MAINTENANCE MANUAL

JW SERIES

CONTENTS

NOVEMBER 2004

Specifications and Function Subject to Change without Notice

1. INTRODUCTION

This maintenance manual contains of certain information that may result in fraudulent use. Do not release any part of this manual to any end users or un-authorized persons.

Ender users should be advised not to undertake any trouble shooting except those listed on the operation manual.

The internal **MINI JUMPER** should be so set to prevent un-authorized settings or alternations.

Should a load cell has been replaced, make sure that the protection devices are properly set.

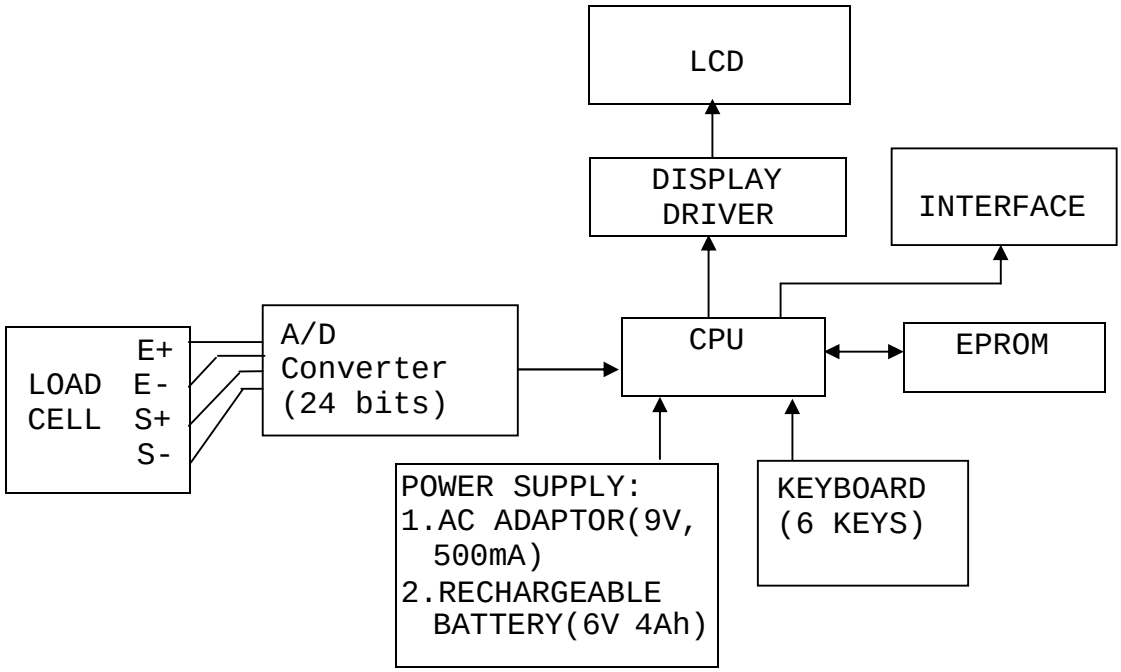
After servicing, it is necessary to go through all tests and procedures to ensure the scale meets all the metrological and approval requirements.

Here are some features of the JW series

1. Zero indicator
2. Tare indicator
3. Negative value indicator
4. Subtractive tare function
5. Power on zero function
6. Manual zero function
7. Power saving function
8. Low battery warning signal
9. Counting & percentage functions included
10. 1/30000 or 1/50000 display resolution
11. Metric unit + 12 user programmable weight units
12. 6 x 19mm digits bold type LCD display
13. Power source: by 6V 3Ah rechargeable battery or AC adaptor
14. 2 types of calibration
15. Equipped with RS232 interface & backlight facility
16. Bubble level included
17. Wind shield included(JW-250,300,500,600,1000)

2. SPECIFICATION

2.1 SYSTEM BLOCK DIAGRAM

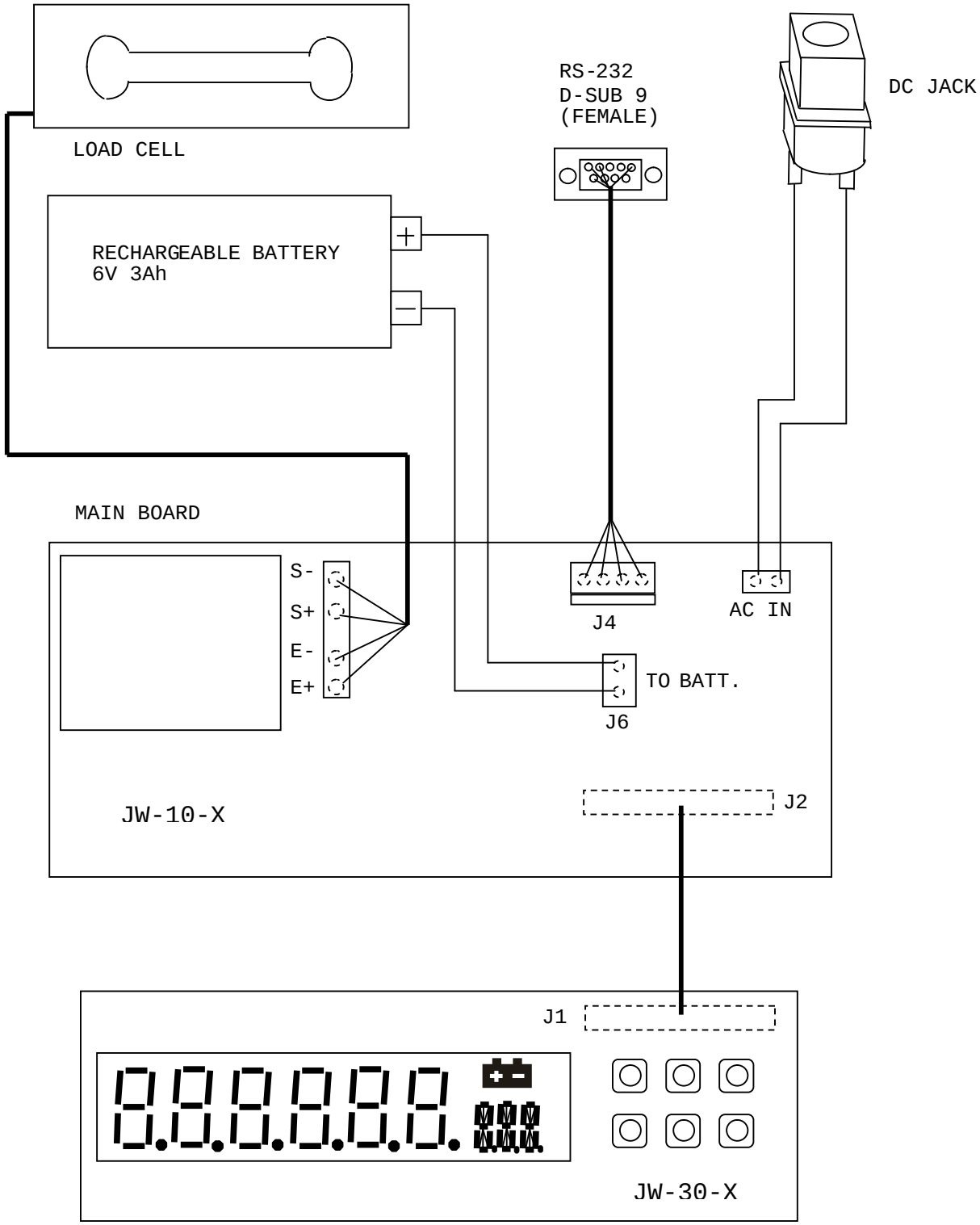


Description:
When an article is placed on the platter, the load of the article is applied to the load cell inside the scale.

The resistance to the excitation current in the strain gauge will then changed and the analog output signal varies.

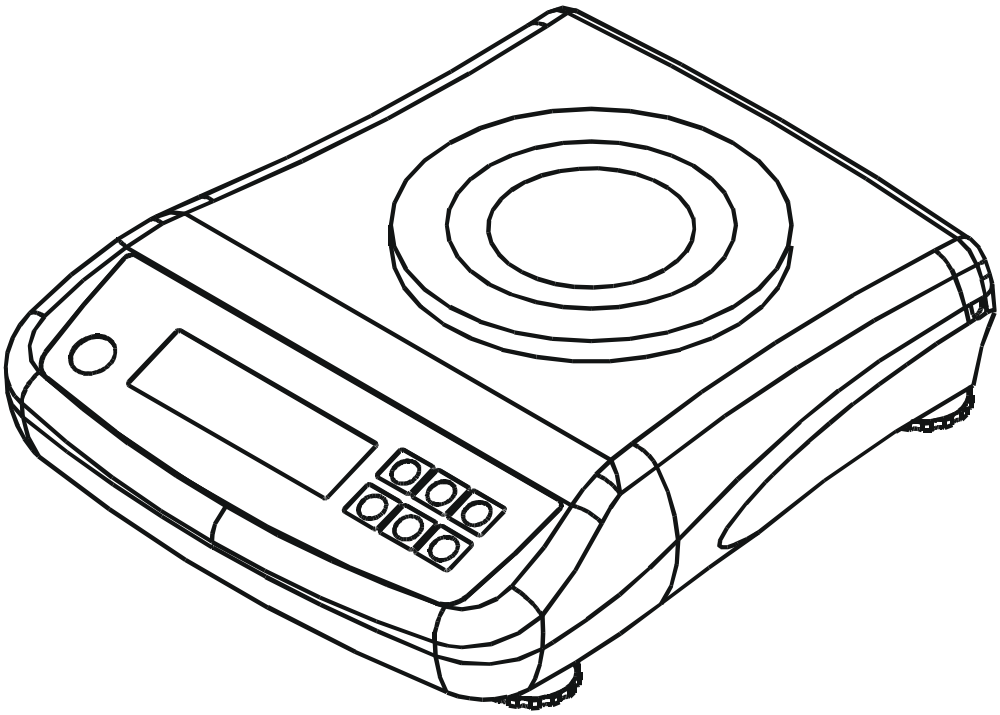
It is amplified and digitized continuously by the A/D converter into a digital signal. Subsequently, the resulting count is processed and managed by the CPU. The CPU refers to the instructions from the keyboard, and then conveys the output data to display driver, which formats the data into readout on the display panels.

2.2 PHYSICAL LAYOUT OF ELECTRICAL CONNECTION



2.3 GENERAL SPECIFICATIONS

2.3.1 Overall View



2.3.2 Overall Dimension:

220(W) X 224(D) X 70(H)mm Max.

2.3.3 Technical Specifications

Model No.	Capacity (Max)	Division (e)
1/50000		
JW-250	250g	0.005g
JW-500	500g	0.01g
JW-1000	1000g	0.02g
JW-2500	2500g	0.05g
1/30000		
JW-300	300g	0.01g
JW-600	600g	0.02g
JW-1500	1500g	0.05g
JW-3000	3000g	0.1g
Tare Range	Full Tare Range	
Power-on Zero Range	Full Power-on Zero Range	
Zero Range	±2%	
Min. Load	20e	
Weighing Units **NOTE A**	Gram, ounce, pound, troy ounce, grain, penny weight, metric carat, momme, troy tael, tola, dram	
Power Source	By Built-in Rechargeable Battery or AD/DC Power Adaptor	
Operating Environment	0^{o}~40^{o}C (32^{o}~104^{o}F), Non-condensed. R.H.≦ 85%	
Weight	N.W. 2.0kg, G.W. 3.0kg	

NOTE A:
To comply with the law of certain countries, the some of the weighing units may be disabled. Contact your dealer for more information.

