

FP-6000/6200/12K BALANCE

MAINTENANCE MANUAL

maintenance FP-6000/6200/12K v.1.a 92.01.13 TES

HIGH RESOLUTION INDUSTRIAL BALANCES

A&D
A&D Company, Limited



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1. OUTLINE



1.1 Organization of the Series

FP6000 (6kg x 0.01g)
FP6200 (1kg x 0.01g/6kg x 0.1g)
FP12K (12kg x 0.1g)

Unit: g, count, %, ct (carat)

Appearance: These units smaller versions of the EP. The display and mechanical sections are connected by a rotational arm. All three models are the same size.

Differences between the FP6000/6200 and FP12K (*Differences in appearance)

Mechanical section: Different

Electrical section: Only the adjusting resistor is different.

Power supply: AC adapter TB135 (15VDC) common to FR

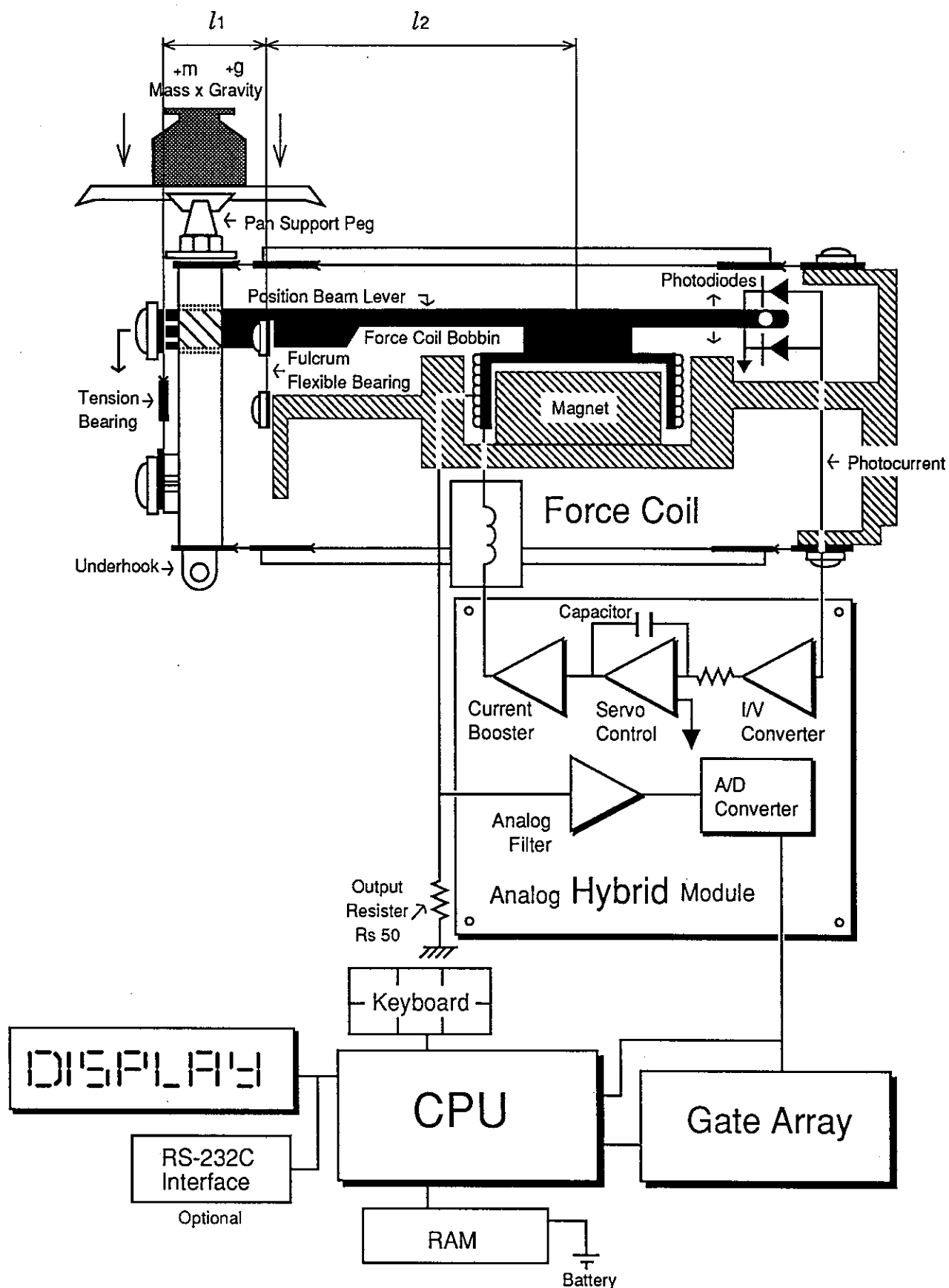


1.2 Options

FP-03: RS-232C (current loop)
FP-04: Comparator (current loop)
AD-1652: Remote controller (sold separately)



2. PRINCIPLES OF OPERATION (Same as FXY)





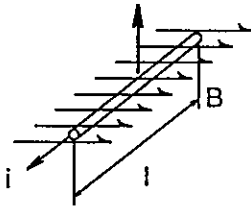
2.1 Principles of Operation

When an object of mass m is placed on the plate, the additional force ($m \times g$) moves the Lobarval's parallel and causes an imbalance. This imbalance is detected by the position detection section, which issues to the current booster through the servo control section. Then a compensating current (i) is generated in the force coil. This current reacts with the magnetic field of the permanent magnet to generate electromagnetic force F (according to Fleming's left-hand rule).

This force returns the mechanism to its original position to maintain the balance.

Current i flowing through the force coil is converted into a voltage by resistor R_s . The voltage is then converted from analog to digital and the volume of mass m is displayed (output).

$$f = B l i$$



Fleming's left-hand rule

The lead length of the coil is $2 \pi r n$

(n : number of windings)

Therefore,

$$f = B \cdot 2 \pi r n \cdot i$$

The mechanism has a lever and the force imposed on the plate becomes the current in the force coil.

Therefore,

$$mg = \frac{l_2}{l_1} \cdot f = \frac{l_2}{l_1} B \cdot 2 \pi r n \cdot i$$

Thus,

$$m = \frac{1}{g} \cdot \frac{l_2}{l_1} \cdot B \cdot 2 \pi r n \cdot i$$

When g , l_1 , l_2 , B , r , and n are constant, and constant coefficient symbol is α ;

$$m = \alpha i$$

The mass m of the object on the plate can be calculated by measuring the current in the force coil.

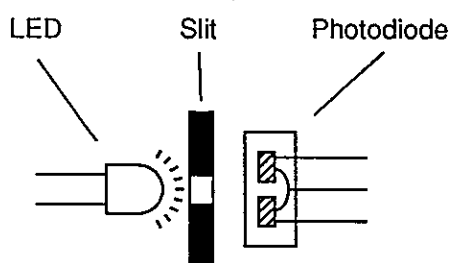
However, the value of B cannot be easily calculated because it is affected by temperature and the diamagnetic field generated by the current in the force coil. These influences can be eliminated by temperature and linearity correction. Should gravity acceleration (g) be different, then extra calibration is necessary.



2.2 Block Operation

2.2.1 Position detecting section

There is a slit on both ends of the beam that moves together with the force coil. The slit is sandwiched between an LED and a pair of photodiodes (upper and lower). If the beam goes up, the upper photodiode irradiates light to a greater area and generates large current. Then the lower photodiode generates only small current.



2.2.2 Analog section

The analog module incorporates the following items:

1. Current-to-voltage converter
2. Servo controller
3. Current booster
4. Analog filter
5. A/D converter

- (1) Current-to-voltage converter

Converts the output current from the photodiode into a voltage.

- (2) Servo control

Controls the current to the coil according to the photodiode output and force coil movement.

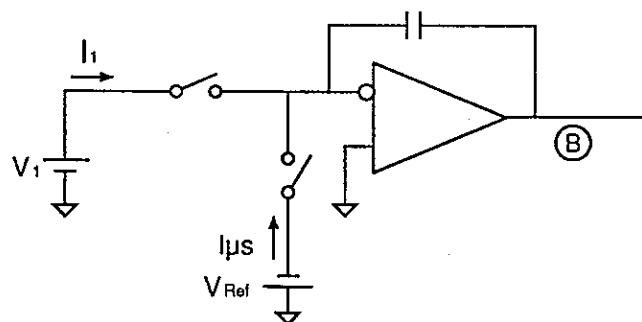
- (3) Current booster

Boosts the current for the force coil.

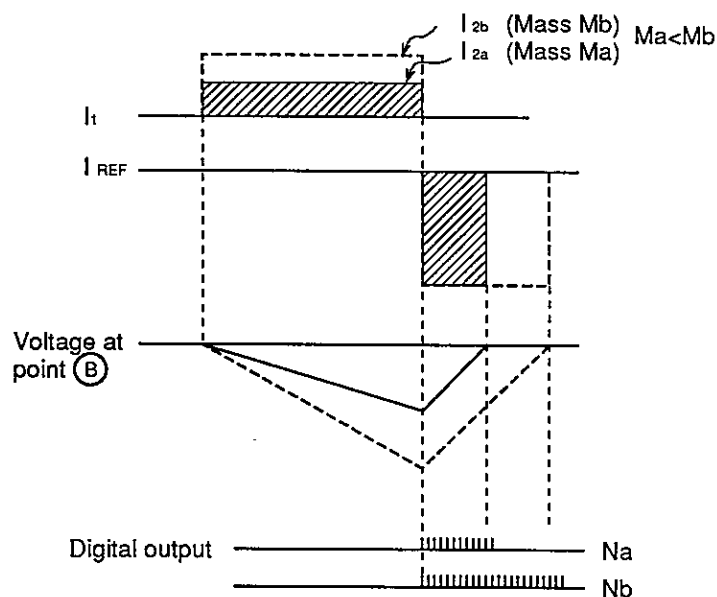
- (4) Analog filter

Eliminates momentary fluctuations in the force coil current and vibration in the installation table.

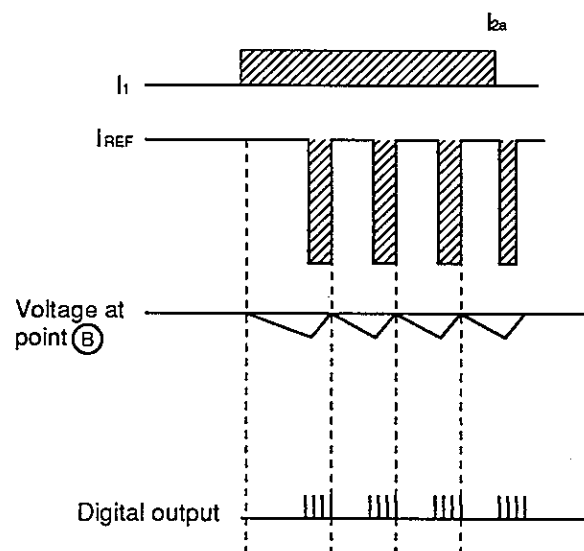
(5) A/D converter
*A/D converter



(Double Integral method)



(Multi-slope method)



Signal V_1 (proportional to mass m) is converted from analog to digital. The FP electronic balance uses an A/D conversion method known as multi-slope. This conversion is controlled by the μ CPU. The multi-slope method is a kind of double integral method. This feature is to subtract many times Reference signal V_{Ref} from signal V_1 during the initial integration as shown in the figure.

This A/D converter produces digital count number N according to signal V_1 .

2.2.3 Logic section

(1) CPU

The logic section uses a four-bit CMOS CPU with masked ROM (NEC). There is a built-in ROM (16K x 8 bits), RAM (512 x 4 bits), and fluorescent display driver/controller. The CPU operates on a 4MHz clock and processes 1 μ s instruction per microsecond. The CPU is housed in a 64-pin plastic QFP package.

(2) Gate array

The logic section uses a CMOS gate array.

Combined with the CPU, the gate array provides the A/D control, counting, decoding, remote control receive, and RS-232C signal sending functions. The gate array is housed in a 52-pin plastic QFP package.

(3) RAM

The CMOS static RAM (8K x 8 bits) is backed up by a lithium battery. The battery will last at least 15 years.

This RAM memorizes model, linearity, and temperature correction data, and is write-protected (WPSW slide switch for write protection).

(4) Remote control receive module

The light receiving element receives 38kHz infrared ray data and sends it to the gate array. This module is common to FR.

2.2.4 Display section

The fluorescent display was uniquely developed by A&D. It consists of 11 digits: 1 for symbol display, 7 for numeric display, and 3 for unit display. The driver incorporates CPU.

