

# Digital Scale FG Series

## MAINTENANCE MANUAL

FG-30KAM

FG-30KBM

FG-60KAM

FG-60KAL

FG-60KBM

FG-150KAM

FG-150KAL



FG-150KBM

# **A&D**

A&D Company, Limited

# This manual and Marks

All safety messages are identified by the following, "WARNING" or "CAUTION", of ANSI Z535.4 (American National Standard Institute: Product Safety Signs and Labels). The meanings are as follows:

 WARNING	A potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	A potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



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# 1 Introduction

The model names on the cover of this manual correspond to the products covered.



## 1.1 Outline of Products

The FG scales are based on the principal of detecting a weight using a load cell transducer. A load cell has strain gages bonded to its surface to detect a small change of strain. When a mass is placed on the weighing pan that is attached to the load cell, the force generated by a mass causes a small change of strain in the load cell. The change is transmitted to the strain gages and the resistance of strain gages changes its value. This small change of the resistance is converted to a voltage signal that is directly proportional to the force applied. The voltage is amplified and sent to an analog to digital converter to be changed to a digital value. The microprocessor calculates the weight value and shows it on the display.



## 1.2 Models

FGK Series

FG-30KAM / FG-30KBM	Max=30kg, d=0.01kg / 0.005kg / 0.002kg
FG-60KAL / FG-60KAM / FG-60KBM	Max=60kg, d=0.02kg / 0.01kg / 0.005kg
FG-150KAL / FG-150KAM / FG-150KBM	Max=150kg / d=0.05kg / 0.02kg / 0.01kg



## 1.4 About this manual

Every care has been taken during the manufacturing process of these scales to ensure that they will perform accurately and reliably for many years.

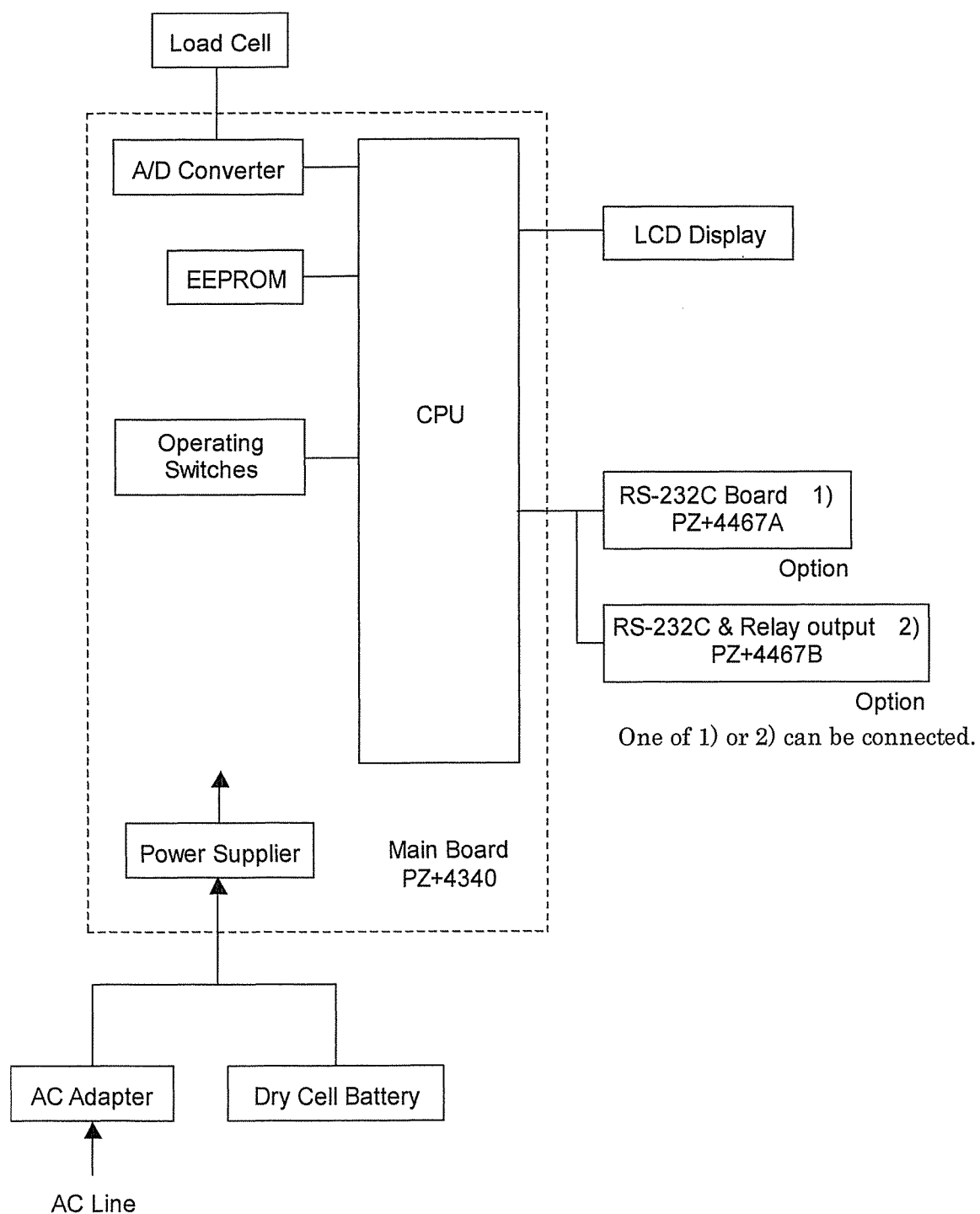
The intent of this manual is to make maintenance as easy as possible for you with a step-by-step guide through the in's and out's of the scale, or related products. Please let us know if it has accomplished the just stated goal - what works, what doesn't, and what we might have left out. We ask that you read through the entire owner's Instruction Manual and this maintenance manual before starting any work.

When a customer has a problem, make sure that: the Best Conditions for Weighing, 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.*



## 2 Block Diagrams





### 3 Gravity acceleration

In the New FG-i series scales, in order to obtain the correct weight, a correction function to allow for gravity acceleration is provided. To perform accurate weighing, it is necessary to set the gravity acceleration to match that of the area where the scale is being used. (Refer to the Technical section: Values of gravity acceleration.)

Step 1. Turn the power on.

After the display check, if the bar display is shown, press the **MODE** key to display the weighing result, etc. (including E and -E displays).

Step 2. Remove the rear cover.

Step 3. Press the **CAL** switch.

By pressing the **CAL** switch, the calibration mode is entered and a "CAL 0" displayed.

Step 4. Press the **PRINT** switch.

Step 5. Gravity acceleration

The four-figure number displayed when the calibration mode is entered, is the currently set gravity acceleration value.

If the gravity value matches the area it is being calibrated in, press **MODE** and move to the calibration procedure.

If the gravity value has to be adjusted, once calibration has been completed, reset the gravity value to that of the area where the scale is to be used.

Example: To set the gravity acceleration from 9.798 (the factory setting) to 9.806 (the value for Milan or Ottawa). (See appendix)

Functions of the keys used:

**PRINT** Adds 1 to the value of the digit that is flashing. After pressing this key, the value stops flashing.

**ZERO** The digit to be changed moves one figure to the left and flashes.

**MODE** Stores the data in memory.

1. Press the **ZERO** key to select the first figure. (The first figure flashes.)
2. Press the **PRINT** key to change the number of the first figure to "6".
3. Press the **ZERO** key to select the second figure. (The second figure flashes.)
4. Press the **PRINT** key to change the number of the second figure to "0".
5. Press the **ZERO** key once to select the third figure. (The third figure flashes.)
6. Press the **PRINT** key to change the number of the third figure to "8".
7. Using the above procedure, the gravity acceleration setting has been completed. Press the **MODE** key store the data in memory.

If the scale requires calibration, continue with the calibration procedure step 3.

If the calibration has been completed and the gravity value is being set to that of another area, press the **CAL** switch to exit the setting procedure.



## 4 Calibration



### 4.1 CAL prohibition procedure

- Step 1. Press and hold the **CAL** switch and **MODE** key. Then press the **ON/OFF** key. "A-2.00." is displayed.
- Step 2. Press the **MODE** key to go into the factory mode.
- Step 3. "dSPly" is displayed. Press the **PRINT** key 3 times.
- Step 4. Then "C-Fnc" is displayed. Press the **MODE** key to start function setup.
- Step 5. "C1-0" is displayed. Press the **PRINT** key to display "C1-1".
- Step 6. Press the **MODE** key several times until "End" is displayed.  
Press the **MODE** key.
- Step 7. Then "C-Fnc" is displayed. Press the **ON/OFF** key to turn off the power supply and end.

Remarks:

C1 = 0: CAL permission

1: CAL prohibition



### 4.2 CAL procedure

- Step 1. Press the **CAL** switch for 2 seconds. "CAL0." is displayed.
- Step 2. With no-load and the stable mark displayed, press the **MODE** key.
- Step 3. "SPn1" is displayed. Using the **PRINT** and **ZERO** keys, change the displayed value to "30.000."
- Step 4. Load the calibration weight, wait for the stable mark to be displayed then press the **MODE** key.
- Step 5. Then, "End" is displayed. Press the **CAL** switch to return to the weight display.





## 4.3 Internal setting

### 4.3.1 Internal setting release of calibration prohibition

- Step 1. Press and hold the **CAL** switch and **MODE** key, then press the **ON/OFF** key.
- Step 2. Press the **MODE** key.
- Step 3. Press the **PRINT** key 3 times.
- Step 4. Press the **MODE** key
- Step 5. "C-1 1" is displayed, press the **PRINT** key to display "C-1 0."
- Step 6. Press the **MODE** key several times until "End." is displayed.
- Step 7. Press the **MODE** key.
- Step 8. Press the **ON/OFF** key to turn the power off.

### 4.3.2 Calibration

- Step 1. Press the **ON/OFF** key to turn the power on.
- Step 2. Press and hold the **CAL** switch for 2 seconds to display "CAL 0".
- Step 3. With no load on the pan and the stable mark displayed, press the **MODE** key.
- Step 4. It becomes display "display-after the display with SPn1" "\*\*\*\*." (\*\*\*\* is value of the calibration mass)
- Step 5. The calibration mass displayed in step 4 is placed on the pan. When the stable mark is displayed, press the **MODE** key.
- Step 6. "End" is displayed. Press the **CAL** switch to display the weighing mode.

