

MAINTENANCE MANUAL

W20 INDICATOR SERIES

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Jan 2005 REV 1

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.

Built-in Pass Word configuration to prevent un-authorized settings or alternations.

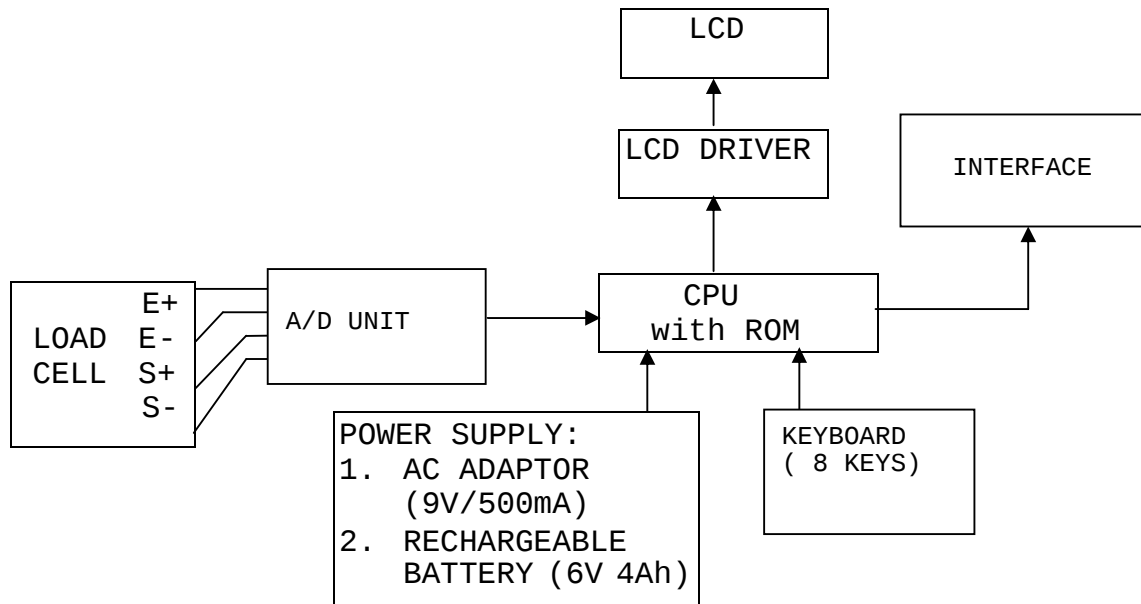
After servicing, it is necessary to go through all tests and procedures to ensure the scale meets all the meteorological and approval requirements.

Here are some features of the W20 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. 5 1/2 x 25mm wide angle LCD digits
8. Dual power: - By built-in rechargeable battery and external AC/DC power adaptor
9. Low battery warning signal
10. Dual color charge status indicator
11. Full digital Calibration
12. AC/DC power adaptor, Desk-top stand and dust cover included
13. Pass word configuration / parameter setting protection
14. User Programmable display resolution(up to 1/30000)
15. Built-in EL backlight
16. Equipped with RS232 interface
17. Optional printer & external display(OP5) interface

2. SPECIFICATION

2.1 SYSTEM BLOCK DIAGRAM



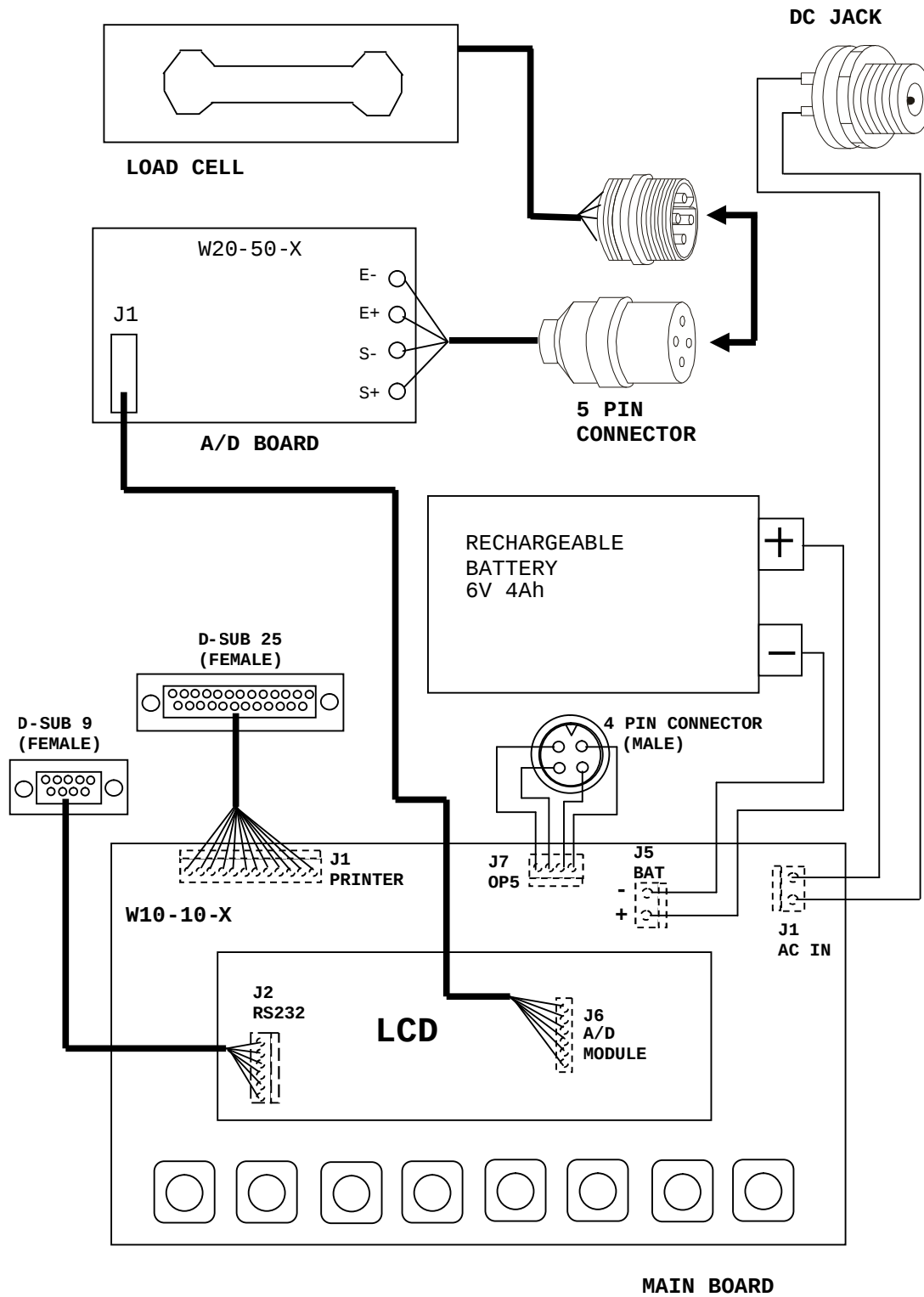
Description:

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 change and the analog output signal varies.

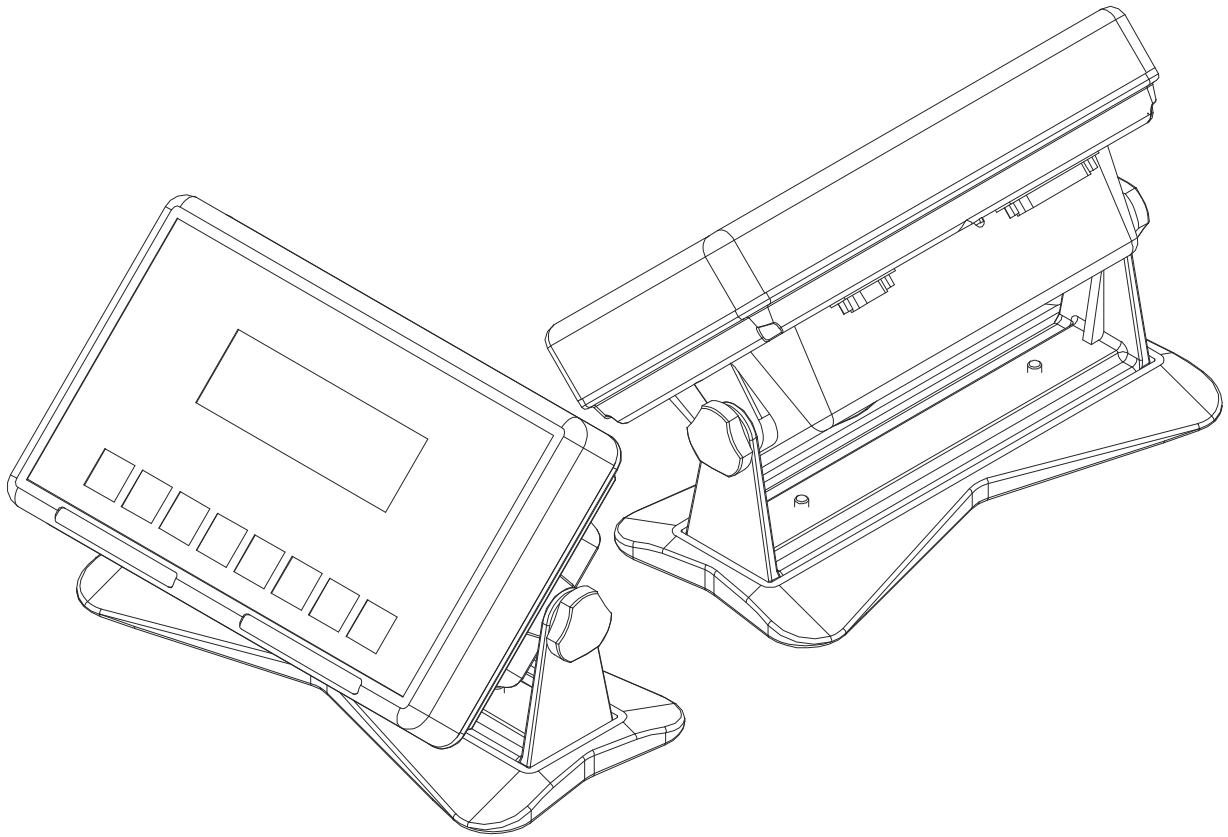
It is amplified and digitized continuously by the A/D converter into a digital signal. Subsequently, the resulting count is processed and managed by the CPU. The CPU refers to the instructions from the keyboard, and then conveys the output data to LCD driver, which formats the data into readout on the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

2.2 PHYSICAL LAYOUT OF ELECTRICAL CONNECTION



2.3 GENERAL SPECIFICATIONS

2.3.1 Overall View



2.3.2 Overall Dimension:

250(W) X 180(D) X 170(H)mm Max.

