GP Series

Precision Balance

MAINTENANCE MANUAL

GP-12K GP-40K GP-30KS
GP-20K GP-60K GP-100KS
GP-22K GP-100K
GP-30K GP-102K

WT:PD4000425

A&D Company, Limited

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Contents

1. Introduction

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

<CAUTION> Before turning the power off, the following precautions must be taken so that the internal mass is removed from the sensor unit. (Avoid to transport the balance with the internal mass being placed on the sensor unit, otherwise the sensor unit may be damaged.)

1. Do not power off (Do not unplug the power cable) without following steps
2. With the power on, press the ON/OFF key and make sure that the balance displays 0g
3. Press the ON/OFF key to turn the display off, and then unplug the power cable

1.1 Equipment and Tools Required

Description	Purpose
(1) A room or chamber controllable to 10℃ and 30℃	For the temperature adjustment of the balance
(2) A phillips screwdriver 3 mm	For disassembling and reassembling
(3) A precision posidrive screwdriver	For securing the motor holder
(4) An adhesive tape 8 mm	For cleaning the force motor unit
(5) A wrench (Spanner) 7 mm	For adjusting the counter weight
8 mm	For securing the pan support rubber
(6) An allen wrench 4 mm	For securing the mass roberval
5 mm (long)	For securing the fulcrum flexure
6 mm	For securing the roberval, frame,tension flexure(1), and pan support arm
1.5 mm	For securing the cam and cam shaft (motor unit)
(7) A box wrench (screwdriver)10mm	For securing the mass spacer
(8) A drill (shaft only) ϕ3	For corner load adjustment
(9) A file (round shape) ϕ2.5	For corner load adjustment
(10) A square level block	For assembling the Mass roberval
(11) A soldering iron (25-40 W)	For soldering the ribbon cable
(12) Masses	

F1 class-compliant

Model	Masses
GP-12K	5kgx2, 10kgx1
GP-20K/22K	5kgx4, 10kgx2
GP-30K/30KS	10kgx3
GP-40K	10kgx4
GP-60K	10kgx2, 20kgx3
GP-100K/100KS/102K	20kgx5

(Total 5kgx4,10kgx4, 20kgx5)

(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

1. 2 One set of jig for disassembling or reassembling the Mechanical unit (7PA:GP-JIG)

(1) A base jig (GP-1/8)

(2) A plate for positioning the beam (1) (GP-2/8)

(3) A spacer for positioning the beam (1) (GP-3/8)

(4) A bolt for holding the beam (1) (GP-4/8)

(5) A jig for positioning the fulcrum flexure (1) (GP-5/8)

(6) A jig for positioning the fulcrum flexure (2) (GP-6/8)

(7) A jig (A) for assembling the mass roberval (GP-7/8)

(8) A jig (B) for assembling the mass roberval (GP-8/8)

(9) Screws

Allen head screw M4x20 : 4 pieces

M5x15 : 8

M6x20 : 4

M8x20 : 1

Temperature Controlled Room

A room where the temperature can be maintained at 10 ±2°C and 30 ±2°C for 8 hours or more.

2. Principles of operation

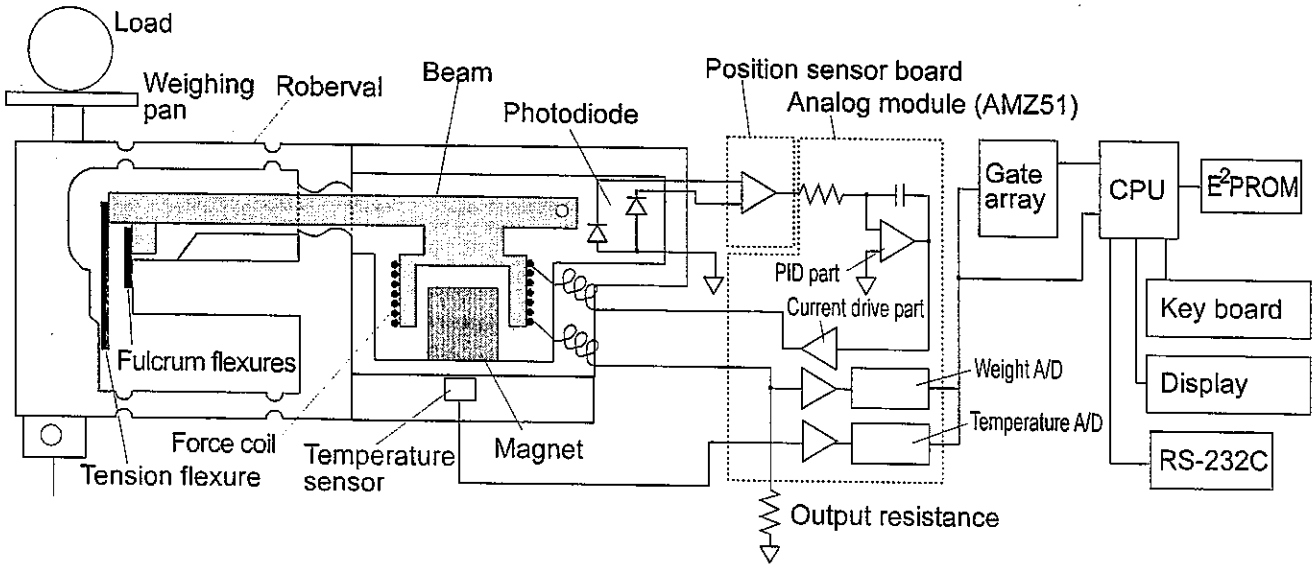
The GP balances work on the principle of "Force Restoration". Any change in the load on the weighing pan causes a Position Beam Lever to pivot on two Fulcrum Flexures (refer to diagram below). Attached to this beam is a bobbin (wound with fine wire), called the "Force Coil", which floats in a permanent 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 Module 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 Module, 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 (GP 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.)

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
- The motor functions properly without noise
- External key inputs function in the RS-232C connector
- The RS-232C communication function
- Date and time accuracy (±Two minutes in error)
- Selection of the weighing units
- Identifies each of three TLs.
- Evaluates the factor k using a 10kg weight (10000.0 g) on GP-12K for instance.

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

Repeatability

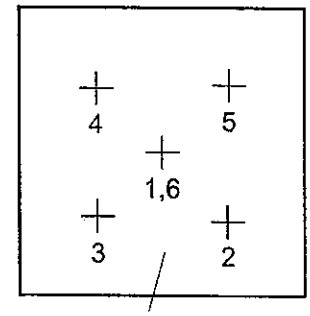
Place the specified mass at the center of the pan and remove. Record the displayed values with and without load. Repeat the test ten times (one set). Get 10 span data with subtracting the displayed value when no load is applied from the displayed value when load is applied. Obtain the standard deviation 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
GP-12K	10kg	±0.1g(standard deviation)
GP-20K	20kg	
GP-22K		±0.25g(standard deviation)
GP-30K/30KS	30kg	±0.1g(standard deviation)
GP-40K	40kg	±0.5g(standard deviation)
GP-60K	60kg	±0.7g(standard deviation)
GP-100K/100KS/102K	100kg	±1g(standard deviation)

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
GP-12K	5kg	±0.5g
GP-20K	10kg	±0.6g
GP-22K		±1.4g
GP-30K/30KS		±0.6g
GP-40K	20kg	±1.5g
GP-60K		±2g
GP-100K/100KS	40kg	±6g
GP102K		±7g

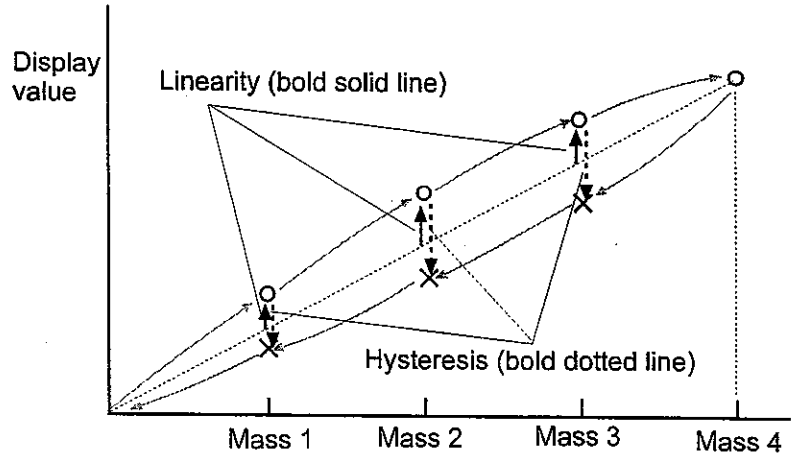


Linearity / Hysteresis

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
GP-12K	5kg×2	±0.2g	±0.5g
GP-20K	5kg×4		
GP-22K		±0.4g	±0.5g
GP-30K/30KS	10kg×3	±0.2g	±0.5g
GP-40K	10kg×4	±1.0g	±2.5g
GP-60K	20kg×3	±1g	±5g
GP-100K/100KS	20kg×5	±2g	
GP-102K			±8g

Linearity / Hysteresis



Internal mass repeatability

First, warm up the balance at room temperature for at least 12 hours after power on.
After auto calibration by pressing CAL key, place the specified mass on the pan and read the displayed value. Repeat this procedure three times. Verify that the difference between the maximum value and the minimum value is within the specifications.

Model	Masses	Specifications
GP-12K	10kg	±1g
GP-20K/22K	20kg	
GP-30K/30KS	30kg	±1.5g
GP-40K	40kg	
GP-60K	60kg	±5g
GP-100K/100KS/102K	100kg	±10g

4. Corrective Maintenance

Perform corrective maintenance for the GP 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
	Fuse	Disconnect the AC adapter and measure the fuse with an ohm meter.	Replace with the correct fuse.	F
	Power supplies of main board	Is the output of the each power supplies correct? (Refer to Table-1 of page 12) Check the V_{dd}, V_{ee}, V_{cc}, V_{fh}, V_{fl}, V_m, V_p.	Check (replace) the main 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. (J2, J2A, J3, J3A)	Replace the force motor with a substitute item. (Refer to "5. Force Motor Disassembly and Reassembly")	A
	Main board assembly (CPU, Gate array is contained)	Check the performance using the standard main board that works properly.	Replace the main board assembly with a substitute item.	H

Problem	Cause	Check	Solution	Type
Unstable weighing data, repeatability error	Force motor, AMZ51	Check the operation of weight / temperature offset A/D. (Refer to "6-13 Method of identifying defect location") If it is [EH no], the cause will be the AMZ51.	Replace the AMZ51	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 breeze break frame.	Clean the area around the pan assembly and the breeze break frame.	F
		Check that the breeze break frame does not touch the pan assembly.	Install the breeze break frame correctly so that it does not touch the pan.	F
	Damage in flexures	Check the condition of tension and fulcrum flexures.	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 37.	F
After calibrated using the internal mass, the weighing data is not correct	Force motor assembly	After auto calibration using the internal mass, check the value using the specified mass.	Fine adjustment of the linearity. Refer to page 40.	F

Problem	Location	Check	Solution	Type
Error 0 Temperature data error	Temperature sensor, AMZ51, 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 AMZ51.	Replace the AMZ51.	E
Error 1 Unstable weighing data	Force motor, AMZ51	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 AMZ51.	Replace the AMZ51.	E
CH nG Result of automatic environment setting	Pan assembly	Check that the pan assembly is correctly installed.	Install the pan assembly correctly.	F
		Check for foreign matter between the pan and breeze break frame.	Clean the area around the pan assembly and the breeze break frame.	F
		Check that the breeze break frame does not touch the pan assembly.	Install the breeze break frame correctly so that it does not touch the pan.	F
	Damaged flexures	Check the condition of tension and fulcrum flexures.	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 (U3, U4, U5) Check the soldering around each IC.	Re-solder	F
			Replace the CPU (U1)	F
			Replace the EEPROM (U3, U4, U5)	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

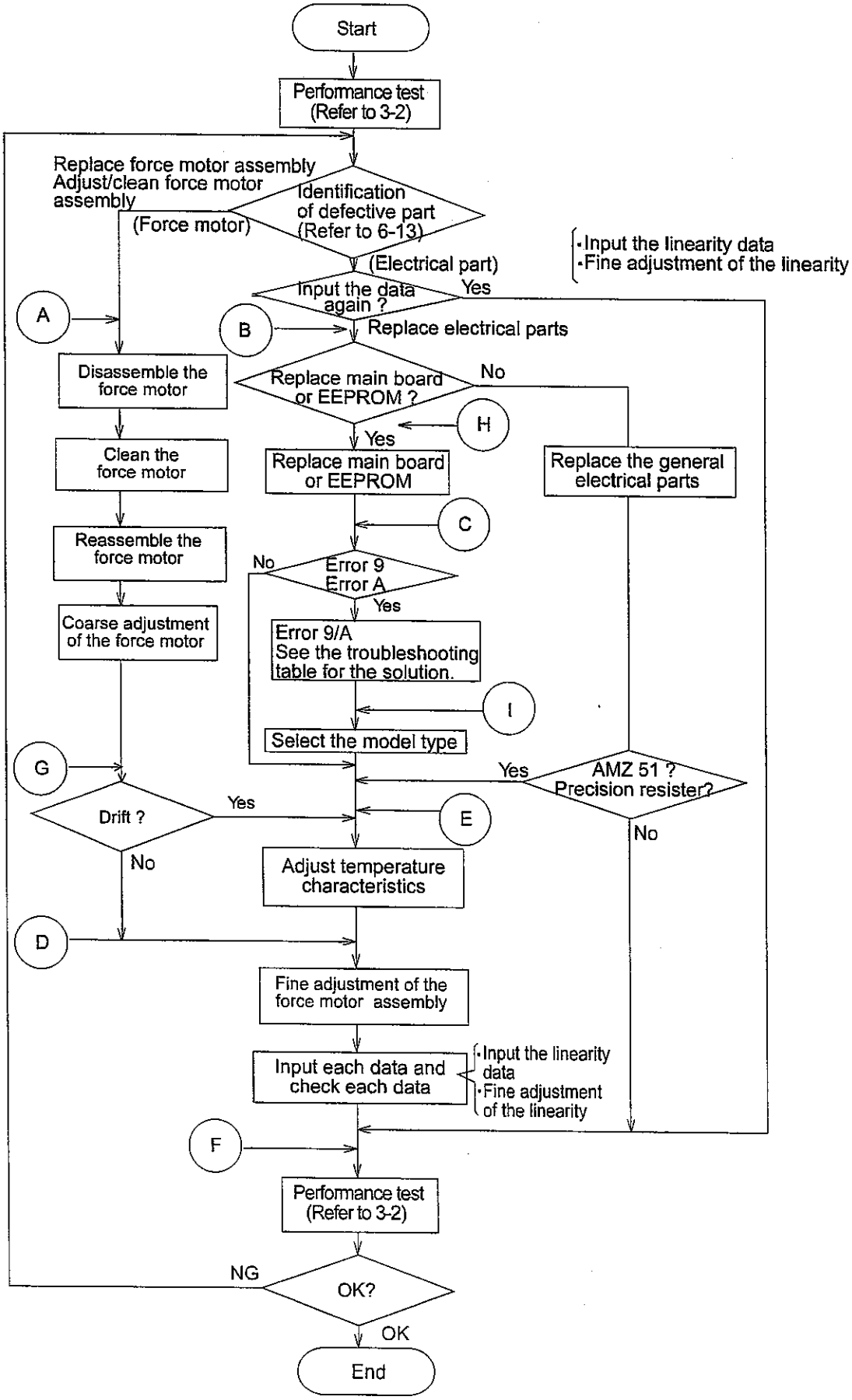
Problem	Cause	Check	Solution	Type
Error 6 Internal mass operation error, D0 value error	Pan assembly	Check that the pan assembly is correctly installed.	Install the pan assembly correctly.	F
	Weighing pan	Check that nothing is placed on the pan when the internal mass moves during the display on and off or power-on.	Make sure that nothing is placed on the pan.	F
	Internal mass assembly	Check that the internal mass is in place and that it can be raised or lowered.	Check the internal mass. Apply grease to the movable parts (five places) of the internal mass assembly.	F
		Check that the flexure beam is not broken.	Replace the flexure beam.	
Error 7 Cam detection error	Defective motor	Remove the motor and check if it rotates correctly.	Replace the motor.	F
	Cam position	Re-position the cam. (Check if the motor is overloaded)	Install the cam in the correct position.	F
	Relative position of the slit and photo interrupter	Check that the motor rotation stops correctly.	Install correctly.	F
Error 8 EEPROM error	CPU (U1) and EEPROM (U3,U4,U5) 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 (U3,U4,U5) 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 (U3,U4,U5) 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
	AMZ51,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

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
	Stopper position, Damage in flexures	Check the D0 value	If the D0 value is not within the specifications, adjust the stoppers, 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
	Stopper position, Damage in flexures	Check the D0 value	If the D0 value is not within the specifications, adjust the stoppers, replace flexures and reassemble	A
rtc PF Or gap at date and time	Defective battery for clock	Check if the voltage at both ends of R20 is 3.3mV or less. Check if the voltage between the minus side of lithium-battery and the cathode side the diode (D3) is 2.5V or more	If the voltage is lower, replace the lithium-battery and set the clock data. (After setting the clock data, do not touch the lead leg of X2 by tool or hand)	F
CH no	AMZ51	In case of CH no is displayed by the self check function	Replace the AMZ51	E

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

Circuit symbol	Specifications	Check point	Voltage generation element
Vdd-LG	5.3V – 4.7V	At both ends of C16	U11
Vg-LG	5.3V – 4.7V	At both ends of C11	U9, U10
Vcc-LG	10.4V – 9.6V	Between the plus side of C10 and the minus side of C11	U9, U10
Vfh-LG	8.0V – 8.9V	Between the plus side of C104 and the minus side of C113	U101
Vvfd-LG	24.8V – 27.5V	At both ends of C112	U104
Vb-LG	2.8V – 3.2V	Between the plus side of C108 and the minus side of C113	D104 – D107
Vfl-LG	0.8V – 1.2V	Between the minus side of C108 and the minus side of C113	U102
Vfh-Vp	5.2V – 5.8V	Between the plus side of C104 and the plus side of C108	U101,102

4.2 Maintenance Flowchart



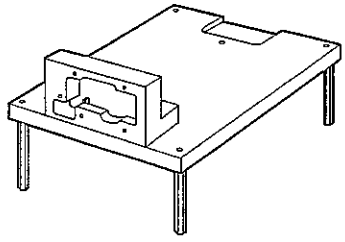
5. Force Motor Disassembly and Reassembly

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

Notes: **It should be a dust free environment for disassembly and reassembly.**
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:GP-JIG) for GP Mechanical unit disassembly and reassembly



Base jig (GP-1/8)

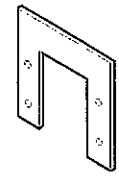
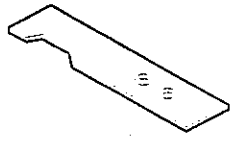
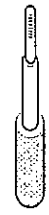


Plate for positioning the beam(1) (GP-2/8)



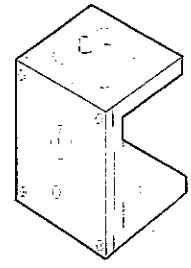
Spacer for positioning the beam(1)(GP-3/8)



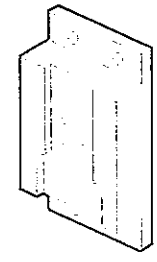
Bolt for holding the beam(1) (GP-4/8)

Jig for positioning the fulcrum flexure(1)(GP-5/8)

Jig for positioning the fulcrum flexure(2)(GP-6/8)

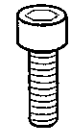


Jig(A) for assembling the mass roberval (GP-7/8)



Jig(B) for assembling the mass roberval (GP-8/8)

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



Allen head screw
- M4x20 (4pcs)
- M5x15 (8pcs)
- M6x20 (4pcs)
- M8x20 (1pce)

5.1 Disassembly

1. Removing the upper case

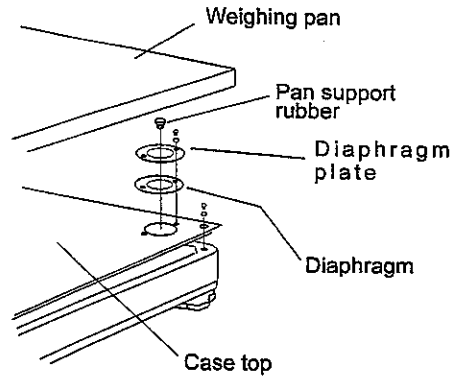
① Remove the weighing pan.