### 4.3.3 Internal setup of calibration prohibition mode

- Step 1. Press and hold the **CAL** switch and the **MODE** key. Then press the **ON/OFF** key. Press the **MODE** key. Press the **PRINT** key 3 times. Press the **MODE** key.
- Step 2. "C-1 0" is displayed, press the **PRINT** key to display "C-1 1."
- Step 3. Press the **MODE** key several times until "End." is displayed. Press the **MODE** key. Press the **ON/OFF** key to turn the power off.



## 5 Software Parameter Settings

This section concerns disabling and enabling functions of the FG 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 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.

### Setting procedure

- Step 1. With the scale switched off, remove the display case rear cover.  
Step 2. Press and hold the **CAL** switch and the **MODE** key. Then press the **ON/OFF** key. Press the **MODE** key. Press the **PRINT** key 3 times. Press the **MODE** key.  
Step 3. "C1 \*" is displayed.  
Step 4. To change the value use the **PRINT** (**^**) and **ZERO** (**<**) keys. Press the **MODE** key to store the value. The setting value is shown below.

- |    |  |
|----|--|
| C1 | CAL<br>0: Inhibit ↗<br>1: Permit ↘                       |
| C2 | Tare key<br>0: Included to "Re-zero" key<br>1: Separated |
| C3 | Capacity<br>0: 30kg<br>1: 60kg<br>2: 150kg               |
| C4 | Weighing unit<br>0: Metric<br>1: Non-metric              |
| C5 | Zero tracking device<br>0: off<br>1: on                  |
| C6 | Decimal point<br>0: "."<br>1: ","                        |
| C7 | Center of zero by NET weight<br>0: off<br>1: on          |

- C8 Not in use  
This value should be "0"
- C9 TARE data clear when push zero.  
0: yes  
1: no

Setting TYPE V/W series

	FG30K	FG60K	FG150K				
C3	1	1	1				

Country

		A						
	Item	JA	EG	EX				
C1	CAL	0	0	0				
C2	TARE key	0	1	0				
C4	Unit	0	1	0				
C5	Zero track	1	1	1				
C6	Decimal point	0	0	0				
C7	Range fix	0	0	0				
C8		0	0	0				
C9	TARE clear	0	1	0				

Function

	EX	JA	EG(NTEP)			
F1	1	1	1			
F2	1	1	1			
F3	2	2	0			
F4	0	0	0			
F5	0	0	0			
F6	0	0	0			
F7	1	1	1			
F8	0	0	0			
F9	1	1	1			



## 6 Troubleshooting

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

### Troubleshooting

- # Check the Keyboard to see if it is functioning properly (See Keyboard Check).
- # 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 (see Calibration section) .
- # If the display remains "E", "-E", or is not stable - then do a full recalibration, including resetting "g" if necessary (see Calibration section).
- # If calibration is not possible:
  - If "-CAL E" is displayed when you press the **MODE** key, the scale cannot enter the maximum capacity value because the calibration mass is under-weight (minus Calibration Error). Check everything is correctly set.
  - Check the analog and main boards for broken leads, and the cable from the Load Cell to J1 of the main board.
  - \* Don't forget to do a full recalibration, including resetting "g" (see Calibration section) if you make any electronic repairs.

### Load cell stopper check

- # If the weighing pan is loaded to just over full scale, does it hit the overload stopper?  
☐ ok

### Pan check

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

### Battery check

- # Remove the battery, and the AC adaptor (if connected). Then re-install the battery. Press the **ON/OFF** key. Does the display turn on?  
☐ ok
- # Check the connection between the battery case, DC jack and the main board.  
☐ ok
- # Check the output of the Battery/AC adaptor to see that it is at least 6.0 volts.  
☐ ok
- # When pressing the **ON/OFF** key, check the resistance between S1 pins to see if they read less than 10  $\Omega$ . If so, then it is normal. ☐ ok
  - If not, replace the switch. ☐ ok
  - If the resistance is correct but the problem remains, try a different main board. ☐ ok

- # When the ON/OFF key is pressed, the voltage at J1 pins 3 and 6 should be 5V  $\pm 10\%$ , and pin 17 of CPU (RESET ) at  $\approx 5V$  (Hi) ☐ ok
- # Check that transistors Q3,Q4, Q5 on the main board are working. ☐ ok

## CPU check

- # Remove the battery, and the AC adaptor (if connected). Then, re-insert the battery. Press the ON/OFF key. Does the display turn on? ☐ ok
- # Check all solder connections. ☐ ok
- # Check that the voltage between pin 3 and 6 of J1 of the main board, it should be  $5V \pm 10\%$ . ☐ ok
- # Is the RESET at the Hi level? [ pin 17 of U1 (RESET ) at  $\approx 5V$  (Hi)] ☐ ok
- # Check the voltage levels for the LCD at U1 pin 1  $\approx 5.0V$ , 2  $\approx 3.3V$ , 3  $\approx 1.7V$  ☐ ok
- # Check that the clock pulse is 8MHz (see #1 Waveform table). ☐ ok

## LCD check

- # Check the glass for cracks (visible as dark spots). ☐ ok
- # Check the soldering for breaks. ☐ ok
- # Check for missing segments during the sequential and 'power on' tests. ☐ ok

## Load cell check

# Check the following cable assembly - pin to wire - connections of J1 on the main board:

1:Orange	<input type="checkbox"/> ok	2:Purple	<input type="checkbox"/> ok	3:Red	<input type="checkbox"/> ok
4:Green	<input type="checkbox"/> ok	5: Blue	<input type="checkbox"/> ok	6:White	<input type="checkbox"/> ok

- # Check that the voltage between pins 1 & 6 of J1 is  $\approx 2.5V$ . ☐ ok
- # Check that the voltage between pins 2 & 6 of J1 is  $\approx 2.5V$ . ☐ ok
- # Check that the voltage between pins 3 & 6 of J1 is  $5V \pm 10\%$ . ☐ ok
- # Check that the voltage between pins 4 & 6 of J1 is  $\approx 2.5V$ . ☐ ok
- # Check that the voltage between pins 5 & 6 of J1 is  $\approx 2.5V$ . ☐ ok
- # Check that the voltage between pins 4 & 5 of J1 is  $0.5 \sim 2mV$  with no weight on the weighing pan. ☐ ok
- # Check that the voltage between pins 4 & 5 of J1 is  $5 \sim 8mV$  with full span weight on the weighing pan. ☐ ok
- # Check that the voltage of U2 at pin 14 on the analog board is  $5V \pm 10\%$ . ☐ ok
- # Check that the A/D converter waveforms are correct (see Waveform table). ☐ ok
- # Check that the wiring is correct. ☐ ok
- # Check that the voltage is correct. ☐ ok

## Keyboard check

Operation of each key

Key:

Function:

- |   |        |   |                             |
|---|--------|---|-----------------------------|
| # | ON/OFF | • Turns power ON and OFF.                   | <input type="checkbox"/> ok |
| # | PRINT  | • Output data to OP-03/04                   | <input type="checkbox"/> ok |
| # | MODE   | • Display should change from "kg" to "PCS". | <input type="checkbox"/> ok |
| # | ZERO   | • Display shows zero when pressed.          | <input type="checkbox"/> ok |
| # | TARE   | • Display shows zero when pressed.          | <input type="checkbox"/> ok |

IF ON/OFF key is fails, then check this.

- # Check that the voltage between pins 20 of U1 & J- is  $> 2.5V$  if the ON/OFF key is not pressed. ☐ ok
- # Check that the voltage between pins 20 of U1 & J- is  $< 1V$  if the ON/OFF key is pressed. ☐ ok
- # Remove the battery pack, and the AC adaptor, if connected. ☐ ok

- # Check that each individual key is working by measuring the resistance between the pins of the switches.

The resistance with the key pressed should be less than 10  $\Omega$  for:

●	TARE	between pins of S1	<input type="checkbox"/> ok
●	ZERO	between pins of S2	<input type="checkbox"/> ok
●	MODE	between pins of S3	<input type="checkbox"/> ok
●	PRINT	between pins of S4	<input type="checkbox"/> ok
●	ON/OFF	between pins of S5	<input type="checkbox"/> ok
●	CAL	between pins of S6	<input type="checkbox"/> ok

If any of the above are out of the correct resistance range, that switch is defective.

