

FW Series

FLOOR & PLATFORM SCALES

MAINTENANCE MANUAL

maintenance-FW-v.1.a AOK

MODELS :

Assembled Scales:

FW-1200KA3
FW-600KA3
FW-600KA4
FW-300KA4
FW-150KA1
FW-100KA1
FW-60KA2
FW-31KA2
FW-15KA2
FW-10KA2

Display Pod & Load Cell Kits:

FW-150KK1
FW-100KK1
FW-60KK2

FW-15KK2
FW-10KK2

Weighing Platform & Load Cell Kits:

FW-1200KB3
FW-600KB3
FW-600KB4
FW-300KB4

FW-100KB1

FW-15KB2
FW-10KB2

A&D
A&D Company, Limited



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COMPLIANCE WITH FCC RULES

Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. If this unit is operated in a residential area it might cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference.

(FCC = Federal Communications Commission in the U.S.A.)



INTRODUCTION

This Maintenance Manual covers A&D FW series of scales:

Assembled Scales:

- FW-1200KA3
- FW-600KA3
- FW-600KA4
- FW-300KA4
- FW-150KA1
- FW-100KA1
- FW-60KA2
- FW-31KA2
- FW-15KA2
- FW-10KA2

Display Pod & Load Cell Kits:

- FW-150KK1
- FW-100KK1
- FW-15KK2
- FW-10KK2

Weighing Platform & Load Cell Kits:

- FW-1200KB3
- FW-600KB3
- FW-600KB4
- FW-300KB4
- FW-100KB1
- FW-15KB2
- FW-10KB2

The FW series of multi-function scales are the product of years of research, design, development and in-field testing. They incorporate the latest advances in electronic and mechanical engineering and offer increased features and functions all at a reduced cost.

The FW scale may be operated on six UM2 ('C' type) 1.5V dry batteries, or on rechargeable batteries of the same size (using an external charger). Continuous operation will be possible for between 100 to 150 hours on one set of batteries at 20°C/68°F. The Display Pod viewing angle is adjustable and it, along with the Display Arm, can be removed for use as a desk top, or wall mounted weighing indicator (with optional adapter kits).

Battery operation permits the scale to be operated anywhere. The weighing platform is of a rugged washdown stainless steel type, and the Display Pod enclosure also permits washdown. The scale's unit conversions are from decimal pounds to kilograms and vice versa. The tare range is from zero to maximum capacity. There is also a counting function for counting up to between 6000 and 10000 pieces. The check weighing display has "HI", "GO", and "LO" (LCD type annunciators), with two setpoints available for setting "HI" and "LO" limits. When the optional RS-232C Interface is installed a comparator buzzer can be heard and relay output control becomes possible via the 1st, 4th and 6th pins of the 7 pin DIN output connector, with the 2nd being common. The A/D converter is highly accurate and there is complete RFI shielding for the analogue section.



Options

- OP-01 ... Wall Mounting Kit (tilting bracket).*
- OP-02 ... 5m/16.4ft Display Pod extension cable.
- OP-03 ... RS-232C Interface and comparator buzzer and relay board.
- OP-04 ...
- OP-05 ... AC adaptor AC100~120V. "A" type plug (2-pin/flat).
- OP-06 ... AC adaptor AC200~240V. "C" type plug (2-pin/flat).
- OP-07 ... AC adaptor AC200~240V. "BF" type plug (3-pin/square).
- OP-08 ... AC adaptor AC200~240V. without plug.
- OP-09 ... AD-8117 cable & Display Pad mounting attachment.†
- OP-10 ... AC adaptor AC200~240V. "S" type plug (3-pin/flat).
- OP-13 ... Conveyor Belt Attachment -FW-150 / FW-100KA1.
- OP-14 ... Conveyor Belt Attachment -FW-60KA2.
- OP-15 ... Display Stand.
- OP-16-3 ... Weighing Platform Casters for FW-600KA3 / FW-1200KA3.
- OP-16-4 ... Weighing Platform Casters for FW-300KA4 / FW-600KA4.
- OP-17 ... Platform cover - stainless steel for FW-600KA3 / FW-1200KA3.
- OP-18-3 ... Roller conveyer for F-W600KA3 / FW-1200KA3.
- OP-18-4 ... Roller conveyer for F-W300KA4 / FW-600KA4.

*Option OP-01 Wall Mounting Kit has the same tilting mechanism found on the display arm bracket. It can be used in conjunction with the printer mounting attachment and 5m (16.4ft) display pod extension cable.

†Option OP-09 includes: the AD-8117 Compact Printer cable, and Display Pod mounting attachment. This option allows connection of the AD-8117 Compact Printer to the FW via the optional RS-232C output board (OP-03, which also contains the comparator buzzer/relay board), and holds the Compact Printer safely next to the scale's display pod. Printer, Wall Mounting bracket (if desired) and interface sold separately. The printer is not waterproof.



USING THIS MANUAL

Every care has been taken during the manufacturing process of this scale to ensure that it will perform accurately and reliably for many years. The intent of this Maintenance Manual is to make that as easy as possible for you with a step-by-step guide through the in's and out's of an FW Scale, or related product. Please let us know if it has accomplished the just stated goal - what works, what doesn't, and what we might have left out.

Along with every other manufacturer in the world, we ask that you read through the entire owner's INSTRUCTION MANUAL, and this MAINTENANCE MANUAL before starting any work. Of particular interest to dealers should be the CALIBRATION section page 9, and UPDATES section, page 38. When a customer has a problem, make sure that: the BEST CONDITIONS FOR WEIGHING, page 6, have been met, the scale has been calibrated and adjusted correctly, and the power is connected correctly. Next, look at the FAULT FINDING section, and the various flow charts. Keep your work area clean, remember how something came apart, and, always calibrate the scale after you have worked on it. Please enjoy yourself.

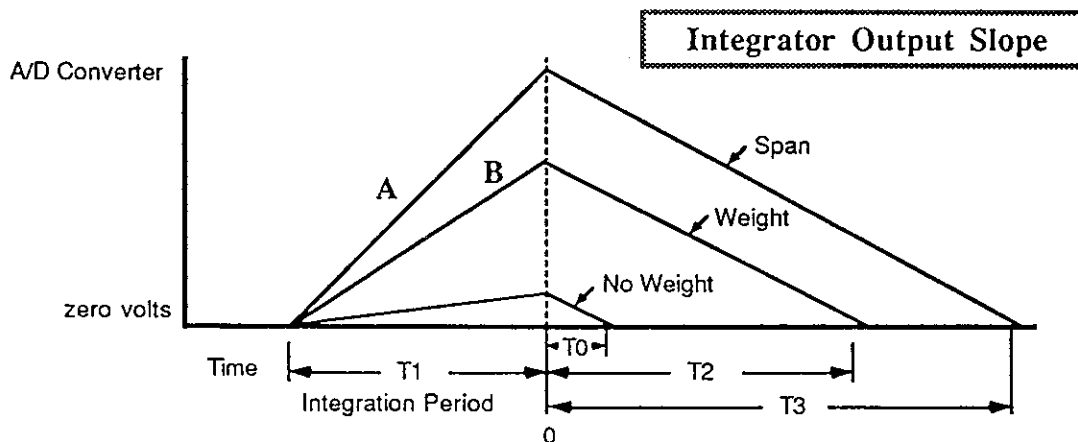


PRINCIPLES OF OPERATION

The FW scales operate using a highly accurate and sensitive Load Cell (Please refer to the LOAD CELL BLOCK DIAGRAM on the following page). When you put an object on the weighing pan it is pulled downwards under the action of gravity. We will call the object a "mass" and the measurement of its massiveness on Earth its "weight" (Weight = Mass x Acceleration due to Gravity - "g").

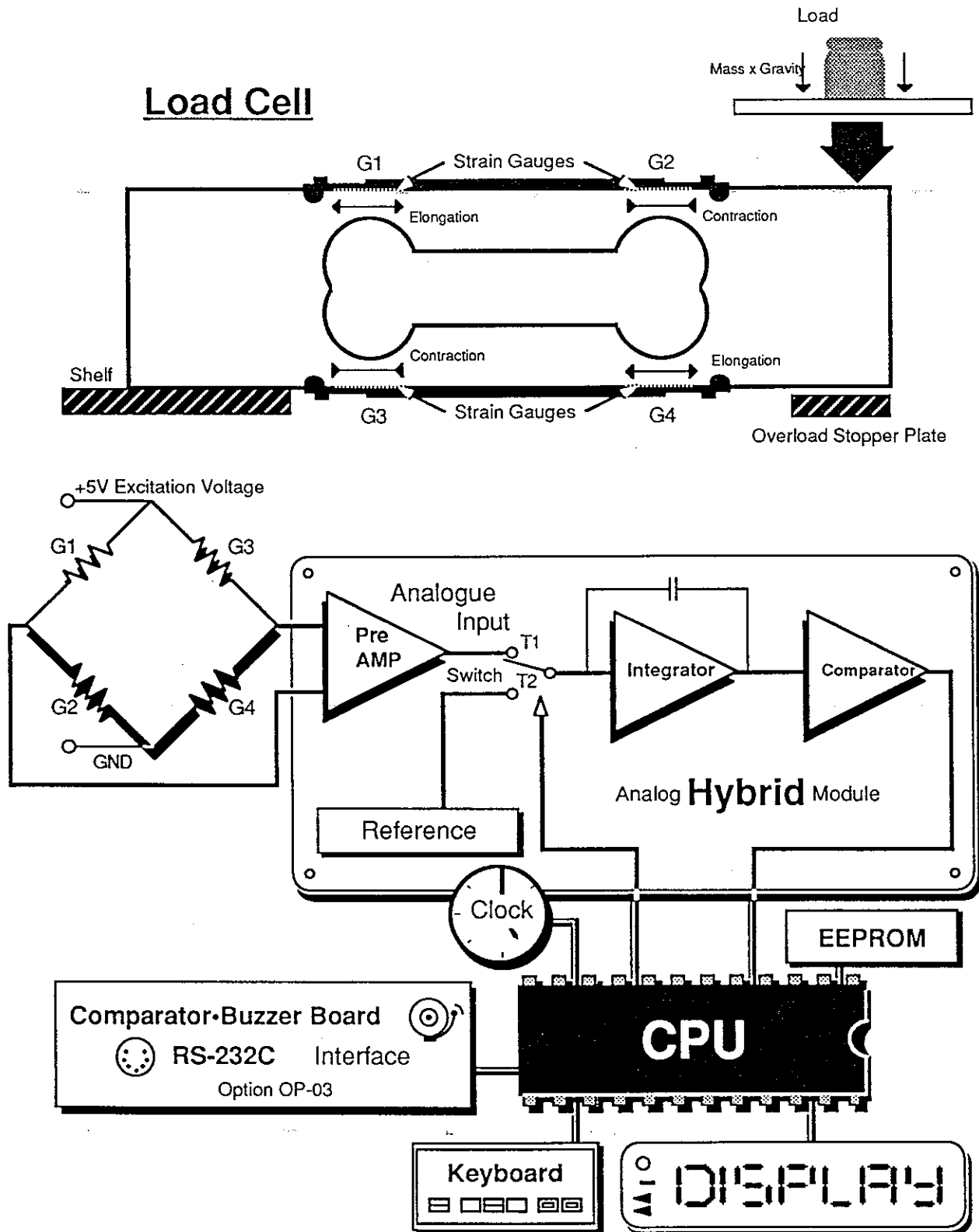
Load Cells work by detecting stress in the cell (a carefully hollowed aluminum bar, forming a Roberval's structure) by means of strain gauge transducers bonded to the upper and lower surfaces. When a mass is placed on the weighing pan, the force causes the Load Cell to bend, causing a elongation-contraction relationship (Hooke's law). As the strain gauges detect change, the analog output signal from the strain gauge varies. This signal is amplified and used as the input signal for an analog to digital converter. The final digital signal is used to calculate the weight for the display.

The integrator output slope is constant with respect to time. The dual-slope converter measures time taken for output to reach zero volts. Small input B=Short T2, Large input A=Long T3 time. $BV_{in} = T2 + T1 \times (V_{ref})$. In simpler terms, the integration period (T1) is always the same, the length of the resulting slope depends on the weight. The HYBRID module knows the zero point from zero volts, with an empty weighing pan from RE-ZEROing the scale (T0), full weight from span calibration (T3), and the output slope of an object (T2) with respect to time from the clock (how long the slope took to return to zero volts). The weight is then the offset distance of the object to that of an empty pan.





LOAD CELL BLOCK DIAGRAM



MODEL	FW-1200KA3	FW-600KA3	FW-600KA4	FW-300KA4	FW-31KA2
Capacity and resolution kg	1200 x 0.2 kg	600 x 0.01 kg	600 x 0.01 kg	300 x 0.1 kg 199.95 x 0.05 kg	31 x 0.01 kg 19.995 x 0.005 kg
Capacity and resolution lb	3000 x 1 lb 1999.5 x 0.5 lb	1200 x 0.2 lb	1200 x 0.2 lb	600 x 0.1 lb	60 x 0.01 lb
Calibration weight kg	1200 or 800 kg	600 or 400 kg	600 or 400 kg	300 or 200 kg	30 or 20 kg
Calibration weight lb	3000 or 2000 lb	1200 or 800 lb	1200 or 800 lb	600 or 400 lb	60 or 40 lb
Min. unit weight (counting)	0.2kg	0.1kg	0.1kg	0.05kg	0.005kg
Max. count pieces	6,000	6,000	6,000	6,000	6,000
Min. 100% value	20kg	10kg	10kg	5kg	0.5kg
Pan size mm	1000 x 1000 mm		600 x 700 mm		326 x 420 mm
Pan size inches	39.3 x 39.3 in.		23.6 x 27.5 in.		12.8 x 16.5 in.
Weight	approx. 110kg/242 lb		approx. 50kg/110 lb		approx.11.5kg/25.3 lb
Power	9V DC from 6 x UM2/ 'C' size batteries or optional AC adaptor				
Battery life	approx. 70 hours		approx. 100 hours		
Operating temperature	-5°C~35°C/23°F~95°F				
Sample size	5,10,20,50,100 pieces (set at 5, selectable with HI/LO key)				
Check weight	Two setpoints with "HI","GO","LO" liquid crystal annunciators				

MODEL	FW-150KA1	FW-100KA1	FW-60KA2	FW-15KA2	FW-10KA2
Capacity and resolution kg	150 x 0.02 kg	100 x 0.01 kg	60 x 0.01 kg	15 x 0.002 kg	10 x 0.001 kg
Capacity and resolution lb	300 x 0.1 lb 199.95 x 0.05 lb	199.98 x 0.02 lb	120 x 0.02 lb	30 x 0.01 lb 19.995 x 0.005 lb	19.998 x 0.002 lb
Calibration weight kg	150 or 100 kg	100 or 60 kg	60 or 40 kg	15 or 10 kg	10 or 6 kg
Calibration weight lb	300 or 200 lb	200 or 150 lb	120 or 80 lb	30 or 20 lb	20 or 15 lb
Min. unit weight (counting)	20g	10g	10g	2g	1g
Max. count pieces	7,500	10,000	6,000	7,500	10,000
Min. 100% value	2kg	1kg	1kg	0.2kg	0.1kg
Pan size mm	390 x 530 mm	390 x 530 mm	326 x 420 mm	326 x 420 mm	326 x 420 mm
Pan size inches	15.4 x 20.8 in.	15.4 x 20.8 in.	12.8 x 16.5 in.	12.8 x 16.5 in.	12.8 x 16.5 in.
Weight	approx. 17.5kg/38.5 lb		approx. 11.5kg/25.3 lb		
Power	9V DC from 6 x UM2/ 'C' size batteries or optional AC adaptor				
Battery life	Approx. 70–100 hours with manganese type cells/200 hours with alkaline, at 20°C/68°F				
Operating temperature	-5°C~35°C/23°F~95°F				
Sample size	5,10,20,50,100 pieces (set at 5, selectable with HI/LO key)				
Check weight	Two setpoints with "HI","GO","LO" liquid crystal annunciators				

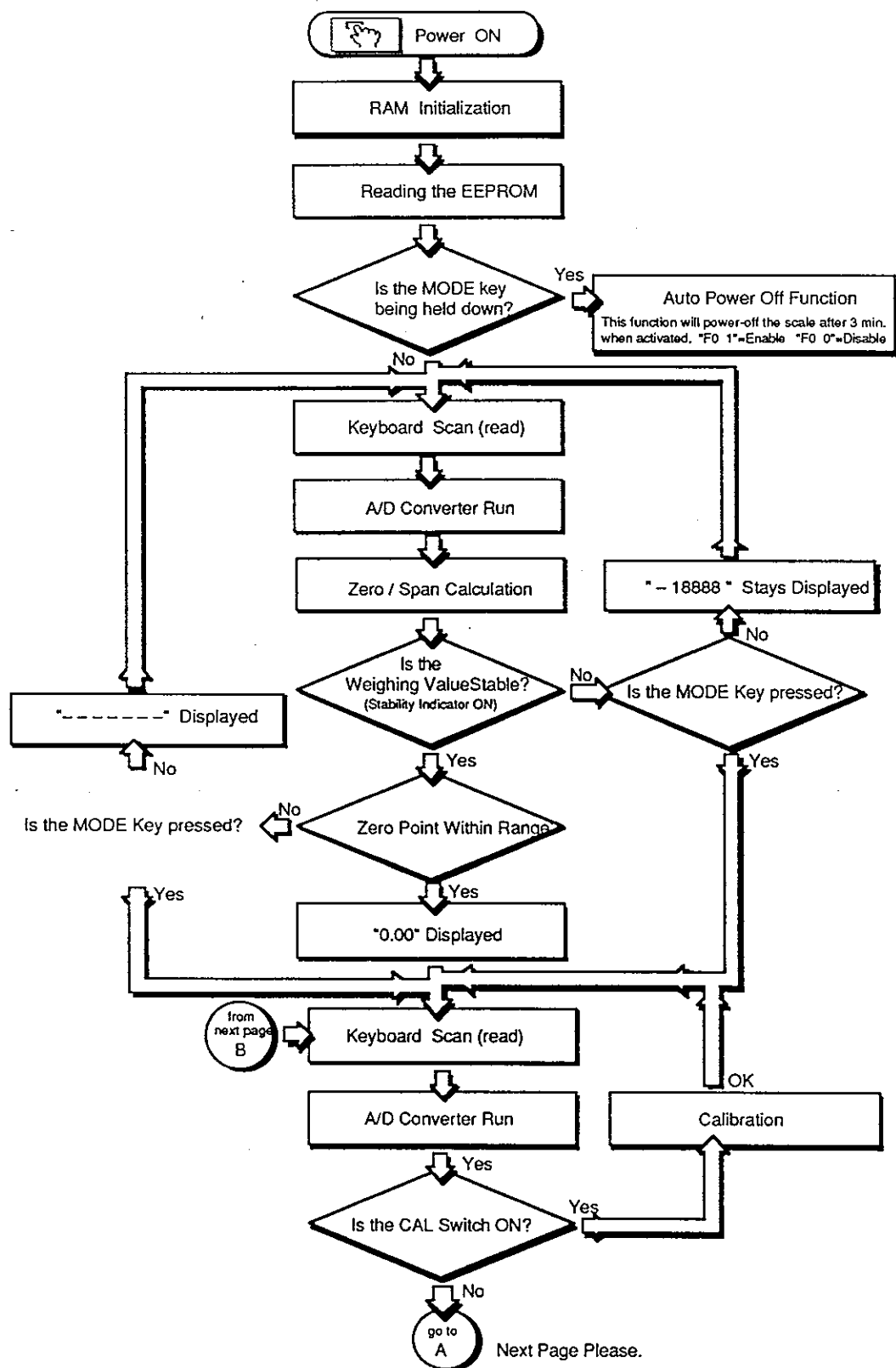
Specifications subject to change for improvement without notice.

BEST CONDITIONS FOR WEIGHING

- ✓ The scale must be level (check the bubble level under the Weighing Pan).
- ✓ Best temperature is about 20°C (68°F), at about 50% Relative Humidity.
- ✓ The weighing table should be of a solid construction.
- ✓ Corners of rooms are best, as they are less prone to vibrations.
- ✓ Don't install the scale in direct sunshine.
- ✓ Try to ensure a stable AC power supply when using an adaptor.
- ✓ Clean the scale with mild soap and water (don't use solvents).

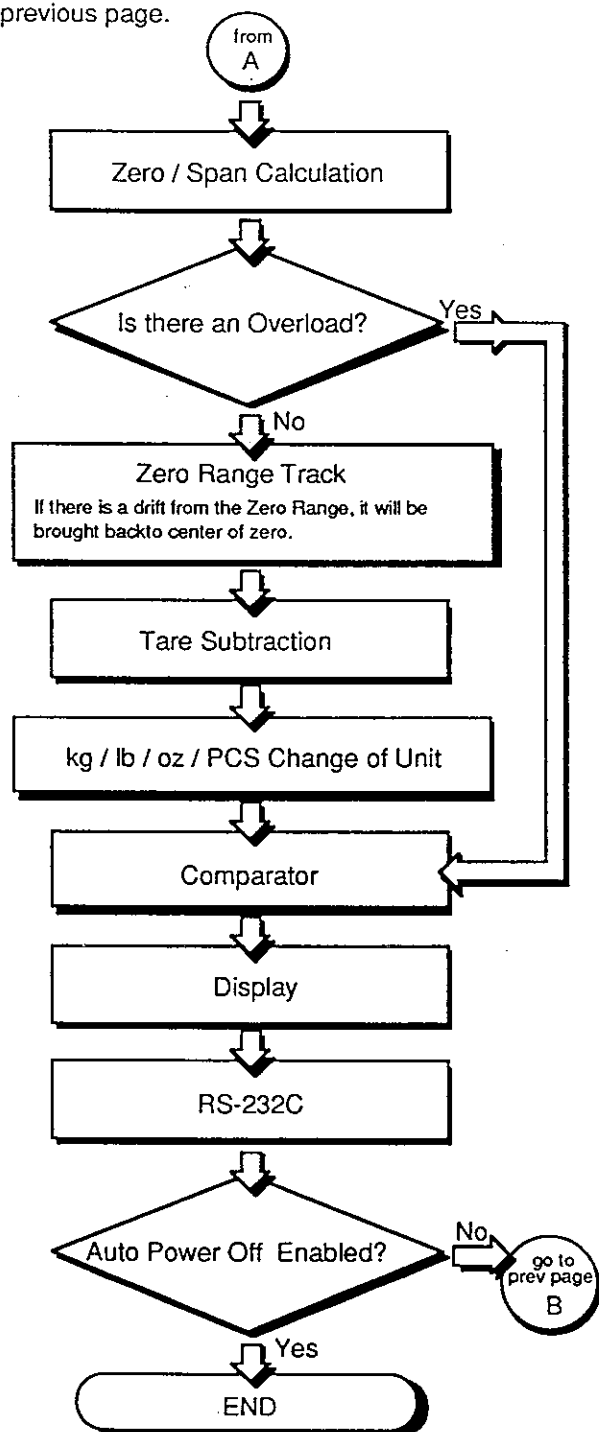


SOFTWARE FLOW CHART



SOFTWARE FLOW CHART

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CALIBRATION



Attention

In territories where the FW scale is registered for commercial use, the end-user should not be given this information, as he will not be permitted to break the seals to carry out span calibration for himself. In this case, calibration would be carried out by the responsible authorities, and the calibration settings would then be sealed. Also, the comparator buzzer dip-switch settings on the optional RS-232C output board must also be set by the dealer/authorities. The scale must be shipped to the end-user in a fully assembled form for commercial use.

