UC-321 Series

Precision Health Scale

MAINTENANCE MANUAL

UC-321JA-C	UC-321PUS-C
UC-321PJA-C	UC-321US-CK
UC-321EX-C	UC-321PUS-CK
UC-321PEX-C	UC-321US-CH
UC-321US-C	UC-321PUS-CH

A&D

Contents

1. Introduction

For smooth maintenance, the products must be technically understood, and the required equipment and tools must be prepared. Since the UC-321 series Precision health scale is a precision instrument, proper operation cannot be guaranteed if the maintenance is performed under unsatisfactory conditions.

1.1　Equipment and Tools Required

1. Tools

Description	Purpose
(1)　A phillips screwdriver 3 mm	For disassembling and reassembling
(2)　A soldering iron (25 – 45W)	For soldering
(3)　A tester or digital multi-meter	For measuring voltage or continuity test of cable
(4)　The UC-321 instruction manual	

2. Jigs

(1)　A calibration switch (CalSW A)	Used with the UC-321**-*　　or	
A calibration switch (CalSW B)	Used with the UC-321P**-*	
(2)　A protection sheet for load cell	For calibration and testing	
(3)　A RS232C convertor	For calibration via computer	

2. Principles of operation

The UC-321 series are based on the principle of detecting a weight using 4 load cell transducers. The load cells work by the use of strain gauges which are bonded to the load cells. When a weight is applied from above, the forces transmitted to the strain gauges which register the stress in the form of a change in resistance which produces a small analog voltage signal. This output is amplified and then convert in an analog to digital converter to a signal which can be handled by the microprocessor. The processor then uses a standard calculation to enable it to display the required value on a liquid crystal display.

Block Diagram
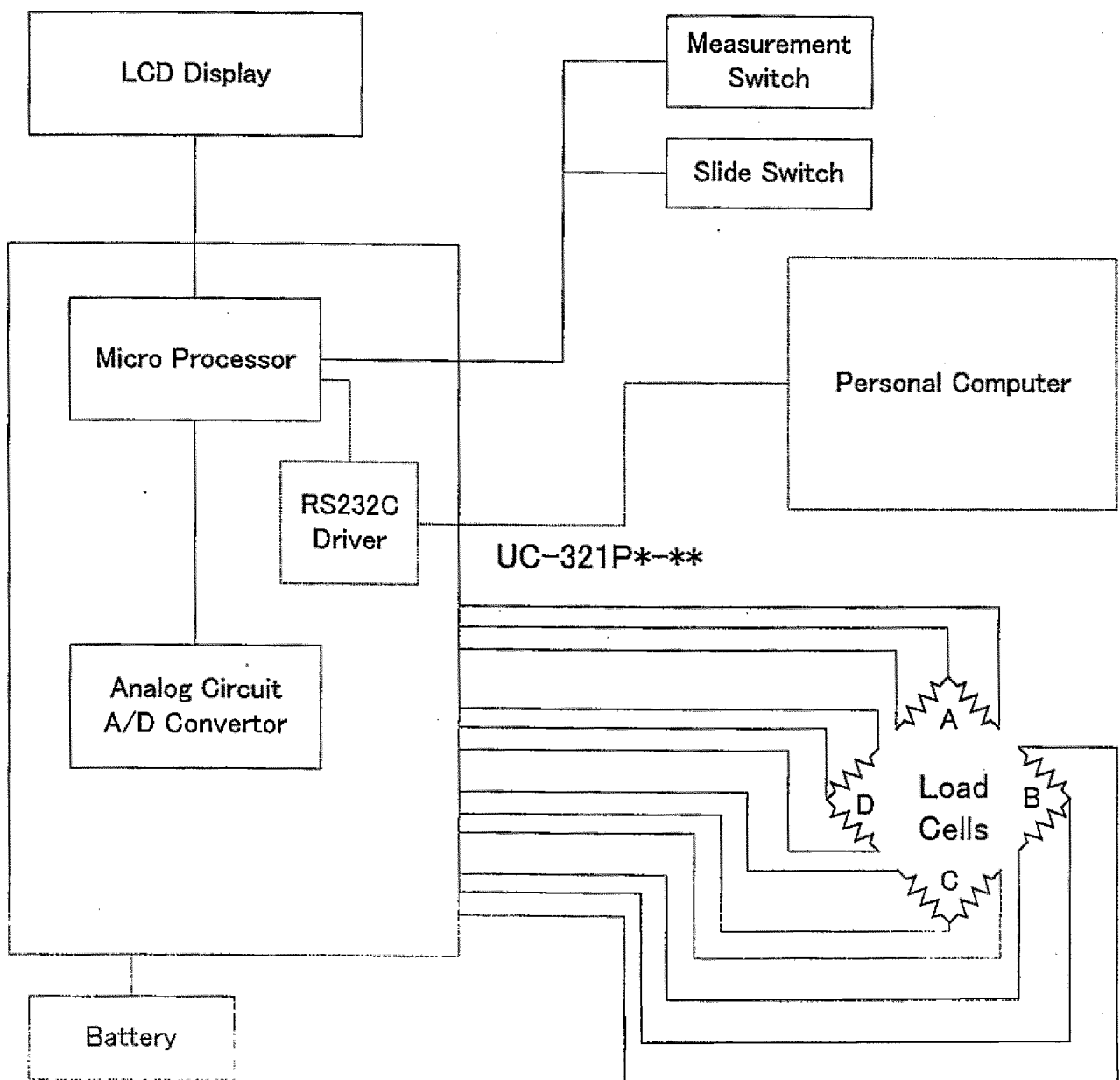
2.1   Product Version Outline

It must be noted that there are several versions of the hardware, software and CPU chip with the UC-321 series as per described below.

Hardware

      Ver1 (Version 1) : Refer to the Exploded view drawing of QD-AS3-001048A

      Ver2 (Version 2) : Refer to the Exploded view drawing of QD-AS3-001048C

Software

      Due to altering the CPU chip, there are three different versions: Ver2, Ver3 and Ver4.

CPU chip

      There are three different versions: Ver2, Ver.3 and Ver.4 due to altering the CPU chip.

3. Product versions

This section describes major changes of the hardware and also parameter settings with different versions of the software and the CPU chip.

3.1 Hardware

The Printed circuit board PE-0232 (refer to the symbol No. 35 of the drawing No. QD-AS3-001048A: Ver1: Version 1) is deleted with the Ver2: Version 2, and the load plate 04:4009691-1A (refer to the symbol NO. 5 of the drawing No. QD-AS3-001048A: Ver2: Version 2) and related parts are added with the Version 2.

3.2 Parameter setting (Software and CPU chip)

Parameter setting must be carried out in accordance with the versions of the software and CPU chip respectively.

As the CPU chip was altered, the software version has been changed as follow. The parts No. is printed on the CPU chip.

Ver2 (Version 2) : UC-D789405A-A42   (parts No. of CPU chip)
Ver3 (Version 3) : UC-D789405A-A53   (parts No. of CPU chip)
Ver4 (Version 4) : UC-D789405A-A62   (parts No. of CPU chip)

Ver2 (Version 2)

No.	Item	Description
1	Model selection	C0, C1, C2
3	Temperature coefficient (thermo – sensitive resistor)	4700ppm
4	Temperature coefficient (load cell)	660ppm
5	Temperature input (calibration)	To input an ambient temperature

Setting by Model

Model	Setting (Capacity, Unit)
UC-321JA-C	C0
UC-321EX-C	C2
UC-321US-C	C1
UC-321US-CK	C2
UC-321US-CH	C1

Ver3 (Version 3) and Ver4 (Version 4)

No.	Item	Description
0	Calibration	L1, L3
1	Model selection	C0, C1, C2
3	Temperature coefficient (thermo-sensitive resistor)	4700ppm
4	Temperature coefficient (load cell)	660ppm
5	Temperature input (calibration)	To input ambient temperature

Setting by Model

Model	Calibration	Weighing capacity and unit
	Setting item 0	Setting item 1
UC-321JA-C	L1	C0
UC-321PJA-C	L1	C0
UC-321EX-C	L1	C2
UC-321PEX-C	L1	C2
UC-321US-C	L3	C1
UC-321PUS-C	L3	C1
UC-321US-CK	L1	C2
UC-321PUS-CK	L1	C2
UC-321US-CH	L3	C1
UC-321PUS-CH	L3	C1

Calibration mode
Ver2 (Version 2)

No	Item	Display	Explanation
	Display test	9999 | 0000	9999 → 0000 is displayed repeatedly.
	Initialization	———	"0000"　　　　　　　　 :　Non initialization "0001"　　　　　　　　　Setting the default values Model type　　　　　,　　C0 Memory clear Target　　　　　　　　0.00kg Height(Default)　　　　30.0cm Temperature Coefficient of Thermo-sensitive resistor 　　　　　　　　　　　　　　　　4700ppm Temperature Coefficient of Load Cell　　575ppm Gravity Acceleration at Calibration　　9798 Gravity Acceleration at Use　　　　　9798
1	Model type	C0 C1 C2 C3 C4	C0　　150kg(50g/under 100kg　100g/100kg~150kg) C1　　350lb(0.1lb/under 200lb　0.2lb/200lb~350lb) C2　　150kg　50g C3　　150kg　100g C4　　350lb　0.2lb 　　　　No memory cleared 　　　　Initializing Target and Height
2	Clear target and memory	———	Memory clear Target　　　　　0.00kg　0.0lb Height　　　　　30.0cm　1-00.0feet
3	Temperature Coefficient of Thermo-sensitive resistor	4700	Default　4700ppm　Possible to change by 1ppm step
4	Temperature Coefficient of Load Cell	660	Default　660ppm　Possible to change by 1ppm step
5	Temperature at Calibration	20	By 1℃
6	Gravity Acceleration at Calibration	9798	Default　9798 Possible to change by 0.1cm/sec2
7	Gravity Acceleration at Use	9798	Default　9798 Possible to change by 0.1cm/sec2
8	AD counts of Thermo-sensitive resistor at shorting the circuit	*****	Off-set counts of the circuit. (for calculation of temperature)　　　Do not change!
9	AD counts of Thermo-sensitive resistor	*****	AD counts for current output of Thermo-sensitive resistor
10	Calibration counts at Zero point	CL0	
11	Calibration counts at the full load	CL1	C0、C2、C3　　　150kg C1、C4　　　　　350lb
12	Raw counts for weight	*****	
13	Counts for weight with correction	*****	With temperature correction
14	Continuous mode	Value	Measuring weight

