positions half the distance from the center of the pan to the edge. Adjust the corner load adjusting screws so that the difference between the values in the center and each position will be within the specification. (If the display on the pan is as shown in the illustration below, turn the corner load adjusting screws as indicated by the arrows.)

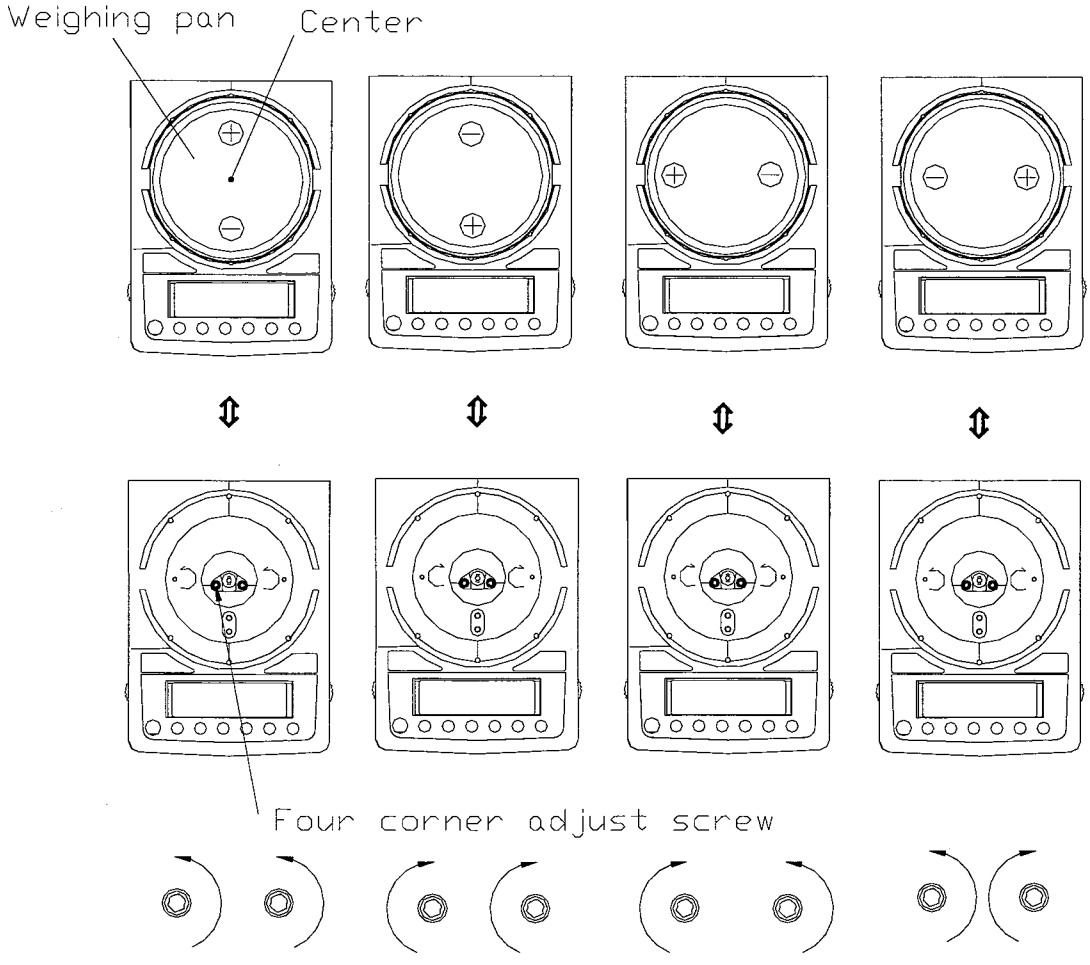
Step 5. Adjust to be within the about +5 digits as the specifications, by turn four corner adjust screws clockwise, the corner load adjustment of the plus side (right or left) on the weighing pan.

When adjusting the corner load, a drift of the zero point may be generated. After adjusting, load the mass listed in table below on the front, back, left and right of the weighing pan, and work again after the drift of the center zero point is confirmed to be within ±3digits.

Model	Masses	Different with center	Drift value of Zero point
FX-120i/200i/300i ,120i/200i/300iGD	200g	+/-0.005g	+/-0.003g
FX-120i/200i/300i WP,	200g	+/-0.010g	+/-0.003g
FX-1200i/2000i/3000i,1200/2000/3000GD	2kg	+/-0.05g	+/-0.03g
FX-1200i/2000i/3000i WP,	2kg	+/-0.10g	+/-0.03g
FX-300/600CT	50g	+/-0.005ct	+/-0.003 ct

If the corner load error at the front of the weighing pan is minus counts, turn four corner adjust screws counterclockwise.