2.3.4 Main Components Used

Microprocessors: SM8958A
Crystal Oscillator: 11.0592MHz
Display Device: WIDE ANGLE LCD DISPLAY
Load Cell Capacity: JW-250/300 = BCL-300g
JW-500/600 = BCL-600g
JW-1000/1500 = BCL-1200g
JW-2500/3000 = BCL-3000g

2.3.5 Analog Specification

- Power supply of 5 V DC;
- Excitation power supply for the load cell is 5 V DC;
- Input impedance of the load cell is 350 Ω;
- Rated output of load cell is 1mV/V;
- The analog data processing unit is built in a closed metal box.
- 24 bits A/D converter
- A/D Conversion Speed: 20 times/second
- Internal Resolution: 1,000,000 counts

2.4 OPTIONAL INTERFACE

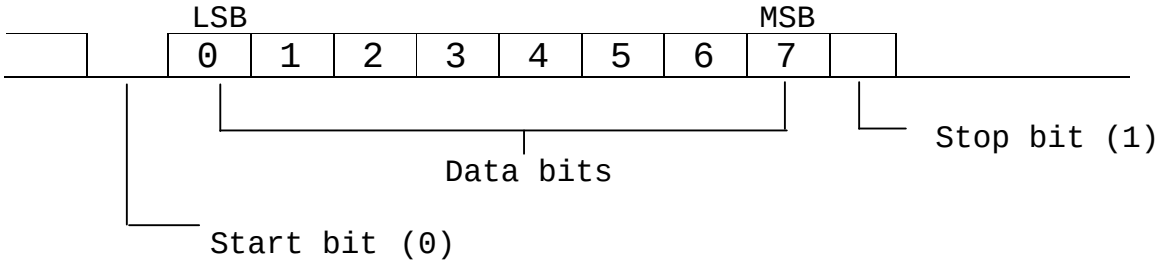
2.4.1 Serial RS-232C Port (D-SUB 9 pin)

RS232 PIN ASSIGNMENT

PIN NUMBER	ASSIGNMENT
1	CD
2	TXD
5	GND
6	DSR
7	RTS
8	CTS

Remarks:

- RTS & CTS are short-circuited internally.
- Should computer signal input end consists of DSR & CD signal check cable, then short circuit pin 1, 6, 7 & 8.



Type : EIA-RS-232C

Method : Half-duplex, asynchronous transmission

Format :

Baud rate : 4800,9600 or 19200

Data bit : 8

Parity bit : None

Stop bit : 1

Code : ASCII

Transmission mode : CONTINUOUS TRANSMISSION

Data format

WEIGHT (include sign)								SPACE	UNIT			CR	LF
1	2	3	4	5	6	7	8	9	10	11	12	13	14

2.5 INTERNAL SETTINGS AND CALIBRATION PROCEDURES

7 internal settings are available as below table.

Function	**Symbol**	**Description**
0	F.0	Compulsory zero display
1	F.1	Offset value Reading
2	F.2	Full display Segment
3	F.3	Select weight unit
4	F.4	Auto power off setting
5	F.5	Baud rate setting
6	F.6	Motion filter speed setting

2.5.1 How to Enter the Functions Required

a. Turn scale on by pressing **ON/RE-ZERO**, then press and hold **%/WT.** before scale completes counting down
b. The display shows **F.1**
c. Press **%/WT.** until the desired function number appears
d. Press **MODE** to enter selection
e. Press **MODE** to select setting value
f. Press **%/WT.** to confirm setup
g. Turn scale off and on again to use it as normal

2.5.2 Compulsory Zero Display (F.0)

A zero weight value will be displayed on the scale if the load detected is within the below range.

Symbol	**Zero Value Display Range**
2Ero_0	±0.5e
2Ero_1	±1.0e
2Ero_2	±1.5e
2Ero_3	±2.0e
2Ero_4	±2.5e

2.5.3 Offset Value Reading (F.1)

1. Remove all loads from platter

2. Enter **F.1** through procedures as described in **2.5.1**
3. The offset value is displayed on the scale

2.5.4 Full Display Segment (F.2)

1. Enter **F.2**
2. Press **MODE**
3. All display segments will be lighted up
4. Check digits and arrow indications to verify any defects or errors
5. Press **%/WT.** to quit

2.5.5 Select Weight Unit (F.3)

1. Enter **F.3**
2. Press **MODE** to select the weighing unit according to the mode indicator
3. Press **PCS/WT.** to turn on or off the selected units
4. To set power on initial unit, press **SAMPLE** when at the selected unit
5. Press **%/WT.** to confirm setup

2.5.6 Auto Power Off Setting (F.4)

This unit is equipped with **AUTO POWER OFF** function. Default setting = auto off after 30 minutes unused. Follow the below steps to disable/employ the **AUTO POWER OFF** function.

1. Refer to the **2.5.1** on how to enter **F.4**
2. Press **MODE** to shift between **0_OFF** and **30_OFF**
   *To disable the **AUTO POWER OFF** function select **“0_OFF”**
   *To employ the **AUTO POWER OFF** function select **“30_OFF”**
3. Press **%/WT.** to confirm and return to other function selection manual

2.5.7 Select RS-232 Baud Rate(F.5)

This unit equipped with 3 baud rates with default setting at 9600 and N.8.1. Follow the below steps to select the desire speed.

1. Enter **F.5**
2. Press **MODE** to select among **br 48**, **br 96** or **br192**
3. Press **%/WT.** to confirm setup

2.5.8 Motion Filter Speed Setting (F.6)

Motion filter is used to give a more stable display when the working environment is affected by motion or airflow interference. Refer to

the below table for motion filter speed setting

Symbol	**Motion Filter Speed**
Filt_0	Disable (Normal)
Filt_1	Minimum
Filt_2	Medium
Filt_3	High
Filt_4	Maximum

2.5.9 AUTO AND DEALER CALIBRATION PROCEDURES

2.5.9.1 Calibration load and span value range

Model No.		**CAL_1**		**CAL_2**	
	OFFSET (Thousand)	LOAD APPLIED	SPAN RANGE (Thousand)	LOAD APPLIED	SPAN RANGE (Thousand)
JW-250	40~200	100g	200~300	250g	500~750
JW-500	40~200	200g	200~300	500g	500~750
JW-1000	40~200	500g	200~300	1000g	500~750
JW-2500	40~200	1000g	200~300	2500g	500~750
JW-300	40~200	100g	200~300	300g	600~900
JW-600	40~200	200g	200~300	600g	600~900
JW-1500	40~200	500g	200~300	1500g	600~900
JW-3000	40~200	1000g	200~300	3000g	600~900

To increase the span value: - Decrease the impedance value of R5
To decrease the span value: - Increase the impedance value of R5

Dealer Calibration Procedures

1. Hold **%/WT.** and press **ON/RE-ZERO** to turn on the scale.
2. “F.1” will appear on WEIGHT panel.
3. Press **MODE** twice to enter calibration.
4. Scale now displays “CAL._1”, press **MODE** again to confirm
5. WEIGHT panel will display 〝yES〞 then “CAL. 0” to automatically calibrate the zero point.
6. When it completes in calibrating zero point, it will automatically enter the next step.

7. WEIGHT panel will now keep flashing a standard calibrate weight to prompt user placing the mass onto the platter.
8. Load the mass.
9. Scale will have a beep sound when it is calibrated.
10. WEIGHT panel now displays “CAL._2”
11. There are two options now, either press **OFF** to exit the calibration or press **MODE** to enter second point calibration.
12. When **MODE** is pressed, scale will display “yES” and ask to load the second weight, which is normally close to the maximum capacity.
13. Load the mass.
14. Scale will automatically exit the calibration procedure when it is calibrated.
15. Scale now reads the weight of the load on the platter.

Auto Calibration Procedures

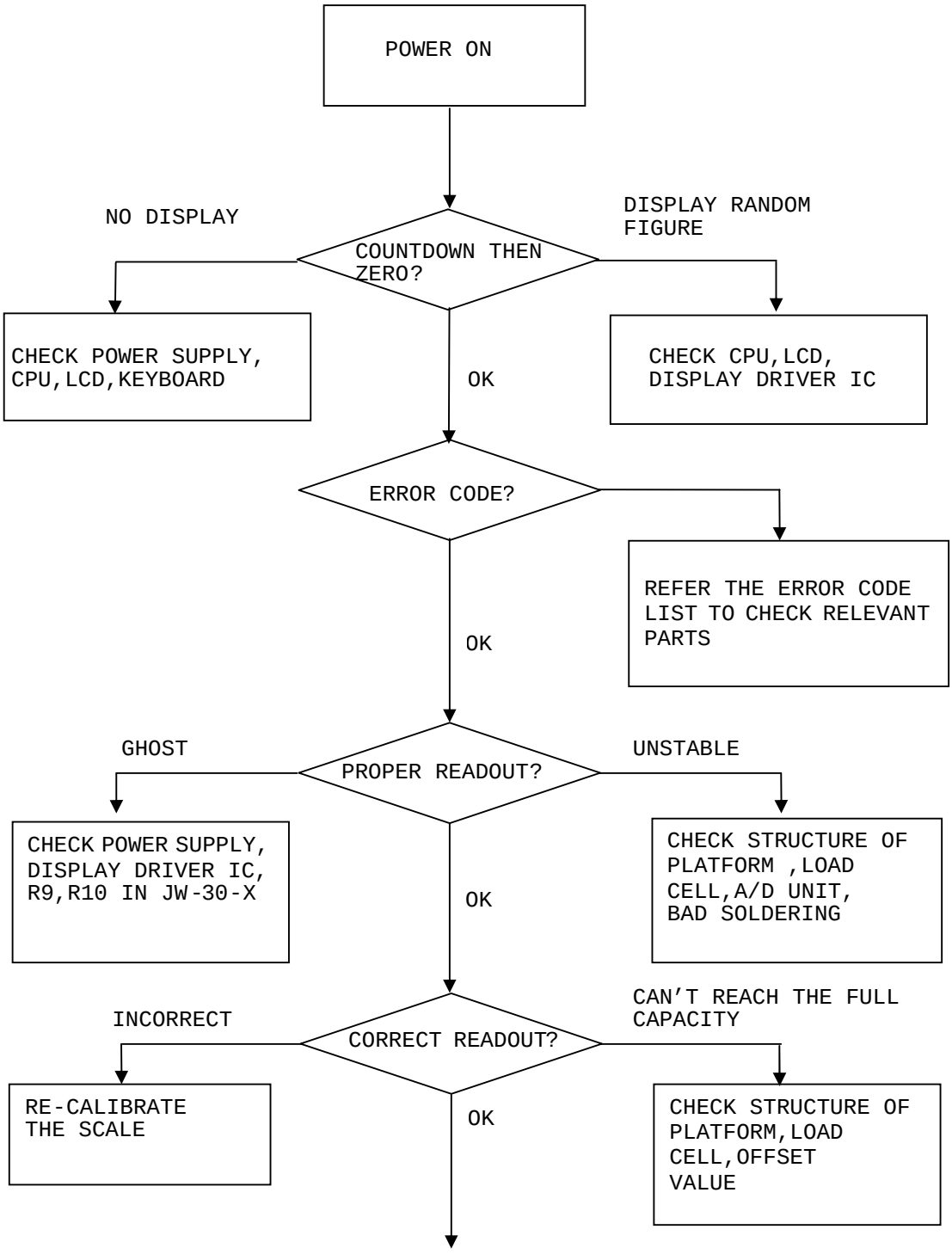
1. Hold **MODE** and press **ON/RE-ZERO** to turn on the scale.
2. “CAL._1” will appear on WEIGHT panel.
3. Press **MODE** again to enter calibration.
4. WEIGHT panel will display 〝yES〞 then “CAL. 0” to automatically calibrate the zero point.
5. When it completes in calibrating zero point, it will automatically enter the next step.
6. WEIGHT panel will now keep flashing a standard calibrate weight to prompt user placing the mass onto the platter.
7. Load the mass.
8. Scale will have a beep sound when it is calibrated.
9. WEIGHT panel now displays “CAL._2”
10. There are two options now, either press **OFF** to exit the calibration or press **MODE** to enter second point calibration.
11. When **MODE** is pressed, scale will display “yES” and ask to load the second weight, which is normally close to the maximum capacity.

12. Load the mass.
13. Scale will automatically exit the calibration procedure when it is calibrated.
14. Scale now reads the weight of the load on the platter.