Ver3 (Version 3)

No	Item	Display	Description
	Display test	9999 | 0000	9999→0000 is displayed repeatedly.
0	Calibration type	———	L0　Calibration at two points　0kg、150kg L1　Calibration at three points　0kg、80kg、150kg L2　Calibration at two points　0lb、350lb L3　Calibration at three points　0lb、176.4lb(80kg)、350lb L4　Setting the Default Value. 　　　L0　Calibration type 　　　C0　Model type 　　　Memory Clear 　　　Target　　　　　　0.00kg 　　　Height　　　　　　30.0cm 　　　Temp. Coefficient of Thermo-sensitive 　　　resistor　　　　　　4700ppm 　　　Temperature Coefficient of Load Cell　　660ppm 　　　Gravity Acceleration at Calibration　　9798 　　　Gravity Acceleration at Use　　　　9798
1	Model type	C0 C1 C2 C3 C4 C5 C6 C7	C0　150kg(50g/under 100kg　100g/100kg～150kg) C1　350lb(0.1lb/under 200lb　0.2lb/200lb～350lb) C2　150kg　　50g C3　150kg　　100g C4　350lb　　0.2lb C5　150kg(50g/under 100kg　100g/100kg～150kg)Decimal Point " ; " C6　150kg　　50g　Decimal Point " ; " C7　150kg　　100g　Decimal Point " ; " 　　　　　No memory cleared 　　　　　Initializing Target and Height
2	Clear target and memory	———	Memory clear Target　　　　　0.00kg　0.0lb Height　　　　　30.0cm　1-00.0feet
3	Temperature Coefficient of Thermo-sensitive resistor	4700	Default　4700ppm　　Possible to Change by 1ppm step
4	Temp. Coefficient of Load Cell	660	Default　660ppm　　Possible to Change by 1ppm step
5	Temperature at Calibration	20	By 1℃
6	Gravity Acceleration at Calibration	9798	Default　9798 Possible to change by 0.1cm/sec2
7	Gravity Acceleration at Use	9798	Default　9798 Possible to change by 0.1cm/sec2
8	AD counts of Thermo-sensitive resistor at shorting the circuit	*****	Off-set counts of the circuit. (for calculation of temperature) Do not charge!
9	AD counts of Thermo-sensitive resistor	*****	AD counts for current output of Thermo-sensitive resistor
10	Calibration counts at Zero point	CL0	
11	Calibration counts at the full load or 80kg	CL1	L0、　　150kg　　　　Full load L2、　　350lb　　　　Full load L1、L3　80kg　　　　80kg load

12	Calibration counts at the full load	CL2	L1	150kg	Full load (kg)
			L3	350lb	Full load (lb)
13	Raw counts for weight	*****	Without temperature correction		
14	Counts for weight with correction	*****	With temperature correction		
15	Continuous mode	Value	Measuring weight		

Ver4 (Version)

No	Item	Display	Description
	Display test	9999 | 0000	9999→0000 is displayed repeatedly.
0	Calibration type	———	L0 Calibration at two points 0kg、150kg L1 Calibration at three points 0kg、80kg、150kg L2 Calibration at two points 0lb、350lb L3 Calibration at three points 0lb、176.4lb(80kg)、350lb L4 Setting the Default Value. L0 Calibration type C0 Model type Memory Clear Target 0.00kg Height 30.0cm Temperature Coefficient of Thermo-sensitive resistor 4700ppm Temperature Coefficient of Load Cell 660ppm Gravity Acceleration at Calibration 9798 Gravity Acceleration at Use 9798
1	Model type	C0 C1 C2 C5 C6	C0 150kg(50g/under 100kg 100g/100kg~150kg) C1 350lb(0.1lb/under 200lb 0.2lb/200lb~350lb) C2 150kg 50g C5 150kg(50g/under 100kg 100g/100kg~150kg)Decimal Point ";" C6 150kg 50g Decimal Point ";" No memory cleared Initializing Target and Height
2	Clear target and memory	———	Memory clear Target 0.00kg 0.0lb Height 30.0cm 1-00.0feet
3	Temp. Coefficient of Thermo-sen. resistor	4700	Default 4700ppm Possible to change by 1ppm step
4	Temp. Coefficient of Load Cell	660	Default 660ppm Possible to change by 1ppm step
5	Temperature at Calibration	20	By 1°C
6	Gravity Acceleration at Calibration	9798	Default 9798 Possible to change by 0.1cm/sec2
7	Gravity Acceleration at Use	9798	Default 9798 Possible to change by 0.1cm/sec2
8	AD counts of Thermo-sensitive resistor at shorting the circuit	*****	Off-set counts of the circuit. (for calculation of temperature) Do not change!
9	AD counts(Thermo-sensitive resistor)	*****	AD counts for current output of Thermo-sensitive resistor
10	Calibration counts at Zero point	CL0	
11	Calibration counts at the full load or 80kg	CL1	L0、 150kg Full load L2、 350lb Full load L1、L3 80kg 80kg load
12	Calibration counts at the full load	CL2	L1 150kg Full load (kg) L3 350lb Full load (lb)
13	Raw counts for weight	*****	Without temperature correction
14	Counts for weight with correction	*****	With temperature correction
15	Continuous mode	Value	Measuring weight

4. Performance Test

The following test procedures determine whether the scale (UC-321 series) works properly.

4.1 Test Details

A gravity acceleration has been entered into the scale in accordance with latitude as shown in Table below.

Code	Gravity acceleration	Marking on the Carton box	Latitude
00***	9.798	No marking	28° to 45°
01***	9.786	Red	0° to 28°
02***	9.813	Yellow	45° to 65°

After auto calibration by pressing $\boxed{\text{CAL}}$ key, place the specified mass on the pan and read the displayed value. Repeat this procedure three times. Verify that the difference between the maximum value and the minimum value is within the specifications below.

Accuracy (on completion of the calibration)

Model	Capacity	Resolution	Accuracy (Division)	Repeatability (Division)
UC-321JA-C	150kg	50g/100kg, 100g/150kg	±1	±1
UC-321PJA-C	150kg	50g/100kg, 100g/150kg	±1	±1
UC-321EX-C	150kg	50g	±2	±2
UC-321PEX-C	150kg	50g	±2	±2
UC-321US-C	350lb	0.1lb	±2	±2
UC-321PUS-C	350lb	0.1lb	±2	±2
UC-321US-CK	150kg	50g	±2	±2
UC-321PUS-CK	150kg	50g	±2	±2
UC-321US-CH	350lb	0.1lb	±2	±2
UC-321PUS-CH	350lb	0.1lb	±2	±2

Accuracy (Division) indicates manufacturing specification at the A&D factory.

The Accuracy may vary after shipment from the A&D factory as follows.
1. The accuracy of the UC-321JA-C may vary approximately 0.1% at the maximum of the maximum capacity due to gravity acceleration, and +/- 1 division due to mechanical distortion with time and use after the shipment.
2. The other models may vary approximately 0.1% at the maximum of the maximum capacity due to gravity acceleration, and +/- 2 divisions due to mechanical distortion with time and use after the shipment.

For accurate weighing, it is necessary to set the gravity acceleration (varies depending on height and latitude) to match the area that the scale is being

used in. (With Ver2 and Ver4, set the gravity acceleration referring to 2-1
Change Setting: page 17.   With Ver3, perform the calibration referring to
1-4 Weight calibration: page15.)

Initialize Target weight, Memory, and BMI data, as required. In the Calibration
mode, press the Measuring switch of the scale.
Followings are stored after initializing the scale.

Menu	Kg	Lb
BMI	30.0 (Initial height data)	1 – 00.0 (Initial height data)
Memory	0.00 (Initial weight data)	0.0 (Initial weight data)
Target	0.00 (Initial target data)	0.0 (Initial target data)

4.2　Calibration

This section describes the calibration procedures of the scale. The calibration adjusts the scale for accurate weighing.

1. Entering the calibration mode

1.1 General

Follow the procedures entering the calibration mode in accordance with the versions of the software (Ver.2, Ver3, and Ver.4).

Setting of the calibration switches is noted in the table below.

Version	UC-321**-*			UC-321P**-*		
	Shorting AD	Manual input	PCCal	Shorting AD	Manual input	PCCal
Ver2	*1	*3	No			
Ver3	*2	*4	Yes	*5	*6	Yes
Ver4	*2	*4	Yes	*5	*6	Yes

Note:　UC-321**-* is non-controllable via a computer.
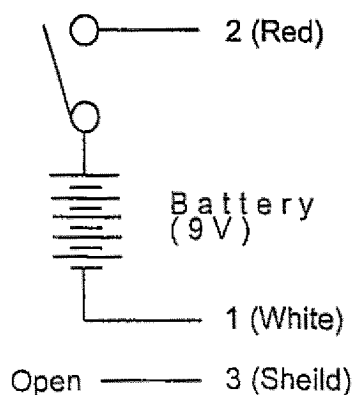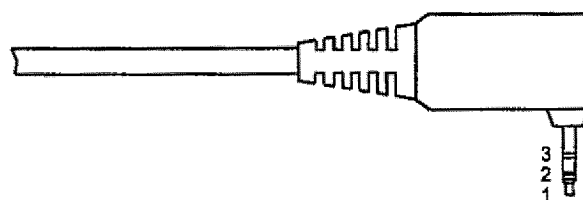
UC-321P**-* is controllable via a computer.

