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Service manual
Electronic Moisture Analyzer

KERN DBS

Version 1.0
11/2012
GB



DBS-SH-e-1210

GB

KERN DBS

Version 1.0 11/2012

Service Manual

Electronic Moisture Analyser

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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.

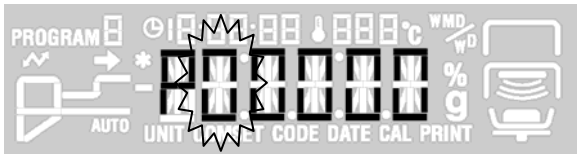
1. Operations for Adjustment

For the general operation method, refer to the User's Manual for the DBS.

1.1 Entering the Service Mode

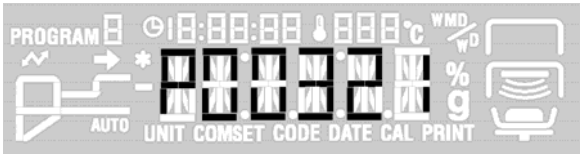
Use the following procedure to switch from the user mode to the service mode.

(1) Hold down the [←] and [ESC] keys for at least 2 seconds. After 2 seconds, a buzzer sounds.
(2) Release the [←] and [ESC] keys.
(3) Within 1 second, hold down the [→] and [TARE] keys for 3 seconds.
(4) The password input display appears.

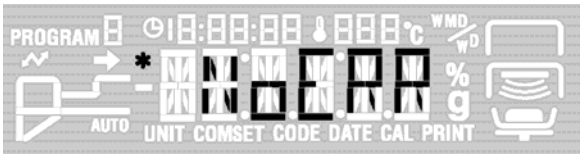


Use the arrow keys to enter numbers.

Enter **00321** as the maintenance mode password and press the [Enter] key.



(5) When the password is approved, the service mode opens.

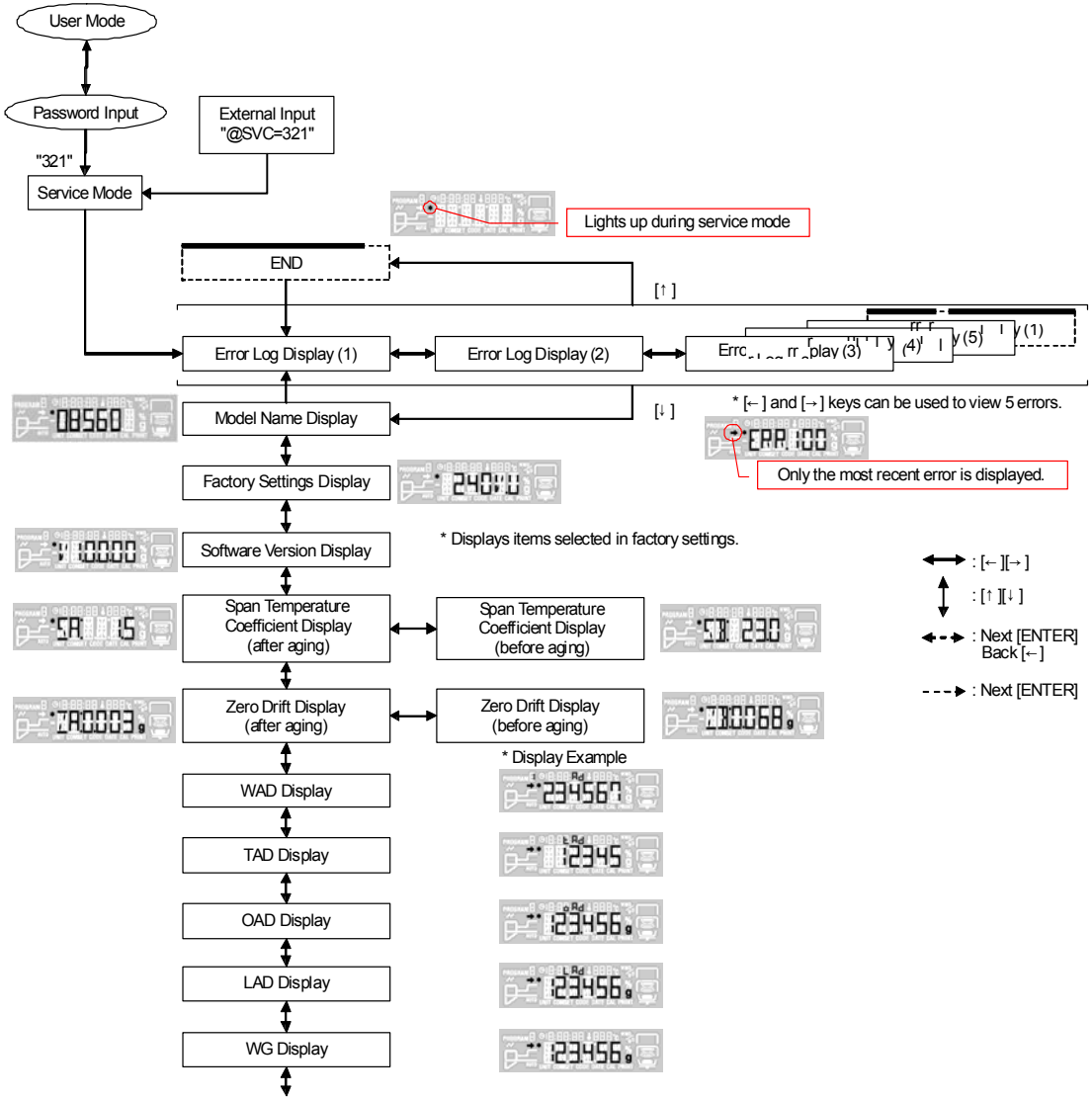


It is also possible to change from the user mode to the service mode by entering the maintenance mode command "@SVC=321" into the computer

.

1.2 Service Menu

The service mode configuration (menu configuration diagram) is shown below.

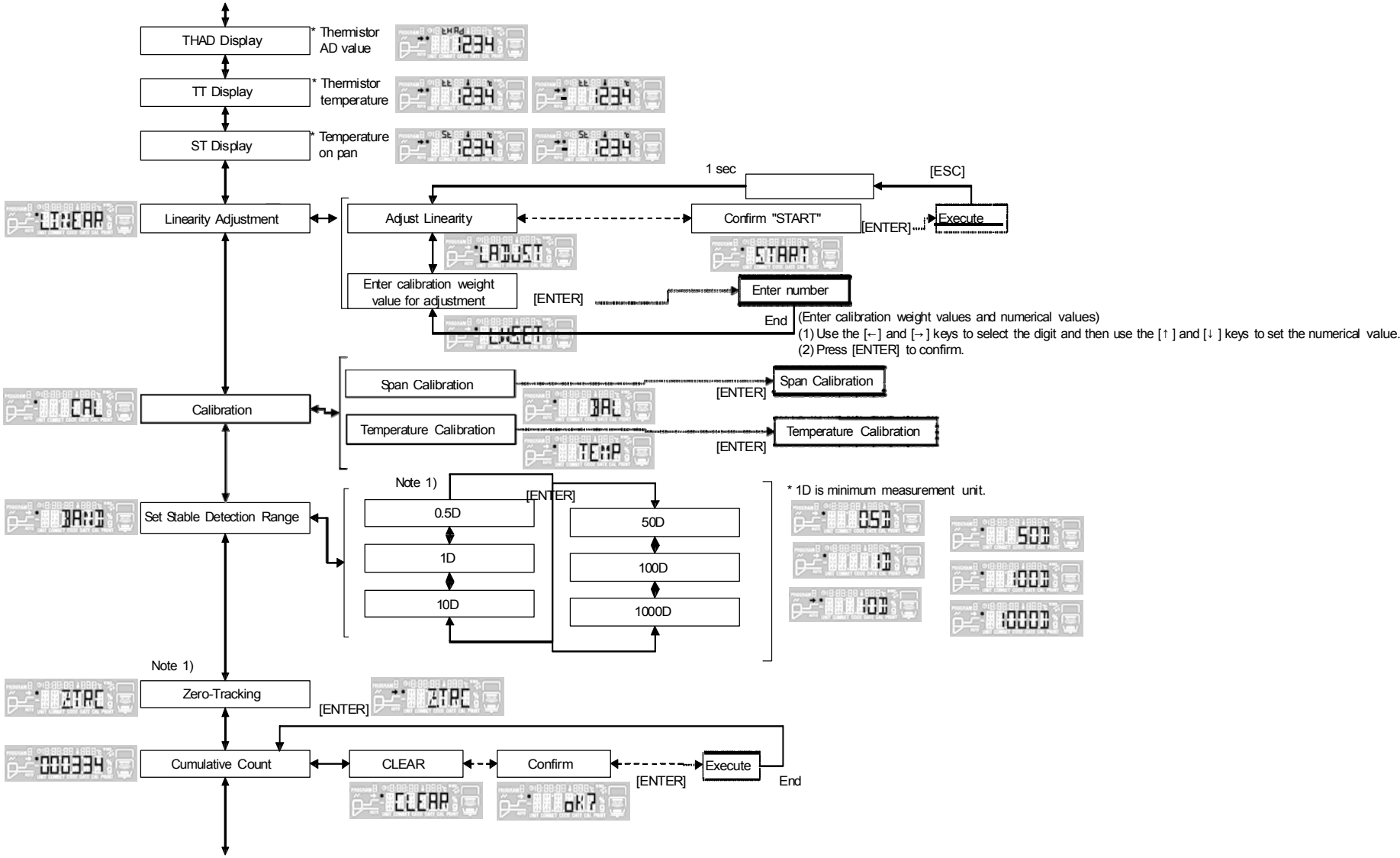


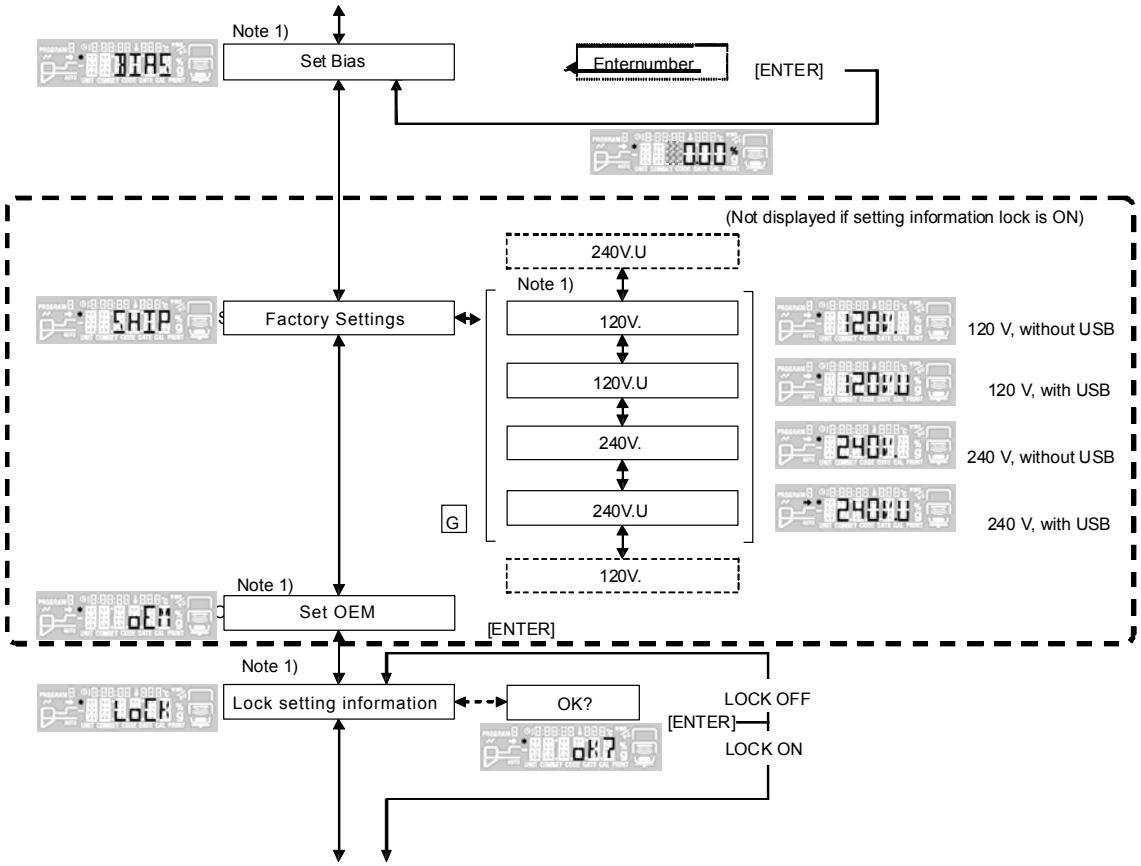
[Normal Range (guideline)]

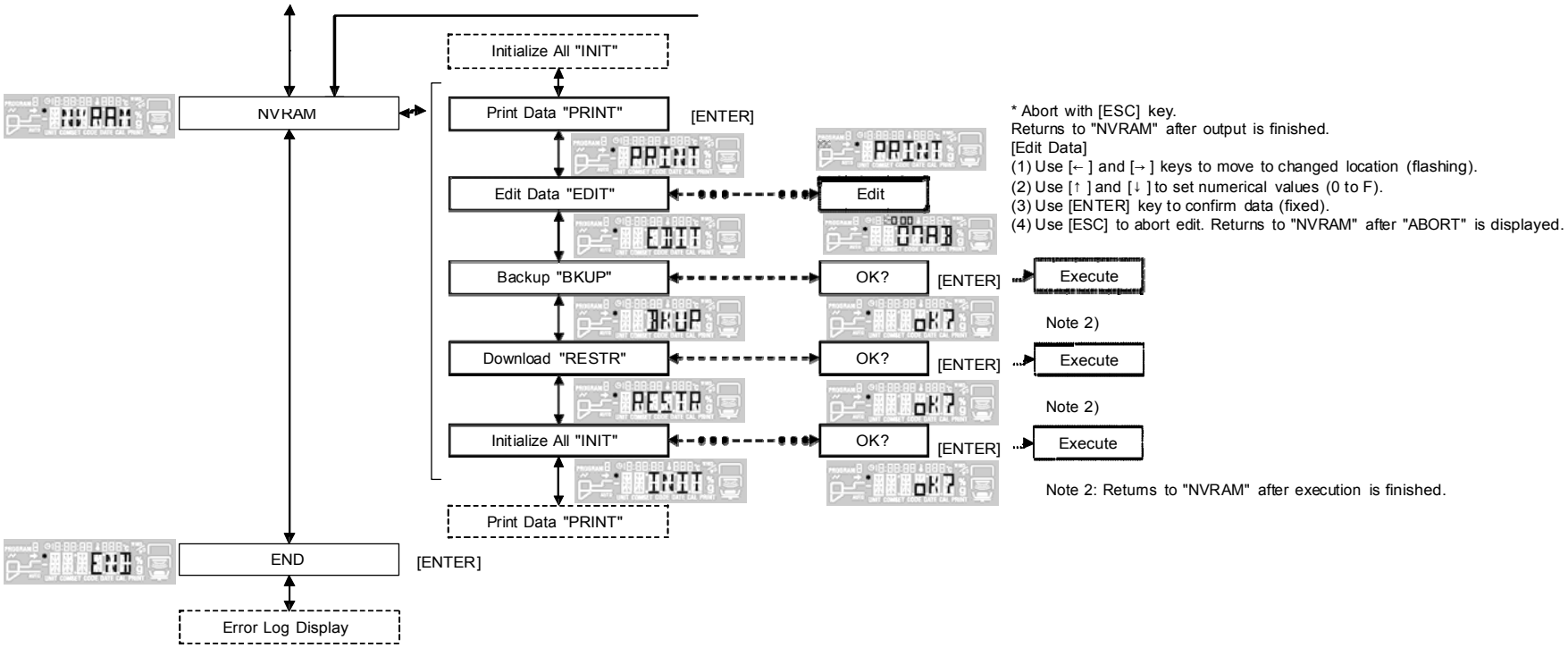
Span after aging	0 to ±3.000 ppm/°C
Span before aging	0 to ±10.000 ppm/°C
Zero after aging	0 to ±0.002 g/°C
Zero before aging	0 to ±0.015 g/°C

	Zero(*1)	Span (60 g)
WAD	300,000 to 800,000	Approx. 1,550,000
TAD (10 to 30 °C)	26,000 to 40,000	
OAD	±10.000 (g)	Weighing capacity (g)
LAD		
WG		
THAD	At TT = 25 °C: approx. 320 to 480	
	At TT = 100 °C: approx. 150 to 220	
TT	Room temperature ±10 °C	
ST	Room temperature ±10 °C	

*1) Loading pan(S14)(t0.3 Aluminum)


THAD Display
* Thermistor AD value
TT Display
* Thermistor temperature
ST Display
* Temperature on pan
1 sec
[ESC]
Linearity Adjustment
Adjust Linearity
Confirm "START"
[ENTER]
Execute
Enter calibration weight value for adjustment
[ENTER]
Enter number
End
(Enter calibration weight values and numerical values)
(1) Use the [←] and [→] keys to select the digit and then use the [↑] and [↓] keys to set the numerical value.
(2) Press [ENTER] to confirm.
Calibration
Span Calibration
[ENTER]
Span Calibration
Temperature Calibration
[ENTER]
Temperature Calibration
Set Stable Detection Range
Note 1)
[ENTER]
0.5D
1D
10D
50D
100D
1000D
* 1D is minimum measurement unit.
Note 1)
Zero-Tracking
[ENTER]
Cumulative Count
CLEAR
Confirm
[ENTER]
Execute
End


Note 1)
Set Bias
Enternumber
[ENTER]
(Not displayed if setting information lock is ON)
240V.U
Note 1)
Factory Settings
120V.
120V.U
240V.
240V.U
120V.
120 V, without USB
120 V, with USB
240 V, without USB
240 V, with USB
G
Note 1)
Set OEM
[ENTER]
Note 1)
Lock setting information
OK?
LOCK OFF
[ENTER]
LOCK ON



Note 1: Stability indicator lights up if the setting is ON.

Note 2: Returns to "NVRAM" after loading is finished.

Use the arrow keys to move between items.

Key	Description
→	Opens lower level menu.
←	Returns to higher level menu.
↓	Moves forward through items.
↑	Moves backward through items.

1.3. Service Mode Functions

Service mode functions are shown below.

Function		Outline
Error display		Displays error codes for errors that have occurred in the user mode. If no errors have occurred when the service mode is opened, the error display does not appear.
Model Name Display		Displays the model name setting. (23 characters)
Software Version Display		Displays the currently installed software version.
Span Temperature Coefficient Display		Displays the span temperature coefficient before and after aging.
Zero Drift Display		Displays the amount of zero drift before and after aging.
AD Value Display	Mass Data (WAD) Display	Displays mass data (smoothed) as received from the AD converter.
	Temperature Data (TAD) Display	Digitally displays voltage from the temperature sensor installed on UniBloc magnet or load cell.
	Temperature-Corrected Mass Data (OAD) Display	Displays temperature-corrected WAD mass data (smoothed).
	Linearity-Corrected Mass Data (LAD) Display	Displays linearity-corrected OAD mass data.
	Absolute Load (WG) Display	Displays mass values corrected by all correction processes in gram units. Displays mass values unaltered by zero setting or tare subtraction.
	Thermistor Temperature (TH) Display	Digitally displays voltage (A/D value) from the thermistor attached to the heater.
	Thermistor Temperature (TT) Display	Displays thermistor temperature (TT) values.
	Pan-Top Temperature (ST) Display	Displays pan-top temperature (ST) values.
Span Calibration		Calibrates sensitivity using the same operations as in the user mode.
Temperature Calibration		Calibrates temperature using the same operations as in the user mode. (This function is used at the factory. Use the temperature calibration function in the user mode for normal calibration.)
Linearity Adjustment		Makes adjustments for calculating linearity correction coefficients.
Stable Detection Range Setting Function		Sets the stable detection range. Select from 0.5D, 1D, 10D, 100D, and 1000D. If the menu is reset, the range is set to 1D.
Zero-Tracking Function		Enables or disables zero-tracking.
Cumulative Count	Cumulative Count Display	Displays a cumulative count of the heater operating time.(1count=15minutes)
	Clear Cumulative Count	Clears the cumulative time count of heater operation.
Bias Setting Function		Sets the correction value for measurement values (normally set to zero).
Factory Settings		Specifies the voltage used and whether or not there is an optional USB.
OEM		Sets (or cancels) the OEM model.

Setting Information Lock		Disables changing model, OEM, factory, and serial number settings. **The balance error check function is only enabled when settings are locked. Be sure to lock setting information before handing over the system to the customer.**
EEPROM	Print Data	Outputs data stored in the EEPROM to the dedicated printer.
	Edit Data	Edits data stored in the EEPROM using the balance display unit.
	Backup	Backs up the temperature correction coefficient, linearity correction coefficient, and model setting status data stored in the EEPROM to flash memory.
	Download	Writes to the EEPROM the data backed up in flash memory.
	Initialize All	Initializes all data saved in the EEPROM.
End		Ends the service mode.

2. Disassembling and Assembling the Balance

2.1 Precautions

1) Pull connectors straight out when disconnecting. Never pull them out at an angle.
   * **Pulling connectors out at an angle could bend the terminal pins, making it difficult to re-insert the connector.**

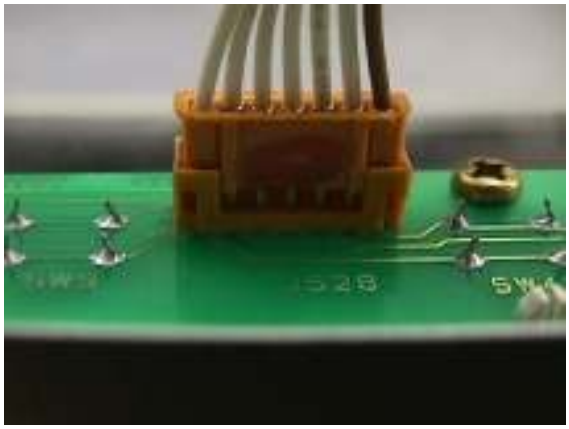


Fig. 1

2) Before disassembling or assembling the MOC unit assembly (1) related parts, insert the lever positioning pin (J1) into the lever fastener hole on the top of the OPF, up to the reference line.
   Note: Insert the pin while slightly lifting up the lever assembly (U7). Be careful not to damage the elastic support.

3) Use a controlled torque driver to tighten the screws to the torques shown in the table below.

Screw	Torque [cN•m]
M2	10
M2.5	25
M3 pan head	90
M3 hexagonal socket head bolt	150
M4 pan head	180
M4 hexagonal socket head bolt	300 (*1)

(*1) 80 [cN• m] for only the sensor shaft

4) To retighten self-tapping screws, carefully align the threads so they are not damaged.
   Note: Turn the screw counterclockwise until it drops back into the screw hole, and screw it in to tighten.

2.2 Removing the Case

Disassembly

1) Remove the power cord from the moisture analyzer, open the heater cover, and remove the sample pan(S14),the pan supporter assembly (S11), windbreak (S12), and heater insulation plate (S13) (Fig. 1).

2) Remove the M3×8 flat head screws (S52) from the back of the balance (Fig. 2).



Fig. 1



Fig. 2

3) Remove the P4 M4×16 screws (S53) from the base plate, along with the grounding spring (S4), slightly lift the back of the case assembly (S2), and then shift it forward to separate it from the base (Fig. 3).
4) Place the case assembly (S2) behind the base not to be damaged on cushion.(Fig. 4).

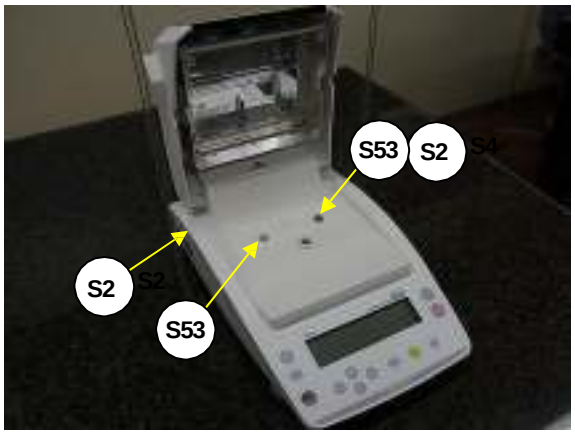


Fig. 3



Fig. 4

5) Disconnect the four cables connected to the case assembly (S2) from J2,J3,J4 and J5 connector of power board assembly (B4) (Fig. 5).
6) Remove the P4 M4×8 screw (S51) from the boss located to the side of the power board assembly (B4) and remove the FG ground cable (H8) (Fig. 6).

Note: The main board assembly (B2) and power board assembly (B4) can be inspected in this state.