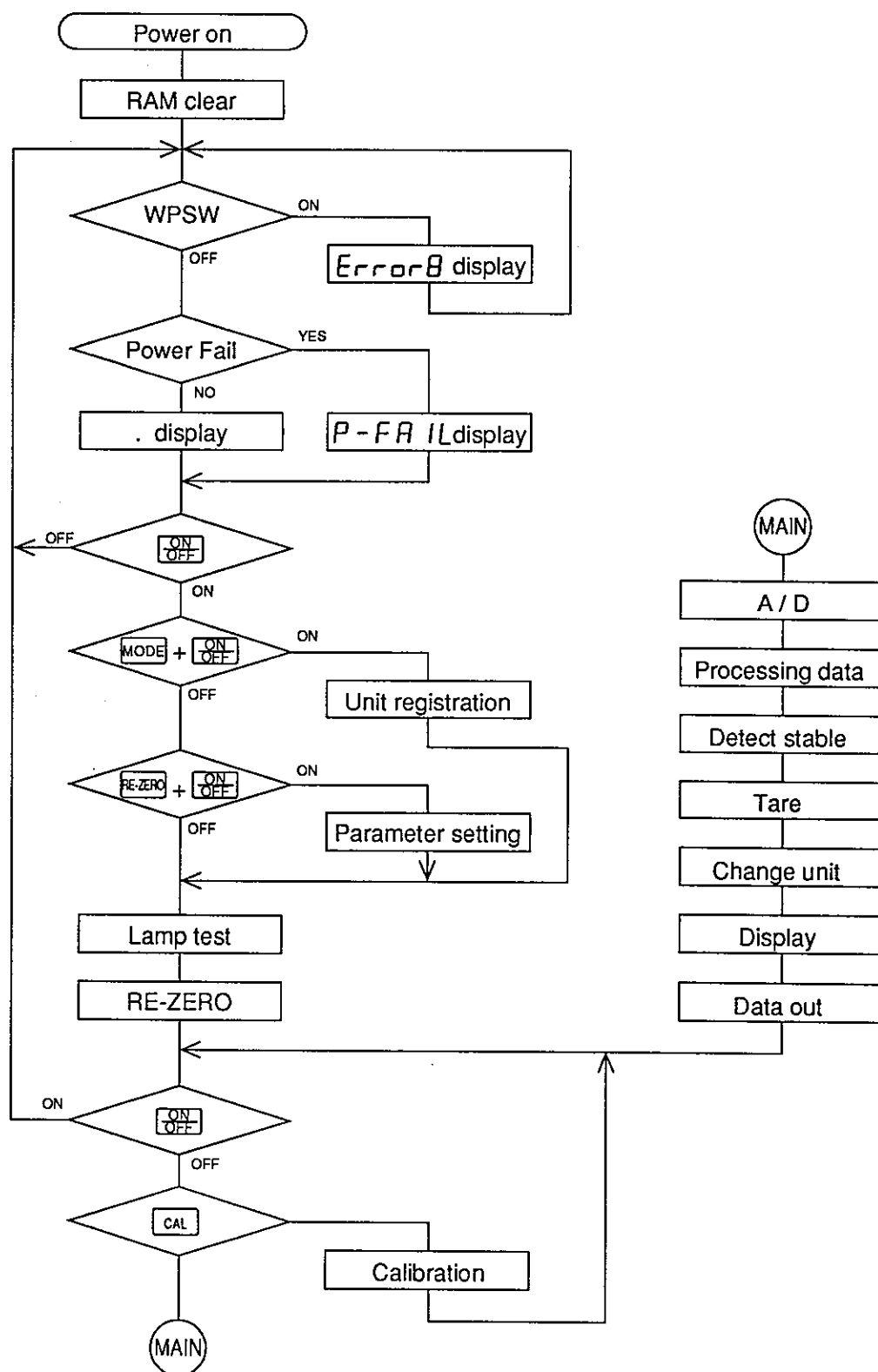
2.2.5 Key switches

The unit has membrane key switches, 6 switches for 1 common.

2.2.6 Power supply

The input power is 15VDC. The input voltage is directly supplied to the DC/DC converter to obtain +10VDC for the analog section (after the three-terminal regulator), -30VDC for the fluorescent display, and +3.9VAC for the filament. The series regulator also generates -10V and -5V. The DC/DC converter oscillates at about 75kHz under 15V input.

2.3 Software Flowchart

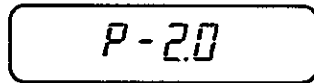


2.3.1 Software version display

The software version can be checked by one of the following three ways:

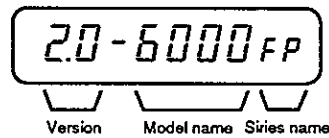
1) Internal setting mode

When the internal setting mode is activated, all lamps light. The version number is then displayed as follows:



2) Check mode

When the check mode is activated, the display changes to the following:



3) CPU

When the number printed on the CPU package is "75216AGF 604," note that "604" is the mask number representing the version.

As of the end of June 1990

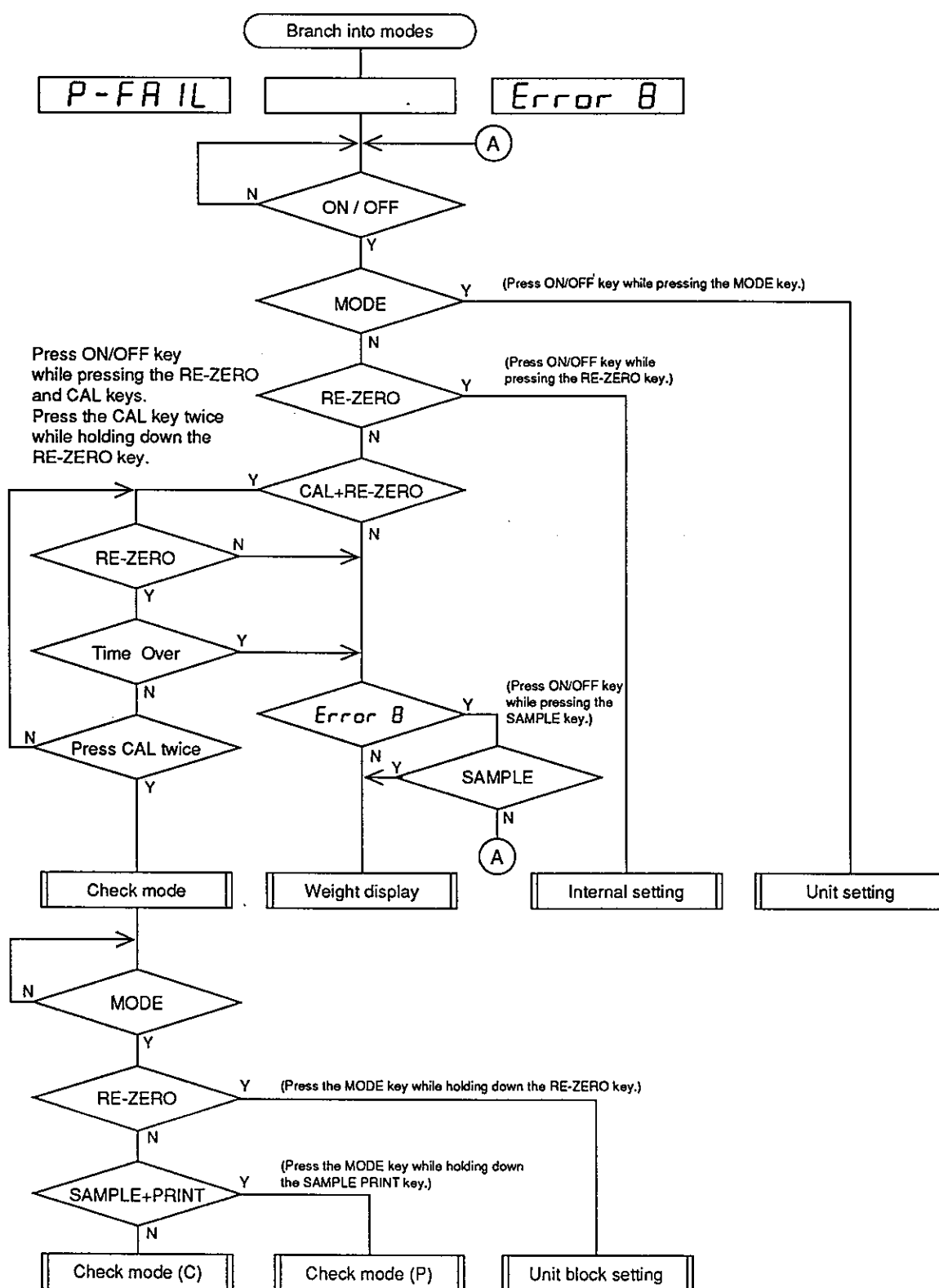
Software version: 2.0

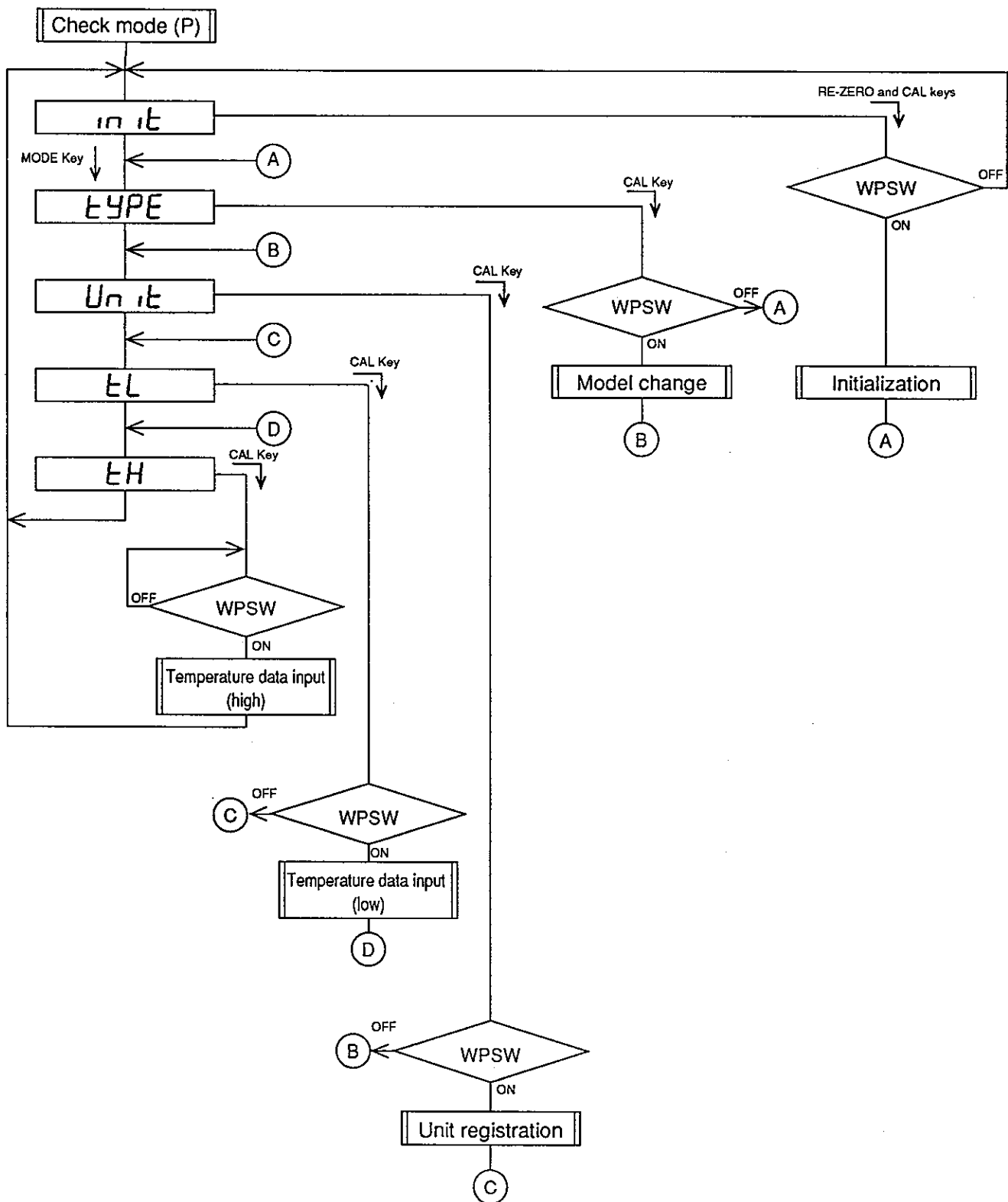
CPU number: 604

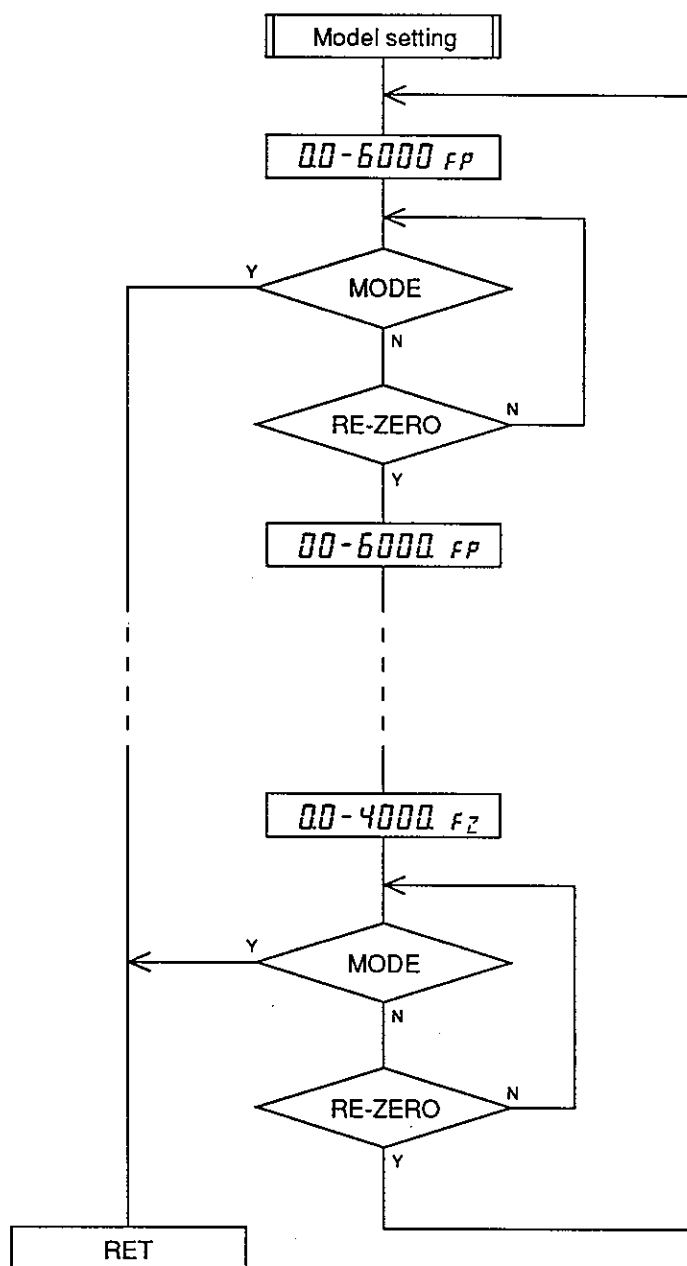
2.3.2 Error display

Error 1	Instability during re-zeroing
Error 2	Instability during unit weight or 100% weight sampling
Error 3	Remote control input data error
Error 6	CPU (U6) internal RAM read/write error
Error 7	RAM (U4) read/write error
Error 8	WPSW slide switch on
CAL E	Calibration mass error
CAL no	Instability during CAL data sampling
E	Weight error
Lo	Sample too light