*1 thru *6 is described in step: 1-2 Shorting AD (page 13 and 14).
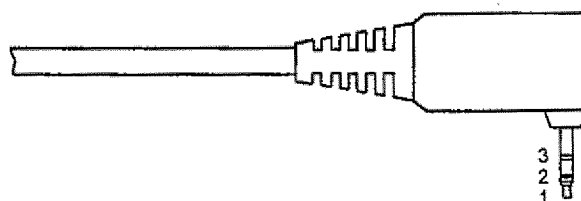
Calibration SW: CalSW A and CalSW B

Use the CalSW A with the UC-321**-*,and the CalSW B with the UC-321P**-*.
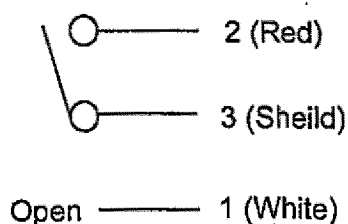
1-2 Shorting AD

Shorting AD is to store a zero point value of the temperature sensing circuit into the memory.
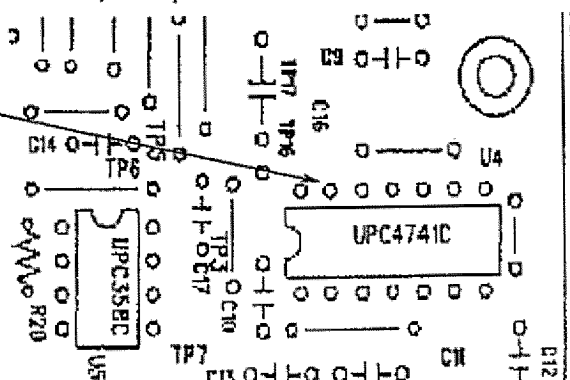
*1 with Ver2

1) Connect the calibration SW : CalSW A to the DATA PORT on the bottom of the UC-321.
2) Set the Slide switch on the bottom of the UC-321 to Weight.
3) Press and hold the calibration SW and press the Measurement switch of the UC-321, and release the Measurement switch and then the calibration SW.
4) If "- - - - -" is displayed, press the Measurement switch.
5) "99999" is displayed and decremented to "00000", press the Measurement switch.
6) The display shows approximately 45000, short the Thermo-sensitive resistor on the Main board. The display shows approximately 21000 and the OK mark on the scale is lit, press the Measurement switch.
7) Press the calibration SW for a longer (approximately 3 seconds) period, or remove the batteries to power off.

Short the pin 1 and 2 of the UC5 (uPC358C) on the Main board
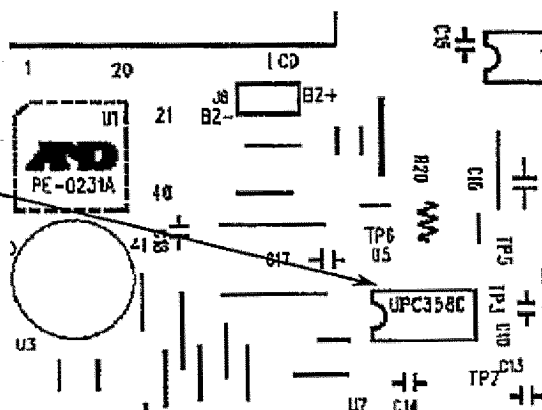
*2 with Ver3 and Ver4

1) Short between the TP14 and TP15 on the board, and press the Measurement switch.
2) If the display shows approximately 45000, short the pin 13 and pin 14 of the U4(uPC4741).

3) If the display shows approximately 21000, and the OK mark is lit, press the Measurement switch.
4) The display and the power is automatically turned off.

1-3 Calibration mode
Setting can be changed in the calibration mode.

*3 with Ver2
1) Connect the Calibration SW: CalSW A to the DATA PORT on the bottom of the UC321.
2) Set the Slide switch on the bottom of the UC-321 to Weight.
3) Press and hold the calibration SW and press Measurement switch of the UC-321, and release the Measurement switch and then the Calibration SW.
4) If the display shows "- - - -", press the Measurement switch.
5) "99999" is displayed and decremented to "00000", press the Calibration switch.
6) Press the Calibration SW to select the Item.

*4 with Ver3 and Ver4
1) Connect the the Calibration SW: CalSW A to the DATA PORT on the bottom of the UC321.
2) Set the Slide switch on the bottom of the UC-321 to BMI.
3) Press and hold the Calibration SW and press the Measurement switch 5 times, and release the Measurement switch and then the Calibration SW.
4) If the display shows "- - - -", press the Measurement switch.
5) "99999" is displayed and decremented to "00000", press the Calibration switch.
6) Press the Calibration SW to select the Item.

*5 with Ver3 and Ver4 (UC-321P**-*)
Use the Calibration SW: CalSW B.
Follow the procedures as per described in step *2.

*6 with Ver3 and Ver4 (UC-321P**-*)
Use the Calibration SW: CalSW B.
Follow the procedures as per described in step *4.

1-4 Weight calibration
1) Connect a DC voltage power supply (5±0.1V) or a battery to the UC-321.
2) Connect the Calibration SW to the DATA PORT of the UC-321. Put the Protection sheet for Load and a mass of 150kg on the UC-321 and remove the mass.
3) Select the Calibration mode, and press the Calibration SW until Temperature at Calibration (Item No. 5 in the Calibration mode) is selected.
4) Enter an ambient temperature.
5) With the Item No.6 and 7 (in the Calibration mode), make sure that the value of Gravity acceleration is set to local gravity acceleration. If not, it should be revised.
6) With the Item No.9 (in the Calibration mode), press the Measurement switch, the display shows temperatures AD count. If the OK mark is lit, press the Measurement switch to enter the temperature AD count.
7) In step of the Item No.10, press the Measurement switch. "CL0" is displayed. If the OK mark is lit, press the Measurement switch to enter the zero point for calibration.
8) In step of the Item No.11, press the Measurement switch. "CL1" is displayed.
With Ver2:   Full load of 150kg or 350lb
With Ver3 and 4:   80kg or full load

9) In step of the Item No.12, with Ver3 and Ver4, carry out the calibration of CL2 depending on setting. Put a weight of the full load on the UC-321. If the OK mark is lit, press the Measurement switch to enter the calibration data.

10) In step of the Item No.14 Ver2, No.15 Ver3 and Ver4, press the Measurement switch to set the UC-321 to the Re-load mode. Carry out weighing check for accuracy.

11) Press the Measurement switch to switch the UC-321 off.

12) If gravity acceleration is not set to the local gravity acceleration, return to the Calibration mode and the gravity acceleration must be carried out.

13) Press the Calibration SW longer (for more than approximately 3 seconds) to switch the UC-321 off.

   Caution:

   1. Allow warm-up at room temperature (approximately 25° C) before carrying out the calibration.

   2. Place the UC-321 on a flat and level surface, and do not move the scale after pre-loading.

   3. With Ver3, the calibration must be carried out on the same site of where the calibration to be carried out and the scale is in use, because of the gravity acceleration.

   4. The procedure of No.8 is only for the shorting AD. Skip the No.8 with calibration.

2. Calibration

2-1 Change Setting

Calibration SW: to select the Item No., setting value and incrementing contents.

Measurement switch: to display setting and select a figure.

| Press the Calibration SW |

Selecting Item

| Press the Measuremant SW |

Displaying Setting

| Press the Measurement SW |

Selecting Figure

Blinking

| Press the Calibration SW |

Incrementing Number

Blinking

| Press the Measurement SW |

Selecting Figure

Blinking

| Press the Measurement SW |

Moving to the 5th digit

Blinking

| Press the Measurement SW |

Verifying Setting

| Press the Calibration SW |

To next step for setting

Caution:

It must be noted if the procedure is not followed, setting of the shorting AD might be Changed.

| Item	Ver2	Ver3	Ver4

0		To select the calibration type
		Set the Slide switch to Weight and press the Measurement SW for the selection
		Weight of calibration:
		   CL0 CL1 CL2
		L0 0kg, 150kg, None
		L1 0kg, 80kg, 150kg
		L2 0lb, 350lb, None
		L3 0lb, 176.4lb, 350lb
		          (80kg)
			To select the calibration type
			Set the Slide switch to "Weight" and press the Measurement SW for the selection
			Weight of calibration:
			   CL0 CL1 CL2
			L0 0kg, 150kg, None
			L1 0kg, 80kg, 150kg
			L2 0lb, 350lb, None
			L3 0lb, 176.4lb, 350lb

1	To change Model To change lb and kg, use a mass of 350lb or 150kg	To change Model as required Model is selectable after calibration.	To change Model as required Model is selectable after calibration.
5	Setting an ambient temperature at calibration	Setting an ambient temperature at calibration	Setting an ambient temperature at calibration
6	Setting gravity acceleration at a site of calibration	Setting gravity acceleration at a site of calibration	Setting gravity acceleration at a site of calibration
7	Setting gravity acceleration at site of use	Set as per described in step No. 6	Setting gravity acceleration at site of use
8	Prohibiting temperature shorting AD setting	Prohibiting temperature shorting AD setting	Prohibiting temperature shorting AD setting
9	Setting temperature AD value at calibration	Setting temperature AD value at calibration	Setting temperature AD value at calibration
10	Weight calibration zero CL0	Weight calibration zero CL0	Weight calibration zero CL0
11	Weight calibration span CL1	Weight calibration span CL1	Weight calibration span CL1
12		Weight calibration span CL2	Weight calibration span CL2
14	Re-load mode		
15		Re-load mode	Re-load mode

3. Calibration via a computer

1-1 Introduction

1) Connect the UC-321 to a personal computer with a communication cable.
   - Connect the UC-321P to the serial port of a personal computer with the RS232C cable (KO-2011)
   - Connect the UC-321 to a personal computer via the converter.
2) Set the Slide switch to BMI.
3) Start the calibration software with the personal computer.
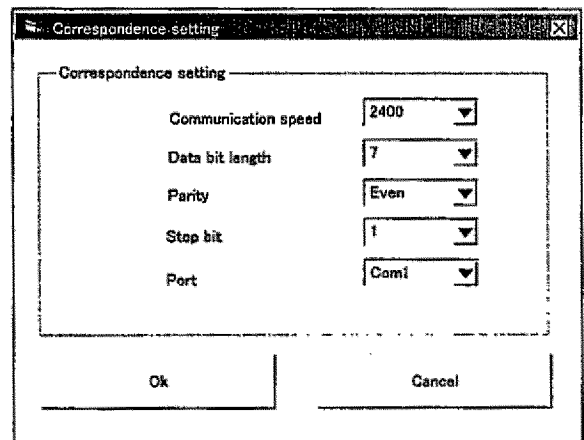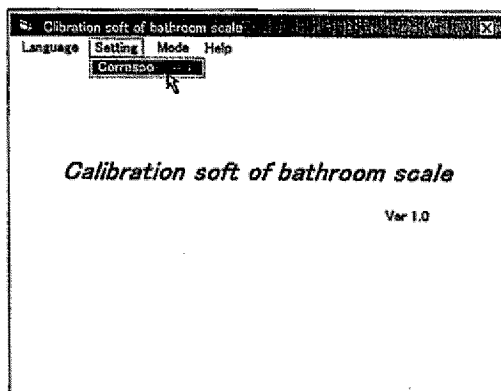
Figure 1
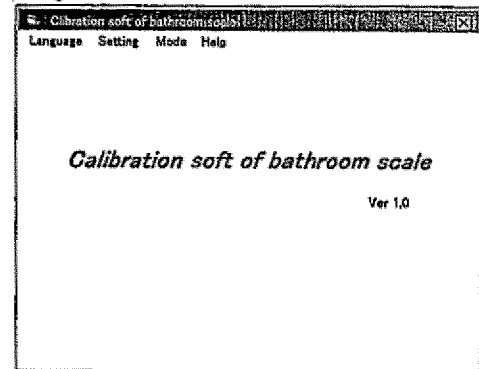
1-2 Correspondence setting