2.3.3 Technical Specifications

PERFORMANCE	
Display	5 ¹ / ₂ digit LCD , 50 m/m height
Display resolution	up to 30,000 divisions , minimum of 0.1μ V / div.
Count-by	1 , 2 , 5 , 10 , 20 , 50
Display speed	25 times / second
Zero adjustment	- 2mV to 20mV
Span adjustment	0.6 mV/V to 4mV/V full scale
Stability / Drift	Zero < 0.3μ V / °C Span < 8ppm / °C Linearity < 0.0033% R.O. Noise < 0.05μ Vp-p
Operating environment	Temperature 0°C ~ 40°C (32°F ~ 104°F) Humidity < 90 % non condensing
A/D CONVERTER	
Type	24 bit Sigma - Delta
Resolution	Up to 1,000,000 internal counts
Conversion rate	50 times/second
LOAD CELL	
Excitation	5 volts for up to 8 × 350Ω load cell
Load cell connection	4 Wires (E ⁺ , E ⁻ , S ⁺ , S ⁻)
INTERFACE	
RS-232C	Baud rate , transmission mode selectable
Printer	Centronics type
OP-05	External display
POWER SUPPLY	
AC Adaptor	9V / 500 mA
Rechargeable battery	6V , 4Ah
Power Consumption	Normal = 0.1W Charging = 5W

2.3.4 Main Components Used

Microprocessors: 89C52

Crystal Oscillator: 6MHz

Display Device: WTN Liquid Crystal Display

A/D converter : AD7730

LCD driver IC : uPD7225

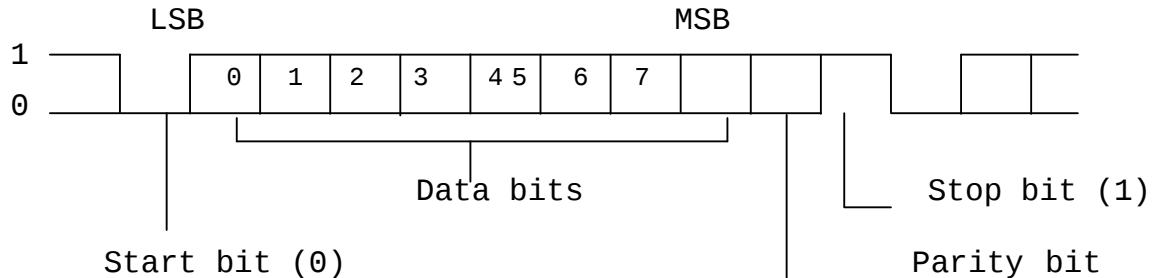
2.4 OPTIONAL INTERFACE

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

PIN ASSIGNMENT

PIN NUMBER	ASSIGNMENT
1	DCD
2	TXD
3	RXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS

Short-circuited
internally



Type : EIA-RS-232C

Method : Half-duplex, asynchronous transmission

Format :

Baud rate : 300, 600, 1200, 2400, 4800, 9600 or 19200

Data bit : 7 or 8

Parity bit : Even or None

Stop bit : 1

Code : ASCII

Transmission mode :

1. KPC(KEYBOARD PRINT CONTROL)

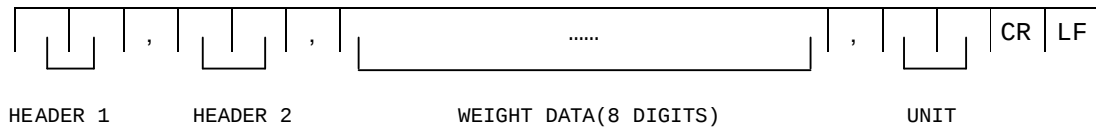
2. AUTO(AUTO PRINT PER WEIGHING EVENT, RESET BY RETURN TO ZERO BAND,<100 div.)
 3. SM(STREAM MODE, CONTINUOUS TRANSMISSION)
 4. CMD(COMMAND MODE)
- (REFER TO 3.1.1 Setting Basic Parameters)**

Command Mode Transmission : (READ)(CR)(LF)----ASCII CODE

PC →

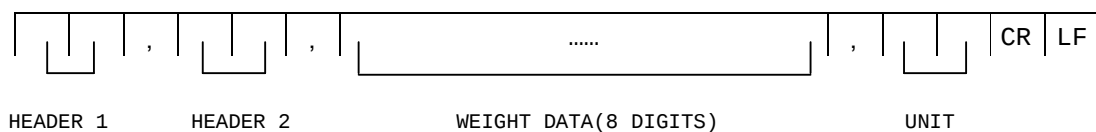
R	E	A	D	CR	LF
52H	45H	41H	44H	0DH	0AH

Indicator →

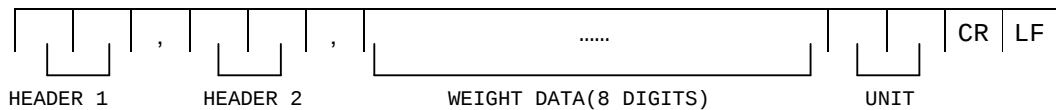


Data Format :

Format1



Format2



HEADER 1	HEADER 2	Unit
OL : Overload	NT : Net weight	kg , lb , g , t
ST : Stable	GS : Gross weight	
US : Unstable		

2.4.2 Parallel Printer Interface (D-SUB 25 pin)

PIN ASSIGNMENT

PIN NUMBER	ASSIGNMENT
1	STROBE
2	D0
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
11	BUSY
25	GND

2.4.3 External Display Interface (Circular connector 4 pin)

PIN ASSIGNMENT

PIN NUMBER	ASSIGNMENT
1	+5V
2	DATA
3	CLOCK
4	GND

2.4.4 Backlight Interface

Operation procedures :

1. After power on, select backlight function by pressing and hold **ZERO**.

B1.on1 → The backlight will be turned off when constant/zero weight is detected and remains stable for about 20/4 seconds. Backlight will be automatically turned on again when a different weight is detected

B1.on2 → The backlight will be always turned on.