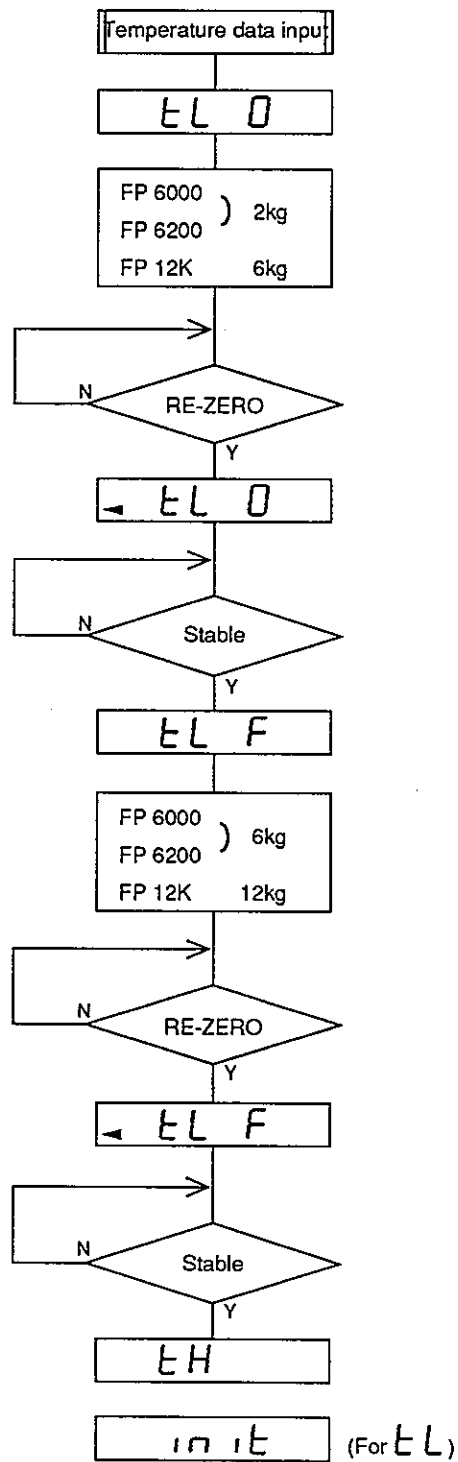
2.3.3 Flowchart

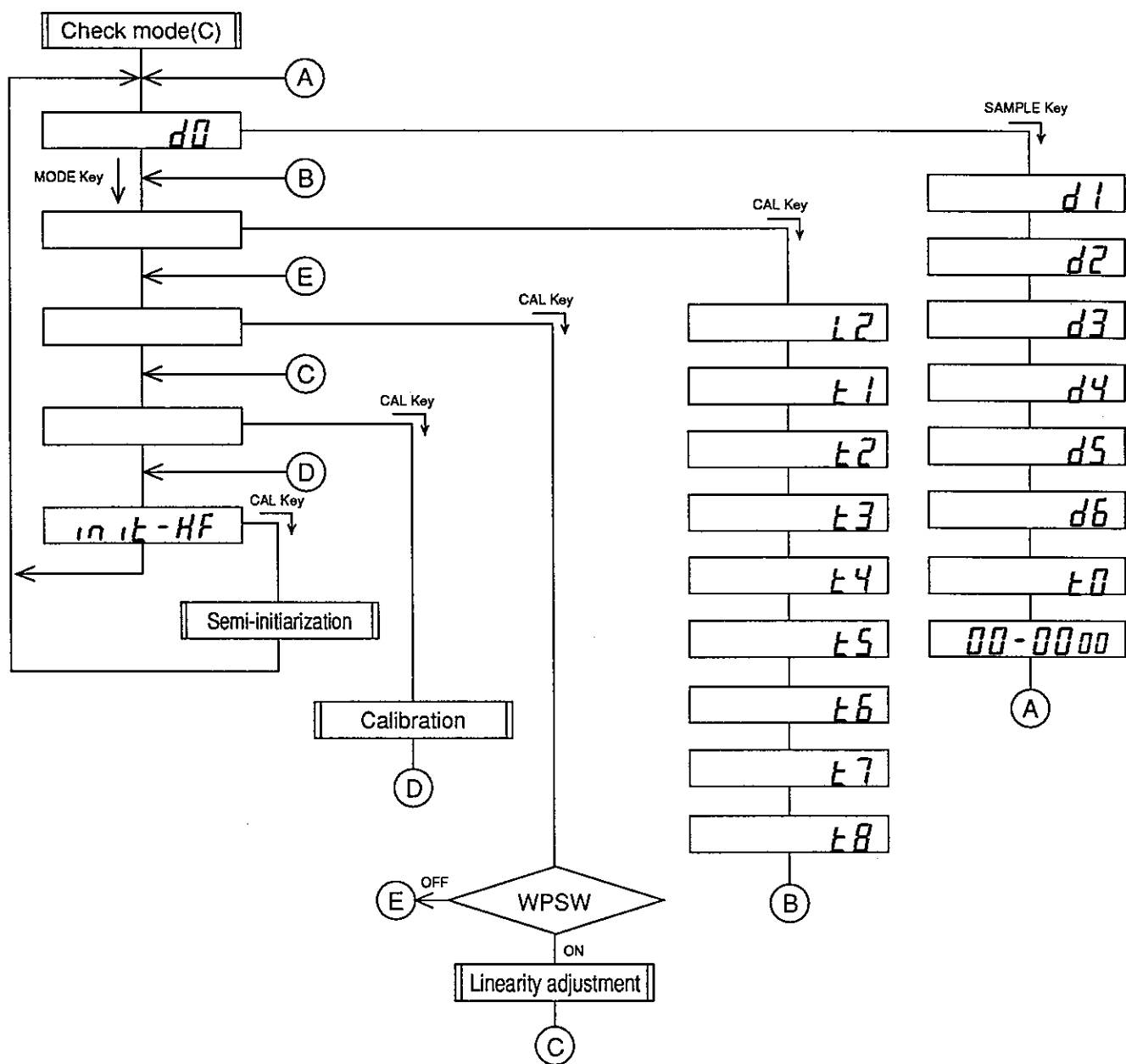


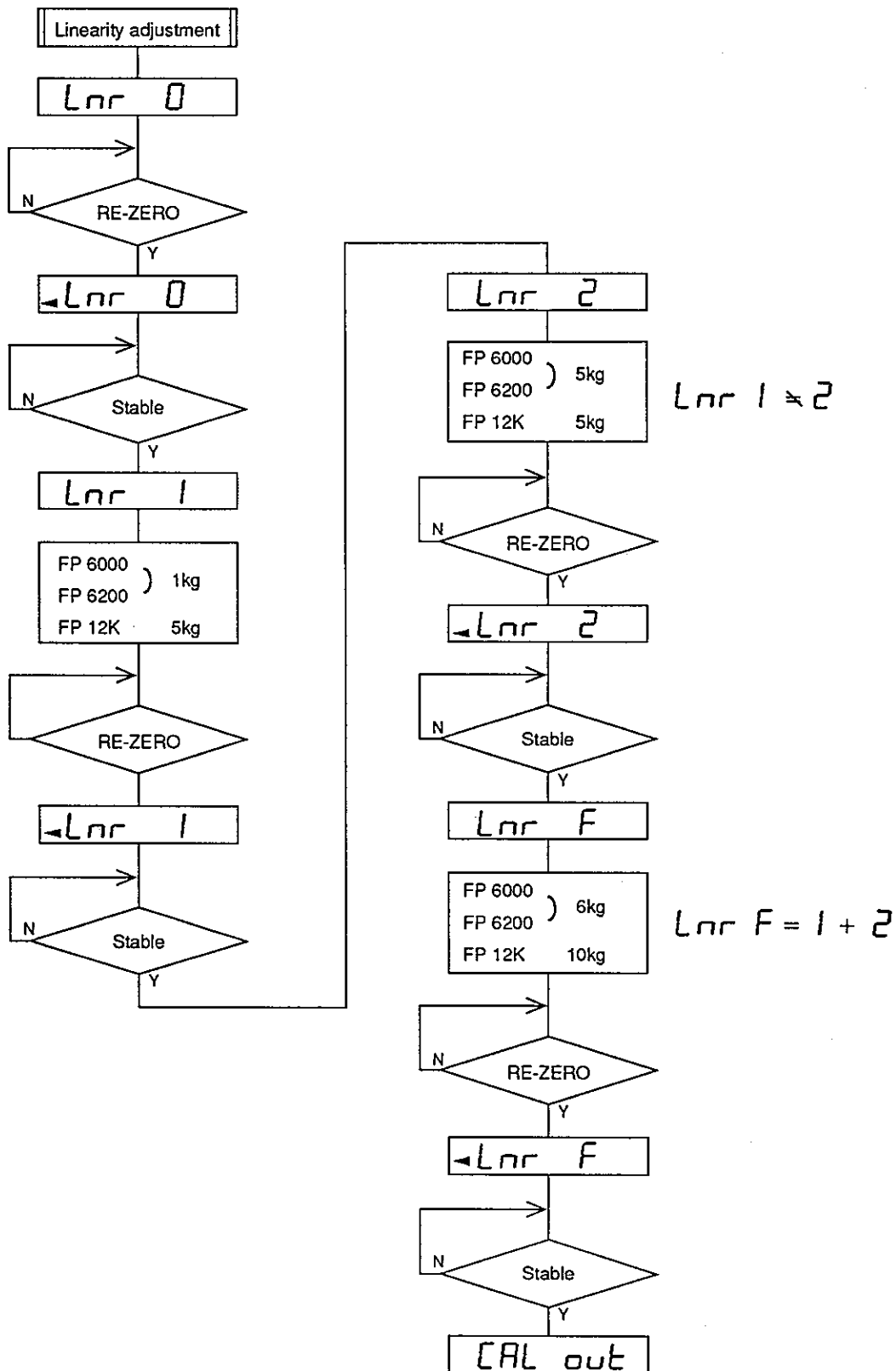


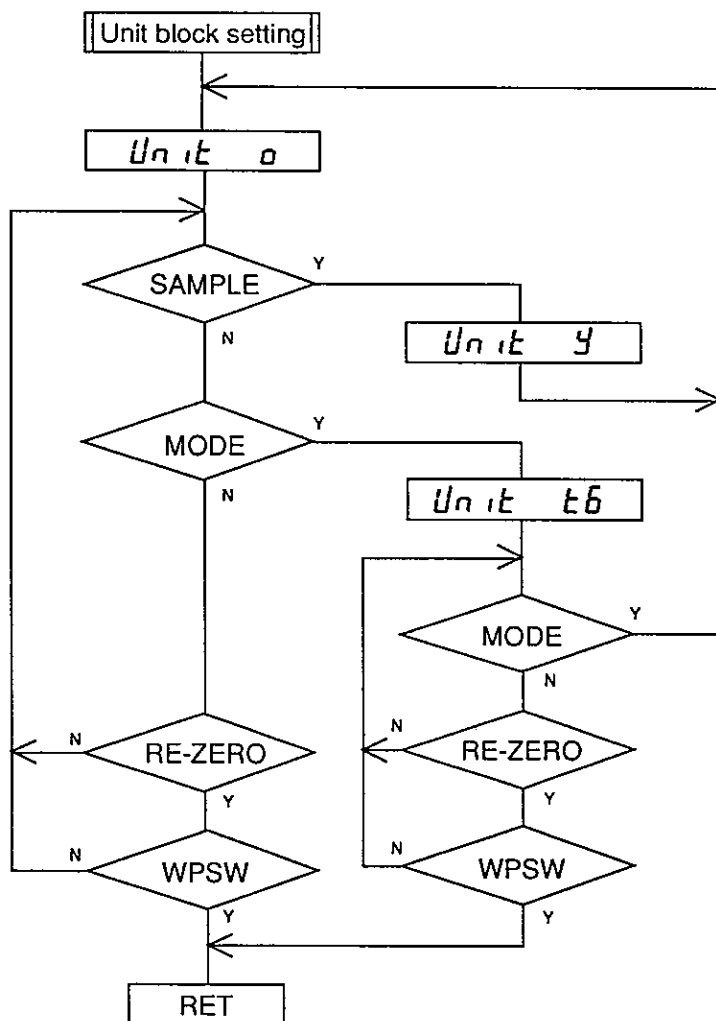


<u>6000 FP</u>	FP6000
<u>6000.FP</u>	FP6000 (With internal balance weight)
<u>12 FP</u>	FP12K
<u>12 .FP</u>	FP12K (With internal balance weight)
<u>400 FZ</u>	FZ400
<u>400.FZ</u>	FZ400 (With internal balance weight)
<u>4000 FZ</u>	FZ4000
<u>4000.FZ</u>	FZ4000 (With internal balance weight)
<u>6200 FP</u>	FP6200
<u>6200.FP</u>	FP6200 (With internal balance weight)