② Remove the screws (pan head screw M3×6 with nylon washer,8pcs) from the diaphragm, and the diaphragm plate.

③ Remove the pan support rubber.

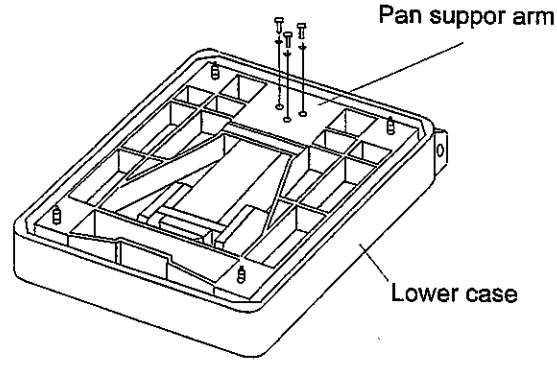
④ Pull and push up to remove the diaphragm from the case top.

⑤ Remove the case top. (pan head screw M4× 12 with nylon washer, 8 pcs)

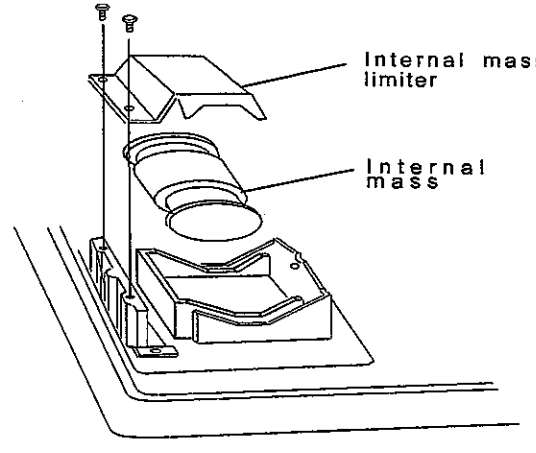


2.Removing the mechanical unit

① Remove the pan support arm from the roberval. (allen head screw M6×20 with coned disk washer (small) steel, 3pcs)

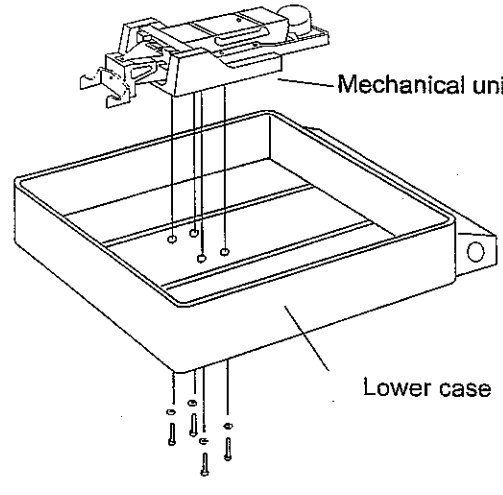


② Remove the internal mass limiter and the internal mass. (pan head screw M4 ×8 with spring and plain washer, 2 pcs)



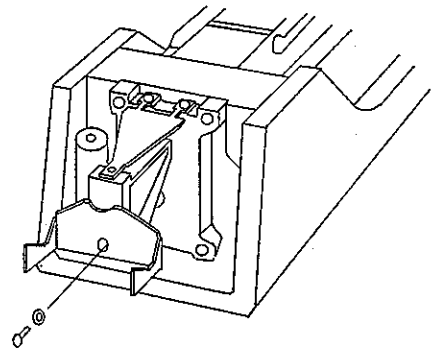
③ Disconnect the cable from the relay board.

④ Remove the mechanical unit. (allen head screw M6×18 with coned disk washer (small) steel, 4 pcs)

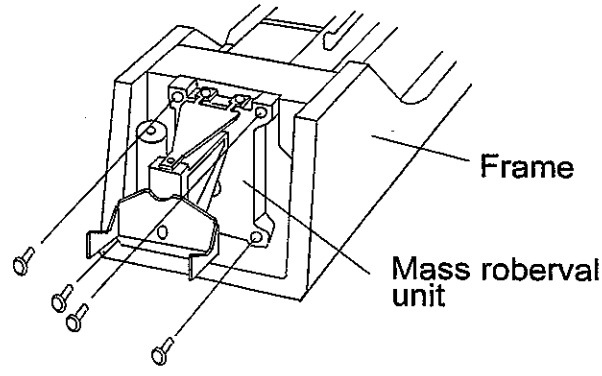


3.Disassembling the mass roberval

① Remove the tension flexure connecting the internal mass floating frame and the mass beam spacer. (pan head screw M4×6 with coned disk washer and the fulcrum flexure holder)

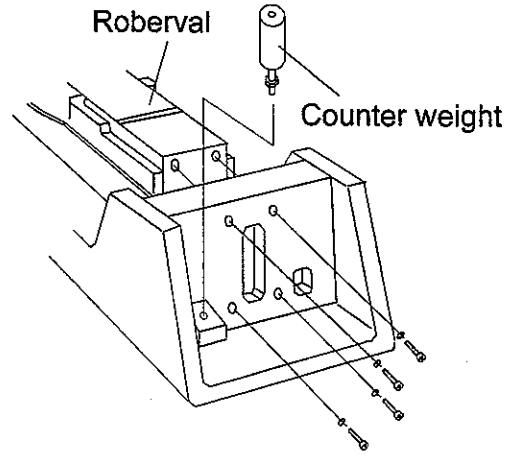


② Remove the mass roberval unit from the frame. (pan head screw M4×18 with spring and plain washer, 4 pcs)



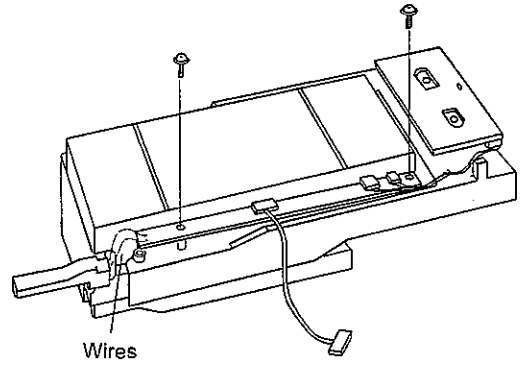
4.Disassembling the frame

① Remove the counter weight. (nut M4)
② Remove the roberval from the frame. (allen head screw M6×25 with spring and plain washer (small), 4 pcs)

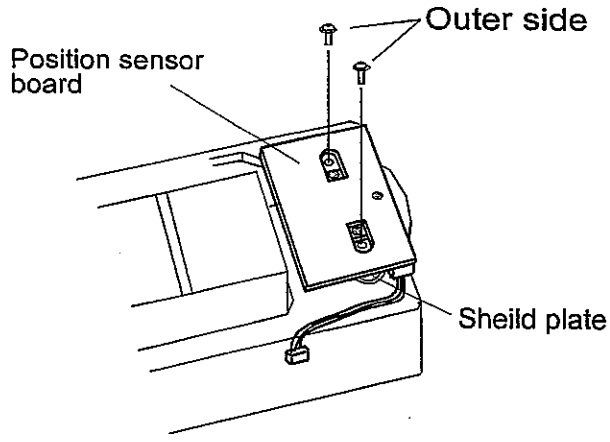


5.Disassembling the mechanical unit

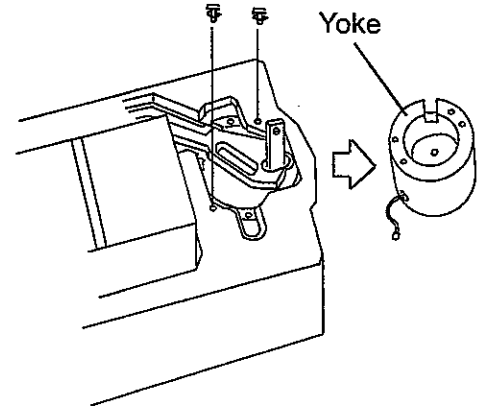
① Remove the wires from the beam (2) using a soldering iron.
② Remove the relay board on the magnetic support. (pan head screw M3 x 6 with spring and plain washer, 2 pcs)



③ Remove the shield plate. (pan head screw M3 × 8 with spring and plain washer, steel, chromated, 2 pcs)
The shield plate can be removed with the position sensor board.

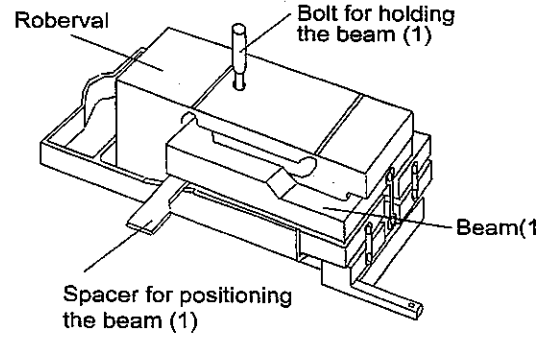


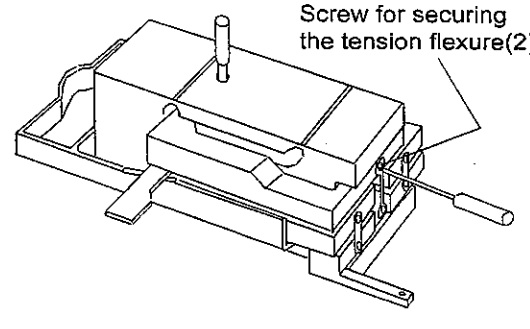
④ Remove the yoke (pan head screw M4 x 8 with spring and plain washer ϕ6.5, 2 pcs)



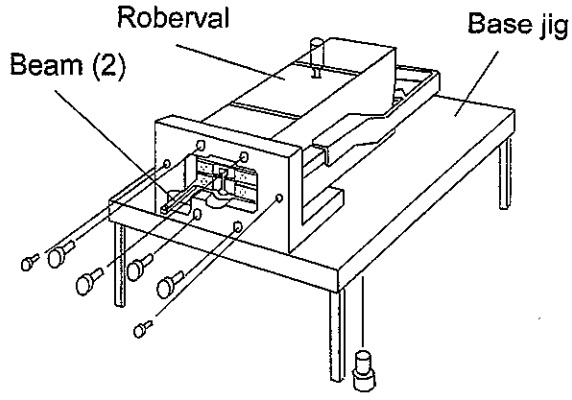
⑤ Remove the relay board.(pan head screw M3 × 6 with spring and plain washer, 2 pcs)

⑥ Insert the spacer for positioning the Beam (1) between the beam (1) and the roberval, and secure the beam (1) with the bolt for holding the beam.
If the spacer for positioning the beam (1) can not be inserted easily, loosen the screw securing the tension flexure (2) on the beam (1).
(pan head screw M4 x 8 with coned disk washer and the flexure holder.



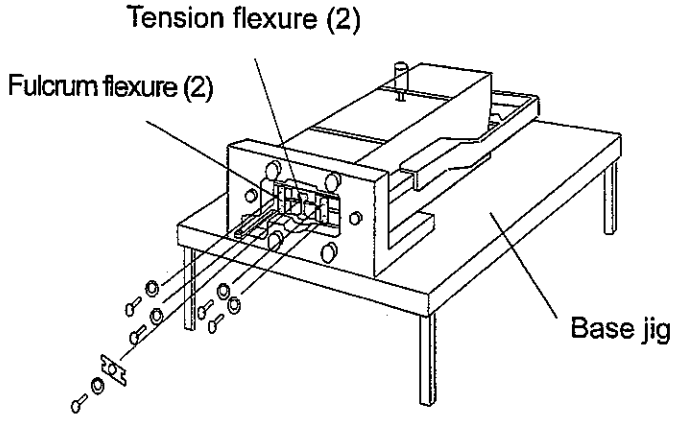


⑦ Secure the roberval and the beam (2) on the base jig.(M4 x 20: 2pcs, M6 x 20: 4pcs, M8 x 20 :1pce)

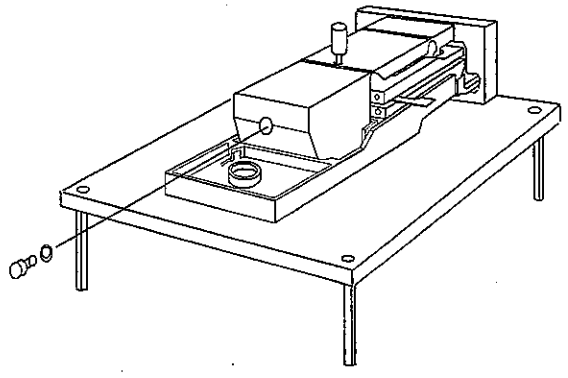


⑧ Remove the tension flexure(2) from the beam (1). (pan head screw M4 × 8, coned disk washer, the flexure holder)
With the tension flexure being bended remove the screw (the mass beam spacer, coned disk washer, the tension flexure holder)

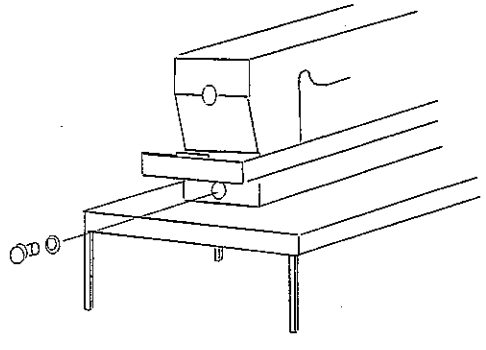
⑨ Remove the fulcrum flexure.(2) (pan head screw M4×6 with the distance ring, coned disk washer, 4pcs)



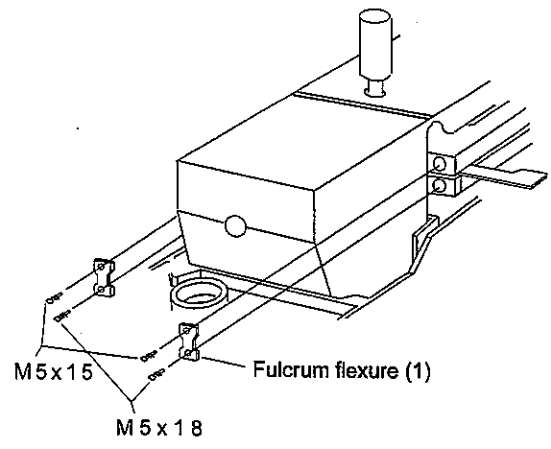
⑩ Remove the bolt for holding the beam from the tension flexure (1). (cap head screw M6×12 with coned disk washer (small), steel, the tension flexure holder (upper).



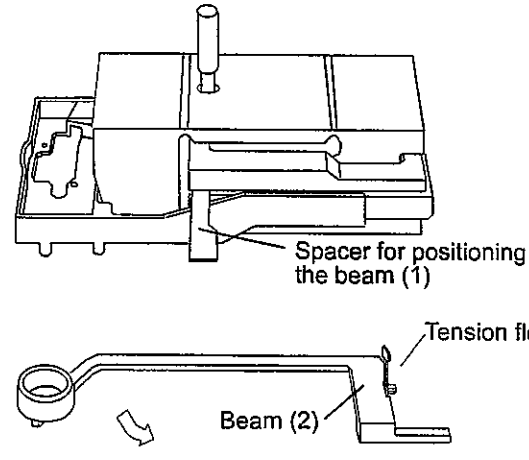
⑪ Loosen the screw securing the tension flexure (1) and the roberval. (cap head screw M6×18 with coned disk washer (small), steel).



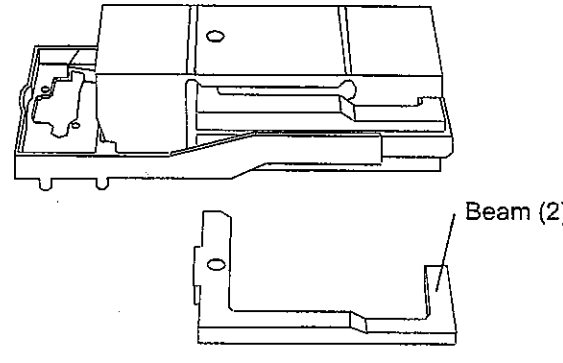
⑫ Remove the fulcrum flexure (1). (allen head M5x15 with coned disk spring, the flexure holder ϕ12, 2pcs, allen head M5 x 18 with coned disk washer, the flexure holder, 2pcs)



⑬ Remove the beam (2) from the base jig.

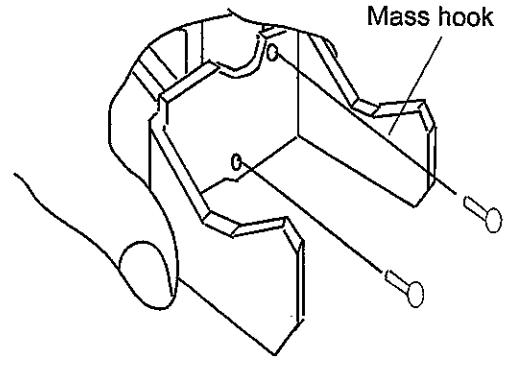


⑭ Remove the spacer for positioning the beam (1) and the bolt for holding the beam, and the beam (1).

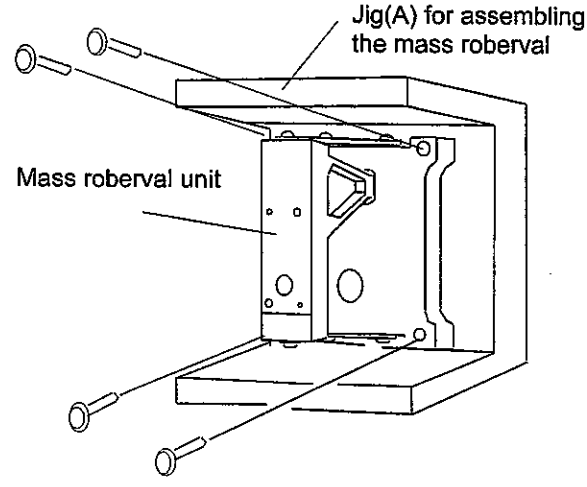


6.Disassembling the roberval Unit

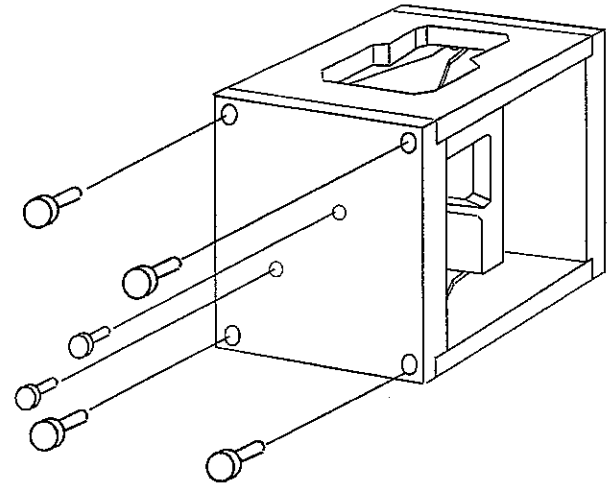
① Remove the internal mass hook. (pan head screw M4×6 with spring washer, 2 pcs)



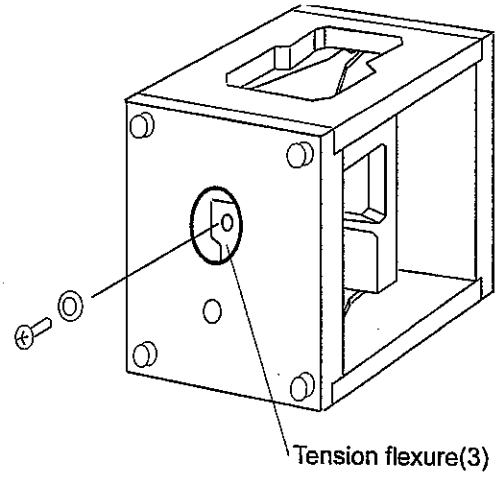
② Secure the frame of the mass roberval unit on the jig (A) for assembling the mass roberval (M4: 4pcs)
Use the screws disassembled.