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Calibration Introduction

Calibration of the scale is required when it is initially installed, if the scale is moved a substantial distance, or in accordance with local regulations. It is necessary because the weight of a mass in one location is not necessarily the same in another location. Also, with time and use, mechanical deviations can occur. "Weight" equals mass times acceleration due to Earth's field of gravity. The internationally adopted value for gravitational acceleration is 9.80665 m/s^2 (32.174 ft/s^2) in a vacuum. However, this varies by about ± 0.3 percent depending on how far you are from the Earth's center of mass. Mass distorts space in such a way that the gravitational power of attraction is inversely proportional to the square of the distance between material objects (if non-gravitational forces are ignored). So, gravitational acceleration is greatest at the poles, least at the equator and decreases with altitude.

When we weigh a mass we are trying to find its weight expressed as pounds or kilograms. Because "g" and other factors vary from location to location, we must calibrate the scale whenever we move it otherwise a mass of 30kg might display 30.00kg in one location and 30.08kg in another (i.e.: "g" may have changed by $+0.267\%$. $w=m \times g$). This would be an error but it can be prevented by placing an accurate mass on the scale (say 30kg) and then telling the scale, in effect, "this is what 30kg weighs at this location so please display 30.00kg"..... this is calibration.

The FW series is also equipped with a gravity compensation function which means that it can be calibrated in one location and then adjusted to match the acceleration of gravity at another location. We call this "setting the value of 'g'". If you wish to take advantage of this feature, please read the GRAVITY COMPENSATION FUNCTION section.



Please Note

You will need to recalibrate and reset the value of "g" (if for different location use) after a memory loss, Load Cell change, or a new main circuit board.



Simple Zero Calibration

For the End User , User's Instruction Manual

Although the end user may not be permitted to carry out span calibration, he may carry out zero calibration by following the procedure below.

WHEN Zero calibration is needed if "----" is displayed when the power is turned on, or when the **ZERO** key will not set the display to zero.

Step 1. Remove all objects from the Weighing Pan and turn the display ON.

Step 2. Press the **MODE** key and **ZERO** key simultaneously.

DISPLAY "CAL 0" will be displayed.

Step 3. Press the **ZERO** key and the zero point will be entered.

DISPLAY The display will then return to normal weighing mode.

END End of SIMPLE ZERO CALIBRATION procedure, continue with normal weighing.

Zero and Span Calibration

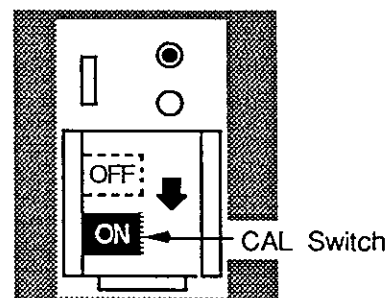
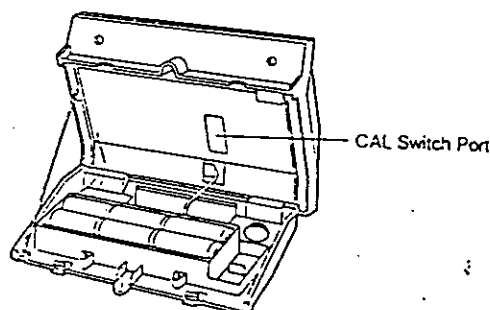
The FW platform scale uses a calibration system called "FDC™" for Full Digital Calibration. This means that the zero point and maximum capacity points are entered digitally through the keyboard, and it makes the calibration method very easy to remember. FW scales can be calibrated using "lb" (pound avoirdupois) or "kg" (kilogram) calibration weights at maximum capacity or at $\frac{2}{3}$ of maximum capacity. Maximum capacity calibration is preferred, if possible, to reduce the risk of span errors at weights above $\frac{2}{3}$ of the full scale point.

Table A. Load Cell List & Calibration Mass



Scale	Display Pod & Load Cell	Platform & Load Cell	Load Cell	Calibration Mass
FW-1200KA3		FW-1200KB3	AD:LC4204K600M2	1200kg or 800kg 300lb or 200lb
FW-600KA3		FW-600KB3	AD:LC4204K600M2	600kg or 400kg 300lb or 200lb
FW-600KA4		FW-600KB4	AD:LC4204K600M1	600kg or 400kg 1200lb or 800lb
FW-300KA4		FW-300KB4	AD:LC4204K600M1	300kg or 200kg 600lb or 400lb
FW-150KA1	FW-150KK1		LC:106-150K	150kg or 100kg 300lb or 200lb
FW-100KA1	FW-100KK1	FW-100KB1	LC:106-100K	100kg or 60kg 200lb or 150lb
FW-60KA2	FW-60KK2		LC:106-60K	60kg or 40kg 120lb or 80lb
FW-31KA2			LC:106-30K	30kg or 20kg 60lb or 40lb
FW-15KA2	FW-15KK2	FW-15KB2	LC:106-15K	15kg or 10kg 30lb or 20lb
FW-10KA2	FW-10KK2	FW-10KB2	LC:106-10K	10kg or 6kg 20lb or 15lb

- Step 1. Warm up the scale for at least 10 minutes before making adjustments. You must be careful of the auto-off function, which turns off the display after three minutes. This can be avoided by:
- Placing an object on the weighing pan,
 - Setting the Tare function so the display shows a negative number after the container weight is set and the container removed,
 - Disable the auto-off function.

- Step 2. With the display ON, remove the calibration plate - Slide **CAL** switch ON↓.



DISPLAY You will now see a display of "9.798" or "9.XXX" (X denoting any other three numbers already set into memory). This is the value of "g", or gravity.

 <p>• Use the MODE key to view settings, move through the settings, and escape a setting if you have made a mistake.</p>	 <p>• The ZERO key enters the zero point, and enters settings into memory.</p>
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Step 3. Press **MODE**.

DISPLAY You should now see a display of "CAL 0", with the circular stability indicator on, if not, please turn off the scale and restart at the beginning of this section.

Step 2. Press **ZERO** to enter the zero point.

DISPLAY You will now see a display of "CAL 1".

Step 3. Select the desired "CAL 1", "CAL 2", "CAL 3" or "CAL 4" by pressing the **MODE** key to move between them.

Table B. Calibration Capacity Settings. (Refer to Table A.)

CAL 1	Means span calibration at maximum capacity in kilograms.
CAL 2	Means span calibration at 2/3 of maximum capacity in kilograms.
CAL 3	Means span calibration at maximum capacity in pounds.
CAL 4	Means span calibration at 2/3 of maximum capacity in pounds.

Step 4. Place the correct calibration weight on the weighing pan.

Step 5. After the circular stability indicator comes on, press **ZERO** to enter the setting.

NOTE: If "-CAL E" is displayed when you press **ZERO**, the scale cannot enter the maximum capacity (or 2/3) value because the calibration mass is under-weight (minus Calibration Error). Check everything is correctly set.

DISPLAY "End" will be displayed.

Step 6. Slide the calibration switch OFF while "END" is displayed, and turn off the scale.

- If you are going to set the value of gravity ("g") for a customer at a different geographical location (see the GRAVITY COMPENSATION FUNCTION section), please go to Step 2., SETTING THE VALUE OF "g" section.



Please Note Before customer delivery:

In areas where the FW scale is registered for commercial use, the calibration port cover and the load cell connector cover must be sealed (which extends to deny access to one of the screws which holds the top of the display pod on). Also, the end-user will not be permitted to remove the top of the display pod as he could thereby switch on the calibration switch. Thus, the comparator buzzer dip-switch settings on the optional RS-232C output board must also be set by the dealer/authorities. The scale must be shipped to the end-user in a fully assembled form for commercial use.

END End of ZERO AND SPAN CALIBRATION procedure.

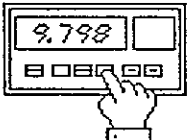
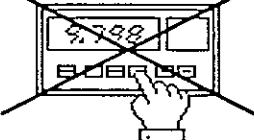
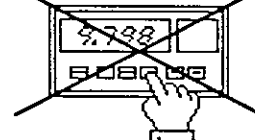
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Gravity Compensation Function

This scale is equipped with a gravity compensation function which means that it can be calibrated in one location and then adjusted to match the acceleration of gravity at another location.

Dealers and Weights & Measures authorities may find this function useful as it will save them having to transport up to 300lb or 150kg in calibration weights to the end-user's location during scale installation. It is solely for this use (when the scale is to be transported to a different geographical area), and not intended, or needed for local or on-sight calibration.

Gravity Compensation Function: Setting the Value of "g"

 <p>A dealer, or weights & measures authority, can calibrate the scale, then set the value of gravity ("g") - so, that after shipping, the calibration is good at the customer's location.</p>	 <p>The dealer does not need to use "Setting the Value of 'g'" if the scale is being calibrated for use locally - just use "Zero and Span Calibration".</p>	 <p>Once at the user's location, the value of gravity ("g") does not need to be reset when calibrating. Only if the scale is to change geographical location after calibration is resetting "g" necessary.</p>
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- The FW scale was calibrated in Tokyo before shipping so, if you do not wish to calibrate the scale again, you can simply set the known acceleration rate (SETTING THE VALUE OF "g") for your customer's location (or your own if it is to be used locally).
- Otherwise, you must complete Zero and Span Calibration, and you will be overriding the "g" function.
- If you are going to use the gravity compensation function (SETTING THE VALUE OF "g"), then you must:
 1. Carry out Zero and Span Calibration. (Not necessary if the scale is fresh out of the box from Tokyo).
 2. Then, set the value of "g" at the end-user's location.
 3. Ship to the end user; the scale will not be accurate in your local area.
- It is best to set the "g" with the actual value of gravity, measured at the location. This can be found in reference tables for the country (or area), or sometimes from a physics laboratory at a local academic institution. Also, if you know the latitude and altitude, you can use the following formula:

Helmert's formula can be used to find the value of "g", the acceleration due to terrestrial gravity, for a given latitude and altitude:

$$g = 9.806\ 16 - 0.025\ 928 \cos 2\lambda + 0.000\ 069 \cos^2 2\lambda - 0.000\ 003\ 086H$$

"g" is in m/s^2 , "λ" means latitude and "H" is meters above sea level.

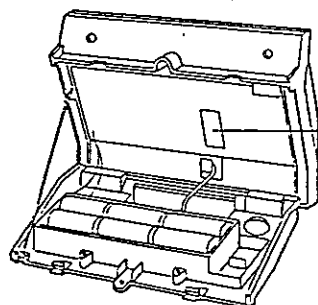
- Alternatively, please refer to the attached table for the value of "g" at various world wide locations or plot the end-user's position in terms of latitude and altitude on the enclosed graph.



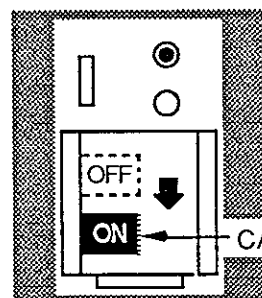
Setting the Value of "g"

Please read the GRAVITY COMPENSATION FUNCTION section before starting this procedure!

- Step 1. Warm up the scale for at least 10 minutes before making adjustments. You must be careful of the auto-off function, which turns off the display after three minutes. This can be avoided by:
- Placing an object on the weighing pan,
 - Setting the Tare function so the display shows a negative number after the container weight is set and the container removed,
 - Disable the auto-off function (see AUTOMATIC POWER OFF FUNCTION).
- Step 2. With the display ON, remove the calibration plate - Slide the **CAL** switch ON↓.



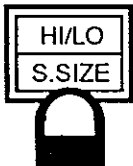
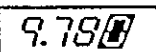
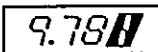
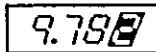
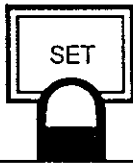


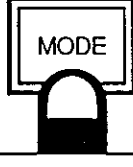
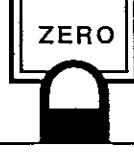
CAL Switch Port



CAL Switch

DISPLAY You will now see a display of "9.798" or "9.XXX" (X denoting any other three numbers already set into memory). This is the value of "g", or gravity. The display "9.798" stands for 9.798m/s^2 , which is the approximate acceleration of gravity in Tokyo, Japan (sea level at 36° latitude). Acceleration due to gravity changes with latitude because the North and South poles are closer to the center of the planet earth than the equator.

- To set the value of "g", the function keys are used in the following manner.

	<ul style="list-style-type: none">• Raises the flashing cursor by one digit. ie:  →  → 
	<ul style="list-style-type: none">• Shifts the cursor left. ie:  → 
	<ul style="list-style-type: none">• Use the MODE key as an escape. If you make a mistake, mode will move you out of the section without setting the number into memory.
	<ul style="list-style-type: none">• The ZERO key enters settings into memory.

- Step 2. Use the HI/LO key to increase the digit that is flashing incrementally by one, (i.e.: 1→2→3).
- Step 3. After the desired digit is displayed, use the SET key to shift the cursor left to the next digit.
- Step 4. After the desired number is displayed, press **ZERO** to enter the setting into memory and proceed to the ZERO AND SPAN CALIBRATION section.
- Step 5. Switch off the calibration switch and seal the calibration port cover and the load cell connector cover (which extends to deny access to one of the screws which holds the top of the display pod on).
- Step 6. Ship to the end user; the scale will not be accurate in the local area.



Please Note *Before customer delivery:*

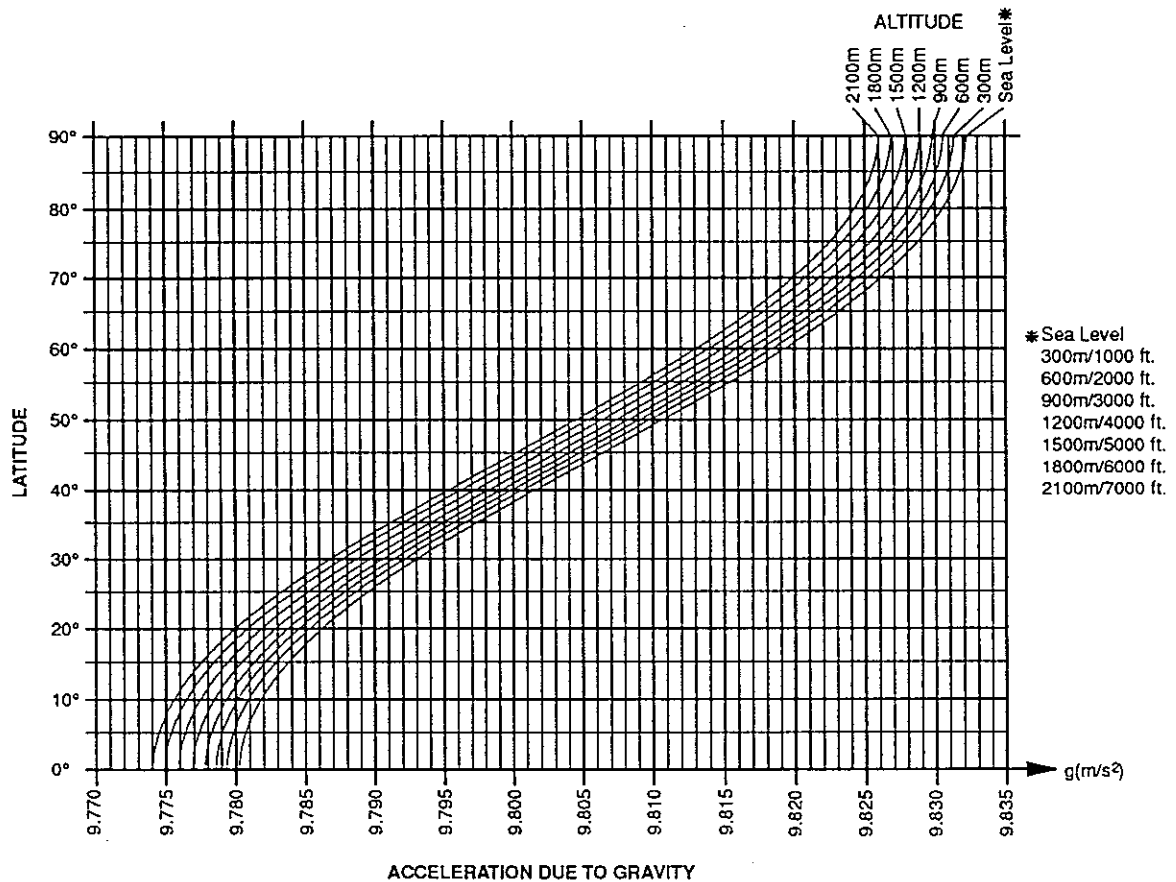
In areas where the FW scale is registered for commercial use, the calibration port cover and the load cell connector cover must be sealed (which extends to deny access to one of the screws which holds the top of the display pod on). Also, the end-user will not be permitted to remove the top of the display pod as he could thereby switch on the calibration switch. Thus, the comparator buzzer dip-switch settings on the optional RS-232C output board must also be set by the dealer/authorities. The scale must be shipped to the end-user in a fully assembled form for commercial use.

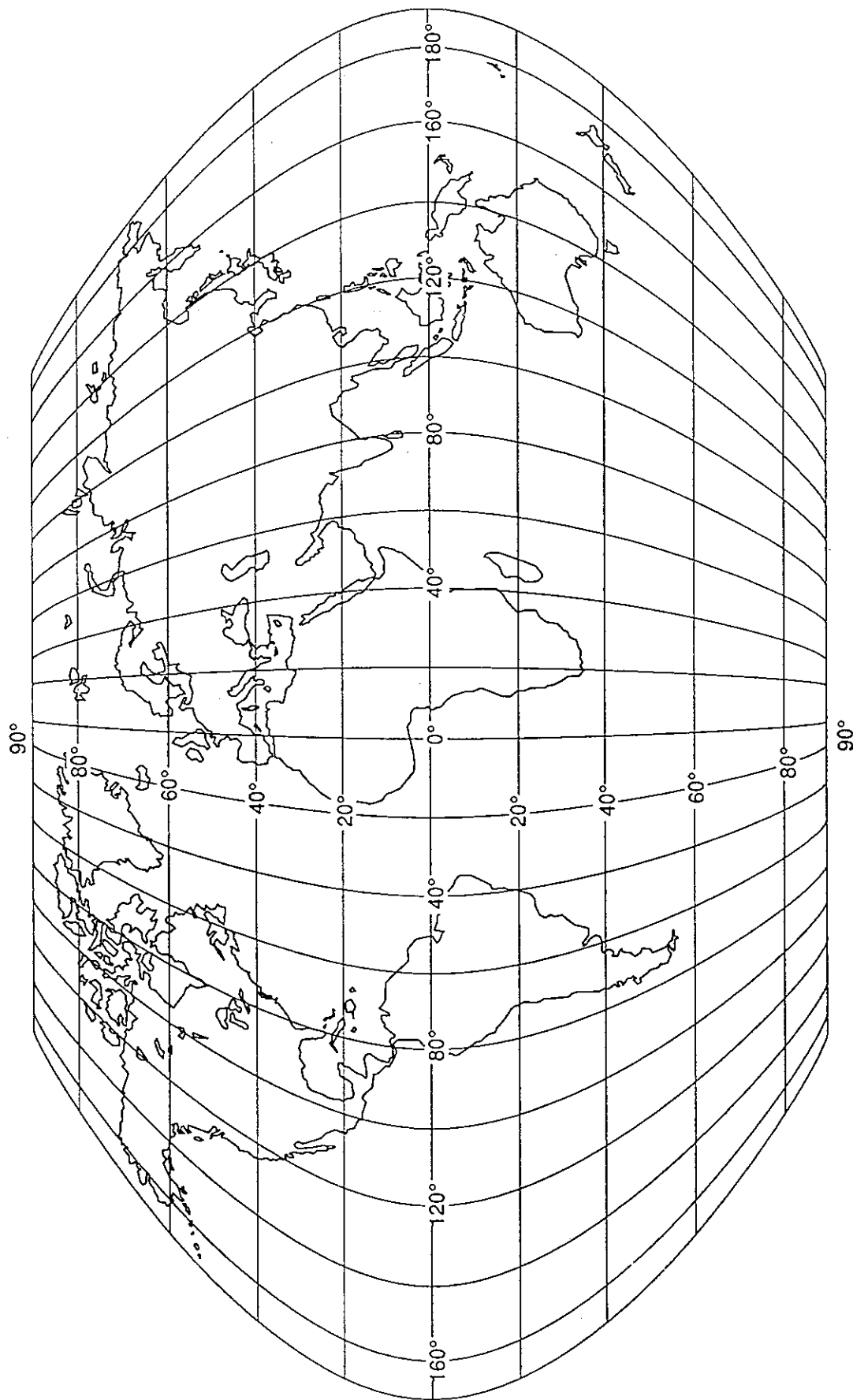
END End of SETTING THE VALUE OF "g" procedure.