1) Move the cursor to the Setting button on the display of the personal computer to open the Correspondence in the menu. (Figure 2)
2) Set Communication speed, Data bit length, Parity, Stop bit, and Port on the screen, and click the OK button. (Figure 3)

Baud rate:	2400	Stop bit:	1
Data bit length:	7		
Parity:	Even	Figure 3	

Figure 2

1-2 Calibration

1) After the correspondence setting, move the cursor to the Mode button and open the Calibration in the menu.
2) Enter parameters (four digits) referring to Table 1
3) Click the Start button, and power the UC-321 on.
   If "ERROR" is displayed, check that the cable connection, the Slide switch setting to BMI, and Correspondence setting is correct.
4) Put a mass of the full load on the UC-321 and remove it. (Pre-loading)
5) After "- - - - -" is displayed, "Step1", "Step2", and "Step3" is displayed in order. Data is stored in the Receive data, and the record is displayed in the Receive data record on the screen.
6) After the Step 3, the screen is changed to the OA screen. While "ST,+******kg" is displayed in the Receive data on the screen, press the Measurement switch. The same procedure is applied to pressing the Measurement switch for CL 0, CL 1 and CL

2. (put a mass for CL 0, CL 1 and CL 2 referring to the setting of IT in Table 1 below.

7) OK is displayed at the end of setting. Click the Discontinue button to break the operation, and restart the application program from the beginning.
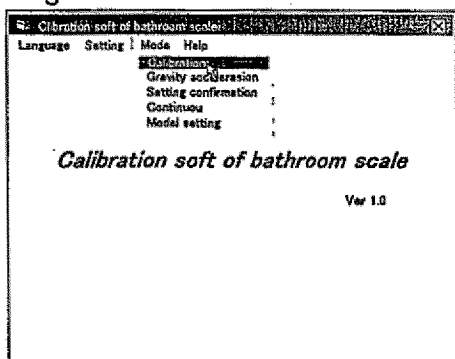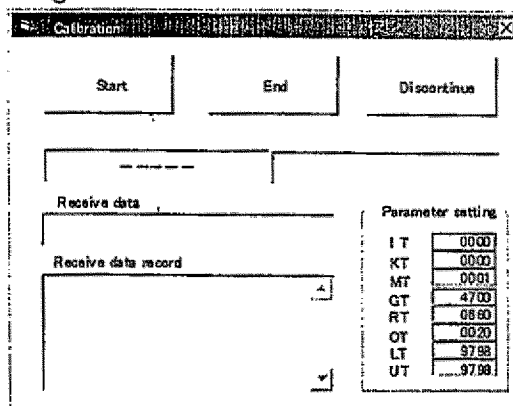
Figure 4

Figure 5

Table 1

	Item	Setting	Description
IT	Number of Calibration	0000	Calibration at 0, 150kg
		0001	Calibration at 0, 80, 150kg
		0002	Calibration at 0, 350lb
		0003	Calibration at 0, 176.4, 350lb
		0004	Initializing Calibration data
KT	Model selection	0000	kg, 50/100g, Decimal point
		0001	lb, 0.1lb, Decimal point
		0002	kg, 50g, Decimal point
		0003	lb, 0.2lb, Decimal point, N/A for Ver4
		0004	kg, 100g, Decimal point, N/A for Ver4
		0005	kg, 50/100g, Decimal point
		0006	kg, 50g, Decimal point
		0007	Kg, 100g, Decimal point, N/A for Ver4
MT	Storing and clearing Memory, and Target weight	0000	Storing and clearing Memory and Target weight
		0001	Storing and clearing Memory and Target weight
GT	Temperature coefficient (Thermo-sensitive resistor)	4700	4700ppm/°C
RT	Temperature coefficient (Load cell)	0660	660ppm/°C
OT	Ambient temperature (°C) at Calibration	0020	20°C
LT	Gravity acceleration at calibration site	9798	9.798m/sec2
UT	Gravity acceleration at site where used	9798	9.798m/sec2

1-3 Gravity acceleration

1) After the correspondence setting, move the cursor to the Mode button and open the Gravity acceleration in the menu.

2) Enter parameters (4 digits) referring to the Table 1.

3) Click the Start button on the screen, and press the Measurement switch of the UC321.

   If "ERROR" is displayed, check that the cable connection, the Slide switch setting to BMI, and the Correspondence setting is correct.

4) After "- - - -" is displayed, "Step1", "Step2", and "Step3" is displayed in order. Data is stored in the Receive data , and the record is displayed in the Receive data record on the screen.

5) "OK" is displayed at the end of setting. Click the Discontinue button to break the operation, and restart the application program from the beginning.

Figure 6

Figure 7

1-4 Setting confirmation

1) After the Correspondence setting, move the cursor the Move button and open the Setting confirmation in the menu.

2) Click the Start button and press the Measurement switch.

   If "ERROR" is displayed. check that the cable connection, the Slide switch setting to BMI, and the Correspondence setting is correct.

3) After "- - - - -" is displayed, "Step1", "Step2" and "Step3"! is displayed in order. Data is stored in the Receive data on the screen, The record is displayed in the Receive data record on the screen and setting data is stored in the Setting data on the screen.

4) "OK" is displayed at the end of the setting, Click the Discontinue button on the screen to break the operation, and restart the application program from the beginning.
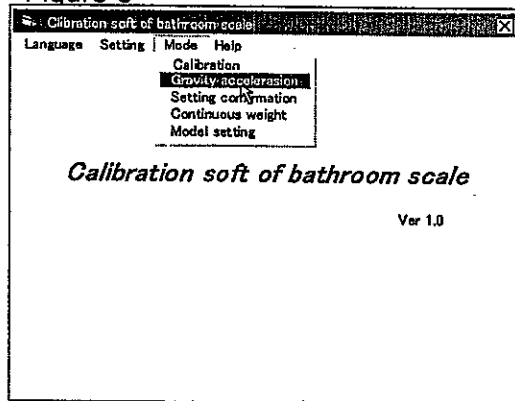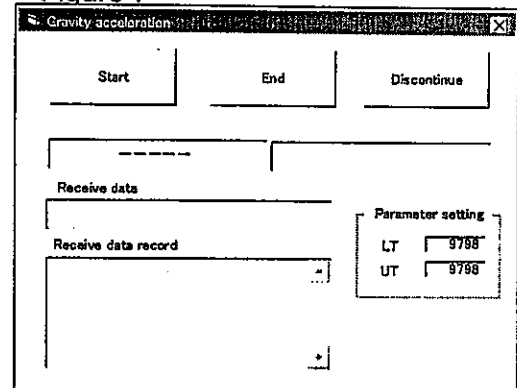
Figure 8

Figure 9
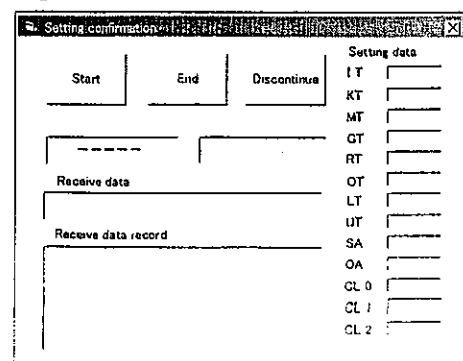
1-5 Continuous weight

1) After the Correspondence setting, move the cursor to the Mode button, and open the Continuous weight in the menu.

2) Click the Start button on the screen, and press the Measurement switch of the UC-321.

   If "ERROR" is displayed, check that the cable connection, the Slide switch setting to BMI, and the Correspondence setting is correct.

3) After "- - - - -" is displayed, "Step1", "Step2" and "Step3" is displayed in order. Data is stored in the Receive data on the screen, and the record is displayed in the Receive data record on the screen.

   Note: ST, +***.**kg shows stable data. US, +***.**kg shows unstable data. OL, +999.99kg shows overload.

4) Click the End button on the screen, or turn the UC-321 off to terminate the operation. Click the Discontinue button to discontinue the operation and restart from the beginning.
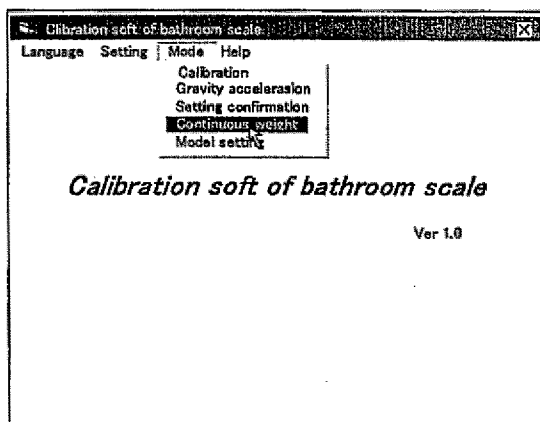
Figure 10   Figure 11
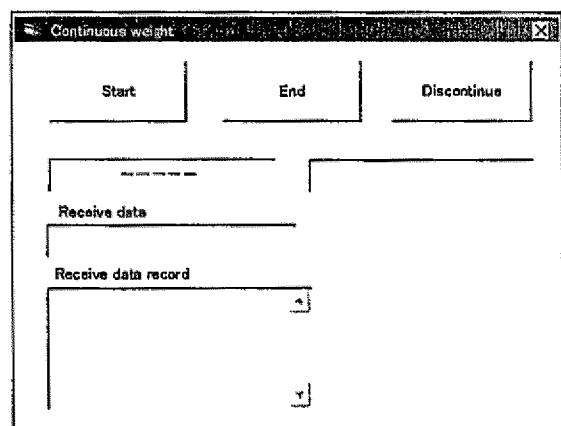
1-6 Model setting (The calibration data is maintained.)

1) Carry out the Setting confirmation referring to 1-4 Setting confirmation.

2) Move the cursor to the Mode on the screen and open the Model setting in the menu.

