

AD-4713

MOISTURE BALANCE

TECHNICAL MANUAL

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MOISTURE BALANCE

AND
A&D Company, Limited

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AD-4713 Technical Manual

Introduction

The AD-4713 is based on the weighing mechanism of the FX-300, and the adjustment of the weighing mechanism is similar to the adjustment procedure for the FX-300 weighing mechanism.

This manual is broken into several sections, these include:

1. Adjustment of the AD-4713
 - 1.1 Adjustment mode versus normal mode
 - 1.2 ROM version
 - 1.3 Initialization
 - 1.3.1 Initialization of the main board
 - 1.3.2 Setting of the data output
 - 1.3.3 Hardware Test
 - 1.3.4 Checking the A/D converter
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2. Changing format
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 - 2.2 Setting the ID number for use with a remote control
 - 2.3 Setting the STABLE START of UNSTABLE START
3. Test modes
 - 3.1 Test modes and what they include
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4. AD-4713 disassembly instructions
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 - 4.3 Upper case assembly
 - 4.4 Lamp hood assembly
 - 4.5 Photo-coupler and trigger diode installation
5. Temperature control circuit and wiring diagrams
 - 5.1 Temperature control circuit diagram
 - 5.2 Temperature control wiring diagram
6. Packing for shipment

There are some special tools required for removing the temperature control board.

1. Adjustment of the AD-4713

This set of procedures are used to establish the proper operating ranges for the AD-4713 Moisture Balance. These procedures may be used at any time that it is determined that the balance is not performing within the published specifications.

1.1 Adjustment mode vs normal mode

In order to activate the adjustment mode, plug in the RS-232C adjustment board or connect pin 6 to pin 8 of the RS-232C connector. The adjustment mode can be either automatic mode or manual mode, and the selection is made when the power is applied.

When the RS-232C adjustment board is plugged in and No. 8 of J10 is kept "HI", the balance is in the normal mode.

Note: The RS-232C adjustment board shorts pin 6 and pin 8 of J10 when set to "low".

With pin 6 shorted to pin 8 of the RS-232C connector, if any key is pressed with the power on, the manual mode will be activated. The manual mode should be selected when any repair is to be done, thus in the following sections it should be noted that the adjustment mode means manual mode. Incidentally, when the automatic mode is activated, "AUTO" is displayed and all the keys are disabled.

- The following can be done once the adjustment (manual) mode is selected.
 1. Initialization of the main board
 2. Inputting of the linearity adjustment parameters and the temperature compensation data (tH, tI)
 3. Check mode of the weighing and measurement section.

In this mode the weight data is displayed in grams. The main CPU controls the weighing and measurement part and the display update rate will be once per second.

- The normal mode is the mode for normal use of the AD-4713, the data update rate from the weighing part of the main CPU will be 4 times per second.

In this mode the following can be done. (These can be done in the adjustment mode as well.)

1. Calibration
2. Hardware test such as temperature, lamp control and other checks.

Corner adjustment of the weighing mechanism can be done more easily in the normal mode.

In the following sections the key annunciators for TEMP/TIME and START/STOP will be abbreviated as T/T and S/S respectively.

1.2 ROM version

The ROM version of the AD-4713 can be displayed as below.

Press the lower three keys, ▼, T/T and S/S simultaneously and release them.

Press the same three keys again simultaneously.

Then, the version will be shown as "ROM No. =205. . XX"

1.3 Initialization

1.3.1 Initialization of the main board (skip to 1.3.5 if only calibration is required)

Note... This initialization procedure will reset all of the parameters and data, thus this should not be conducted unless all the adjustments are made including the weight / measurement part and the IR lamp control data.

Objective

Set the weighing section and initialize all the temperature data and all the IR lamp control data.

Procedure

1. Make sure that JP1 located at the right-hand side of LCD is connected.
2. Insert the RS-232C adjustment board or connect NO. 6 and No. 8 of J10 so the mode will be in the adjustment mode.
3. Turn power on.
4. "BUSY" will be displayed, then "INITIALIZE".
5. "INITIALIZE END" will be displayed, then the buzzer will sound.
6. Stop the buzzer by cutting JP1.
7. Turn power off

1.3.2 Setting of the data output (Adjustment may not be needed in normal cases.)

Objective

Set the data output baud rate of the weighing part to 2400 and Stream Mode.

Procedure

1. Unplug the RS-232C adjustment board.
2. Turn power on while pressing ▼ and S/S keys (lower left and right keys).
3. "C3-4 SET" will be displayed, then the buzzer will turn on.
4. The display will show "100 15 0.000g" after BUSY is shown. The mechanical weighing part must be complete, otherwise "-E" or "E" will be displayed.

Note: This procedure forwards the internal setting of C3- in 4 steps, and this adjustment is only possible when the adjustment is done in the normal mode after the initialization. Once this procedure is started, C3-3 (Command mode) will be activated next, and C3-2 (Auto print mode) next, thus it prohibits weighing in the normal mode. When this happens, repeat the above procedures until the proper display is made.

1.3.3 Hardware Test (Not needed in normal cases except where the main board alone is to be tested).

Objective

Test the hardware functions as the moisture analyzer other than the weighing functions. At the same time check the key switch functions.

Procedure

1. Connect the jig, a voltmeter and a printer.

2. Press all the lower three keys, ▼, T/T, S/S simultaneously. The weighing will be set to direct reading mode and the display will show "ST, +0 000.000 g".
3. Press S/S key, then "HARD - TEST" will be displayed.
4. Press each switch in the following sequence and verify each function.

Switch	Display	Function
(1) ▼	CONTROL H	Output voltage -1.02V to -1.03V
(2) ▲	CONTROL L	Output voltage -0.24V to -0.25V
(3) T/T	20 C (example)	2, 20, 157 C by selection of the jig switches
(4) S/S	REMOCON 5	Corresponds to the keys of AD-1652
(5) TARE	PRINT	Printer will print "PRINT".
(6) RESET	LED BUZZER	Buzzer will be on.

5. Turn the power off by unplugging the power cable

1.3.4 Checking the A/D converter

Procedure

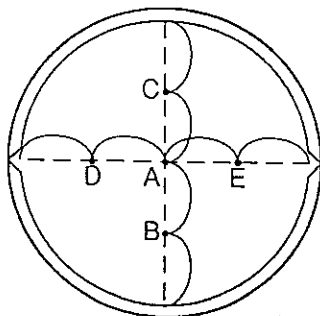
1. Turn on the power while in the adjustment mode.
2. Press the RESET key. The display will show the weight A/D value after displaying "CHECK MODE 1"
3. Verify that the zero and 300g weight corresponds to the values shown below.
4. Press the ▲ key. The display will show the temperature A/D value with the indication of "g#". Verify that the value is between the values listed below.

Check Item	Corresponding Values
Zero	60000 to 160000
Weight A/D 300g	Less than 900000
Difference between zero and 300g values	640000 to 800000
Temperature A/D (Room Temperature)	450000 to 550000

1.3.5 Checking the corner loading (it is recommended that this be done in the normal mode).

Procedure

1. Press the ▲ key. After checking the A/D mode, the zero track will be disabled. (Unit "g\$").
2. Specifications for the corner loading is ± 2 counts using a 200g weight (see the diagram below for placement of the weight. Start at "A" and check that the display reads within ± 2 counts of "A" at "B", "C", "D" and "E".



1.3.6 Linearity Adjustment

Procedure

1. Turn on the power while in the adjustment mode.
2. Press the T/T key (lower center). "LINEARITY 0" will be displayed.
3. Press the TARE key. "□" will be displayed on the lower left side.
4. Place weights in this order:
 - "0", place no weight on the pan, press the TARE key.
 - "1", place a 100g weight on the pan and press the TARE key.
 - "2", place a 200g weight on the pan and press the TARE key.
 - "F", place a 300g weight on the pan and press the TARE key.
5. The specifications are $\pm 0.002\text{g}$

1.3.7 Calibration

Procedure

1. Press the S/S key while in the adjustment mode (if the balance is in the normal mode, press the ▲ key, RESET and TARE keys simultaneously).
 2. "CALIBRATION", then "TARE KEY" will be displayed.
 3. Press the TARE key. "□" will be displayed on the lower left side.
 4. "CAL 200g" will be displayed. Place 200g on the pan.
 5. Press the TARE key. "□" will be displayed.
 6. "CAL END" will be displayed, indication that the calibration has finished. Next "BUSY" will be displayed. Continue with the next test.
- ### 1.3.8 Temperature adjustment (this must be done in a temperature controlled room or chamber)

Procedure

1. The specifications are $\pm 3\text{PPM}/^\circ\text{C}$.
2. Turn the power on while in the adjustment mode.
3. With the balance at 5°C for a minimum of 4 hours, press the ▲ key. "TEMP H", then "0" will be displayed. With nothing on the pan, press the TARE key. Next "F" will be displayed. Place 200g on the pan and press the TARE key. "□" will be displayed.
4. With the balance at 35°C for a minimum of 4 hours, press the ▼ key. "TEMP L" then "0" will be displayed. With nothing on the pan, press the TARE key. Next "F" will be displayed. Place 200g on the pan and press the TARE key. "□" will be displayed.

This completes the electronic adjustment procedure. Other adjustments will be discussed in later sections of this manual that can effect the adjustments done here. It is best to fully repair the balance prior to the final calibration. Repeat sections 1.3.5 through 1.3.8 as a final calibration.

2. Changing format

2.1 Changing the style of the decimal point from "." to ","

- Either sample weight or moisture content (%) may display a decimal point as a "." or ",".
- The comma indication is also available when printing data or using computer.
- When setting the decimal point on the remote keyboard, a display of (.01 or .1) can be shifted to (,01 or ,1).

(the following have not been altered in respect to the decimal point)

- The display and printing of the prediction measurement coefficient mode (decimals among such as a.b.c.d.)
- Input from a computer when selecting the decimal point (.01% or .1%) under computer control.




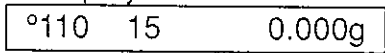









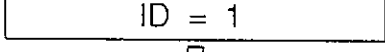
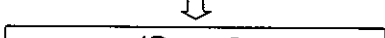


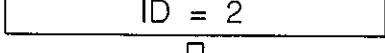
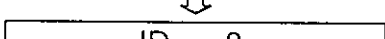


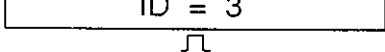
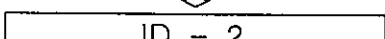



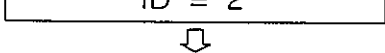
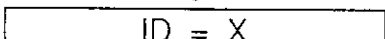


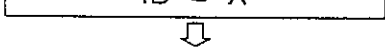
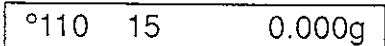

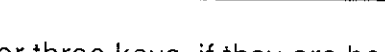
Setting

Keys to press	Display	Function
Lower keys ▼ T/T S/S	°110 15 0.000g °C min ↓	Regular display
Lower keys ▼ T/T S/S	ST, + 0000.000g ↓	Direct balance reading
Upper keys ▲ RESET TARE	ROM NO. = 205 . 25 ↓	ROM No.
▲ key	N ↓	Regular mode
▲ key	K ↓	
▲ key	C ↓	
▲ key	J ↓	
RESET key	, ↓	Comma mode
	°110 15 0.000g	

2.2 Setting the ID number for use with a remote control

2.2.1 The standard setting for the AD-4713 is with the ID=1. This can be changed as necessary from ID=1 to any number through ID=7 (if more than one AD-4713 is to be used in the same area, change the ID number to avoid disturbing other balances).