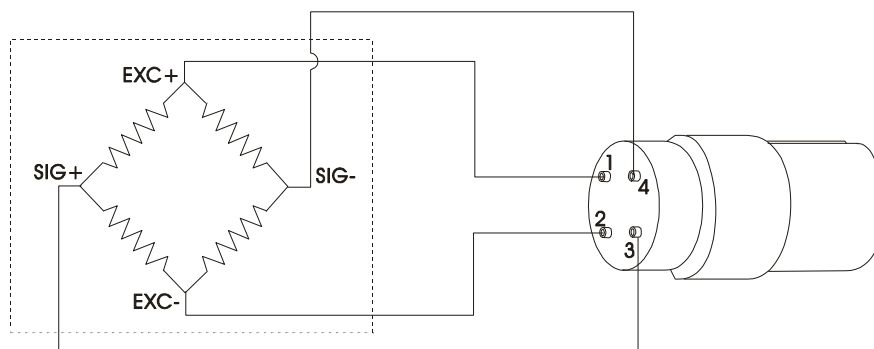
B1.off → The backlight will be always turned off.

2. When the desired setting appears, release **ZERO** key.
3. The backlight function will be employed right away.

2.5 LOAD CELL CONNECTION (Circular connector 4 pin)

PIN ASSIGNMENT

PIN NUMBER	ASSIGNMENT
1	EXC+
2	EXC-
3	SIG+
4	SIG-

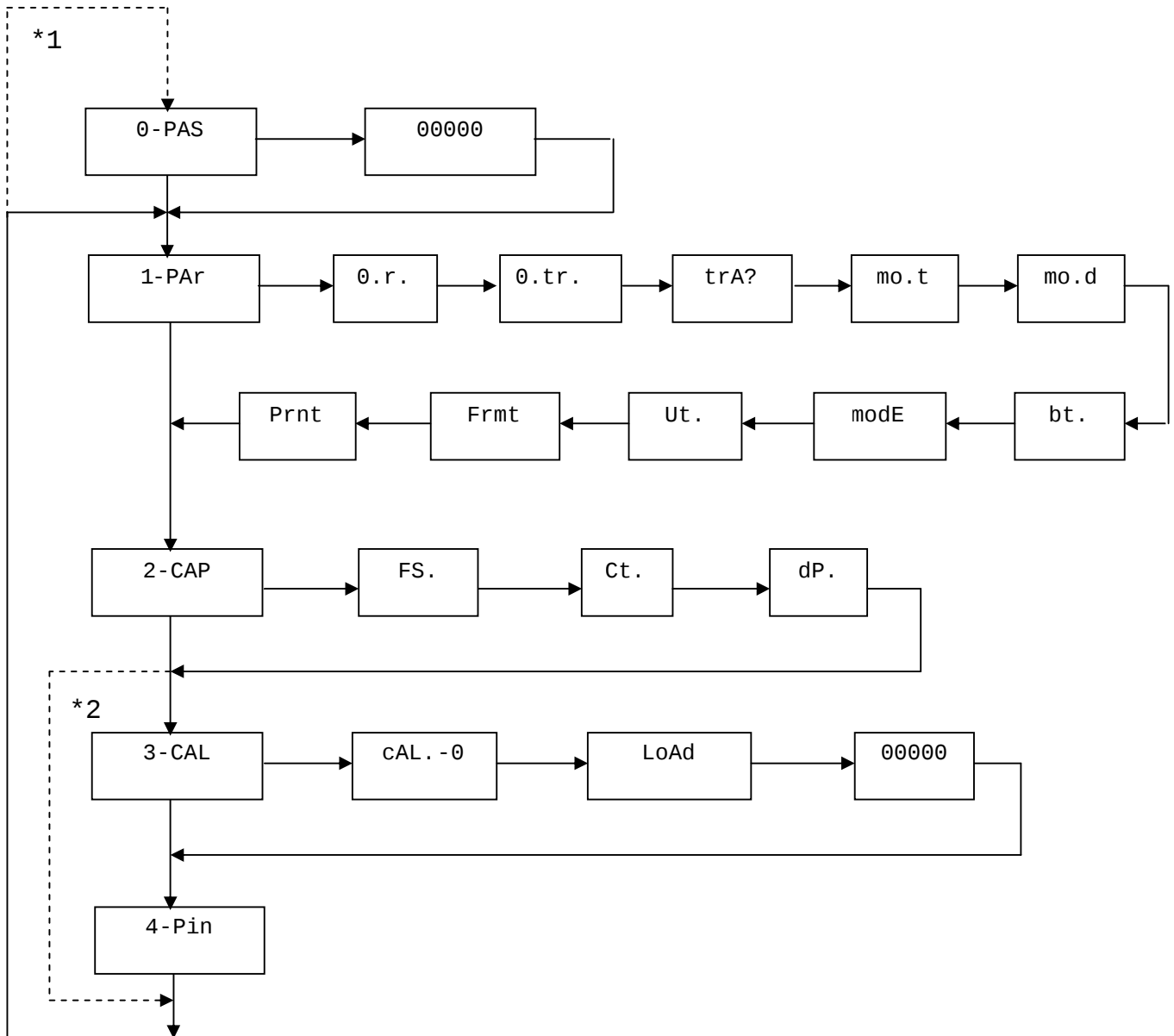


Pin 5 is ground.

