

HR SERIES

MAINTENANCE MANUAL

PRECISION ELECTRONIC BALANCE

HR-60
HR-120
HR-200
HR-300CT
HR-600CT



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1. Introduction

This is the maintenance manual that is described regarding following balances.

HR-60

HR-300CT (same as HR-60 about maitenence)

HR-120

HR-600CT (same as HR-120 about maitenence)

HR-200

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



1.1 Equipment and Tools Required

Description	Purpose
Phillips screwdriver 3 mm	For disassembly and reassembly
Posidrive screwdriver	For adjusting the counter weight
Flat bladed screwdriver	For disassembly and reassembly
Adhesive tape 8 mm	For cleaning
Mechanical alignment fixture	For disassembly and reassembly of the mechanical unit
Wrench (spanner), 8 mm	For corner load adjustment
Wrench (spanner), 13 mm	For installation of the pan support leg
Wrench (spanner), 5.5 mm	For counter weight adjustment
Allen wrench, 3 mm	For mechanical unit repair
Allen wrench, 2.5 mm	For internal weight stopper installation
Allen wrench, 2 mm	For installation of the weld nut (motor)
Allen wrench, 2.5 mm	For repairing the cam and cam shaft (motor unit)
Round-nose chain pliers	For installing the lower case post & bottom parts
Soldering iron (25-40 W)	For soldering
Weights	
HR-60:	Three 20g, one 50 g, one 200g (calibrated weights with correction factor)
HR-120:	Two 50g, one 200g (calibrated weights with correction factor)
HR-200:	Four 50g (calibrated weights with correction factor)
AC adapter	The adapter will be dependent on the area of use. See the Parts List for the proper adapter.
Multimeter	
Oscilloscope	
Temperature Controlled Room	A room where the temperature can be maintained at $10 \pm 2^\circ\text{C}$ and $30 \pm 2^\circ\text{C}$ for 4 hours or more.



1.2 Corrective Maintenance Outline

Test to locate defects	To perform the corrective maintenance, defects must be located and their cause determined. The easiest ways to locate a defect is to perform an operation check replacing suspected components.
Corrective maintenance procedure	Corrective maintenance is described by using a flowchart and a trouble-shooting table.
Adjustment details	An adjustment procedure is described that covers all units.



2. Performance Test

Allow four hours warm-up prior to conducting the performance test.



2.1 Performance Test Procedure

Verify the following points:

- External view (is the unit properly assembled and clean)
- The balance has been leveled using the bubble spirit level.
- The pan is level. (check for correct assembly)

Functions

1. Verify that each key functions correctly:

- ON:OFF key
- PRINT key
- RANGE key
- MODE key
- RE-ZERO key

2. Verify that the following function correctly:

- The minus indicators
- The decimal point indicators
- That a stable display is obtained.
- External key inputs
- Selection of the weighing units (see table below)
- The interface options
- Battery option

3. Verify that the TAEL values are within tolerance :

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



2.2 Test Details

Calibration verification

After calibration, place the calibration mass on the pan. The balance should indicate the exact weight of the mass within ± 0.2 mg.

Repeatability

After calibration, place the specified mass on the pan and read the displayed value.

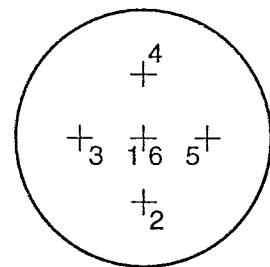
Repeat the test five times. The difference between the values of all five tests and the true value must be within the specifications.

Unit Type	Mass used	Specifications
HR-60	50g	± 0.1 mg
HR-120	100g	± 0.1 mg
HR-200	200g	± 0.1 mg

Corner load error

Place the specified mass at the center of the pan (1) and record the displayed value. Then place the mass, at positions 2, 3, 4, 5 then 6. Check the difference between the values at the center and the four cross marks (the cross marks are half the distance from the center of the pan to the edge).

Unit Type	Mass used	Specifications
HR-60	20g	± 0.3 mg
HR-120	50g	± 0.3 mg
HR-200	50g	± 0.3 mg



Hysteresis

After calibration, place mass 1 on the pan and gradually add mass 2, 3 and 4, as specified in the table below. Remove the mass, one at a time and check the error each time you add or remove a mass.

Unit Type	Mass 1	Mass 2	Mass 3	Mass 4	Specifications
HR-60	20g	20g	20g		± 0.3 mg
HR-120	50g	50g	50g		± 0.3 mg
HR-200	50g	50g	50g	50g	± 0.3 mg

Linearity

After calibration, place mass 1 on the pan and gradually add mass 2, 3 and 4, as specified in the table below. Remove the mass, one at a time and check the error each time you add or remove a mass.

Unit Type	Mass 1	Mass 2	Mass 3	Mass 4	Specifications
HR-60	20g	20g	20g		± 0.2 mg
HR-120	50g	50g	50g		± 0.2 mg
HR-200	50g	50g	50g	50g	± 0.2 mg



3. Corrective Maintenance

Perform corrective maintenance for the HR series by referring to the maintenance flowchart and the troubleshooting table. The troubleshooting table describes the possible cause and solution to facilitate corrective maintenance. The maintenance flowchart describes what you must do if anything has been replaced or adjusted.

Perform corrective maintenance according to the error (the letters refer to nodes on the maintenance flow chart on page 9):

- Type A: Replacing, disassembling, or assembling mechanical unit.
- Type B: Replacing or adjusting electrical parts.
- Type C: Initializing a board and inputting specific data.
- Type D: Adjusting the characteristics of the mechanical unit.
- Type E: Inputting temperature data.
- Type F: Performing function tests.
- Type G: Performing drift check.



3.1 Troubleshooting Table

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

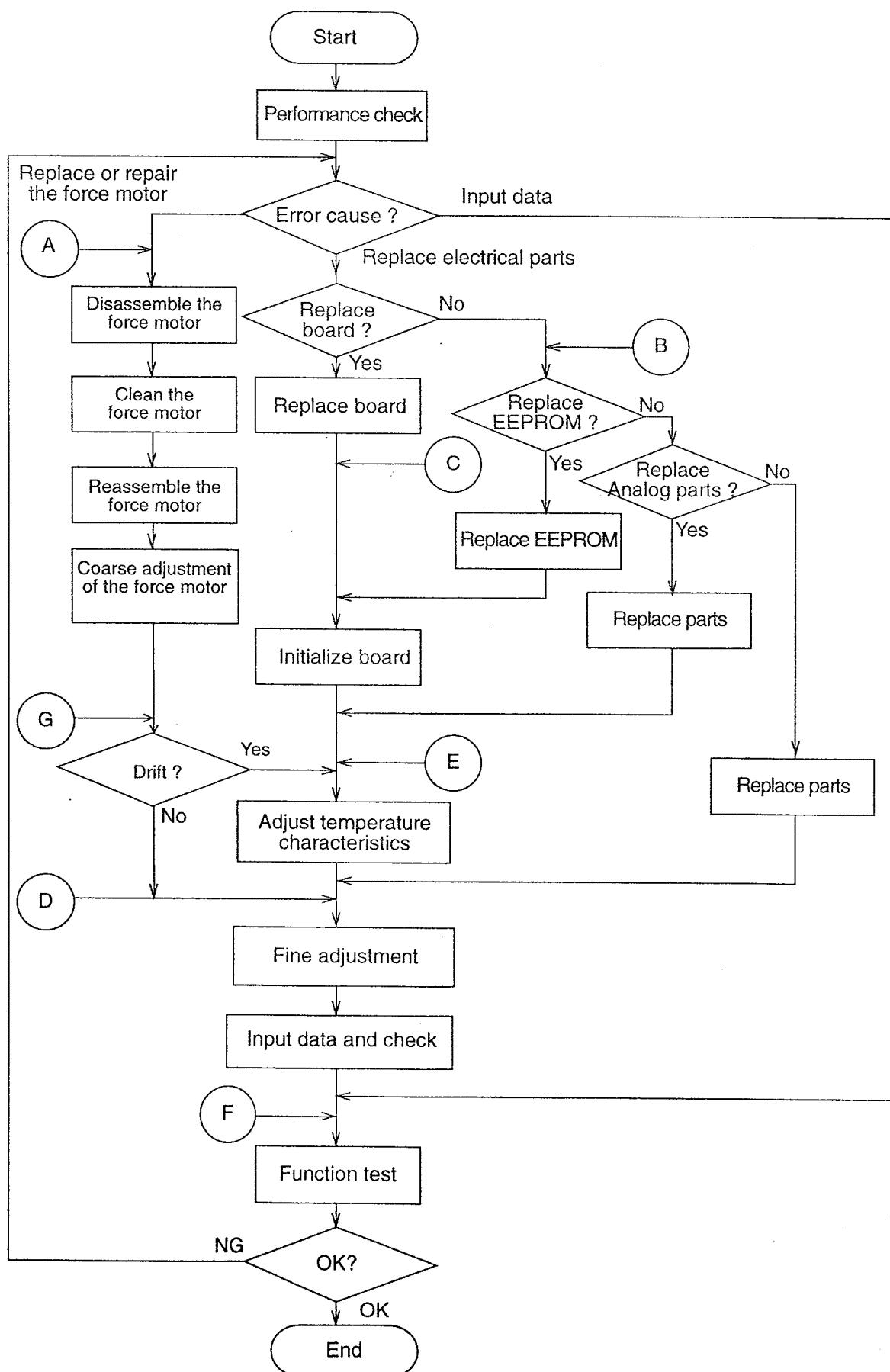
Problem	Location	Check	Solution	Type
No display, beam is not balanced	AC adapter	Is it the correct AC adapter for the power source used	Replace with the correct AC adapter	F
		Is the output correct. Measure the output of the AC adapter with it connected to the balance (contacts of the power input connector on the power board). The DC output should be at least 12 volts, but no greater than 22 volts	If the output is not correct, replace the AC adapter	
	Fuse	Disconnect the AC adapter and measure the fuse with an ohm meter	Replace with correct fuse	F
	Main board	Is the output of the power supplies correct. Measure from the GND pin to the +5V pin, and GND pin to the -10V pin	Replace the main and display boards with substitute items	C
	Force motor	Check that the connectors are installed correctly	Replace the force motor with a substitute item	A
	Battery option	If the battery option is installed, check the condition of the battery. Is the battery voltage (12 volts) correct under load.	Replace with a fully charged battery.	F

Problem	Location	Check	Solution	Type
No display, but the beam is balanced	Keyboard assembly	Check the condition of the cable, connector and switches	Replace with a substitute keyboard assembly	F
	Display assembly	Check the display cable and the connections to the main board	Replace the main board assembly with a substitute assembly	F C
	Main board assembly	Check using a voltmeter with the common connected to J5 pin 1 and the positive lead connected to J5 pin 5. With power applied, this should be approximately 5 volts. Press the ON/OFF key and the voltage should be zero volts	Replace the main board assembly with a substitute assembly	F
Unstable display, repeatability or 4 corner check not within specifications	Pan assembly	Check that the pan assembly is correctly assembled and installed	Replace with a substitute pan assembly	F
		Check for foreign matter between the pan and breeze break ring	Clean the area around the pan assembly and the breeze break ring.	D
		Check that the breeze break ring does not touch the pan assembly	Correctly install the breeze break ring so that it does not touch the pan	D
	Main board	Check voltages and wave forms described on the circuit diagram	Replace the main board assembly with a substitute assembly	B
	Force motor assembly	Check for particles between the magnet and the force coil	Clean the force motor assembly or replace with a substitute item	A
		Check the position sensor gap for dust	Clean the position sensor or replace it with a substitute item.	G
		Check that the flexures are in good condition and are correctly installed	Repair the force motor assembly or replace with a substitute item	A
Hysteresis error	Upper and lower flexure assy. Tension flexure. Fulcrum flexure.	Check position of upper and lower flexure assy. that are placed with parallel, no gradient and horizon. Check condition of Tension flexure and Fulcrum flexure that are not distortion.	Replace flexure or flexture assy.	A
Linearity error			Take adjustment using software for Linearity correction. Refer to page 24.	

Problem	Location	Check	Solution	Type
Error 0 Internal error, temp. A/D	Force motor, A/D board assembly	Check the A/D count "T1". It should be 600,000 to 900,000.	Replace analog module or re- place temperatuer sensor.	E
Error 1 Unstable	Force motor assembly	Force moter check. Analog module check	Replace fprce moter or analog module .	A E
Error 2 Unacceptable value	Data entry	Indicates that the data input was not within the range ac- ceptable	After the error indication, the display will return to the weigh- ing mode.	F
Error 3 E ² PROM error	Main board	E ² PROM data error	Replace the main board with substitute or replace the E ² PROM IC. Check the CPU solder condi- tion.	C B
Error 4 RAM error	Main board	Microprocessor RAM error.	Replace the microprocessor with a substitute.	D
Error 8 E ² PROM version error	Main board	Data in the E ² PROM does not agree with the data in the mi- croprocessor.	Press RE-ZERO key to up- date the version data in the microprocessor.	D
Error 9 E ² PROM initialization error	Main board	E ² PROM is not initialized (IC was changed).	Before initialization, check the CPU solder condition. (Wire connected to E ² PROM) Press and hold the MODE and RE-ZERO keys and press the PRINT key to initialize the E ² PROM (CAL, tH, tL, Lnr are initialized)	C
CAL E Calibration mass error (-) CAL E		Calibration mass not within expected weight range.	Change the calibration mass selection to fit the weight used or use the standard calibration mass required by the bal- ance.	F
----- Zero point error		The zero point of the balance is beyond the 5% allowable error.	Remove any mass from the weighing pan. Press the RE- ZERO key to clear this error. Recalibrate the zero point.	F
P FAIL		Power was interrupted without turning the balance off using the ON/OFF key.	Remove any mass from the weighing pan. Press the RE- ZERO key to clear this error. Recalibrate the zero point. Press the ON/OFF key to clear this error.	



3.2 Maintenance Flowchart





4. Force Motor Disassembly & Reassembly

This chapter describes the procedures and notes for the flexure assembly replacement, bobbin cleaning, and adjustment after reassembly of the mechanical unit.

Notes: Use a dust free environment for disassembly and reassembly.

Adjustments are needed after reassembly for linearity, repeatability, and corner load error.

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

Mechanical alignment fixture:

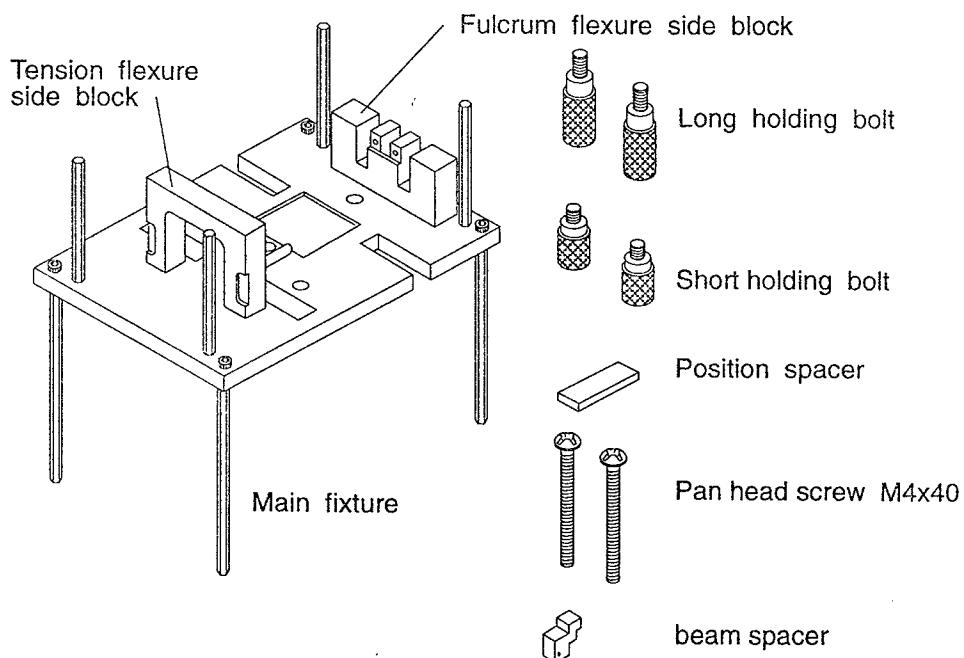


Fig 1

Other tools required:

Phillips screwdriver, 3mm

Allen wrench, 4mm



4.1 Disassembly

This section describes the disassembly procedure using the HR-200 as an example.

Step 1. Remove the breeze break and the upper case. Use caution when lifting the upper case off as the keyboard cable must be disconnected (Fig 2).

Step 2. Remove the cables from main board.

Step 3. Remove the force motor assembly from the lower case. Support the force motor with your hand and remove the three screws shown in the diagram (Fig 3).

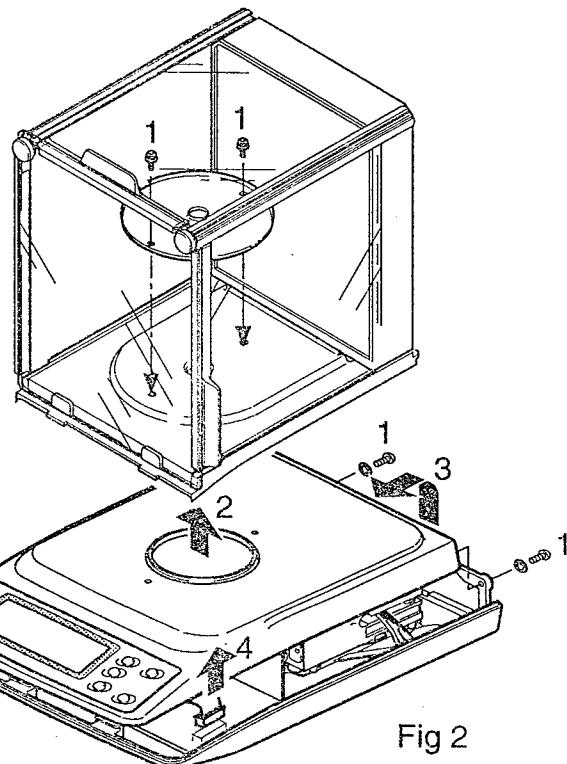


Fig 2

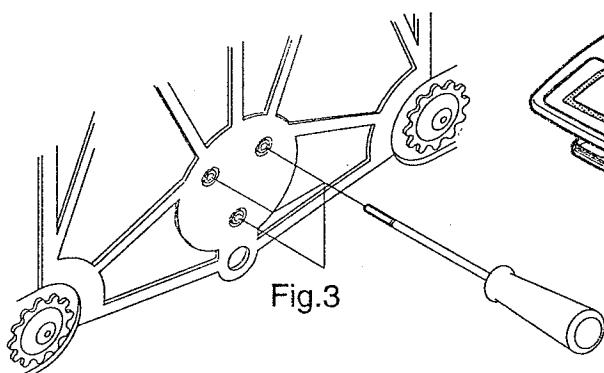


Fig 3

Step 4. Remove the pan support receiver from the top of the suspension guide (Fig 4).

Step 5. Remove sensor board.

Step 6. Attach the force motor assembly to the alignment fixture (2 screws on the front, Fig 5 and 4 on the bottom, Fig 6).

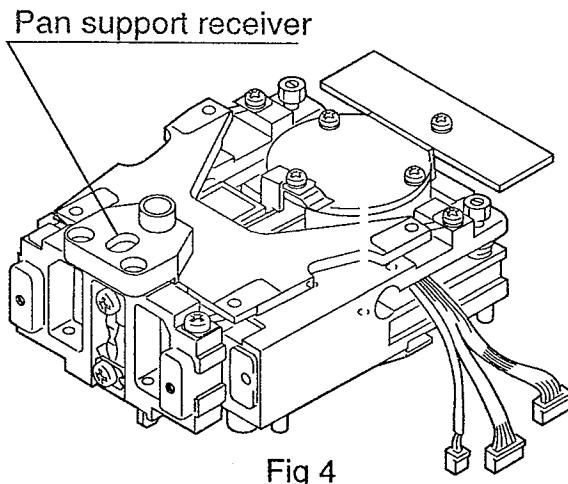


Fig 4

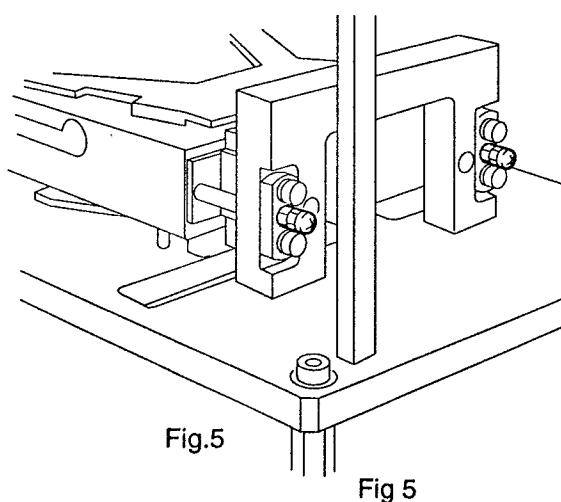


Fig 5

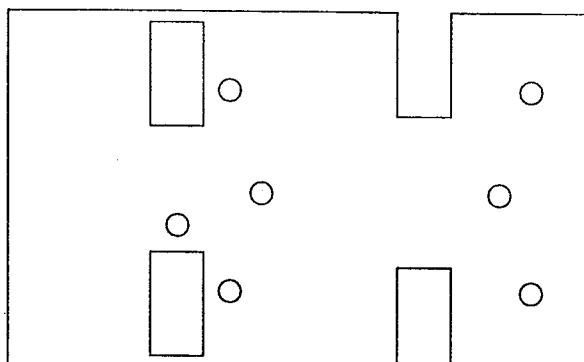
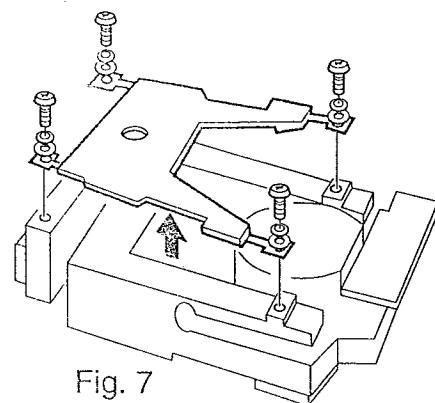
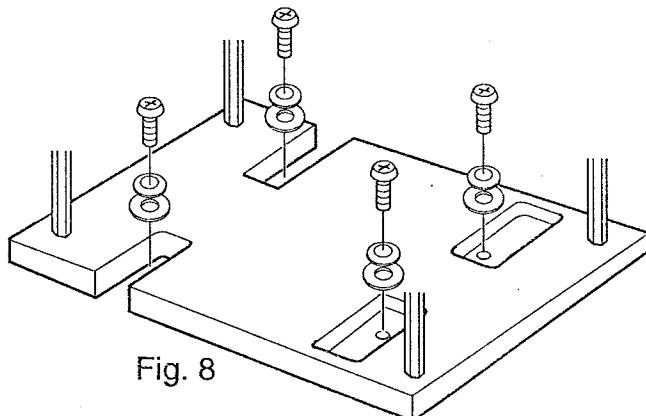


Fig 6

Step 5. Remove the upper flexure assembly. (Fig 7).

Step 6. Invert the alignment fixture and remove the lower flexure assembly screws. (Fig 8).



Step 7. Remove the lower side screw of tension flexure. Support the beam assembly with your thumb and fore finger (Fig 9) and remove the upper side screw of tension flexure (Fig 10).

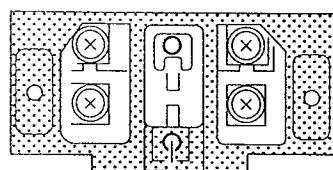
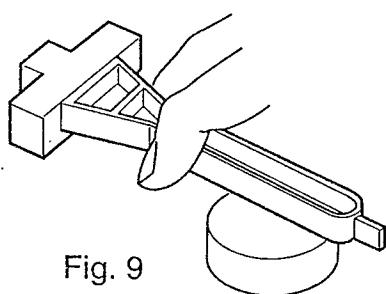
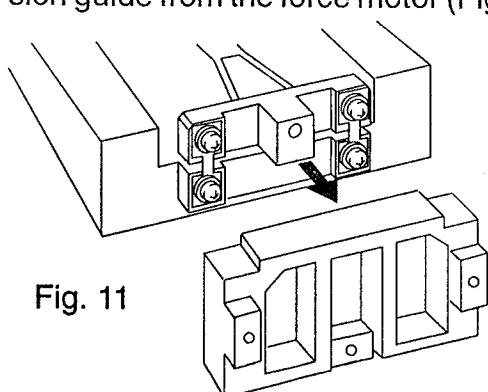


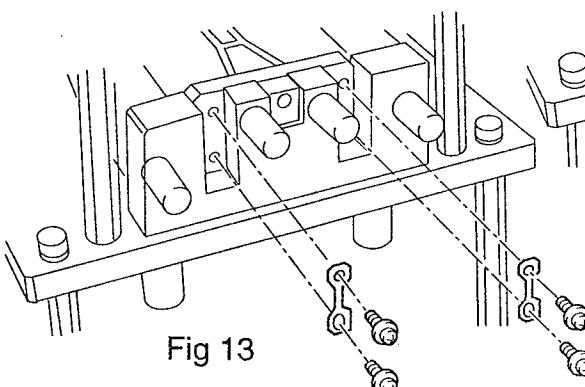
Fig. 10

Step 8 Remove the force motor from the alignment fixture. Then remove the suspension guide from the force motor (Fig 11).

