

HA-M SERIES

MAINTENANCE MANUAL

Maintenance-HA-M-series-v.1.a 92.09.28.

PRECISION ELECTRONIC BALANCES

MODELS
HA-180M
HA-120M

A&D
A&D Company, Limited



CONTENTS

1. Introduction	Page 1
1-1 Fixtures and Tools Required	Page 1
1-2 Repair and Maintenance Flow	Page 1
2. Performance Check	Page 2
2-1 Performance Check Procedure	Page 2
2-2 Check List	Page 6
3. Repair Procedure	Page 8
3-1 HA-M Maintenance Flowchart	Page 9
3-2 Troubleshooting Table	Page 10
4. Disassembly and Assembly of the force motor section	Page 11
4-1 Disassembly	Page 12
4-2 Cleaning the Bobbin	Page 15
4-3 Assembly	Page 16
5. Adjustment Procedure	Page 22
5-1 Entering Check Mode	Page 22
5-2 Checking the Electrical System	Page 27
5-3 Coarse Adjustment	Page 28
(Cornerload adjustment/Center of gravity/ Balance/Linearity data and CAL data input/ Internal weight check)	
5-4 Temperature Compensation	Page 28
5-5 Fine Adjustment	Page 29
(Creep data input/Repeatability check/ Cornerload check and adjustment/ Hysteresis/Repeatability check for the internal weight/Linearity data input/ Calibration of the internal weight/Setting the export version)	

6. Block Diagram	Page 33
7. Parts List	
PZ:2464 Main Board	Page 34
PZ:2467 Display Board	Page 36
PZ:2468 Motor Board	Page 37
PZ:2517 HA-03	Page 38
HA-11 Anti-Theft Device	Page 38
8. Schematic Diagrams	
PZ:2464 Main Board	Page 39
PZ:2467 Display Board	Page 41
PZ:2468 Motor Board	Page 42
PZ:2517 HA-03	Page 42
9. Parts Location	
PZ:2464 Main Board	Page 43
PZ:2467 Display Board	Page 44
PZ:2517 HA-03	Page 45
10. Exploded View	
Exploded View 1 Parts list	Page 46
Exploded View 1	Page 48
Exploded View 2 Parts list	Page 49
Exploded View 2	Page 51
Exploded View 3 Parts list	Page 52
Exploded View 3	Page 54



1. Introduction

Servicing the HA series Precision Balance should be performed by qualified personnel, using alignment fixtures and special tools to obtain proper performance.

1-1 Fixtures and Tools Required

Weights

- Four 50g weights, one 200g calibrated weight
- For HA180M: One 150g calibrated weight
- For HA120M: One 100g calibrated weight

Tools

- Mechanical alignment fixture set... 7PA:HA-JIG
 - M3 screwdriver (3-mm Phillips screwdriver)
 - Soldering iron
 - Adhesive tape 5cm
 - 7-mm spanner (wrench)
 - 1.5-mm allen wrench
 - 5.5mm socket wrench
 - Precision square
 - Machinist's ruler with 0.1mm graduations
 - Multimeter
 - Oscilloscope
 - One complete main board ... PZ:2464
 - Three analog boards PZ:2465, PZ:2466, and PZ:2514
- Temperature controlled room
- Temperature should be controlled within $\pm 1^{\circ}\text{C}$ at 10°C and 30°C , for inputing temperature data.
- Service bench
- The service bench should be free of vibration, variations in temperature, dust and drafts.

1-2 Repair and Maintenance Flow

Performance check

- A performance check is required to determine if there are any malfunctions and which section to repair.
- The easy way to locate a defective portion, replace a doubtful assembly with complete tested assembly..

Repair procedure

- The repair procedure is shown in the maintenance flowchart (refer to pages 9 and 10). A combination of the maintenance flowchart and troubleshooting table offers repair and adjustment procedures.

Adjustment

- Describes adjustment procedure for each item.



2. Performance Check

Allow an eight hours warm-up period prior to performance checks.

2-1 Performance Check Procedure

Appearance

- Does the door open smoothly.
- Is the pan level.
- Does the draft ring and pan have 1mm clearance.
- Is the draft ring positioned 0.5 to 3mm or lower than the pan.
- Is the instrument leveled.

Function

- ON/OFF key functions correctly.
- PRINT key functions correctly.
- SAMPLE key functions correctly.
- MODE key functions correctly.
- CAL key functions correctly.
- Positive and negative are displayed correctly.
- Displays decimal point correctly.
- Displays stabilized status.
- Internal weight accuracy is 200g \pm 0.2mg.
- Motor rotates smoothly with no abnormal sound.
- Unit setting is correct.
- Five TLs are identifiable.

Example

Checking Hong Kong tael.

Obtain coefficient k using 100g (100.0025g) weight.

If the display is 2.67179 TL,

$$k = \frac{g \text{ reading}}{TL \text{ reading}} = \frac{100.0025}{2.67179} \approx 37.429$$

Therefore, TL reading is acceptable.

	Unit											Tolerance of k
Domestic	g	mg				ct						
Metric	g	mg										
Foreign countries	g	mg	oz	ozt	dwt	ct	mm	GN			MLt	
Hong Kong, general	g	mg	oz	ozt	dwt	ct	mm	GN	t	TL	MLt	37.798 - 37.800
Hong Kong Jewelry	g	mg	oz	ozt	dwt	ct	mm	GN	t	TL	MLt	37.428 - 430
China	g	mg	oz	ozt	dwt	ct	mm	GN	t	TL	MLt	31.249 - 31.251
Singapore	g	mg	oz	ozt	dwt	ct	mm	GN	t	TL	MLt	37.792 - 37.794
Taiwan	g	mg	oz	ozt	dwt	ct	mm	GN	t	TL	MLt	37.499 - 37.501
Iran	g	mg				ct			t		MS	
India	g	mg	oz	ozt	dwt	ct	mm	GN	t		MLt	

Specifications

Repeatability

The repeatability denotes the degree to which repeated measurements of a quantity agree when obtained by using the same weight and under the same conditions.

Check point

Repeat the measurement eleven (11) times. Each result should be within following specifications.

HA180M Zero Within $\pm 0.2\text{mg}$

SpanStandard deviation σ (n -1) is within 0.1mg at 150g

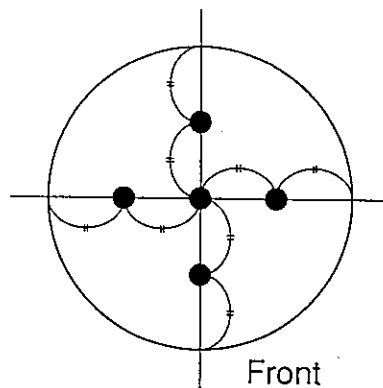
HA120M Zero Within $\pm 0.2\text{mg}$

SpanStandard deviation σ (n -1) is within 0.1mg at 100g

Span = Full scale - Zero

Cornerload error

Cornerload error denotes a reading difference when loading a weight on the pan center and each of the four points as shown in the figure below.



Check point

HA180M Within 0.2mg using 50g weights

HA120M Within 0.2mg using 50g weights

Hysteresis

The hysteresis denotes a reading difference between incrementing and decrementing the load.

Check point

The error at each check point should be within $\pm 0.2\text{mg}$.

HA180M 50g, 100g, 150g

HA120M 50g, 100g

Perform calibration and go to the next step.

Linearity

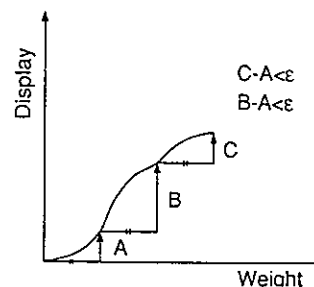
Linearity denotes a reading difference between indicated value and true value.

To check the linearity, one standard weight and several offset weights are used to obtain several points of data.




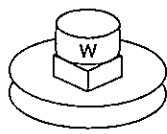
Select one point for the reference, then obtain differences at other points.

Load the standard weight to obtain a reference value.




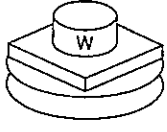
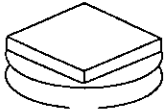
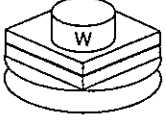
Always use the same standard weight to avoid erratic measurement.



HA120M Here the standard weight "W" is 50g
 Check point
 Reading difference, B - A, should be within ± 0.1 mg

Point	Operation sample	Display procedure	Operating
0g	Press the ZERO key.	0.0000g	
50g	Load the weight W. Here the reading is A.	A = 50.0010g	
50g	Unload the weight W.	0.0000g	
100g	Load other 50g weight. Press the ZERO key. Load the weight W. Here the reading is B.	50.0518g ↓ 0.0000g ↓ B = 50.0011g (Spec. 9 to 11)	

HA180M Here the standard weight "W" is 50g
 Check point
 Reading differences, B - A, and C - A should be within ± 0.1 mg

Point	Operation sample	Display procedure	Operating
0g	Press the ZERO key.	0.0000g	
50g	Load the weight W. Here the reading is A.	A = 50.0010g	
50g	Unload the weight W.	0.0000g	
100g	Load other 50g weight. Press the ZERO key. Load the weight W. Here the reading is B.	50.0518g ↓ 0.0000g ↓ B = 50.0011g (Spec. 9 to 11)	
100g	Unload the weight W.	0.0000g	
150g	Load other 100g weight. Press the ZERO key. Load the weight W. Here the reading is C.	50.0318g ↓ 0.0000g ↓ C = 50.0009g (Spec. 9 to 11)	

Internal weight accuracy

Perform calibration, then measure internal weight accuracy using a calibrated weight.

Check point

Confirm that the reading difference between balance's display and the calibrated weight be within $\pm 0.2\text{mg}$.

HA180M Use 150g weight.

HA120M Use 100g weight.

2-2 Check List HA180M/HA120M

Appearance

Door opens smoothly. _____ OK, NG
 The pan leveled. _____ OK, NG
 The draft ring and pan are apart 1mm or more. _____ OK, NG
 The pan is positioned 0.5 to 3mm or higher
 than the draft ring. _____ OK, NG
 The instrument is leveled. _____ OK, NG

Function

ON/OFF key functions correctly. _____ OK, NG
 PRINT key functions correctly. _____ OK, NG
 SAMPLE key functions correctly. _____ OK, NG
 MODE key functions correctly. _____ OK, NG
 CAL key functions correctly. _____ OK, NG
 Positive and negative are displayed correctly. _____ OK, NG
 Displays decimal point correctly. _____ OK, NG
 Displays stabilized status. _____ OK, NG
 Internal weight accuracy is 200g \pm 0.2mg. _____ OK, NG
 Motor rotates smoothly with no abnormal sound. _____ OK, NG
 Unit setting is correct. _____ OK, NG

Repeatability. _____ OK, NG

HA180M Zero Within \pm 0.2mg

Span σ (n - 1) should be within 0.1mg at 150g

HA120M Zero Within \pm 0.2mg

Span = Full scale - Zero

Span σ (n - 1) should be within 0.1mg at 100g

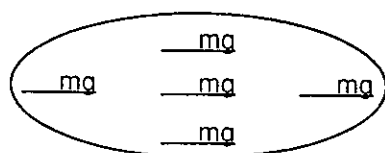
	1	2	3	4	5	6	7	8	9	10	11
Zero											
Full scale											
Span											

Span σ (n - 1) =

Cornerload error _____ OK, NG

HA180M Within \pm 0.2mg at 50g

HA120M Within \pm 0.2mg at 50g



Hysteresis _____ OK, NG

Within \pm 0.2mg

HA180M 50g, 100g, 150g

HA120M 50g, 100g

50g			50g		
100g			100g		
150g					

Linearity _____ OK, NG

HA120M B - A should be within ± 0.1 mg

HA180M B - A, and C - A should be within ± 0.1 mg

50g A			
100g B		B - A	
150g C		C - A	

Internal weight accuracy _____ OK, NG

Within ± 0.2 mmg.

HA180M Use 150g weight.

HA120M Use 100g weight.



3. Repair Procedure

Refer to the maintenance flowchart and troubleshooting table for repair (pages 9 and 10). The maintenance flowchart shows the repair procedure. The troubleshooting table is used to locate a defective section.

The meaning of the nodes in the HA-M maintenance flowchart

Start repair from a corresponding node.

A : Is used when mechanical parts is replaced or disassembled and reassembled.

B : Is used when electrical parts are replaced or adjusted.

C : Is used to initialize the main board and input characteristic data.

D : Is used to align the force motor section characteristics.

E : Is used to input temperature data.

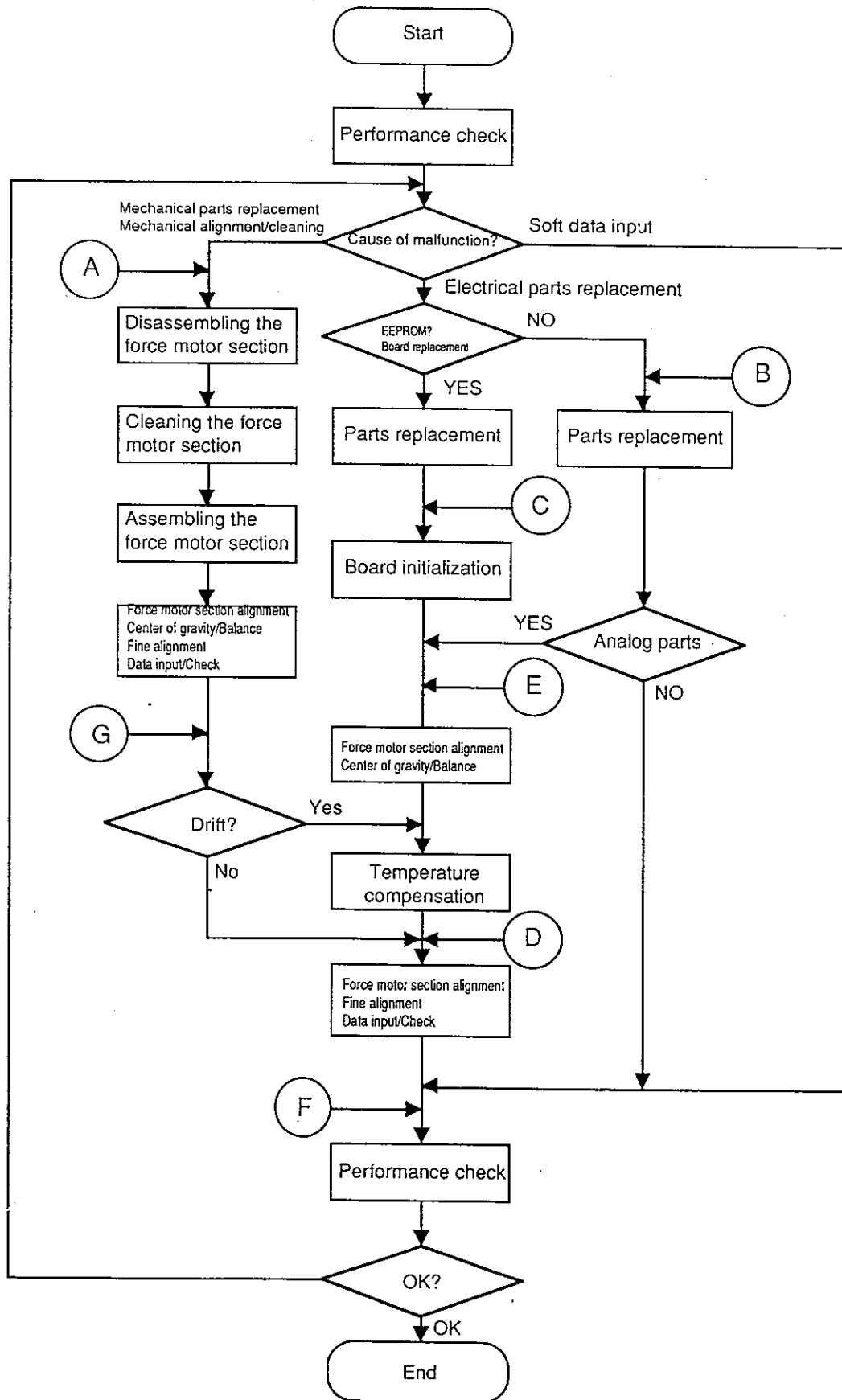
F : Is used for final inspection.