0 g. cnt. Pct. ct

1 g

2 g. cnt. Pct. ct. mm

3 g. cnt. Pct. oz. lb. lb.o.ct. mm.
dwt. ozt. GN. t

4 g. cnt. Pct. oz. lb. lb.o.ct. mm.
dwt. ozt. GN. t

5 g. cnt. Pct. oz. lb. lb.o.ct. mm.
dwt. ozt. GN. t

6 g. cnt. Pct. oz. lb. lb.o.ct. mm.
dwt. ozt. GN. t

7 g. cnt. Pct. oz. lb. lb.o.ct. mm.
dwt. ozt. GN. t

8 g. cnt. Pct. oz. lb. lb.o.ct. mm.
dwt. ozt. GN. t

9 g. cnt. Pct. oz. lb. lb.o.ct. mm.
dwt. ozt. GN. t

TG

TN

TS

TC

TT

MS

CHECK MODE (Addition)

[D0	Weight A/D data	[Zero: 510,000 - 790,000]
[D1	After averaging	[Do x 2]
[D2	After temperature data input	
[D3	After linearity correction	
[D4	After calibration	
[D5	After TARE weight	[D6 x 2]
[D6	Gram display	[Zero track off]
[T0	Temperature A/D data	[20°C, 1,000,000~1,100,000]
[00-00 00	Clock display	[hhmmss]
[L1	Linearity factor	[Initial value: 0]
[L2	Calibration factor	[Initial value: 48425]
[T1	Temperature data input factor 1(Q)	[Initial value: 83465]
[T2	Temperature data input factor 2(P)	[Initial value: -785339]
[T3	Temperature data input (low): Zero	[Initial value: 2001488]
[T4	Temperature control data (low): Span	[Initial value: 2696572]
[T5	Temperature data input (low): Temperature	[Initial value: 1100477]
[T6	Temperature control data (high): Zero	[Initial value: 2001185]
[T7	Temperature data input (high): Span	[Initial value: 2699120]
[T8	Temperature data input (low): Temperature	[Initial value: 1039571]

DETAILS OF INITIALIZATION

in it

→

Model	FP-6000
Unit	g, cnt, pct, ct
Temperature data input factor	Constant setting 83485 T1 -785339 T2 2001488 T3 2698572 T4 1100477 T5 2001185 T6 2699120 T7 1039571 T8
Linearity factor	Constant setting 0 L1
Calibration factor	Constant setting 42425 L2
Internal setting	Factory setting
Various setting values (CAL weight value, comparator value)	Factory setting

in it-HF

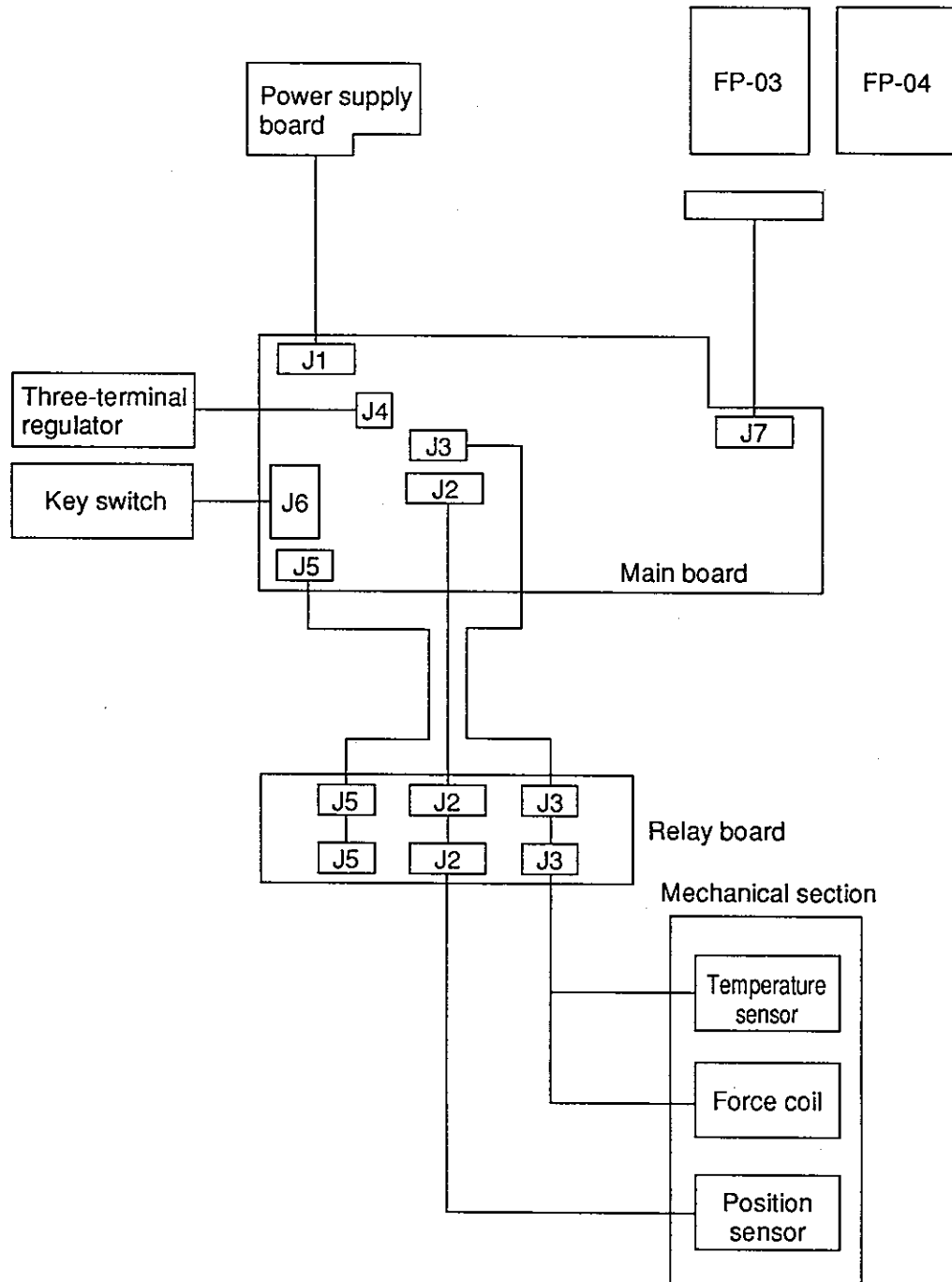
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3. ELECTRIC CIRCUIT



3.1 Block Diagram





3.2 Checkpoints

Voltage

Measure the voltages between the following test points and check that they are within the specified ranges.

TP2 - TP7 : -10.5 to -9.4 [V]

TP2 - TP3 : 9.3 to 10.5 [V]

TP2 - TP1 : -5.5 to -4.5 [V]

TP2 - TP4 : -29 to -34 [V]

(-) (+)

Lithium battery voltage

TP1 - TP6: 2.5V or more

Both ends of R14: 1mV or less

Analog module

Disconnect J2 and J3 to isolate the electrical section, then check that count value on the "D0" display is within the following ranges (the decimal point may be ignored);

870000 ~ 880000 Fluctuation: ± 4 or less (FP6000/6200)

1040000 ~ 1050000 Fluctuation: ± 4 or less (FP12K)

A/D count

Connect the mechanical section, then check that count value on the "D0" display is within the following ranges (the decimal point may be ignored):

	FP6000/6200		FP12K
0kg	510000 ~ 790000	0kg	510000 ~ 840000
6kg	1490000 or less	12kg	1490000 or less
Span	700000 or less	Span	500000 or less

Temperature sensor

Check that count value on the "T0" display is within the following ranges (the decimal point may be ignored):

1000000 ~ 1100000 Fluctuation: ± 10 or less (20°C)



Waveform Check - LOGIC WAVEFORM

No.	Signal Name	Test Points	Waveform	Commands
1	OSC1 OSC2	U5(12) ~LG U5(13)		Gate Array (U5) Clock Input
2	X ₁ X ₂	U5(8),U6(56) ~LG U5(9),U6(57)		CPU(U6) Clock Input
3	AZ	U6(46) ~LG		A/D Auto Zero
4	WIST	U5(2) ~LG U6(44)		Weighing A/D 1st Signal
5	TIST	U5(3) ~LG U6(45)		Temperature A/D 1st Signal (When Stable)
6	CNTE	U5(1) ~LG U6(43)		A/D Count Enable
7	COU	U5(52) ~LG U6(38)		A/D Count Pulse 2 ⁸ bit.
8	CMPI	U5(4) ~LG		Comparator Input From HYBRID to Gate Array
9	T ₀ ~ T ₉	U6(2~11) ~VSS FLP1G~11G		Display Timing
10	WPSW	U5(20) ~LG	If WPSW is OFF, then H(+5) If WPSW is ON, then L(0)	WPSW switch Input Reading
11	AUXE	U5(41) ~LG		Key Switch Enable



4. ADJUSTMENT




4.1 Linearity Adjustment

Items to prepare



- Calibration mass
- M3 screwdriver

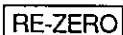

	Weight A	Weight B
for FP6000, FP6200	1 Kg	5Kg
for FP12K	5 Kg	5 Kg

Adjustment

Step 1: Press the  key to turn on the power. The display is usually reset to zero.

Step 2: Hold down the  key until step 3.

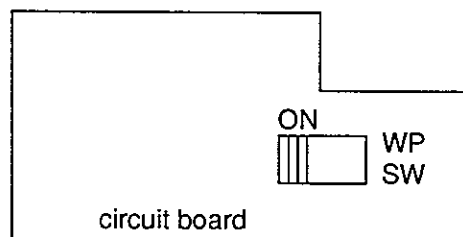
Press the  key while holding down the  key.

Step 3: While holding down the  key, press the  key twice to activate the check mode.

Step 4: Press the  key three times to change the display to



Step 5: Turn on the write-protect switch (WPSW).



Step 6: Press the **CAL** key to start the adjustment operation.
Now the zero point is stored.

Lnr 0

◀ Lnr 0

Step 7: Place weight A.
Store the value of weight A.

Lnr 1

◀ Lnr 1

Weight A	FP6000, FP6200	1 Kg
	FP12K	5 Kg

Step 8: Place weight B.
Store the value of weight B.

Lnr 2

◀ Lnr 2

Weight B	FP6000, FP6200	5 Kg
	FP12K	5 Kg

Step 9: Place weights A and B.
Store the total value of weights A and B.

Lnr F

◀ Lnr F

Step 10: Terminate the linearity adjustment.

CAL out

Step 11: Turn off the WPSW switch.

Step 12: Press the **ON/OFF** key to turn off the power.



4.2 Four-corner Adjustment

Items to prepare

- Calibration mass (4kg weight for FP6000/6200, 10kg weight for FP12K)
- M3 screwdriver
- Adjustment washer (three types)

Adjustment

Step 1: Leave the power on for at least thirty minutes.

Step 2: Remove the shield "50" and cover "47".

Step 3: Adjust the stopper "66" until the stopper plate "54" comes to the center of the stopper gap.

Step 4: "D6" is displayed in the check mode. (See the flowchart.)

Press the **CAL** key while holding down the **RE-ZERO** key.

Press the **MODE** key. **D 0** is displayed.

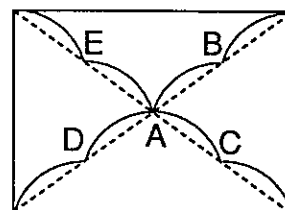
Press the **SAMPLE** key several times. **D 6** is displayed.

Step 5: Place the weight at the center (A) of the plate. (Example: FP6000)

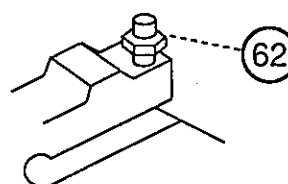
Step 6: Press the **RE-ZERO** key to display **0.00**.

Step 7: Read the difference from position A when the weight is placed at points B, C, D, and E.

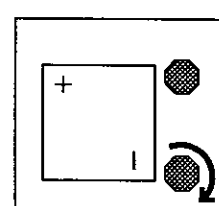
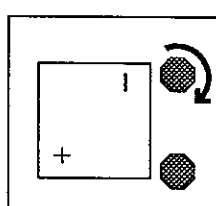
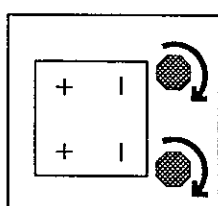
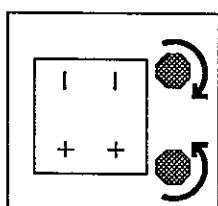
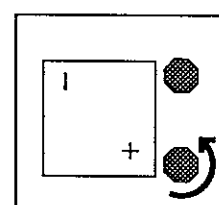
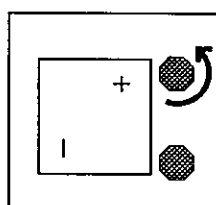
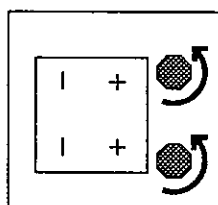
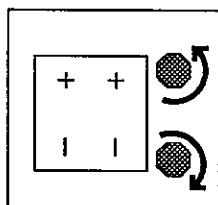
Step 8: In the following case, adjust the two four-corner adjustment screws to set the values at points B and C to zero.



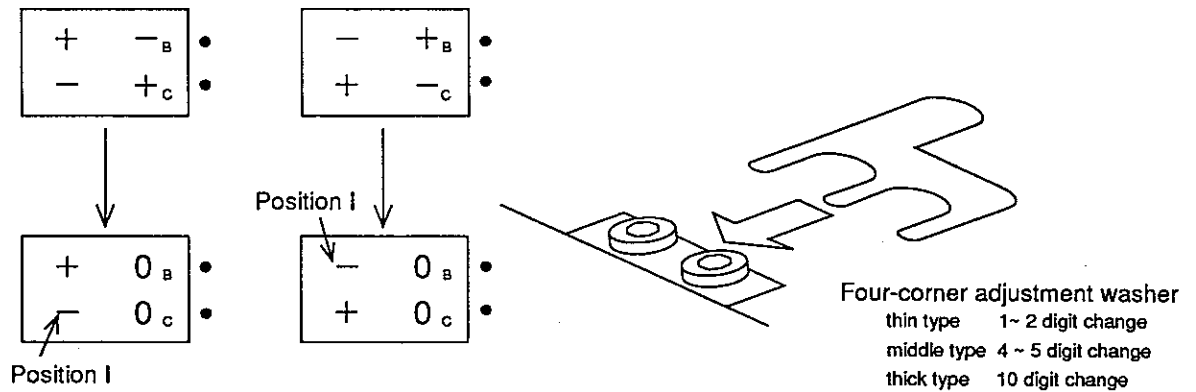
D6



The variance (\pm) should be two digits or less.