Setting

Keys to press	Display	Function
Lower keys   	 °110 15 0.000g	Regular display
	 °C min 	
Upper keys   	 ST, + 0000.000g	Direct balance reading
	 	
 key	 ID = 1	The ID number last set
	 	
 key	 ID = 2	Increasing the ID number
	 	
 key	 ID = 3	
	 	
Increase or decrease the ID number as necessary using the  or  keys	 ID = 2	Decreasing the ID number
	 	
 key	 ID = X	The RESET key stores the ID number selected
	 	
	 °110 15 0.000g	

Use caution when pressing the lower three keys, if they are held too long the balance will bypass the direct reading and display the ROM version. If this occurs, press the reset key and try again.

2.3 Setting of STABLE START or UNSTABLE START

"Stable Start" was set at the factory. If conditions warrant, this can be set to "Unstable Start".

To start moisture measurement, put a sample on the pan and press the **[S/S]** key while STABLE START is displayed.

An initial weight is also established that has been verified in STABLE.

Some cases which include measuring in area with shaking or rocking and using a sample that is quickly evaporating are never stable and are impossible to measure or slow to start. If this happens, set UNSTABLE START and the measurement will start when the **[S/S]** key is pressed.

To set UNSTABLE START:

Keys to press	Display	Function
Lower keys [▼] [T/T] [S/S]	<div>°110 15 0.000g</div> <div>°C min ↴</div>	Regular display
[S/S] key	<div>ST, + 0000.000g</div> <div>↴</div>	Direct balance reading
[RESET] key	<div>HARD - TEST</div> <div>↴</div>	
Lower keys [▼] [T/T] [S/S]	<div>LED BUZZER</div> <div>↴</div>	Buzzer check
Use [▲] or [▼] keys to select	<div>STABLE START</div> <div>↴</div>	
[RESET] key	<div>UNSTABLE START</div> <div>↴</div>	
	<div>°110 15 0.000g</div> <div>°C min</div>	Regular display

Pressing the RESET key will store the selection of STABLE START or UNSTABLE START in memory.

3. Test Modes

3.1 Test modes and what they include.

- 1 TEST-0 (WT) : The drift in the weight measurement is printed out at point that the IR lamp is turned off.
- 2 TEST-1 (WT) : The drift in the weight measurement is printed out while under temperature control
- 3 TEST-2 (PC) : A number for control corresponding to the gain in the temperature control system is acquired, recording the increase in temperature during 5 minutes, when under constant output power for temperature control.
- 4 TEST-3 (TMP): Controllable status with it's change is illustrated graphically
- 5 TEST-4 (SET) : Similar to item 3 above and a control number acquired is set. (It is used when controlling the temperature.
- 6 Display and alteration of a control number : A control number already set is verified or altered

During manufacturing of a product, the control number is set at TEST-4 and drift is checked at TEST-1.

Entering into the test modes

Keys to press	Display	Function
Lower keys ▼ T/T S/S	°110 15 0.000g °C min ↵	Regular display
Lower keys ▼ and S/S	ST, + 0000.000g ↵	Direct balance reading
S/S key	TEST-0 (WT) ↵	Test 0 (weight)
S/S key	TEST-1 (WT) ↵	Test 1 (weight)
S/S key	TEST-2 (PC) ↵	Test 2 (gain in temp.)
S/S key	TEST-3 (TMP) ↵	Test 3 (temperature)
S/S key	TEST-4 (SET) ↵	Test 4 (control number)
	CONTROLL 2	

Test-0 through test-4 will start when the RESET key is pressed while the test number is displayed.

3.2 TEST-0

Start the test after putting weight on to be followed by setting desired time and span.

Keys to press

Display

RESET key

TEST-0 (WT)		
↓		
000	15	0.000g
°C	min	

Example: Time = 5 minutes Span = 20 Weight = 10.001g

S/S key

000	5	10.001g
°C	min	↓
024	5	10.001g
°C	min	

TEST-0

SAMPLE NO. : 1

SETTING TEMP : 000°C

SETTING TIME : 5 MIN

WET WEIGHT : 10.001g

MIN	T(°C)	GRAM	Weight (g)		
00	24	10.001g	9.980	10.000	10.020
	24	9.998g		°	
01	24	9.999g		°	
	24	9.997g		°	
02	24	9.998g		°	
	24	9.999g		°	
03	24	9.995g		°	
	24	10.000g		°	
04	24	9.998g		°	
	24	9.999g		°	
05	24	10.000g		°	

DRY WEIGHT : 10.000g

The range of the SPAN 20 is to be ± 20 mg based on the weight at the time of start. Weight measurements are shown as average figures for 10 seconds.

* No setting of time and span leads to acquiring the figure set previously

3.3 TEST-1

You can set the desired temperature.

Keys to press	Display
	TEST-1 (WT)
	↓
RESET key	110 15 0.000g
	°C min

Example: Temp = 110°C Time = 5 Weight = 10.000g

	110 5 10.000g
	°C min ↓
S/S key	110 5 10.000g
	°C min

TEST-1

SAMPLE NO. : 2

SETTING TEMP : 110°C

SETTING TIME : 5 MIN

WET WEIGHT : 10.000g

MIN	T(°C)	GRAM	Weight (g)
00	24	10.000g	9.980
	84	9.997g	10.000
01	109	9.996g	10.020
	111	9.999g	
02	111	9.999g	
	110	10.002g	
03	109	9.998g	
	109	10.003g	
04	110	10.002g	
	111	9.999g	
05	111	10.001g	

DRY WEIGHT : 10.001g

3.4 TEST-2

Researched the control number and found no setting.

Keys to press

Display

RESET key

TEST-2 (PC)		
↓		
110	5	9.997g
°C	min	

The temperature setting will have no effect in TEST-2 and 5 minutes is set automatically

S/S key

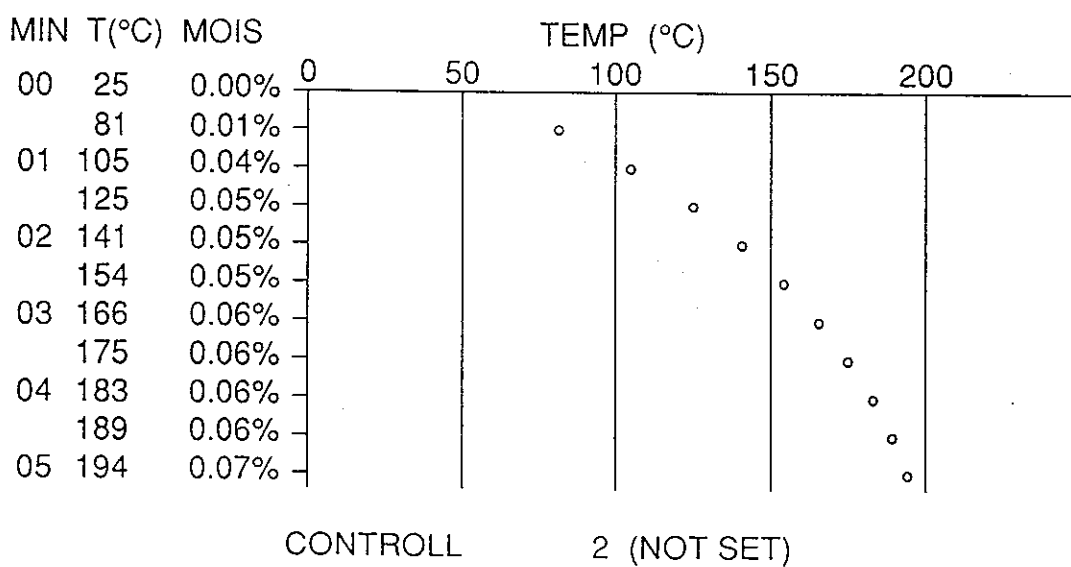
25	5	0.00%
°C	min	

TEST-2

SAMPLE NO. : 3

SETTING TIME : 5 MIN

WET WEIGHT : 9.997g



3.5 TEST-3

Keys to press	Display
	TEST-3 (TMP)
	↓
RESET key	110 5 10.000g
	°C min
	↓
S/S key	27 5 0.00%
	°C min

The temperature span is fixed at 250°C

TEST-3

SAMPLE NO. : 4

SETTING TEMP : 110°C

SETTING TIME : 5 MIN

WET WEIGHT : 10.000g

MIN T(°C)	MOIS	TEMP (°C)
00 27	0.00%	0
85	0.02%	50
01 110	0.04%	100
112	0.07%	150
02 110	0.07%	200
109	0.07%	
03 110	0.07%	
110	0.07%	
04 110	0.07%	
109	0.07%	
05 109	0.08%	

3.6 TEST-4

Keys to press

Display

RESET key

TEST-4 (SET)

↓

110 5 10.005g

°C min

The time is set automatically to 5 minutes and both the weight and temperature settings have no effect.

S/S key

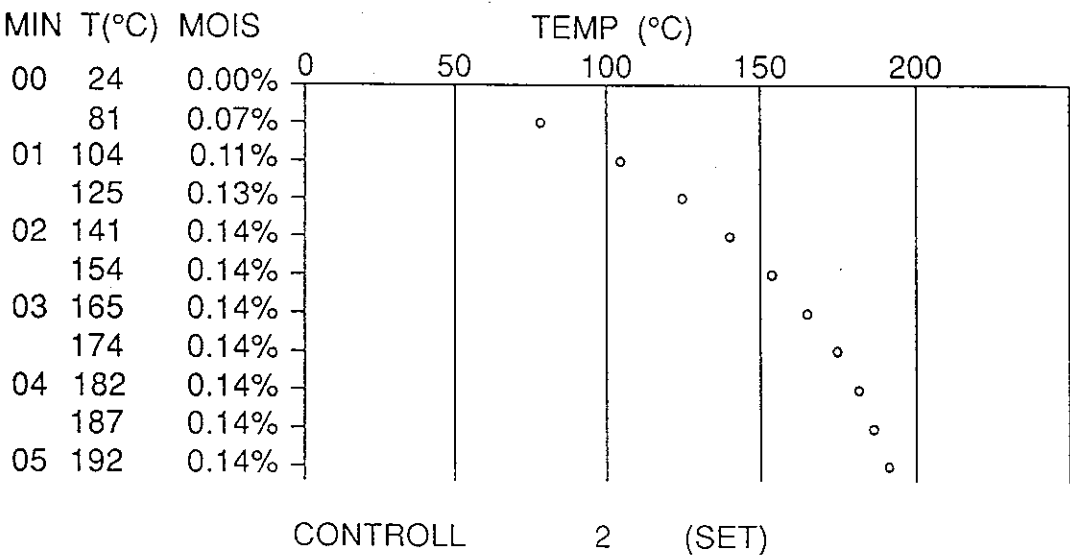
↓

24 5 0.00%

°C min

TEST-3

SAMPLE NO. : 5
SETTING TIME : 5 MIN
WET WEIGHT : 10.005g



After control 2 is set, it is used for temperature control

Displaying the control number:

Keys to press

Display

 key

TEST-4 (SET)



CONTROLL 2

(It is indicated that number 2 has been set)

Changing the control number

 key



CONTROLL 3

 key



CONTROLL 4

 key



CONTROLL 3

 key



°110 15 0.000g

°C min

Pressing the RESET key stores your choice (CONTROLL 3) in memory. This will be used for the temperature control

There are control numbers 0 through 9 listed on the display, but only 0 through 4 are used by the AD-4713.