G : Is used to check the drift.

Troubleshooting table

The troubleshooting table is used to select a repair procedure based on the symptom.

A, B, C, D, E, F, and G indicate jumping to the maintenance flowchart.



HA-M maintenance flowchart

3-2 Troubleshooting Table

Symptom	Probable cause	Corrective action
Nothing displayed	Fuse AC adaptor Fluorescent display and associated parts	Replace parts, then go to F.
Unstable display Error 1 CAL no	Main board malfunction Bobbin binds Internal weight or associated portion touches	Check performance with a good board. If the main board is malfunctioning, go to B. If the main board is OK go to A. (Cleaning the force motor section)
Error 0	Temperature sensor defective Temperature sensor data error	Check connector J2. If it is OK, go to F. Replace PZ2514. If it is OK, go to B. Check performance with temperature sensor of a good Force motor section. If performance is OK, go to B.
Motor defective Error 4	Motor defective Board malfunction Internal weight or associated portion touches the Pan or associated portion touches	Check internal weight or associated portion. Check pan or associated portion.
Error 5	Motor defective Slit incorrect	Check cam, then go to B.
Error 6	RAM defective	Replace RAM to correct the Error 8, then go to F. U4: 5564
Error 7	EEPROM defective RAM defective	Replace RAM to correct the Error 8, then go to F. Or replace EEPROM, then go to C. U4: 5564 U3: S2914
Error 8	Lithium battery weak RAM defective	Hold down the RANGE and PRINT keys, then press the CAL key to correct the error. If Error 8 is still displayed, check the battery voltage. If the voltage is correct, replace RAM to correct the Error 8, then go to F.
CAL-E CAL E	Lineality data incorrect	Input data, then go to F.
-E E	BEARING Fulcrum bearing Tention bearing	Go to A including bearing replacement.
Hysteresis Error	Stopper loose or out of adjustment. Flexible bearing, etc. (Shock, overload, etc.)	Check and align the stopper, then go to F. Go to A including bearing replacement.
Repeatability error	Flexible bearing, etc. (Shock, overload, etc.) Analog board malfunction Bobbin binds	Check performance with a known good board. If the board has malfunctioned, go to B. If the mechanical section is defective, go to A.
Linearity error	Flexible bearing, etc. (Shock, overload, etc.) Bobbin binds Data missing or in error	Input the linearity data, then go to F. If the force motor section is defective, go to A.
Cornerload error	Adjustment error Flexible bearing, etc. (Shock, overload, etc.)	Adjust cornerland error, then go to D. If the error still exists, go to A including bearing replacement.
Creep	Creep data error Temperature data error	Input creep data, then go to F. If the error still exists, go to E.
Drift	Alignment error of the force motor section	Check performance, then go to A, B, or E.

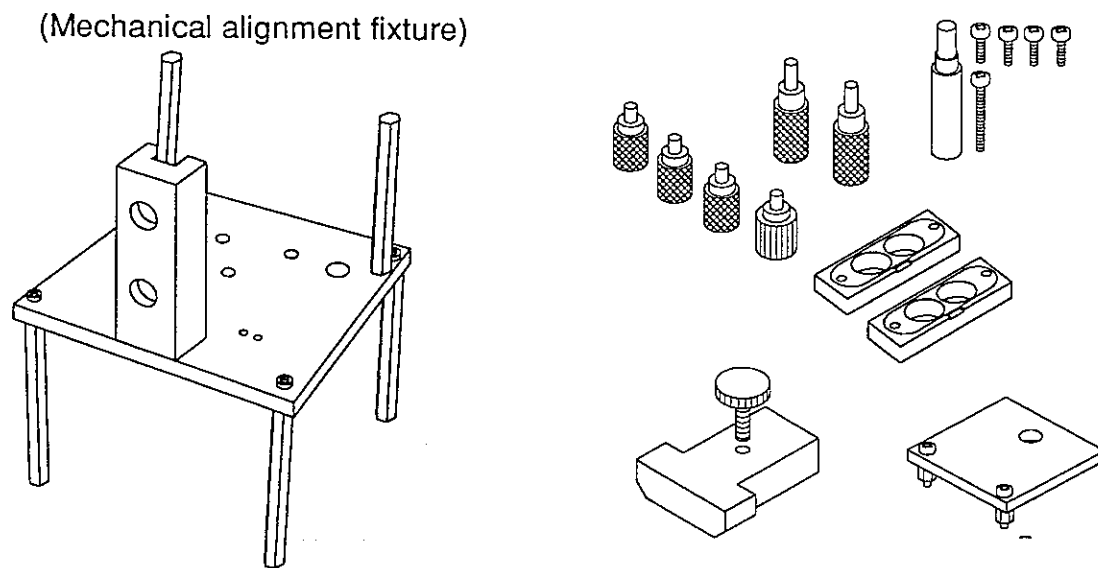
4. Disassembly and reassembly of the Force motor section

This chapter describes flexible bearing replacement, bobbin cleaning, force motor section alignment, and cautions concerning that procedure.

Note : During disassembly and reassembly, the work site should be be dust free.

After disassembly and reassembly are completed, adjustment of linearity, center of gravity, stopper, and cornerload are required.

(Large amounts of drift may occur depending on the tightening torque and mechanical stress when reassembly is completed. Temperature compensation is required in this case.)



(Main fixture)

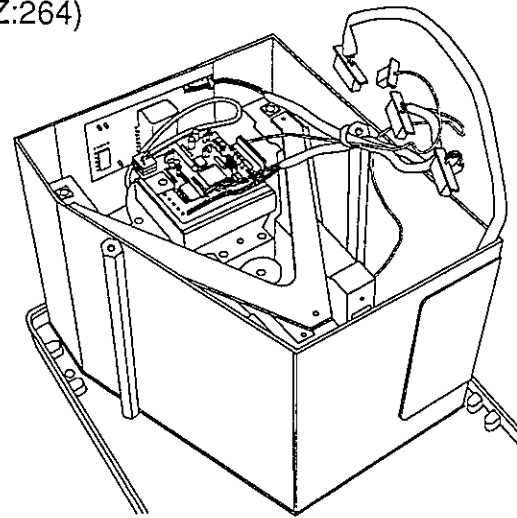
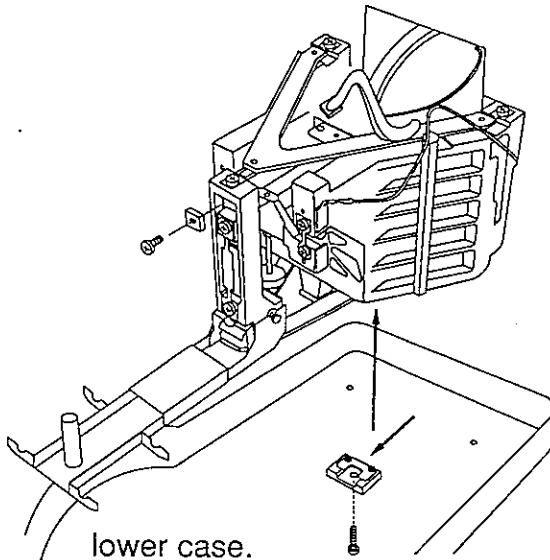
Holding Bolt A 3 pieces
Long Holding Bolts B 2 pieces
M4 × 12 Screw 4 pieces
Side fixture 2 piece
Large Holding Bolts C 1 piece
Bobbin pole 1 piece
M4 × 30 screw 1 piece
Pan axis block
Main fixture
Shock absorber height alignment fixture

M3 screwdriver
5.5-mm socket wrench
7-mm spanner (wrench)
Machinists ruler
Precision square
Soldering iron
1.5-mm Allen wrench
Mechanical alignment fixture 7PA:HA-JIG

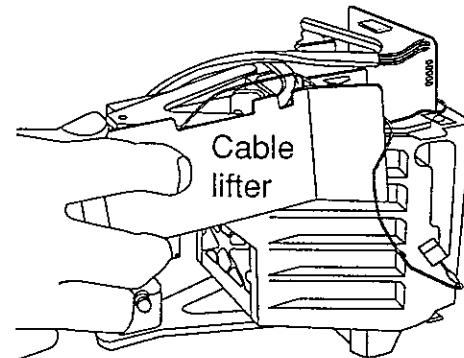
4-1 Disassembly

1 Discount cables from the main board (PZ:264)

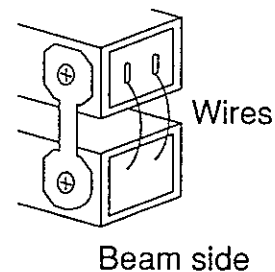
2 Remove the three screws holding the force motor section and remove the force motor from the lower case.



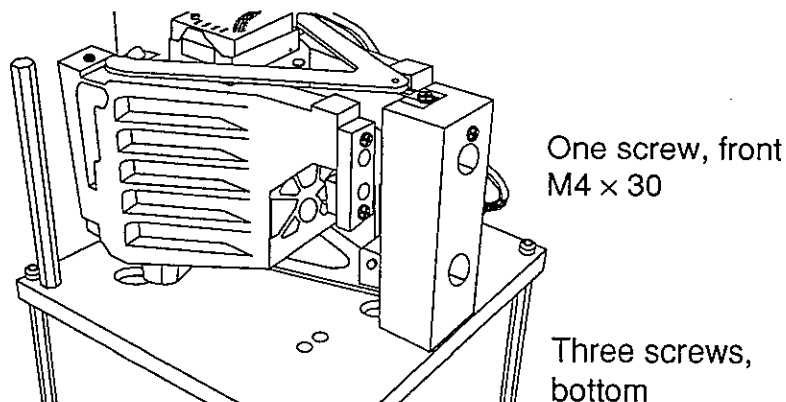
3 Disconnect cable lifter from the force motor section.



4 Disconnect wires from the beam side using a soldering iron.
Remove the shock absorber.
Remove the zero adjustment weight.



5 Install the force motor section on the main fixture.



6

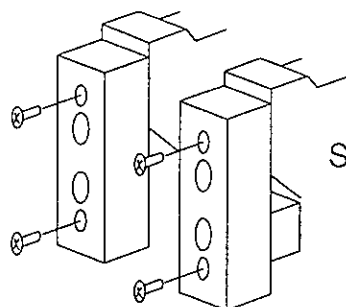
Remove the stopper plate.

7

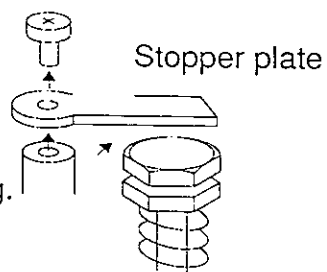
Remove the three analog boards with shield plate.

8

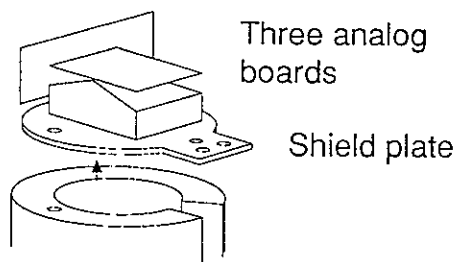
Install the side fixture on the fulcrum bearing.



Side fixture



Stopper plate



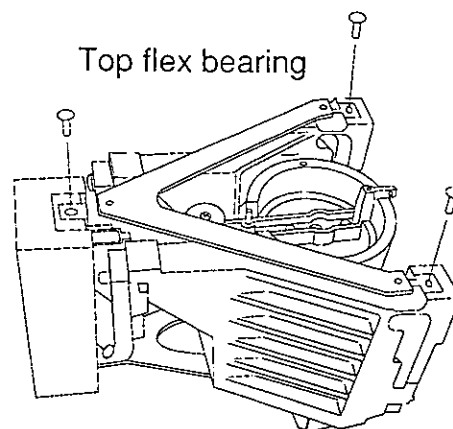
Three analog boards

Shield plate

9

To remove the top flex bearing assembly, remove screws from the riser beam then the sides in order.

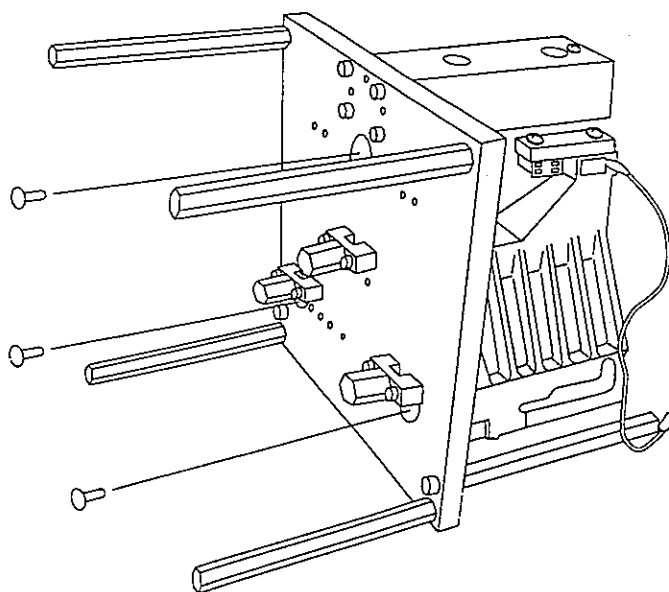
Riser Beam



Top flex bearing

10

Lay the mechanical section on its back (Force motor). To remove the bottom flex bearing assembly, remove screws from the riser beam then the sides in order.



11

Set the force motor section in the upright position.

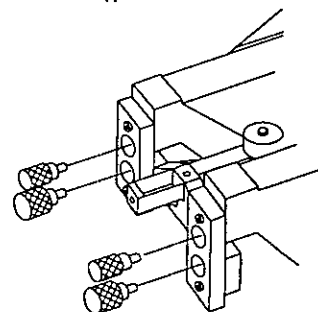
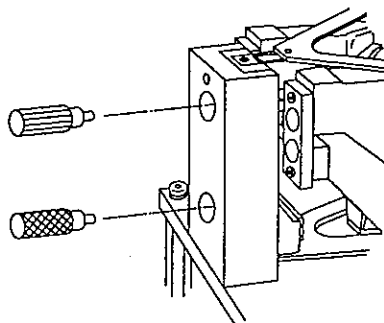
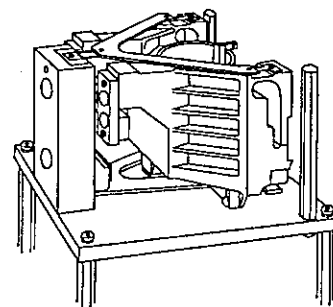
Force motor section

12

To remove the tension bearing, remove the screws holding the of the mechanical section to the alignment fixture.

13

Remove screws from the fulcrum bearing.

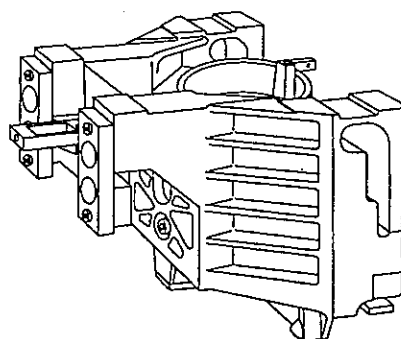


14

Remove the force motor section from the fixture.

Remove the side fixture from the force motor section.