Note：*Auto calibration can only be performed when the span value is within +/-10% tolerance of dealer calibration.*

3.TROUBLE SHOOTING

3.1 TROUBLE SHOOTING LOOP



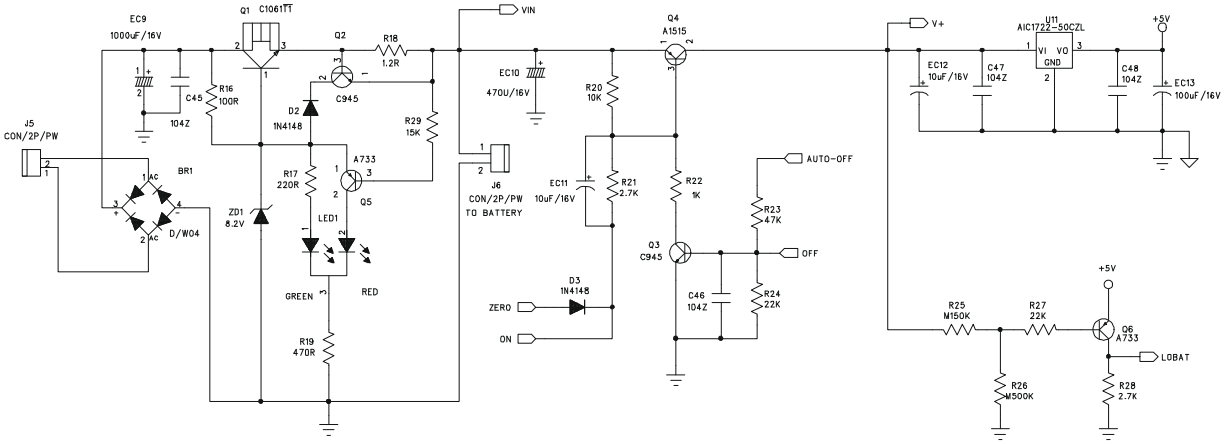
NORMAL OPERATION

3.2 PARTS AND COMPONENTS TROUBLE SHOOTING

3.2.1 Power Supply Checking

3.2.1.1 Relevant parts:

Main Board (JW-10-X)
DC JACK
Q1 (C1061)
Q2 (C945)
Q3 (C945)
Q4 (A1515)
Q6 (A733)
U11 (AIC 1722-5.0)
R18 (1.2R 1/2W)
ZD1 (ZENER 8.2V)
BATTERY (6V 3Ah)



Description:

1) Power source: Rechargeable Battery 6V/3Ah or AC adaptor (9V, 500mA)

2) How Battery is charged completely?
   The charging voltage is regulated by Q1 (C1061) and ZD1 (8.2V) for about 7 volts.

The charging current will go down automatically when voltage reached. Q2 (C945) and R18 (1.2R, 1/2W) provide Over-Current protection.

3) +5V power drives digital circuit system.
U11 (AIC 1722-5.0) is a 5volts Voltage Regulator.

4) +5V power drives analog circuit system.
U5 (NS2950A) is a 5volts Voltage Regulator.

5) Auto-off:
If the scale is set with 30_oFF or even under LO-BAT situation, after fixed time interval, CPU will release a low potential signal to draw down Q3, then Q4 cuts off, the scale will be shut down immediately.

6) Low Power Detection:
The Q6(A733) is designed to detect the power level. When battery power is less than 5.5V, the collector pole will become high potential, then CPU will instruct LCD display to show LO-BAT symbol.

3.2.1.2 Input voltage: 5.5V or higher

Check and recharge battery if voltage is less than 5.5V.

3.2.1.3 System voltage (Vcc): 5V +/- 10%

Check that the system voltage is within 5V +/- 10%
a) less than 4.5V, the CPU may not work properly.
b) more than 6V, ghost will appear on LCD.

3.2.2 Platform Stopper Checking

The platform device shall not touch anything around itself during operation. Check that the platform is not contacted with the upper (no load) and/or lower (with load) stopper.

3.2.3 LCD Display Checking

3.2.3.1 Check that it is soldered and connected properly between LCD and driver IC (PCF8576), driver IC (PCF8576) and CPU.

3.2.3.2 Check whether LCD is broken.

3.2.4 CPU Checking

3.2.4.1 Check that all pins are seated properly into the socket.

3.2.4.2 Check that the Crystal Oscillator works.

3.2.4.3 Check the RESET is normally low.

3.2.5 A/D Unit Checking

3.2.5.1 Check that the +5V powers are correctly fed to the A/D unit.

3.2.5.2 Check that the signal output of loadcell is normal.

3.2.5.3 Check OP. Amplifiers & A/D Converter (AD7730).

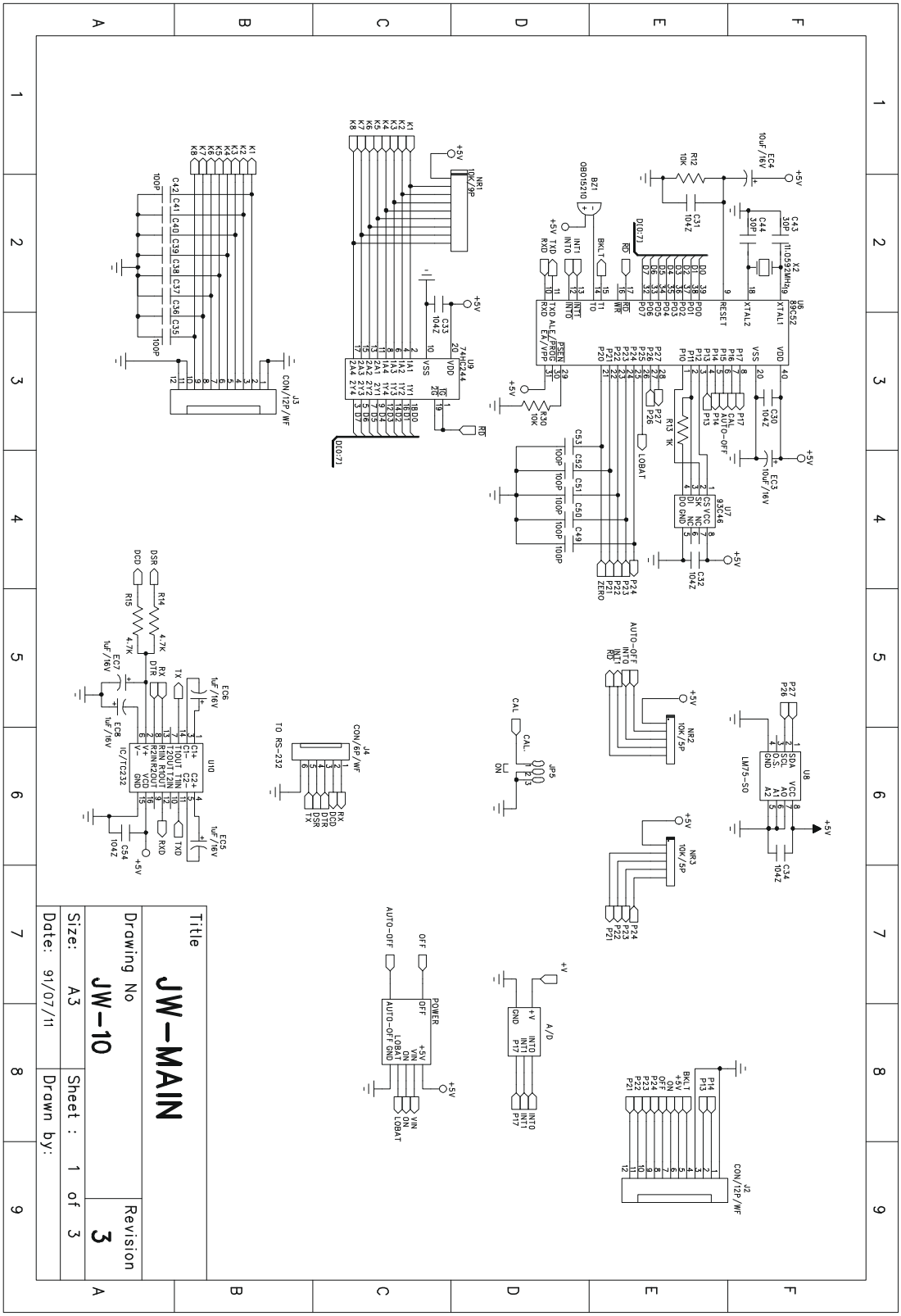
When no error is found with the above checking procedures, the trouble can be caused on the load cell or the PCB itself. Replace a new one could be better to identify the defective.
In this way, the readout of weight would be varied because of the output voltage of load cell and different span value, so re-calibration is required after this replacement.

3.2.6 ERROR CODES AND DESCRIPTIONS

ERROR CODE	DESCRIPTION
000000 ------	Excess weight over full capacity
Err_ov	Span value too high during calibration
------ 000000	Negative weight over weighable range

4.ELECTRICAL CIRCUITRY

4.1 SCHEMATICS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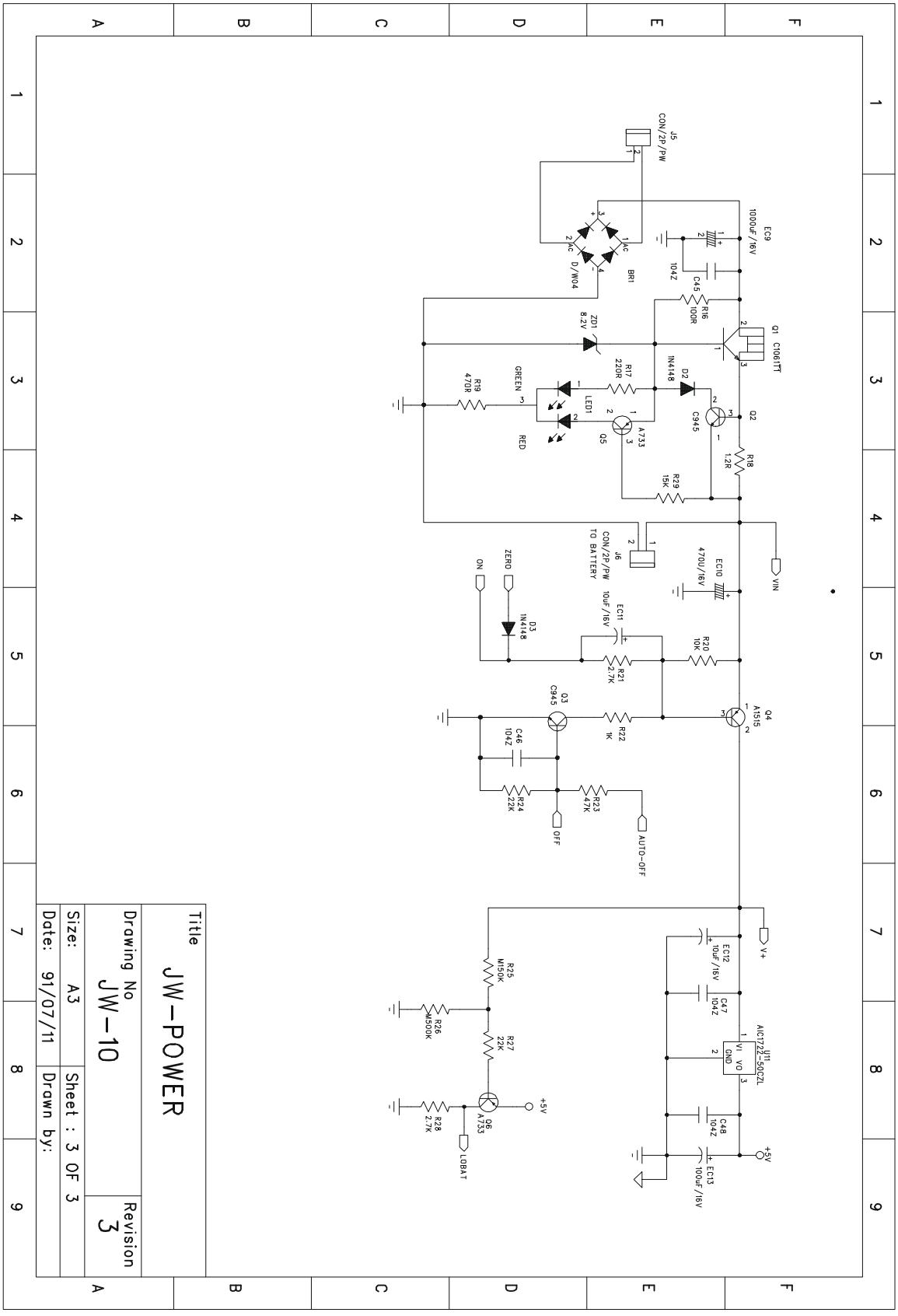
Drawing No
JW-10
Revision
3
Size: A3
Sheet : 1 of 3
Date: 91/07/11
Drawn by:


J5
CON/2P/PW
BR1
D/W04
EC9
1000uF/16V
C45
104Z
R16
100R
ZD1
8.2V
Q1
C1061TT
R17
220R
D2
IN4148
LED1
GREEN
RED
R19
470R
Q5
A733
Q2
C945
R18
1.2R
R29
15K
J6
CON/2P/PW
TO BATTERY
VIN
EC10
470U/16V
ZERO
ON
D3
IN4148
EC11
10uF/16V
R20
10K
R21
2.7K
Q3
C945
Q4
A1515
R22
1K
C46
104Z
R24
22K
R23
47K
OFF
AUTO-OFF
V+
EC12
10uF/16V
C47
104Z
U11
AIC1722-50CZL
VI
VO
GND
C48
104Z
EC13
100uF/16V
+5V
R25
M150K
R26
M500K
R27
22K
Q6
A733
R28
2.7K
LOBAT
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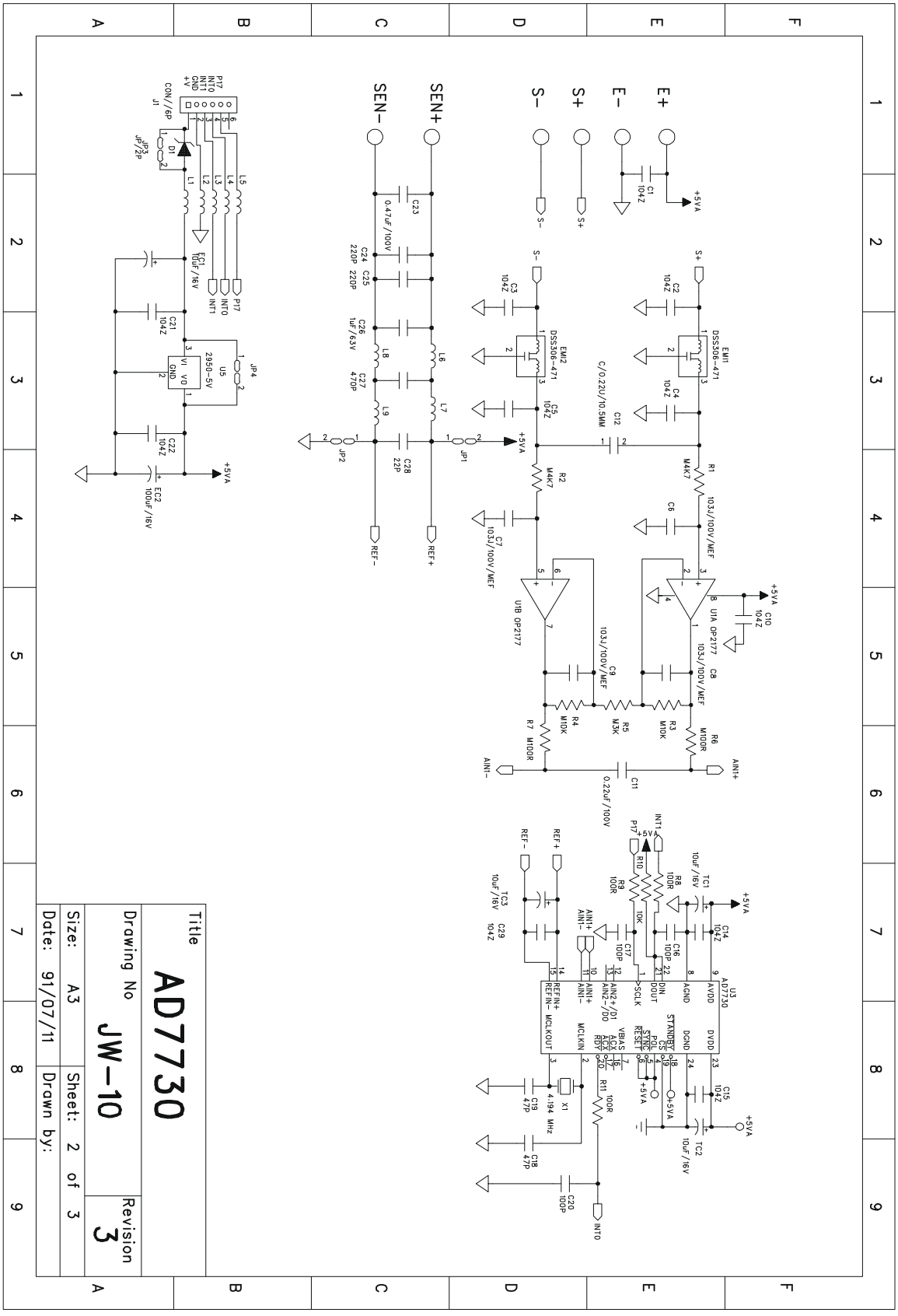
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S+
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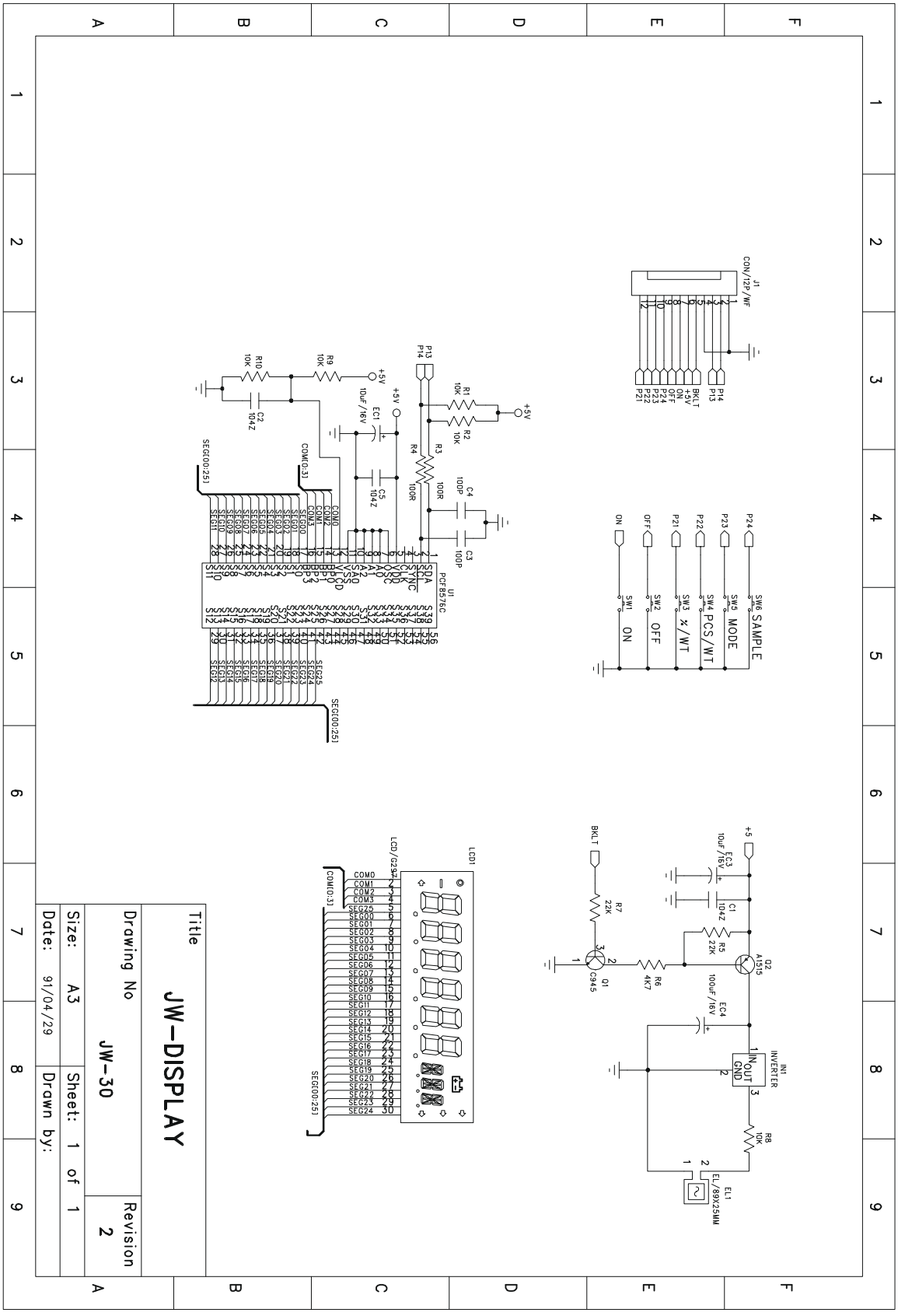
SEN+
SEN-
+5VA
AIN1+
AIN1-
INT0
INT1
P17
U1A OP2177
U1B OP2177
U3 AD7730
2950-5V
EMI1 DSS306-471
EMI2 DSS306-471
CON/6P
REF+
REF-
X1 4.194 MHz