THE VALUE FOR "g"

AT VARIOUS WORLD-WIDE LOCATIONS

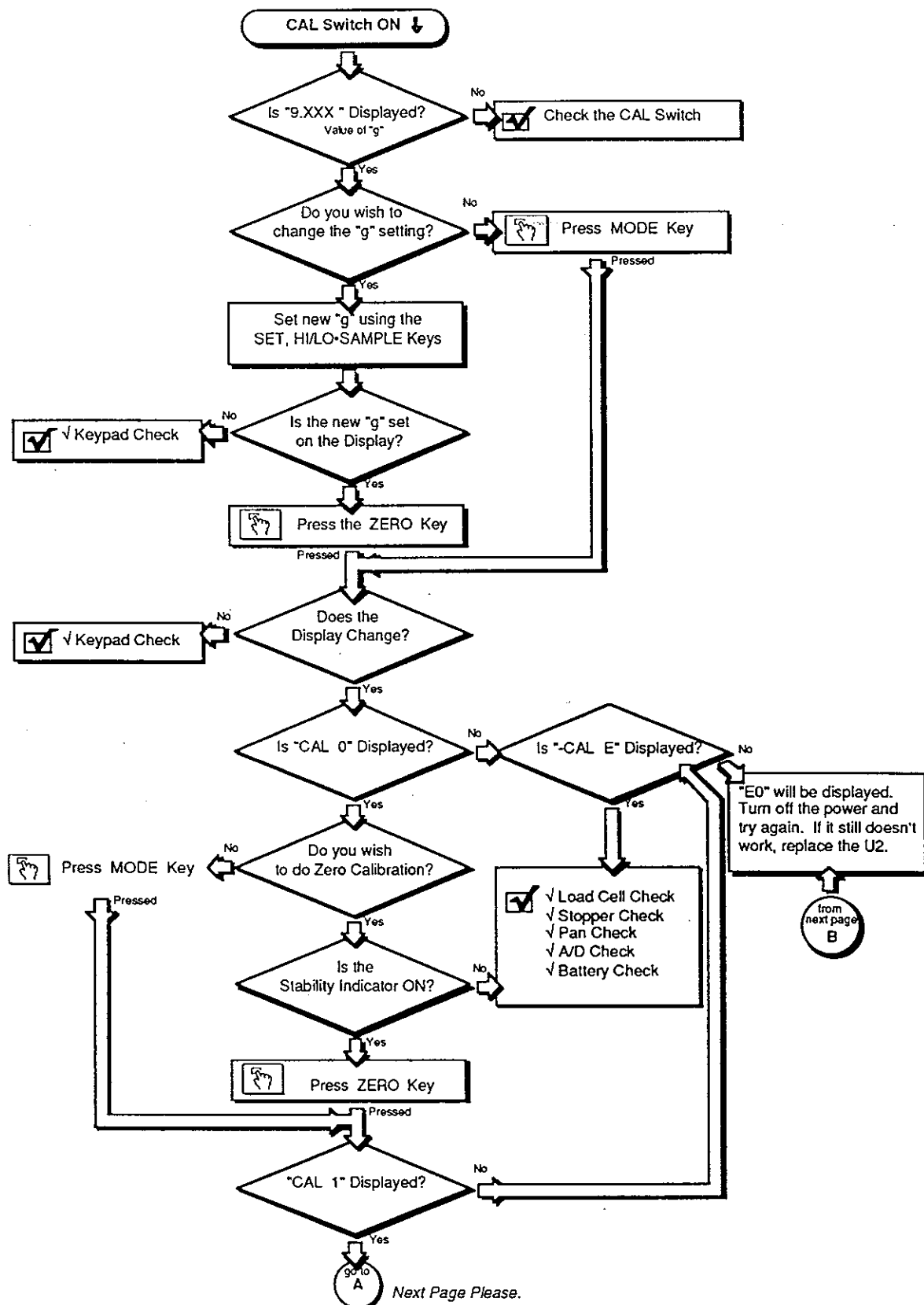
Amsterdam	9.813	m/s ²	Manila	9.784	m/s ²
Athens	9.800	m/s ²	Melbourne	9.800	m/s ²
Auckland NZ	9.799	m/s ²	Mexico City	9.779	m/s ²
Bangkok	9.783	m/s ²	Milan	9.806	m/s ²
Birmingham	9.813	m/s ²	New York	9.802	m/s ²
Brussels	9.811	m/s ²	Oslo	9.819	m/s ²
Buenos Aires	9.797	m/s ²	Ottawa	9.806	m/s ²
Calcutta	9.788	m/s ²	Paris	9.809	m/s ²
Capetown	9.796	m/s ²	Rio de Janeiro	9.788	m/s ²
Chicago	9.803	m/s ²	Rome	9.803	m/s ²
Copenhagen	9.815	m/s ²	San Francisco	9.800	m/s ²
Cyprus	9.797	m/s ²	Singapore	9.781	m/s ²
Djakarta	9.781	m/s ²	Stockholm	9.818	m/s ²
Frankfurt	9.810	m/s ²	Sydney	9.797	m/s ²
Glasgow	9.816	m/s ²	Taichung	9.789	m/s ²
Havana	9.788	m/s ²	Taiwan	9.788	m/s ²
Helsinki	9.819	m/s ²	Taipei	9.790	m/s ²
Kuwait	9.793	m/s ²	Tokyo	9.798	m/s ²
Lisbon	9.801	m/s ²	Vancouver, BC	9.809	m/s ²
London (Greenwich)	9.812	m/s ²	Washington DC	9.801	m/s ²
Los Angeles	9.796	m/s ²	Wellington NZ	9.803	m/s ²
Madrid	9.800	m/s ²	Zurich	9.807	m/s ²





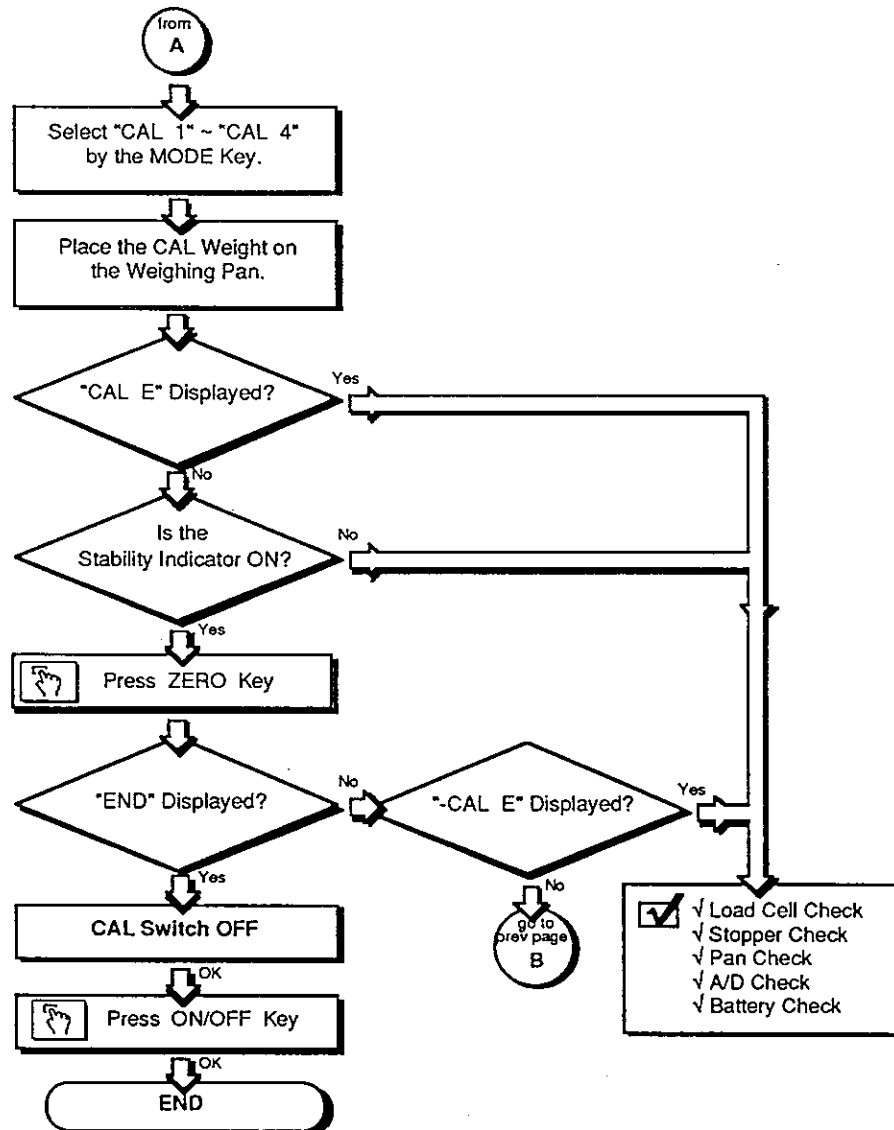


CALIBRATION FLOW CHART



CALIBRATION FLOW CHART

continued
from previous page.





Software Parameter Settings

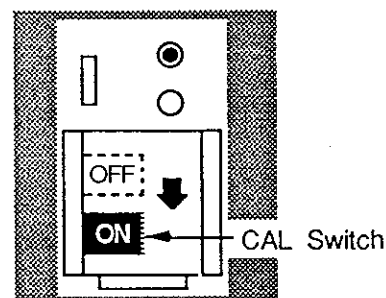
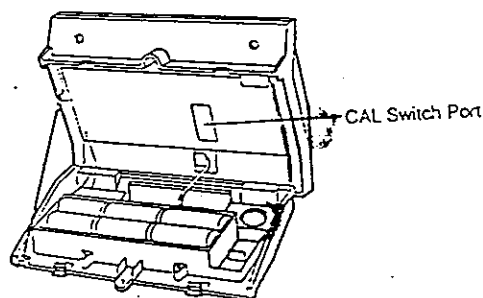


CONFIDENTIAL INFORMATION



This section concerns disabling and enabling functions of the FW Series of Platform Scales at a software level not described to the end user in the Instruction Manual. Because some software functions will be illegal in some countries, and other functions could be inadvertently disabled - it is important that the end users should not have access to this information. Clearly it is important to A&D and to our dealers that these scales should be functioning at their full and proper potential for the customer, and not be used in fraudulent or other criminal activity

Step 1. With the scale OFF, remove the calibration plate - Slide **CAL** switch ON.



Step 2. Press and hold the **MODE** and **ZERO** keys with your right hand - while continuing to hold them, press **ON/OFF**. Release **MODE** and **ZERO** keys.

NOTE: The use of each key as you move through this procedure is listed below. Please take a moment to read each.

	<ul style="list-style-type: none"> • The ZERO key enters settings into memory. "F0" thru "F1" are entered individually, "F2" - "F4" are entered together. • At the end of the "F" cycle ("F4 2") it is used to enter, then move to "END", the completion of the cycle.
	<ul style="list-style-type: none"> • Use the MODE key to view settings, move through the settings, and escape a setting if you have made a mistake. • You cannot enter settings with the MODE key, it will only move you through the settings with no change.
	<ul style="list-style-type: none"> • Once in the "F" group, use this key to move incrementally through the settings available in each group, ie: <div data-bbox="710 1676 1080 1712" data-label="Text"> <p>F1 0 → F1 1 → F1 0</p> </div>

NOTE: You are now able to just view (by only pressing the **MODE** key), or change the parameter settings (using the **ZERO** key to enter).

DISPLAY Display will show "F0 0" (or "F0 1").

F0 0	F0 Is the automatic function: Power Off After Three Minutes
F0 0	Function Disabled
F0 1	Function Enabled

Step 3. Use the HI/LO key to move incrementally between "F0 0" to "F0 1". When the desired setting is displayed, press ZERO to enter the setting into memory, and move to F1.

F1 0	F1 Is the function: Counting Mode Enable / Disable
F1 0	Function Enabled
F1 1	Function Disabled

Step 4. After using the HI/LO key to move to the desired setting - press ZERO to enter the setting into memory, and move to F2.

F2 0	F2 Is the function: Zero Band
F2 0	10% of Maximum Capacity
F2 1	5% of Maximum Capacity
F2 2	2% of Maximum Capacity

Note: "F2 0" through "F4 2" are entered in as a block, in other words you will need to make any change in "F2" through "F4" - and then when you press ZERO, they will all be entered. If there is no change in an "F" group, then press MODE to move you without change.

Step 5. After using the HI/LO key to move to the desired setting - press MODE to move to F3.

F3 0	F3 Permits the display of "lb" and sets the TARE and ZERO conditions.
F3 0	TARE works when the display is stable, but will not work if "ZERO" is displayed. "lb/oz" is not displayed (OIML/Most Countries).
F3 1	TARE always works when the display is stable, "lb/oz" is displayed (USA).
F3 2	TARE is permitted when the scale is stable and the display is not at the center-of-zero. "lb/oz" not displayed. (New Zealand).
F3 3	TARE is permitted when the scale is stable and the display is not zero. After TARE, the ZERO and NET indicators will switch on simultaneously. While TARE is entered, Zero does not work. "lb/oz" not displayed. (Australia).

Step 6. After using The HI/LO key to move the desired setting-press **MODE** to move "**F 4**"

F4 0		F4 sets the maximum capacity of the scale
F4 1	60Kg (FW-60k)	
F4 2	150Kg (FW-150k)	
F4 3	15Kg (FW-15k)	
F4 4	100kg(FW-100k)	
F4 5	10kg(FW-10k)	
F4 6	300kg(FW-300k)	
F4 7	600kg(FW-600k)	
F4 8	1200kg(FW-1200k)	
F4 C	31kg(FW-31k)	

Step 7. After using the HI/LO key to move to the desired setting - press **ZERO** to enter the settings ("F2 0" through "F4 2") into memory and move to **F5**.

F5 0		F5 the communication mode of the operational RS-232C interface.
F5 0	STREAM mode	
F5 1	COMMAND mode, terminator of command is <CR>+<LF>	
F5 2	COMMAND mode, terminator of command is <CR>.	

Step 8. After using the HI/LO key to move to the desired setting - press **ZERO** to enter the settings and move to **F6**.

F6 0		F6 sets the comparator mode enviroment.	
SETTING	Comparator function is ON or OFF when scale is powered ON	Comparator Buzzer and Relay Output	
F4 0	OFF	Always	
F4 1	OFF	Prohibited Near Zero	
F4 2	ON	Always	
F4 3	ON	Prohibited Near Zero	

NOTE: Near Zero = -4 to +4 weight display divisions.

DISPLAY Display will show "END".

NOTE: You may also go back to the beginning of the cycle "F0" by pressing **MODE**, and not **ZERO** - but, no settings will be entered into memory until **ZERO** is pressed.

Step9 Slide OFF↑ the Calibration switch while "END" is displayed.

END End of SOFTWARE PARAMETER SETTINGS procedure.



FAULT FINDING

This section can be photocopied and used as a check sheet -
Simply mark the boxes provided after each step is successfully completed.



Troubleshooting

- ✓ Check the Keypad to see if it's okay, replace if defective. (see KEYPAD CHECK)
- ✓ If the display remains "E", "-E", or is not stable - then do a full recalibration, including setting "g" if used (see CALIBRATION section).
- ✓ If you are unable to calibrate:
 - Zero calibration may be needed if the ZERO key will not set the display to zero, or if "----" is displayed when the power is turned on .
 - If "-CAL E" is displayed when you press ZERO, the scale cannot enter the maximum capacity (or $2/3$) value because the calibration mass is under-weight (minus Calibration Error). Check everything is correctly set.
 - Check the Load Cell and the Main Board for broken leads, and the cable from the Load Cell to J1.
- ✓ If "E0" is displayed, turn off the power and try again. If that doesn't work, change either U2 of PZ2024, U3, or change the whole board.*
 - * Don't forget to do a full recalibration, including setting "g" (see CALIBRATION section) if you make any electronic repairs.



Load Cell Stopper Check

Mechanical

- ✓ If you load the weighing pan to just over full scale, does it hit the overload stopper? ☐ok



Pan Check

Mechanical

- ✓ Is the weighing pan touching anything? ☐ok
- ✓ Is the weighing pan mounted correctly? ☐ok
- ✓ Is the weighing pan perfectly horizontal? ☐ok



Battery Check

Electronic

- ✓ Disconnect the battery pack, and the AC adaptor (if connected). Then, reconnect the battery pack.
- ✓ Check the connection between J4 and the display. ☐ok
- ✓ Check the output of the Battery/AC adaptor to see that it is at least 6.5 volts. ☐ok
- ✓ When pressing the ON/OFF key, check the resistance between J4 pins 1 & 8 to see if they read less than 10K Ω . If so, then it is okay. ☐ok
 - If not, check the connection. ☐ok
 - If the resistance is correct and the problem isn't solved, try a different Keypad to make sure that the problem with the Keypad and not the Main Circuit Board. If it checks out, then change the Keypad.
- ✓ When the ON/OFF key is ON, the output of U1 should be 5V \pm 10%, with the clock pulse at 12MHz, and pin 8 of U4 (RESET) at \approx 5V (Hi). ☐ok

- ✓ Check to see that transistors Q1, Q2, Q3 are working. Q1 ☐ ok Q2 ☐ ok Q3 ☐ ok

CPU Check

Electronic

- ✓ Disconnect the battery pack, and the AC adaptor (if connected). Then, reconnect the battery pack.
- ✓ Check all solder connections. ☐ ok
- ✓ Check that the voltage between pin 58 & GND of U5, it should be 5V \pm 10%. ☐ ok
- ✓ Is the the RESET at the Hi level? [pin 8 of U4 (RESET) at \approx 5V (Hi)] ☐ ok
- ✓ Check the following resistor's voltage levels for the LCD:

R10	\approx 1.1V	<input type="checkbox"/> ok	R8	\approx 1.1V	<input type="checkbox"/> ok
R9	\approx 1.1V	<input type="checkbox"/> ok	R7	\approx 1.7V	<input type="checkbox"/> ok

- ✓ Check that the clock pulse (slope/oscillate) is 12MHz (see #1 WAVEFORM table).
- ✓ Check the waveform for: (see WAVEFORM table)

1st	<input type="checkbox"/> ok	$\overline{1st}$	<input type="checkbox"/> ok	2nd	<input type="checkbox"/> ok
AZ	<input type="checkbox"/> ok	CMP	<input type="checkbox"/> ok		

- ✓ Check the waveform of EEPROM (see WAVEFORM table). ☐ ok

A/D HYBRID Check

Electronic

- ✓ Check the voltage of U3 at pin 10, it should be 5V \pm 10%. ☐ ok
- ✓ Check the following voltages from the Load Cell between U3 pin and:

Should be \approx 3V	Should be \approx 3V	Should be 0V
Pin 1 (GND) <input type="checkbox"/> ok	Pin 2 (Hi) <input type="checkbox"/> ok	Pin 3 (Lo) <input type="checkbox"/> ok

- ✓ Check the waveform for: (see WAVEFORM table)

1st	<input type="checkbox"/> ok	$\overline{1st}$	<input type="checkbox"/> ok	2nd	<input type="checkbox"/> ok
AZ	<input type="checkbox"/> ok	CMP	<input type="checkbox"/> ok		

LCD Check

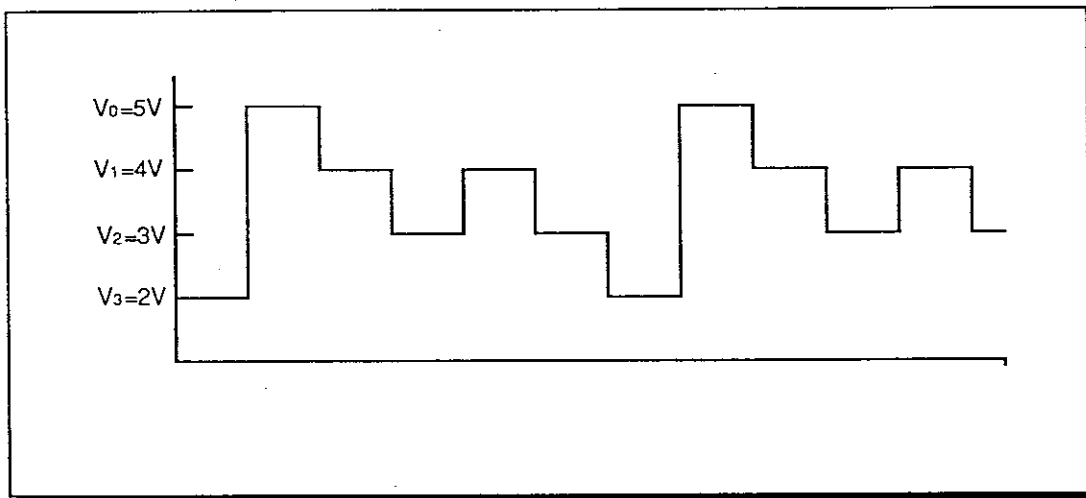
Electronic

- ✓ Check the glass for cracks.
- ✓ Check the soldering for breaks, or dry solder between the CPU and the LCD.
- ✓ Check the following resistor's voltage levels for the LCD:

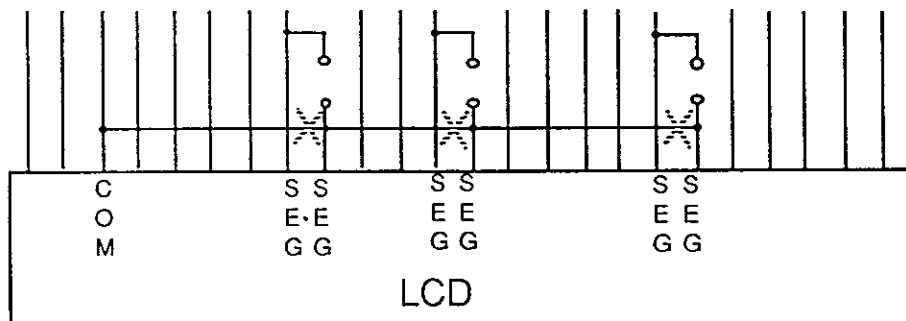
R10	\approx 1.1V	<input type="checkbox"/> ok	R8	\approx 1.1V	<input type="checkbox"/> ok
R9	\approx 1.1V	<input type="checkbox"/> ok	R7	\approx 1.7V	<input type="checkbox"/> ok

✓ Check the following waveforms for the LCD:

- Waveforms of **COM**.



- The common lines output stair step waveforms with a period of about 24 msec., one third out of phase from each other. Each segment line also outputs a stair step waveform with a period of 24 msec. When lit up, the segment produces a waveform of large amplitude in opposite phase to the common; when turned off, the segment produces a waveform of small amplitude.
- 'SEG,' is used to change the shape of the decimal point from '■' to '9'. Normally, 'SEG,' is short circuited to COM 0 and turned OFF. Short circuiting 'SEG,' to SEG A of each digit lights '9' as well as '■'. [Cut the pattern indicated by crosses (X) and attach jumpers.]



Load Cell Check Electronic

- ✓ Check the following cable assembly - pin to wire - connections of J1:

Pin	Color	Pin	Color	Pin	Color
1	Red <input type="checkbox"/> ok	2	Green <input type="checkbox"/> ok	3	Blue <input type="checkbox"/> ok
4	White <input type="checkbox"/> ok	5	Yellow <input type="checkbox"/> ok		

- ✓ Check the voltage between pins 1 & 4 of J1, it should be 5V $\pm 10\%$.
 ✓ Check the Load Cell output of J1 between the following:

Between Pin 2 & Pin 3	No Weight: 0.5~2mV <input type="checkbox"/> ok	Full Scale: 5~8mV <input type="checkbox"/> ok
Between Pin 2 & GND	3V <input type="checkbox"/> ok	
Between Pin 3 & GND	3V <input type="checkbox"/> ok	

Keypad Check Electronic

Key: • What should happen when pressed:

- ✓ **ON/OFF** • The power should go ON and OFF. ☐ ok
- ✓ **MODE** • The display should go from "kg" to "PCS". ☐ ok
- ✓ **SET** • In the "PCS" mode it should show "5 0 pcs". ☐ ok
- ✓ **HI/LO** • In the Counting Mode, the sample size should move from 5 to 10 to 20, etc. ☐ ok
- ✓ **ZERO** • It should cause the display to show zero when pressed. ☐ ok
- ✓ **TARE** • It should cause the display to show zero when pressed. ☐ ok
- ✓ Disconnect the battery pack, and the AC adaptor, if connected. Then, reconnect the battery pack.
- ✓ Check the connection between the Keypad and J4. ☐ ok
- ✓ Check the soldering of J4. ☐ ok
- ✓ You can also check if an individual key is working by measuring the resistance between the following pins of the J4 connector.

The resistance should be less than 10K Ω for:

- **ON/OFF** between pins 1~8 ☐ ok
- **MODE** between pins 2~5 ☐ ok
- **SET** between pins 2~7 ☐ ok
- **ZERO** between pins 2~4 ☐ ok
- **SAMPLE** between pins 2~6 ☐ ok

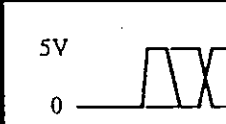
The resistance should be less than 3K Ω for:

- **TARE** between pins 2~3 ☐ ok

If the above are out of the correct resistance, try a different Keypad to make sure that the problem with the Keypad and not the Main Circuit Board. If it checks out, then change the Keypad.