3. INITIAL SETUP

3.1 INTERNAL FUNCTIONS AND SETTING METHODS

INTERNAL FUNCTION FLOW CHART



NOTE :

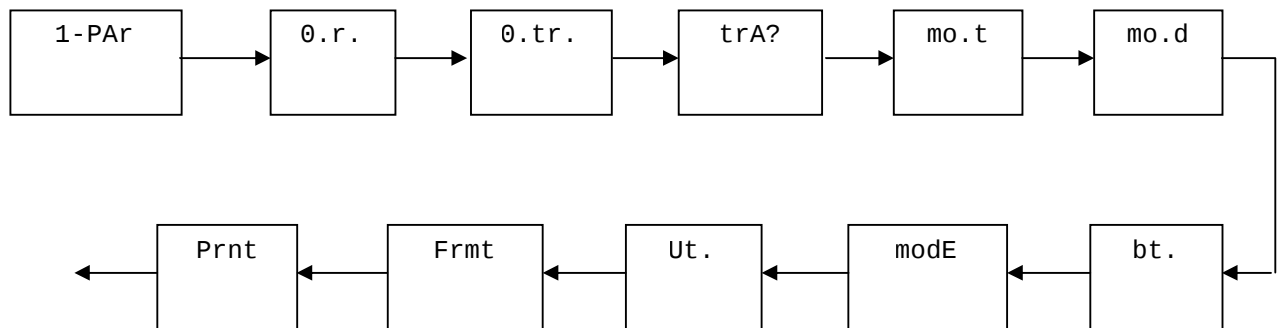
- * 1. When password function disable, this selection will not appear.
- * 2. If indicator is protected by password, enter correct password in order to access menu 3 & 4.

HOW TO ENTER THE REQUIRED FUNCTION AND PARAMETER SETTING

- Turn indicator off.
- Power on indicator.
- Press **M+(SET)** while 'W10' symbol appears.
- Indicator displays internal A/D counts.
- Press **M+(SET)** again.
- Select desired menu to access by Pressing **ZERO**.
- Enter Sub-menu by Pressing **M+(SET)**.
- Quit the function setting by pressing **MC(ESC)**.

3.1.1 Setting Basic Parameters

【SET】



SYMBOL/DEFINITION	SETTINGS
0.r. (ZERO RANGE)	0 = 0% OF RATED CAPACITY
	2 = 2% OF RATED CAPACITY
	4 = 4% OF RATED CAPACITY
	10 = 10% OF RATED CAPACITY (DEFAULT)
	20 = 20% OF RATED CAPACITY
	100 = 100% OF RATED CAPACITY
0.tr. (AUTO ZERO TRACKING RANGE) i.e. 0.tr.n.m division = n x 0.5d time interval = m x 0.5s	0.0 = DISABLE
	3.2 = 1.5 DIV./1 SEC. (DEFAULT)
	5.4 = 2.5 DIV./2 SEC.

	9.9 = 4.5 DIV./4.5 SEC.
trA? (ZERO TRACKING ANYWHERE)	0 = DISABLE
	1 = ENABLE (DEFAULT)

SYMBOL/DEFINITION	SETTINGS
mo.t (MOTION TRACKING TIME INTERVAL)	0.1 = 0.1 SECOND
	0.2 = 0.2 SECOND
	0.3 = 0.3 SECOND
	- - -
	1.0 = 1 SECOND (DEFAULT)
	- - -
	9.7 = 9.7 SECOND
	9.8 = 9.8 SECOND
	9.9 = 9.9 SECOND (MAXIMUM)
mo.d (MOTION DETECTION DIVISION RANGE)	0.1 = 0.1 DIVISION
	0.2 = 0.2 DIVISION
	0.3 = 0.3 DIVISION
	- - -
	2.0 = 2.0 DIVISION (DEFAULT)
	- - -
	9.7 = 9.7 DIVISION
	9.8 = 9.8 DIVISION
	9.9 = 9.9 DIVISION (MAXIMUM)
bt. (BAUD RATE)	0.3 = 300 BPS
	0.6 = 600 BPS
	1.2 = 1200 BPS
	2.4 = 2400 BPS
	4.8 = 4800 BPS
	9.6 = 9600 BPS (DEFAULT)
	19.2 = 19200 BPS
modE (COMMUNICATION MODE)	0 = KPC (KEYBOARD PRINT CONTROL, WEIGHT DATA WILL BE SENT BY PRESSING PRINT KEY)
	1 = AUTO (AUTO PRINT WHEN CONSTANT WEIGHT IS DETECTED PER WEIGHING EVENT)
	2 = CMD (COMMAND RESPONSE MODE, INITIATE DATA TRANSMISSION BY GIVING A COMPUTER COMMAND)
	3 = SM (STREAM MODE, CONTINUOUS TRANSMISSION) (DEFAULT)
Ut. (WEIGHT UNIT)	lb = POUND
	t = METRIC TONNE (BLANK SPACE)
	g = GRAM
	kg = KILOGRAM (DEFAULT)