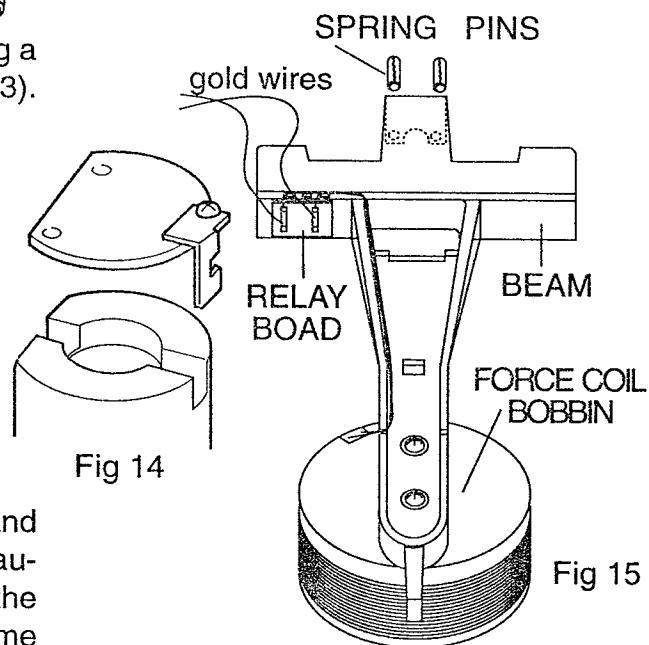


Step 9. Attach the force motor to the alignment fixture with 4 screws in the front and 3 on the bottom (Fig 12).

Step 10 Remove the fulcrum flexures (Fig 13)



Step 11. Remove the flexible gold wires using a soldering iron from relay board (Fig 13).



Step 12. Remove the shield plate (Fig 14) and the beam assembly (Fig 15). Use caution when removing the bobbin from the magnet well, so that it does not become scratched.

Step 13. Place the tension and fulcrum flexures on a flat surface to check them (a glass door works very well). They should lay flat. Press on each corner, the flexure should not move. Turn the flexure over and repeat this test. If a flexure is not flat, replace it. A bent or twisted flexure can cause 4 corner error and repeatability problems. (Fig 16).

Step 14. Place the upper flexure assembly on a flat surface with the supporting plate up. Check that the flexures are flat and not twisted. Repeat this procedure with the lower flexure assembly.

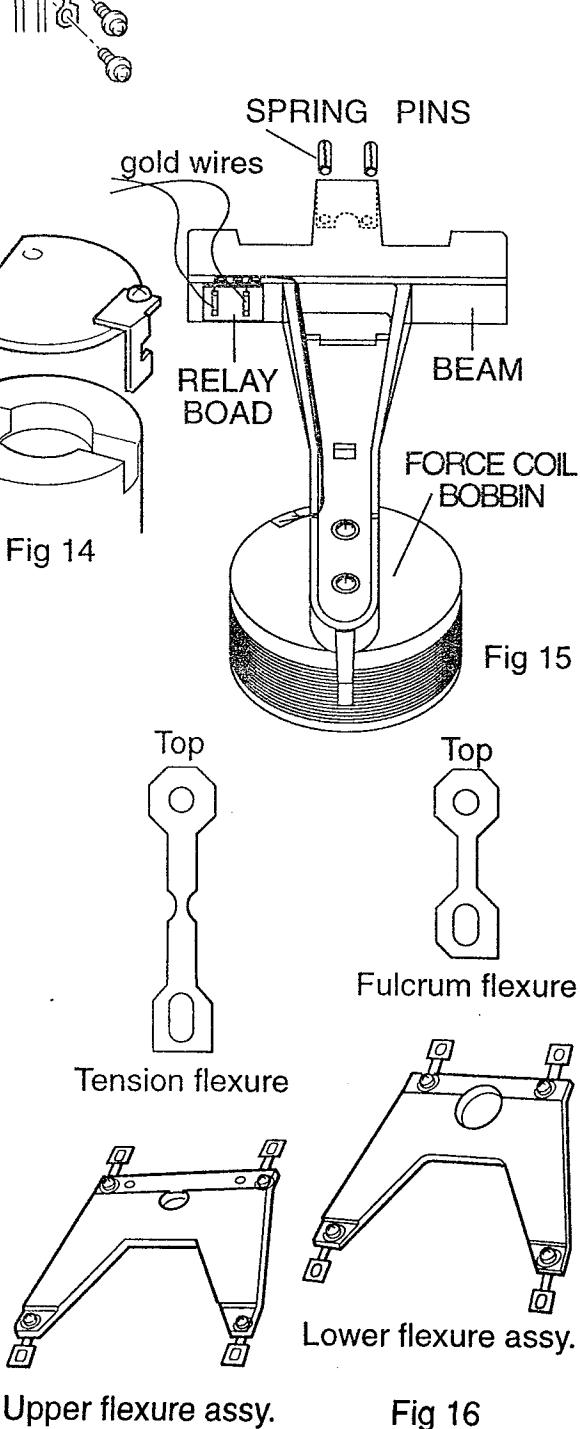
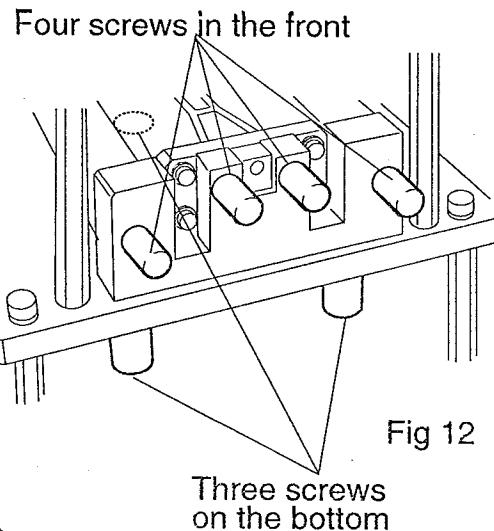


Fig 16



4.2 Cleaning the Magnet Assembly and Bobbin

The magnet assembly and the bobbin will require cleaning if there is a repeatability problem. Any particles of metal, dust or other foreign material can collect around the bobbin. If this material touches the bobbin, it will not move freely. Metal particles are attracted to the magnet and tend to stand straight out. The gap for the bobbin is very narrow, so be very cautious while cleaning to remove all particles.

Note: Do not use compressed air to blow out the magnet well. There may be particles of magnetic material stuck to the bottom of the magnet.

The tools that you use near the magnet should be free of plating and non-magnetic. A flake of plating or a chip of steel will be attracted to the magnet. The screws used in this balance are non-magnetic. Do not substitute screws made of magnetic material.

It is best to avoid smoking while working on the force motor, ash and smoke particles can stick to the magnet and bobbin.

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

Step 2. Disassemble the force motor far enough to allow removal of the beam assembly.

Step 3. Clean around the inner and outer surfaces of the magnet well using the adhesive tape.

Step 4. Clean the inner and outer surfaces of the bobbin using adhesive tape.

Step 5. Inspect the magnet well and bobbin using a very strong light. Look for any possible particles stuck to the surfaces. Metal particles may be shiny or dark, look for anything sticking out from the sides of the magnet.

Step 6. Reassemble the force motor and test it for repeatability. A 4 corner error can often be traced to a repeatability problem.

If there is still a problem, disassemble the force motor and check closely for particles in the magnet gap. If a balance is used around food, check for contamination caused by insects. The force motor is warm and insects find this a good place to lay their eggs.

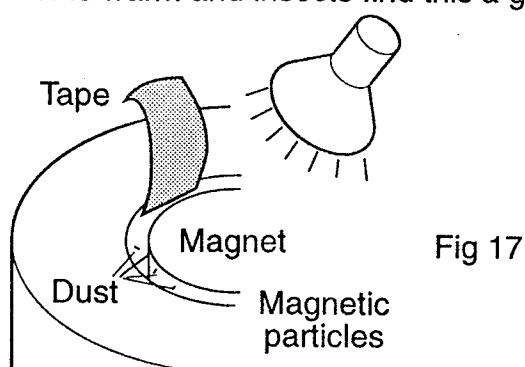
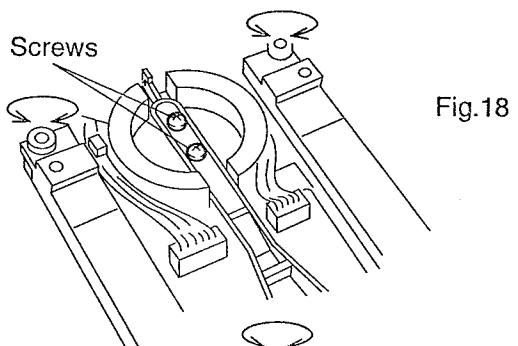


Fig 17



4.3 Reassembly

Step 1. Adjust the depth to $35\text{mm} \pm 0.1\text{mm}$ between upper and lower flexure assy. Loosen the two screws holding the bobbin. Insert the beam, with the bobbin loosely attached, into place. (Fig 18).



Step 2. Attach the force motor to the alignment fixture (at the fulcrum flexure support) and install the fulcrum flexures (Fig 19, 20, 21 & 22).

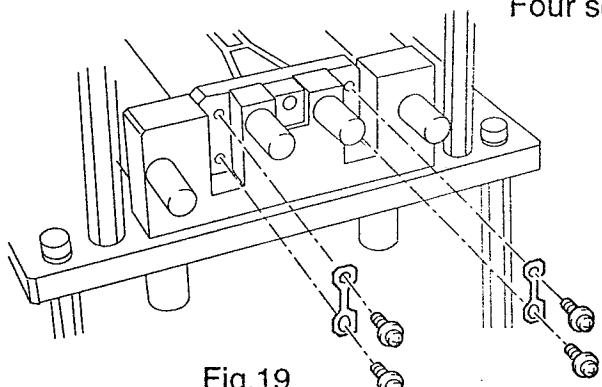


Fig.19

Four screws in the front

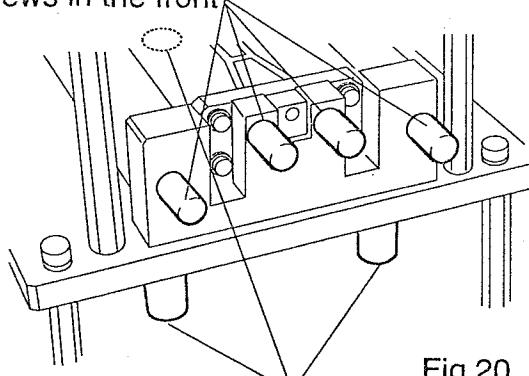


Fig.20

Three screws on the bottom

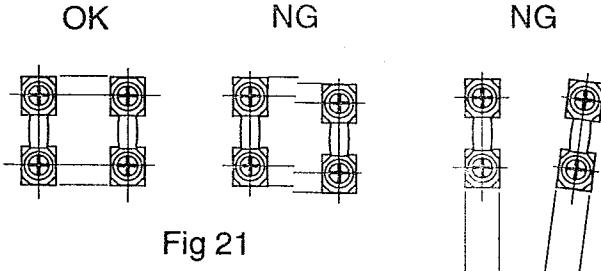


Fig 21

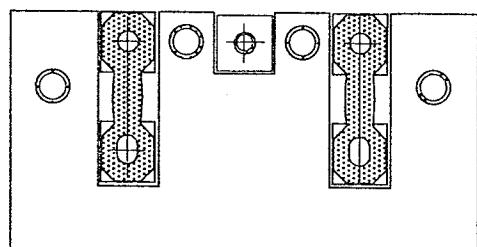


Fig 22

Step 3. Adjust the bobbin position so that it does not touch the magnet or the sides of the well, then tighten the screws. (Fig 18)

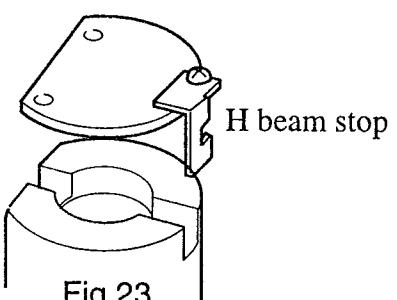


Fig.23

Step 4. Install the shield plate and the H stop (Fig 23).

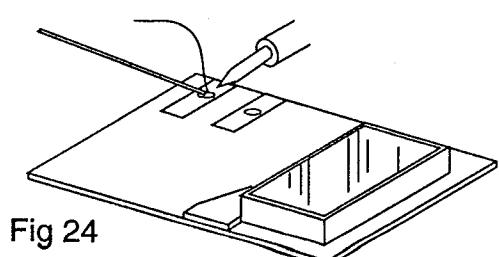
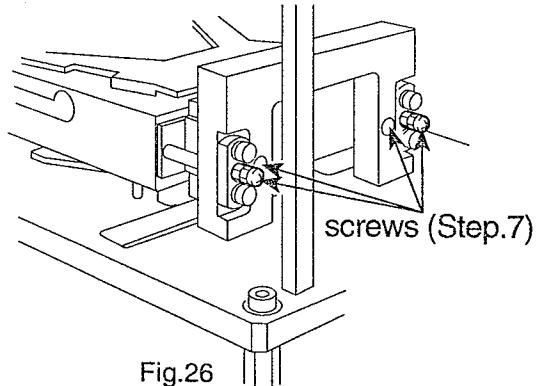
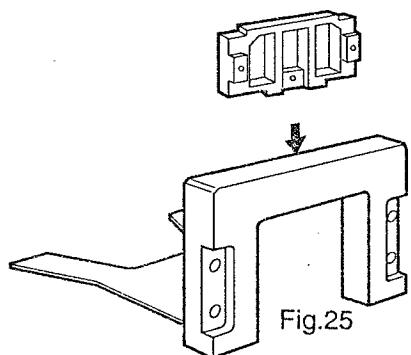


Fig 24

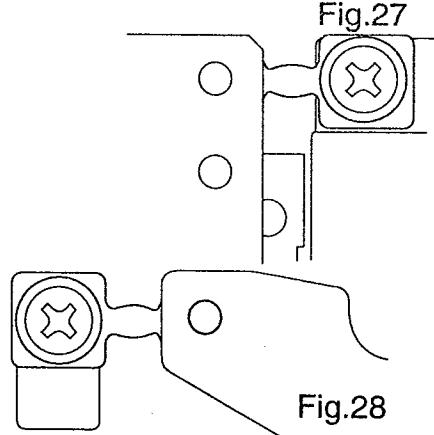
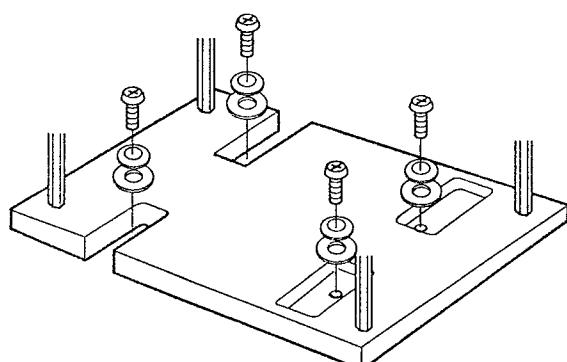
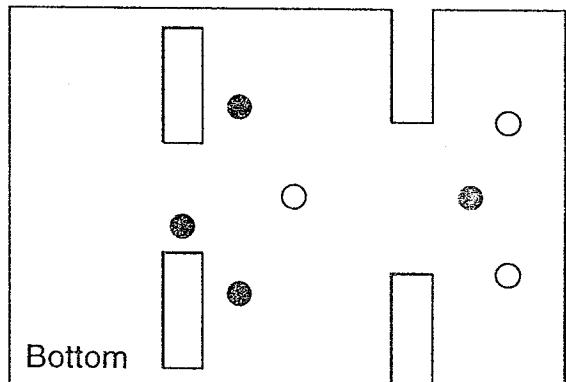
Step 6. Place the lower flexure assembly and the suspension guide on the alignment fixture. Place the force motor on the alignment fixture using caution so that you do not bend the flexures. (Fig 25, 26.)



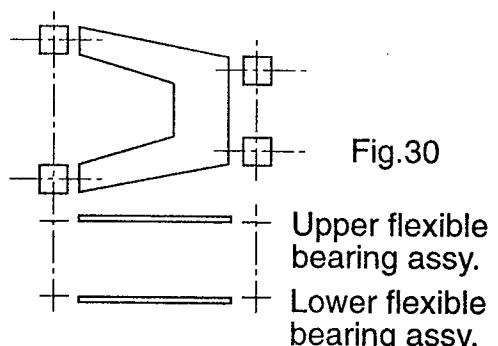
Step 7. Using two screws, affix the suspension guide to the alignment fixture (Fig 26)

Step 8. Fasten the force motor using 5 screws from the underside of the alignment fixture (Fig 27).

Step 9. Invert the alignment fixture and install the lower flexure assembly screws (Fig 28, 29, 30).



Step 10. Turn the alignment fixture over again and install the upper flexure assembly (Fig 29, 30)



Step 11. Install and tighten the tension flexure lightly (Fig 31)

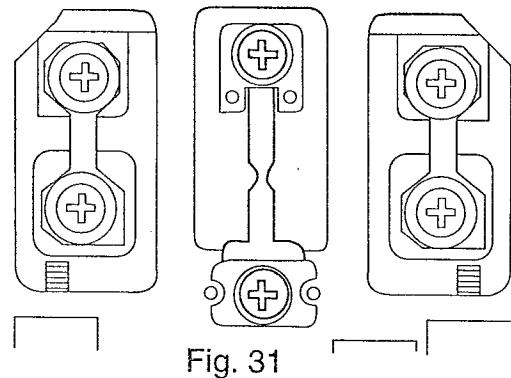


Fig. 31

Step 12. Insert the spacer under the end of the beam (Fig 33) and tighten the tension flexure.

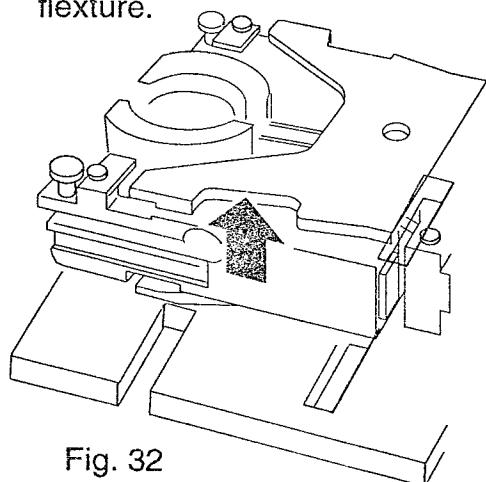


Fig. 32

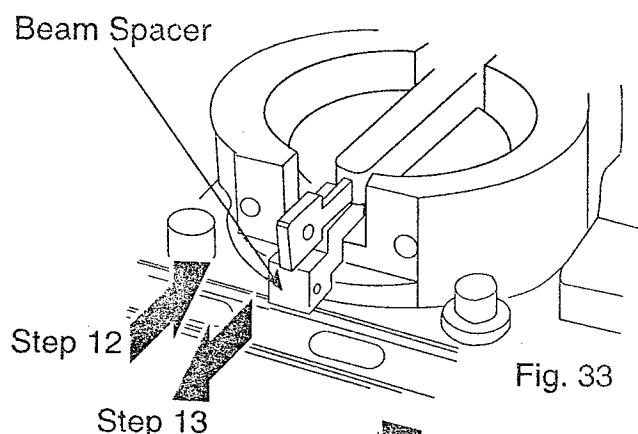


Fig. 33

Step 13. Remove the Force Motor from main fixture. (Fig 32) Remove the spacer. (Fig 33) Place the shield plate. (Fig 34)

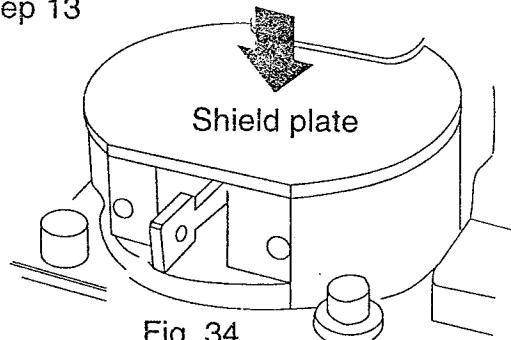


Fig. 34

Step 14. Remove the force motor assembly from the alignment fixture and install the position sensor (Fig 35, 36)

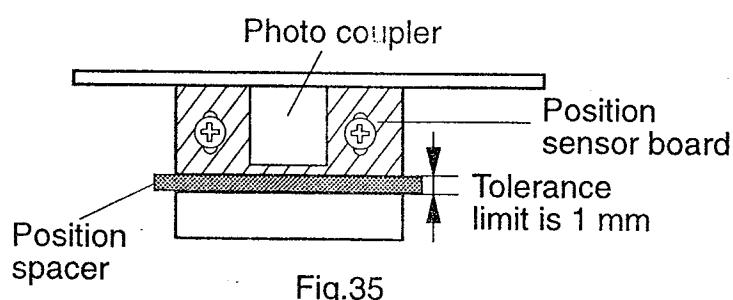


Fig. 35

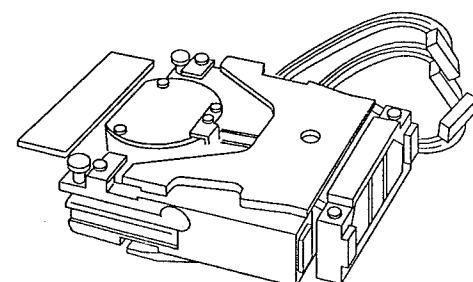


Fig. 36

Step 15. Install the pan support receiver (Fig 37)

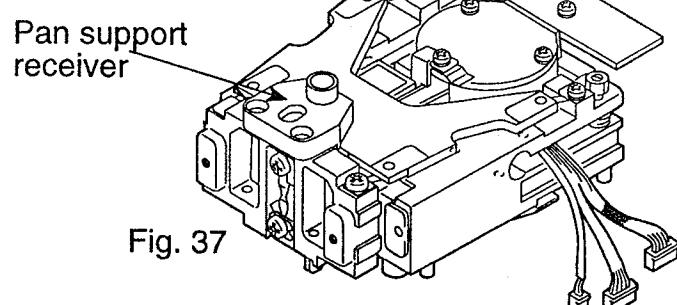


Fig. 37

Step 16. Position the force motor in the lower case and fasten it with three screws (Fig 38) removed earlier. It may be necessary to loosen these screws to correctly position the force motor with the upper case in place. In this case, center the pan support receiver in the opening of the upper case.

