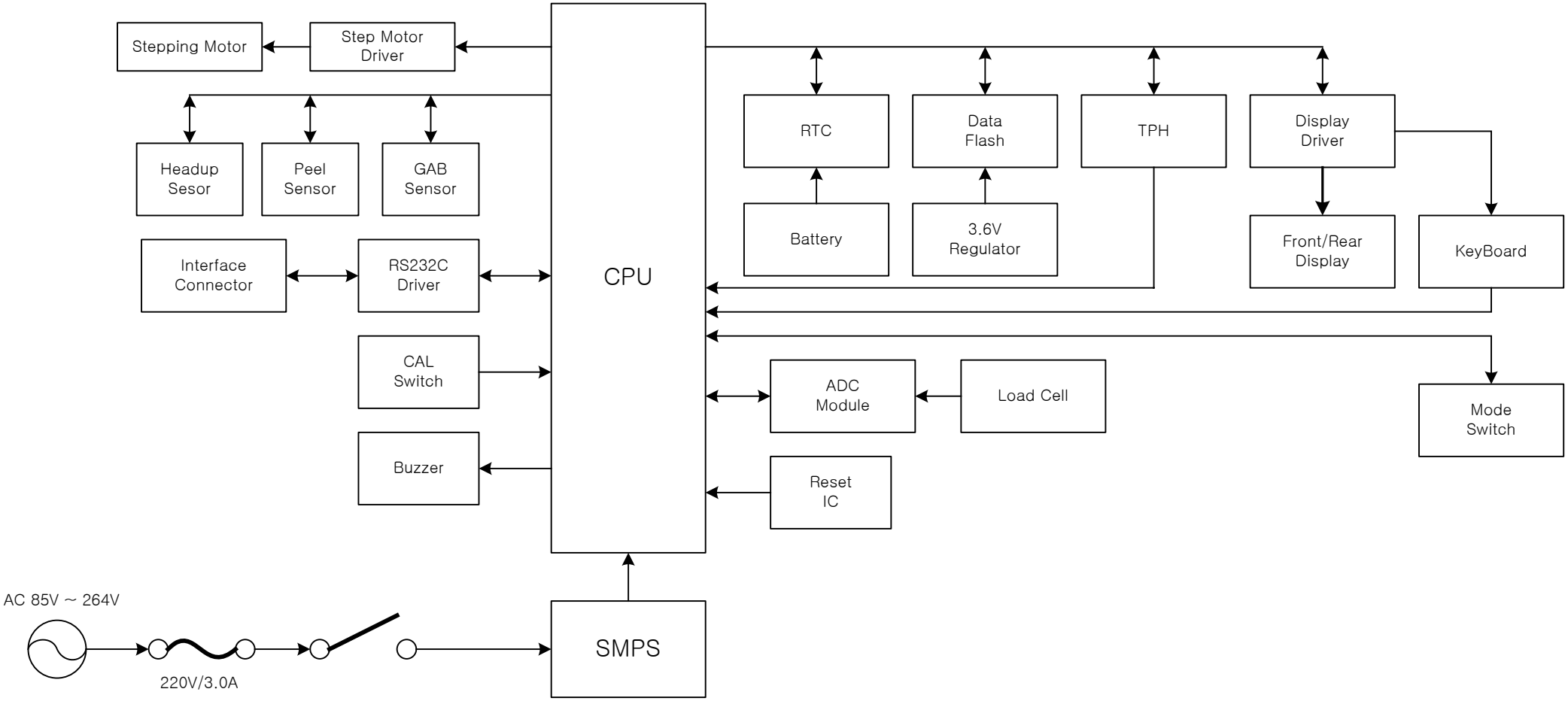
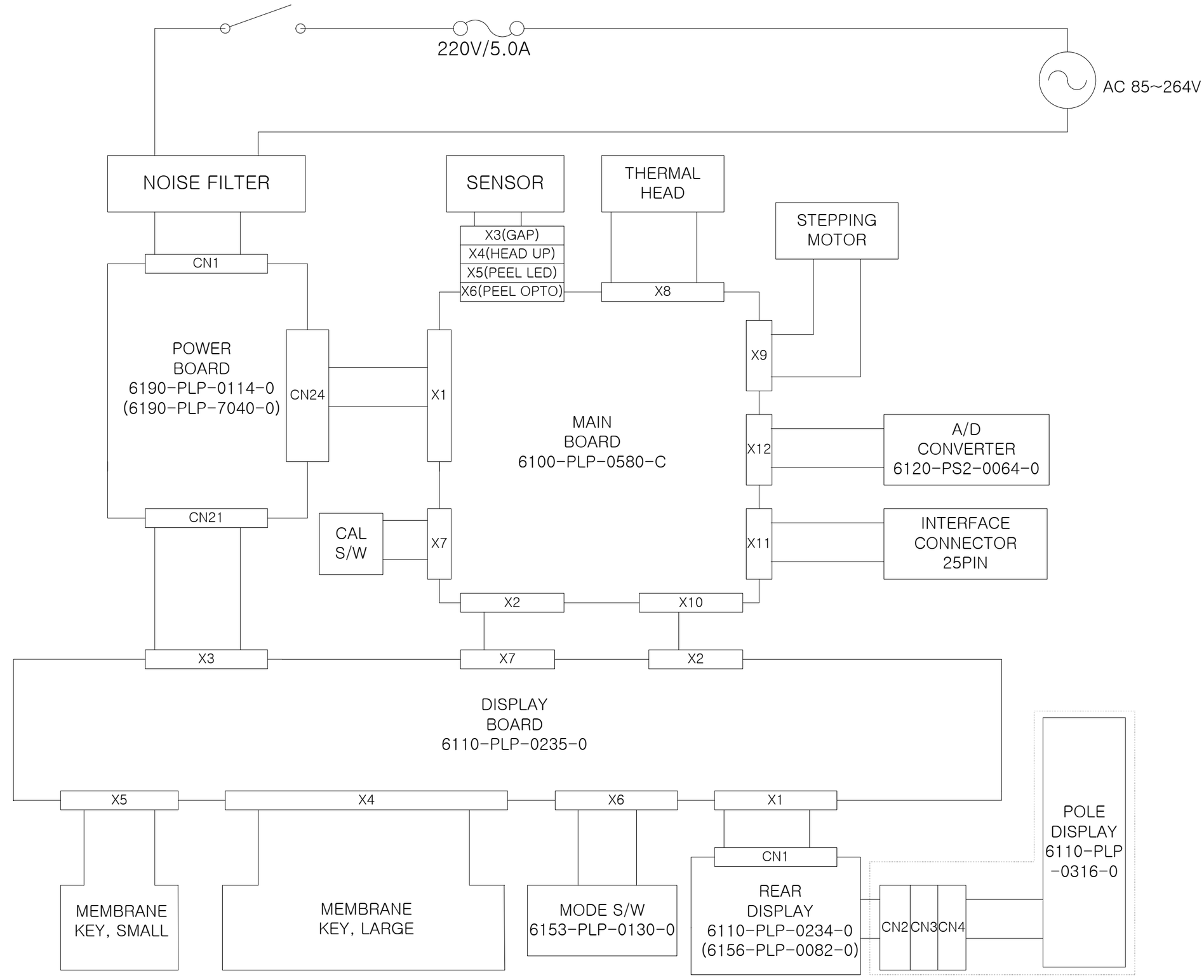