If the corner load error at the front of the weighing pan is plus counts, turn four corner adjust screws clockwise.



3. Hysteresis check

Apply a preliminary load by placing and removing a load with the same weight value as the full scale value. Perform this pre-load three times.

Note: Be careful, the corner load error has a bad effect on the linearity adjustment or linearity and hysteresis check.

In the D2(CT is D4)data mode, place the specified check mass in the table below one by one on the pan. After reaching the weighing capacity, remove each mass one by one, and check that the difference between increasing points and decreasing points are within the specifications (hysteresis).

Model	Masses	Hysterisis (D2 mode)
FX-120i,120 iWP,120GD	50g x 2	±0.002g
FX-200i,200 iWP,200GD	100g x 2	±0.002g
FX-300i,300 iWP,300GD	100g x 3	±0.002g
FX-1200i,1200 iWP,1200GD	500g x 2	±0.03g
FX-2000i,2000 iWP,2000GD	1kg x 2	±0.03g
FX-3000i,3000 iWP,3000GD	1kg x 3	±0.03g
FX-300CT	20g×3	±0.005ct(D4 mode)
FX-600CT	40g×3	±0.005ct(D4 mode)

6.9 Temperature Adjustment

A room or chamber that can be set at 10°C and 30°C is required for this adjustment. The balance must stabilize at each temperature for more than 4 hours before the data is taken.

Input high temperature data initially, then input low temperature data. Finally go back to high temperature state, and check the zero drift and the span drift.

Use the same mass when inputting data for both high temperature and low temperature.

1. Inputting the temperature data

Step 1. Display the data adjustment mode [d-dSP] after getting into check mode shown on page 26.

Step 2. Press the [SAMPLE] key six times. [tH] appears. Press the [SAMPLE] key two more times. Then [tL] appears. Input high temperature data in the tH display, low temperature data in the tL display.

Step 3. In the [tH] or [tL] display, press the [PRINT] key. The motor starts and adjusts the internal mass position correctly. Then [tH 0] or [tL 0] is displayed respectively.

Step 4. With nothing placed on the weighing pan, press the [PRINT] key as zero point data. To cancel the operation, press the [CAL] key.

Step 5. After it stabilized, [tH F] or [tL F] is displayed respectively.

Step 6. Place the mass in table below on the weighing pan and press the [PRINT] key.

Model	Masses
FX-120i/200i/300i, FX-120i/200i/300iWP,120/200/300GD	200g
FX-1200i/2000i/3000i ,1200/2000/3000WP,1200/2000/3000GD	2kg
FX -600CT/300CT	100g

Step 7. After it stabilized, [End] is displayed.

2. Temperature adjustment check

Step 1. After inputting the low temperature data, keep the temperature.

Step 2. Press the [RE-ZERO] key to show zero. Note the zero point reading. Place a mass in table below on the pan and note the span reading. The span data is calculated after subtracting the zero point reading from the full point reading. Remove the mass.

Step 3. Set the temperature to 30°C again. Leave the balance at that temperature for at least 4 hours. (Leave the balance with D2 or D3 data mode.)

Step 4. Note the zero point reading.

Step 5. Press the [RE-ZERO] key to display zero.

Step 6. Place a mass in table below on the pan and note the span reading. The span data is calculated after subtracting the zero point reading from the full point reading. Remove the mass.

Step 7. Verify that the changes in the zero point and span are within the specifications.

Model	Masses	Data mode	Zero	Span
FX-120i/200i/300i, FX-120i/200i/300iWP,120/200/300GD	200g	D2	±0.050g	±0.008 g
FX-1200i/2000i/3000i , 1200/2000/3000WP,1200/2000/3000GD	2kg	D2	±0.50g	±0.08 g
FX -300/600CT	100g	D2	±0.050g	±0.004 g

6.10 Fine Adjustment

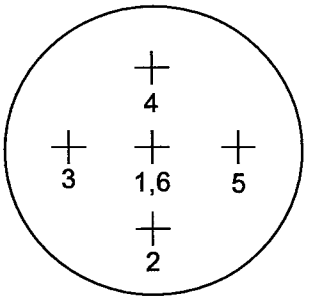
1. Corner load adjustment

In the D2(CT is D4) data mode, place an external mass on the center of the pan and at four positions half the distance from the center of the pan to the corner edge shown in a figure below. Verify that the difference between the values at the center and at each position is within the specifications.

About the adjustment method, refer to the "2.Corner load adjustment" of "6.8 Coarse Adjustment" .