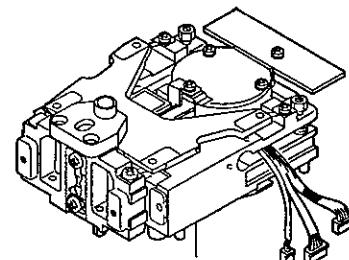
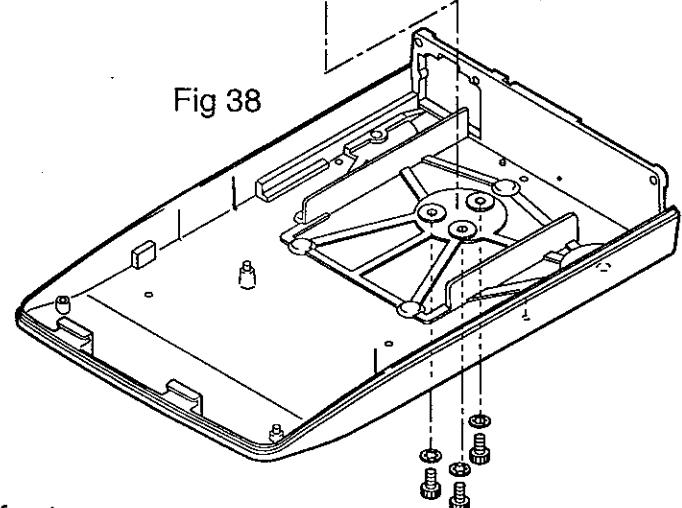


Fig 38



Step 17. Cancel the corner load error. Refer to "1. Corner load adjustment" of "5.11 Fine Adjustment". (Fig 39)

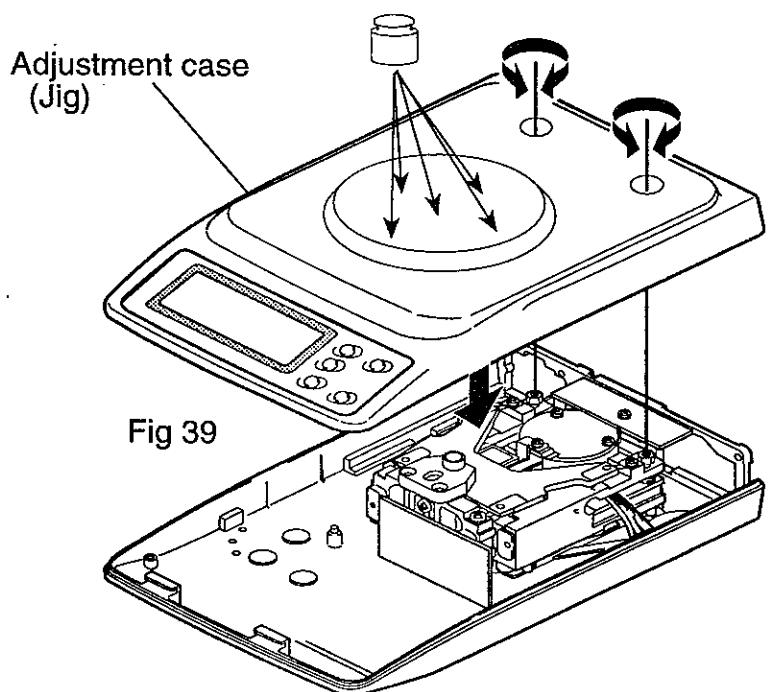


Fig 39

Step 18. Temporarily install the upper case, breeze break and pan assemblies (Fig 40). Connect the force motor cables to the main board and apply power to the balance. Check the balance for repeatability at zero, full span.

Step 19. If the repeatability is ok, continue with the adjustment section.

Note: If the balance fails the repeatability test, there may be particles stuck to the magnet, or the force coil bobbin may be touching the edge of the magnet well. Also the corner load adjustment could be off far enough to make it difficult to position the weight in the same place. Do the coarse corner load adjustment and then check the repeatability again.

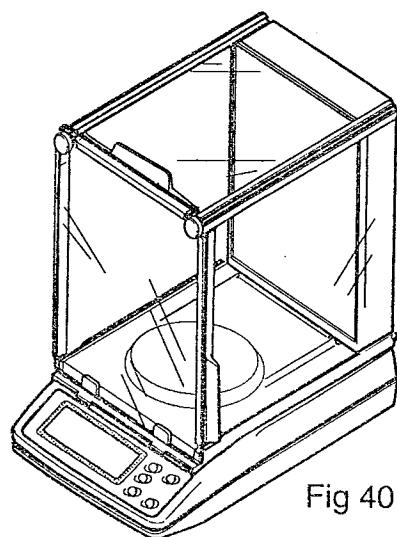


Fig 40



5. Adjustments

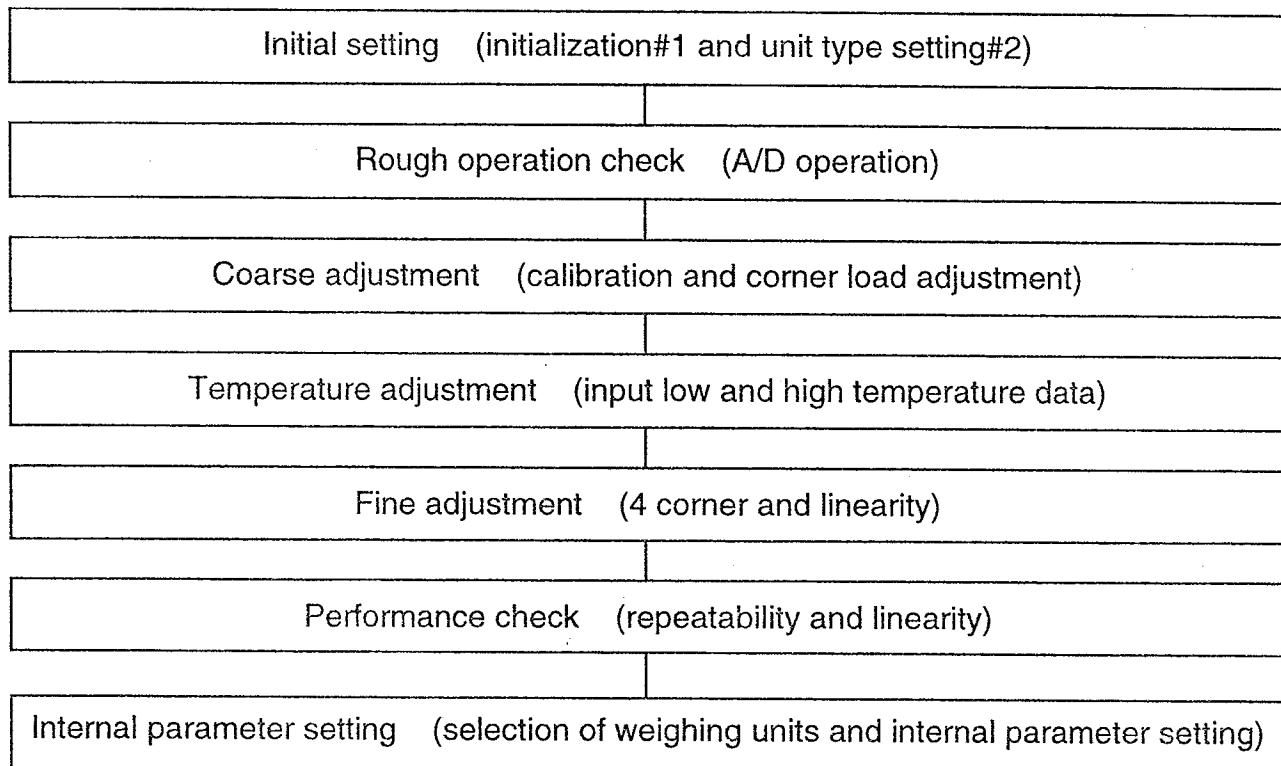


5.1 Adjustment Specifications

Item	HR-60	HR-120	HR-200
Repeatability (Standard deviation)	$\pm 0.1 \text{ mg}$	$\pm 0.1 \text{ mg}$	$\pm 0.1 \text{ mg}$
Test weight	50g	100g	200g
4 corner error	$\pm 0.3 \text{ mg}$	$\pm 0.3 \text{ mg}$	$\pm 0.3 \text{ mg}$
Test weight	20g	50g	50g
Linearity	Max-Min = 0.3 mg	Max-Min = 0.3 mg	Max-Min = 0.3 mg
Test point	20g, 20g+40g	50g, 50g+50g	100g, 100g+100g
Calibration error	$\pm 0.2 \text{ mg}$	$\pm 0.2 \text{ mg}$	$\pm 0.2 \text{ mg}$
Test weight	50g	100g	200g
Temperature Time	4 hours	4 hours	4 hours
Zero (10°C~30°C)	$\pm 10.0 \text{ mg}$	$\pm 10.0 \text{ mg}$	$\pm 10.0 \text{ mg}$
Span	$\pm 8.0 \text{ mg}$	$\pm 8.0 \text{ mg}$	$\pm 8.0 \text{ mg}$
Test weight	200g	200g	200g
Temperature	10°C & 30°C $\pm 2^\circ\text{C}$	10°C & 30°C $\pm 2^\circ\text{C}$	10°C & 30°C $\pm 2^\circ\text{C}$
Inclination error	$\pm 0.2 \text{ mg}$	$\pm 0.2 \text{ mg}$	$\pm 0.2 \text{ mg}$
Up to 1mm at the rear			



5.2 Adjustment Flow Chart



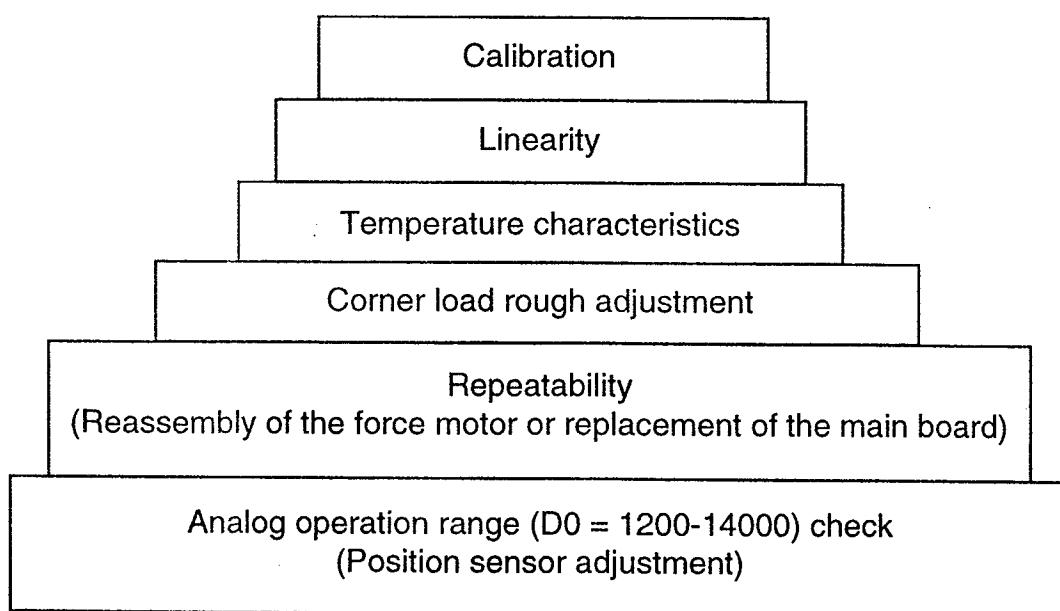
#1 Initialization makes only on replacing the EEPROM (or main board).

#2 Unit type setting makes only on replacing the main board.



5.3 General Precautions

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





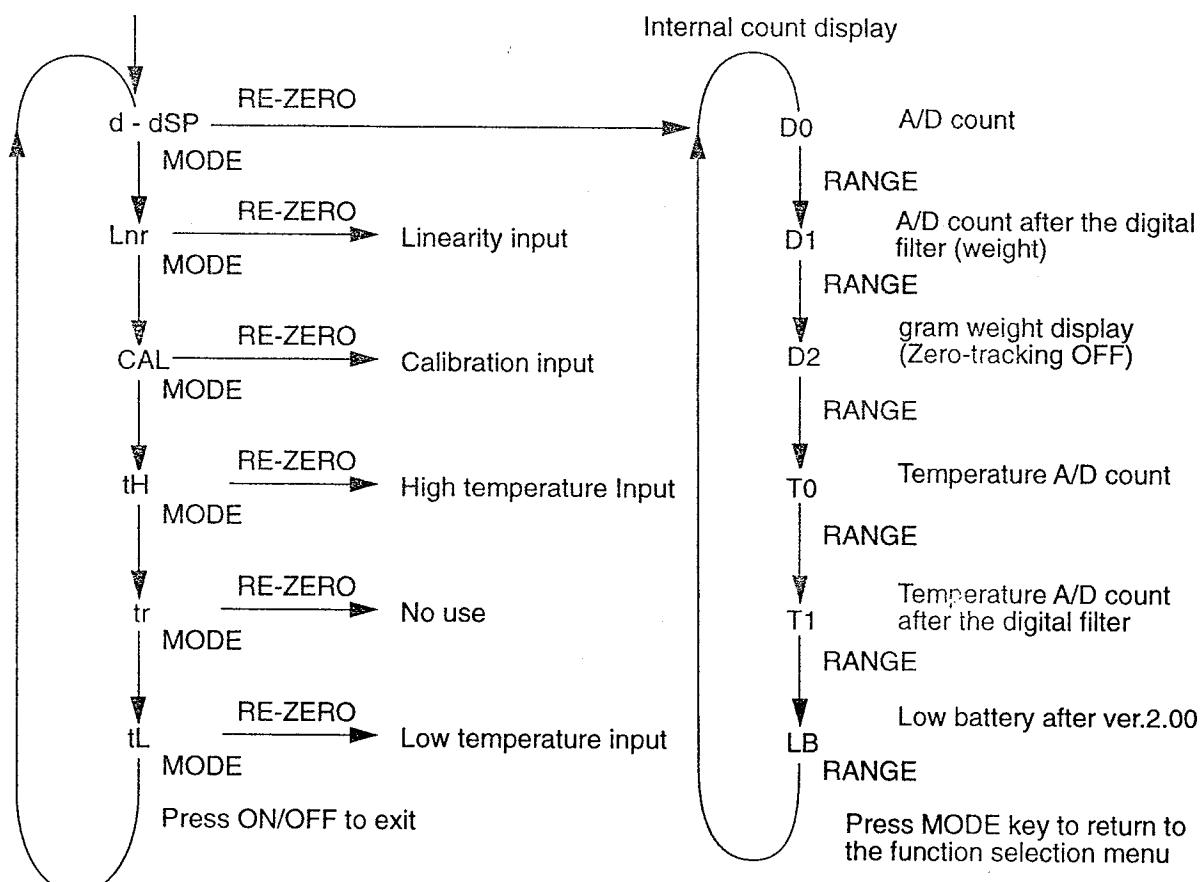
1. Entering check mode

- Step 1. Verify that the display is OFF
 - Step 2. Press and hold the RE-ZERO and MODE keys and press the ON/OFF key. Release the MODE and ON/OFF keys while still holding the RE-ZERO key. Immediately press the MODE key twice.
 - Step 3. The ROM version will be displayed for about 1 second [P - XXXX], then the balance type will be displayed [HR - XXX], Then all of the display segments will turn on. The balance will wait in this mode until the next key entry.
 - Step 4. Press the RE-ZERO key to enter the data display mode [d - dSP] or press the MODE and RANGE keys at the same time to enter the setting mode [init].

2. Check mode menu.

Use the MODE, RE-ZERO and RANGE keys to move around in the menus.
Use the ON/OFF key to exit the check mode.

Function selection



The software version identifies the microprocessor used. With each version change, there are some changes to the setting menus.

Version	Microprocessor
Ver. 1.05	μPD78063-022
Ver. 1.06	μPD78063-028
Ver. 2.00	μPD78063-031
Ver. 2.03	μPD78063-051

Version	Microprocessor
Ver. 2.12	μPD78064-036
Ver. 2.20	μPD78064-041
Ver. 2.41	μPD78064-050
Ver. 2.43	μPD78064-104



5.5 Check Mode Menus

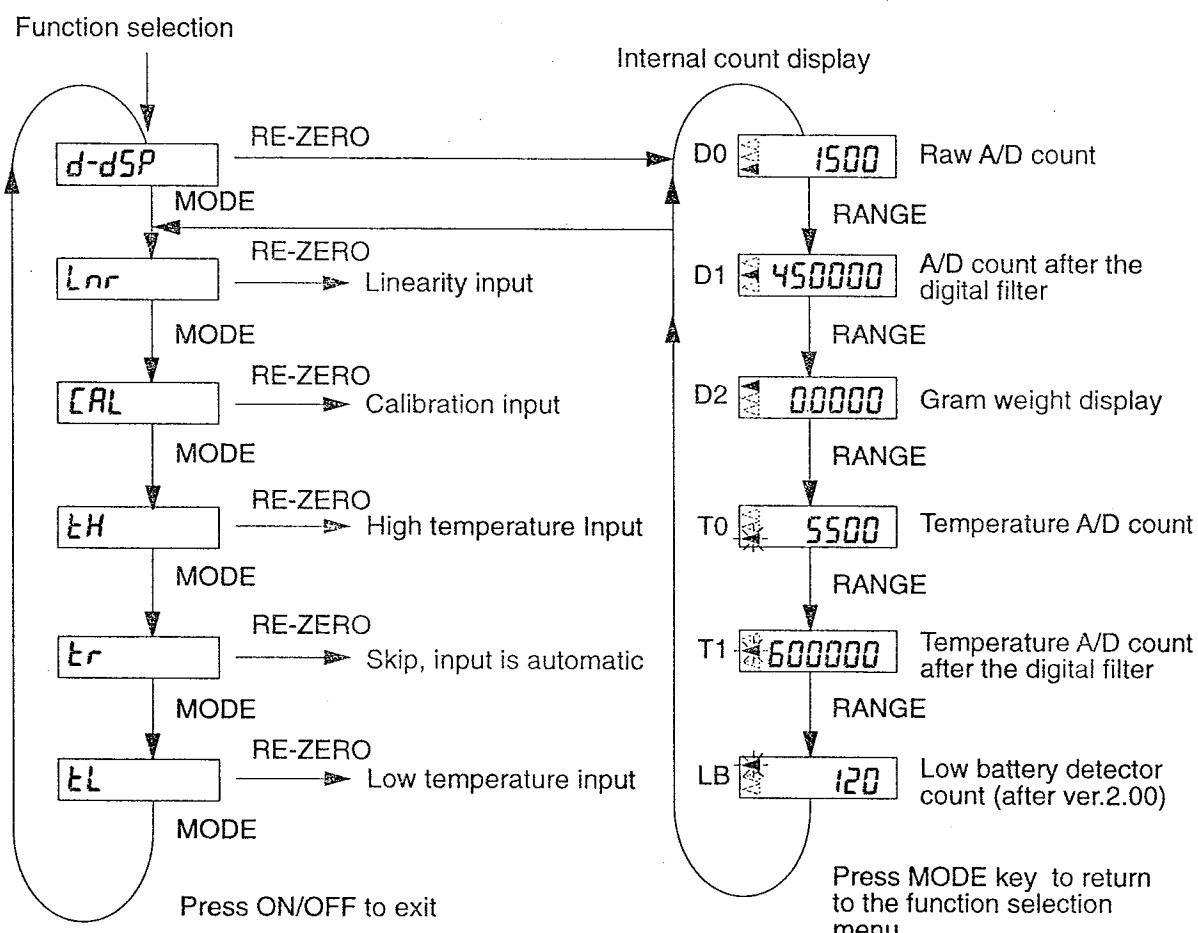
Check mode menus.

Used to check the status of or input a parameter.

Use the MODE, RE-ZERO and RANGE keys to move around in the menus.

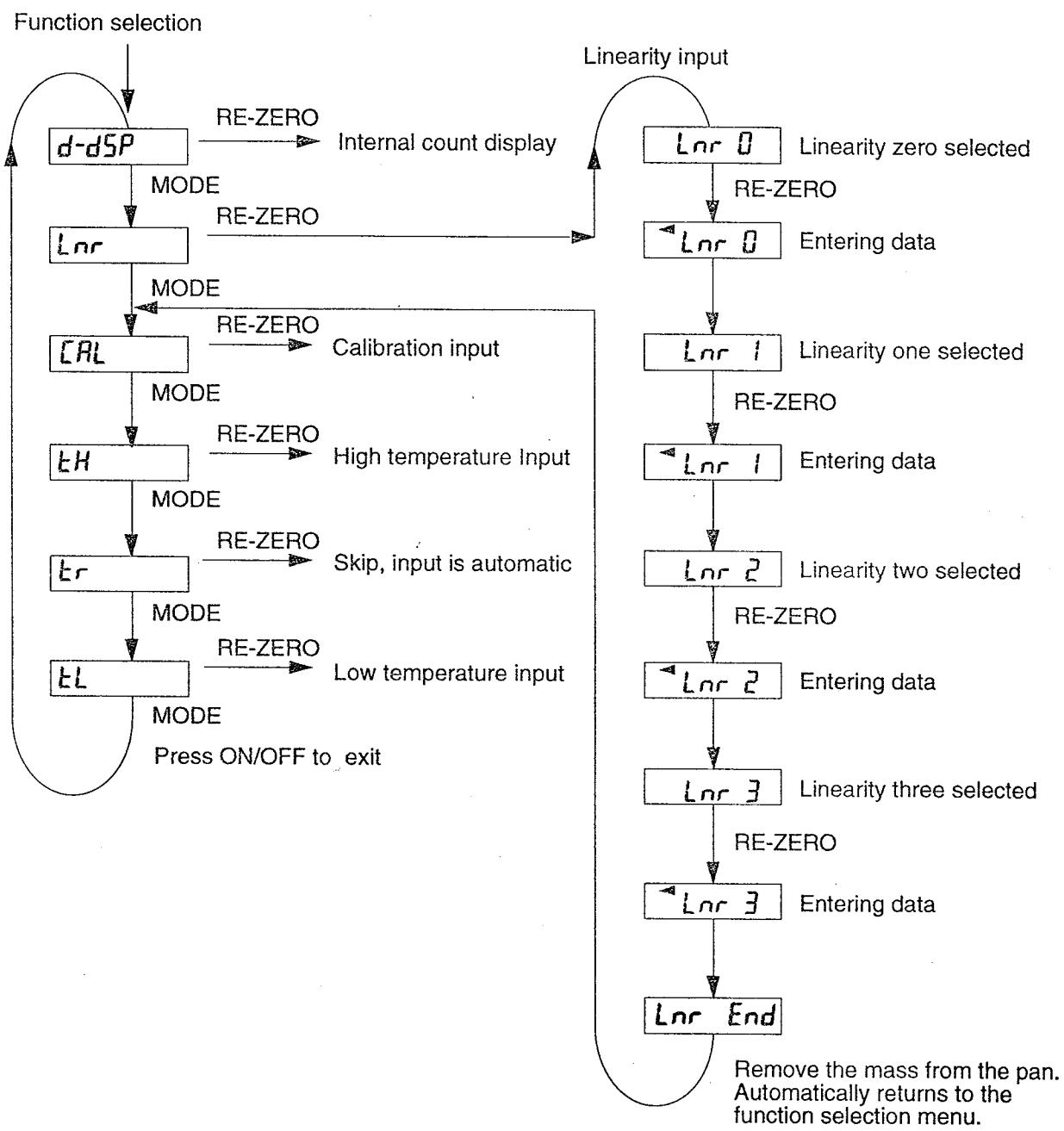
Use the ON/OFF key to exit the check mode.

Use the internal count display to view raw data.



Linearity input.

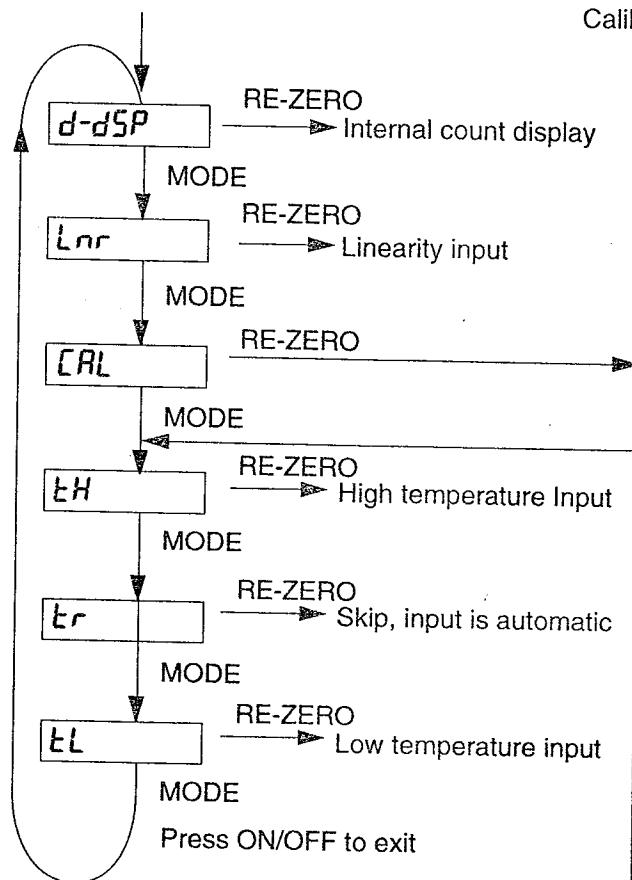
Used to correct deviations from the true weight value of a test mass.