J1~4 Checks Electronic

J1 Load Cell Input		
1	+5V	Excitation +
2	≈ 3V	Output Hight
3	≈ 3V	Output Low
4	GND	Excitation –
5	GND	Shield

J2 Option - 03 RS-232C, Weight Comparator Output			
1	+5V		
2	GND		
3	RS-232C Signal (transmission)		
4	RS-232C Signal (reception)		
5	Comparator	LO	Low Active
6	Comparator	GO	Low Active
7	Comparator	HI	Low Active
8	Comparator	Stable	Low Active

J3 Power, External Switch Input		
1	Battery/AC Adapter	+9V (>6V)
2	GND	
3	External Tare Switch	= Tare Key J4 - 3 Pin
4	External Zero Switch	= Zero Key J4 - 4 Pin

J4 Front Panel Key Switch Input			
1	Power ON/OFF Switch (1- 8 Pin)	ON ≈ 1V	OFF ≈ 9V
2	GND (Switch Common - 3 ~ 7 Pin)	ON ≈ 0V	OFF ≈ 5V
3	Tare Switch	ON ≈ 0V	OFF ≈ 5V
4	Zero Switch	ON ≈ 0V	OFF ≈ 5V
5	Mode Switch	ON ≈ 0V	OFF ≈ 5V
6	HI/LO • Sample Size Switch	ON ≈ 0V	OFF ≈ 5V
7	Set Switch	ON ≈ 0V	OFF ≈ 5V
8	Power ON/OFF Switch (1 - 8 Pin)	ON ≈ 0.7V	OFF = Open



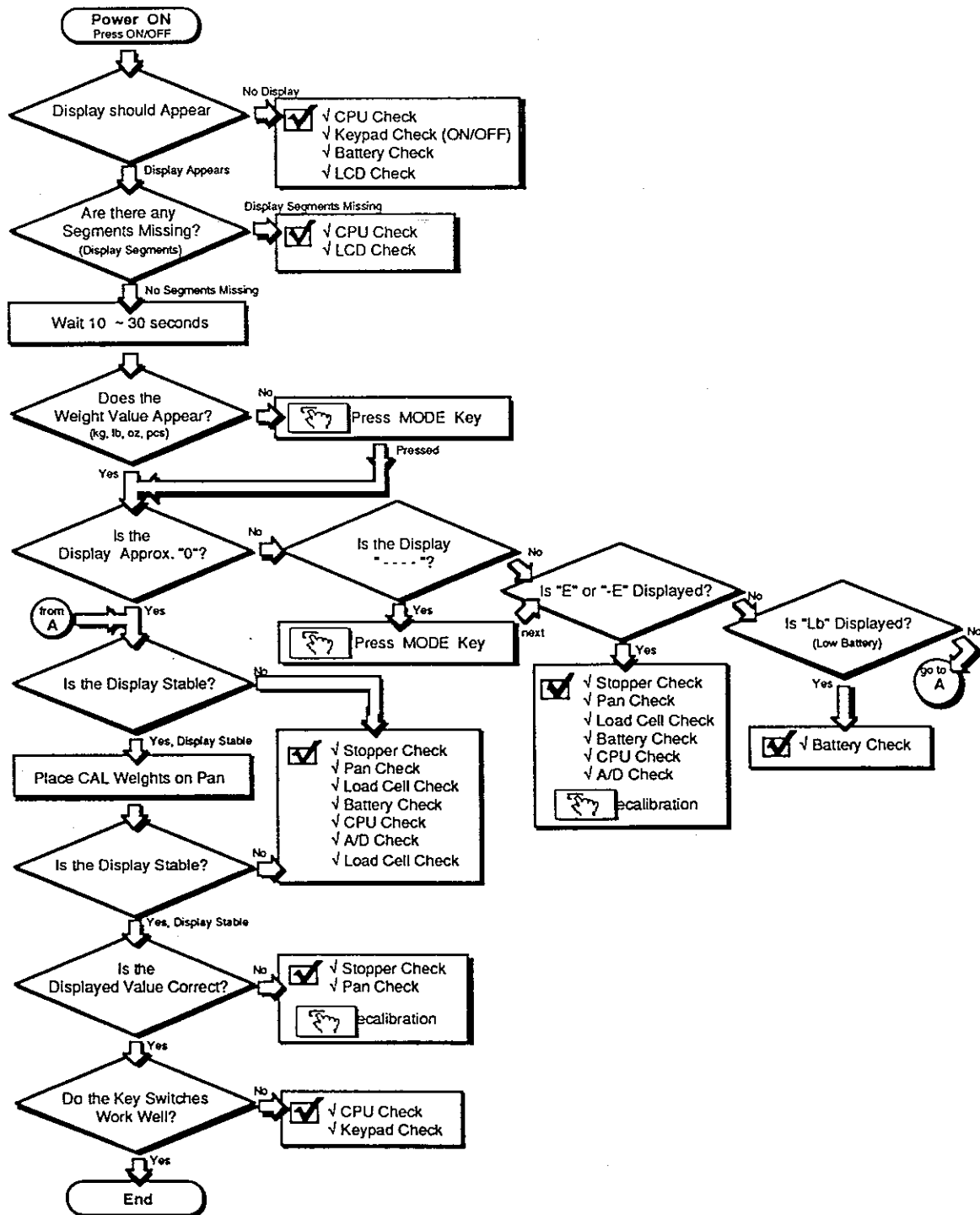
Waveform Check - LOGIC WAVEFORM

No.	Signal	Test Points	Wave Form	Comments
1	X1 X2	XT1 (25), U5(25) ~ GND XT1 (24), U5(24)		CPU Clock 12 MHz
2	1st	U3 (6) ~ GND U5 (59) ~ GND		A/D Control Input
3	1st	U3 (7) ~ GND U5 (60) ~ GND		
4	2nd	U3 (8) ~ GND U5 (61) ~ GND		
5	AZ	U3 (9) ~ GND U5 (62) ~ GND		
6	CMP	U3 (5) ~ GND U5 (16) ~ GND		A/D Output
7	RESET	U4 (5) ~ GND		+5V Input
8		U4 (8) ~ GND U5 (22) ~ GND		Reset Output
9 *	CS	U2 (1) ~ GND U5 (63) ~ GND		EEPROM Control Chip Select
10 *	SK	U2 (2) ~ GND U5 (64) ~ GND		Clock
11 *	DI	U2 (3) ~ GND U5 (1) ~ GND		Data Input
12 *	DO	U2 (4) ~ GND U5 (2) ~ GND		Data Output

* Waveforms 9-12 can only be observed with Power ON, normally they are flat.



MECHANICAL FAULT FINDING FLOW CHART





LOAD CELL REPLACEMENT



Please Note

- Make sure that you read fully through the entire procedure before initiating replacement work.
- In particular, read the entire step before attempting it, taking the time to look for notes in the step pertaining to the particular scale you are working on.
- Please identify the Load Cell for the assembly that you are working on before starting replacement work. In the FW series, there are eight Load Cells used:

Table A. Load Cell List

Scale	Display Pod & Load Cell	Platform & Load Cell	Load Cell	Fixed Torque kg-cm	Calibration Mass
FW-1200KA3	none	FW-1200KB3	AD:LC4204K600M2	800	1200kg or 800kg 300lb or 200lb
FW-600KA3	none	FW-600KB3	AD:LC4204K600M2	800	600kg or 400kg 300lb or 200lb
FW-600KA4	none	FW-600KB4	AD:LC4204K600M1	800	600kg or 400kg 1200lb or 800lb
FW-300KA4	none	FW-300KB4	AD:LC4204K600M1	800	300kg or 200kg 600lb or 400lb
FW-150KA1	FW-150KK1	none	LC:106-150K	300	150kg or 100kg 300lb or 200lb
FW-100KA1	FW-100KK1	FW-100KB1	LC:106-100K	300	100kg or 60kg 200lb or 150lb
FW-60KA2	FW-60KK2	none	LC:106-60K	150	60kg or 40kg 120lb or 80lb
FW-31KA2	none	none	LC:106-30K	150	30kg or 20kg 60lb or 40lb
FW-15KA2	FW-15KK2	FW-15KB2	LC:106-15K	150	15kg or 10kg 30lb or 20lb
FW-10KA2	FW-10KK2	FW-10KB2	LC:106-10K	150	10kg or 6kg 20lb or 15lb



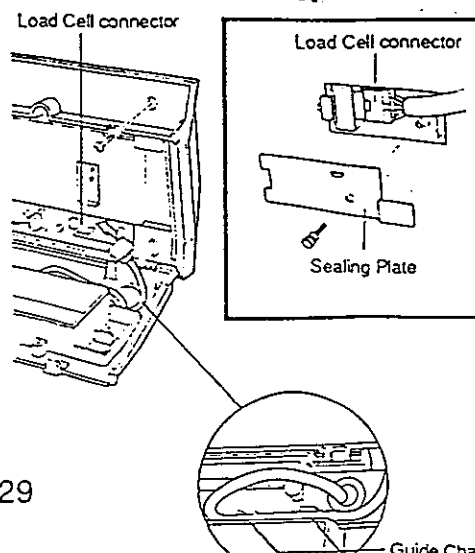
DISASSEMBLY

Disassembly for FW-150KA1, FW-100KA1, FW-60KA2, FW-31KA2, FW-15KA2, FW-10KA2, FW-100KB1, FW-15KB2, FW-10KB2

NOTE: If you are working on an FW-KB series (Weighing Platform and Load Cell) please disregard instructions referring to the Display Arm and Display Pod. As to the weighing indicator you are using, you will have to use the Load Cell specifications for setting information.

Step 1. Open the Display Pod, remove the sealing plate, and disconnect the Load Cell cable (the one coming through the Display Arm). Make sure that you also removed the cable from its guide channel. (Figure A).

Figure A

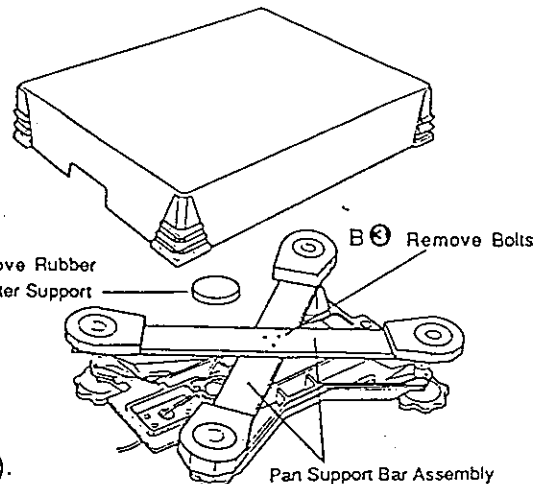


B❶ Remove Weighing Pan

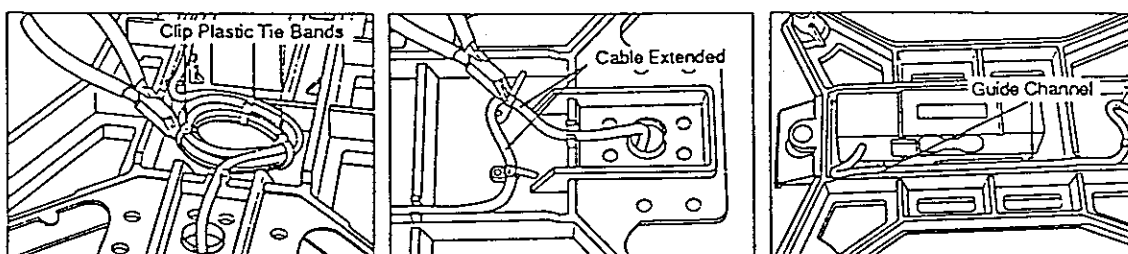
B❷ Remove Rubber
Center Support

B❸ Remove Bolts

Figure B



- Step 2. Remove the Weighing Pan (Figure B, B❶).
- Step 3. Remove the rubber Center Support in the center of the Pan Support Bar assembly (Figure B, B❷).
- Step 4. Remove the hex (*three on the FW-150/100KA1/KB1; *two on the FW-60/31/15/10KA2/KB2 and the stopper bolt with a hex nut - the bolt is needed any new Load Cell) bolts holding the Pan Support Bar assembly to the Load Cell (Figure B, B❸).
- Step 5. Lift off the Pan Support Bar assembly.
- FW-150KA1 This type platform have a spacer plate between the pan Support Bar assembly and the Load cell.
 - FW-100KA1 / B1
 - FW-60KA2
 - FW-31KA2 This type platform have two spacer plate. One spacer plate is between the pan Support Bars and other spacer plate is between the pan Support Bar assembly and the Load cell.
 - FW-15KA2 / B2
 - FW-60KA2 / B2
- Step 6. Clip the plastic tie bands holding the Load Cell surplus cord (there may be no coil if the Display Pod has been externally mounted) and gently remove the cable from its guiding channel to the Load Cell (Figure C).
- Make sure that you leave the holders that secure the plastic tie bands to the Platform, you will need them for reassembly.



- Step 7. Turn the Platform Base on its side. Holding the Load Cell in one hand and (from the bottom of the Platform Base):
- FW-150KA1 Remove the four hexagon bolts that hold the Load Cell to the base.
 - FW-100KA1 / B1
 - FW-60KA2 Remove the four hexagon bolts and plates that holds the Load Cell to the base.
 - FW-31KA2
 - FW-15KA2 / B2
 - FW-10KA2 / B2
- Step 8. Set the Platform Base down, and lift out the Load Cell.



ASSEMBLY

Assembly for FW-150KA1 , FW-100KA1 , FW-60KA2 , FW-31KA2 , FW-15KA2 , FW-10KA2 , FW-100KB1 , FW-15KB2 , FW-10KB2

NOTE: If you are working on an Weighing Platform and Load Cell (FW-BK series) please extrapolate references from the A&D Display Pod to what ever weighing indicator you are using.

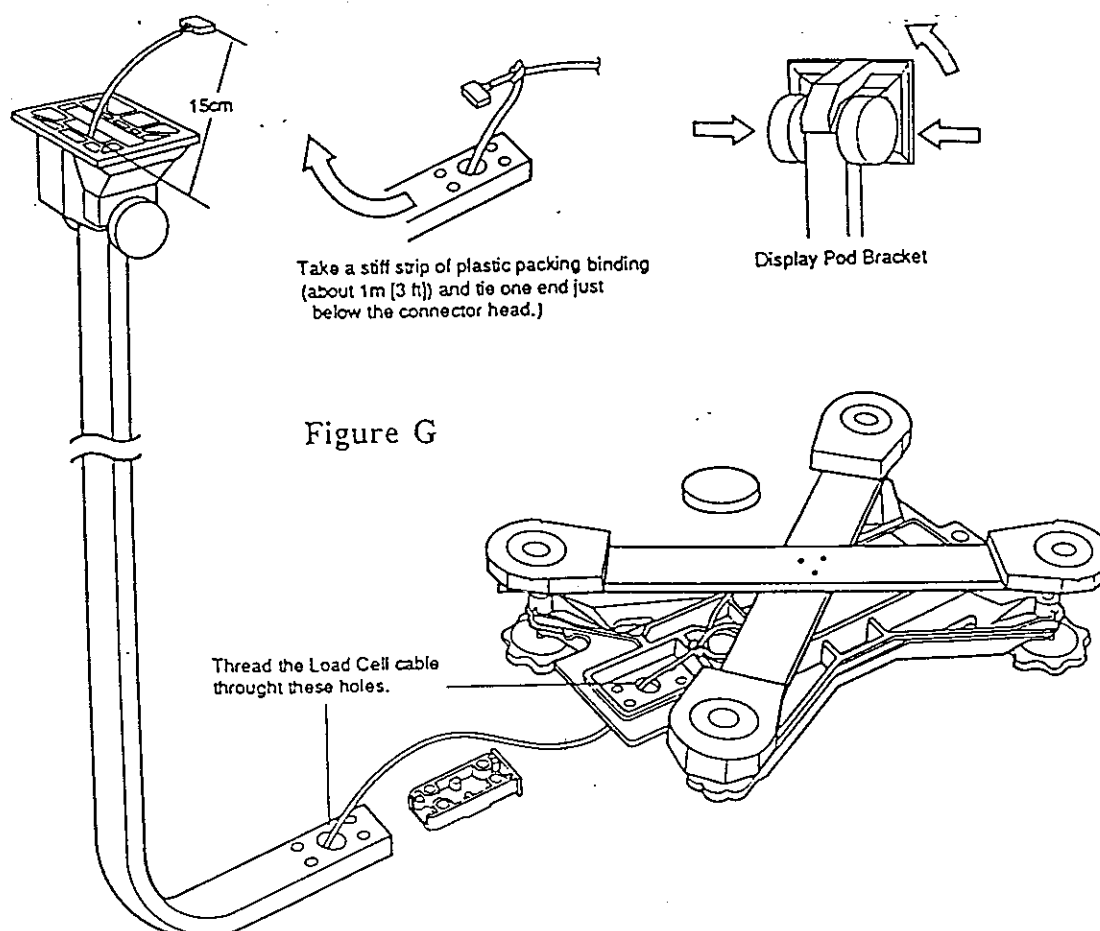
Step 1. Turn the Platform Base on its side. Holding the Load Cell in one hand and (from the bottom of the Platform Base):

- First just firmly attach the hex bolts (the FW-60KA2 , FW-31KA2 , FW-15KA2 /B2, FW-10KA2/B2 also have a plate) that hold the Load Cell to the base, then tighten them. Make sure that the convex washers are facing the correct way.
- If you are using a torque wrench:

Fixed Torque as following ;

FW-150KA1 , FW-100KA1/B1	300kg•cm
FW-60KA2 , FW-31KA2	150kg•cm
FW-15KA2/B2 , FW-10KA2/B2	150kg•cm

Step 2. Set the Platform Base back down and thread the Load Cell cable through its guide channel .



- Note: If the Display Pod is mounted externally (does not use the Display Arm), please skip to Step 6. If the Display Arm has been removed and you are going to reattach it, please see the FW ASSEMBLY INSTRUCTIONS. *Do not try to reattach the Display Arm on your own without the knowing the correct instructions, the metal brace must be installed correctly.*
- Step 3. Take a stiff strip of plastic packing binding (about 1m [3 ft]) and tie one end just below the connector head (Figure G).
- Step 4. Tilt the Display Pod bracket slightly forward by pressing in on the two round side clamps (until you can clearly see through the Display Pod bracket) (Figure G).
- Step 5. Thread the strip of plastic packing binding through the Platform Base hole and up through the hole (from the Display Arm channel) in the Display Pod (Figure G).
- Step 6. Leaving about 15cm (6 in) out at the end of the Display Arm, lay the cable in its Display Pod guide channel (Figure H).

Figure H

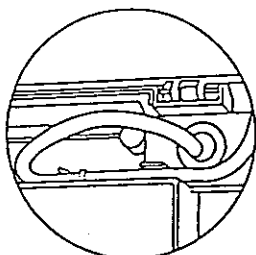
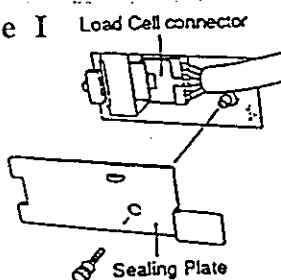
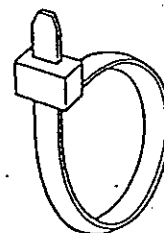


Figure I



New Plastic Tie Bands



- Step 7. Connect the Load Cell cable to the Display Pod and replace Sealing Plate (Figure I).
- Step 8. Coil the remaining cable and secure it with plastic tie bands (Figure J).

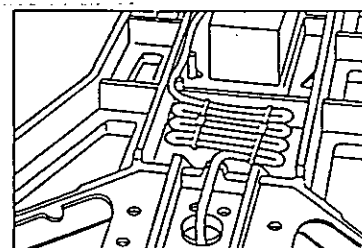
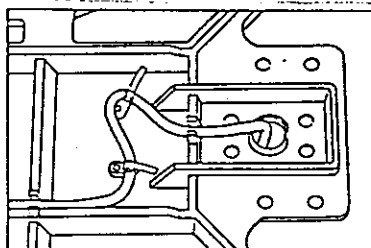
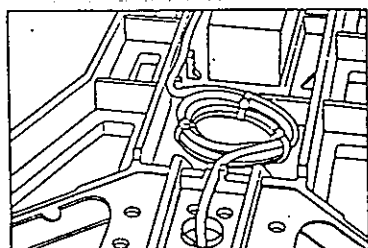


Figure J

- Step 9. Attach the plastic tie bands to the Platform Base with the holders (Refer to Disassembly section)
- Step 10. Attach the bolts (FW-150KA1, FW-100KA1 / B1, has three, FW-60KA2, FW-15KA2 / B2, FW-10KA2 / B2 has two) holding the Pan Support Bar assembly to the Load Cell (see Figure B, B0).
- FW-150KA1 These type has a spacer between Pan Support Bar assembly and Load Cell .
 - FW-100KA1 / B1
 - FW-60KA2
 - FW-31KA2 These type has one thin spacer between Pan Support Bars and one thick spacer between Pan Support Bar assembly and Load Cell
 - FW-15KA2 / B2
 - FW-10KA2 / B2

- Step 11. Replace the rubber Center Support in the center of the Pan Support Bar assembly (see Figure B, B0).
- Step 12. Replace the Weighing Pan (see Figure B, B0).
- ✓ You must check here to make sure that the Pan Support Bar assembly was correctly installed. If you have difficulty replacing the Weighing Pan (it is a tight fit and the sides of the Pan are obviously rubbing on the Pan Support assembly) then just loosen the bolts holding the Pan Support Bar assembly to the Load Cell and adjust the Pan Support Bars so that they are closer together (Refer to Load Cell specifications)
- Step 13. Go to the CALIBRATION section, page 9, and complete the full Zero and Span calibration procedure (including Setting "g" if scale location is to be elsewhere).



Attention

Do not use the scale, or return it to the customer without completing the above step, the scale will not be accurate without it!

- Step 14. If you are working on FW-150KA1,FW-100KA1/B1, you finished assembly .
If you are working on FW-60KA2, FW-31KA2, FW-15KA2 / B2, FW-10KA2 / B2, please continue to LOAD CELL STOPPER ADJUSTMENT.

END End of LOAD CELL REPLACEMENT procedure.



LOAD CELL STOPPER ADJUSTMENT

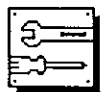
※ Please read the opening NOTE in the LOAD CELL REPLACEMENT section.

There is a bolt that runs through the Load Cell on the FW-60K, 31K, 15K, and 10K type that will hit an Overload Stopper Plate when there is too much weight on the Weighing Pan. This bolt is called the Stopper Bolt and its head is located on the Pan Support Bar assembly. It consists of a long, thin, threaded shaft that is tightened with a hex nut after it has been correctly adjusted.

You must adjust the Load Cell Stopper Bolt when the Load Cell has been replaced, or if there is a scale malfunction that indicates stopper misadjustment.

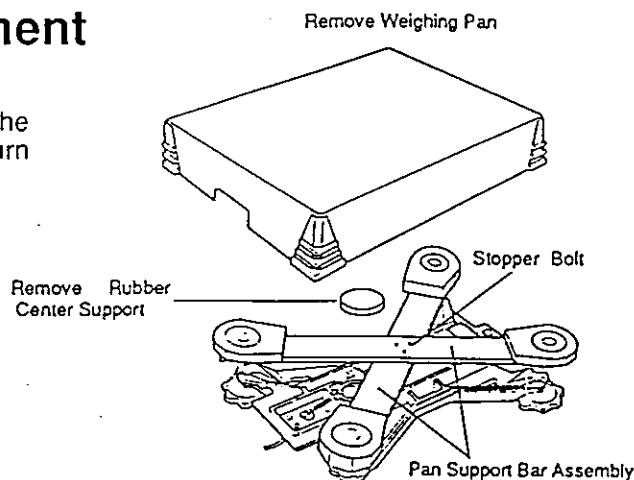
To perform this operation, you must have the correct Stopper Jig for the:

- FW-60KA2 it is order number 04:A47968.
- FW-31KA2 it is order number 04:A47967.
- FW-15KA2/B2, FW-10KA2/B2 it is order number 04:A48757.