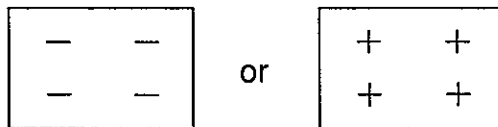


Step 9: In the following case, adjust the values at points B and C to zero. Then insert the four-corner adjustment washer into position I for the adjustment in step 8.



The variance (\pm) should be adjusted to two digits or less.

Step 10: In the following case, the unit should be reassembled, or any one of the belt "77", the belt "69", set 2 or set 3 should be replaced.



Step 11: Execute step 8.

Step 12: When step 8 is normally completed, mount the shield "50" and cover "47".

Step 13: Check again that no problems occur in step 8.



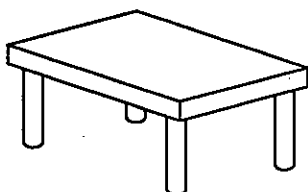
5. ASSEMBLY AND DIASSEMBLY



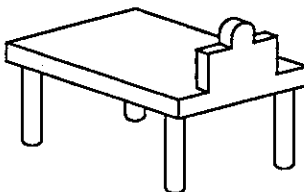
5.1 Diassembly

Items to prepare for removing the coil

Securing table A



Securing table B

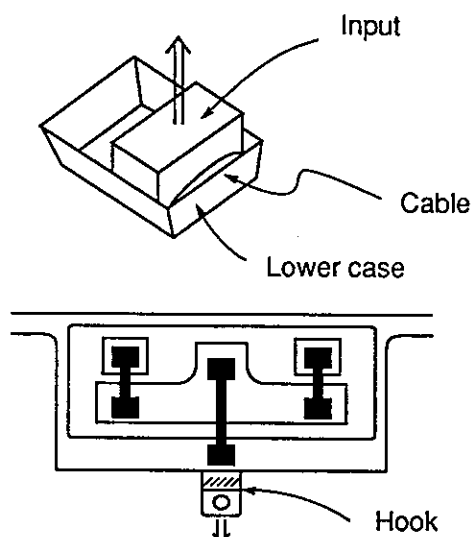


M3 plus
screwdriver

M5 hex wrench

Soldering iron

1. Disconnect the cable from the mechanism.
2. Remove the mechanism from the lower case with a hex wrench.
3. Remove the weighing bracket (hook) for underhook weighing "76".
4. Secure the mechanism on securing table A.
5. The exploded view shows the disassembly procedure.



- Step 1: Remove "125", "143", and "47".
- Step 2: Remove "91", "129", "130", "49", and "88".
- Step 3: Remove "132", "123", "124", "128", and "50".
- Step 4: Transfer the mechanism to securing table B.
- Step 5: Remove "131", "130", "78", and "77".
- Step 6: Remove unit A.
- Step 7: Remove "87" and "137".
- Step 8: Remove "125", "51", "52", "128", "123", and "54".
- Step 9: Remove the wire of the coil from "68". (Soldered)
- Step 10: Remove "132", "123", "124", "58", "139", "115", "59", "64", and "60".
- Step 11: Remove "128", "123", "124", and "65".
- Step 12: Remove "69", "70", "115", and "113".
- Step 13: Remove unit B.



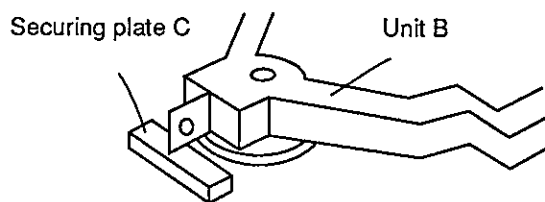
5.2 Assembly

Items to prepare for removing the coil

- Securing table A • Plate • Soldering iron
- Securing table B • M3 screwdriver • Tentative belts
- Securing plate C • Hex wrench

Step 1: Secure the mechanism on securing table B.

Step 2: Insert unit B into the frame and secure the floating position on securing board C.



Step 2

Step 3: Secure unit B on securing table B.

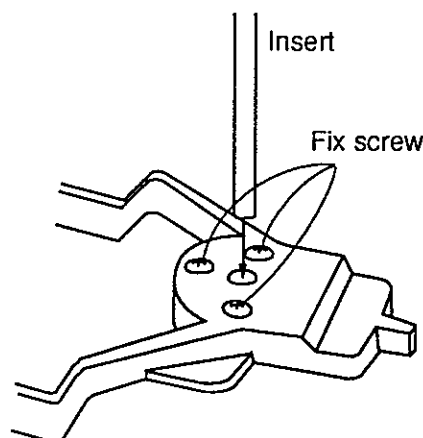
Step 4: Secure set 12 temporarily with the tentative belts.

Step 5: Replace the tentative belts one by one with the belts "69".

Step 6: Solder the lead wires of set 9.

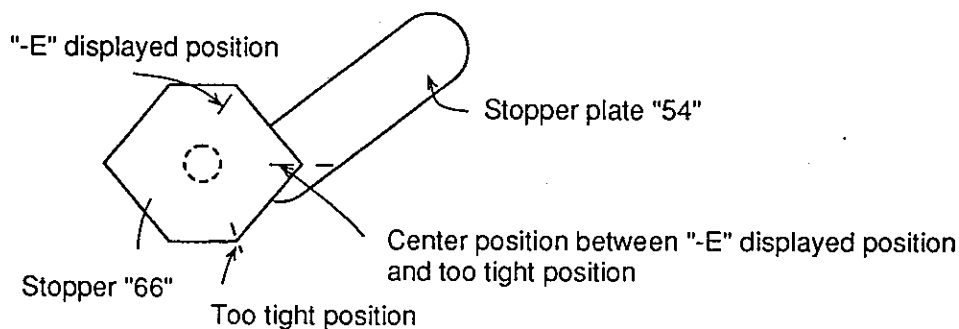
Step 7: Remove the unit from securing table B.

Step 8: Align the position of the bobbin "57" by using the round bar.



Step 8

Step 9: Mount set 8 and adjust "66" until the stopper plate "54" is correctly positioned. Then remove securing plate C.



Step 10: Mount sets 10, 11, and 7 in this order.

Step 11: Place set 3 on securing table A and secure the mechanism.

- Step 12: Secure unit A on securing table A.
- Step 13: Mount set 3.
- Step 14: Mount set 2.
- Step 15: Mount set 5.
- Step 16: Mount the mechanism on the upper case of FP and connect the wires.
- Step 17: Mount the plate and turn on the power.
- Step 18: Adjust the stopper "66" until the stopper plate "54" comes to the center of the stopper gap.
- Step 19: Mount set 1.



6. FP JIG LIST

DESCRIPTION		PARTS NAME	Quantity
05:	A49000	positioning jig	1
05:	B46483	spacer ø12	1
05:	B46484	volt ø12	1
05:	B46485	fulcrum setting jig	2
05:	B46487	beam setting jig	1
05:	B46757	volt ø15	2
09:	A38351	base plate S	1
05:	A38251	base plate 198X150	1
05:	B46486	beam positioning jig	1
05:	A48205	foot	4
09:	A38350	base plate L	1
05:	A38250	base plate 290X180	1
05:	A48996	right angle plate L	1
05:	A48997	right angle plate S	1
05:	A48205	foot	8
10:	CB-M5-20	wing bolt M5X20	3
		bind M3X8	2
		bind M4X20	2
		bind M4X12	4
		bind M5X12	1

PARTS LIST

FP6000/6200 -1/3

90.06.21

CIRCUIT SYMBOL or DRWG. NO.	PARTS NAME	DESCRIPTION	Q'TY
	7PZ:2194C	MAIN BOARD FP6000	
C13, 31	CC:0.01U	CERAMIC CAPACITOR 0.01 μ F 50V	2
C21, 24, 25, 26, 28, 29	CC:0.022U	CERAMIC CAPACITOR 0.022 μ F 80V	6
C2, 3, 5, 11, 14	CC:0.1U25V	CERAMIC CAPACITOR 0.1 μ F 25V	5
C22, 23	CC:10P	CERAMIC CAPACITOR 10pF 50V	2
C1	CC:220P	CERAMIC CAPACITOR 220pF 50V	1
C9	CC:470P	CERAMIC CAPACITOR 470pF 50V	1
C6	CK:SM10VB100	ELECTROLYTIC CAPACITOR 100 μ F 10V	1
C4, 15	CK:SM25VB100	ELECTROLYTIC CAPACITOR 100 μ F 25V	2
C12	CK:SM25VB220	ELECTROLYTIC CAPACITOR 220 μ F 25V	1
C1	CK:SM35VB470	ELECTROLYTIC CAPACITOR 470 μ F 35V	1
C10	CK:SM50VB10	ELECTROLYTIC CAPACITOR 10 μ F 50V	1
C8, 27	CK:SM50VB3R3	ELECTROLYTIC CAPACITOR 3.3 μ F 50V	2
C2	CK:SRA50VB-2.2	ELECTROLYTIC CAPACITOR 2.2 μ F 50V	1
C3	CK:SRA50VB-3.3	ELECTROLYTIC CAPACITOR 3.3 μ F 50V	1
C5	CK:SRA6.3VB47	ELECTROLYTIC CAPACITOR 47 μ F 6.3V	1
C4	CM:92PP2A331J	FILM CAPACITOR	1
C30	CT:1D2R2	TANTALUM CAPACITOR 2.2 μ F 20V	1
C7	CT:1V010	TANTALUM CAPACITOR 1 μ F 35V	1
D15	DI:1SS53	DIODE	1
D16	DI:1SS97	DIODE	1
D2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	DI:1S1588	DIODE	12
D1	DL:TPS703A	PHOTO DIODE	1
D17	DZ:RD3.3EB1	ZENNER DIODE	1
D4	DZ:RD3.6EB	ZENNER DIODE	1
D1, 18	DZ:05Z9.1	ZENNER DIODE	2
E1	EB:CR2032-WT12	LITHIUM BATTERY	1
	ED:FIP11C11	DISPLAY TUBE	1
BZ	ET:MEB-12C-5	BUZZER	1
J6	JD:230-07-30	CONNECTOR	1
J7	JT:1-172429-1	CONNECTOR	1
J4	JT:172429-3	CONNECTOR	1
J3	JT:172429-4	CONNECTOR	1
J5	JT:172429-5	CONNECTOR	1
J2	JT:172429-6	CONNECTOR	1

PARTS LIST

FP6000/6200 -2/3

90.06.21

CIRCUIT SYMBOL or DRWG. NO.	PARTS NAME	DESCRIPTION	Q'TY
	7PZ:2194C	MAIN BOARD FP6000	
J1	JT:172429-8	CONNECTOR	1
	KO:731-15	CONNECTOR CABLE	1
	MF:AMZ22	HYBRID IC	1
	PC:2194B	PC BOARD	1
	PC:2312	PC BOARD	1
	QA:AC256-1674	COOL SHEET	1
	QA:AC316A	NYLON WASHER	1
Q4, 6	QT:A1015Y	TRANSISTOR	2
Q1	QT:C1173	TRANSISTOR	1
Q2, 3, 5, 7	QT:C1815Y	TRANSISTOR	4
R15	RC:NAT1.2K	CARBON RESISTOR 1.2K Ω 1/4W	1
R10	RC:NAT1.8K	CARBON RESISTOR 1.8K Ω 1/4W	1
R5, 6	RC:NAT1K	CARBON RESISTOR 1K Ω 1/4W	2
R57	RC:NAT1M	CARBON RESISTOR 1M Ω 1/4W	1
R11, 32	RC:NAT10K	CARBON RESISTOR 10K Ω 1/4W	2
R19, 21, 23, 24, 30, 58	RC:NAT15K	CARBON RESISTOR 15K Ω 1/4W	6
R17, 18	RC:NAT150R	CARBON RESISTOR 150 Ω 1/4W	2
R14	RC:NAT2.2K	CARBON RESISTOR 2.2K Ω 1/4W	1
R3, 13	RC:NAT22K	CARBON RESISTOR 22K Ω 1/4W	2
R3, 4, 16	RC:NAT270R	CARBON RESISTOR 270 Ω 1/4W	3
R12	RC:NAT3.9K	CARBON RESISTOR 3.9K Ω 1/4W	1
R2	RC:NAT33K	CARBON RESISTOR 33K Ω 1/4W	1
R22	RC:NAT4.7K	CARBON RESISTOR 4.7K Ω 1/4W	1
R4	RC:NAT47R	CARBON RESISTOR 47 Ω 1/4W	1
R1, 7	RC:NAT5.6R	CARBON RESISTOR 5.6 Ω 1/4W	3
R20, 31, 48, 49, 50 51, 52, 54	RC:NAT56K	CARBON RESISTOR 56K Ω 1/4W	8
R8	RC:NAT560R	CARBON RESISTOR 560 Ω 1/4W	1
R9	RC:NAT820R	CARBON RESISTOR 820 Ω 1/4W	1
R56	RC:1/22.2M	CARBON RESISTOR 2.2M Ω 1/2W	1
R55	RC:1/28.2M	CARBON RESISTOR 8.2M Ω 1/2W	1
R25	RF:3.9KRF	METALIZED RESISTOR 3.9K Ω	1
R27	RL:54R000F	METALIZED RESISTOR 54 Ω	1
R2	RM:RNM158KF	METALIZED RESISTOR 158K Ω 1/4W	1
R44	RN:IHR-4-223MA	RESISTOR NETWORK 22K Ω \times 4	1