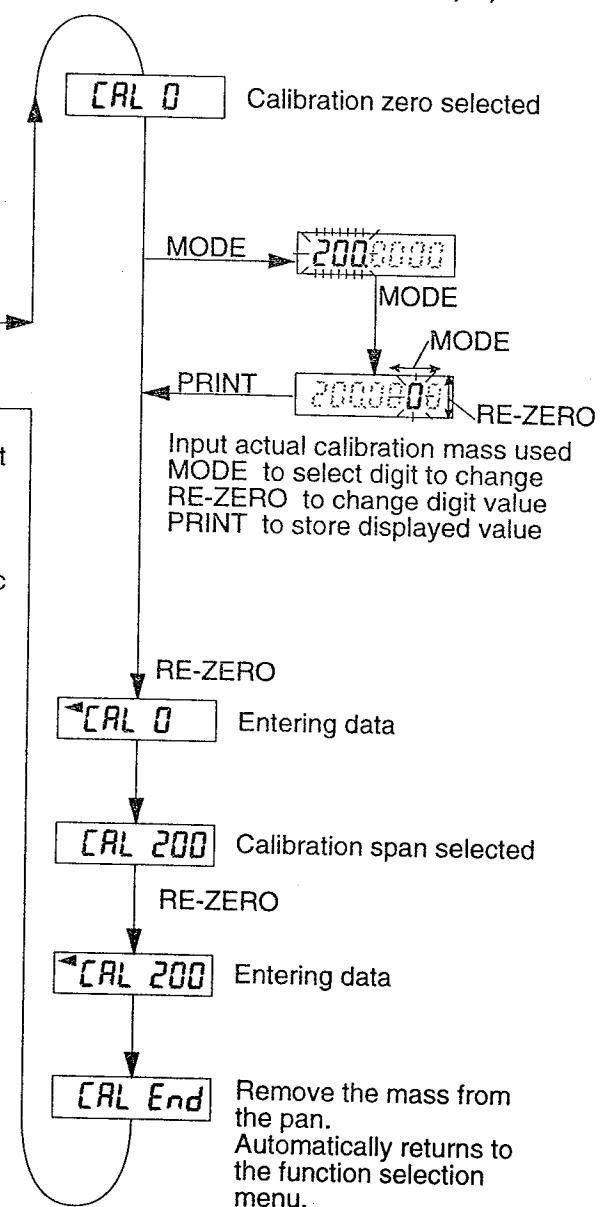
Calibration input mode.

Used to set the zero and span points based on a known calibration mass.

Function selection

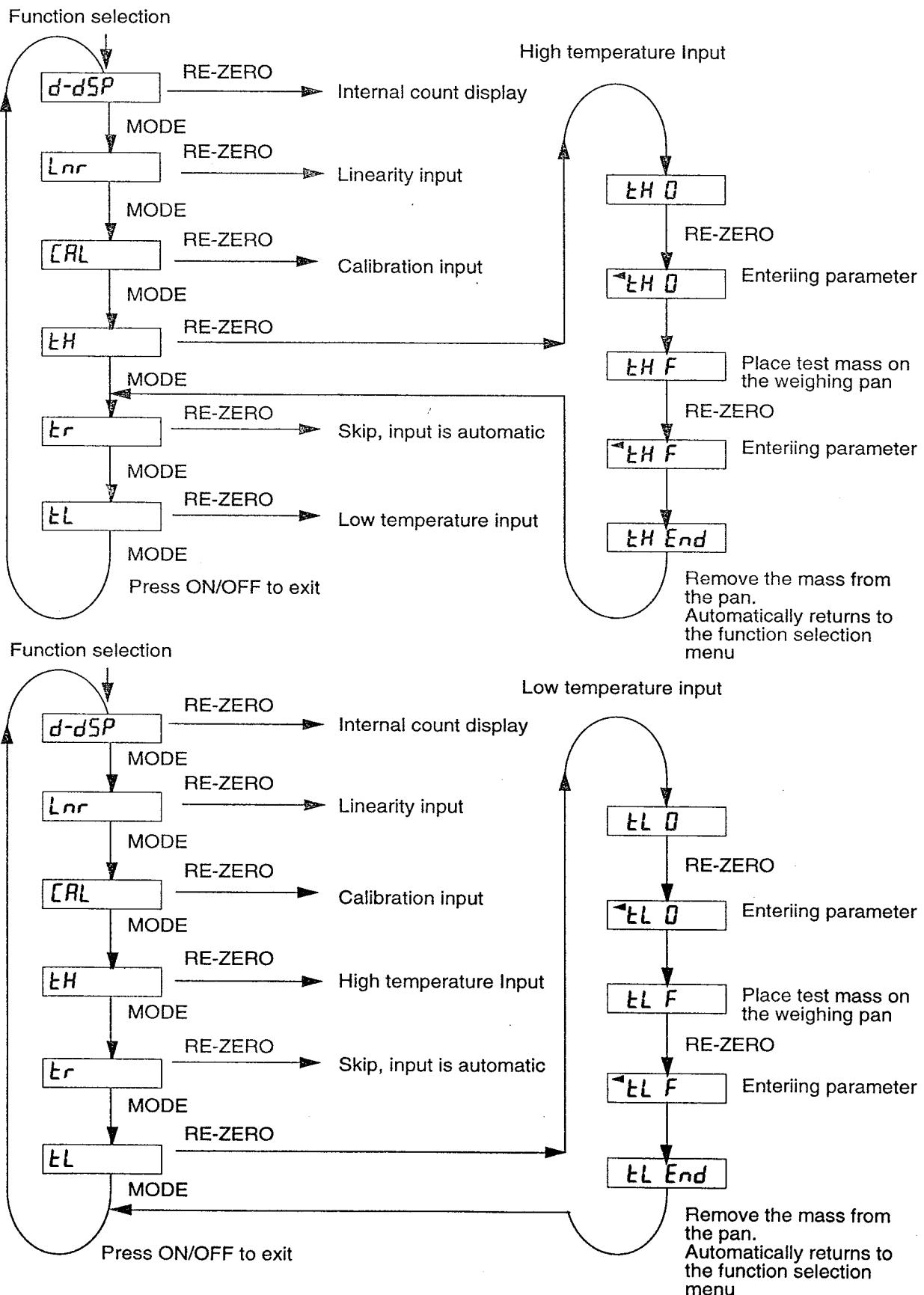


Calibration input (HR-200 used as example)



Temperature correction.

Used to input the offset for changes in temperature.
The low and high temperatures may be set separately





5.6 Setting Mode

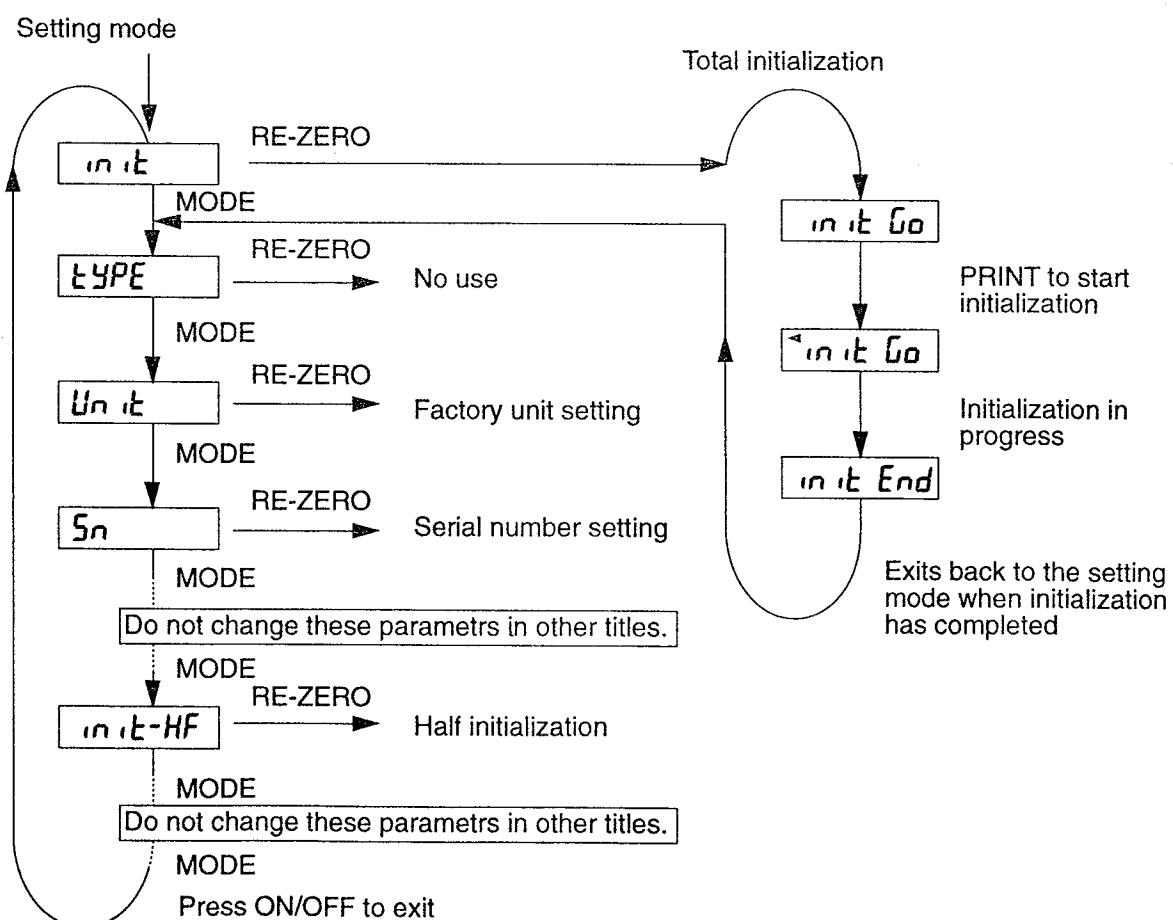
The setting mode is used to initialize and set the parameters for a new or repaired main board. With the display off, follow this procedure

- Step 1. Press and hold the RE-ZERO and MODE keys
- Step 2. Press the ON/OFF key and release it
- Step 3. While still holding the RE-ZERO key, release the MODE key and press it again twice.
- Step 4. Release all keys. [P - XXX] displayed, then [HR - XXX], then all segments of the display will turn on.
- Step 5. Press and hold the MODE and press the RANGE keys. [init] will be displayed.
- Step 6. Press the MODE key to move to the setting to be changed
- Step 7. Press the ON/OFF key to store the data and exit the setting mode.

Some of the setting modes have a pronounced affect on the operation of the balance. Once a procedure has been started, it is not possible to stop it. Make certain that what you are doing is what you want to do before starting.

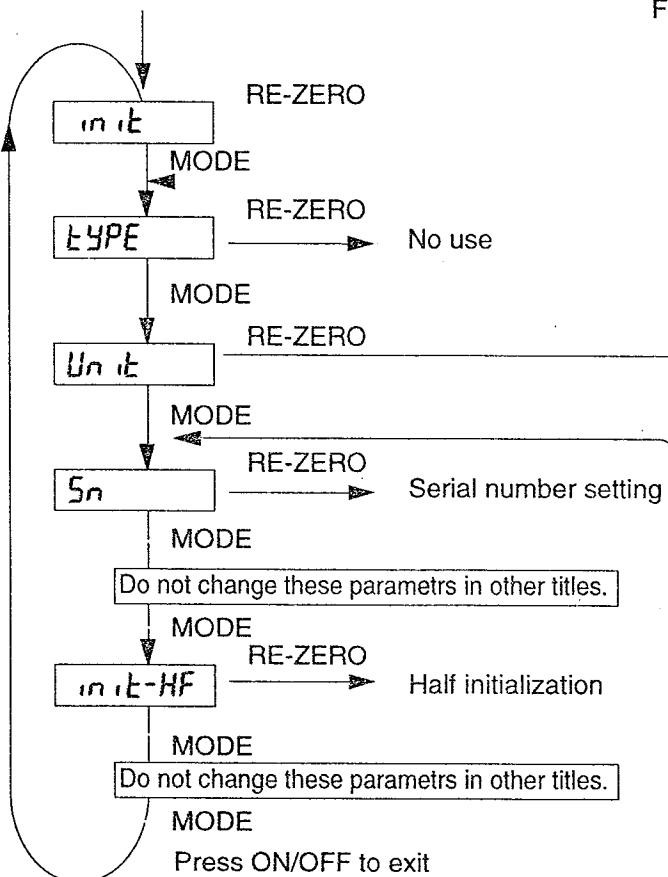
Initialization: Resets the main board.

Clears: Memory of unit, serial number, temperature settings and temperature compensation. All settings will have to be re-input. **Requires a temperature controlled chamber or room for inputting new temperature settings.** Alternate, 'Half initialization'.

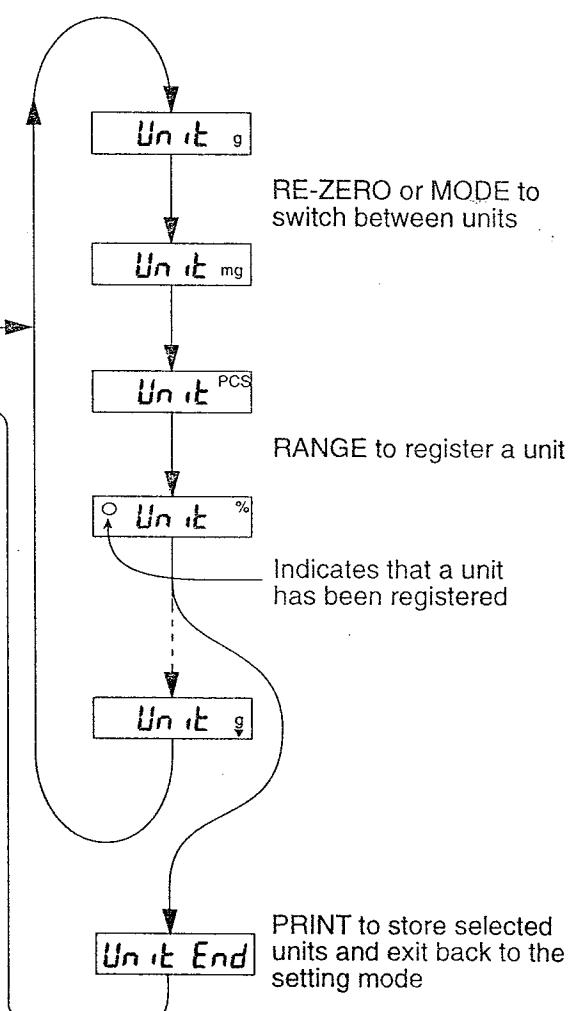


Factory unit setting: Used to set the weighing units that can be selected by the user.

Setting mode



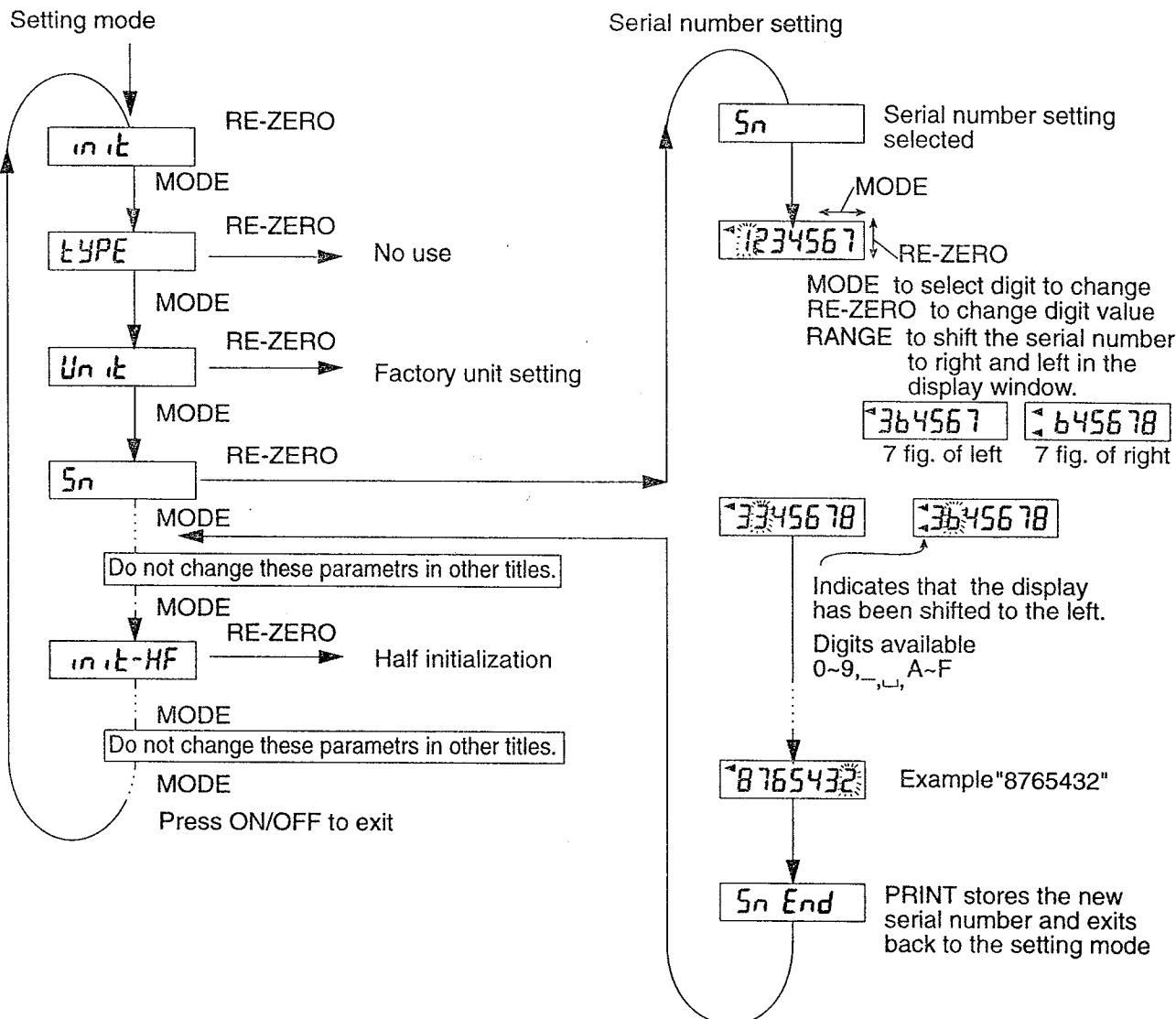
Factory unit setting



Serial number setting:

Sets the serial number used by GLP or by requests issued by a computer to the balance using the RS-232C option.

Set this the same as the serial number plate on the balance.



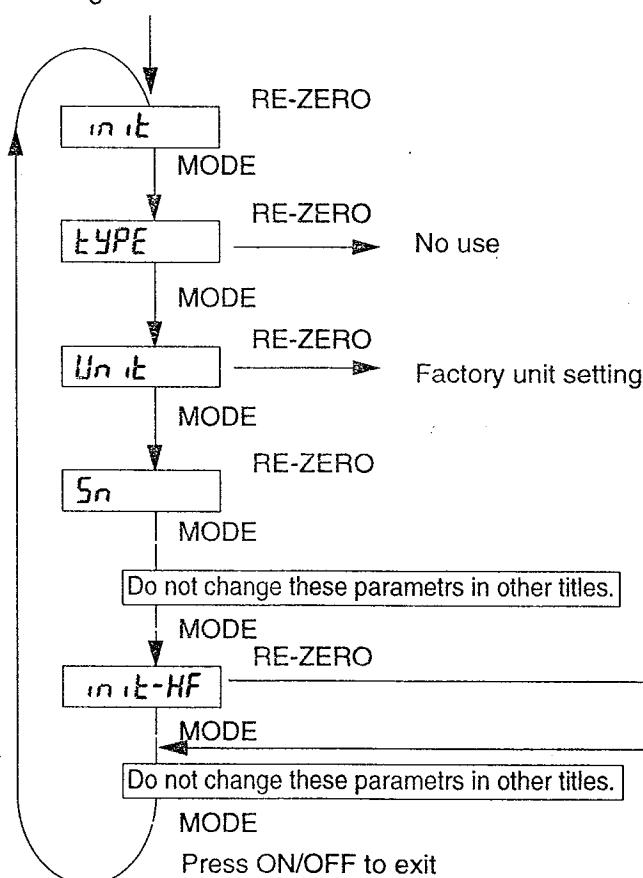
Half initialization

Used to clear memory of some, but not all parameters (see listing below).

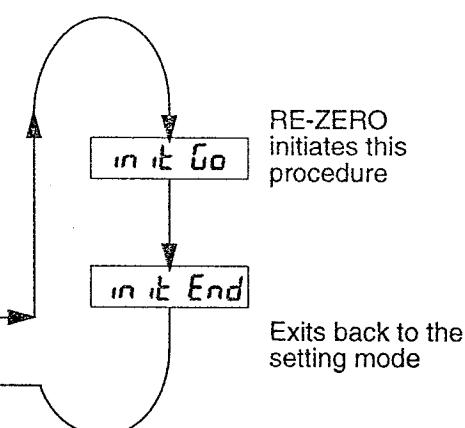
This procedure is used when a force motor has been repaired and the settings must be changed.

This procedure may also be used when the main board has been damaged by static electricity. This is evidenced by data in memory that can not be changed.

Setting mode



Half initialization



Data that is reset:

- ID number
- Calibration data
- Unit weight (for counting)
- Unit weight (for percent)
- Weighing unit registration (user)
- Internal settings



5.7 Initial Setting (done at the time of manufacturing)

<CAUTION> Do not make initial settings without replacing the EEPROM.

1. Check that all cables are correctly installed.
2. Connect the AC adapter.
3. One of the following will be displayed at this time:
 - 1) An arrow in the lower left corner of the display
 - 2) [P-FAIL] if power was removed without pressing the ON/OFF key.
4. Perform initialization
5. Perform the unit type setting
6. Disconnect the AC adapter then connect it. Enter the check mode again and check that the unit type setting is correct



5.8 Initialization

<CAUTION> Do not make initialization without replacing the EEPROM.

<CAUTION> Do not use this procedure if you do not have a temperature controlled room. Use this procedure only if a new main board is installed or the main board does not work correctly.

This operation initializes all of the following data.

- Calibration data
- Serial number data
- Temperature data (cleared). (Requires a temperature controlled room that can be set to $10^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $30^{\circ}\text{C} \pm 2^{\circ}\text{C}$)
- Linearity data (cleared)
- Internal weight value (set to default)
- Internal parameter settings (reset to manufacturers setting)

With the display off, follow this procedure to completely initialize the data stored in the non-volatile memory. The first 3 steps must be done quickly or the balance will turn on in the weighing mode.

- Step 1. Press and hold the RE-ZERO and MODE keys
- Step 2. Press the ON/OFF key and release it
- Step 3. While still holding the RE-ZERO key, release the MODE key and press it again twice.
- Step 4. Release all keys. [P - XXX] displayed, then [HR - XXX], then all segments of the display will turn on.
- Step 5. Press and hold the MODE and press the RANGE keys. [init] will be displayed.
- Step 6. Press the RE-ZERO key. [init Go] will be displayed.
- Step 7. Press the PRINT key. [init Go] will be displayed with an arrow in the upper left corner of the display. After a few seconds, [init End] will be displayed.
- Step 8. Reset all of the data that was cleared.



5.9 Unit Setting

Note This section explains the details for disabling/enabling the multiple units more than the instruction manual. If the law in user's area permits, user may use all of the units, user can disable the weighing units on the software user does not regularly use. Also, some dealers may initially turn OFF units which are not regularly used, but you may want to turn them back on.
The most common unit of weight used around the world is grams, but there is often a need to shift to an alternative unit specific to the country where the balance is used or to select modes such as counting or percent.
If a unit of weight has been turned off, the sequence will be missing that unit. There are also the various Tael and Tola. User can be included a unit of them if necessary.

With the display off, follow this procedure to set the unit. The first 3 steps must be done quickly or the balance will turn on in the weighing mode.

- Step 1. Press and hold the RE-ZERO and MODE keys
- Step 2. Press the ON/OFF key and release it
- Step 3. While still holding the RE-ZERO key, release the MODE key and press it again twice.
- Step 4. Release all keys. [P - XXX] displayed, then [HR - XXX], then all segments of the display will turn on.
- Step 5. Press the MODE and RANGE keys at the same time. [init] will be displayed.
- Step 6. Press the MODE key. [Unit] will be displayed.
- Step 7. Press the RE-ZERO key. Then this mode enters to unit setting sequence.
Select units by the following keys.

RE-ZERO key	To select a unit.
MODE key	To select a unit.
RANGE key	To register a unit.
PRINT key	To store selected units and exit this sequence.



5.10 Coarse Operation Check & Adjustment

A/D count check

A/D count in the check mode. This check & adjustment need at reassembling the force motor.

With the display off, follow this procedure to verify the A/D values for D0, D1, D2, T0 and T1. The first 3 steps must be done quickly or the balance will turn on in the weighing mode.

- Step 1. Press and hold the RE-ZERO and MODE keys
- Step 2. Press the ON/OFF key and release it
- Step 3. While still holding the RE-ZERO key, release the MODE key and press it again twice.
- Step 4. Release all keys. [P - XXX] displayed, then [HR - XXX], then all segments of the display will turn on.
- Step 5. Press the RE-ZERO key. [d - dSP] will be displayed. Press the RE-ZERO key to display D0.
- Step 6. Press the RANGE key to select D0 through T1. Check the values in the following table. With D2 displayed adjust the H beam stop (see page 14 for location) so that the time required for the balance to reach full span is approximately the same as the time required to go from full span to zero. Press the MODE key to return to the main check mode menu.