Title: LP-1(ver 1.6) BLOCK DIAGRAM		
Document Number: 9000-L16-0001		Rev: 00
Date:		



Title: LP-1(ver 1.6) CONNECTION DIAGRAM		
Document Number: 9000-L16-0002		Rev: 00
Date:		

Opening the UNIT

1. Removing the Display PCB (6110-PLP-0235-0).

1) **Disconnect the AC cord.**
2) **Put the scale where you can reach both the back and the front of it easily.**
3) **Refer to "12.EXPLODED VIEW – UPPER CASE. "**
   Pull out the tray and the paper cover.
4) **On the front side of the upper case are the four screws holding the front cover on.**
   Unscrew them and put them in a safe place.
5) **Unscrew a bolt that is on the left front side of the main body and put it in a safe place.**
6) **Lift the front cover and pull it.**
   Carefully remove the all cables including the FPC of the membrane key boards and screw the screws fastened to the main body with the ground wires.
7) **The five screws are holding the Display PCB on the front cover.**
   Remove them and place them in a safe place.
   Loosing the five hooks, pull out the board.

2. Removing the printer

1) **Follow the steps 1) ~ 5) listed in "1. Removing the Display PCB".**
2) **Remove the platform, side cover, upper case and rear cover.**
   Refer to "12. EXPLODED VIEW – UPPER CASE."
3) **Remove the cables carefully.**
4) **Refer to "13. EXPLODED VIEW – PRINTER MECHANISM."**
   Unscrew the three screws fixing the printer on the main body.
   Remove the sensor support from the main body.
5) **Carefully pull out the printer.**

LP-1.6 Calibration (in English)

The LP-1.6 has the Calibration mode of work. Calibration mode is not accessible in normal user's operation mode. Calibration mode is intended for the service operations: scale's test, span calibration and printing quality adjustment.

To enter the Calibration mode please turn the scale's power OFF then move the calibration switch to the CAL position then turn ON the scale's power.

The [CAL] switch is placed on the upper case under the tray. For the metrology sealing the [CAL] switch is protected by the metal cover. Thus the sequence to enter the calibration mode is: after the turning scale's power OFF please remove the tray then unscrew the bolts on the metal protection cover then remove this cover. Then move the [CAL] switch to CAL position. Then install the tray. Turn the scale's power ON and observe <CAL> caption on the "WEIGHT" display.

The Calibration mode consists of eight functions that are accessed with the functional keyboard plus Calibration mode has one "hidden" function. To access one of eight functions, one should press a digit key on functional keyboard where digit corresponds to the function number. Each function access is possible only from the root of Calibration mode i.e. when display shows nothing else except <CAL> caption and when [CAL] switch is in CAL position. To exit functions {1}, {2}, {5}, {6} please press [C] key. Function {8} exits automatically. Functions {3}, {7} and {9} exit automatically if calibration finishes successfully. To exit these functions without calibration please press [C] key.

Function {1}.
Test of calibrated load cell output and fine span calibration.

After entering this function the "WEIGHT" display contains caption <CAL 1> and "PRICE" display contains digital value of raw calibrated zeroed load cell output from AD converter and "TOTAL" display contains value of raw calibrated absolute load cell output from AD converter.

Load cell output test:

1. Please be sure both the scale's tray and platform don't contact any foreign subjects or parts. Be sure the scale is placed according parts (1.7) – (1.9) of User's Manual.
2. Keeping the tray empty please check the absolute load cell output value on the "TOTAL" display. The value should be within /900...9900/ range. The out of this range value indicates problem with either load cell or ADC board.
3. Keeping the tray empty please check the zeroed load cell output on the "PRICE" display. The value should be within /-1...1/ range. In case of other value please press [ZERO] key. As a result a value on the "PRICE" display should become zero or at least it becomes within /-1...1/ range.
4. After step (3) please put on the tray a weight within full capacity. With increasing or reducing a weight on the tray within full capacity please check whether a value on the "PRICE" display changes proportionally to the change of weight. After a weight change a value on the "PRICE" display should not differ from expected proportional value by more then 10. Otherwise the problem with either load cell or ADC board exists.

5. Please make the tray empty. To enter other functions please exit function {1} by pressing [C] key first.

Fine span calibration:

Note: This procedure may usually be performed after calibration in function {3} or in function {7}.

1. Please be sure both the scale's tray and platform don't contact any foreign subjects or parts. Be sure the scale is placed according parts (1.7) – (1.9) of User's Manual.
2. Keeping the tray empty please check the zeroed load cell output on the "PRICE" display. The value should be within /-1...1/ range. In case of other value please press [ZERO] key. As a result a value on the "PRICE" display should become zero or at least it becomes within /-1...1/ range.
3. Please put the standard weight of full capacity on the tray.
4. Please check whether a value on the "PRICE" display is within /29995...30005/ range.
5. If a value on the "PRICE" display differs from the above mentioned range not significantly then the fine calibration could be performed in order to put a value on the "PRICE" display as close as possible to 30000. To increase a value, please press [9] key on functional keyboard or press [ARROW UP] key on alphabetic keyboard. To decrease a value, please press [7] key on functional keyboard or press [ARROW DOWN] key on alphabetic keyboard.
6. Please remove a weight from the tray. To verify the fine calibration please repeat steps (2) through (5). To finish fine calibration and to exit function {1} please press [C] key.

Function {2}.
Keyboard test.

After entering this function the "WEIGHT" display contains caption <CAL 2>. Then pressing a key causes a short beep sound and the scan-code of this key (two or three digits) appears on the "PRICE" display. When a key is depressed the scan-code of this key stays on the "PRICE" display until some other key is pressed. The exception is [C] key: the scan-code of this key is on the display only when key is pressed. Depressing [C] key causes exit from function {2}. The scan-codes of keys are listed in Table 1 and in Table 2.

Table 1.
The scan-codes of alphabetic keyboard:

00	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**56**
08	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**57**
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**58**
24	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**59**
32	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**60**
40	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**61**
48	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**62**

Table 2.
The scan-codes of functional keyboard:

64	**65**	**80**	**81**	**96**
66	**67**	**82**	**83**	**98**
68	**69**	**84**	**85**	**100**
70	**71**	**86**	**87**	**102**

Function {3}.
Span calibration with full capacity load.