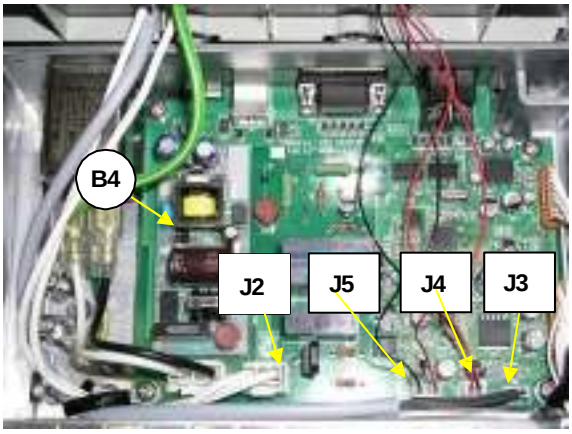


Fig. 5

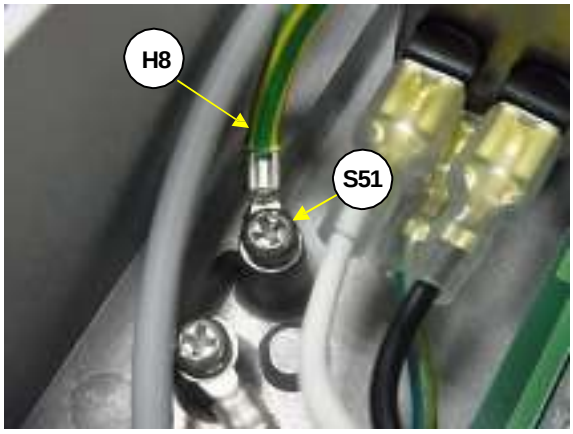


Fig.6

Assembly

1) Place the case assembly (S2) behind the base (Fig. 4).
2) Fasten the FG ground cable (H8) to the boss located to the side of the power board assembly (B4) using the P4 M4×8 screw (S51) (Fig. 5).
3) Connect the four cables from the case assembly (S2) to J2,J3,J4 and J5 conncetor of the power board assembly (B4) (Fig. 5).

Note: Route the thermistor cable(J3) by pressing it into the gap between the base (B1) wall and the power board assembly (B4).

Note: Use clamps to route the thermistor(J3) and heater lines(J2) away from the power supply line and power board assembly (B4).

4) Attach the case assembly (S2) to the base assembly (S1) by hooking it on the flange on the front of the base assembly (S1), being careful not to pinch any wires between the case and base, and fasten it with the M3×8 flat head screws (S52) on the back side of the balance (Fig. 7).
5) Fasten the P4 M4×16 base plate screws (S53), together with the grounding spring (S4)on right side, to the case assembly (S2) (Fig. 3).
6) Install the heater insulation plate (S13), windbreak (S12) , pan supporter assembly (S11) and sample pan(S14) n this order (Fig. 1).



Fig. 7

7) Level the balance by turning the two level adjusters (B6) at the front of the balance so that the bubble in the level gauge is centered.
8) Connect the power cord and confirm that the balance portion of the moisture analyzer functions properly.
   When the display stop “check” after pressing the power key,press “←”key and “ESC” key for 3 seconds at the same time to be the gram display.

2.3 Replacing Components

2.3.1. Replacing the Thermal Fuses (S18)

1) Remove the fuse holder by inserting a flat head screwdriver below inside the filter (B11) fuse holder (Fig. 8).
2) Remove the two fuses (S18) from the fuse holder (Fig. 9).
3) Install two new fuses (S18) by reversing steps 1 and 2 above.

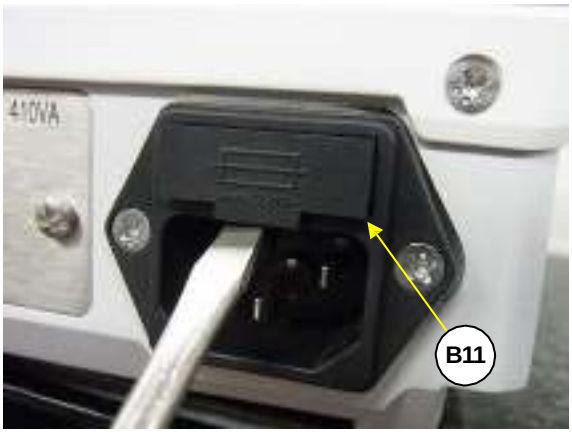


Fig. 8

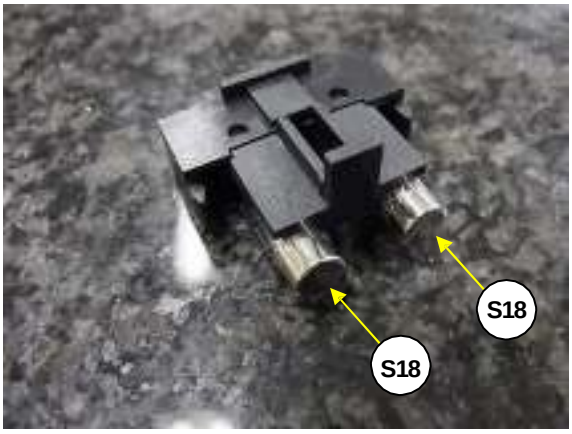


Fig. 9

2.3.2 Replacing the Main Board Assembly (B2)

1) Disassemble the balance down to the case assembly (S2) by following the procedure in 2.2 Removing the Case.
2) Remove the three P4 M4×8 screws (B53) that fasten the main board assembly (B2) (Fig. 10).

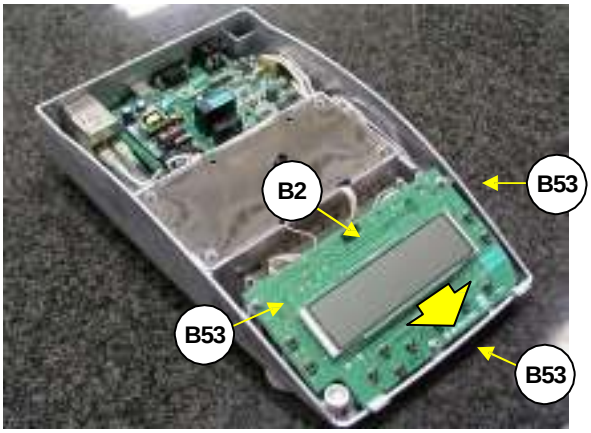


Fig. 10

3) Disconnect the three cables from connectors J1, J2, and J4 on the main board assembly (B2)and separate from base assembly.
4) Remove the two EEMPROM from its socket on the back of the main board assembly (B2), being careful not to damage its pins.
   M4: Moisuture analyzer's memory function M5: Balance's fixed information
5) Install the EEPROM on the same place of the new main board assembly (B2).
6) Install the new main board assembly (B2) by reversing steps 2 to 6 above.

Note: When assembling, install the main board assy(B2) setting front side of the base assy(B1)

2.3.3 Replacing the Analog Board Assembly (B3)

1) Disassemble the balance down to the main board assembly (B2), in the same manner as described in 2.3.2. Replacing the Main Board Assembly (B2), steps 1 to 3.
2) Disconnect the three cables from connectors J1, J2, and J3 on the analog board assembly (B3), loosen the four P4 M4×8 screws (53)and then remove the analog board cover plate (B14) (Fig. 11).
3) Loosen and remove the two P4 M4×8 screws (B22) that fasten the analog board assembly (B3) (Fig. 12).

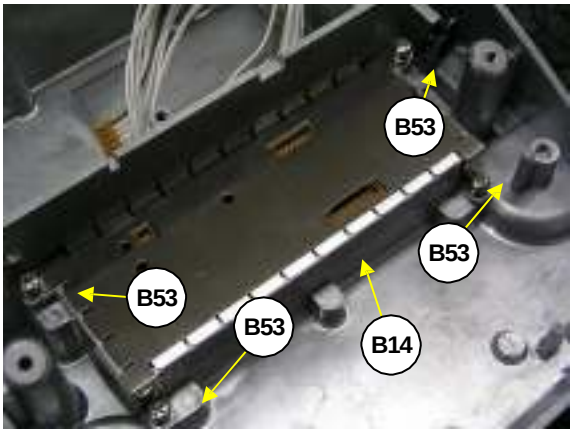


Fig. 11

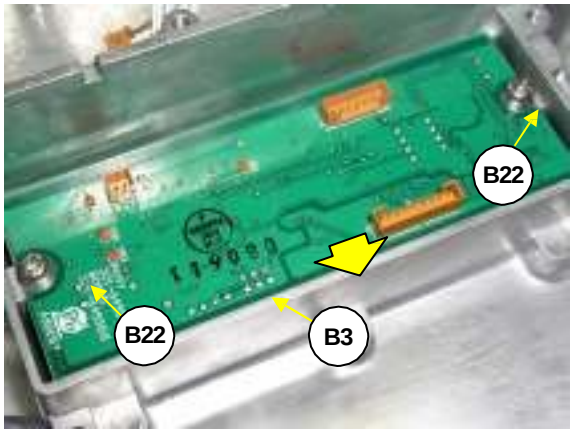


Fig. 12

4) Install a new analog board assembly (B3) by reversing steps 2 and 3 above.

Note: When assembling, install the analog board assy(B3) setting front side of the base assy(B1) (Fig.12)

Note: When assembling, use clip CS-5 (B26) to securely hold the power board assembly (B4)

cable down toward the bottom (Fig. 13).

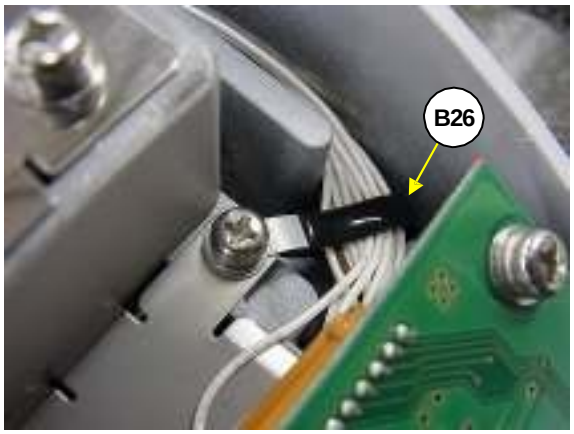


Fig. 13

2.3.4 Replacing the Power Board Assembly (B4)

1) Disassemble the balance down to the case assembly (S2) by following the procedure in 2.2 Removing the case.
2) Loosen the two M3×6 bind screws (B55) (Fig. 14).
3) Remove the two D-sub screws (B25) that fasten the power board assembly (B4) and rear panel (B5), and remove the rear panel (Fig. 15).



Fig. 14

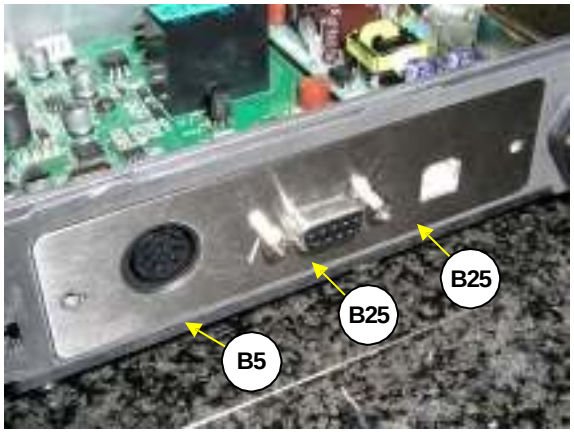


Fig. 15

4) Disconnect J1l cables connected to the power board assembly (B4) (Fig. 16).
5) Loosen the four P4 M4×8 screws (B53) that fasten the power board assembly (B4), and remove the board along with clip CS-5 (B26) (Fig. 16).
   Note: The power board assembly (B4) can be removed by lifting it up at an angle, as shown in Fig. 17.
6) Disconnect J9 and J10 cables connected to the power board assembly (B4) (Fig.17)

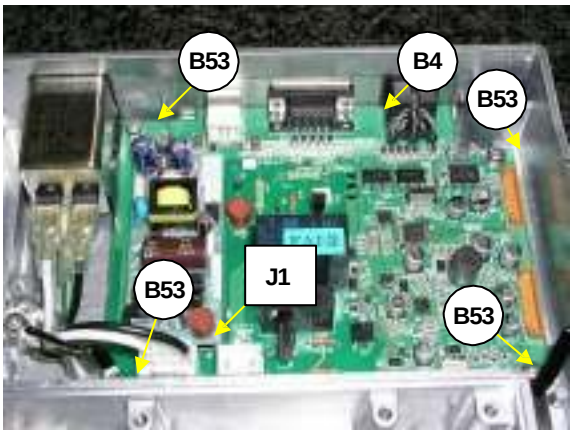


Fig. 16

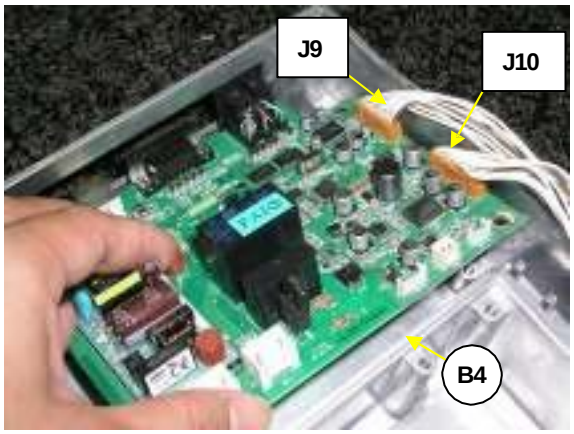


Fig. 17

7) Install a new power board assembly (B4) by reversing steps 1 to 5 above.

Note: When assembling, use clip CS-5 (B26) to securely hold the power board assembly (B4) cable down toward the bottom (Fig. 18).

Note: When assembling, tighten screws of procedure 5 temporally and tighten firm after tightening screw of procedure 2 and 3.

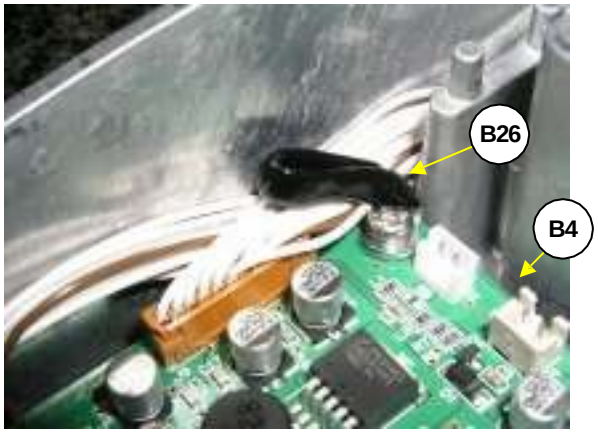


Fig. 18

2.3.5 Replacing the Inlet Assembly (S11)

1) Disassemble the balance down to the case assembly (S2) by following the procedure in 2.2 Removing the case.
2) Loosen the two screws,pan head M3x8(B52) that fasten the inlet assembly(S11).(Fig.19)
3) Disconnect the cables connected to the J1 connector of the power board assembly(B4),(Fig.20)
4) Loosen the screw P4 M4x8(B53)(Fig.20)
5) Remove the inlet assembly(S11) from rear side of the base assembly(B2)
6) Install a new inlet assembly (S11) by reversing steps 1 and 5 above.

Note: When assembling, install the inlet assembly (S11) printed face top. (Fig.19, 20)

Note: When assembling, align the cables of the inlet assembly (S11) as shown. (Fig.20)



Fig.19

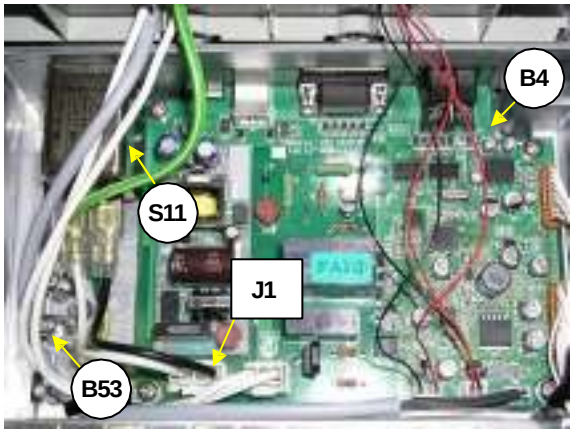


Fig.20

2.3.6 Replacing the DBS Unit Assembly (U1)

1) Disassemble the balance down to the case assembly (S2) by following the procedure in 2.2 Removing the case
2) Loosen the five P4 M4×16 screws (62) and remove the upper unit cover (24) and lower unit cover (23) (Fig. 21).
   Note: There is no screw on 2 position of rear center in this status,since fasten with case assembly(S2)
3) Insert the lever positioning pin (J1) into the lever fastener hole on the top of the OPF, up to the reference line.
4) Disconnect the cables from connectors J2 and J3 on the analog board assembly (B3) (Fig. 22).

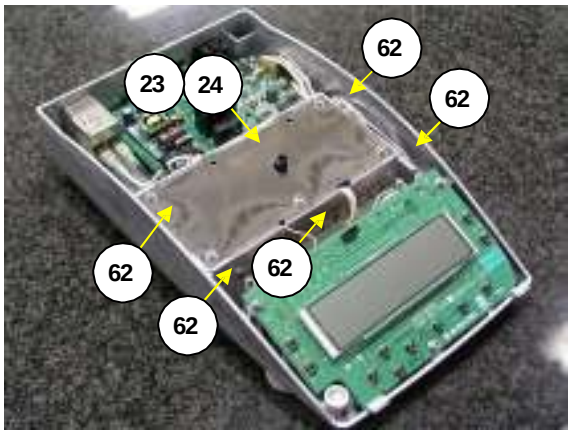


Fig. 21

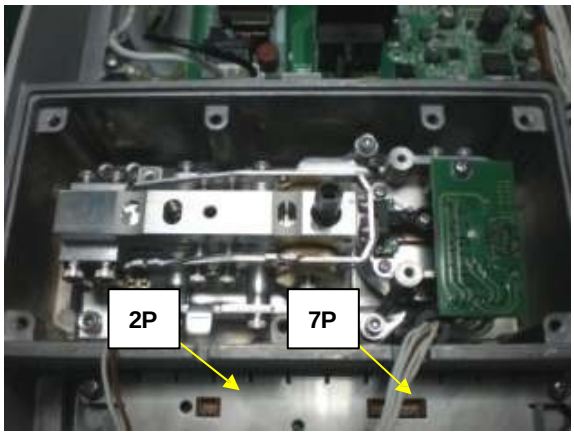


Fig. 22

5) Loosen and remove the four P4 M4×14 socket head bolts (61) that fasten the DBS unit assembly (U1) (Fig. 23).
   Note: When lifting the DBS unit assembly (U1), do not hold it by the parallel guides or movable posts.

6) Install a new DBS unit assembly (U1) by using a unit assembly positioning jig (J8) to position the assembly and reversing steps 2 to 5 above (Fig. 24).
   Note: Be careful not to pinch wires when installing the unit cover.

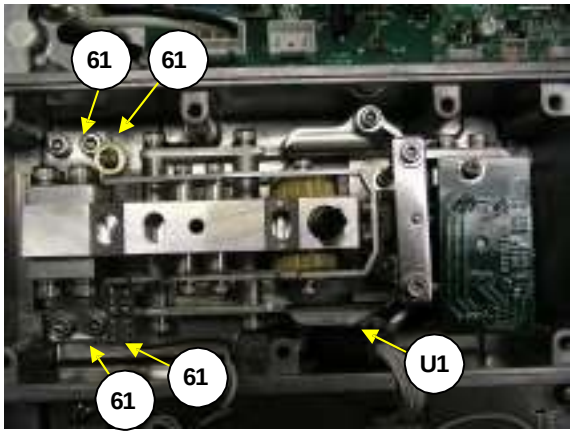


Fig. 23

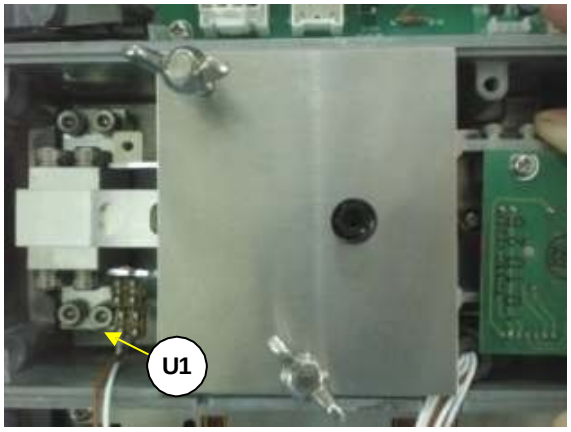


Fig. 24

7) Confirm the tilt error and cornerload error levels according to "4.2 Adjusting the Tilt Error" and "4.3 Adjusting the Cornerload Error." If the error exceeds allowable levels, adjust the tilt or cornerload.
8) Enter the attached EEPROM (temperature coefficient) data into the replacement unit assembly (see 4 *2).

   Temperature Coefficients at Address Numbers 00CA to 0131、 ~~00CAto0011~~, 05A0 to 05AF, ~~and0112to0131~~

2.3.7 Replacing the Detector Assembly (U11)

1) Remove the DBS unit assembly (1) using the same procedure as described in 2.3.6 Replacing the DBS Unit Assembly (U1).
2) Unsolder the temperature sensor cables connected to the detector assembly (U11) (Fig. 25).
   Note: Yellow wire is for TP1 and blue wire is for TP2
3) Disconnect connector J25 on the ILS 7S-7S-140 cable (U19), which is connected to the detector assembly (U11).
   Note: When disconnecting the connector, be careful not to contact the lever assembly (U7) and damage the elastic support.
4) Loosen and remove the two P3 M3×10 socket head bolts (U53) that fasten the detector assembly (U11) (Fig. 26).

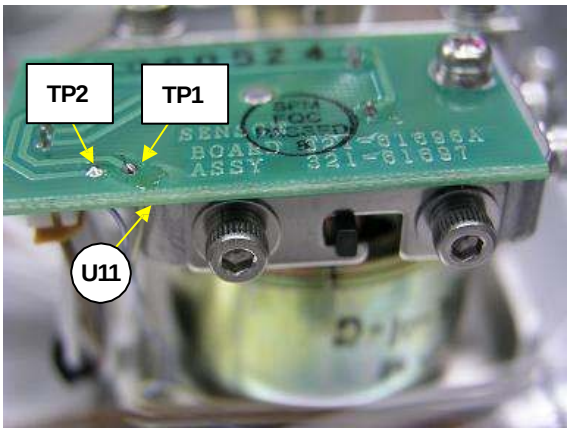


Fig. 25

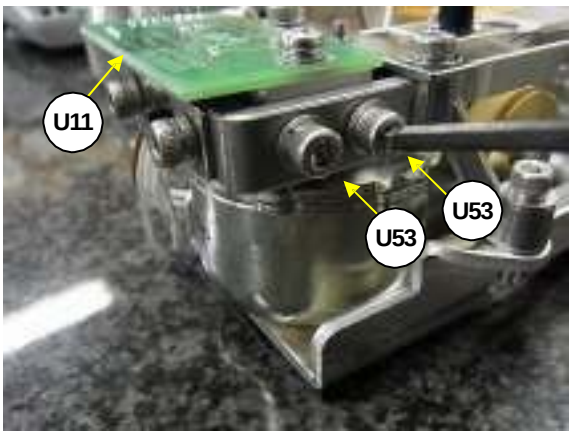


Fig. 26

5) Install the detector assembly (U11) by reversing steps 4 to 7 above.
6) Adjust the detector height according to 4.1.1 Adjusting the Detector Assembly (U11) Height.
7) Reassemble by reversing steps 1 to 4 above.

Note: Securely clamp the ILS 7S-7S-140 cable (U19) in a slack state, as shown, to prevent any pulling or upward pushing forces from acting on the detector assembly (U11) (Fig. 27).

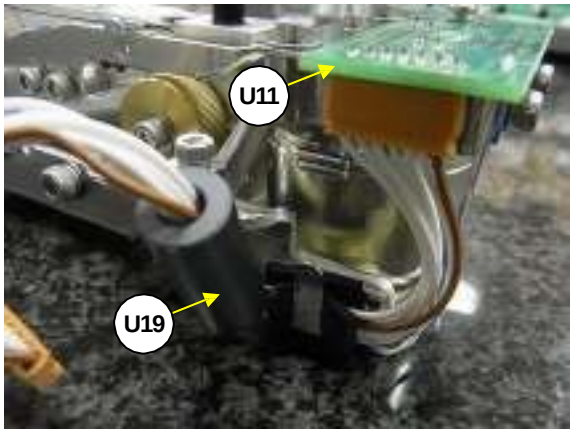


Fig. 27

2.3.8 Replacing the Force Coil Assembly (L1)

1) Remove the DBS unit assembly (1) using the same procedure as described in 2.3.6 Replacing the DBS Unit Assembly (U1).
2) Remove the solder on the lever assembly (U7) side of the two Pt-Ni bands (U17).
   Note: Do not break or scratch the Pt-Ni bands (U17).
3) Loosen and remove the two P3 M3×15 socket head bolts (U58) that fasten the detector frame (U10) (Fig. 28).
4) Loosen the four M2.5×6 (U54) screws that fasten the four magnetic lids (U16), and remove the magnetic lids (U16) by sliding them out to the side (Fig. 29).

