Service Manual for Electronic Precision Balances series

KERN 434

Version 1.0 7/97

434-SH-e-9710

Table of Contents

1 Specifications

Model	*KERN 434-23*	*KERN 434-33*	*KERN 434-37*
Gram	*310 x 0.001*	*510 x 0.001*	*3100 x 0.001*
Ounce	*10 x 0.0005*	*18 x 0.0005*	*109 x 0.0005*
Pound	*0.6 x 0.000005*	*1.1 x 0.000005*	*6.8 x 0.000005*
Carat	*1550 x 0.005*	*2550 x 0.005*	*15500 x 0.005*
Pennyweight	*199 x 0.001*	*327 x 0.001*	*1993 x 0.001*
Troy Ounce	*9.9 x 0.00005*	*16 x 0.00005*	*99 x 0.00005*
Grain	*4784. x 0.02*	*7870. x 0.02*	*47840. x 0.02*
Momme	*82 x 0.0005*	*136 x 0.0005*	*826 x 0.0005*
Tael (Hong Kong)	*8 x 0.00005*	*13 x 0.00005*	*82 x 0.00005*
Tael (Singapore)	*8 x 0.00005*	*13 x 0.00005*	*82 x 0.00005*
Tael (Taiwan)	*8 x 0.00005*	*13 x 0.00005*	*82 x 0.00005*
Linearity	*± 0.002 g*		*± 0.02 g*
Readability	*0.001 g*		*0.01 g*
Stabilization time	*2.3 sec*		
Span drift (15° C - 30°C)	*± 5 ppm/° C*		*± 3 ppm/° C*
Operation temperature	*10° C - 40° C*		
Pan size	*∅ 135 mm*		*160 x 160 mm*
Total min. weight of percent display	*1 g*		*10 g*
Min. percent display	*0.01 %*		
Total min. weight of piece counting	*0.01 g*		*0.1 g*
Max. piece counting display	*31000 pcs*	*51000 pcs*	*31000 pcs*
Sampling number of piece counting	*5, 20, 100 or 100 pcs*		
Data output	*RS-232C bi-direction (standard accessory)*		
Power supply	*AC Adapter 220 V, 110 V or other (+10 V, 015 V) 50/60 Hz Output AC19V 200 mA*		
Dimensions	*194 (W) x 334 (D) x 81 (H) mm*		

Options: Auxiliary display (OMK-0), Underweighing hook (OMJ-1), Air shield case (OMJ-2) Animal weighing pan (OMJ-3), Small animal weighing pan (OMJ-4), Auxiliary display base stand (OMJ-10), Dust cover (OMJ-11), Auxiliary display stand pole (OMJ-12)

2 Introduction

This Maintenance Manual covers three models from the KERN 434 series, the KERN 434-23, KERN 434-33 and KERN 434-37. Please read this Maintenance Manual and the owner's Instruction Manual fully before beginning any maintenance work.

The KERN 434 series precision balances are the products of years of research, development, design and in-field testing. They incorporate the latest advances in mechanical and electronic engineering and offer the highest standard of reliability, easy to use functions and rugged durability.

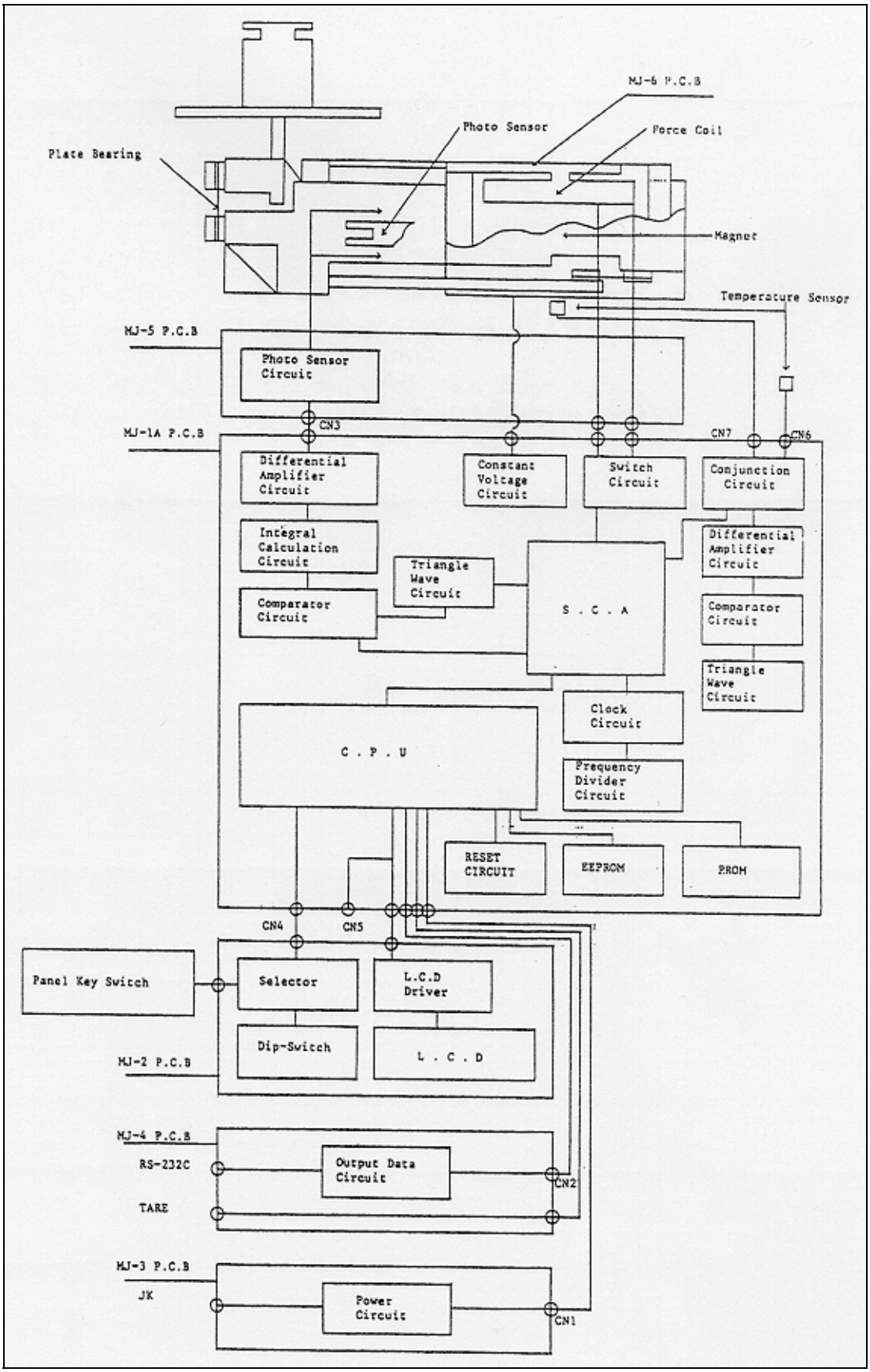
3 Principles of operation

The KERN 434 series precision balances work on the principle of "Force Compensation". Any change in the load on the weighing pan causes the Beam to pivot on fulcrum Plate Bearings (see Block Diagram page 4). Attached to this Beam is a coil wound with fine wire, called the "Force Coil Bobbin", which floats in a permanent magnet. At the end of the Beam there is a small notch which allows light from a Light-Emitting Diode (LED) to pass through to a Photo Sensor (Light Measuring Diode). At zero weight, the light detected by the Photo Sensor is exactly equal to the light emitted by the LED.

When the end of the beam is forced up by the leverage exerted from a mass placed on the weighing pan, the Photo Sensor detects a change in the position of the beam and the attached Force Coil Bobbin, because the light reaching the Photo Sensor has become less than that emitted by the LED. The balance then feeds the Force Coil Bobbin with more voltage, which increases the magnetic power and pulls the Bobbin downward until the light reaching the Photo Sensor is once again equal to the light emitted by the LED. This is accomplished by a Differential Amplifier, a filter and an Analogue/Digital (A/D) Converter receiving photo current from the Photo Sensor, converting it to voltage and boosting it back to the Force Coil Bobbin.

The electrical current flowing through the Force Coil Bobbin generates a voltage proportional to the load weight on the pan. This is read back through the Differential Amplifier and filter, then the A/D Converter digitalises this voltage. The resulting value is then counted and fed to the microprocessor (CPU). The CPU performs a multitude of commands and mathematical operations in conjunction with parameter and adjusting information stored in Random Access Memory (RAM). Finally, the results are displayed on the Liquid Crystal Display (LCD) or sent to the RS-232 C Interface.

4 Block Diagram



5 Best Conditions for Weighing

1. ***Never turn off the power switch or disconnect the AC adapter when in use.***

2. ***When making a measurement, always place the sample in the centre of the weighing pan. Slight errors may result if the sample is not near the centre of the pan.***

3. ***Make sure the balance is level by using the level vial and the adjustable feet on the bottom.***

4. ***Install the balance in a controlled environment.***

   A) The weighing room should be kept clean, dry and free of cigarette smoke.
   B) Protect the balance from drafts (air currents). Use a draft shield if necessary.
   C) Maintain the ambient temperature to ± 3° C.
   D) Maintain the ambient humidity to ± 10 %.
   E) If larger changes in temperature or humidity occur, re-calibrate the balance.
   F) The balance table should be level and free from excessive vibration. Corners of rooms are less prone to vibration.
   G) Do not expose the balance to direct sunlight or radiated heat. Keep away from windows, heaters, hot plates, flames, fans, air conditioners, etc.
   H) Allow hot or cold sample containers to come to ambient temperature before weighing.
   I) Discharge any statically charged sample before weighing.
   J) Do not expose the balance to corrosive gases.

5. ***Magnetised samples cannot be weighed accurately on an electronic balance. Keep equipment containing magnets away from the balance.***

6. ***Make certain that the AC power supply is free from electrical disturbances.***

7. ***Clean the balance with a damp cloth only (no solvents).***

8. ***Always warm-up the balance before use or leave on Stand-by (display off) overnight.***

9. ***Always handle the balance with care during use or when moving or storing.***

6 Balance Functions

Sampling Time Function (SAP): The ***SAP*** function allows the balance to adapt to the surrounding environmental conditions. The ***SAP*** should be adjusted to a small value for corresponds to the "integration time" in seconds that the balance is using to display readings.

Stability Indicator Function (STb): All KERN 434 series balances use the star (H) symbol to indicate stability. When the H appears on the display, the balance has not yet stabilised. When the H disappears from the display, the balance is stable. The weight reading should be made only after the H has disappeared from the display and the indicator on the display for different sample types and weighing conditions. Small values for ***STb*** require very stable conditions before the H disappears from the display and large values allow the H to disappear under more reliable conditions such as animal weighing.

Adjusting (Cal): The ***Cal*** function is used to perform a Span Adjusting on the balance. See Span Adjusting page 35 for the steps required for this procedure.

Weighing Unit Selection (Uni): The ***Uni*** function is used to select and lock in different weighing units. ***Uni-1*** locks in grams or another unit and prevents switching between units. ***Uni-2*** allows the user to switch from grams to another unit by pushing the ***U*** key. See Weighing Unit Initialisation page 9 to select or change the available weighing units.

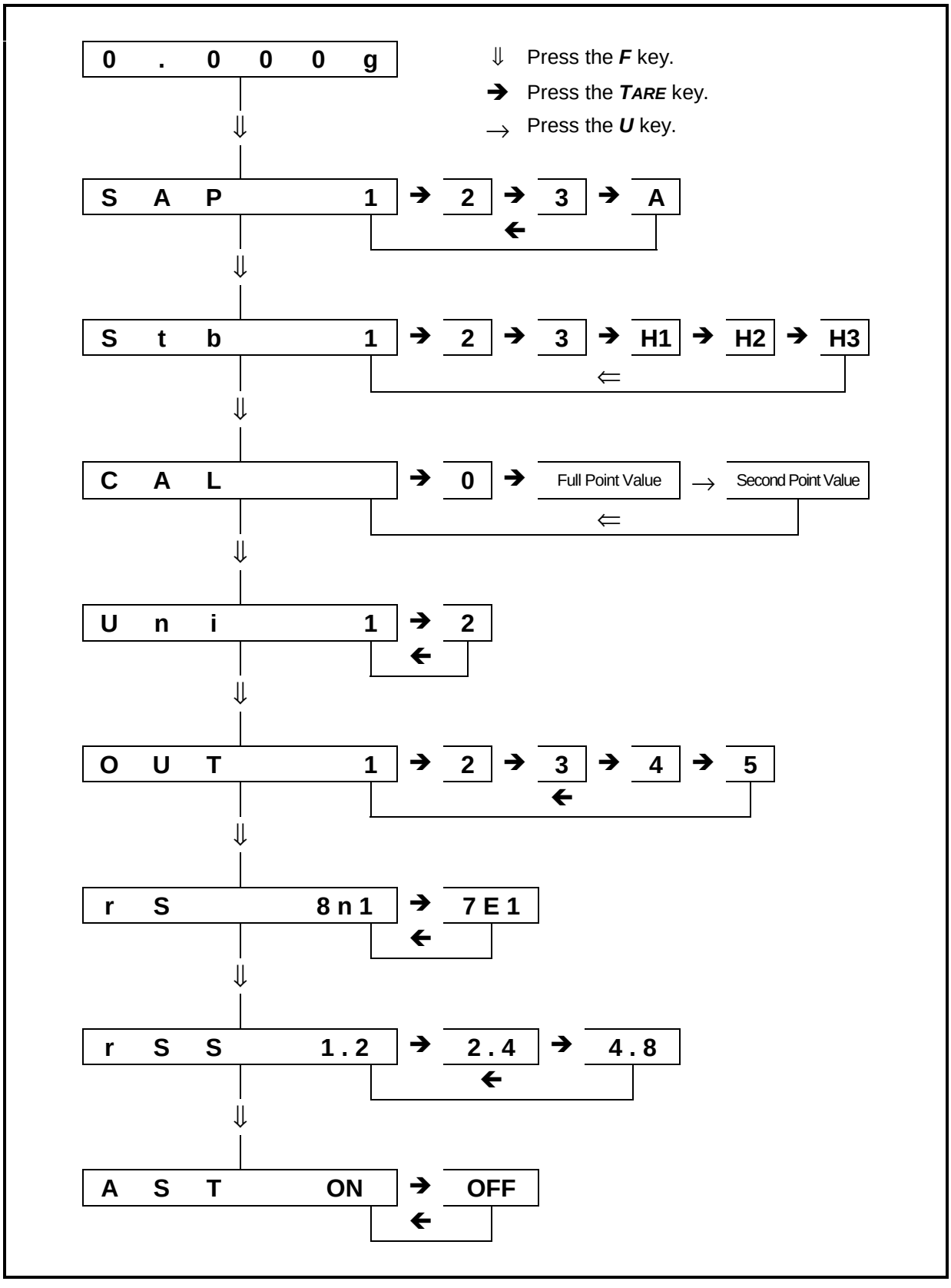
Output Data Mode (oUT): The ***oUT*** function is used to change the output data mode when using the RS-232 C interface. See RS-232 C Interface page 54.

RS-232 C Mode (rS): The ***rS*** function allows you to switch between 8 bit non-parity (8N1) and 7 bit even-parity (7E1)when using the RS-232 C Interface. See RS-232 C Interface page 58 - 63

Baud Rate Speed (rSS): The ***rSS*** function changes the baud rate speed when using the RS-232 C Interface. See RS-232 C Interface page 8 for the steps required for this procedure.

Auto-Start Mode (AST-ON): If ***auto-start mode*** is on, the balance will be weighing position immediately without pressing the ***On/Stby*** key.

7 Description of Function Menu



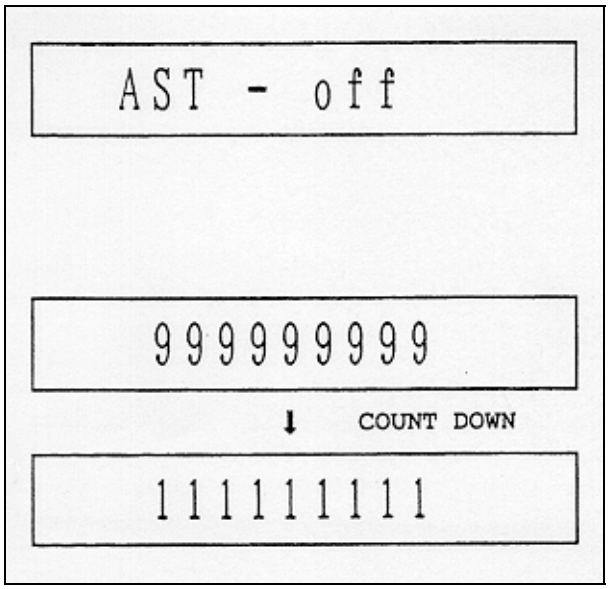
The display returns to the weighing mode if no operation is made for 3 sec. See the appropriate section for further explanation of individual function

8 Description of Functions

Display	Command	Selectable Setting		Factory Setting	Remarks
SAP	Range of Vibration Adapter	1	Very steady	2	Note 1
		2	Normal		
		3	Unstable		
		A	Extremely unstable		
STb	Range of Stability	1	Limited	2	Note 1
		2	Standard		
		3	Extensive		
		H1	HOLD - Limited		
		H2	HOLD - Standard		
		H3	HOLD - Extensive		
CAL	Adjusting	See the adjusting section (page 11).			Note 2
Uni	Unit Selection	Locking the key.		2	Note 3
		Release the lock.			
OUT	Data Transmission Mode	1	Output upon print command made only after the balance has stabilised.		Note 4
		2	After print command made, output as soon as balance has stabilised.		
		3	Output upon print command regard-less of stability.		
		4	Automatic output as soon as balance has stabilised.		
		5	Automatic output regardless of stability.		
rS	RS-232 C Interface Mode	8N1	8 bit Non-parity	8N1	Note 5
		7E1	7 bit Even-parity		
rSS	RS-232 C Interface Speed Mode	1.2	1200 BPS	1.2	Note 5
		2.4	2400 BPS		
		4.8	4800 BPS		
AST	Auto-Start Mode	ON	Auto-start is on.	OFF	Note 6
		OFF	Auto-start is off.		

9 Weighing Unit Initialisation

9.1 Keyboard Method



Step 1: Make certain that AST function mode (Automatic start) is off.

Step 2: To have the count-down display, once disconnect the AC adapter cord and reconnect it again.

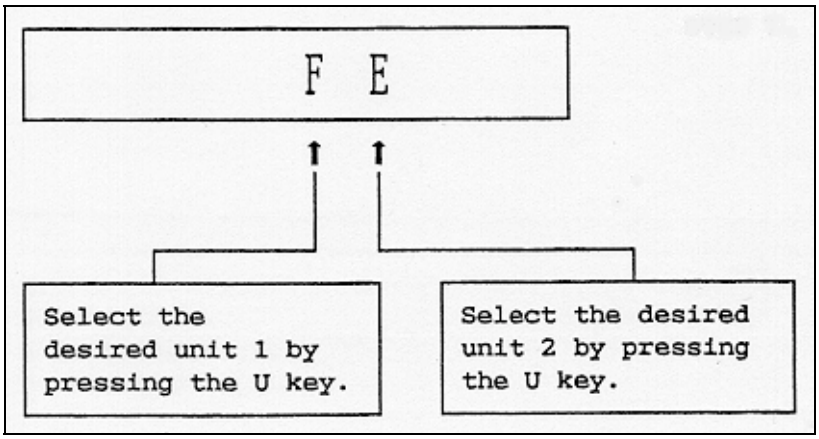
Step 3: Press and hold the ***TARE***, ***U*** and ***F*** keys at the same time when "***111111111***" appears.

Step 4: Release the keys when the „All Segment" line appears.

Step 5: Parameter number will appear after „All Segment" line has stopped flashing.

Step 6: Two units in addition to grams can be selected and programmed into memory. Grams will automatically be in memory and does not need to be selected in this procedure. Unit 1 is selected by pressing the ***U*** key until the unit code place. Unit 2 is selected by pressing the ***TARE*** key until the unit does appear on the display in the Unit 2 digit place. For example, if you select Units F and E as shown below the balance will show weighing results in Piece Counting and Percent.