SYMBOL/DEFINITION	SETTINGS
Frmt (RS-232 FORMAT)	1 = E,7,1 , FORMAT 1
	2 = E,7,1 , FORMAT 2
	8 = N,8,1 , FORMAT 1
	9 = N,8,1 , FORMAT 2
Prnt ¹ (PRINTER CONTROL)	0 = PRINT KEY HAS NO FUNCTION, M+ KEY CAN PRINT. PRESS MC TO PRINT ACCUMULATED VALUE AND CLEAR IT FROM MEMORY AT THE SAME TIME.
	1 = PRINT KEY HAS FUNCTION, M+ KEY DOES NOT PRINT. P.S.EACH WEIGHING CAN PRINT ONCE, THE WEIGHT SHOULD BE RETURN TO ZERO THEN WEIGH AGAIN TO ATTAIN NEXT PRINT .

¹ Prnt = 0

Press M+, weighing data is printed out as below

					,			CR	LF
SERIAL NO.	SPACE			WEIGHT DATA(8 DIGITS)				UNIT	

Press MC, Accumulated value is printed out

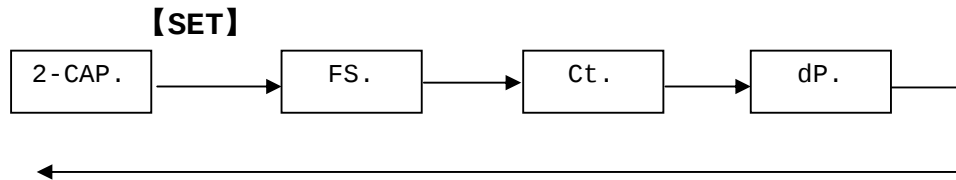
					,			CR	LF
COUNT OF ACCUM.	SPACE			WEIGHT DATA(8 DIGITS)				UNIT	

Prnt = 1

Press PRINT, weighing data is printed out as below

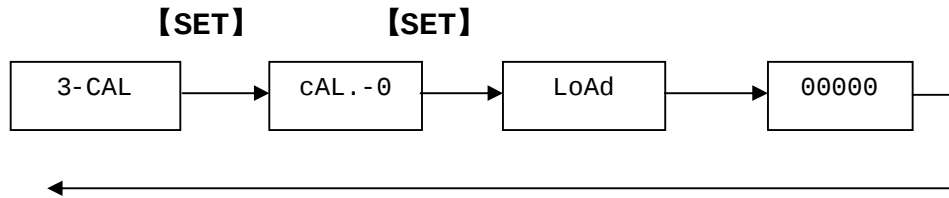
		,								CR	LF
HEADER 1			HEADER 2			WEIGHT DATA(8 DIGITS)				UNIT	

3.1.2 Setting Capacity And Division



SYMBOL/DEFINITION	SETTINGS
FS. (FULL SCALE RANGE)	USER PROGRAMMABLE DISPLAY RESOLUTION, MIN. DIV./FULL CAPACITY $\geq 1/30000$ INCREASE/DECREASE/MOVE CURSER LEFT/MOVE CURSER RIGHT BY PRESSING ZERO/TARE/ NET-GROSS/PRINT
Ct. (MINIMUM DIVISION)	DIV. COUNTS BY 1/2/5/10/20/50. → 1 → 2 → 5 → 10 → 20 → 50 → SELECT DIV. BY PRESSING ZERO OR TARE
dP. (POSITION OF DECIMAL POINT)	→ 0 → 0.0 → 0.00 → 0.000 → 0.0000 → SELECT POSITION OF DECIMAL POINT BY PRESSING ZERO OR TARE

3.1.3 Calibration Procedures



STEP	DISPLAY
1. Remove all loads form platform and wait until the MOTION INDICATOR goes off.	3-CAL
2. Press SET .	↓
3. Indicator displays caL.-0	cAL.-0
4. Wait until MOTION INDICATOR goes off.	↓
5. Press SET .	LoAd
6. Indicator displays ... then LoAd	↓
7. Indicator display 00000	00000
8. Place a constant load with known weight value (the heavier the better) onto the platform.	↓
9. Enter the weight of load applied by means of the ZERO , TARE , GROSS/NET and PRINT key.	↓
10.Wait until MOTION INDICATOR goes off.	↓
11.Press SET TO CONFIRM ENTRY.	↓
12.Indicator displays ... and then 4-Pin for PASSWORD SETUP or press ESC to quit and return to normal operation status.	↓
13.If any caution appears, please find paragraph of ERROR CODES AND DESCRIPTION to do further check.	4-Pin

3.1.4 PASSWORD SETUP PROCEDURES

STEP	DISPLAY
1. If calibration procedures is completed, indicator will display 4-Pin .	↓ 4-Pin
2. Press SET .	↓
3. Indicator displays 00000	00000
4. Enter the desired password by means of the ZERO , TARE , GROSS/NET and PRINT key.	↓
5. Password setup is completed and return to Normal operation status.	xxxxx

NOTE :

1. If password is set as **00000**, then it has no access restrictions to any selections. The **0-PAS** selection will not appear on menu.
2. In case password is forgotten, contact your local agent or send unit back to manufacturer for assistance.
3. Under password protection mode (when password is not 00000), enter the password to access to menu 3&4. Otherwise, only menu 0, 1, 2 can be accessed.