When adjusting the corner load error by turn four corner adjust scerws , zero point drift may be generated. After turn four corner adjust scerws, load the mass listed in table below on the front, back, left and right of the weighing pan, and work after the drift of the center zero point is confirmed to be within the ±2digits.

Model	Masses	Difference with center (D2 data mode)	Drift value (D2 data mode)
FX-120i ,120GD	100g	±0.003g	±0.002g
FX-200i ,200GD	100g	±0.003g	±0.002g
FX-300 i,300GD	200g	±0.003g	±0.002g
FX-1200i ,1200GD	1kg	±0.03g	±0.02g
FX-2000i ,2000GD	1kg	±0.03g	±0.02g
FX-3000i ,3000GD	2kg	±0.03g	±0.02g
FX-120i WP	100g	±0.010g	±0.002g
FX-200i WP	100g	±0.010g	±0.002g
FX-300i WP	200g	±0.010g	±0.002g
FX-1200i WP	1kg	±0.10g	±0.02g
FX-2000i WP	1kg	±0.10g	±0.02g
FX-3000i WP	2kg	±0.10g	±0.02g
FX-300/600CT	50g	±0.005ct (D4 data mode)	±0.002ct (D4 data mode)



Weighing pan

2.Linearity adjustment (Lnr-2, 3) / Linearity and Hysteresis check

First, warm up the balance at room temperature for at least 1 hours before carrying out the adjustment.

Apply a preliminary load by placing and removing a load with the same weight value as the full scale value. Perform this pre-load three times. Follow the procedure below to input linearity data.

Note: Be careful, the corner load error has a bad effect on the linearity adjustment or linearity and hysteresis check.

Step 1. Display the data adjustment mode [d-dSP] after getting into check mode shown on page 30.

Step 2. In case of FX-300i/200i/120i FX-3000i/2000i/1200i press the [SAMPLE] key one time. [Lnr-2] is displayed.

Step 3. Press the PRINT key. The motor starts and adjusts the internal mass position correctly. Then Lnr-0 is displayed. (Press the CAL key to cancel this procedure.)

Step 4. With nothing placed on the pan, press the PRINT key.

Step 5. After stabilization, Lnr-1 is displayed (Press the CAL key to cancel the operation.).

Step 6. Place mass A shown on the table below on the weighing pan and press the PRINT key.

Step 7. After it stabilized, Lnr-2 is displayed. (Press the CAL key to cancel the operation.)

Step 8. Remove mass A, place mass B and press the PRINT key.

Step 9. After it stabilized, Lnr-3 is displayed. (Press the CAL key to cancel the operation.)

Step 10. Add mass A (confirm to place mass B and mass A on the weighing pan) and press the PRINT key.

Step 11. After it stabilized, End is displayed.

Step12. The linearity adjustment is completed. Remove the mass from the pan.

Model	Input grade	Weights		Input method and actual load on the pan			
				Lnr0	Lnr1	Lnr2	Lnr3
		A	B	No load	A	B	B+A
FX-120i, 120i WP,120GD	2	50g	50g	0	50g	50g	100g
FX-200i, 200i WP,200GD	2	100g	100g	0	100g	100g	200g
FX-300i, 300i WP,300GD	2						
FX-1200i, 1200i WP,1200GD	2	500g	500g	0	500g	500g	1kg
FX-2000i, 2000i WP,2000GD	2	1kg	1kg	0	1kg	1kg	2kg
FX-3000i, 3000i WP,3000GD	2						
FX-300CT	2	20g	20g	0	20g	40g	60g
FX-600CT	2	40g	80g	0	40g	80g	120g

Linearity and Hysteresis check

Calibrate by using the calibration mass in table below.

After calibration, in the D2(CT is D4) data mode, place the specified check mass in the table below one by one on the pan, and check that the difference between the true value and the displayed value is within the specifications (linearity). After reaching the weighing capacity, remove each mass one by one, and check that the difference between increasing points and decreasing points are within the specifications (hysteresis).

Model	Calibration masses	Check masses	Linearity (D2 mode)	Hysteresis (D2 mode)
FX-120i,120GD	100g	50g×2	±0.002g	±0.002g
FX-200i,200GD	200g	100g×2	±0.002g	±0.002g
FX-300i,300GD		100g×3	±0.002g	±0.002g
FX-1200i,1200GD	1kg	500g×2	±0.02g	±0.03g
FX-2000i,2000GD	2kg	1kg×2	±0.02g	±0.03g
FX-3000i,3000GD		1kg×3	±0.02g	±0.03g
FX-120iWP	100g	50g×2	±0.002g	±0.010g
FX-200iWP	200g	100g×2	±0.002g	±0.010g
FX-300iWP		100g×3	±0.002g	±0.010g
FX-1200iWP	1kg	500g×2	±0.02g	±0.10g
FX-2000iWP	2kg	1kg×2	±0.02g	±0.10g
FX-3000iWP		1kg×3	±0.02g	±0.10g
FX-300CT	50g	20g×3	±0.002ct (D4 mode)	±0.005ct (D4 mode)
FX-600CT	100g	40g×3	±0.002ct (D4 mode)	±0.005ct (D4 mode)

6.11 Parameter Settings

2. Serial number setting

Follow the procedure below to set the serial number.