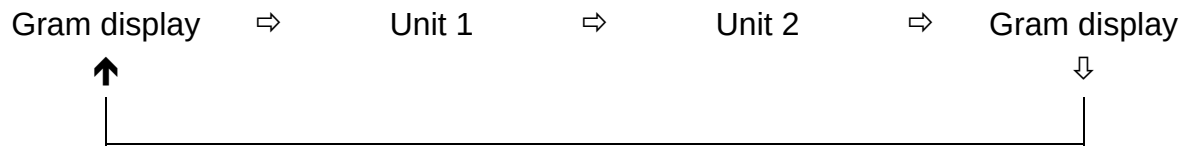
Step 7: Press the ***F*** key to store your selections. Check to make certain the desired units have been stored by pressing the ***U*** key. When the unit selection (Uni) is set at Uni-2 you can switch between units by pressing the ***U*** key. The Uni-1 setting locks in one unit and switching to another unit is not possible.



Step 8: Press the F key to complete the Unit Selection procedure.

Display Circular

(⇨ Press the ***U*** key)

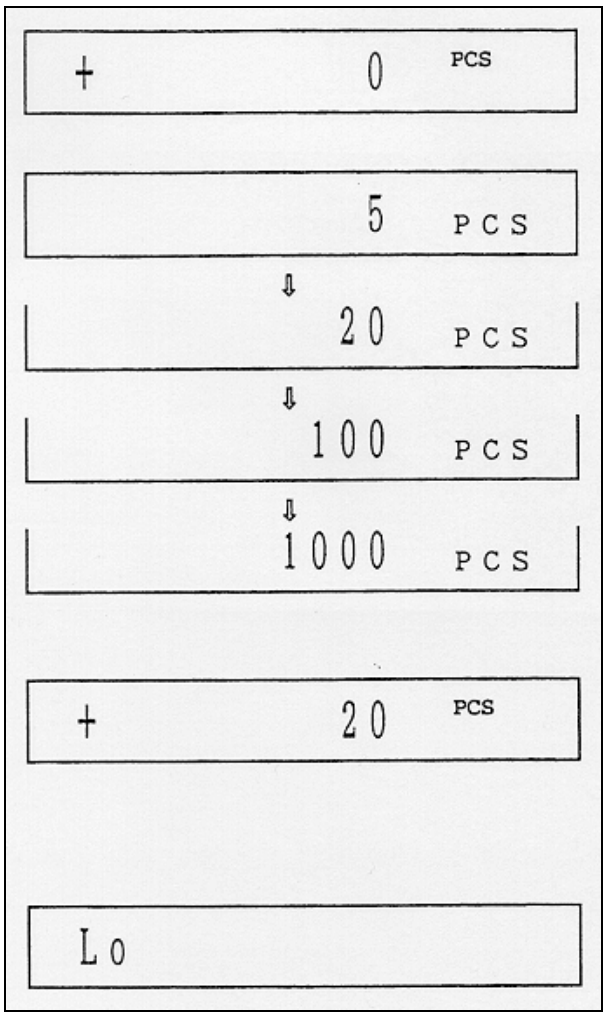


9.2 Parameter Number Chart

0	Gram	g	9		Carat	C.M
1	Cancel last digit	g	A		Momme	mom
2	Kilogram	kg	B		Taiwan Tael	tl
3	Pound	lb	C		Singapore Tael	tl
4	Ounce	oz	D		Hongkong Tael	tl
5	Troy ounce	ozt	E	H	Percent	%
6	Grain	gr	F	H	Piece counting	pcs
7	Pennyweight	dwt				
8	Carat	ct				

H Factory setting

10 Piece Counting Mode



Step 1: Press the ***U*** key to switch the display to Piece Counting Mode (see Weighing Unit Initialisation page 11).

Step 2: Press the ***F*** key until the desired count value is displayed, 5, 20, 100 or 1000 pcs.

Step 3: Count out the same number of sample pieces as you selected in Step 2, and place them on the weighing pan.

Step 4: Press the ***TARE*** key to memorise the number of sample pieces and their unit weight. The display will flash until the balance has memorised this data.

Step 5: Proceed with piece counting.

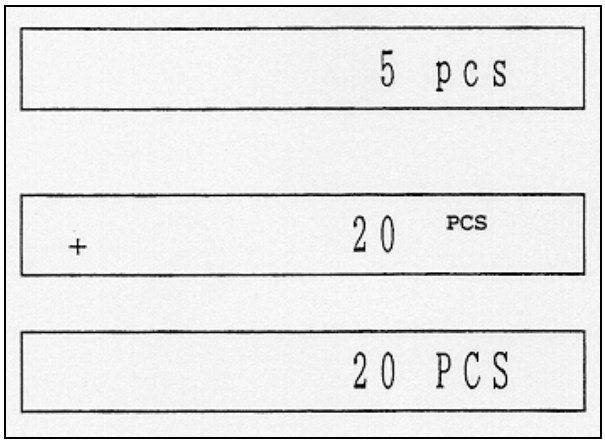
Step 6: If the display shows a ***"Lo"*** message when pressing the ***TARE*** key, the unit weight of the sample pieces is less than the balance can detect.

The minimum weight of each sample piece required to establish piece counting is as follows:

KERN 434-23	⇑	*0.01 g*
KERN 434-33	⇑	*0.01 g*
KERN 434-37	⇑	*0.1 g*

10.1 Removing establishment of the standard unit weight for piece counting

This unique function of the KERN 434 series is used to easily increase the number of pieces of sample used as your piece counting standard without taking the time to count out each standard sample separately. This is important because the greater the number of sample pieces used to set your standard, the more accurate an precise your piece counting will be.



Step 1: Establish the standard number of sample pieces and unit weight at 5 PCS, for example, by following the procedure on the previous page.

Step 2: Place 15 more sample pieces on the weighing pan. The display will show that there are 20 pieces on the pan.

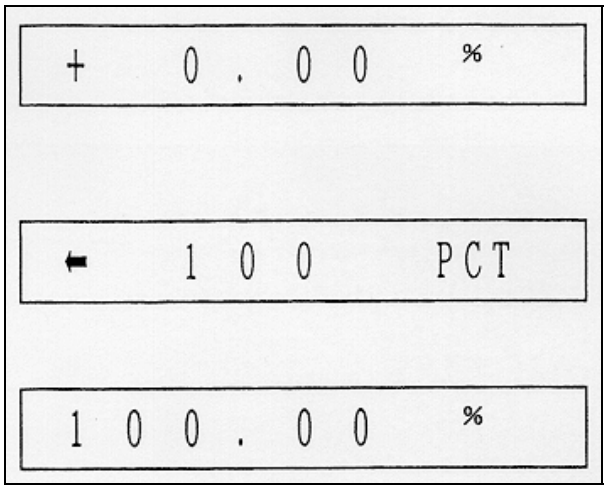
Step 3: Leave the 20 pieces on the weighing pan and press the ***F*** key until 20 PCS appears on the display.

Step 4: Press the ***Tare*** key to memorise the new number of sample pieces and the new unit weight.

Step 5: Follow the same procedure to increase the standard to 100 or 1000 pieces.

Note: The key is to let the balance do the counting for you when establishing the standard. For example, count out 20 pieces by yourself and set the standard at 20 pieces. Use the piece counting mode to count up to 100 pieces and set the new standard at 100 pieces. Then use the piece counting mode again to count up to 1000 pieces and set the new standard again at 1000 pieces.

11 Percent Mode



Target weight:

Step 1: Continuously press the ***U*** key until "%" appears.

Step 2: Place a sample of the ideal 100% weight on the weighing pan.

Step 3: Press the ***F*** key to memorise the 100% weight. Make certain that "←" sign appears when entering a sample. Press the ***TARE*** key if the "←" sign does not appear.

Step 4: Percent mode procedure is complete when "100.00%" appears. Proceed with percent weighing by placing a new sample on the weighing pan. Percentage display is 100.00& for KERN 434-23, KERN 434-33 and KERN 434-37.

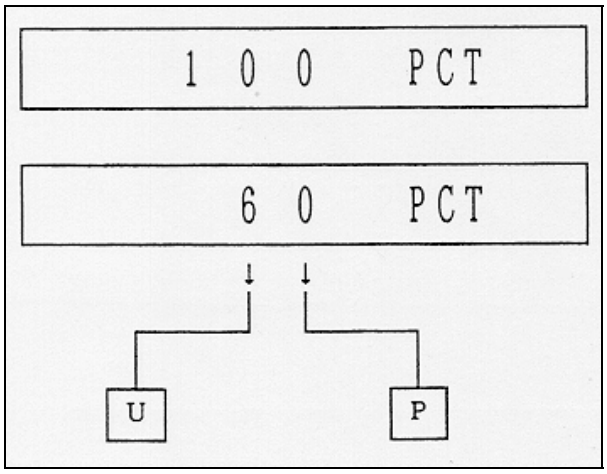
The minimum weight of the 100% sample required to establish percent weighing is as follows:

KERN 434-23	⇑	*1 g*
KERN 434-33	⇑	*1 g*
KERN 434-37	⇑	*10 g*

11.1 Weighing Mixture Mode

This mode is used when you want to mix two sample together. For instance when you add sample B to sample A to make a 100% mixture sample.

Sample B 40 %
Sample A 60 %



Step 1: First, memorise sample A to be the 100 % weight by using the percent mode procedure above.

Step 2: Reset sample A at 60 % weight by pressing the ***U*** and ***P*** keys.

Step 3: Add sample B to sample A until the 100 % weight is reached.

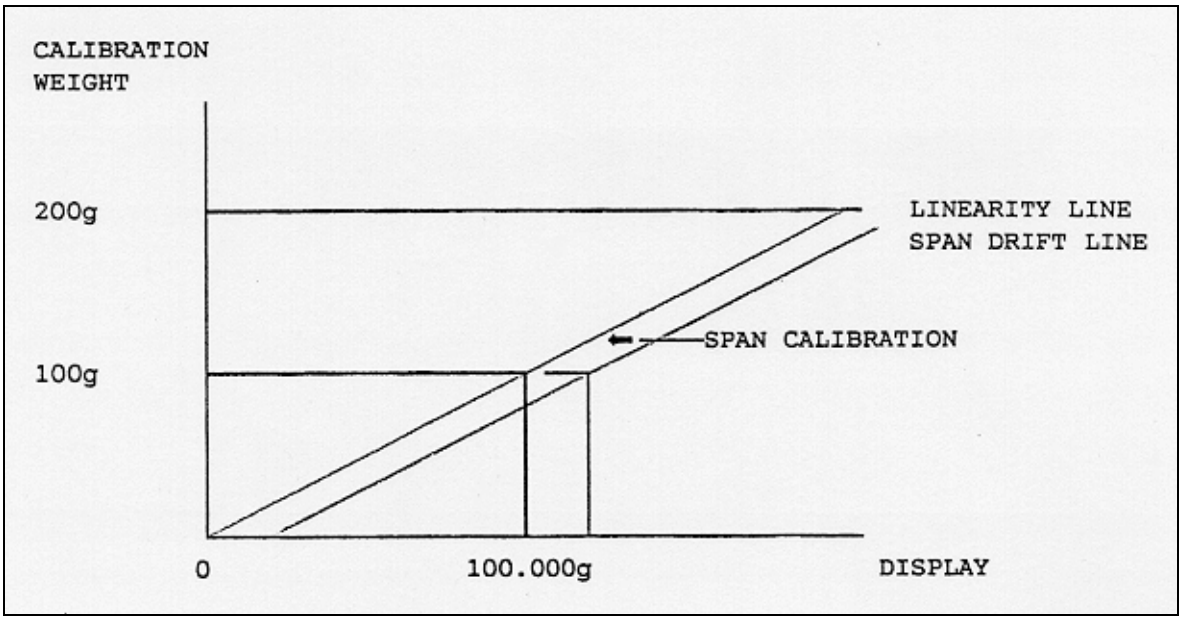
12 Adjusting Introduction

Adjusting of KERN 434 series precision balances is required at initial installation, any time the balance is moved or bumped, whenever the ambient temperature changes by more than 3° C, and additionally every 30 days or so. Adjusting is necessary for two main reasons. First, with time and use, mechanical deviations can occur. Secondly, the weight of a mass in one location or under a certain set of conditions will not always be the same at a different location or under a different set of conditions.

There are a number of adjusting procedures that will need to be done during the life of a KERN 434 series balance. They are briefly explained below. The actual adjusting procedures are contained throughout this manual (see Table of Contents page 2).

Linearity Adjusting: *The purpose of Linearity Adjusting is to create a straight line from Zero to the Full Capacity Scale Value to that the balance will display accurate weighing results at all values in between. On the graph below, the Y-axis represents the "true weight" of a mass on the weighing pan and the X-axis represents the weight displayed by the balance. An accurate mass of any weight value will be plotted on a linear (straight line) path from zero to the maximum capacity. However, although a straight line will be generated by Linear Adjusting, this line must be correctly placed by the balance during Span Adjusting (see Linearity Adjusting page 41).*

Span Adjusting: *With Span Adjusting, we are shifting the straight line generated during Linearity Adjusting by giving it the Zero Load Value and the full capacity adjusting mass value as reference points (see Span Adjusting page 43).*



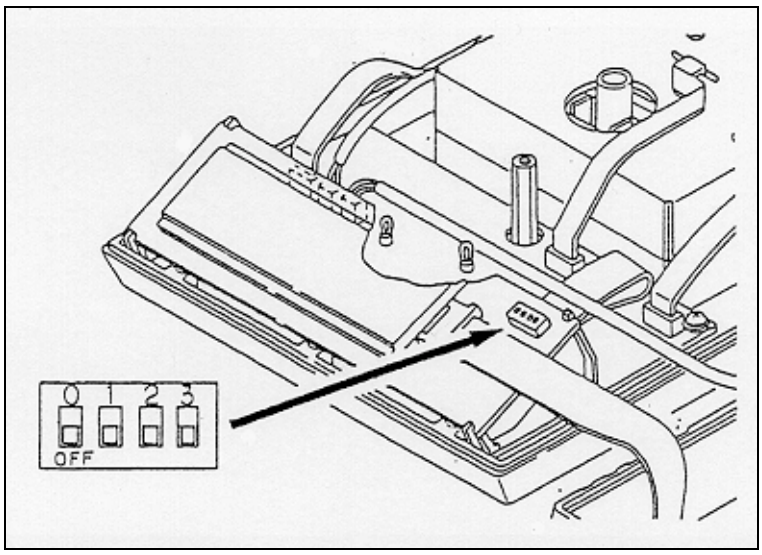
Temperature Compensation Adjusting: *The KERN 434 Mechanical Unit operates by a force coil moving inside a permanent magnet. A change in ambient temperature causes a change in the temperature of the Mechanical Unit, in turn altering the characteristics of the magnet. Unless this is compensated for, it will cause sensitivity drift problems. KERN 434 balances use a transistor temperature sensor in the Mechanical Unit to detect changes in temperature. The temperature compensation settings, which match the temperature characteristics of the Mechanical Unit sensor, are stored in Electronic Erasable Programmable Read Only Memory (EEPROM).*

All KERN 434 series balances undergo a Temperature Compensation Adjusting at the factory before shipment. At that time all temperature compensations settings are programmed into EEPROM. Therefore, it is not necessary to perform this adjusting regularly to avoid sensitivity drift problems.

EEPROM: *If the EEPROM is lost due to a component replacement or short circuit, all adjusting data is cleared. If this happens, the EEPROM must be reinitialised. Reinitialisations of the EEPROM must always be followed by Linearity and Span Adjustings. Depending the user's needs, a Temperature Compensation Adjusting may also be necessary (see Initialisation of EEPROM, page 39).*

13 Inner A /D Counter Check Mode

Many of the maintenance procedures contained in this manual require adjustments to the Inner A / D Counter Dip Switch, hereby referred to as Dip Switch, located on the Display P.C.B. (MJ-1A).



The Check Modes needed to perform the repair procedures contained in this manual are found below. When a Dip Switch adjustment is required, simply flip the switches so that they correspond to the appropriate Modes below.

Check 0 Mode

(Normal Weighing)

1	2	3	4	
ν	ν	ν	ν	***Off***
				On

Check 1 Mode

(A/D Count Data)

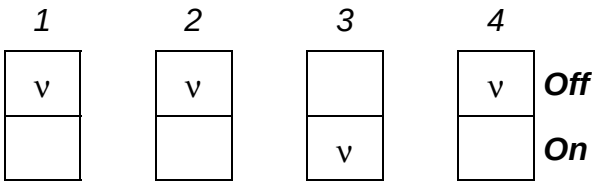
(A/D Counter Range 0000000 - 3884160)

1	2	3	4	
ν		ν	ν	***Off***
	ν			***On***

Check 2 Mode

(Temperature Compensation Data)

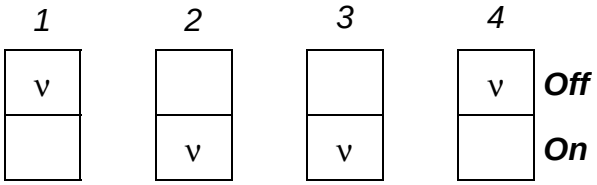
(A/D Counter Range 180000 - 220000)



Check 3 Mode

(Linearity Data)

(A/D Counter Range 0000000 - 3884160)



14 Disassembly / Assembly

14.1 Removing the Top Case

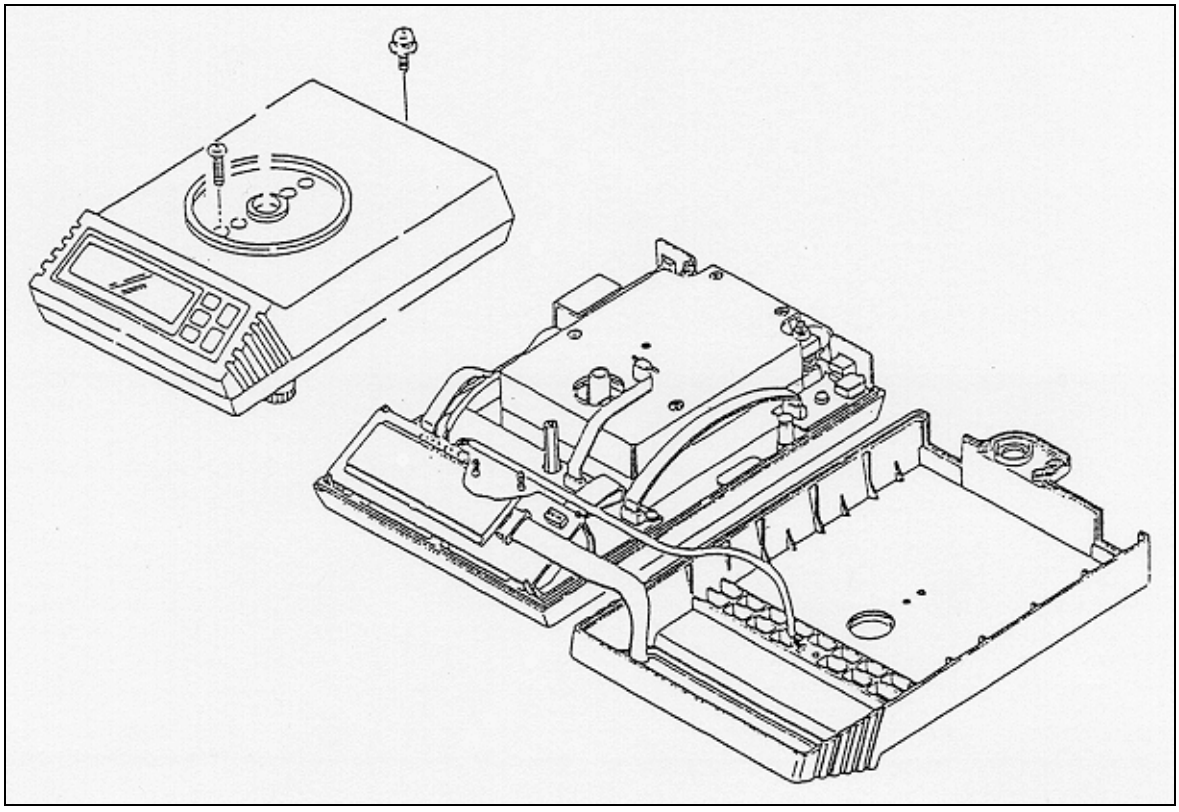
Step 1: Unplug the AC adapter from the balance.

Step 2: Remove the weighing pan and the pan support.

Step 3: Loosen a forehead screw toward the display keyboard and screws on rear side of the balance.

Step 4: Gently lift off the top cover, flipping it to the right.
Do not jerk the connecting cable.

Step 5: Disconnect all cables inside the balance.



