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# Service manual
# Counting scale

## KERN CFS

Version 1.0
5/2011
GB

**CFS-SH-e-1110**

GB

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Version 1.0 5/2011

**Service manual**

**Counting scale**

## Table of Contents

# 1 Basic information

## Grundlegende Hinweise

**The device must be repaired only by trained specialist staff or personnel with professional formation (such as a repair-specialist accredited by law concerning verification).**

**The service manual is obligatory for repair work.**

**After repair, original conditions of the device have to be restored.**

**Only original spare parts should be used.**

Das Gerät darf nur von geschultem oder beruflich ausgebildetem Fachpersonal (z. B. eichrechtlich anerkannter Instandsetzer) repariert werden.

Die Serviceanleitung ist bindend für Reparaturen.

Das Gerät muss nach erfolgter Reparatur wieder in den Originalzustand zurückversetzt werden.

Es dürfen nur Originalersatzteile verwendet werden.

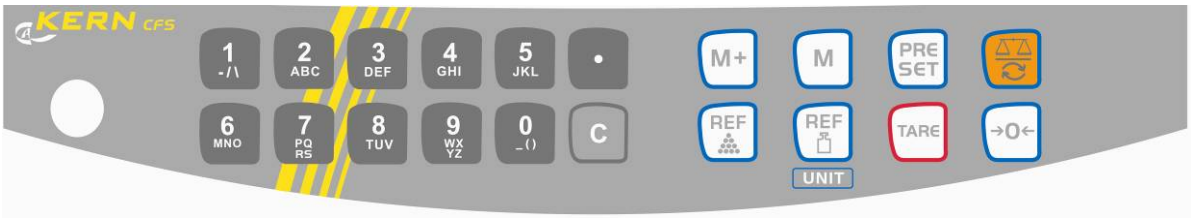
# 2 Technical data

| KERN | CFS |
|---|---|
| Weighing Units | kg, lb |
| Warm-up time | 2 h |
| Permissible ambient condition | 0° C to 40° C |
| Humidity of air | max. 80 % relative (not condensing) |
| Weighing plate, stainless steel | 294 x 225 mm |
| Dimensions of the housing (B x D x H) | 320 x 330 x 125 mm |
| Mains connection | Mains adapter 230 V AC, 50 Hz; balance 9 V DC, 500 mA |
| Rechargeable battery (Option) | Operating duration approx. 70 h / loading time approx. 12 hours |

# 3 Appliance overview

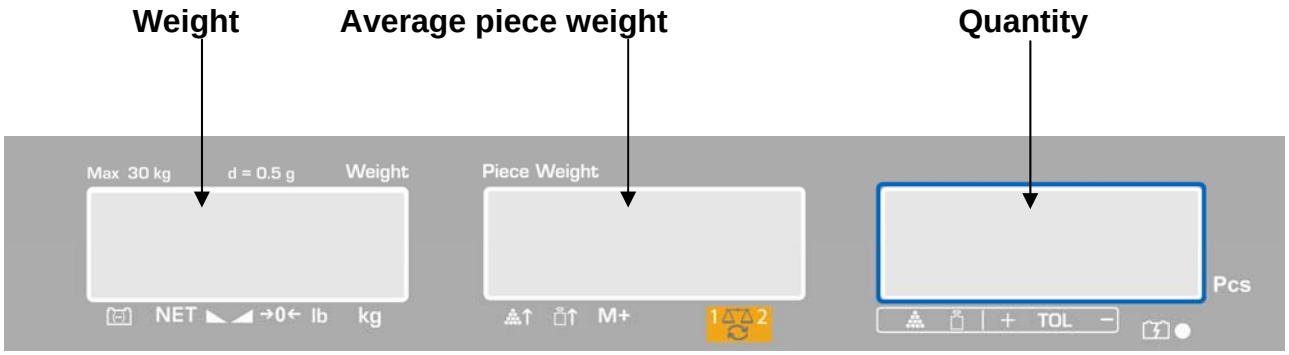

1. Weighing plate / rechargeable battery compartment (under weighing plate)
2. Bubble level
3. RS 232 interface
4. Second balance interface
5. Foot screws
6. ON/OFF switch
7. Mains adapter connection

## 3.1 Keyboard overview




| Choice | Function in Weighing mode | Function in Menu |
|---|---|---|
| 0 _() ..... 9 WX YZ | • Numeric keys | |
| • | • Decimal point<br>• At numeric input number selection to the left | |
| C | • Delete key | |
| M+ | • Addition in summation memory<br>• Display total weight /number of weighings / total quantity<br>• At numeric input digit selection to the right<br>• Data output (menu setting "AU oFF") | |
| M | • Set or call-up PLU | |
| PRE SET | • Tolerance control | • Call up menu |
| | • Switch-over balance | |
| REF | • Input of the average piece weight by weighing | |
| REF | • Numeric input of the average piece weight | • Function /parameter selection |
| UNIT | • Switch-over weighing unit | |
| TARE | • Taring key | • Confirm |
| →0← | • Zeroing key | • Back to menu/weighing mode |

## 3.2 Overview of displays




### Display weight

Here the weight of your goods is displayed in [kg].

**The arrows [▼] above the symbols show:**

| | |
|---|---|
| **NET** | Net weight |
| ~ | Stability display |
| →0← | Zeroing display |
| **lb/kg** | Current weighing unit |

### Display average piece weight

Here the average reference weight of a sample is displayed in [g]. This value is either numerically entered by user or calculated by weighing on balance.

**The arrows [▼] above the symbols show:**

| | |
|---|---|
| | Number of parts placed on balance too small |
| | Piece below minimum weight of piece |
| **M+** | Data in summation memory |
| 1 2 | Active balance:<br>1. Reference balance KERN CFS<br>2. Bulk material balance, e.g. KERN KFP |

**Display quantity**

Here the current piece quantity (PCS = pieces) or in totalizing mode the sum.

**The arrows [▼] above the symbols show:**

| | |
|---|---|
|  | Tolerance control in counting mode |
|  | Tolerance control in weighing mode |
| **+** | Goods to be weighed above tolerance limit |
| **TOL** | Goods to be weighed within tolerance range |
| **-** | Goods to be weighed below tolerance limit |

# 4 Menu

The menu is structured in the following menu blocks.