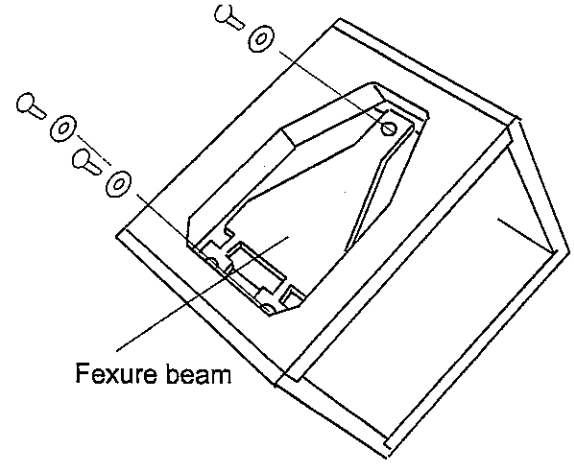
③ Place the jig (B) for assembling the mass roberval into the jigs assembled in step No.② above. (M5 x 15: 4 pcs, M4 x 20: 2 pcs)



④ Remove the Tension flexure (3). (pan head screw M4 x 6 with teflon coated disk washer)



⑤ Remove the flexure beams. (pan head screw M4×6 with teflon coated disk washer, 6 pcs)



7.Disassembling the Beam (2)

① Remove the tension flexure (2). (the mass beam spacer)

② Remove the wires from the bobbin with a soldering iron.

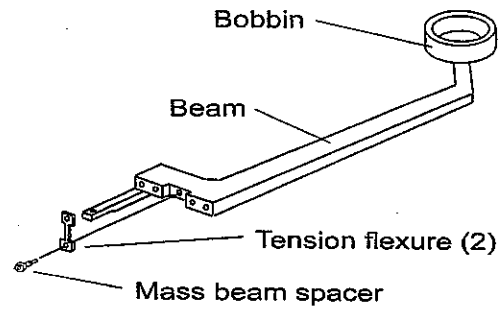
③ Remove the bobbin. (pan head screw M3×4, brass, no plating, 2 pcs)

5.2 Assembly

1.Assembling the beam (2) unit

② Secure the bobbin from the beam. (pan head screw M3 × 4, brass, no plating, 2 pcs)

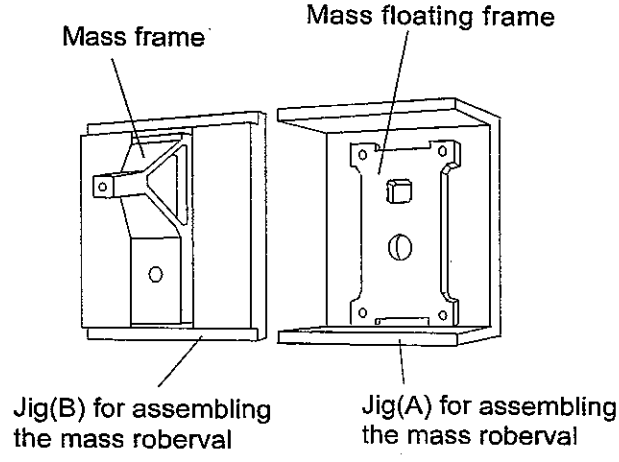
③ Solder the wires to the bobbin. The wire must be glued to the bobbin.



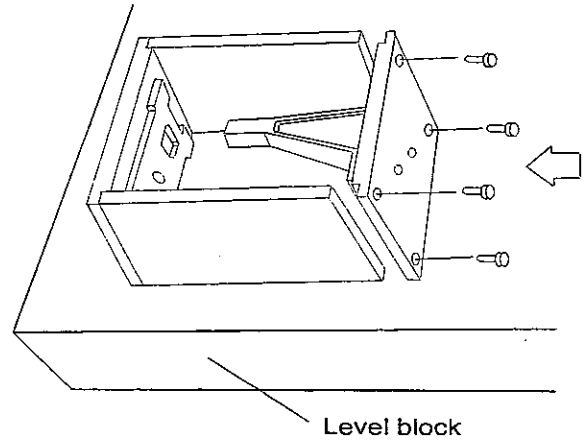
④ Insert the tension flexure (2) into the guide of the beam (2) and secure the tension flexure (2) with the mass beam spacer.
Tightening torque...30kgf · cm

2. Assembling the mass roberval unit

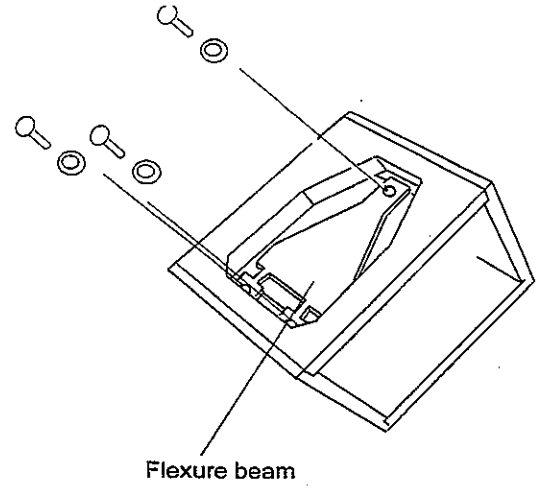
① Place the internal mass frame on the jig (A) for assembling the mass roberval, and the jig (B) for assembling the mass roberval on the internal mass frame.



② Place the jigs with the internal mass frame on the level block horizontally.

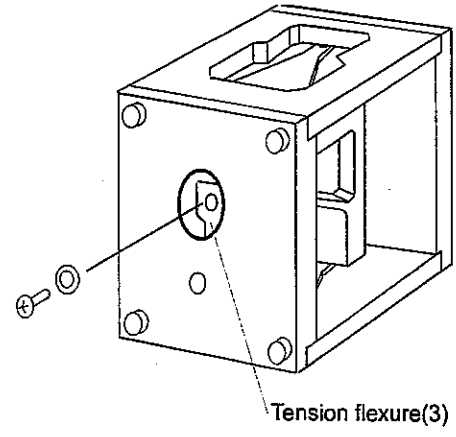


③ Secure the flexure beam. (pan head screw M4 × 6 with Teflon coated coned disk washer, 6 pcs)
Tightning torque...14kgf · cm



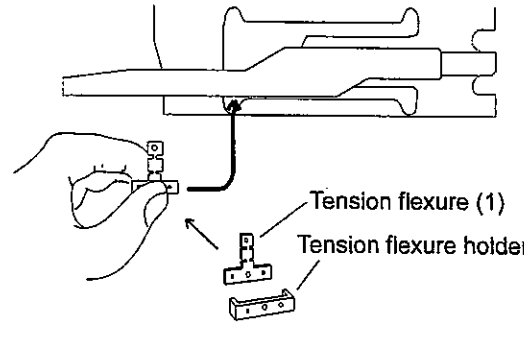
④ Secure the tension flexure (3) to the mass roberval. (pan head screw M4 X 6 with teflon coated coned disk washer)

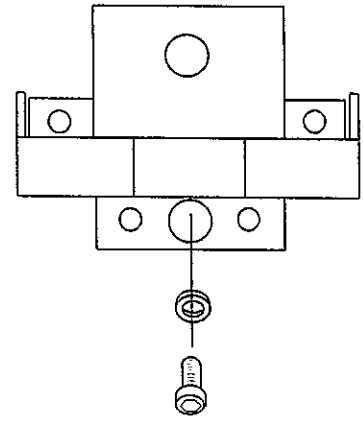
⑤ Remove the mass roberval from the jigs.



3. Assembling the mechanical unit

① Place the tension flexure (1) and then the tension flexure holder on the roberval, and tighten the screw temporarily. (allen head screw M6× 18 with coned disk washer (small), steel)





② Assemble the beam (1) temporarily using the spacer for positioning the beam (1) and the bolt for holding the beam (1). Adjust the position of the tension flexure so that the hole of the tension flexure (upper side) drilled hole of the tension flexure meets the hole of the beam (1).

③ Hold the roberval to the surface, for installing the fulcrum flexure (1), of the beam (1) using the plate positioning the beam (1).
Adjust the position of the tension flexure (1) so that the screw hole of the tension flexure (1) meets one of the beam (1).

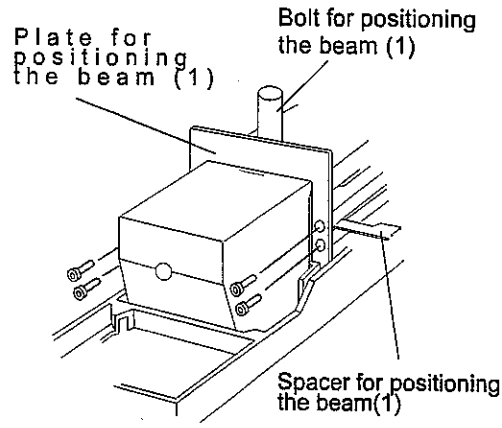
④ Tighten the bolt for holding the beam (1).

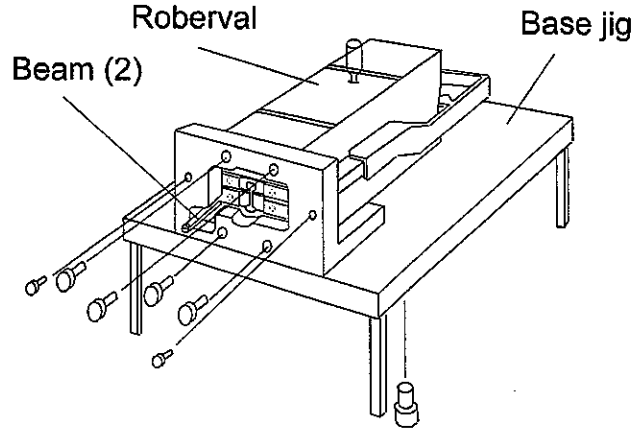
⑤ Install the beam (2) to the roberval with care not to bend the tension flexure (2).
Make sure that the force coil should not touch the magnetic support while installing.

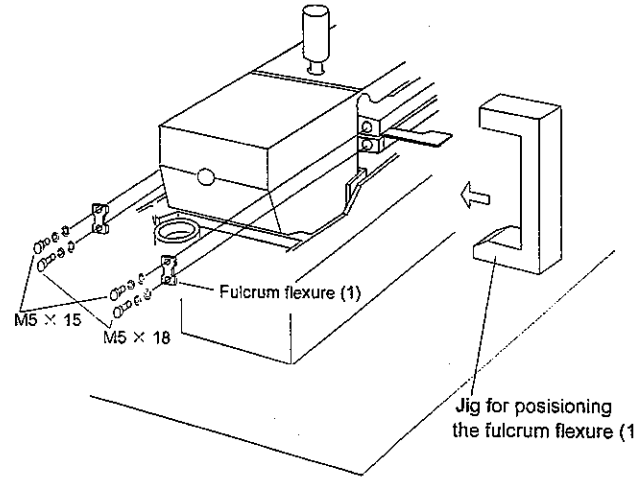
⑥ Place the roberval and the beam (2) to the base jig.
Make sure that the screw hole of the tension flexure (2) overlaps one of the beam (1).

⑦ Remove the plate for positioning the beam (1). Secure the fulcrum flexure (1) using the jig for positioning the fulcrum flexure (1). Install the fulcrum flexure (1) perpendicularly. (allen head screw M5×15 with coned disk washer and the flexure holder, allen head screw M5×18 with the coned disk washer and the flexure holder, 2 pcs each)
Tightening torque...80kgf・cm

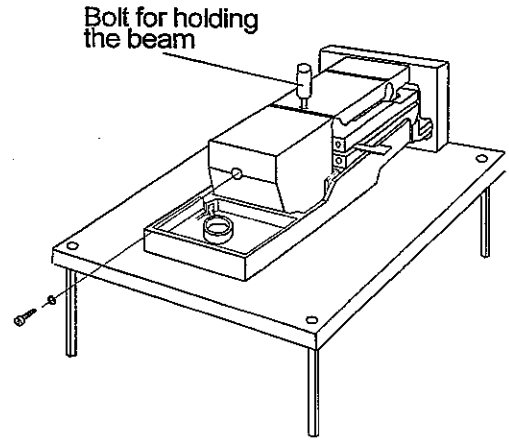
⑧ Tighten the screw on the lower side of the tension flexure (1). (allen head screw M6 x 18 with coned disk washer (small), steel)
Tightening torque...120kgf・cm







⑨ Secure the screw on the upper side of the tension flexure (1). (allen head screw M6 × 12 with coned disk washer (small) steel and the tension flexure holder (upper).
Tightening torgue...120kgf · cm

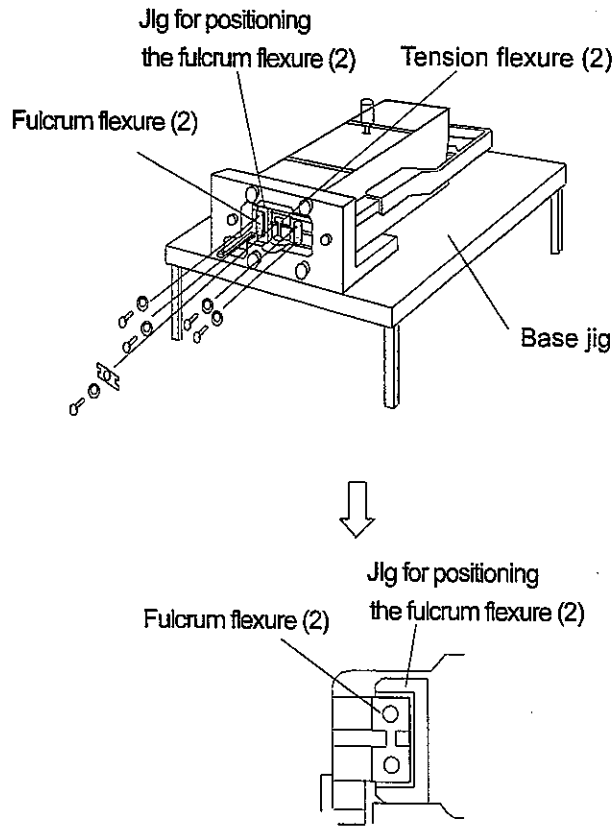


⑩ Secure the the fulcrum flexure (2) using the jig for positioning the fulcrum flexure (2). Install the fulcrum flexure (2) perpendicularly. (pan head screw M4×6 with coned disk washer, 4 pcs)
Tightening torque...15kgf · cm

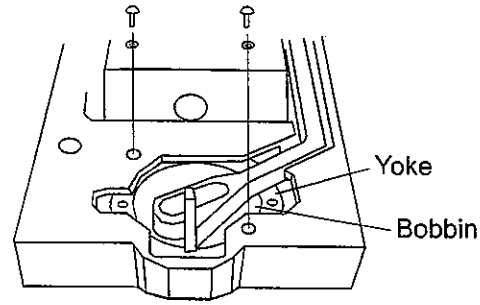
⑪ Secure the the tension flexure (2) to the beam (1). (pan head screw M4×8 with coned disk screw and the flexure holder)
Tightening torque...15kgf · cm

⑫ Remove the mechanical unit from the base jig.

⑬ Remove the bolt for positioning the beam (1) and the spacer positioning the beam (1)

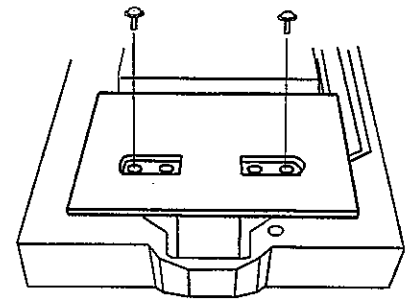


⑭ Secure the yoke to the frame keepingan even clearance between the yoke and bobbin. (pan head screw M4x8 with spring and plain washer ϕ 6.5, 2 pcs)
Tightening torque...15kgf · cm

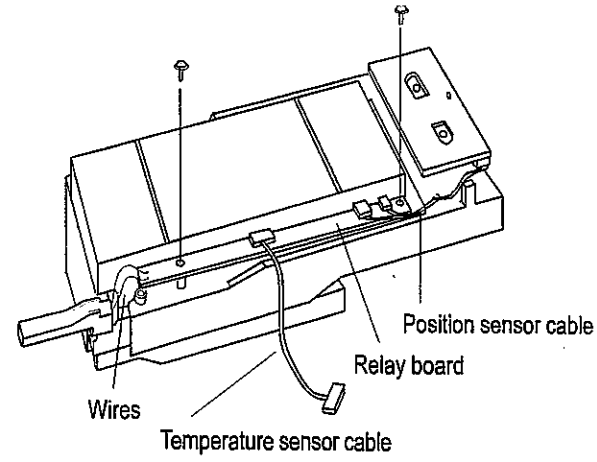


⑮ Secure the shield plate. (pan head screw M3x8 with plain and spring washer, steel, chromated,2 pcs)
Tightening torque...10kgf · cm

⑯ Secure the relay board on the magnetic support, (pan head screw M3x6 with spring washer and plain washer, 2 pcs)

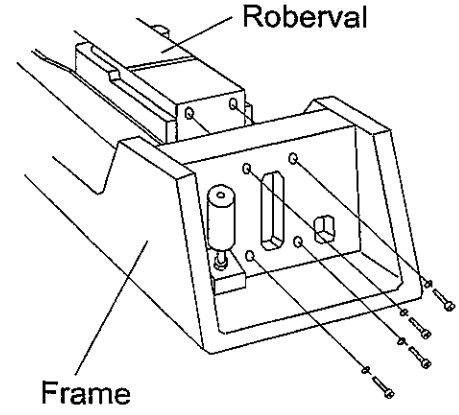


⑰ Solder the wires from the relay board to the beam (2).

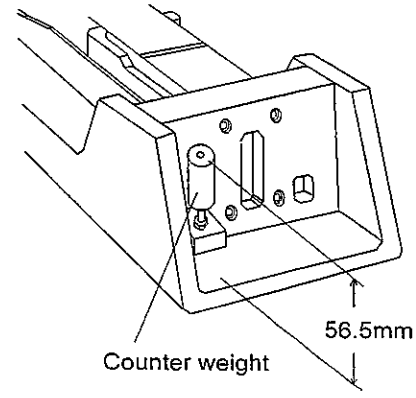


4. Installing the mechanical unit

① Hold the upper side of the roberval , and place and secure the roberval to the frame installing the sensor cable through the hole of the frame. (allen head screw M6x25 with spring washer and plain washer (small), 2 pcs)
Tightening torque...120kgf · cm



② Secure the counter weight.
The distance between the surface of the frame and the top of the counter weight is 56.5mm.