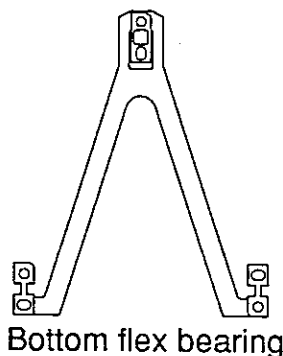
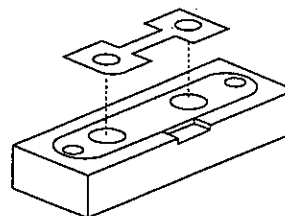
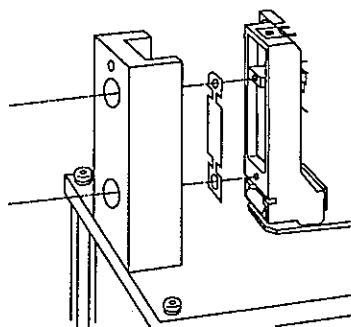
Remove the riser beam from the fixture.



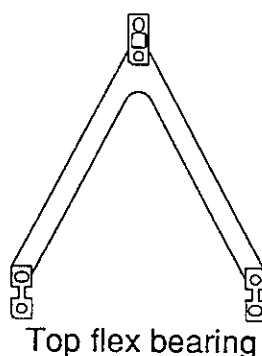
15

Check that the top and bottom flex bearing assemblies have no distortion by using a precise flat surface. If the bearing assembly is distorted, replace it.

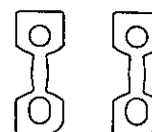
Caution Do not break down the Force motor Magnet frame assembly



Bottom flex bearing



Top flex bearing



Fulcrum Bearing



Tension Bearing

4-2 Cleaning the Bobbin

To clean the force motor section, cleaning the bobbin and magnet assembly are required. Proceed as follows.

- 1 Prepare 5cm of adhesive tape.

Note : Metal dust may exist around the magnet. Never use compressed air, and do not smoke at the job site.

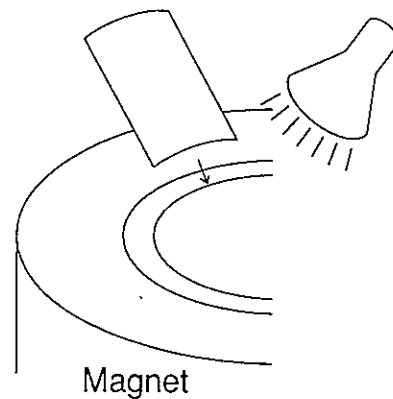
- 2 Use a bright light to examin, remove dust using adhesive tape.

- 3 Use the adhesive tape to clean the wire that is wound on the bobbin.

- 4 Check that no dust is on the magnet using light a bright.

- 5 Carefully insert the bobbin into the magnet assembly.

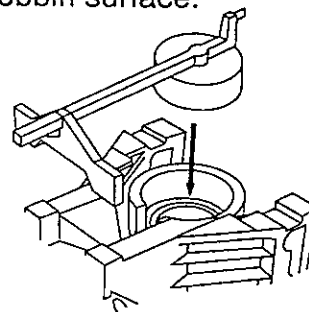
- 6 Assemble the force motor section.



4-3 Assembly

After magnet cleaning has been completed, assemble force motor section using the following procedure.

- 1 After bobbin cleaning has been completed, insert the bobbin into the magnet assembly. Use caution to prevent scratches on the bobbin surface.

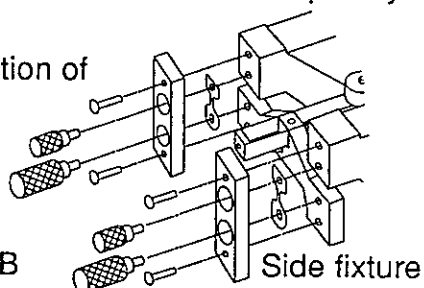


- 2 Install the fulcrum bearings with the side fixture temporarily.

Caution Check setting direction of fulcrum bearing.

Holding bolt A

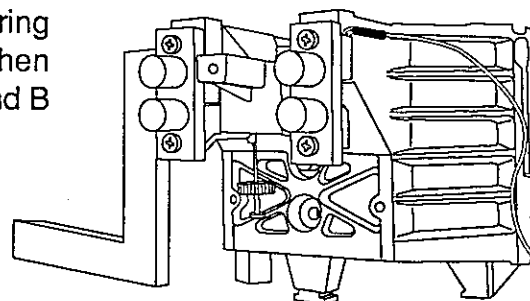
Long holding bolt B



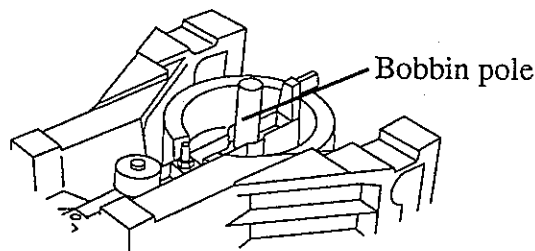
- 3 Check the alignment of the fulcrum bearing using a square on a precise flat surface, then carefully attach it with holding bolts A and B (L holding bolt and holding bolt).

Note: //

Precision square



- 4 Install the bobbin pole, then attach the bobbin temporarily.

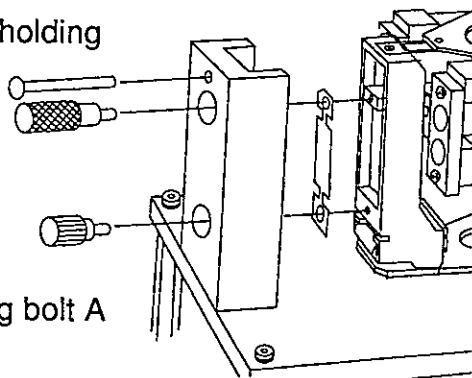


- 5 Insert the tension bearing onto the main fixture, then attach it temporarily.

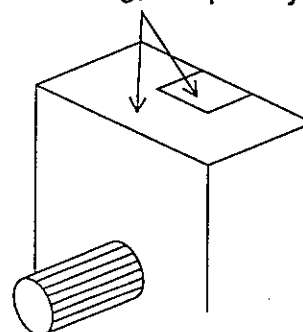
Caution Check setting direction of fulcrum bearing.

Large holding bolt C

Holding bolt A



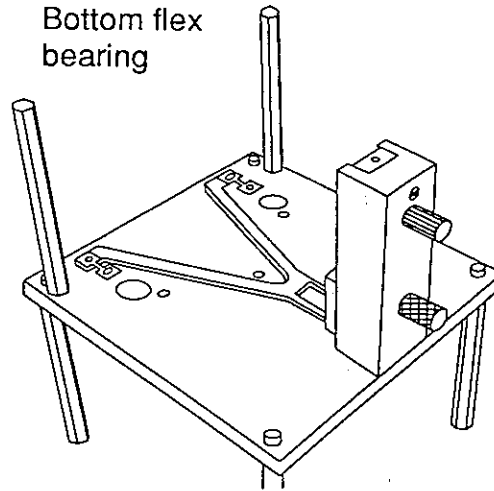
Flush mounting, temporarily



6

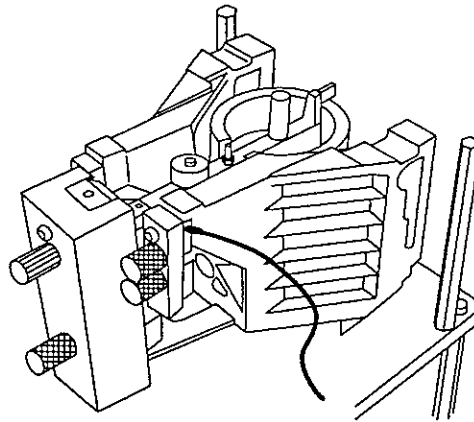
Place the bottom flex bearing assembly on the main fixture.

Bottom flex bearing

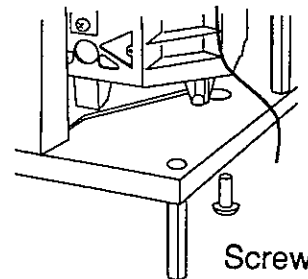
**7**

Place the force motor section carefully over the bottom flex bearing assembly. Install the large holding bolt C through the tension bearing pulling the force motor section to the front of the alignment fixture.

Large holding bolt C

**8**

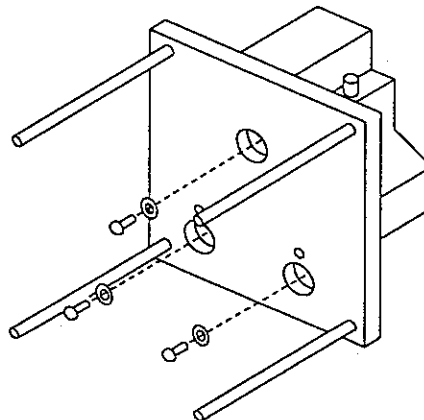
Attach the force motor section with screws to the main fixture (Three screws on the bottom).



Screw

9

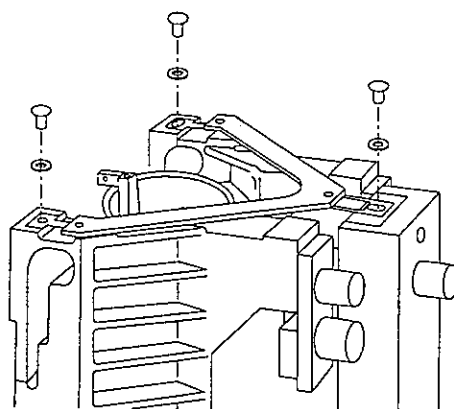
Place the force motor section on its back, then attach the bottom flex bearing assembly.



10

Set the force motor section in the upright position. Attach the top flex bearing assembly with three screws.

Top flex bearing

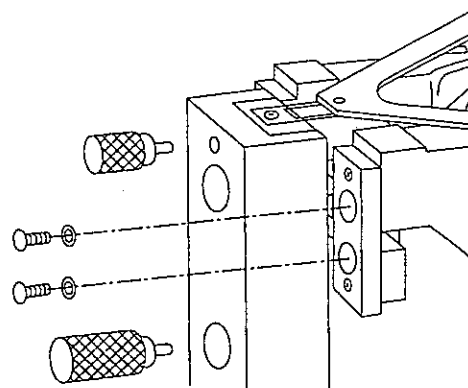
**11**

Replace the holding bolt A and B securing the fulcrum bearings with M4 screws (4-mm Phillips screws) top first then bottom. The holding bolts A and B should be removed carefully when replacing the screws.

Holding bolt A

M4 screw

Long holding bolt B

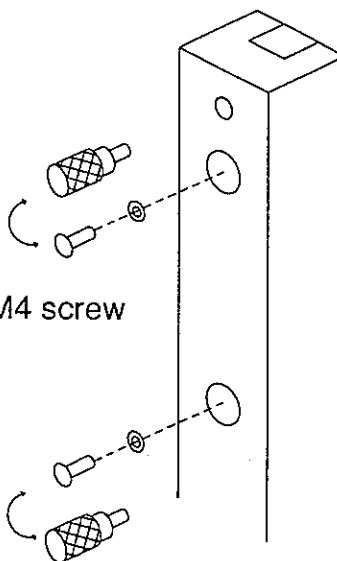
**12**

Replace holding bolts C and A of the tension bearing with M4 screws top first then bottom.

Large holding bolt C

M4 screw

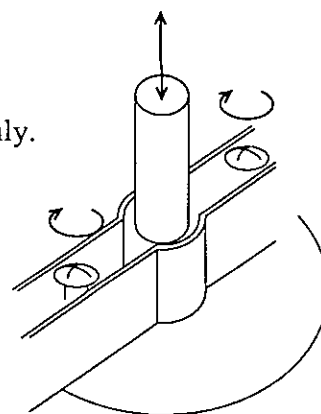
Holding bolt A



13

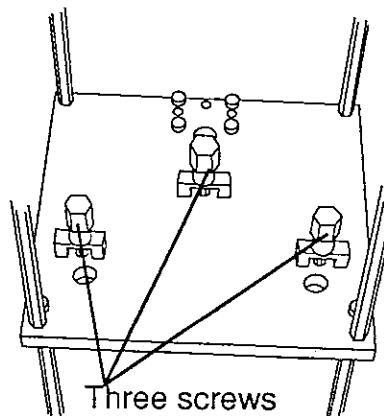
Align the center of bobbin using the bobbin pole.

Note Check that the bobbin pole moves smoothly.



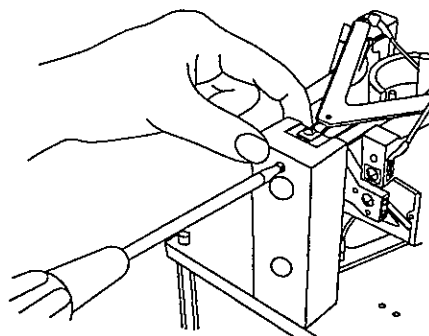
14

Remove screws attaching the force motor section to the main fixture. (Three screws on the bottom.)



15

Lightly hold the riser beam, and remove it's screws.



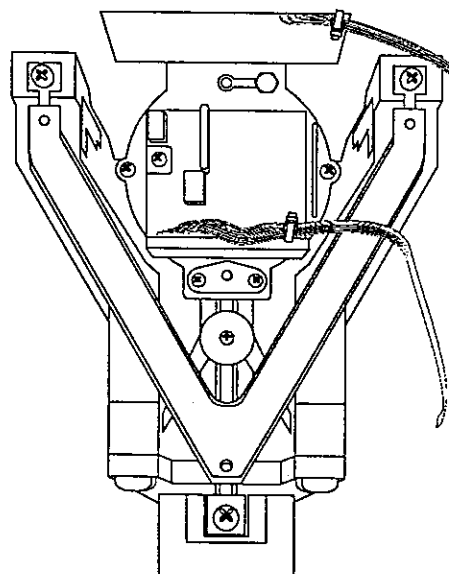
M4 x 30
screw to fix front arm

16

Install the three analog boards and shielding plate. Remove the force motor section from the main fixture.

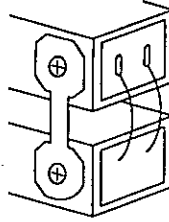
Top/bottom stopper

Three analog boards
Shielding plate
Left/right stopper



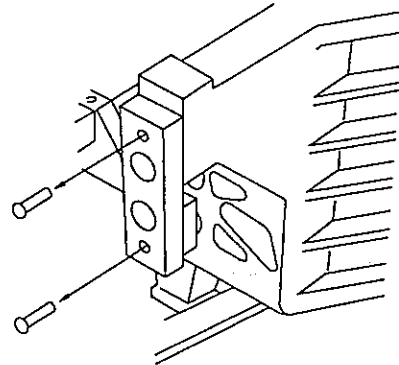
17

Resolder the wires.



18

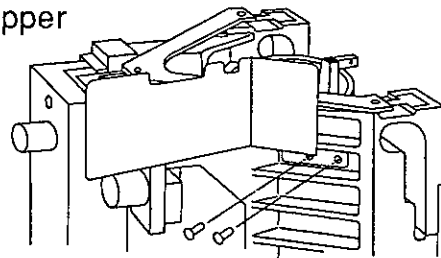
Remove the screws attaching the fulcrum bearing fixtures from the bottom, then the top.



19

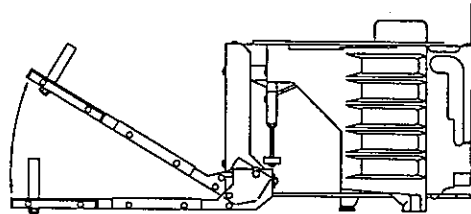
Install the cable lifter to the force motor section, then attach left/right stopper and top/bottom stopper temporarily.

Cable Lifter



20

Mount the shock absorber.



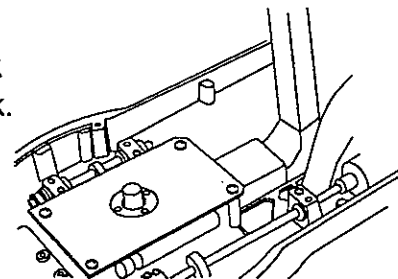
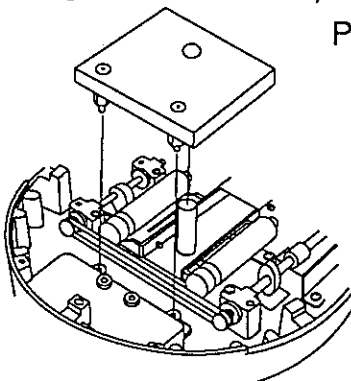
21

Attach the force motor section using the pan axis block.