The control number, and how it is used:

At TEST-4, the AD-4713 is set automatically (from 0 through 4) based on the temperature reached (T°C) in 5 minuets (this is dependent upon the condition of the photo coupler)

Temp. Reached (°C)	Control No.
$T \geq 230$	0
$230 > T \geq 210$	1
$210 > T \geq 150$	2
$150 > T \geq 100$	3
$100 > T \geq 55$	4

In the case of $T \geq 249$ and $T \leq 55$, The control change is printed as well as displayed on the LCD. In this case, the photo coupler should be replaced as it is defective. TEST-4 must be executed if the photo coupler is replaced.

The attained temperature varies dependent upon the environment of the balance and the conditions at START. If the temperature of the probe is still high even after the balance has cooled for a while, the control number will be changed.

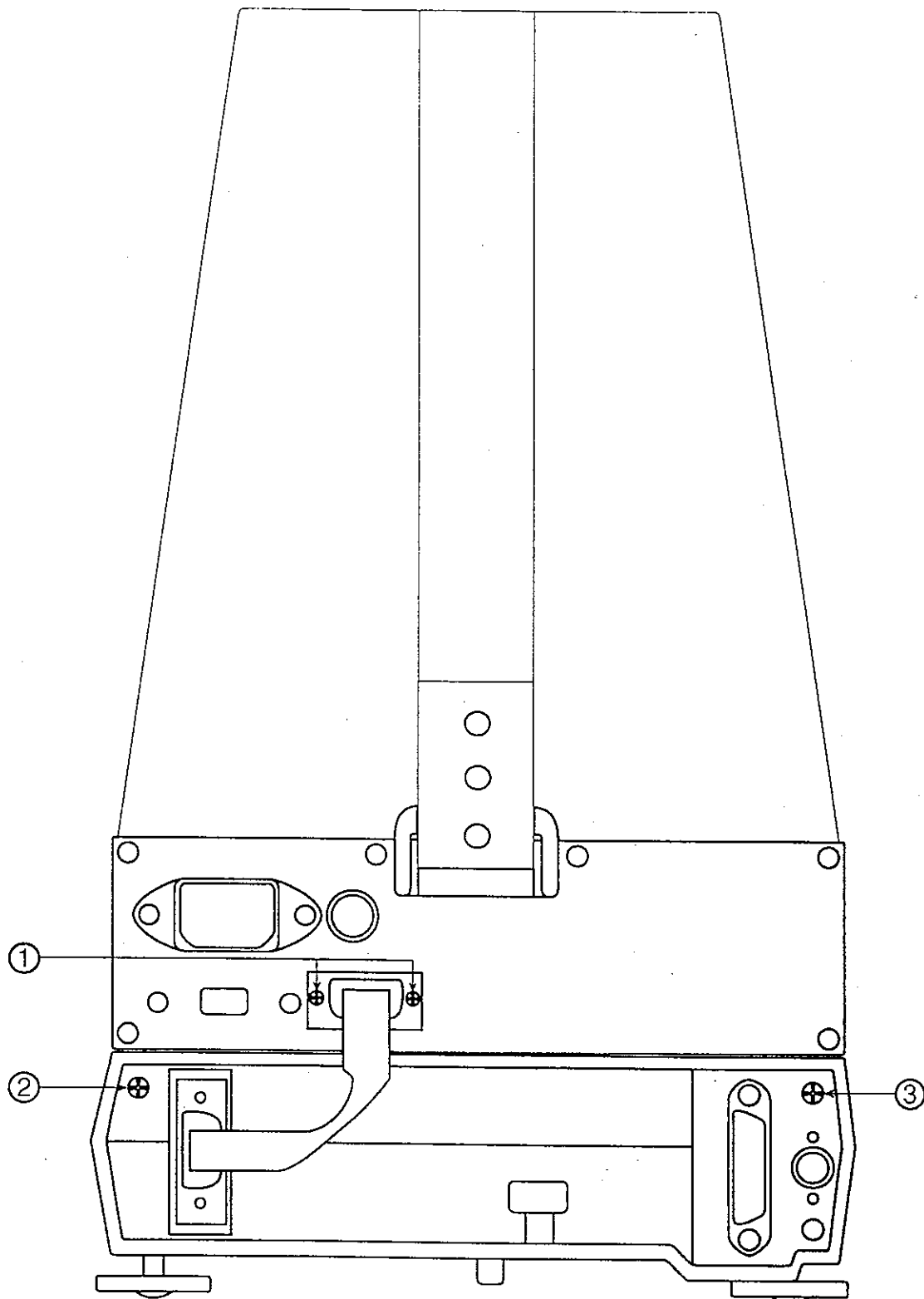
To avoid problems, "TEST" should only be preformed between 15°C and 28°C with a fully cooled balance.

A higher control number is given for a temperature control system, whose temperature does not rise quickly enough, by applying constant input power.

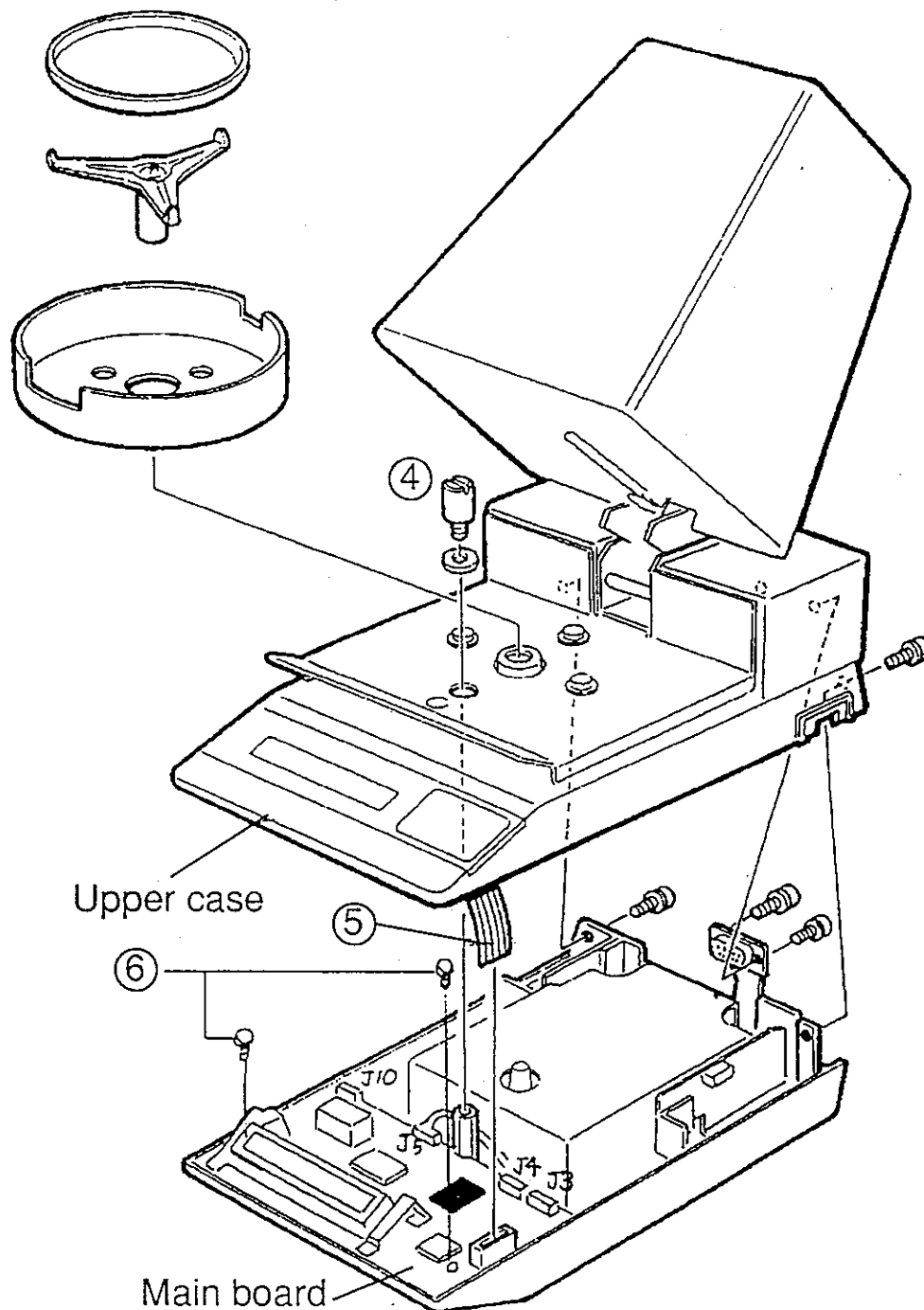
If the quality of the system degrades and the temperature control deteriorates, the control number should be lessened for a system with overshoot and increased for a system that is slow to heat up. Follow the sequence on the previous page to set the control number.