J1
CON/12P/WF
P14
P13
BKLT
+5V
ON
OFF
P23
P22
P21
SW6 SAMPLE
SW5 MODE
SW4 PCS/WT
SW3 +/WT
SW2 OFF
SW1 ON
P24
P23
P22
P21
ON
OFF
U1
PCF8576C
R1 10K
R2 10K
R3 100R
R4 100R
C4 100P
C3 100P
EC1 10uF/16V
C5 104Z
C2 104Z
R9 10K
R10 10K
P13
P14
+5V
COM0-3
SEG00-25
LCD1
LCD/G2327
Q2 A1515
Q1 C945
R5 22K
R6 4K7
R7 22K
EC3 10uF/16V
C1 104Z
EC4 100uF/16V
IN1 INVERTER
R8 10K
EL1 EL/89X25MM
Title
JW-DISPLAY
Drawing No
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Revision
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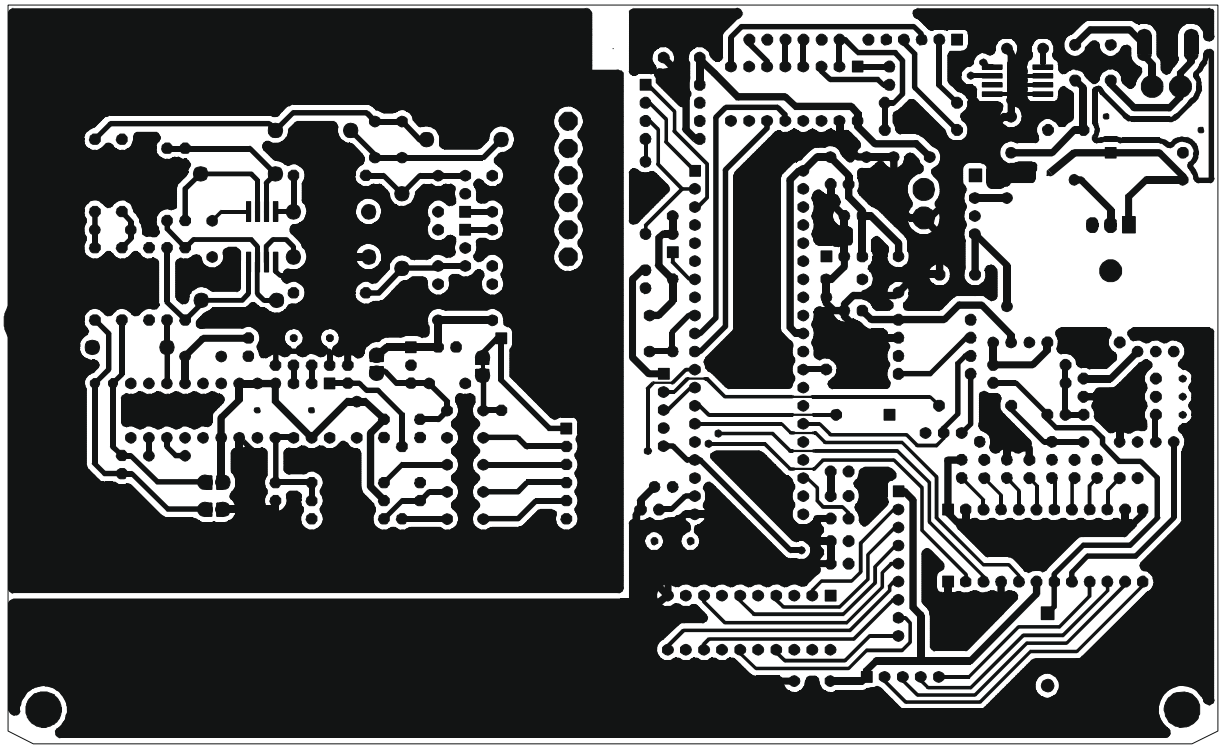
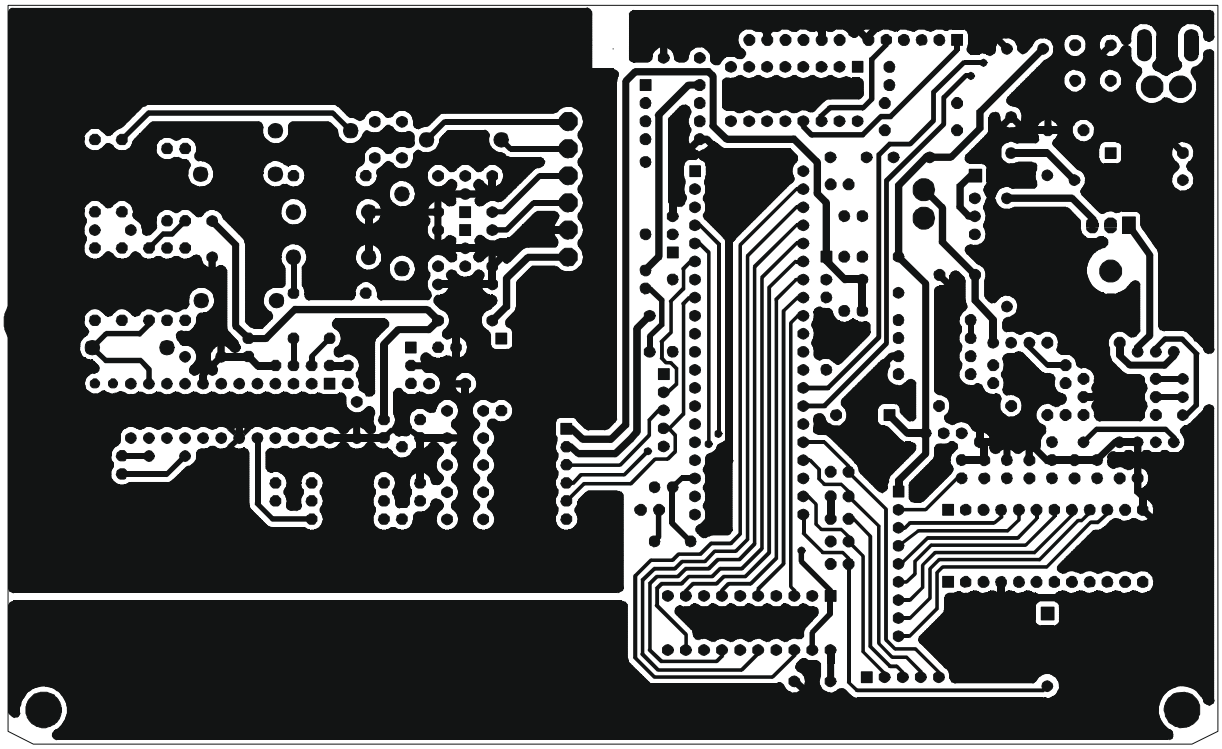
Drawn by:

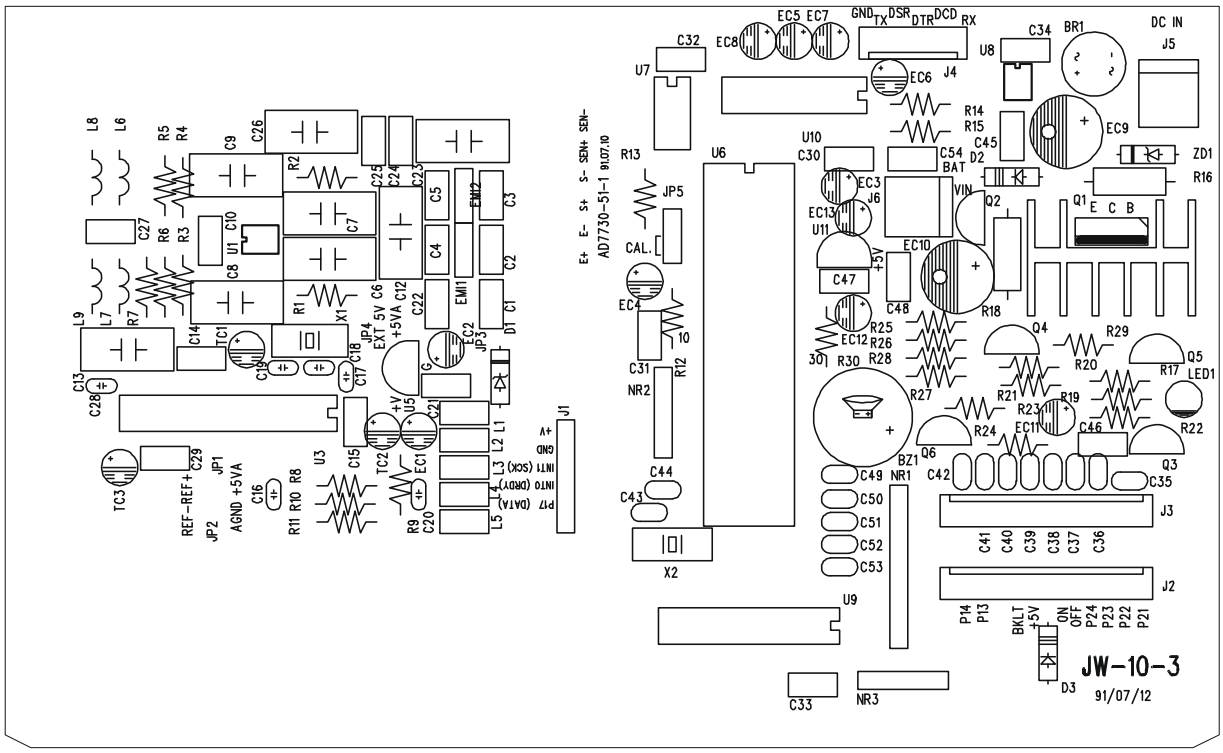
4.2 PCB LAYOUT



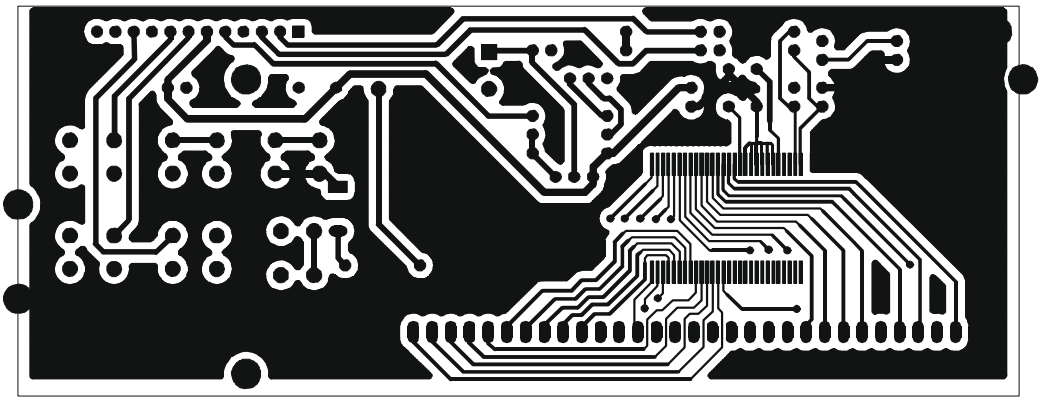
JW-10-3 TOP LAYER



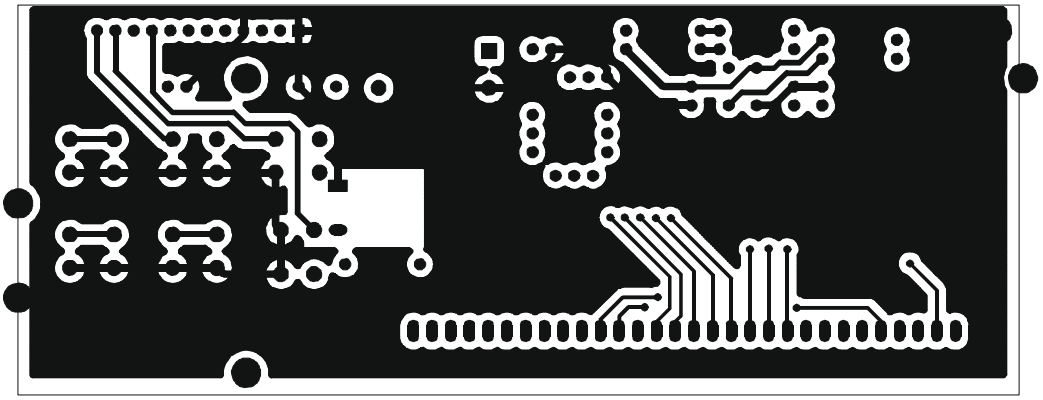
JW-10-3 BOTTOM LAYER



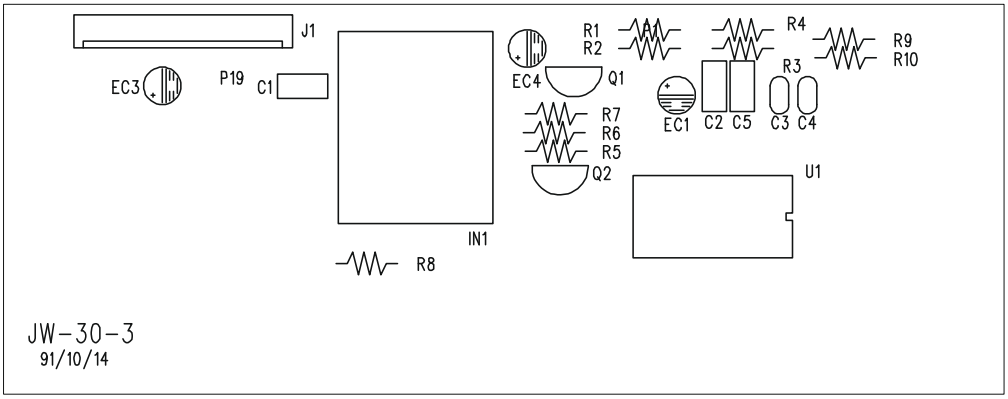
JW-10-3 TOP OVERLAY



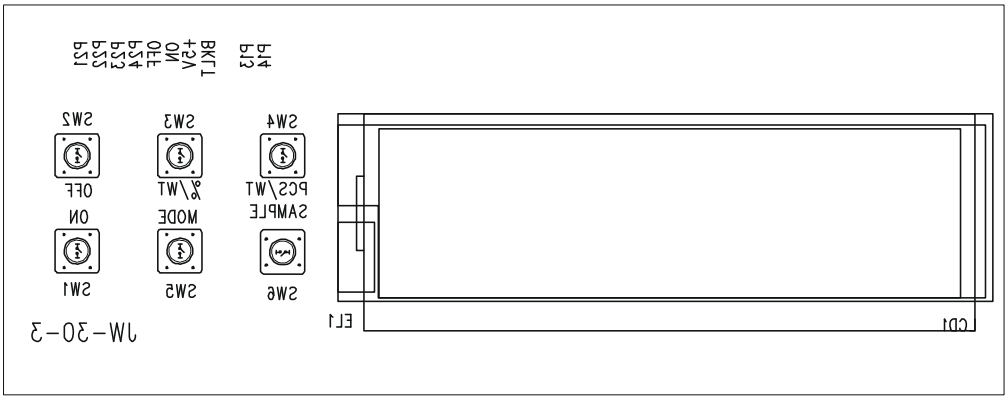
JW-30-3 TOP LAYER



JW-30-3 BOTTOM LAYER



JW-30-3 TOP OVERLAY



JW-30-3 BOTTOM OVERLAY

5.BILL OF MATERIAL

STRUCTURE

Parts No.	Description	Specification	Qty	Remark
A0905600400	CONNECTOR	PLT-164-R	1	OPTION
A1001000150	TRANSFORMER	W50	1	
A1003010301	EMI FILTER	03AB1	1	
A1304000001	SLIDE SW.	SY-14-H04, 3 PIN	1	
A1307000001	VOLTAGE SELECTOR	3 PIN, 230V/115V	1	
A5005000001	MICA	TO-92	2	
A5005000010	ISOLATION BUSH	TO-220A	2	
C1W50031000	K/B OVERLAY	W50 SERIES	1	
C1W50030000	PANEL OVERLAY	W50 SERIES	1	
E1W5000001X	P.C.B.	W50-10-X	1	MAINBOARD
E1W5000010X	P.C.B.	W50-30-X	1	DISPLAY
F0005W50000	ALUMINUM HOUSING	ALUMINUM HOUSING	1	
F0005W50100	STEEL BACK PANEL	W50 SERIES, 186*91*0.8t	1	
F0007W50000	STEEL FIXING PLATE	W50 SERIES, DISPLAY	2	
F0011W50000	S/S MOUNTING PLATE	W50 SERIES, HOUSING	2	
G0001W50100	PLASTIC DISPLAY FRAME	W50 SERIES	1	
Z0010000205	SCREW(ROUND HEAD)	M2*0.4P*5L	2	
Z0010001308	SCREW(TAPPED)	M3*8	6	
Z0010000308	SCREW(ROUND HEAD)	M3*0.5P*8L	4	
Z0010000306	SCREW(ROUND HEAD)	M3*0.5P*5L	4	
Z0011000308	SCREW(FLAT HEAD)	M3*0.5P*8L	2	
Z0015000410	SCREW	M4*0.7P*10L	8	
Z0015000415	SCREW	M4*0.7P*15L	2	
Z0016000003	NUT	M3*0.5P	4	
HW400000005	JUNCTION BOX	JB-W40-5	1	4 CHANNELS
HW400000007	JUNCTION BOX	JB-W40-7	1	6 CHANNELS
HW400000009	JUNCTION BOX	JB-W40-9	1	8 CHANNELS

W50-10-X MAINBOARD

E0W50000010	P.C.B.	W50-10-X	1	
A0201080321	I.C.	80C32	1	U10
A0202024021	I.C.	AT24C02	1	U9
A0202062640	I.C.	HM6264	1	U13
A0202275121	I.C.	27C512	1	U12
A0203002322	I.C.	MAX232CPE	1	U2
A0204074002	I.C.	74HC00	1	U14
A0204074060	I.C.	7406	1	U5
A0204741382	I.C.	74HC138	1	U15
A0204742452	I.C.	74HC245	1	U16
A0204745732	I.C.	74HC573	1	U11
A0206003930	I.C.	LM393	1	U7
A0207078050	VOLTAGE REGULATOR I.C.	7805	1	RG2
A0207078180	VOLTAGE REGULATOR I.C.	7818	1	RG1
A0250013020	I.C.	DS1302	1	U8
A0300000028	I.C. SOCKET	28 PIN	1	U12
A0401009450	TRANSISTOR	2SC945	2	Q1,Q2
A0403008170	PHOTO COUPLER	K817P	1	U6
A0501004148	DIODE	1N4148	4	D1,4-5,7
A0502000001	BRIDGE RECTIFIER	W06(1A)	3	BG1-3
A0503020030	ZENER DIODE	1/2W 3V	2	ZD1-2

A0503020068	ZENER DIODE	1/2W 6V8	1	ZD3
A0503020350	ZENER DIODE	1/2W 35V	1	ZD4
A0701106017	CAPACITOR (EC)	10uF/16V (SS TYPE)	4	C6-9
A0701108025	CAPACITOR (EC)	1000uF/25V	2	C4-5
A0701227050	CAPACITOR (EC)	220uF/50V	1	C3
A0701228035	CAPACITOR (EC)	2200uF/35V	1	C1
A0701478016	CAPACITOR (EC)	4700uF/16V	1	C2
A0702106016	CAPACITOR (TC)	10uF/16V	1	C21
A0730104050	CAPACITOR (MLC)	104Z	20	C10-16,20, 22-29,35-38
A0740020050	CAPACITOR (CC)	20pF	2	C17-18
A0740101050	CAPACITOR (CC)	100pF(101)	8	P_C1-8
A0804040075	METAL FILM RESISTOR	7.5Ω 1/4W	1	R9
A0804041002	METAL FILM RESISTOR	10KΩ 1/4W	1	R6
A0804044701	METAL FILM RESISTOR	4.7KΩ 1/4W	1	R5
A0805041101	CARBON FILE RESISTOR	100Ω 1/4W	8	P_R1-8
A0805041102	CARBON FILE RESISTOR	1KΩ 1/4W	2	R1,7
A0805041103	CARBON FILE RESISTOR	10KΩ 1/4W	5	R11,16,18, 23,15
A0805041104	CARBON FILE RESISTOR	100KΩ 1/4W	1	R12
A0805041221	CARBON FILE RESISTOR	220Ω 1/4W	2	R2,4
A0805041203	CARBON FILE RESISTOR	20KΩ 1/4W	1	R43
A0805041222	CARBON FILE RESISTOR	2.2KΩ 1/4W	1	R8
A0805041561	CARBON FILE RESISTOR	560Ω 1/4W	2	R3,10
A0902010090	CONNECTOR	9 PIN WAFER,PITCH=3.9mm	1	PW_SW1
A0904121090	CONNECTOR	D-SUB 9PIN(FEMALE)	2	C_L/C1, C_SER1
A0904121250	CONNECTOR	D-SUB 25PIN(FEMALE)	1	PRN1
A1004140471	SURGE ABSORBOR	14K 471	1	TNR1
A1100032768	CRYSTAL	32.768KHZ	1	X2
A1100311059	CRYSTAL	11.0952MHZ	1	X1
A1500000004	BUZZER	OBO-15210	1	BZ1
A1602036003	Ni-Cd BATTERY	UM-3, 1.2V*3	1	
A5002000521	FUSE	250V/500mA	1	F1
A5003000004	FUSE HOLDER(P.C.B. MOUNT)	CQ-203P (1.2)	1	F1

W50-30-X DISPLAY BOARD

E0W50000100	P.C.B.	W50-30-X	1	
A0101430601	TUBE	VFD43-0601	1	DISP1
A0204742372	I.C.	74HC237	2	U18,20
A0204743672	I.C.	74HC367	1	U21
A0208061180	I.C.	UDN 6118A	2	U17,19
A0501004148	DIODE	1N4148	2	D2,6
A0730104050	CAPACITOR (MLC)	104Z	5	C30-34
A0805041103	CARBON FILE RESISTOR	10KΩ 1/4W	4	R19-22
A1306000003	TACT SW	KPT-1104B	8	K1-8

==========

6.APPENDIX

PARTS EXPLOSION:

ITEM	PARTS NO.	DESCRIPTION	SPECIFICATION	QTY
2	F0005W50000	ALUMINUM HOUSING	ALUMINUM HOUSING	1
4	F0007W50000	STEEL FIXING PLATE	W50 SERIES, DISPLAY	2
6	Z0010000308	SCREW(ROUND HEAD)	M3*0.5P*8L	4
7	Z0015000410	SCREW	M4*0.7P*10L	8
8	G0001W50100	PLASTIC DISPLAY FRAME	W50 SERIES	1
10	C1W50030000	PANEL OVERLAY	W50 SERIES	1
12	C1W50031000	K/B OVERLAY	W50 SERIES	1
14	E0W50000100	P.C.B.	W50-30-X	1
16	Z0010001308	SCREW(TAPPED)	M3*8	6
18	Z0010000306	SCREW(ROUND HEAD)	M3*0.5P*5L	4
20	E0W50000010	P.C.B.	W50-10-X	1
22	F0005W50100	STEEL BACK PANEL	W50 SERIES, 186*91*0.8t	1
24		SCREW	1/8-40 UNC	6
26	Z0016000003	NUT	M3*0.5P	4
28	A0905600400	CONNECTOR	PLT-164-R	1
30	A1304000001	SLIDE SW.	SY-14-H04, 3 PIN	1
32	Z0010000205	SCREW(ROUND HEAD)	M2*0.4P*5L	2
34	A1307000001	VOLTAGE SELECTOR	3 PIN, 230V/115V	1
36	A1003010301	EMI FILTER	03AB1	1
38	Z0011000308	SCREW(FLAT HEAD)	M3*0.5P*8L	2
40	F0011W50000	S/S MOUNTING PLATE	W50 SERIES, HOUSING	2
42	Z0015000415	SCREW	M4*0.7P*15L	2

May 2001

8 - Bit Micro-controller

with 32KB flash & 1KB RAM embedded

Product List

SM8958L25, 25 MHz 32KB internal memory MCU
SM8958C25, 25 MHz 32KB internal memory MCU
SM8958C40, 40 MHz 32KB internal memory MCU

Description

The SM8958 series product is an 8 - bit single chip micro controller with 32KB flash & 1KB RAM embedded. It is a derivative of the 8052 micro controller family. With its hardware features and powerful instruction set, it's straight forward to make it a versatile and cost effective controller for those applications which demand up to 32 I/O pins for PDIP package or up to 36 I/O pins for PLCC/QFP package, or applications which need up to 32KB memory either for program or for data or mixed.
To program the on-chip flash memory, a commercial writer is available to do it in parallel programming method.

Ordering Information

yywwv
SM8958ihhk

yy: year, ww:week
v: version identifier {, A, B,...}
i: process identifier {L=3.0V ~ 3.6V, C=4.5V ~ 5.5V}
hh: working clock in MHz {25, 40}
k: package type postfix {as below table}

Postfix	Package	Pin/Pad Configuration	Dimension
P	40L PDIP	page 2	page15
J	44L PLCC	page 2	page16
Q	44L QFP	page 2	page17

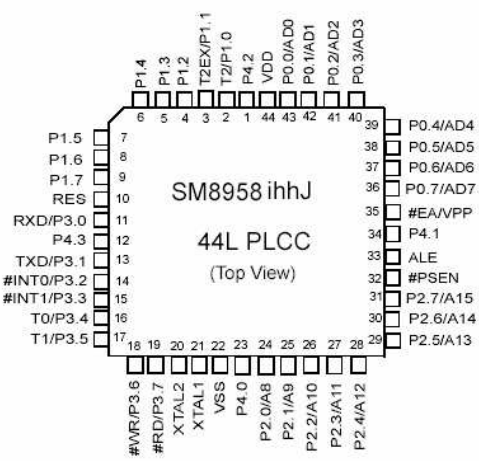
Features

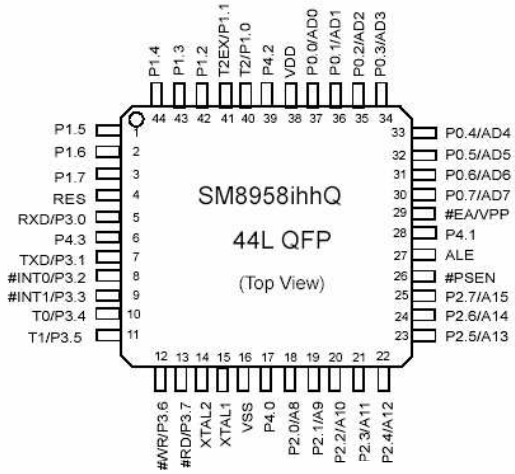
- Working voltage: 3.0V ~ 3.6V For L Version
  4.5V ~ 5.5V For C Version
- General 8052 family compatible
- 12 clocks per machine cycle
- 32 KB internal flash memory
- 1024 bytes data RAM
- 3 16 bit timers/counters
- Four 8-bit I/O ports for PDIP package
- Four 8-bit I/O ports + one 4-bit I/O ports for PLCC or QFP package
- Full duplex serial channel
- Bit operation instruction
- Page free jumps
- 8-bit unsigned division
- 8-bit unsigned multiply
- BCD arithmetic operations
- Direct addressing
- Indirect addressing
- Nested interrupts
- Two priority level interrupts
- A serial I/O port
- Power save modes:
  Idle mode and power down mode
- Code protection function
- One watch dog timer (WDT)
- Low EMI (inhibit ALE)