1. F1oFF Balance and application settings
2. F2PrE Settings serial interface
3. UId Setting user identification number
4. SCId Setting balance identification number
5. tECH Configuration balance or balance bridge

## 4.1 Navigation in the menu

| | |
|---|---|
| **Call up menu** | ⇨ Switch-on balance and during the self test press PRE SET. The first menu block F1oFF is displayed. |
| **Select menu block** | ⇨ With help of REF, the individual menu blocks can be selected one after the other.<br><br>F1oFF ⇨ F2PrE ⇨ UId ⇨ SCId ⇨ tECH ⇨ F1oFF |
| **Select menu item** | ⇨ Confirm selected menu block with TARE. The first menu item is displayed, e.g. F1oFF ⇨ bEEP<br>⇨ With help of REF, the individual menu items can be selected one after the other. |
| **Select setting** | ⇨ Confirm selected menu item with TARE. The current setting will be displayed. |
| **Change settings** | ⇨ Switch into the available settings using REF. |
| **Acknowledge setting / exit the menu** | ⇨ Press TARE, balance will return to submenu<br>⇨ Or make more adjustments in the menu or go back to main menu using. |
| **Return to weighing mode** | ⇨ Press →0← anew |

## 4.2 Menu overview

| Menu block main menu | Menu item submenu | Disponible adjustments | | Explanation |
|---|---|---|---|---|
| F1oFF | bEEP | "bEEP" "oFF" | | Signal tone switched off |
| | | "bEEP" "on in" | | Signal tone on, if weighing value within tolerance limits |
| | | "bEEP" "on oUt" | | Signal tone on, if weighing value outside tolerance limits |
| | EL | "LItE" " oFF" | | Display background illumination off |
| | | "LItE" " on" | | Display background illumination on |
| | | "LItE" " AUt" | | Background illumination switches on automatically when loaded or a button is pressed |
| | Unit | "Unit" "kG/Lb" | | Weighing unit can be switched over kg ⇔ lb |
| | | "Unit" "kiLo" | | Weighing unit "kg" |
| | | "Unit" " Lb" | | Weighing unit "lb" |
| | oFF | 0 / 3 / 5 / 15 / 3( | | Auto-off function, balance will switch off automatically after the set time.<br>Selectable 0/3/5/15/30 minutes. |
| | "ACC" | "ACC" "on" | | Totalizing mode on |
| | | "ACC" "oFF" | | Totalizing mode off |
| F2Prt | PmodE | Print | "AU oFF" | Data output of stable weighing values after pressing M+ |
| | | | "AU on" | Automatic data output of stable weighing values after unloading the balance |
| | | P Cont | | Continuous data output of all weighing data, (totalizing deactivated) |
| | | P SErrE | | Continuous data output only weight value. |
| | P bAUd | b 600 | | Baud rate 600 |
| | | b 1200 | | Baud rate 1200 |
| | | b 2400 | | Baud rate 2400 |
| | | b 4800 | | Baud rate 4800 |
| | | b 9600 | | Baud rate 9600 |

| | | | |
|---|---|---|---|
| | PArIty | 8 n 1 | 8 bits, no parity |
| | | 7 E 1 | 7 bits, even parity |
| | | 7 o 1 | 7 bits, odd parity |
| | PtyPE | tPUP | Standard printer setting |
| | | LPSO | Not documented |
| Uid | "Uid"<br>"AbC234"<br>"" | Shows the current user identification number, max. 6 characters | |
| SCid | "SCid"<br>"AbC234"<br>"" | Shows the current balance identification number, max. 6 characters | |
| tECH | Details see chpt. 6 | password-protected | |

# 5 Adjustment

- The weight to be used depends on the capacity of the scale. Carry out adjustment as near as possible to the scale's maximum weight. Info about test weights can be found on the Internet at: http://www.kern-sohn.com
- Observe stable environmental conditions. Stabilization requires a certain warm-up time.

| Operation | Display |
|---|---|
| ⇨ Switch-on balance and during the self test press →0←. | "PIN" |
| ⇨ Use the number keys to enter password:<br>Either<br>• Standard password „0000"<br>or<br>• personal password, input see chapter 6.2<br>⇨ Confirm input with TARE. | "PIN" "----" |
| ⇨ When using as counting system, the bulk material balance as well as the reference balance must be adjusted. The adjustment process must be carried out on both balances.<br>Select bulk material or reference balance via ⚖. The appeared **[▼]** displays the current balance.<br>Acknowledge with TARE. | "tECH" "LoCAL"<br>⇳<br>"tECH" "rEMotE" |
| ⇨ If necessary, at balance zero display using UNIT select the weighing unit [kg or lb], which shall be used for adjustment. The appeared **[▼]** displays the current weighing unit.<br>Acknowledge with TARE. | "tECH" "UNIt" |
| ⇨ Ensure that there are no objects on the weighing plate. After successful stop check press the TARE button. | "UNLoAd" |

| | |
|---|---|
| ⇨ The weight value of the required adjustment weight will be displayed.<br>Acknowledge with TARE.<br>⇨ Place the required adjusting weight carefully in the centre of the weighing plate and press TARE to confirm. | “SEL” “000003”<br>“LoAd” |
| **or**<br>⇨ Enter value of the necessary adjustment weight using numeric keyboard and acknowledge with TARE.<br>In order to achieve high-quality weighing results in the sense of the measuring technology, it is recommended to select the nominal value as high as possible.<br>We recommend 80 % max.<br>⇨ Place the required adjusting weight carefully in the centre of the weighing plate and press TARE to confirm. | “SEL” “000002”<br>“LoAd” |
| ⇨ After the adjustment the balance will carry out a self-test. Remove adjusting weight **during** self test, balance will return into weighing mode automatically. In case of an adjustment error or incorrect adjusting weight the display will show an error message (FAIL H / FAIL L), repeat adjustment process. | |

# 6 Technical parameters (configuration bulk material balance)

⇨ Changes should only be carried out by trained specialized personnel.

⇨ Navigation in menu see chpt. 4.1

In factory the balance **KERN CFS** or the counting system **KERN CCS** are preconfigured in a way that normally no more changes will be necessary.
But if there are special conditions of use or if as bulk material balance another weighing bridge (not preconfigured by **KERN**) is connected, in the menu block "tECH" the required settings can be made.