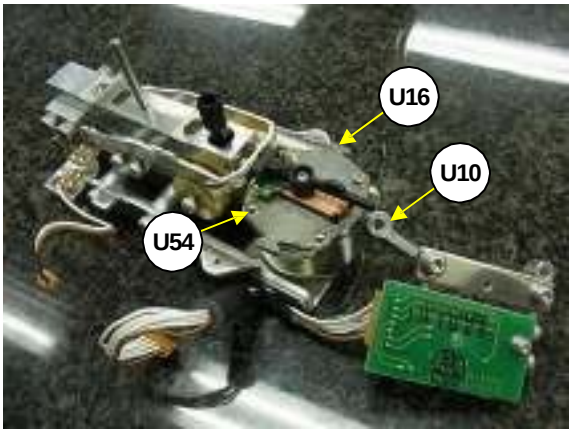


Fig. 28


Fig. 29

5) Remove the four P3 M3×15 socket head bolts (58) that fasten the lever assembly (U7), and remove the lever assembly (U7) from the top.
6) Unsolder the twisted wire (L7) from the terminal plate on the force coil assembly (L1).
7) Loosen and remove the M2.5×6 screws (L5) and M2.6 PB SPG washers (L6) used to fasten the force coil assembly (L1).
8) Tentatively fasten the new force coil assembly (L1) to the lever assembly (U7) using the M2.5×6 screws (L5) and solder the twisted wires (L7) to the force coil assembly (1) (Fig. 30).
   Note: The yellow wire is on the left and the blue wire on the right, as viewed from where the lever assembly (U7) is attached.
9) Insert the lever assembly (U7) from the top of the unit and tentatively fasten it with four P3 M3×15 socket bolts (58).
10) The stopper plate (U14) and the lever stopper (U15) are attached to the detector frame (U10). Pass the pin on the lever assembly (U7) through the pin hole in the stopper plate (U14) and pass the

protruding part of the lever assembly (U7) through the slit in the lever stopper (U15) at the same time. Tentatively fasten the detector frame (U7) with two P3 M3×15 socket head bolts (58).

11) Insert and position a gap setting shim (J3) between the bottom of the lever shutter on the end of the lever assembly (U7) and the bottom of the slit in the lever stopper (U15), and fasten it with four P3 M3×15 socket head bolts (58) (Fig. 31).

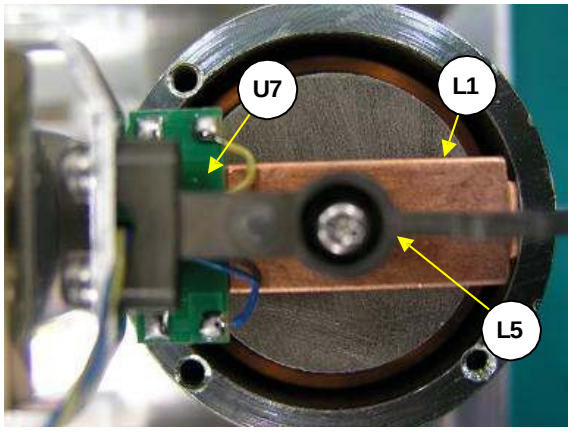


Fig. 30

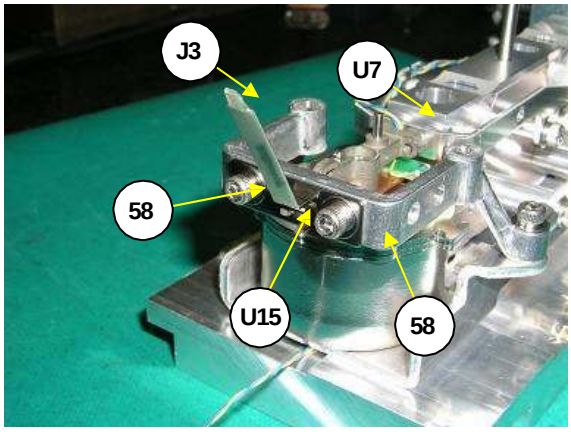


Fig. 31

12) Remove the tentatively fastened detector frame (U7).
13) Viewing the DBS unit assembly (U1) from above, fasten the force coil assembly (L1) with the center of the magnet assembly (U9) and force coil assembly (L1) aligned.
14) Install the four magnetic lids (U16) by sliding them in from the side and fasten them with the four M2.5×6 screws (U54).
15) Again, pass the pin on the lever assembly (U7) through the pin hole in the stopper plate (U14) and pass the protruding part of the lever assembly (U7) through the slit in the lever stopper (U15) at the same time. Fasten the detector frame (U10) with the two P3 M3×15 socket head bolts (58).
16) Solder the two Pt-Ni bands (U17) to the lever assembly (U7).
Note: Make sure the Pt-Ni bands do not twist or bend during soldering.
17) Align the hole in the stopper plate (U14) with the pin on the lever assembly (U7), and fasten it with an M3×6 socket head bolt (U57) and M3 washer (U56) (Fig. 32).

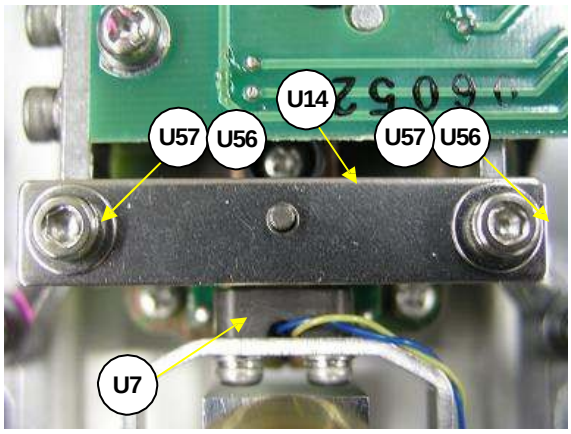


Fig. 32

18) Pull out the lever positioning pin (J1) from the MOC unit assembly (U1) and try lightly wiggling the DBS unit assembly (U1). If the lever assembly (U7) moves up and down smoothly and the lever stopper (U15) emits a clear contact sound, the DBS unit assembly (U1) assembly process is finished.
19) Install a new DBS unit assembly (U1) by reversing steps 4 to 6 in 2.3.6 Replacing the DBS Unit Assembly (U1).

20) Adjust the tilt error and cornerload error levels according to 4.2 Adjusting the Tilt Error and 4.3 Adjusting the Cornerload Error.
21) Restore the previous state by reversing steps 1 to 3 in 2.3.6 Replacing the DBS Unit Assembly (U1).

2.3.9 Replacing the Sensor shaft (U4)

1) Remove the DBS unit Assembly (U1) using the same procedure as described in 2.3.6 Replacing the DBS Unit Assembly (U1).
2) Loosen the P4 M4×14 socket head bolt (U59) that fasten the sonsor shaft (U4) and remove(Fig.33).
3) Install a new sensor shaft (U4) by using a pan support positioning jig (J9) to position the sensor shaft and fasten by the P4 M4×14 socket head bolt (U59)(Fig.34).

Note: Tighten torque for the Sensor shaft(U4) : 80[cm· N].

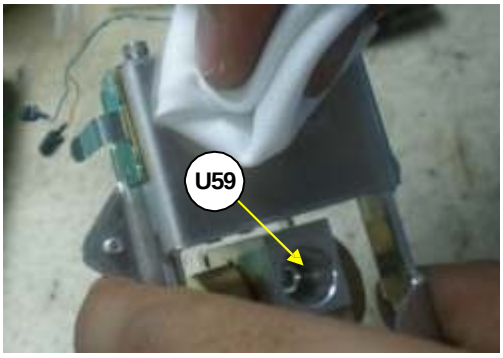


Fig.33

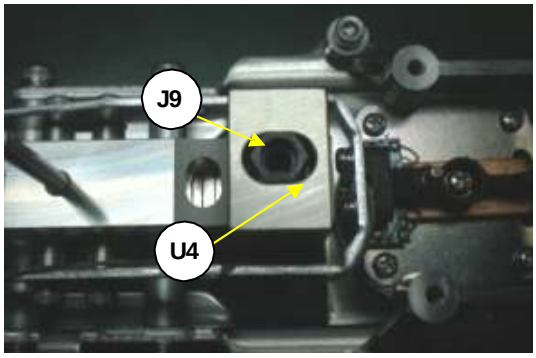


Fig.34

2.3.10 Replacing the Glass Unit Assembly (S3)

1) With the heater cover open, loosen the two P4 M3×16 socket head bolts (H51) (Fig. 35).
2) Slide the glass unit assembly (S3) upward and remove it from the heater cover by pulling the P4 M3×16 socket head bolts (H51) out through the wide part of the pear-shaped holes.
3) Loosen the P4 M3×6 screws (G51) and remove the two glass springs (G3) (Fig. 36).
4) The main glass (G4) and front glass (G5) can be removed by sliding them out of the glass holder assembly (G1).
5) Reassemble by reversing steps 1 to 4 above.

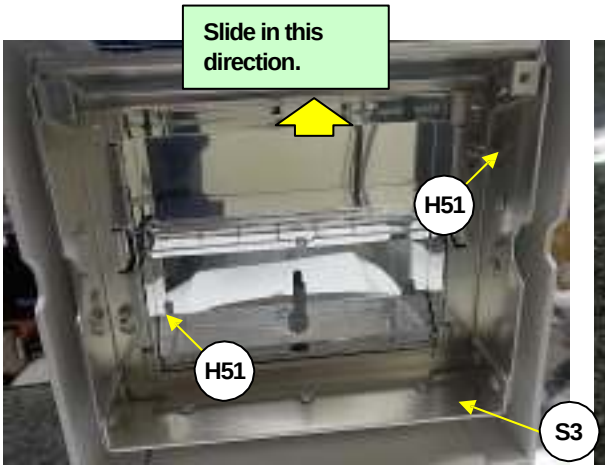


Fig. 35

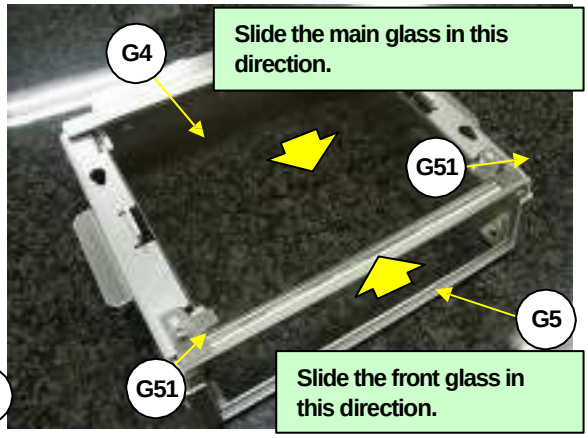


Fig. 36

2.3.11 Replacing the Window Panel (C7)

1) Remove the glass unit assembly (3) using the same procedure as described in 2.3.10 Replacing the Glass Unit Assembly (S3).

2) Loosen the 2×8 self-tapping screws (C53) and remove the window panel (C7) (Fig. 37).
3) Reassemble by reversing steps 1 to 2 above.

2.3.12 Replacing the Top Case Grille (H2)

1) With the heater case closed, remove the grille (H2) from the top case (H1) by pressing its back side toward the inside (Fig. 38).
2) Reassemble by reversing step 1 above.

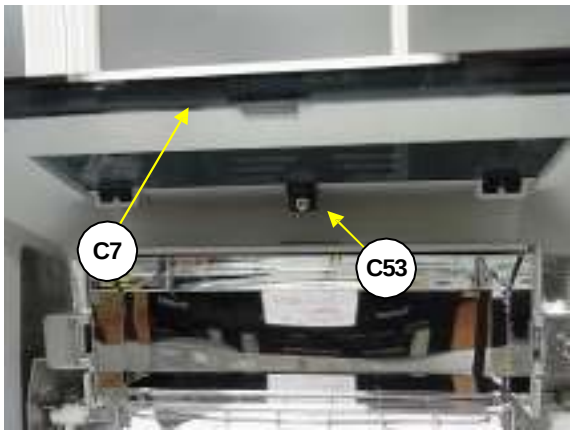


Fig. 37

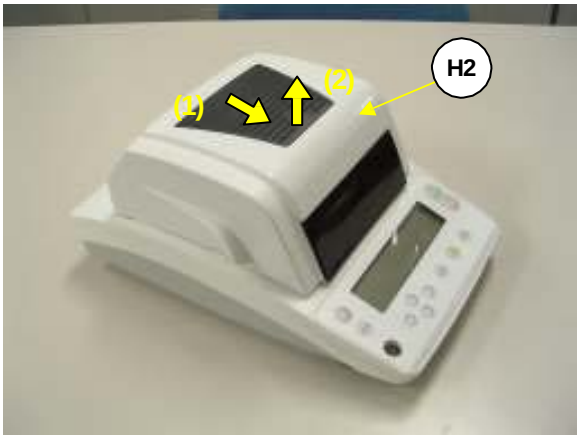


Fig. 38

2.3.13 Replacing the DBS Heater (S5)

1) Remove the glass unit assembly (3) using the same procedure as described in 2.3.10 Replacing the Glass Unit Assembly (S3).
2) Disconnect the heater (S5) connector and remove the wire from the wire saddle (H12).
3) Holding the heater (S5) insulator, pull it toward the front to remove the heater (S5) from the heater bracket (H4) (Fig. 39).
4) Reassemble by reversing steps 1 to 4 above.

Note: Do not touch the glass portion of the heater (S5). Doing so could shorten the service life of the heater.

2.3.14 Replacing the Reflector Plate (H9)

1) Remove the glass unit assembly (3) and heater (S5) using the same procedure as described in 2.3.13 Replacing the DBS Heater (S5).
2) Slightly bend the reflector plate (H9) inward and unhook the flanges in the four corners from the heater frame (H3) (Fig. 40).
3) Remove the thermistor (H10) from its hole by sliding it toward the front, and remove the reflector plate (H9).
4) Reassemble by reversing steps 1 to 3 above.

Note: Before installing the reflector plate (H9), remove only the protective film on the flanges. After installation, peel off the rest of the film, being careful to not leave any finger prints.

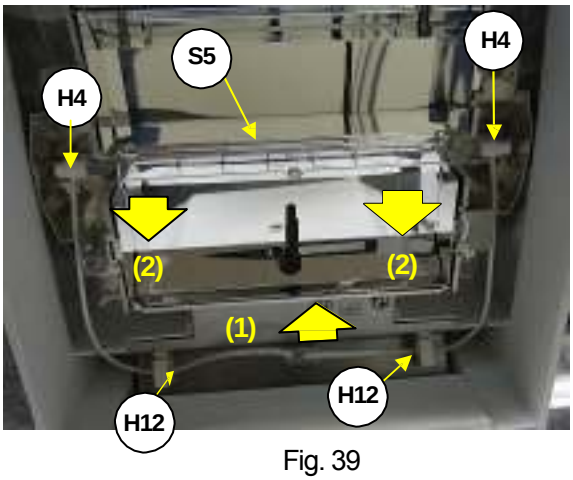


Fig. 39

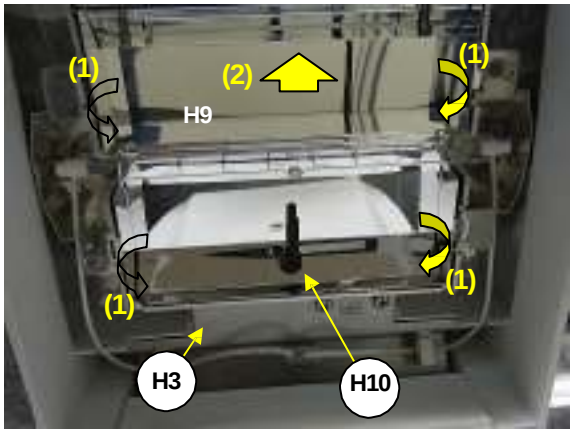


Fig. 40

2.3.15 Replacing the Fan Cable Assembly (C5)

1) Disassemble the balance down to the case assembly (S2) by following the procedure in 2.2 Removing the Case.
2) Lay down cushioning materials to prevent scratching, and invert the case assembly (S2).
3) On the front side, secure the top base (C3) and window panel (C7) with tape. On the rear side, insert a shim about from 0.8 to 1.5 mm thick between the top base (C3) and top case (H1) (Fig. 42).
4) Remove the four 4×12 self-tapping screws (C52), pull out each cable from the hole in the case assembly (S2) to separate it from the top case (3) (Fig. 41).

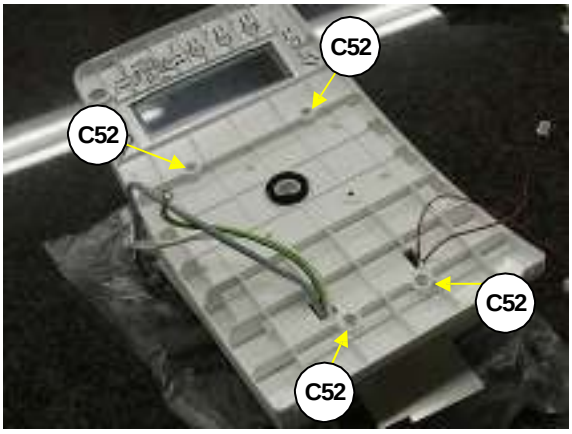


Fig. 41

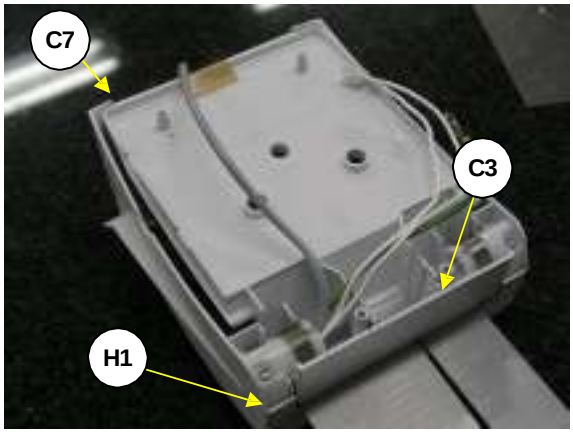


Fig. 42

5) Pull the fan cable assembly (C5) out from the top base (C3) frame.
6) Insert the new fan cable assembly (C5) into the top base (C3) frame (Fig. 43).

   Note: Insert the fan cable assembly so that the arrow, molded into the assembly, is oriented in the direction shown below.
7) Insert the wires from the fan cable assembly (C5) and LSW cable assembly (C6) into the slit in the Top base (C3) (Fig. 43).
8) Reassemble by reversing steps 1 to 4 above.

   Note: Make sure no wires are pinched between the case assembly (S2) and top base (C3).

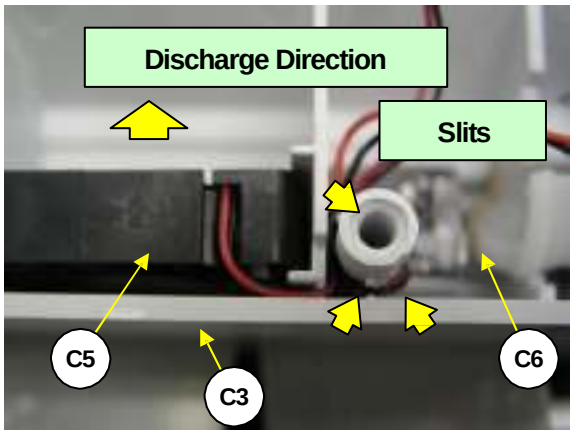


Fig. 43

2.3.16 Replacing the LSW Cable Assembly (C6)

1) Separate the case assembly (S2) and heater case assembly (C1) by following the procedure in 2.3.15 Replacing the Fan Cable Assembly (C5).
2) Remove the 2×12 self-tapping screw (C51) and then the LSW cable assembly (C6).
3) Fasten the LSW cable assembly (C6) to the top base using the 2×12 self-tapping screw (C51) (Fig.44).
   Note: Confirm that the LSW is ON in this state.

4) Insert the wires from the fan cable assembly (C5) and LSW cable assembly (C6) into the slit in the top base (C3) and hold them in place (Fig. 43).

5) Reassemble by reversing step 1 above.
   Note: Make sure no wires are pinched between the case assembly (S2) and top base (C3).

6) When replacing the LSW cable assembly (C6), confirm that the LSW functions properly when it is assembled with the case assembly (S2), by opening and closing the heater cover.
   Note: Confirm the LSW functions properly in the following modes.
   1. Close slowly. ⇒ If it does not function properly, retighten LSW screws or replace LSW.
   2. Close while pressing laterally on heater cover (Fig. 45). ⇒ Move LSW closer to hinges and retighten.

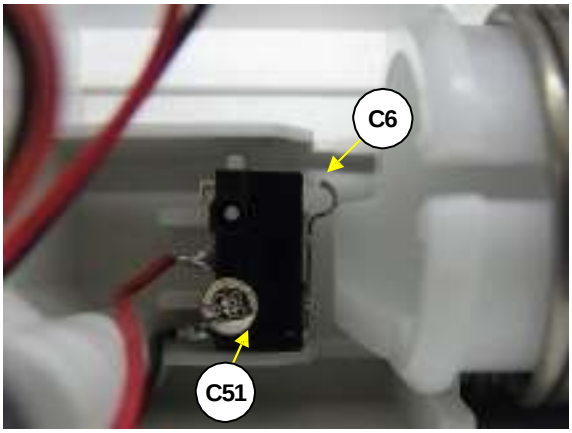


Fig.44

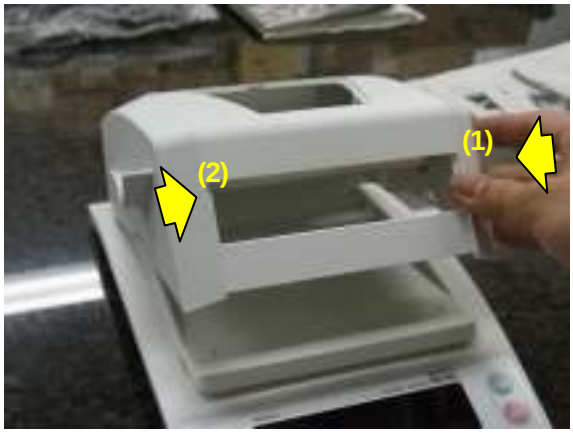


Fig. 45

2.3.17 Replacing the Right Hinge (H13), Left Hinge (H14), and Hinge Springs (H15)

1) Separate the case assembly (S2) and heater case assembly (C1) by following the procedure in 2.3.15 Replacing the Fan Cable Assembly (C5).
2) Separate the LSW cable assembly (C6) by following the procedure in 2.3.16 Replacing the LSW Cable Assembly (C6)
3) Secure the front side with tape, remove the shim from the rear side, and then rotate the top base (C3) about 135 degrees toward the rear to separate it from the heater case assembly (C1).
4) Remove the hinge springs (H15) from the right hinge (H13) and left hinge (H14) (Fig. 46).
5) Loosen the two 4×12 self-tapping screws (H60) on each hinge, pull out the three cables from the right hinge (H13), and then remove the right hinge (H13) and left hinge (H14).
6) Pass the three cables through the right hinge (H13) prior to big one, align the inside flange spacing on both hinges with the spacing of the bearings on the top base (C5), and then fasten the new right hinge (H13) and left hinge (H14) with the two 4×12 self-tapping screws (H60) each.
7) Reattach the tubing (H24) to the inner hooks on the new hinge springs (H15) and insert the springs through the right hinge (H13) and left hinge (H14).

   Note: Cover the inner end of the hinge spring(H15) with the tubing (H24) or the rubber sponge(H25) not to touch the cables. In some case, there is no tubing(H24) originally.
8) Pass the three cables through the rubber sponge(H25) and insert it in the left hinge(H14) to align with the end of the left hinge(H14)(Fig.47)

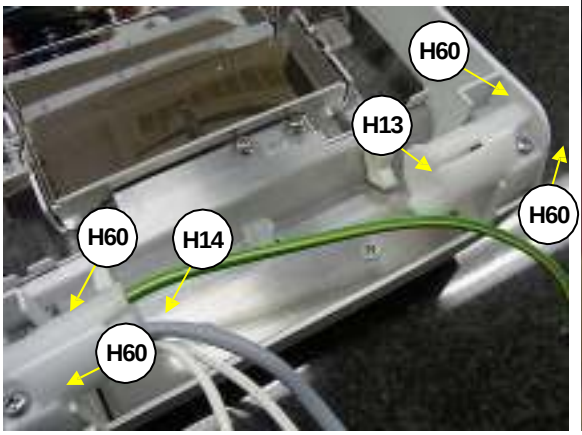


Fig. 46

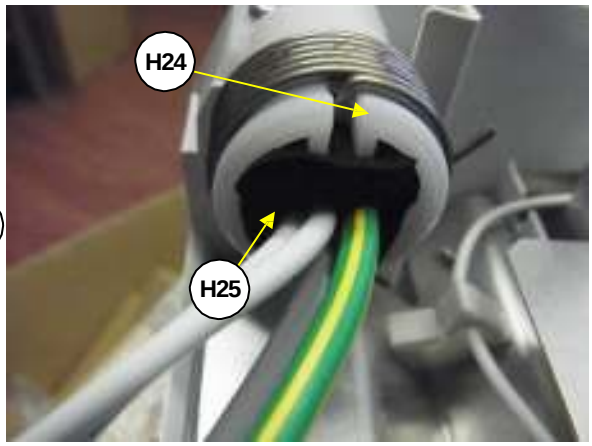


Fig. 47

9) Starting with the top base (C3) rotated toward the rear about 135 degrees and the outer hooks on both hinge springs (H15) hooked to the spring retention groove on the top base (C3)(Fig.48), rotate the top base (C3) toward the front holding the hinge R(H13) and the hinge L(H14) upward without gap against the hinge guide of the top base(C3) upward(Fig. 49).
10) On the front side, secure the top base (C3) and window panel (C7) with tape. On the rear side, insert a shim about 1 mm thick between the top base (C3) and top case (H1) (Fig. 42).
11) Reassemble by reversing steps described in 2.3.16 Replacing the LSW Cable Assembly (C6).
12) Reassemble by reversing steps described in 2.3.15 Replacing the Fan Cable Assembly (C5).
13) When replacing the right hinge (H13) or left hinge (H14), confirm that the LSW functions properly when it is assembled with the case assembly (S2), by opening and closing the heater cover.