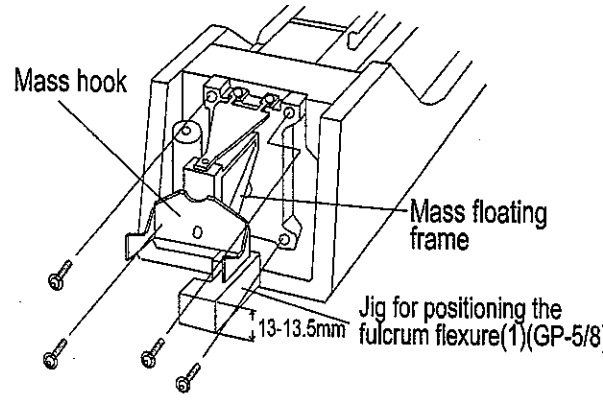


5. Installing the mass roberval unit

① Install the mass roberval unit. Make sure that the hole, for the tension flexure, of the internal mass floating frame overlaps the tapping hole of the beam (2). (pan head screw M4x18 with spring washer and plain washer, 4 pcs)
Tightening torque...15kgf · cm

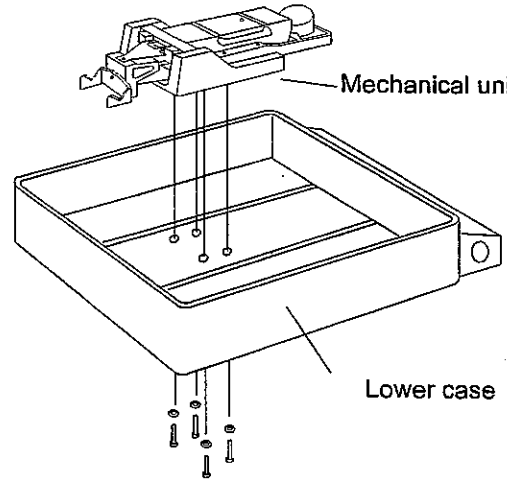
② Place the frame on the level block. Insert the jig for positioning the fulcrum flexure (1) using the width of 13.0mm under the internal mass floating frame, and secure the tension flexure (3) to the mass beam spacer. (pan head screw M4x6 with teflon coated coned disk washer and the tension flexure holder)
Tightening torque...15kgf · cm

③ Secure the mass hook to the internal mass floating frame. (pan head screw M4x6 with spring washer and plain washer, 2 pcs)



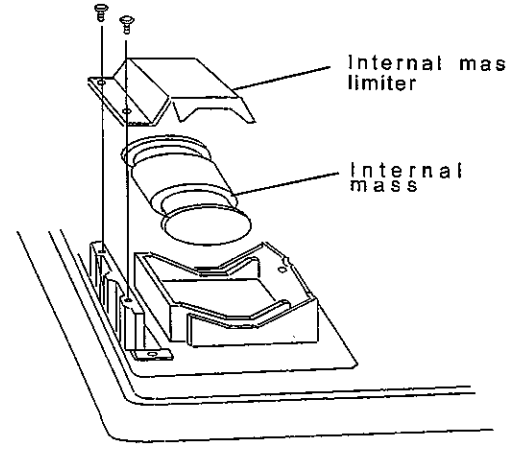
6. Installing the mechnical unit to the lower case

① Secure the mechnical unit to the lower case. (Position the mechanical unit side by side with the lower case)
(allen head screw M6x18 with coned disk washer(small), steel, 4 pcs)
Tightening torque...140kgf · cm

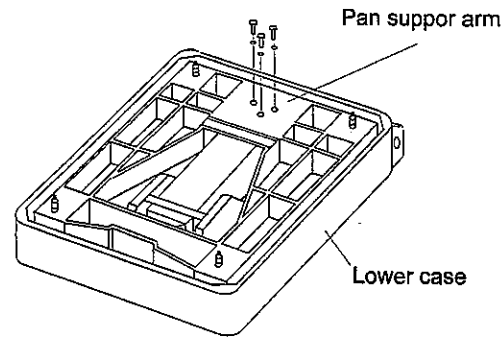


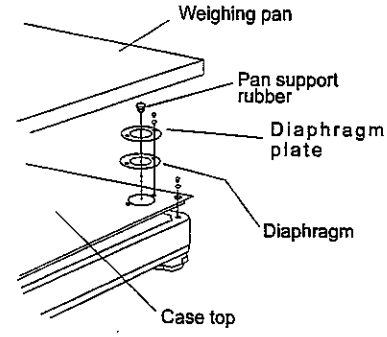
② Install the 380g internal mass and the internal mass holder. (Position the internal mass holder side by side)
(pan head screw M4x6 with spring and plain washer, 2 pcs)

③ Adjust the motor unit back and forth so that the intenal mass pushes down the internal mass holder.



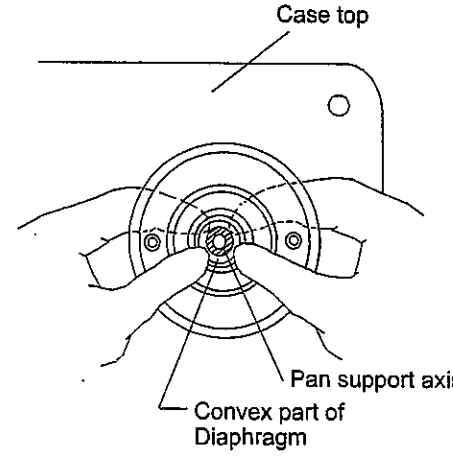
④ Secure the pan support arm side by side with the lower case. (allen head screw M6x20 with coned disk washer (small), steel, 3 pcs)
Tightening torque...140kgf・cm



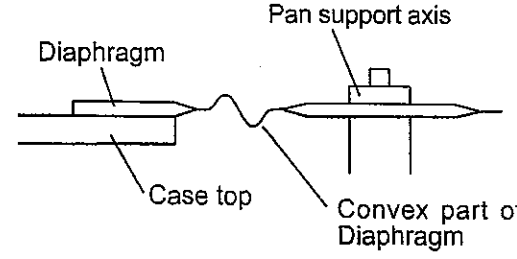


7. Installing the case top

① Make sure that the packing is not swelled. If being swelled, glue the packing on the lower case with silicon adhesive agent.
② Secure the case top to the lower case. Adjust the position of the pan support axis to meet the hole of the case top. (pan head screw M4x12 with plastic washer, 8 pcs)
Tightening torque...5kgf・cm
③ Hold the convex part of the diaphragm with hands, and insert the diaphragm into the guide of the pan support axis. Make sure that the diaphragm is not swelled.



④ Install the pan support rubber and tighten temporarily with a spanner wrench. Adjust the tightening rotation of the pan support axis so that the holes of the diaphragm meet the hole of the tapping hole of the case top.
⑤ Hold and secure the diaphragm. (pan head screw M3x6 with plastic washer, 8 pcs)
Tightening torque...3kgf・cm



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).

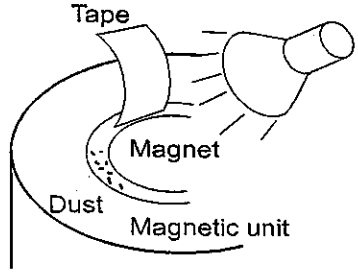
② Clean around the inner and outer surfaces of the magnet well using the adhesive tape.

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.

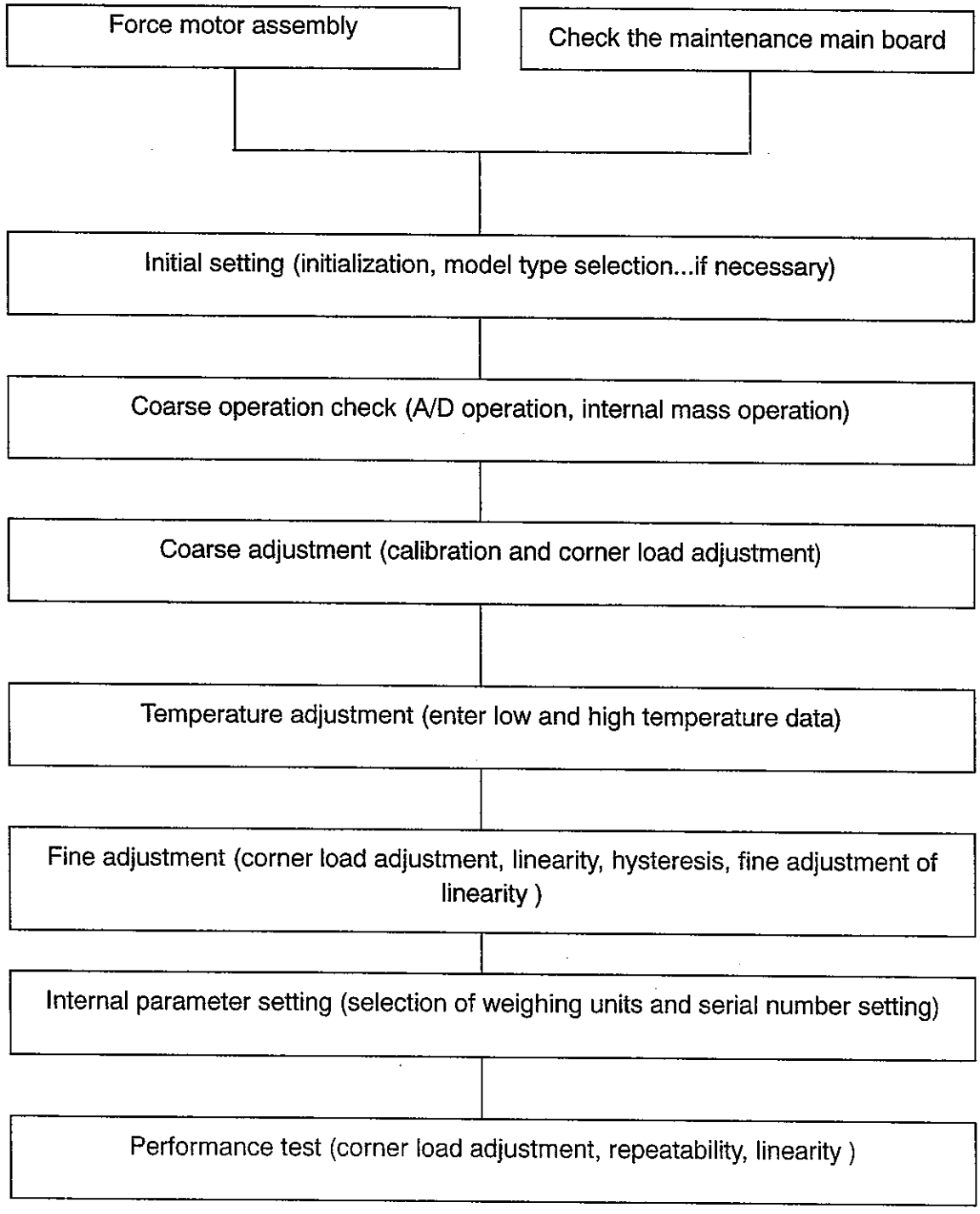
⑤ Reassemble the force motor and test it for repeatability. Corner load error can often be traced to a repeatability problem.

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



6. Adjustments

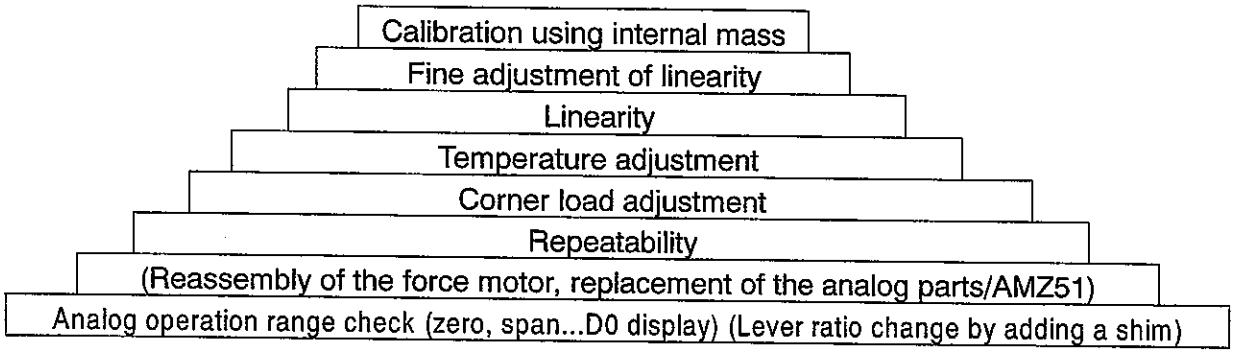
6.1 Adjustment Flow Chart



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.

GP Series



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.

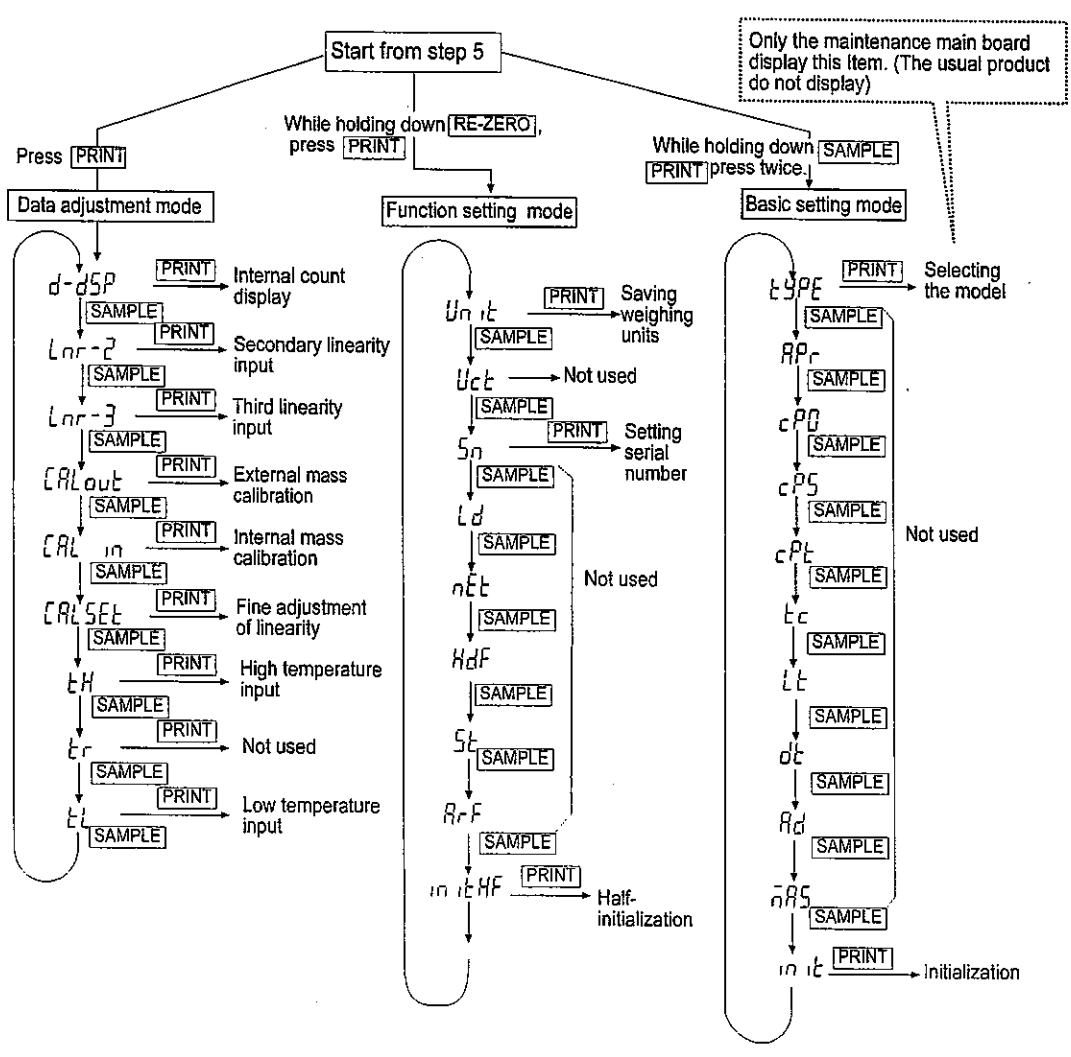
Step 2. Press and hold the RE-ZERO and PRINT keys and press the ON/OFF key. Release the PRINT and ON/OFF keys while still holding the RE-ZERO key. Immediately press the PRINT key twice. Perform this procedure within 2 seconds.

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

Step 4. The balance model type will be displayed [12 GF- K] . (The model type displayed depends on each actual model.)

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

2. Check mode menu

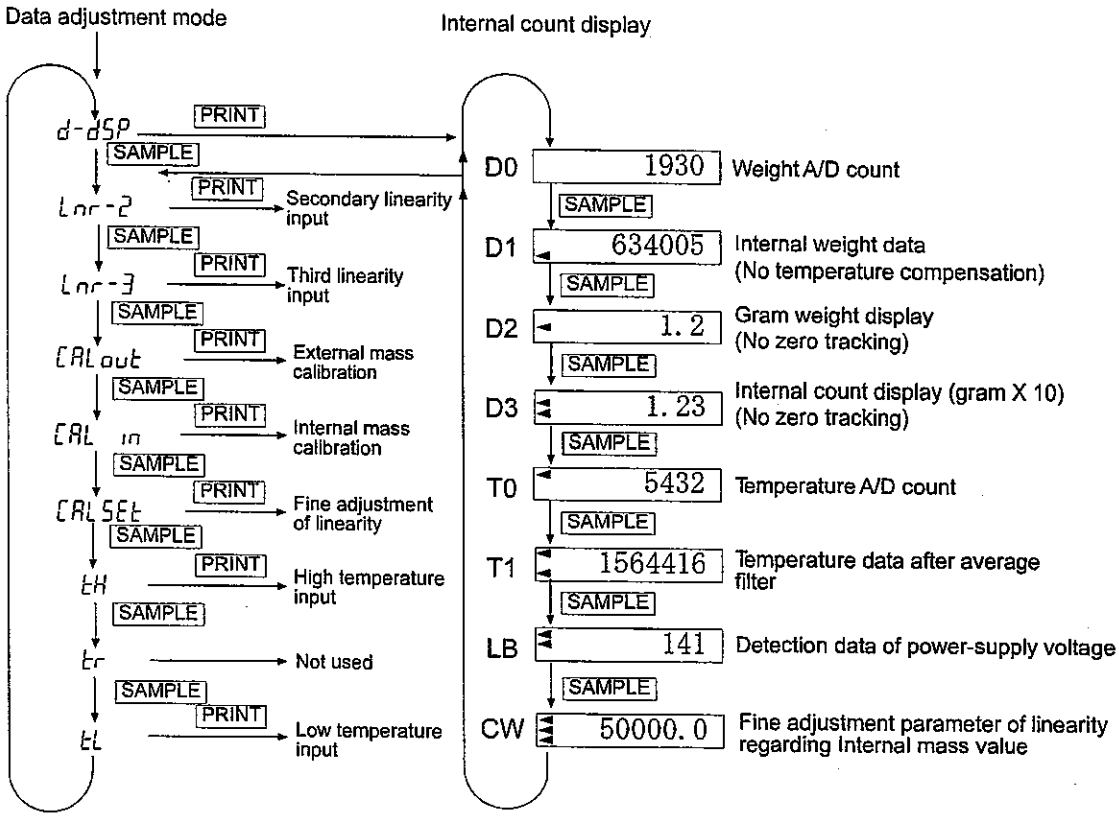


Note: In the above content, the way of displaying may differ depending on the each software version.

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, or T0, T1 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 or the temperature sensor is disconnected internally. And certain electric signals are input in each 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-3633A/B (Main board for the maintenance).

☐ Verify the type of the board

- To the each type (A/B), verify the value of R11/R12 and 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 32 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-3633A	GP12K/20K/22K/30K/40K/30KS	30 GP K
7PZ-3633B	GP60K/100K/102K/100KS	100 GP K

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 and pan support receptor is installed properly. Verify that the count without load (zero point) is within 2000 – 4000 counts.

Note: If the zero point is not within the specification, adjust it by cutting jumpers (on the main board).
Cut JP2...Zero point +1500(D0), cut JPA...Zero point +3000(D0)

Step 4. Place the mass in the table below on the pan. Read the count with load. Subtract the count without load from the count with load to obtain the span value. Verify that the span 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.