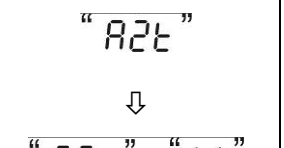
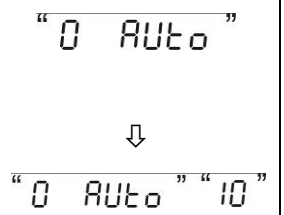
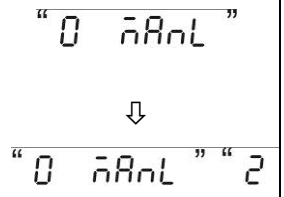
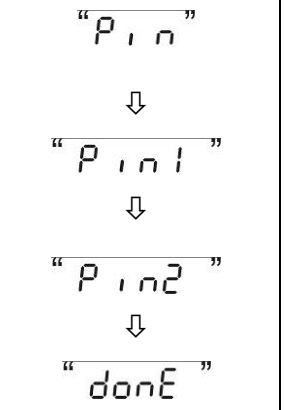
## 6.1 Technical specifications

| | |
|---|---|
| Supply voltage | 5 VDC |
| Max. signal voltage | 0-20 mV |
| Zeroing range | 0-5 mv |
| Sensitivity | > 0.02 µv/internal ADC count |
| Internal ADC count | 500,000 Max. at 10mV input |
| Resistance parameter | 87 Ω Min., 4 x 350 Ω load cell |
| Connector | 4 poles |
| Max. cable length | 6 meter |
| Connection plug | 9 pin d-subminiature bushing |

## 6.2 Menu settings

| | |
|---|---|
| **Call up menu**<br>⇨ Switch-on balance and during the self test press PRE SET.<br>The first menu block F1oFF is displayed. | F1oFF |
| ⇨ Press REF repeatedly until tECH is displayed.<br>F1oFF ⇨ F2PrT ⇨ Uid ⇨ SC id ⇨ tECH | tECH |
| ⇨ Acknowledge with TARE. The request to enter the password appears. | "PIN" |
| ⇨ Or as standard password enter four times zero "0000" or the stored password (input see parameter "PIN"). Any other password can be overwritten with "9999".<br>⇨ Acknowledge with TARE. | "PIN" "----" |
| ⇨ Use ⚖ to select the balance which should be configured (bulk material/reference balance).<br>The appeared **[▼]** displays the current balance.<br>Acknowledge with TARE. | "tECH" "LoCAL"<br>⇳<br>"tECH" "rEMotE" |
| ⇨ Use UNIT to select the weighing unit [kg or lb], where the adjustment shall be made.<br>The appeared **[▼]** displays the current weighing unit.<br>Confirm with TARE, the first menu item "Cnt" appears. | "tECH" "UNIt"<br>⇩<br>"Cnt" |

| | |
|---|---|
| **Navigation in the menu**<br>⇨ With help of REF, the individual menu items can be selected one after the other.<br>⇨ Confirm selected menu item with TARE. The current setting will be displayed.<br>⇨ Switch into the available settings using REF.<br>⇨ Or store with TARE or reject with →0←. | |
| **Parameter selection**<br>1. Display **internal resolution** | "Cnt" |
| 2. **Balance capacity**<br>Settings only possible on the bulk material balance.<br>⇨ Press TARE, the currently set position of the decimal dot is displayed.<br>Select the desired setting by REF and acknowledge on TARE.<br>The currently set capacity is displayed.<br>For changes delete display using C and enter the desired value via the numeric keyboard. Confirm input with TARE.<br>The currently set readability is displayed, for changes see step 3 "Readability". | "CAP"<br>⇩<br>"dESC" "0.00"<br>⇩<br>"SEL" "0.00 100"<br>⇩<br>"InC" "1" |
| 3. **Readability**<br>⇨ Press TARE, the currently set readability is displayed.<br>Select the desired setting by REF and acknowledge on TARE. | "div"<br>Display at selection reference balance<br>⇩<br>"InC" "1" |

| | |
|---|---|
| 4. Automatic zero point correction (**Autozero**) by changing the display, digits selectable (0.5d, 1d, 2d, 4d)<br>⇨ Press TARE, the currently set value is displayed.<br>Press REF to select the desired setting (0.5d, 1d, 2d, 4d) and acknowledge by pressing TARE. |  |
| 5. **Zero setting range**<br>Load range where the display after switching-on the balance is set to zero<br>⇨ Press TARE, the currently set zero setting range is displayed.<br>Press REF to select the desired setting (0 %, 2 %, 5 %, 10 , 20 %) and acknowledge by pressing TARE. |  |
| 6. **Zero setting range**<br>Load range where the display is set to zero by pressing →0←<br>⇨ Press TARE, the currently set auto-zero range is displayed.<br>Press REF to select the desired setting (0 %, 2 %, 5 %, 10 %, 20 %) and acknowledge by pressing TARE. |  |
| 7. **Password** input for menu block „tECH“<br>⇨ Press TARE, "Pin1" is displayed. Use the numeric keyboard to enter the desired code and acknowledge with TARE.<br>⇨ "Pin2" is displayed, request to repeat the password input. Enter code anew and press TARE to acknowledge. At successful input, "donE" is displayed, at wrong input "FAIL". In this case repeat the code input. |  |

# 7 Second balance interface

When using as counting system, the weighing bridge must be connected with a suitable cable via the second-balance interface.

| **9 pin d-subminiature bushing of the balance** | | **Connection of weighing bridge, e.g. KERN KFP** |
|---|---|---|
| **Pin no.:** | **Balance connection** | |
| Pin 1 or 2 | EXC+ (5V) | see labelling of load cell |
| Pin 4 or 5 | EXC– (0) | |
| Pin 7 | SIG– | |
| Pin 8 | SIG+ | |