4. AD-4713 Disassembly instructions

4.1 Removal of the main PC board



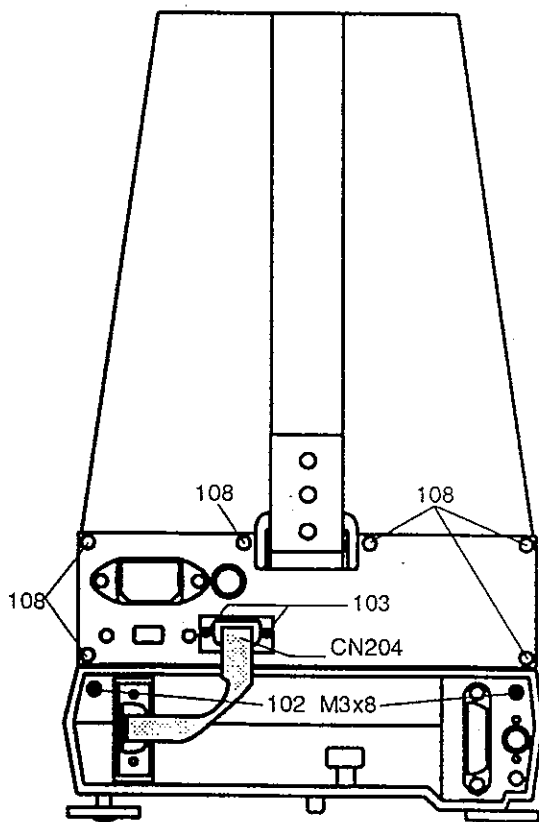
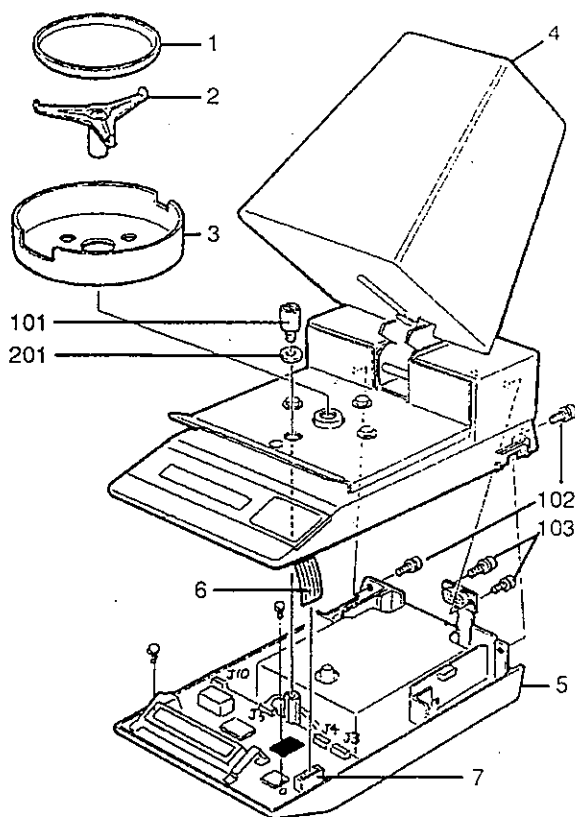
1. Remove the screws (1) through (3) as shown above. Continue to the next page.



2. Remove the sample pan, pan support and pan cover. Remove screw number (4)
3. Slowly lift the upper case away from the base and reach under the right front edge and pull the flexible ribbon from it's connector (5). The black portion is not fastened to the ribbon, it is soldered to the board. Set the upper case to one side.
4. Remove the connectors (J3) through (J5) and (J10). These connectors separate along the center line. Do not pull on the wires, use a small flat blade screw driver inserted in the edge to separate the part attached to the wires. Remove the screws (6) and lift the board out of the lower case.

4.2 Upper case disassembly

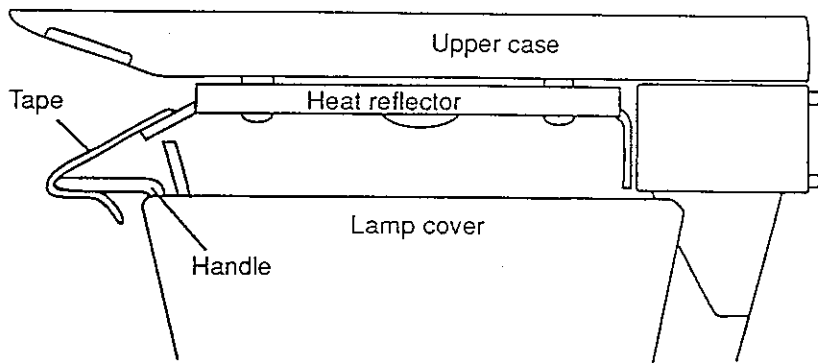
4.2.1 Removal of the power control box and control board



START

- ① Remove the power cable from the rear of the balance. Refer to the drawings at the left to locate the parts referred to in the remaining steps.
- ② Remove the weighing pan.
- ③ Remove the weighing pan support.
- ④ Remove the weighing pan cover
- ⑤ Remove two M3 x 8 screws (102).
- ⑥ Remove two M2.6 x 4 screws (103) and pull out connector (CN204).
- ⑦ Remove upper case holding screw (101) and plain washer (201).
- ⑧ Carefully lift the dryer and upper case assembly enough to reach inside the front right corner and pull the ribbon cable (6) from it's connector (&). the black part of the connector is soldered to the PC board, do not try to remove it with the ribbon cable.

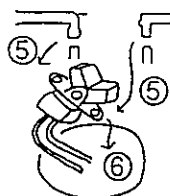
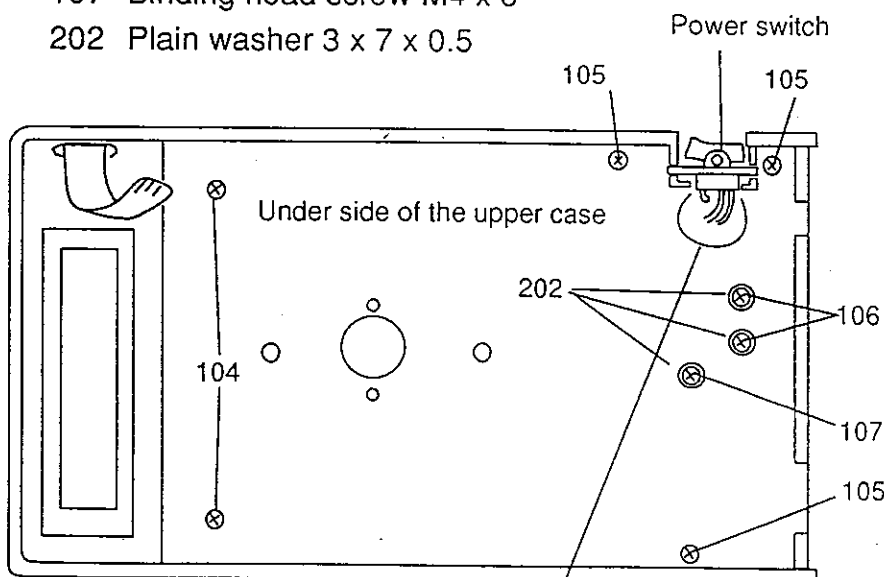
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the next page



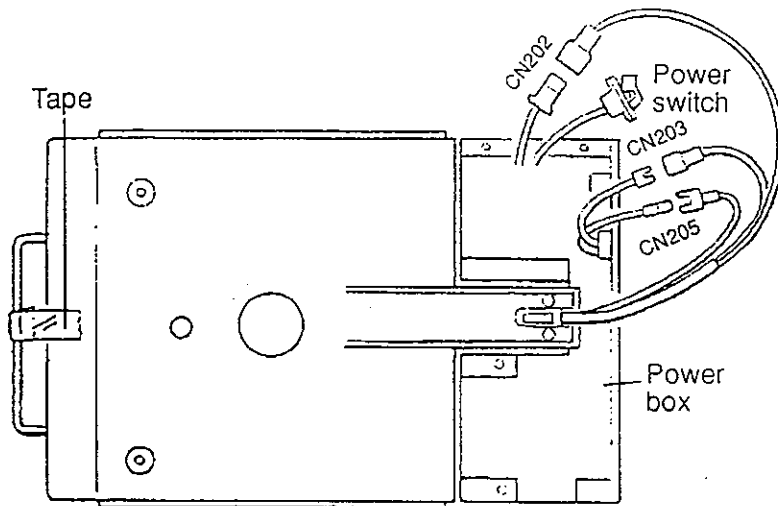
Continued from the previous page

- ① Place some strong tape around the lamp cover handle and fasten it to the front of the heat reflector.
- ② Position the assembly with the lamp cover down.
- ③ Remove all of the screws 104 through 107 from the under side of the assembly.
- ④ Remove the two washers 202.
- ⑤ Note the position of the power switch, then remove it (slide it out of the holder).
- ⑥ Push the power switch through the hole so that the case can be separated from the heater control box.

- 104 Binding head screw M4 x 8
- 105 Miniature screw M3x 8
- 106 Binding head screw M3 x 8
- 107 Binding head screw M4 x 6
- 202 Plain washer 3 x 7 x 0.5