Note: Confirm the LSW functions properly in the following modes.

1. Close slowly. ⇒ If it does not function properly, retighten LSW screws or replace LSW.
2. Close while pressing laterally on heater cover (Fig. 45). ⇒ Move LSW closer to hinges and retighten.

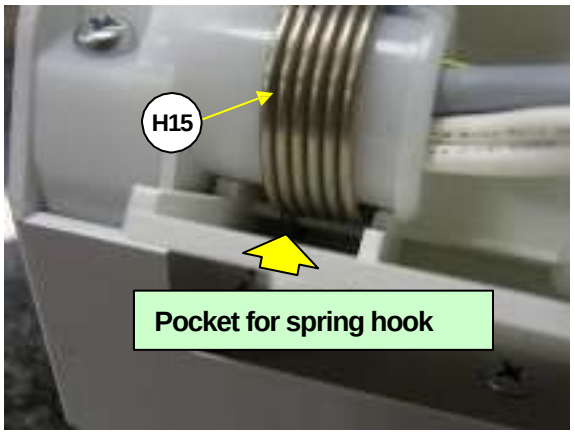


Fig. 48

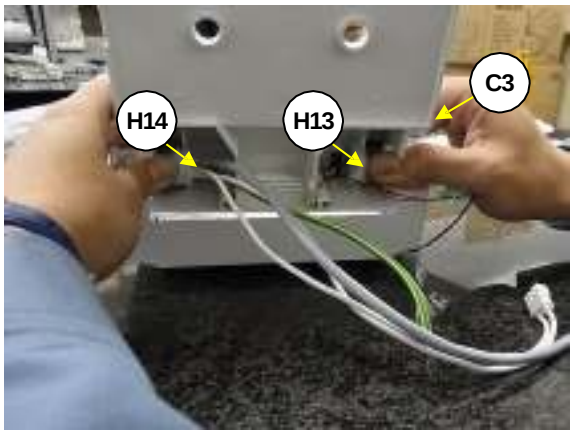


Fig. 49

2.3.18 Replacing the Thermistor (H10)

1) Remove the hinges by following the procedure in 2.3.17 Replacing the Right Hinge (H13), Left Hinge (H14), and Hinge Springs (H15).
2) Loosen the two self-tapping flat head screws (H59) and two P4 M4×8 screws (H58) and remove the blind cover (H11) (Fig. 50).
3) Pull the thermistor (H10) (gray line) out from the hole in the side wall of the top case (H1) (Fig. 51).

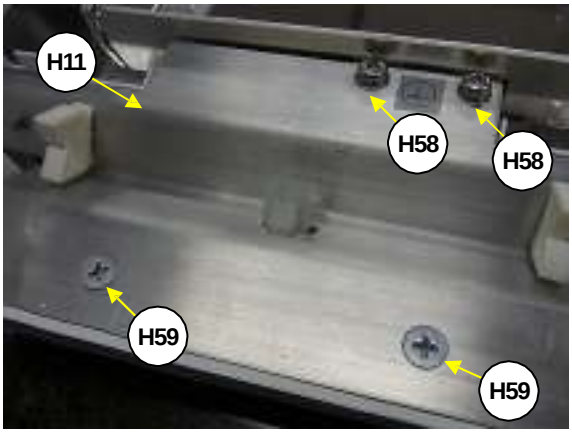


Fig. 50

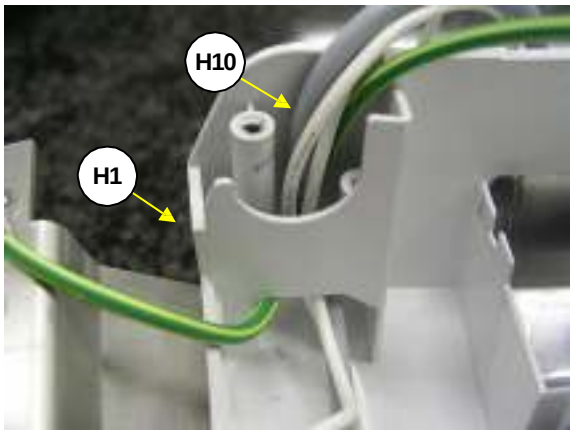


Fig. 51

4) Cut the Cable tie,T18S-HSW(H26) bundled the Cables by the nipper (Fig. 54,55)

5) The thermistor (H10) can be removed by loosening the M3 flange nuts (H56) and P3 M3×10 socket head bolts (H57) partway, rotating the thermistor clockwise 90 degrees, and then sliding it to the rear (Fig. 52).

6) Bundle the Cables with the Cable,tie,T18S-HSW(H26) as shown in Fig.54 and Fig.55) then, Reassemble by reversing steps 1 to 4 above to take care not to sandwich the cables between assembled parts.

Note: Be careful not to damage the black heat resistant paint of 10mm from the end when inserting the thermistor (H10) into the hole.

Note: Tighten theFG earth cable (H17) as shown to be behind the blind cover (H11). (Fig.53)

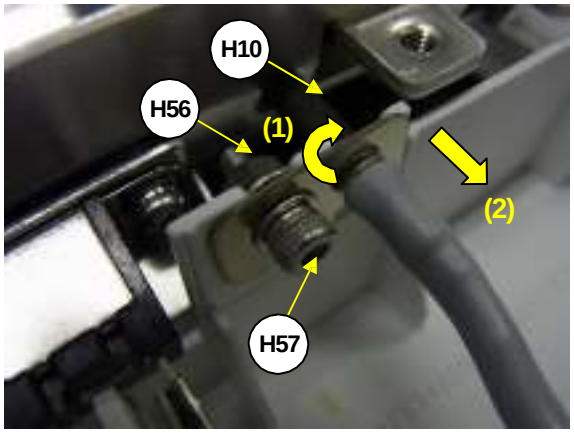


Fig. 52

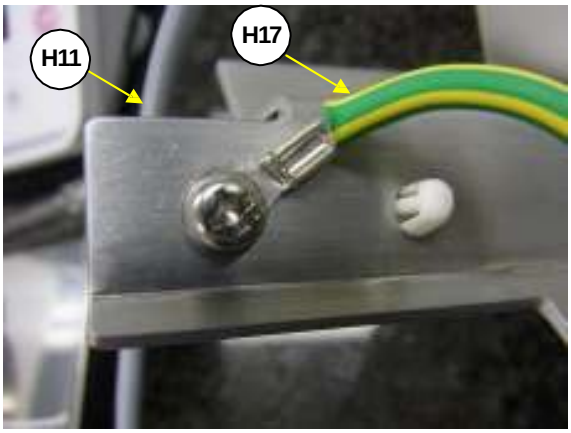


Fig.53

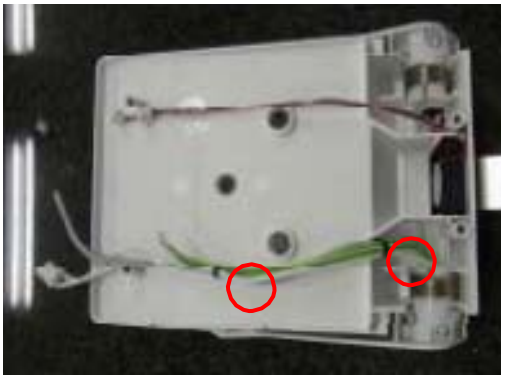


Fig. 54

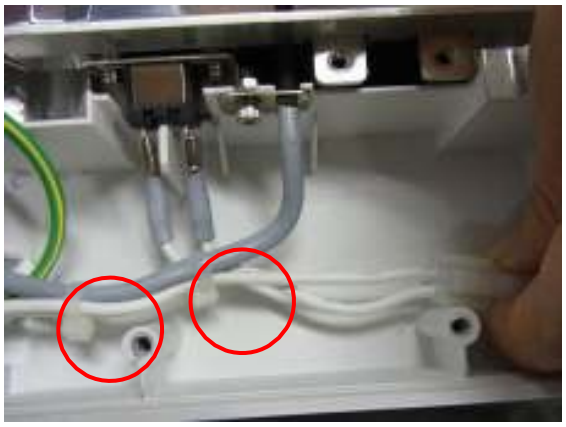


Fig.55

2.3.19 Replacing the Thermal Fuse (H6)

1) Remove the thermistor by following the procedure in 2.3.18 Replacing the Thermistor (H10).
2) Remove the reflector plate (H9) by unhooking the flanges in the four corners from the heater frame and slightly bending the reflector plate (H9) inward (Fig. 56).
   Note: Be careful not to get finger prints on the reflector plate.

3) Loosen the four 3×10 self-tapping screws (H55) and remove the heater frame (H3) from the top case (H1) (Fig. 57).

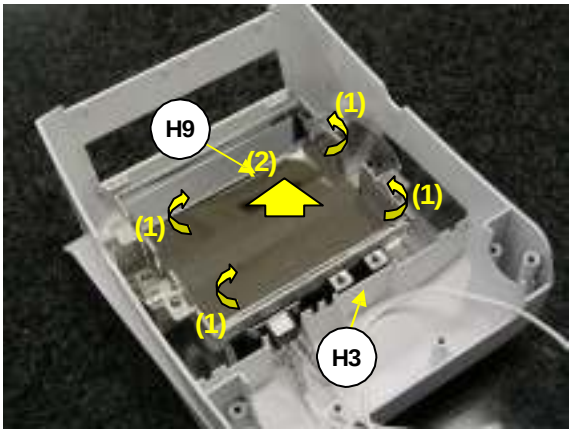


Fig. 56

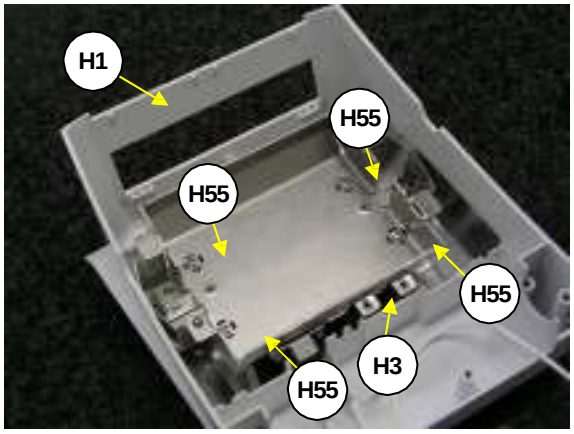


Fig. 57

4) Pull out the Faston terminals on the heater junction cables (H7) from the thermal fuse (H6) (Fig. 58).
5) Loosen the two P4 M3×8 screws (H61) and remove the two spacers (H16), plate thermal fuse (H17), and thermal fuse (H6) from the heater frame (H3) (Fig. 59).
6) Reassemble by reversing steps 1 to 5 above.

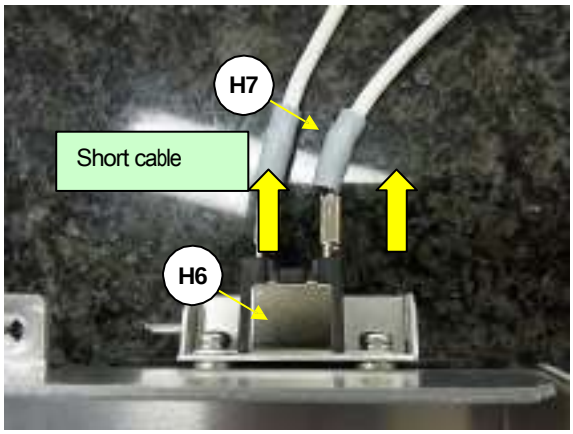


Fig. 58

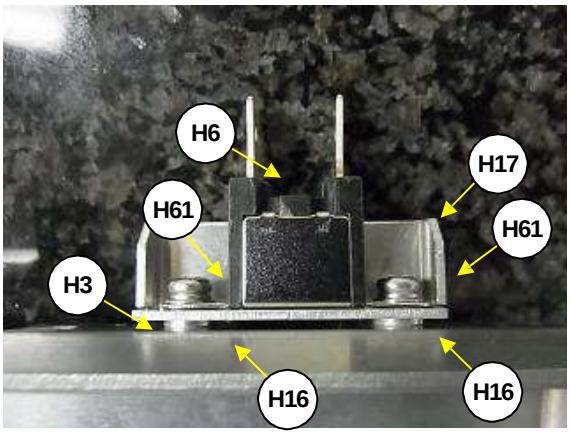


Fig. 59

2.3.20 Replacing the level Gauge Assy (B7)

1. Insert flat-blade screw driver to the slit under the Level as Fig.8 and twist/remove to the Level. Then remove adhesive from the Base.



Fig.8

2. Set level gauge jig on the Unibloc's top face of fixing end as Fig.9
   Adjust the level adjuster until the bubble of the level gauge jig centered to the red circle.

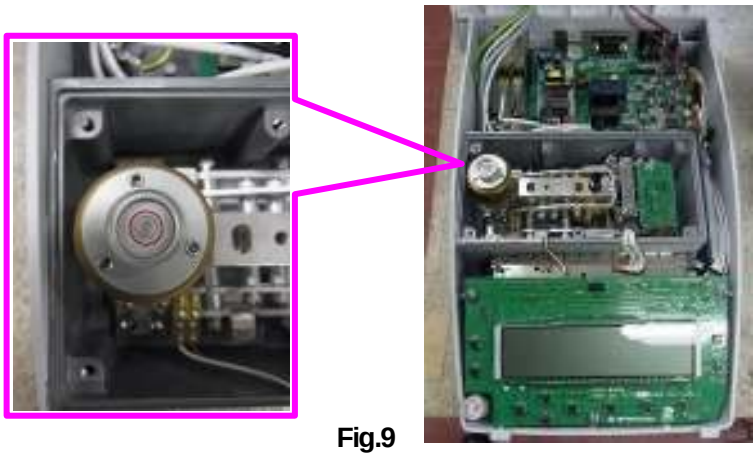


Fig.9

3. Apply mix Araldite 2012 on the under side of level gauge and base. Place the level gauge on the base. Bubbles must be smaller than the size (around 3/4) for the red circle.

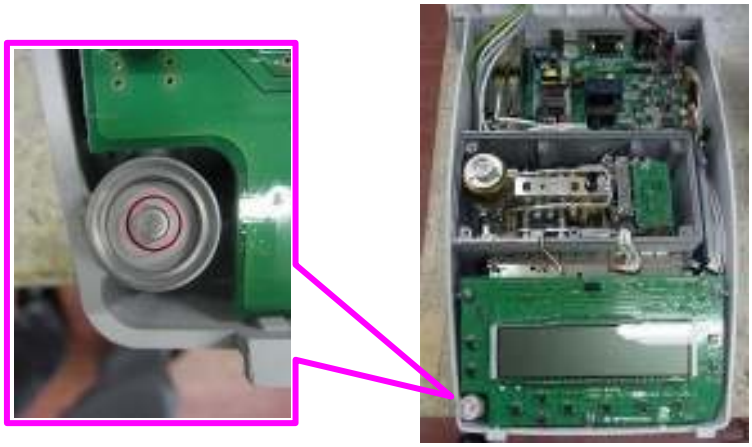


Fig.10

4. Press the level gauge, center the bubbles on the level gauge by using finger only.
   Bubble must be on the center of the red circle.
   Drying time for level gauge to the base is 15~20 mins. In case of araldite rapid

3. Checking the Electronic Board

The DBS boards and their signal allocations are summarized below. Numbers in parentheses ((1), (2), (3), and so on) indicate pin numbers, and a checkmark (✔) indicates a point that should be checked, if possible.

3.1 Main Board Assembly (B2)

ASSY P/N		321-71373-41 (same for all models)
Board P/N		321-71372
Circuits Mounted		CPU (calculates measurement data and controls key switches) Dedicated LCD driver IC chip EEPROM with connector J3 for writing with Flash Writer Main clock (20 MHz), used to form a +5 V logic system Dedicated calendar IC chip

3.2 Analog Board Assembly (B3)

ASSY P/N		321-64556-14 (same for all models)	
Board P/N		321-64558	
Circuits Mounted		Mechanical sensor PID control (feedback) circuit Measurement system (A/D converter) circuit and reference power supply generator circuit Magnet temperature correction and measurement circuits	
Voltage for Checking (when connected to detector assy)		TPG	Signal ground (0 V)
	✔	TP1	During pre-amp control signal output feedback: 0 V
		TP2	Coil current control voltage
	✔	TP3	Voltage on output resistance end (about 0.6 to 2.3 V)
	✔	J2 (1)	Beam sensor LED positive potential about -5.2 V
	✔	J2 (2)	Beam sensor LED negative potential about -6.8 V
	✔	J2 (3)	Magnet temperature sensor output voltage about 0.6 V
		J2 (4)	Signal ground (0 V)
		J2 (5)	During beam sensor photodiode output feedback: 0 V
		J2 (6)	Signal ground (0 V)
		J2 (7)	During beam sensor photodiode output feedback: 0 V
		J1 (1)	Signal ground (0 V)
	✔	J1 (2)	Power supply for analog system: about -12 V
	✔	J1 (3)	Power supply for analog system: about +12 V
		J1 (4)	Temperature A/D digital signal
		J1 (5)	Temperature A/D digital signal
		J1 (6)	Weight A/D digital signal
		J1 (7)	Weight A/D digital signal
		J1 (8)	Weight A/D digital signal
		J1 (9)	Weight A/D digital signal

3.3 Power Board Assembly (B4)

The power board assembly (B4) includes AC primary power supplies (high voltage) intermingled on the circuit board. Therefore, carelessly touching the board could cause electric shock. Since this would be extremely dangerous, please work carefully.

If necessary, check voltages on the main board assembly (B2).

ASSY P/N		321-71351-41 (with USB) or -42 (without USB)		
Board P/N		321-71350		
Circuits Mounted		+12 V formed from AC input power supply and -12 V and +5 V formed from +12 V. Includes heater control circuit, thermistor signal input circuit, fan motor control circuit, cover open/close detection limit switch detection circuit, and AC input power supply voltage decision circuit Includes data I/O, RS-232C, and USB communication circuits		
Voltage for Checking		J10 (1)	USB RxD signal	Check at J2 (1) on the main board assembly (B2)
		J10 (2)	USB TxD signal	Check at J2 (2) on the main board assembly (B2)
		J10 (3)	USB DSR signal	Check at J2 (3) on the main board assembly (B2)
		J10 (4)	USB DTR signal	Check at J2 (4) on the main board assembly (B2)
		J10 (5)	USB SLEEP signal	Check at J2 (5) on the main board assembly (B2)
		J10 (6)	Signal ground (0 V)	Check at J2 (6) on the main board assembly (B2)
		J10 (7)	Serial DSR signal	Check at J2 (7) on the main board assembly (B2)
		J10 (8)	Serial RxD signal	Check at J2 (8) on the main board assembly (B2)
		J10 (9)	Serial TxD signal	Check at J2 (9) on the main board assembly (B2)
		J10 (10)	Serial DTR signal	Check at J2 (10) on the main board assembly (B2)
	✓	J9 (1)	Limit switch detection signal (about 0 V when cover is closed) (about 5 V when cover is open)	Check at J1 (1) on the main board assembly (B2)
		J9 (2)	Heater ON/OFF control signal	Check at J1 (2) on the main board assembly (B2)
		J9 (3)	Fan motor control signal	Check at J1 (3) on the main board assembly (B2)
	✓	J9 (4)	Thermistor power supply: about 5 V	Check at J1 (4) on the main board assembly (B2)
		J9 (5)	Thermistor detection signal	Check at J1 (5) on the main board assembly (B2)
		J9 (6)	Heater control signal	Check at J1 (6) on the main board assembly (B2)
		J9 (7)	Signal ground (0 V)	Check at J1 (7) on the main board assembly (B2)
	✓	J9 (8)	+5 V circuit power supply	Check at J1 (8) on the main board assembly (B2)
	✓	J9 (9)	+12 V circuit power supply	Check at J1 (9) on the main board assembly (B2)
	✓	J9 (10)	-12 V circuit power supply	Check at J1 (10) on the main board assembly (B2)
		J9 (11)	AC input power supply voltage decision signal	Check at J1 (11) on the main board assembly (B2)

Dangerous high voltage area on the power board assembly (B4) is indicated below.



Fig. 60

4. Hardware Adjustment

Replacing the following components may alter balance performance. After replacement, check the performance and make adjustments if necessary.

	Service / Adjustments Required	See	Unit Assembly Replacement	Force Coil Assembly Replacement	Detector Assembly Replacement	Analog Board Assembly Replacement	Main Board Replacement		Cornerload Error Adjustment	Tools Required
		See	2.3.6	2.3.8	2.3.7	2.3.3	2.3.2		4.3	
1	Detector Assembly Height Adjustment	4.1			✓					Tester (+/-5 VDC) Check wire set
2	Tilt Error Adjustment	4.2		✓	✓					
3	Span Temperature Coefficient Writing	6.2	✓ (*2)				✓ (*1)			
4	Linearity Adjustment	5.5	✓	✓	✓	✓			✓	Calibration weight
5	Calibration (E-CAL)	5.6	✓	✓	✓	✓			✓	Calibration weight
6	Error Log Reset (*3)	6.2	✓	✓	✓	✓	✓		✓	
7	EEPROM Data Backup	6.3	✓	✓	✓	✓	✓		✓	

*1) When the main board assembly (B2) has been replaced, mount the EEPROM (M4 and M5)that was included with the original main board assembly (B2).

*2) Input the included EEPROM data into the balance **(temperature coefficients at address numbers 00CA - 0131, and 05A0 - 05AF).**

*3) See 6.2 Data Edit (EDIT) Operations and **set address numbers 0234 - 0235 and 03DE - 03E7 to "0."** (Error Log Reset)

	Service / Adjustments Required	See	Thermistor Replacement(*5)	Heater Replacement						Tools Required
		See	2.3.18	2.3.13						
1	Temperature Calibration (Service Mode)	5.7	✓							Temperature calibration kit
2	Temperature Calibration (User Mode)	5.8		✓						Temperature calibration kit
3	Error Log Reset (*4)	6.2	✓	✓						
4	EEPROM Data Backup	6.3	✓	✓						
5	Heater Operating Time Count Reset	5.9		✓						

*4) See 6.2 Data Edit (EDIT) Operations and **set address numbers 0234 - 0235 and 03DE - 03E7 to "0."**

*5) Replace the thermistor (H10) also, when replacing the thermal fuse. (H6)

4.1 Adjusting the Detector Assembly (U11) Height

1) With the connector on the ILS 2S-90 cable (U20) that is connected the analog board assembly (B3) disconnected, plug in the power cord to provide power.
2) Connect electrical tester terminals to the TP1 (+) and TPG (-) pins on the analog board assembly (B3).
3) With the P3 M3×10 socket head bolts (U53) on the detector assembly (U11) slightly loosened, lightly move the lever assembly (U7) up and down until it hits the lever stopper (U15), and adjust the detector assembly (U11) height so that (+) is inverted to (-) on the tester display and the difference between the (+) and (-) values does not exceed 25 %.

   Note: If the display on the digital multimeter remains "(-)(-)," lower the detector assembly (U11) height. If it remains "(+)(+)," raise the detector assembly (U11) height.

4) After making adjustments, fasten the P3 M3×10 socket head bolt (U53) (Fig. 61).
5) Disconnect the electrical tester TP1 and TPG pins from the analog board assembly (B3).
6) Temporarily unplug the AC adapter, and connect the ILS 2S-90 cable (U20) connector to the analog board assembly (B3).