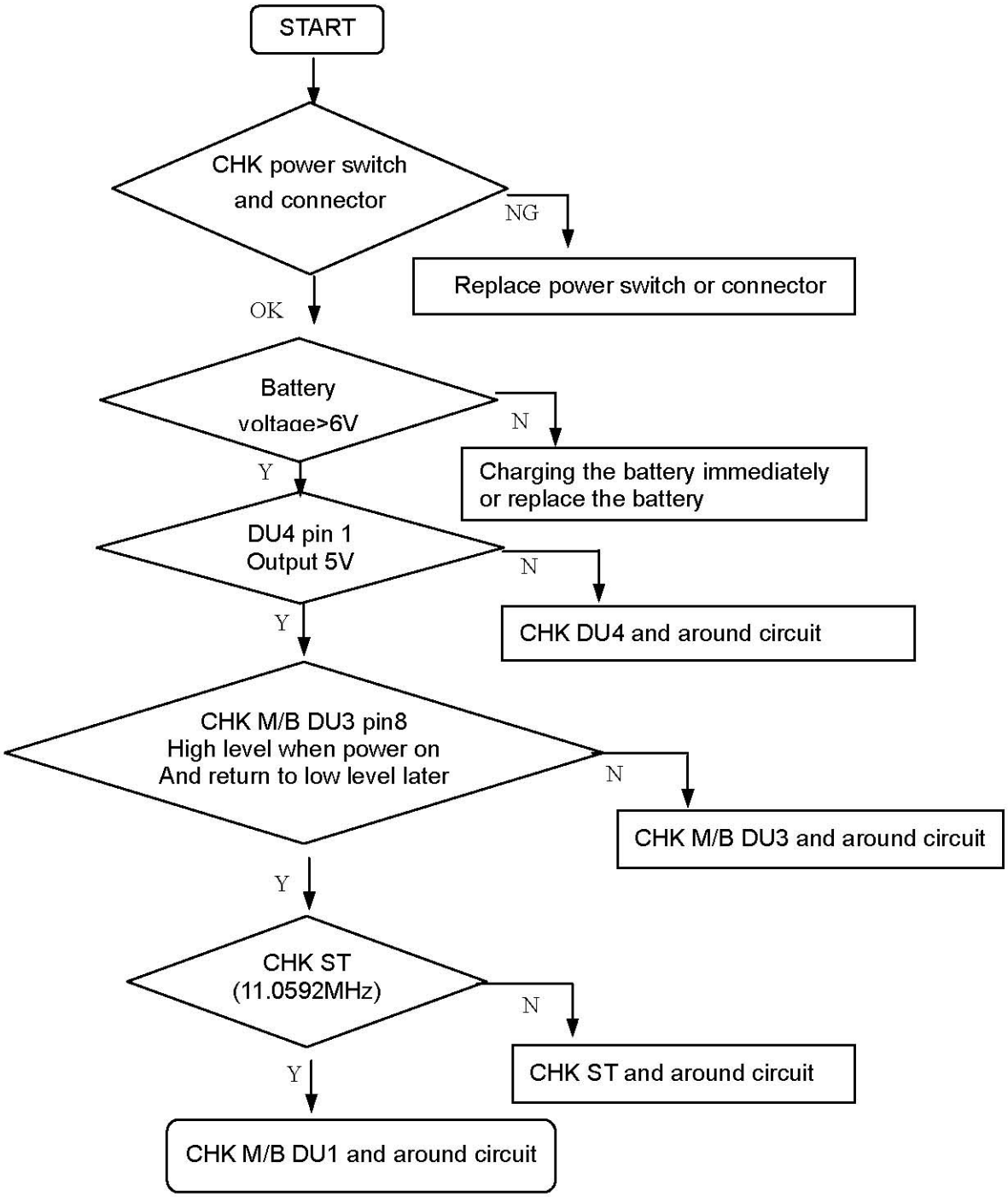
# 8 Error messages

| Error message | Description | Possible causes |
|---|---|---|
| "Err 4" | Zeroing range exceeded due to switching-on balance or pressing →0← (normally 4% max) | • Object on the weighing plate<br>• Overload when zeroing<br>• Improper adjustment<br>• Damaged weighing cell<br>• Damaged electronics |
| "Err 5" | Keyboard error | • Improper operation of the balance |
| "Err 6" | Value outside the A/D changer range | • Weighing plate not installed<br>• Damaged weighing cell<br>• Damaged electronics |
| FAIL H / FAIL L | Adjustment error | • Improper adjustment |

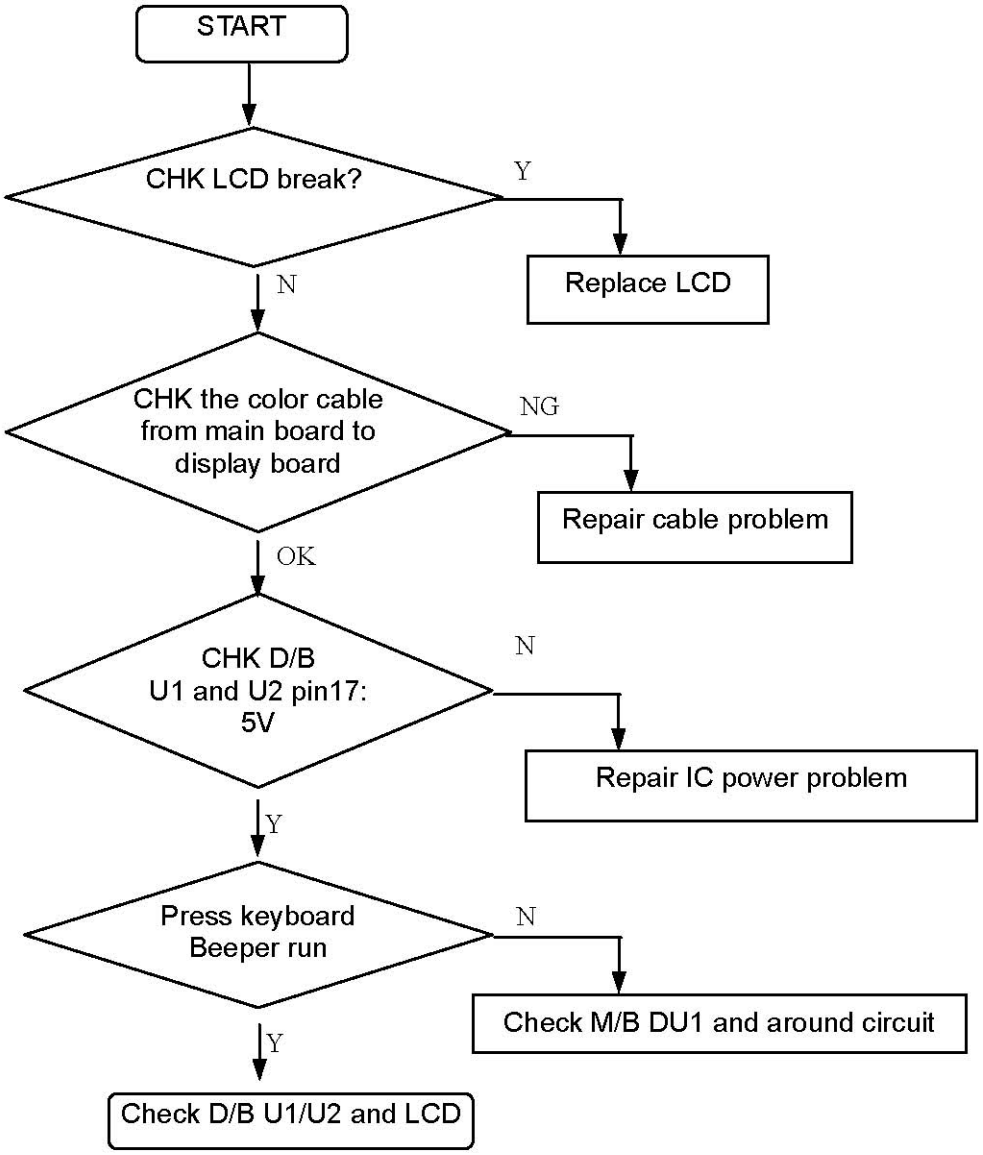
Should other error messages occur, switch balance off and then on again. If the error message remains inform manufacturer.