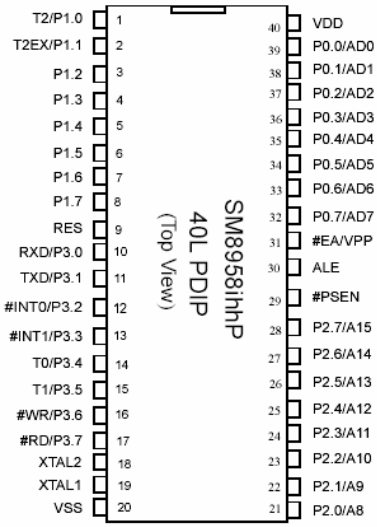
Taiwan
4F, No. 1 Creation Road 1,
Science-based Industrial Park,
Hsinchu, Taiwan 30077

TEL: 886-3-579-2926
886-3-579-2988
FAX: 886-3-579-2960
886-3-578-0493

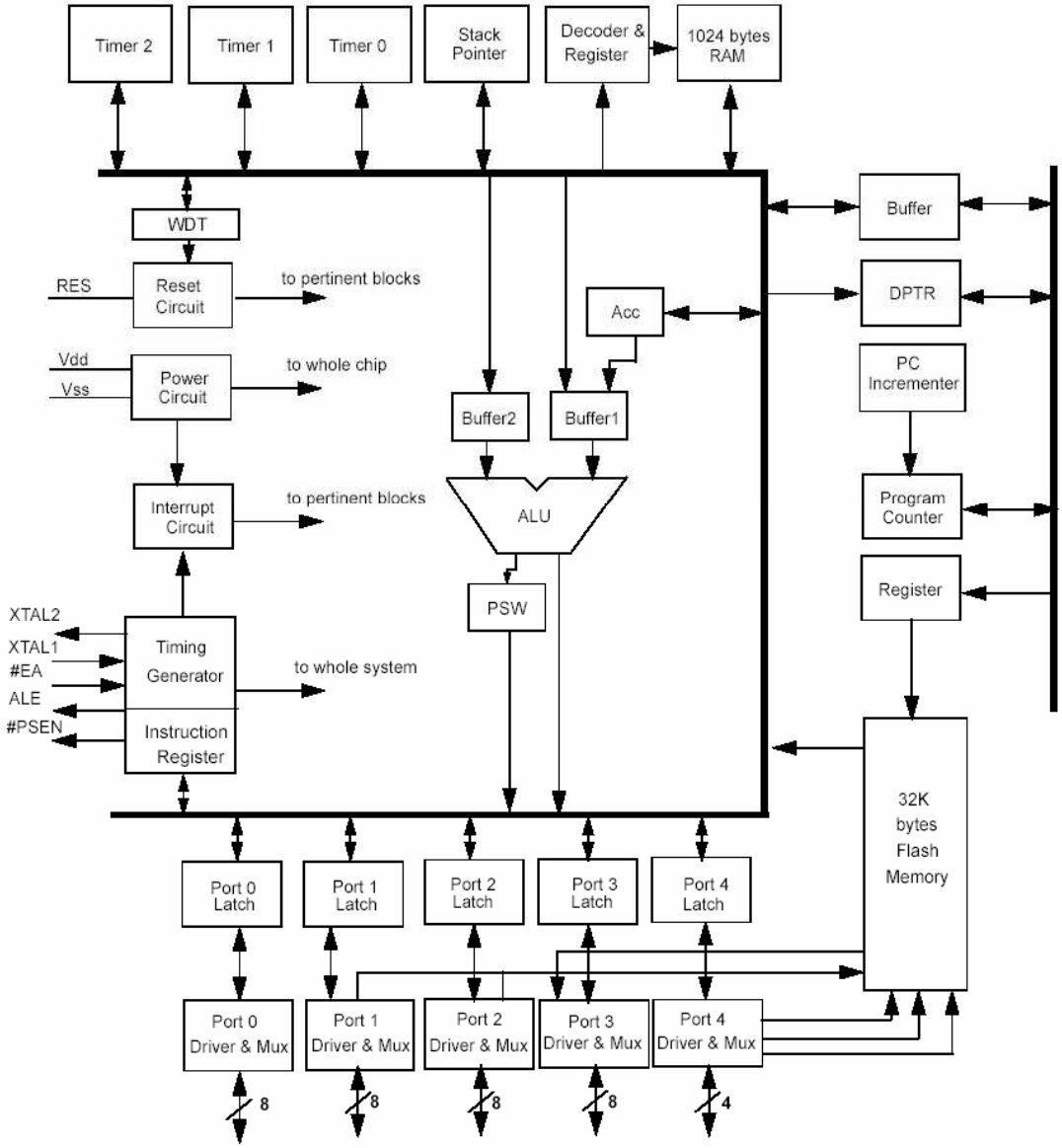
Pin Configurations







Block Diagram



Bridge Transducer ADC

AD7730/AD7730L

KEY FEATURES
Resolution of 230,000 Counts (Peak-to-Peak)
Offset Drift: 5 nV/°C
Gain Drift: 2 ppm/°C
Line Frequency Rejection: >150 dB
Buffered Differential Inputs
Programmable Filter Cutoffs
Specified for Drift Over Time
Operates with Reference Voltages of 1 V to 5 V

ADDITIONAL FEATURES
Two-Channel Programmable Gain Front End
On-Chip DAC for Offset/TARE Removal
***FAST*Step™ Mode**
AC or DC Excitation
Single Supply Operation

APPLICATIONS
Weigh Scales
Pressure Measurement

GENERAL DESCRIPTION

The AD7730 is a complete analog front end for weigh-scale and pressure measurement applications. The device accepts low-level signals directly from a transducer and outputs a serial digital word. The input signal is applied to a proprietary programmable gain front end based around an analog modulator. The modulator output is processed by a low pass programmable digital filter, allowing adjustment of filter cutoff, output rate and settling time.

The part features two buffered differential programmable gain analog inputs as well as a differential reference input. The part operates from a single +5 V supply. It accepts four unipolar analog input ranges: 0 mV to +10 mV, +20 mV, +40 mV and +80 mV and four bipolar ranges: ±10 mV, ±20 mV, ±40 mV and ±80 mV. The peak-to-peak resolution achievable directly from the part is 1 in 230,000 counts. An on-chip 6-bit DAC allows the removal of TARE voltages. Clock signals for synchronizing ac excitation of the bridge are also provided.

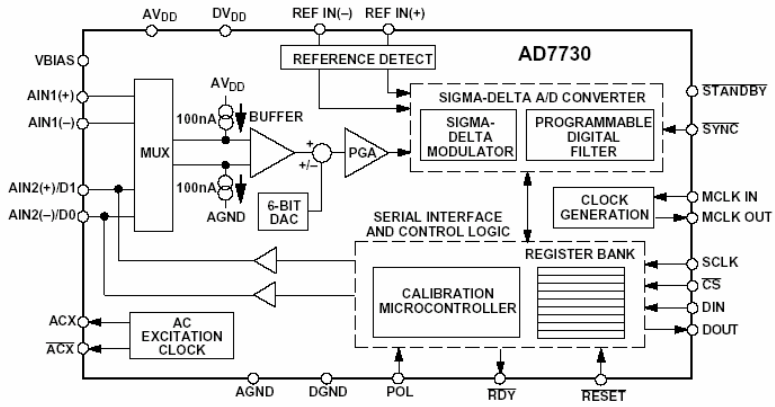
The serial interface on the part can be configured for three-wire operation and is compatible with microcontrollers and digital signal processors. The AD7730 contains self-calibration and system calibration options, and features an offset drift of less than 5 nV/°C and a gain drift of less than 2 ppm/°C.

The AD7730 is available in a 24-pin plastic DIP, a 24-lead SOIC and 24-lead TSSOP package. The AD7730L is available in a 24-lead SOIC and 24-lead TSSOP package.

NOTE

The description of the functions and operation given in this data sheet apply to both the AD7730 and AD7730L. Specifications and performance parameters differ for the parts. Specifications for the AD7730L are outlined in Appendix A.

FUNCTIONAL BLOCK DIAGRAM



*FAST*Step is a trademark of Analog Devices, Inc.

REV. A

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781/329-4700 World Wide Web Site: http://www.analog.com
Fax: 781/326-8703

AD7730–SPECIFICATIONS

(AV_{DD} = +5 V, DV_{DD} = +3 V or +5 V; REF IN(+) = AV_{DD}; REF IN(–) = AGND = DGND = 0 V; $f_{CLK\ IN}$ = 4.9152 MHz. All specifications T_{MIN} to T_{MAX} unless otherwise noted.)

Parameter	B Version[1]	Units	Conditions/Comments
STATIC PERFORMANCE (CHP = 1)			
No Missing Codes[2]	24	Bits min	
Output Noise and Update Rates[2]	See Tables I & II		
Integral Nonlinearity	18	ppm of FSR max	
Offset Error[2]	See Note 3		Offset Error and Offset Drift Refer to Both
Offset Drift vs. Temperature[2]	5	nV/°C typ	Unipolar Offset and Bipolar Zero Errors
Offset Drift vs. Time[4]	25	nV/1000 Hours typ	
Positive Full-Scale Error[2, 5]	See Note 3		
Positive Full-Scale Drift vs Temp[2, 6, 7]	2	ppm of FS/°C max	
Positive Full-Scale Drift vs Time[4]	10	ppm of FS/1000 Hours typ	
Gain Error[2, 8]	See Note 3		
Gain Drift vs. Temperature[2, 6, 9]	2	ppm/°C max	
Gain Drift vs. Time[4]	10	ppm/1000 Hours typ	
Bipolar Negative Full-Scale Error[2]	See Note 3		
Negative Full-Scale Drift vs. Temp[2, 6]	2	ppm of FS/°C max	
Power Supply Rejection	120	dB typ	Measured with Zero Differential Voltage
Common-Mode Rejection (CMR)	120	dB min	At DC. Measured with Zero Differential Voltage
Analog Input DC Bias Current[2]	50	nA max	
Analog Input DC Bias Current Drift[2]	100	pA/°C typ	
Analog Input DC Offset Current[2]	10	nA max	
Analog Input DC Offset Current Drift[2]	50	pA/°C typ	
STATIC PERFORMANCE (CHP = 0)[2]			
No Missing Codes	24	Bits min	SKIP = 0[10]
Output Noise and Update Rates	See Tables III & IV		
Integral Nonlinearity	18	ppm of FSR max	
Offset Error	See Note 3		Offset Error and Offset Drift Refer to Both
Offset Drift vs. Temperature[6]	0.5	µV/°C typ	Unipolar Offset and Bipolar Zero Errors
Offset Drift vs. Time[4]	2.5	µV/1000 Hours typ	
Positive Full-Scale Error[5]	See Note 3		
Positive Full-Scale Drift vs. Temp[6, 7]	0.6	µV/°C typ	
Positive Full-Scale Drift vs. Time[4]	3	µV/1000 Hours typ	
Gain Error[8]	See Note 3		
Gain Drift vs. Temperature[6, 9]	2	ppm/°C typ	
Gain Drift vs. Time[4]	10	ppm/1000 Hours typ	
Bipolar Negative Full-Scale Error	See Note 3		
Negative Full-Scale Drift vs. Temp	0.6	µV/°C typ	
Power Supply Rejection	90	dB typ	Measured with Zero Differential Voltage
Common-Mode Rejection (CMR) on AIN	100	dB typ	At DC. Measured with Zero Differential Voltage
CMR on REF IN	120	dB typ	At DC. Measured with Zero Differential Voltage
Analog Input DC Bias Current	60	nA max	
Analog Input DC Bias Current Drift	150	pA/°C typ	
Analog Input DC Offset Current	30	nA max	
Analog Input DC Offset Current Drift	100	pA/°C typ	
ANALOG INPUTS/REFERENCE INPUTS			
Normal-Mode 50 Hz Rejection[2]	88	dB min	From 49 Hz to 51 Hz
Normal-Mode 60 Hz Rejection[2]	88	dB min	From 59 Hz to 61 Hz
Common-Mode 50 Hz Rejection[2]	120	dB min	From 49 Hz to 51 Hz
Common-Mode 60 Hz Rejection[2]	120	dB min	From 59 Hz to 61 Hz
Analog Inputs			
Differential Input Voltage Ranges[11]			Assuming 2.5 V or 5 V Reference with HIREF Bit Set Appropriately
	0 to +10 or ±10	mV nom	Gain = 250
	0 to +20 or ±20	mV nom	Gain = 125
	0 to +40 or ±40	mV nom	Gain = 62.5
	0 to +80 or ±80	mV nom	Gain = 31.25
Absolute/Common-Mode Voltage[12]	AGND + 1.2 V	V min	
	AV_{DD} – 0.95 V	V max	
Reference Input			
REF IN(+) – REF IN(–) Voltage	+2.5	V nom	HIREF Bit of Mode Register = 0
REF IN(+) – REF IN(–) Voltage	+5	V nom	HIREF Bit of Mode Register = 1
Absolute/Common-Mode Voltage[13]	AGND – 30 mV	V min	
	AV_{DD} + 30 mV	V max	
NO REF Trigger Voltage	0.3	V min	NO REF Bit Active If V_{REF} Below This Voltage
	0.65	V max	NO REF Bit Inactive If V_{REF} Above This Voltage