The load cell output is taken to be linearly proportional to the applied load. Thus two load points are required for calibration. First point is defined with empty tray and second one is defined with the tray loaded by the standard weight of full capacity. The values of load cell output measured in these two points are used for the span calibration coefficient calculation. This coefficient is recorded into the EEPROM of scale's processor. The load cell output value at empty tray condition is also recorded into the EEPROM. This value is a reference point for the zero range control.

After entering this function the “WEIGHT” display contains caption <CAL 3> and the “PRICE” display contains “invitation” caption <UnLOAd>. If [C] key is pressed here then the calibration process is aborted and neither old calibration data is corrupted no new calibration data is recorded. The exit from function happens only.

Calibration sequence:

1. Please be sure the scale’s tray is empty. Please be sure both the scale’s tray and platform don’t contact any foreign subjects or parts. Be sure the scale is placed according parts (1.7) – (1.9) of User’s Manual.
2. Output signal value measurement with empty tray. There could be some reasons to leave unchanged the recorded to EEPROM value of load cell output at empty tray condition. If so, then this measurement could be skipped by means of pressing [ZERO] key. Skipping this measurement doesn’t affect correctness of next calibration. But such situations are exclusive. In normal situation the [PRT] key should be pressed. After that the “PRICE” display starts show the countdown 9-8-7-6-5-4-3-2-1. If a measurement is successful then an “invitation” <LOAd> appears there. Otherwise the load cell output signal value is out of /900…9900/ range and long beep sounds. In this case “PRICE” display shows a warning message for 1 sec., <LLLLLL> if signal value is less then lower limit or <HHHHHH> if signal value is higher then upper limit. After a warning message the “PRICE” display contains caption <UnLOAd> inviting to go back to step (1). If a problem is fixed then please repeat actions since step (1). If not, please press [C] key to exit from function {3} then go please to function {1} or to function {5} in order to check the load cell output signal.
3. Output signal value measurement under full capacity load. After successful completion of step (2) the “PRICE” display contains caption <LOAd> inviting to put on the tray the standard weight of full capacity. There could be some reasons to leave unchanged the calibration coefficient recorded to the EEPROM. If so, then both this measurement and calculation of new span calibration coefficient could be skipped by means of pressing [ZERO] key. But such situations are exclusive. In normal situation please put the standard weight of full capacity on the tray then press the [PRT] key. After that the “PRICE” display starts show the countdown 9-8-7-6-5-4-3-2-1. If a measurement is successful then together with the long beep sound the “PRICE” display shows the <End> message then the non-skipped new calibration data is recorder to the EEPROM then the function {3} automatically exits. But if the load cell output signal value is out of /30000...39900/ range then together with long beep sound the “PRICE” display shows a warning message for 1 sec., <LLLLLL> if signal value is less then lower limit or <HHHHHH> if signal value is higher then upper limit. After a warning message the “PRICE” display contains caption <LOAd> inviting to go back to the beginning of step (3). If a problem is fixed then please repeat actions of step (3). If not, please press [C] key to exit from function {3} then go please to function {1} or to function {5} in order to check the load cell output signal.

Function {4} is absent.

The decimal point positions, maximum capacity, resolution, price round unit and many other parameters are not available in Calibration mode. These parameters are loaded from the configuration file to the EEPROM of scale’s processor during the operation of the processor programming.

Function {5}.
Test of pure (raw not calibrated) load cell output.

After entering this function the “WEIGHT” display contains caption <CAL 5> and “PRICE” display contains digital value of pure zeroed load cell output from AD converter and “TOTAL” display contains value of pure absolute load cell output from AD converter.

Load cell output test:

1. Please be sure both the scale’s tray and platform don’t contact any foreign subjects or parts. Be sure the scale is placed according parts (1.7) – (1.9) of User’s Manual.
2. Keeping the tray empty please check the absolute load cell output value on the “TOTAL” display. The value should be within /900...9900/ range. The out of this range value indicates problem with either load cell or ADC board.
3. Keeping the tray empty please check the zeroed load cell output on the “PRICE” display. The value should be within /-1...1/ range. In case of other value please press [ZERO] key. As a result a value on the “PRICE” display should become zero or at least it becomes within /-1...1/ range.
4. After step (3) please put on the tray a weight within full capacity. With increasing or reducing a weight on the tray within full capacity please check whether a value on the “PRICE” display changes proportionally to the change of weight. After a weight change a value on the “PRICE” display should not differ from expected proportional value by more then 10. Otherwise the problem with either load cell or ADC board exists.
5. Please put the standard weight of full capacity on the tray.
6. Please check whether a value on the “PRICE” display is within /30000...39900/ range. The out of this range value indicates problem with either load cell or ADC board.
7. Please make the tray empty. Please press [C] key for exit.

Function {6}.
Printing adjustment.

The density of printing and the printer sensors test and these sensors threshold calibration can be performed in this function.

After entering this function the “WEIGHT” display contains caption <CAL 6>. The “PRICE” display here contains an EEPROM stored value of a sensor threshold or printing density. The “TOTAL” display here contains a name of sensor and its current output signal value. At moment of function {6} entering the “Peel Off” sensor data appears on the display. Pressing the [ARROW UP] or [ARROW DOWN] keys on the alphabetic keyboard one can switch to another sensor data. To exit the function {6}, please press [C] key.

Sensor names are:

- <POFF> - The “Peel Off” sensor – to check whether printed label is removed;
- <HEAD> - The thermal printing head (TPH) temperature sensor;
- <PEnd> - The “Paper End” – the label gap and no paper sensor;
- <HdUP> - the “Head Up” – the sensor of TPH position.

The printer mechanism operation should be adjusted in order to provide a high quality printing without problems. The printer mechanism operation is controlled using the data from the printer sensors. The data from sensors help to find events and conditions in the printer mechanism. The event is found when the sensor’s output

signal value crosses the threshold level. The condition is found by compare the sensor's output signal value with a reference level. The sensor's characteristics may vary from sample to sample as well as label roll paper properties may vary so the threshold and reference levels are to be adjusted. The sensor's threshold and reference levels could be adjusted in function {6}. Please take into consideration the hysteresis algorithm that is applied in the printer control in order to prevent false or multiple events. Some event is taken into account if a value of output signal from the sensor is higher then threshold level by 10 or more high. The opposite event is taken into account if the sensor output value is lower then threshold level by 10 or more less. The range of possible sensor output signal values is from 0 through 255.

Test of sensors. Thresholds and reference adjustment.

1. Pressing the [ARROW UP] or [ARROW DOWN] keys on the alphabetic keyboard please switch to the sensor that is a subject of interest.
2. Please observe a sensor output signal value at the "TOTAL" display. Although the "0" and "255" are possible values of the sensor output signal but these values appearance rather indicates the sensor damage or bad contact in cables. The threshold or reference value is shown on the "PRICE" display.