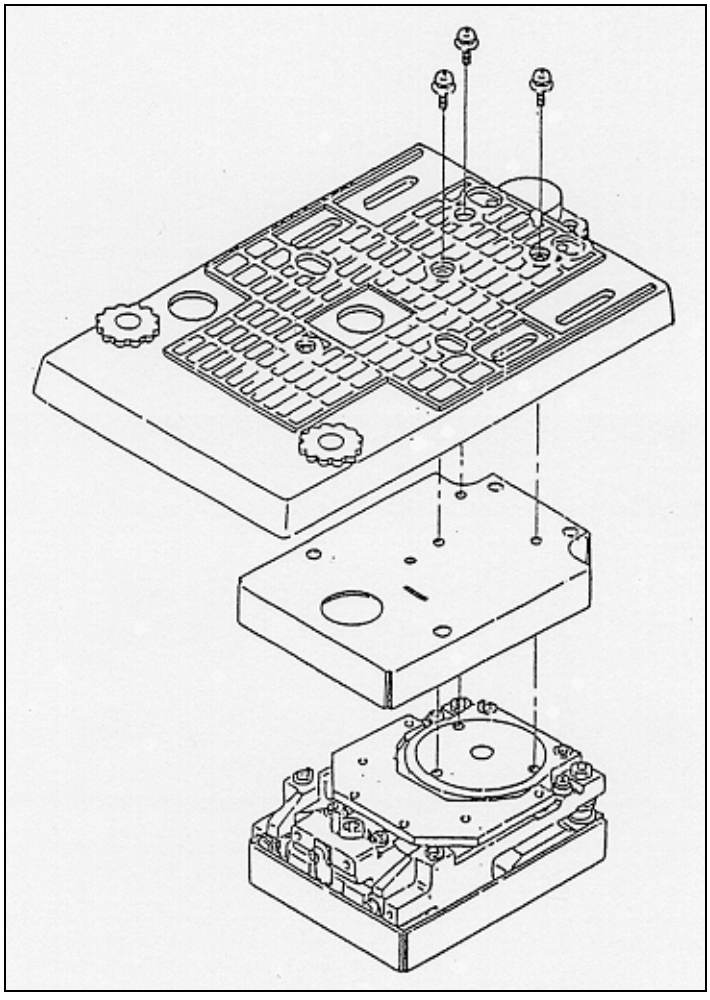
14.2 Removing the Mechanical Unit

Step 1: Loosen 3 screws on the bottom of the balance.

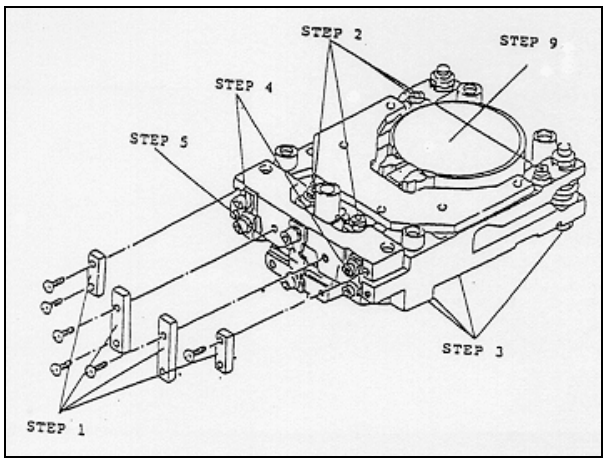
Step 2: Gently lift the Mechanical Unit box from the bottom case.

Step 3: Slowly place this Mechanical Unit box a flat surface and loosen 4 screws on top of this box.

Step 4: Open this box, then the Mechanical Unit will be exposed.



14.3 Mechanical Unit Disassembly



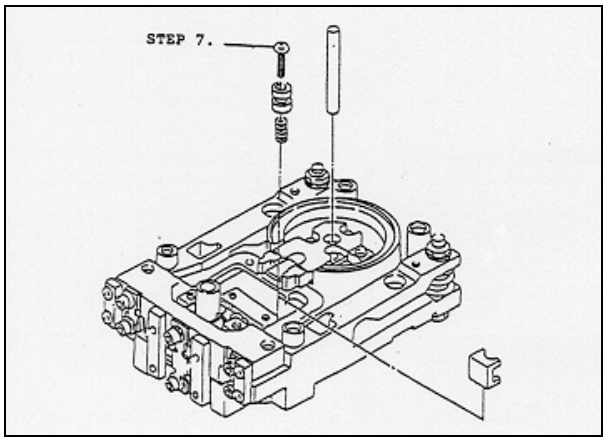
Step 1: Attach the appropriate KERN 434 Jig Set (the beam Jig and the beam-suspension Jig) - see the Jig Set page 21.

Step 2: Loosen 4 screws on the upper plate bearing assembly and remove it.

Step 3: Loosen 4 screws on the lower plate bearing assembly and remove it.

Step 4: Loosen 4 screws for removing vertical plate springs.

Step 5: Loosen 2 screws on bottom of the balance weight and remove it.

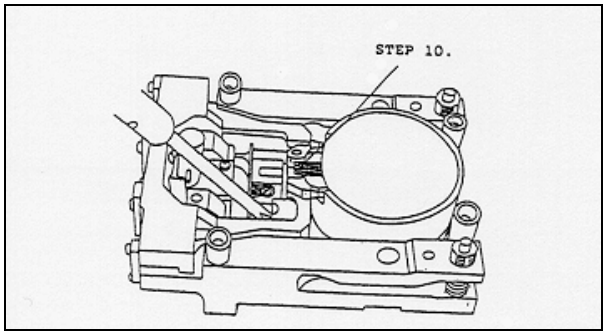


Step 6: Loosen 4 screws for removing a coupling link.

Step 7: Loosen a screw on top of the beam positioning and remove it.

Step 8: Make certain that the beam assembly, the suspension assembly and the mechanical unit base will be disassembled separately.

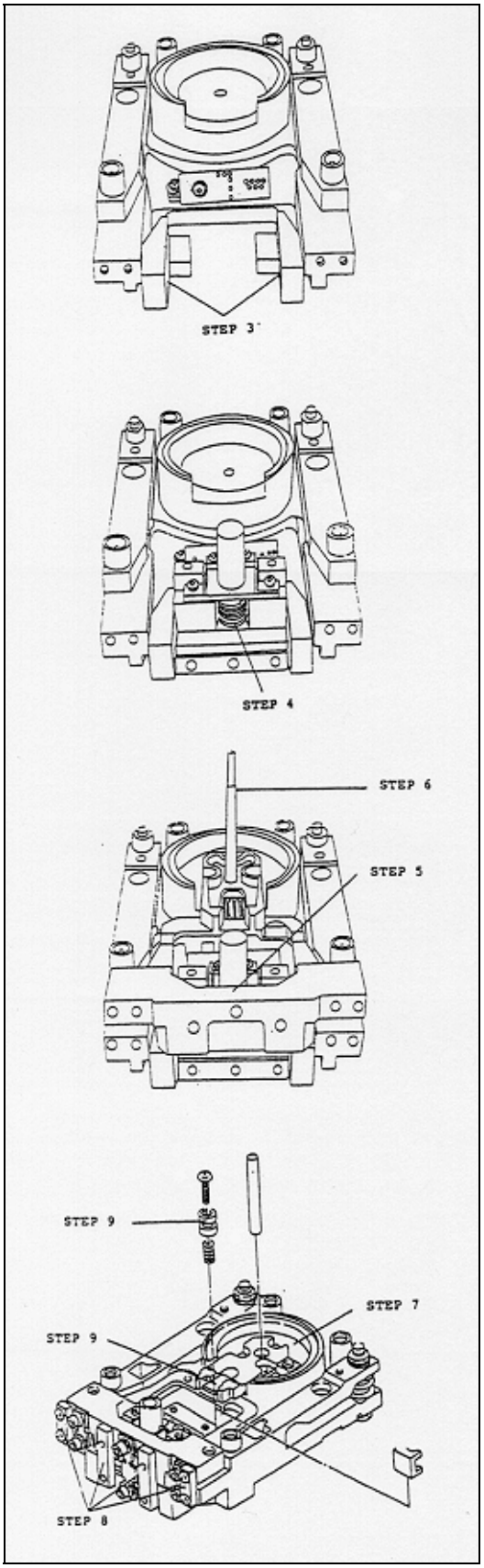
Step 9: Remove the magnet lid.



Step 10: Unsolder the short wire attached on the beam

Step 11: Remove the Force Coil Bobbin from the beam. We recommend that you should wear gloves when handling the Force Coil Bobbin.

14.4 Assembly



Step 1: Note that the beam assembly is the force coil bobbin attached to the beam.

Step 2: Slightly loosen the screws where the force coil bobbin is attached to the beam.

Step 3: Be laid and insert the right and left positioning jigs in the mechanical unit base.

Step 4: Mount the suspension assembly on the right and left positioning jigs.

Step 5: Gently mount the beam assembly on the mechanical unit.

Step 6: Insert the force coil bobbin jig into the force coil bobbin.

Step 7: Make certain that the force coil bobbin is completely positioned to have an even space between outer rim of the bobbin and the magnet inside. Then tighten the screws for fixing in between the force coil bobbin and the beam
And an edge of the beam will be positioned in right space inside the photo sensor.

Step 8: Reattach the beam and the suspension jigs by tightening the screws.

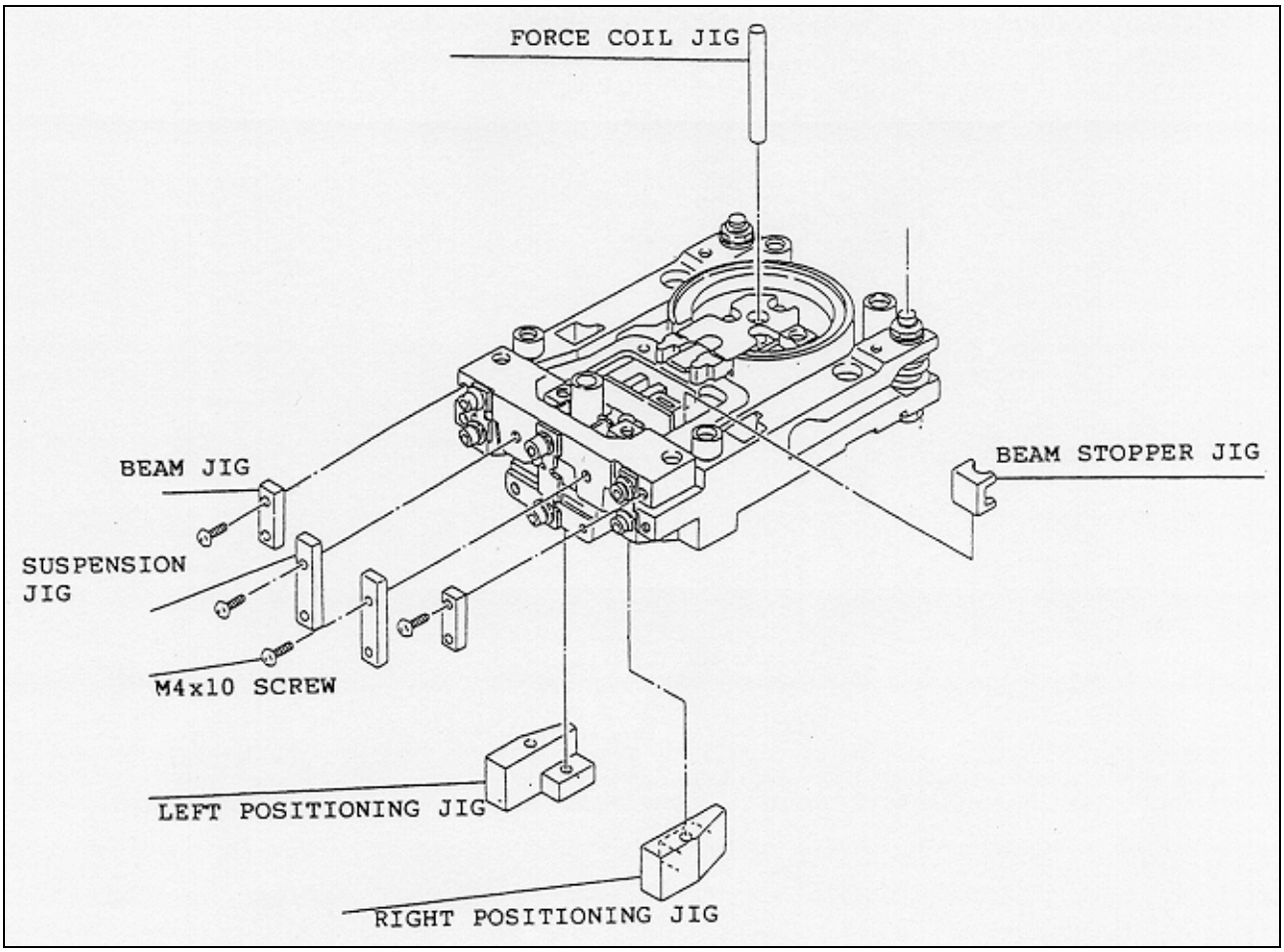
Step 9: Resolder the short wire and insert to tighten the beam stopper with the beam stopper jig.

Step 10: Make certain to tighten the screws that the beam stopper will be installed at an proper height with the beam stopper jig.

Step 11: Proceed steps of the disassembly, then removing the mechanical unit and then removing the top case in reverse order to be complete.

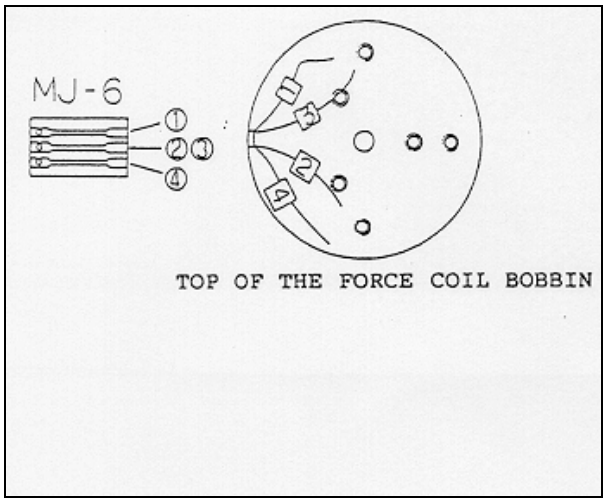
15 Jig Set

You should never attempt to replace Plate Bearings or disassemble the Mechanical Unit without first attaching the appropriate KERN 434 Jig Set. Even slight movements or shifts in the Mechanical Unit components can seriously hamper the performance and accuracy of the balance. The Jig Set's primary purpose, therefore, is to secure the Mechanical Unit to prevent such movements.



16 Additional Disassembly / Assembly

16.1 Replacement of the Force Coil Bobbin



Step 1: Completely follow all procedure orders of the Disassembly / Assembly section page 21).

Step 2: Solder to release 4 lead wires toward the force coil bobbin on the MJ-6 P.C.B. (Allow this small P.C.B. was attached on center of the beam).

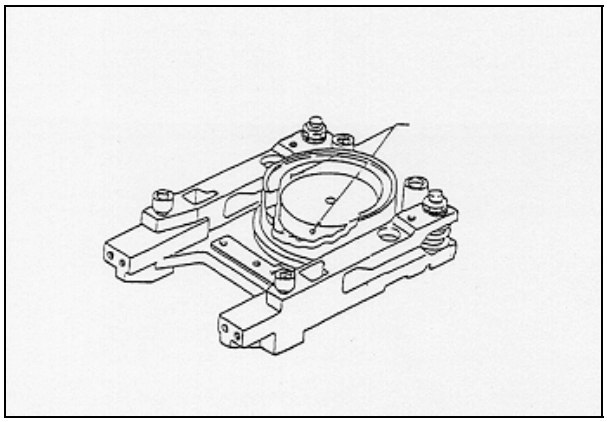
Step 3: Remove the force coil bobbin from the beam by loosening the screws. Allow counter weight(s) is also mounted on one or two of the same screw holes.

Step 4: Make certain that 4 lead wires were always isolated and attached in order on a new force coil bobbin.

Step 5: Slightly tighten the screws when reattaching the new force coil bobbin below the beam.

Step 6: make certain that 4 lead wires have to be resoldered exactly in order to the MJ-6 P.C.B.

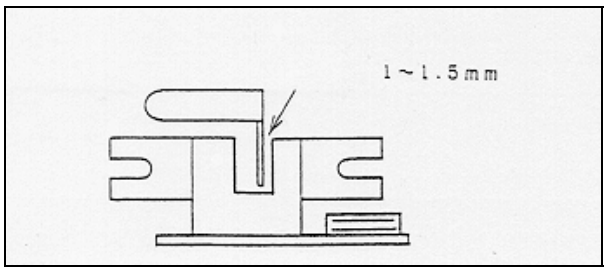
16.2 Cleaning Inside the Magnet



Step 1: Make certain that any dust is attaching inside the magnet.

Step 2: Always blow out or clean inside the magnet by air or adhesive tape.

16.3 Positioning Edge of the Beam Inside the Photo Sensor



Edge of the have has to be positioned 1 or 1.5 mm space inside the photo sensor.

17 Primary Checking Procedure

When checking a damaged balance, there are primarily 3 major checking procedures that should be followed in order until the damage is detected and corrected.

1. ***Visual Check (page 28)***
2. ***Mechanical Fault Finding (page 29)***
3. ***Electronic Fault Finding (page 49)***

Most repair problems that you will encounter will be a result of damage to the Mechanical unit during transport or rough usage. Occasionally you will also encounter problems resulting from damage to the Electronic Unit. Please carefully read the Disassembly / Assembly section on page 21 - 24 before going through the repair procedure.

18 Visual Check

A careful Visual Check should always be performed before attempting further repairs. If damage is detected during the Visual Check, replace the damaged unit.

Step 1: Balance Case and Chassis - There should be no cracks or gaps in the balance housing. Check that all housing screws are in place.

Step 2: Keyboard - They keyboard pad should be free of cracks or tears.

Step 3: Weighing Pan - The weighing pan and pan support should be free of dents or bends and should be parallel to the balance case.

Step 4: Level Vial - The level should be filled with fluid and the leveling bubble should be within the circle at the top. Use the adjustable feet to level the balance.

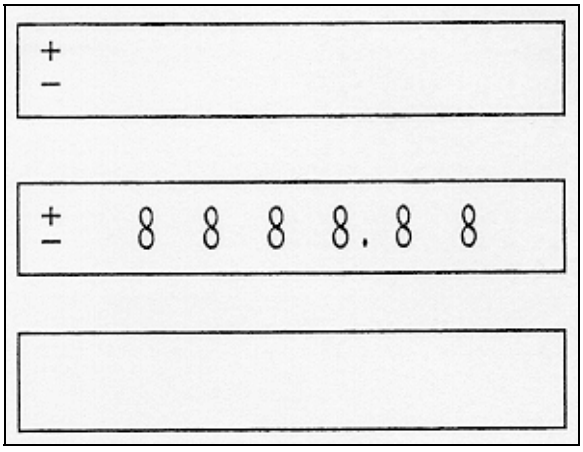
Step 5: RS-232C Interface - Check for any damage, including dirt in the connectors.

19 Mechanical Fault Finding

This section provides a simple fault finding method when checking a balance for Mechanical Unit damage. When mechanical damage is present, there are two major problems that can occur when the power switch is turned on. First, the display may show only a decimal point with a polarity sign (+ / -), "all segment lines" message or no display at all. The second problem is when the display shows and unstable weighing result.

19.1 "+ / - .", "All Segment Lines" or No Display

The procedure below is designed to fix a balance that shows the following displays when the power switch is turned on.



(Only a decimal point and + or - sign)

(All Segment Lines)

(No Display)

Step 1: Make certain that the Short Wires are correctly soldered (page 33).

Step 2: Make certain that all Connecting Cables are completely connected (page 21).

Step 3: Make certain that all Plate Bearings and the Coupling Link are not damaged, twisted or broken (page 35).

Step 4: Reprogram the Linearity into EEPROM by doing a Linearity Adjusting (page 41).

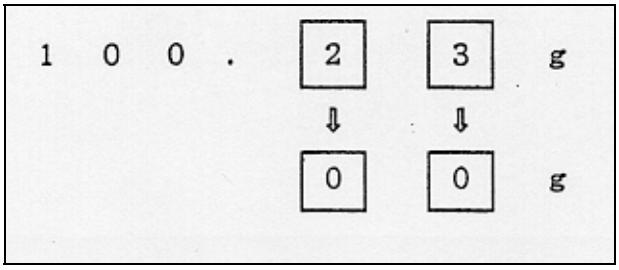
Step 5: Return to the normal weighing mode by setting Dip Switch 2 to Check 0 Mode, and make certain that the three error messages above are gone and that the balance shows a correct weighing display. If not, check all circuit boards.

Step 6: If the display shows an unstable weighing result, proceed to the Unstable Weighing Results Adjustment procedure on page 30.