# 9 Troubleshooting

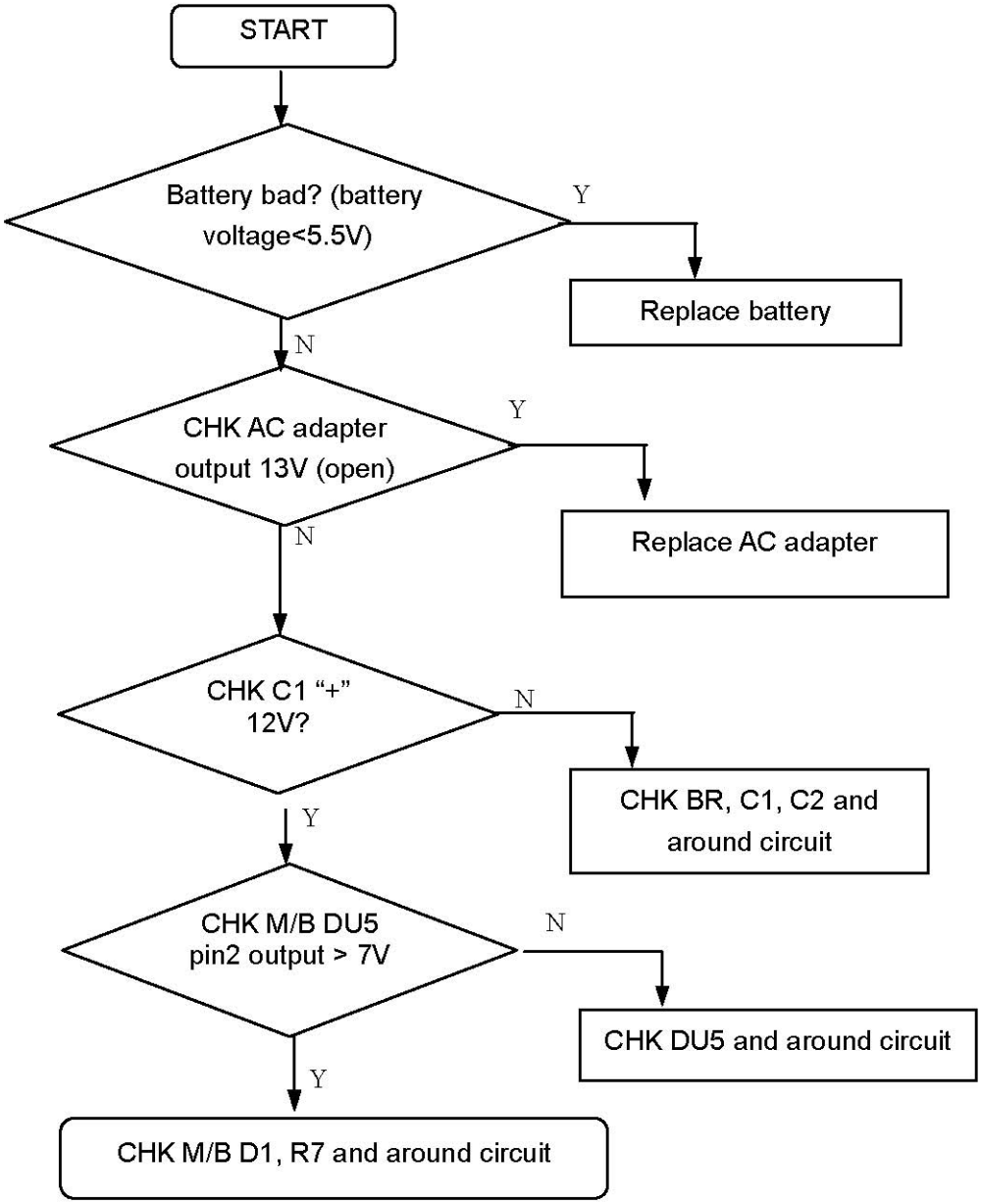
## A. Unit does not turn on



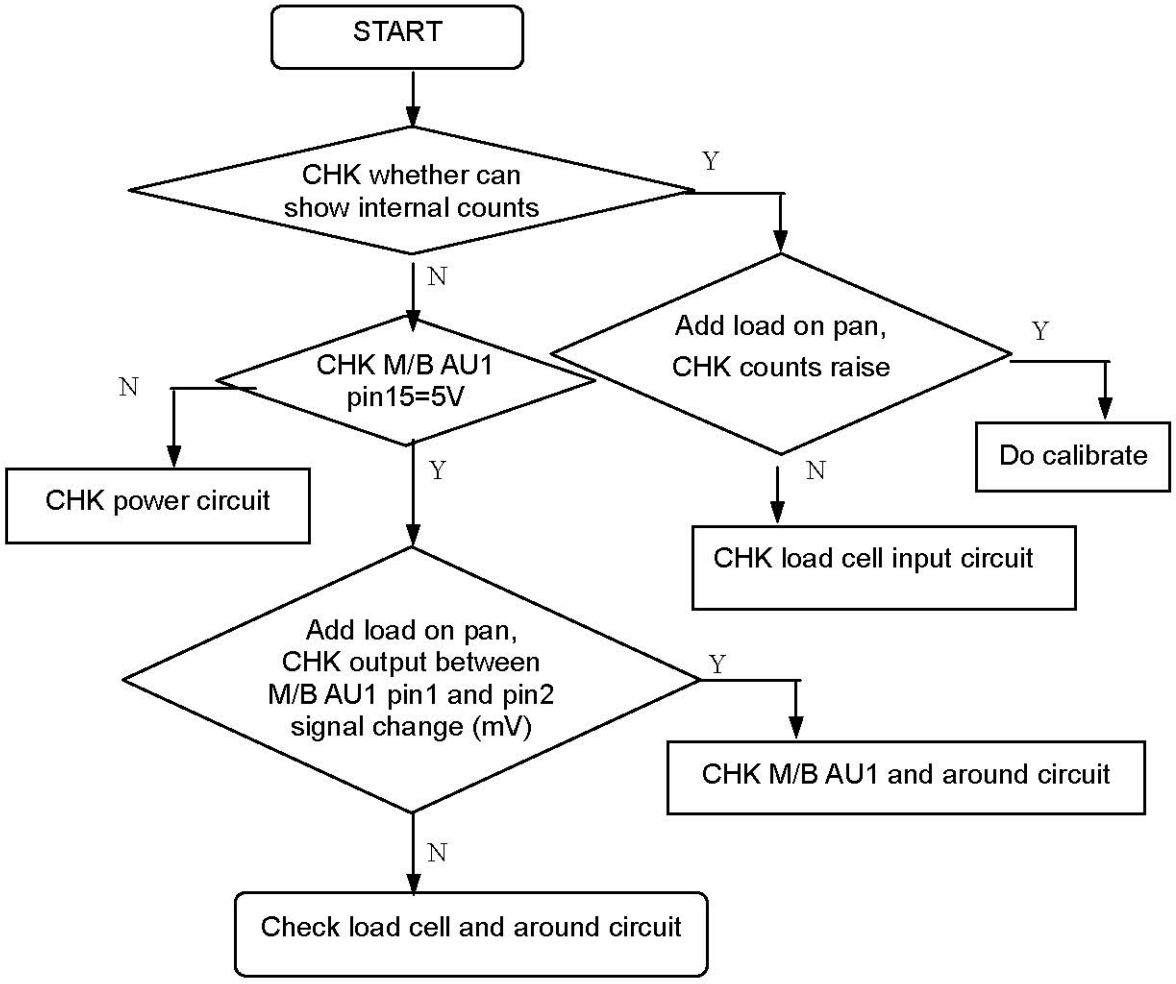
## B. No display indication



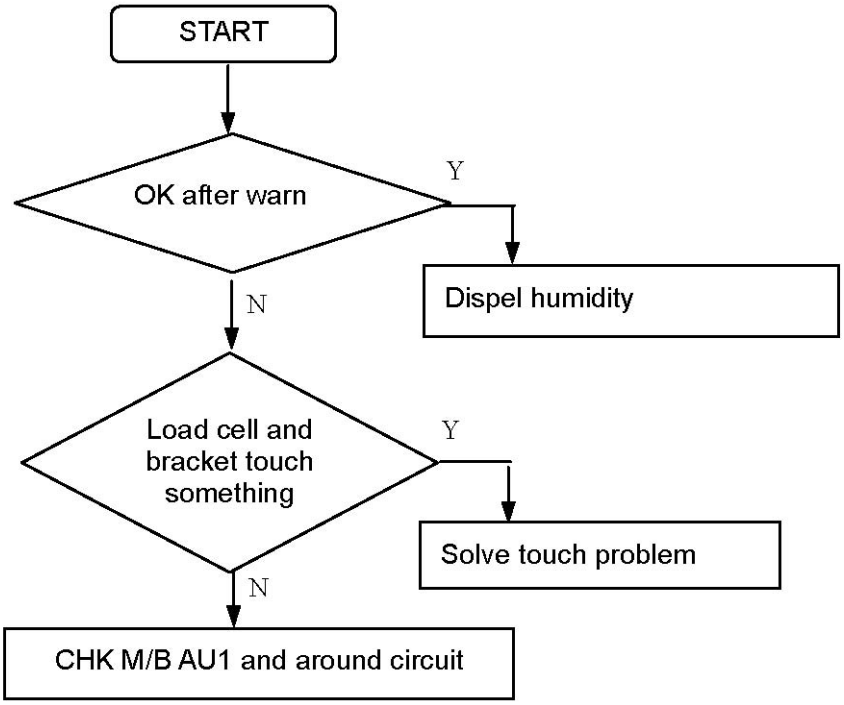
## C. Can’t charge the battery



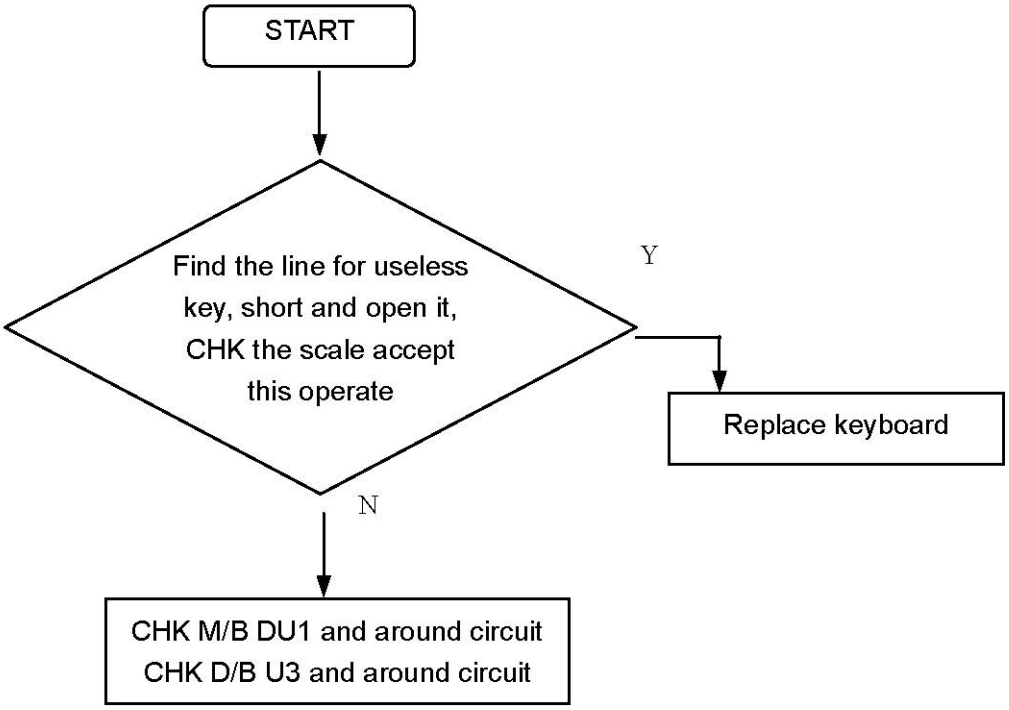
**D. Can’t weigh**


START
CHK whether can show internal counts
Y
N
Add load on pan, CHK counts raise
Y
Do calibrate
N
CHK load cell input circuit
CHK M/B AU1 pin15=5V
N
CHK power circuit
Y
Add load on pan, CHK output between M/B AU1 pin1 and pin2 signal change (mV)
Y
CHK M/B AU1 and around circuit
N
Check load cell and around circuit