PARTS LIST

FP6000/6200 -3/3

90.06.21

[illegible]

PARTS LIST

FP12K -1/3

90.06.21

CIRCUIT SYMBOL or DRWG. NO.	PARTS NAME	DESCRIPTION	Q'TY
	7PZ:2194D	MAIN BOARD FP12K	
C13, 31	CC:0.01U	CERAMIC CAPACITOR 0.01 μ F 50V	2
C21, 24, 25, 26, 28, 29	CC:0.022U	CERAMIC CAPACITOR 0.022 μ F 80V	6
C2, 3, 5, 11, 14	CC:0.1U25V	CERAMIC CAPACITOR 0.1 μ F 25V	5
C22, 23	CC:10P	CERAMIC CAPACITOR 10pF 50V	2
C1	CC:220P	CERAMIC CAPACITOR 220pF 50V	1
C9	CC:470P	CERAMIC CAPACITOR 470pF 50V	1
C6	CK:SM10VB100	ELECTROLYTIC CAPACITOR 100 μ F 10V	1
C4, 15	CK:SM25VB100	ELECTROLYTIC CAPACITOR 100 μ F 25V	2
C12	CK:SM25VB220	ELECTROLYTIC CAPACITOR 220 μ F 25V	1
C1	CK:SM35VB470	ELECTROLYTIC CAPACITOR 470 μ F 35V	1
C10	CK:SM50VB10	ELECTROLYTIC CAPACITOR 10 μ F 50V	1
C8, 27	CK:SM50VB3R3	ELECTROLYTIC CAPACITOR 3.3 μ F 50V	2
C2	CK:SRA50VB-2.2	ELECTROLYTIC CAPACITOR 2.2 μ F 50V	1
C3	CK:SRA50VB-3.3	ELECTROLYTIC CAPACITOR 3.3 μ F 50V	1
C5	CK:SRA6.3VB47	ELECTROLYTIC CAPACITOR 47 μ F 6.3V	1
C4	CM:92PP2A331J	FILM CAPACITOR	1
C30	CT:1D2R2	TANTALUM CAPACITOR 2.2 μ F 20V	1
C7	CT:1V010	TANTALUM CAPACITOR 1 μ F 35V	1
D15	DI:1SS53	DIODE	1
D16	DI:1SS97	DIODE	1
D2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	DI:1S1588	DIODE	12
D1	DL:TPS703A	PHOTO DIODE	1
D17	DZ:RD3.3EB1	ZENNER DIODE	1
D4	DZ:RD3.6EB	ZENNER DIODE	1
D1, 18	DZ:05Z9.1	ZENNER DIODE	2
E1	EB:CR2032-WT12	LITHIUM BATTREY	1
	ED:FIP11C11	DISPLAY TUBE	1
BZ	ET:MEB-12C-5	BUZZER	1
J6	JD:230-07-30	CONNECTOR	1
J7	JT:1-172429-1	CONNECTOR	1
J4	JT:172429-3	CONNECTOR	1
J3	JT:172429-4	CONNECTOR	1
J5	JT:172429-5	CONNECTOR	1
J2	JT:172429-6	CONNECTOR	1

PARTS LIST

FP12K -2/3

90.06.21

CIRCUIT SYMBOL or DRWG. NO.	PARTS NAME	DESCRIPTION	Q'TY
	7PZ:2194D	MAIN BOARD FP12K	
J1	JT:172429-8	CONNECTOR	1
	KO:731-15	CONNECTOR CABLE	1
	MF:AMZ22	HYBRID IC	1
	PC:2194B	PC BOARD	1
	PC:2312	PC BOARD	1
	QA:AC256-1674	COOL SHEET	1
	QA:AC316A	NYLON WASHER	1
Q4,6	QT:A1015Y	TRANSISTOR	2
Q1	QT:C1173	TRANSISTOR	1
Q2,3,5,7	QT:C1815Y	TRANSISTOR	4
R15	RC:NAT1.2K	CARBON RESISTOR 1.2K Ω 1/4W	1
R10	RC:NAT1.8K	CARBON RESISTOR 1.8K Ω 1/4W	1
R5,6	RC:NAT1K	CARBON RESISTOR 1K Ω 1/4W	2
R57	RC:NAT1M	CARBON RESISTOR 1 Ω 1/4W	1
R11,32	RC:NAT10K	CARBON RESISTOR 10K Ω 1/4W	2
R19,21,23,24,30, 58	RC:NAT15K	CARBON RESISTOR 15K Ω 1/4W	6
R17,18	RC:NAT150R	CARBON RESISTOR 150 Ω 1/4W	2
R14	RC:NAT2.2K	CARBON RESISTOR 2.2K Ω 1/4W	1
R3,13	RC:NAT22K	CARBON RESISTOR 22K Ω 1/4W	2
R3,4,16	RC:NAT270R	CARBON RESISTOR 270 Ω 1/4W	3
R12	RC:NAT3.9K	CARBON RESISTOR 3.9K Ω 1/4W	1
R2	RC:NAT33K	CARBON RESISTOR 33K Ω 1/4W	1
R22	RC:NAT4.7K	CARBON RESISTOR 4.7K Ω 1/4W	1
R4	RC:NAT47R	CARBON RESISTOR 47 Ω 1/4W	1
R1,7	RC:NAT5.6R	CARBON RESISTOR 5.6 Ω 1/4W	3
R20,31,48,49,50 51,52,54	RC:NAT56K	CARBON RESISTOR 56K Ω 1/4W	8
R8	RC:NAT560R	CARBON RESISTOR 560 Ω 1/4W	1
R9	RC:NAT820R	CARBON RESISTOR 820 Ω 1/4W	1
R56	RC:1/22.2M	CARBON RESISTOR 2.2M Ω 1/2W	1
R55	RC:1/28.2M	CARBON RESISTOR 8.2M Ω 1/2W	1
R27	RL:B34ROF	METALIZED RESISTOR 34 Ω	1
R28	RL:86ROF	METALIZED RESISTOR 86 Ω	1
R2	RM:RNM158KF	METALIZED RESISTOR 158K Ω 1/4W	1
R44	RN:IHR-4-223MA	RESISTOR NETWORK 22K Ω \times 4	1

PARTS LIST

FP12K -3/3

90.06.21

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PARTS LIST

FP6000/6200/12K -1

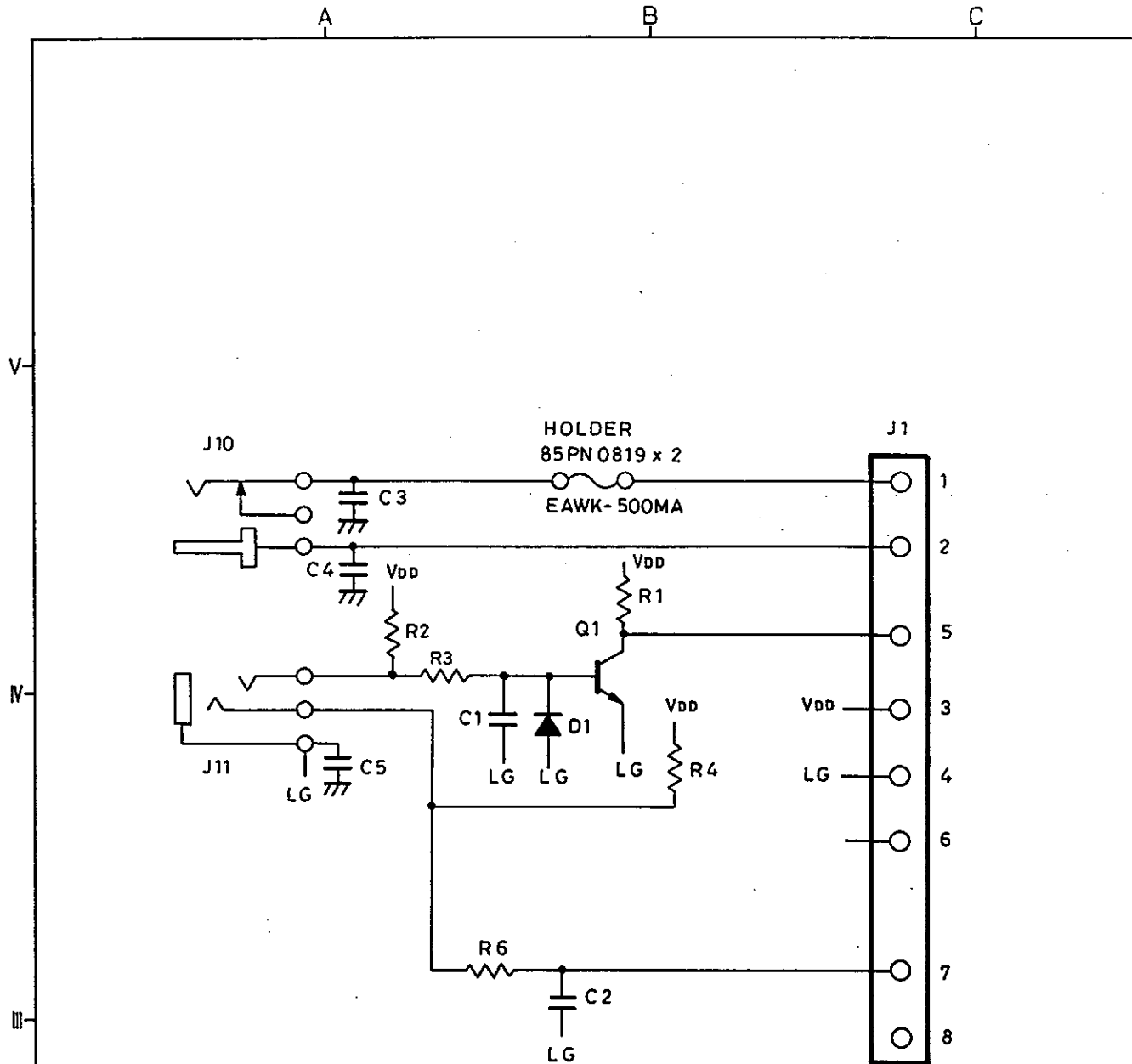
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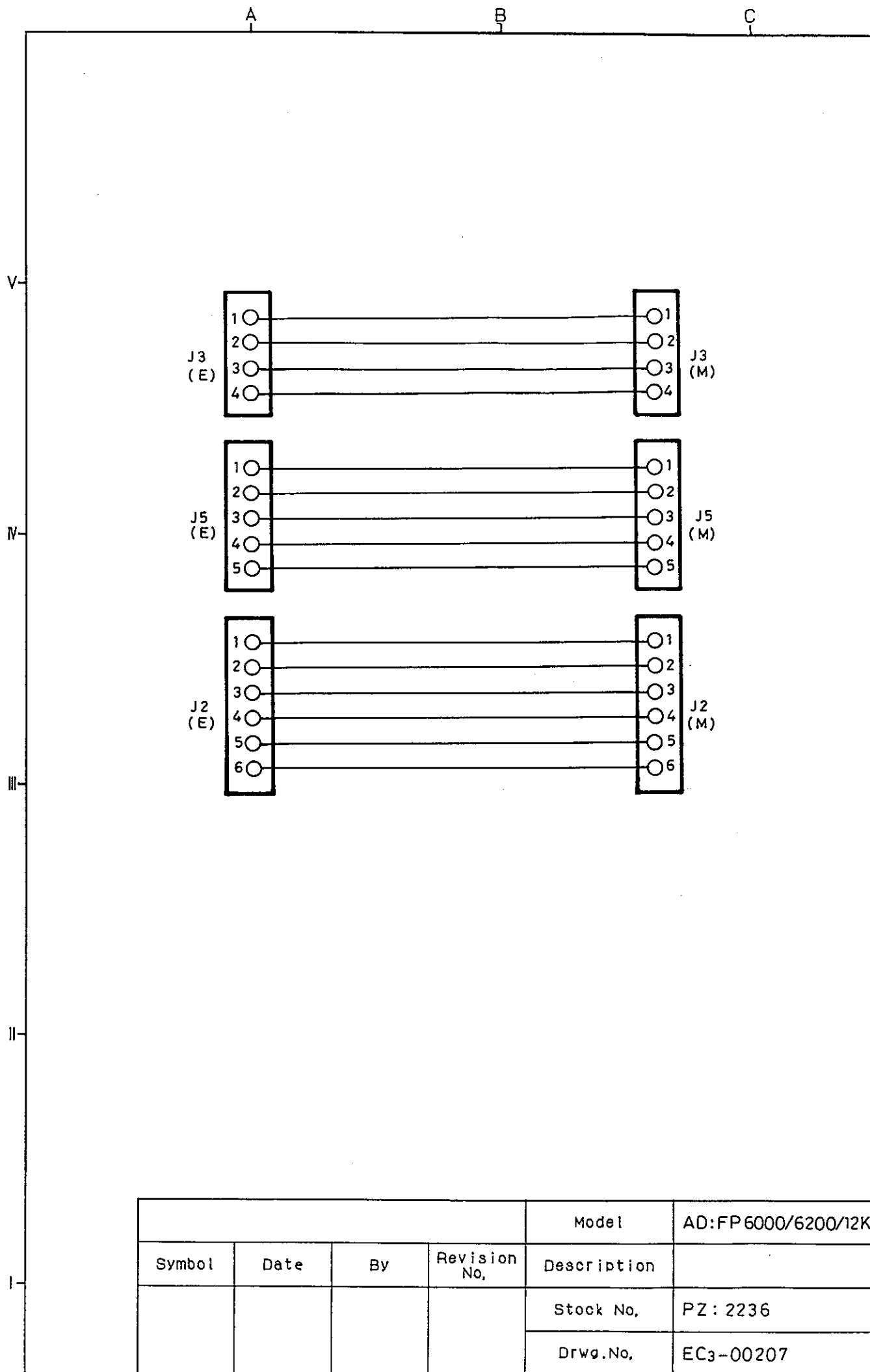
FP6000/6200/12K -2