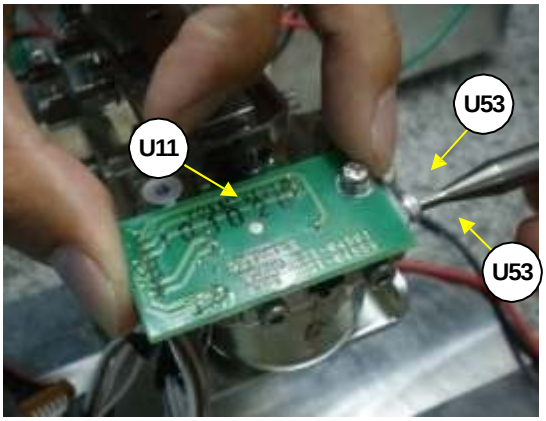


Fig. 61

4.2 Adjusting the Tilt Error

1) Disassemble the balance down to the case assembly (S2) by following the procedure in 2.2 Removing the Case.
2) Level the balance by turning the two level adjusters (B6) at the front of the balance so that the bubble in the level gauge is centered.
3) Place the sample pan and pan supporter assembly (S11) in position and supply power by connecting the power cord.
4) Press the Power key to display grams, insert a 1 mm thick shim in one location, under the front right foot of the balance, and then read the display value (Fig. 62).
5) If the displayed value is outside adjustment standards, unplug the AC adapter, insert the lever positioning pin (J1) into the lever fastener hole on the top of the OPF, up to the reference line, and then loosen the M3 nut (L9).
6) If a positive value is displayed, turn the P4 M3×25 screw (L12) clockwise on the lever assembly (U7). If a negative value is displayed, turn it counterclockwise.
7) Pull out the lever positioning pin (J1) and supply power by plugging in the power cord.
8) Repeat steps 4 to 7 to make adjustments. When finished making adjustments, use the M3 nut (L9) to lock the P4 M3×25 screw (L12) (Fig. 63).

Note: Be sure to unplug the AC adapter and leave the lever positioning pin (J1) inserted into the OPF when adjusting the screw and nut on the lever assembly (U7).

Note: If tilt error adjustments were not necessary at the factory, a weight (U10) may not be attached to the lever assembly (U7).



Fig. 62

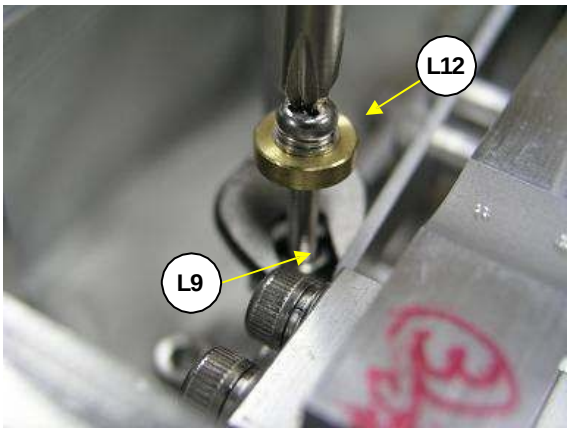


Fig. 63

4.3 Adjusting the Cornerload Error

Note: Only adjust cornerload error for minor error levels (max. ±30 count).
For larger errors, replace the entire TX unit assembly (1).

1) Disassemble the balance down to the case assembly (S2) by following the procedure in 2.2 Removing the Case.
2) Level the balance by turning the two level adjusters (B6) at the front of the balance so that the bubble in the level gauge is centered.
3) Place the sample pan and pan supporter assembly (S11) in position and supply power by plugging in the power cord.
4) Press a key to display grams.
5) Place the following calibration weight on the sample pan and press the [TARE] key to display "0 g."

Model	Weight
DBS 60-3	30 (g)

6) Record the indicated value for each position indicated in Figure 65 by placing and measuring the weight successively in the center (1), then off-center positions (2), (3), (4), and (5), and, lastly, in the center (1) again.
7) Use the cornerload adjustment tools (J3 and J4) to cut metal from the thin part of the parallel guide corresponding to the position where **a positive value** was displayed (Fig. 64).
8) Repeat steps 6 and 7 to record display values and make adjustments until the values are within the adjustment standards.

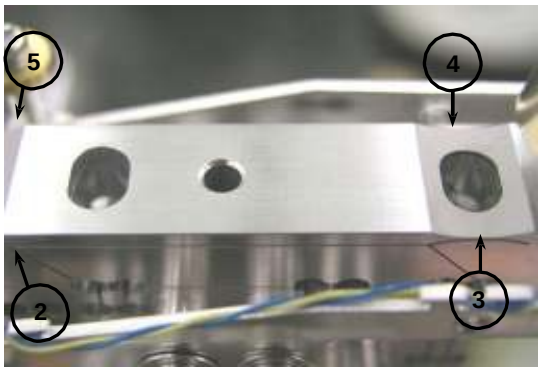


Fig. 64

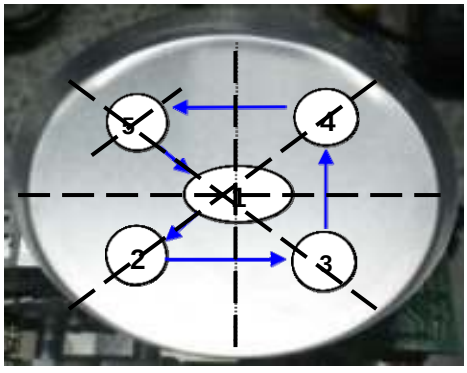


Fig. 65

5. Software Adjustment

5.1 EPROM Initialization

There are two methods for initializing the EEPROM, as follows.

(1) Initializing the EEPROM When Turning On the Power

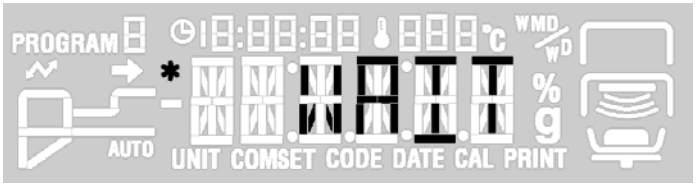
(1) Hold down the [←] and [ESC] keys and switch the power ON.
(2) "EE INIT" is displayed.
(3) Press the [Enter] key, which displays "PART."
Press the [↓] or [↑] key, which displays "ALL."
(4) - With "PART" displayed, hold down the [Enter] key (until the display changes), which initializes part of the EEPROM data.
Write the backup temperature correction coefficient and linearity correction coefficient data stored in flash memory into the EEPROM.
- With "ALL" displayed, hold down the [Enter] key (until the display changes). This initializes all EEPROM data and writes the initialized data to the EEPROM.

Note: With "PART" or "ALL" displayed, keep holding down the [Enter] key until "P00000"

(5) After the data is initialized, move back to the service mode by entering the password.

(2) Initializing the EEPROM from the Service Menu

(1) In the service menu, select [NVRAM] → [INIT] (initialize all).
(2) The execution confirmation display "OK?" appears.
(3) Press the [Enter] key to confirm execution.
(4) The initializing progress indicator appears.

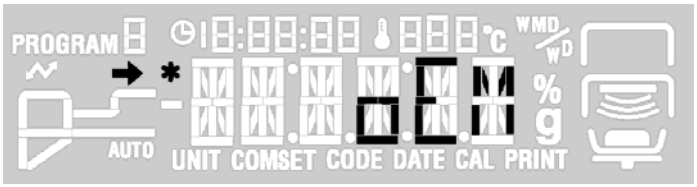


(5) When initialization is finished, the screen returns to the [NVRAM] menu.

5.2 Model Selection

This selects whether to switch the OEM setting ON or OFF. The operation procedure is as shown below.

(1) In the service menu, press the [↓] or [↑] key to select [OEM] (OEM setting). To switch the OEM setting OFF, confirm that the stability indicator is OFF in the [OEM] (OEM setting) menu and skip
to step (4). To switch the OEM setting ON, do the following.
(2) Press the [Enter] key.



(3) Connect a computer to the RS-232C connector on the back of the balance, and use the following commands to specify the OEM company name and model name.
@CN = Company Name
@MN = Model Name
Specify the OEM name and model name using a maximum of 23 alphanumeric characters.
(4) Connect a computer to the RS-232C connector on the back of the balance, and use the following

commands to specify the serial number.

@SN = Serial Number

Serial numbers are specified using 10 or 12 alphanumeric characters.

5.2.1 How to specify the serial No without using a computer

Use the [EDIT] menu to edit NVRAM and specify the S/N setting. Replace each of digits of the serial number to ASCII code using the following table. Set the ASCII code to the address 0044-004E. Set the code "00" to the following address of the serial number.

S/N	ASCII code	S/N	ASCII code	S/N	ASCII code	S/N	ASCII code
_(space)	20	F	46	V	56	l	6C
0	30	G	47	W	57	m	6D
1	31	H	48	X	58	n	6E
2	32	I	49	Y	59	o	6F
3	33	J	4A	Z	5A	p	70
4	34	K	4B	a	61	q	71
5	35	L	4C	b	62	r	72
6	36	M	4D	c	63	s	73
7	37	N	4E	d	64	t	74
8	38	O	4F	e	65	u	75
9	39	P	50	f	66	v	76
A	41	Q	51	g	67	w	77
B	42	R	52	h	68	x	78
C	43	S	53	i	69	y	79
D	44	T	54	j	6A	z	7A
E	45	U	55	k	6B		

For example, if the serial number is D209407582, the address setting is as follows.

Address	S/N	Setting value
0044	D2	4432
0046	09	3039
0048	40	3430
004A	75	3735
004C	82	3832
004E		0000
0050		0000

5.3 Factory Settings (voltage/USB)

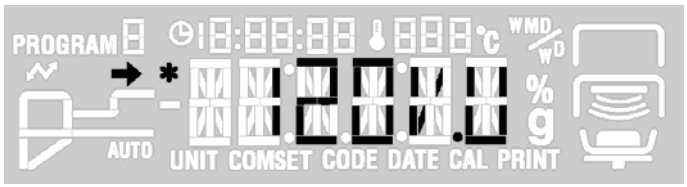
Select the voltage mode (120 V/240 V) and the optional USB connection.
The procedure is described below.

(1) In the service menu, press the [↓] or [↑] key to select [SHIP] (factory settings).

(2) Press the [→] key, which displays "120V."

Press the [↓] or [↑] key to select the voltage mode and USB option status, and press the [Enter] key to confirm the settings.

Example of Menu Displayed with 120 V Mode and USB Option Selected



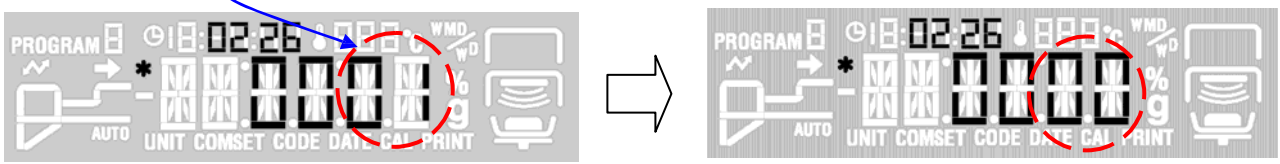
5.4 Switching ON and OFF the Setting Information Lock

There will be cases where the setting information lock must be switched OFF to perform readjustment, such as due to calibration error. In such cases, follow the procedure below to switch ON or OFF the setting information lock.

5.4.1 Unlocking the Setting Information

(1) In the service menu, select [NVRAM] → [EDIT] (edit data). Note: See 6.2 Data Edit (EDIT) Operations.

(2) Enter an address of "0226" and edit the lower number (227 on the right side) from "01" to "00."



(3) In the service menu, confirm that "LOCK" is displayed.

5.4.2 Locking the Setting Information

(1) In the service menu, select [LOCK].

(2) The confirmation message "OK?" is displayed. Press the [Enter] key to lock the setting information.

CAUTION: Failing to lock setting information could result in malfunctions or invalid operations to be not recognized as errors. In other words, if the information is left unlocked, an incorrect span calibration could prevent obtaining correct measurement data, or failure to detect a broken open/close switch could result in the cover remaining open with the heater ON.

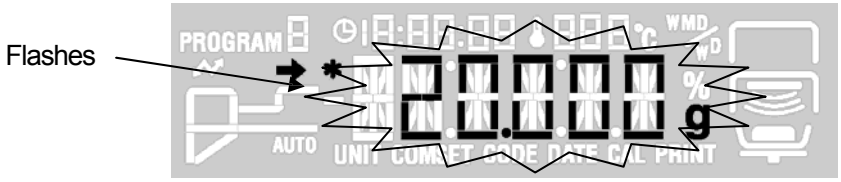
5.5 Adjusting Linearity

To satisfy product linearity specifications, a coefficient is calculated for correcting the linearity error of the hardware. The weight value for the linearity adjustment is 50, 20, 70, 100, and 120g. For the change of the weight value, refer to the 5.5.1.

The procedure is described below.

(1) Make linearity adjustment by selecting [LINEAR] → [LADJUST] and pressing the [Enter] key.
(2) When "START" appears, press the [Enter] key.
(3) Place the indicated calibration weight on the pan, **wait 10 seconds after the stability indicator lights up**, and then press the [Enter] key to measure data. After the data is obtained, perform the next adjustment.

Example of Calibration Weight Display:



(4) When all adjustment data measurements are finished, a correction coefficient is automatically calculated and stored in the EEPROM.
(Correction coefficients are automatically backed up to flash memory.)

The weight of the pan is not constant. Then, zero point of the linear adjustment are considered to be an initial 0 point.

5.5.1 Weight Value input

The value of weight can be changed.

(1) In the [LINEAR] menu, press the[↓] or [↑]key to select [L.W.SET] and press the [Enter] key.
(2) The value of weight is displayed,as shown below.
Press the [←] or [→] key to select digits, press the [↓] or [↑] key to select number(0-9). And press the [Enter] key.
If [ESC] key is pushed, the weight value input is discontinued, and advances to the next weight value input.



(3) The value of next weight is displayed. And return to step(2).
(4) Input all of the value of weights, writes the value of weights to the EEPROM automatically.

5.6 Span Calibration

Calibrate sensitivity using the same operations as in the user mode.
Procedure

(1) In the service menu, select [CAL] → [BAL].
(2) Calibrate sensitivity.
(3) If an error occurs, the error code is displayed.

For a description of errors, see 8.2.

(4) If an error does not occur, the sensitivity correction coefficient is updated and saved in the EEPROM.

(5) When the calibration is finished, the screen returns to the [BAL] menu.

Use a 50 g standard calibration weight for calibrating sensitivity.

5.7 Temperature Calibration (Service Mode)

Calibrate temperature in the service mode only if the thermistor was replaced. In all other cases, calibrate temperature in the user mode. If temperature is calibrated in the service mode, it does not need to be calibrated in the user mode.

Calibrate sensitivity using the same operations as in the user mode.

Procedure

(1) In the service mode, select [NVRAM] → [EDIT] and rewrite addresses as indicated below.

Address	Data
03A0	3F80
03A2	0000
03A4	0000
03A6	0000
03A8	3F80
03AA	0000
03AC	~~0005~~ 0000
03AE	~~0005~~ 0000

(2) In the **service menu**, select [CAL] → [TEMP].

(3) Calibrate temperature.

(4) When the calibration is finished, the screen returns to the [TEMP] menu.

Temperature is measured at two points for temperature calibration, 100 °C and 180 °C, but if these measurement values are not within ±10 °C range of the target temperature, verify that the heater, thermistor, and temperature calibration kit are attached properly and that the power supply voltage is correct, and then calibrate temperature again.

5.8 Temperature Calibration (User Mode)

When the heater is replaced, calibrate temperature in the user mode.

Procedure

(1) In the **user menu**, select [CAL] → [TEMP].

(2) Calibrate temperature.

(3) When the calibration is finished, the screen returns to the [TEMP] menu.

5.9 Heater Operating Time Count

To allow determining the halogen heater service life and user usage status, clear the heater operating time counter (cumulative count).

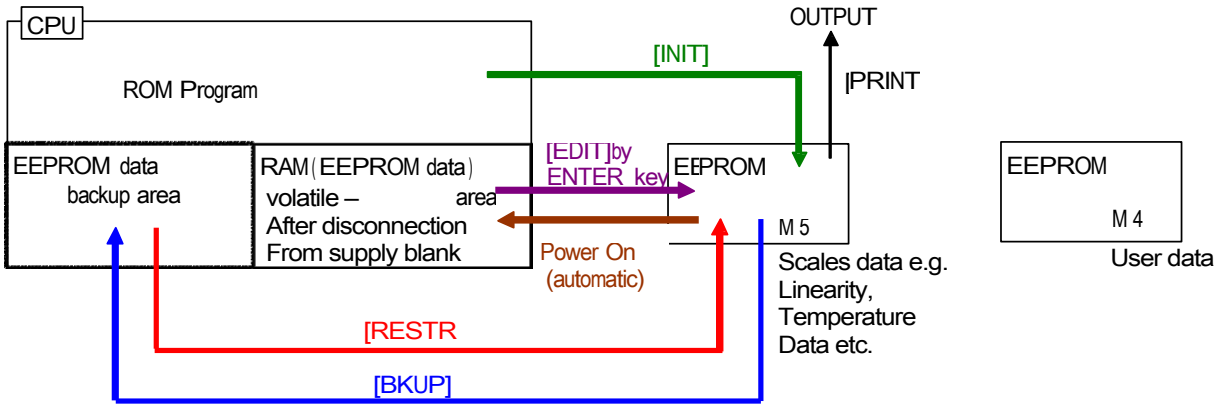
The procedure is described below.

(1) In the service menu, select cumulative count.

(2) In the cumulative count display, press the [→] key to display "CLEAR."

(3) Press the [Enter] key. When "OK?" appears, press the [Enter] key again.

6. EEPROM



The DBS incorporates two EEPROM (M4,M5) . The DBS save the measurement data on M4. Use the user menu to operate M4.

	data	address	edit	initialize	back up	restore	print out
M5	setting parameter	0000-07FF	service menu [NVRAM]>[EDIT]	service menu [NVRAM]>[INIT]	service menu [NVRAM]>[BKUP]	service menu [NVRAM]>[RESTR]	service menu [NVRAM]>[PRINT]
M4	measurement data	1000-17FF	service menu [NVRAM]>[EDIT]	user menu [MEM.CLR]	-	-	user menu [PRINT]>[MEMORY]

	address	note
Aging parameters	**00CA-0131 , 05A0-05AF**	
error log	**0234-0235 , 03DE-03E7**	
power supply	**0225**	**0:120V 1:120V.U 2:240V 3:240V.U**
lock (cf. 5.4.1)	**0227**	**1:ON 0:OFF**
temperature calibration parameters of user mode (cf. 5.7)	**03A0-03AF**	

6.1 PRINT Operations

(1) In the service menu, select [NVRAM] → [PRINT] (print).

(2) After the model name, serial number, and software version number are printed in the header section, EEPROM addresses are added and the data is printed.

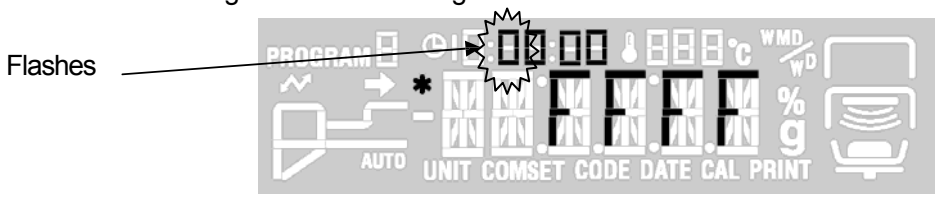
[Print Example]

TYPE DBS
SN WB12AH0332
VER V1.0.2.00
0000: FFFF
0002: FFFF
0004: FFFF
0006: FFFF
0008: FFFF
•
•

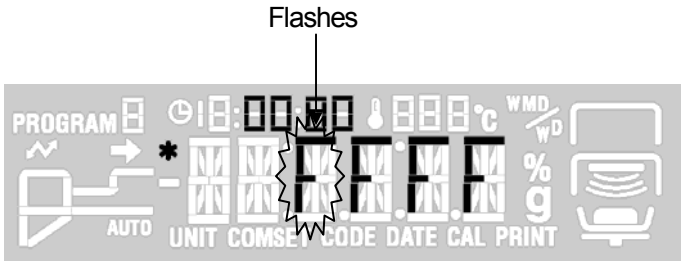
(3) When all data has been printed, the screen returns to [NVRAM] in the service menu.

6.2 Data Edit (EDIT) Operations

(1) In the service menu, select [NVRAM] → [EDIT] (edit data).
(2) Data is displayed with EEPROM addresses added, as shown below.
The flashing value can be changed.



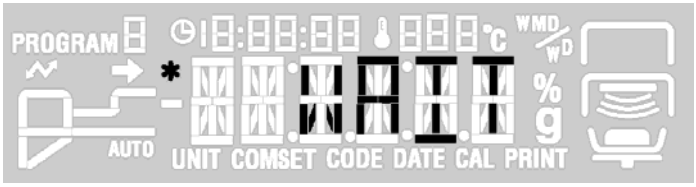
(3) Entering the address of the data to be edited displays the data corresponding to that address (on the lower level).
(4) Press the [→] key to move to the data (lower level) and enable editing data for that address.



(5) Edit the data.
(6) Press the [Enter] key to confirm the data and save it to the corresponding address.
(7) To continue editing, repeat the procedure from step (2).
To finish editing, press the [ESC] key. This changes the screen back to [NVRAM] in the service menu.

6.3 Backup (BKUP) Operations

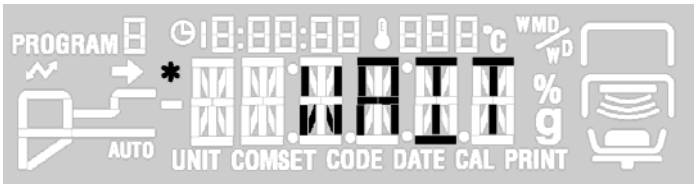
(1) In the service menu, select [NVRAM] → [BKUP (Backup)].
(2) The execution confirmation message "OK?" appears.
(3) Press the [Enter] key. Data in the EEPROM is backed up and saved to the microprocessor flash memory.
(4) The backup progress indicator appears.



(5) When backup is finished, the screen returns to [NVRAM] in the service menu.

6.4 Download (RESTR) Operations

(1) In the service menu, select [NVRAM] → [RESTR] (download).
(2) The execution confirmation message "OK?" appears.
(3) Press the [Enter] key. Data backed up in the microprocessor flash memory is transferred to the EEPROM.
(4) The download progress indicator appears.



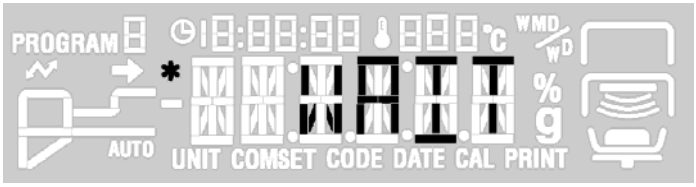
(5) When downloading is finished, the screen returns to [NVRAM] in the service menu.

The following items are not downloaded in RESTR. Setup is required.

- Serial Number
- Factory setting(SHIP)
- Setting information Lock(LOCK)
- OEM model setting(OEM Model Only.)

6.5 All Initialization (INIT) Operations

(1) In the service menu, select [NVRAM] → [INIT] (initialize all).
(2) The execution confirmation message "OK?" appears.
(3) Press [Enter] to confirm execution.
(4) The initialization progress indicator appears.



(5) When initialization is finished, the screen returns to [NVRAM] in the service menu.

7. Performance Inspection

Inspect performance at least 1 hour after the power has been switched ON and mass is displayed (with the backlight ON), in a location not exposed to air flow, vibration, or sharp changes in temperature.

7.1 Repeatability

1) Place, measure, and remove the weights (preferably calibration weights) indicated in Attached Table 1 5 times in the center of the pan to determine the variability ranges Rx and Ry for the zero-point and weighing capacity.

$$R_x = X_{\max} - X_{\min} \qquad : X_1, X_2 \cdots X_5$$
$$R_y = Y_{\max} - Y_{\min} \qquad : Y_1, Y_2 \cdots Y_5$$

("max" indicates the maximum value, and "min" indicates the minimum value.)

7.2 Cornerload Error

1) Prepare the weights indicated for each model in Attached Table 1.
2) Record the indicated value for each position indicated in Figure 65 of 4.3 Adjusting the Cornerload Error by placing and measuring the weight successively in the center (1), then off-center positions (2), (3), (4), and (5), and, lastly, in the center (1) position again. If the difference between the value indicated for the center (1) and the values
3) for off-center positions (2), (3), (4), and
   (5) (cornerload error) is within the specified allowable limits, then it is functioning normally.
   Example: Error for Position (3) = Indicated Value for (3) - Average of 2 Measurements at (1)
4) For small error levels, adjust the error according to 4.3 Adjusting the Cornerload Error.

Note: Only adjust cornerload error for minor error levels (max. ±30 count).
For larger errors, replace the entire unit assembly (1).

7.3 Instrument-to-Instrument Variability Inspection

1) Use calibration weights to perform "E CAL" calibration one time.
2) Place each weight on the pan and record the displayed value after the display stabilizes, in the sequence indicated in Table 1.
3) Calculate the error at each load level.
   Error = (display value for each load) - (mean zero-point display value) - (conventional mass of calibration weight)
4) For minor errors, follow the instructions in 5.5 Adjusting Linearity.

Note: Only adjust linearity for minor error levels (max. ±10 count).
For larger errors, replace the entire unit assembly (1).

7.4 Tilt Error

1) Press the [(TARE(] key to change to the "0 g" display. (A)
2) Insert a 1 mm thick shim under the left level adjuster and record the displayed value after the display stabilizes. (B)
Error = (B) - (A)
3) For large error levels, adjust the error according to 4.2 Adjusting the Tilt Error.