## E. Unstable readout




## F. Keyboard without function

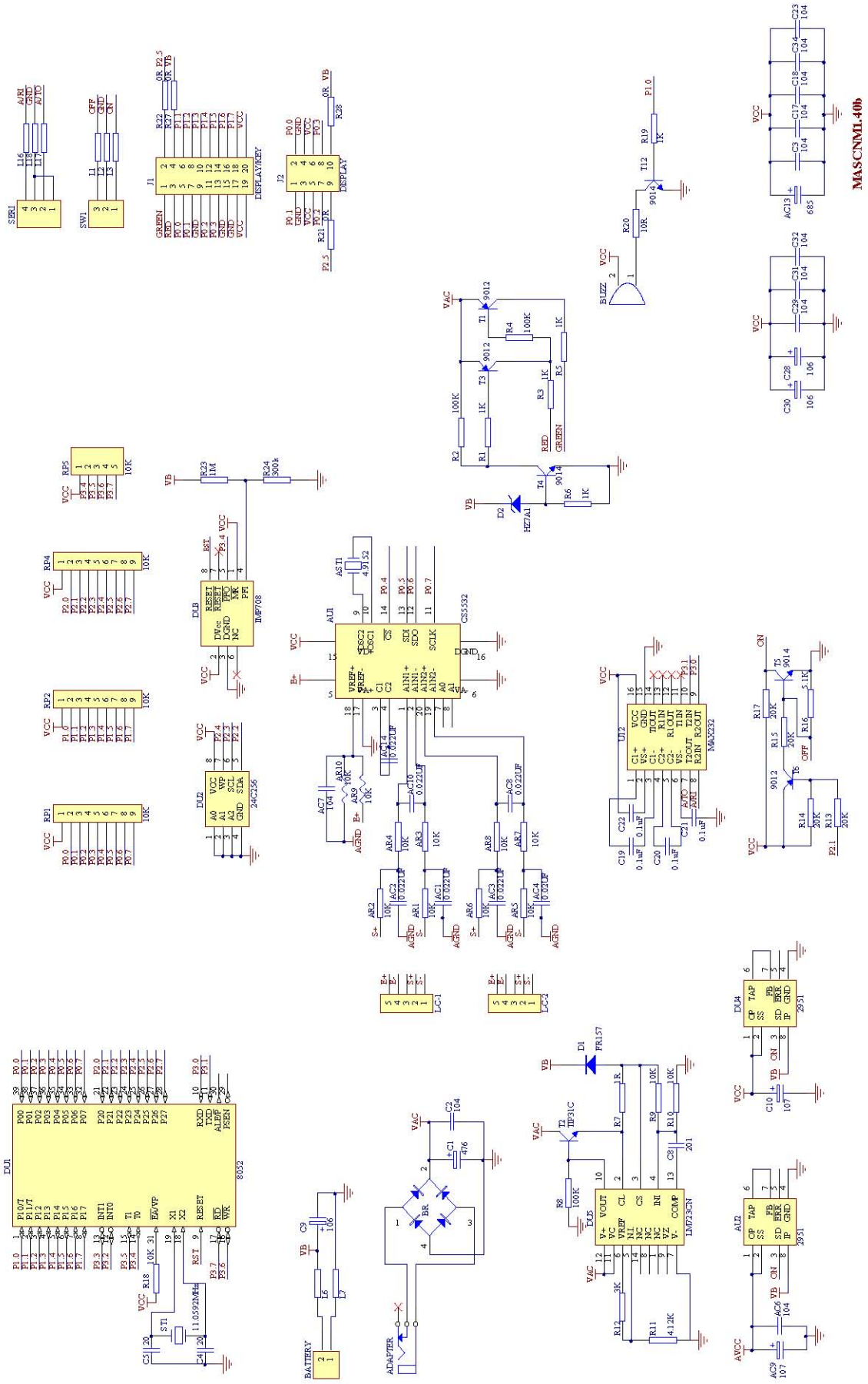



Note:

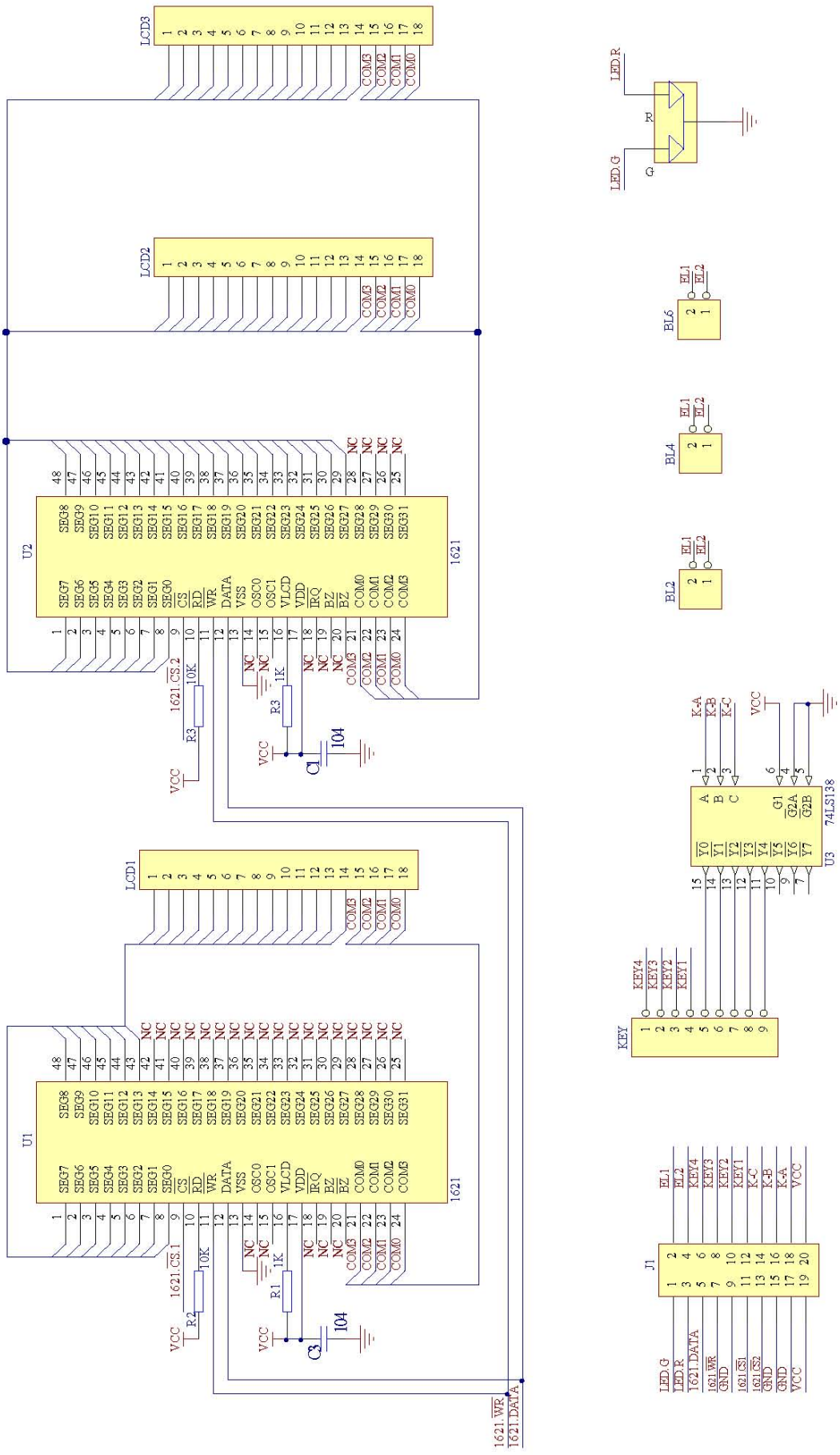
M/B means main board, D/B means display board. CHK means check.