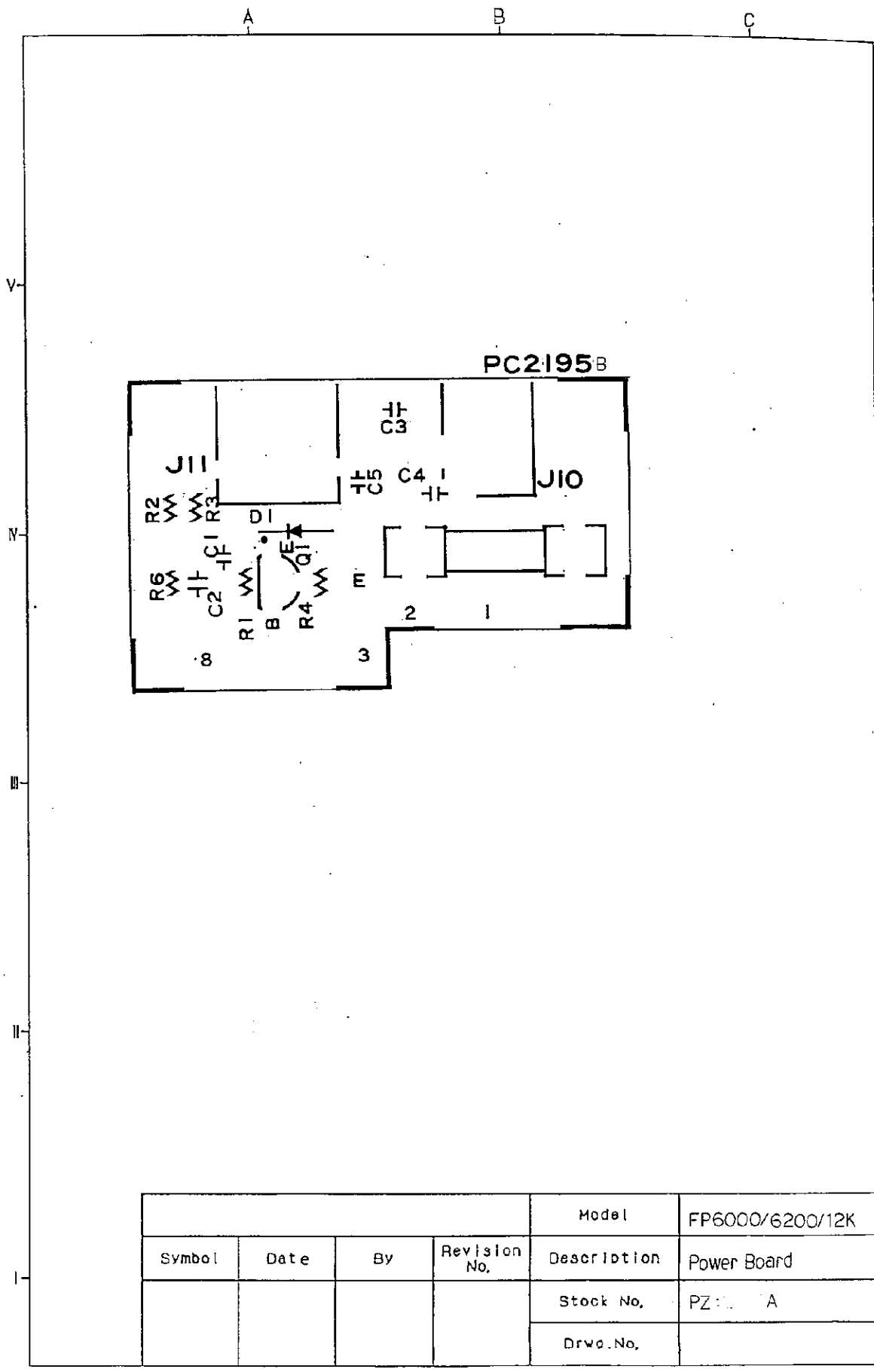
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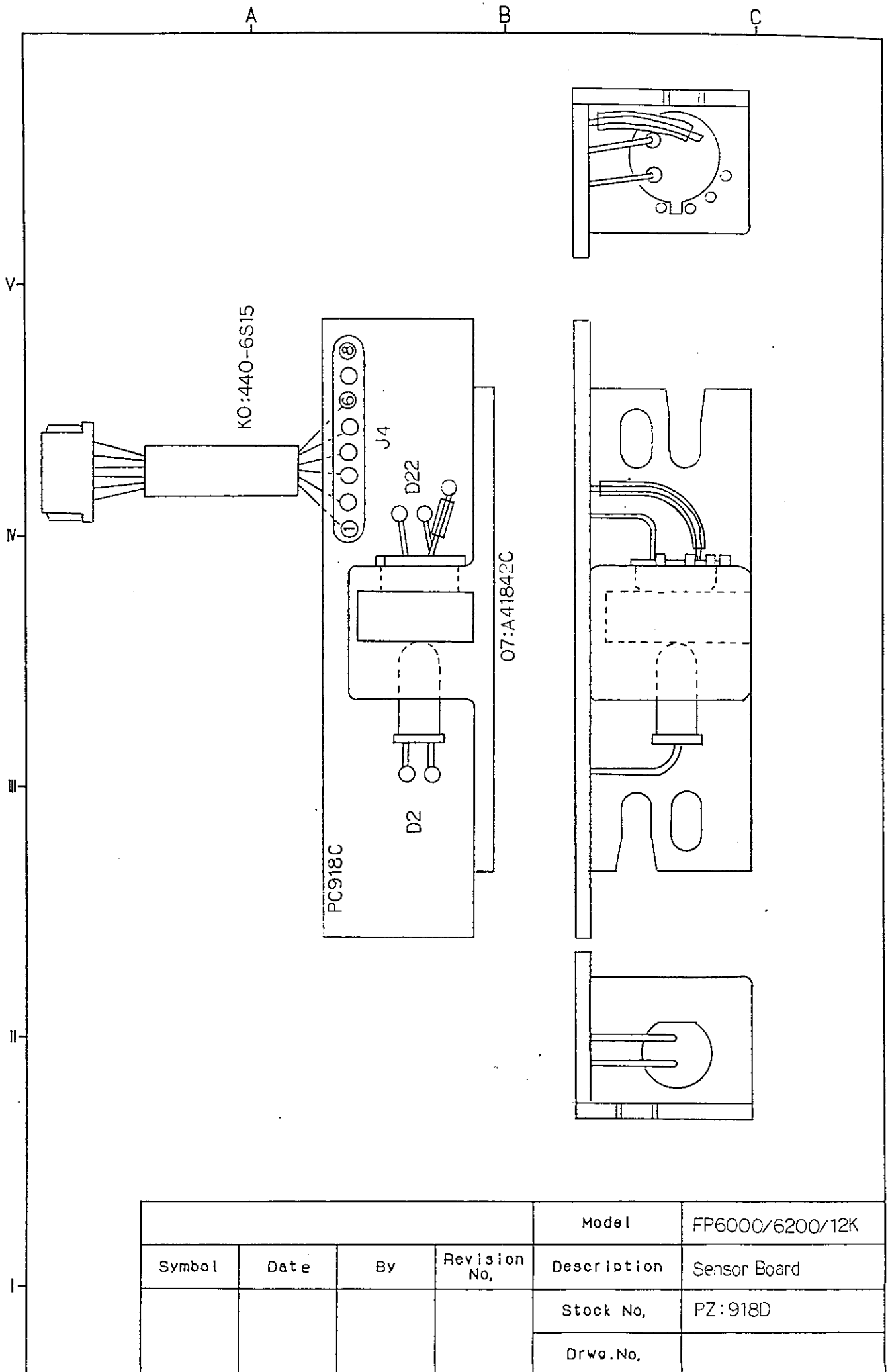


				Model	AD:FP6000/6200/12K
Symbol	Date	By	Revision No.	Description	Power Board
				Stock No.	PZ: 2195 / A
				Drwg.No.	EC4-00206





				Model	FP6000/6200/12K
Symbol	Date	By	Revision No.	Description	Power Board
				Stock No.	PZ 100 A
				Drwg. No.	

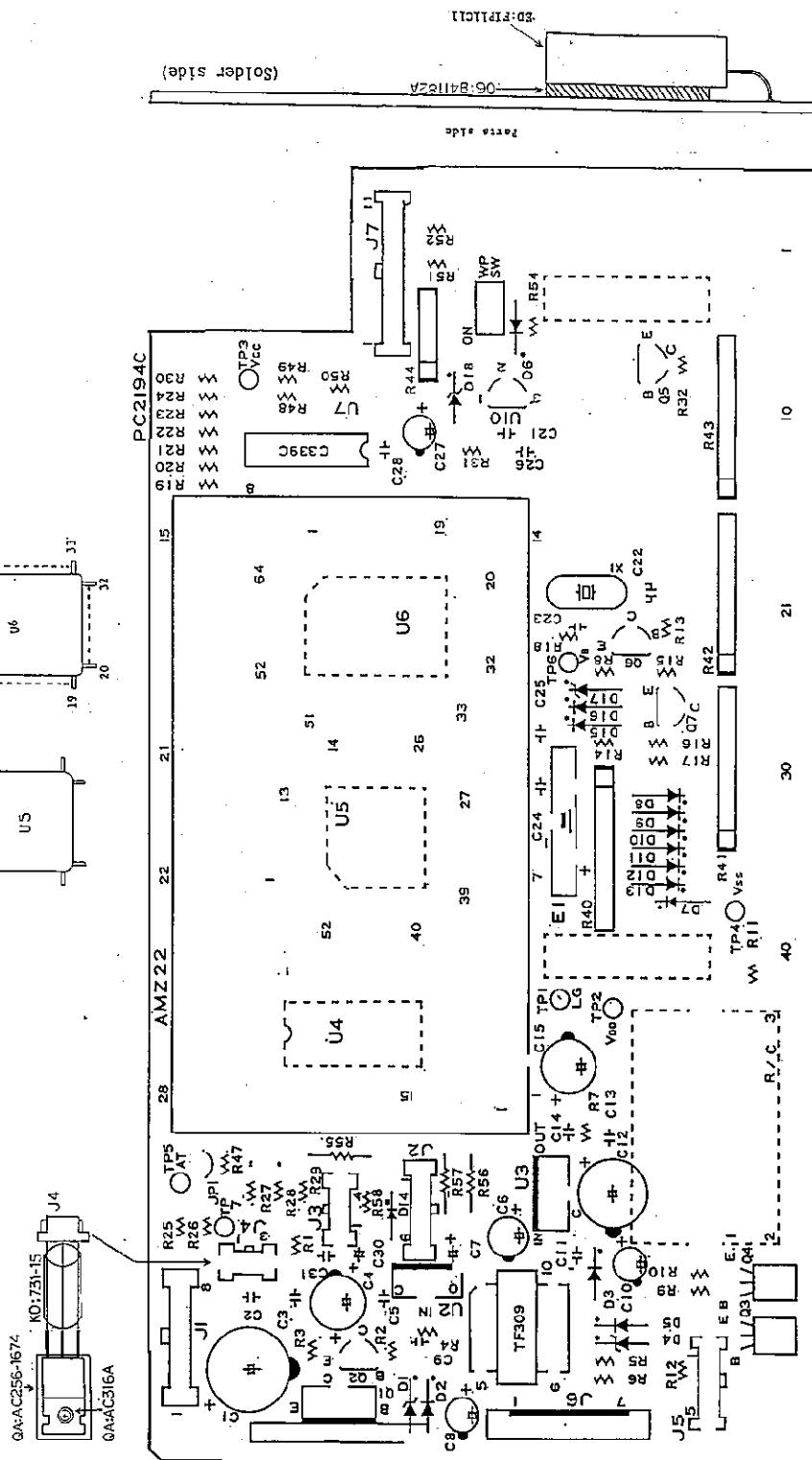


				Model	FP6000/6200/12K
Symbol	Date	By	Revision No.	Description	Sensor Board
				Stock No.	PZ:918D
				Drwg.No.	