3.1.5 ERROR CODES AND DESCRIPTION

ZERO CALIBRATION

ERROR CODE	DESCRIPTION
AAAAA	1. Poor connection ---To check the connector 2. Wrong connection ---To check the Load Cell connector to see if the parity of signal is reversed. 3. The input offset voltage signal is too low. ---To disconnect the power and insert a resistor around 100K~500Kohm between EXC+ and SIG+ terminals of Load Cell connector 4. Load Cells were damaged. ---To replace with new Load Cells.
UUUUU	1. Poor or Wrong connection ---To check the connector 2. The input offset voltage signal is too high(over 30mV) ---The Load Cell capacity is too small or it is even dead. Change new Load Cell with bigger capacity. 3. Load Cells were damaged ---To replace with new Load Cells 4. Thunderstorm damage ---To contact your local agent for assistance

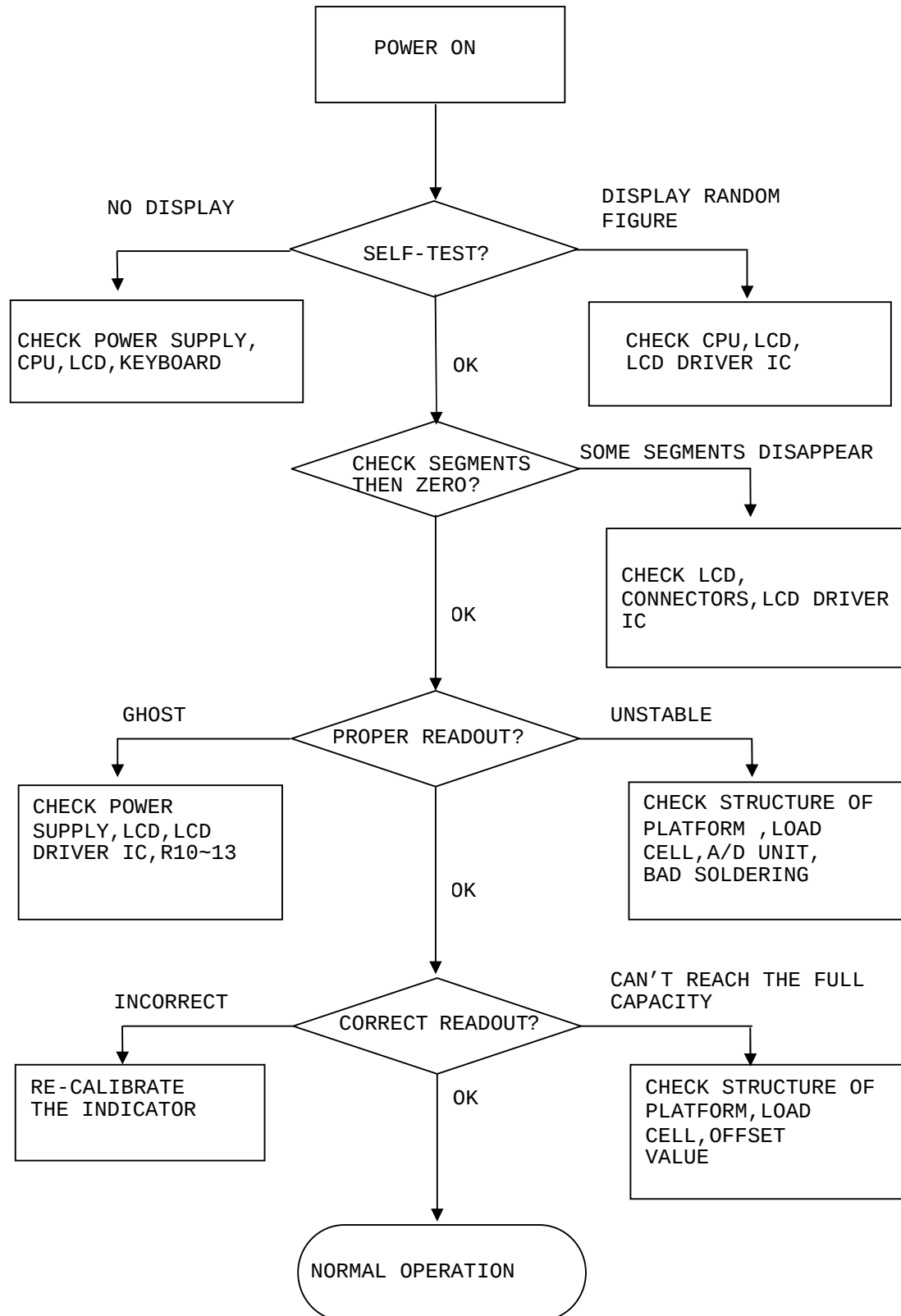
SPAN CALIBRATION

ERROR CODE	DESCRIPTION
LLLLL	The input signal becomes lower. ---Check the Load Cell connector to see if the parity of signal is reversed. ---The platform device has been disturbed.
CCCCC	The value of span is too small. ---Choose the proper value of span not less than 100 div.
-----	The output signal of Load Cell is inadequate for span calibration. ---To decrease the display resolution ---To change Load Cells with higher output signal