Step 7: If the display shows a stable weighing reading, the problem has been corrected. Do a Span Adjusting (page 43) before beginning to weigh.

19.2 Unstable Weighing Results Adjustment

The procedure below is designed to fix a balance that shows unstable weighing results after the power switch has been turned on. Fox example, when a 100 g sample is placed on the KERN 434-23 and the display shows a reading that rapidly shifts from one reading to another the following adjustment must be made to bring the display back to a stable reading of 100.00 g.



Step 1: Make certain that all Plate Bearings and the Coupling Link are not damaged, twisted or broken (page 35).

Step 2: Adjust the Inner A / D Counter (page 19).

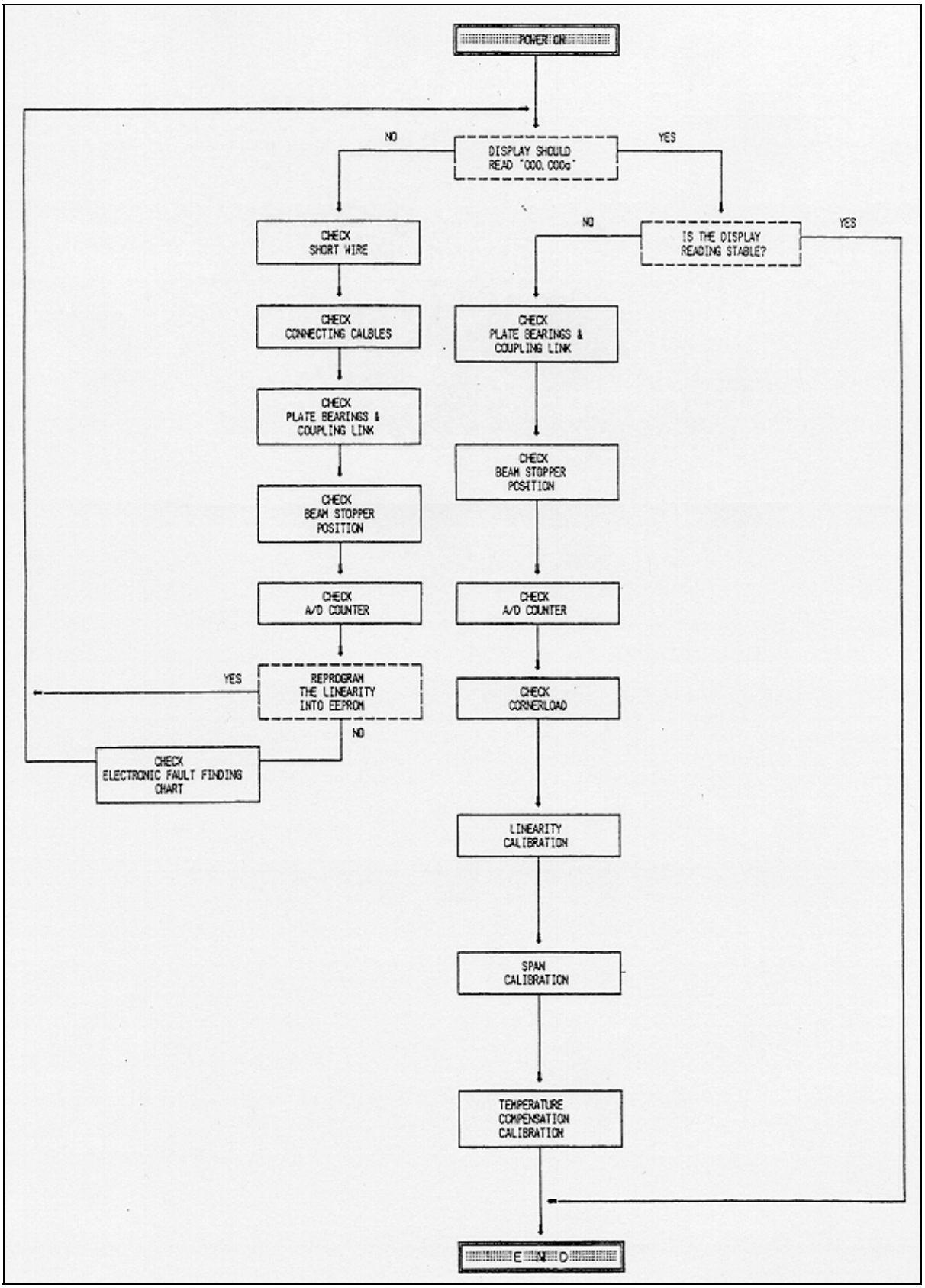
Step 3: Adjust the corner error by doing a Cornerload Adjustment (page 47 - 48).

Step 4: Reprogram the Linearity into EEPROM by doing a Linearity Adjusting (page 41).

Step 5: Do a Span Adjusting (page 43).

Step 6: If the problem has been corrected, the balance will display a "***Pass***" message. If a "***Pass***" message does not appear, check all circuit boards.

20 Mechanical Fault Finding Chart



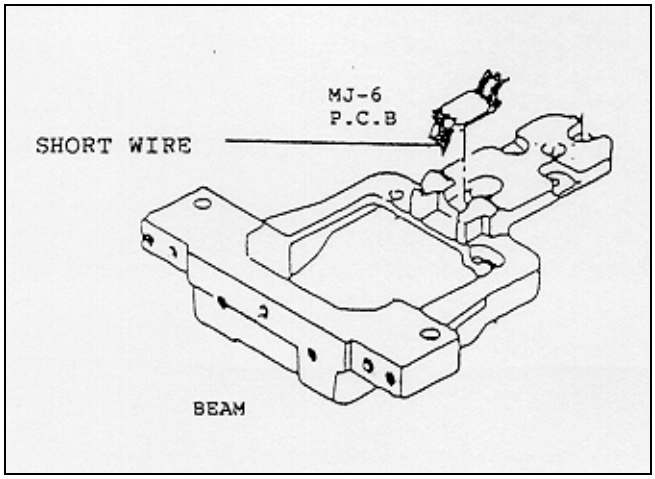
21 Short Wire Check

The Short Wire (two wires) is used to conduct electronic current from the Photo Sensor to the Force Coil Bobbin. The voltage that reaches the Bobbin via the Short Wires provides the magnetic power required for the Beam to reach equilibrium when a sample is placed on the Weighing Pan.

Step 1: Remove the top cover (see Disassembly / Assembly page 21).

Step 2: Check the Short Wire to make sure that it is securely soldered.

Step 3: If the Short Wire is disconnected, then resolder. When resoldering, maintain contact with the soldering iron for only 1 second to avoid melting the wire.

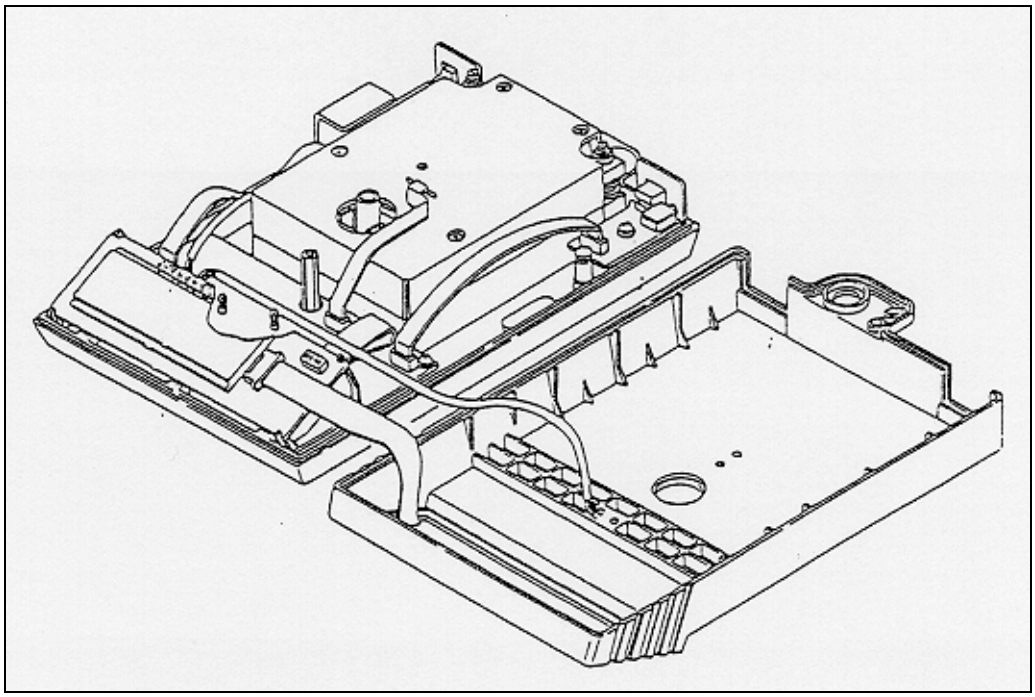


22 Connecting Cable Check

Step 1: Remove the top cover (see Disassembly / Assembly page 21).

Step 2: Check all Cables for damage. Take special notice of all bending parts and Cable Connectors.

Step 3: Make certain that all Connecting Cables are properly connected. Cables should be checked in the order given in the illustration below.



23 Plate Bearing / Coupling Link Check

To replace Plate Bearings or Coupling Links you must have the Jig Set used exclusively on KERN 434 series balances. Do not attempt to disassemble the Mechanical Unit or replace Plate Bearings without the appropriate Jig Set. Please read the Disassembly / Assembly and Jig Set sections (page 25) before attempting the steps below.

Step 1: Remove the Mechanical Unit from the base unit.

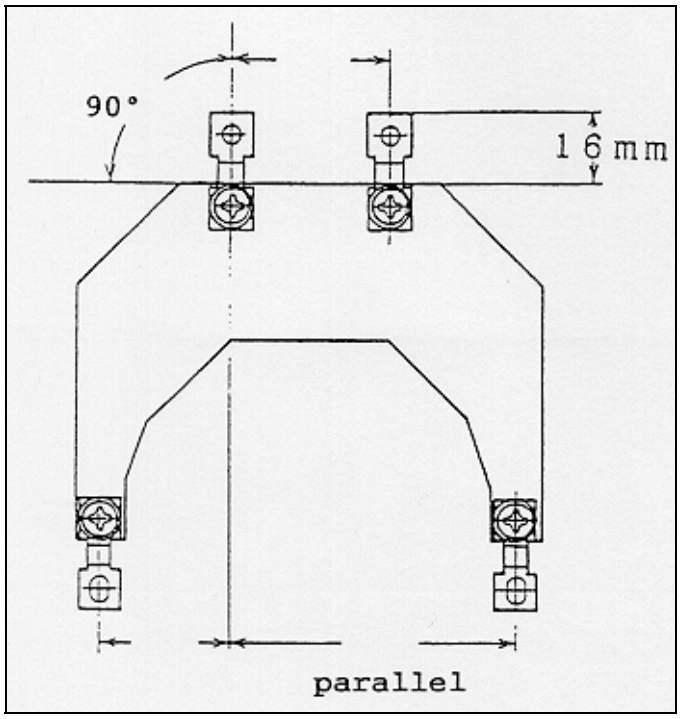
Step 2: Check all Plate Bearings and the Coupling Link for bending, breakage or other damage.

Step 3: If replacement is required, install the appropriate KERN 434 Jig Set on the Mechanical Unit. Make certain that the Jig Set has been properly attached.

Step 4: Remove the damaged part from the Mechanical Unit.

Step 5: Replace the Plate Bearing or Coupling Link. Visually check to be sure the new part is perfectly straight and even.

Step 6: Remove Jig Set and return Mechanical Unit to the balance housing.

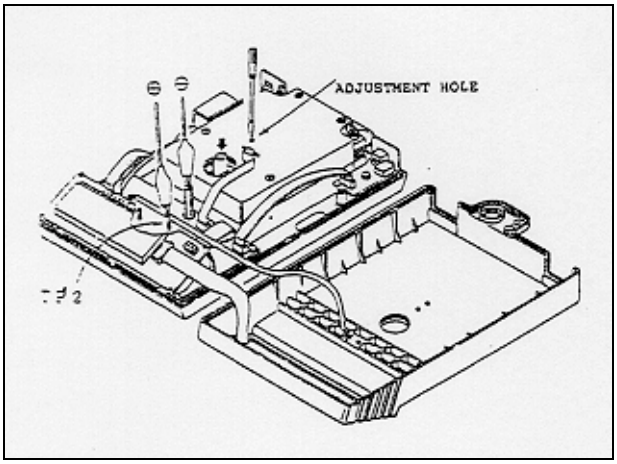


Remark: *When reattaching plate bearing(s), then your tightening torgue has to be exactly the same compared to other tightening torgues.*

KERN 434-23, 434-33	*1 Nm (10 kgfcm)*
KERN 434-37	*1.8 Nm (18 kgfcm)*

24 Beam Stopper Adjustment

This procedure is required to adjust the up-down movement range of the Beam in order to get a proper analogue count. The Photo Sensor will catch the up-down movement of the Beam and determine the proper supply of electronic current sent to the magnet.



Step 1: Remove the Balance Case (see Assembly / Disassembly page 21 - 24-).

Step 2: Make certain that the beam stopper has to be set at exact height by using the beam stopper jig.

Step 3: Reassemble the scale as shown in the illustration. And make certain that all connecting cables have to be set completely.

Step 4: Re-plug AC adapter cord to the balance.

Step 5: Contact a Digital Tester to Ground and Contact Point TP 2 on the MJ-1 P.C.B.

Step 6: Allow an adjustment hole right behind the pan suspension.

Step 7: Insert a screw driver in the hole and screw up or down the extension piece space until the acceptable voltage + 3 V appears on the Tester.

Step 8: Absolute voltage has to be ± 3 V even comparing No Load and Full Load.

☞

- Contact Pin to GND *+ Contact Point to TP 2*

☞

Acceptable Voltage Range	
No Load	*+ 3 V ± 1 V*
Full Load	*- 3 V ± 1 V*

25 A / D Converter Check

When checking the A / D Converter you will be looking at the inner A / C count from the Mechanical Unit. Three weighing conditions will be tested and at the appropriate step you will be reading a number on the display and comparing it to Table A below.

Table A

Model	*Adjusting Masses*			*A / D Count Value*
	No Load	*A*	*B*	
KERN 434-23	*0 g*	*250 g*	*300 g*	*138720 - 971040* *1720128 - 2164032* *1803360 - 2635680*
KERN 434-33	*0 g*	*250 g*	*500 g*	*138720 - 971040* *1720128 - 2164032* *2913120 - 3745440*
KERN 434-37	*0 g*	*1500 g*	*3000 g*	*138720 - 971040* *1720128 - 2164032* *2913120 - 3745440*

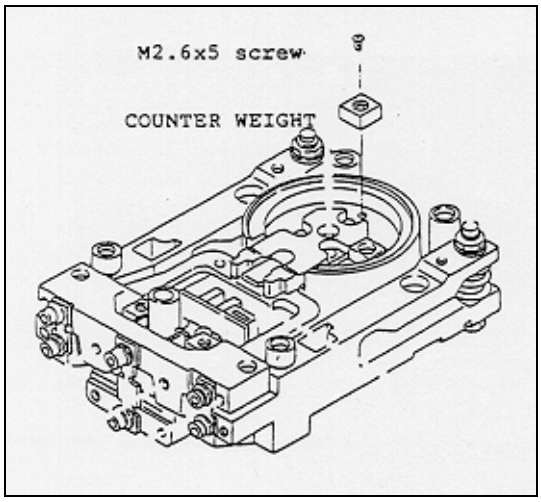
Step 1: Set the balance to Check 3 Mode (see Inner A / D Counter Check Modes page 19).

Step 2: Turn the power switch ***On***.

Step 3: Make certain the balance has no load on the pan. Check to make certain that A / D count value will be appeared within the correct range.

Step 4: Continuously place different adjusting masses A & B in accordance with Table A. And make certain that A / D count values are displayed as same as the Table A shows. If wrong A / D count value appears, then you must readjust to replace counter weight(s) on the force coil bobbin.

Step 5: Remove to readjust the counter weight if attached for having the correct value. If not attached, then reattach the weight.



26 Initialisation of EEPROM

This procedure is necessary only when a complete loss of memory has occurred. A loss of memory can occur from a component replacement, short circuit or other electronic problem. To successfully complete this procedure you will need to initialise the RAM, do a Linearity Adjusting and a Span Adjusting. You may also need to do a Temperature Compensation Adjusting.

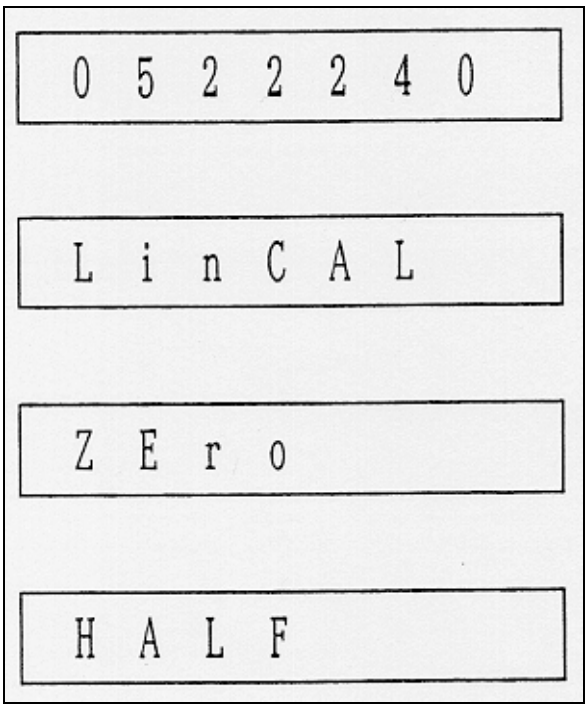
Step 1: Readjust the Linearity Adjusting (see Linearity Adjusting page 41).

Step 2: Readjust the Span Adjusting (see Span Adjusting page 43).

27 Linearity Adjusting

The purpose of Linearity Adjusting is to create a straight line from Zero to the Full Capacity Scale Value so that the balance will display accurate weighing results at all values in between. For this adjusting procedure, please use a high quality, non-magnetic-metric, stainless steel „Standard Mass“ that is OIML Class F2 or better. Whenever Linearity Adjusting is performed on the balance, it must be followed by a Span Adjusting.

27.1 Linearity Adjusting Procedure



Step 1: The balance should be fully warmed-up (plugged in for 30 minutes) and all of the Best Conditions for Weighing (page 7) should be met.

Step 2: With the power switch ***OFF***, reset Dip-Switch 2 & 3 to the Check 3 Mode.

Step 3: Turn the power switch ***ON*** while pressing the ***F*** key. The current A / D convert value will appear on the display.

Step 4: Press the ***TARE*** key for proceeding the procedure steps. Allow that "***Lin CAL***" appears on the display.

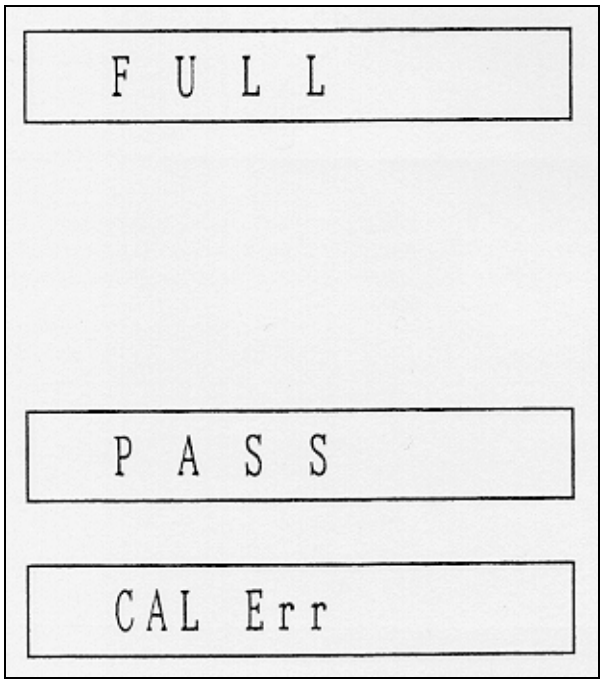
Step 5: Press the ***TARE*** key. Allow that "***ZEro***" appears on the display.

Step 6: Press the ***TARE*** key. Allow that "***HALF***" appears on the display.

Step 7: Carefully place an adequate size of the adjusting weight A on the weighing pan. See the Adjusting Masses Chart.

27.2 Adjusting Masses Chart

Model	*Adjusting Mass Size*	
	A - Half Size	*B - Full Size*
KERN 434-23	*150 g*	*300 g*
KERN 434-33	*250 g*	*500 g*
KERN 434-37	*1500 g*	*3000 g*



Step 8: Press the ***TARE*** key. Allow that "***FULL***" appears on the display.