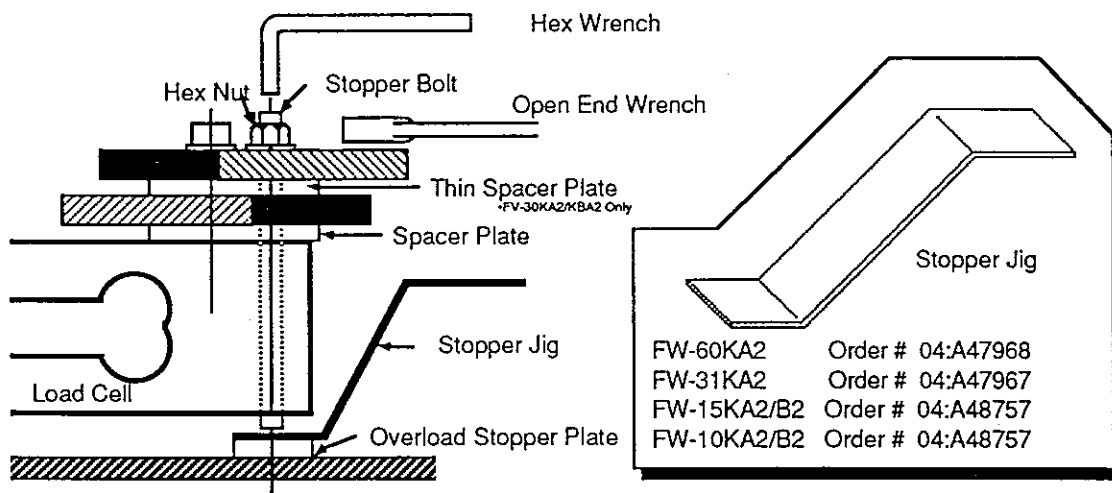


Stopper Adjustment

- Step 1. Remove the Weighing Pan, the rubber center support, and turn on the display.



- Step 2. Holding the Stopper Bolt with a hex wrench - loosen the hex nut holding the Stopper Bolt with an open end wrench. You may also want to loosen (counterclockwise) the Stopper Bolt a little.



- Step 3. Slide the correct jig for the scale you are working on between the Load Cell Stopper Bolt and the Overload Stopper Plate.

Step 4. Watching the display, adjust the Stopper Bolt with the hex wrench until the display shows: **-1.00 to -0.50.**

Step 5. Holding the hex wrench tightly, tighten the hex nut (clockwise).

DISPLAY During the above step you will see display fluctuations, after you have tightened the hex bolt, the following display readings are allowable: **-1.00 to 0.**

Step 6. Check that the display readings are in the allowable range listed above. If not, restart the procedure.

Step 7. Carefully remove the stopper jig.

Step 8. Replace the rubber Center Support, and the Weighing Pan.

Step 9. Go to the CALIBRATION section, page 9 and complete the full Zero and Span calibration procedure (including Setting "g" if scale location is to be elsewhere).



Attention

Do not use the scale, or return it to the customer without completing the above step, the scale will not be accurate without it!

END End of LOAD CELL STOPPER ADJUSTMENT procedure.



INSTALLING OPTION

RS-232C Interface and comparator buzzer

- Step 1. Open the Display Pod by pressing the two latch clips and lifting (Figure A).
- Step 2. Disconnect the Battery Pack leads (Figure A).
- Step 3. Remove the four screws holding the Display Pod Faceplate to the Pod Body (Figure A).
- Step 4. Carefully detach the thin ribbon cable from the Display Pod Keypad to the Mother board (J4) by pressing in on the clips and gently sliding out the connector assembly, and then detaching the cable (Figure B). NOTE: The clip does not come out of the connector, just the flat cable! Set the Display Pod Faceplate aside with the screws.

Figure A

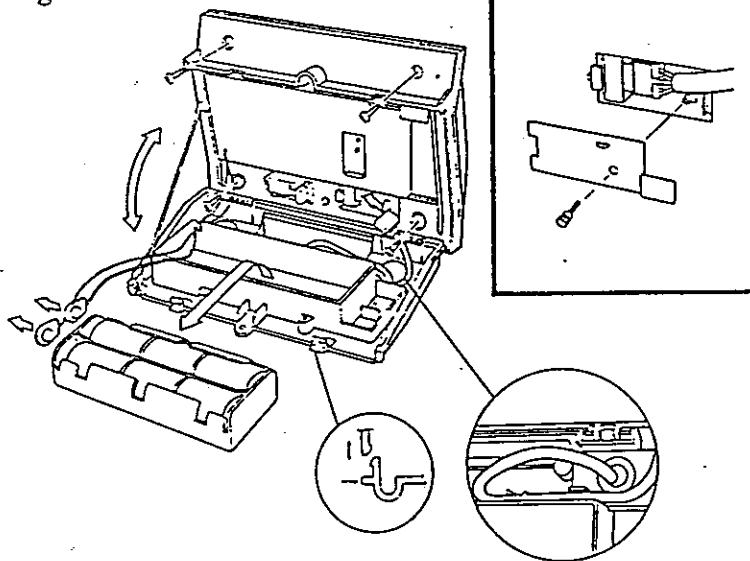
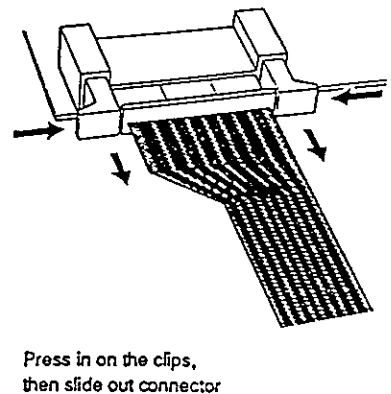


Figure B



- Step 5. Remove the RS232C Interface and Comparator Buzzer Board from its package. If the board is in one piece, carefully snap it apart at the grooved line between the DIP switches and the 7-PIN connector.
- Step 6. Turn both the main and small board over. Slide the 7-PIN connector into its' slot until the two holding pins can be seen in the board (Figure C, C0). Screw down the small board (Figure C, C0).
- Step 7. Now take the large board and fold it up and back, then slip the end into the corner slots (Figure D, D0). Screw the main board down (Figure D, D0).

Figure C

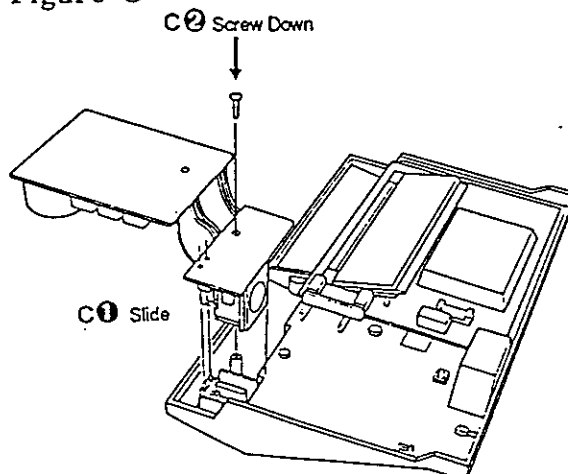
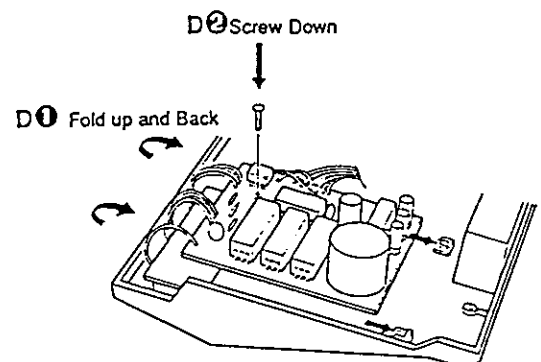


Figure D



Step 8. Attach the cable to the Mother Board at the J2 - OPTION connector (Figure E).

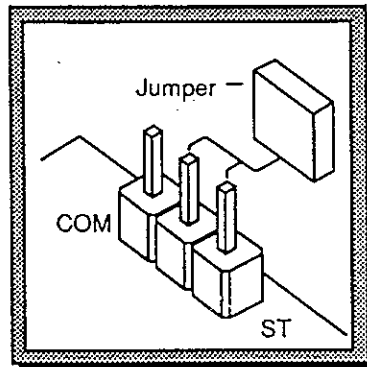
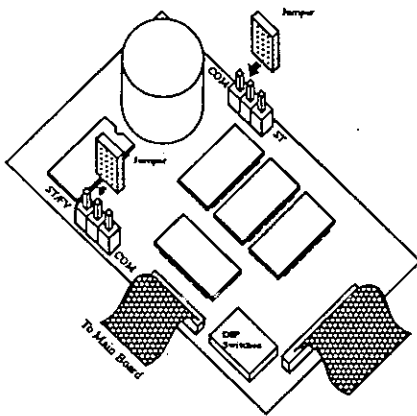
Step 9. Set the Comparator DIP switches as desired.





Comparator DIP Switch Settings		
1	OFF	Transmit when stable.
	ON	Transmit when stable, or unstable.
2	OFF	For "LO" signal buzzer OFF.
	ON	For "LO" signal buzzer ON.
3	OFF	For "GO" signal buzzer OFF.
	ON	For "GO" signal buzzer ON.
4	OFF	For "HI" signal buzzer OFF.
	ON	For "HI" signal buzzer ON.

▣ When the **COMMAND** mode is used , two jumpers on the interface must be set as follows:

ST: For **STREAM** mode. The comparator relay output control is available.

COM: For **STREAM** and **COMMAND** mode. The comparator relay output control is not available.



Jumper Setting	Operation
COM  ST ST/FV  COM	STREAM mode only, and relay output is available <i>Factory Setting</i>
COM  ST ST/FV  COM	COMMAND and STREAM mode can be used, but relay output is not available

Step 10. Re-attach the thin ribbon cable from the Display Pod Keypad to the Mother board (J4) by carefully sliding the cable (shiny side down) into the bottom of the connector, and when it's in solidly, slid the clip unit back into place until the snap from the clips can be heard (Figure F).

- Step 11. Re-attach the Display Pod Faceplate to the Pod Body using the four screws (the short screws at the front, the longer screws at the back).
- Step 12. Close the Display Pod, and connect the Battery Pack leads.
- Step 13. The FV scale is now ready to use. When attaching the printer cable to the FV, make sure that the 7-PIN connector is inserted tightly.
- END End of INSTALLING OPTION OP-03 procedure.

Figure E

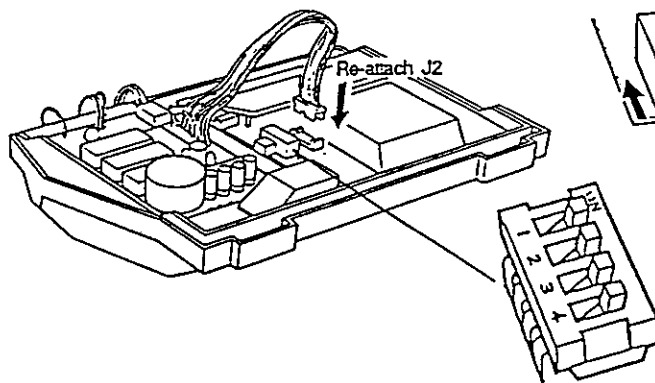
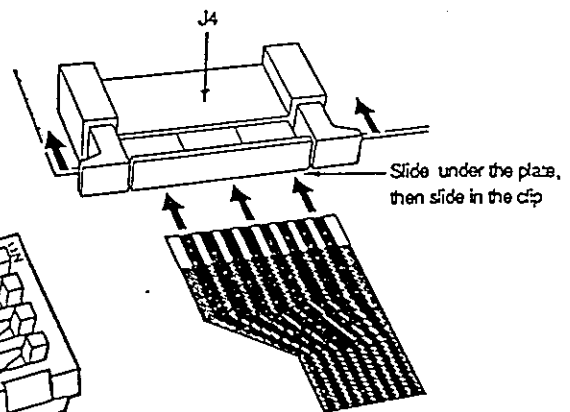


Figure F



Part 1

Technical Data for platform scales

FW-150KA1	FW-150KK1	
FW-100KA1	FW-100KK1	FW-100KB1
FW-60KA2	FW-60KK2	
FW-31KA2		
FW-15KA2	FW-15KK2	FW-15KB2
FW-10KA2	FW-10KK2	FW-10KB2

PARTS LIST

FW

MAIN BOARD -1/2

90.11.02

CIRCUIT SYMBOL or DRWG. NO.	PARTS NAME	DESCRIPTION	Q'TY
	7PZ:2024	MAIN BOARD PARTS FW/6201/6102	1
C14, 15, 16, 17, 18, 19, 20, 34	CC:0.001U	CAPACITOR 0.001 μ F	8
C1, 3, 4, 7, 8, 10, 11 24, 25, 26, 27, 36, 38, 39, 44, 45.	CC:0.022U	CAPACITOR 0.022 μ F	16
C43	CC:0.1U25V	CAPACITOR 0.1 μ F 25V	1
C46, 47	CC:10P	CAPACITOR 10PF	2
	CK:SM10VB47	CAPACITOR 47 μ F 10V	1
C5, 6, 42	CT:1D2R2	CAPACITOR 2.2 μ F 20V	3
C35, 37	CT:1V010	CAPACITOR 1 μ F 35V	2
LCD	ED:LT5108-35P3	LCD	1
J4	JD:68147-008	CONNECTOR	1
U8	JS:10328-01-445	IC SOCKET	1
J1	JT:171826-5	CONNECTOR	1
J3	JT:172429-4	CONNECTOR	1
J2	JT:172429-8	CONNECTOR	1
	MF:AMZ24	HYBRID IC	1
	PC:2024D	PC BOARD	1
Q3	QT:A1015Y	TRANSISTOR	1
Q1	QT:A1020Y	TRANSISTOR	1
Q2, 4	QT:C1815Y	TRANSISTOR	2
R4	RC:1.5K	RESISTOR 1.5K Ω 1/4W	1
R1	RC:1K	RESISTOR 1K Ω 1/4W	1
R5, 23, 25	RC:10K	RESISTOR 10K Ω 1/4W	3
R19	RC:18K	RESISTOR 18K Ω 1/4W	1
R21	RC:2.2K	RESISTOR 2.2K Ω 1/4W	1
R2	RC:2.7K	RESISTOR 2.7K Ω 1/4W	1
R17, 20	RC:22K	RESISTOR 22K Ω 1/4W	2
R3	RC:3.9K	RESISTOR 3.9K Ω 1/4W	1
R6, 15, 16, 18, 22, 24	RC:47K	RESISTOR 47K Ω 1/4W	6
R7, 8, 9	RM:10KF	RESISTOR 10K Ω 1/4W	3
R10	RM:16.2KF	RESISTOR 16.2K Ω 1/4W	1
R14	RM:261KF	RESISTOR 261K Ω 1/4W	1
R11, 12	RN:IHR-4-223MA	RESISTOR NETWORK 22K Ω \times 4	2
R13	RN:IHR-6-104JA	RESISTOR NETWORK 100K Ω \times 6	1
CAL	SS:SSP1 \times 2NB5 \times 8	SWITCH	1
U4	UA:MB3771	VOLTAGE COMPARATOR	1

FW

MAIN BOARD -2/2

90.11.02

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FW

POWER BOARD -1/1

[illegible]

FW
SPARE PARTS LIST

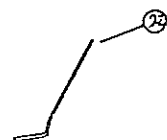
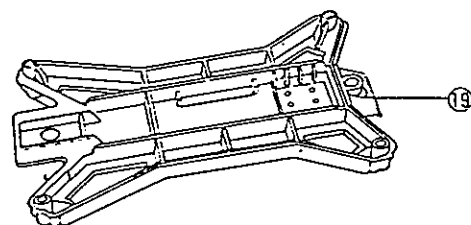
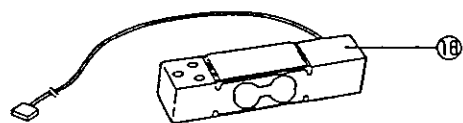
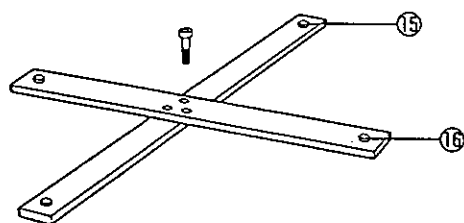
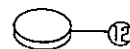
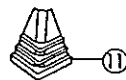
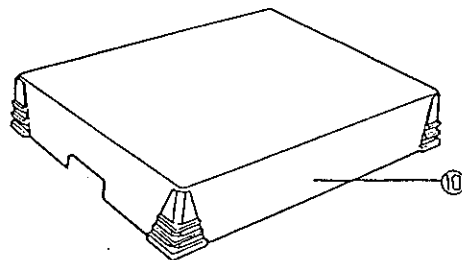
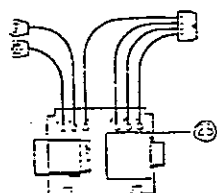
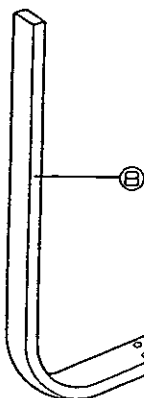
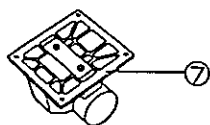
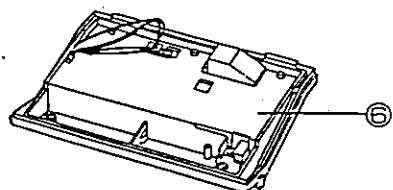
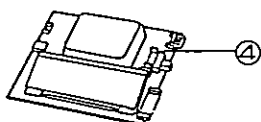
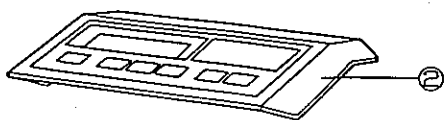
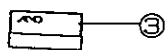
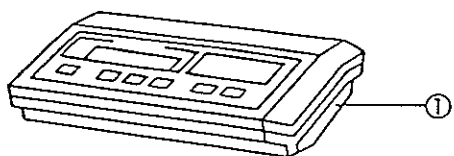
90.12.27

NO.	ORDER NO.	DESCRIPTION	ADJUST
1	7PA-FW-0	DISPLAY UNIT	YES
2	7PM-FW-3-1	UPPER CASE UNIT INTERNATIONAL	NO
(2)	7PM-FW-3-2	UPPER CASE UNIT JAPANESE	NO
3	08-A34646-1	CAPACITY LABEL 15KA2 (METRIC)	NO
(3)	08-A34646-2	CAPACITY LABEL 60KA2 (METRIC)	NO
(3)	08-A34646-3	CAPACITY LABEL 150KA1 (METRIC)	NO
(3)	08-A34646-4	CAPACITY LABEL 10KA2 (METRIC)	NO
(3)	08-A34646-5	CAPACITY LABEL 100KA1 (METRIC)	NO
(3)	08-A34896-1	CAPACITY LABEL 15KA2(NON-METRIC)	NO
(3)	08-A34896-2	CAPACITY LABEL 60KA2(NON-METRIC)	NO
(3)	08-A34896-3	CAPACITY LABEL 150KA1(NON-METRIC)	NO
(3)	08-A34896-4	CAPACITY LABEL 10KA2(NON-METRIC)	NO
(3)	08-A34896-5	CAPACITY LABEL 100KA1(NON-METRIC)	NO
4	7PZ-2024	MAIN BOARD UNIT FW	YES
5	MF-AMZ24	HYBRID IC	YES
6	709-A34156	LOWER CASE UNIT	NO
7	707-A10078	BRACKET UNIT	NO
8	04-A46953B	ARM FW10/15/60KA2	NO
(8)	04-A45966D	ARM FW100/150KA1	NO
9	03-A33740A	POLE BRACE	NO
10	09-A34169	PAN UNIT FW10/15/30/60KA2	NO
(10)	09-A34095	PAN UNIT FW100/150KA1	NO
11	07-A34026A	CORNER PIECE LARGE FW10/15/30/60KA2	NO
(11)	07-A34010	CORNER PIECE SMALL FW100/150KA1	NO
12	06-A47308	CENTER SUPPORT FW10/15/30/60KA2	NO
(12)	06-A46166C	CENTER SUPPORT FW100/150KA1	NO
13	06-A33710-2A	CUSHION RUBBER 24H	NO

FW
SPARE PARTS LIST

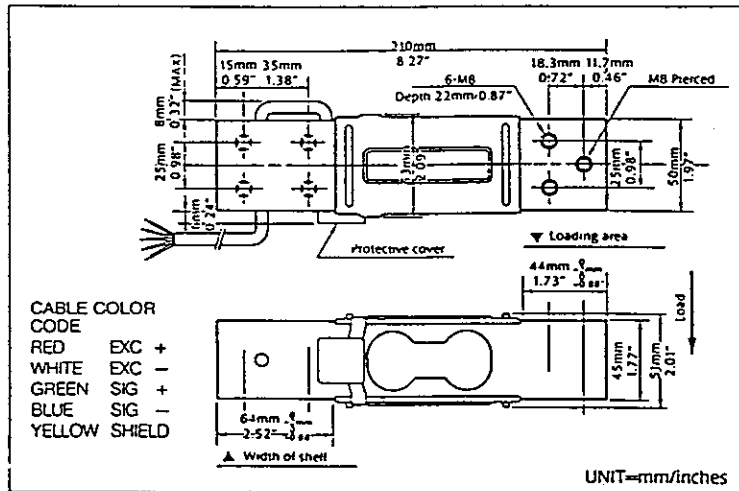
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14	06-A33710-1A	CUSHION RUBBER 15H	NO
15	09-A48718-1	SUSPENSION BAR-U FW10/15KA2	NO
(15)	09-A47746-1	SUSPENSION BAR-U FW60KA2	NO
(15)	09-A48717-1A	SUSPENSION BAR-U FW100KA1	NO
(15)	09-A47744-1A	SUSPENSION BAR-U FW150KA1	NO
16	09-A48718-2	SUSPENSION BAR-L FW10/15KA2	NO
(16)	09-A47746-2	SUSPENSION BAR-L FW60KA2	NO
(16)	09-A48717-2A	SUSPENSION BAR-L FW100KA1	NO
(16)	09-A47744-2	SUSPENSION BAR-L FW150KA1	NO
17	04-A48387	SPACER PLATE FW10/15KA2	NO
(17)	04-A46971-1A	SPACER PLATE FW60KA2	NO
(17)	04-A47950	SPACER PLATE FW100/150KA1	NO
18	7LC-105-10K	LOADCELL FW10KA2	YES
(18)	7LC-105-15K	LOADCELL FW15KA2	YES
(18)	7LC-105-30K	LOADCELL FW30KA2	YES
(18)	7LC-105-60K	LOADCELL FW60KA2	YES
(18)	7LC-106-100K	LOADCELL FW100KA1	YES
(18)	7LC-106-150K	LOADCELL FW150KA1	YES
19	703-A10076A	BASE UNIT FW10/15/60KA2	NO
(19)	703-A20564B	BASE UNIT FW100/150KA1	NO
20	04-A47453	SPACER PLATE C	NO
21	07-A33688D	ADJUSTABLE FOOT	NO
22	04-A47967	STOPPER JIG 31KA2	
(22)	04-A47968	STOPPER JIG FW60KA2	
23	7PZ-2005	BOARD	
22	04-A48757	STOPPER JIG FW-10K/15K	