22

Set the shock absorber height using the shock absorber fixture and affix the mechanical block.
(Height: 5.5 to 6.0mm)

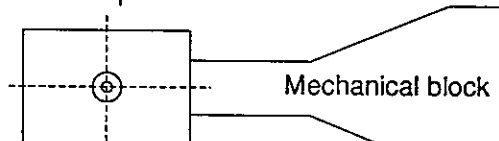
Pan axis block



Weight holder

Check point

Weight pan receptor



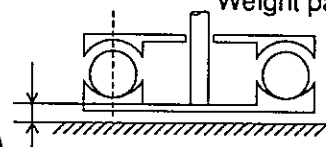
Weight cover

Weight pan receptor

23

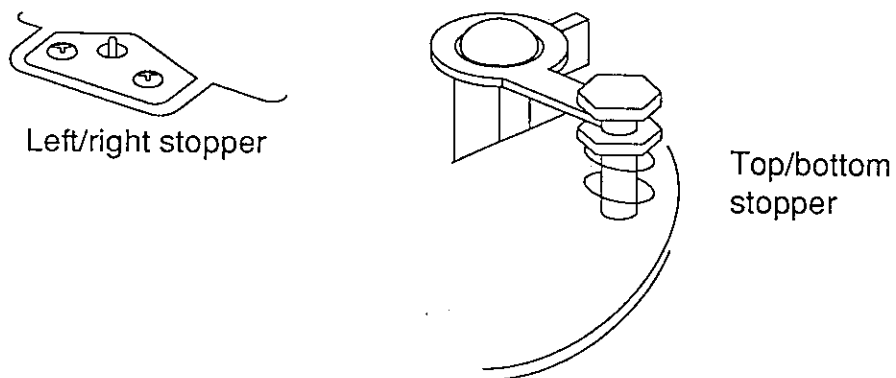
Install the weight holder.
Check the position of the weight cover and weight pan receptor.

Height
(5.5+06.0mm)

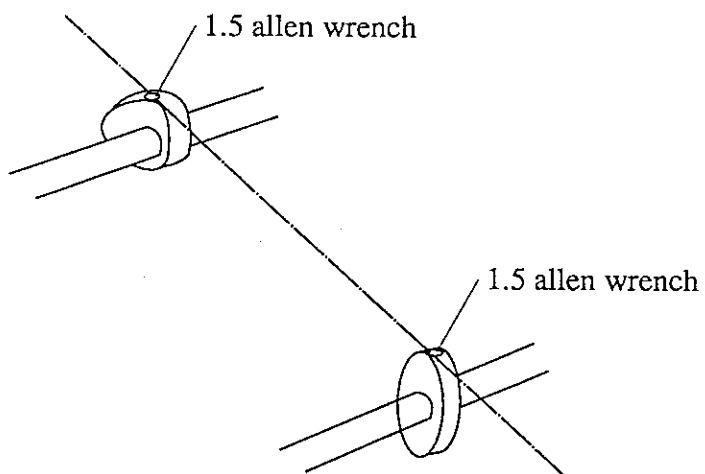


24

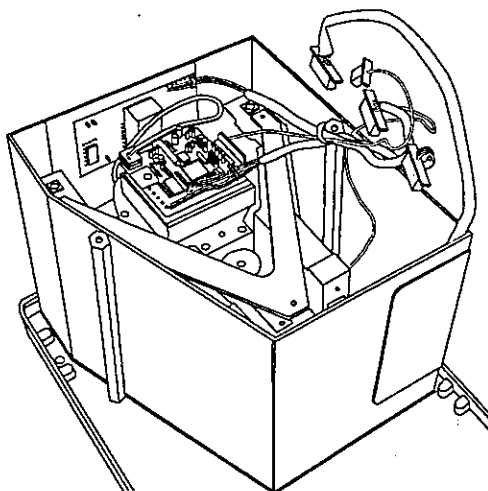
Connect main board. Turn power on.
Align the left/right stopper, and top/bottom stopper.

**25**

Check that the weight moves up and down smoothly by using the ON/OFF or CAL key.

**26**

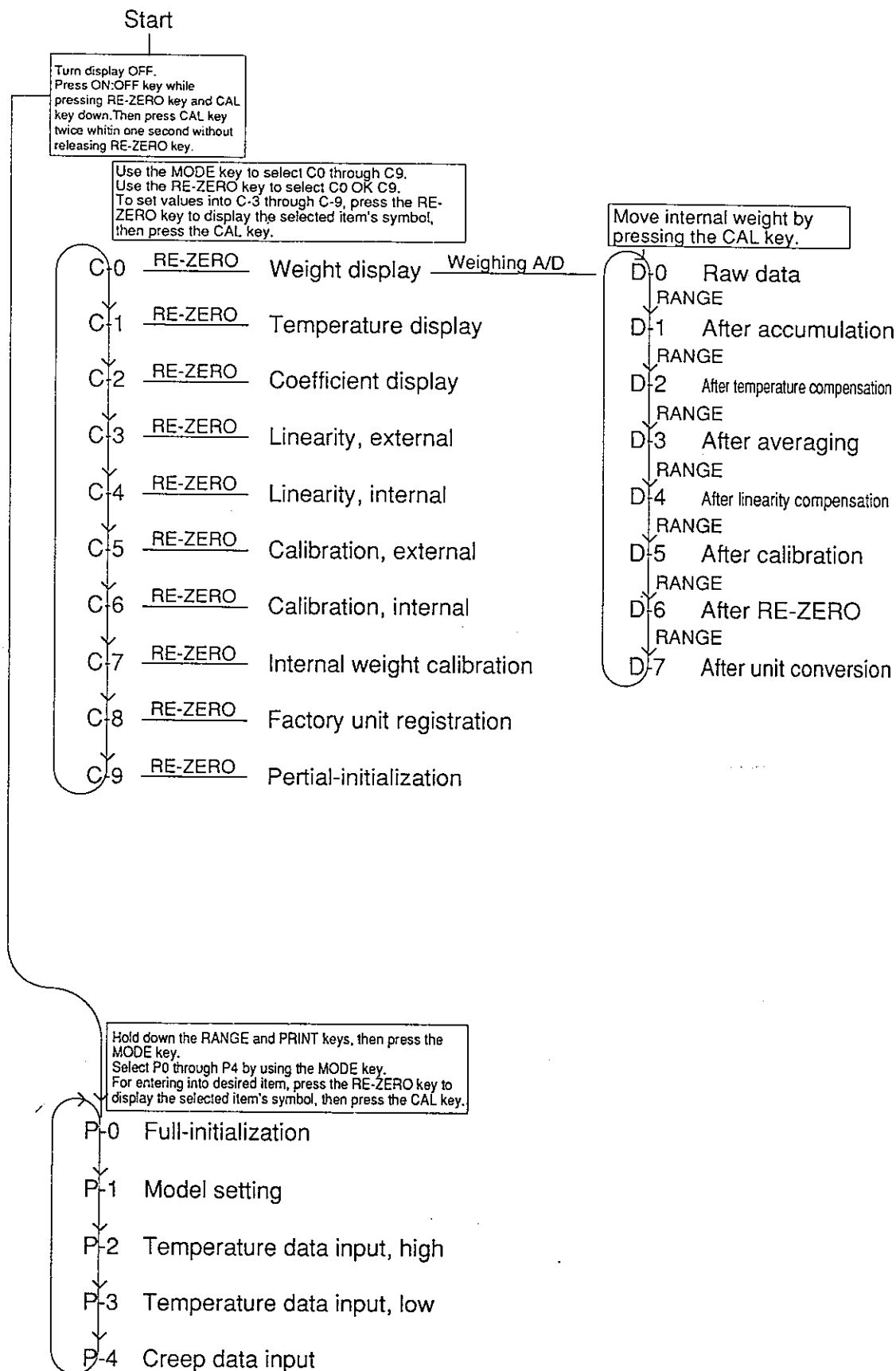
Install the cable with clamp. Mount inner case.



5. Adjustment Procedure

5-1 Entering Check Mode

Flowchart for HA-M check mode



Entering into the check mode

In the display OFF condition, press ON/OFF key while pressing RE-ZERO key and CAL key down. Then press CAL key twice within one second without releasing RE-ZERO key.

[E. 3-xxxHA]

(Version display)

By pressing the MODE key, the instrument enters into following check mode.

To select items, 0 through 9, use the MODE key.

For entering into C-0 through C-9, use the RE-ZERO key.

To set values into C3 through C-9, press the RE-ZERO key to display the selected item's symbol, then press the CAL key.

- C-0 Weight display
- C-1 Temperature display
- C-2 Coefficient display
- C-3 Linearity input (external weight)
- C-4 Linearity input (internal weight)
- C-5 Calibration (external weight)
- C-6 Calibration (internal weight)
- C-7 Internal weight calibration
- C-8 Factory unit registration (arbitrary unit)
- C-9 Partial-initialization

To enter into the following protected modes in the version display status, hold down the RANGE and PRINT keys and press the MODE key.

To select items, 0 through 4, use the MODE key. Press the RE-ZERO key to display the selected item's symbol, then press the CAL key.

- P-0 Full-initialization
- P-1 Model setting
- P-2 Temperature data input (High temperature)
- P-3 Temperature data input (Low temperature)
- P-4 Creep data input

The contents of the check mode are described below.

- C-0 D-0 Weight A/D Raw data
- D-1 Weight A/D After accumulation — 125ms, almost the same as the display [Average of 300ms]
- D-2 Weight A/D After temperature compensation
- D-3 Weight A/D After averaging
- D-4 Weight A/D After linearity compensation
- D-5 Weight A/D After calibration
- D-6 Weight A/D After RE-ZERO
- D-7 Weight A/D After unit conversion (g display)

- * Displays D0 through D7 by pressing the RANGE key.
- * Move the internal weight by pressing the CAL key.

- C-1 T0 Temperature A/DRaw data
 T1 Temperature A/DAfter 90 times accumulation
 T2 Yoke temperature Moving average value in four seconds
 T3 Analog temperature
 ZL Zero weight data in low temperature (No temperature compensation, D3)
 FL Full weight data in low temperature (No temperature compensation, D3)
 TL Low temperature data (T2)
 ZH Zero weight data in high temperature (No temperature compensation, D3)
 FH Full weight data in high temperature (No temperature compensation, D3)
 TH High temperature data (T2)
 MO Zero temperature compensating coefficient
 MS Span temperature compensating coefficient
 * Displays T0 through MS by pressing the RANGE key.
 * Move the internal weight with the CAL key.

- C-2 LC Linearity coefficient (User)
 CC Calibration coefficient (User)
 LB Linearity coefficient (Factory)
 CB Calibration coefficient (Factory)
 CP Creep value
 BR Creep compensating coefficient
 * Displays LC through BR by pressing the RANGE key.

C-3 Linearity data input (External weight)

[RE-ZERO]	[C-3]
[CAL]	[Lnr out]
[RE-ZERO]	[Lnr 0]
	[< Lnr 0]
Load weight 1 [RE-ZERO]	[Lnr 1]
	[< Lnr 1]
Load weight 2 [RE-ZERO]	[Lnr 2]
	[< Lnr 2]
Load weights 1 and 2 [RE-ZERO]	[Lnr 3]
	[< Lnr 3]
Unload weights	[Lnr End]
	[C-4]

C-4 Linearity data input (Internal weight)

[RE-ZERO]	[C-4]
[CAL]	[Lnr in]
	[< Lnr 0]
	[Lnr 1]
	[< Lnr 1]
	[Lnr 2]
	[< Lnr 2]
	[Lnr 3]
	[< Lnr 3]
	[C-5]

C-5 Calibration (External weight)

[RE-ZERO] [C-5]
 [CAL] for external weight calibration [CAL out]
 [150.0000g]
 Displays calibration value for the external weight.
 Use the following keys to set the calibration value.
 [RANGE] Weight selection (50 - 200g)
 [MODE] Calibration setting (1mg: Up to ± 15 mg)
 [PRINT] Calibration setting (0.1mg)
 [RE-ZERO] Calibration value enters. Calibration will start.

[< CAL 0]
 [CAL F]
 Load the weight [< CAL F]
 [CAL End]
 Unload the weight [C-6]

C-6 Calibration (Internal weight/Linearity compensation is also executed)

[RE-ZERO] [C-6]
 [CAL] [CAL in]
 [CAL.]
 [CAL.]
 [CAL .]
 [CAL .]
 [CAL .]
 [CAL End]
 [C-7]

C-7 Internal weight calibration

[RE-ZERO] [C-7]
 [CAL] [CAL Set]
 [RANGE] to display the internal weight's value [100.0000 1]
 Value of the internal weight, 1 [100.0000 1]
 Value of the internal weight, 2 [100.0000 2]
 Value of the internal weights, 1 and 2 [200.0000 3]
 [CAL] for the external weight calibration [150.0000 g]
 (Initialization) [200.0000g]
 Displays calibration value of the external weight.
 Use following keys to set the calibration value.
 [RANGE] Weight selection (50 - 200g)
 [MODE] Calibration setting (1mg: Up to ± 15 mg)
 [PRINT] Calibration setting (0.1mg: Up to ± 15 mg)
 [RE-ZERO] Calibration value enters. Calibration will start.

[< CAL 0]
 [CAL F]
 Load the weight [< CAL F]
 [CAL End]
 Unload the weight [. g]
 Displays weight [0.0000 cw]
 [PRINT] for calibration start. Repeat the load and unload four times to obtain the average value.

C-8 Factory unit registration (arbitrary unit)

[RE-ZERO] [C-8]
[CAL] [Unit]
[RANGE] for temporally registration. If the unit is registered
temporally, stability-mark will light.
[MODE] for changing the displayed unit.
[PRINT] To exit this procedure. [-----]
[C-9]

C-9 Partial-initialization

Initializing the memory that a user can rewrite.

- Linearity
- Calibration value
- Internal setting
- Target weight etc.

[RE-ZERO] [C-9]
[CAL] [init-HF]
[-----]
[C-0]

P-0 Full-initialization

Initializes all stored data including temperature compensation data, internal weight value, etc.

[RE-ZERO] [P-0]
[CAL] [init]
[-----]
[P-1]

P-1 Model setting

[RE-ZERO] [P-1]
[CAL] [tyPE]
[180HA]
Displays current model number. Press the RANGE or RE-ZERO key to change the model.
[PRINT] Stores model number [-----]
[P-2]

P-2 High temperature data input

[RE-ZERO] [P-2]
[CAL] [tH]
[< tH 0]
[tH F]
[< tH F]
[P-3]

P-3 Low temperature data input

[RE-ZERO] [P-3]
[CAL] [tL]
[< tL 0]
[tL F]
[< tL F]
[P-4]

P-4 Creep data input

[RE-ZERO]	[P-4]
[CAL] to display weight	[CrEEP]
[PRINT] to input creep data (The decimal point will move for approximately five minutes)	[0. 0000CP]
	[-----]
	[P-0]

5-2 Checking the Electrical System

(1) Display board checking (PZ:2467)

→If the board has malfunctioned, check for poor soldering.

(2) Main board check

- ① Visual check (also check that the seal on the buzzer has not come off.)
- ② Lithium battery check (Disconnect the AC adaptor while checking the battery.)
 - TP16 - TP5 2.5V or higher
 - TP14 - TP15 1mV or lower
- ③ Power supply voltage
 - TP9 - TP5 +5V $\pm 5\%$
 - TP6 - TP5 -10V $\pm 5\%$
 - TP10 - TP5 -25V $\pm 5\%$

(All the force motor section, display section, and analog section should be connected.)
- ④ Initialization of the board
 - a. Hold down the RANGE and PRINT keys, then press the CAL key.
 - b. The balance enters into the P-0 mode for initialization.
- ⑤ Model setting
HA180M OR HA120M
... P-1 mode

(3) Insulation check for the bobbin

- Measure the resistance between one end of the coil and balance's frame before connecting to the board.