Model	Masses	Span (D0 data)	Dispersion (D2 data)
GP-12K/20K/22K/30K/ 30KS/40K	30kg	4000～5000	MAX-MIN: 0.2g/5 seconds
GP-60K/100K/100KS/ 102K	100kg	8000～10000	MAX-MIN: 2g/5 seconds

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 data)	Dispersion (T1 data)
GP-12K/20K/22K/30K/ 30KS/40K	1500000-1700000	MAX-MIN: 20 counts/5 seconds
GP-60K/100K/100KS/ 102K		

2. Motor operation check

Step 1. In the D0 data mode (weight A/D count), press the [SAMPLE] key twice. [X.XXX] will be displayed. (D2 data)

Step 2. Each time the PRINT key is pressed, the motor rotates and [M0] is displayed. Verify the following:

Applying and releasing the internal mass is performed smoothly.
No strange noises are generated during the movement of the internal mass.

Step 3. In the D2 data mode, press the PRINT key five times, and check the repeatability of internal mass.

Model	Times	Repeatability specifications (D2 data mode)		
		Repeatability		Absolute value
		Zero	Span	Span
GP-12K/20K/22K/30K/ 30KS	5	±0.2 g	±0.2 g	40kg～60kg
GP-40K		±1.0g	±1.0 g	
GP-60K/100K/100KS/ 102K		±2g	±2 g	

3. Insulation check of force coil

By using a multimeter which can measure 20MΩ or more, measure the resistance between the force coil (pin 1 or pin 2 of J3) and the frame.
Verify that the measurement result is the same as when the terminal of multimeter is opened.

6.8 Coarse Adjustment

1. Calibration

Internal mass calibration

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

Step 1. Display the data adjustment mode [d-dSP] after getting into check mode shown on page 32.

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

Step 3. Press the [PRINT] key. The motor starts to operate.

Step 4. The display changes in turn as follows:

[CAL.] → [<CAL .] → [CAL .] → [<CAL .] → [End]

Step 5. The operation is completed. Proceed to the next step.

2. Corner load adjustment

Corner load is adjusted in the check mode D2 display.
If the corner load error is greater, insert a spacer between the mass roberval and the mass frame and adjust the corner load within +/- 2.0kg.
For the adjustment method, save the adjustment hole of the roberval using a file.
(By the corner load adjustment, particles are likely to be generated. Be careful that the particles do not affect the force motor unit or the circuit board. Remove the particles by using adhesive tape.)

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 data mode, place an external mass as shown on the table below on the center of the pan and at four positions half the distance from the center of the pan to the edge. See the figure on next page.
If the error is greater than 2.0kg comparing the corner load between right and left side, insert a spacer between the mass roberval and the mass frame for the adjustment.
Adjust the corner load error at the back of weighing pan to be within about +10digits, shaving the center hole of the corner load adjustment holes of the rolerval with a shaft of drill ϕ3. Turn the shaft of the drill gently by hand.

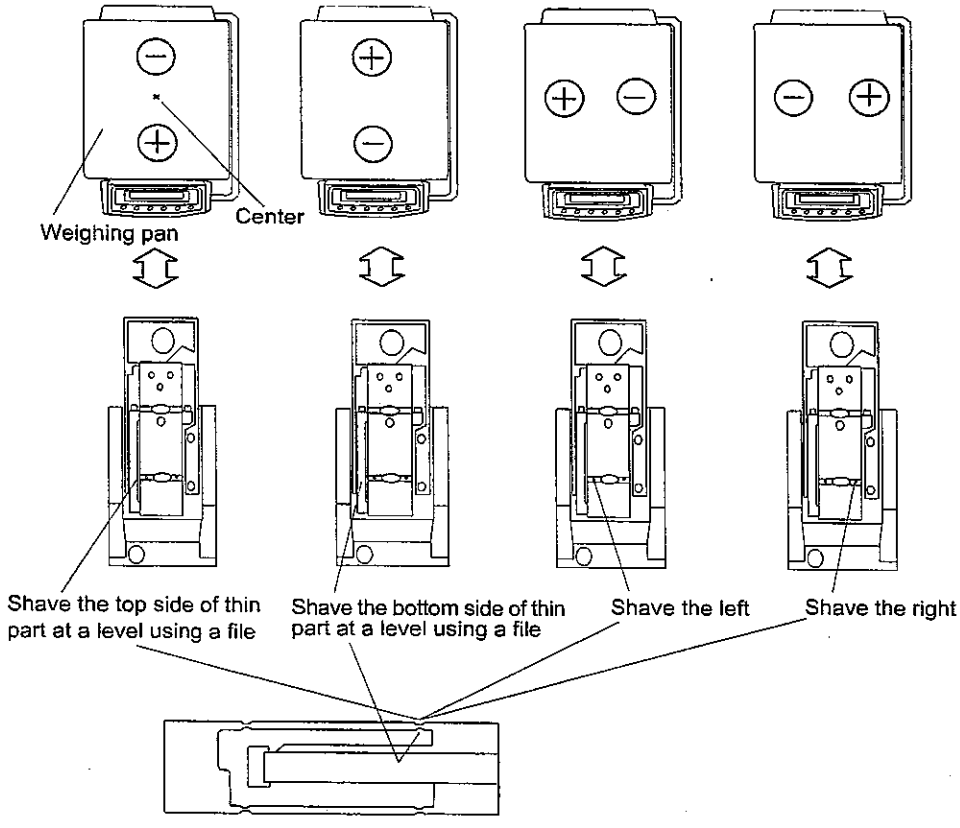
In the initial state, If the corner load error at the back of weighing pan is minus counts, shave the bottom side of thin part at a level using a file (ϕ 2.5).

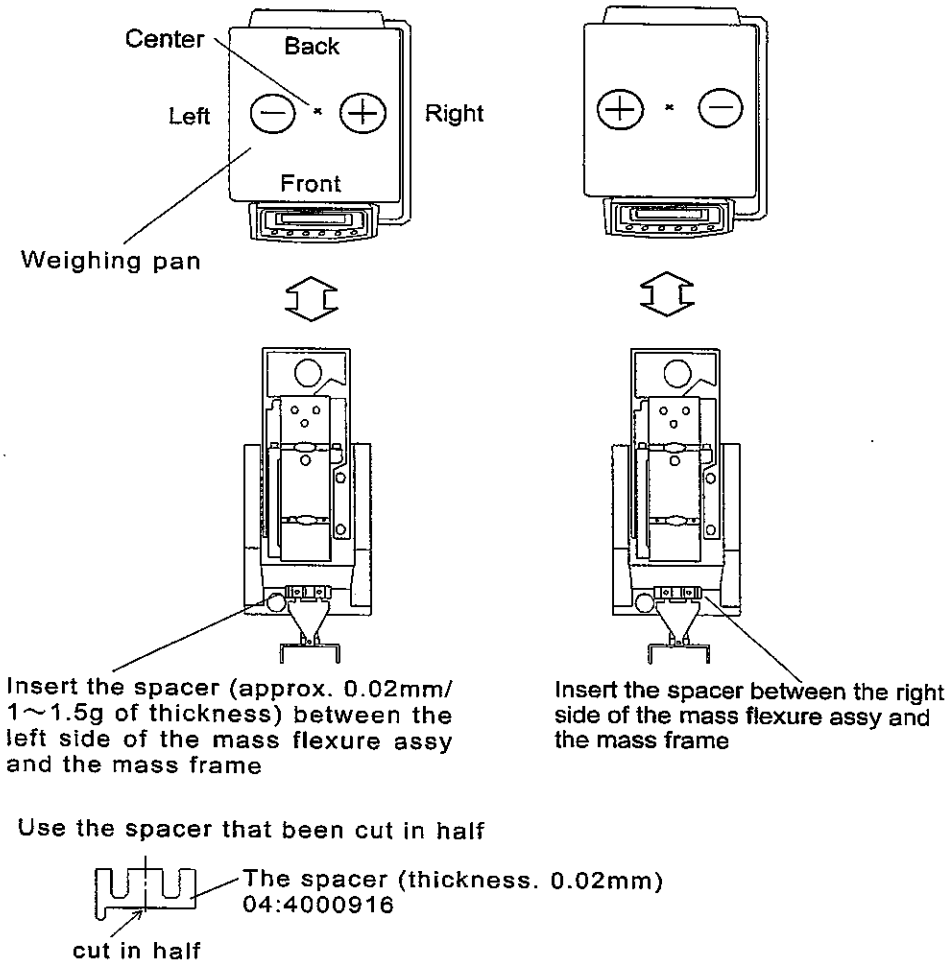
Step 5. Adjust to be within the about +4 digits as the specifications, by shaving the corner load adjustment hole of the plus side (right or left) on the weighing pan.
When adjusting the corner load by shaving, a drift of the zero point may be generated. After shaving, load the mass listed in table below 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 (front-back)	Different with center (right-left)	Drift value of Zero point
GP-12K/20K/22K/ 30K/30KS/40K	10kg	+/-0.4g	+/-0.4g	+/-0.3g
GP-60K/100K/100KS/ 102K	40kg	+/-4g	+/-4g	+/-3g

Step 6. Install the diaphragm after adjusting as per the table below.

Model	Masses	Different with center (front-side of display)
GP-12K/20K/22K/ 30K/30KS/40K	10kg	+0.2g
GP-60K/100K/100KS/ 102K	40kg	+3g





Use the spacer that been cut in half

If the corner load error at the front of the weighing pan is minus counts, shave the bottom side of thin part at a level using a file.

If the corner load error at the front of the weighing pan is plus counts, shave the top side of thin part at a level using a file.

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 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)
GP-12K	5kg x 2	±0.5g
GP-20K	5kg x 4	
GP-22K		
GP-30K/30KS	10kg x 3	
GP-40K	10kg x 4	±2.5g

GP-60K	20kg x 3	±5g
GP-100K/100KS	20kg x 5	
GP-102K		±8g

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 8 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
GP-12K/20K/22K/30K/40K/30KS	20kg
GP-60K/100K/102K/100KS	60kg

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

Step 8. Remove the mass and proceed to the next step.
Removing the mass, [tH in] or [tL in] is displayed and the internal mass data is automatically read in. Proceed to the next step, after the display is changed,

2. Temperature adjustment check

Step 1. After inputting the low temperature data, keep the temperature. In the [CAL in] mode, carry out the calibration with the internal mass, and select D2 or D3 data mode (as described below) in the internal count display.

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 8 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
GP-12K/20K/22K/30K/ 40K/30KS	20kg	D2	±6.0g	±1.2 g
GP-60K/100K/102K/ 100KS	60kg	D3	±20.0g	±7.2g

Step 8. In the CAL in mode, carry out the calibration with the internal mass.

Step 9. Place the mass on the weighing pan and read the display.

Sep 10. Verify that the changes in the span and span are within the specifications

Model	Masses	Data mode	Span
GP-12K/20K/22K/30K/40K/30KS	20kg	D2	±0.4g
GP-60K/100K/102K/100KS	60kg	D3	±1.5g

6.10 Fine Adjustment

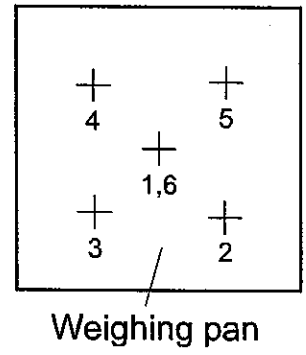
1. Corner load adjustment

In the D2 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 shaving, zero point drift may be generated. After shaving, 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)
GP-12K	5kg	±0.3g	±0.2g
GP-20K	10kg	±0.4g	
GP-22K		±1.0g	±0.4g
GP-30K/30KS	10kg	±0.4g	±0.2g
GP-40K	20kg	±1.0g	±0.4g
GP-60K		±1g	±1g
GP-100K/100KS	40kg	±4g	±2g
GP-102K		±5g	



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

First, warm up the balance at room temperature for at least 12 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-d5P] after getting into check mode shown on page 26.

Step 2. In case of GP-12K/20K/22K/40K/60K, press the [SAMPLE] key one time. [Lnr 2] is displayed. In case of GP-30K/30KS/100K/100KS/102K, press the [SAMPLE] key two times, [Lnr 3] 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.
In case of GP-12K/20K/22K/40K/60K, go to the Step 15.
In case of GP-30K/30KS/100K/100KS/102K, go to the Step 11, and input the Lnr 4 and Lnr 5 data.

Step 11. After it stabilized, [Lnr 4] is displayed. (Press the [CAL] key to cancel the operation.)

Step 12. Remove mass A, place mass C (confirm to place mass B and mass C on the weighing pan) and press the [PRINT] key.

Step 13. After it stabilized, [Lnr 5] is displayed. (Press the [CAL] key to cancel the operation.)

Step 14. Add mass A (confirm to place mass B, mass C and mass A on the weighing pan) and press the [PRINT] key.

Step 15. After it stabilized, [END] is displayed.

Step16. 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	Lnr4	Lnr5
			A	B	C	No load	A	B	B+A	B+C	B+C+A
GP-12K	2		5kg	5kg	—	0	5kg	5kg	10kg	—	—
GP-20K/22K			10kg	10kg	—	0	10kg	10kg	20kg	—	—
GP-30K/30KS	3		10kg	10kg	10kg	0	10kg	10kg	20kg	20kg	30kg
GP-40K	2		20kg	20kg	—	0	20kg	20kg	40kg	—	—
GP-60K		(a)	20kg	40kg	—	0	20kg	40kg	60kg	—	—
		(b)	30kg	30kg	—	0	30kg	30kg	60kg	—	—
GP-100K/100 KS/102K	3		20kg	40kg	40kg	0	20kg	40kg	60kg	80kg	100kg

Either of (a) or (b) can be selected with GP-60K.

Linearity and Hysteresis check

Calibrate by using the calibration mass in table below.

After calibration, in the D2 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)
GP-12K	10kg	5kg×2	±0.2g	±0.5g
GP-20K	20kg	5kg×4		
GP-22K			±0.4g	±0.5g
GP-30K/30KS	30kg	10kg×3	±0.2g	±0.5g
GP-40K	40kg	10kg×4	±1.0g	±2.5g
GP-60K	60kg	20kg×3	±1g	±5g
GP-100K/100KS	100kg	20kg×5	±2g	
GP-102K				±8g

3. Internal mass value correction (CAL SET)

The following explains about how the internal mass value is adjusted precisely.
Perform the linearity adjustment before internal mass value correction. In the case of performing the internal mass value correction only, the internal temperature of the balance must be approached to the room (the air) temperature enough.

(1) Preliminary load

Apply a preliminary load by placing a load with the full scale value and remove it. Perform this pre-load three times.

(2) External mass calibration (CAL out)

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

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

Step 3. Press the PRINT key. The motor starts and adjust the internal mass position correctly.

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

Model	Standard masses
GP-12K	10kg
GP-20K/22K	20kg
GP-30K/30KS	30kg
GP-40K	40kg
GP-60K	60kg
GP-100K/100KS/102K	100kg

To change the calibration mass value, press the SAMPLE key and change the value as necessary using the following keys.
SAMPLE key: changes the blinking digit position.
RE-ZERO key : changes the value of the blinking digit.
PRINT key: saves the data.

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

Step 6. After it stabilized, [10k] is displayed. (Example of the GP-12K)

Step 7. Place the calibration mass specified in step 4 on the pan. Press the PRINT key. [< 10k] is displayed. (Example of the GP-12K)

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

Step 9. Remove the mass.

(3) Fine adjustment of internal mass value

Step 1. In the data adjustment mode [d-dSP] , press the [SAMPLE] key five times. [CALSEt] is displayed.

Step 2. Press the [PRINT] key. The motor starts and adjusts the internal mass position correctly.

Step 3. The display changes in turn as follows:

[CC] → [<CC .] → [CC .] → [<CC .] → [End] → [tH]

Step 4. Proceed to the next step.

(4) Internal mass calibration ([CAL in])

Step 1. In the data adjustment mode [d-dSP] , press the [SAMPLE] key four times. [CAL in] is displayed.

Step 2. Press the [PRINT] key. The motor starts and adjusts the internal mass position correctly.

Step 3. The display changes in turn as follows:

[CAL] → [<CAL .] → [CAL .] → [<CAL .] → [End]

Step 4. Proceed to the next step.

(5) In D2 data mode, verify the error of the fine adjustment

Step 1. In the data adjustment mode [d-dSP] , press the [PRINT] key. [XXXX] is displayed. (D0 data-weight A/D count)

Step 2. Press the [SAMPLE] key twice. [XXXXX.X] is displayed. (D2 data-gram weight display)

Step 3. Place again the calibration mass used in "(2) External mass calibration". Verify that the error (the difference between the displayed weight value and the mass value) is within the specifications.

If not within the specifications, perform the fine adjustment again (operation of (2), (3)), or perform the digital correction as explained later.

Model	Standard masses	Specifications (D2 data mode)
GP-12K	10kg	±0.4g
GP-20K/22K	20kg	
GP-30K/30KS	30kg	
GP-40K	40kg	
GP-60K	60kg	±2g
GP-100K/100KS/102K	100kg	±4g

(6) Calibrate using the internal mass and verify the fine adjustment error (operation (4)-(5)). Perform this three times, verify that the all data be within the specifications.

Digital correction of the fine adjustment

If the error is not within the specifications, it can be corrected digitally. After correcting the value digitally, calibrate again using the internal mass and verify the error.

Step 1. In the data adjustment mode [d-d5P], press the [PRINT] key. [XXXX] is displayed. (D0 data-weight A/D count)

Step 2. Press the [SAMPLE] key seven times. [XXXXX.X] is displayed. (CW display-fine adjustment parameter of linearity regarding internal mass)

Step 3. To change the internal mass value, press the [PRINT] key and change the value as necessary using the following keys.

[RE-ZERO] key: increases the value by one.
[SAMPLE] key : decreases the value by one.
[PRINT] key: saves the final data.
[CAL] key: cancels the data.

Step 4. Press the [PRINT] key. Then, the balance returns to the CW display with corrected data.

6.11 Parameter Settings

1. Unit setting

The weighing units can be saved in the check mode. Follow the procedure below to save the units.

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

Step 2. Press the [PRINT] key. [UnIt g] is displayed.

Step 3. Save the units using the following keys if it is needed.
[RE-ZERO] key: selects the displayed unit.
[SAMPLE] key : changes the unit to be displayed.
[CAL] key: cancels the operation.

Step 4. When every units you need are saved, press the [PRINT] key.

Step 5. [End] is displayed to indicate that the operation is completed.

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 26.

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

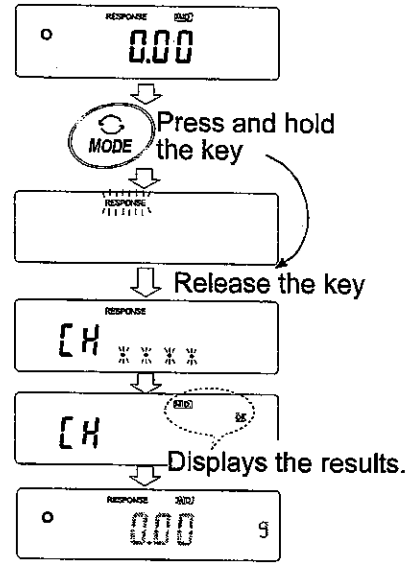
6.13 Method of identifying defect location (Electrical part or Mechanical part)

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. Simple method (Self Check Function)

Self-checks the balance performance using the internal mass.

If the balance displays [CH no] after this operation, the electrical part (especially AMZ51) is clearly defective. It is necessary to check or replace the AMZ51.



Step 1. Press and hold the [MODE] key until [RESPONSE] is displayed.
In case of GX series, the balance automatically starts to check the balance performance and sets the response feature.
Do not allow vibration or drafts to affect the balance during this adjustment.
In case of GF series, the balance automatically starts to check the balance performance.