## Other voltage checks.

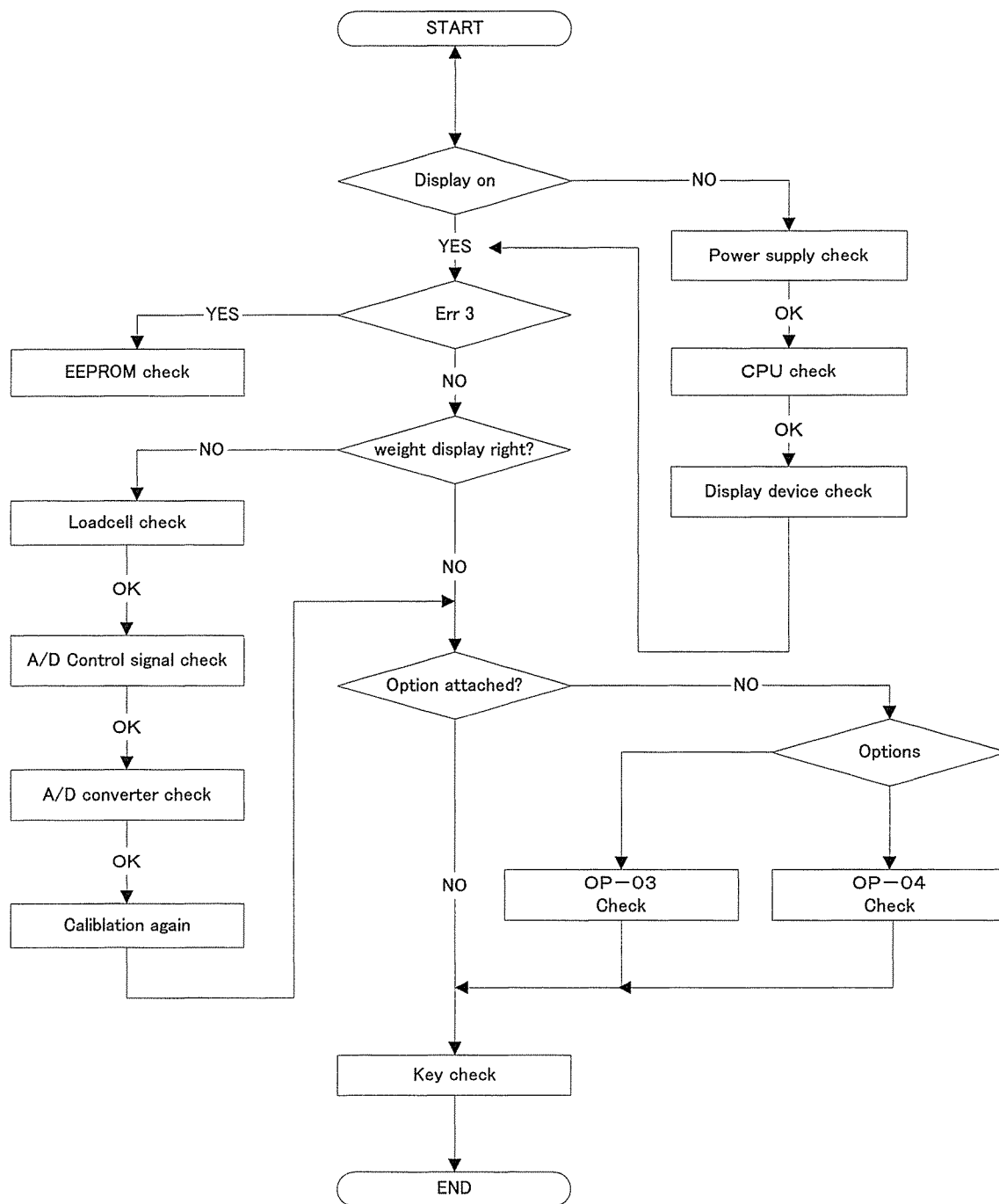
### Voltage check

- # Re-install the battery pack, and the AC adaptor, if used.
- # Check that the voltage between pins B+ & B- is 9V.(Battery) ☐ ok
- # Check that the voltage between pins J+ & J- is 9V.(AC adaptor) ☐ ok
- # Check that the voltage between pins 1 & 2 of J2 is 5V. ☐ ok
- # Check that the voltage between pins 3 of U14 & J- is > 6V. ☐ ok

## Tolerance check.

Model	Linearity	Corner error(Test load)	
FG-30K	$\pm 10g$	$\pm 10g(10kg)$	<input type="checkbox"/> ok
FG-60K	$\pm 20g$	$\pm 20g(20kg)$	<input type="checkbox"/> ok
FG-150K	$\pm 50g$	$\pm 50g(50kg)$	<input type="checkbox"/> ok

## Troubleshooting flow chart





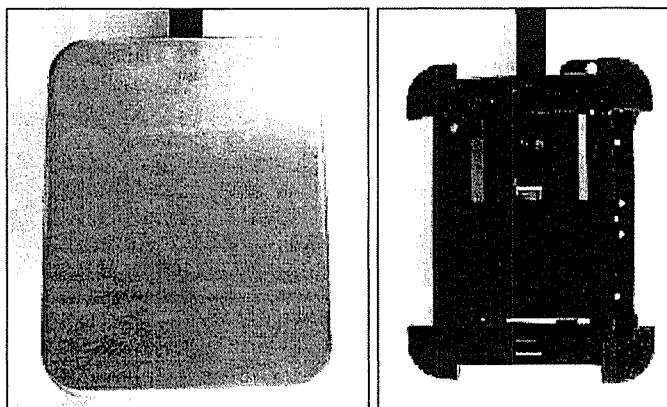


## 7 Replacing the Load cell

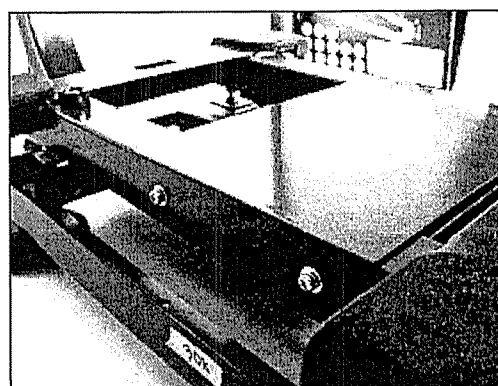


### 7.1 Disassembly

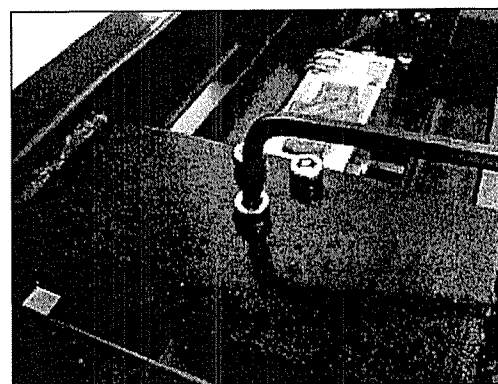
Step 1. Remove weighing pan.



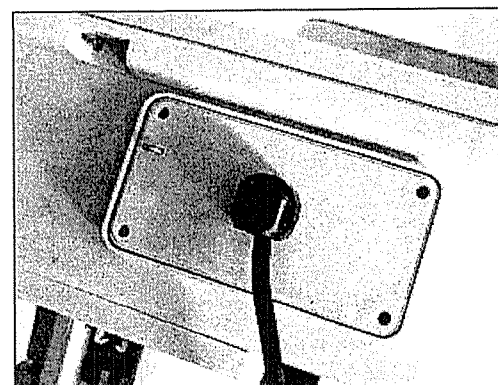
Step 2. Remove four screws on the cover side and remove the cover.



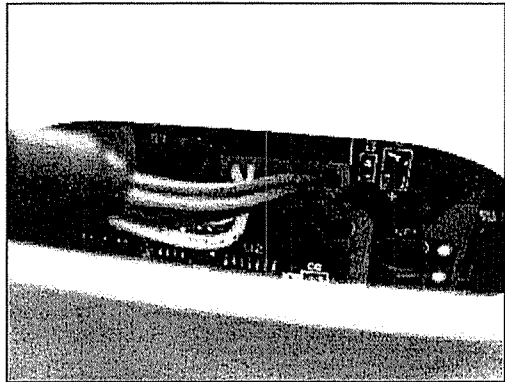
Step 3. Remove three hexagon bolts that fix the upper frame. Then remove the upper frame.



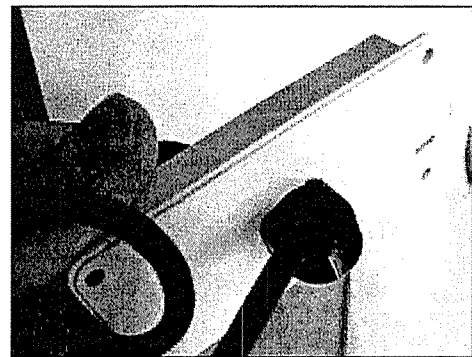
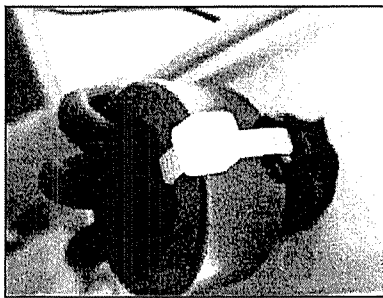
Step 4. Remove four screws that fix the CAL panel on the display back side, and remove the CAL panel.



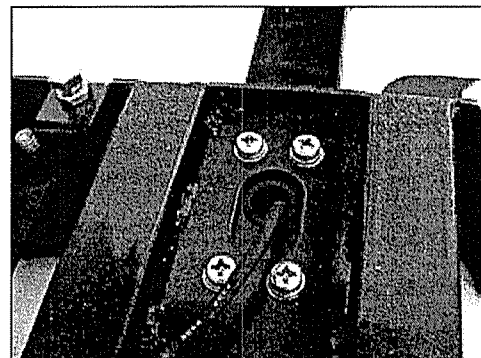
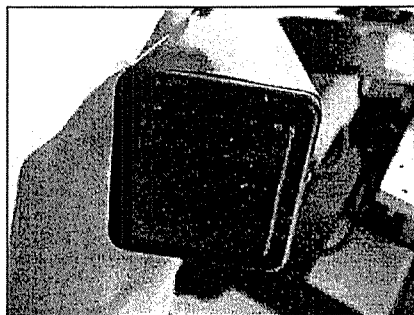
Step 5. Remove the load cell cable assembly from the mainboard connector.



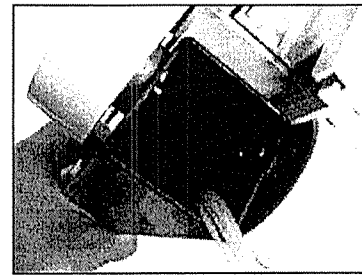
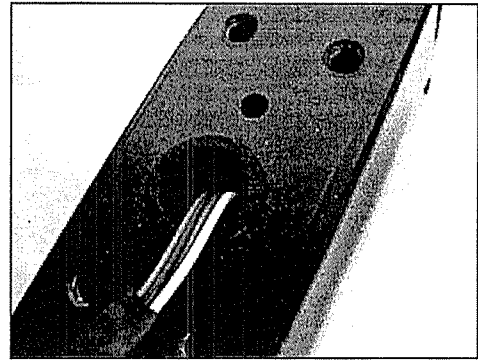
Step 6. Remove the cable clamp and core, then remove the CAL panel.



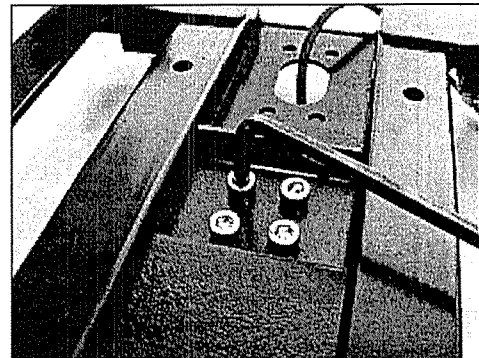
Step 7. Remove four screws which are fixing the poll to base unit. Remove the poll and also remove the end cap at the tip of the pole.



- Step 8. Extract the load cell cable assembly from the poll. Be careful not to damage to the cable assembly at this time. Moreover, attach something like a string or wire to the connector at the tip of the cable assembly, and let it pass through the poll. By carrying this out, the job of passing the cable assembly through the poll at the time of assembly becomes easier.



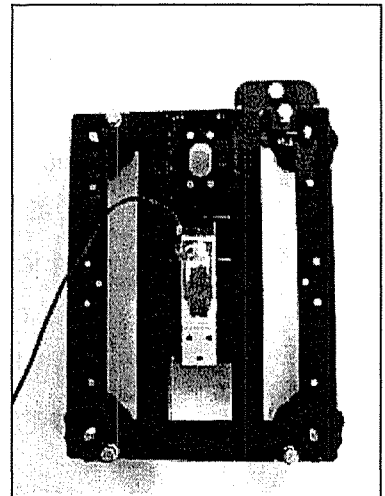
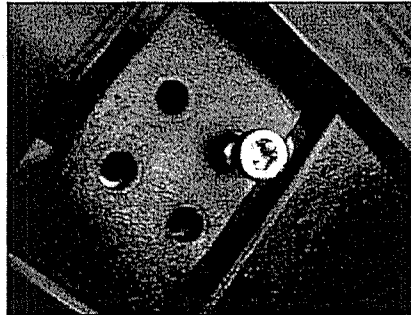
- Step 9. Remove four bolts located on the reverse side of base which fix the load cell. Then remove the load cell.