(4) Coarse Checking the Electrical System

- ① Confirm that two weights are lowered and D0 value will vary by pressing the CAL key three times in the C-0 mode.
- ② Record T2 and T3 values in the C-1 mode.

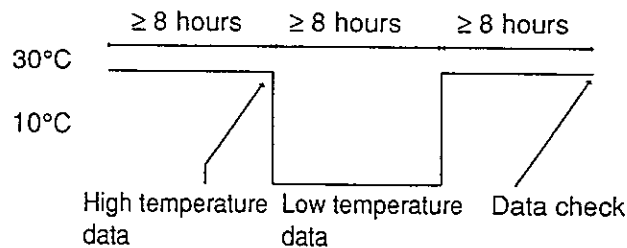
T2 value in the C-1 mode	1,500.000 - 25,00.000
T3 value in the C-1 mode	1,500.000 - 25,00.000
T2: Within ± 100 digits in eight seconds	
T3: Within $\pm 1,500$ digits in eight seconds	

5-3 Coarse Adjustment

- (1) Cornerload adjustment
Adjust for a reading of within ± 5 digits using 150g weight (D7).
- (2) Center of gravity
Lift up the front side 3mm. Adjust for a reading of within ± 10 digits (D7).
- (3) Balance
 - ① Adjust for a zero point between 1450 and 1650. (D0)
 - ② Record the values in the C-0 mode; zero point and when pressing the CAL key three times.
The difference should be within 13,000.
- (4) Linearity data and CAL data input (Use internal weight)
Input linearity data and CAL data in the C6 mode.
- (5) Internal weight check
In the D7 display, check the repeatability (0g, Ag, Bg, and A + Bg) of two 100g internal weights(A and B) by pressing the CAL key.
Repeat this procedure four times. The reading should be within ± 2 digits.
(If the reading is not within specifications, temperature compensation cannot be performed.)

5-4 Temperature Compensation

(1)



- (2) Input the high temperature data in the P-2 mode.
Input the low temperature data in the P-3 mode.
- (3) Data check
Note: Check the span using the internal weight (press the CAL key three times). Record the values.
Specifications:
 - Zero Within ± 50 digits
 - Span Within ± 35 digits

5-5 Fine Adjustment

Preparation ... Allow the balance to operate overnight before proceeding with the fine adjustment.

(1) Creep data input and check

Note: • Before inputting the data, at least a one hour warm up period is required with no load.

- Use internal weight.
- While inputting the data, no air flow, or vibration should be allowed.

(Attach a small piece of tape on the slit of a door or window as required. The person doing the fine adjustments should stay there.)

① Enter into the P-4 mode, then press RE-ZERO, CAL, and PRINT keys.

② Data input will complete in about five minutes, after, P-0 is displayed.

③ Data check

Check the CP value and polarity in the C-2 mode.

- Record the value.

Acceptable value is +1 to +2500.

(2) Repeatability check

In the D7 display, repeat this test 11 times using an external weight record each value.

(HA180M ... 200g, HA120M ... 150g)

Zero ... Within ± 2 digits

Specifications Span ... $\sigma \leq 1$ digit

(FS - 0 σ is obtained from 11 data.)

(3) Cornerload check and adjustment

In the D7 display, adjust ===== for proper cornerload weighing using an external weight.

(HA180M ... 50g, HA120M ... 50g)

Specifications Within ± 2 digits

(4) Hysteresis

Specifications: ± 2 digits

(HA180M)

0g→50g→100g→150g→200g

0g←50g←100g←150g←

(HA120M)

0g→50g→100g→150g

0g←50g←100g←

(5) Repeatability check for the internal weight

→ If the accuracy is not within specifications in this step, linearity input and calibration cannot be performed.

In the D7 mode, check that the repeatability of two 100g internal weights (A and B) at the points of 0g, Ag, Bg, and A + Bg by pressing the CAL key.

Compare A + Bg and (A + Bg).

Specifications: Repeatability, Within ± 1 digit for six measurements.

$$A + Bg - (A + Bg) \leq 3 \text{ digits}$$

(If the difference is greater than 3 digits, input linearity and CAL data in the C-6 mode, then check it again.)

(6) Linearity data input (Use internal weight)

① Input linearity and CAL data in the C-6 mode.

② check

Specifications ± 1 digit with pile up method ... Record the values.

(HA180M)

(HA120M)

0g + 50g'

0g + 50g'

50g + 50g'

50g + 50g'

100g + 50g'

100g + 50g'

150g + 50g'

* If the accuracy is not within specifications, input the linearity in the C-3 mode, then CAL using 200g external weight in the C-5 mode. If the result is acceptable, check cornerload and internal weight, then return to step (5).

(7) Calibration of the internal weight

① Prepare a 200g calibrated weight.

② Calibrate the balance in the C-7 mode.

③ Calibrate the balance in the C-6 mode using the internal weight.

④ Load the 200g weight mentioned above. The reading should be within ± 2 digits.

(Common to both HA180M and HA120M.)

Record the error value.

(8) Setting the export version

① Set the decimal point shape and registration unit in the C8 mode. Refer to attached sheet for export version.

HA180M/HA120M Adjustment List

S/N

Date

Person checking
the balance

5-2 Electrical System

Main board check			
Lithium battery check (with AC adapter disconnected)	TP16 - TP5 TP14 - TP15	2.5V or higher 1mV or lower	OK/NG
Power supply voltage	TP9 - TP5 TP6 - TP5 TP10 - TP5	+5V $\pm 5\%$ -10V $\pm 5\%$ -25V $\pm 5\%$	OK/NG
Initialization of the board			OK/NG
Model setting			OK/NG
Insulation check of the bobbin			OK/NG
Coarse Checking the Electrical System	CAL in the C-0 mode T2 value in the C-1 mode 1,500.000 - 25,00.000 T3 value in the C-1 mode 1,500.000 - 25,00.000 T2: Within ± 100 digits in eight seconds T3: Within $\pm 1,500$ digits in eight seconds		OK/NG

5-3 Coarse Adjustment

Four-point adjustment Adjust =for a reading of within ± 5 digits using 150g weight. (D7)	OK/NG
Center of gravity adjustment Lift up the front side 3mm. Adjust =for a reading of within +10 digits (D7).	OK/NG
Balance adjustment Adjust =for a zero point between 1450 and 1650. (D0) Record the values in the C-0 mode; zero point and when pressing the CAL key three times. Within 13,000 digits	OK/NG
Linearity data and CAL data input (Using internal weight) Input linearity data and CAL data in the C6 mode.	OK/NG
Internal weight check In the D7 mode, check that the repeatability of two 100g internal weights (A and B) at the points of 0g, Ag, Bg, and A + Bg by pressing the CAL key. Repeat four times for each weight. The reading should be within ± 2 digits. (If the reading is not within specifications, temperature compensation cannot be performed.)	OK/NG

5-4 Temperature Compensation

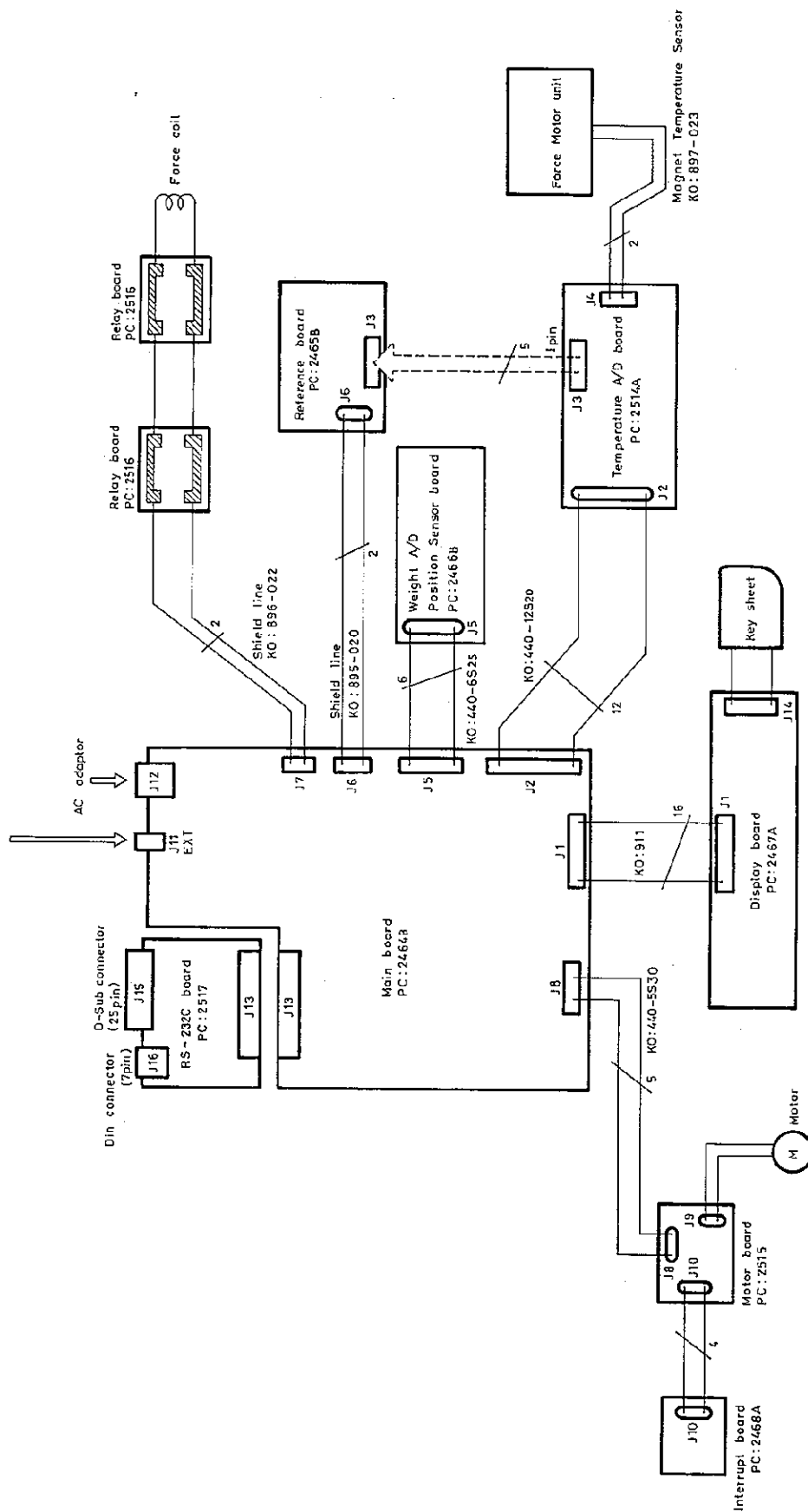
Zero	Within ± 50 digits	OK/NG
Span	Within ± 35 digits	

5-5 Fine Adjustment

Creep data input and check Check the CP value and polarity in the C-2 mode. The acceptable range is +1 to +2500.	OK/NG
Repeatability check In the D7 display, repeat this test 11 times using an external weight. (HA180M ... 200g, HA120M ... 150g) Zero ... Within ± 2 digits Specifications Span ... $\sigma \leq 1$ digit (FS - 0 σ is obtained from 11 data.)	OK/NG
Cornerload check and adjustment In the D7 display, adjust ===== using an external weight. (HA180M ... 50g, HA120M ... 50g) Specifications: Within width ± 2 digits	OK/NG
Hysteresis Specifications ± 2 digits	OK/NG
Repeatability check of the internal weight Specifications: Repeatability, Within ± 1 digit for six measurements. $A + Bg - (A + Bg) \leq 3$ digits	OK/NG
Linearity data input (Use internal weight) Specifications: ± 1 digit using the pile up method	OK/NG
Calibration of the internal weight Specifications Within ± 2 digits using 200g weight	OK/NG
Setting the export version	OK/NG

A B C D E F G

(RE-ZERO or PRINT)
AD1851



Symbol	Date	By	Revision No.	Model	AD: HA180M/120M
				Description	Electric Constitution
				Stock No.	
				Draw.No.	EC3 - 01522

CIRCUIT SYMBOL	PARTS NAME	DESCRIPTION	Q' TY
	04:B47983	SHIELD CASE LARGE	1
	04:B47984	SHIELD CASE SMALL	1
	PC:2464B	PRINTED CIRUCIT BOARD	1
T1	TF:402B	TRANSFORMER	1
U1	UC:D78C10G-1B	CPU	1
U2	UC:D65013GC-388	GATE ARRAY	1
U3	UC:RP93C46	EEPROM	1
U4	UC:5564AFL-15	SRAM	1
U5	UC:HC573F	CMOS IC	1
U6	UC:HC139F	CMOS CMOS IC	1
U7, 8	UC:HC590AF	CMOS IC	2
U9, 10	UC:HC74F	CMOS IC	2
U11	UC:HC244F	CMOS IC	1
U12	UC:HCU04F	CMOS IC	1
U13	UA:S-8054ALR	VOLTAGE COMPARATOR	1
U14	JS:10328-01-445	IC SOCKET	1
U15	UR:TA78DL05P	REGULATOR	1
U16, 18	UR:TA78DL12P	REGULATOR	2
U17	UR:TA78DL10P	VOLTAGE REGULATOR	1
Q1, 4	QT:A1015Y	TRANSISTOR	2
Q2, 6, 7, 13, 16	QT:C1815Y	TRANSISTOR	5
Q3, 5	QF:K701	POWER MOS FET	2
Q8	QT:A1153	TRANSISTOR	1
Q12	QF:K30ATM-GR	FET	1
Q14	QT:C1173	TRANSISTOR	1
Q11	QT:C2901	TRANSISTOR	1
R1, 35, 55	RC:NAT22K	RESISTOR 22K Ω 1/4W	3
R2	RC:NAT1.5K	CARBON RESISTOR 1.5K Ω 1/4W	1
R4	RC:NAT750R	CARBON RESISTOR 750 Ω 1/4W	1
R5	RC:NAT680R	CARBON RESISTOR 680 Ω 1/4W	1
R6, 15, 42, 31	RC:NAT2.2K	RESISTOR 2.2K Ω 1/4W	4
R8	RC:NAT1M	RESISTOR 1M Ω 1/4W	1
R9, 21, 28, 29	RC:NAT4.7K	RESISTOR 4.7K Ω 1/4W	4
R10, 11, 22, 23, 24, 46, 47	RC:NAT1K	RESISTOR 1K Ω 1/4W	7
R12	RC:NAT100R	RESISTOR 100 Ω 1/4W	1
R13, 19, 16	RC:NAT10K	RESISTOR 10K Ω 1/4W	3
R14, 3	RC:NAT2.7K	CARBON RESISTOR 2.7K Ω 1/4W	2
R18	RC:NAT3.9K	RESISTOR 3.9K Ω 1/4W	1
R20	RC:NAT15K	RESISTOR 1/4 15K Ω	1
R32, 33, 34	RC:NAT56K	RESISTOR 1/4W 56K Ω	3
R43	RC:NAT33K	RESISTOR 33K Ω 1/4W	1
R44, 45	RC:NAT270R	CARBON RESISTOR 270 Ω 1/4W	2
R7	RC:NAT330R	CARBON RESISTOR 330 Ω 1/4W	1
R48, 49, 50, 51	RC:NAT5.6R	CARBON RESISTOR 5.6 Ω 1/4W	4
R17	RC:NAT3.3K	RESISTOR 3.3K Ω 1/4W	1
R56, 57	RC:NAT100K	CARBON RESISTOR 100K Ω 1/4W	2
R38	RN:IHR-4-223MA	RESISTOR NETWORK 22K x 4, 1/8W	1
R36, 37	RN:IHR-8-223MA	RESISTOR NETWORK 22K Ω x 8	2
D1	DI:1SS97	DIODE	1
D2	DI:1SS53	DIODE	1
D3	DZ:RD3.3EB2	ZENER DIODE 3.3V	1
D4, 5, 6, 7, 8, 11, 13	DI:1S1588	DIODE	7
D10	DZ:05Z9.1	ZENER DIODE 9.1V	1
D12	DI:AL01Z	DIODE	1
D14	DZ:05Z5.6	ZENER DIODE	1