# 10 Schematics

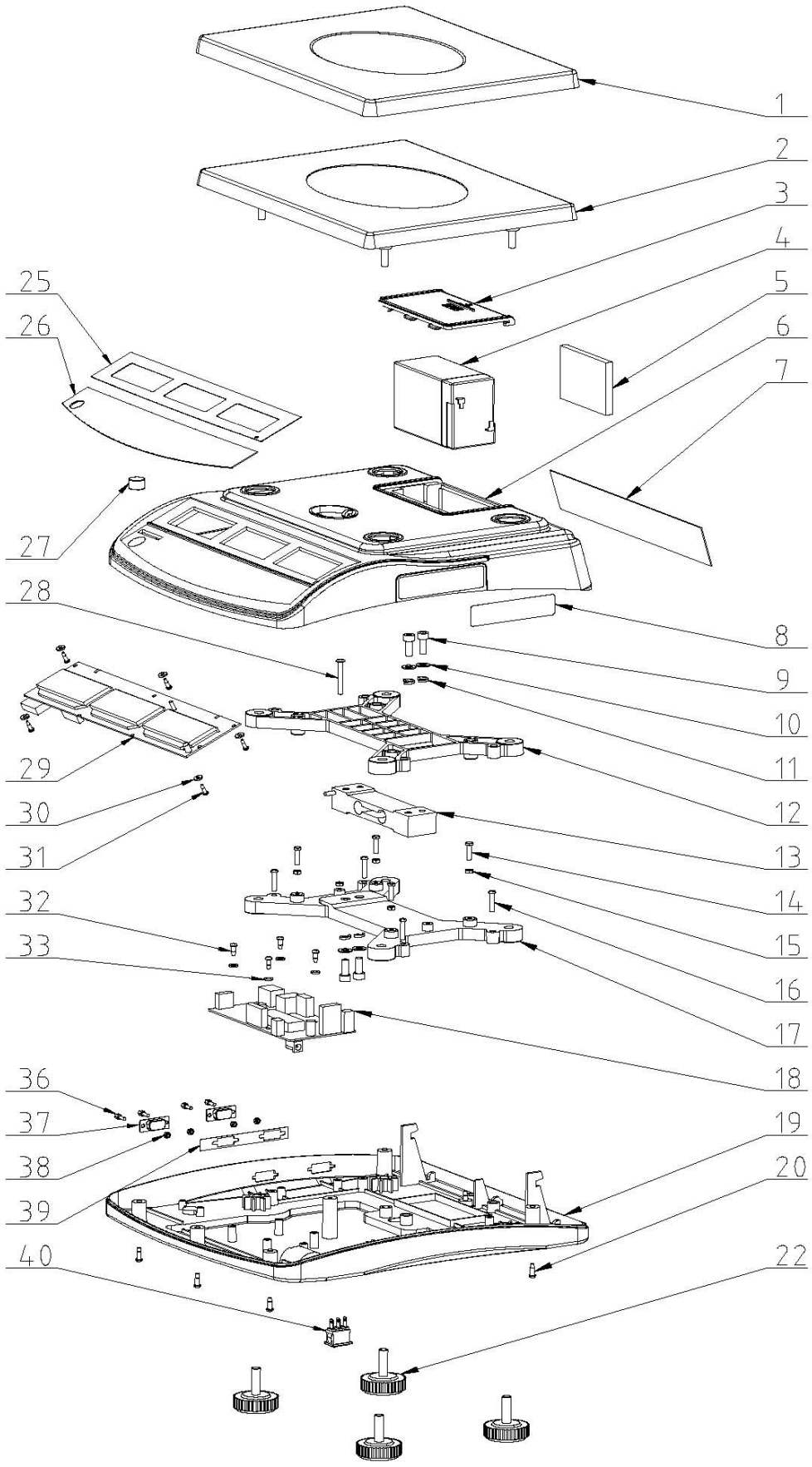
## Main



## Display


LCD3
LCD2
LCD1
U1
U2
1621
LED.R
LED.G
BL6
BL4
BL2
EL1
EL2
K-A
K-B
K-C
VCC
74LS138
U3
KEY
KEY1
KEY2
KEY3
KEY4
J1
1621.CS1
1621.CS2
1621.WR
1621.DATA
GND
R1
R2
R3
10K
1K
104
C1
C3

# 11 Explosion diagram



| No. | Parts name | Qty | Material | Spec |
|---|---|---|---|---|
| 1 | pan | 1 | SST | 230mmx300mm |
| 2 | pan | 1 | ABS | 230mmx300mm |
| 3 | battery cover | 1 | ABS | |
| 4 | rechargeable battery | 1 | lead acid | 6V/4Ah |
| 5 | foam | 1 | CR | |
| 6 | top cover | 1 | ABS | |
| 7 | rear overlay | | | |
| 8 | name plate | 1 | | |
| 9 | internal hexagon screw | 4 | | M6x20, 8.8 |
| 10 | washer (M6) | 4 | 65Mn | 200-300HV |
| 11 | spring washer (M6) | 4 | | HRC42-50 |
| 12 | load cell upper bracket | 1 | Aluminum | |
| 13 | load cell | 1 | | |
| 14 | hexagon screw | 4 | 20Mn | M4x16 |
| 15 | hexagon nut | 4 | | M4 |
| 16 | "+" triangle thread screw | 4 | 20Mn | M4x20 |
| 17 | load cell lower bracket | 1 | Aluminum | |
| 18 | main PCB | 1 | | |
| 19 | bottom cover | 1 | | ABS |
| 20 | self thread screw | 5 | 20Mn | 4x12 |
| 22 | foot | 4 | PVC | |
| 25 | front display overlay | 1 | | |
| 26 | keyboard | 1 | | |
| 27 | level bubble | 1 | | 14.7mm |
| 28 | screw | 1 | | M4x35 |
| 29 | front display PCB | 1 | | |
| 30 | insulative washer | 7 | EDPM | 8x3.1x1.2t |
| 31 | self thread screw | 5 | S18C | 3x12 |
| 32 | self thread screw | 5 | S18C | 4x8 |
| 33 | insulative washer | 4 | EDPM | 10x4.2x1.2t |
| 34 | "+" self thread screw | 2 | 20Mn | 3x10 |
| 36 | screw for D connector | 4 | | |
| 37 | D type connector | 2 | | |
| 38 | hexagon nut for D connecto | 4 | | |
| 39 | RS-232 overlay | 1 | PC | |
| 40 | power switch | 1 | | |