7.5 Temperature

Calibrate the temperature using the same operations as in the user mode and confirm the value indicated on the temperature calibration kit.

Table 1 DBS Inspection Standards

Model		DBS 60-3
Weighing Capacity		60 g
Minimum Value Displayed		0.001 g
Repeatability (Rx, Ry)		0.006 g
	Calibration Weight	50 g
Cornerload Error		±0.002 g
	Calibration Weight	20 g
Linearity		±0.005 g
Tilt Error		±0.03 g
Temperature	100 °C 180 °C	±5 °C

8. Troubleshooting

8.1 General Corrective Measures

Problem	Cause	Solution
Nothing appears on the display.	1) Power supply voltage is lower than rating.	Check the power supply voltage.
	2) Defective power cord (S17)	Replace the power cord (S17).
	3) Defective power board assembly (B4)	Replace the power board assembly (B4).
	4) Defective main board assembly (B2)	Replace the main board assembly (B2).
	5) Defective power supply inlet (B11)	Replace the power supply inlet (B11).
	6) Blown fuse (S18)	Replace the fuse (S18).
Display does not change from "CHK" display after turning on the power.	1) Improper cable alignment of the unit assembly (1)	Re-clamp the cable of the unit assembly (1)with proper alignment. (Fig.27) Re-clamp the Cable and the Ferrite core of the unit assembly (1) not touch the detector assembly (U11) (Fig.23)
	2) Defective Pt-Ni band (U17)	Check the Pt-Ni band (U17) and reconnect it properly.
	3) Damaged OPF (U1)	Replace the unit assembly (1).
Part of displayed numbers or symbols does not appear.	1) Defective main board assembly (B2)	Replace the main board assembly (B2).
Keys do not function.	1) Defective main board assembly (B2)	Replace the main board assembly (B2).
	2)Case assembly (S2) is not fastened properly.	Refasten the case assembly (S2).
Password was forgotten.	-	Input 9999 as password , and press "←"key and "ENTER" key for 3 seconds at the same time. The password can be set to 9999.
"OL" or "-OL" is displayed.	1) Stopper plate (U14) is hitting the stabilizer pin.	Reposition the stopper plate (U14).
	2) Defective Pt-Ni band (U17)	Check the Pt-Ni band (U17) and reconnect it properly.
	3) Force coil assembly (L1) is hiting the magnet assembly (U9).	Reattach or replace the force coil assembly (L1).
	4) Defective force coil assembly (L1)	Replace the force coil assembly (L1).
	5) Damaged OPF (U1)	Replace the unit assembly (1).
	6) Defective detector assembly (U11)	Replace the detector assembly (U11).
	7) Defective analog board assembly (B3)	Replace the analog board assembly (B3).
	8) Corrupt EEPROM data	Initialize all NVRAM data (6.5), and download data (6.4).
	9) Overweight sample or calibration weight is on the pan.	Remove the sample or weight.
Zero-drift or span-drift is large.	1) Warmup time is inadequate.	Warm up the system.
	2) Instrument is exposed to direct sunlight or draft from a heater, cooler, etc.	Change the installation location.
Span is incorrect.	1) Instrument is not leveled.	Level the instrument using the level adjusters (B6).
	2) Damaged OPF (U1)	Replace the unit assembly (1)
Cornerload error is large. (30 d or more)	1) Damaged OPF (U1)	Replace the unit assembly (1) and make readjustment.

Reproducibility of weight measurements is poor. Fluctuation of display value is large. Difficult getting the stability indicator to light up. Span error is large. "ERR.C01" is displayed. "ERR.C04" is displayed.	1) Air flow or vibration effects	Change the installation location. Specify more stable settings.
	2) Stopper plate (U14) is hitting the stabilizer pin.	Reposition the stopper plate (U14).
	3) Force coil assembly (L1) is hitting the magnet assembly (U9).	Reattach or replace the force coil assembly (L1).
	4) Debris is stuck inside the force coil assembly (L1) or magnet assembly (U9).	Remove the debris.
	5) Defective temperature sensor	Resolder the temperature sensor to the detector assembly (U11).
	6) Damaged OPF (U1)	Replace the unit assembly (1).
	7) Defective analog board assembly (B3)	Replace the analog board assembly (B3).
	8) Defective detector assembly (U11)	Replace the detector assembly (U11).
	9) Calibration weight (or sample) is touching the main glass.	Calibrate sensitivity with the heater cover open. Reduce the sample height to prevent it from touching the main glass.
Linearity error is large.	1) Improper linearity adjustment	Readjust linearity. If the error level is 10 d or more, replace the unit.
	2) Damaged OPF (U1)	Replace the unit assembly (1).
Weighted value does not change. "ERR.005" is displayed.	Corrupt EEPROM data	Initialize all NVRAM data, download NVRAM data, calibrate sensitivity, and then calibrate temperature. F/W version up is required, if version is under 1.0.00.01.
"ERR.001" is displayed. "ERR.002" is displayed.	Temperature sensor for correcting UniBloc sensor temperature characteristics has failed.	Check sensor soldering. Check the TAD value.
Lid open/close status is not detected. "ERR.110" is displayed.	1) Defective limit switch (C6) (broken circuit, defective connector, or bad connector connection)	Replace the limit switch (C6).
	2) Defective limit switch (C6) fastener screw	Refasten the limit switch (C6).
	3) Inadequate right hinge (H13) stroke	Readjust right hinge (H13) spacing. Reposition the limit switch (C6).
	4) Defective power board assembly (B4)	Replace the power board assembly (B4).
	5) The DBS was tilted or vibrated with the lid closed.	Open the lid of DBS, before you tilt or vibrate the DBS.
Heater does not come ON.	1) Defective or expired heater (S5)	Replace the heater (S5).
	2) Defective junction cable (H7)	Replace the junction cable (H7).
	3) Thermal fuse (H6) is blown or defective.	Replace the thermal fuse (H6) and the thermistor (H10).
	4) Defective power board assembly (B4)	Replace the power board assembly (B4).
	5) Defective main board assembly (B2)	Replace the main board assembly (B2).
Fan does not rotate.	1) Defective fan motor (C5)	Replace the fan motor (C5).
	2) Fan motor (C5) broken circuit, defective connector, or bad connector connection	Replace the fan motor (C5).
	3) Defective power board assembly (B4)	Replace the power board assembly (B4).
Lid does not close or requires effort.	Debris is obstructing moving parts.	Remove the debris.
Does not reach temperature specified during moisture level	1) Defective heater (S5)	Replace the heater (S5).
	2) Defective thermistor (H10)	Replace the thermistor (H10).

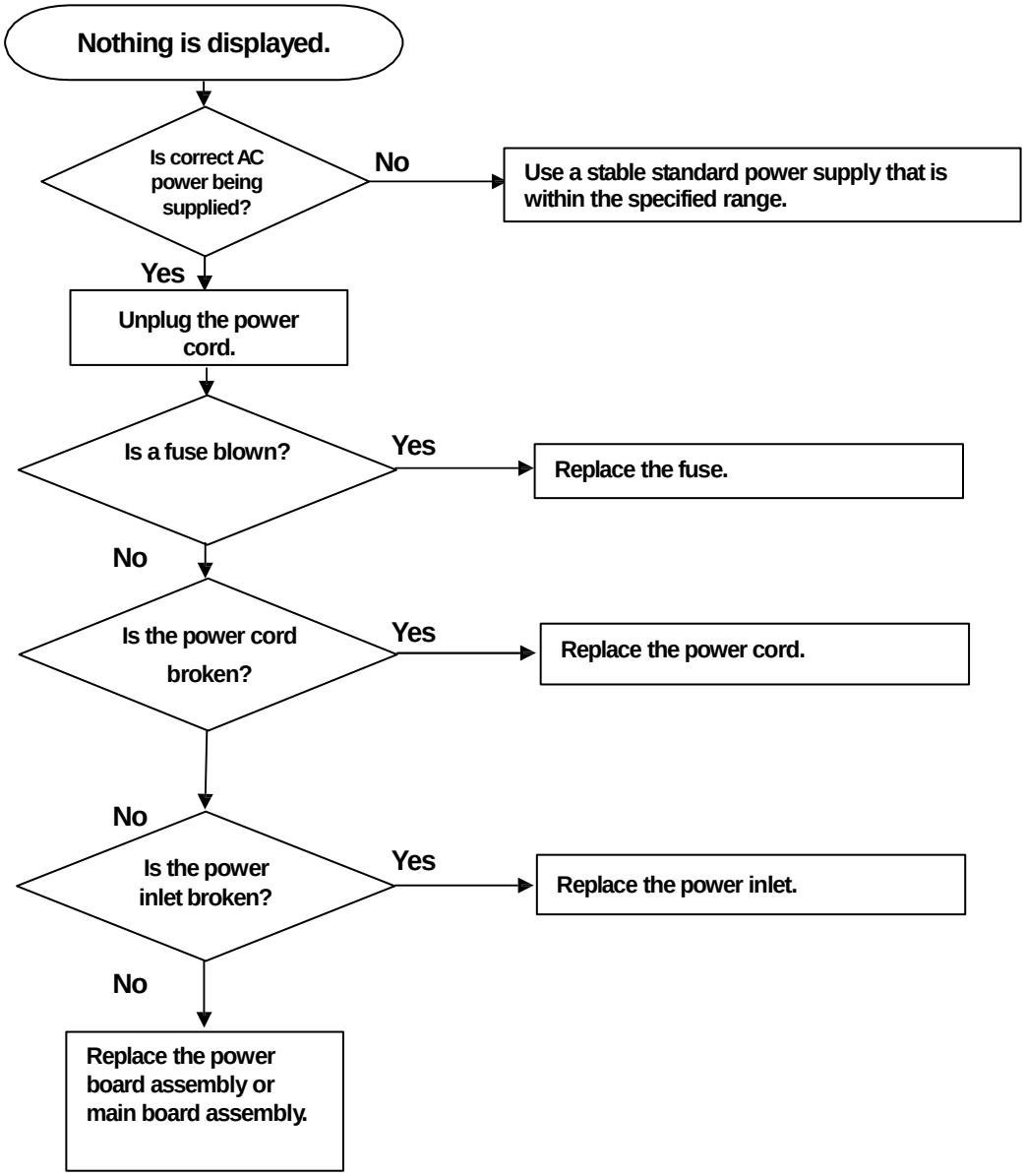
measurement. "ERR.121" is displayed. "ERR.122" is displayed. "ERR.123" is displayed.	3) Dirty heater (S5)	Remove the dirt/contamination. However, do not touch directly with hands.
	4) Dirty glass holder	Remove the contamination.
	5) Temperature calibration is incorrect.	Recalibrate temperature.
"ERR.200" is displayed.	Power supply voltage does not match the factory setting.	Supply the correct voltage. Modify the factory setting.
"ERR.202" is displayed. "ERR.201" is displayed.	1) Unstable power supply frequency or voltage.	Supply the correct frequency and voltage.
	2) Defective power board assembly (B4)	Replace the power board assembly (B4).
	3) Defective main board assembly (B2)	Replace the main board assembly (B2).
"COM.ERR" is displayed.	1) Defective power board assembly (B4)	Replace the power board assembly (B4).
	2) Defective main board assembly (B2)	Replace the main board assembly (B2).
"ERR.124" is displayed.	See "Zero-drift or span-drift is large" above.	
	See "Reproducibility for weight measurements is poor" above.	
	See "Does not reach temperature specified during moisture level measurement" above.	

8.2 Error Display

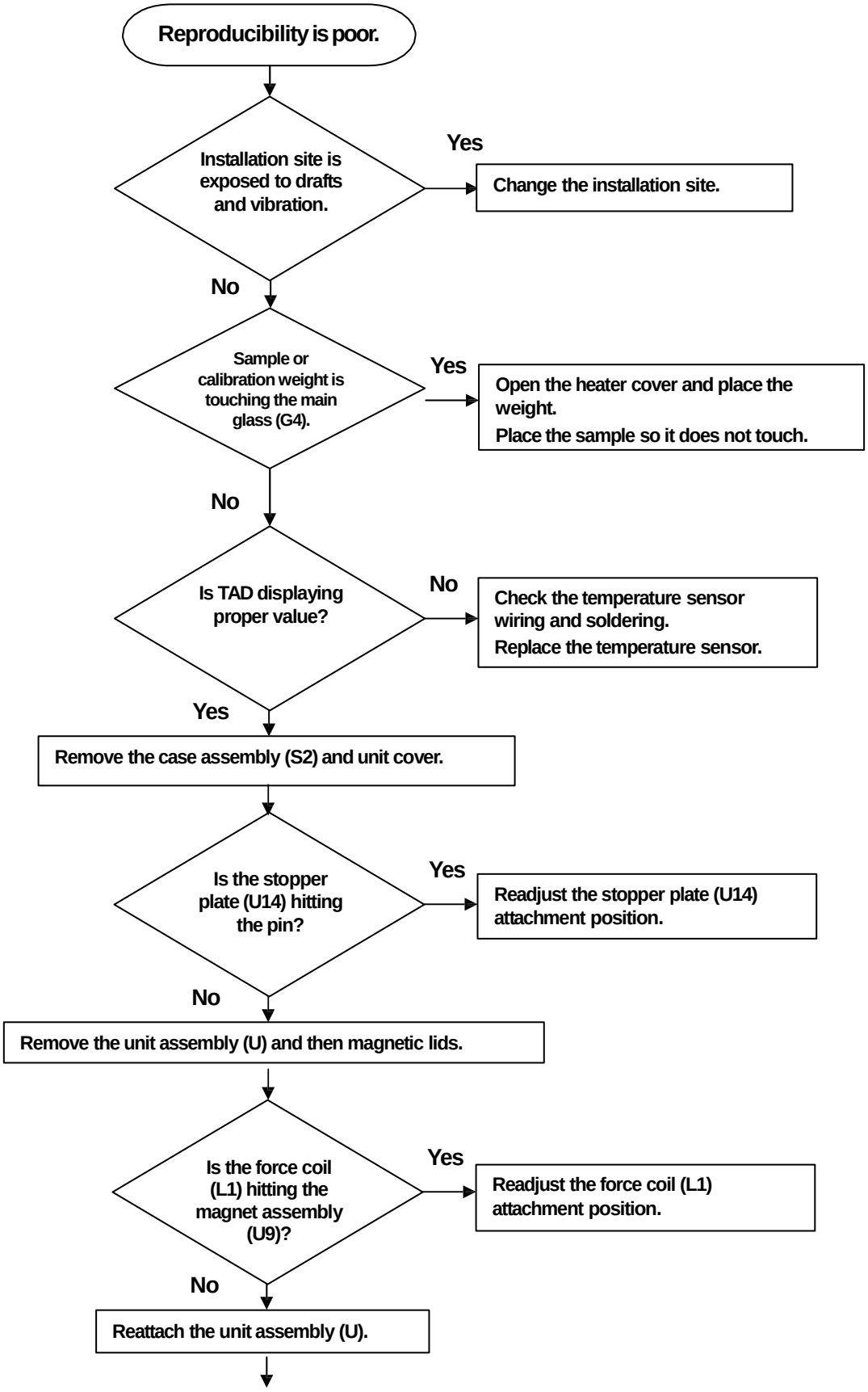
Error No.	Name	Description
(Warning) OL	Overload	Weighing capacity is exceeded.
(Warning) -OL	Underload	Pan supporter is missing.
ERR. OL	Overload During Measurement	Mass exceeded weighing capacity during measurement.
ERR. -OL	Underload During Measurement	Pan supporter was removed during measurement.
ERR. 001	Mass Temperature Sensor (TAD) Open Circuit	Circuit broke in the mass temperature sensor.
ERR. 002	Mass Temperature Sensor (TAD) Short Circuit	Short circuit occurred in the mass temperature sensor.
ERR. 005	EEPROM Data Error	Invalid value was written to the EEPROM. Failed to read from the EEPROM.
ERR. 100	Lid Open 1 Minute Error	Lid was open for 1 minute or more during a measurement (when heated).
ERR. 101	Thermistor Open	Circuit broke in the thermistor.
ERR. 102	Thermistor Short	Short circuit occurred in the thermistor.
ERR. 110	Lid Switch Error	Mass increased even though the lid is not open.
ERR. 111	TARE Error	Measurement was not started within 3 minutes of pressing the [TARE] key. Measurement was attempted without pressing the [TARE] key.
ERR. 121	Heater Failure	Temperature did not rise during measurements. Starting temperature differential (difference between temperature when heating starts and temperature setting) was at least 60 degrees and temperature did not increase by 15 degrees within 30 seconds (5 degrees within 60 seconds in the slow mode, however). Decision is aborted if the lid is open before decision. Also, decision is aborted if differential is less than 60 degrees.
ERR. 122	Heater Error	Not during measurement (when heater is OFF) (1) Sensor detected temperature rose (at least 20 °C per 10 sec). During measurement (2) Temperature exceeded the setting value and increased rapidly (at least 15 °C per 10 sec). (3) Temperature increased after heating ended (at least 16 °C per 10 sec).
ERR. 123	Heating Error	Thermistor temperature exceeded 270 °C
ERR. 124	△ M Error	△ M did not reach the setting value for at least 4 hours.
ERR. 200	Power Supply Error	Power supply voltage range setting in CPU is inconsistent with the actual power supply.
ERR. 201	Unknown Frequency Error	Power supply frequency could not be determined.
ERR. 202	Unknown Voltage	Power supply voltage could not be determined.
COM. ERR	Communications Error	Unrecognized command was received during command reception.
ERR. C01	Instability Error	Unstable state continued for at least 1 minute during mass calibration.
ERR. C04	Span Error	Difference between the measured span value and specified standard calibration weight value exceeded 2 % of the mass of the standard calibration weight.
ABORT	Abort	Moisture analyzer function was aborted.

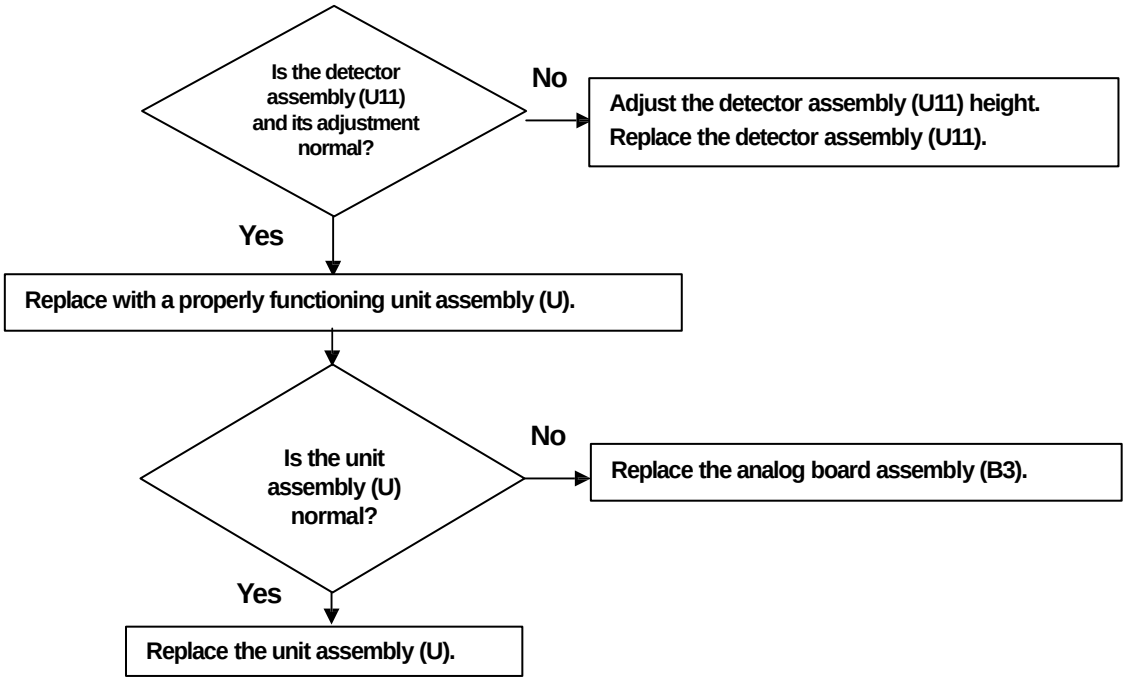
9. Troubleshooting

9.1 Nothing Is Displayed

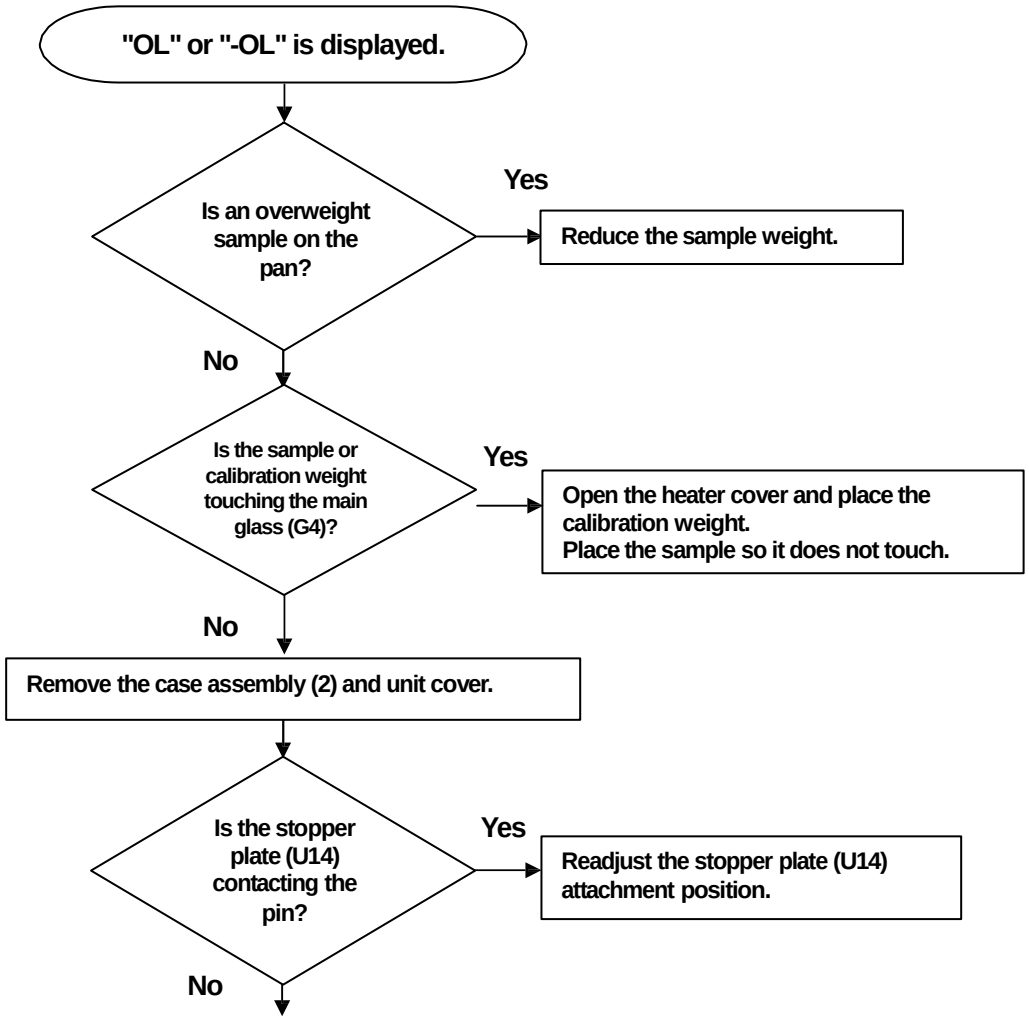


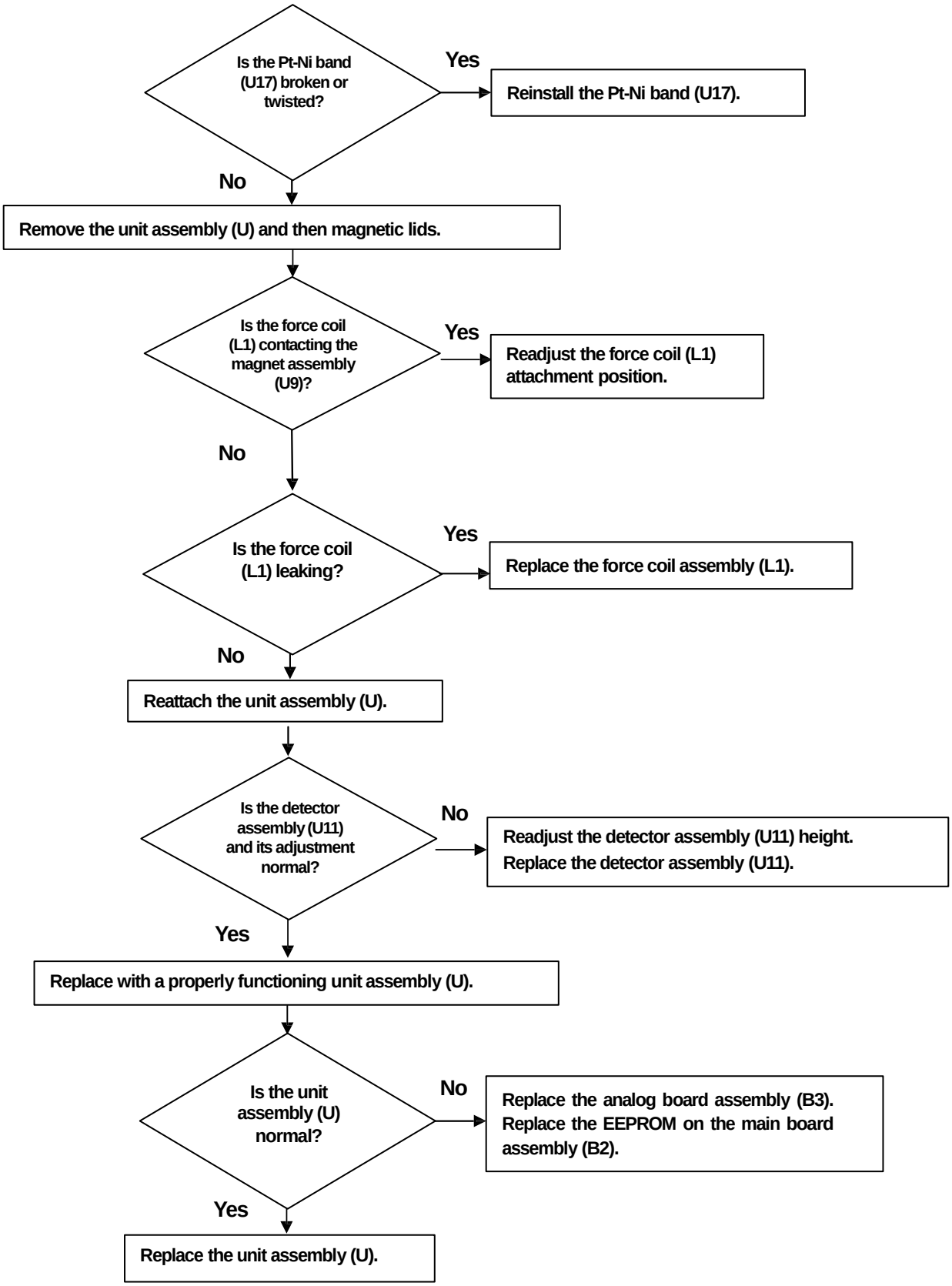
9.2 Reproducibility of Weight Measurements Is Poor