Unit type	Zero point D0	Test weight	Test weight D0	Dispersion D2	T1
HR-200					
HR-120	1000~2050	200g	10000~13600	± 2 digits / 5 sec	600000~900000
HR-60					(± 10 digits / 5 sec)

Calibration

- Step 1. Press and hold the RE-ZERO and MODE keys
- Step 2. Press the ON/OFF key and release it
- Step 3. While still holding the RE-ZERO key, release the MODE key and press it again twice.
- Step 4. Release all keys. [P - XXX] displayed, then [HR - XXX], then all segments of the display will turn on.
- Step 5. Press the MODE key to display [CAL].
- Step 6. Press the RE-ZERO key to enter calibration mode.
- Step 7. Press the RE-ZERO key to read zero point.
- Step 8. Place the mass on the pan. Press the RE-ZERO key to read the mass value.
- Step 9. Remove the mass after displaying [CAL End]. Then the balance displays [tH].

Corner load adjustment.

Step 1. With the balance level and in the gram mode, place the corner load mass on the weighing pan at the center (1) and press the RE-ZERO key.

Item	HR-60	HR-120	HR-200
Test mass	20g	50g	50g

Step 2. Move the test mass to a point half the distance from the center to the front edge (2) of the weighing pan. Note the error and polarity.

Step 3. Move the test mass to a point half the distance from the center to the rear edge (4) of the weighing pan. Note the error and polarity.

Step 4. Move the test mass to a point half the distance from the center to the right edge (5) of the weighing pan. Note the error and polarity.

Step 5. Move the test mass to a point half the distance from the center to the left edge (3) of the weighing pan. Note the error and polarity.

Step 6. Return the test mass to the center of the weighing pan (6).

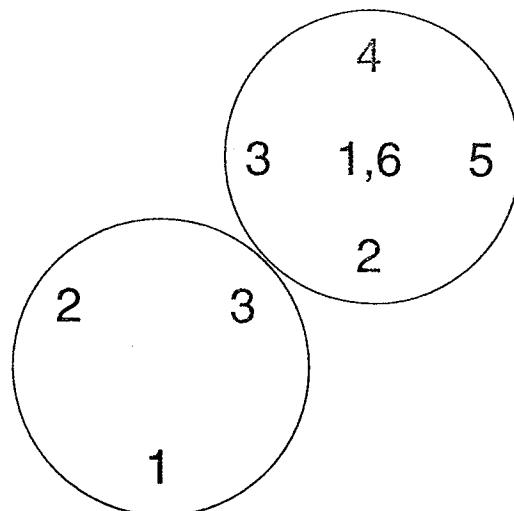
Step 7. Turn the corner load adjustment screws, as shown in the diagram on the next page, and repeat steps 1 through 6 until the error is less than ± 5 digits

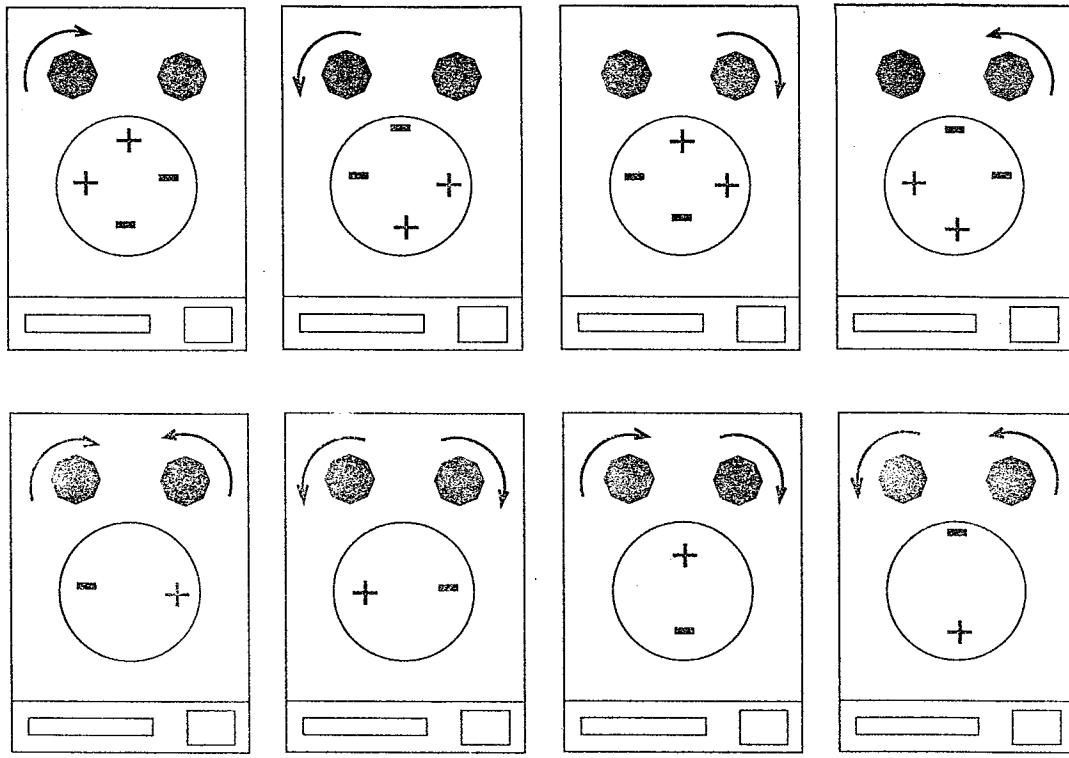
Note If the display does not read zero when the test mass is returned to the center of the weighing pan, there may be a repeatability problem.

If the corner load error is large, it may be very difficult to place the test mass back in the same spot each time. It will appear that there is a repeatability problem.

Coarse adjustment

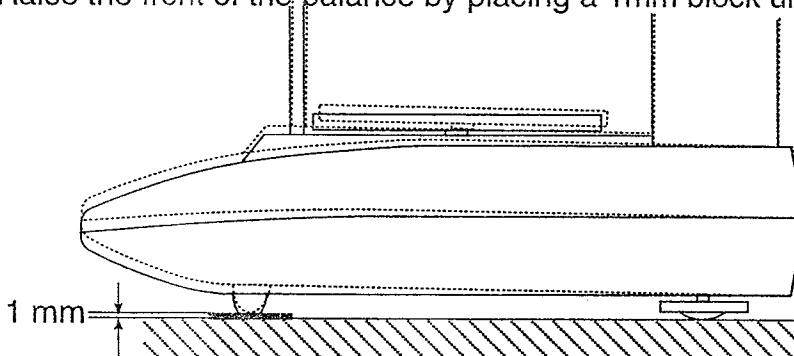
Place a test mass at '1' in the drawing at the left and press RE-ZERO. Place the weight at '2' to adjust the corner loading screw on that side. Place the test mass at '1' again and press RE-ZERO. Place the weight at '3' to adjust the corner loading screw on that side.



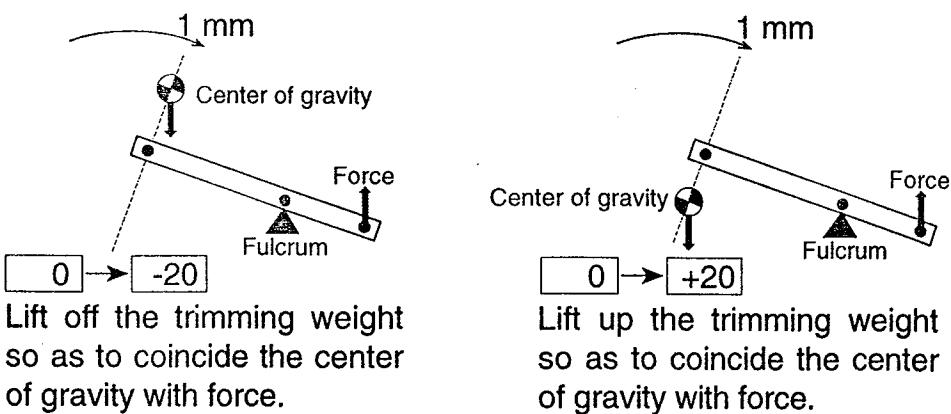


3. Counter weight check.

- Step 1. With D2 of check mode displayed, note the display reading.
 Step 2. Raise the front of the balance by placing a 1mm block under the front foot .



- Step 3 If the display changes by more than ± 10 digits, adjust the counter weight on the beam assembly in the direction shown (see drawing below)



- Step 4 Remove the 1mm block and repeat steps 1 through 3 until the display stays within ± 10 digits.



5.11 Temperature Adjustment

A room or chamber that can be set to 10°C and 30°C and held within $\pm 2^\circ\text{C}$ of the set temperature is required for this adjustment.

The balance must stabilize at each temperature (about 4 hours) before the data is taken.

First, warm up the balance at room temperature, then calibrate the balance. Do the high temperature test first, then the low temperature.

1. Input the temperature data

- Step 1. Verify that the display is OFF.
- Step 2. Press and hold the RE-ZERO and MODE keys and press the ON/OFF key. Release the MODE and ON/OFF keys while still holding the RE-ZERO key. Immediately press the MODE key twice.
- Step 3. The ROM version will be displayed for about 1 second [P - XXXX], then the balance type will be displayed [HR - XXX], Then all of the display segments will turn on. The balance will wait in this mode until the next key entry.
- Step 4. Press the RE-ZERO key to enter the data display mode [d - dSP].
- Step 5. Place the balance in the temperature controlled room set to 30°C and wait for the balance to stabilize (about 4 hours).
- Step 6. Press the MODE key 3 times to select the 'tH' mode. Press the RE-ZERO key to initiate this mode. [tH 0] will be displayed.
- Step 7. With nothing on the weighing pan, press the RE-ZERO key. The display will show an arrow in the upper left corner while the balance is reading the data., then change to [tH F].
- Step 8. Place a 200 gram mass on the weighing pan and press the RE-ZERO key. The display will show an arrow in the upper left corner while the balance is reading the data. [tH End] will then be displayed after removing mass. After a few seconds the display will switch to [tr].
- Step 9. Place the balance in the temperature controlled room set to 10°C and wait for the balance to stabilize (about 4 hours).
- Step 10. Press the MODE key 1 times to select the 'tL' mode. Press the RE-ZERO key to initiate this mode. [tL 0] will be displayed.
- Step 11. With nothing on the weighing pan, press the RE-ZERO key. The display will show an arrow in the upper left corner while the balance is reading the data., then change to [tL F]

- Step 12. Place a 200 gram mass on the weighing pan and press the RE-ZERO key. The display will show an arrow in the upper left corner while the balance is reading the data. [tL End] will then be displayed. [d-dsp] will be displayed after removing mass. After a few seconds the display will switch to [tL].
If you plan to check the temperature, proceed to that procedure and skip step 13.

- Step 13. Press the ON/OFF key to store the data and turn the display off.

2. Temperature check

If this check follows the temperature setting procedure, select the D2 mode and go to step 7. If this check does not follow the temperature setting procedure, calibrate the balance at room temperature before starting.

- Step 1. With the display off, press and hold the RE-ZERO and MODE keys and press the ON/OFF key. Release the MODE and ON/OFF keys while still holding the RE-ZERO key. Immediately press the MODE key twice.
- Step 2. The ROM version will be displayed for about 1 second [P - XXXX], then the balance type will be displayed [HR - XXX], Then all of the display segments will turn on. The balance will wait in this mode until the next key entry.
- Step 3. Press the RE-ZERO key to enter the data display mode [d - dSP].
- Step 4. Press the RE-ZERO key to select the internal count display.
- Step 5. Press the RANGE key twice to select the D2 mode.
- Step 6. Place the balance in a temperature controlled room at 10°C and allow the balance to stabilize for 4 hours.
- Step 7. With nothing on the weighing pan note the zero point.
- Step 8. Place a 200 gram weight on the weighing pan and note the span reading.
- Step 9. Place the balance in the temperature controlled room at 30°C and allow the balance to stabilize for 4 hours.
- Step 10. With nothing on the weighing pan note the zero point.
- Step 11. Place a 200 gram weight on the weighing pan and note the span reading.
- Step 12. The zero point should be zero \pm 100 digits and the span point should be 200 grams \pm 80 digits.
- Step 13. Remove the test mass and press the RE-ZERO key to exit the internal count mode.
- Step 14. Press the ON/OFF key to exit from the check mode.

If this procedure was entered from the temperature setting mode, step 14 will store the new data.



5.12 Fine Adjustment

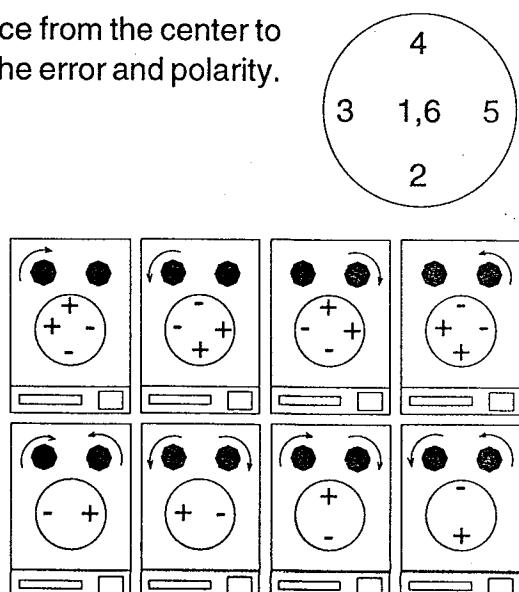
1. Corner load adjustment

Perform the fine corner load adjustment in the D2 check mode.

- Step 1. Verify that the display is OFF.
- Step 2. Press and hold the RE-ZERO and MODE keys and press the ON/OFF key. Release the MODE and ON/OFF keys while still holding the RE-ZERO key. Immediately press the MODE key twice.
- Step 3. The ROM version will be displayed for about 1 second [P - XXXX], then the balance type will be displayed [HR - XXX], Then all of the display segments will turn on. The balance will wait in this mode until the next key entry.
- Step 4. Press the RE-ZERO key to enter the data display mode [d - dSP].
- Step 5. Press the RE-ZERO key to enter the internal count mode.
- Step 6. Press the RANGE key twice to select the D2 display
- Step 7. Place the test mass at the center of the weighing pan (1 in the drawing at the bottom of the page). Note the error and polarity.

Item	HR-60	HR-120	HR-200
Four corner error	± 0.3 mg	± 0.3 mg	± 0.3 mg
Test mass	20g	50g	50g

- Step 8. Move the test mass to a point half the distance from the center to the front edge (2) of the weighing pan. Note the error and polarity.
- Step 9. Move the test mass to a point half the distance from the center to the rear edge (4) of the weighing pan. Note the error and polarity.
- Step 10. Move the test mass to a point half the distance from the center to the right edge (5) of the weighing pan. Note the error and polarity.
- Step 11. Move the test mass to a point half the distance from the center to the left edge (3) of the weighing pan. Note the error and polarity.
- Step 12. Return the test mass to the center of the weighing pan (6).
- Step 13. Turn the corner load adjustment screws, as shown in the diagram below, and repeat steps 1 through 6 until the error is less than ± 3 digits.



2. Linearity adjustment

Perform the fine linearity adjustment in the check mode. The test mass used in setting the linearity is listed in the table at the bottom of the page.

- Step 1. Verify that the display is OFF
- Step 2. Press and hold the RE-ZERO and MODE keys and press the ON/OFF key. Release the MODE and ON/OFF keys while still holding the RE-ZERO key. Immediately press the MODE key twice.
- Step 3. The ROM version will be displayed for about 1 second [P - XXXX], then the balance type will be displayed [HR - XXX], Then all of the display segments will turn on. The balance will wait in this mode until the next key entry.
- Step 4. Press the RE-ZERO key to enter the data display mode [d - dSP].
- Step 5. Press the MODE key to select the 'Lnr' mode.
- Step 6. Press the RE-ZERO key. [Lnr 0] will be displayed.
- Step 7. Press the RE-ZERO key. An arrow will appear in the upper left corner of the display while the data is being read. [Lnr 1] will be displayed.
- Step 8. Place mass 1 on the weighing pan and press the RE-ZERO key. An arrow will appear in the upper left corner of the display while the data is being read. [Lnr 2] will be displayed.
- Step 9. Place mass 2 on the weighing pan and press the RE-ZERO key. An arrow will appear in the upper left corner of the display while the data is being read. [Lnr 3] will be displayed.
- Step 10. Place mass 1 and 2 on the weighing pan and press the RE-ZERO key. An arrow will appear in the upper left corner of the display while the data is being read. [Lnr End] then [Lnr] will be displayed.

3. Linearity check

Perform the fine linearity check in the internal count mode D2. The test mass used in checking the linearity is listed in the table at the bottom of the page.

- Step 1. Select the check mode as in the adjustment procedure. At [d - dSP], press the RE-ZERO key three times to enter the internal count mode D2.
- Step 2. Place the standard weight on the weighing pan, then each offset listed in the table below. The deviation at any given offset should be no greater than ± 3 minor divisions.
- Step 3. Remove all test weights from the weighing pan and press the RANGE key to return to the check mode. Press the ON/OFF key to save the linearity data.

Unit	Mass 1	Mass 2	Standard mass	Offset 1	Offset 2	Offset 3	Offset 4	Deviation (D2)
HR-60	20g	20g	20g	0g	20g	40g	—	Max-Min ≥ 0.3 mg
HR-120	50g	50g	50g	0g	50g	—	—	
HR-200	100g	100g	50g	0g	50g	100g	150g	

4. Final calibration

Perform the final in the weighing mode. The calibration mass used in setting the span is listed in the table below.

- Step 1. Verify that the display is OFF
- Step 2. Press and hold the RE-ZERO and MODE keys and press the ON/OFF key. Release the MODE and ON/OFF keys while still holding the RE-ZERO key. Immediately press the MODE key twice.
- Step 3. The ROM version will be displayed for about 1 second [P - XXXX], then the balance type will be displayed [HR - XXX], Then all of the display segments will turn on. The balance will wait in this mode until the next key entry.
- Step 4. Press the RE-ZERO key to enter the data display mode [d - dSP].
- Step 5. Press the MODE key to select the 'CAL' mode.
- Step 6. Press the RE-ZERO key. [CAL 0] will be displayed.
- Step 7. If you want other calibration mass, although you can input a lesser weight for the calibration mass. It is best use a full span certified weight with correction factor for the calibration mass. Press the MODE key to enter the setting routine. Use the following keys to input the exact certified weight:

 MODE key Used to move to the digit to be changed
 RE-ZERO key Used to increment the digit selected
 PRINT key Used to store the value selected.

- Step 8. Press the RE-ZERO key. The balance will input the zero point, then display the calibration mass again.
- Step 9. Place the required calibration mass on the weighing pan and press the RE-ZERO key. [CAL End] will be displayed. Remove the calibration mass from the weighing pan, the display should return to the normal weighing mode.
- Step 10. Press the ON:OFF key twice so that the balance displays normal weighing value.
- Step 11. Place the calibration mass on the weighing pan. Allow several seconds for the balance to stabilize. The value displayed should be the exact weight of the calibration mass ± 0.2 mg.

Unit	Standard Calibration Mass	Error
HR-60	50g	
HR-120	100g	± 0.2 mg
HR-200	200g	



5.13 Parameter Settings

Parameter settings and what effect [init] and [init HF] have on them.

Parameter	init	init HF	comments
CAL 0	o	o	Dependent on model number
CAL SPAN	o	o	Dependent on model number
tH	o	x	Dependent on model number
tL	o	x	Dependent on model number
Sn	o	x	00000000
Model No.	x	x	Does not change
ID No.	o	o	0000000
Unit wt. PCS	o	o	0
Unit wt. %	o	o	0
Unit registration (factory)	o	x	Dependent on model number
Unit registration (user)	o	o	Dependent on model number
Internal setting	o	o	Factory reference check
Linearity comp.	o	x	Dependant on model number