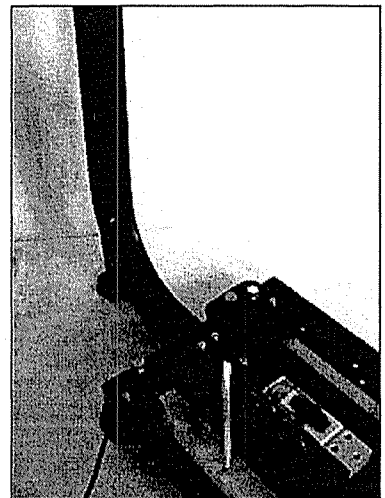
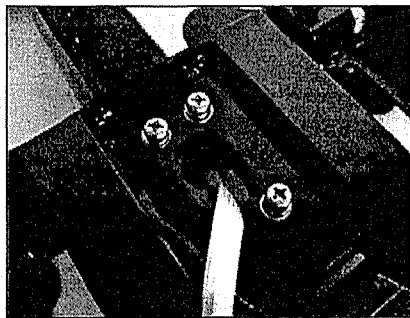


## 7.2 Assembly

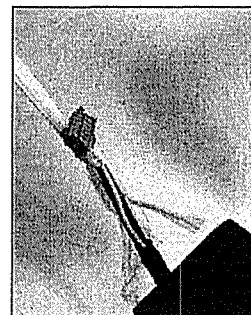
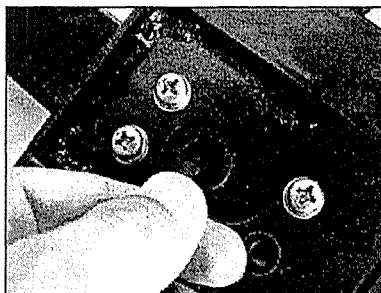
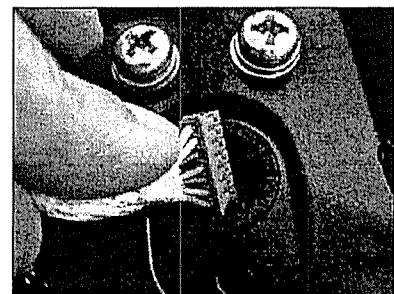
- Step 1. Install the load cell on the base and fix from the reverse side on the base with four hexagon bolts.



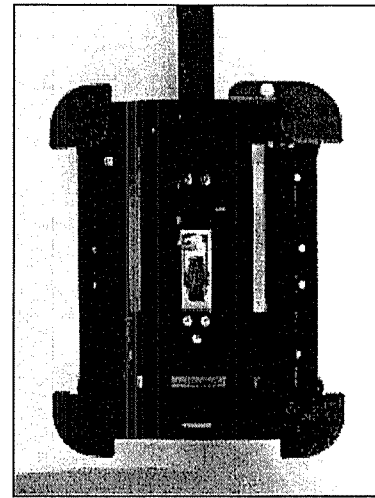
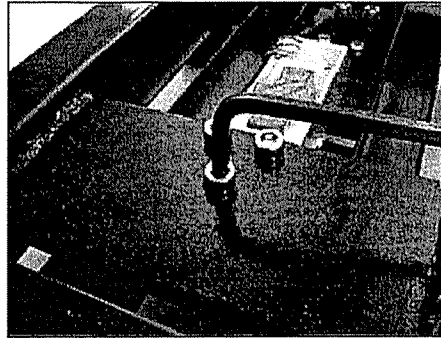
- Step 2. Attach the end cap at a tip of pole. Then attach the pole to the base.



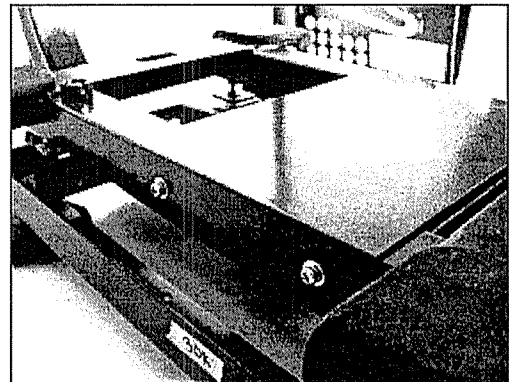
- Step 3. Pull the load cell cable assembly through the poll using the string or wire that was passed through the poll at the time of disassembly.



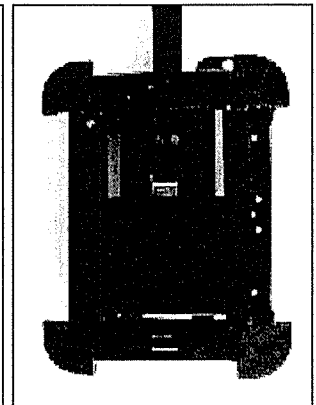
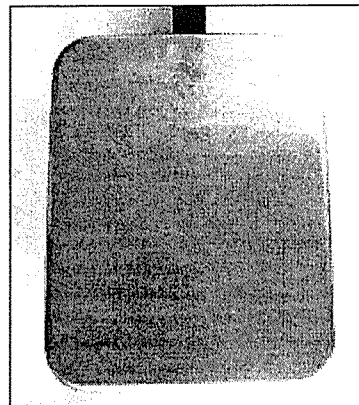
- Step 4. Install the upper frame on the load cell and secure using three hexagon bolts to fix it.



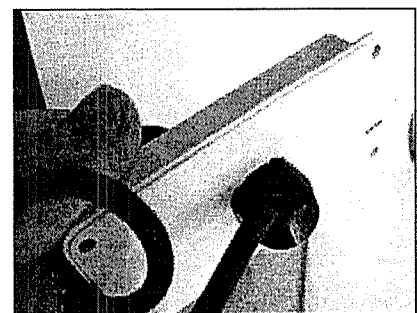
- Step 5. Place the cover on the upper frame. Then secure it using the four screws to fix it .



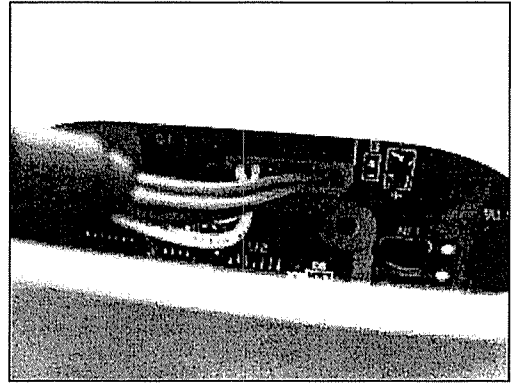
- Step 6. Place the weighing pan on the upper frame.



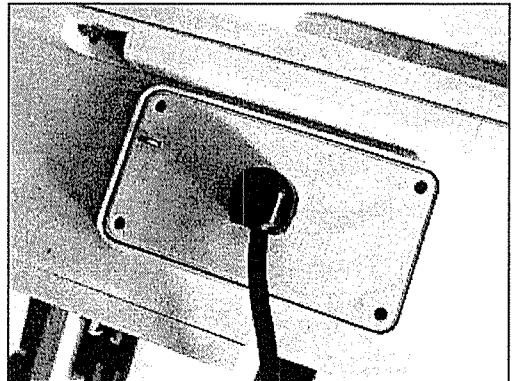
- Step 7. Pass the load cell cable through the hole in the CAL panel. Then attach the cable clamp. After attaching the cable clamp, fix it on the CAL panel and attach the core.



Step 8. Connect the load cell cable to the connector on the mainboard.



Step 9. Attach the CAL panel to the display unit.  
Then install the four screws to fix it





## 8 Initialization & Display Check



### 8.1 Initialization/display check of the FG-i

Initialization readjustment is required when the load cell or main board is replaced. Please do not initialize during regular repairs without first replacing the above-mentioned parts. Since an important internal parameter will be lost if it is initialized, accuracy cannot be guaranteed unless it is readjusted. A calibration and a thermometer are required for readjustment. Readjustment should be carried out in a place with little temperature change.

Step 1. Start the factory adjustment mode.

With the display off, press and hold **MODE** and **CAL** , then turn the power on by **ON/OFF** key.

After "A2.00" is displayed press the **MODE** key to enter the factory adjustment mode. (The display will change to "dSPly")

Step 2. Initialization

Press the **PRINT** key twice in factory adjustment mode. Then "init" is displayed.

Press the **MODE** key twice. Turn into the "C-FuC" mode.

Step 3. Model setup

Refer to the item "model setup" in this manual.

Step 4. Temperature coefficient set.

Press the **PRINT** key in factory adjustment mode. "tEP-C" is displayed. Then press the **MODE** key. Select "%" by **MODE** key. Enter the Temperature coefficient valu of new load cell.

Step 5. Calibration

Place the unit where there is little temperature change and turn it on to warm it up. When the unit has warmed up sufficiently, Press the **PRINT** key in the factory adjustment mode. "t-CAL" is displayed.

Press the **MODE** key, "22" (the numerical value of double figures) is displayed.

Enter the temperature of the road cell (surrounding temperature) and press the **MODE** key. "9798" is displayed. Then enter the gravity acceleration value and press the **MODE** key. "CAL0" is displayed.

Make sure nothing is on the weighing pan, and press the **MODE** key.

"SPn1" is displayed. Place the relevant mass on the weighing pan according to the values below.