3) Enter parameter (four digits) referring to Table 1

4) Click the Start button on the screen, and press the Measurement switch of the UC-321.

   IF "ERROR" is displayed, check that the cable connection to the UC-321, the Slide switch setting to BMI, and the Correspondence setting is correct.

5) After "- - - - -" is displayed, "Step1", "Step2" and "Step3" is displayed in order. Data is stored in the Receive data on the screen, and the record is displayed in the Receive data record on the screen.

6) "OK" is displayed at the end of the setting, Click the Discontinue button on the screen to break the operation, and restart the application program from the beginning.
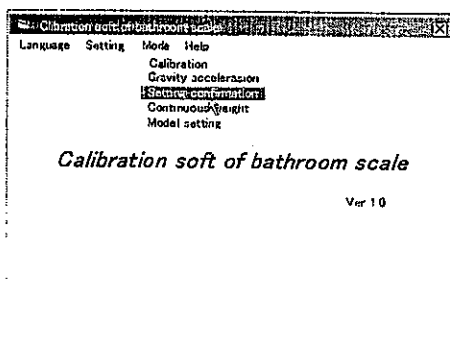
Figure 12
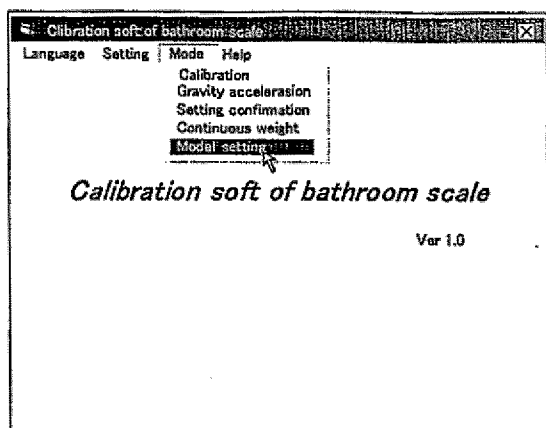
Figure 13
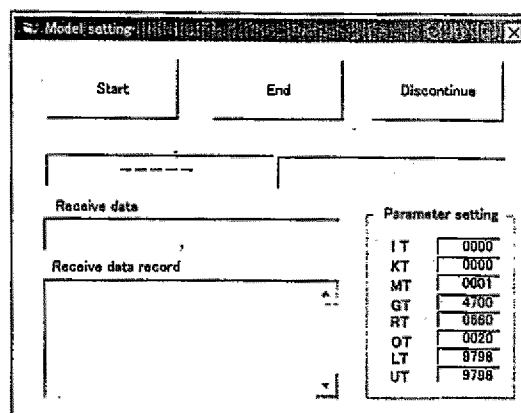
4. Setting value

Main board: PE-0231A

No,	Item	Range
8	Offset input (Shorting temperature AD)	19000 to 22000
9	Ambient temperature input (Temperature AD)	40000 to 45000
10	Zero at Weight calibration	10000 to 100000
11	Span at Weight calibration	Number of zero point counts + 21000 to 28000

Main board: PE-0231C

No,	Item	Range
8	Offset input (Shorting temperature AD)	19000 to 22000
9	Ambient temperature input (Temperature AD)	40000 to 45000
10	Zero at Weight calibration	10000 to 100000
11 or 12	Span at Weight calibration	Number of zero point counts + 21000 to 28000

Troubleshooting

```
┌─────────────────────────────────────┐
│  Slide switch setting to Weight      │
└─────────────────────────────────────┘

        (  Measurement SW on  )
                  │
                  ▼
            ◇ All segments on? ◇ ──No──▶ ◇ Battery OK? ◇ ──No──▶ (1)
                  │                            │
                 Yes                          Yes ────────────────▶ (2)
                  ▼
            ◇ Zero displays? ◇ ──No──▶ ◇ E-0 displays? ◇ ──No──▶ (3)
                  │                            │
                 Yes                          Yes ────────────────▶ (4)
                  ▼
            ◇ OK mark on? ◇ ──No──────────────────────────────────▶ (5)
                  │
                 Yes
                  ▼
            ◇ Accuracy OK? ◇ ──No──▶ ◇ Repeatability OK? ◇ ──Yes──▶ (5)
                  │                            │
                 Yes                          No
                  ▼                            ▼
            (  END  )                  ◇ Incorrect reading? ◇ ──Yes──▶ (5)
                                               │
                                              No
                                               ▼
                                        (  Others  ) ──────────────▶ (5)
```
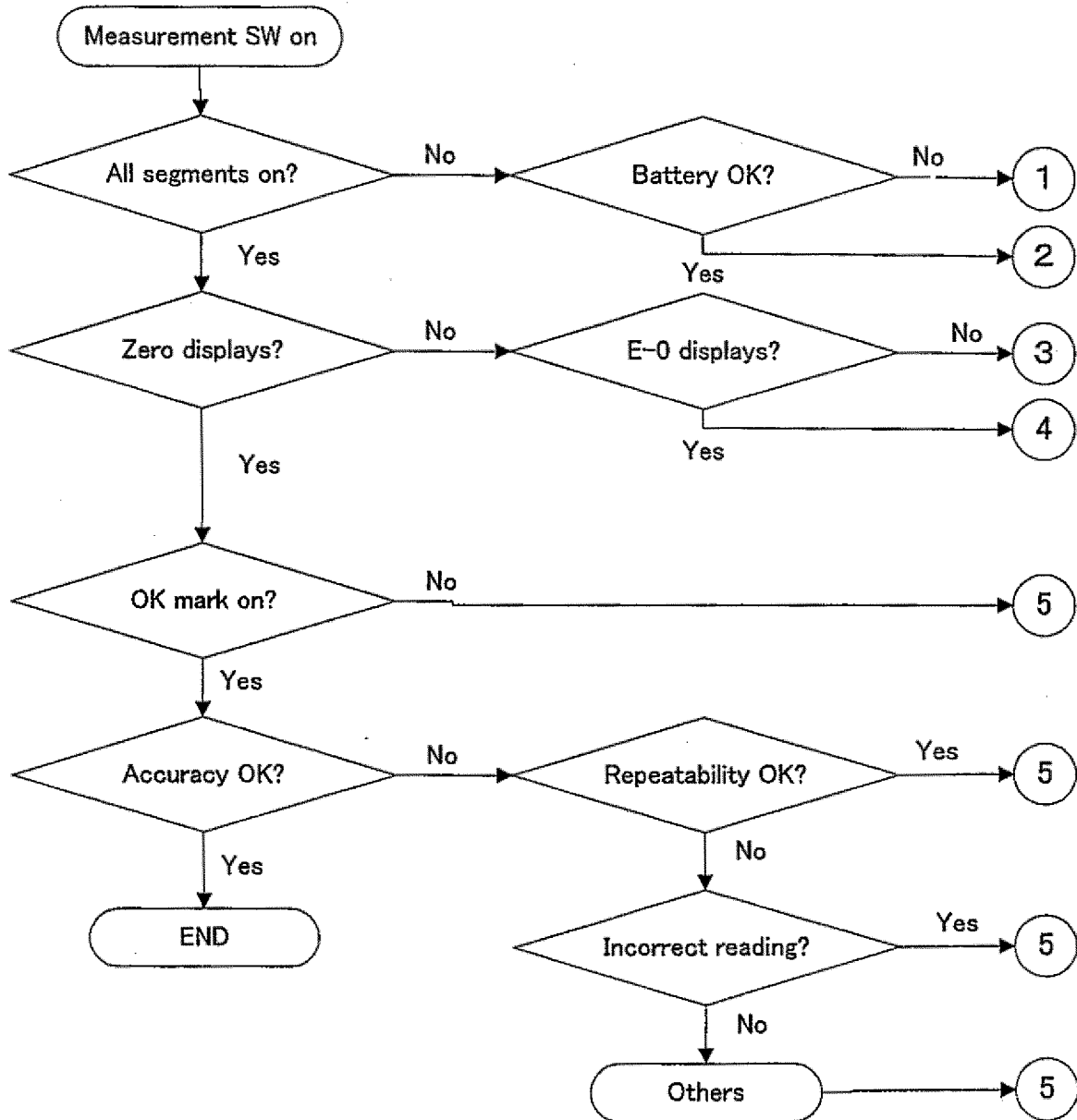
UC-321P only

```
┌──────────────────────────┐          ┌──────────────────────────────────┐
│  Data communication      │          │  Slide switch setting to Memory  │
└──────────────────────────┘          └──────────────────────────────────┘
           │
           ▼
  ◇ Data tranfering      ◇ ──No──▶ ◇ OK? with Interface ◇ ──Yes──▶ ┌──────────────────────┐
  ◇ to/from PC OK?       ◇          ◇ cable replaced     ◇           │ Interface cable faulty │
           │                               │                        └──────────────────────┘
          Yes                             No
           ▼                               ▼
      (  END  )              ┌─────────────────┐      ┌──────────────────────┐
                             │ Main board faulty │ ──▶ │ Peplace Main board    │
                             └─────────────────┘      └──────────────────────┘
```

page 24

① ——————————→ | Low battery voltage | → | Replace Battery |

② —▷ Remove Upper case ▷

◇ Wire continuity test OK ? ◇ —No→ | SW cable broken | → | Replace Cable |

Yes

| Poor soldering | → | Resolder |

| Main board faulty | → | Replace Main board |

④ —▷ Select Calibration mode ▷

▷ Verify Settings ▷

◇ Zero, Span out of limit? ◇ —Yes→ | Calibration improper | → | Re-calibration |

No

◇ Shorting AD out of limit? ◇ —Yes→ | Shoting AD faulty | → | Repeat Shorting AD |

No ————————————→ ⑤

③ —▷ Remove Upper case ▷

With all segments on

▷ Select Calibration mode ▷

◇ Temp. counts display OK? ◇ —No→ | Main board faulty | → | Replace Main board |

Yes

◇ Weight counts OK? ◇ —No→ | Main board faulty | → | Replace Main board |

Yes ————————————→ ⑤

⑥ ◁ Re-calibration ▷

⑤ → Remove Upper case

Loosen screws of Load celll? → Load cell installed improperly → Tighten screws

Select Calibration mode

Set Weight count mode

Counts unstable —Yes→ Main board faulty → Replace Main board, or Unit

No

Pull Load cell cable gently adding no load to Load celll

Counts unstable —Yes→ Load cell cable broken, Poor soldering → Replace Load cell, or Unit Resolder

No

Pull Load cell cable gently adding no load to Load cell

Counts unstable —Yes→ Load cell cable broken, Poor soldering → Replace Cable, orUnit Resolder

No

Replace Main board

⑥ → Assemble

Re-calibration

Normal operation? —No→ No cause found → Non-repairable

Yes

Repaired

Once the Upper case is removed, the Calibration must be carried out to for accurate weighing.