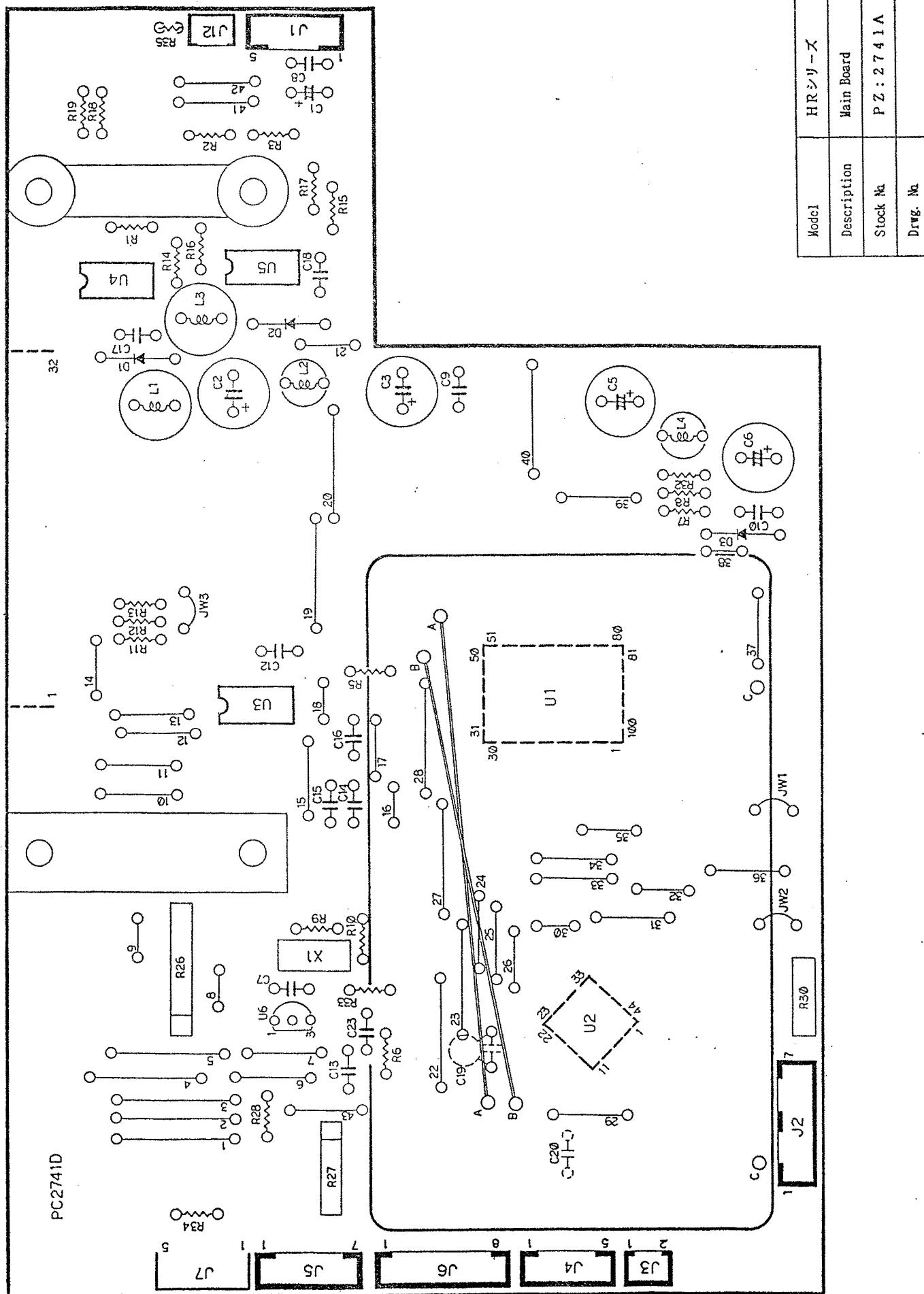
o = Data initialized

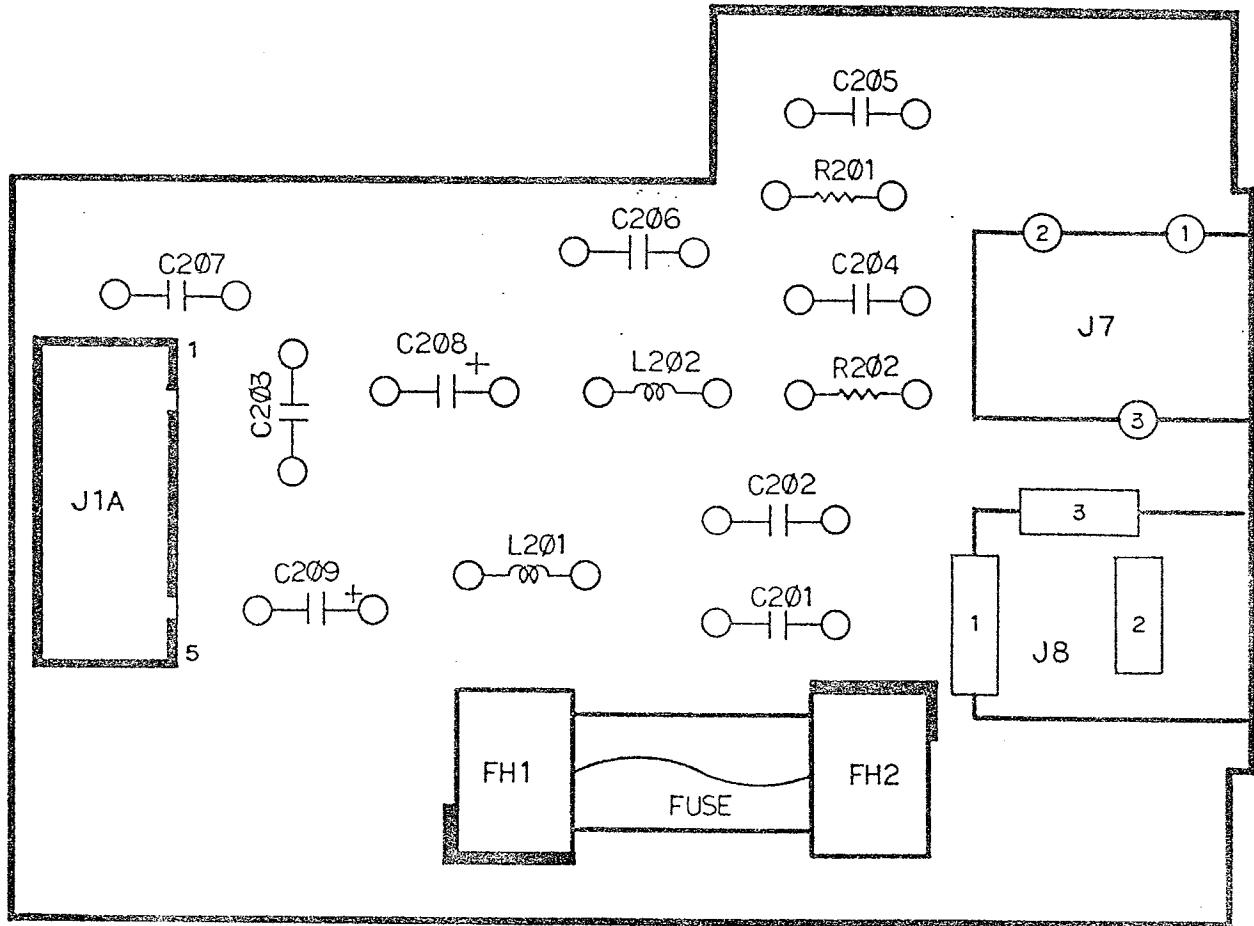
x = Retains previous data

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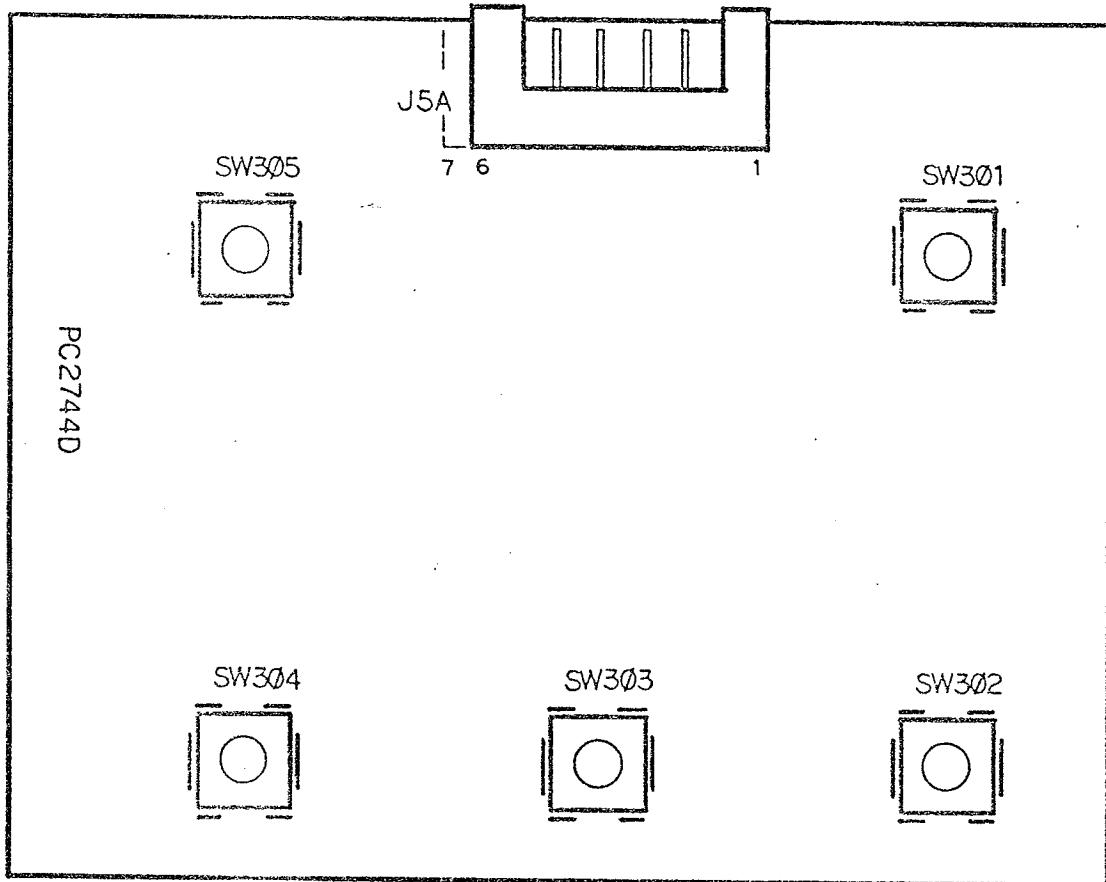


6. Parts layout of circuit

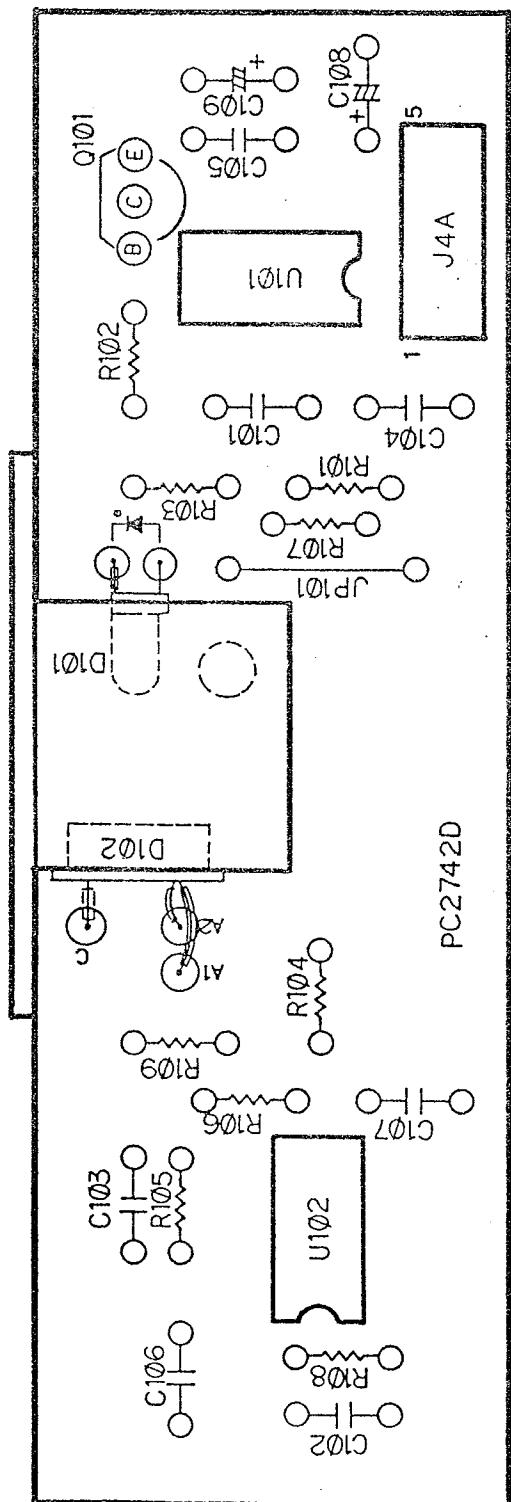




Model	HR シリーズ
Description	Power Supply Board
Stock No	P Z : 2 7 4 3
Drwg. No	

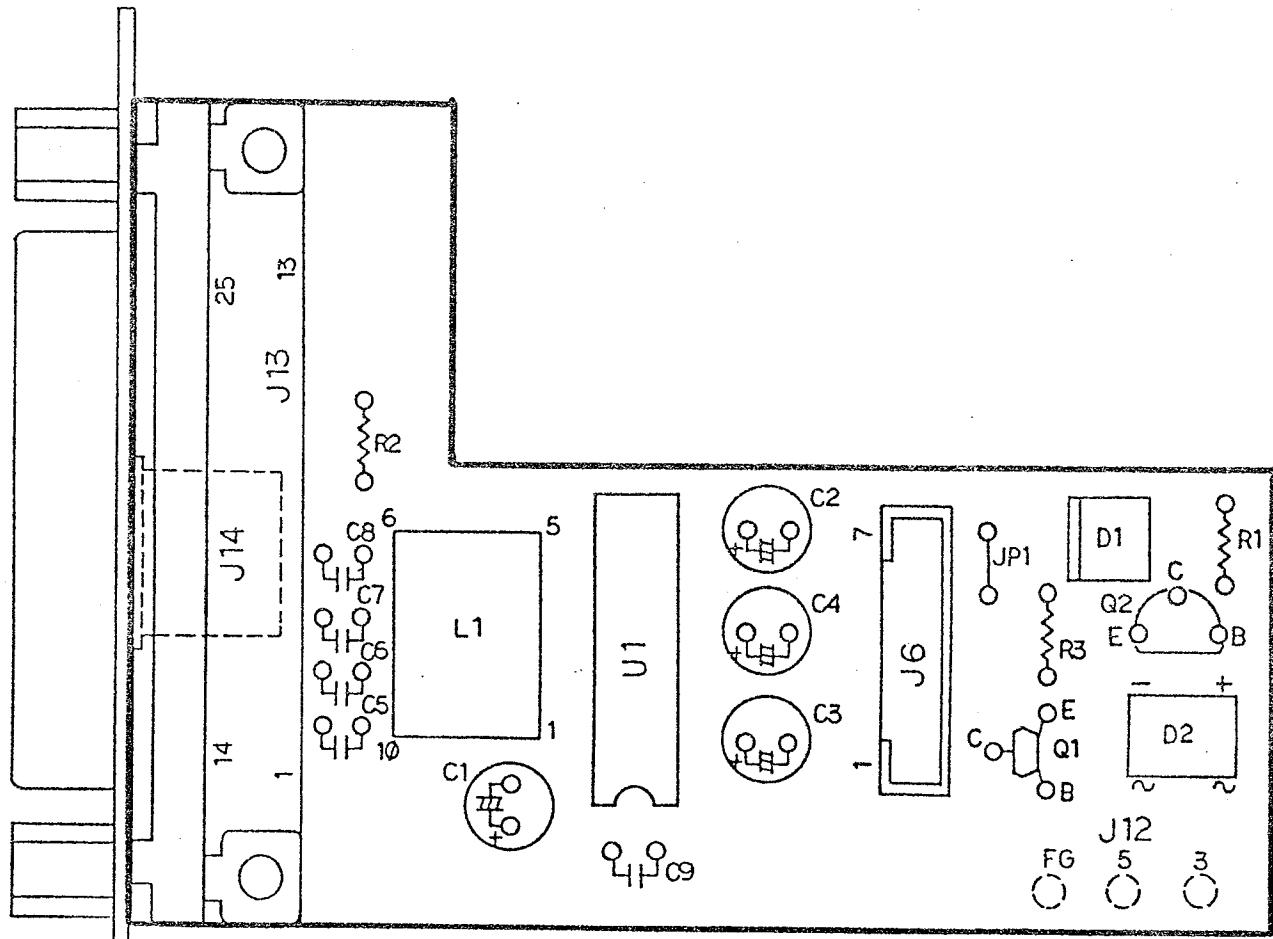


Model	HRシリーズ
Description	Switch Board
Stock No	P Z : 2 7 4 4
Drwg. No.	

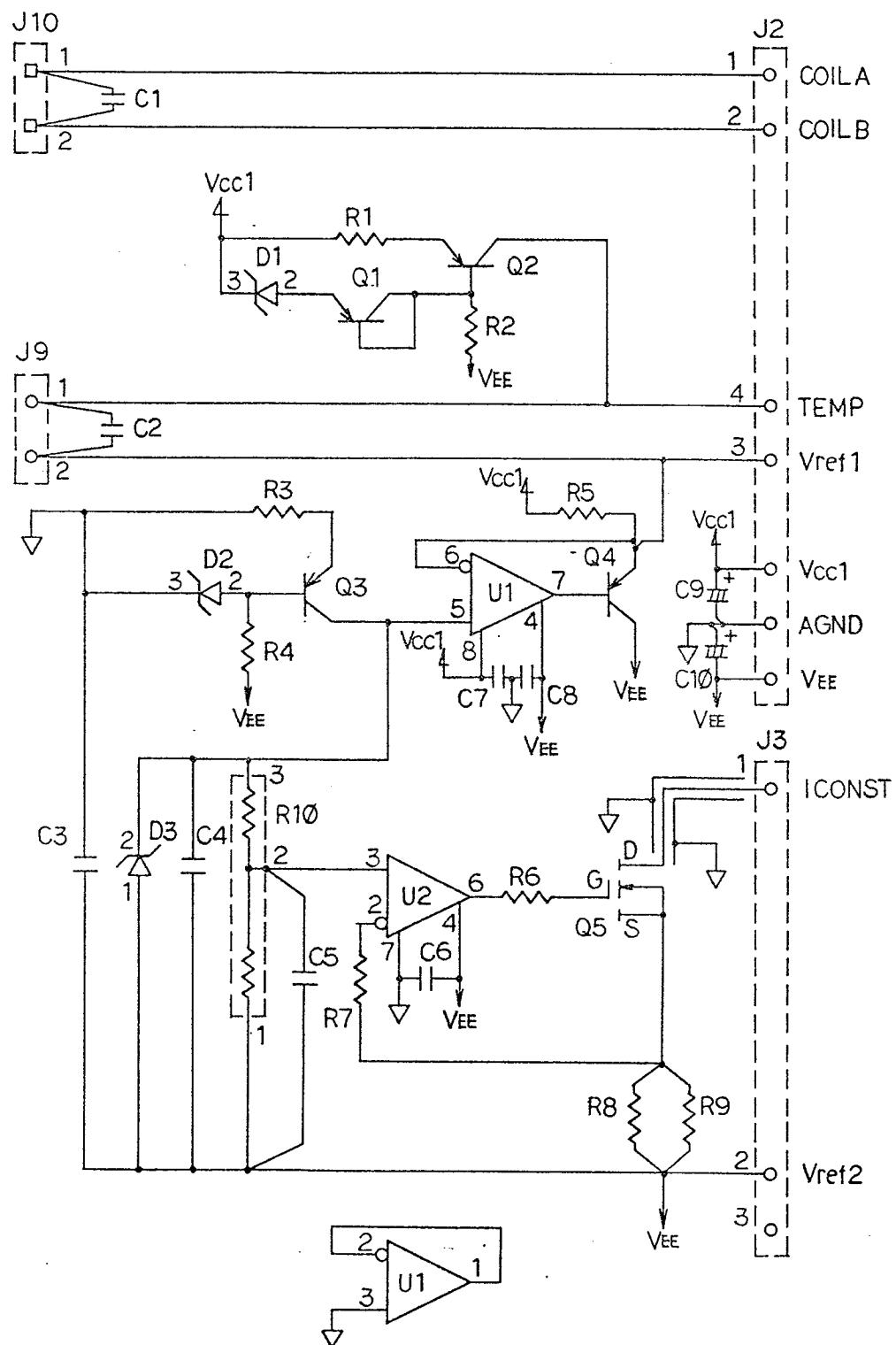


PC2742D

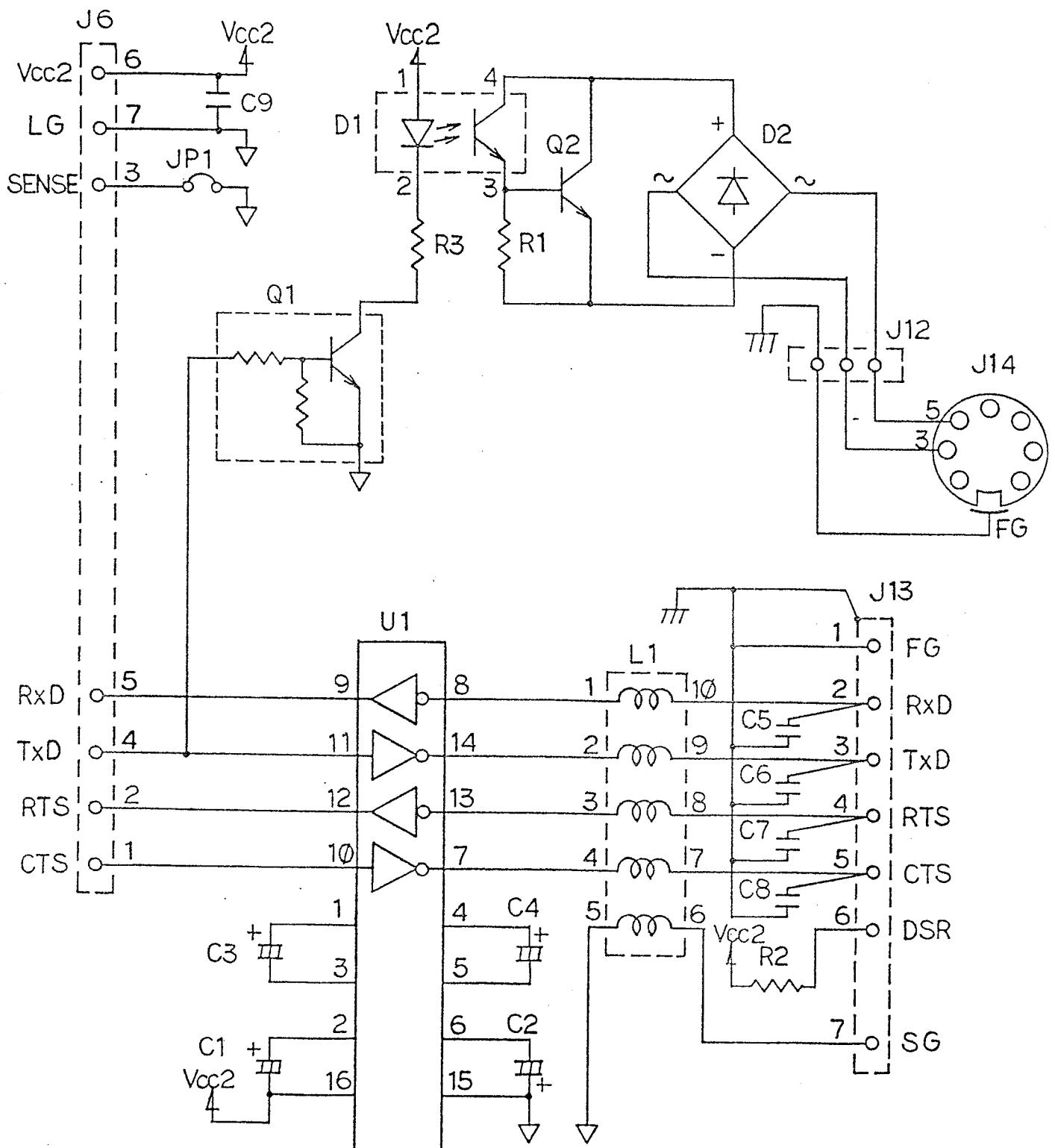
Model	HRシリ-ズ
Description	Position Sensor
Stock No	PZ : 2742
Drawg. No	



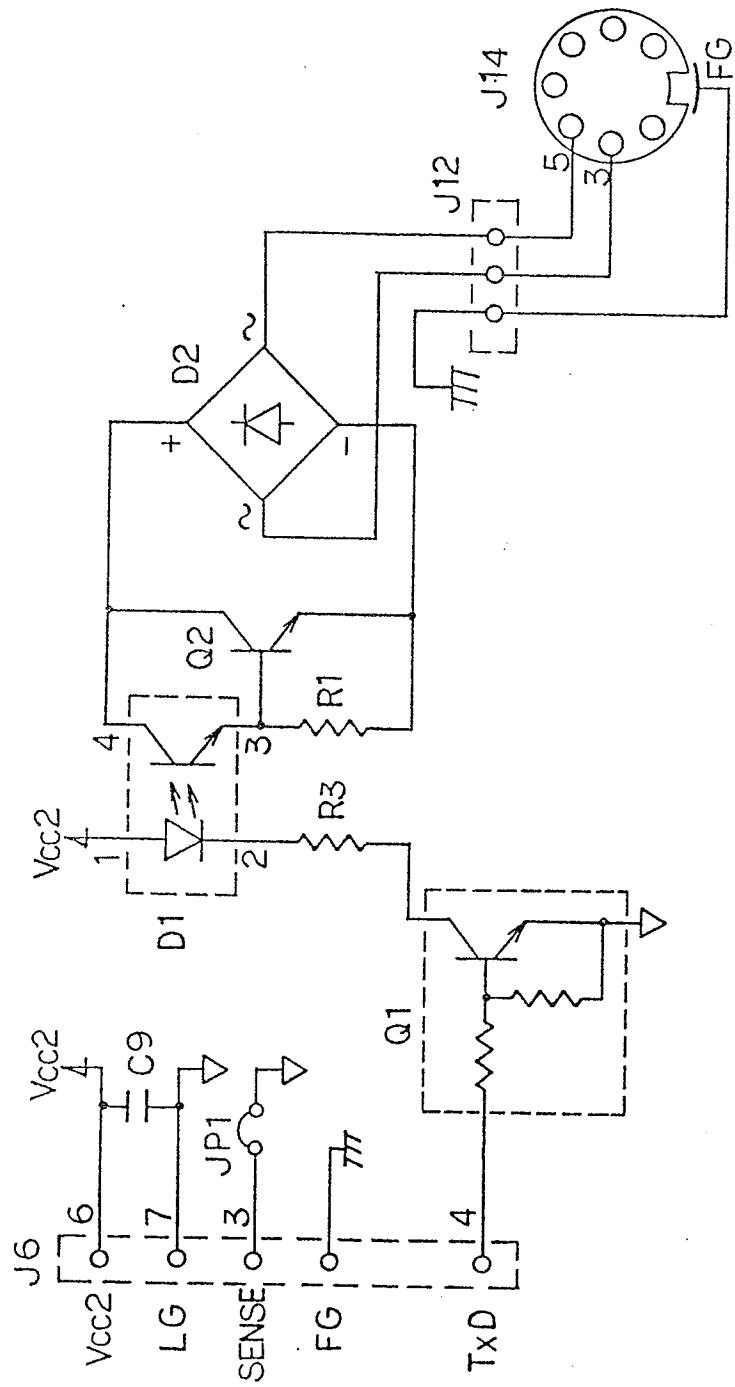
Model	HR - 0 3
Description	
Stock No	P Z : 2 7 4 7 A
Drwg. No	QD-KZ4-000001B