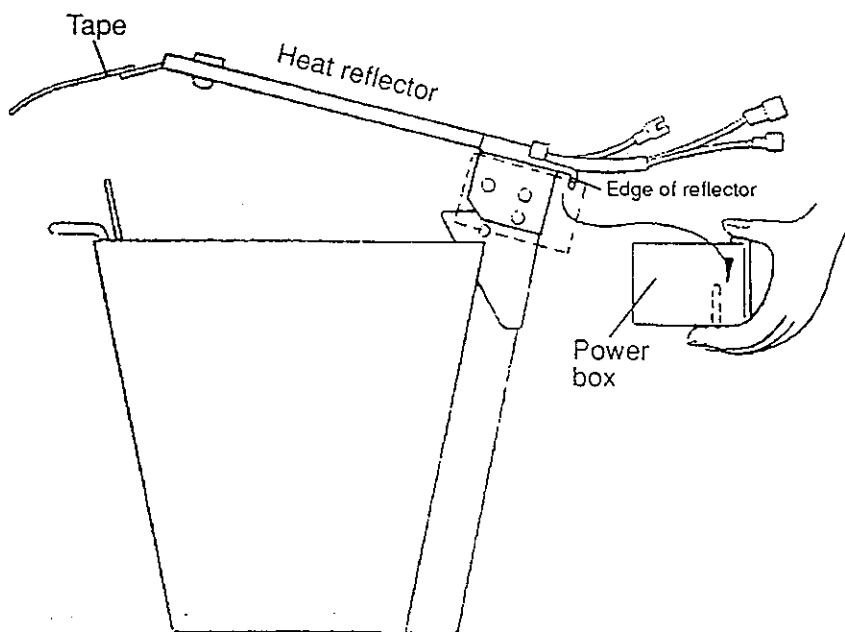
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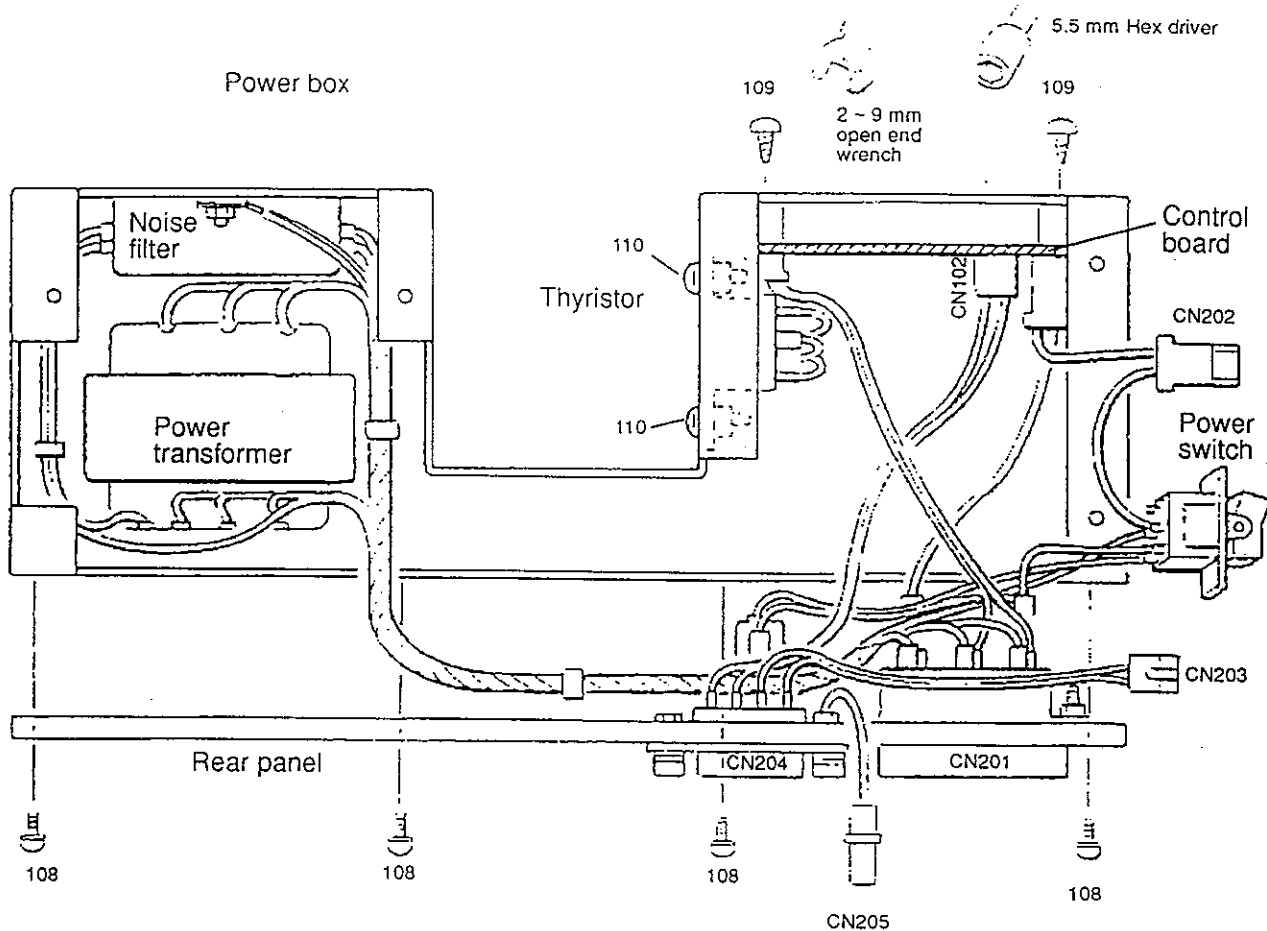


Continued from the previous page

- ① Draw out all of the connectors from the power box.
- ② Disconnect CN202, CN203 and CN205.
- ③ Remove the tape from the handle while supporting the power box.
- ④ Lift the heat reflector to allow the power box to get by the lip on the rear edge.

Continued on the next page



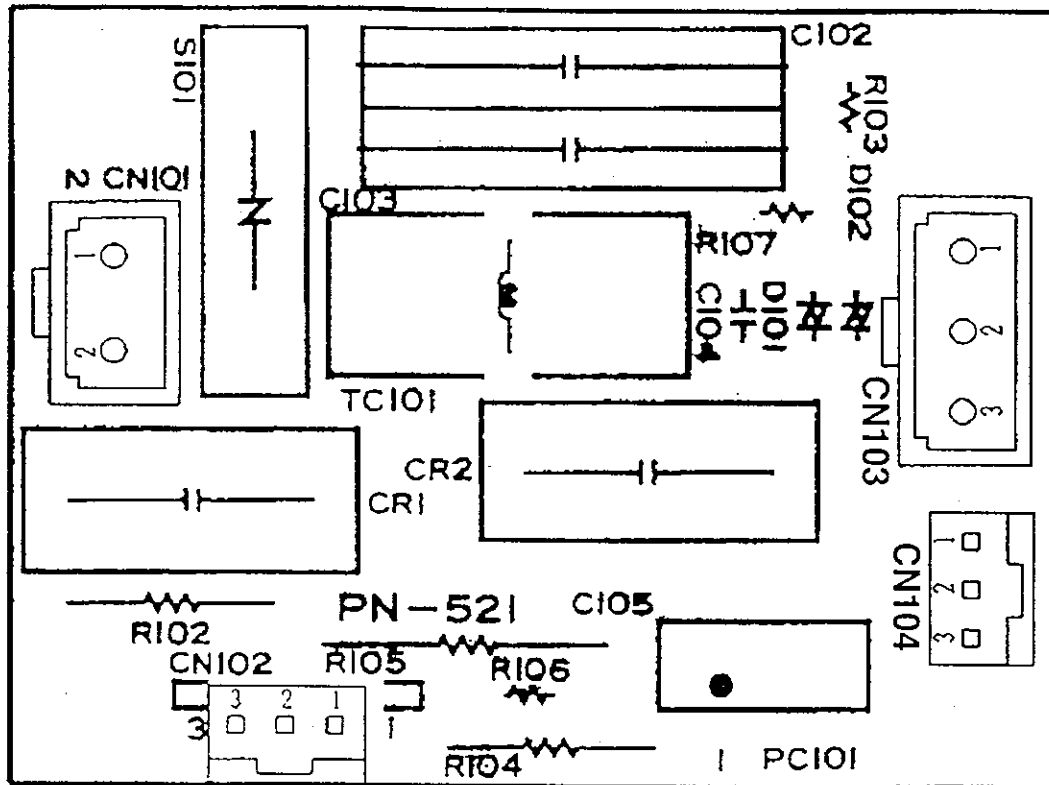


Continued from the
previous page

- ① Remove 6 screws 108 and remove the power box from the rear panel.
- ② Disconnect CN102 from the control board.
- ③ Remove the tape from the handle while supporting the power box.
- ④ Hold the hexagonal spacers with an open end wrench and remove the 4 screws 109, that hold the control board.
- ⑤ Remove the control board using caution so as not to damage the thyristor.
- ⑥ Remove CN101 ~ CN104 from the control board. These are a locking type connector.
- ⑦ Remove 2 screws 110 while holding the nut with a hex driver.

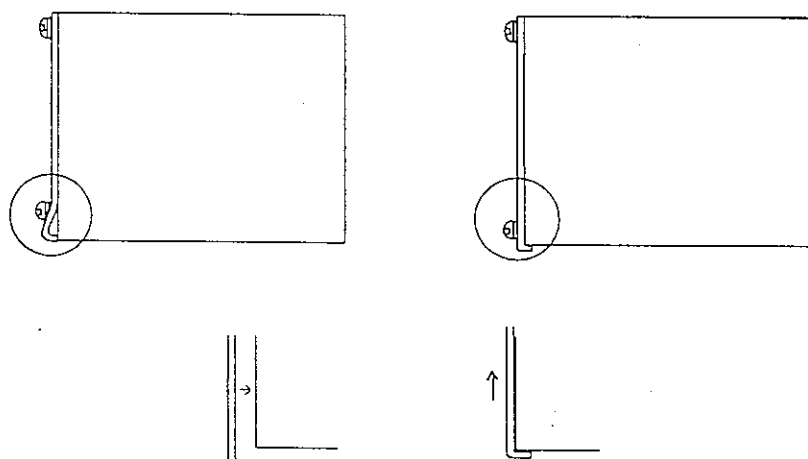
End of procedure for removal of
the control board

4.2.2 Control board layout (for parts location)



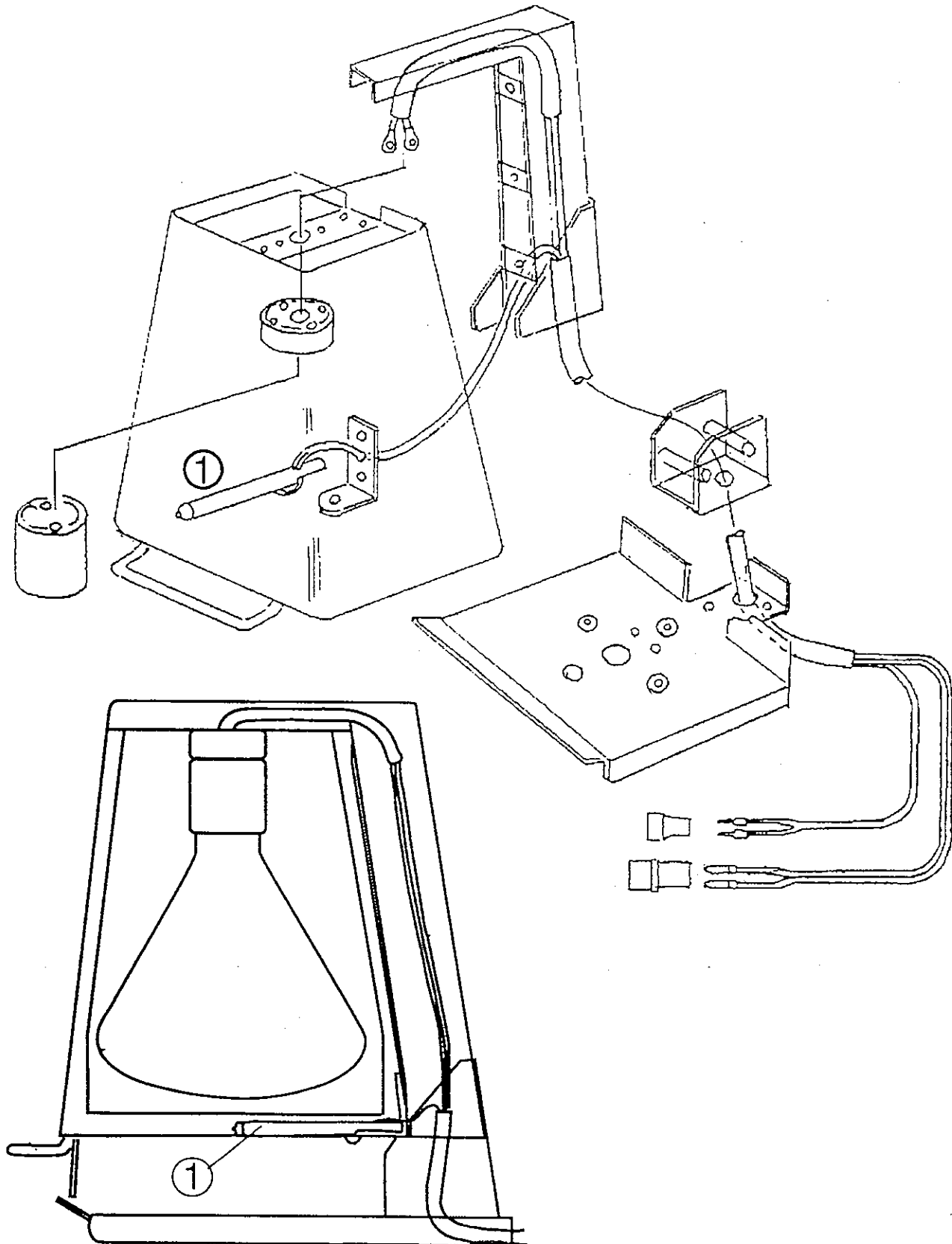
4.3 Upper case assembly

- 4.3.1 Reverse the process of disassembly. Use caution so as to not to trap wires between the parts as they are assembled. When the back panel of the power box is mounted, check that the edge fits over the box and will not be bent (see below).