P Z : 2 4 6 4

CIRCUIT SYMBOL	PARTS NAME	DESCRIPTION	Q' TY
C1~15, 43, 44, 47, 48, 49, 50, 52, 53, (NO USE 6, 13)	CC:FK16Y5V1H104	CAPACITOR 0.1 μ F	20
C17, 23, 24	CC:0.022U	CAPACITOR 0.01 μ F 500V	4
C18	CC:68P	CAPACITOR 68PF 50V	1
C19, 32, 40, 42, 46, 54, 55, 56	CC:0.01U	CAPACITOR 0.01 μ F	8
C21, 22, 25, 26	CC:0.001U	CAPACITOR 0.001 μ F 50V	4
C27	CC:0.1U25V	CAPACITOR 0.1 μ F 25V	1
C33, 34	CC:10P	CAPACITOR 10pF 50V	2
C35, 36	CC:0.01U1KV	CERAMIC CAPACITOR 0.01 μ F	2
C59	CC:470P	CAPACITOR 470PF 50V	1
C28, 29, 30	CM:E1106KN	CAPACITOR 10 μ F 50V	3
C16	CC:33P	CAPACITOR 33pF 50V	1
C31	CK:SXE35VB1000	CAPACITOR 1000 μ F/35V	1
C38	CK:SM50VB3R3	CAPACITOR 3.3 μ F 50V	1
C39	CK:SM25VB470	CAPACITOR 470 μ F 25V	1
C41	CK:SM50VB100	CAPACITOR 100 μ F 50V	1
C45	CK:SM10VB470	ELECTROLYTIC CAPACITOR 470 μ F 10V	1
C51	CK:SM25VB100	CAPACITOR 100 μ F 25V	1
C58	CK:SM25VB47	ELECTROLYTIC CAPACITOR 47 μ F 25V	1
C20	CC:0.047U	CAPACITOR 0.047 μ F 50V	1
J1	JD:SLEM16S-2	CONNECTOR	1
J2	JT:1-172429-2	CONNECTOR	1
J5	JT:172429-6	SPRING HEADER	1
J6	JT:172429-3	SPRING HEADER	1
J7	JT:172429-2	SPRING HEADER	1
J8	JT:172429-5	SPRING HEADER	1
J11	JE:HSJ0916-01	CONNECTOR	1
J12	EJ:0470-01-230	CONNECTOR	1
J13	JI:CL583-0078-6	CONNECTOR	1
L1	NF:ZBF253D-01	BEAD FILTER	1
L2, 3	LL:SF-T8-40S	COIL	2
L4, 5	NF:FB-43-101	FERRITIC BEADS	2
X1	XT:C4SB-12M-K02	RESONATOR 12MHz	1
Batt	EB:CR2032-WT12	LITHIUM BATTERY	1
	ET:MEB-12C-5	BUZZER	1
	FH:F-105	FUSE HOLDER	1
	FS:EAWK-500MA	FUSE 500mA T	1
TP1~18	TM:CP-10	TEST PIN	18
	HT:6073PB	HEAT SINK	3
	QA:AC256-1674	MICA SPACER	3
	QA:AC316A	WASHER	3

P Z : 2 4 6 7

CIRCUIT SYMBOL	PARTS NAME	DESCRIPTION	Q' TY
	PC:2467A	PRINTED CIRCUIT BOARD	1
	ED:FIP11C11	DISPLAY TUBE	1
	07:A46734B	PILLOW	2
	06:A47138	DISPLAY SEAT	2
U1	UC:7516HG631-12	CPU	1
U2	UC:HC4049F	CMOS IC	1
D1	DZ:05Z9.1	ZENER DIODE 9.1V	1
R1, 2, 3	RN:IHR-8-563JA	RESISTOR NETWORK	3
R4, 5, 6, 7	RC:NAT100K	CARBON RESISTOR 100K Ω 1/4W	4
R8	RC:NAT56K	RESISTOR 1/4W 56K Ω	1
R9, 10, 11, 12, 13, 14	RC:NAT4.7K	RESISTOR 4.7K Ω 1/4W	6
L1	NF:FB-43-101	FERRITIC BEADS	1
C2	CK:SM50VB10	ELECTROLYTIC CAPACITOR 10 μ F 50V	1
C3	CK:SM50VB3R3	CAPACITOR 3.3 μ F 50V	1
C4, 7	CC:FK16Y5V1H104	CAPACITOR 0.1 μ F	2
C5	CC:0.1U25V	CAPACITOR 0.1 μ F 25V	1
C11, 12, 13, 14, 15, 16	CC:0.0047U	CAPACITOR 0.0047 μ F 50V	6
C1	CK:SRA16VB-10	CAPACITOR 10 μ F	1
X1	XT:C4SB-6M-L02	CRYSTAL 6MHz	1
J1	JD:SLEM16R-2	CONNECTOR	1
J14	JD:230-07-30	CONNECTOR	1

P Z : 2 4 6 8

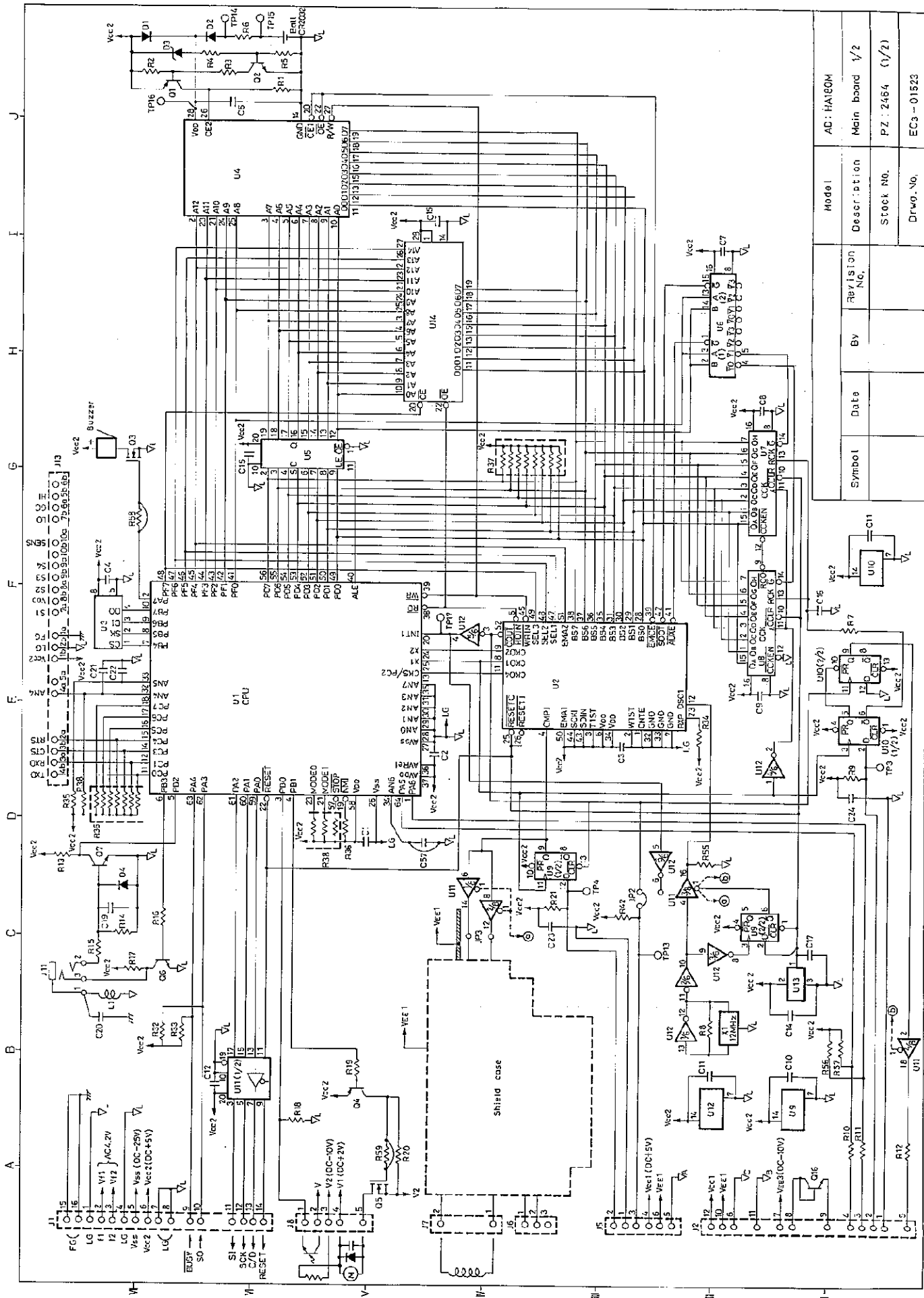
CIRCUIT SYMBOL	PARTS NAME	DESCRIPTION	Q' TY
	KO:440-5S30	CABLE	1
	04:B48186A	INTERRUPT FOLDER	1
	PC:2468A	INTERRUPT BOARD	1
	PC:2515	MOTOR BOARD	1
D2	DI:1S1588	DIODE	1
D1	DF:TLP852	PHOTO INTERRUPTER	1
C1	CC:0.01U	CAPACITOR 0.01 μ F 50V	1
	RC:NAT3.3K	RESISTOR 3.3K Ω 1/4W	1

H A — 0 3

CIRCUIT SYMBOL	PARTS NAME	DESCRIPTION	Q' TY
	JA:TCP0576	DIN 7PIN PLUG	1
	02:B47859A	RS-232C PLATE	1
	07:B47808	OPTION GUIDE	1
	PC:2517	PRINTED CIRCUIT	1
U1	UC:MAX232CPE	RS232C TRANSMITTER/RECEIVER	1
Q1	QT:BA1A4P	TRANSISTER WITH RESISTER	1
Q2	QT:C1815Y	TRANSISTER	1
D1	DF:PS-2403-1	PHOTO COUPLER	1
D2	DI:1B4B42	DIODE BRIDGE	1
R1	RC:NAT1.2K	RESISTER 1.2K Ω	1
R2	RC:NAT330R	RESISTER 330 Ω	1
R3	RC:NAT3.3K	RESISTER 3.3K Ω	1
C1, 2, 3, 4	CK:SRA16VB-47	CAPACITOR 47 μ F	4
C5	CC:FK16Y5V1H104	CAPACITOR 0.01PF	1
C6, ~15	CC:22P	CAPACITOR 22PF	10
L1, 2, 3, 4, 5, 6, 7, 8, 9	NF:ZBF253D-01	FERRITIC BEADS	9
J13	JI:CL583-0201-0	PCN10C-20S-2.54DS CONNECTOR	1
J15	JA:TCS0274	DIN CONNECTOR	1
J16	JA:17LE-13250	D-SUB CONNECTOR	1
TP1, 2, 3	TM:CP-10	TEST PIN	3