Step 2. After automatic adjustment, the balance displays the updated response indicator and returns to the weighing mode. The response indicator remains displayed for a while.
e.g. " [MID.] [OK] "

The example above indicates that the result of the self check is good and [MID.] is selected as the response rate.

2. 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 AMZ51.**

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 26.

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-" and "-4-".
(1) Verify that the offset 1 (- 1-) shows within 2940-3060.
(2) In the offset 2 (-2-), verify that the data is within 4400-4600.
(3) In the offset 3 (-3-), verify that the data is within 5900-6100.
(4) In the offset 4 (-4-), verify that the data is within 7350-7650.

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

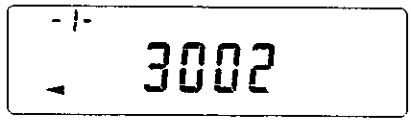
Step 5. Press and hold RE-ZERO key and press MODE key. "- 1-" is diplayed on the upper left display in offset mode (seven segments). See the example. With a same key operation, the mode can be moved to "-2-", "-3-" and "-4-".

(1) In the offset 3 (-3-), verify that the data is within 2020000-1930000, and the data of dispersion is within 3 counts (MAX-MIN) in 5 seconds.

Offset mode (Weight A/D)

Weight A/D input	Seven segments on the upper left	D0 data	D1 data
Offset 1 only	- 1-	Approx.3000	Approx.1000000
Offset 2 only	-2-	Approx.4500	Approx.1500000
Offset 3 only	-3-	Approx.6000	Approx.2000000
Offset 4 only	-4-	Approx.7500	Approx.2500000
Offset 5 only	-5-	Approx.7500	Approx.2500000
Offset 6 only	-6-	Approx.12000	Approx.4000000
Ordinary state (Connecting to the mechanical part)	No display	Weight A/D count	Internal weight data D1

Example) In the D0 data mode, to display "- 1-".



ii) Operation confirmation for the electrical portion of the temperature A/D part by itself

Step 1. In the D1 data mode, press the SAMPLE key four times. XXXXXX is displayed. (T1 data mode-Temperature A/D count after average filter)

Step 2. Press and hold RE-ZERO key and press MODE key. "- 1-" is displayed on the upper left display in offset mode (seven segments).

(1) In the offset 1 (- 1-), verify that the data is within 170000-210000, and the data of dispersion is within 10 counts (MAX-MIN) in 5 seconds.

Offset mode (Temperature A/D)

Temperature A/D input	Seven segments on the upper left	T0 data	T1 data
Offset 1 only	- 1-	Approx.670	Approx.200000
Ordinary state (Connecting to the temperature sensor)	No display	Temperature A/D count	Temperature data T1 after average filter

Appendix

GP TECHNICAL INFORMATION

1. Introduction

1-1 About this Manual

This manual contains technical information on ten (10) models from the A&D GP series of balances:
GP-12K/ 20K/ 22K/ 30K/ 40K/ 60K /100K/102K (Standard type)
GP-30KS/ 100KS (Wall-mount type)

Before starting any work on this product, read through the entire owner's instruction manual.

1-2 Models and types

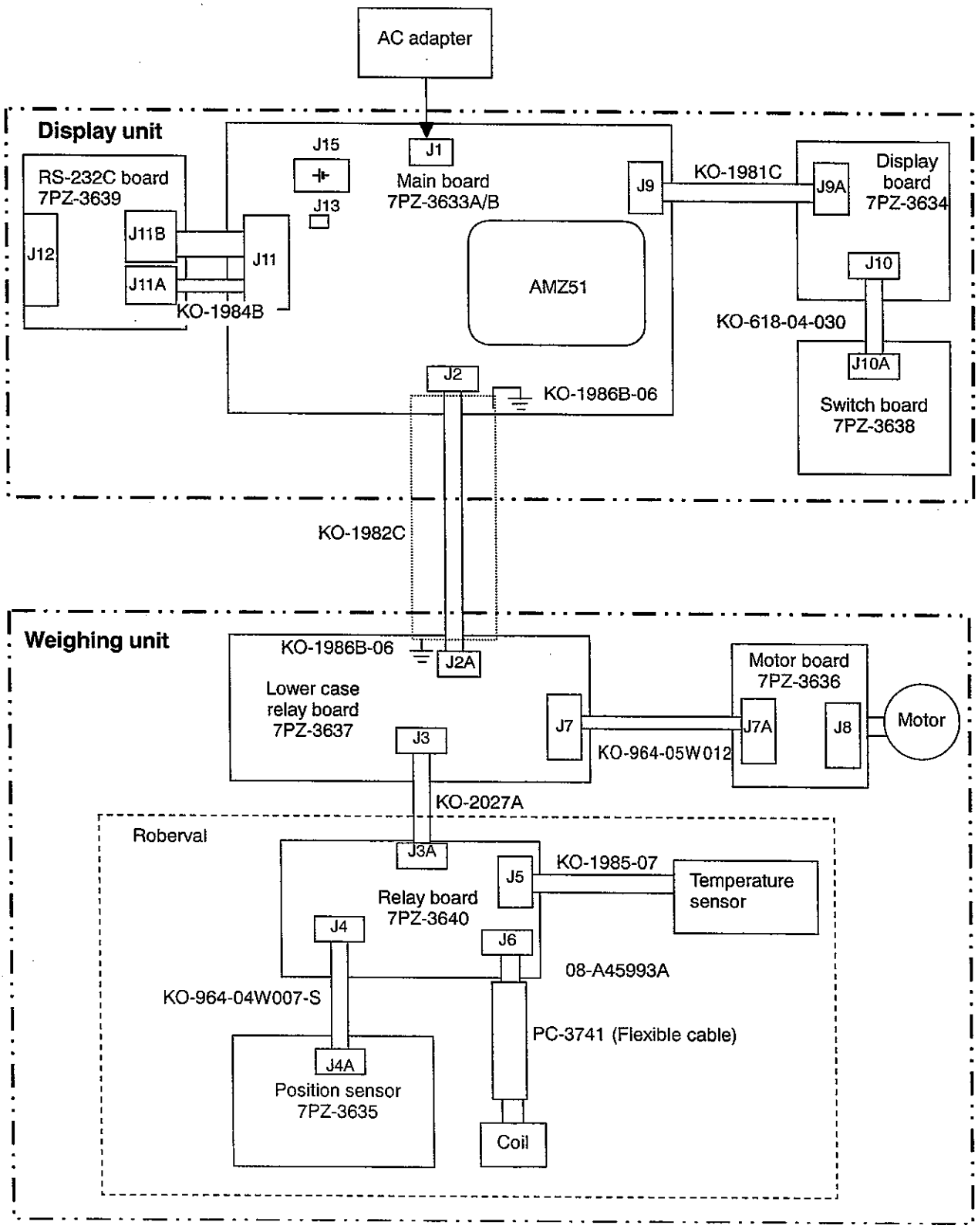
* See {2. Exploded view} for a board location

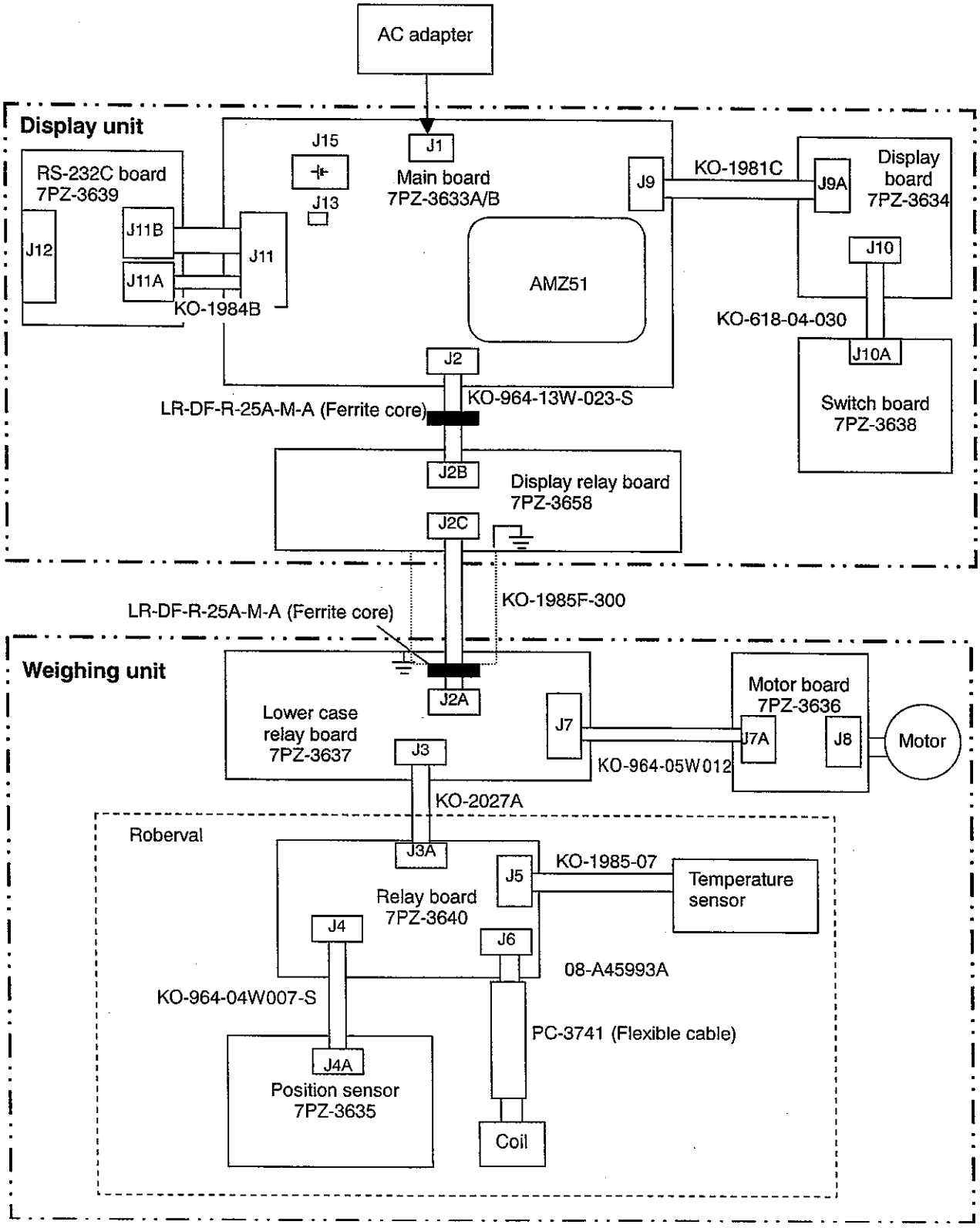
**See {3. circuit diagram} and {4. Part layout} for more information.

		Models: (GP-)									
*Loc.	Name	12K	20K	22K	30K	40K	60K	100K	102K	30KS	100KS
(109)	Main board	7PZ-3633A					7PZ-3633B			7PZ-3633A	7PZ-3633B
(107)	Display board	7PZ-3634									
(217)	Position sensor board	7PZ-3635									
	Motor board	7PZ-3636									
(313)	Lower case relay board	7PZ-3637									
(108)	Switch board	7PZ-3638									
(119)	RS-232C board	7PZ-3639									
(204)	Relay board	7PZ-3640									
Roberval (Force motor cell)		Same									
ROM version		Same									
Display relay board		N/A								7PZ-3658	

1-3 Block Diagram

GP-12K/20K/22K/30 K/40K/60K/100K/102K




AC adapter
Display unit
RS-232C board
7PZ-3639
J12
J11B
J11A
J11
KO-1984B
J15
J13
J1
Main board
7PZ-3633A/B
AMZ51
J9
KO-1981C
J9A
Display
board
7PZ-3634
J10
KO-618-04-030
J10A
Switch board
7PZ-3638
J2
KO-964-13W-023-S
LR-DF-R-25A-M-A (Ferrite core)
J2B
Display relay board
7PZ-3658
J2C
KO-1985F-300
LR-DF-R-25A-M-A (Ferrite core)
Weighing unit
J2A
Lower case
relay board
7PZ-3637
J3
J7
J7A
KO-964-05W012
Motor board
7PZ-3636
J8
Motor
KO-2027A
Roberval
J3A
J5
KO-1985-07
Temperature
sensor
Relay board
7PZ-3640
J4
J6
08-A45993A
KO-964-04W007-S
PC-3741 (Flexible cable)
J4A
Position sensor
7PZ-3635
Coil

Cables

GP-12K/20K/22K/30K/40K/60K/100K/102K

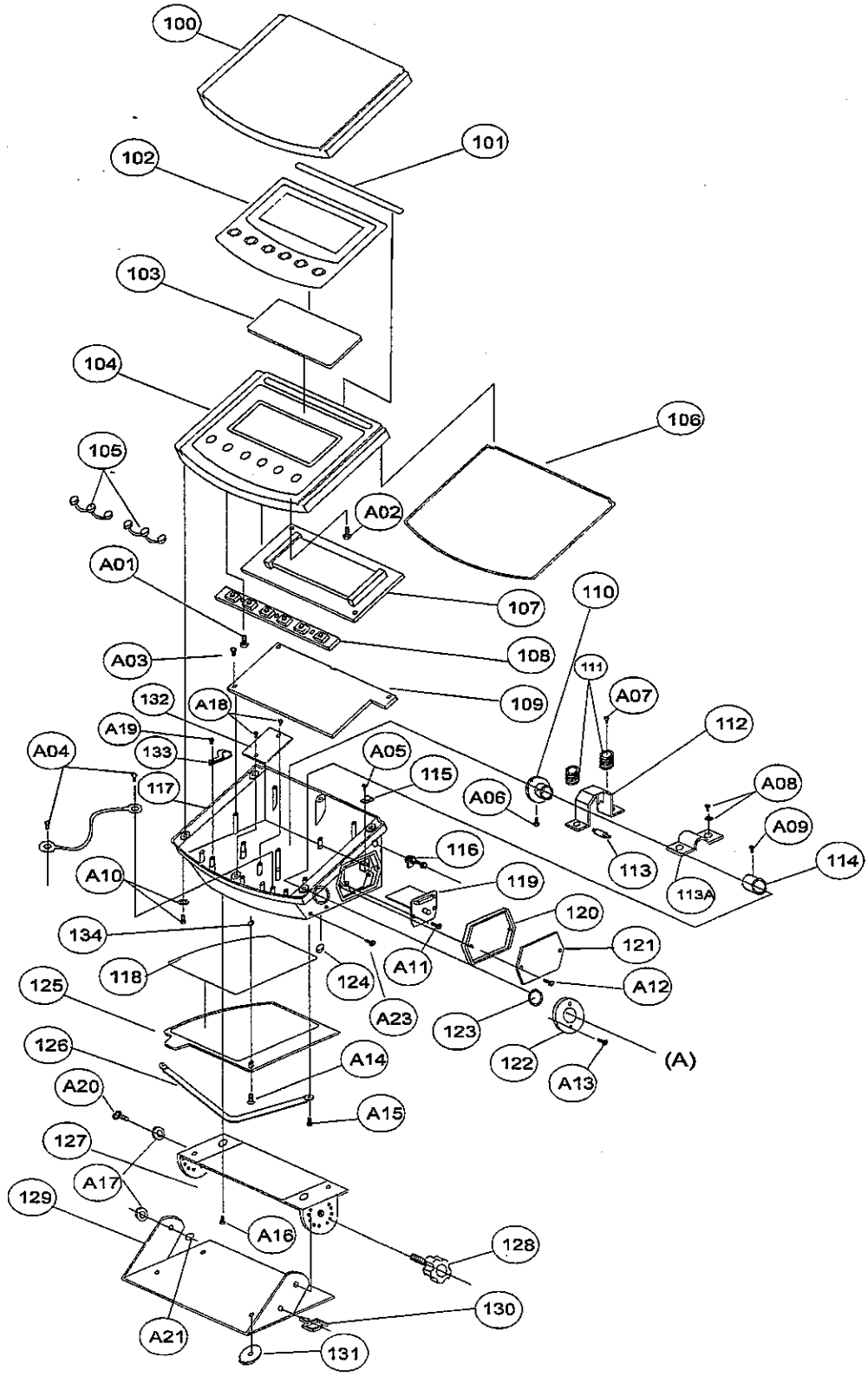
Part number	Description	QTY
KO:1981C	Cable for Display board	1
KO:1984B	Cable for RS-232C board	1
KO:1982C	Cable for Lower case relay board	1
KO:2027A	Cable for Mech relay board	1
KO:964-04W007-S	Cable for Positioning sensor board	1
KO:1985-07	Cable for Temperature sensor board	1
KO:964-05W012	Cable for Motor board cable	1
KO:1986B-06	Bias earth	2
KO:618-04-030	PC joiner	1

GP-30KS/100KS

Part number	Description	QTY
KO:1981C	Cable for Display board	1
KO:1984B	Cable for Interface board	1
KO:2027A	Cable for Mech relay board	1
KO:964-04W007-S	Cable for Positioning sensor	1
KO:1985-07	Cable for Temperature sensor	1
KO:964-05W012	Cable for Motor board	1
KO:618-04-030	PC joiner	1
KO:964-13W023-S	Cable for Relay board of separate type	1
KO:1935F-300	Cable for Relay of separate type	1