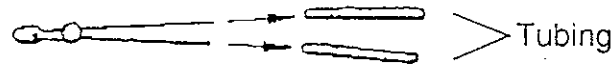
4.4 Lamp hood assembly

4.4.1 An exploded view (below) shows the various component locations for the lamp assembly. The temperature probe (1) must be parallel to the bottom of the lamp housing for correct temperature control. It may be necessary to bend the mounting bracket slightly to correctly position the probe.



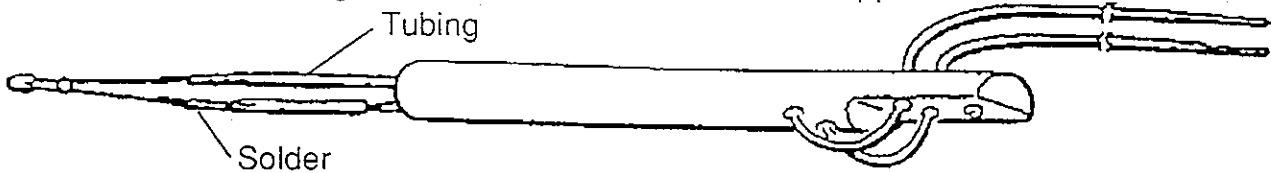
4.4.2 Temperature probe assembly

- 1 Remove the vinyl tubing from the thermister leads as it is not suitable for use at higher temperatures.

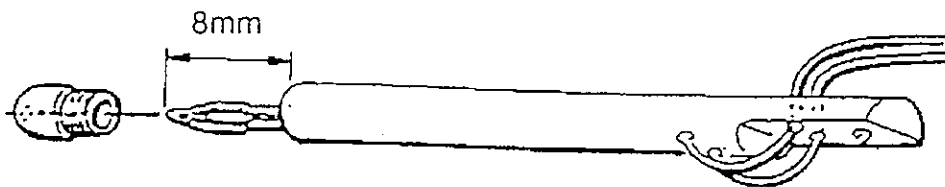


Check the resistance of the thermister using an ohm meter.

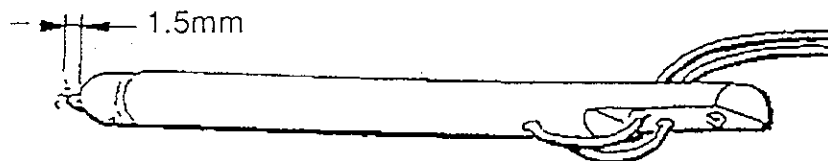
- 2 Place teflon tubing on the wires from the thermister support.



- 3 Solder the thermister leads to the wires and push the teflon tubing all the way down the thermister leads. None of the leads should be left exposed or a short may develop.



- 4 Push the thermister into the support (pull on the leads where they come out the rear of the support). Leave 8mm sticking out. Coat the thermister with RTV.



- 5 Place the cap over the thermister and screw it down. Wipe off any excess RTV.

Check the resistance of the completed temperature probe, it should be the same as was measured in step 1. If not, quickly disassemble the probe before the RTV becomes hardened. If this becomes necessary, wipe off as much of the RTV as possible from the thermister, probe and cap and check for broken or shorted connections.

4.5 Photo-coupler and trigger diode installation.

4.5.1 Replacement of photo-coupler, part no. P1500 with part no. P873-G35-687.

This change was made when the temperature control board was upgraded from part no. PN-521 to PN-521-02. At this time the trigger diodes D101 and D102 were changed along with the value of C103 and R102.

The main processor board was also upgraded with changes to R9, R13, and the microprocessor.

These changes were made at the change of program ROM version from 205.25 to version 205.28 (see page 1, 1.2 ROM version).

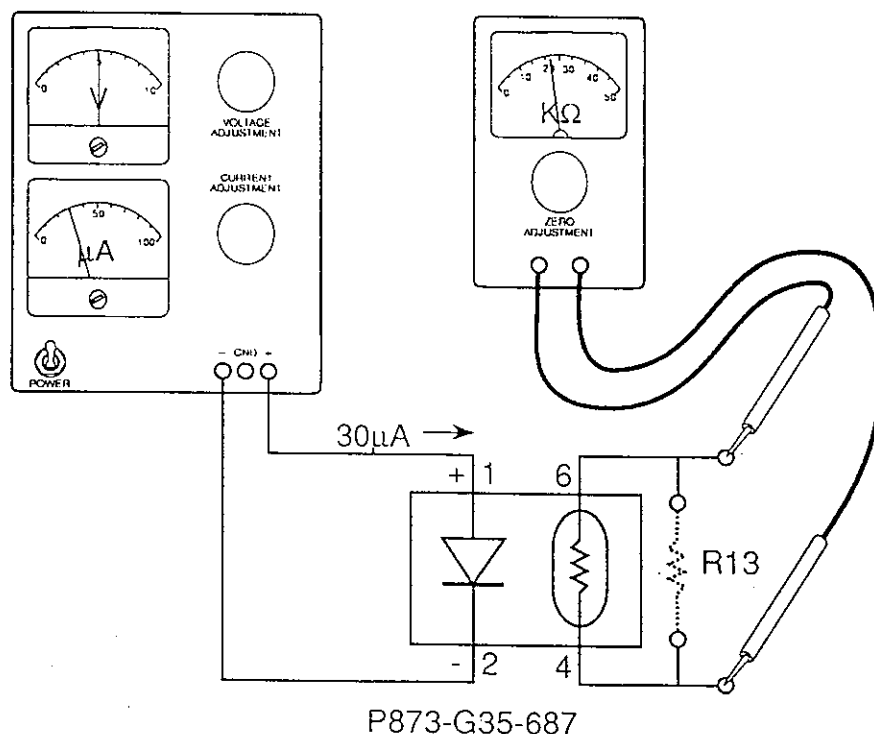
4.5.2 Installation of the photo-coupler, part no. P873-G35-687. on the older temperature control board (PN-521). A resistor (R13) may be needed (for ROM versions 205.23 and 205.25).

To determine if the resistor (R13) is needed it will be necessary to test the photo-coupler.

Provide a stable current of $30\mu\text{A}$ to the input (note the polarity).

Using an ohm meter, measure the resistance between terminals 4 and 6 (the end that the arrow points to). If the resistance is between $11\text{K}\Omega$ and $23\text{K}\Omega$, add a $220\text{K}\Omega$ resistor between terminals 4 and 6 on the photo-coupler. If the resistance is between $24\text{K}\Omega$ and $47\text{K}\Omega$, no resistor is needed.

If the resistance is less than $11\text{K}\Omega$ or greater than $47\text{K}\Omega$ the photo coupler may be defective.



4.5.3 Install as shown on the board as shown (Fig 1)

- 1 Place tubing on leads 1 and 2 ~2mm long and on leads 4 and 6 ~21mm long (Fig 2).
- 2 Bend leads 4 and 6 down and insert the leads through the holes in the board and solder into place (fig 3).