Step 9: Carefully place an adequate size of the adjusting mass B on the weighing pan. See the Adjusting Masses Chart.

Step 10: Press the ***TARE*** key. Allow that "***PASS***" appears on the display.
The above procedure is successfully completed.

If "***CAL Err***" appears, then check to make certain the procedure was followed correctly including proper size adjusting mass.

28 Span Adjusting

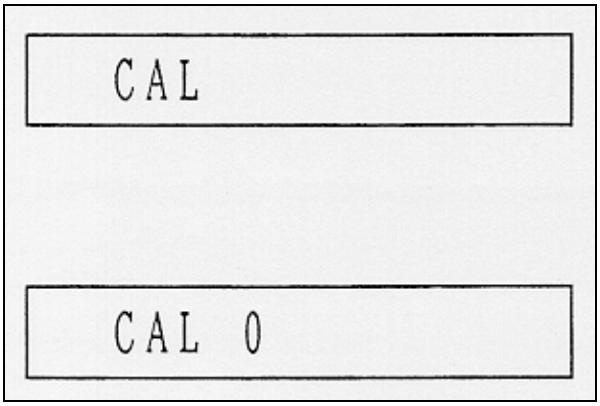
The balance should be adjusted for span when it is first installed, any time it is moved or bumped, whenever the ambient temperature changes by more than 3° C, and additionally every 30 days or so. For this adjusting procedure, please use a high quality, non-magnetic, metric, stainless steel "Standard Mass" that is OIML Class F2 or better.

28.1 Adjusting Masses Chart

Model	***Adjusting Masses***	
	A	***B***
KERN 434-23	*300 g*	*200 g*
KERN 434-33	*500 g*	*300 g*
KERN 434-37	*3000 g*	*2000 g*

Step 1: The balance should be fully warmed-up (plugged in for 30 minutes) and all of the Best Conditions for Weighing (page 7) should be met.

Step 2: Reset Dip Switch 2 to the Check 0 Mode (normal weighing).

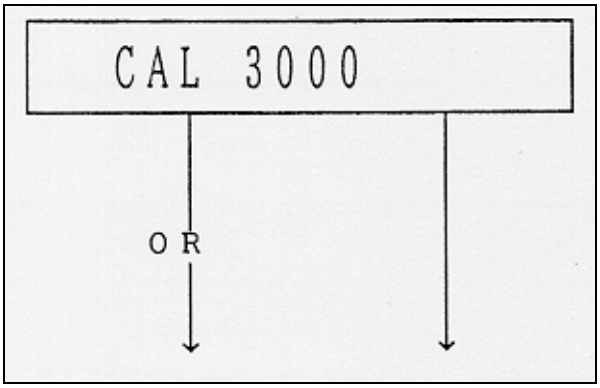


Step 3: Continuously press the ***F*** key until ***"CAL"*** appears on the display.

Step 4: Press the ***TARE*** key. Allow that ***"CAL 0"*** appears on the display.

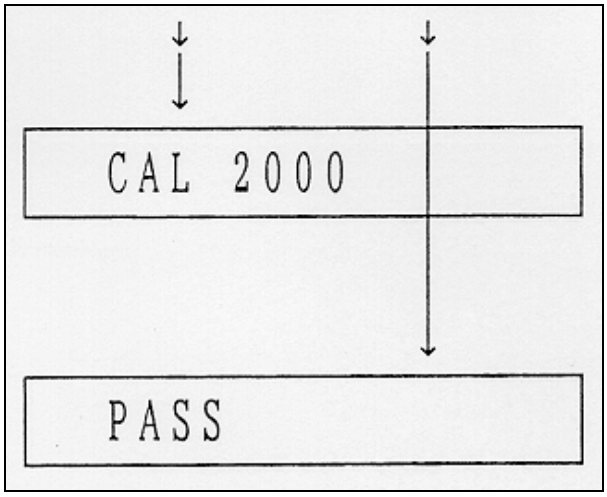
Step 5: Press the ***TARE*** key. The balance automatically sets Zero.
Do not disturb the balance when pressing the ***TARE*** key.

(In case of KERN 434-37)



Step 6: The balanced will then request the appropriate size adjusting masses. Carefully place the adjusting masses on the weighing pan.

Step 7: Press the ***U*** key.

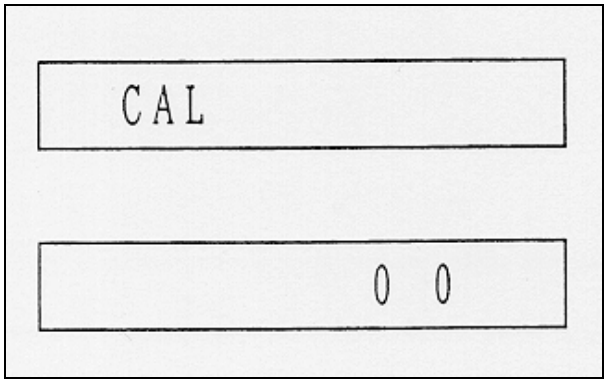


Step 8: It is better to place an adequate adjusting mass A size as same as a full capacity value. However, if unfortunately you have limited numbers of the adjusting mass, then choose this secondary procedure as follows the adjusting mass B size.

Step 9: "PASS" appears on the display when adjusting is complete.

28.2 Adjusting Mass Tolerance Collection

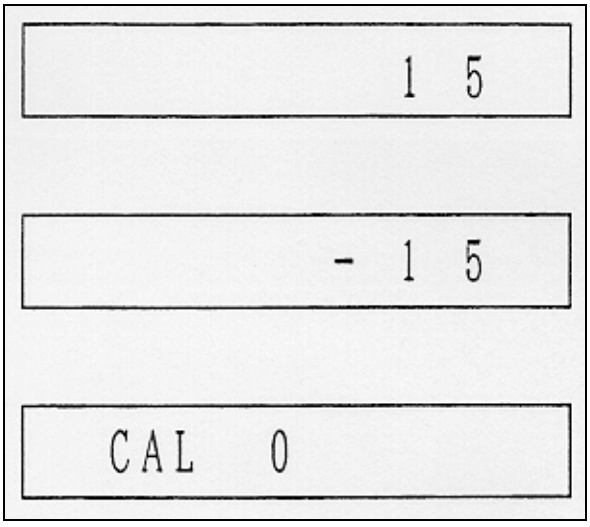
If users desire to request for you to readjust KERN 434 balances by standard masses, it is common to know that Standard Masses have always been certified with an exact tolerance by your local Measurement Authority, then readjust the span of the KERN 434 balances with this exact tolerance as follows the below additional procedures.



Step 1: Continuously press the ***F*** key until ***"CAL"*** appears on the display.

Step 2: Press the ***U*** key. Allow the deviation number appear on the display. Proceed to readjust a deviation value as calculation of programmed adjusting value - true value of the standard mass.

For instance, in case of KERN 434-37, programmed adjusting value is 2000.00 g and true value of the standard mass is 1999.85 g (you have to round off the numeric figures below than 1 mg readings). The deviation is + 0.15 g equal to programmed deviation 15.



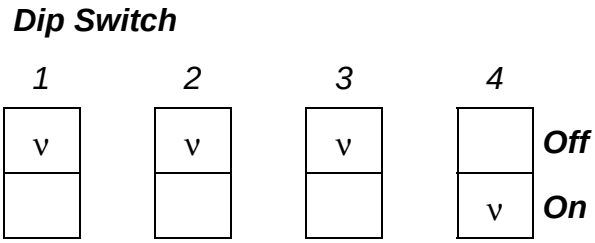
Step 3: Press continuously the ***U*** key for resetting the deviation value. Maximum setting value is up to ± 25 deviation value.

Step 4: If setting value is - 15, then press the ***P*** key. Minus polarity will appear on the display for resetting negative values.

Step 5: Press the ***TARE*** key for this setting. Allow ***"CAL 0"*** to appear on the display. Then this procedure is complete. Follow the same steps of the span adjusting procedure.

28.3 Disable the Span Adjusting Function

If the user does not require to have the adjusting function on KERN 434 balances, then simply reset a combination of the dip switches to disable this function.



Step 1: Open the top case, and allow A / D counter has been set to be Check 0 Mode (see Inner A / C Counter Check Mode, page 19).

Step 2: Reset No. 4 of the dip switch has to be ***On***.

29 Cornerload Adjustment

Since the weighing pan is connected to the balance through one central point, as you move away from the centre toward the outer rim of the pan, mechanical distortions can occur, thus reducing the balance's accuracy. Cornerload Adjustment is performed to compensate for the problem.

Step 1: The balance must be fully warmed-up (plugged in for 30 minutes) before starting.

Step 2: Remove the top case (see Disassembly / Assembly page 21 - 24).

Step 3: Replace the weighing pan.

Step 4: Make certain that the balance is level.

Step 5: Plug the AC adapter into the power source.

Step 6: Press the ***ON/OFF*** key to get a normal weighing display (Check 0 Mode).

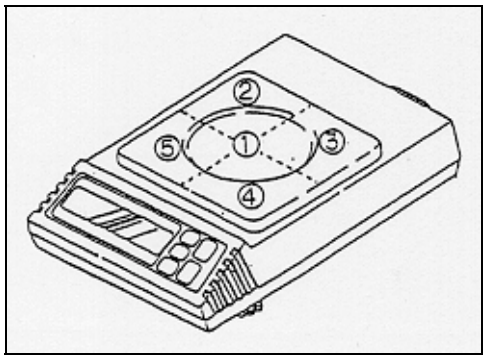
Step 7: Place the appropriate Cornerload Adjustment Mass in the centre of the weighing pan (Point ①). Place it around the pan. When using the draft shield, make certain that it does not touch the pan.

29.1 Cornerload Adjustment Masses

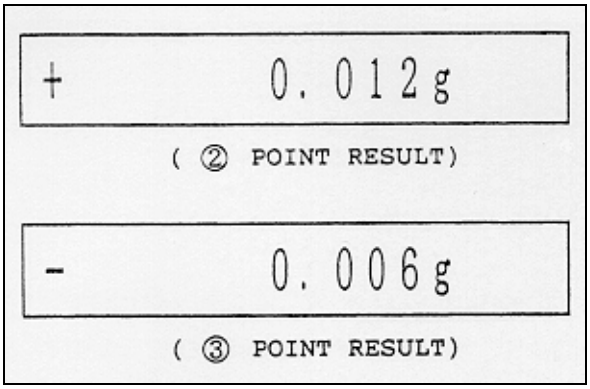
Model	***Masses***
KERN 434-23	*150 g*
KERN 434-33	*250 g*
KERN 434-37	*1500 g*

Step 8: Press the ***TARE*** key.

Step 9: Move the Cornerload Mass to Point ② and make a note of the display reading.

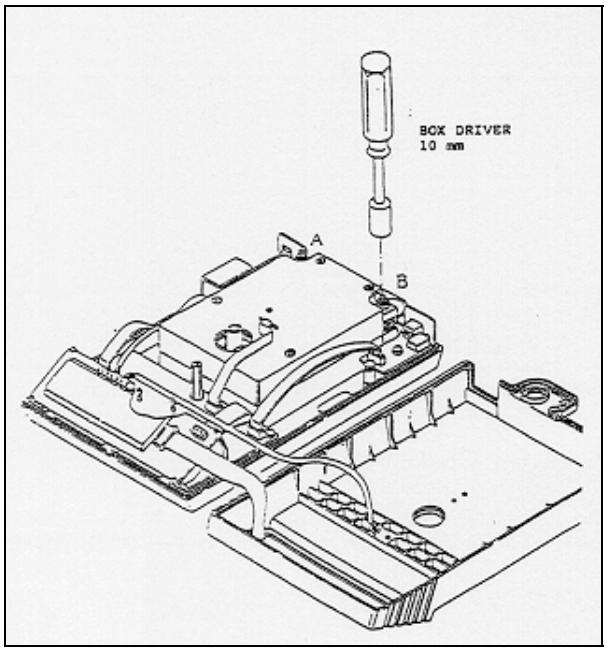


Step 11: Move the Cornerload Mass to Point ③ and make a note of the display reading.



Step 12: Compare the absolute values (ignore "+" or "-" signs) of the display readings at Point ② and Point ③ and determine which is the greater deviation from zero. The side that is greater must be adjusted first. For example, if you get results similar to those left, then Point ② must be adjusted.

Step 13: Make the adjustment by slightly turning the appropriate Adjustment Screw shown left with a box driver (Screw B to adjust Point ③ result and Screw A to adjust Point ② result). When the result is positive, "+", like the Point ② above, turn the screw counter-clockwise. When negative, "-", turn clockwise.



Step 14: Repeat Steps 7 to 13 until both Point ② and ③ display zero ± 3 deviations.

Step 15: Place the mass at Point ① and push the ***TARE*** key. Check Points ② to ④ and ③ to ⑤ as diagonal to be certain that they are all at Zero ± 3 deviations.

30 Electronic Fault Finding

The following procedures are used to detect and repair damage to the Electronic Unit. Before proceeding with any of the repair procedures below, it is advisable to make a thorough visual check of the Electronic Unit. Look for dirt or other foreign objects throughout the balance. Check for objects touching the circuitry, broken circuit paths, grounding, solder dry joints or any other damage to the P.C. Boards.

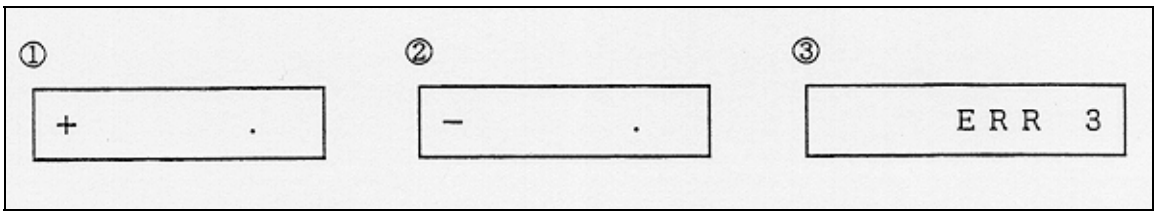
30.1 Power Check

Fuse: If the fuse (0.5 AMP) keeps blowing, there is a short circuit. Check the circuitry for touching objects. Also check the power supply electronics.

AD Adapter: The proper voltage AC adapter for your local power supply is provided before shipment. If you find that the AC adapter is providing too little voltage or that it generates irregular heat, check the attached voltage label to make sure the proper voltage for your local power.

30.2 EEPROM Check

If the EEPROM (Electronic Erasable Programmable Read Only Memory) has been lost, the balance will not show the normal weighing display when the power switch is turned on. One of the following three messages will appear:



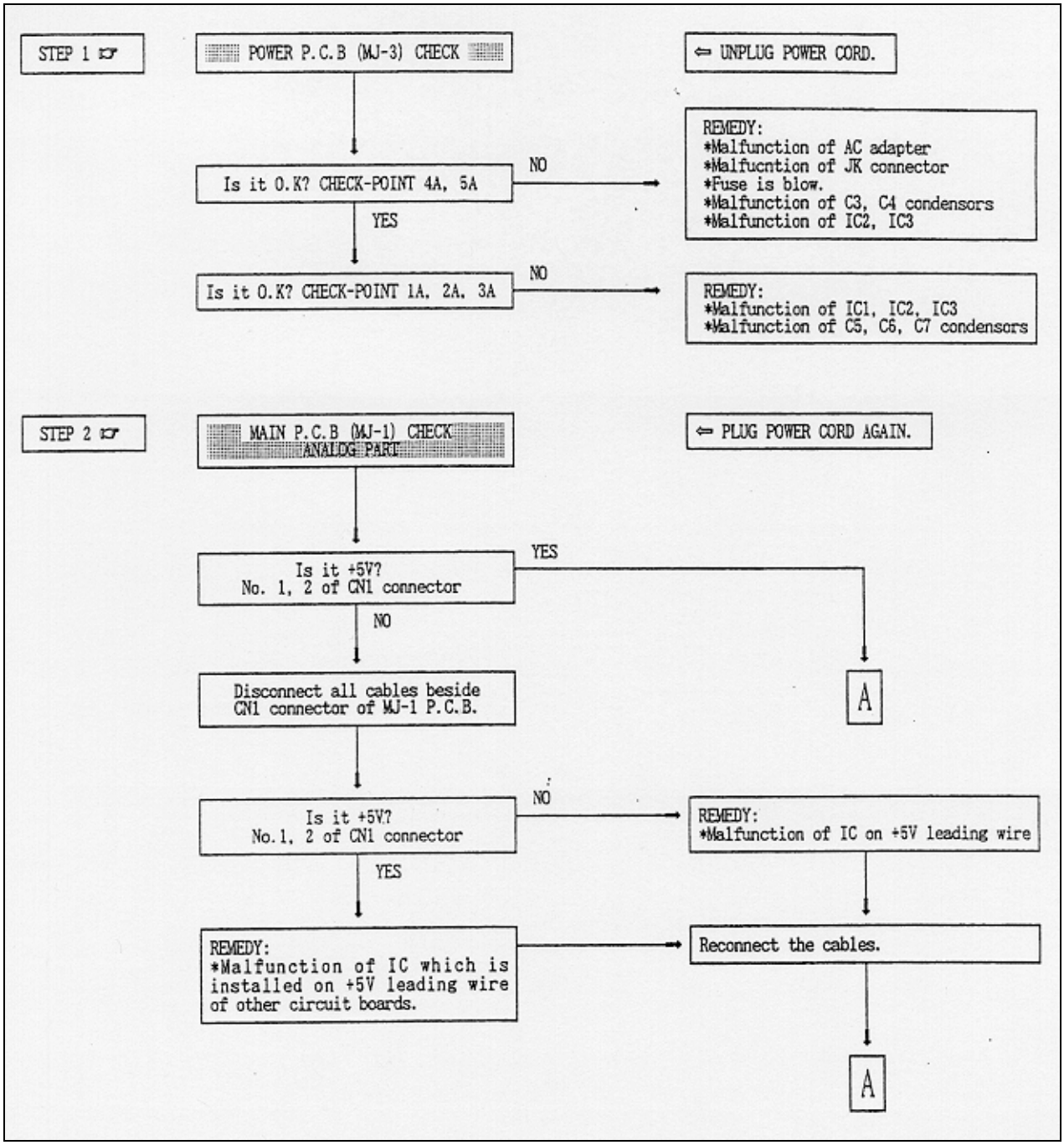
Step 1: Attempt to restore the linearity program into EEPROM by using the procedures given in the Linearity Adjusting section on page 41.

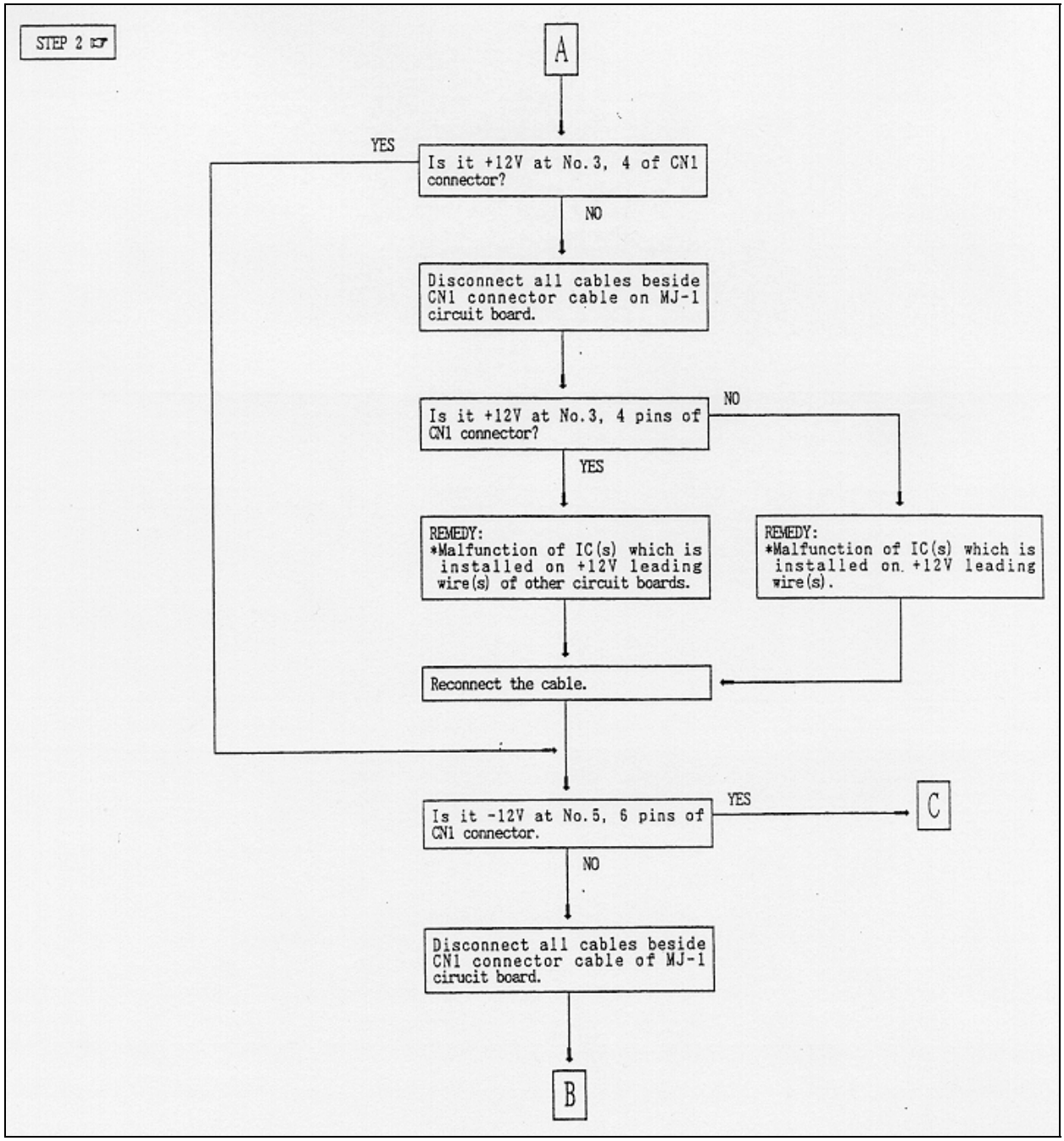
Step 2: If the above procedure does not solve the problem, then replace the EEPROM IC chip (IC 8).