FG-30K series	30.000kg
FG-60K series	60.000kg
FG-150K series	150.000kg

- Step 6. Press the MODE key. "End" is displayed.
- Step 7. Press the CAL key to enter the setting mode. The value of the mass is displayed.  
Press the MODE key, "End" is displayed.
- Step 8. Press the CAL key and CAL is ended. (The weight of the mass is displayed)

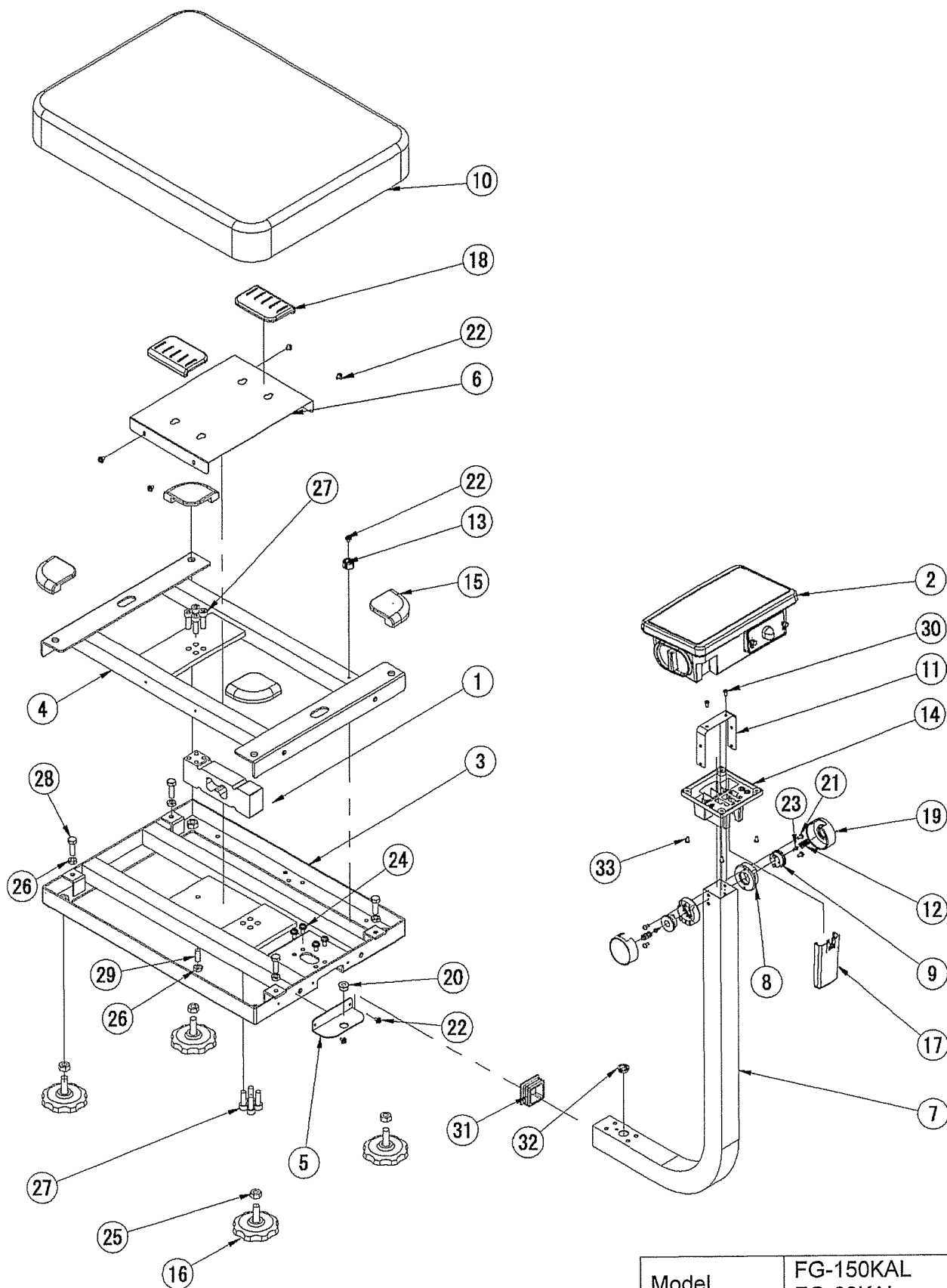




## 10 Exploded View and Parts List



### 10.1 Base Unit (FG-KAL)



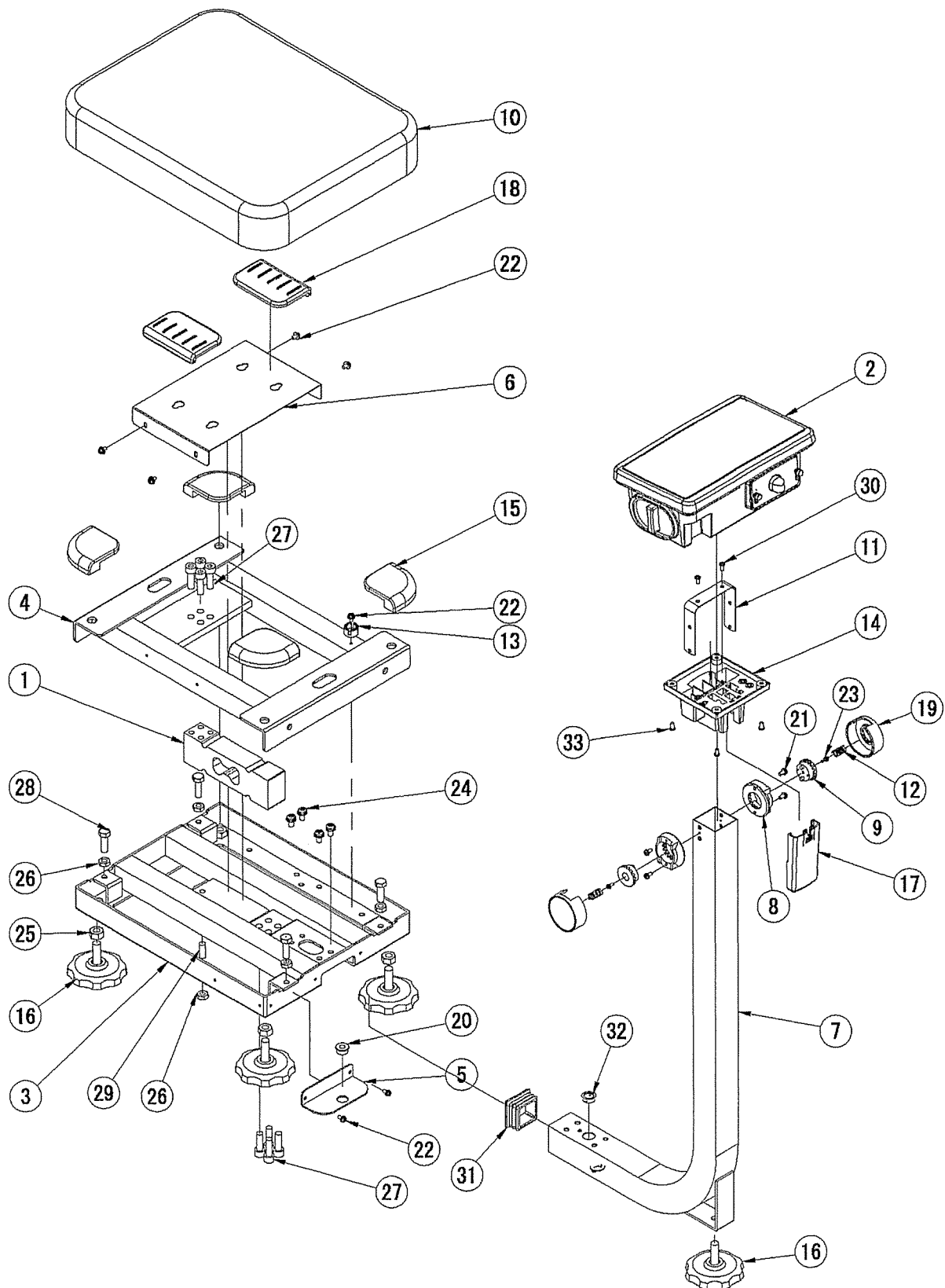
Model	FG-150KAL FG-60KAL
Description	Base Unit (AL)

## Parts List

No.	Part Name	Part No.	Qty
1	LOAD CELL	LC+150-60K	1
		LC+150-150K	
2	DISPLAY UNIT		1
3	BOTTOM FRAME (L)	02+3007741	1
4	TOP FRAME (L)	02+3007742	1
5	SPRIT LEVEL FIXING PLATE	02+4015220	1
6	COVER (L)	02+4015222	1
7	POLE	02+4015536	1
8	HANDLE STOPPER 1	03+C43481	2
9	HANDLE STOPPER 2	03+C43482	2
10	PAN (L)	04+3003087C	1
11	LOCK SPRING	04+A47309B	1
12	SPRING	05+A46051	2
13	CARBON CAP	06+4015650	1
14	POLE BRACKET	07+2000949	1
15	CORNER PAD	07+3007267	4
16	LEVELING FOOT	07+3007273	4
17	CABLE COVER	07+3007479	1
18	CENTER PAD	07+3007815A	2
19	CAP (WHITE)	10+A46050-2	2
20	BUBBLE SPRIT LEVEL	10+MR14	1
21	Pan head Sems M4x8 Ni-plated	17+02FN-B4X8	4
22	Pan head W-sems L M4x8 Ni-plated	17+02FN-L4X8	7
23	Pan head W-sems S M3x8 Ni-plated	17+02FN-S3X8	2
24	Pan head W-sems S M6x16 Ni-plated	17+02FN-S6X16	4
25	Hex nut M10 Ni-plated 2-shu	17+03-12-FN10	4
26	Hex nut M8 Ni-plated 3-shu	17+03-13-FN8	5
27	Socket head cap bolt M8x25 Ni-plated	17+05FN-8X25	8
28	Hex head bolt fully threaded M8x25 Ni-plated	17+08FN-8X25	4
29	Socket setscrew M8x25 with cup point Ni-plated	17+11FN-K8X25	1
30	B-tite M4x8 Ni-plated	17+14FN-B4X8	2
31	Square rubber cap 40x40	10+CAP-40X404	1
32	Nylon bushing	10+DASB-625-8	1
33	P-tite M4x10 Ni-plated	17+14FN-P4X10	4