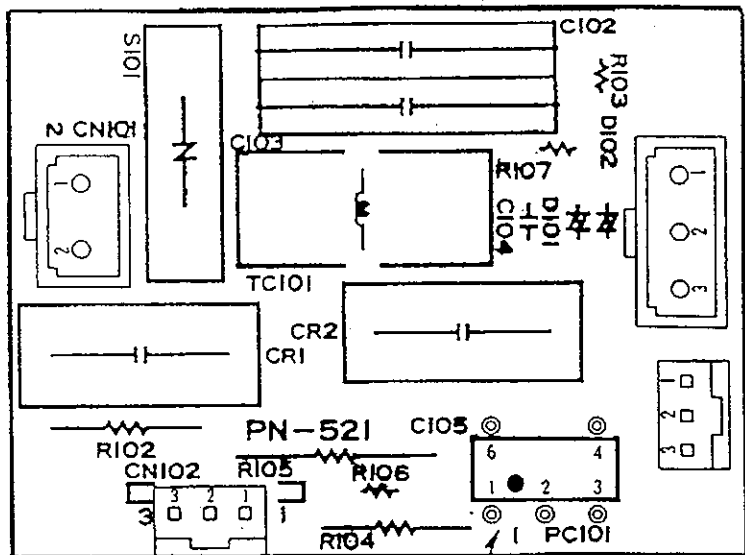


Fig 1

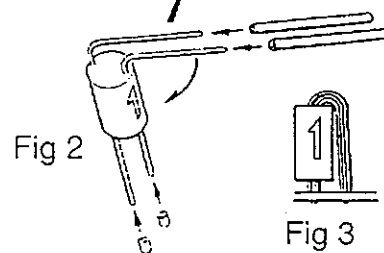


Fig 2

Fig 3

4.5.4 Installation of the photo-coupler, part no. P873-G35-687, on the PN-521-02 temperature control board (Fig 4).

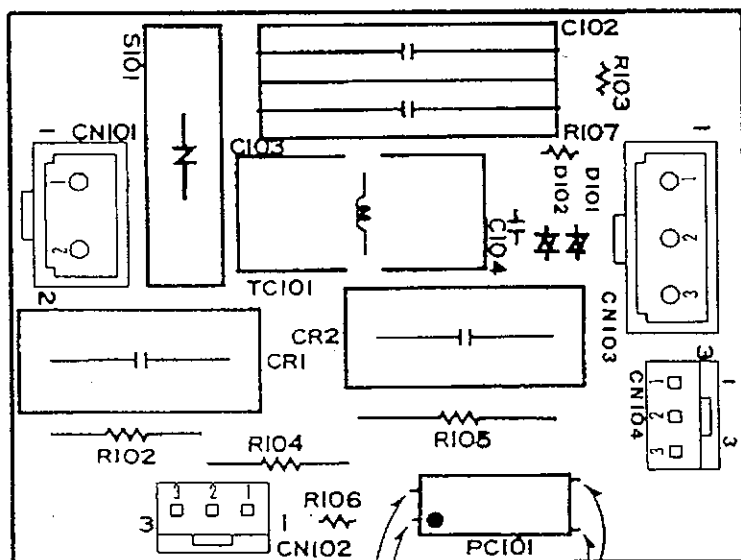
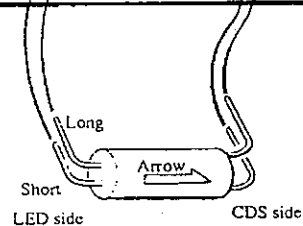
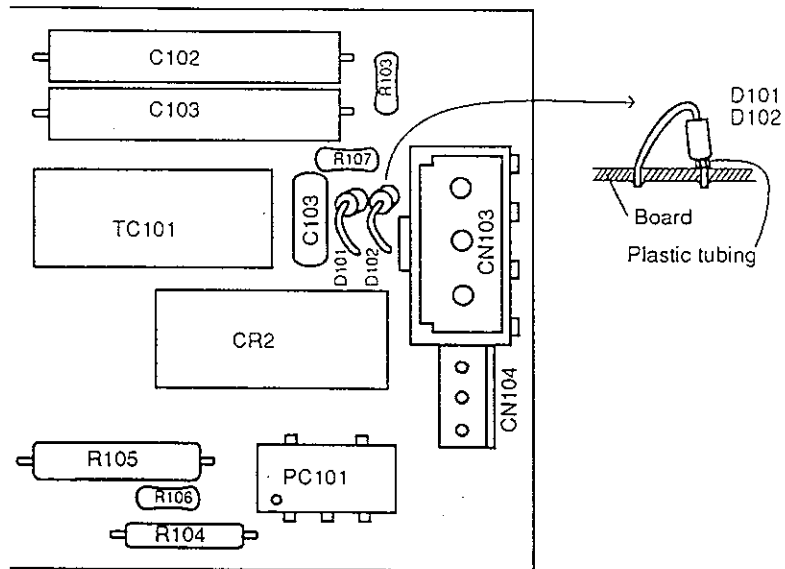


Fig 4



4.5.5 Installation of the trigger diodes, D101 and D102.

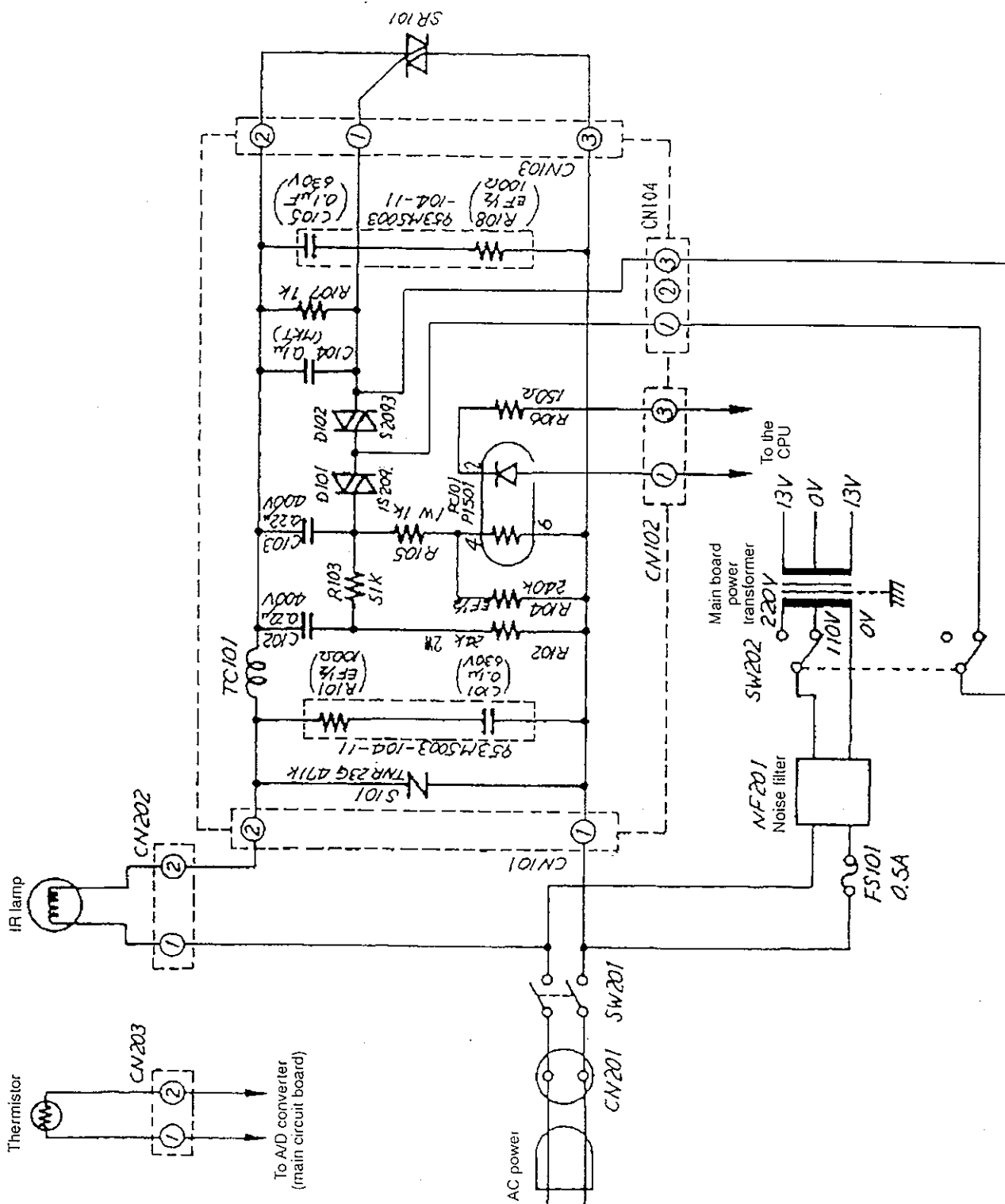


- 1 Install as shown in the drawing above.
- 2 Heat sink the diode leads to prevent damage to the diodes while soldering.
- 3 Position the top of the diodes away from CN103 so that they will not cause problems when installing the plug into the connector.

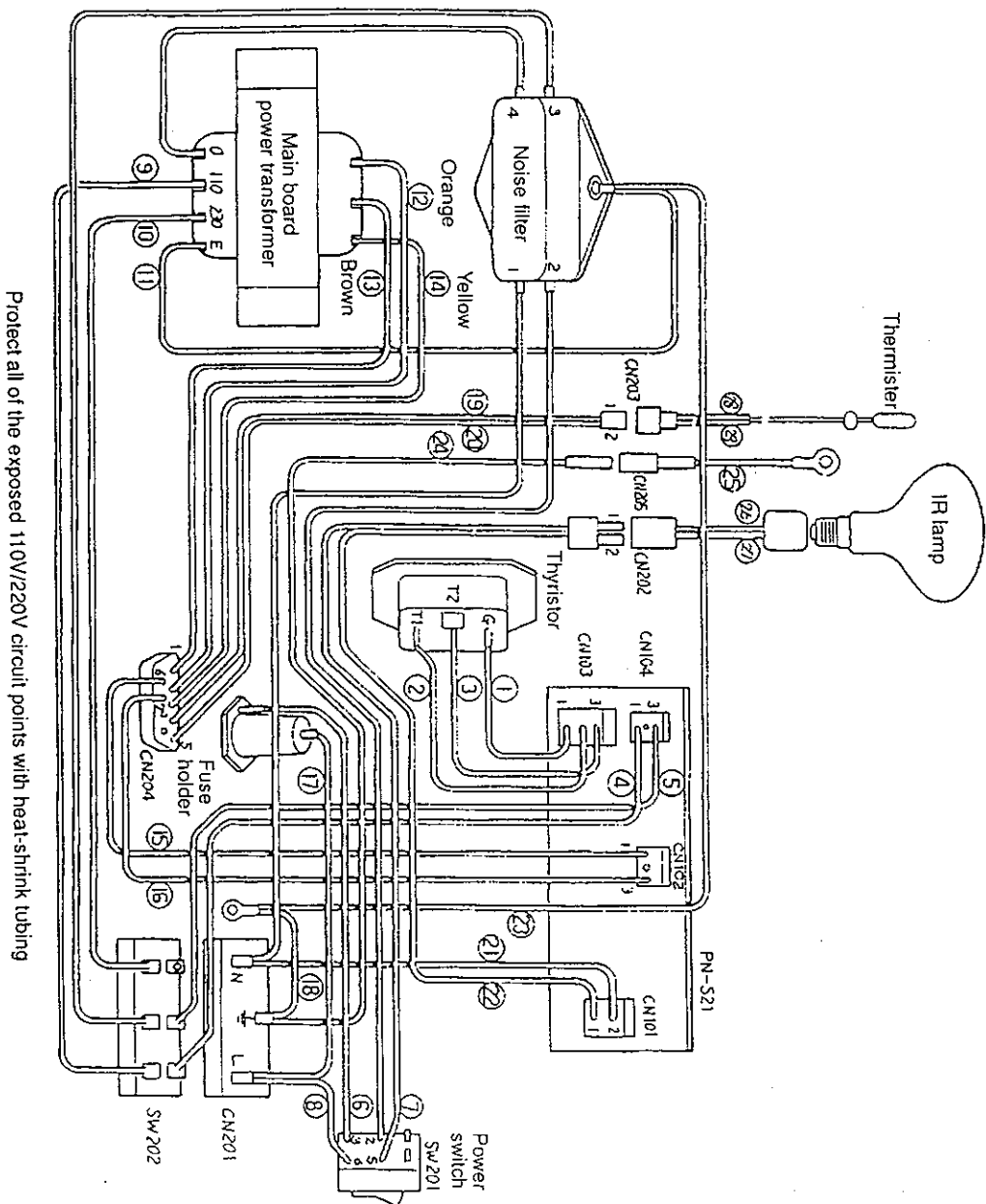
5. Temperature Control Circuit & Wiring

The temperature control circuit diagram and wiring diagram are included for a better understanding of the IR lamp temperature control and the actual point to point wiring.