2.1. **Test and threshold adjustment of the <POFF> sensor of printed label remove (Peel Off).** Please turn the release lever to open the printing head. Then please manually turn the rewind roll in order to feed paper. Please feed the paper slow and carefully for the label output until the position where the end of label, 2 or 3 mm, remains connected to the liner paper. Leaving the label in this position please remove the printing head back to the close position. Please remember or record an output signal value of the "Peel Off" sensor. Please remove the label then again remember or record an output value. First (biggest) value should be bigger then second (lowest) one by 20 or more. Otherwise the hysteresis algorithm doesn't work. To calculate the threshold level value please add first and second values of output signal then please divide the result by 2. Actually the threshold level value can be chosen in a range from a (lowest+10) up to a (biggest-10) values of sensor signal output. If a threshold level value shown at the "PRICE" display doesn't correspond to the above described condition then a new calculated value should be entered. Please use the digit keys to enter three digits. For example if a value to be entered is "50" then please enter <050>. In case of incorrect value is entered by mistake then simply enter again. After successful entering of digits please press PRT key. Now one can switch to another sensor data or exit the function {6}.

2.2. **Test of the thermal printing head temperature sensor <HEAd>.** The sensor output value versus the thermal printing head temperature is shown in Table 3. The real output values may differ from the listed in the table values by 10%. If the intensive printing has been performed right before this test then the printing head temperature may be significantly higher then the air temperature.

Table 3:
The temperature sensor output value versus the thermal printing head temperature.

t, ^{o}C	Signal Value		t, ^{o}C	Signal Value
-10	206		+25	128
-5	197		+30	115
0	187		+35	104
+5	175		+40	94
+10	164		+45	83
+15	152		+50	75
+20	140		+55	67

2.3. **The printing density reference value adjustment <HEAd>.** The printing density reference value is to be found experimentally. Increasing the reference value causes increasing the printing density but decreasing the value decreases the density. The range of reference value is from 0 through 255. Please use the digit keys to enter three digits. For example if a value to be entered is "5" then please enter <005>. In case of incorrect value is entered by mistake then simply enter again. After successful entering of digits please press PRT key. Now one can switch to another sensor data or exit the function {6}.

2.4. **Test and threshold adjustment of the <PEnd> sensor of the label gap and paper absence.** Please turn the release lever to open the printing head. Then please manually turn the rewind roll in order to feed paper. Please feed the paper slow and carefully until the label is in the position of the gap sensor. Please remember or record an output signal value of the "Paper End" sensor at this position of label. Please continue to feed paper until the gap between two labels is in the position of the gap sensor. Please move the paper slightly forward and back in order to find a minimum of the sensor output value at the "TOTAL" display. Please remember or record an output signal value again. Please move the paper and the printing head to the original position and then please check the remembered or recorded output values of sensor and then if necessary please calculate and enter a new value of the threshold level as it has been described in part (2.1). After successful entering of new value of threshold please press PRT key. Now one can switch to another sensor data or exit the function {6}.

2.5. **Test and threshold adjustment of the <HdUP> sensor of the thermal printing head position (Head Up).** Please be sure the printing head is on the paper (in close position). Please remember or record an output signal value of the "Head Up" sensor at this position of printing head. Please turn the release lever to open the printing head. Please remember or record an output signal value again. Please move the printing head to the original position and then please check the remembered or recorded output values of sensor and then if necessary please calculate and enter a new value of the threshold level as it has been described in part (2.1). After successful entering of new value of threshold please press PRT key. Then one can switch to another sensor data or exit the function {6}.

3. When the tests of the output signal of the printer sensors are finished and the adjustments of the levels of thresholds and reference are complete then please exit the function {6} by pressing the [C] key.

Function {7}.
Span calibration with load in % of full capacity.

The load cell output is taken to be linearly proportional to the applied load. Thus two load points are required for calibration. In this function first point is defined with empty tray and second one is defined with the tray loaded by the standard weight that is less then the full capacity. The load weight value is entered from the keyboard as percent of the full capacity before the calibration. The values of load cell output measured in these two points are used for the span calibration coefficient calculation. This coefficient is recorded into the EEPROM of scale's processor. The load cell output value at empty tray condition is also recorded into the EEPROM. This value is a reference point for the zero range control.

After entering this function the "WEIGHT" display contains caption <CAL 7> and the "PRICE" display contains caption < Per=10>. If [C] key is pressed here then the calibration process is aborted and neither old calibration data is corrupted no new calibration data is recorded. The exit from function happens only.

Calibration sequence:

1. Please enter the load weight value from the keyboard as percent of the full capacity (not less then 10%). The entered value is shown on the "PRICE" display. For example if a standard weight for load is equal to 20% of the full capacity then please enter <20> value. The "PRICE" display contains caption <Per=20>. In case of incorrect value is entered by mistake then simply enter again. After successful input please press the [PRT] key. After that the "PRICE" display contains "invitation" caption <UnLOAd>.
2. Please be sure the scale's tray is empty. Please be sure both the scale's tray and platform don't contact any foreign subjects or parts. Be sure the scale is placed according parts (1.7) – (1.9) of User's Manual.
3. This step is an output signal value measurement with empty tray. There could be some reasons to leave unchanged the recorded to EEPROM value of load cell output at empty tray condition. If so, then this measurement could be skipped by means of pressing [ZERO] key. Skipping this measurement doesn't affect correctness of next calibration. But such situations are exclusive. In normal situation the [PRT] key should be pressed. After that the "PRICE" display starts show the countdown 9-8-7-6-5-4-3-2-1. If a measurement is successful then an "invitation" <LOAd> appears there. Otherwise the load cell output signal value is out of /900…9900/ range and long beep sounds. In this case "PRICE" display shows a warning message for 1 sec., <LLLLLL> if signal value is less then lower limit or <HHHHHH> if signal value is higher then upper limit. After a warning message the "PRICE" display contains caption <UnLOAd> inviting to go back to step (1). If a problem is fixed then please repeat actions since step (1). If not, please press [C] key to exit from function {7} then go please to function {1} or to function {5} in order to check the load cell output signal.
4. This step is an output signal value measurement under the load. After successful completion of step (3) the "PRICE" display contains caption <LOAd> inviting to put on the tray the standard weight of capacity that has been planned on step (1). There could be some reasons to leave unchanged the calibration coefficient recorded to the EEPROM. If so, then both this measurement and calculation of new span calibration coefficient could be skipped by means of pressing [ZERO] key. But such situations are exclusive. In normal situation please put the standard weight of the planned capacity on the tray then press the [PRT] key. After that the

"PRICE" display starts show the countdown 9-8-7-6-5-4-3-2-1. The load cell signal output value is measured under the partial load so the value of full capacity load is then calculated from the measured one. If a measurement is successful then together with the long beep sound the "PRICE" display shows the <End> message then the non-skipped new calibration data is recorder to the EEPROM then the function {7} automatically exits. But if the calculated load cell output signal value is out of /30000...39900/ range then together with long beep sound the "PRICE" display shows a warning message for 1 sec., <LLLLLL> if signal value is less then lower limit or <HHHHHH> if signal value is higher then upper limit. After a warning message the "PRICE" display contains caption <LOAd> inviting to go back to the beginning of step (4). If a problem is fixed then please repeat actions of step (4). If not, please press [C] key to exit from function {7} then go please to function {1} or to function {5} in order to check the load cell output signal.