## 10.2 Base Unit (FG-KAM)



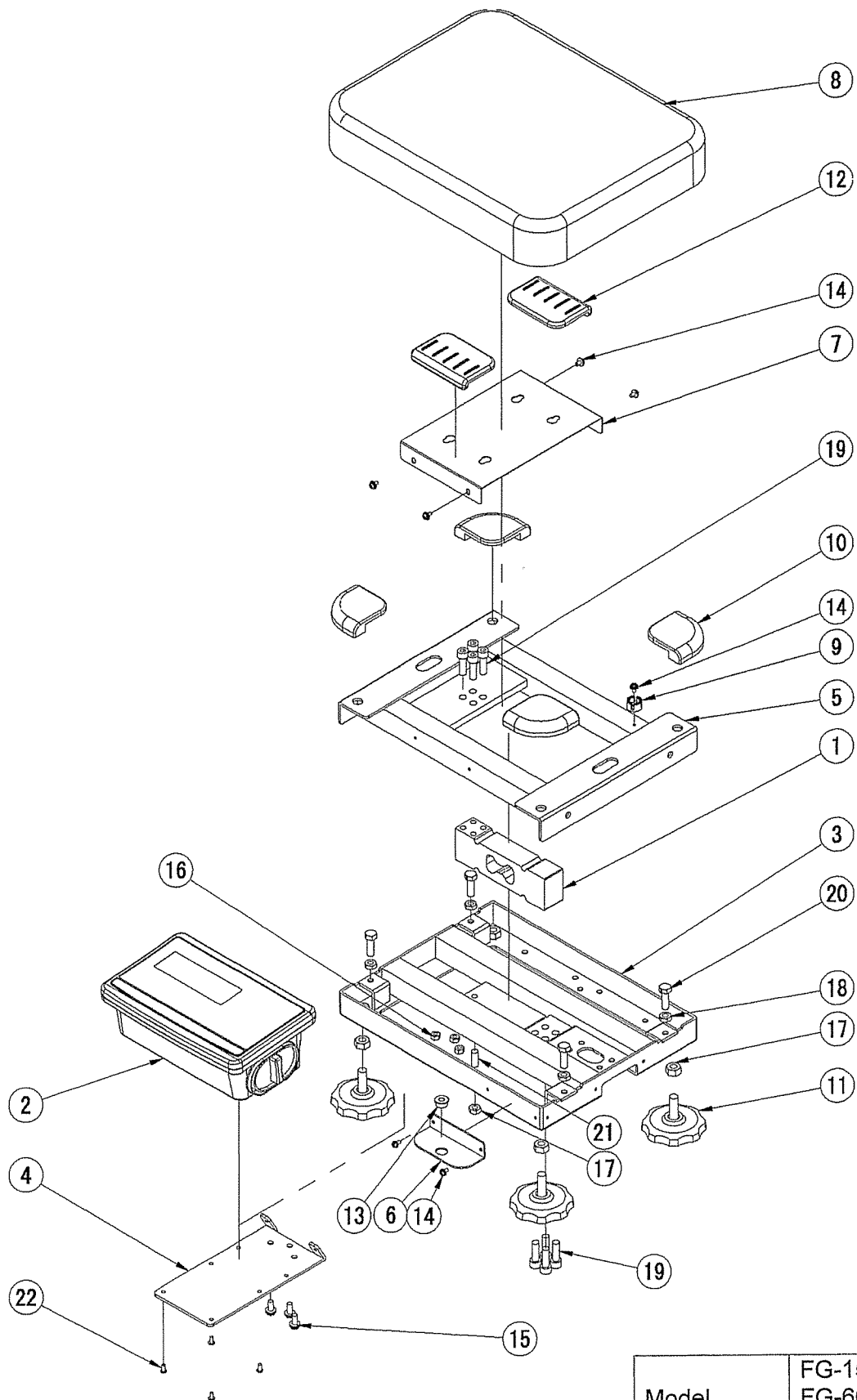
Model	FG-150KAM FG-60KM FG-30KM
Description	Base Unit (AM)

## Parts List

No.	Part Name	Part No.	Qty
1	LOAD CELL	LC+150-150K	1
		LC+150-60K	
		LC+150-30K	
2	INDICATOR UNIT		1
3	BOTTOM FRAME (L)	02+3007741	1
4	TOP FRAME (L)	02+3007742	1
5	SPRIT LEVEL FIXING PLATE	02+4015220	1
6	COVER (L)	02+4015222	1
7	POLE	02+4015536	1
8	HANDLE STOPPER 1	03+C43481	2
9	HANDLE STOPPER 2	03+C43482	2
10	PAN (L)	04+3003087C	1
11	LOCK SPRING	04+A47309B	1
12	SPRING	05+A46051	2
13	CARBON CAP	06+4015650	1
14	POLE BRACKET	07+2000949	1
15	CORNER PAD	07+3007267	4
16	LEVELING FOOT	07+3007273	4
17	CABLE COVER	07+3007479	1
18	CENTER PAD	07+3007815A	2
19	CAP (WHITE)	10+A46050-2	2
20	BUBBLE SPRIT LEVEL	10+MR14	1
21	Pan head Sems M4x8 Ni-plated	17+02FN-B4X8	4
22	Pan head W-sems L M4x8 Ni-plated	17+02FN-L4X8	7
23	Pan head W-sems S M3x8 Ni-plated	17+02FN-S3X8	2
24	Pan head W-sems S M6x16 Ni-plated	17+02FN-S6X16	4
25	Hex nut M10 Ni-plated 2-shu	17+03-12-FN10	4
26	Hex nut M8 Ni-plated 3-shu	17+03-13-FN8	5
27	Socket head cap bolt M8x25 Ni-plated	17+05FN-8X25	8
28	Hex head bolt fully threaded M8x25 Ni-plated	17+08FN-8X25	4
29	Socket setscrew M8x25 with cup point Ni-plated	17+11FN-K8X25	1
30	B-tite M4x8 Ni-plated	17+14FN-B4X8	2
31	Square rubber cap 40x40	10+CAP-40X404	1
32	Nylon bushing	10+DASB-625-8	1
33	P-tite M4x10 Ni-plated	17+14FN-P4X10	4



## 10.3 Base Unit (FG-KBM)



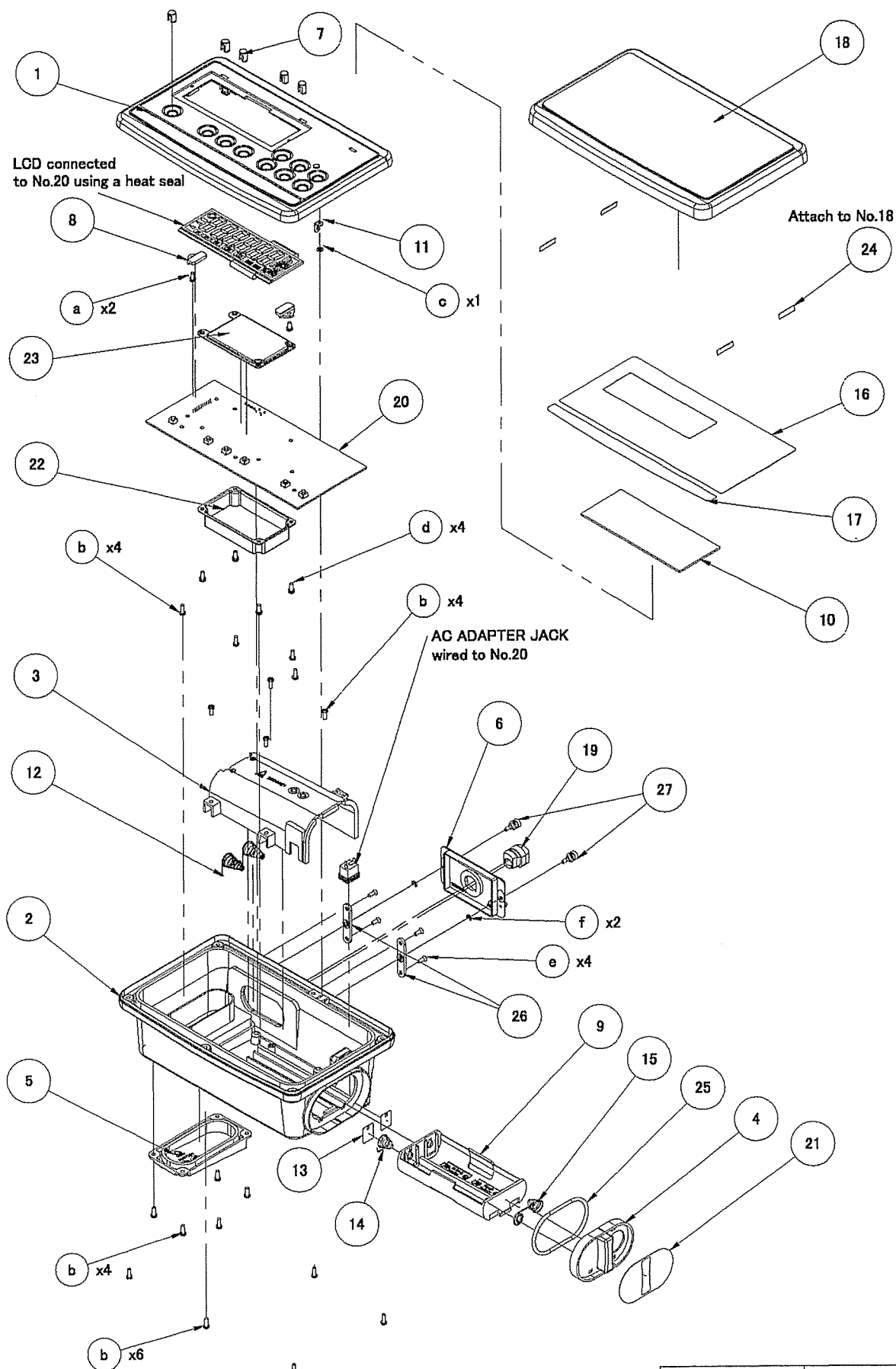
Model	FG-150KBM FG-60KBM FG-30KBM
Description	Base Unit (BM)

## Parts List

No.	Part Name	Part No.	Q'ty
1	LOAD CELL		1
2	DISPLAY UNIT		1
3	UNDER FRAME (M)	02+3007739	1
4	ATTACHMENT	02+3007264A	1
5	UPPER FRAME (M)	02+3007740	1
6	SPLIT LATELPLATE	02+4015220	1
7	COVER (M)	02+4015221	1
8	PAN	04+3007268	1
9	CARBON CAP	06+4015650	1
10	CONER PAD	07+3007267	4
11	LEVEL FOOT	07+3007273	4
12	CENTER PAD	07+3007815A	2
13	BUBBLE SPRIT LEVEL	10+MR14	1
14	Pan head W-sems L M4x8 Ni-plated	17+02FN-L4X8	7
15	Pan head W-sems S M6x16 Ni-plated	17+02FN-S6X16	3
16	Hex nut M6 Ni-plated 1-shu	17+03-11-FN6	3
17	Hex nut M10 Ni-plated 2-shu	17+03-12-FN10	4
18	Hex nut M8 Ni-plated 3-shu	17+03-13-FN8	5
19	Socket head cap bolt M8x25 Ni-plated	17+05FN-8X25	8
20	Hex head bolt fully threaded M8x25 Ni-plated	17+08FN-8X25	4
21	Socket setscrew M8x25 with cup point Ni-plated	17+11FY-K8X25	1
22	P-tite M4x10 Ni-plated	17+14FN-P4X10	4