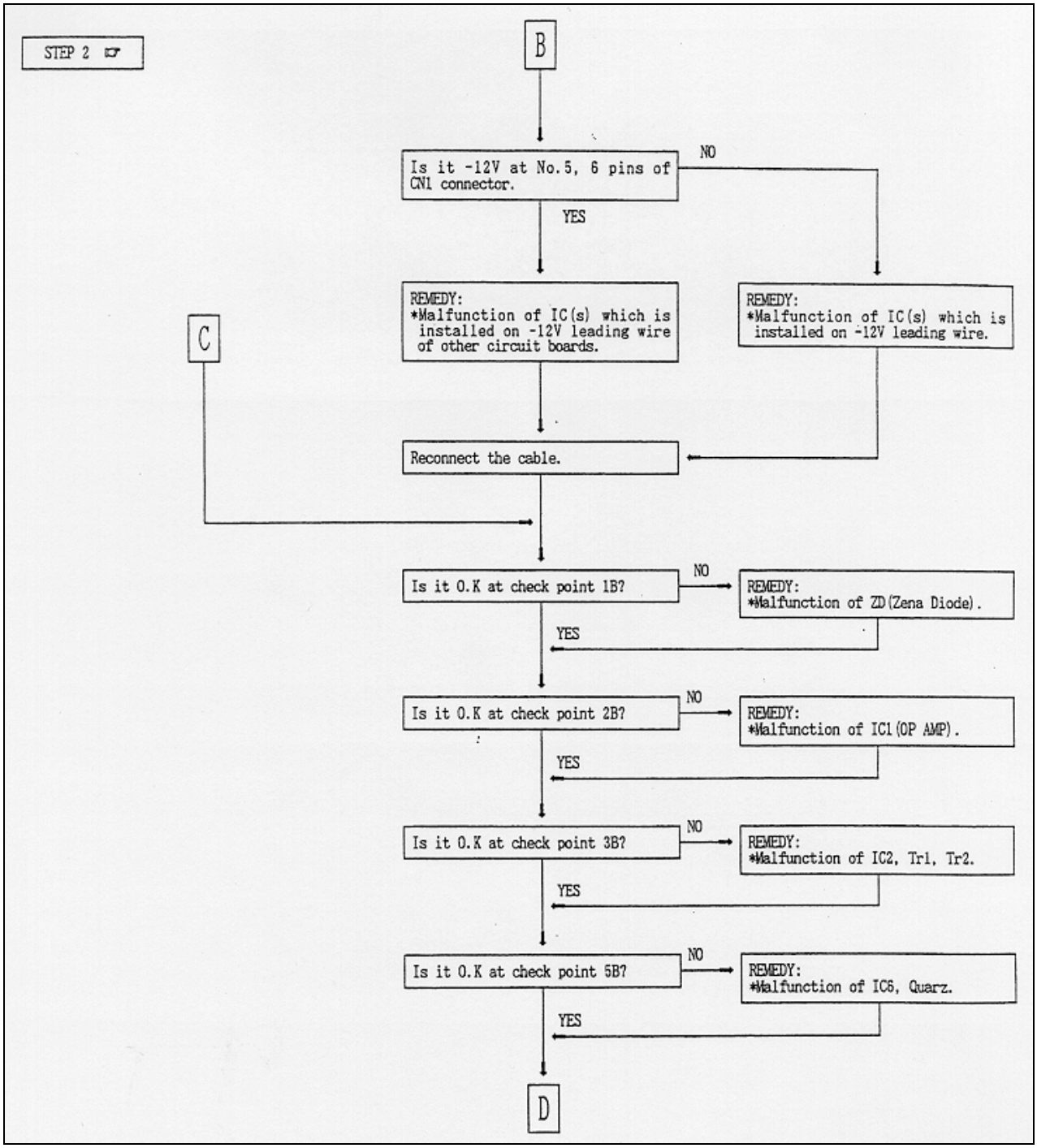
30.3 Voltage Check

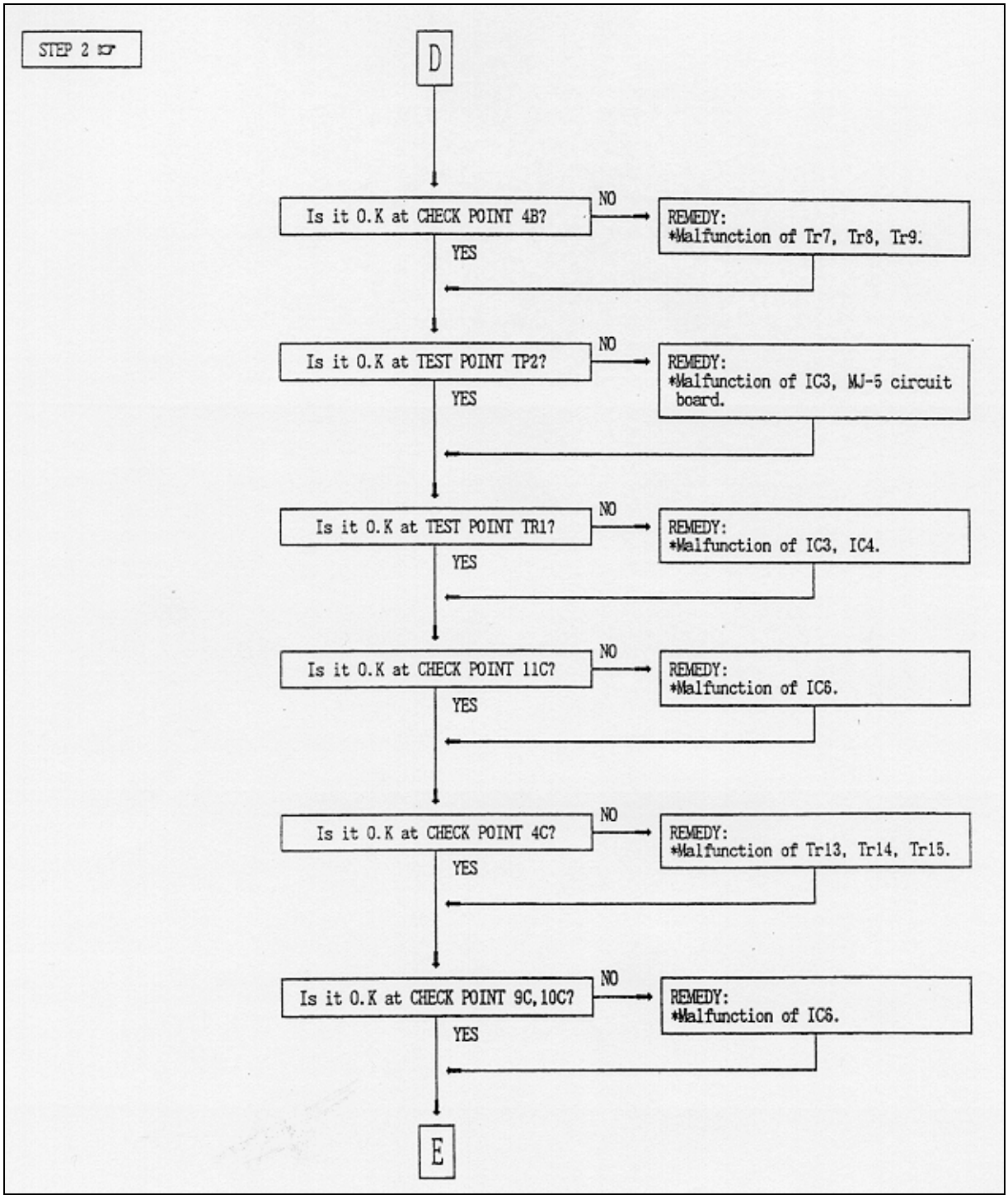
There are a number of voltage checks that can be carried out on the P.C. Boards for pinpointing faulty electronics. The main checking points (1A, 2A, 3A, 4A, 5A) are on the power circuit MJ-3. Always check the voltage range first. Other points are followed by listed numbers on the Electronic Fault Finding Chart (page 47) and attached Circuit Diagrams (hereafter).

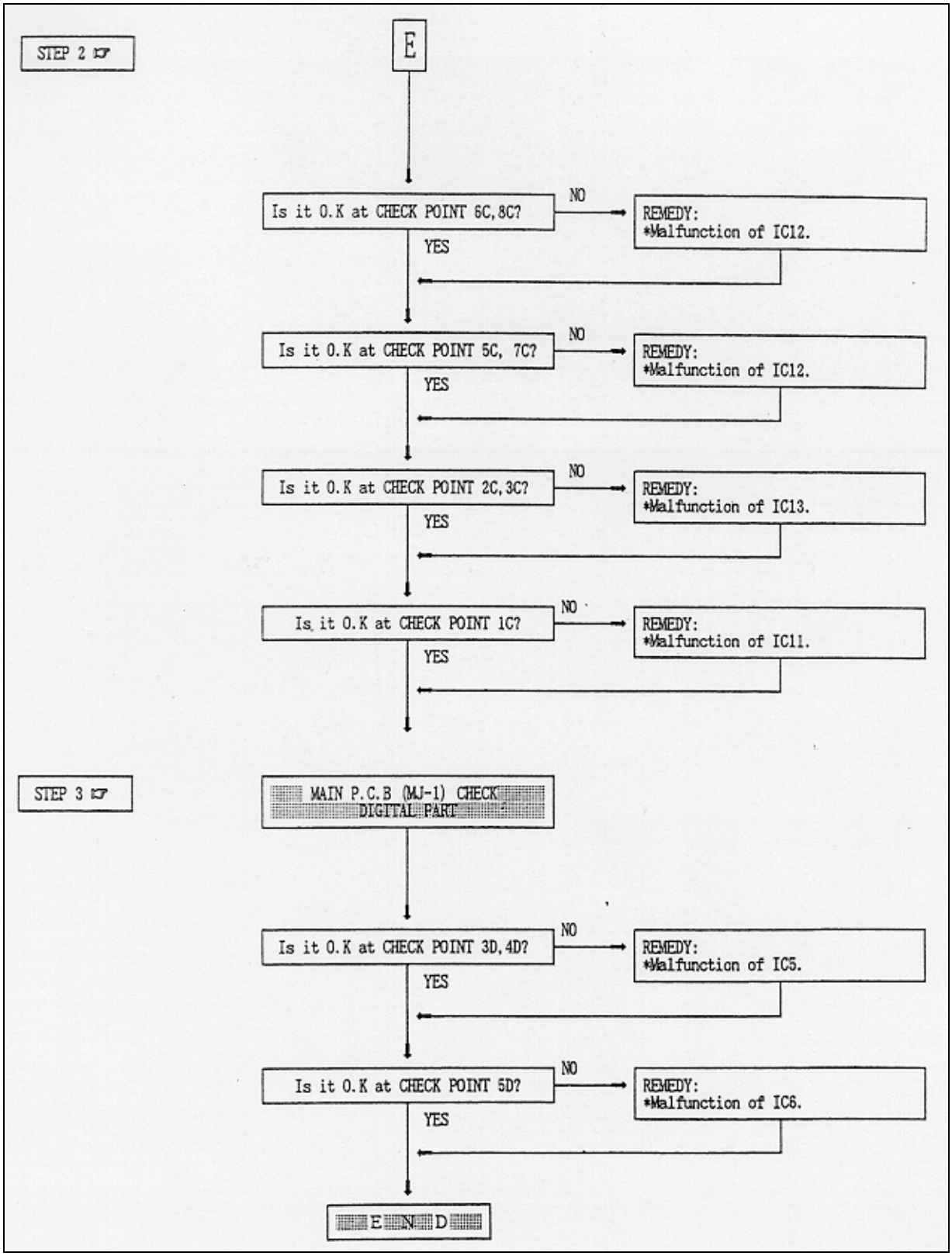
31 Electronic Fault Finding Charts




STEP 2
A
YES
Is it +12V at No.3, 4 of CN1 connector?
NO
Disconnect all cables beside CN1 connector cable on MJ-1 circuit board.
Is it +12V at No.3, 4 pins of CN1 connector?
NO
YES
REMEDY:
*Malfunction of IC(s) which is installed on +12V leading wire(s) of other circuit boards.
REMEDY:
*Malfunction of IC(s) which is installed on +12V leading wire(s).
Reconnect the cable.
Is it -12V at No.5, 6 pins of CN1 connector.
YES
C
NO
Disconnect all cables beside CN1 connector cable of MJ-1 cirucit board.
B


STEP 2
B
Is it -12V at No.5, 6 pins of CN1 connector.
NO
YES
REMEDY:
*Malfunction of IC(s) which is installed on -12V leading wire of other circuit boards.
REMEDY:
*Malfunction of IC(s) which is installed on -12V leading wire.
C
Reconnect the cable.
Is it O.K at check point 1B?
NO
REMEDY:
*Malfunction of ZD(Zena Diode).
YES
Is it O.K at check point 2B?
NO
REMEDY:
*Malfunction of IC1(OP AMP).
YES
Is it O.K at check point 3B?
NO
REMEDY:
*Malfunction of IC2, Tr1, Tr2.
YES
Is it O.K at check point 5B?
NO
REMEDY:
*Malfunction of IC6, Quarz.
YES
D

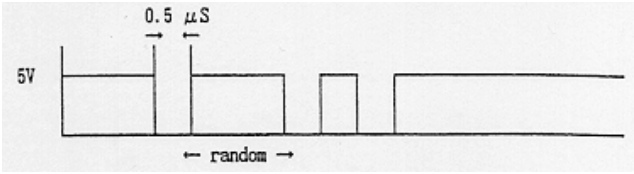
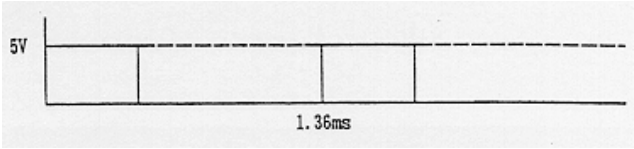
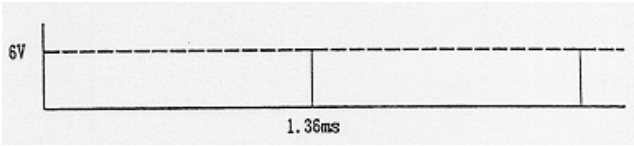
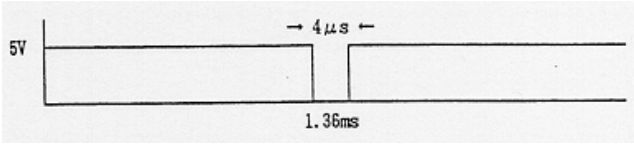

STEP 2
D
Is it O.K at CHECK POINT 4B?
NO
REMEDY:
*Malfunction of Tr7, Tr8, Tr9.
YES
Is it O.K at TEST POINT TP2?
NO
REMEDY:
*Malfunction of IC3, MJ-5 circuit board.
YES
Is it O.K at TEST POINT TR1?
NO
REMEDY:
*Malfunction of IC3, IC4.
YES
Is it O.K at CHECK POINT 11C?
NO
REMEDY:
*Malfunction of IC6.
YES
Is it O.K at CHECK POINT 4C?
NO
REMEDY:
*Malfunction of Tr13, Tr14, Tr15.
YES
Is it O.K at CHECK POINT 9C,10C?
NO
REMEDY:
*Malfunction of IC6.
YES
E

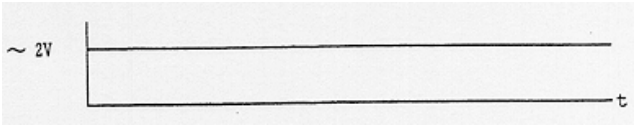
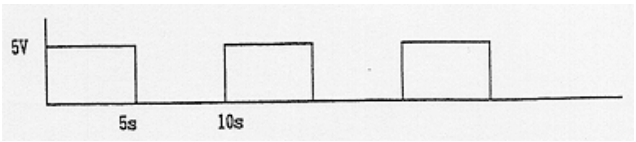
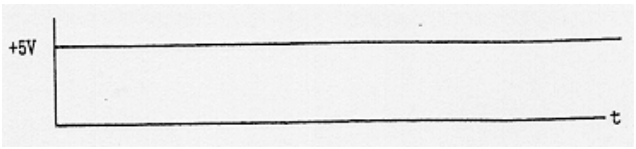
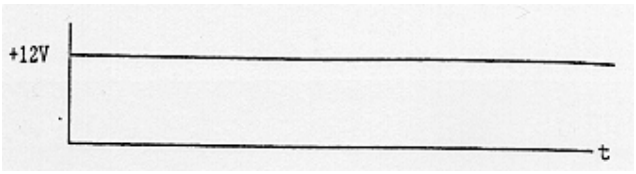
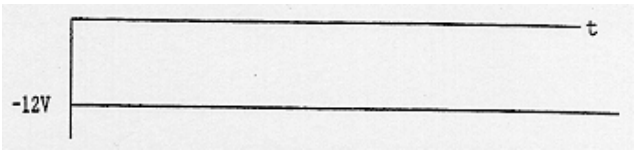
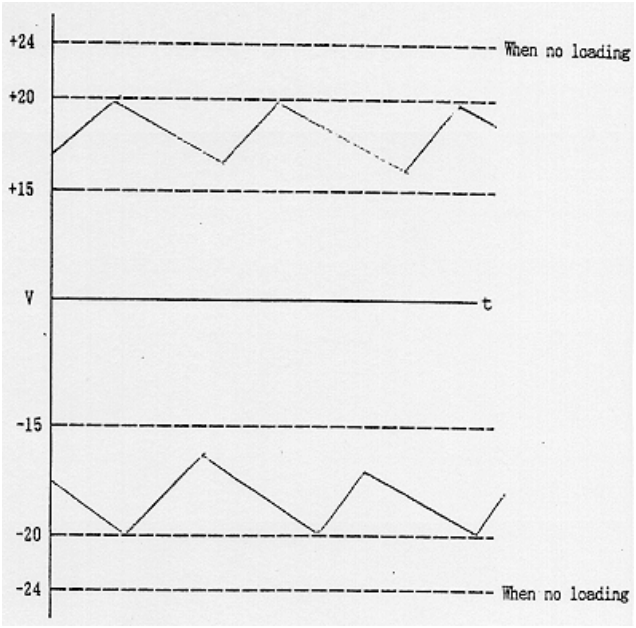

STEP 2
E
Is it O.K at CHECK POINT 6C, 8C?
NO
REMEDY:
*Malfunction of IC12.
YES
Is it O.K at CHECK POINT 5C, 7C?
NO
REMEDY:
*Malfunction of IC12.
YES
Is it O.K at CHECK POINT 2C, 3C?
NO
REMEDY:
*Malfunction of IC13.
YES
Is it O.K at CHECK POINT 1C?
NO
REMEDY:
*Malfunction of IC11.
YES
STEP 3
MAIN P.C.B (MJ-1) CHECK
DIGITAL PART
Is it O.K at CHECK POINT 3D, 4D?
NO
REMEDY:
*Malfunction of IC5.
YES
Is it O.K at CHECK POINT 5D?
NO
REMEDY:
*Malfunction of IC6.
YES
E N D

32 Wave Form Check

If everything is correct in the Electronic Fault Finding Chart but the displayed value is still incorrect, then either the CPU, the EEPROM or the SCA is at fault. We will be able to tell by the wave form that is generated during testing. See the Wave Form Table for the testing points. If an incorrect wave form is found, then replace the unit that is the generator of the signal.