Parameter	B Version[1]	Units	Conditions/Comments
LOGIC INPUTS			
Input Current	±10	µA max	
All Inputs Except SCLK and MCLK IN			
V_{INL}, Input Low Voltage	0.8	V max	DV_{DD} = +5 V
V_{INL}, Input Low Voltage	0.4	V max	DV_{DD} = +3 V
V_{INH}, Input High Voltage	2.0	V min	
SCLK Only (Schmitt Triggered Input)			
V_{T+}	1.4/3	V min to V max	DV_{DD} = +5 V
V_{T+}	1/2.5	V min to V max	DV_{DD} = +3 V
V_{T-}	0.8/1.4	V min to V max	DV_{DD} = +5 V
V_{T-}	0.4/1.1	V min to V max	DV_{DD} = +3 V
$V_{T+} - V_{T-}$	0.4/0.8	V min to V max	DV_{DD} = +5 V
$V_{T+} - V_{T-}$	0.4/0.8	V min to V max	DV_{DD} = +3 V
MCLK IN Only			
V_{INL}, Input Low Voltage	0.8	V max	DV_{DD} = +5 V
V_{INL}, Input Low Voltage	0.4	V max	DV_{DD} = +3 V
V_{INH}, Input High Voltage	3.5	V min	DV_{DD} = +5 V
V_{INH}, Input High Voltage	2.5	V min	DV_{DD} = +3 V
LOGIC OUTPUTS (Including MCLK OUT)			
V_{OL}, Output Low Voltage	0.4	V max	I_{SINK} = 800 µA Except for MCLK OUT[14]; V_{DD}[15] = +5 V
V_{OL}, Output Low Voltage	0.4	V max	I_{SINK} = 100 µA Except for MCLK OUT[14]; V_{DD}[15] = +3 V
V_{OH}, Output High Voltage	4.0	V min	I_{SOURCE} = 200 µA Except for MCLK OUT[14]; V_{DD}[15] = +5 V
V_{OH}, Output High Voltage	V_{DD} – 0.6 V	V min	I_{SOURCE} = 100 µA Except for MCLK OUT[14]; V_{DD}[15] = +3 V
Floating State Leakage Current	±10	µA max	
Floating State Output Capacitance[2]	6	pF typ	
TRANSDUCER BURNOUT			
AIN1(+) Current	–100	nA nom	
AIN1(–) Current	100	nA nom	
Initial Tolerance @ 25°C	±10	% typ	
Drift[2]	0.1	%/°C typ	
OFFSET (TARE) DAC			
Resolution	6	Bit	
LSB Size	2.3/2.6	mV min/mV max	2.5 mV Nominal with 5 V Reference (REF IN/2000)
DAC Drift[16]	2.5	ppm/°C max	
DAC Drift vs. Time[4, 16]	25	ppm/1000 Hours typ	
Differential Linearity	–0.25/+0.75	LSB max	Guaranteed Monotonic
SYSTEM CALIBRATION			
Positive Full-Scale Calibration Limit[17]	1.05 × FS	V max	FS Is the Nominal Full-Scale Voltage (10 mV, 20 mV, 40 mV or 80 mV)
Negative Full-Scale Calibration Limit[17]	–1.05 × FS	V max	
Offset Calibration Limit[18]	–1.05 × FS	V max	
Input Span[17]	0.8 × FS	V min	
	2.1 × FS	V max	
POWER REQUIREMENTS			
Power Supply Voltages			
AV_{DD} – AGND Voltage	+4.75 to +5.25	V min to V max	
DV_{DD} Voltage	+2.7 to +5.25	V min to V max	With AGND = 0 V
Power Supply Currents			External MCLK. Digital I/Ps = 0 V or DV_{DD}
AV_{DD} Current (Normal Mode)	10.3	mA max	All Input Ranges Except 0 mV to +10 mV and ±10 mV
AV_{DD} Current (Normal Mode)	22.3	mA max	Input Ranges of 0 mV to +10 mV and ±10 mV Only
DV_{DD} Current (Normal Mode)	1.3	mA max	DV_{DD} of 2.7 V to 3.3 V
DV_{DD} Current (Normal Mode)	2.7	mA max	DV_{DD} of 4.75 V to 5.25 V
AV_{DD} + DV_{DD} Current (Standby Mode)	25	µA max	Typically 10 µA. External MCLK IN = 0 V or DV_{DD}
Power Dissipation			AV_{DD} = DV_{DD} = +5 V. Digital I/Ps = 0 V or DV_{DD}
Normal Mode	65	mW max	All Input Ranges Except 0 mV to +10 mV and ±10 mV
	125	mW max	Input Ranges of 0 mV to +10 mV and ±10 mV Only
Standby Mode	125	µW max	Typically 50 µW. External MCLK IN = 0 V or DV_{DD}

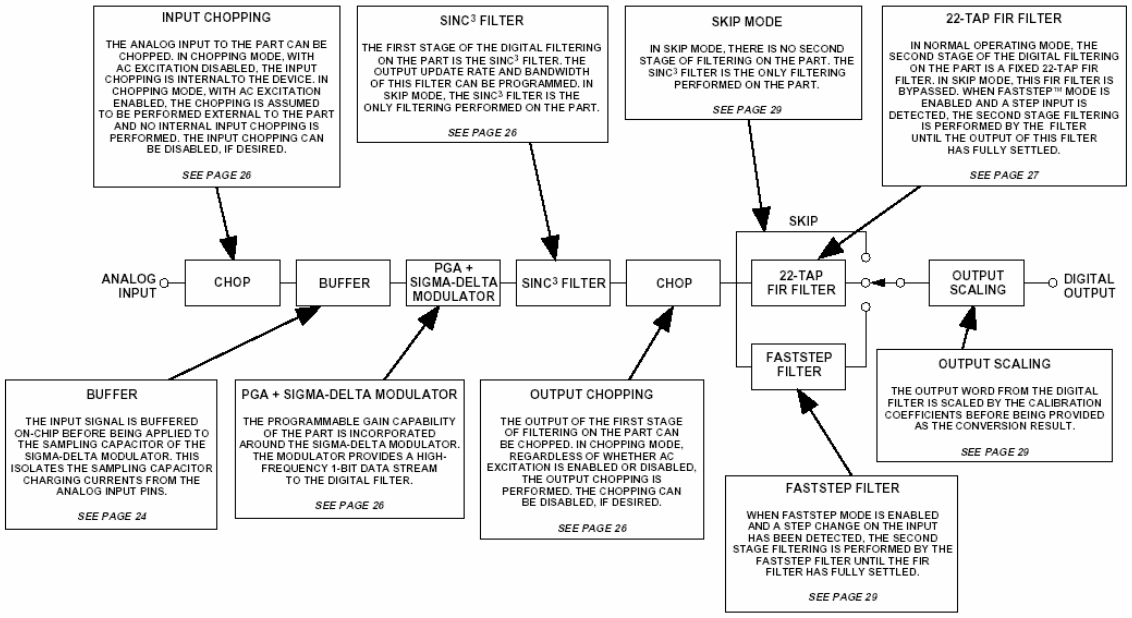
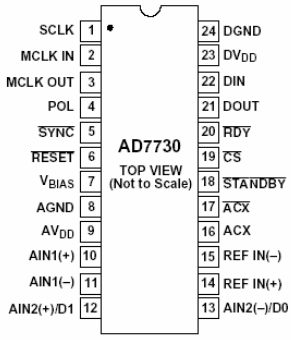


Figure 3. Signal Processing Chain

PIN CONFIGURATION



PIN FUNCTION DESCRIPTIONS

Pin No.	Mnemonic	Function
1	SCLK	Serial Clock. Schmitt-Triggered Logic Input. An external serial clock is applied to this input to transfer serial data to or from the AD7730. This serial clock can be a continuous clock with all data transmitted in a continuous train of pulses. Alternatively, it can be a noncontinuous clock with the information being transmitted to or from the AD7730 in smaller batches of data.
2	MCLK IN	Master Clock signal for the device. This can be provided in the form of a crystal/resonator or external clock. A crystal/resonator can be tied across the MCLK IN and MCLK OUT pins. Alternatively, the MCLK IN pin can be driven with a CMOS-compatible clock and MCLK OUT left unconnected. The AD7730 is specified with a clock input frequency of 4.9152 MHz while the AD7730L is specified with a clock input frequency of 2.4576 MHz.

1 FEATURES

- Single-chip LCD controller/driver
- Selectable backplane drive configuration: static or 2/3/4 backplane multiplexing
- Selectable display bias configuration: static, ½ or ⅓
- Internal LCD bias generation with voltage-follower buffers
- 40 segment drives: up to twenty 8-segment numeric characters; up to ten 15-segment alphanumeric characters; or any graphics of up to 160 elements
- 40 × 4-bit RAM for display data storage
- Auto-incremented display data loading across device subaddress boundaries
- Display memory bank switching in static and duplex drive modes
- Versatile blinking modes
- LCD and logic supplies may be separated
- Wide power supply range: from 2 V for low-threshold LCDs and up to 9 V for guest-host LCDs and high-threshold (automobile) twisted nematic LCDs
- Low power consumption
- Power-saving mode for extremely low power consumption in battery-operated and telephone applications
- I²C-bus interface
- TTL/CMOS compatible
- Compatible with any 4-bit, 8-bit or 16-bit microprocessors/microcontrollers
- May be cascaded for large LCD applications (up to 2560 segments possible)
- Cascadable with 24-segment LCD driver PCF8566
- Optimized pinning for plane wiring in both single and multiple PCF8576 applications
- Space-saving 56-lead plastic very small outline package (VSO56)
- Very low external component count (at most one resistor, even in multiple device applications)
- Compatible with chip-on-glass technology
- Manufactured in silicon gate CMOS process.

2 GENERAL DESCRIPTION

The PCF8576 is a peripheral device which interfaces to almost any Liquid Crystal Display (LCD) with low multiplex rates. It generates the drive signals for any static or multiplexed LCD containing up to four backplanes and up to 40 segments and can easily be cascaded for larger LCD applications. The PCF8576 is compatible with most microprocessors/microcontrollers and communicates via a two-line bidirectional I²C-bus. Communication overheads are minimized by a display RAM with auto-incremented addressing, by hardware subaddressing and by display memory switching (static and duplex drive modes).

3 ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PCF8576T	VSO56	plastic very small outline package; 56 leads	SOT190-1
PCF8576U	–	chip in tray	–
PCF8576U/2	–	chip with bumps in tray	–
PCF8576U/5	–	unsawn wafer	–
PCF8576U/10	FFC	chip on film frame carrier (FFC)	–
PCF8576U/12	FFC	chip with bumps on film frame carrier (FFC)	–