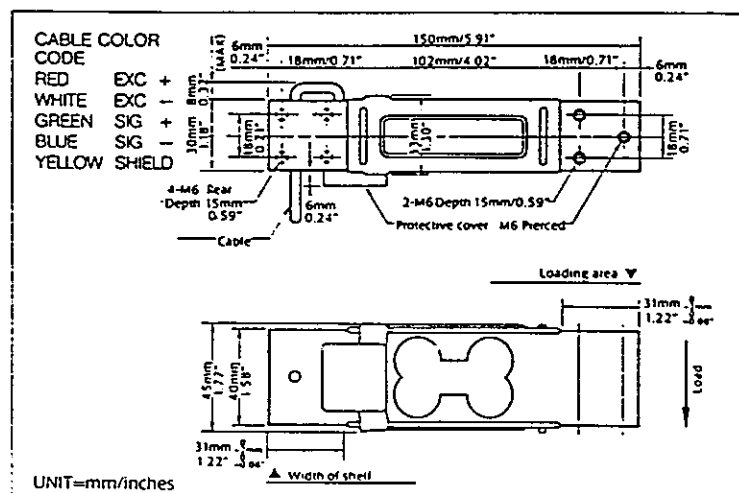
LOAD CELL SPECIFICATIONS

Load Cells LC:106



Capacities..... 60kg, 150kg, 100kg
 Maximum deadload... 80% of rated capacity
 Rated Output..... 1mV/V-15/-0%
 Maximum Load..... 300% of rated capacity
 Hysteresis..... $\pm 0.015\%$ of rated output
 Creep..... $\pm 0.015\%$ of rated output/
 per hour
 Zero Balance..... 20 $\pm 5\%$ of rated output
 Temperature range.... $-10^{\circ}\sim +40^{\circ}\text{C}$ ($+14^{\circ}\sim +104^{\circ}\text{F}$)
 Recommended
 excitation voltage..... 12V
 Maximum
 excitation voltage.. 15V
 Input resistance..... Approx. 400 Ω
 Output resistance..... 300 $\Omega \pm 5\Omega$
 Insulation resistance. 500M Ω at greater than DC50V
 Temperature coefficient
 -Zero..... 0.004% of rated output/ $^{\circ}\text{C}$
 -Span..... 0.0014% of rated output/ $^{\circ}\text{C}$
 Platform size..... 400X600mm (15.8X23.6 inches)
 Cable Length..... 2m (78 inches)

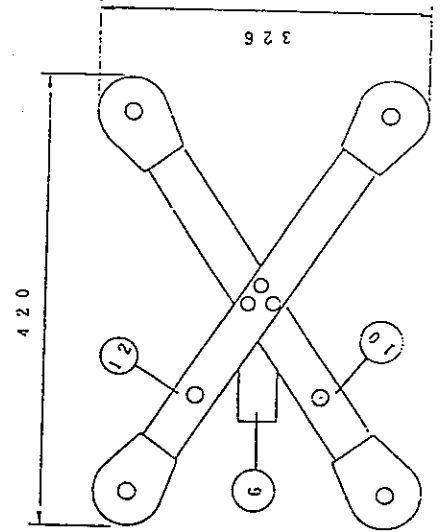
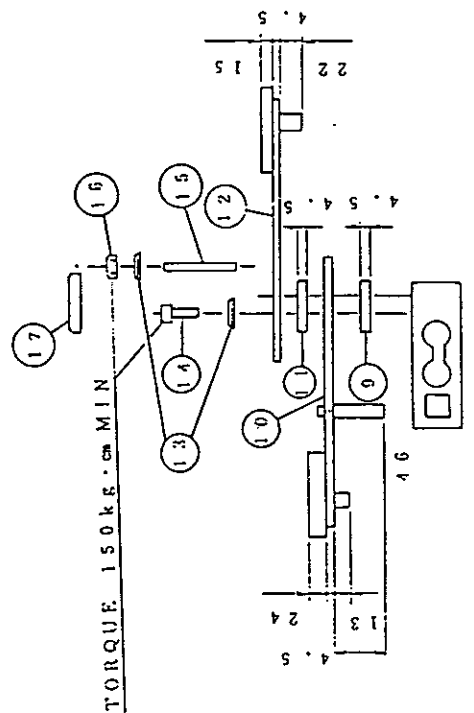
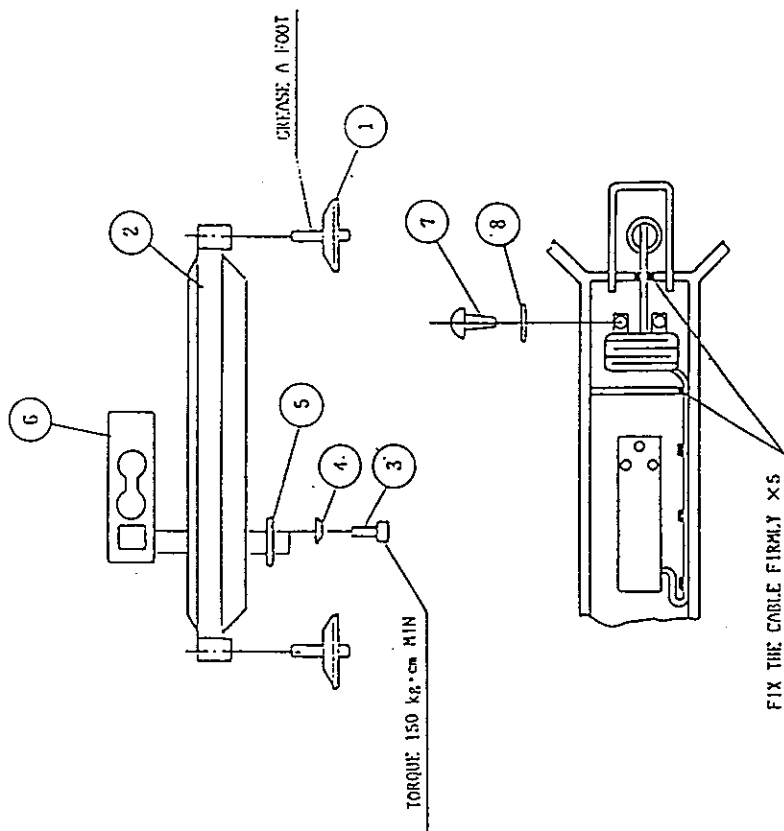
Load Cells LC:105



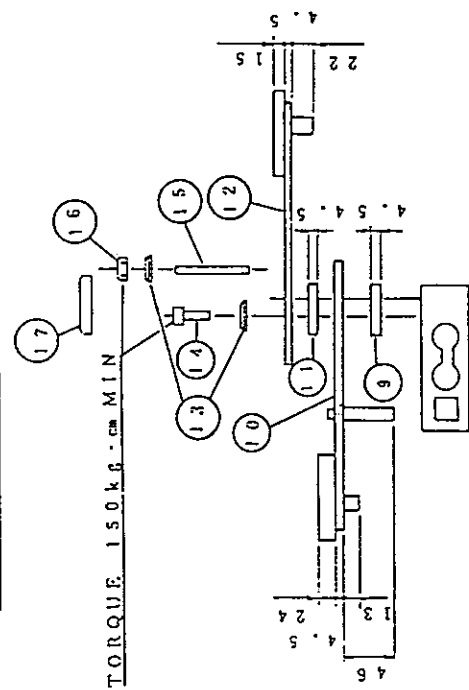
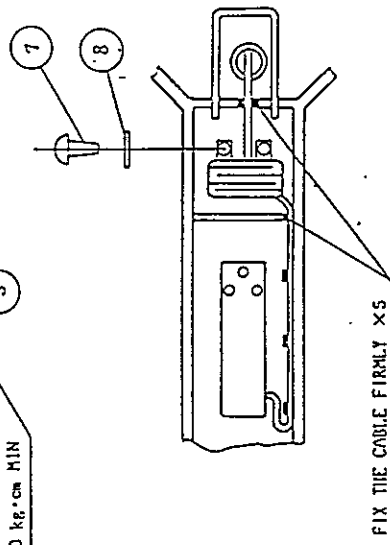
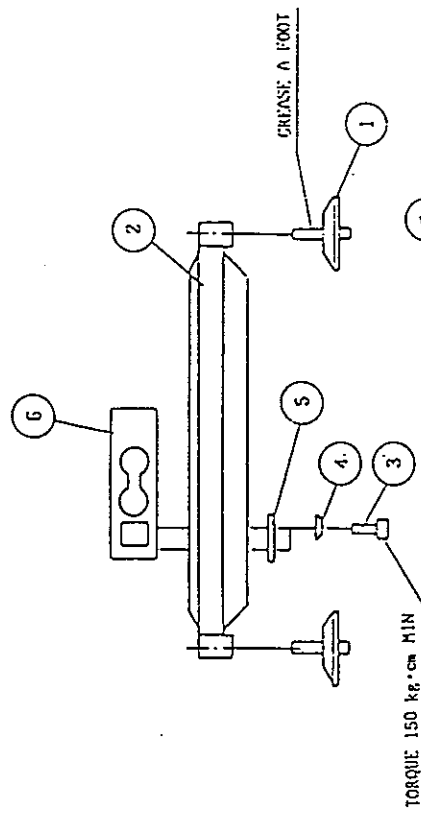
Capacities..... 10kg, 15kg, 30kg, 60kg
 Maximum deadload... 80% of rated capacity
 Rated Output..... 1mV/V-15/-0%
 Maximum Load..... 300% of rated capacity
 Hysteresis..... $\pm 0.015\%$ of rated output
 Creep..... $\pm 0.015\%$ of rated output/
 per hour
 Zero Balance..... 20 $\pm 5\%$ of rated output
 Temperature range.... $-10^{\circ}\sim +40^{\circ}\text{C}$ ($+14^{\circ}\sim +104^{\circ}\text{F}$)
 Recommended
 excitation voltage..... 12V
 Maximum
 excitation voltage.. 15V
 Input resistance..... Approx. 400 Ω
 Output resistance..... 300 $\Omega \pm 5\Omega$
 Insulation resistance. 500M Ω at greater than DC50V
 Temperature coefficient
 -Zero..... 0.004% of rated output/ $^{\circ}\text{C}$
 -Span..... 0.0014% of rated output/ $^{\circ}\text{C}$
 Platform size..... 400X400mm (15.8X15.8 inches)
 Cable Length..... 1.5m (59 inches)

Platform Specifications FW10KA2/B2

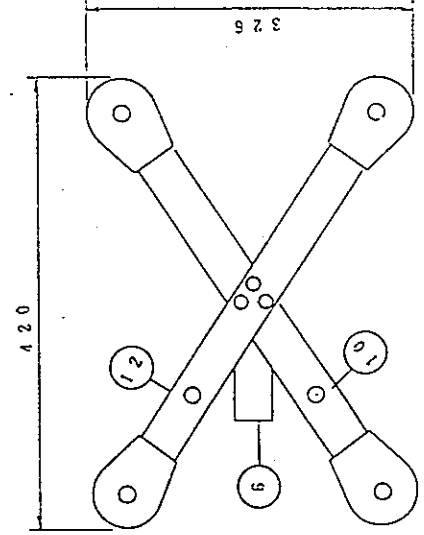
NO.	PARTS NAME	DESCRIPTION	SIZE (mm)	Q'TY
1	07:A33GRSD	ADJUSTABLE FOOT	M10 X 50 (L.)	4
2	03:A1007GA	BASE	282(W) X 397 (D) X 49 (H)	1
3		HEX BOLT	M6 X 25 (L.)	4
4		CONVEX WASHER	M6 (H)	4
5	04:A47453	SPACER PLATE	44 (W) X 32 (D) X 2.3 (T)	1
6	LC:10S-10K	LOAD CELL	30 (W) X 150 (D) X 45 (H)	1
7		SCREW	M3 X 10 (L.) S-TYPE	2
8		WASHER	M3	2
9	04:A48387	SPACER PLATE	40 (W) X 32 (D) X 4.5 (T)	1
10	09:A48718-1	SUSPENSION BAR 10K2-R	50 (W) X 500 (D) X 4.5 (T)	1
11	04:A48387	SPACER PLATE	40 (W) X 32 (D) X 4.5 (T)	1
12	09:A48718-2	SUSPENSION BAR 10K2-L	50 (W) X 500 (D) X 4.5 (T)	1
13		CONVEX WASHER	M6 (H)	2
14		HEX BOLT	M6 X 25 (L.)	2
15		STOPPER BOLT	M6 X 65 (L.)	1
16		HEX NUT	M6	1
17	06:A47308	CENTER SUPPORT	Ø 60 X 10	1



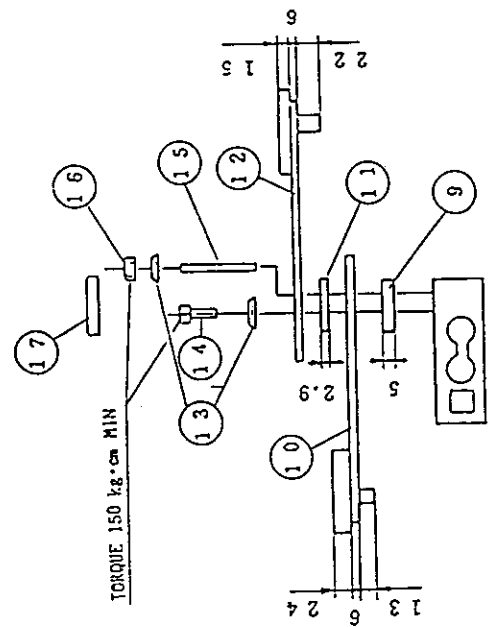
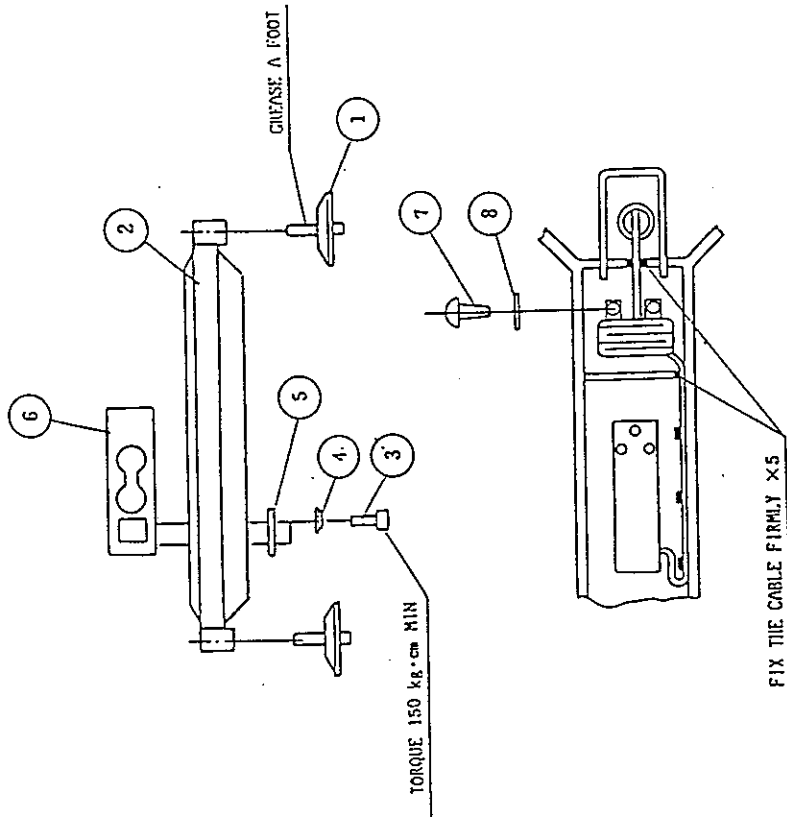
Platform Specifications FW15KA2/B2



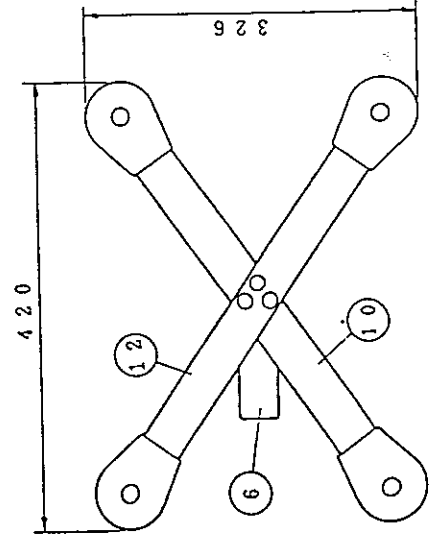
NO.	PARTS NAME	DESCRIPTION	SIZE (mm)	Q'TY
1	07:A336RND	ADJUSTABLE FOOT	M10×50(L.)	4
2	03:A10076A	BASE	282(W)×397(D)×49(H)	1
3		HEX BOLT	M6×25(L.)	4
4		CONVEX WASHER	M6(H)	4
5	04:A47453	SPACER PLATE	44(W)×32(D)×2.3(T)	1
6	LC:105-15K	LOAD CELL	30(W)×150(D)×45(H)	1
7		SCREW	M3×10(L.) S-TYPE	2
8		WASHER	M3	2
9	04:A48387	SPACER PLATE	40(W)×32(D)×4.5(T)	1
10	03:A48718-1	SUSPENSION BAR10K2-R	50(W)×500(D)×4.5(T)	1
11	04:A48387	SPACER PLATE	40(W)×32(D)×4.5(T)	1
12	03:A48718-2	SUSPENSION BAR10K2-L	50(W)×500(D)×4.5(T)	1
13		CONVEX WASHER	M6(H)	2
14		HEX BOLT	M6×25(L.)	2
15		STOPPER BOLT	M6×65(L.)	1
16		HEX NUT	M6	1
17	06:A47308	CENTER SUPPORT	∅ 60×10	1



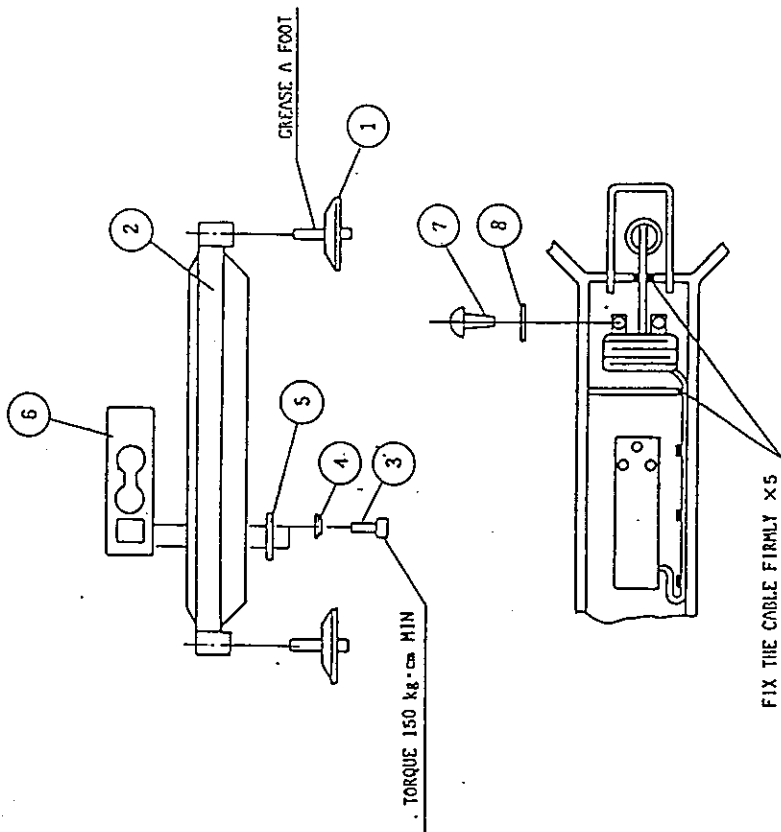
Platform Specifications FW30KA2



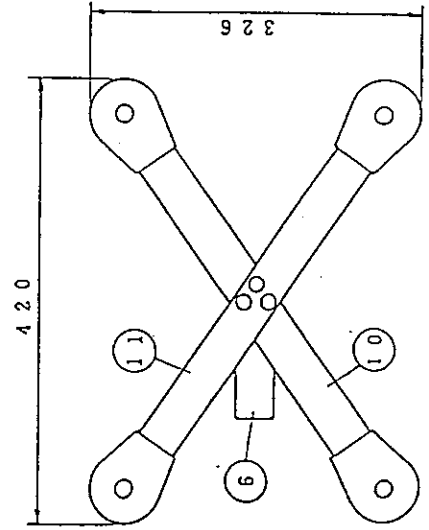
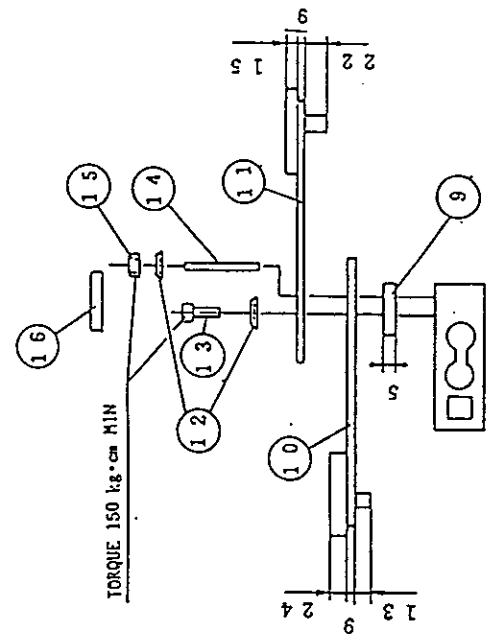
NO.	PARTS NAME	DESCRIPTION	SIZE (mm)	Q'TY
1	07:A33688D	ADJUSTABLE FOOT	M10×50(L)	4
2	03:A10076A	BASE	282(W)×397(D)×49(H)	1
3		HEX BOLT	M6×25(L)	4
4		CONVEX WASHER	M6(H)	4
5	04:A47453	SPACER PLATE	44(W)×32(D)×2.3(T)	1
6	LC:105-30K	LOAD CELL	30(W)×150(D)×45(H)	1
7		SCREW	M3×10(L) S-TYPE	2
8		WASHER	M3	2
9	04:A46971-1A	SPACER PLATE	40(W)×32(D)×5(T)	1
10	09:A47747-1	SUSPENSION BAR-R	50(W)×500(D)×6(T)	1
11	04:A46971-2	SPACER PLATE	40(W)×30(D)×2.9(T)	1
12	09:A47747-2	SUSPENSION BAR-L	50(W)×500(D)×6(T)	1
13		CONVEX WASHER	M6(H)	2
14		HEX BOLT	M6×30(L)	2
15		STOPPER BOLT	M6×70(L)	1
16		HEX NUT	M6	1
17	06:A47308	CENTER SUPPORT	φ60×10	1