5.1 Temperature control circuit diagram.



5.2 Temperature control wiring diagram.

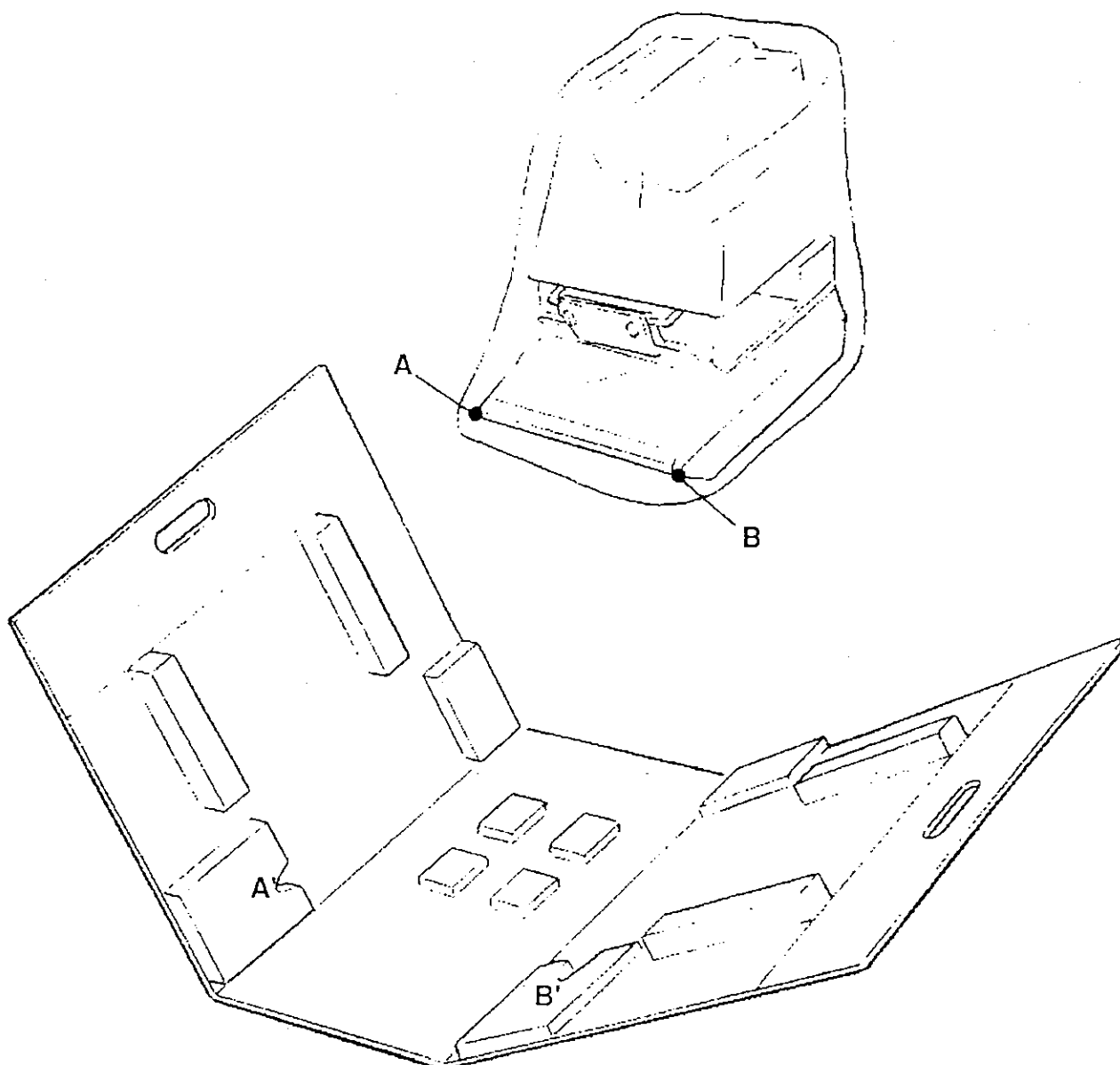


6. Packaging The AD-4713 for Shipment

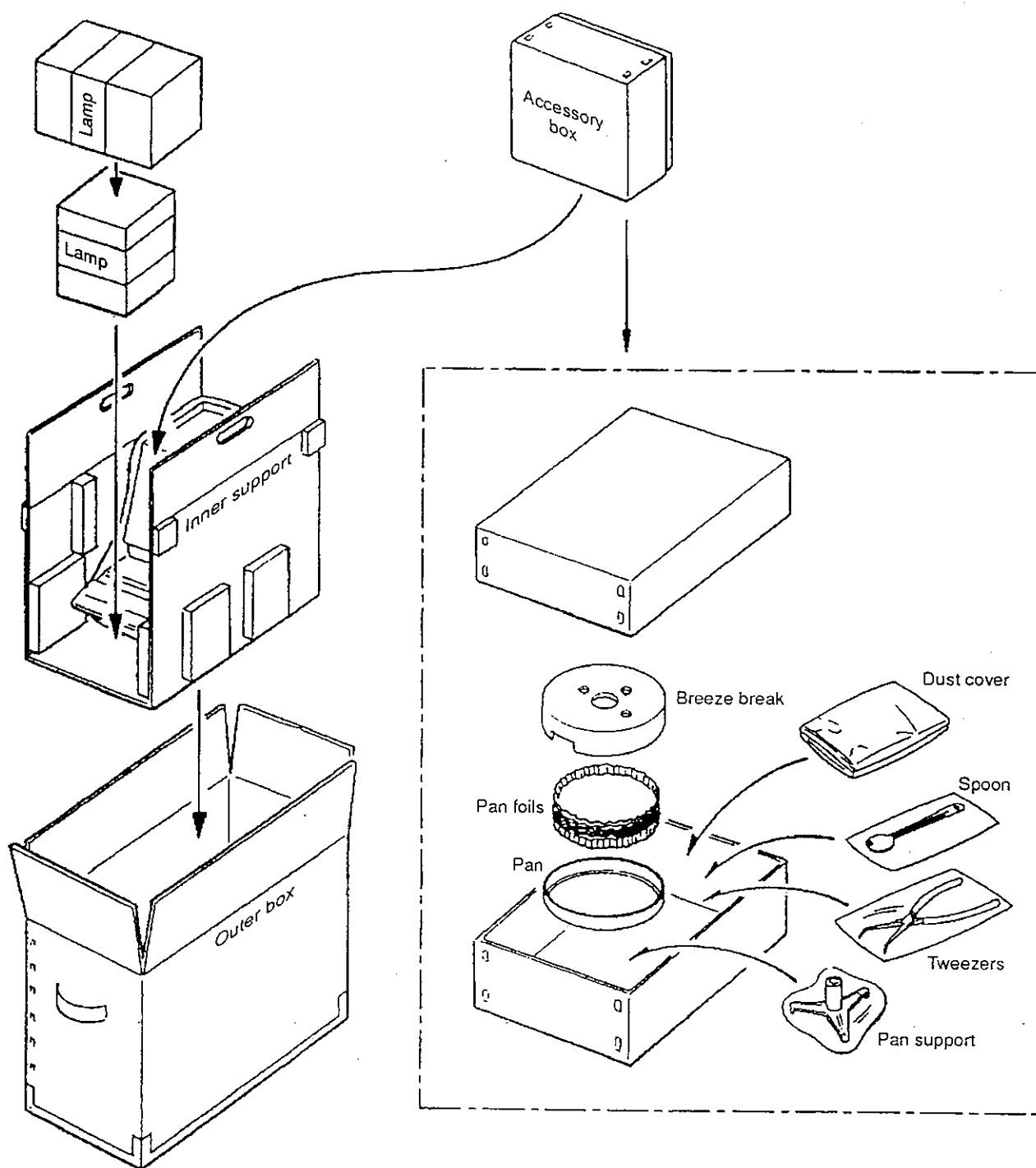
Should the need arise to move the balance to another area, it is best to re-pack it in the original box for proper protection. If the original box is not available, contact the company from which you purchased the balance to get a new one.

6.1 Shown here are the steps used to re-pack the balance.

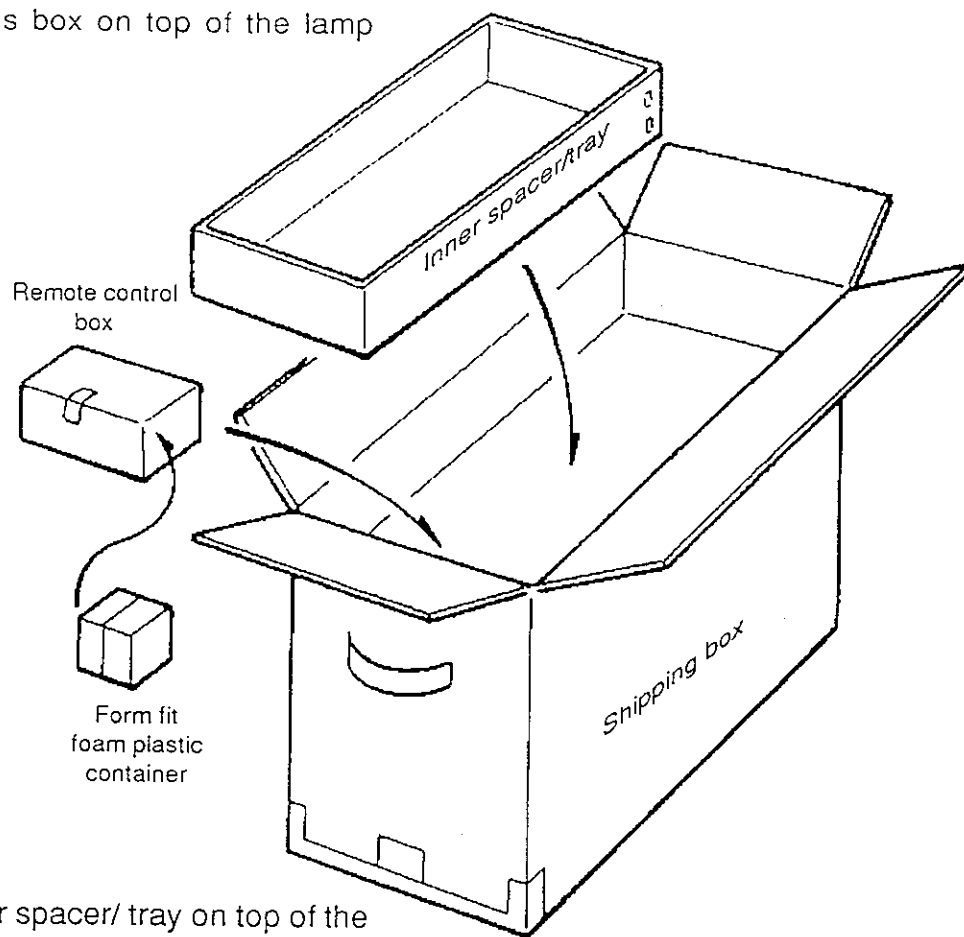
1. Screw the levelling feet in as far as they will go, but do not tighten.
2. Remove the IR lamp and put it in the box it was shipped in.
3. Write down the serial number of the balance to match that to the shipping box.
4. Carefully wrap the balance in a polyethylene bag of approximately 400mm wide 215mm deep and 500mm high
5. Set the balance on the inner support as shown with points A and B aligning with points A' and B'.



6. Place the accessories in protective bags. Place these into the accessory box.
7. Place the inner support into the outer box, but do not close the box yet.
8. Place the lamp boxes as shown at the front of the balance.
9. Place the accessory box in front of the balance as shown.



10. Place the remote control in the form fit foam plastic case. Place the case in it's box. Place this box on top of the lamp boxes. Place this box on top of the lamp boxes.



11. Place the inner spacer/ tray on top of the balance so that it will not move while transporting. If an AD-8121 is included as an optional accessory, it can be placed in the inner spacer / tray.
12. Close the box and secure it with tape.
13. If the serial number does not match that on the box, change that now.