## 10.4 Indicator Unit



Model	FG series
Description	Indicator Unit

## Parts List

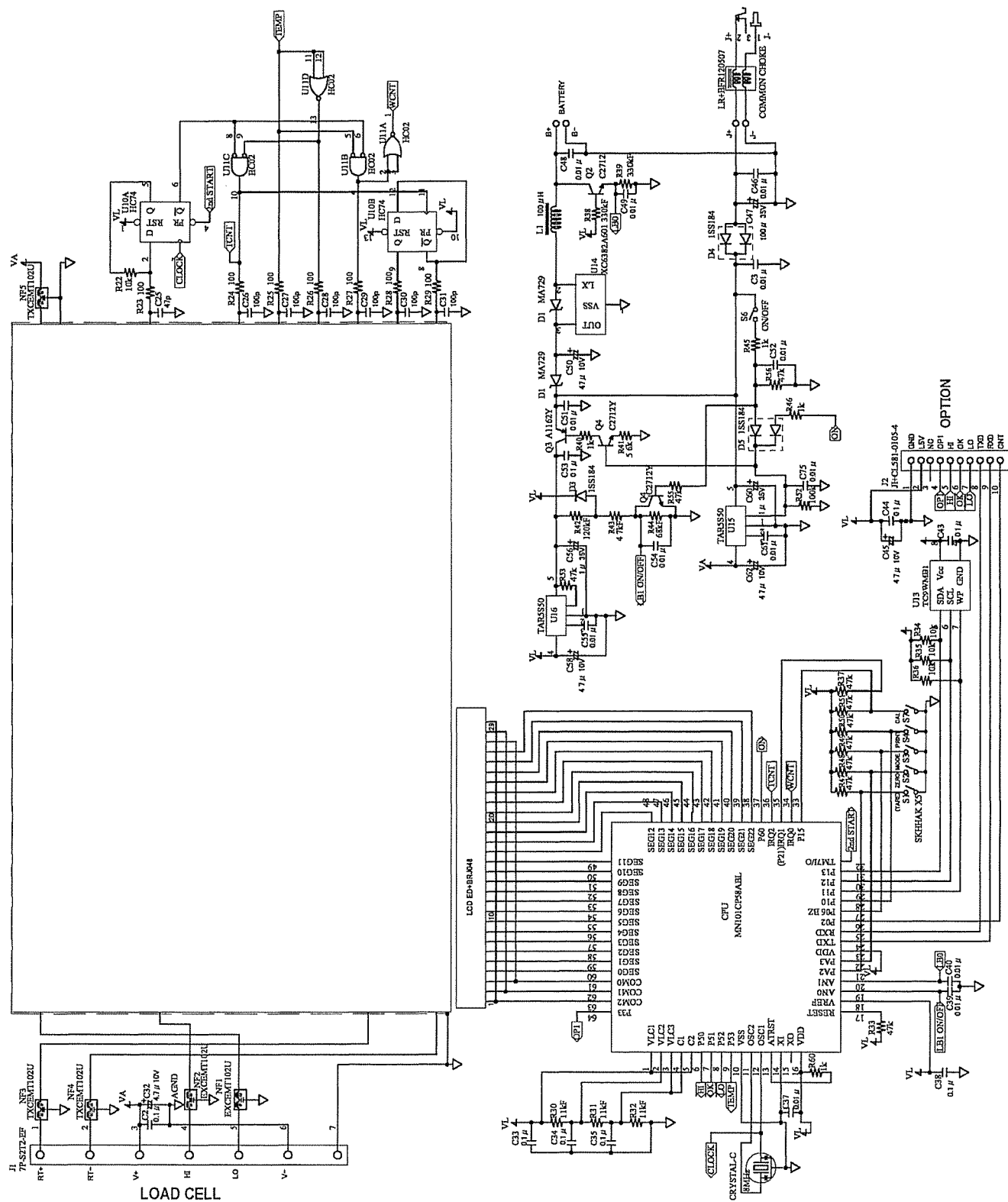
No.	Part Name	Part No.	Qty
1	FRONT CASE	07+1000368	1
2	BOTTOM CASE	07+1000369A	1
3	BATTERY HOLDER	07+2000951C	1
4	BATTERY PANEL	07+3007280A	1
5	BLANK PANEL	07+3007281	1
6	CAL PANEL	07+3007831	1
7	KEY TOP	07+4015224	5
8	LCD HOLDER	07+4015237	2
9	BATTERY BOX SUM2x4	07+2000954A	1
10	LCD FILTER	07+4015225	1
11	SEAL PLATE	04+4015371	1
12	HOLDER SPRING	15+4015416A	2
13	SPRING SUPPORT	04+4015236	2
14	SPRING (-)	15+4015239	1
15	SPRING (±)	15+4015238	1
16	KEY SHEET (EG)	08+2000952A	1
	KEY SHEET (EX)	08+2000993A	
17	MODEL LABEL FG150KAL-EG	08+3007642-1A	1
	MODEL LABEL FG60KAL-EG	08+3007642-2A	
	MODEL LABEL FG150KAM-EG	08+3007642-3A	
	MODEL LABEL FG60KAM-EG	08+3007642-4A	
	MODEL LABEL FG30KAM-EG	08+3007642-5A	
	MODEL LABEL FG150KBM-EG	08+3007642-6A	
	MODEL LABEL FG60KBM-EG	08+3007642-7A	
	MODEL LABEL FG30KBM-EG	08+3007642-8A	
	MODEL LABEL FG150KAL-EX	08+3007284-1A	
	MODEL LABEL FG60KAL-EX	08+3007284-2A	
	MODEL LABEL FG150KAM-EX	08+3007284-3A	
	MODEL LABEL FG60KAM-EX	08+3007284-4A	
	MODEL LABEL FG30KAM-EX	08+3007284-5A	
	MODEL LABEL FG150KBM-EX	08+3007284-6A	
	MODEL LABEL FG60KBM-EX	08+3007284-7A	
	MODEL LABEL FG30KBM-EX	08+3007284-8A	
18	DISPLAY COVER	07+3007527	1
19	CABLE CLAMPER	ET+SR-10-2	1
20	MAIN BOARD	PZ+4340	1
21	RATING LABEL	08+4015894B	1
22	SHIELD CASE A	04+4005255	1
23	SHIELD CASE B	04+3004953	1
24	DISPLAY COVER TAPE	08+4015994	4
25	O-RING 3x56	06+4016227	1
26	PANEL PLATE	07+4016227	2
27	LOCK SCREW	05+A42208	2
a	B TIGHT M3x6 NI	17+14FN-B3X6	2
b	B TIGHT M3x8 NI	17+14FN-B3X8	18
c	CS-RING-2 SUS	10+CSTW-2	1
d	W SEMS S PANHD M3x8 NI	17+02FN-S3X8	4
e	TAPPING FLATHD M3x8 NI	17+13-S3X8B1-N	4



f	E-RING-2.6NI	17+15FN-E2.6	2
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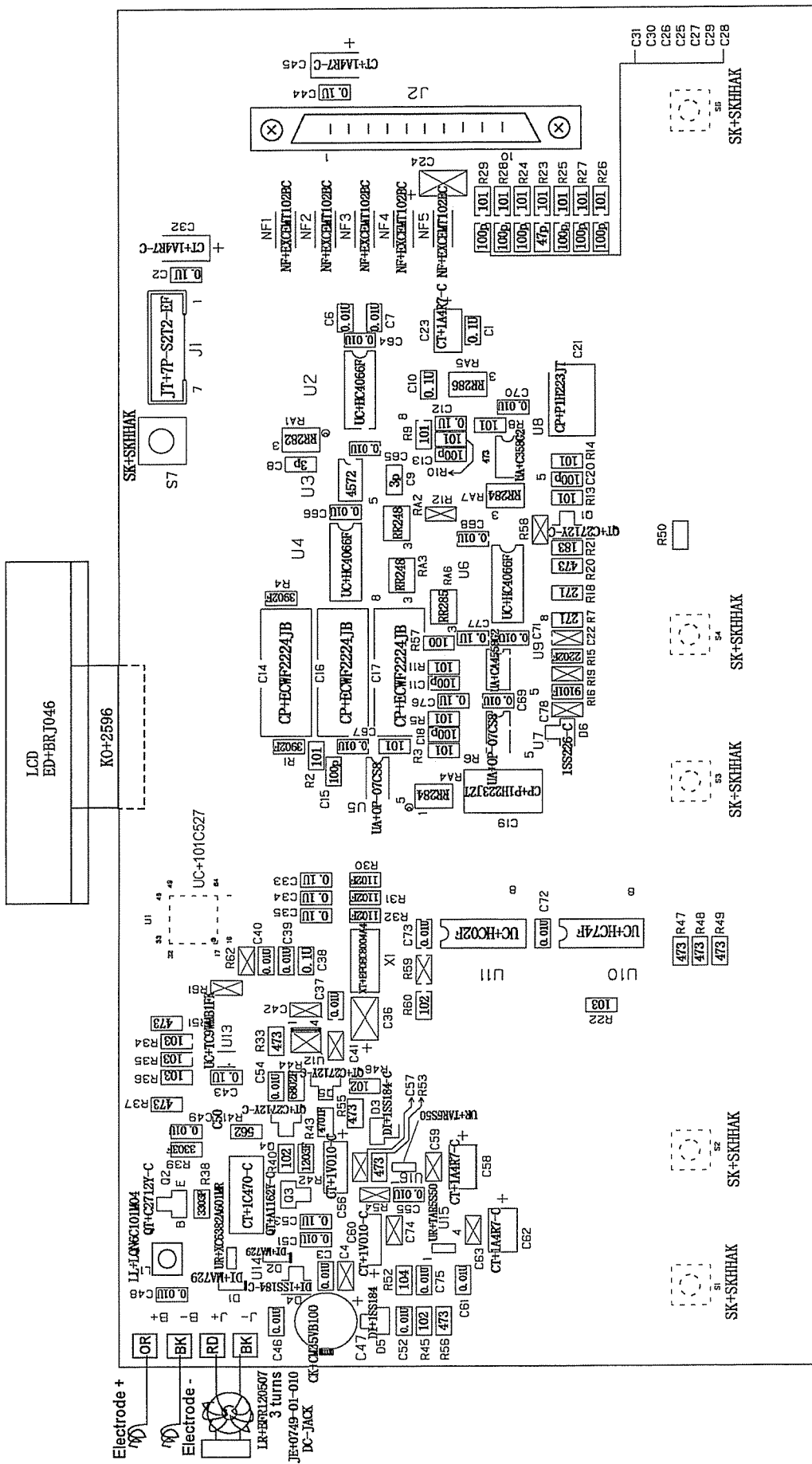