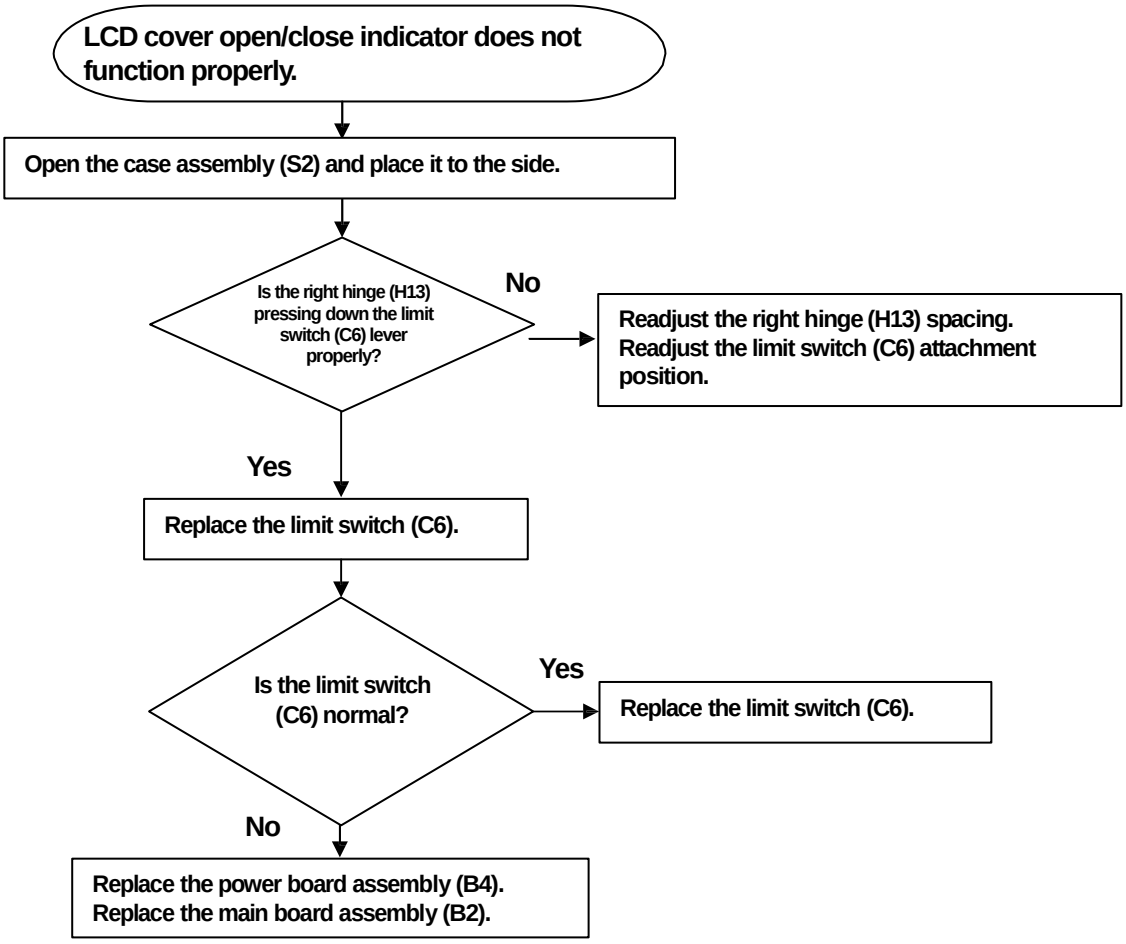


9.3 "OL" or "-OL" Is Displayed

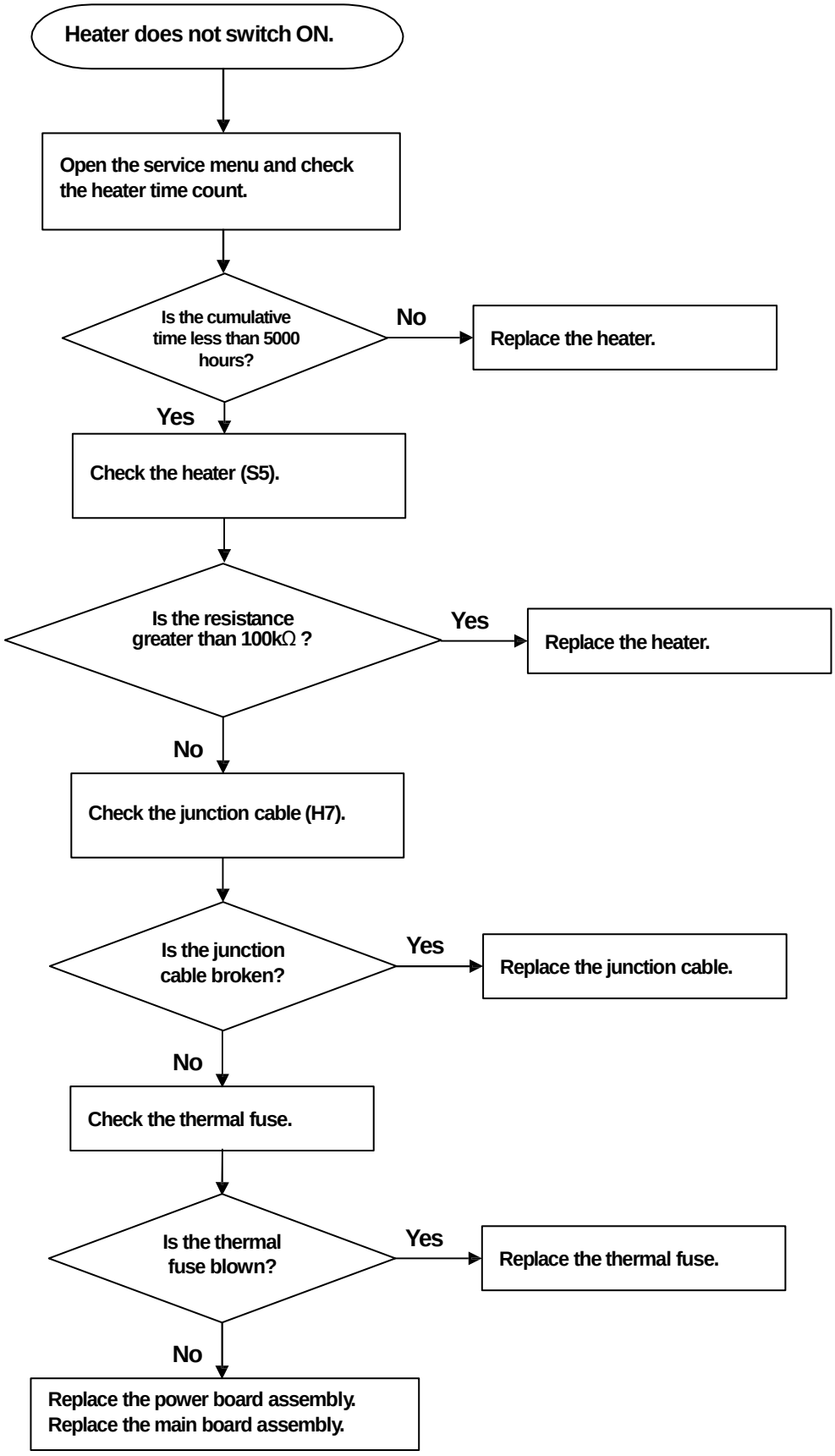



Is the Pt-Ni band (U17) broken or twisted?
Yes
Reinstall the Pt-Ni band (U17).
No
Remove the unit assembly (U) and then magnetic lids.
Is the force coil (L1) contacting the magnet assembly (U9)?
Yes
Readjust the force coil (L1) attachment position.
No
Is the force coil (L1) leaking?
Yes
Replace the force coil assembly (L1).
No
Reattach the unit assembly (U).
Is the detector assembly (U11) and its adjustment normal?
No
Readjust the detector assembly (U11) height.
Replace the detector assembly (U11).
Yes
Replace with a properly functioning unit assembly (U).
Is the unit assembly (U) normal?
No
Replace the analog board assembly (B3).
Replace the EEPROM on the main board assembly (B2).
Yes
Replace the unit assembly (U).

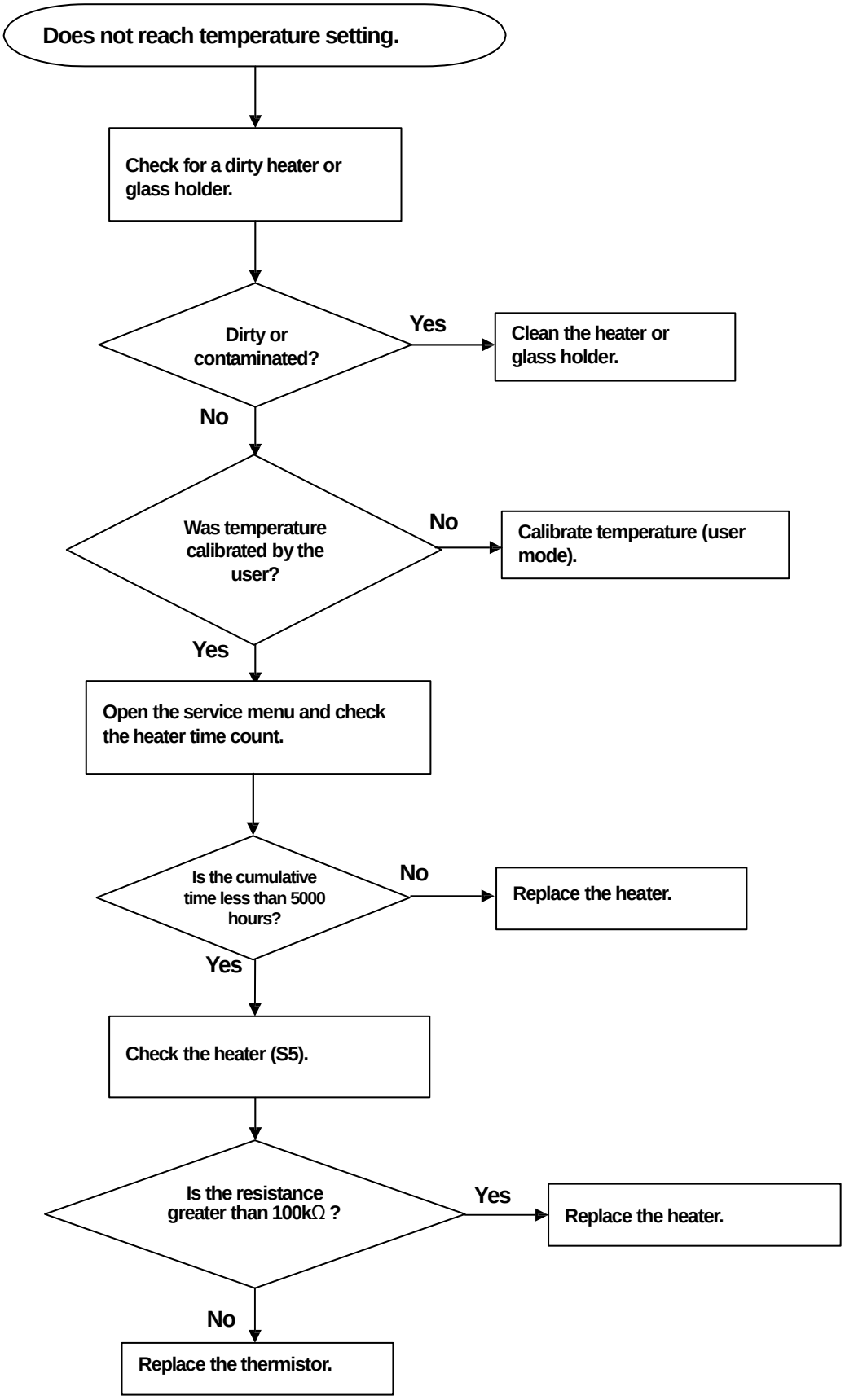
9.4 Lid Open/Close Status Is Not Detected