Function {8}.
Display test.

For the display test please press and hold pressed the [8] key on the functional keyboard. Please check all the display segments and all the indicator lamps are lit. Please remember the *ZERO* indicator lamp is lit only at stable condition of scales. After the [8] key depressing the function {8} exits automatically.

Function {9}.
Calibration correction with gravity constant recording.

Sometimes scales are transported from one geographic area to another. After such transportation usually the scale's calibration coefficient is to be corrected. It happens because of difference of the gravity in different geographic points. The function {9} gives the ability to make the calibration coefficient correction without standard weight. So, if the gravity constant ***g*** of some certain geographic point has been recorded into scale's EEPROM and if the scale has been calibrated with the standard weight at this certain geographic point then the only thing to correct calibration at the new geographic point is to record a new gravity constant ***g*** value into the EEPROM. After entering the function {9} the "WEIGHT" display contains caption <CAL 9> and the "PRICE" display contains previously recorded to the EEPROM value of ***g***, for example <9.815> for Moscow, Russia. The "TOTAL" display contains an "invitation" to enter a new value of gravity constant where the first digit is already entered: <9._>. If [C] key is pressed here then the exit from function happens only. To correct the calibration please enter three last digits of a new ***g*** value. When all digits of new ***g*** value are entered then this value is automatically recorded to the EEPROM and the calibration coefficient is automatically corrected and the exit from function {9} happens automatically. At new access to function {9} the entered value of ***g*** appears on the "PRICE" display.

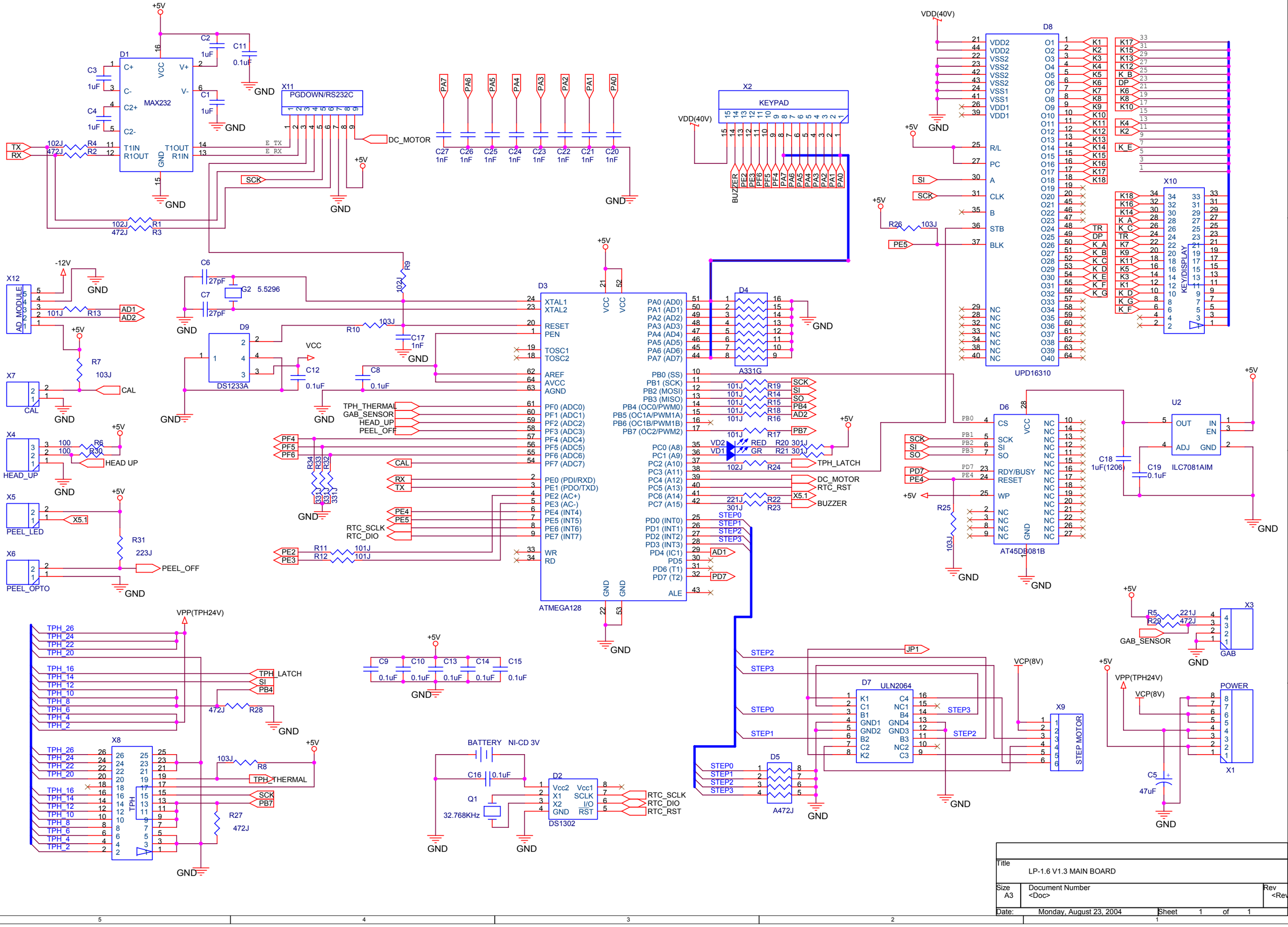
"Hidden" function.
Test of printer mechanism.

In order to test the printer mechanism work it's not required to have the display and the keyboard and the AD converter connected to the processor board. It could be useful in the situations when scales are dissembled for repair.

1. Please be sure the display shows nothing else except <CAL> caption and the [CAL] switch is in CAL position. No any function of Calibration mode should be

open. If the display is not connected then please move the [CAL] switch to CAL position and turn the power ON. The green light emission diode should blink in the hole under the paper roll.

2. Keeping the power ON please move the [CAL] switch from CAL to normal position.
3. Please observe the output of two subsequent labels. The second label should be stopped in the position where the end of label, 2 or 3 mm, remains connected to the liner paper. If something different happens please check whether the green diode continues to blink. Please check and adjust the printer sensors in function {6} if the red diode blinks instead of green. Please check the printing head position if the red diode blinks together with green.
4. Please remove the label and observe the output of the next label with the printed chess pattern. This action can be repeated many times.
5. In order to exit from this function please turn the power OFF or please move the [CAL] switch to CAL position after the label output.