Model	HR series
Description	
Stock No	P Z : 2 7 4 0
Drwg. No	QD-EC4-000004A



Model	HR - 0 3
Description	
Stock No	P Z : 2 7 4 7 A
Drwg. No	QD-EC4-000002



Model	HR - 0 5
Description	
Stock No.	PZ : 2747B
Drwg. No.	QD-EC4-000003

Parts list of electronic circuit

Parts No.	Order code	Spec.
-	07:C42853	SENSOR HOLDER on PZ:2742
-	07:C43674	ISOLATION SHEET on PZ:2741A
-	BKE:AMZ42	ANALOG MODULE on PZ:2741A
C201, 202	CC:0.01U500V	CERAMIC CAPACITOR 0.01μF
C101	CC:0.01UT	CERAMIC CAPACITOR 0.01μF
C7	CC:0.022UT	CERAMIC CAPACITOR 0.022μF
C102	CC:10PT	CERAMIC CAPACITOR 10PF
C19	CC:330P	CERAMIC CAPACITOR 330PF
C14, 15, 17, 18	CC:330PT	CERAMIC CAPACITOR 330PF
C103	CC:68PT	CERAMIC CAPACITOR 68PF
C8, 9, 10, 12, 13, 16, 104~107,203~207	CC:FK26Y5V104T	CERAMIC CAPACITOR 0.1μF
C2, 3, 5, 6	CK:ECA1EM471-T	ELECTROLYTIC CAPACITOR 470μF
C208, 209	CK:ECA1VM471-T	ELECTROLYTIC CAPACITOR 470μF
C1, 108, 109	CT:1V010T	TANTALUM CAPACITOR 1μF
D102	DI:MI-33H-2D	PHOTO DIODE
D1, 2	DI:SB10-03A2-T	SHOTKEY DIODE
D101	DL:SLR-935A	LED
-	ED:LD-R7388AY	LCD on PZ:2741A
J8	EJ:0470-01-230	CONNECTOR
-	FH:85PN0819	FUSE HOLDER on PZ:2743
-	FS:EAWK-500MA	FUSE on PZ:2743
J7	JE:HSJ1415-01	CONNECTOR
J1, 4, 4A	JI:05P-S2T2-EF	CONNRCTOR
J5A	JI:06P-S2L2-EF	CONNRCTOR
J5	JI:06P-S2T2-EF	CONNRCTOR
J6	JI:08P-S2T2-EF	CONNRCTOR
J3	JI:2P-S2T2-EF	CONNRCTOR
J2	JI:7P-S2T2-EF	CONNRCTOR
J1A	JI:B5B-XH-A	CONNRCTOR
-	KB:2-130010RD77	RED WIRE on PZ:2741A
-	KB:2-130012BK77	BLACK WIRE on PZ:2741A
-	KO:1122	CABLE on PZ:2741A
L4	LL:LHL06TB100K	INDUCTOR
L201, 202	LL:LHL06TB470K	INDUCTOR
L1, 3	LL:LHL08TB471K	INDUCTOR
Q101	QT:C1815YT	TRANSISTOR
R28, 32, 101, 104	RC:NAT100KJT	CARBON RESISTOR 100K
R34	RC:NAT100RJT	CARBON RESISTOR 100
R11, 12, 13	RC:NAT10KJT	CARBON RESISTOR 10K
R10	RC:NAT1MJT	CARBON RESISTOR 1M
R1, 2, 3	RC:NAT1RJT	CARBON RESISTOR 1

Parts list of electronic circuit

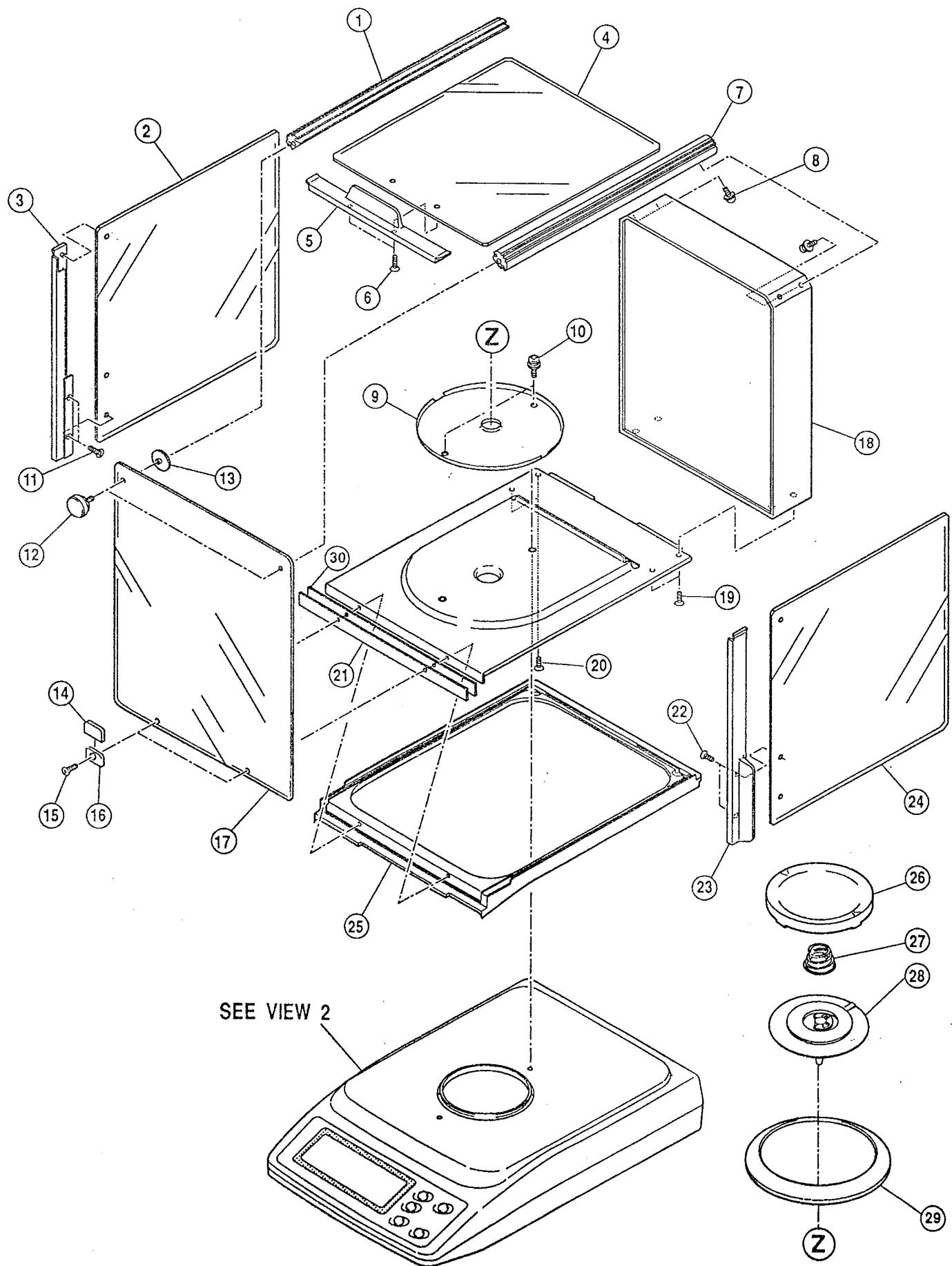
Parts No.	Order code	Spec.
R201, 202	RC:NAT2.2KJT	CARBON RESISTOR 2.2K
R7, 8	RC:NAT22KJT	CARBON RESISTOR 22K
R102	RC:NAT3.3KJT	CARBON RESISTOR 3.3K
R105	RC:NAT390KJT	CARBON RESISTOR 390K
R5, 6, 33	RC:NAT4.7KJT	CARBON RESISTOR 4.7K
R9	RC:NAT470RJT	CARBON RESISTOR 470
R106	RC:NAT47KJT	CARBON RESISTOR 47K
R103	RC:NAT680RJT	CARBON RESISTOR 680
R18	RM:RNM150KFT	METALIC FILM RESISTOR 150K
R15, 16	RM:RNM1KFT	METALIC FILM RESISTOR 1K
R19	RM:RNM22KFT	METALIC FILM RESISTOR 22K
R107	RM:RNM240KFT	METALIC FILM RESISTOR 240K
R108, 109	RM:RNM390KFT	METALIC FILM RESISTOR 390K
R14	RM:RNM3KFT	METALIC FILM RESISTOR 3K
R17	RM:RNM6.98KFT	METALIC FILM RESISTOR 390K
R27	RN:IHR-4-104JA	RESISTOR NETWORK 100K
R26	RN:IHR-6-104JA	RESISTOR NETWORK 100K
SW301, 302, 303, 304, 305	SK:EVQ21307K	SWITCH
U101	UA:C4062C	OP AMP
U102	UA:C4072C	OP AMP
U6	UA:S-8054ALR-Z	RESET IC
U3	UC:93LC56P	EEPROM
U1	UC:D78064GF-050	PROGRAMED CPU
U2	UC:TC140G02AU12	GATEARRAY
U4, 5	UR:IR3M03A	DC/DC IC
X1	XT:C4SB12M-K02U	CRYSTAL 12MHz

Parts No. Rule

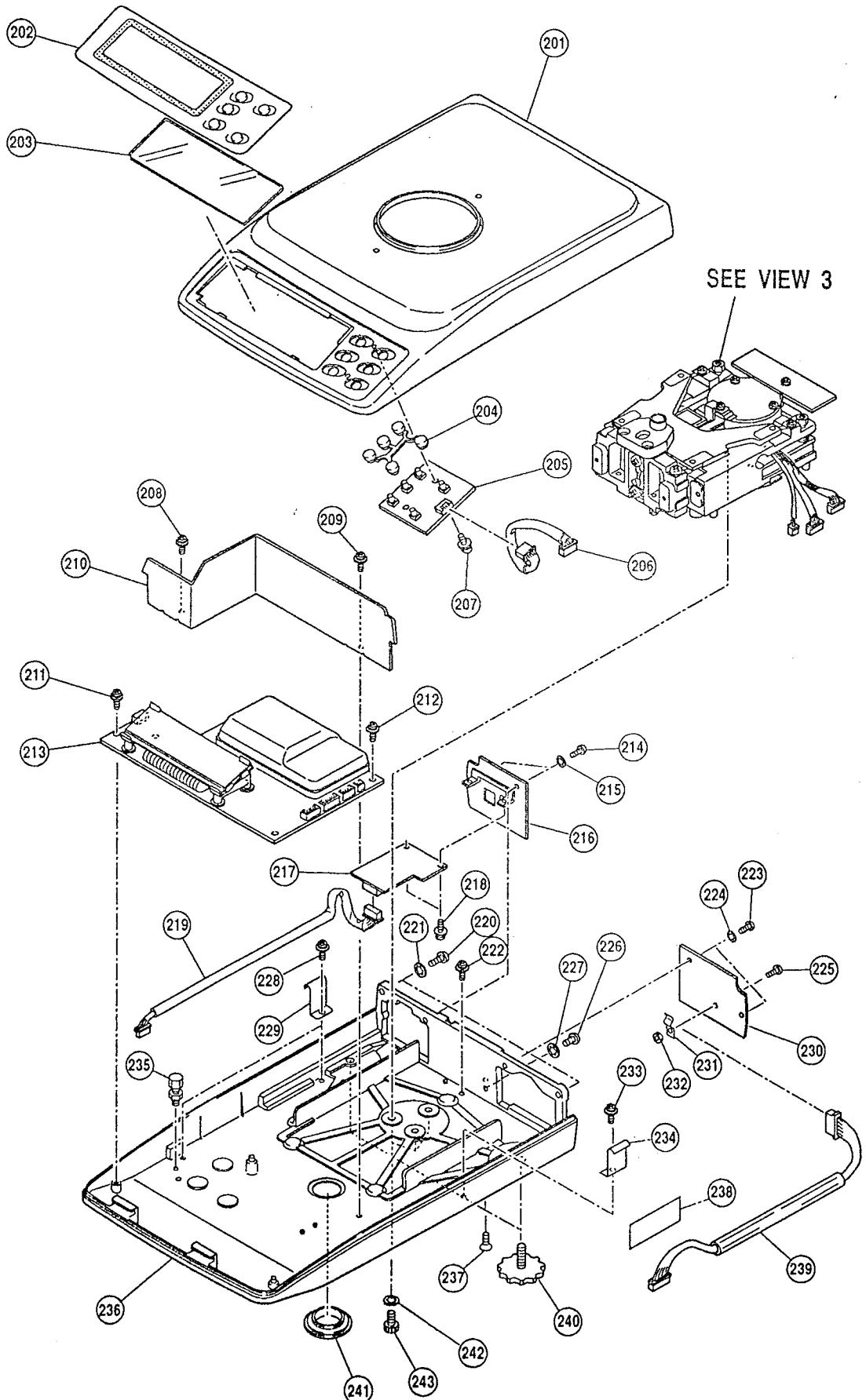
RANGE OF Parts No.	BOARD No.	BOARD NAME
0 ~ 99	PZ:2741A	MAIN BOARD
100 ~ 199	PZ:2742	POSITIONING SENSOR BOARD
200 ~ 299	PZ:2743	POWER SUPPLY BOARD
300 ~ 399	PZ:2744	SWITCH BOARD



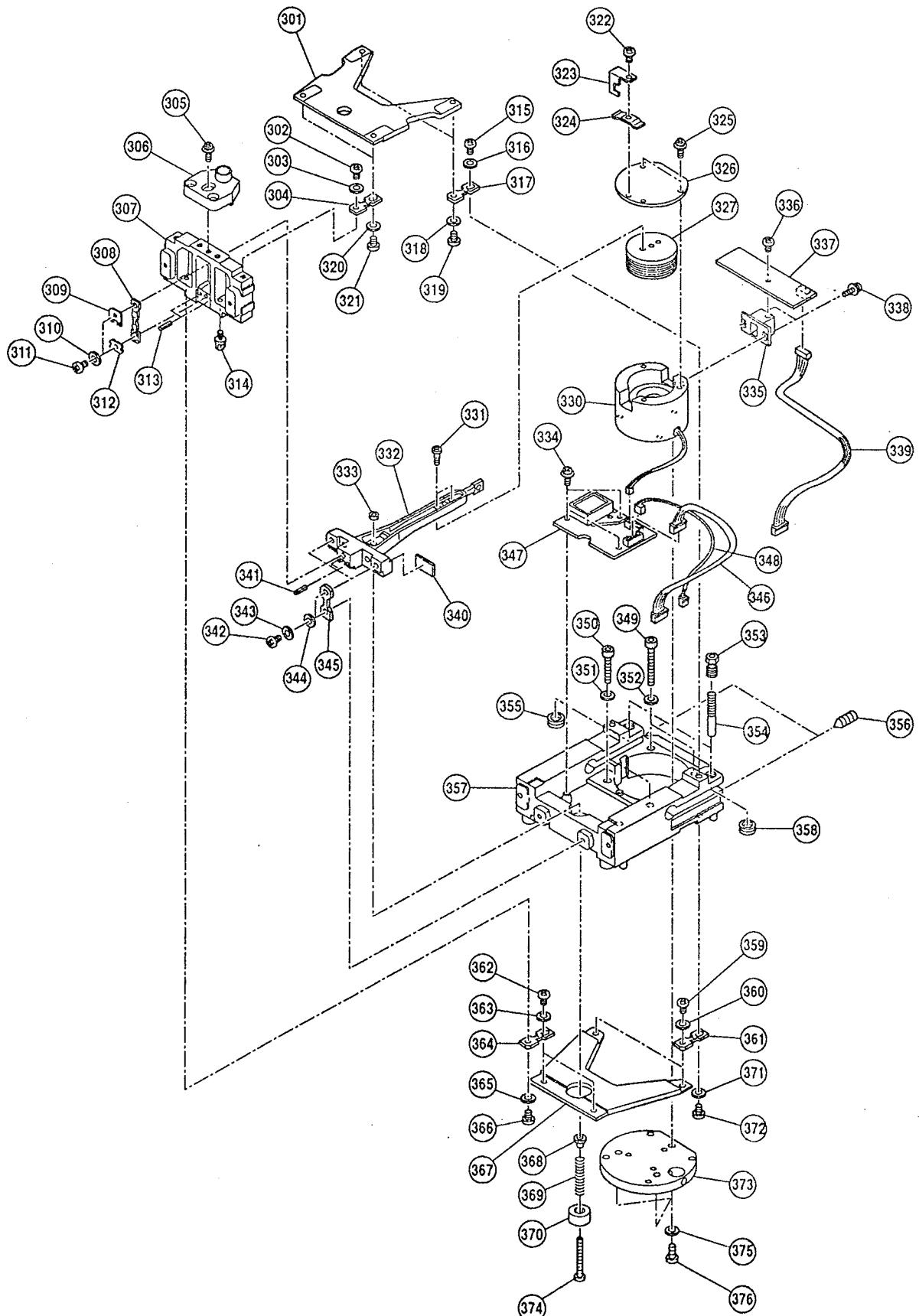
8. Exploded views and Parts list



EXPLODED VIEW-1
HR-Series



EXPLODED VIEW-2
HR-Series



HR SERIES

EXPLODED VIEW 1

NO.	PARTS NAME	DESCRIPTION
1	05:C42771	GUIDE RAIL
2	00:C42768D	SIDE GLASS
3	07:C42752B-2	SIDE KNOB L
4	00:C42770D	TOP GLSS
5	07:C42753A	TOP KNOB
6		FLAT HEAD SCREW M2. 6×10
7	05:C42771	GUIDE RAIL
8		PAN HEAD SCREW WITH SPRING AND LARGE PLAIN WASHER M3×6
9	04:C42803	PROTECTIVE DUST PLATE
10		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M4×12
11		FLAT HEAD SCREW M2. 6×10
12	07:C42754A	FRONT GLASS SCREW
13	07:C42755A	FRONT GLASS BUSHING
14	07:C42758	FRONT GLASS FIXING PLATE COVER
15		FLAT HEAD SCREW M3×10
16	07:C42757A	FRONT GLASS FIXING PLATE
17	00:C42767C	FRONT GLSS
18	03:B31620A	BREEZE BREAK FRAME
19		FLAT HEAD SCREW M3×6
20		FLAT HEAD SCREW M3×6
21	07:C43222A	FRONT GRASS CUSHION
22		FLAT HEAD TAPPING SCREW M2. 6×10
23	07:C42752B-1	SIDE KNOB R
24	00:C42768D	SIDE GLASS
25	07:C21589B	BREEZE BREAK ATTACHMENT
26	04:B47118A	WEIGHT PAN
27	00:C42806B	SHOCK ABSORBER SPRING
28		PAN SUPPORT UNIT
29	04:B49016	BREEZE BREAK RING
30	07:C43222A	FRONT GRASS CUSHION

HR SERIES

EXPLODED VIEW 2

NO.	PARTS NAME	DESCRIPTION
201	03:A10234B	UPPER CASE
202	01:B31720A	KEY SHEET (HR-200)
202	01:B31721A	KEY SHEET (HR-120)
202	01:B31834	KEY SHEET (HR-60)
203	07:C42517	DISPLAY FILTER
204	06:C42512D	KEY CAP RUBBER
205	PZ:2744	SWITCH BOARD
206	KO:964-06W010	SWITCH BOARD CABLE
207		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×6
208		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×6
209		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×6
210	04:B31348A	SEPARATION PLATE
211		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×6
212		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×6
213	PZ:2741A	MAIN BOARD
214		BINDING HEAD SCREW M3×6
215		TOOTHED LOCK WASHER M3
216	02:C42978A	REAR PANEL OF POWER SUPPLY UNIT
217	PZ:2743	POWER SUPPLY BOARD
218		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×6
219	KO:1111A-029	POWER SUPPLY CABLE
220		PAN HEAD SCREW M4×12
221		TOOTHED LOCK WASHER M4
222		NO USE
223		BINDING HEAD SCREW M3×6
224		TOOTHED WASHER M3
225		BINDING HEAD SCREW M3×6
226		BINDING HEAD SCREW M3×6
227		TOOTHED LOCK WASHER M4
228		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×5
229	04:C42597	CABLE CLAMPER 1
230	02:C42532A	OPTION BLANK PANEL
231	04:B40416	CABLE CLAMPER 2
232		HEXAGON NUT M2.6
233		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×5
234	04:C42597	CABLE CLAMPER 1
235	05:C43466	BATTERY CASE STOPPER SCREW
236	03:A10233D	LOWER CASE
237		FLAT HEAD SCREW M2.6×4
238		SERIAL NUMBER SEAL
239	KO:1126A-028	INTERFACE CABLE
240	07:A46735A	LEVELING FEET
241	07:A46858	UNDER HOOK COVER
242		TOOTHED LOCK WASHER M4
243		ALLEN HEAD BOLT M4×8