2. Exploded views and part lists

2-1 Display

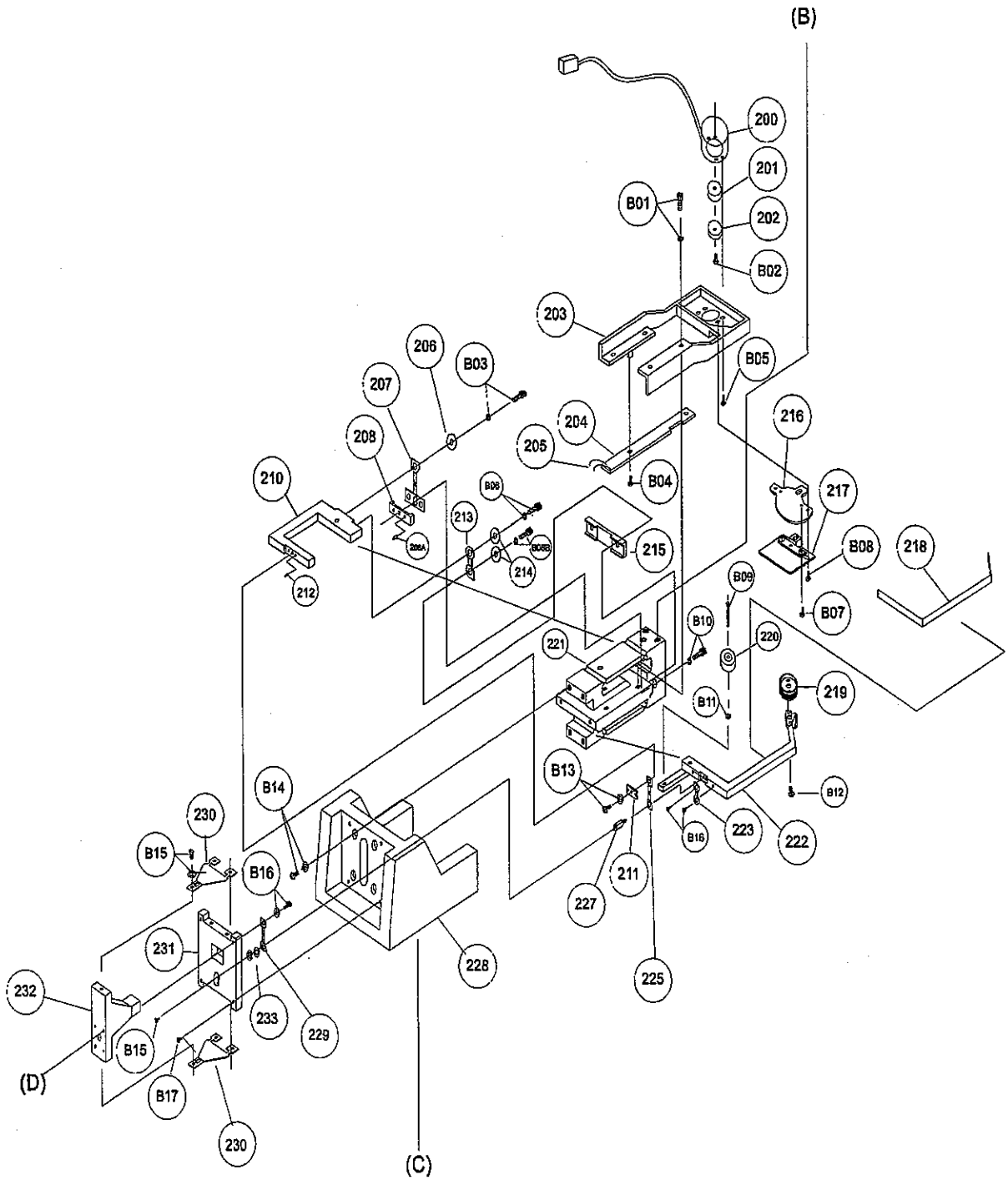


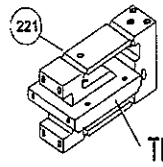
No.	Part number	Description	QTY
100	07-3004753	Protection cover	1
101	08-3004447A-1	Model label for GP-12K	1
101	08-3004447A-2	Model label for GP-20K	1
101	08-3004447A-3	Model label for GP-22K	1
101	08-3004447A-4	Model label for GP-30K	1
101	08-3004447A-5	Model label for GP-40K	1
101	08-3004447A-6	Model label for GP-60K	1
101	08-3004447A-7	Model label for GP-100K	1
101	08-3004447A-8	Model label for GP-102K	1
101	08-3004447A-9	Model label for GP-30KS	1
101	08-3004447A-10	Model label for GP-100KS	1
102	08-2000570	Key sheet	1
103	07-4009515	Display filter	1
104	03-1000143	Display upper case	1
105	06-4009516	Rubber key cap	2
106	06-4010936	Packing	1
107	7PZ-3634	Display board	1
108	7PZ-3638	Switch board	1
109	7PZ-3633A	Main board	1
110	04-4010710	Stopper plate	1
111	15-4010603	Latch spring (top)	2
112	04-4010711A	Stopper spring holder	1
113	05-4009675	Roller	1
113A	06-C43406B	Pipe holder	1
114	07-C43603A	Spacer	1
115	10-NK-4N	Nylon cramp	1
116	06-4009518	Rubber cover	1
117	03-1000144A	Display lower case	1
118	08-4010604A	Step sheet (Japanese)	1
	08-4010605A	Step sheet (English)	1
119	7PZ-3639	RS-232C board	1
120	06-3004216	Rubber blank cover	1
121	04-4009600	Blank plate	1
122	04-4009597	O-ring holder	1
	05-4009598	Separate panel for GP-30KS/100KS	1
123	10-P22-NBR	O ring	1
	06-4009685	Separate panel packing for GP-30KS/100KS	1
124	10-NO-7521	Urethane roll stock (808-10)	2
125	07-3004214	Step card plate	1
126	04-3004279	Step card guide	1
127	04-3004454B	Wall mount fitting (U) for GP-30KS/100KS	1
128	10-SK-38-W	Knob bolt (white) for GP-30KS/100KS	1
129	04-2000571C	Wall mount fixture (L) for GP-30KS/100KS	1
130	10-NO-647-POM	Wire clip for GP-30KS/100KS	1
131	06-4009966A	Rubber foot separate for GP-30KS/100KS	4

132	7PZ-3658	Display relay board for GP-30KS/100KS	1
133	10-NK-4N	Nylon cramp for GP-30KS/100KS	1
134	10-P6	O ring	1

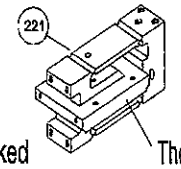
No.	Description			QTY
A01	Pan head screw	4x6	with spring and plain washer	2
A02	Pan head screw	4x6	with spring and plain washer	3
A03	Pan head screw	4x6	with spring and plain washer	2
A04	Pan head screw	4x6	with spring washer	2
A05	Pan head screw	4x8	with spring and plain washer	1
A06	Pan head screw	4x25	with star washer	1
A07	Allen head screw	4x10	with plain washer、(M5)	2
A08	Allen head screw	5x10		2
A09	Pan head screw	3x6		1
A10	Pan head screw	4x8	with plastic washer	6
A11	Pan head screw	4x6	with spring and plain washer	2
A12	Pan head screw	4x8	with spring and plain washer	2
A13	Pan head screw	4x6	with spring and plain washer	2
	Pan head screw	4x12	With spring and plain washer for GP-30KS/100KS	2
A14	Flat head screw	4x10		1
A15	Pan head screw	4x6	with spring and plain washer	2
A16	Pan head screw	4x8	with spring and plain washer	2
A17	Plastic washer	ϕ18	07-4010800	2
A18	Pan head screw	4x6	with spring and plain washer	2
A19	Pan head screw	4x8	with spring and plain washer	1
A20	Hex-head bolt	8x20		1
A21	M8 nut			1
A22	Pan head screw	4x8	with spring and plain washer	1
A23	Binding head screw	4x5	with star washer	1

2-2 Sensor





The number is not marked on the roberval (2024).

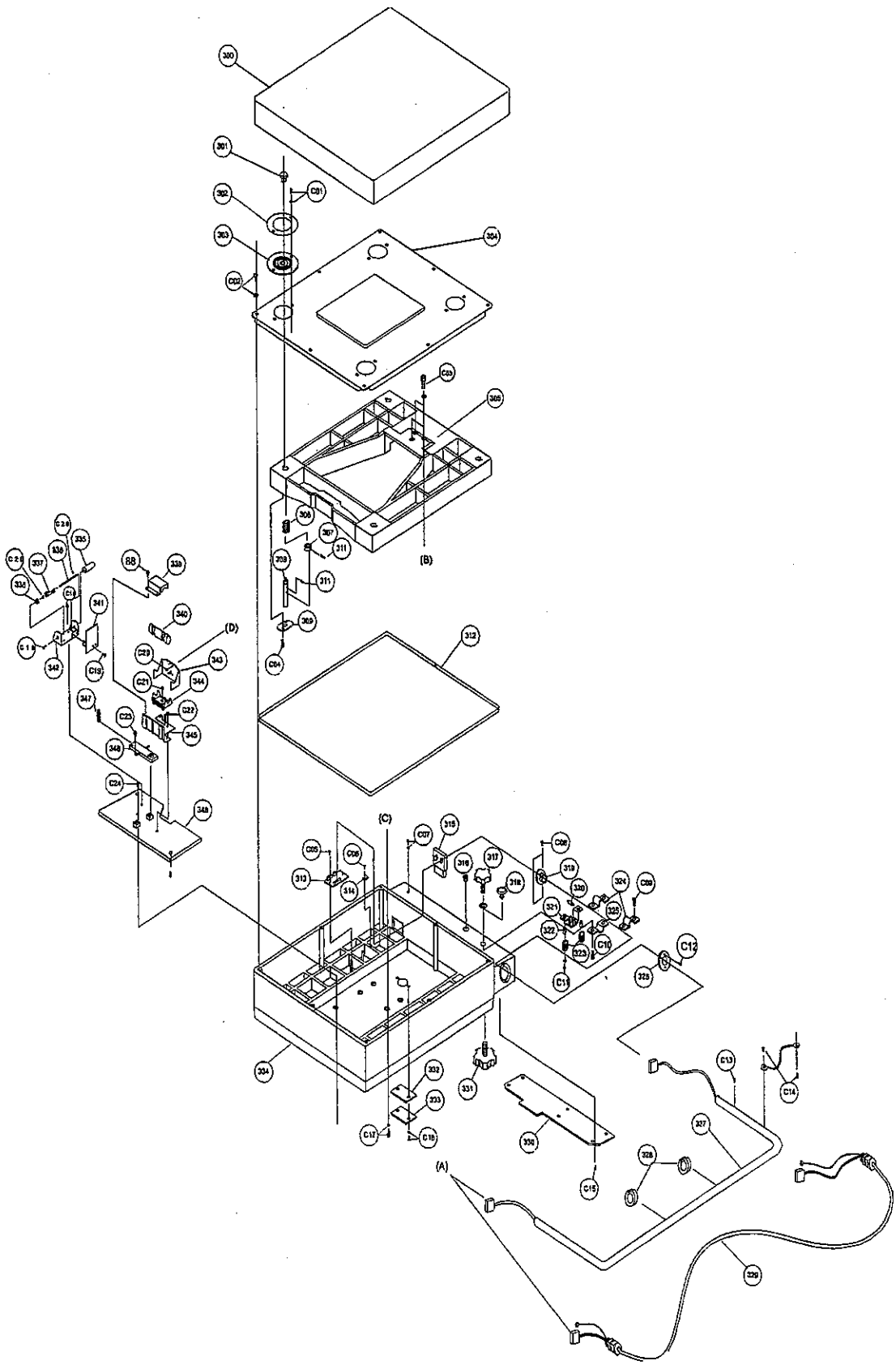


The number(2000572) is marked on the roberval (cast).

o.	Part number	Description	QTY
200	05-4010410	Yoke	1
201	00-4007995	Magnet	1
202	05-4007994	Pole piece GX	1
203	03-3004636	Magnet support	1
204	7PZ-3640	Relay board	1
205	08-4008510	Wire	2
206	05-4011114	Tension flexure holder (upper)	1
207	04-4011023B	Tension flexure (1)	1
208	03-4010014A	Tension flexure holder (lower)	1
208A	17-16SX-S4X8	Spring pin ϕ4x8	2
210	03-3004472E	Beam (1)	1
211	04-B47108	Tension flexure holder (2) HX	1
212	10-P1.5x6	Corrugated spring pin ϕ1.5x6	2
213	04-4011022C	Fulcrum flexure (1)	2
214	05-4010829	Flexure holder	4
215	03-4010013A	Attachment	1
216	04-4010409	Shield plate	1
217	7PZ-3635	Position sensor board	1
218	PC-3741	F.P.C(GP)	1
219	09-4008009	Force coil bobbin	1
220	05-4010408	Trimming mass (30K)	1
221	03-2000572B	Roberval (cast) for GP-12K/20K/22K	1
	05-2000681	Roberval (2024) for GP-30K/40K/60K/100K/102K/30KS/100KS	1
222	03-3004473D	Beam (2)	1
223	04-4008758	Fulcrum flexure (2)	2
225	04-4011025B	Tension flexure (2)	1
227	05-4010650C	Mass beam spacer	1
228	03-2000573A	Frame	1
229	04-4008310-1	Tension flexure (3)	1
230	04-4010648C	Flexure beam	2
231	03-4010398A	Internal mass frame	1
232	03-3004642B	Internal mass floating frame	1
233	05-B49476	Tension flexure holder	1

No.	Description			QTY
B01	Allen head screw	5x15	with spring and plain washer	4
B02	Pan head screw	4X16	with spring washer, brass, no plating	1
B03	Allen head screw	6X12	with coned disk washer(small), steel	1
B04	Pan head screw	3x6	with spring and plain washer	1
B05	Pan head screw	4x8	with spring and plain washer (ϕ6.5)	2
B06	Allen head screw	5x15	with coned disk washer	2
B06A	Allen head screw	5x18	with coned disk washer	2
B07	Pan head screw	3x10	with spring and plain washer	2
B08	Pan head screw	3x8	with spring and plain washer, steel, chromated	2
B09	Pan head screw	4x50	with spring washer	1
B10	Allen head screw	6x18	with coned disk washer(small), steel	1
B11	Nut	M4		1
B12	Pan head screw	3x4	Brass, no plating	2
B13	Pan head screw	4x8	with coned disk washer	1
B14	Allen head screw	6x25	with spring and plain washer(small)	4
B15	Pan head screw	4x6	with teflon coated coned disk washer	7
B16	Pan head screw	4x6	with distanced ring and coned disk washer	5
B17	Pan head screw	4x18	with spring and plain washer	4

2-3 Pan/ Lower case



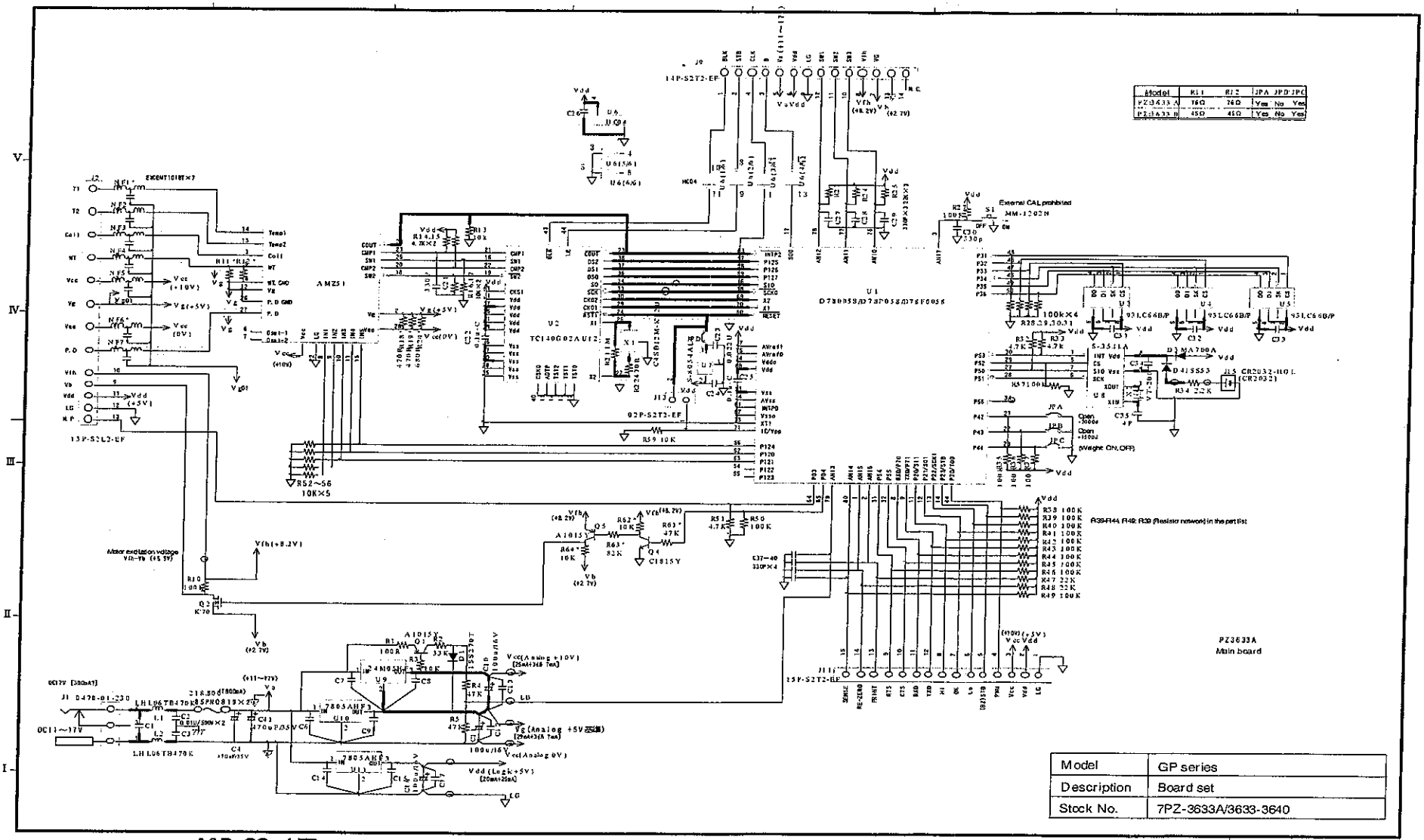
No.	Part number	Description	QTY
300	04-3001383A	Weighing pan for GP-100K/102K/100KS	1
300	04-B31752E	Weighing pan for GP-30K/40K/30KS/12K/20K/22K/60K	1
301	06-4010656	Pan support rubber	4
302	04-C43408A	Diaphragm stopper	4
303	06-C43390D	Diaphragm	4
304	04-B31751D	Case top	1
305	03-1000196B	Pan support arm	1
306	15-4010830	Coil spring (30K) for GP-12K/20K/22K/30K/40K/30KS	4
	15-4010646A	Coil spring (100K) for GP-60K/100K/102K/100KS	4
307	05-4010678	Axis stopper ring	4
308	05-4010677	Pan support axis	4
309	04-4010643	Spring holder plate	4
311	17-16SX-S4x10	Parallel pin with internal thread ϕ4x10	8
312	06-C43671	Packing	1
313	7PZ-3637	Lower case relay board	1
314	10-NK-4N	Nylon cramp	1
315	06-C43393	Cable cover	1
316	00-4010937	Bubble spirit level	1
317	09-4000910	Knob bolt with plastic washer	1
318	10-NO-4A43-N6	Bush clip1 for GP-30KS/100KS	1
319	04-4010647	Stopper plate (bottom)	1
320	05-4009675	Roller	1
321	04-4010711A	Stopper spring holder	1
322	05-4010676A	Spring guide collar	2
323	15-4010603	Latch spring (top)	2
324	04-C43406B	Pipe holder A	2
325	04-C43407B	Pipe holder B	1
326	04-4009597	O-ring holder	1
	05-4009598	Separate panel for GP-30KS/100KS	1
327	04-3004328	Display pod arm	1
328	07-4001231	Cable cramper	2
329	KO-1935E-300	Cable for GP-30KS/100KS	1
330	04-3004739	Case bottom plate	1
331	06-4010649	Leveling foot	4
332	06-C43392	Floor base rubber	1
333	04-C43409	Floor base panel	1
334	03-1000181A	Lower case	1
335	10-4007979	Geared motor	1
336	05-4007984B	Cam shaft	1
337	07-4007978A	Cam	1
338	10-80F-0503	Flange bush	1
339	04-4007983	Internal mass limiter	1
340	05-4010660	380g internal mass	1
341	7PZ-3636	Motor board	1
342	04-3003600	Motor holder	1
343	04-4007982	Internal mass hook	1

No.	Part number	Description	QTY
344	07-3003978A	Internal mass guide	1
345	03-3003602A	Internal mass frame	1
346	03-4007969A	Seesaw	1
347	15-4009484	Seesaw spring	1
348	03-3004641	Internal mass base	1