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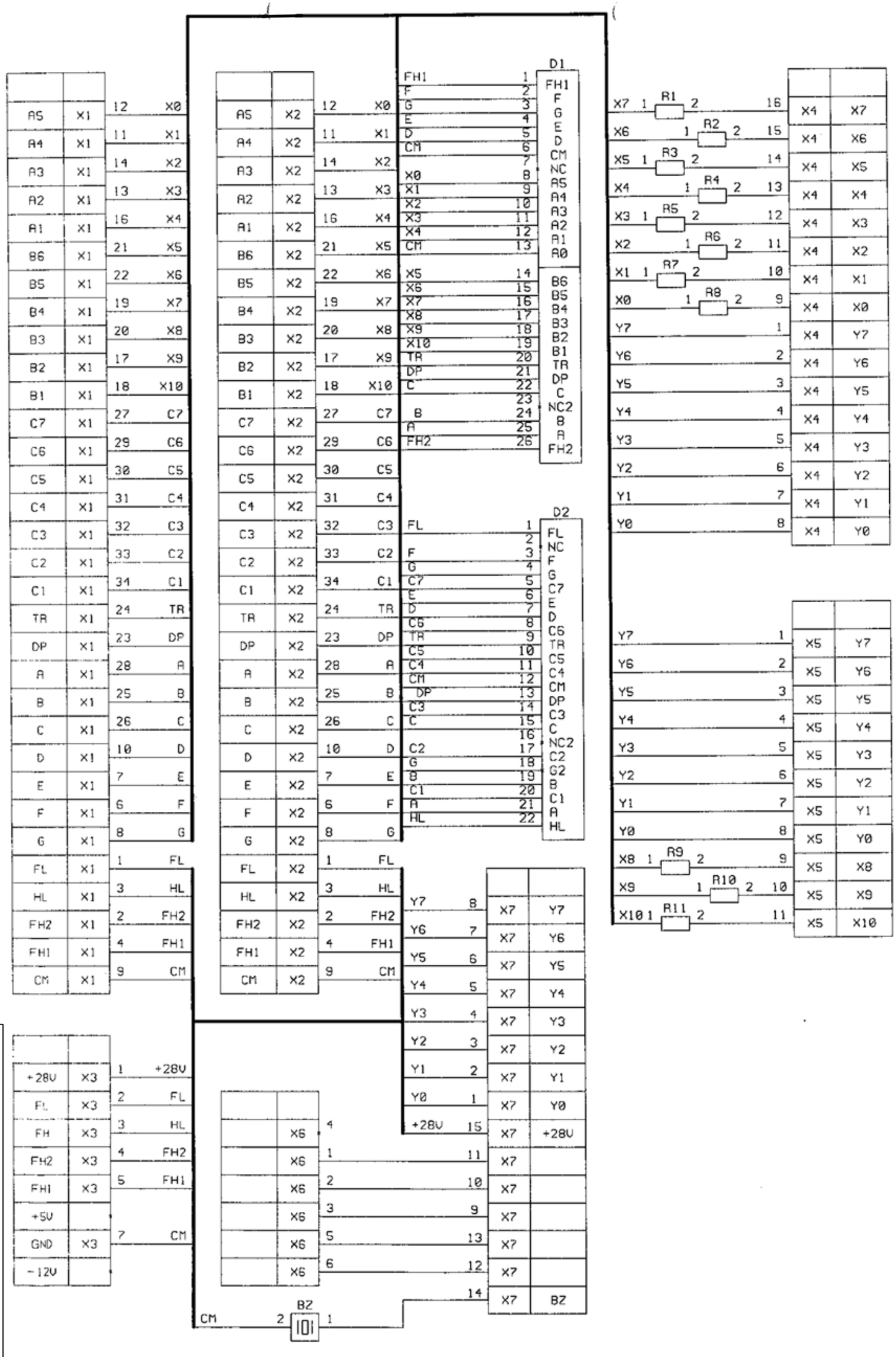
Size A3	Document Number <Doc>	Rev <RevCode>
Date: Monday, August 23, 2004	Sheet 1 of 1	



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LP-1(ver 1.6) DISPLAY CIRCUIT DIAGRAM