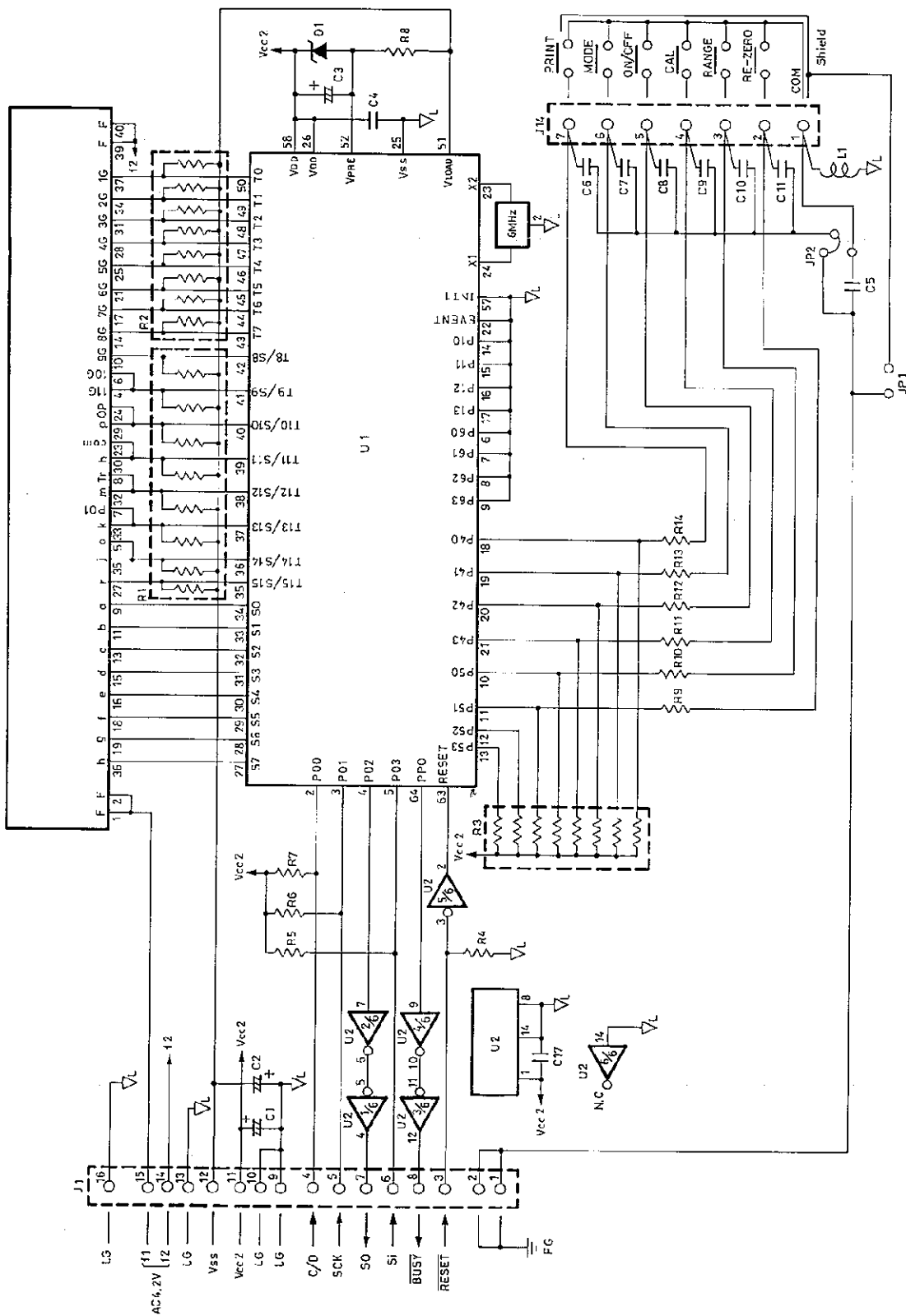
H A — 1 1

CIRCUIT SYMBOL	PARTS NAME	DESCRIPTION	Q' TY
	05:B48363	ANTI-THEFT DEVICE	1
	10:C-555-35	35mm PADLOCK	1

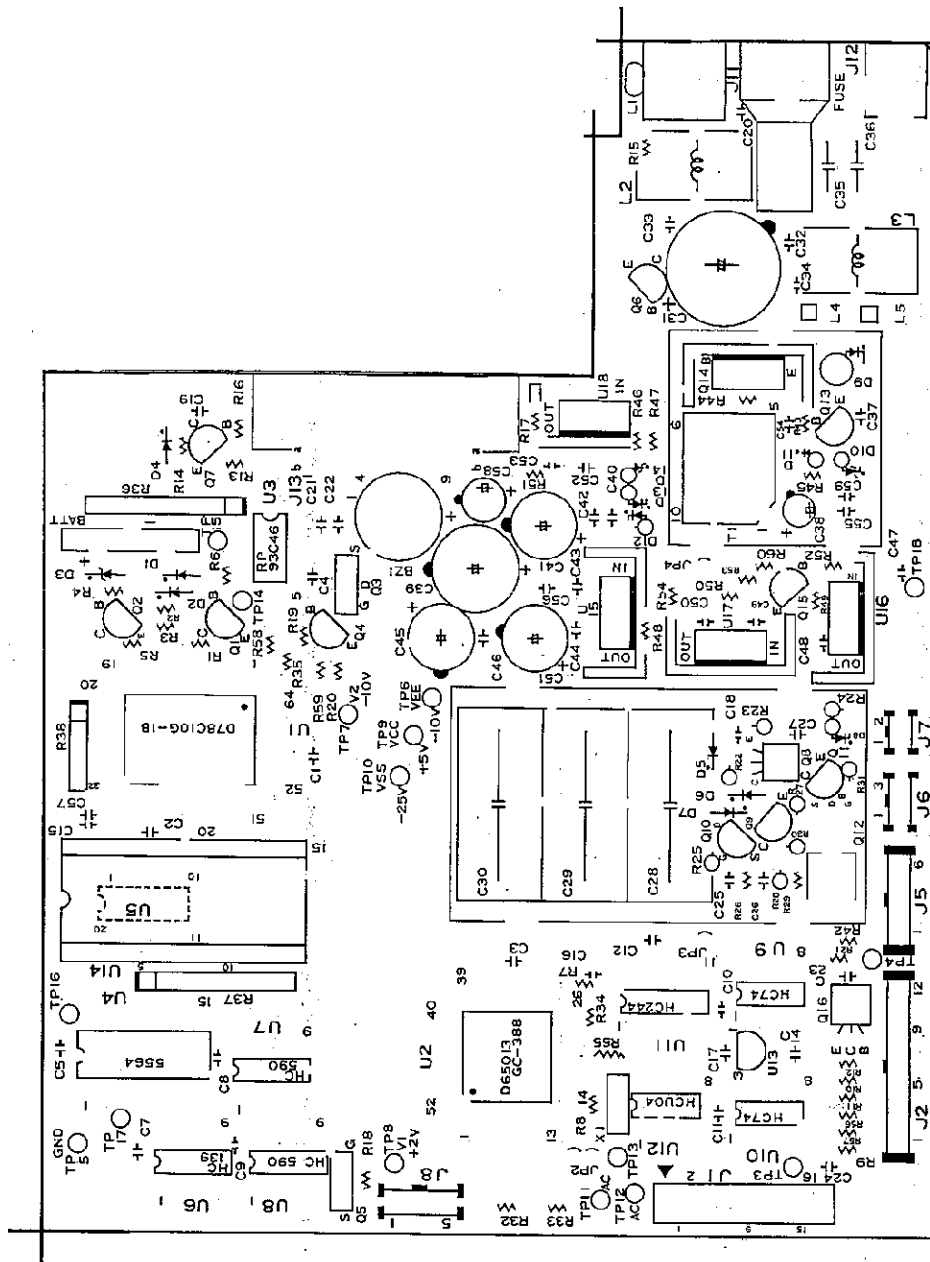


Symbol	Date	By	Revision No.	Model	AD: HA180M
				Description	Main board 1/2
				Stock No.	PZ: 2464 (1/2)
				Draw. No.	EC3-01523

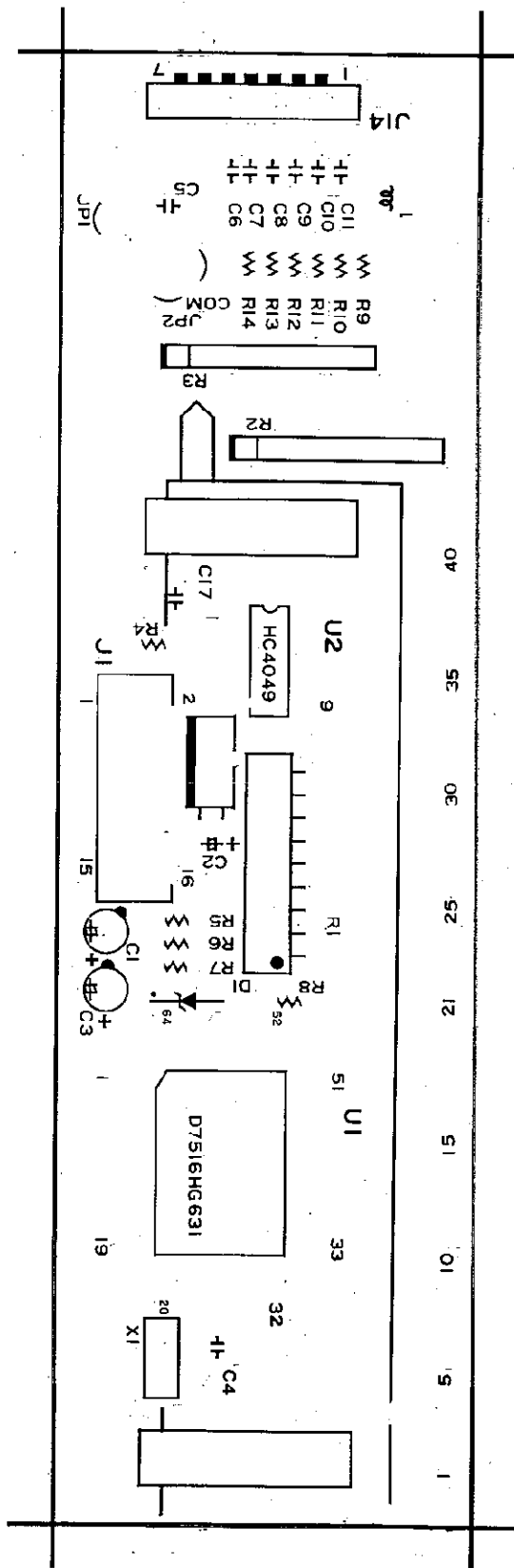
A B C D E F G



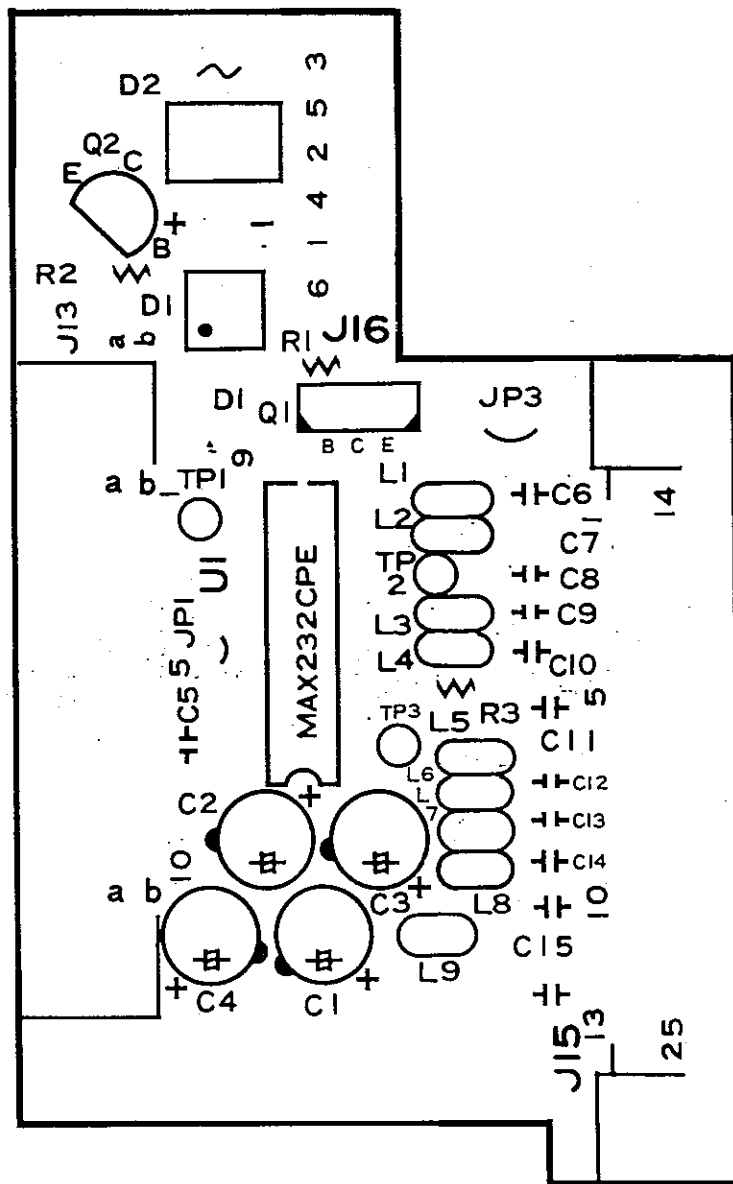
SYMBOL	Date	By	Revision No.	Description	Model
				Display board	AD : HA180M
				Stook No.	PZ : 2467
				Drwg.No.	EC4-00235



Symbol	Date	By	Revision No.	Model	AD: HA180M
				Description	main board Layout
				Stock No	PZ: 2464
				Drwg. No	



Symbol	Date	By	Revision No.	Model	AD: HA180M
				Description	Display board Layout
				Stock No	PZ: 2467
				Drwg. No	



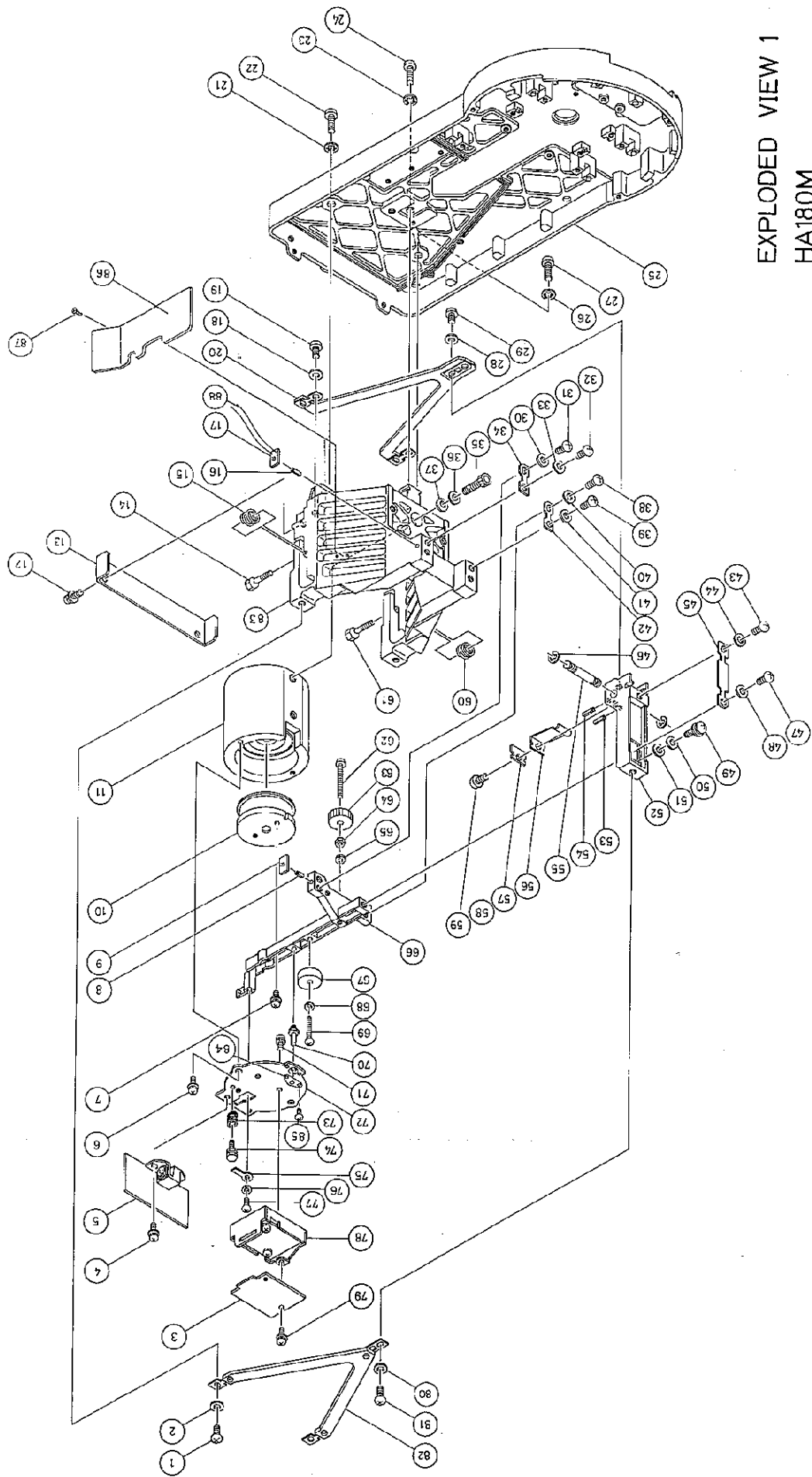
Symbol	Date	By	Revision No.	Model	AD: HA-03
				Description	RS-232C board Layout
				Stock No	.PZ: 2517
				Drwg. No	

Exploded view 1

NO.	PARTS NAME	DESCRIPTION
1		PAN HEAD M4×6
2	10:S-NO-1-SUS	CONVEX WASHER
3	PZ:2514	TEMPERATURE A/D BOARD
4		PAN HEAD WITH WASHER M3×6
5	PZ:2466	POSITION SENSOR BOARD
6		PAN HEAD WITH WASHER M3×6
7		PAN HEAD WITH WASHER M3×8
8	10:20008	SPRING PIN
9	PC:2516	RELAY BOARD
10	09:A38695A	FORCE COIL BOBBIN
11	PB:HA180M-1	MAGNETIC UNIT
12		PAN HEAD WITH WASHER M3×6
13	04:B49180	COVER
14	05:B48376	FOUR CORNER ADJUST SCREW
15	00:A47004	SPRING
16	10:20008	SPRING PIN
17	PC:2516	RELAY BOARD
18	10:S-NO-1-SUS	CONVEX WASHER
19		PAN HEAD M4×6
20	PB:HA180M-3	LOWER BEAM SET
21		TOOTHED LOOK WASHER M5
22		PAN HEAD M5×12
23		TOOTHED LOOK WASHER M5
24		PAN HEAD M5×12
25	03:A10178	LOWER CASE
26		TOOTHED LOOK WASHER M5
27		PAN HEAD M5×12
28	10:S-NO-1-SUS	CONVEX WASHER
29		PAN HEAD M4×6
30	10:S-NO-1-SUS	CONVEX WASHER
31		PAN HEAD M4×6
32		PAN HEAD M4×6
33	10:S-NO-1-SUS	CONVEX WASHER
34	04:B46626A;B	NUCLEUS BAND
35		HEXAGON BOLT M5×15
36		SPRING WASHER M5
37		WASHER M5
38		PAN HEAD M4×6
39		PAN HEAD M4×6
40	10:S-NO-1-SUS	CONVEX WASHER
41	10:S-NO-1-SUS	CONVEX WASHER
42	04:B46626A;B	NUCLEUS BAND
43		PAN HEAD M4×6
44	10:S-NO-1-SUS	CONVEX WASHER
45	04:B46627A;B	HANGING BAND
46	10:5A	E-RING
47		PAN HEAD M4×6
48	10:S-NO-1-SUS	CONVEX WASHER
49		PAN HEAD WITH WASHER M4×10
50		WASHER M4
51		WASHER M4