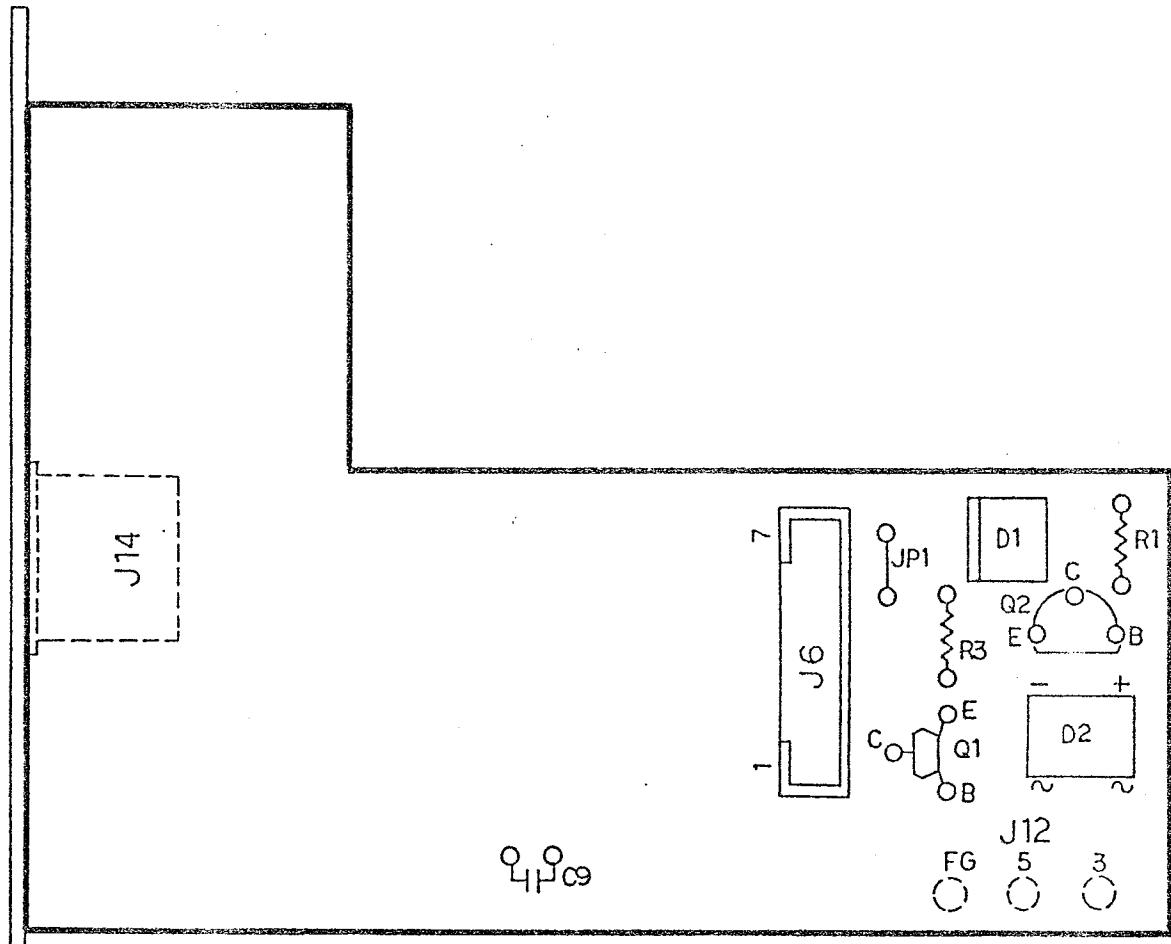
HR SERIES

EXPLODED VIEW 3

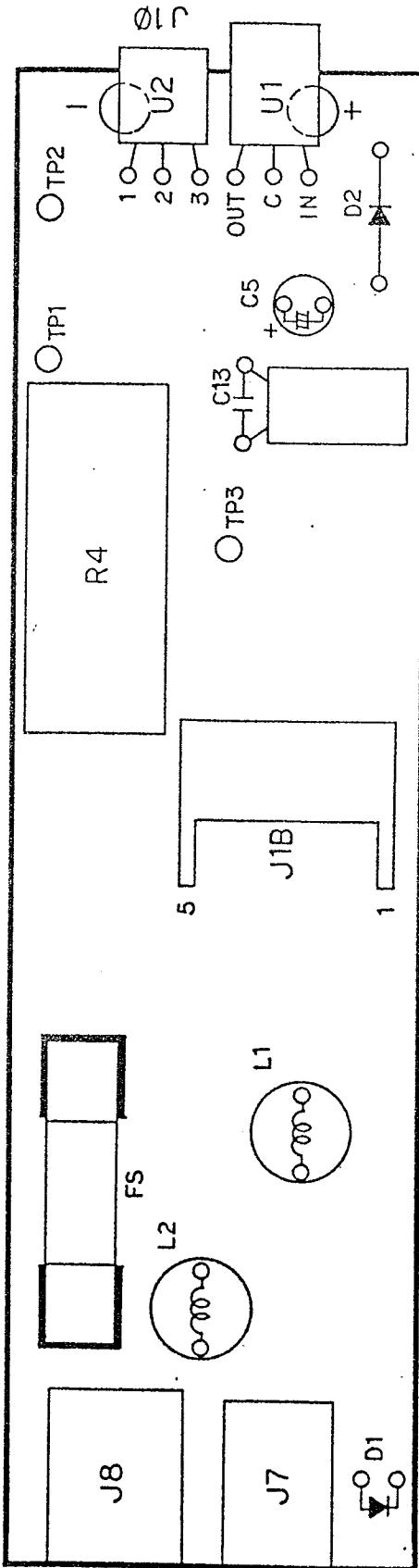
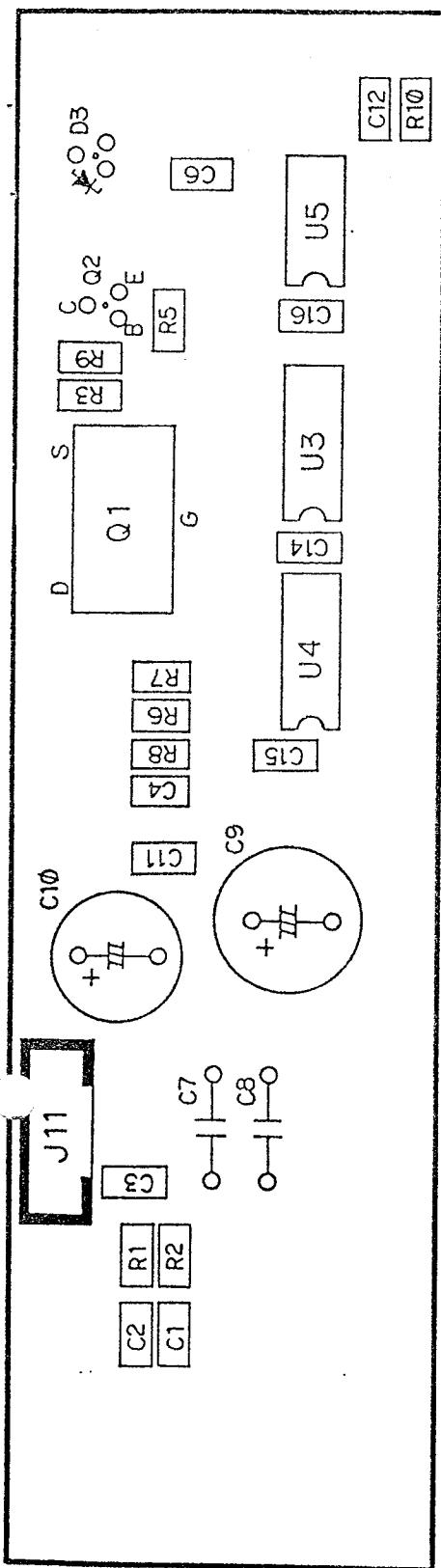
NO.	PARTS NAME	DESCRIPTION
301	03:C40781B	UPPER FLEXTURE BEAM
302		PAN HEAD M4×6
303	02:C41775	FLEXTURE WASHER
304	04:A46360;B	FLEXTURE
305		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M4×8
306	03:C42805A	PAN SUPPORTER
307	03:B31292	SUSPENSION GUIDE
308	04:C43479;B	TENSION FLEXTURE
309	04:B47107A	UPPER TENSION FLEXTURE HOLDER
310	10:S-NO-1-SUS	CONED DISC SPRING
311		PAN HEAD M4×8
312	04:B47108	LOWER TENSION FLEXTURE HOLDER
313	10:P1.5X6	SPRING PIN
314	05:A46919	UNDERHOOK
315		PAN HEAD M4×6
316	02:C41775	FLEXTURE WASHER
317	04:A46360;B	FLEXTURE
318	02:C41775	FLEXTURE WASHER
319		PAN HEAD M4×5
320	02:C41775	FLEXTURE WASHER
321		PAN HEAD M4×5
322		PAN HEAD SCREW WITH SPRING WASHER M3×6
323	04:C42509A	BEAM STOPPER
324	04:C41679	BEAM STOPPER SPRING PLATE
325		PAN HEAD SCREW WITH SPRING WASHER M3×6
326	04:B47737B	SHIELD PLATE
327	09:C42321D	BOBBIN
328		
329		
330	PB:HR200-1	MAGNET UNIT
331		PAN HEAD M3×8
332	03:B31291	BEAM
333		HEXAGON NUT M3
334		PAN HEAD SCREW WITH SPRING AND PLAIN WASHER M3×6
335	07:C42853	POSITION SENSOR HOLDER
336		BINDING HEAD SCREW M3×6
337	PZ:2742	POSITION SENSOR BOARD
338		PAN HEAD SCREW WITH SPRING AND LARGE PLAIN WASHER M3×6
339	KO:1127-05W025	POSITION SENSOR CABLE
340		RELAY BOARD
341	10:P1.5X6	SPRING PIN
342		PAN HEAD M4×6
343	10:S-NO-1-SUS	CONED DISC SPRING
344	05:C43519	FULCRUM FLEXTURE WASHER
345	04:A48929;B	FULCRUM FLEXTURE
346	KO:1127-07W021	ANALOG BOARD CABLE
347	PZ:2740	TEMPERATURE SENSOR BOARD
348	KO:1110B	SHIELD CABLE
349		ALLEN HEAD BOLT M4×30
350		ALLEN HEAD BOLT M4×25
351		SPRING WASHER
352		SPRING WASHER
353	05:C41729	FOUR CORNER ADJUSTMEMT SCREW
354	05:C42441A	FOUR CORNER ADJUSTMENT INNER SCREW
355	00:C43336	FOUR CORNER SPRING

HR SCREWS

NAME	SIZE	Q'TY	MATERIAL
FLAT HEAD SCREW	M2. 6 × 4	1	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW	M2. 6 × 6	1	BRASS, ELECTROPLATED COATINGS OF NICKEL
FLAT HEAD TAPPING SCREW	M2. 6 × 10	6	CARBON STEEL, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW WITH SPRING AND PLAIN WASHER	M3 × 5	3	BRASS, ELECTROPLATED COATINGS OF NICKEL
BINDING HEAD SCREW	M3 × 6	5	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW WITH SPRING WASHER	M3 × 6	3	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW WITH SPRING AND PLAIN WASHER	M3 × 6	10	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW WITH SPRING AND LARGE PLAIN WASHER	M3 × 6	2	BRASS, ELECTROPLATED COATINGS OF NICKEL
FLAT HEAD SCREW	M3 × 6	4	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW	M3 × 8	2	BRASS, NO ELECTROPLATED COATINGS
FLAT HEAD SCREW WITH SPRING AND LARGE PLAIN WASHER	M3 × 8	4	BRASS, ELECTROPLATED COATINGS OF NICKEL
FLAT HEAD SCREW	M3 × 10	2	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW	M4 × 5	8	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW	M4 × 6	12	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
BINDING HEAD SCREW	M4 × 6	1	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW	M4 × 8	5	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
ALLEN HEAD BOLT	M4 × 8	3	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW WITH SPRING AND PLAIN WASHER	M4 × 8	1	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW WITH SPRING AND PLAIN WASHER	M4 × 12	2	BRASS, ELECTROPLATED COATINGS OF NICKEL
PAN HEAD SCREW	M4 × 12	2	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
ALLEN HEAD BOLT	M4 × 25	2	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
ALLEN HEAD BOLT	M4 × 30	2	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
ALLEN HEAD BOLT WITH CONE POINT	M6 × 6	2	STAINLESS STEEL, ELECTROPLATED COATINGS OF NICKEL
HEXAGON NUT	M2. 6	1	BRASS, ELECTROPLATED COATINGS OF NICKEL
HEXAGON NUT	M3	1	BRASS, ELECTROPLATED COATINGS OF NICKEL
TOOTHED LOCK WASHER	M3	2	PHOSPHOR BRONZE, ELECTROPLATED COATINGS OF NICKEL
TOOTHED LOCK WASHER	M4	5	PHOSPHOR BRONZE, ELECTROPLATED COATINGS OF NICKEL
SPRING WASHER	M4	4	BRASS, ELECTROPLATED COATINGS OF NICKEL



Model	HR - 0 5
Description	
Stock No	P Z : 2 7 4 7 B
Drwg. No	QD-KZ4-000002A

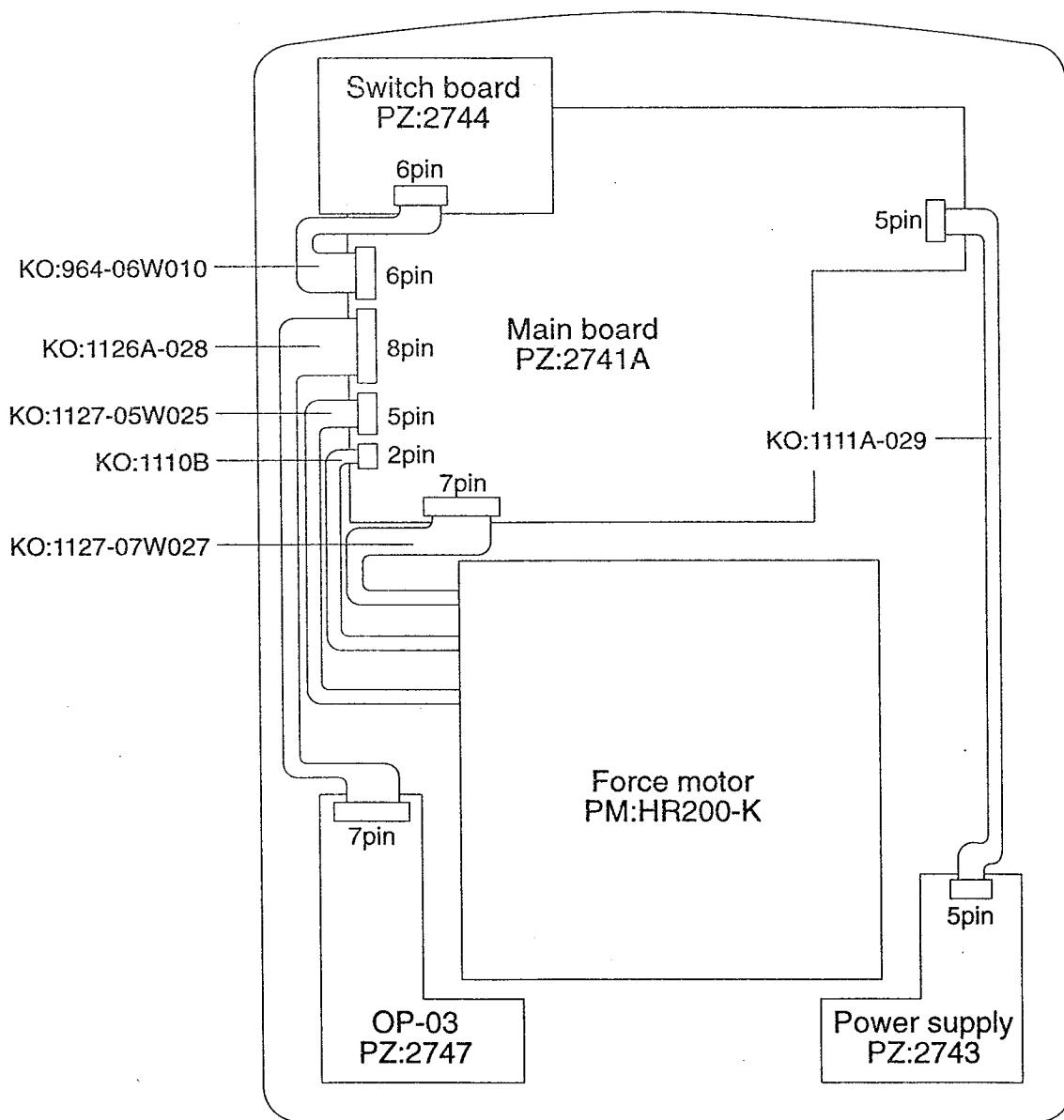


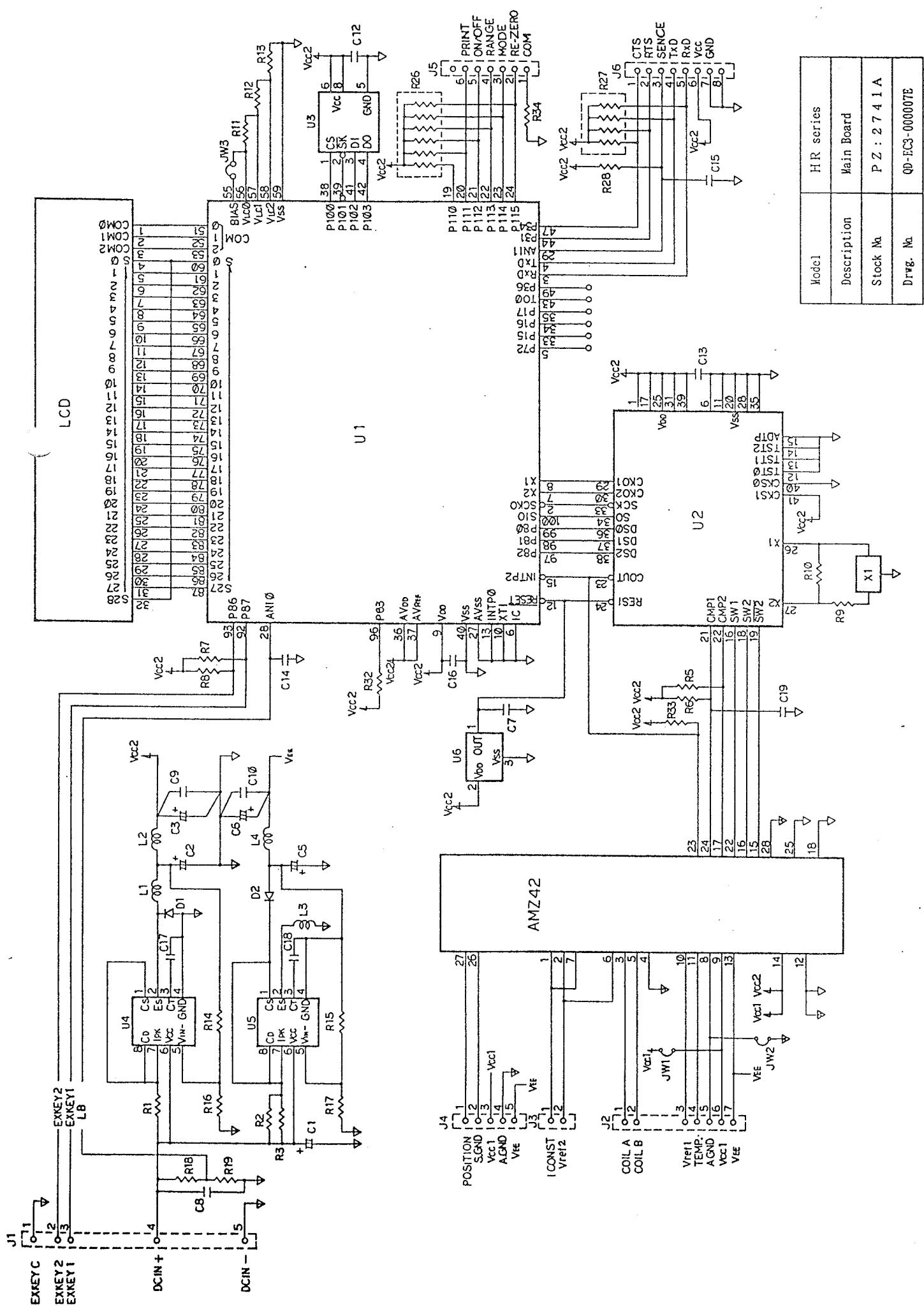
Model	H R - 0 9
Description	
Stock. No.	P.Z : 2 7 7 8
Dwg. No.	QD-KZ3-000024A

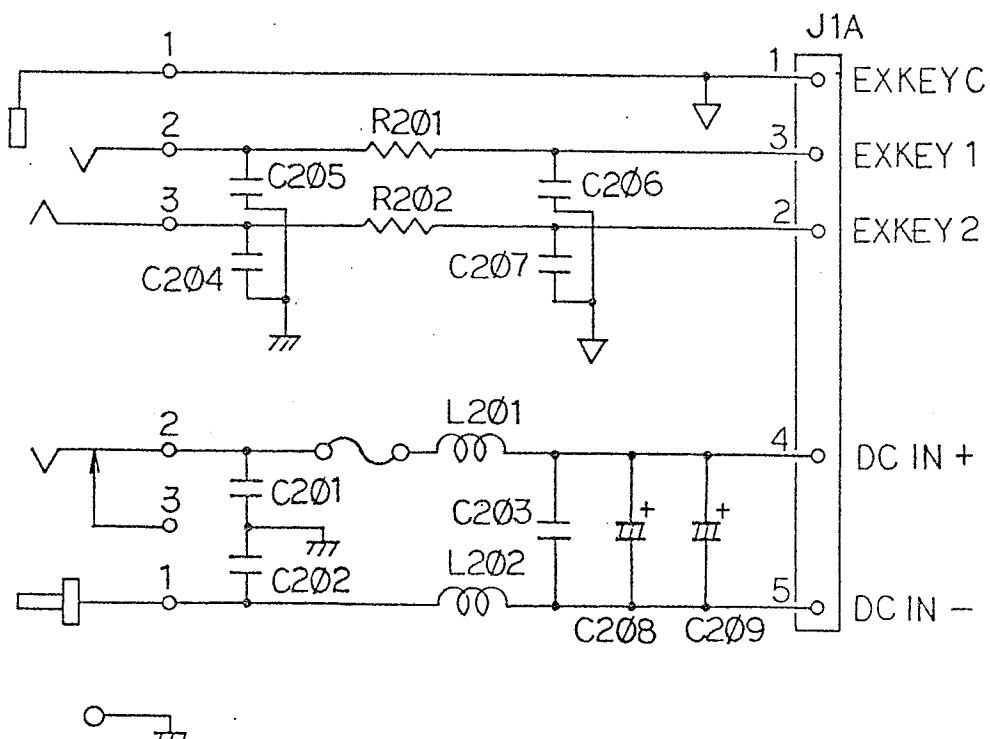


7. Circuit Diagrams

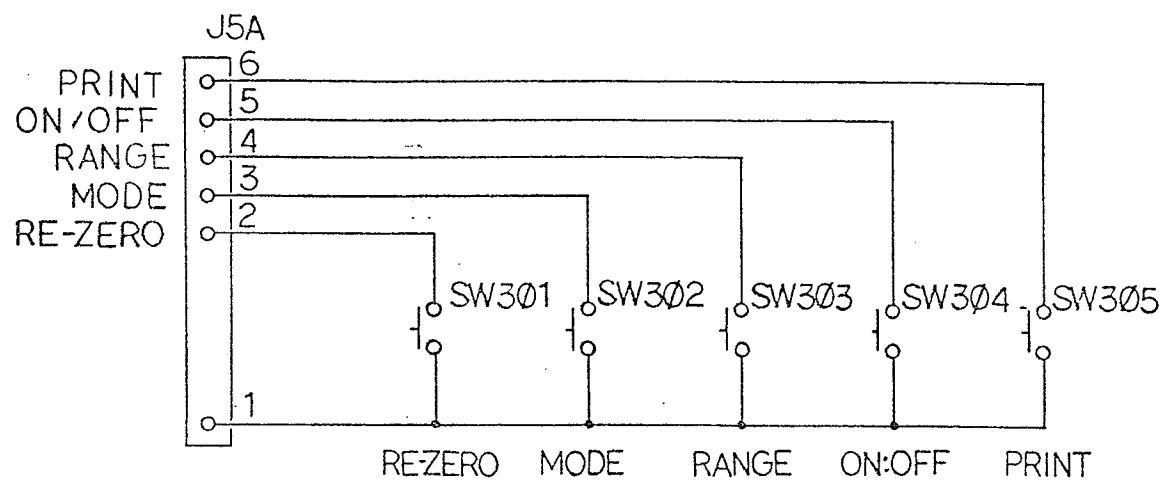
Block diagram



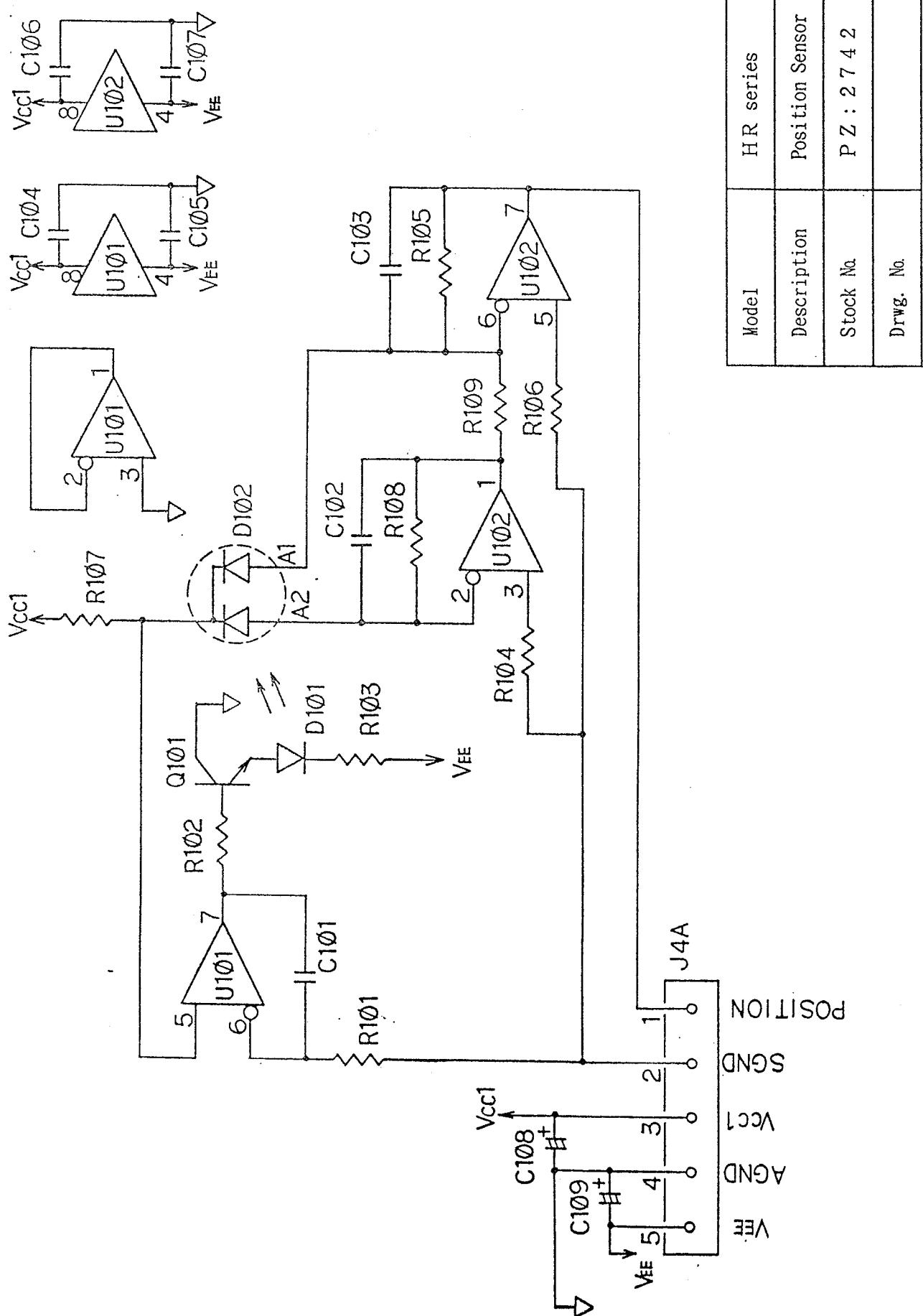




Model	HR series
Description	Power Supply Board
Stock No.	P Z : 2 7 4 3
Drwg. No.	



Model	H R series
Description	Switch Board
Stock No	P Z : 2 7 4 4
Drwg. No	



HR SERIES

EXPLODED VIEW 3

NO.	PARTS NAME	DESCRIPTION
356		ALLEN HEAD WITH HOLE AND CONE POINT M6×6
357	03:A21572	MAIN MECHANICAL FRAME
358	00:C43336	FOUR CORNER SPRING
359		PAN HEAD SCREW M4×5
360	02:C41775	FLEXTURE WASHER
361	04:A46360;B	FLEXTURE
362		PAN HEAD SCREW M4×5
363	02:C41775	FLEXTURE WASHER
364	04:A46360;B	FLEXTURE
365	02:C41775	FLEXTURE WASHER
367	03:C40782B	LOWER FLEXTURE BEAM
368	05:B47111	SPRING GUIDE RING
369	10:C-207	TRIMMING WEIGHT SPRING
370	05:C41000	TRIMMING WEIGHT
371	02:C41775	FLEXTURE WASHER
372		PAN HEAD SCREW M4×6
373	03:C40335	MAGNET HOLDER BASE
374	05:B47110A	ADJUST SCREW FOR CENTER OF GRAVITY
375	10:S-NO-1-SUS	CONED DISC SPRING
376		PAN HEAD SCREW M4×8