Document Number
6100-PLP-0235

Rev
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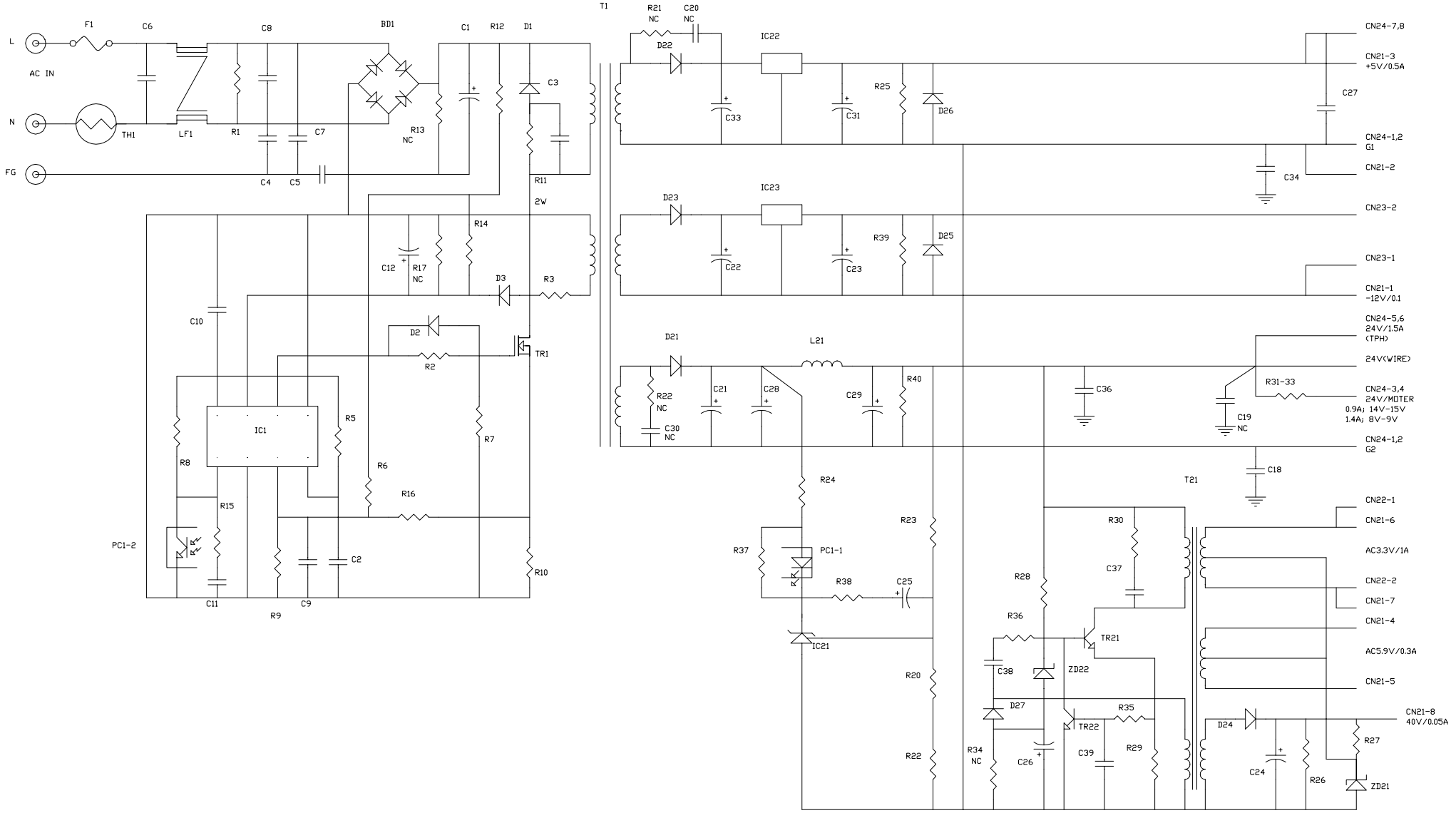
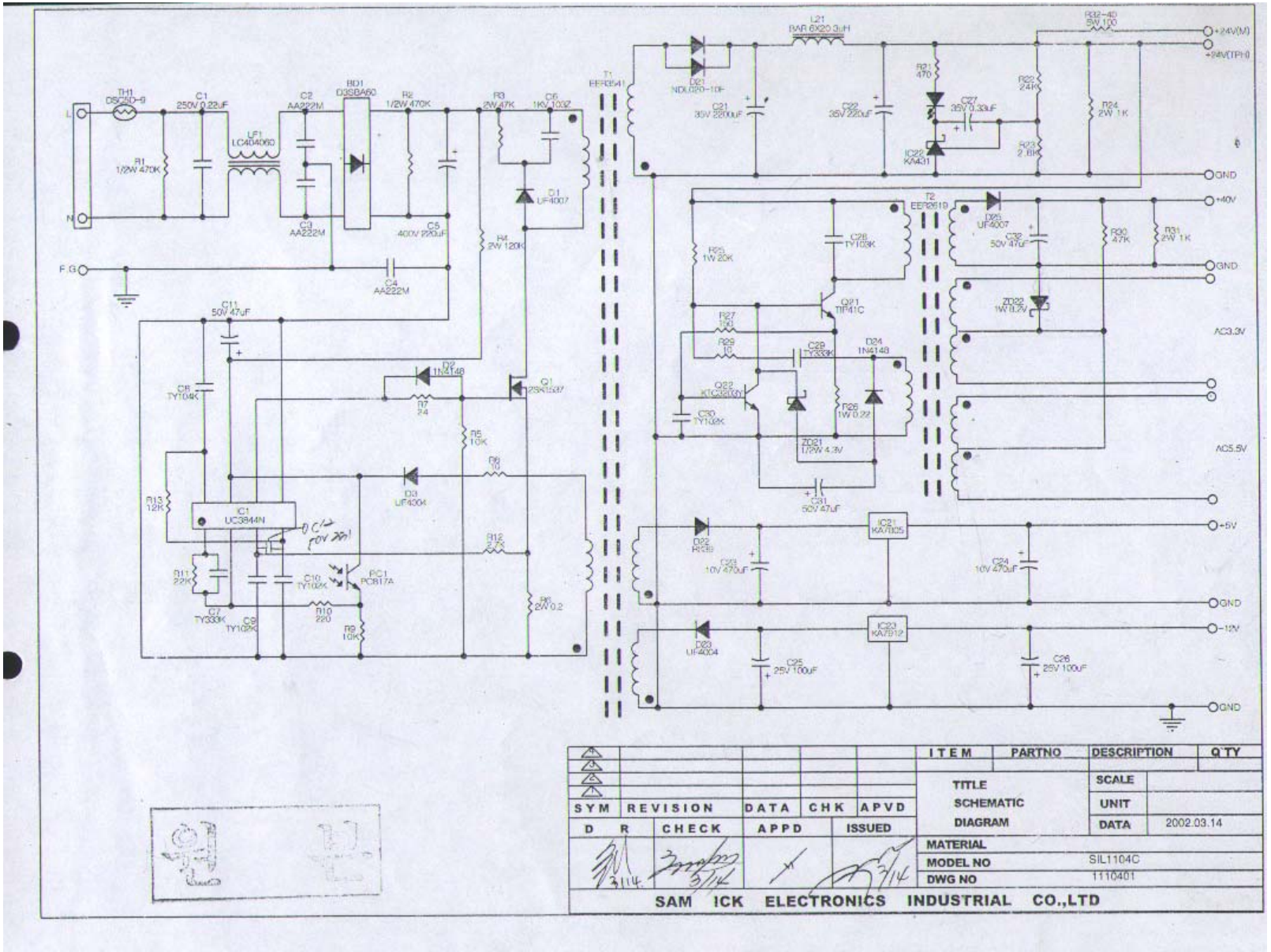
Date:



CAS-7040

Fine Electronics Co., LTD.		
Size A3	Document Number CAS-7040	Rev A
Date: 2004, 4, 6	Sheet 1 of 1	



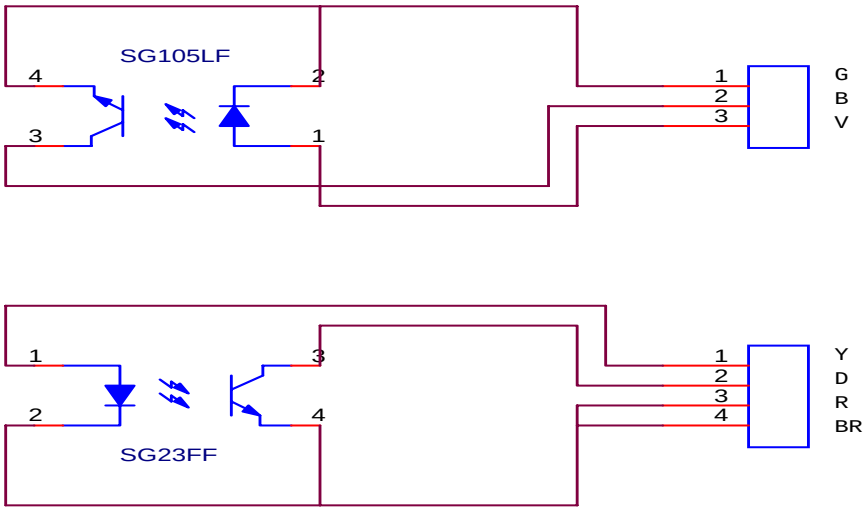
SYM	REVISION	DATA	CHK	APVD
D R	CHECK	APPD	ISSUED	