Exploded view 1

NO.	PARTS NAME	DESCRIPTION
52	03:A38696C;B	RISER BEAM
53	10:20008	SPRING PIN
54	10:20008	SPRING PIN
55	05:B46640A	S.A. BEARING
56	04:B46628A	S.A. LEAF SPRING
57	04:B46629A	S.A. SPACER PLATE
58		
59		PAN HEAD WHH WASHER M4×6
60	00:A47004	SPRING
61	05:B48376	FOUR CORNER ADJUST SCREW
62		PAN HEAD M3×30
63	09:A45376	COUNTER BALANCE WT.
64		NUT M3
65		SPRING WASHER M3
66	03:A21310A;B	BEAM
67	05:B48702	COUNTER BALANCE WT.
68		SPRING WASHER M3
69		PAN HEAD M3×12
70	05:B47536	BEAM STOPPER
71		PAN HEAD WITH WASHER M3×6
72	04:B47535C	SHIELD PLATE
73	00:B48842A	STOPPER SPRING
74	05:B48791	STOPPER BOLT
75	04:B47537A	STOPPER PLATE
76		SPRING WASHER M3
77		PAN HEAD M3×6
78	PZ:2465	ANALOG UNIT
79		PAN HEAD WITH WASHER M3×6
80	10:S-NO-1-SUS	CONVEX WASHER
81		PAN HEAD M4×6
82	PB:HA180M-2	UPPER BEAM SET
83	03:A10181C;B	MAGNET FRAME
84	04:B40498A	BEAM STOPPER PLATE
85		PAN HEAD WITH WASHER M3×6
86	04:B48924A	CABLE LIFTER
87		PAN HEAD WITH WASHER M4×6
88	08:A45993B	WIRE



EXPLODED VIEW 1

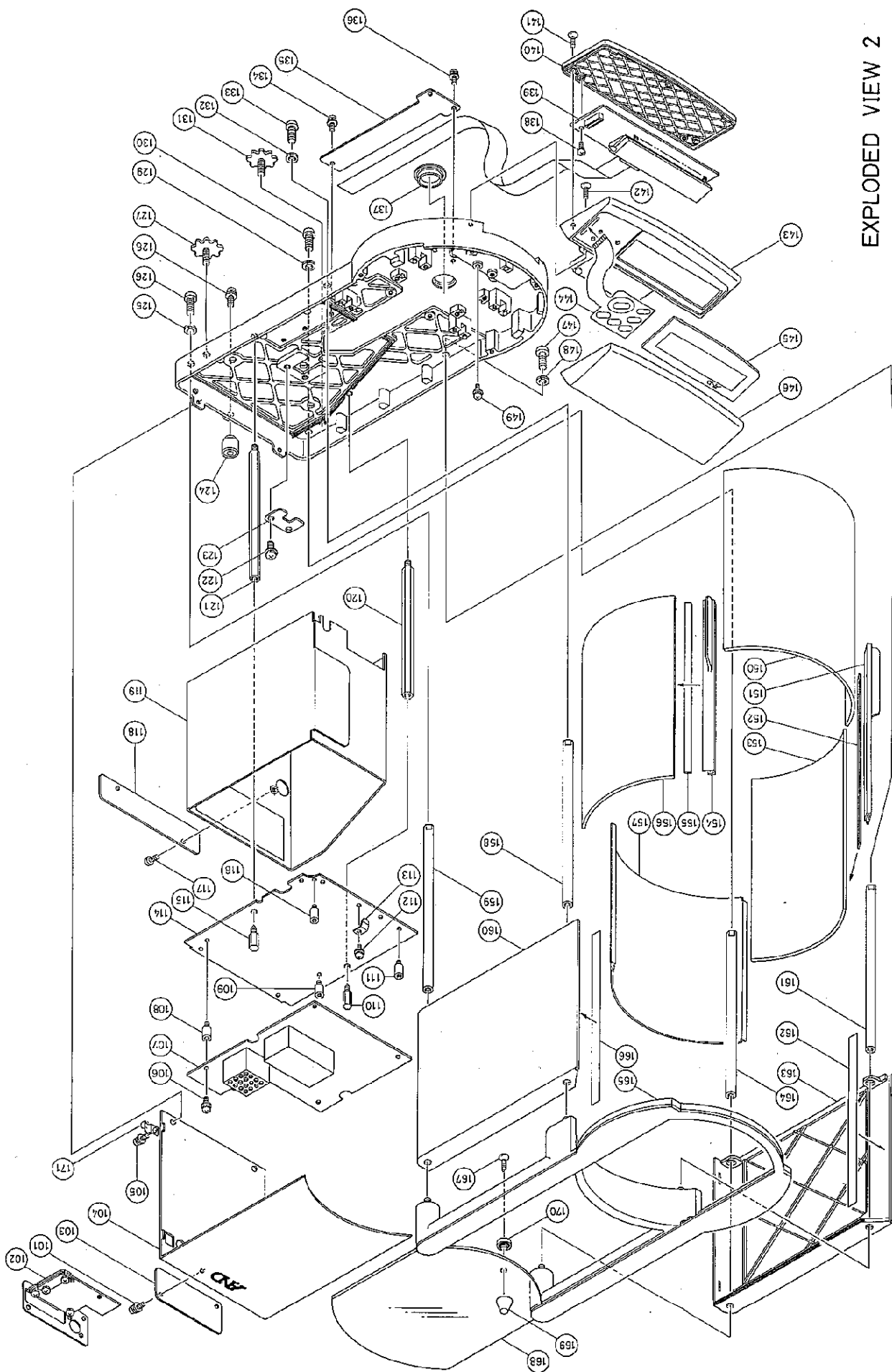
HA180M

Exploded view 2

NO.	PARTS NAME	DESCRIPTION
101		PAN HEAD WITH WASHER M3×6
102	AD:HA-03	OPTION BOARD
103	02:B47858	OPTION BLANKING PANEL
104	02:A38852A	REAR PANEL
105		PAN HEAD WITH WASHER M3×6
106		PAN HEAD WITH WASHER M3×6
107	PZ:2464	MAIN BOARD
108	05:B48198	SPACER
109	05:B48198	SPACER
110	05:B40473	STOPPER SCREW
111	05:B48198	SPACER
112		PAN HEAD WITH WASHER M3×6
113	04:B47856	EARTH PLATE
114	04:A38851B	SHIELD
115	05:B40473	STOPPER SCREW
116	05:B48198	SPACER
117		PAN HEAD M3×6
118	04:B47855	FOUR CORNER ADJUST PLATE
119	04:A38850A	INNER CASE
120	05:B48179	SUPPORT PILLAR
121	05:B48179	SUPPORT PILLAR
122		PAN HEAD WITH WASHER M4×6
123	04:B48181	PILLAR GUIDE PLATE
124	05:B48231B	LEVEL GUIDE HOLDER
125		TOOTHED LOCK WASHER M5
126		PAN HEAD M5×12
127	07:A46735	FOOT
128		PAN HEAD WITH WASHER M4×6
129		TOOTHED LOCK WASHER M5
130		PAN HEAD M5×12
131	07:A46735	FOOT
132		TOOTHED LOCK WASHER M5
133		PAN HEAD M5×12
134		PAN HEAD WITH WASHER M3×6
135	04:B49317A	CABLE GUIDE PLATE
136		PAN HEAD WITH WASHER M3×6
137	07:A46858	UNDER HOOK COVER FR
138		PAN HEAD M2.6×6
139	PZ:2467	DISPLAY BOARD
140	07:A21313	DISPLAY LOWER CASE
141		FLAT HEAD M3.6×12
142		FLAT HEAD M3×8
143	07:A21321	DISPLAY UPPER CASE
144	09:A38790A	SWITCH
145	01:B47636	FILTER FOR 180M
145	01:B47915	FILTER FOR 120M
146	00:A39320A	DISPLAY COVER
147		PAN HEAD M5×12
148		TOOTHED LOCK WASHER M5
149		PAN HEAD WITH WASHER M3×6
150	00:B46054A	FRONT GLASS
151	07:A39266-2	KNOB (LEFT)
152	07:B49260	CHINK TAPE
153	00:B47702A	SIDE GLASS
154	07:A39266-1	KNOB (RIGHT)
155	07:B49260	CHINK TAPE

Exploded view 2

NO.	PARTS NAME	DESCRIPTION
156	00:B47702A	SIDE GLASS
157	02:A38853A	SEPARATER PLATE
158	05:B48180	CASE PILLAR
159	05:B48180	CASE PILLAR
160	07:A21338-2	SIDE COVER (RIGHT)
161	05:B48180	CASE PILLAR
162	07:B49312	TEFLON TAPE
163	07:A21338-1	SIDE COVER (LEFT)
164	05:B48180	CASE PILLAR
165	07:A10180	UPPER RAIL
166	07:B49312	TEFLON TAPE
167		FLAT HEAD TAPPING M3×12
168	00:B48123	TOP GLASS
169	07:B48174A	TOP HANDLER
170	07:B48175	TOP HANDLER BASE
171	04:B0416	CABLE STOPPER



EXPLODED VIEW 2

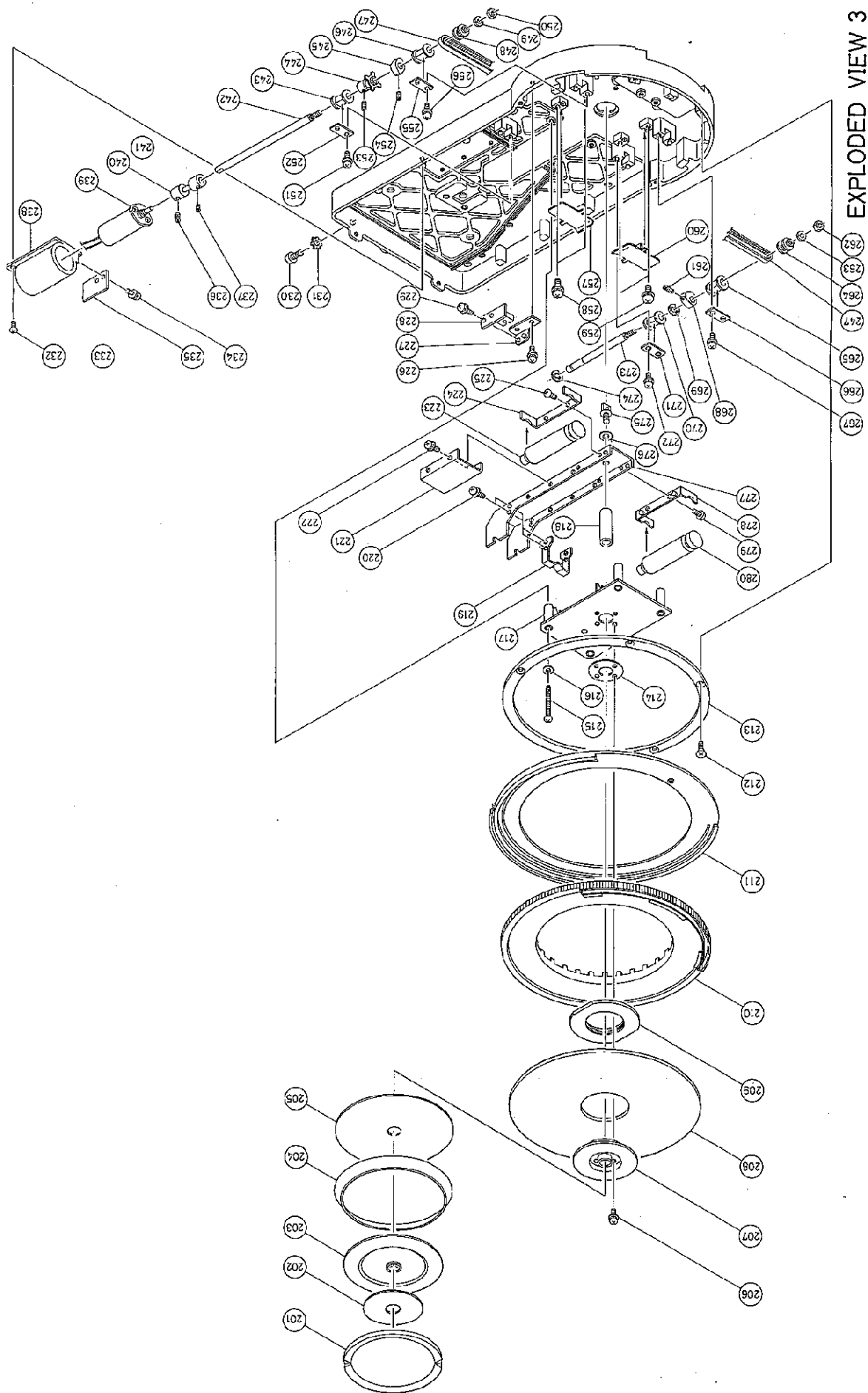
HA180M

Exploded view 3

NO.	PARTS NAME	DESCRIPTION
201	04:B40478A	WEIGHT PAN
202	04:B48920	WEIGHT PLATE
203	09:B48214	PAN SUPPORT
204	04:B40243	WIND PROTECT RING
205	04:B48219	DUST PLATE
206		PAN HEAD WITH WASHER M3×8
207	05:B48177A	FLOOR GUIDE
208	00:B48124A	FLOOR GLASS
209	07:B48178B	FLOOR NUT
210	07:A21358A	ROTATION RAIL
211	07:A21357A	FIX RAIL
212		FLAT HEAD M3×8
213	04:B47907	GUIDE RING
214	04:B49259A-2	FLOOR GUIDE SPACER
215		PAN HEAD M3×30
216		WASHER M3
217	09:B48193C	WEIGHT HOLDER
218	05:B48212	WEIGHT PAN RECEPTER
219	04:B46630B	SPRING RECEPTER
220		PAN HEAD WITH WASHER M3×6
221	04:B48166	FRONT ARM COVER
222		PAN HEAD M3×6
223	05:B48187A	STD WEIGHT (100g)
224	04:B47906B	WEIGHT RECEPTER
225		PAN HEAD M3×6
226		PAN HEAD WITH WASHER M3×6
227	04:B48186A	INTERRUPTER HOLDER
228	PZ:2468	INTERRUPTER BOARD
229		PAN HEAD WITH WASHER M3×6
230		BINDING HEAD M4×6
231		TOOTHED LOCK WASHER M4
232		PAN HEAD WITH WASHER M3×6
233		
234		PAN HEAD WITH WASHER M3×6
235	PZ:2515	MOTOR BOARD
236		COUNTINUOUS-THREAD STUD M3×3
237		COUNTINUOUS-THREAD STUD M3×3
238	09:B44747	MOTOR HOLDER
239	10:A35234	GEARED MOTOR
240	07:B48183	COUPLING
241		
242	05:B48185A	MOTOR SHAFT
243	07:B40278	SHAFT HOLDER
244	09:B48190	SWITCHING CAM
245	07:B46559	UPPER CAM
246	07:B40278	SHAFT HOLDER
247	10:B120 MXL3.2	MXL BELT
248	09:B48195A	CAL PULLEY
249		SPRING WASHER M3
250		NUT M3
251		PAN HEAD WITH WASHER M3×6
252	04:B40464	SHAFT STOPPER
253		CONTINUOUS-THREAD STUD M3×3
254		CONTINUOUS-THREAD STUD M3×5
255	04:B40464	SHAFT STOPPER
256		PAN HEAD WITH WASHER M3×6

Exploded view 3

NO.	PARTS NAME	DESCRIPTION
257	04:B47908A	WEIGHT GUIDE
258		PAN HEAD WITH WASHER M4×8
259		PAN HEAD WITH WASHER M4×8
260	04:B47908	WEIGHT GUIDE
261		CONTINUOUS-THREAD STUD M3×5
262		NUT M3
263		SPRING WASHER M3
264	09:B48195A	CAL PULLEY
265	07:B40278	SHAFT HOLDER
266	04:B40464	SHAFT STOPPER
267		PAN HEAD WITH WASHER M3×6
268	07:B46560	LOWER CAM
269		E RING
270	07:B40278	SHAFT HOLDER
271	04:B40464	SHAFT STOPPER
272		PAN HEAD WITH WASHER M3×6
273	05:B48184B	CAM SHAFT
274		E RING
275	05:B43355	UNDER HOOK FR
276	10:S-NO-1-SUS	CONVEX WASHER
277	04:B47905D	ARM
278	04:B47906B	WEIGHT RECEPTER
279		PAN HEAD M3×6
280	05:B48187A	STD WEIGHT (100g)



EXPLODED VIEW 3 HA180M