We recommend to use an oscilloscope (measuring capacity more than DC 100 MHz) and a digital tester (readability is 0.1 μA).

P.C.B. No.	*Location*	*Pinpoint No.*	*Wave Form*
MJ-1	*IC 10 pin 3* *IC 10 pin 5* *CN 4 pin 12* *CN 4 pin13* *CN 4 pin 11*	*1D* *2D* *3D* *4D* *5D*	
MJ-1	*IC 11 pin 4* *IC 11 pin 3* *IC 11 pin 2* *Resistor 37* *Resistor 38*	*1C* *2C* *3C* *9C* *10C*	
MJ-1	*IC 13 pin 2*	*4C*	
MJ-1	*Transistor 14*	*11C*	

P.C.B. No.	Location	Pinpoint No.	Wave Form
MJ-1	IC 13 pin 3 IC 12 pin 7 IC 12 pin 14 IC 12 pin 8	5C 6C 7C 8C	
	IC 11 pin 1	12C	
MJ-3	IC 1	1A	
	Condenser 6	2A	
	Condenser 7	3A	
	Diode 1 Diode 2	4A 5A	

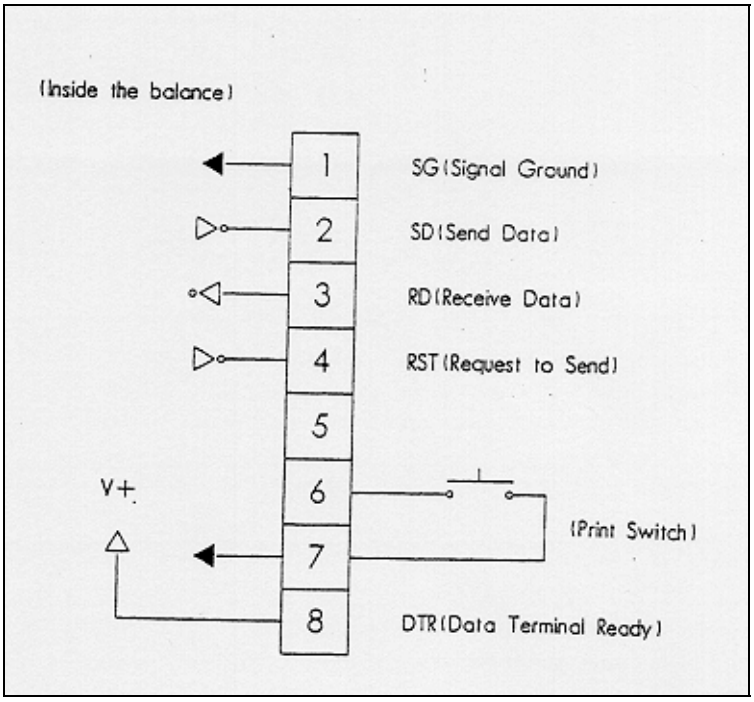
33 RS-232 C Interface

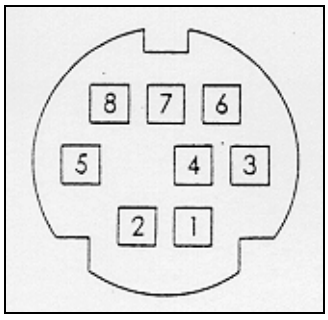
The data transmission RS-232 C Interface allows the user to use KERN 434 balances in conjunction with a computer, printer or other peripheral device. The Interface circuit is already mounted in the balance as a standard accessory.

Please read the following section and the instruction manuals of related equipment before using this device. The RS-232 C Interface is designed for exclusive use on KERN Balances and peripheral equipment designed by or recommended by KERN & Sohn GmbH. Use of this Interface with any other type of equipment is solely the responsibility of the user.

33.1 Interface Specifications

Type	*RS-232 C*
Method	*Half Duplex Transmission*
Speed	*1200, 2400, 4800 BPS*
System	*Asynchronous system*
	8 bit length, non-parity, 1 Start bit, 1 Stop bit
	7 bit length, even-parity, 1 Start bit, 1 Stop bit
Signal	





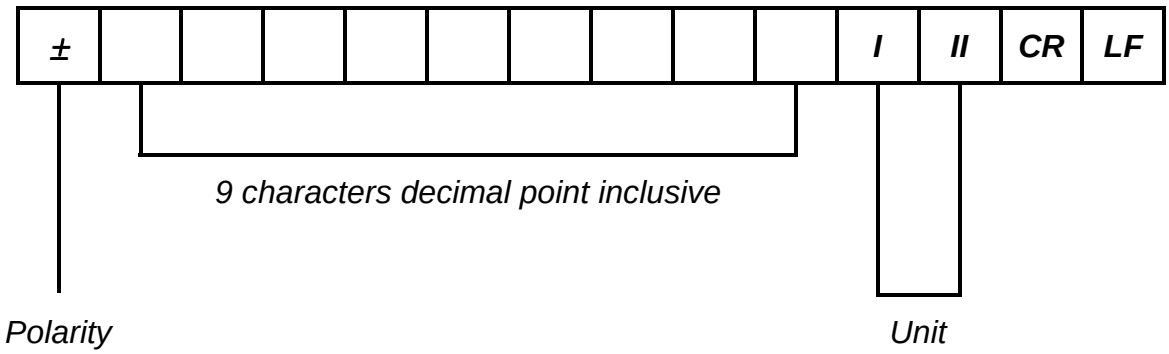
Configuration of Receptacle pins

Plug: Circle Type
Miniature connector
TCP8580 Type

Receptacle: Circle Type
Miniature connector
TCS75850-01-101

33.2 Output Format

1. Method



Total: *14 characters*

Unit I: *Space or unit*

Unit II: *Non-stable data*

g: *Gram & other units*

2. Example, data output

Gram weighing

+			**3**	**0**	**0**	**0**	**.**	**0**	**0**		**g**	**CR**	**LF**

Percent weighing

+				**1**	**0**	**0**	**.**	**0**	**0**		**%**	**CR**	**LF**

Piece counting

+							**1**	**0**	**0**	**P**	**C**	**CR**	**LF**

3. Example, data output

Gram weighing

+							**.**					***CR***	***LF***

The other weighing units

+												***CR***	***LF***

4. There will be no output when the balance is under following conditions:

- Π *The function data is being displayed.*
- Π *"All segments" display is on.*
- Π *The adjusting mark is being displayed.*
- Π *The stand-by mark is being displayed.*
- Π *The piece counting & percent weighing marks are being displayed.*

33.3 Output Data Mode

(Out 1) Transmits one data upon the print command when the balance is stabilised.

Step 1: Place a sample on the weighing pan.

Step 2: Allow reading to stabilise.

Step 3: Press the ***P*** key. The balance will output one data.

(Out 2) Transmits one data upon the print command as soon as the balance has stabilised.

Step 1: Place a sample on the weighing pan.

Step 2: Press the ***P*** key. The balance will output one data as soon as the reading has stabilised.

(Out 3) Transmits one data upon the print command even if the balance has not stabilised.

Step 1: Place a sample on the weighing pan.

Step 2: Press the ***P*** key. The balance will output one data even if the reading has not stabilised.

(Out 4) Automatically transmits one data when the balance has stabilised.

Step 1: Place a sample on the weighing pan.

Step 2: When the reading stabilises the balance will automatically output one data without pressing the ***P*** key.

Step 3: Remove the sample and place another sample on the pan.

Step 4: The balance will automatically output another data after the reading has stabilised.

(Out 5) Automatically transmits all data regardless of whether the balance has stabilised or not.

Step 1: Place a sample on the weighing pan. The balance will automatically output all data.

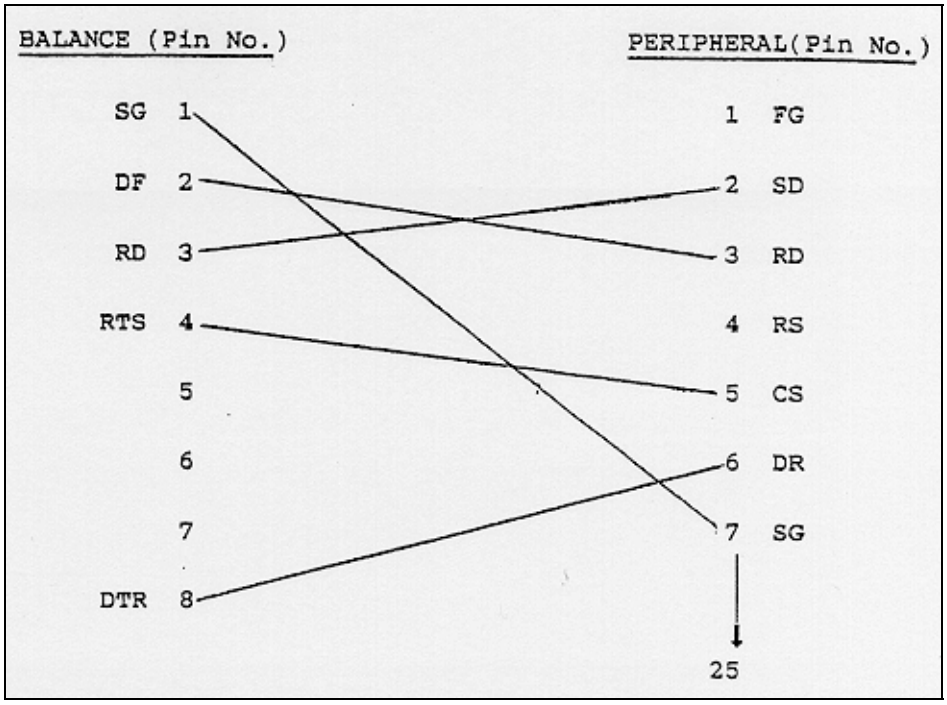
33.4 External Control Commands

The command (ASCII) will be transmitted into the balance through the miniature connector No.3 pin when pressing the appropriate code on the peripheral keyboard.

Command (ASCII)	***Functions***
"D"	*Functions the same as pressing the **P** key.*
"Z"	*Functions the same as pressing the **TARE** key.*
"R"	*Functions the same as pressing the **U** key.*
"F"	*Functions the same as pressing the **F** key.*

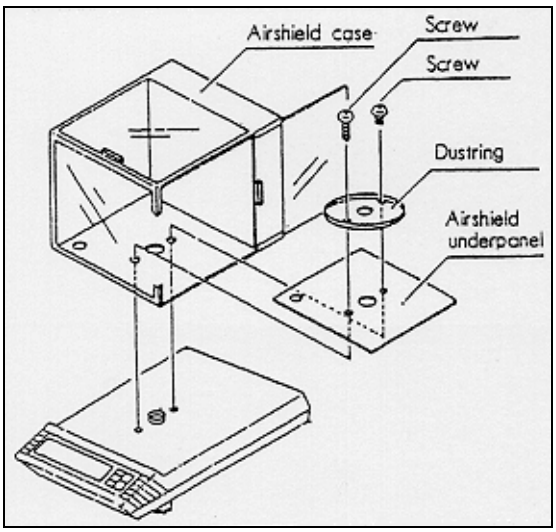
33.5 Cabling Diagrams

For connecting a computer or a peripheral device to the balance.



34 Installation of the Air Shield Case (OMJ-2 Option)

We recommend the installation of an air shield case whenever your operation will be held under unstable weighing conditions.



Remove the weighing pan and the pan support from the balance.

Loosen the 4 screws on top of the balance case.

Remove the dust ring from the top case.

Install the Air Shield Case by placing it squarely on the top of the balance.

Replace the dust ring on top of the air shield under panel.

Replace only the 2 outside screws and tighten them snugly into place.

Replace the weighing pan and the pan support.

35 Troubleshooting

Problem	Research	Cause	Possible Solution
A) No display when plug AC adapter into power.	*(1) Problem with check point 4A, 5A voltage on MJ-3 P.C.B. Before checking must disconnect CN 1 connector.*	*AC adapter malfunction. Blown fuse. Power Jack (JK) malfunction. MJ-3 P.C.B. malfunction.*	*Replace the defective parts.*
	(2) Problem with check point 1A, 2A, 3A when correct voltage on check point 4A, 5A on MJ-3 P.C.B. Before checking must disconnect CN 1 connector.	*IC 1, IC 2, IC 3 malfunction. C 5, C6, C7 malfunction or D3, D4, D5 malfunction on MJ-3 P.C.B.*	*Replace the defective parts.*
	(3) No display when check mode 1.	*Power cable malfunction. Disconnect power cable. Disconnect display cable.*	*Replace the new parts. Re-plug the power cable. Re-plug the display cable.*
	(4) Problem with check point 1D on MJ-1 P.C.B.	*Quarts malfunction.*	*Replace the defective parts.*
	(5) Problem with check point 2D on MJ-1 P.C.B.	*IC 10 malfunction.*	*Replace the defective parts.*
	(6) No signal at check point 3D, 4D on MJ-1 P.C.B.	*IC 5 malfunction.*	*Replace the defective parts.*
	(7) No signal at check point 5D on MJ-1 P.C.B.	*IC 6 malfunction.*	*Replace the defective parts.*
B) No display after count display when plug AC adapter into power.	*(1) No display of correct data when check mode 1.*	*IC 6 malfunction on MJ-1 P.C.B.*	*Replace the defective parts.*
C) Error message display "Error 3" when plug AC adapter into power.	*(1) Correct display when re-plug into power.*	*IC 9 malfunction on MJ-1 P.C.B.*	*Replace the defective parts.*
	(2) Always error message display "Error 3".	*IC 8 malfunction on MJ-1 P.C.B.*	*Replace the defective parts.*

Problem	Research	Cause	Possible Solution
	(3) No continuous error message.	Caused by electronic noise.	
D) Continuous flashing display after all segment line when plug into power	(1) Check whether zero display is unsteady after pushing down the weighing pan to end.	Program data is unstable by draft, vibration, etc.	Attach a wind shield case on the balance. Install the balance on an anti-vibration table.
		Dust cover attaching weighing pan.	Set up the dust cover again.
	(2) Problem with check point 2A, 3A on MJ-3 P.C.B.	Power supply is fluctuated.	Replace AC adapter.
		AC adapter malfunction.	Replace the defective parts.
		IC 2, IC 3 malfunction on MJ-3 P.C.B.	
		D1, D2 malfunction on MJ-3 P.C.B.	
		C3, C4 malfunction on MJ-3 P.C.B.	
	(3) No signal at check point 5B.	IC 6 (SCA) malfunction on MJ-1 P.C.B.	Replace the defective parts.
	(4) No triangle wave at check point 4B.	Tr 7, Tr8, C 13 malfunction on MJ-1.	Replace the defective parts.
E) "+." or "-." appears after all segment line when AC adapter was plugged.	(1) Problem with voltage at check point 2A, 3A on MJ-3 P.C.B.	Same as D) 2.	Same as D) 2.
	(2) Cable disconnection.	Disconnect Photo sensor cable.	Reconnect the cable again.
	(3) "CAL Err" appears	A / D count value is wrong.	Recheck the A / D count value.
		Linearity program is wrong.	Restore the correct linearity program.
	(4) Visual check.	Object attaching weighing pan.	Clean around the weighing pan.
		Defective plate bearing or coupling link.	Replace the defective parts.
	(5) Problem with voltage at check point 1B, 2B or 3B on MJ-1 P.C.B.	ZD, IC 1, IC 2, Tr 1, Tr 2 malfunction.	Replace the defective parts.

Problem	Research	Cause	Possible Solution
	(6) A / D count value at Check 3 Mode is "0000000" or "3884160"	Defective plate bearings or coupling link.	Replace the defective parts.
		Broken wire of force coil.	
		Defective photo sensor.	
	(7) Problem with TP 1, TP 2.	IC 3 malfunction on MJ-1 P.C.B.	Replace the defective parts.
		IC 4 malfunction on MJ-1 P.C.B.	Replace the defective parts.
F) Irregular span adjusting.	(1) Problem with A / D count value at Check 2 Mode.	Broken wire of temperature sensor or disconnecting the connector.	Resolder the wire or reconnecting the connector.
	(2) No signal at check point 11C.	Problem with IC 10 on MJ-1 P.C.B.	Replace the defective parts.
	(3) Problem with signal at check point 1C, 2C, 3C.	Problem with IC 11, IC 13.	
	(4) Problem with voltage at check point 5C, 6C, 7C, 8C.	Problem with IC 12, Tr 11, Tr 12.	
	(5) Problem with voltage at check point 4C.	Problem with Tr 13, Tr 14, Tr 15.	
	(6) Recheck plate bearings or coupling link.	Problem with plate bearings or coupling link.	
G) When increasing load on the weighing pan, display does not allow the corresponding results in half way.	(1) No electricity into forth coil wire.	Broken wire of the forth coil.	Replace the defective parts.
		Problem with Tr 3, Tr 4, Tr 5, Tr 6.	Replace the defective parts.
H) No corresponding results when loading on the weighing pan.	(1) Problem with AC adapter.	Misuse of the wrong voltage AC adapter.	Replace a new AC adapter.