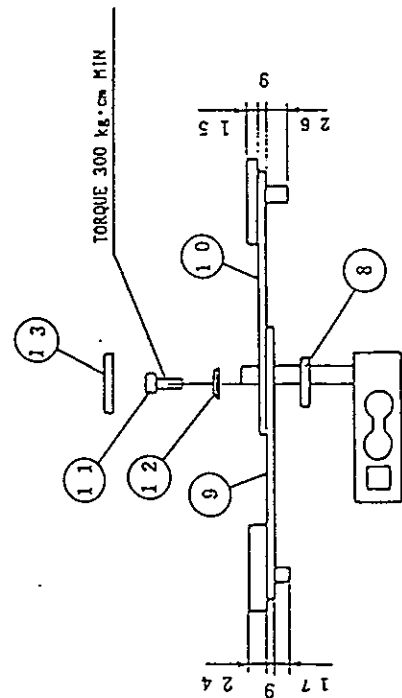
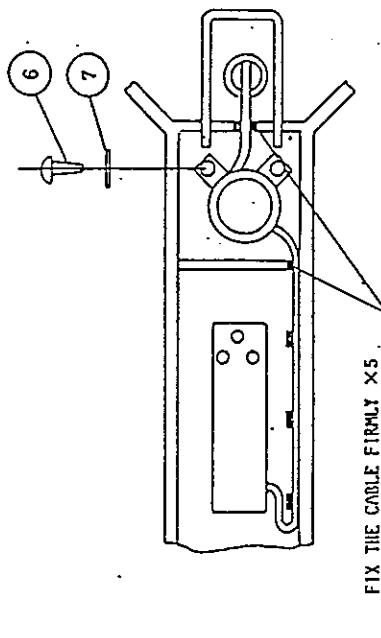
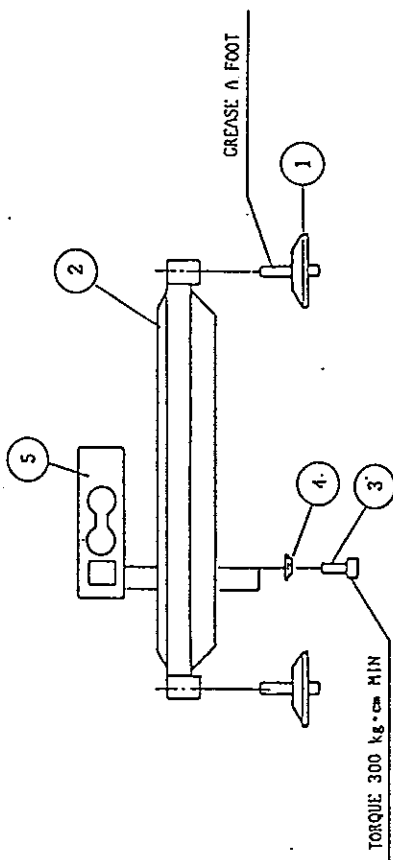
Platform Specifications FW60KA2



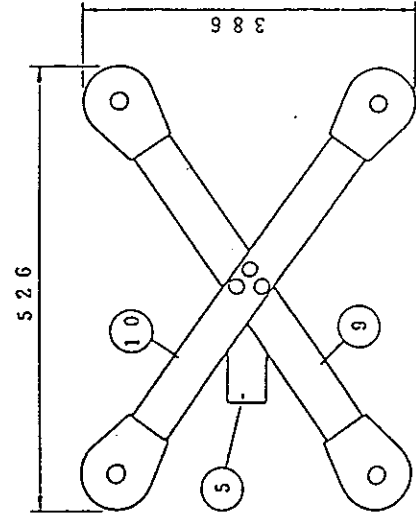
NO.	PARTS NAME	DESCRIPTION	SIZE (mm)	Q' TY
1	07:A33688D	ADJUSTABLE FOOT	M10×50(L)	4
2	03:A10076A	BASE	282(W)×397(D)×49(H)	1
3		HEX BOLT	M6×25(L)	4
4		CONVEX WASHER	M6(H)	4
5	04:A47453	SPACER PLATE	44(W)×32(D)×2.3(T)	1
6	LC:105-60K	LOAD CELL	30(W)×150(D)×45(H)	1
7		SCREW	M3×10(L) S-TYPE	2
8		WASHER	M3	2
9	04:A46971-1A	SPACER PLATE	40(W)×32(D)×5(T)	1
10	09:A4774G-1	SUSPENSION BAR-R	50(W)×500(D)×9(T)	1
11	09:A4774G-2	SUSPENSION BAR-L	50(W)×500(D)×9(T)	1
12		CONVEX WASHER	M6(H)	2
13		HEX BOLT	M6×35(L)	2
14		STOPPER BOLT	M6×70(L)	1
15		HEX NUT	M6	1
16	06:A47308	CENTER SUPPORT	∅ 60×10	1



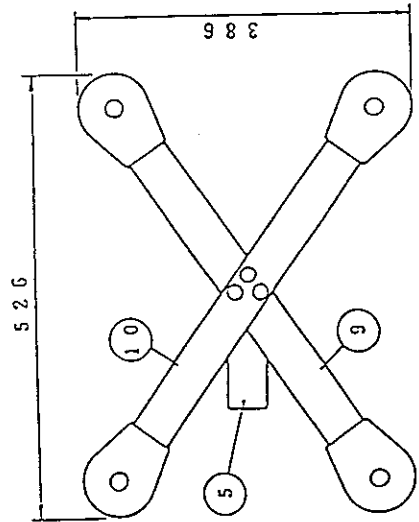
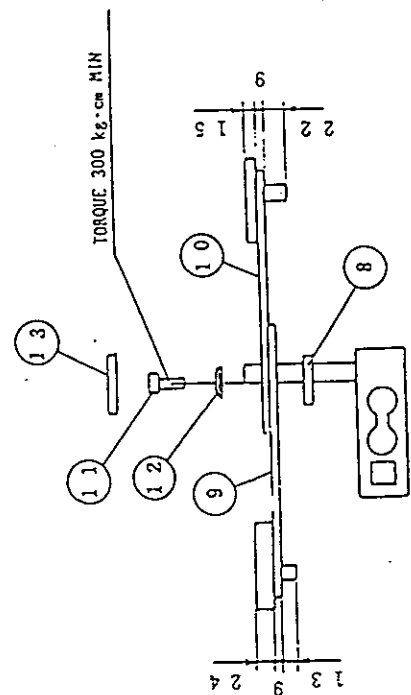
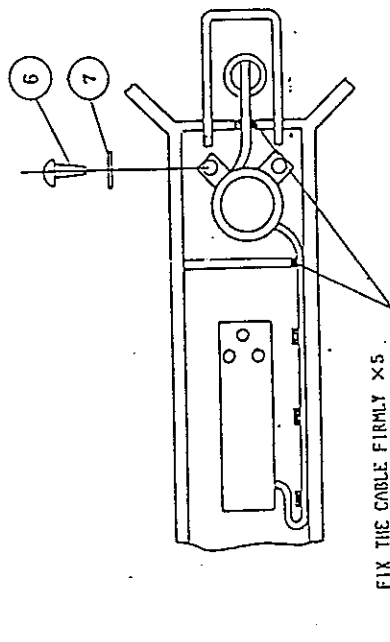
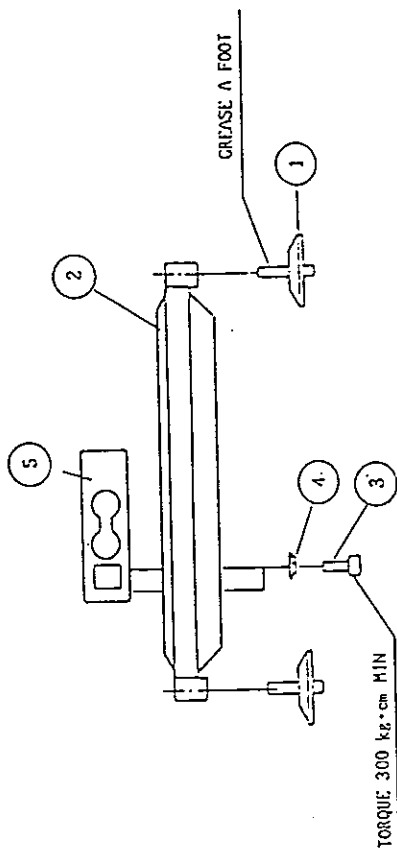
Platform Specifications FW100KA1/B1



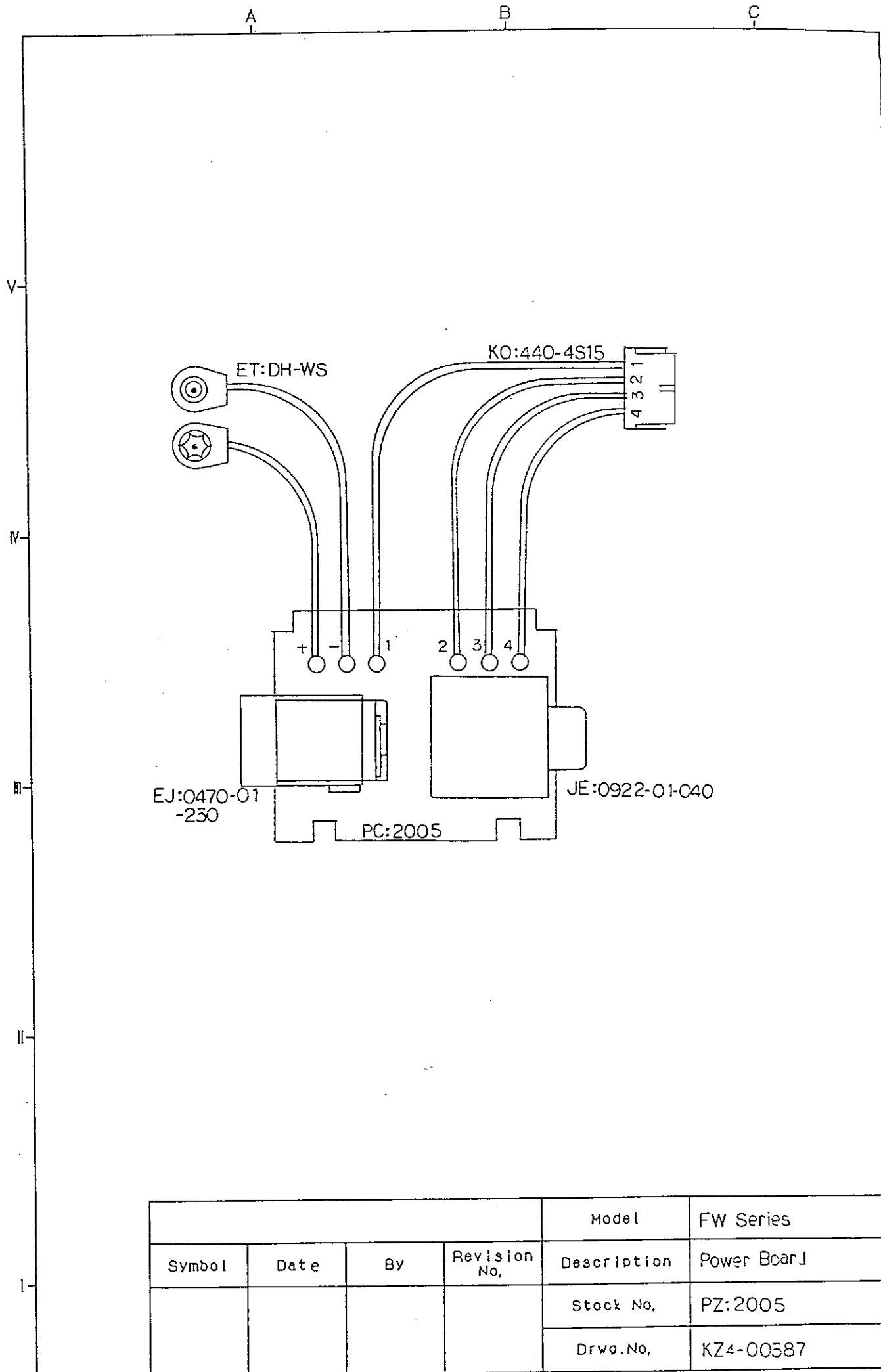
NO.	PARTS NAME	DESCRIPTION	SIZE(mm)	Q' TY.
1	07:A33688D	ADJUSTABLE FOOT	M10×50(L)	4
2	03:A20564B	BASE	343(W)×500(D)×60(H)	1
3		HEX BOLT	M8×40(L)	4
4		CONVEX WASHER	M8(H)	4
5	LC:106-100K	LOAD CELL	50(W)×210(D)×51(H)	1
6		SCREW	M3×10(L)× S-TYPE	2
7		WASHER	M3	2
8	04:M6165B	SPACER PLATE	50(W)×70(D)×5(T)	1
9	09:M48717-1	SUSPENSION BAR100K1-R	50(W)×618(D)×9(T)	1
10	09:M48717-2	SUSPENSION BAR100K1-L	50(W)×618(D)×9(T)	1
11		HEX BOLT	M8×40(L)	3
12		CONVEX WASHER	M8(H)	3
13	06:M46166C	CENTER SUPPORT	φ60×10(H)	1



Platform Specifications FW150KA1



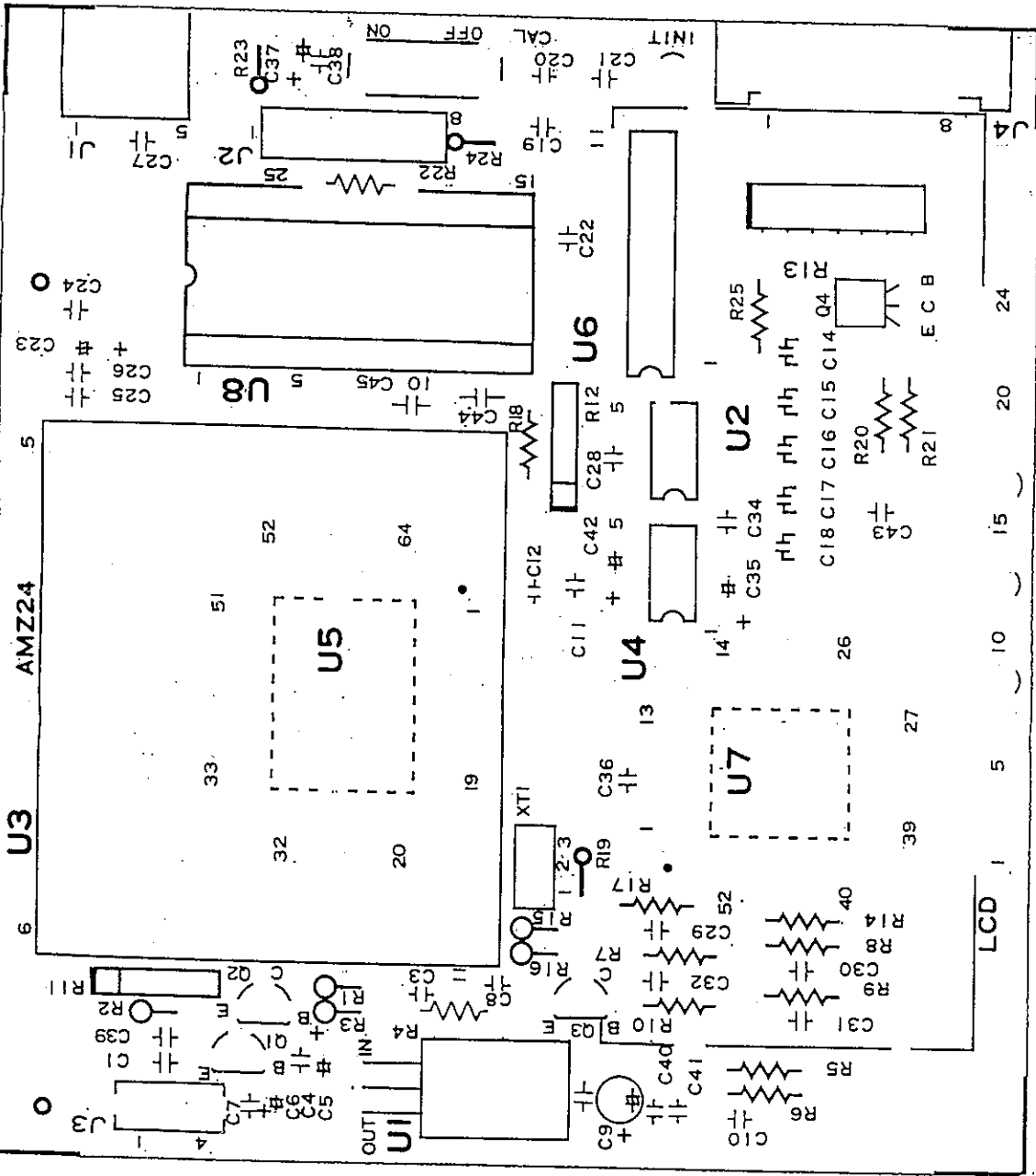
NO.	PARTS NAME	DESCRIPTION	SIZE (mm)	Q'TY
1	07:A33688D	ADJUSTABLE FOOT	M10X50(L)	4
2	03:A20564B	BASE	343(W)X500(D)X60(H)	1
3		HEX BOLT	M8X40(L)	4
4		CONVEX WASHER	M8(H)	4
5	LC:106-150K	LOAD CELL	50(W)X210(D)X51(H)	1
6		SCREW	M3X10(L) S-TYPE	2
7		WASHER	M3	2
8	04:A46165B	SPACER PLATE	50(W)X70(D)X5(T)	1
9	09:A47744-1	SUSPENSION BAR-R	50(W)X618(D)X9(T)	1
10	09:A47744-2	SUSPENSION BAR-L	50(W)X618(D)X9(T)	1
11		HEX BOLT	M8X40(L)	3
12		CONVEX WASHER	M8(H)	3
13	06:A6166C	CENTER SUPPORT	φ60X10(H)	1



				Model	FW Series
Symbol	Date	By	Revision No.	Description	Power Board
				Stock No.	PZ:2005
				Drwg.No.	KZ4-00587

A B C D E F G

PC2024D



Symbol	Date	By	Revision No.	Model	FW Series
				Description	Main Board
				Stock No.	PZ:2024
				Drwg.No.	KZ3-00671

Part 2

Technical Data for Floor scales

FW-1200KA3
FW-600KA3
FW-600KA4
FW-300KA4

FW-1200KB3
FW-600KB3
FW-600KB4
FW-300KB4

PARTS LIST

FW

MAIN BOARD -1/2

90.11.02

CIRCUIT SYMBOL or DRWG. NO.	PARTS NAME	DESCRIPTION	Q'TY
	7PZ:2024	MAIN BOARD PARTS FW/6201/6102	1
C14, 15, 16, 17, 18, 19, 20, 34	CC:0.001U	CAPACITOR 0.001 μ F	8
C1, 3, 4, 7, 8, 10, 11 24, 25, 26, 27, 36, 38, 39, 44, 45,	CC:0.022U	CAPACITOR 0.022 μ F	16
C43	CC:0.1U25V	CAPACITOR 0.1 μ F 25V	1
C46, 47	CC:10P	CAPACITOR 10PF	2
	CK:SM10VB47	CAPACITOR 47 μ F 10V	1
C5, 6, 42	CT:1D2R2	CAPACITOR 2.2 μ F 20V	3
C35, 37	CT:1V010	CAPACITOR 1 μ F 35V	2
LCD	ED:LT5108-35P3	LCD	1
J4	JD:68147-008	CONNECTOR	1
U8	JS:10328-01-445	IC SOCKET	1
J1	JT:171826-5	CONNECTOR	1
J3	JT:172429-4	CONNECTOR	1
J2	JT:172429-8	CONNECTOR	1
	MF:AMZ24	HYBRID IC	1
	PC:2024D	PC BOARD	1
Q3	QT:A1015Y	TRANSISTOR	1
Q1	QT:A1020Y	TRANSISTOR	1
Q2, 4	QT:C1815Y	TRANSISTOR	2
R4	RC:1.5K	RESISTOR 1.5K Ω 1/4W	1
R1	RC:1K	RESISTOR 1K Ω 1/4W	1
R5, 23, 25	RC:10K	RESISTOR 10K Ω 1/4W	3
R19	RC:18K	RESISTOR 18K Ω 1/4W	1
R21	RC:2.2K	RESISTOR 2.2K Ω 1/4W	1
R2	RC:2.7K	RESISTOR 2.7K Ω 1/4W	1
R17, 20	RC:22K	RESISTOR 22K Ω 1/4W	2
R3	RC:3.9K	RESISTOR 3.9K Ω 1/4W	1
R6, 15, 16, 18, 22, 24	RC:47K	RESISTOR 47K Ω 1/4W	6
R7, 8, 9	RM:10KF	RESISTOR 10K Ω 1/4W	3
R10	RM:16.2KF	RESISTOR 16.2K Ω 1/4W	1
R14	RM:261KF	RESISTOR 261K Ω 1/4W	1
R11, 12	RN:IHR-4-223MA	RESISTOR NETWORK 22K Ω \times 4	2
R13	RN:IHR-6-104JA	RESISTOR NETWORK 100K Ω \times 6	1
CAL	SS:SSP1 \times 2NB5 \times 8	SWITCH	1
U4	UA:MB3771	VOLTAGE COMPARATOR	1

FW

90.11.02

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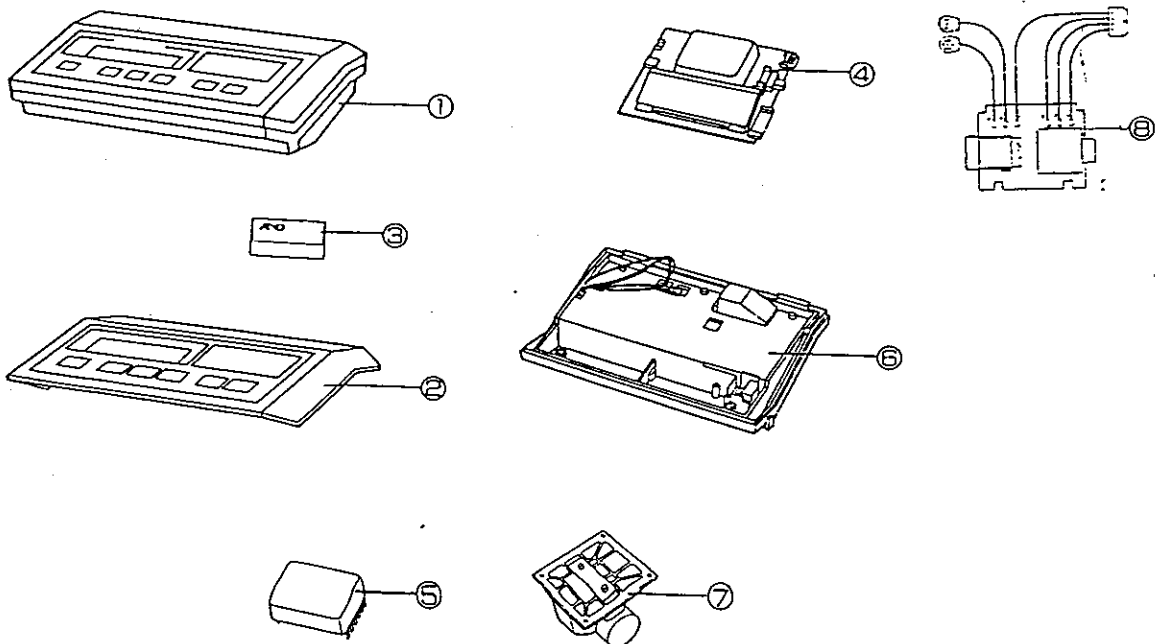
FW