ITEM	PARTNO	DESCRIPTION	Q'TY

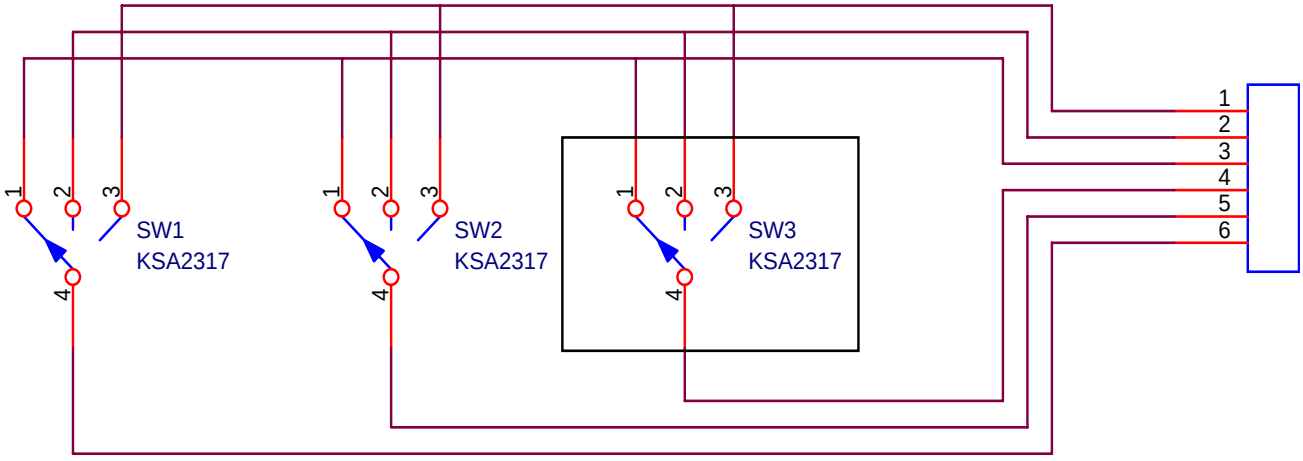
TITLE SCHEMATIC DIAGRAM	SCALE		
	UNIT		
	DATA	2002.03.14	
MATERIAL			
MODEL NO	SIL1104C		
DWG NO	1110401		

SAM ICK ELECTRONICS INDUSTRIAL CO.,LTD

Photo Sensor

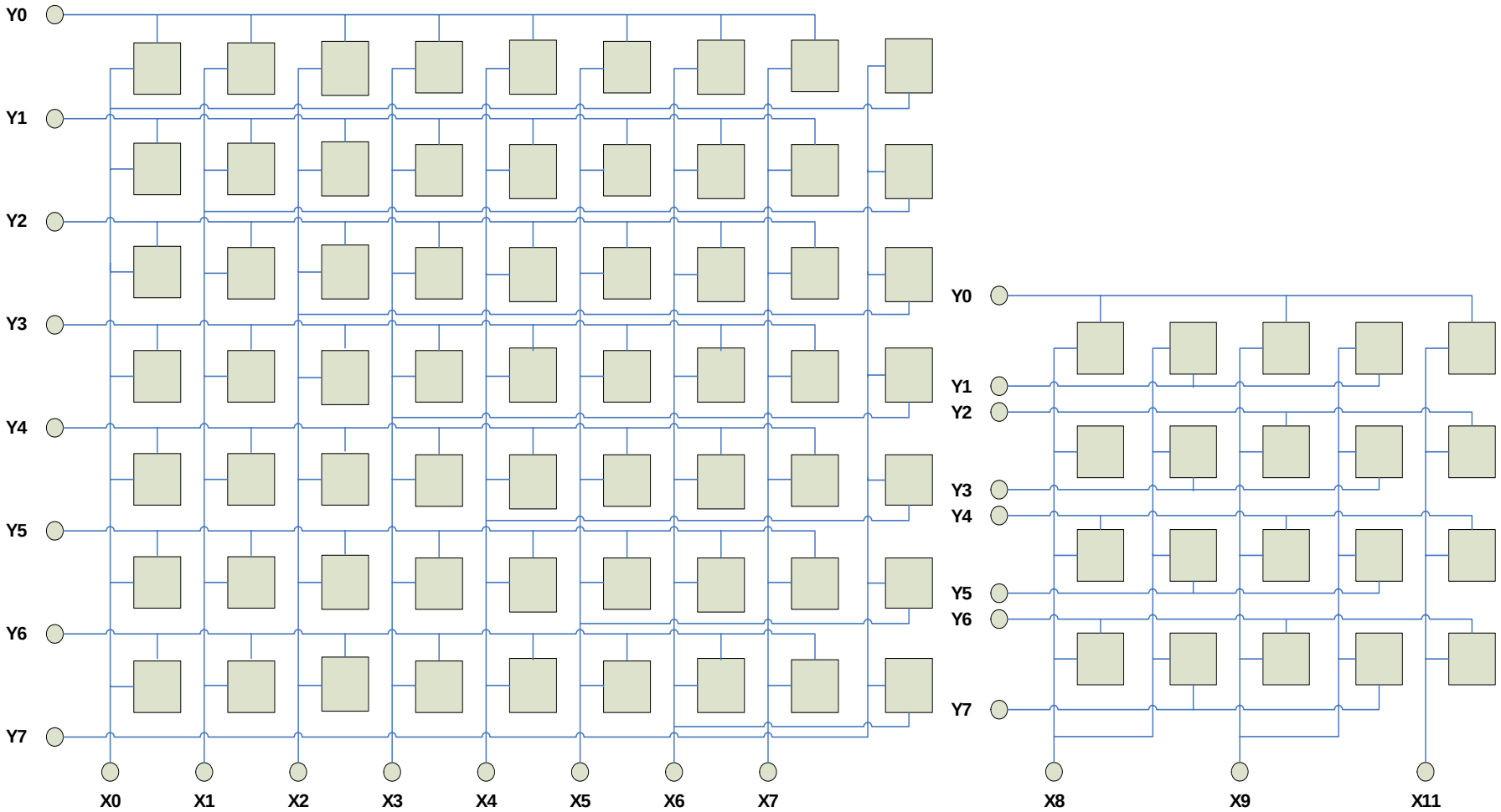


Slide S/W



Dashed lined switch is designed for the future application.

KEY MATRIX


Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
X0
X1
X2
X3
X4
X5
X6
X7
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
X8
X9
X11

VD1 GREEN

VD2 RED

Title: LP-1(ver 1.6) MAIN PCB DIAGRAM (BOTTOM)		
Document Number: 9000-L16-0004		Rev: 00
Date:		