Problem	Research	Cause	Possible Solution
I) Very poor reproducibility.	*(1) Recheck weighing condition for effection of any vibration or air draft.*	*Air draft (by air condition or by vibration which caused by somebody walking near the balance).*	*Attach Air Shield Case on the balance.*
		Vibration (caused by machine operation or car moving outside).	*Replace the balance somewhere in stable condition and on anti-vibration table.*
	(2) Unstable installation of the balance.	*Surface of the balance table is not completely flat.*	

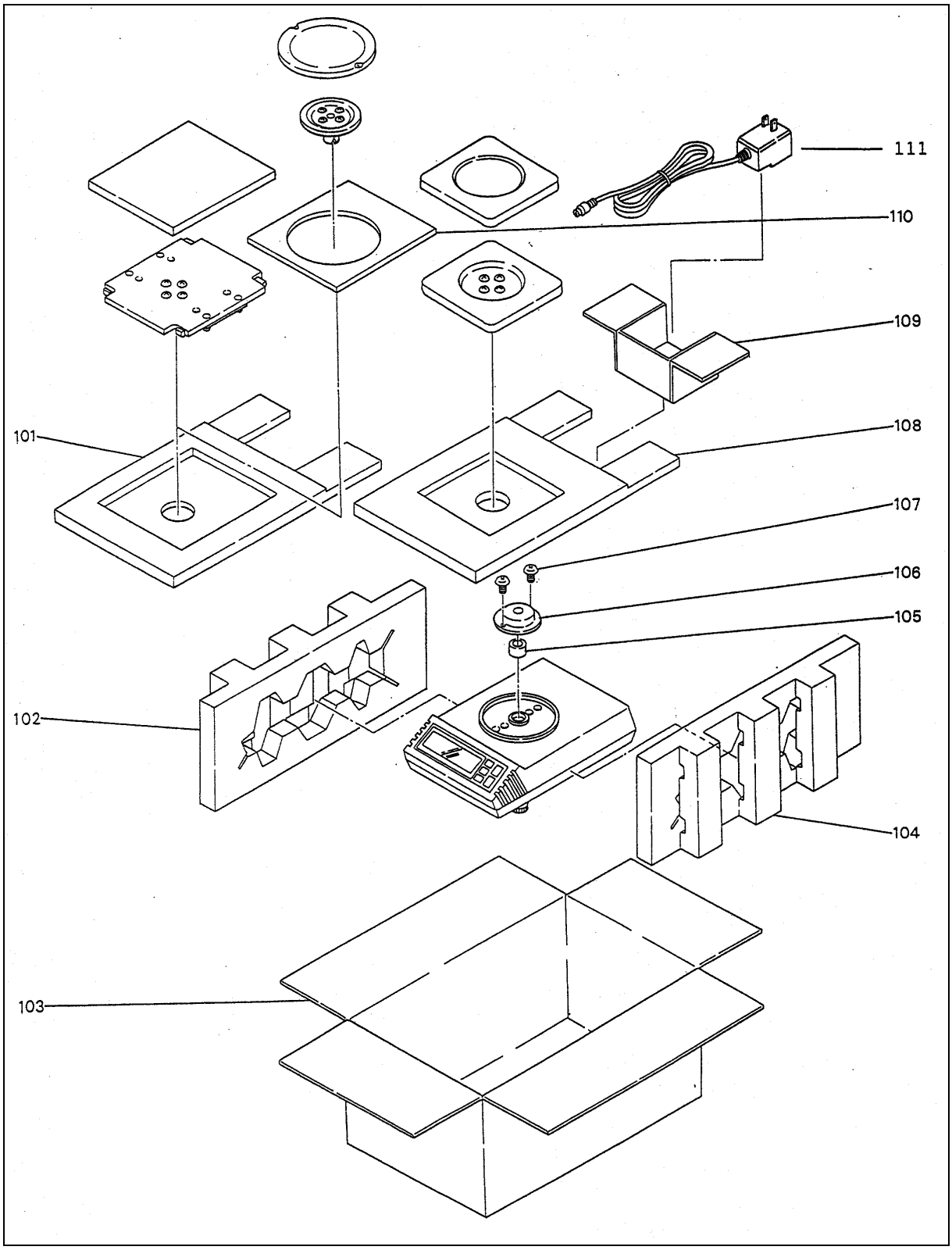
36 KERN 434 Series Parts List

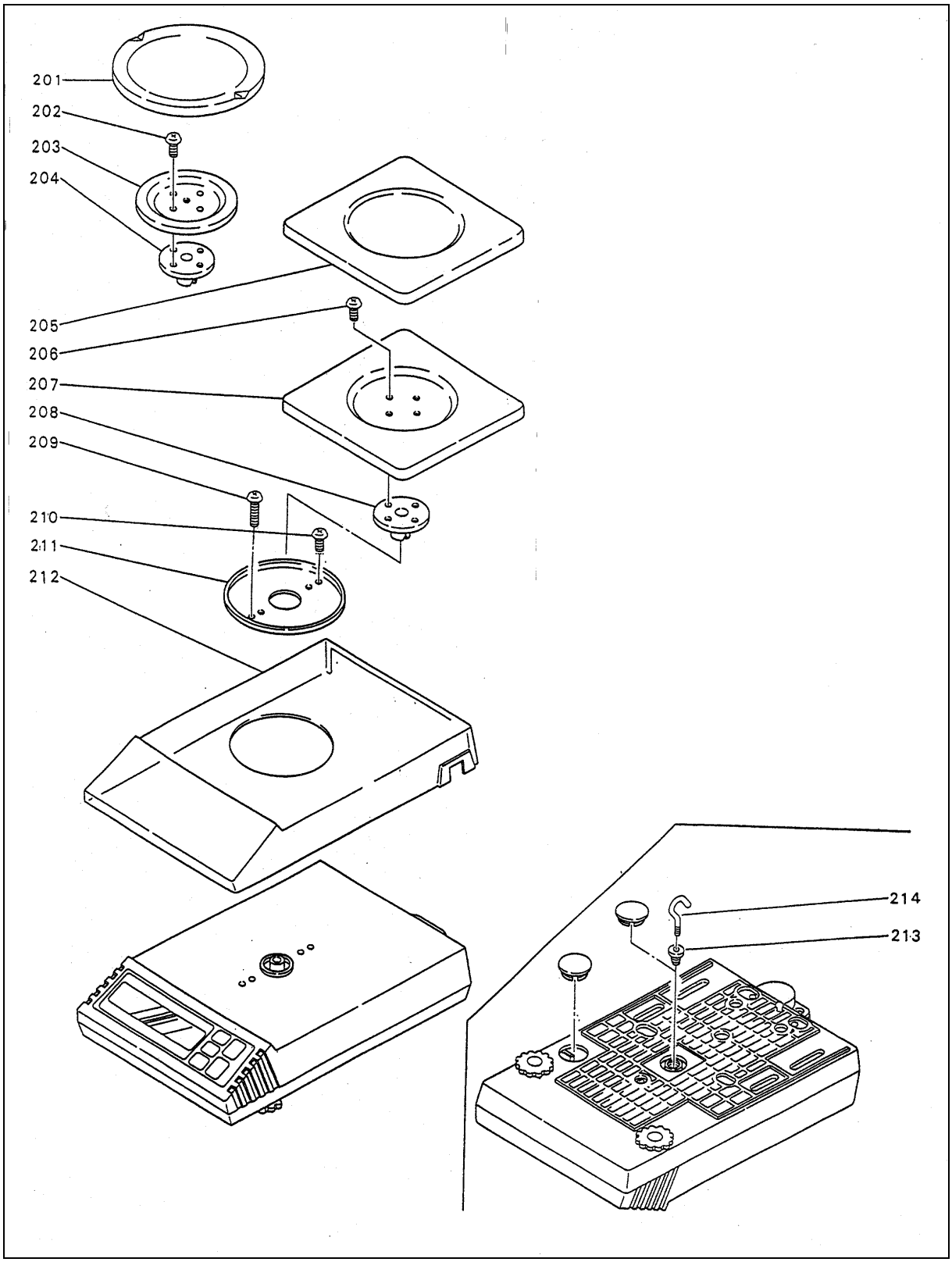
No.	Description	Qty	434-23	434-33	434-37
101	Pan holder (type 1)	1	325013	325013	- -
102	Packing cushion (left)	1	325010	325010	325010
103	Outer packing case	1	325009	325009	325009
104	Packing cushion (right)	1	325011	325011	325011
105	Shipping lock spacer	1	211013	211013	- -
106	Shipping lock	1	240232	240232	240232
108	Pan holder (type 2)	1	- -	- -	325014
109	AC adapter box	1	325012	325012	325012
111	AC adapter (220 – 240 V)	1	122107	122107	122107
201	Weighing pan	1	230205	230205	- -
203	Pan support	1	240210	240210	- -
204	Pan support peg	1	240405	240405	- -
205	Weighing pan	1	- -	- -	210202
207	Pan support	1	- -	- -	240246
208	Pan support peg	1	- -	- -	240406
211	Dust ring	1	240238	240238	240238
212	Dust cover	1	210906	210906	210906
213	Hook connection	1	210712	210712	210712
214	Underweighing hook	1	210712	210712	210712
301	Panel keyboard	1	121945	121945	121945
302	Temperature sensor cable	1	123015	123015	123015
303	Power cable	1	123009	123009	123009
304	Display board	1	130109-2	130110-2	130111-2
305	Display board guide	2	210815	210815	210815
306	Display board cable	1	123010	123010	123010
307	Photo sensor cable	1	123011	123011	123011
308	Main circuit board	1	130109-1	130110-1	130111-1
310	Case shaft	1	210463	210463	210463
311	Bed	1	240103	240103	240103
312	Adjustable legs	2	210809	210809	210809

No.	Description	Qty	434-23	434-33	434-37
315	Underweighing cap	2	210813	210813	210813
317	Circuit board stand (A)	2	210464	210464	210464
318	Circuit board stand (B)	2	210465	210465	210465
319	Spirit level washer	1	211106	211106	211106
320	Spirit level	1	211121	211121	211121
322	Data output board	1	130109-4	130110-4	130111-4
323	Rear socket plate (right)	1	210329	210329	210329
325	Data output cable	1	123009	123009	123009
326	Power circuit board	1	130109-3	130110-3	130111-3
327	Rear socket plate (left)	1	210330	210330	210330
329	Top case	1	210812	210812	210812
330	Spirit level window	1	211010	211010	211010
402	Transducer shield (upper)	1	210328	210328	210328
403	Magnet cover	1	240332	240332	240332
404	Upper parallel guide	1	210506	210506	210508
405	Parallel plate bearing	8	211214	211214	211215
407	Force coil board	1	120114	120114	120114
409	Beam plate bearing	2	2112166	2112166	211214
414	Beam extension piece	1	210239	210239	210239
415	Extension piece spacer	1	210470	210470	210470
419	Short wire (silver)	3	113107	113107	113107
420	Photo sensor board	1	120113	120113	120113
429	Suspension spring	1	210717	210717	210718
431	Coupling link	1	211204	211204	211205
432	Lower parallel guide	1	210507	210507	210509
434	Corner adjustment spring	2	210715	210715	210715
435	Corner adjust screw (B)	2	210467	210467	210467
436	Corner adjust screw (A)	2	210466	210466	210466
437	Beam stopper spring	1	210716	210716	210716
438	Beam stopper	1	241011	241011	241011
440	Force coil bobbin	1	251506	251506	251506
441	Beam counter weight	0-3	210473	210473	210473
444	Plate bearing spacer	16	- -	- -	210472

No.	Description	Qty	434-23	434-33	434-37
447	Temperature sensor cable	1	123015	123015	123015
448	Balance weight	1	211634	211634	211634
451	Coupling link spacer	2	210398	210398	210398
453	Transducer shield (lower)	1	240397	240397	240397
500	434 series complete jig set	1	310102	310102	310102
501	Force coil jig	1	- -	- -	- -
502	Beam jig	2	- -	- -	- -
503	Suspension jig	2	- -	- -	- -
505	Left positioning jig	1	- -	- -	- -
506	Right positioning jig	1	- -	- -	- -
507	Beam stopper jig	1	- -	- -	- -

37 Balance drawings

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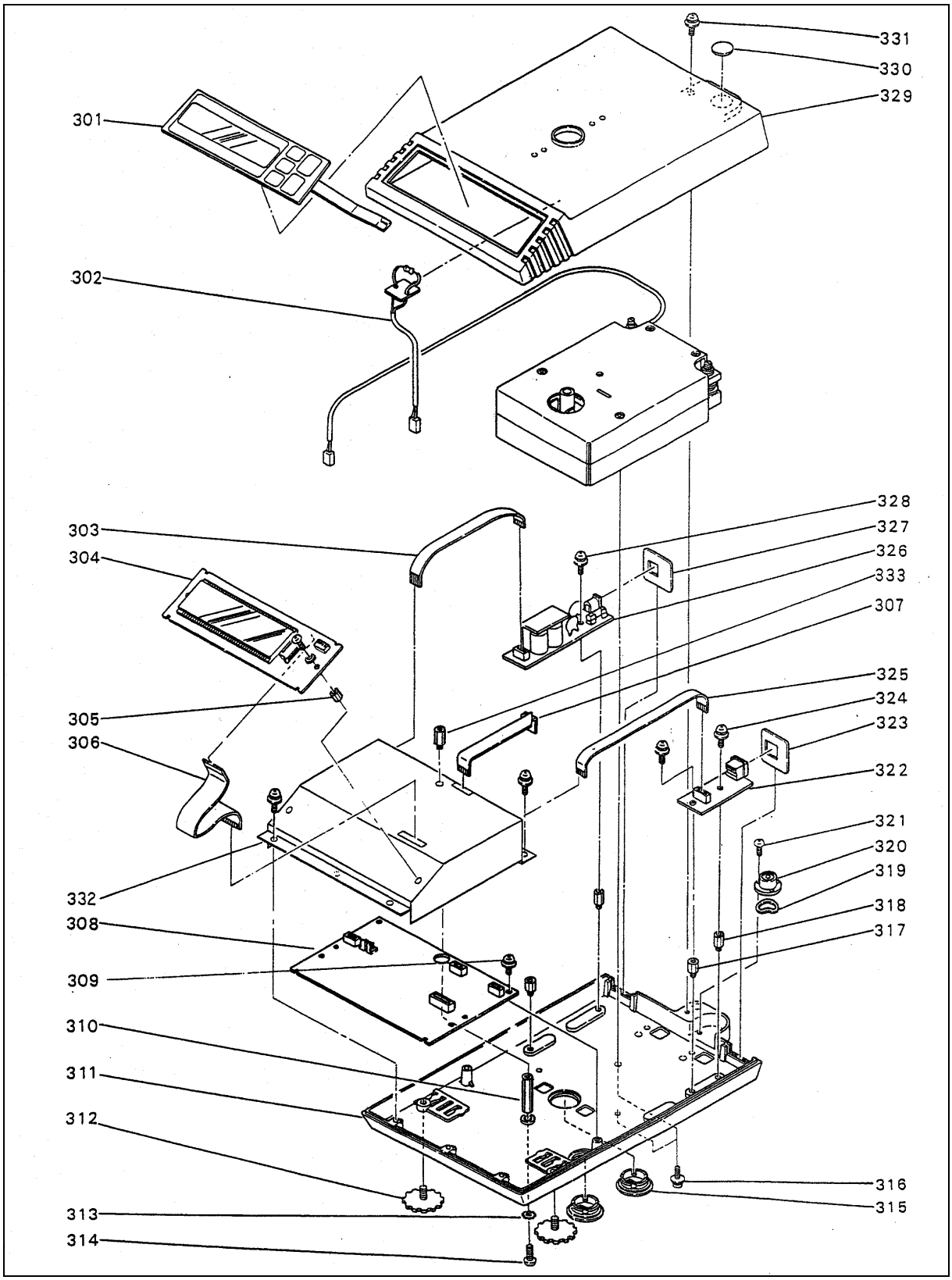
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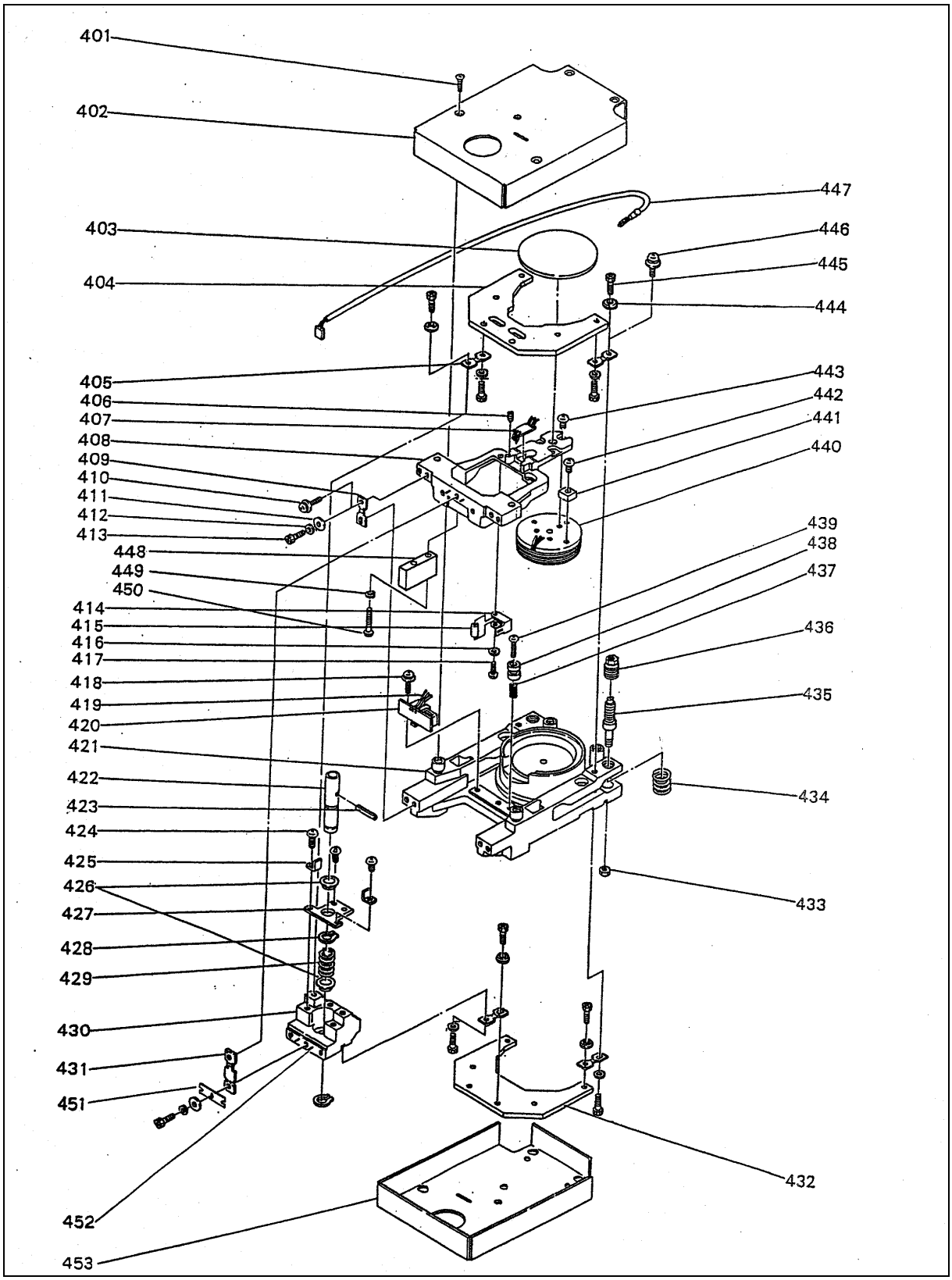
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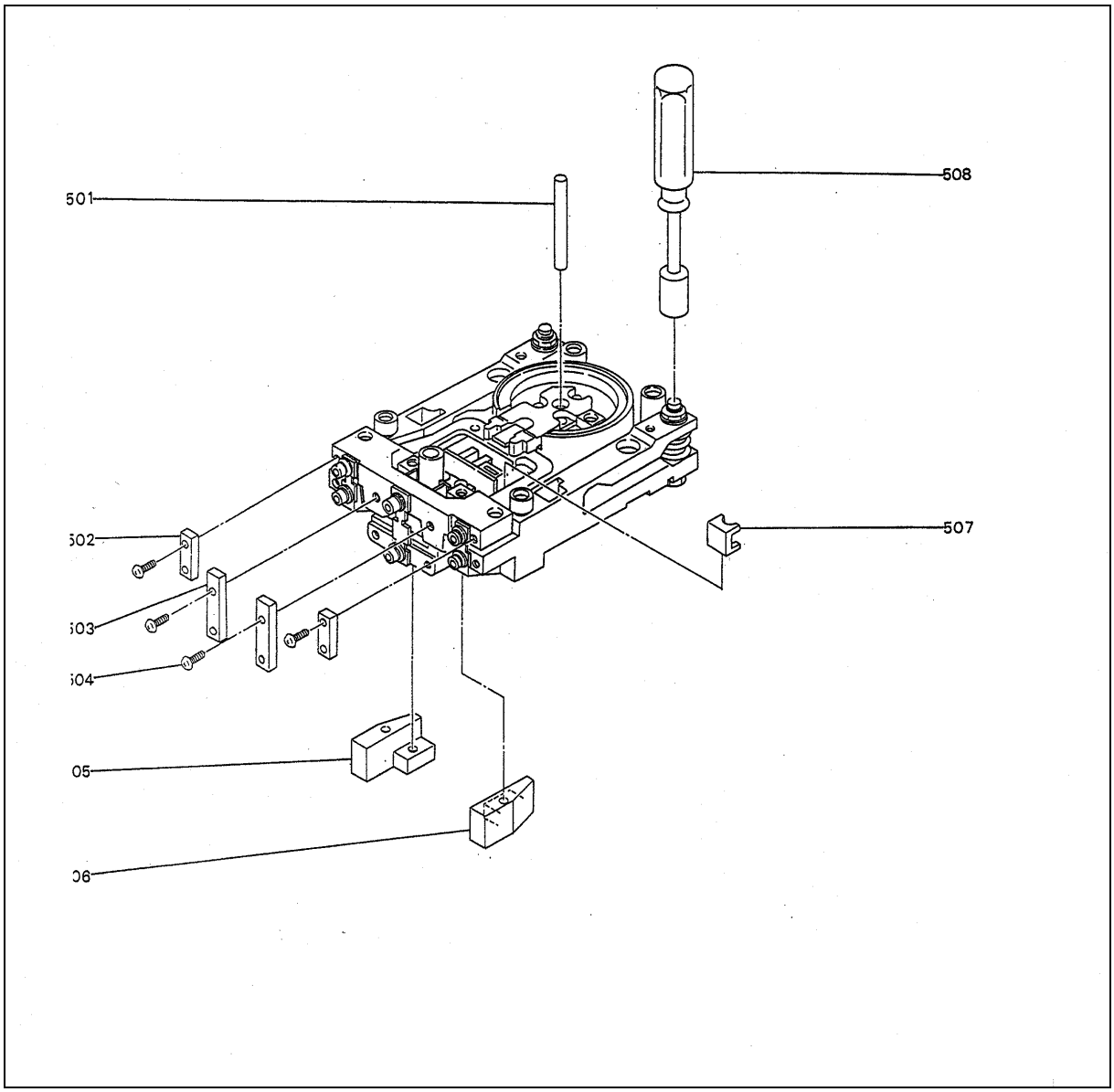
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