Step 1. Display the function setting mode [UnIt], after getting into check mode shown on page 26.

Step 2. Press the [SAMPLE] key. [Sn] is displayed.

Step 3. Press the [PRINT] key. Then the display starts to blink.

Step 4. Using the following keys, input the serial number on the label attached to the each balances.
[RE-ZERO] key: changes the value of the blinking digit.
[SAMPLE] key: changes the blinking digit position.
[CAL] key : cancels the operation

Step 5. When the serial number is set, press the [PRINT] key.

Step 6. [End] is displayed to indicate that the operation is completed.

6.12 Half-initialization

Half-initialization changes all the user settings(*1) to the default values. Follow the procedure below.

Step 1. Display the function setting mode [UnIt], after getting into check mode shown on page 28.

Step 2. Press the [SAMPLE] key several times. [InItHF] is displayed.

Step 3. Press the [PRINT] key. [HF no] is displayed. (To cancel the operation, press the [CAL] key or [PRINT] key.)

Step 4. Press the [RE-ZERO] key. [HF Go] is displayed. (To cancel the operation, press the [CAL] key.)

Step 5. Press the [PRINT] key. [<HF Go] and then [End] is displayed. The Half-initialization is completed.

(*1) The user settings

- Function setting
- Value of the external mass for calibration
- Content of data memory function
- Density data of liquid for density measurement

6.13 Method of identifying defect location (Electrical part or Mechanical part)

In this chapter it explains about how easily you can check the cause of malfunction in the mechanical parts or in the electrical part, without disassembling the balance. It is advantageous if the defect is "unstable data" or "repeatability error".

1. Method of identifying in the internal offset mode

*** If both i) and ii) below are OK, the electrical part is not defective. In this case, it is likely that the cause is in the mechanical part.**

*** If both of i) and ii) are NG, or one of two is NG, the electrical part is defective. It is necessary to check or replace the electrical part especially analog board.**

i) Operation confirmation for the electrical portion of the weight A/D part by itself

Step 1. Display the data adjustment mode [d-dSP] after getting into check mode shown on page 28.

Step 2. Press the [PRINT] key. [XXXX] is displayed. (D0 data mode-weight A/D count)

Step 3. Press and hold [RE-ZERO] key and press [MODE] key. "- 1-" is diplayed on the upper left display in offset mode (seven segments). See the example on next page. With a same key operation, the mode can be moved to "-2-", "-3-" .

PC4600A (1) In the offset 1 (- 1-), verify that the data is within 1050-1350.
(2) In the offset 2 (-2-), verify that the data is within 2200-2600.
(3) In the offset 3 (-3-), verify that the data is within 3400-3800.

PC4600B～ (1) In the offset 2 (-2-), verify that the data is within 2300-2700.
(2) In the offset 3 (-3-), verify that the data is within 4800-5200

Step 4. Press the [SAMPLE] key. [XXXXXX] is displayed. (D1 display-Internal weight data)

Step 5. Press and hold [RE-ZERO] key and press [MODE] key. "- 1-" is diplayed on the upper left display in offset mode (seven segments). See the example. With a same key operation, the mode can be moved to "-2-", "-3-".

PC4600A (1) In the offset 3 (-3-), verify that the data is within 2010000-2090000.

PC4600B～ (2) In the offset 3 (-3-), verify that the data is within 2760000-3000000, and the data of dispersion is within 3 counts (MAX-MIN) in 5 seconds.

Offset mode (Weight A/D)

Weight A/D input	Dot on the upper left	PC4600A		PC4600B～	
		D0 data	D1 data	D0 data	D1 data
Offset 1 only	- 1-	Approx.1200	Approx.691200	Approx.0	Approx.1000
Offset 2 only	-2-	Approx.2400	Approx.1382400	Approx.2500	Approx.1440000
Offset 3 only	-3-	Approx.3600	Approx.2073600	Approx.5000	Approx.2880000
Ordinary state (Connecting to the mechanical part)	No display	Weight A/D count	Internal weight data D1	Weight A/D count	Internal weight data D1

Example) In the D0 data mode, to display "-2-".

MEMO