Appendix

UC-321 Precision Health Scale Serial Output Specification

1. Transmission Protocol

Method:	Asynchronous Transmission, unidirectional
Baud Rate:	2400bps
Date Bit:	7 bit
Parity	1 bit
Stop Bit:	1 bit
Code:	ASCII

2. Data format

Stop bit
Parity bit
Data bit
Start bit

| S | T | , | + | 0 | 0 | 0 | . | 0 | 0 | k | g | CR | LF |

Header   Data bits   Unit   Termination
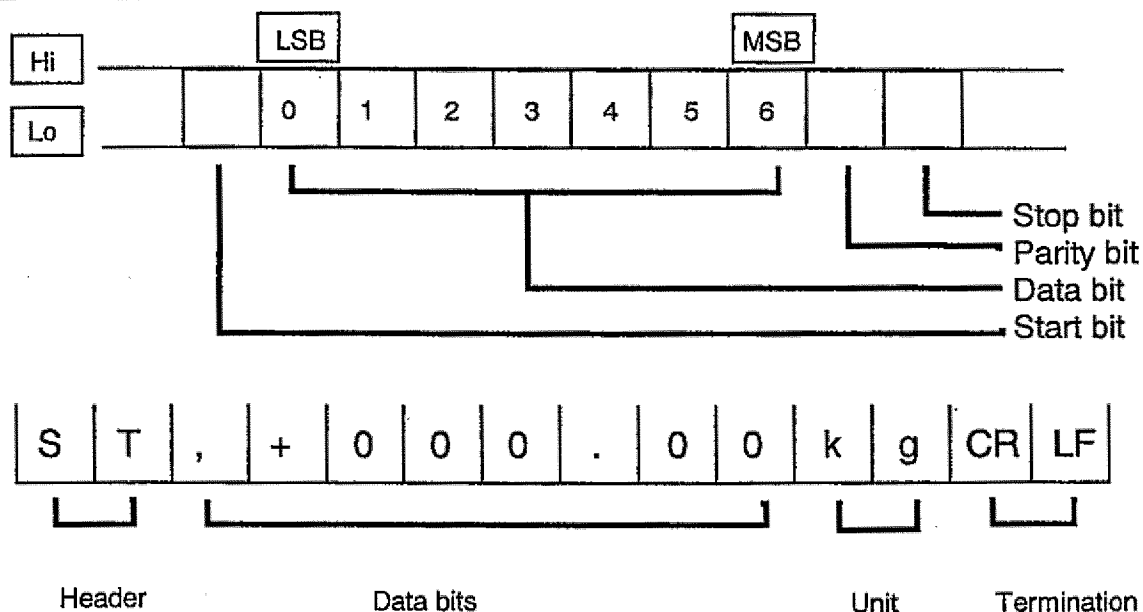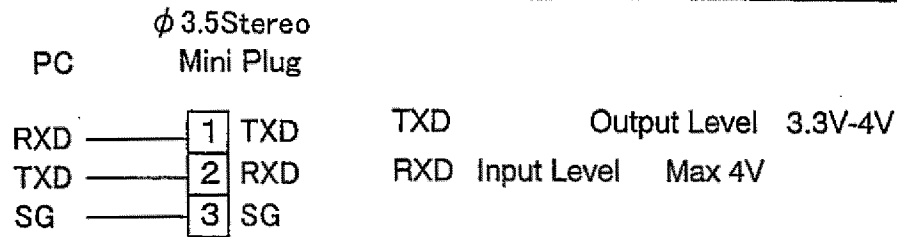
Header:	ST : weight is stable
	US: weight is not stable
	OL: weight overload
Data:	7 digits including decimal point

Remarks:

1. The output timing is same frequency as display update. (4 - 5 times/sec.) And termination is always <CR> <LF>.

2. Data bits shows 999.99 when the header is OL.

3. Pin connections : as shown below.

5. UC-321

PC ϕ 3.5Stereo Mini Plug

RXD ——— [1] TXD
TXD ——— [2] RXD
SG ——— [3] SG

TXD   Output Level   3.3V-4V
RXD   Input Level   Max 4V

Output Level
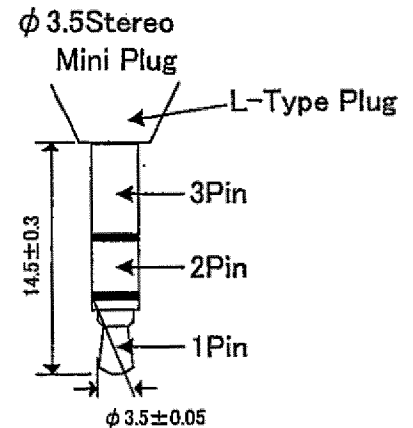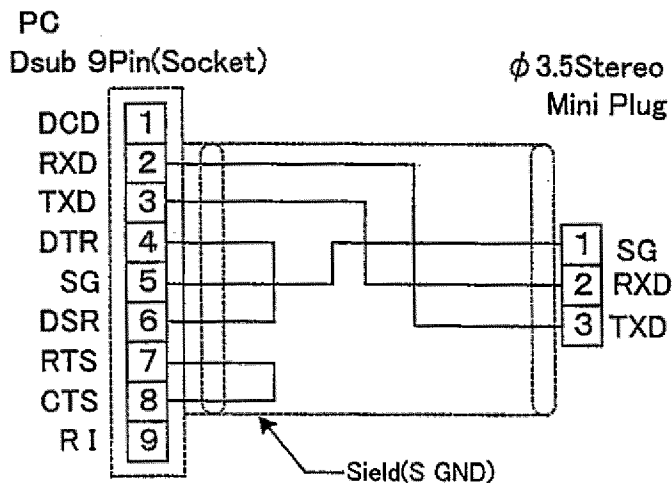   High   Min 3.5V(0.1mA)
                        Min 3.0V(0.4mA)
            Low   Max 0.5V(0.4mA)
                        Max 1.0V(10mA)
Input Level   Non-connection (recommended)
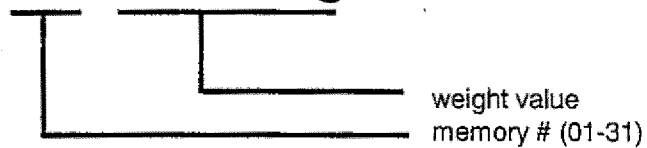   Low   Max 0.4V
            High   Min 3.6V
                    Max 4.0V

6. UC-321P

PC
Dsub 9Pin(Socket)

DCD [1]
RXD [2]
TXD [3]
DTR [4]
SG [5]
DSR [6]
RTS [7]
CTS [8]
R I [9]

—Sield(S GND)

ϕ 3.5Stereo Mini Plug

[1] SG
[2] RXD
[3] TXD

ϕ 3.5Stereo Mini Plug

L-Type Plug

3Pin
14.5±0.3
2Pin
1Pin

ϕ 3.5±0.05

I/O Level   RS232C(Driver IC ADM3222)

3. Output of Memory Data

UC-321 outputs the memory data once when the data is displayed.

00, 000. kg CR LF

                weight value
                memory # (01-31)

(ref. - Procedure of memory weighing)

Storing a current weight

1. Set the slide switch to "MEMORY"
2. Press the measurement switch.
3. Step onto the scale.
4. The scale measures weight displays the current weight.
5. Step out from the scale.
6. The scale shows the difference between the last reading and current reading.
7. The weight is stored in memory, and the scale is automatically turned off.

Sending weight data stored in the scale to a personal computer.

1. Set the slide switch to "MEMORY".
2. Press and hold the measurement switch until displaying the next datum, then you may release the measurement switch.
3. Weight data are displayed and sent to personal computer in order from the last result.
4. After all stored data are sent, the scale is automatically turned off.

4. Difference of the output sequence and Sample of Output Data

The difference point of the output sequence according to the model and version is shown below.

Mode	UC300	UC321 Ver2(A42)	UC321 Ver3(A53) Ver4(A62)
Weight	Data out after Power ON	Data out after auto zero	Data out after auto zero
	The weight value is output until auto-power-off	The weight value is output until auto-power-off	The weight value is output until auto-power-off
Target	The Target value is output at first	No target value	The Target value is output at first
	The difference weight value(TW; header) from the target is output once.	The Weight value(ST; header) is output once	The difference weight value(TW; header) from the target is output once.
Memory	The last weight value (00; header) is output at first	**No last Weight**	The last weight value (00; header) is output at first
	The weight value is output until auto-power-off.	The Weight value (ST; header) is output once	The Weight value (ST; header) is output once
	The difference weight value (TW; header) from the last weight is output once, before auto power off	No difference weight	The difference weight value (TW; header) from the last weight is output once, after the weight (ST; header) once.
BMI	none	As well as the Weight position	Calibration confirmation code "JO1111"

The bold type shows the difference points.