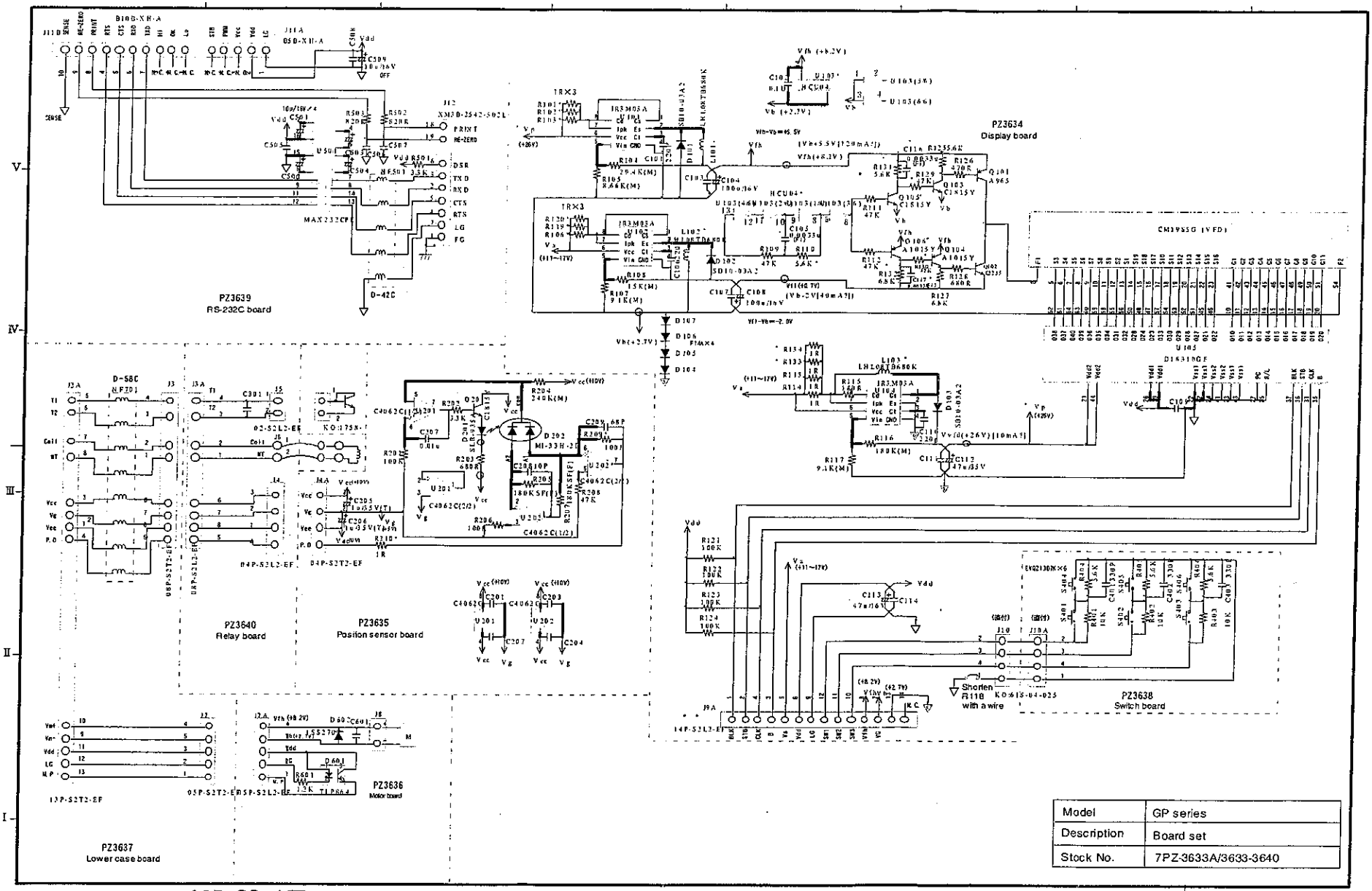
No.	Description			QTY
C01	Pan head screw	3x6	with plastic washer (10-4003714)	8
C02	Pan head screw	4x12	with plastic washer	8
C03	Allen head screw	6x20	with coned disk washer(small), steel	3
C04	Allen head screw	6x12		8
C05	Pan head screw	3x6	with spring and plain washer	2
C06	Pan head screw	3x8	with spring and plain washer	1
C07	Pan head screw	4x5	with star washer	1
C08	Pan head screw	4x25	with star washer	1
C09	Allen head screw	5x10		4
C10	Allen head screw	5x10		1
C11	Pan head screw	4X25	with plain washer(M5)	2
C12	Pan head screw	4x8	with spring and plain washer	2
	Pan head screw	4X12	with spring and plain washer for GP-30KS/100KS	2
C13	Allen head screw	4X30	Steel, black coated	1
C14	Pan head screw	4X6	with spring and plain washer	2
C15	Pan head screw	4X8	with spring and plain washer	4
C16	Pan head screw	3X10	with plastic washers(10-4003714)	2
C17	Allen head screw	6X18	with corned disk washer(small),steel	4
C18	Binding head screw	2x5		2
C19	Pan head screw	3x6	with spring and plain washer	2
C20	Pan head screw	4x6	with spring washer	2
C21	Plastic flat head screw	4x8		1
C22	Pan head screw	4x8	with spring and plain washer	2
C23	Pan head screw	4x10	with plain washer(large)	2
C24	Pan head screw	4x12	with spring and plain washer	2
C25	E ring	Size 4		1
C26	Continuous thread stud	3x4		1

3. Circuit Diagram

7PZ-3633A/3633 - 3640 (1/2)

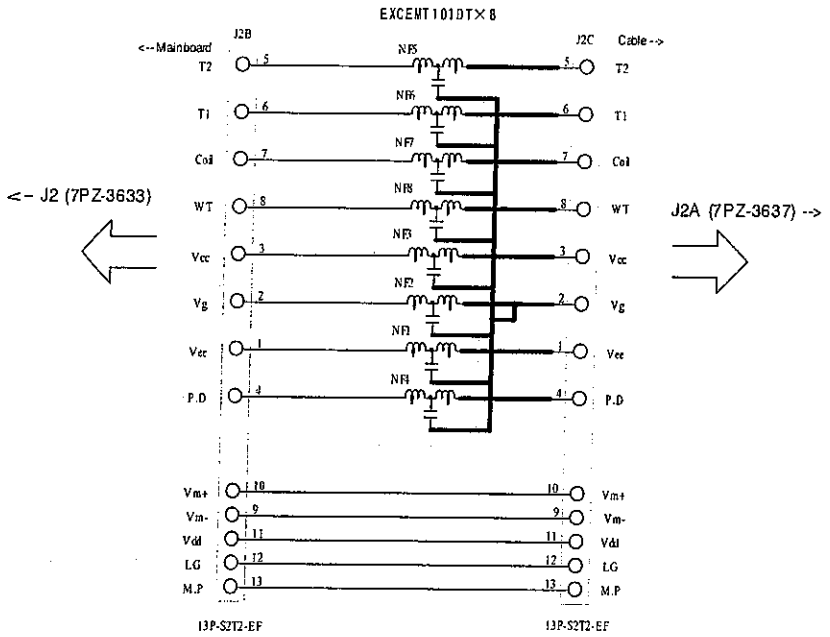


7PZ-3633A/3633 - 3640 (2/2)



Model	GP series
Description	Board set
Stock No.	7PZ-3633A/3633-3640

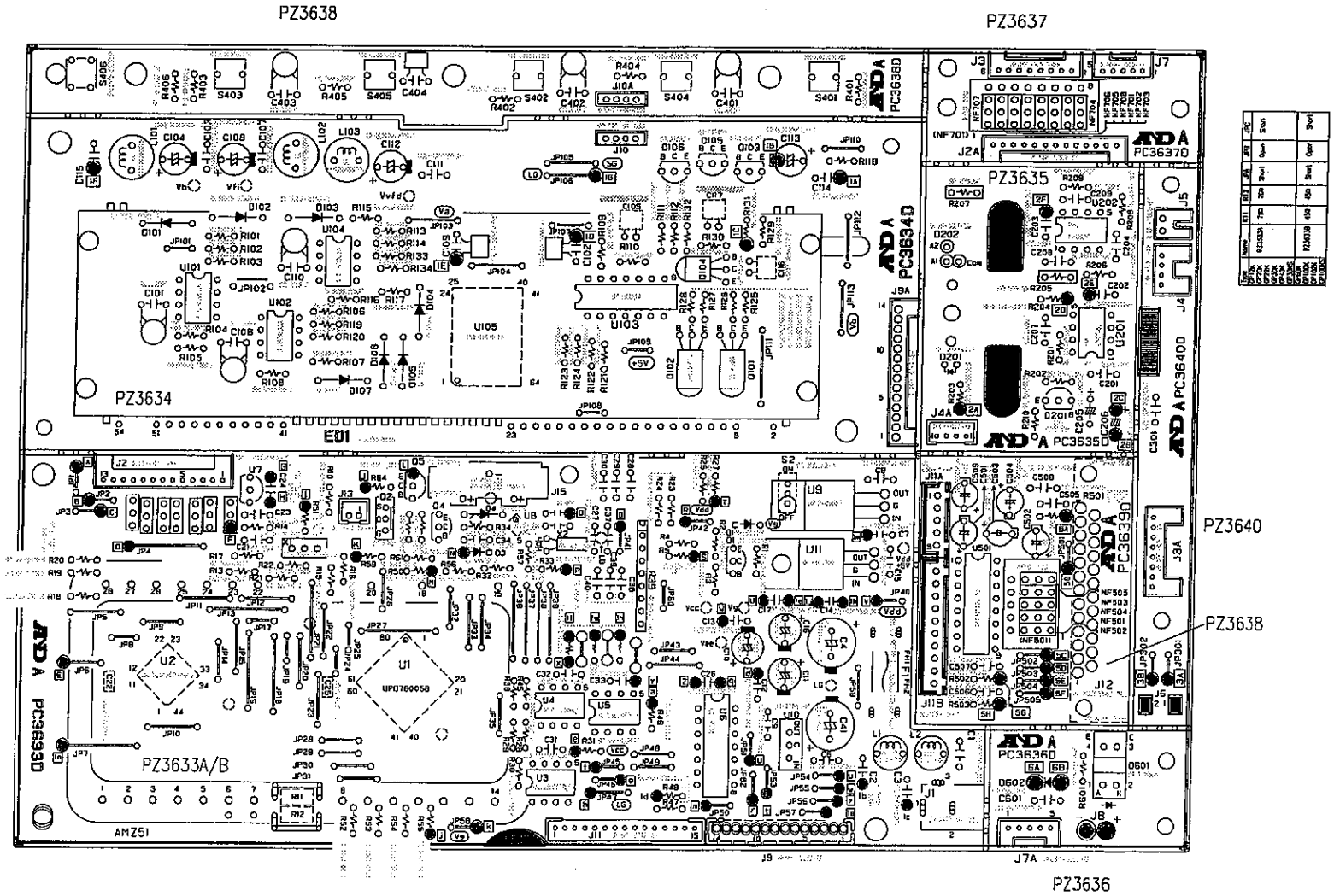
A&D CO., LTD.

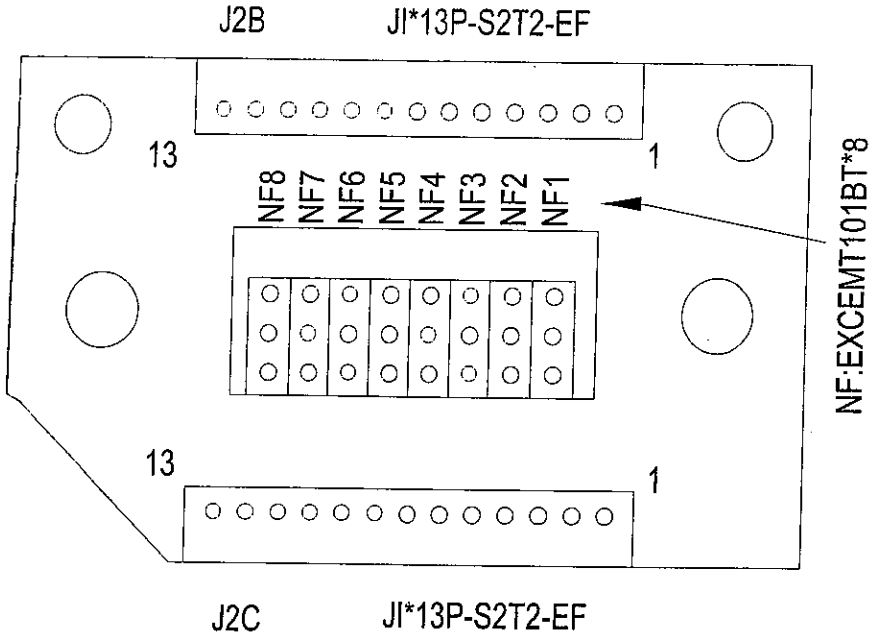


Model	GP series
Description	Display relay board
Stock No.	7PZ-3658

4. Part Layout

7PZ-3633A/3633 - 3640




J2B
JI*13P-S2T2-EF
13
1
NF8
NF7
NF6
NF5
NF4
NF3
NF2
NF1
NF:EXCEMT101BT*8
13
1
J2C
JI*13P-S2T2-EF

5. Part List for PCBs

7PZ3633-3640

Symbol	Location	Part number	English	QTY
		MF-AMZ51	Analog module	1
		ED-CM1985G	VFD	1
		EB-CR2032-VHOLD	Holder	1
B		EB-CR2032	Lithium battery	1
C	21,27,28,29,37,38,39,40,30,401,402,403	CC-330PT	Ceramic capacitor	12
C	1,6,7,8,9,12,13,14,15,17,24,26,31,32,33,34,102,103,107,109,111,114,301,505 - 508,201 - 204,601	CC-FK26Y5V104T	Ceramic capacitor	32
C	10,11,16,104,108,113	CK-ECA1CM101-T	Chemical Capacitor 100u/16V	6
C	101,106,110	CC-220PT	Ceramic capacitor	3
C	112	CK-ECA1VM470-T	Chemical Capacitor 47u/35V	1
C	2,3	CC-0.01U500V	Ceramic capacitor	2
C	205,206	CT-1V010T	Tantalum capacitor	2
C	207	CC-0.01UT	Ceramic capacitor	1
C	208	CC-10PT	Ceramic capacitor	1
C	209	CC-68PT	Ceramic capacitor	1
C	22,25	CC-0.1U25V-C	Chip Ceramic capacitor	2
C	23	CC-0.022UT	Ceramic capacitor	1
C	35	CC-4PT	Ceramic capacitor	1
C	4,41	CK-ECA1VM471-T	Chemical Capacitor 470u/35V	2
C	501 - 504,509	CK-SRA16VB-10T	Chemical Capacitor 10u/16V	5
C	105,116,117	CM-ECQB1H332JF	Film capacitor	3
D	1,602	DI-1SS270T	Diode	2
D	101,102,103	DI-SB10-03A2-T	Shottky diode	3
D	104 - 107	DI-F14AT	Diode	4
D	201	DL-SLR-935A	LED	1
D	202	DI-MI-33H-2D	Photo diode	1
D	3	DI-MA700AT	Shottky diode	1
D	4	DI-1SS53T	Switching diode	1
D	601	DF-TLP864	Photo interrupter	1
F		FH-85PN0819	Fuse holder	2
J	1	EJ-0470-01-230	Power jack	1
J	10	KO-618-04-030	Cable	1
J	11	JI-15P-S2T2-EF	IL-S Pin header	1
J	11A	JI-B5B-XH-A	IL-S Pin header	1
J	11B	JI-B10B-XH-A	IL-S Pin header	1
J	12	JA-XM3B2542-502	25P-Dsub Connector	1

Symbol	Location	Part number	English	QTY
J	12	JA-XM4Z-0021	Screw, M4.8 mm	2
J	13	JI-2P-S2T2-EF	IL-S Pin header	1
J	2,2A	JI-13P-S2L2-EF	IL-S Pin header	2
J	3,3A	JI-08P-S2L2-EF	IL-S Pin header	2
J	4	JI-4P-S2L2-EF	IL-S Pin header	1
J	4A	JI-4P-ST2-EF	IL-S Pin header	1
J	5	JI-2P-S2L2-EF	IL-S Pin header	1
J	7,7A	JI-05P-S2L2-EF	IL-S Pin header	2
J	9	JI-14P-S2T2-EF	IL-S Pin header	1
J	9A	JI-14P-S2L2-EF	IL-S Pin header	1
L	1,2	LL-LHL06TB470K	Radial lead inductor	2
L	101,102,103	LL-LHL08TB680K	Radial lead inductor	3
NF	1 - 7	NF-EXCEMT101BT	EMI filter	7
NF	501～505	NF-D-42C	Common choke coil	1
NF	701～708	NF-D-58C	Common choke coil	1
Q	1,5	QT-A1015YT	Transistor	2
Q	101	QT-A965	Transistor	1
Q	102	QT-C2235	Transistor	1
Q	104,106	QT-A1015Y	Transistor	2
Q	2	QF-K701	FET	1
Q	201,4,103	QT-C1815YT	Transistor	3
Q	105	QT-C1815Y	Transistor	1
R	1	RC-NAT100RJT	Carbon resistor	1
R	10,27 - 31,35,36,37,38,45,46,50,57,121 - 124,201,206,209	RC-NAT100KJT	Carbon resistor	21
R	101,102,103,106,113,114,119,120,210,133,134	RC-NAT1RJT	Carbon resistor	11
R	104	RM-RNM29.4KFT	Metal foiled resistor	1
R	105	RM-RNM8.66KFT	Metal foiled resistor	1
R	107,117	RM-RNM9.1KFT	Metal foiled resistor	2
R	108	RM-RNM15KFT	Metal foiled resistor	1
R	11,12	RL-MP76R00	Metal foiled resistor for 7PZ-3633A	2
R	11,12	RL-MP45R00	Metal foiled resistor for 7PZ-3633B	2
R	115	RC-NAT180RJT	Carbon resistor	1
R	116	RM-RNM180KFT	Metal foiled resistor	1
R	127,132	RC-NAT6.8KJT	Carbon resistor	2
R	14,15,32,33,51	RC-NAT4.7KJT	Carbon resistor	5
R	18,19,22,126	RC-NAT470RJT	Carbon resistor	4
R	2	RC-NAT33KJT	Carbon resistor	1
R	20,203,128	RC-NAT680RJT	Carbon resistor	3
R	204	RM-RNM240KFT	Metal foiled resistor	1
R	205,207	RF-180KSF	Metal foiled resistor	2
R	21	RC-NAT1MJT	Carbon resistor	1
R	23,24,25,47,48	RC-NAT22KJT	Carbon resistor	5

Symbol	Location	Part number	English	QTY
R	3,13,16,17,52 - 56,59,62,64,401, 402,403	RC-NAT10KJT	Carbon resistor	15
R	34	RC-NAT2.2KJT	Carbon resistor	1
R	39	RN-iHR-8-104JA	Resistor networks	1
R	4,5,61,109,111,2 08,112,129,130	RC-NAT47KJT	Carbon resistor	9
R	404,405,406,110, 131,125	RC-NAT5.6KJT	Carbon resistor	6
R	501,202	RC-NAT3.3KJT	Carbon resistor	2
R	502,503	RC-NAT820RJT	Carbon resistor	2
R	601	RC-NAT1.2KJT	Carbon resistor	1
R	63	RC-NAT82KJT	Carbon resistor	1
S	1	SS-MM-1202N	Slide switch	1
S	401 - 405	SK-EVQ21307K	Tact switch	5
S	406	SK-EVQ-QS307K	Tact switch	1
U	1	UC-78F0058-GX1	CPU	1
U	10,11	UR-7805AHF	Voltage regulator	2
U	101,102,104	UR-IR3M03A	DC/DC converter	3
U	103	UC-HCU04	NOT	1
U	105	UC-D16310GF	VFD driver	1
U	2	UC-TC140G02AU12	Gate Array	1
U	201,202	UA-C4062C	OP Amp.	2
U	3,4,5	UC-93LC66B/P	EEPR0M	3
U	501	UC-MAX232CPE	RS-232C Driver	1
U	6	UC-HC04	NOT	1
U	7	UA-S-8054ALR-Z	Voltage comparator	1
U	8	UC-S-3511AEFS	RTC	1
U	9	UR-24M05HF	Voltage regulator	1
X	1	XT-C4SB12M-K02U	Ceramic clock generator	1
X	2	XT-DS-VT-200	Crystal generator	1
		FS-218.800	Fuse	1
		07-4009517	VFD holder	2
		07-C43674	Insulation sheet	1
		03-4010723	Position sensor holder	1
		07-4010682A-1	Receptor bush	1
		10-NO-1E20-N6	PC support	1
		PC-3633D	Board set	1

7PZ-3658

Symbol	Location	Part number	Description	QTY
		LR-DF-R-25A-M-A	Ferrite core	2
		KO-964-13W020-S	Relay board cable to main board, 20cm	1
		KO-1935E-300	Relay board cable to platform, 3m	1
J	2B, 2C	JI-13P-S2T2-EF	IL-S Pin header	2
NF	1 - 8	NF-EXCEMT101BT	EMI filter	8

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