A B C D E F G

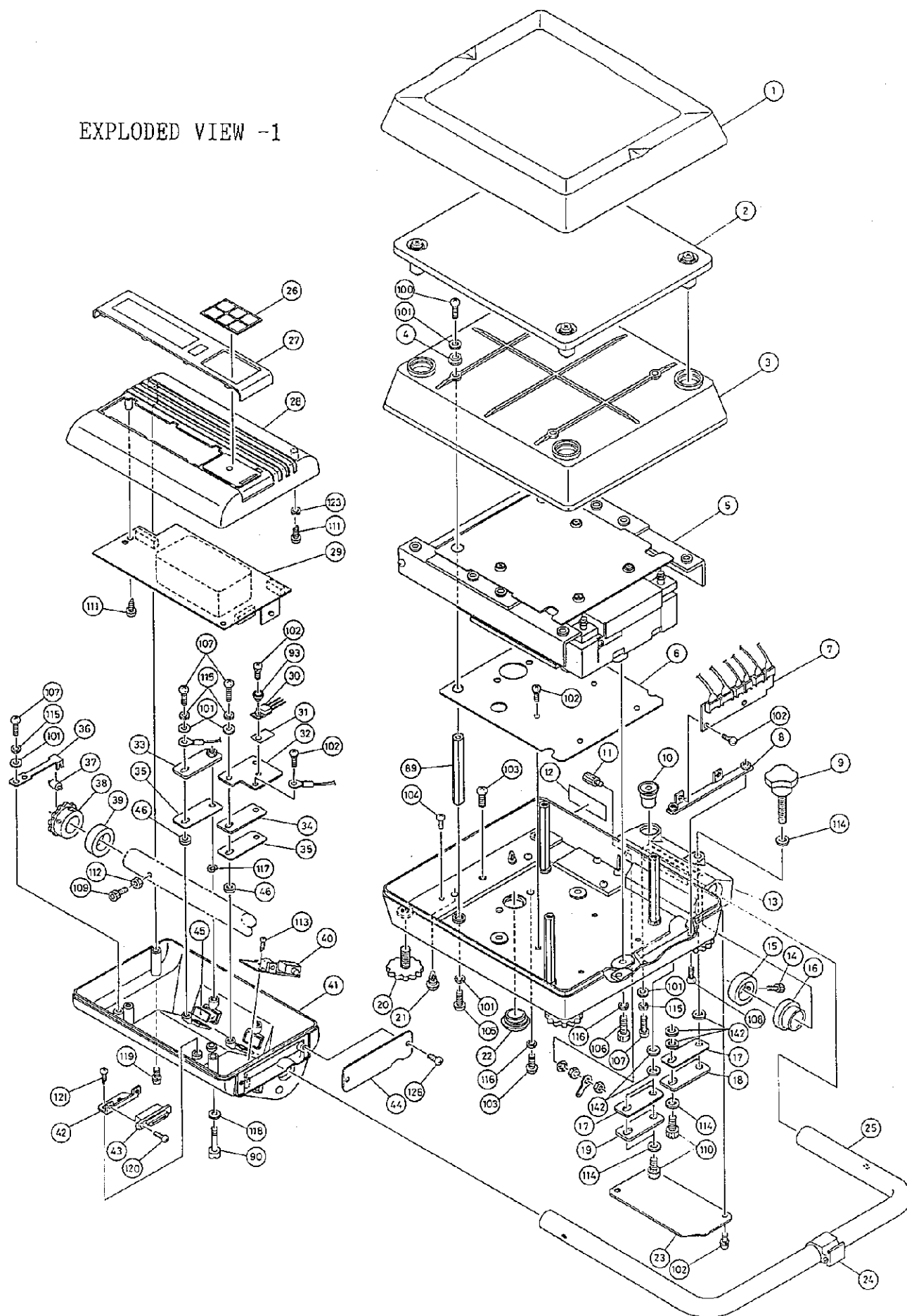
	R25	R26	R27	R28	R29	R47
PZ:2194C	3.9KRF	★	54R000F	★	★	★
PZ:2194D	JUNPER	★	B34R0F	88R0F	★	★

★ MASKING

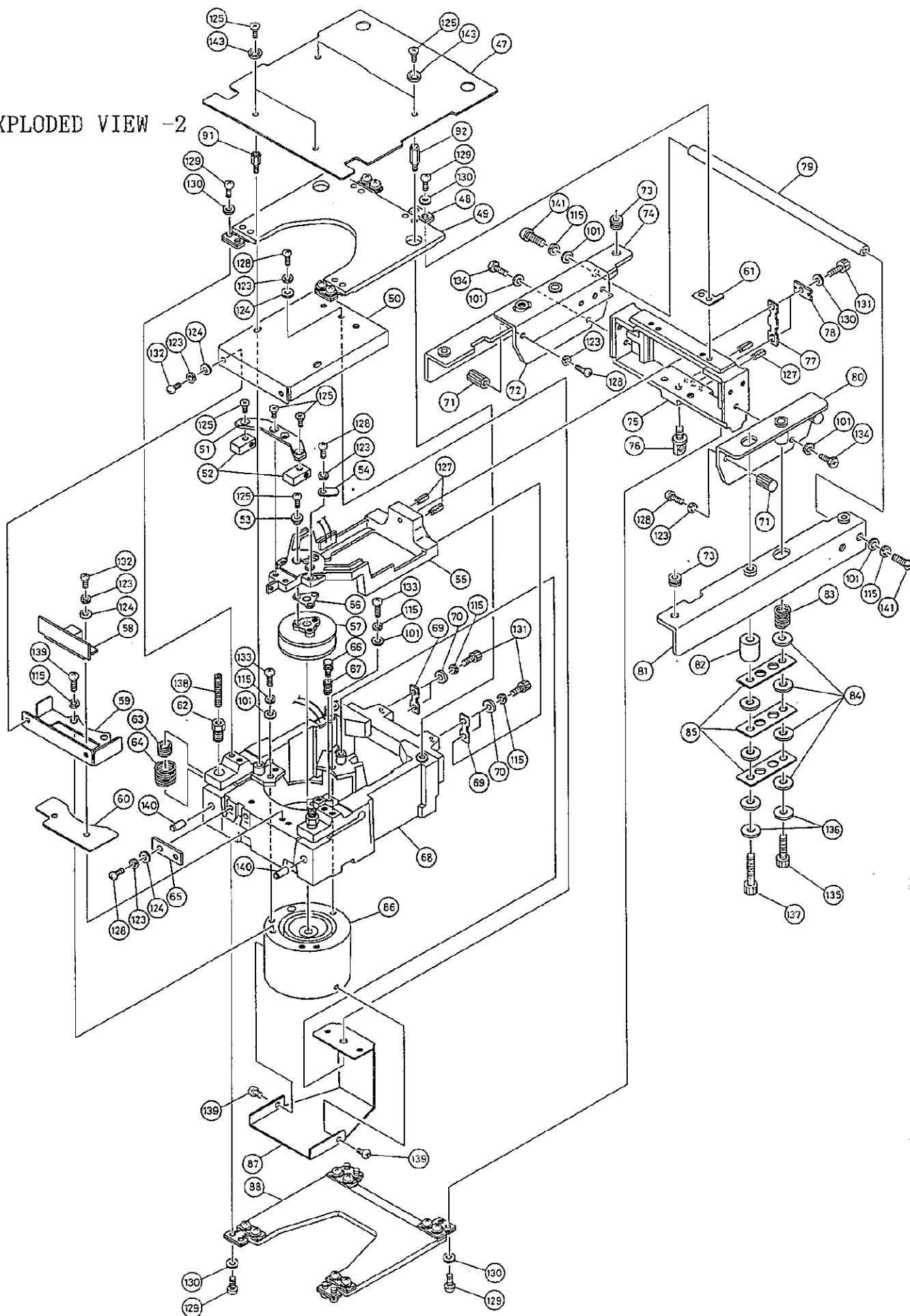


Symbol	Date	By	Revision No.	Model	FP600C/6200/12K
				Description	Main Board
				Stock No.	PZ:2194C/D
				Drvo.No.	

EXPLODED VIEW -1



EXPLODED VIEW -2



DRWG.NO.	PARTS NAME	DESCRIPTION	QTY
1	04:A35815B	WEIGHING PAN	1
2	7PB:FP6000-8	PAN SUPPORT FP6000/6200	1
(2)	7PB:FP12K-8	PAN SUPPORT FP12K	1
3	07:A20877D	UPPER CASE	1
4	05:B45442	WASHER T=3.5	4
5	7PA:FP6000-K	MECHANICAL UNIT FP6000/6200	1
(5)	7PA:FP12K-K	MECHANICAL UNIT FP12K	1
6	04:A37296A	SHIELD PLATE	1
7	PZ:2236	RELAY BOARD	1
8	04:B41159A	RELAY BOARD STAND	1
9	09:B44641A	KNOB BOLT	1
10	7PB:FP6000-7	LEVEL VIAL UNIT	1
11	TM:T-10	EARTH TERMINAL	1
12		STICKER	
13	03:A10113G	LOWER CASE	1
14			1
15	07:B44343A	STOPPER RING	1
16	05:B40654B	WATERPROOF RING	1
17	04:B40660	ARM FITTING PLATE 2	2
18	04:B40659A	ARM FITTING PLATE 1	1
19	04:B40967	ARM FITTING PLATE 3	1
20	07:A41834C	ADJUSTABLE FOOT	4
21	10:N04655	CHRISTMAS TREE CLIP	2
22	07:A46858	UNDERHOOK CHASSIS PLUG	1
23	04:B40652A	LOWER COVER	1
24	07:B44216A	CABLE HOLDER	1
25	05:A35614D	DISPLAY ARM	1
26	09:A35421A	KEYPAD	1

DRWG.NO.	PARTS NAME	DESCRIPTION	QTY
27	01:B44762A	FILTER FP6000	1
(27)	01:B44763A	FILTER FP6200	1
(27)	01:B44764A	FILTER FP12K	1
28	07:A10124C	DISPLAY UPPER CASE	1
29	7PZ:2194C	MAIN BOARD FP6000/6200	1
(29)	7PZ:2194D	MAIN BOARD FP12K	1
30		REGULATOR	1
31		COOL SHEET	1
32	04:B43969B		1
33	04:B41174A	ARM FITTING PLATE 4	1
34	04:B41176	ARM FITTING PLATE 6	1
35	04:B41175	ARM FITTING PLATE 5	2
36	04:B41178C	STOPPER	1
37	05:B41181	ROLLER	1
38	09:B43827C	STOPPER	1
39	07:B44338	STOPPER RING	1
40	7PZ:2195A	POWER BOARD ASS'Y	1
41	07:B44338	STOPPER RING	1
42	04:B41578C	CONNECTOR STAND	1
43		DATA OUT CONNECTOR	1
44	02:B41173B	BLANK PANEL	1
45	04:A45019A		1
46			
47	04:A37300C	SHIELD PLATE	1
48	04:A44775D	STOPPER PLATE	8
49	7PB:FP6000-2	FLEXURE ASS'Y (U) FP6000/6200	1
(49)	7PB:FP12K-2	FLEXURE ASS'Y (U) FP12K	1
50	04:B43957	SHIELD PLATE	1

DRWG.NO.	PARTS NAME	DESCRIPTION	QTY
51	04:B41170	BALANCE PLATE FP12K	1
52	04:B41349	BALANCE WEIGHT FP12K	2
53	07:B44122B	INSULATING WASHER	3
54	04:A47002A;B	STOPPER PLATE	1
55	03:A20723C-2	BEAM	1
57	09:A37824	FORCE COIL BOBBIN	1
58	PZ:918D	SENSOR BOARD	1
59	04:B43959A	SHIELD PLATE 3	1
60	04:B44068	SHIELD PLATE 4	1
62	05:A46369	ADJUSTMENT SCREW	2
63	00:B41264A	ADJUSTMENT SPRING	2
64	00:B41262	ADJUSTMENT SPRING	2
65	04:B41162	CABLE STOPPER	1
66	05:A47983	STOPPER SCREW	1
67	00:A47139	STOPPER SPRING	1
68	03:A10088F	FRAME	1
69	04:A47644A;B	FLEXURE FP6000/6200	2
(69)	04:A48962;B	FLEXURE FP12K	2
70	05:B41298	CONVEX WASHER	4
71	05:B44337A	STOPPER	2
72	09:B43823B-2	PAN SUPPORT ARM-1-(R)	1
73	06:A43885B	GROMMET	4
74	04:A37177A-2	PAN SUPPORT ARM-2-(R)	1
75	03:A20724C-2		1
76	05:A44811A	UNDERHOOK PEG	1
77	04:B44486;B	FLEXURE FP6000/6200	1
(77)	04:A48960;B	FLEXURE FP12K	1
78	05:A48341A	FITTING PLATE	2

DRWG.NO.	PARTS NAME	DESCRIPTION	QTY
80	09:B43823B	PAN SUPPORT ARM-1-(L)	1
81	04:A37177A-1	PAN SUPPORT ARM-2-(L)	1
82	05:B43824	AXIS A	2
83	00:B43965	SHOCK ABSORBER	2
84	05:B43821	AXIS B FP6000/6200	6
(84)	05:B43821	AXIS B FP12K	8
85	04:B44302	SHOCK ABSORBER FP6000/6200	4
(85)	04:B44302	SHOCK ABSORBER FP12K	6
86	7PB:FP6000-1	MAGNET UNIT	1
87	04:A37283	SHIELD PLATE 2	1
88	7PB:FP6000-3	FLEXURE ASS'Y FP6000/6200	1
(88)	7PB:FP12K-3	FLEXURE ASS'Y FP12K	1
89	05:A49771A	SPACER	4
90	05:B44291A	SCREW	
91	05:B45753	SPACER BOLT (S)	2
92	05:B45376	SPACER BOLT (L)	2
100		TRUSS SCREW M4x15	
101		CONVEX WASHER M4	
102		SCREW WITH S.W. M3x6	
103		SCREW M5x6	
104		SCREW M4x4	
105		SCREW M4x10	
106		BOLT WITH HEXAGON HOLE M5x15	
107		SCREW M4x12	
108		SCREW M3x12	
109		BOLT WITH HEXAGON HOLE M3x10	
110		BOLT WITH HEXAGON HOLE M6x12	
111		TAPPING SCREW M3x8	

DRWG.NO.	PARTS NAME	DESCRIPTION	QTY
112		NUT M3	
113		TAPPING SCREW M2x5	
114		CONVEX WASHER M6	
115		S.W. M4	
116		S.W. M5	
117		E RING M4	
118		WASHER M5	
119		SEMUSU M3x10	
120		M2.6x6	
121		TAPPING SCREW M2.6x2	
122		SCREW M4x8	
123		S.W. M3	
124		WASHER M3	
125		FLAT SCREW M3x6	
126		BIND SCREW M3x6	
127		SPRING PIN 2x6	
128		SCREW M3x8	
129		SCREW M4x8	
130		WASHER (H NO.1-SUS)	
131		BOLT WITH HEXAGON HOLE M4x10	
132		SCREW M3x6	
133		SCREW M4x15	
134		HEXAGON BOLT M4x12	
135		BOLT WITH HEXAGON HOLE M6x25	
136		WASHER (H NO.3-SUS)	
137		BOLT WITH HEXAGON HOLE M6x25	
138		M5x30	
139		SCREW M4x6	