1. Ver2 (CPU: A42)

UC-321　　Ver2(A42)

Weight	Memory	output Memory	Target	BMI
ST,+000.00kg	ST,+000.00kg	00,+005.00kg	ST,+000.00kg	ST,+000.00kg
ST,+000.00kg	ST,+000.00kg	01,+005.00kg	ST,+000.00kg	ST,+000.00kg
ST,+000.00kg	ST,+000.00kg	02,+072.70kg	ST,+000.00kg	ST,+000.00kg
US,+000.10kg	US,+000.15kg	03,+072.65kg	ST,+000.00kg	US,+000.10kg
US,+000.75kg	US,+001.75kg	04,+072.70kg	US,+000.45kg	US,+000.75kg
US,+003.50kg	US,+005.00kg	05,+072.60kg	US,+003.50kg	US,+003.50kg
US,+005.00kg	US,+005.00kg	06,+072.70kg	US,+005.00kg	US,+005.00kg
ST,+005.00kg	ST,+005.00kg	07,+072.65kg	US,+005.00kg	ST,+005.00kg
ST,+005.00kg		08,+072.65kg		
ST,+005.00kg		09,+072.65kg		

UC-321　　Ver3(A53),Ver4(A62)

Weight	Memory	output Memory	Target	BMI
ST,+000.00kg	00,+072.70kg	00,+005.00kg	TW,+075.00kg	JO1111
ST,+000.00kg	ST,+000.00kg	01,+005.00kg	ST,+000.00kg	JO1111
ST,+000.00kg	ST,+000.00kg	02,+072.70kg	ST,+000.00kg	JO1111
US,+000.10kg	ST,+000.00kg	03,+072.65kg	ST,+000.00kg	JO1111
US,+000.75kg	US,+000.15kg	04,+072.70kg	ST,+000.00kg	JO1111
US,+003.50kg	US,+001.75kg	05,+072.60kg	US,+000.45kg	
US,+005.00kg	US,+005.00kg	06,+072.70kg	US,+003.50kg	
ST,+005.00kg	US,+005.00kg	07,+072.65kg	US,+005.00kg	
ST,+005.00kg	ST,+005.00kg	08,+072.65kg	US,+005.00kg	
ST,+005.00kg	DW,-067.70kg	09,+072.65kg	DW,-070.00kg	

UC-300

Weight	Memory	output Memory	Target
US,+058.90kg	00,+010.00kg	00,+005.00kg	TW,+010.90kg
US,+006.10kg	US,+058.90kg	01,+005.00kg	US,+058.90kg
US,+001.70kg	US,+006.10kg	02,+072.70kg	US,+006.10kg
ST,+000.00kg	US,+001.70kg	03,+072.65kg	US,+001.70kg
ST,+000.00kg	ST,+000.00kg	04,+072.70kg	ST,+000.00kg
ST,+000.00kg	ST,+000.00kg	05,+072.60kg	ST,+000.00kg
US,+000.30kg	US,+005.00kg	06,+072.70kg	US,+001.40kg
US,+000.90kg	US,+005.00kg	07,+072.65kg	US,+004.70kg
US,+004.15kg	US,+005.00kg	08,+072.65kg	US,+005.00kg
US,+005.05kg	ST,+005.00kg	09,+072.65kg	US,+005.00kg
US,+001.60kg	ST,+005.00kg	10,+072.65kg	US,+005.00kg
US,+004.80kg	ST,+005.00kg	11,+072.70kg	DW,-005.90kg
US,+005.00kg	DW,-005.00kg	12,+072.65kg	
ST,+005.00kg		13,+072.65kg	
ST,+005.00kg		14,+072.65kg	
ST,+005.00kg		15,+072.70kg	

ST   Stable (The weight data is output repeatedly at Weight position, but only onetime at BMI position)

US   Unstable

TW   Target Weight (Output only onetime)

DW   Difference from the last weight or the target weight   (Output only onetime)

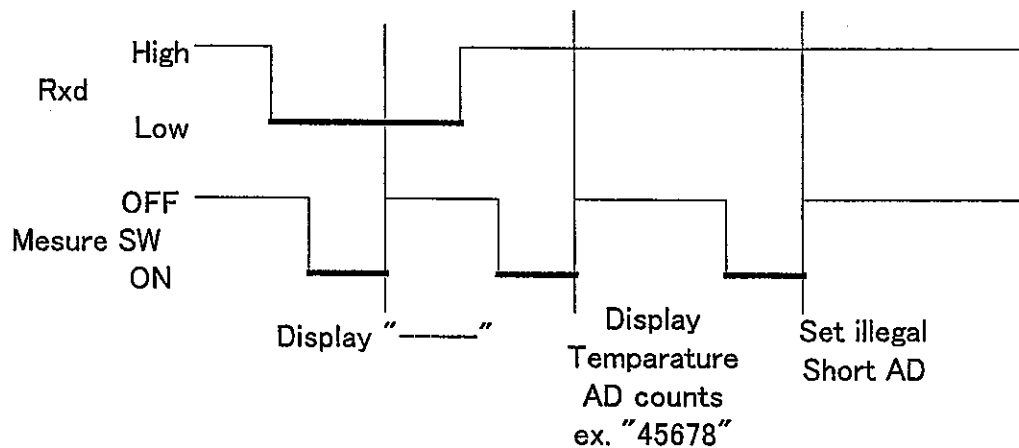01,02,03,......   Memory data with order number.

5. Timing Chart at the Case of Error

Ver2(A42) only. The position of slide switch is "Weight".

E-9

Display "-----"
Test Mode

Signal or Noise

E-9

E-0

Display "-----"

Display
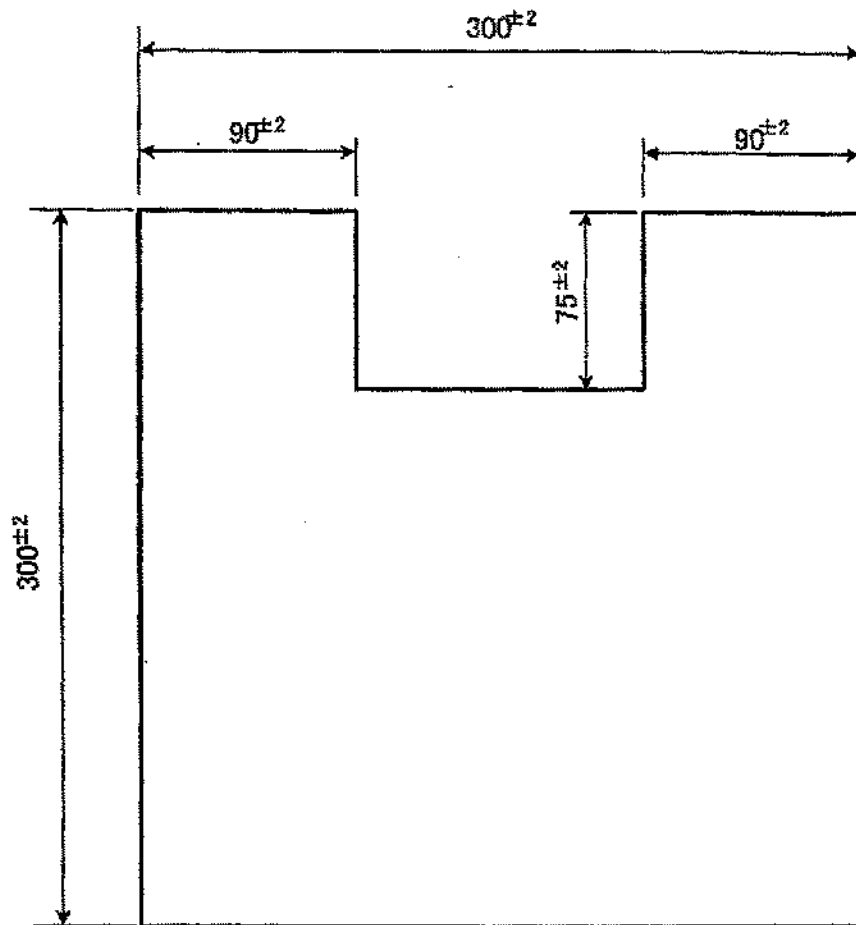Temparature
AD counts
ex. "45678"
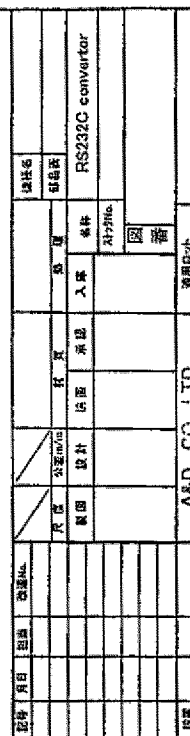
Set illegal
Short AD
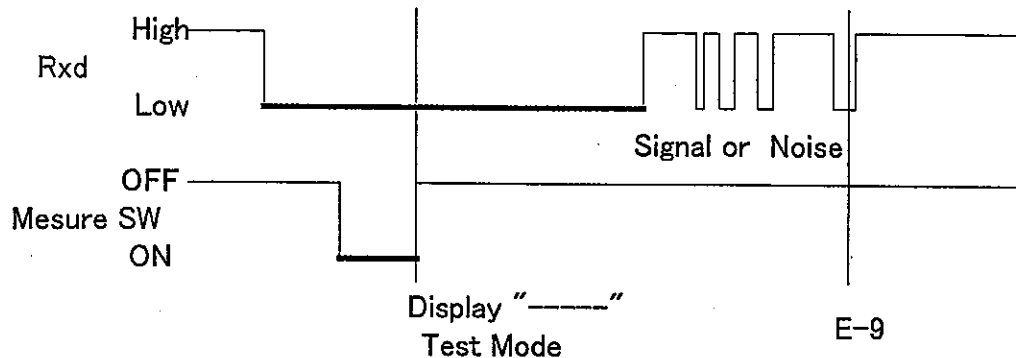
The illegal short AD causes E-0.

Remark

As for Ver3(CPU: A53) and Ver4(CPU: A62), E-0 by the above timing have been improved. No outside operation can change the short AD value.