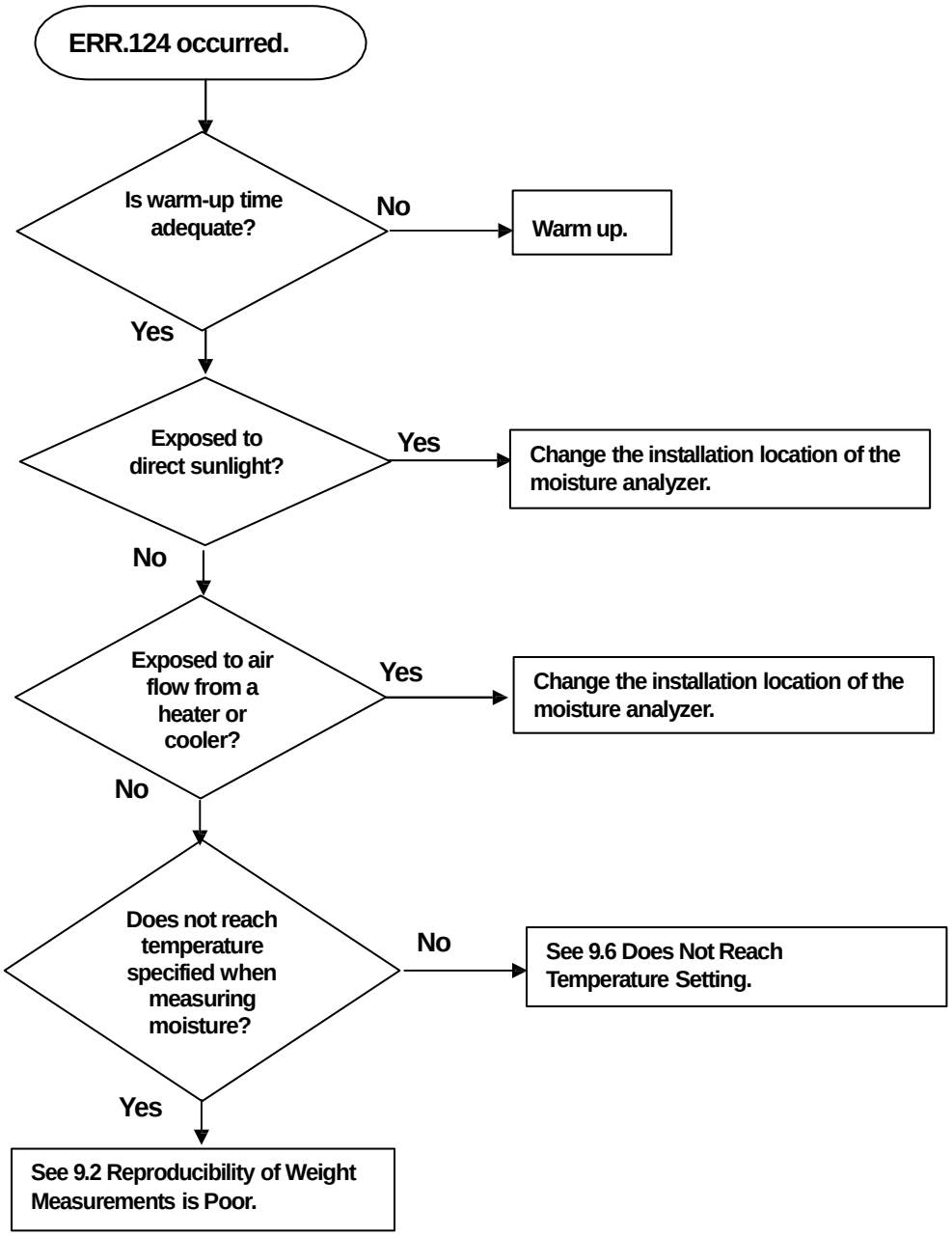
9.5 Heater Does Not Come ON



9.6 Does Not Reach Temperature Setting



9.7 ERR.124 Occurred



10. Parts

10.1 DBS Exploded View

DBS Sub-Assembly Exploded View

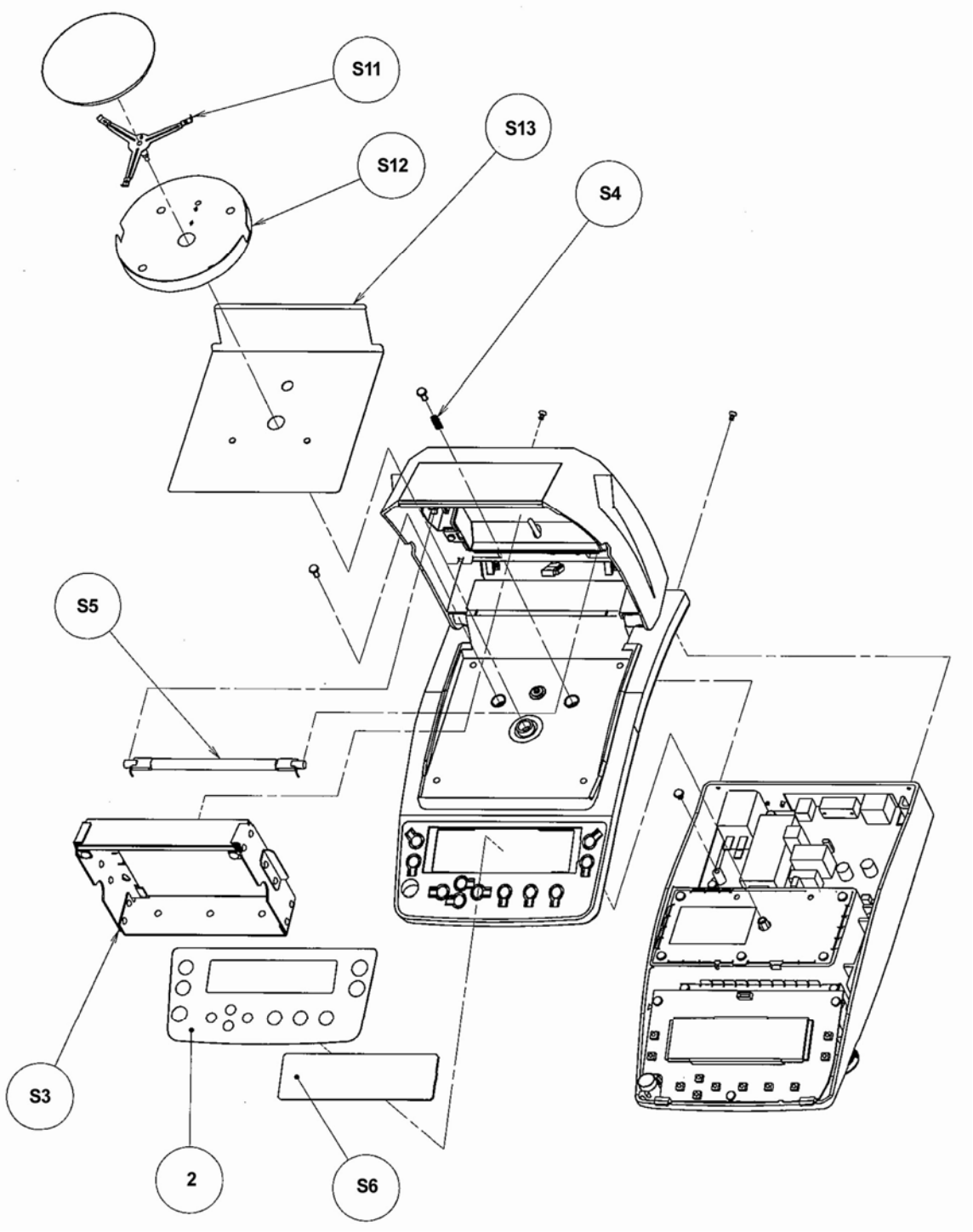


Fig.1

Base Unit Assembly Exploded View

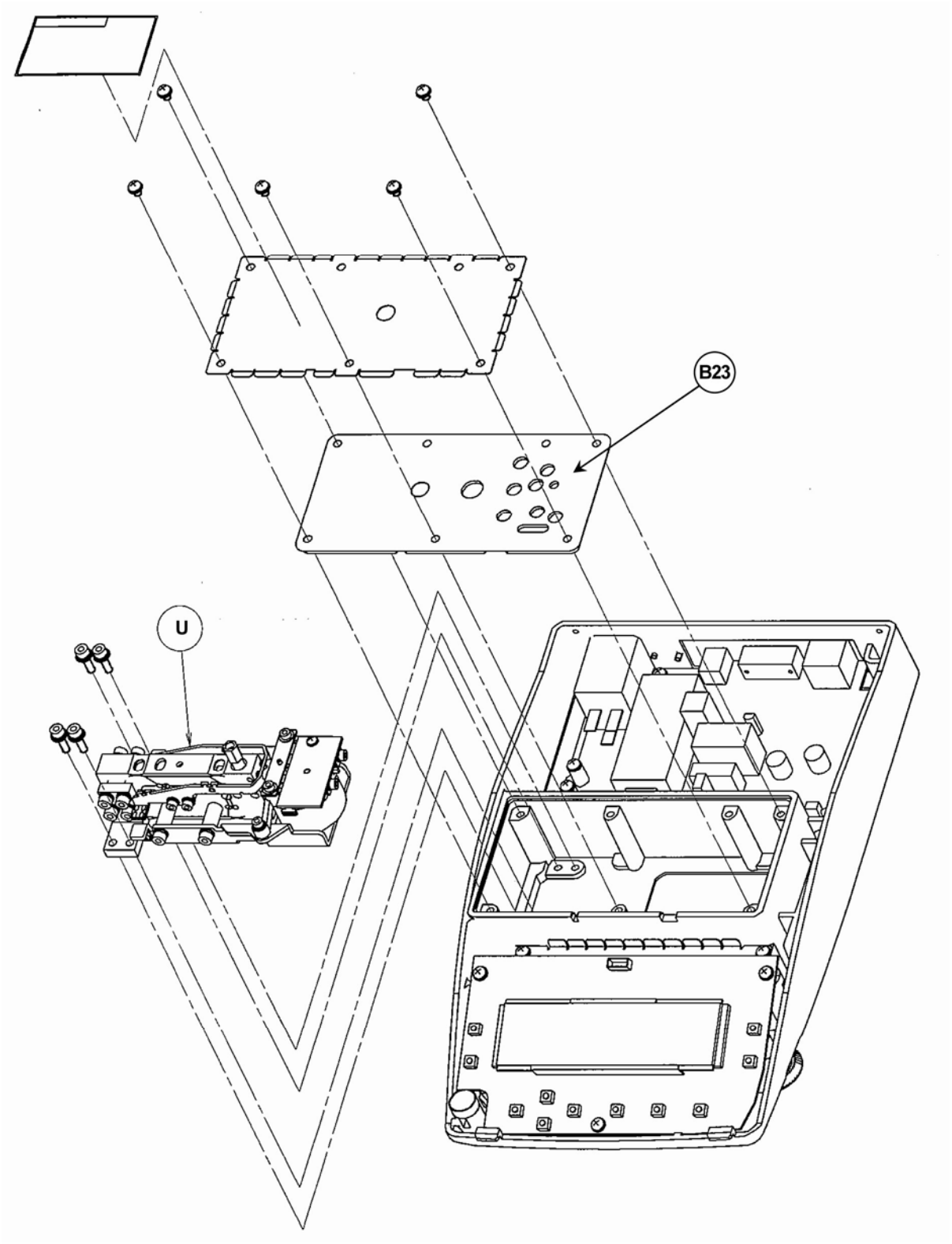


Fig.2

Base Unit Assembly Exploded View

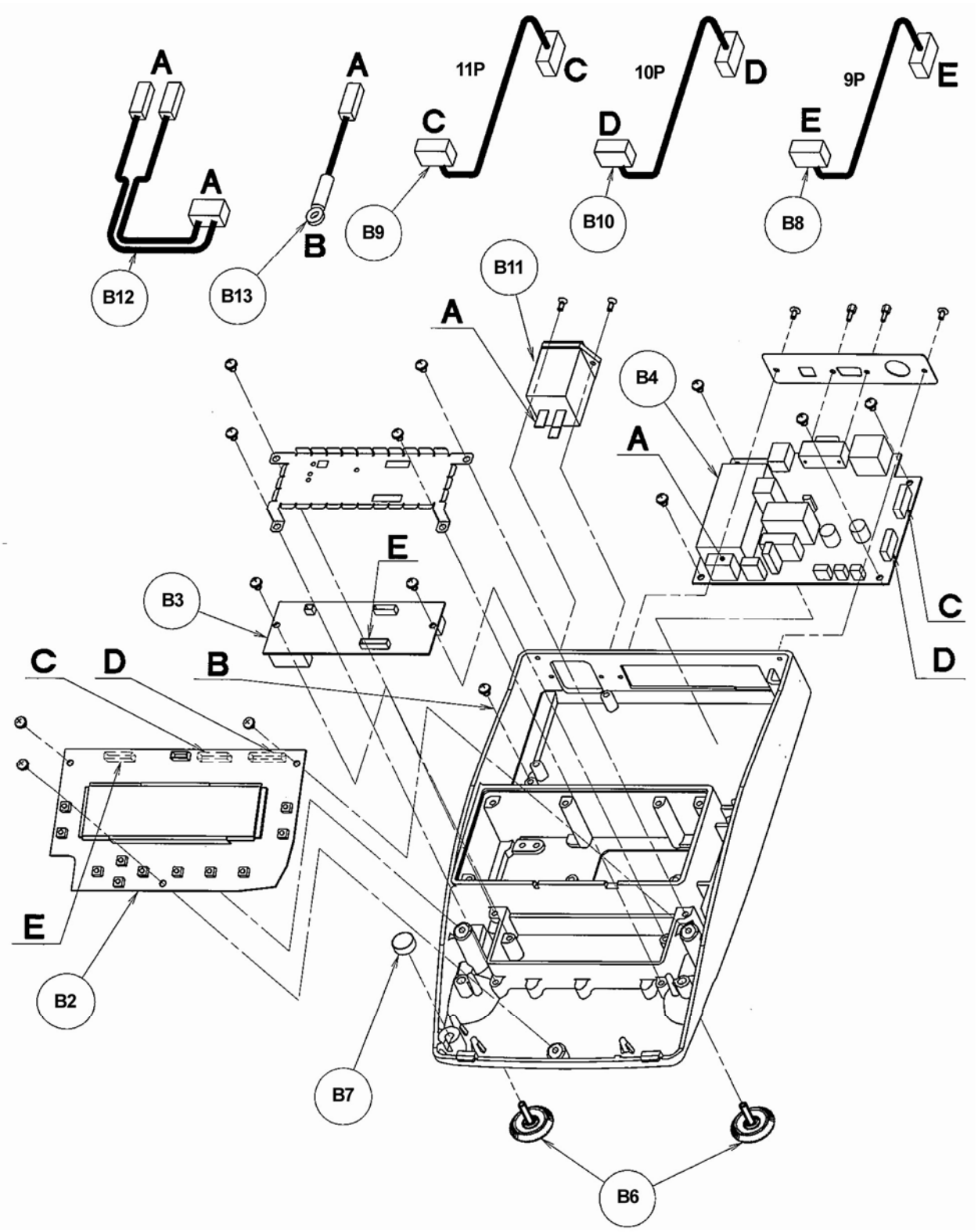


Fig.3

DBS Unit Assembly

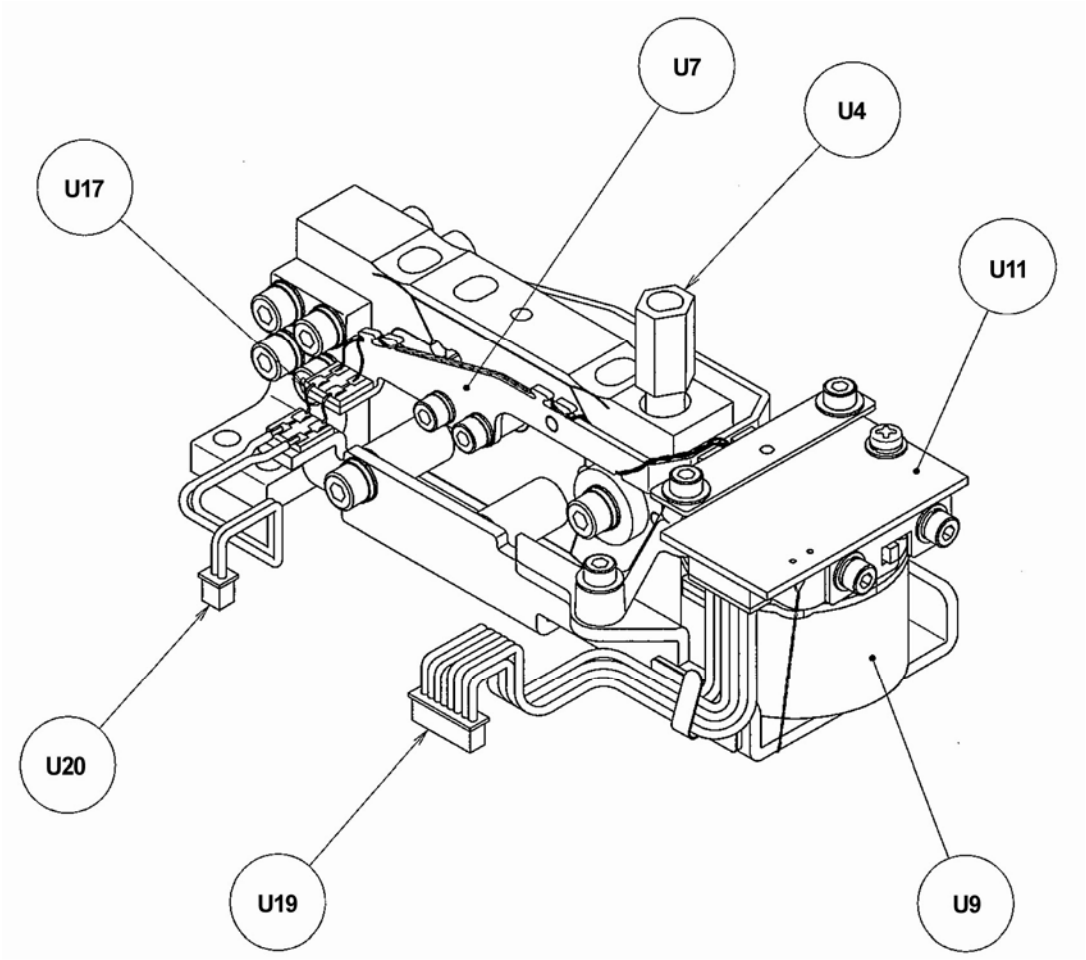


Fig.4

Glass Unit Assembly

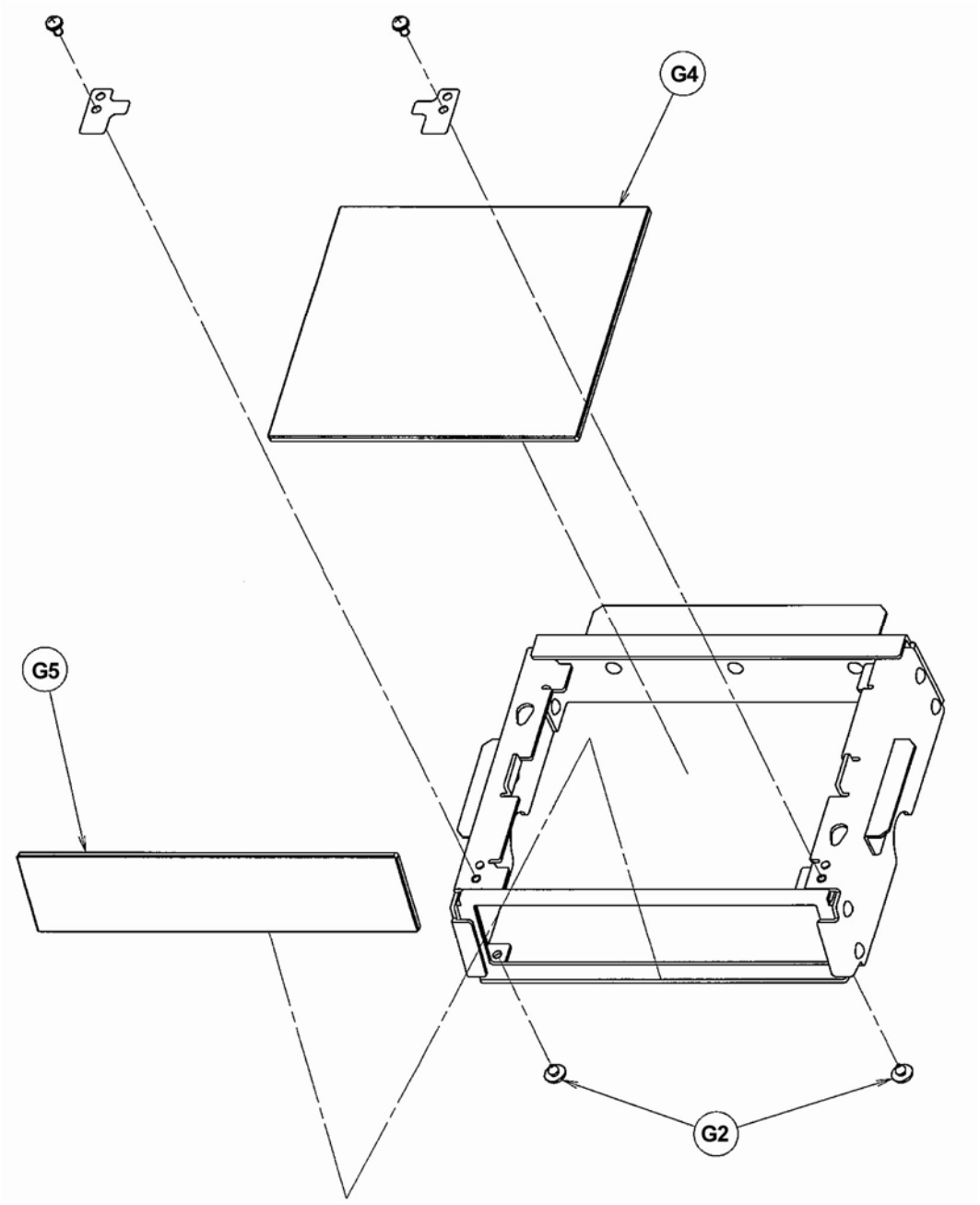


Fig.5

Case Assembly Exploded View

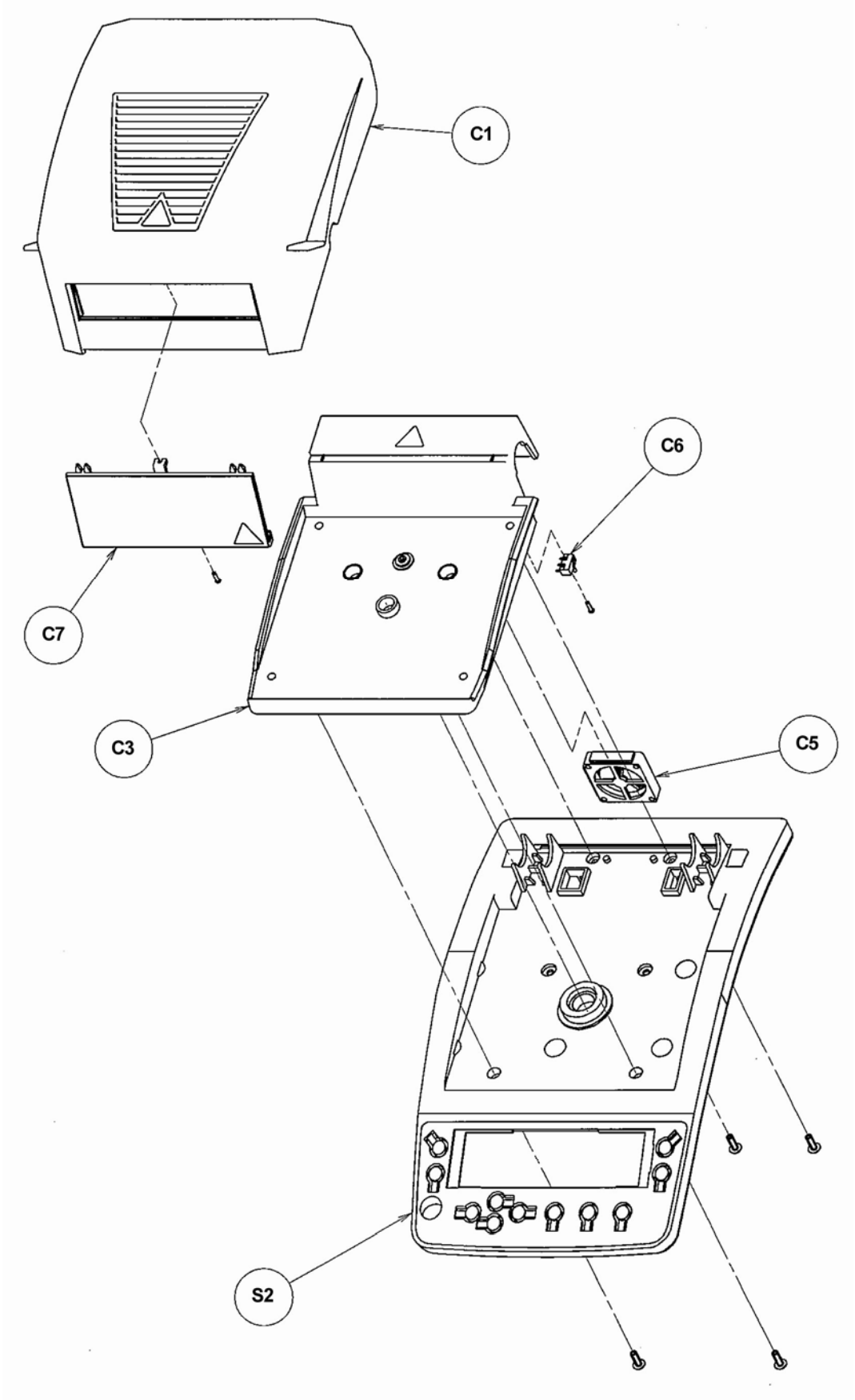


Fig.6

Heater Case Assembly Exploded View

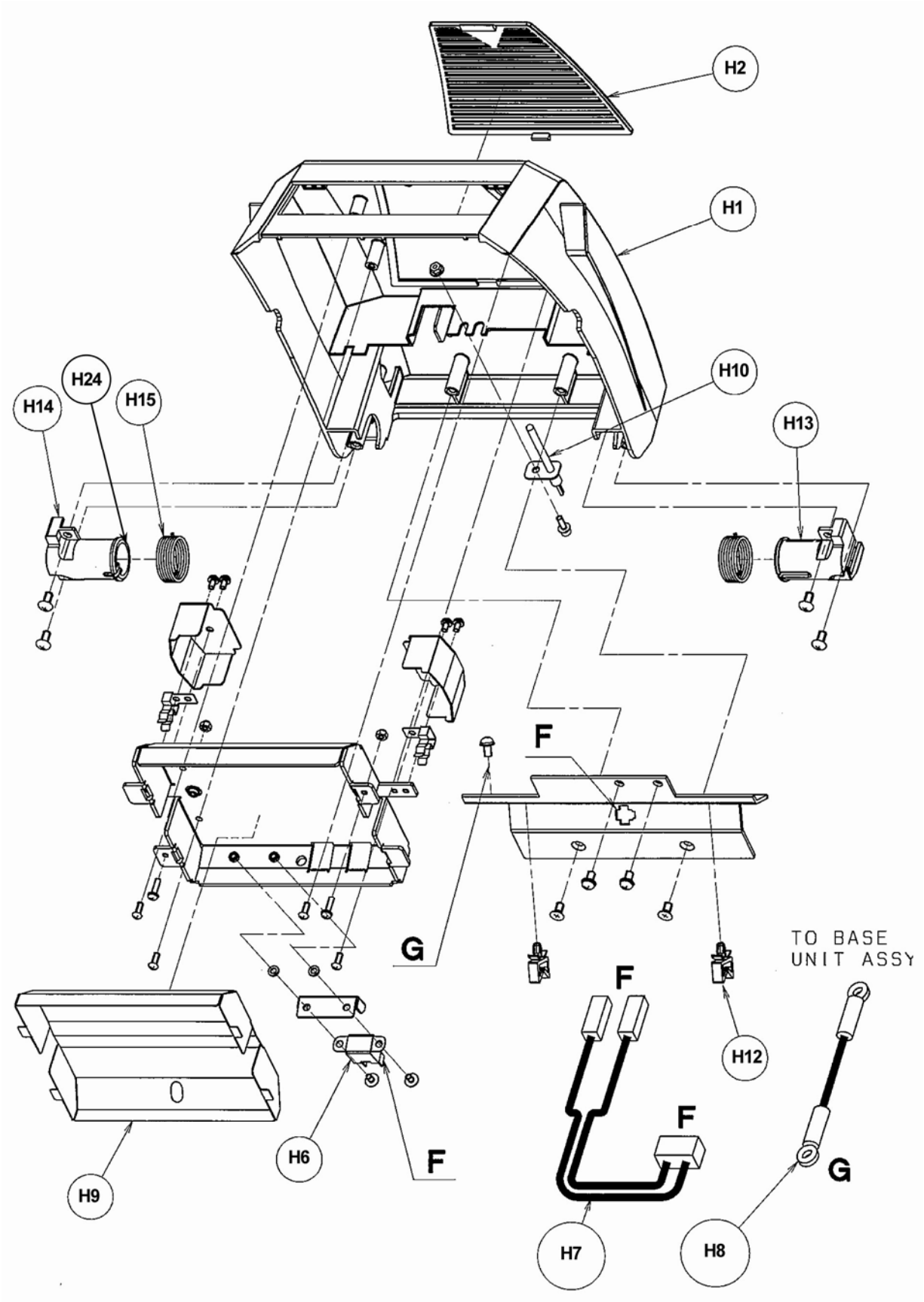


Fig.7

10.2 DBS Maintenance Parts List

No.	Parts Name	P/N	Remarks
2	Sheet Panel, DBS	321-72203	
8	Packing box assy, DBS	321-71514-11	Including cushioning material
P1	Packing box, DBS	321-72207	Outer box only
S2	Case Assy, DBS Service	321-71738-11	including sheet panel, window panel, etc.
S3	Glass Unit Assy	321-72172-01	
S4	Spring, Grounding	321-71601	
S5	Heater, 240 V	321-71534-02	(*1) Includes hex wrench
S6	Window, Display	321-71037	LCD window
S11	Pan Supporter Assy	321-71598	(*1)
S12	Windbreak	321-71720	(*1)
S13	Heater Insulation Plate	321-71736-02	(*1) Including caution label
S17	Power Cord, 240 V	071-60825-51	(*1) For regions with 220 to 240 V (Germany, etc.)
S18	Fuse, 240 V	072-02004-21	(*1) Rated 250 V / 3.15 A
G2	Cushion, Rubber	321-71573	(*1)
G4	Glass.Main	321-71450-01	(*1)
G5	Glass,Front	321-71451-01	(*1)
B2	Main Board Assy	321-71373-41	
B3	Analog Board Assy, CE600	321-64556-14	
B4	Power Board Assy, with USB	321-71746-41	Including 2 D-sub screws
B6	Level Adjuster Assy	321-64540	
B7	Level Gauge Assy	321-70691-01	
B8	Cable, ILS 9P	321-64566-01	
B9	Cable, ILS MOC 11S	321-71383-41	
B10	Cable, ILS MOC 10S	321-71383-41	
B11	Inlet Assy,service 240V	321-71745-02	220-240V power supply inlet
B23	Unit cover,lower	321-71511	
C1	Heater Case Assy	321-71507-01	
C3	Top Base Assy,service	321-71742-11	Including caution label
C5	Fan Cable Assy.service	321-71740-41	Including cushion tape
C6	LSW Cable Assy	321-71384-41	
C7	Window Panel Assy,service	321-71743-01	Sample Observation Window Including caution label
H1	Top Case Assy,service	321-71741-01	Including aluminum tape
H2	Top Case, Grill,service	321-71744-01	Including caution label
H6	Thermal Fuse, DM150V	072-01843-19	
H7	Heater Junction Cable	321-71380-41	
H8	FG Ground Cable	321-71381-41	
H9	Reflector Plate, T0.3 MIRO	321-71586-01	
H10	Thermistor, E1M-312-S11	321-71336	
H12	Saddle, Wire WS-A-1-19	072-60611-01	
H13	Right Hinge, for Top Case	321-71433	LSW side
H14	Left Hinge, for Top Case	321-71501	
H15	Spring, Hinge D1.6	321-71602-04	(*3)
H24	Rubber sponge	321-72146	
U1	Aging Unit Assy, MOC-T	321-71525-01	
U4	Sensor Shaft	321-71436	
U9	Magnet Assy	321-55222-12	
U11	Assy, Detector	321-64559	
U17	Pt-Ni Band, 1M	321-70188-01	014-54301 1 m reel
U19	Cable, ILS 7S-7S-140	321-64566-04	
U20	Cable, ILS 2S-90	321-64567-01	
L1	Force Coil Assy	321-53912-10	
T3	Packing Carton Assy, Temperature Calibration DBS	321-72242-54	
O1	Plate,thrmal cal kit	321-71521-01	Heat consentration plate
O2	Cap nut,M3	023-33130	(*5) Parts for Plate,thermal cal kit

10.3 Tools

No.	Parts Name	P/N	Remarks
J1	Lever Positioning Pin, for OPF	321-62674	
J2	Shim for Setting Gap (t = 0.2 mm)	321-69034	
J3	Handle for Cornerload Adjustment	321-69205	
J4	Grind Stone	321-69206	
J5	Check Wire Set	321-62356	
J6	Flash Programmer, S-550SFW	321-71365	
J7	Cable, S-550SFW	321-71371	
J8	Unit Setting Jig Assy	321-72075-01	
J9	Pan Support Jig	321-72076-01	
J10	Plate, Temperature Calibration Kit	321-71521-01	Heat collector plate assembly
J11	Temperature Calibration Kit, DBS	321-71520-21	JCSS measurement points: 1 point (160 °C), certificate (including English)
J12	Cap nut,M3	023-33130	(*5) Parts for Plate,thermal cal kit
J13	Jig cable,2P	321-72077-01	
J14	Jig cable,7P-7P	321-72078-01	
	Torque Driver, 6LTDK	321-72079-01	
	Torque Driver, 30LTDK	321-72079-02	
	Torque Driver, 50LTDK	321-72079-03	
	Hex Bit SB2.5 (for M3)	321-72080-01	
	Hex Bit SB3 (for M4)	321-72080-02	
	Nut Driver #5 (for #4-40UNC)	086-12003	(*5)
	Nut Driver #7 (for M4)	086-12005	(*5)
	Wrench 5.5×7 (for M3/M4)	086-03050	(*5)
	Ball Driver, BS2.5 (for M3 sockets)	086-12023	(*5)
	Ball Driver, BS3 (for M4 sockets)	086-12024	(*5)
	Soldering Iron, FX-951-01 (for Pb-free)	086-72039-01	(*5)
	Solder, P3M705-0, 8 (Pb-free)	018-52130-03	(*5)
	Tester (+/- 5.00 V)		(*5)

10.4 Optional accessories list

No.	Parts Name	P/N	Remarks
	Protective Cover	321-71512-10	Set of 5
	Aluminum Sheets	321-71571-10	1 box (50 sheets)
	Fiberglass Sheets	321-71371	1 box (100 sheets)
	Temperature Calibration Kit, DBS-A01	321-71520-54	
	Sample Pan (stainless steel)	321-71572-10	Set of 5
	RS-232C Cable	321-61967	
	USB cable	088-52848-32	
	Tongs	321-71623	

(*1) Indicated in User's Manual. User replaceable maintenance parts.

(*3) Use PTFE tube(inside diameter 1.5mm, outside diameter 2.5mm)(016-37514-20) for inside hook end protection of spring hinge

(*5) No stock in our factory. Please prepare items refer to specification on the drawing by yourself.