90.11.02

Page 65

FW300/600/1200 SPARE PARTS LIST
90.11.02

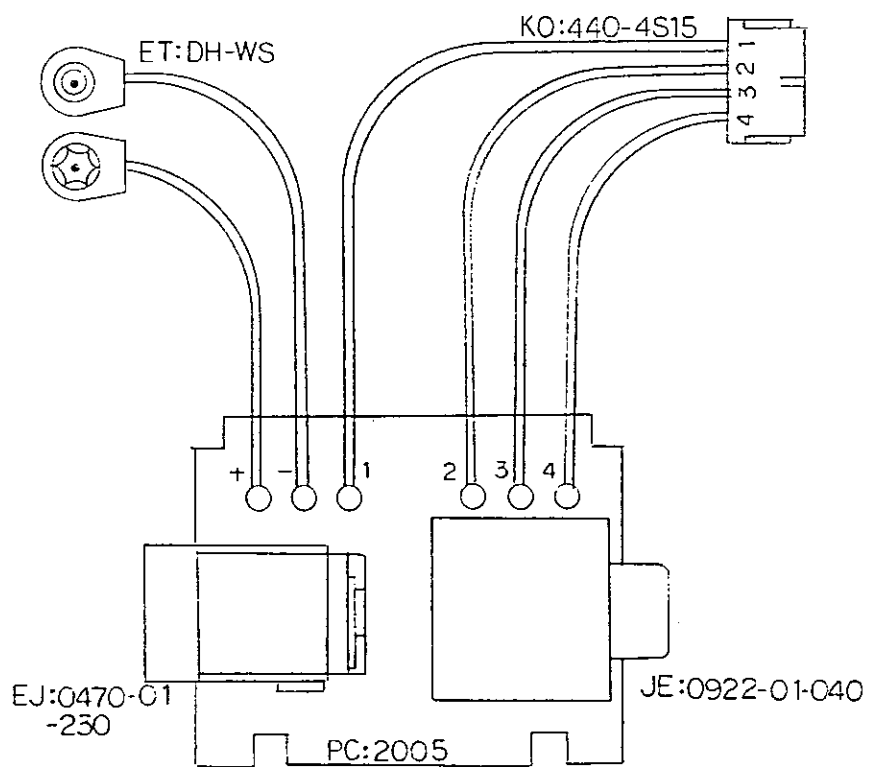
NO	PARTS NO	DESCRIPTION	Q'TY
1	7PA-FW-0	DISPLAY UNIT	
2	7PM-FW-3-1	UPPER CASE UNIT JAPANESE	
(2)	7PM-FW-3-2	UPPER CASE UNIT INTERNATIONAL	
3	08-A34646-6	CAPACITY LABEL FW300K (METRIC)	
(3)	08-A34646-7	CAPACITY LABEL FW600K (METRIC)	
(3)	08-A34646-8	CAPACITY LABEL FW1200K(METRIC)	
(3)	08-A34896-6	CAPACITY LABEL FW300K (NON-METRIC)	
(3)	08-A34896-7	CAPACITY LABEL FW600K (NON-METRIC)	
(3)	08-A34896-8	CAPACITY LABEL FW1200K (NON-METRIC)	
4	7PZ-2024	MAIN BOARD UNIT	
5	MF-AMZ24	HYBRID IC	
6	709-A34156	LOWER CASE UNIT	
7	707-A10078	BRACKET UNIT	
8	7PZ-2005	CONNECTOR BOARD	



EXPLODED VIEW
FW300/600KA4

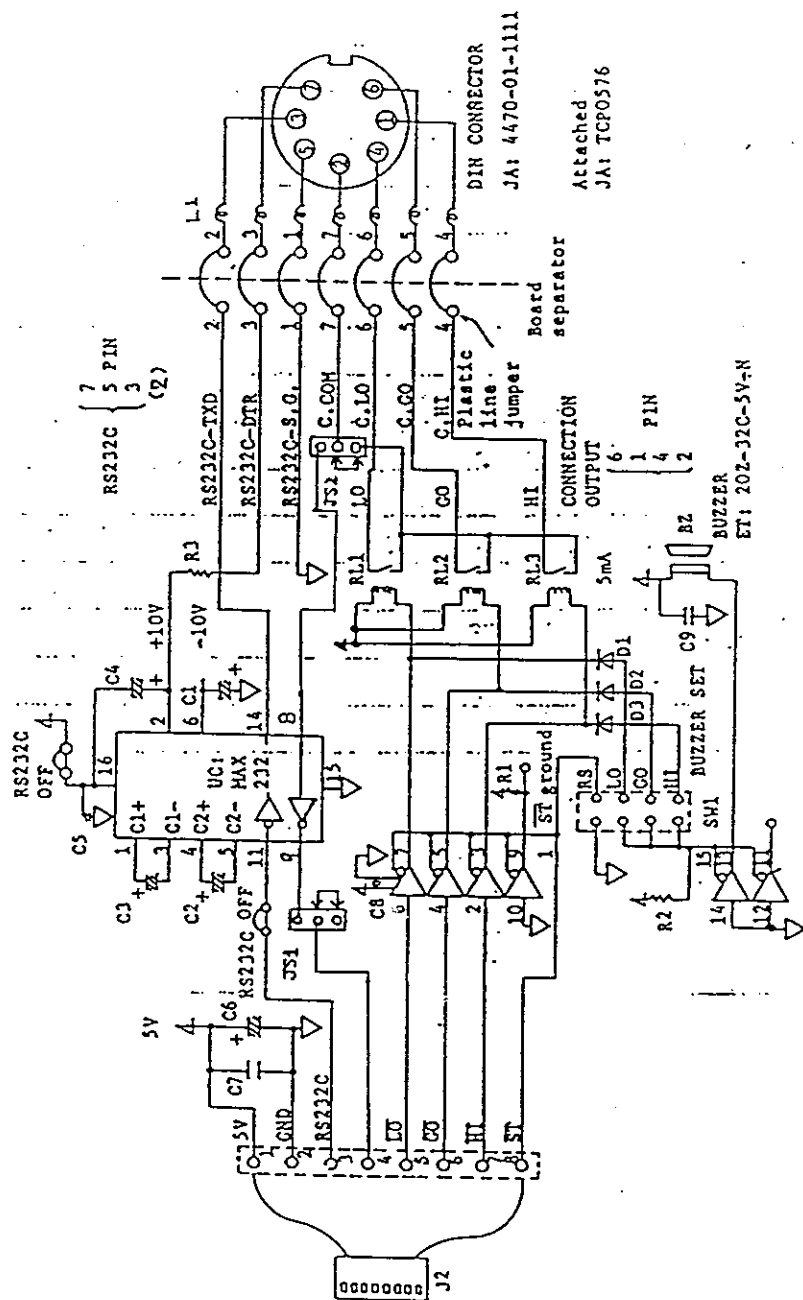
90.07.05

[illegible]



				Model	FW Series
Symbol	Date	By	Revision No.	Description	CONNECTOR BOARD
				Stock No.	PZ:2005
				Drwg.No.	KZ4-00387

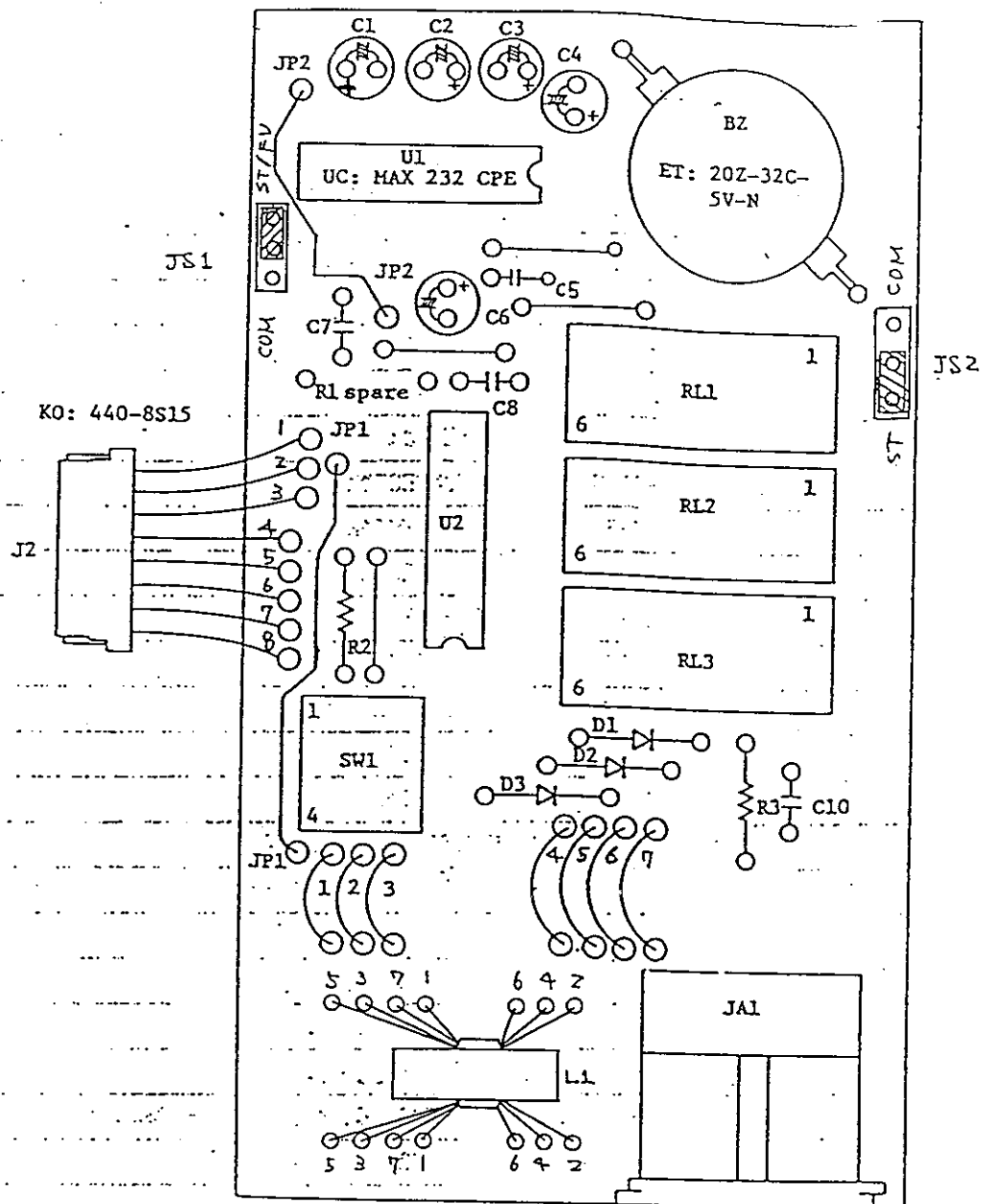
				Model	OP-03
Symbol	Date	By	Revision No.	Description	PZ: 946
				Stock No.	RS232C Comparator Dataout
				Drwg. No.	EC ₄ -00116



DIP SW	
1	OFF: Contact output will only sound buzzer when stable. ON: Any contact output will sound buzzer.
2	OFF: No low buzzer ON: Low buzzer
3	OFF: No go buzzer ON: Go buzzer
4	OFF: No hi buzzer ON: Hi buzzer
5	RS232C OFF
6	RS232C OFF
7	Relay OFF
8	NC

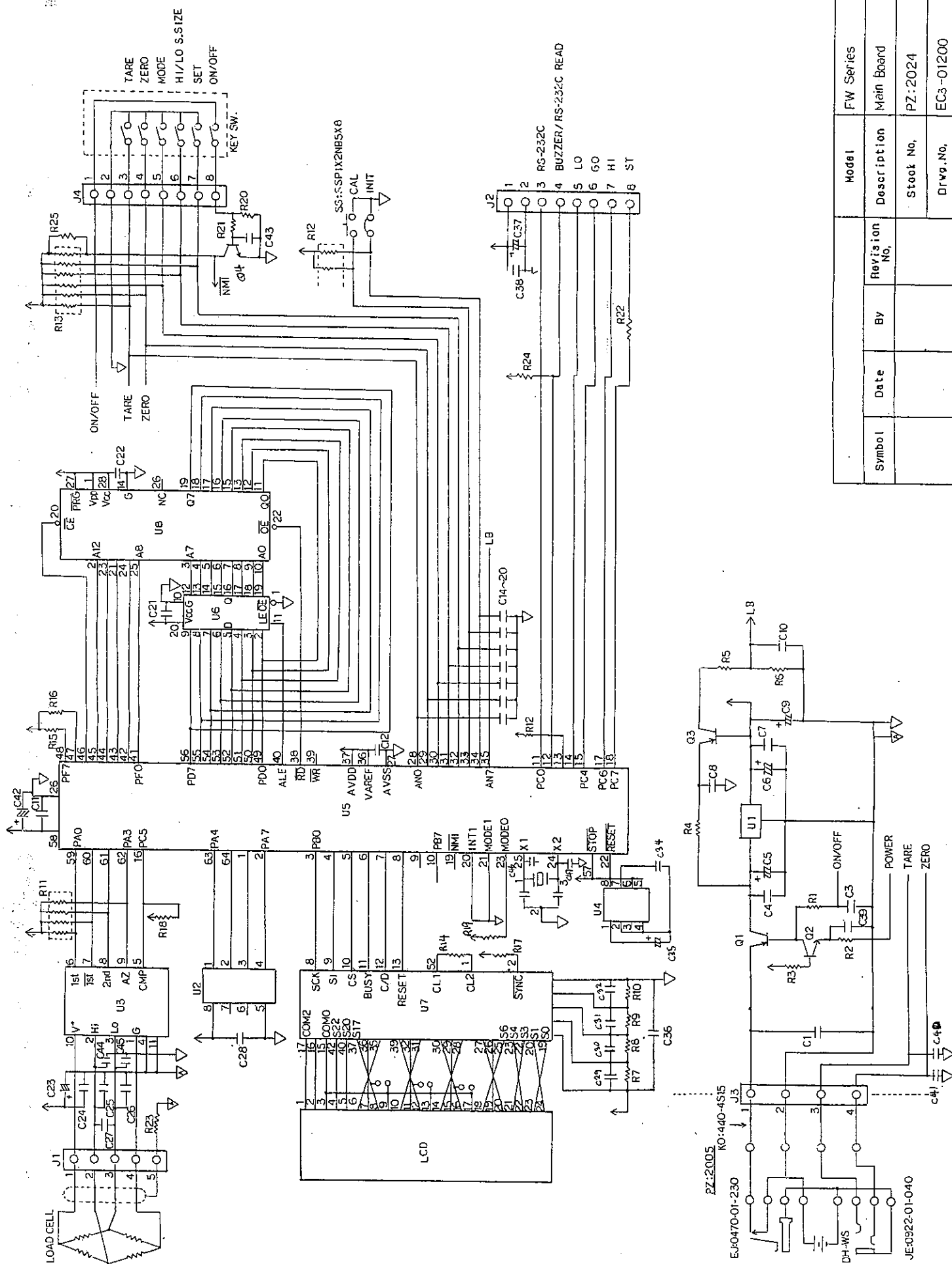
P Z : 9 4 6

CIRCUIT SYMBOL	PARTS NAME	DESCRIPTION	Q'TY
C5, 7, 8, 10	CC:0.022U	CAPACITOR 0.01 μ F 500V	4
C1~4, 6	CK:SM25VB22	ELECTROLYTIC CAPACITOR 22 μ F 25V	5
D1~3	DI:1S1588	DIODE	3
BZ	ET:20Z-32C-55V-N	BUZZER	1
JA1	JA:4470-01-1111	DIN CONNECTOR	1
JS1, 2	JE:66464-102	CONNECTOR	2
JS1, 2	JT:65507-406	CONNECTOR	1
J2	KO:440-8S15	CONNECTOR CABLE	1
L1	LR:H5AT7-14-3.5	TRANSFORMER 13TURN-13TURN	1
	PZ:946	OPTION-03 FULLY ASSEMBLED	1
R2	RC:22K	RESISTOR 22K 1/4W	1
R3	RC:3.3K	RESISTOR 3.3K 1/4W	1
SW1	SD:KTD04	DIP SWITCH	1
RL1~3	SL:LD1-1M-05D	RELAY	3
U2	UC:HC367	CMOS IC	1
U1	UC:MAX232CPE	PS-232C DRIVER/RECEIVER	1



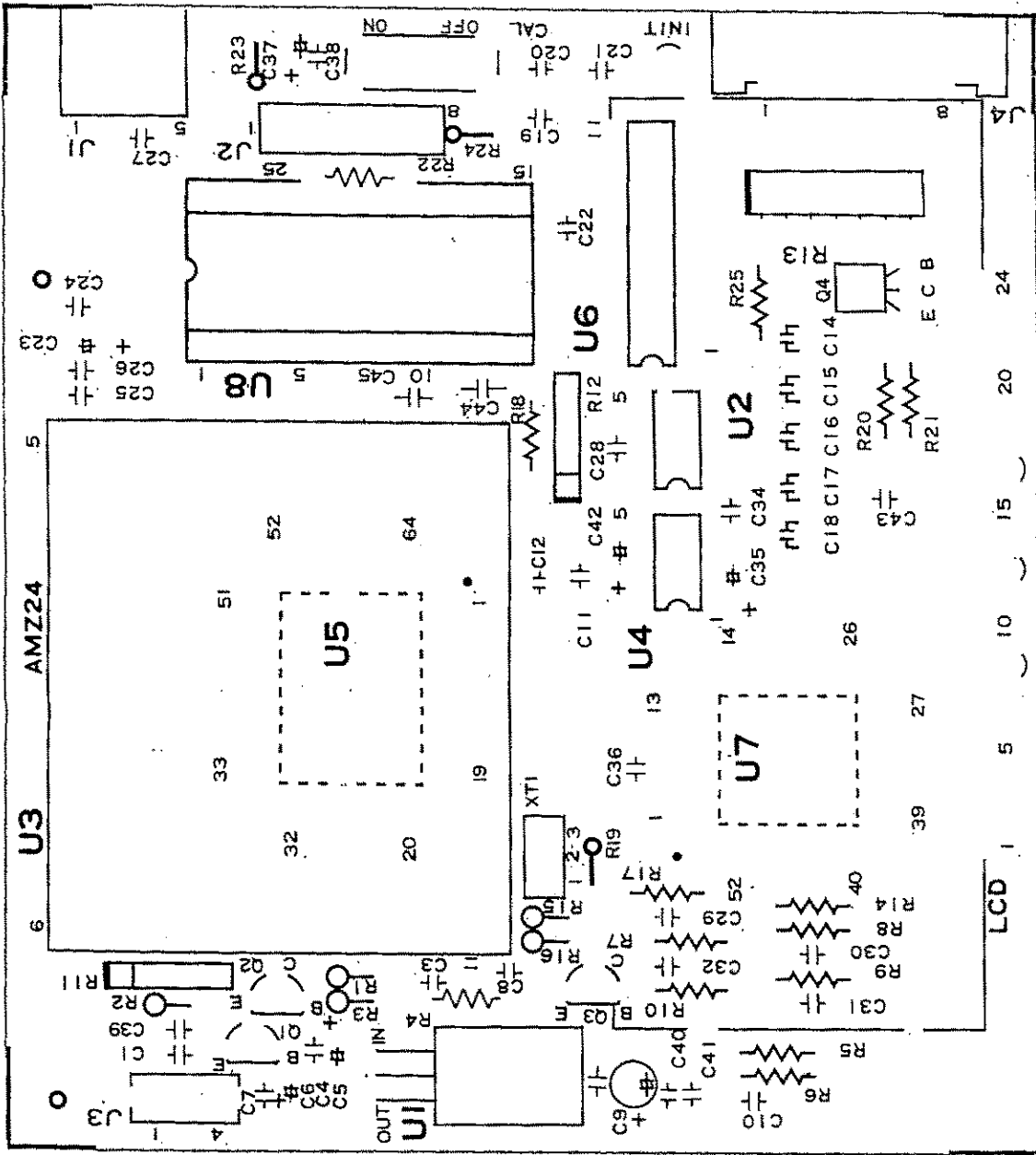
				Model	OP-03
Symbol	Date	By	Revision No.	Description	Board Parts Allocation Chart
				Stock No.	PZ: 946
				Drwg. No.	KZ ₃ -00587

A B C D E F G



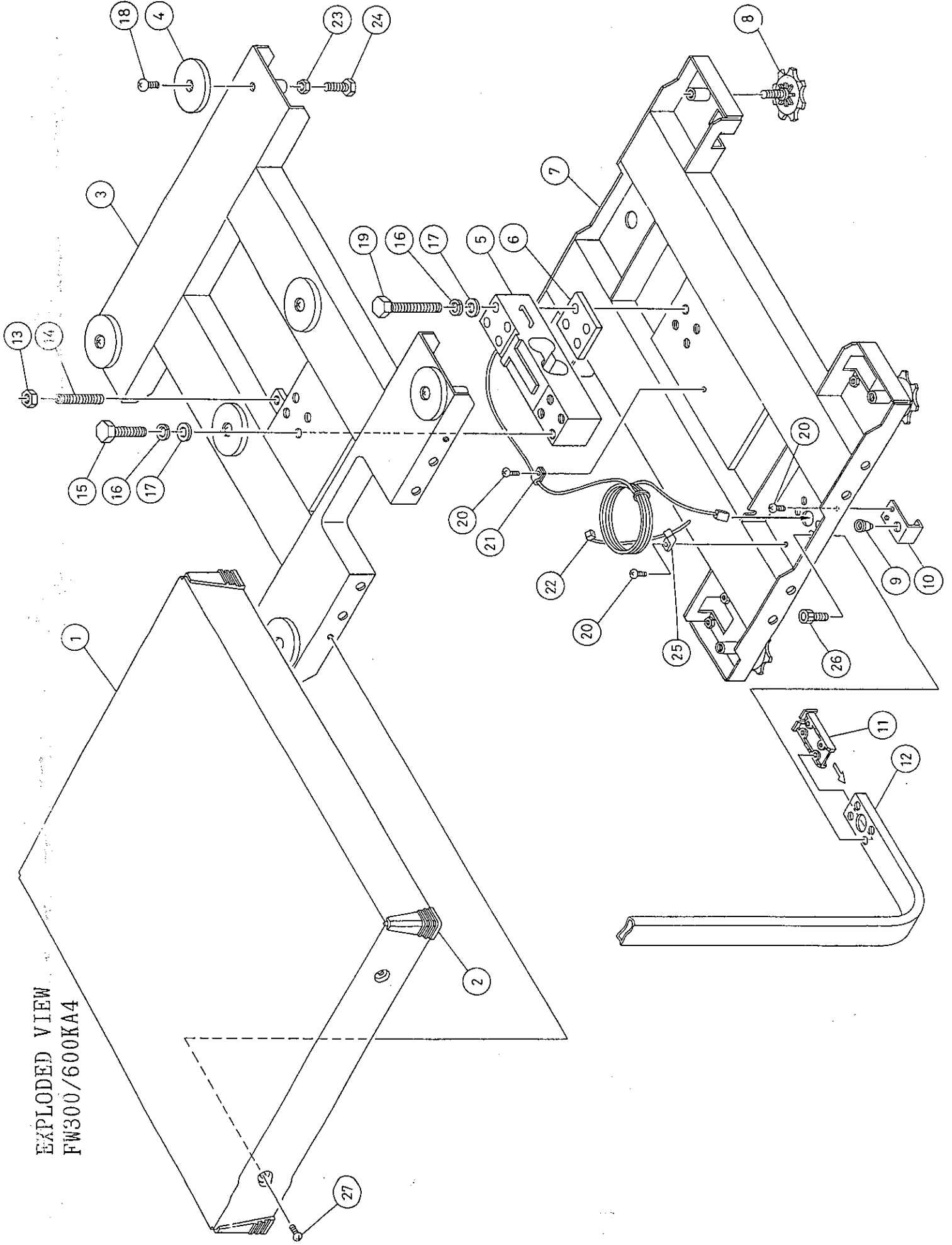
Symbol	Date	By	Revision No.	Model	FW Series
				Description	Main Board
				Stock No.	PZ:2024
				Drwg. No.	EC3-01200

PC2024D



Symbol	Date	By	Revision No.	Model	FW Series
				Description	Main Board
				Stock No.	PZ:2024
				Drawg.No.	KZ3-Q0671

EXPLODED VIEW
FW300/600KA4



EXPLODED VIEW
FW600/1200KA3