$300^{\pm 2}$

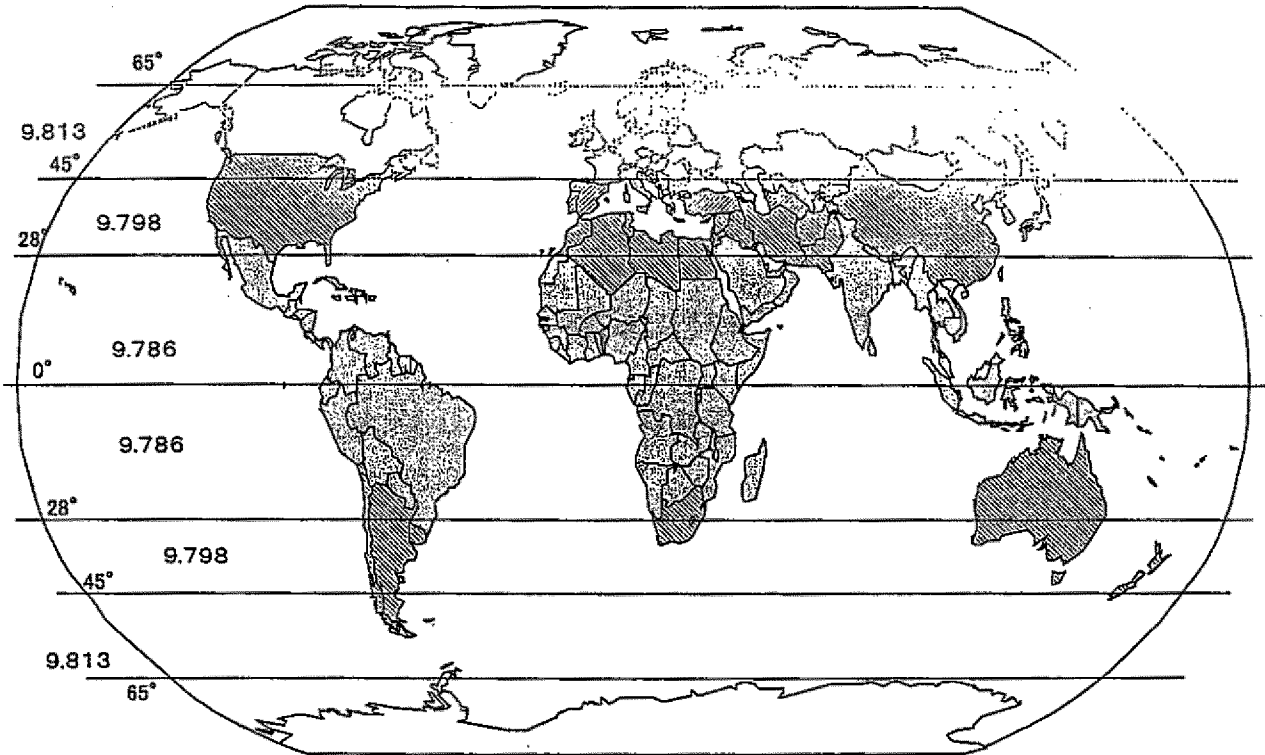$90^{\pm 2}$

$90^{\pm 2}$

$75^{\pm 2}$

$300^{\pm 2}$

$t = 1 \quad ^{\pm 0.2}$

Model	UC-321 Series
Description	Protection Sheet for Load
Material	Teflon Sheet
Drawing No	N/A

A&D CO., LTD.

Gravity Acceleration Geographical chart

Code	Gravity Acceleration	Marking on the carton box	Division
0 0 ✱ ✱ ✱	9. 7 9 8	Nothing	Latitude 2 8° ～ 4
0 1 ✱ ✱ ✱	9. 7 8 6	Red	Latitude 0° ～ 2
0 2 ✱ ✱ ✱	9. 8 1 3	Yellow	Latitude 4 5°·～ 6 5°

番号	規格名	名称	数量
1	07:1000139-1	UPPERCASE	1
2	07:1000138-1	LOWERCASE	1
3	04:1000136-1A	BASE FRAME	1
4	04:4009691-2A	LOAD PLATE (L)	2
5	04:4009691-1A	LOAD PLATE (R)	2
6	04:4009958	FOOT PLATE	4
7	10:BALL5/32 (500)	STEEL BALL 1/8 inch	4
8	07:4009959B	FOOT	4
9	08:4009960B	DUST COVER ON FOOT	4
10	U4-5471	ELECTRODE +	1
11	U4-5472	ELECTRODE -	1
12	U4-1512-A	ELECTRODE +/-	1
13	07:3004240A	KEY TOP	1
14	15:4009981	SPRING FOR SWITCH	2
15	07:3004242	FILTER FOR LCD	1
16	08:3004666A	LCD LABEL	1
17	06:4009961A	LCD PILLOW	2
18	07:3004459	BATTERY COVER	1
19	08:4010428	CAUTION LABEL	1
20	17:19FZ-5×12	SCREW WITH HEXAGONAL HOLE	24
21	17:14FZ-P3×6	TAPPING SCREW M3×6	2
22	17:14FN-P3×10	TAPPING SCREW M3×10	10
23	17:02FZ-B4×8	TAPPING SCREW WITH WASHER	8
24	17:14FZ-P2×6	TAPPING SCREW M2×6	1
25	04:4009690-1A	SPACER FOR LOAD CELL (t=1.2)	4
26	17:01FZ-N3×8	TAPPING SCREW M3×10	8
27	10:13823093055	SPACER φ3×5.5	8
27	10:13823093065	SPACER D3×6.5	8
28		LOAD CELL	4
29		PRINT CIRCUIT BOARD	1
30	08:4010440A	SETTING LABEL	1
31	17:04-22-FZ3	PLAIN WASHER	2
32	08:4010869	LCD FILM	1
33	04:4009690-2A	SPACER FOR LOAD CELL (t=1.2)	4
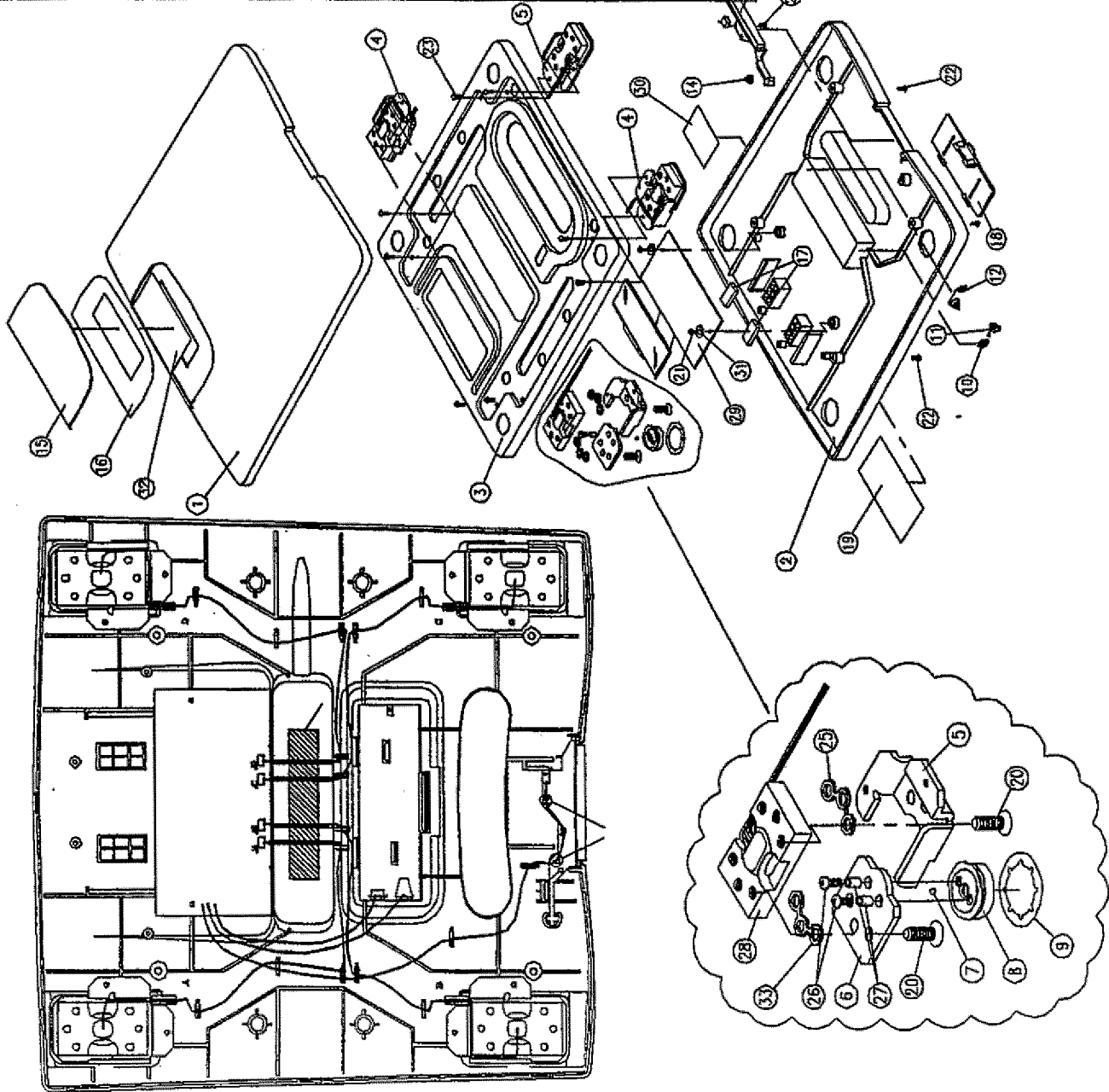
MODEL	UC-321
DESCRIPTION	EXPLODED VIEW
DRAWING No.	QD-AS3-001048A

A&D CO.,LTD.

番号	規格名	名称	数量
1	07:1000139-1	UPPERCASE	1
2	07:1000138-1	LOWERCASE	1
3	04:1000136-1A	BASE FRAME	1
4	04:4009691-2A	LOAD PLATE (L)	2
4	04:4009691-1A	LOAD PLATE (R)	2
5	04:4009658	FOOT PLATE	4
6	10:BALL5/32(500)	STEEL BALL 1/8 inch	4
7	07:4009959B	FOOT	4
8	08:4009960B	DUST COVER ON FOOT	4
9	U4-5471	ELECTRODE +	1
10	U4-5472	ELECTRODE −	1
11	U4-1512-A	ELECTRODE +/−	1
12	03:3004240A	KEY TOP	1
13	15:4009981	SPRING FOR SWITCH	1
14	01:3004242	FILTER FOR LCD	1
15	08:3004686A	LCD LABEL	2
16	06:4009961A	LCD PILLOW	1
17	07:3004459	BATTERY COVER	1
18	08:4010428	CAUTION LABEL	1
19	17:19F7-5×12	SCREW WITH HEXAGONAL HOLE	24
20	17:14FZ-P1×6	TAPPING SCREW M3×6	2
21	17:14FN-P3×10	TAPPING SCREW M3×10	10
22	17:02FZ-B4×8	TAPPING SCREW WITH WASHER	8
23	17:14FZ-P2×6	TAPPING SCREW M2×6	1
24	04:4009690-1A	SPACER FOR LOAD CELL (t=1,2)	4
25	17:01FZ-N3×8	TAPPING SCREW M3×10	8
26	10:13823093D0055	SPACER φ3×5.5	8
27	10:13823093D065	SPACER D3×6.5	8
28		LOAD CELL	4
29	08:4010440A	PRINT CIRCUIT BOARD	1
30	17:04-22-F73	SETTING LABEL	1
31	08:4010869	PLAIN WASHER	2
32	04:4009690-2A	LCD FILM	1
33	07:4011080	SPACER FOR LOAD CELL (t=1,2)	4
34		CABLE GUARD	4

MODEL	UC-321
DESCRIPTION	EXPLODED VIEW
DRAWING No.	QD-AS3-001048C