### 11.1.1 Circuit Diagram



Model	FG series
Stock No.	PZ+4340

### 11.1.2 Parts Layout



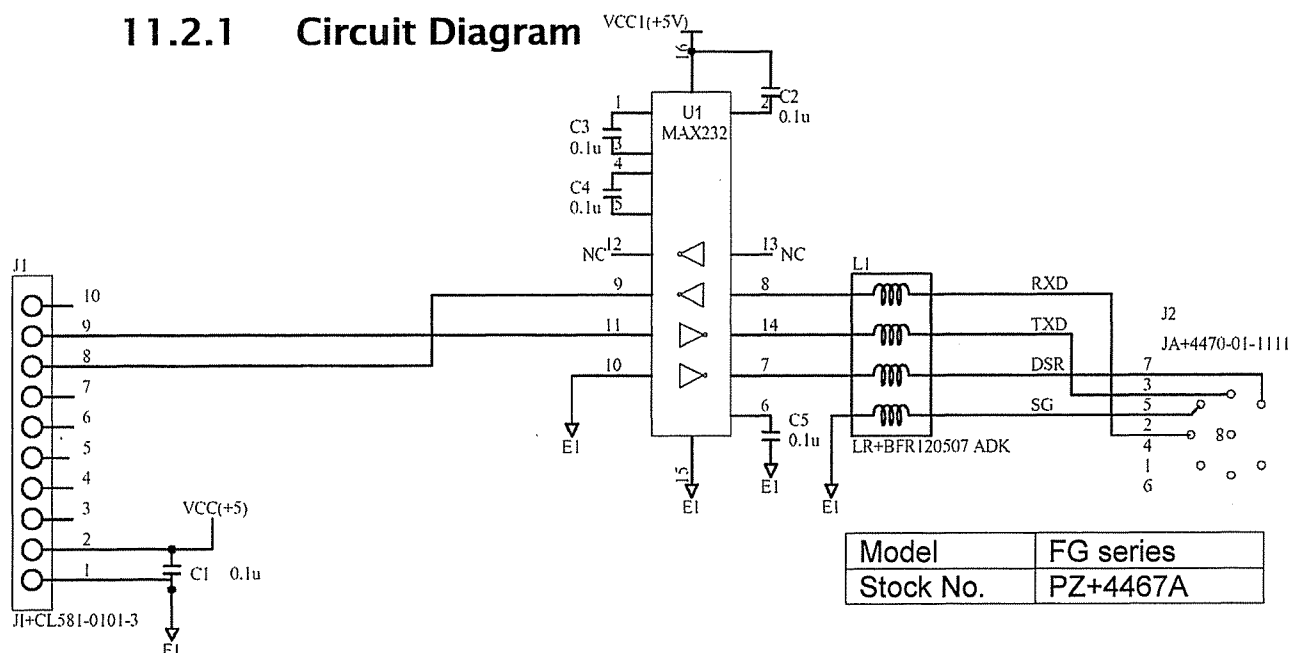
### 11.1.3 Parts List

Symbol	Parts Name	Parts No.	Qty
U1	μCPU	UC+MN101C527	1
U2,4,6	Analog switch	UC+HC4066F	3
U3	Operational amplifier	UA+C4572G	1
U5,7	Operational amplifier	UA+OP07CS8	2
U8	Operational amplifier	UA+C358G2	1
U9	Operational amplifier	UA+C4558G2	1
U10	Flip-Flop	UC+HC74F	1
U11	NOR gate	UC+HC02F	1
U12	Voltage detector 4.1V S-80840ANNP-ED4-T2	UC+S-80840ANNP	1
U13	EEPROM 1Kbit	UC+TC9WMB1F-K	1
U14	DC/DC converter	UR+XC6382A601	1
U15,16	5V Regulator	UR+TAR5S50	2
Q1,2,4,5	Transistor	QT+C2712Y-C	4
Q3	Transistor	QT+A1162Y-C	1
D1,2	Schottky diode	DI+MA729	2
D3,4,5	Diode	DI+1SS184-C	3
D6	Diode	DI+1SS226-C	1
R1,4	Carbon resistor 39K 1%	RC+1/10W3902F	2
R2,3,5,6,8~11,13,14,23~29	Carbon resistor 100 5%	RC+1/10W101J	17
R7,18	Carbon resistor 270 5%	RC+1/10W271J	2
R15	Carbon resistor 22K 1%	RC+1/10W2202F	1
R16	Carbon resistor 9.1K 1%	RC+1/10W9101F	1
R20,33,37,47~51,53,55,56	Carbon resistor 47K 5%	RC+1/10W473J	11
R21	Carbon resistor 18K 5%	RC+1/10W183J	1
R22,34,35,36	Carbon resistor 10K 5%	RC+1/10W103J	4
R30,31,32	Carbon resistor 11K 1%	RC+1/10W1102F	3
R38,39	Carbon resistor 330K 1%	RC+1/10W3303F	2
R40,45,46,60	Carbon resistor 1K 5%	RC+1/10W102J	4
R41	Carbon resistor 5.6K 5%	RC+1/10W562J	1
R42	Carbon resistor 120K 1%	RC+1/10W1203F	1
R43	Carbon resistor 4.7K 1%	RC+1/10W1701F	1
R44	Carbon resistor 68K 1%	RC+1/10W6802F	1
R52	Carbon resistor 100K 5%	RC+1/10W104J	1
R53	Carbon resistor 10Ω5%	RC+1/10W100J	1
RA1	Metal film resistor array 24.5K/1K/24.5K	RF+RR282	1
RA2,3	Metal film resistor array 100K/100K	RF+RR248	2
RA4,7	Metal film resistor array 44K/66K	RF+RR284	2
RA5	Metal film resistor array 12K/10K/11K	RF+RR286	1
RA6	Metal film resistor array 100/10K	RF+RR285	1
C1,2,10,12,33~35,38,42~44,53, 76,77	Ceramic capacitor 0.1μ/25V	CC+0.1U25V-C	14

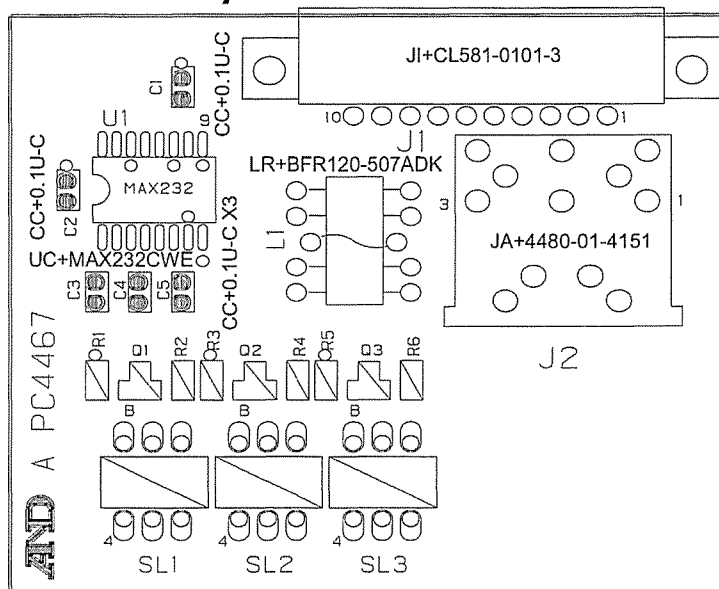
Symbol	Parts Name	Parts No.	Qty
C3,6,7,37,39~41,46,48, 49,51,52,54,55,61,64~73,75	Ceramic capacitor 0.01μ	CC+0.01U-C	26
C8,9	Ceramic capacitor 3P	CC+3P-C	2
C11,13,15,18,20,26~31	Ceramic capacitor 100P	CC+100P-C	11
C25	Ceramic capacitor 47P	CC+47P-C	1
C47	Aluminum electrolytic 100μ/35V	CK+SME35VB100	1
C14,16,17	Polypropylene 0.022μ	CP+ ECWF2224JB	3
C19,21	Polypropylene 0.0022μ	CP+P1H223JZT	2
C23,32,45,58,62	Tantalum electrolytic 4.7μ/10V	CT+1A4R7-C	5
C50	Tantalum electrolytic 47μ/16V	CT+1C470-C	1
C56,60	Tantalum electrolytic 1μ/35V	CT+1V010-C	2
ED1	LCD	ED+BRJ046	1
X1	Ceramic resonator 8MHz	XT+EFOEC8004A4	1
NF1~5	EMI Filter	NF+EXCEMT102BC	5
L1	COIL	LL+LQN6C101M04	1
CORE (3 turns)	Ferrite core	LR+BFR120507	1
J1	L/C connector	JI+7P-S2T2-EF	1
J2	Option connector	JI+CL581-0105-4	1
J+/-	DC Jack cable	JE+0749-01-010	1
ON/OFF,PRINT,MODE, (RE-)ZERO,TARE,CAL	Tact switch	SK+ SKHHAK	6
	Heat seal	KO+2596	1
	PCB	PC+4340C	1

## 11.2 OP-23 RS-232C Board, PZ+4467A

### 11.2.1 Circuit Diagram



### 11.2.2 Parts Layout



### 11.2.3 Parts List of PZ+4467A

Symbol	Parts Name	Parts No.	Qty
U1	RS232C drive IC	UC+MAX232CPE	1
C1,2,3,4,5	Ceramic capacitor	CC+0.1U-C	5
L1	Ferrite core 3 turns	LR+BFR120507	1
J1	PCN6 Connector	JI+CL581-0101-3	1
J2	DIN connector 8P	JA4480-01-4151	1
	3 turns common choke coil core	LR+BFR120507	1
	PCB	PC+4467	1



### 11.3.3 Parts List

Symbol	Parts Name	Parts No.	Qty
U1	RS232C drive IC	UC+MAX232CPE	1
Q1,2,3	Transistor	QT+A1162Y-C	3
SL1,2,3	Photo MOS relay	DF+PS7141-1A	3
R1,3,5	Carbon Resister 22K	RC+1/10W223J	3
R2,4,6	Carbon Resister 47 $\Omega$	RC+1/10W470J	3
C1,2,3,4,5	Ceramic capacitor 0.1 $\mu$	CC+0.1U-C	5
L1	Ferrite core 3 turns	LR+BFR120507	1
J1	PCN6 Connector	JI+CL581-0101-3	1
J2	DIN connector 8P	JA4480-01-4151	1
	3 turns common choke coil core	LR+BFR120507	1
	PCB	PC+4467	1



# MEMO

This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, leaving small margins at the top and bottom. There is no handwriting or printed text on the page.

## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.





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