UUUUU	1. The input signal is too high(over 30mV) ---Replace new Load Cells with bigger capacity 2. Load Cells were damaged ---To replace with new Load Cells 3. Poor connection ---To check the connector
-------	--

4. TROUBLE SHOOTING

4.1 TROUBLE SHOOTING LOOP



4.2 PARTS AND COMPONENTS TROUBLE SHOOTING

4.2.1 Power Supply Checking

4.2.1.1 Relevant parts:

Main Board (W10-10-X)

Q8 (C1061T)

ZD1 (8.2V)

BR1 (W04/1A)

Q4 (A1515)

Q6 (C945)

R26 (1.2 ohm, 1/2W)

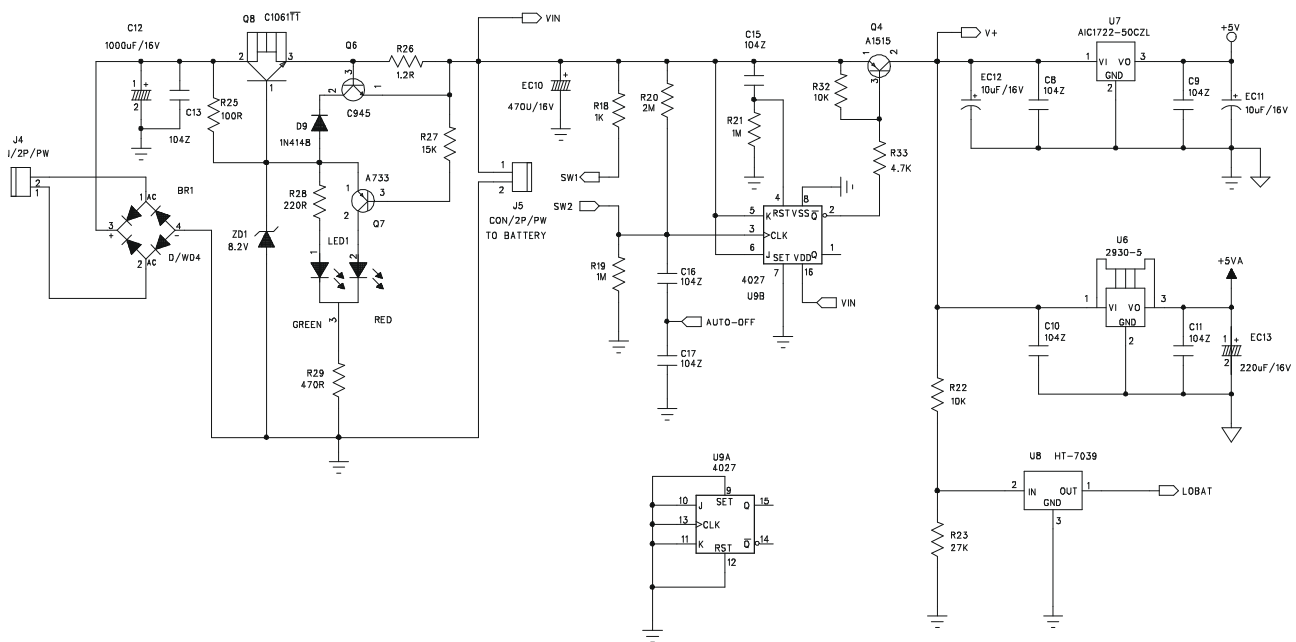
U9 (IC 4027)

U8 (HT-7039)

U7(AIC 1722-50)

U6(2930-5V)

DC JACK(SCD-021)



Description:

- 1) AC Adaptor: This AC Adaptor provides power for DC9~12V,500mA
- 2) Battery: Built-in Rechargeable Battery 6V/4Ah

- 3) How Battery is charged completely?
 The charging voltage is regulated by Q8 (C1061) and ZD1 (8.2V) for about 7 volts.
 The charging current will go down automatically when voltage reached.
 Q6 (C945) and R26 (1.2R, 1/2W) provide Over-Current protection.
- 4) +5VA power drives analog system including A/D converter device (IC 7730).
 U6 (2930-5V) is a 5volts Voltage Regulator.
- 5) +5V power drives digital circuit systems.
 U7 (AIC 1722-50) is a 5volts Voltage Regulator.
- 6) Auto-off:
 If the indicator is under LO-BAT situation, after fixed minutes CPU will launch a low-to-high pulse to trigger the U9(IC 4027), then Q4 cuts off, the indicator will be shut down immediately.
- 7) Low Power Detection:
 The U8 (HT-7039) is designed to detect the power level. When battery voltage is less than 5.5V, it will release a low potential signal to CPU, and then CPU will instruct LCD display to show LO-BAT symbol.

4.2.1.2 Input voltage: 5.5V or higher

Check and recharge battery if voltage less than 5.5V.
 Check DC-JACK or AC Adaptor if been defective.

4.2.1.3 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.

4.2.2 Platform Structure Checking

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

4.2.3 LCD Display Checking

4.2.3.1 Check that it is soldered and connected properly between LCD and driver IC (uPD7225), driver IC (uPD7225) and CPU.

4.2.3.2 Check whether LCD is broken.

4.2.4 CPU Checking

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

4.2.4.2 Check that the Crystal Oscillator works.

4.2.4.3 Check the RESET is normally low.

4.2.5 A/D Unit Checking

4.2.5.1 Check that the +5VA power is correctly fed to the A/D unit.

4.2.5.2 Check that the signal output of loadcell is adequate.

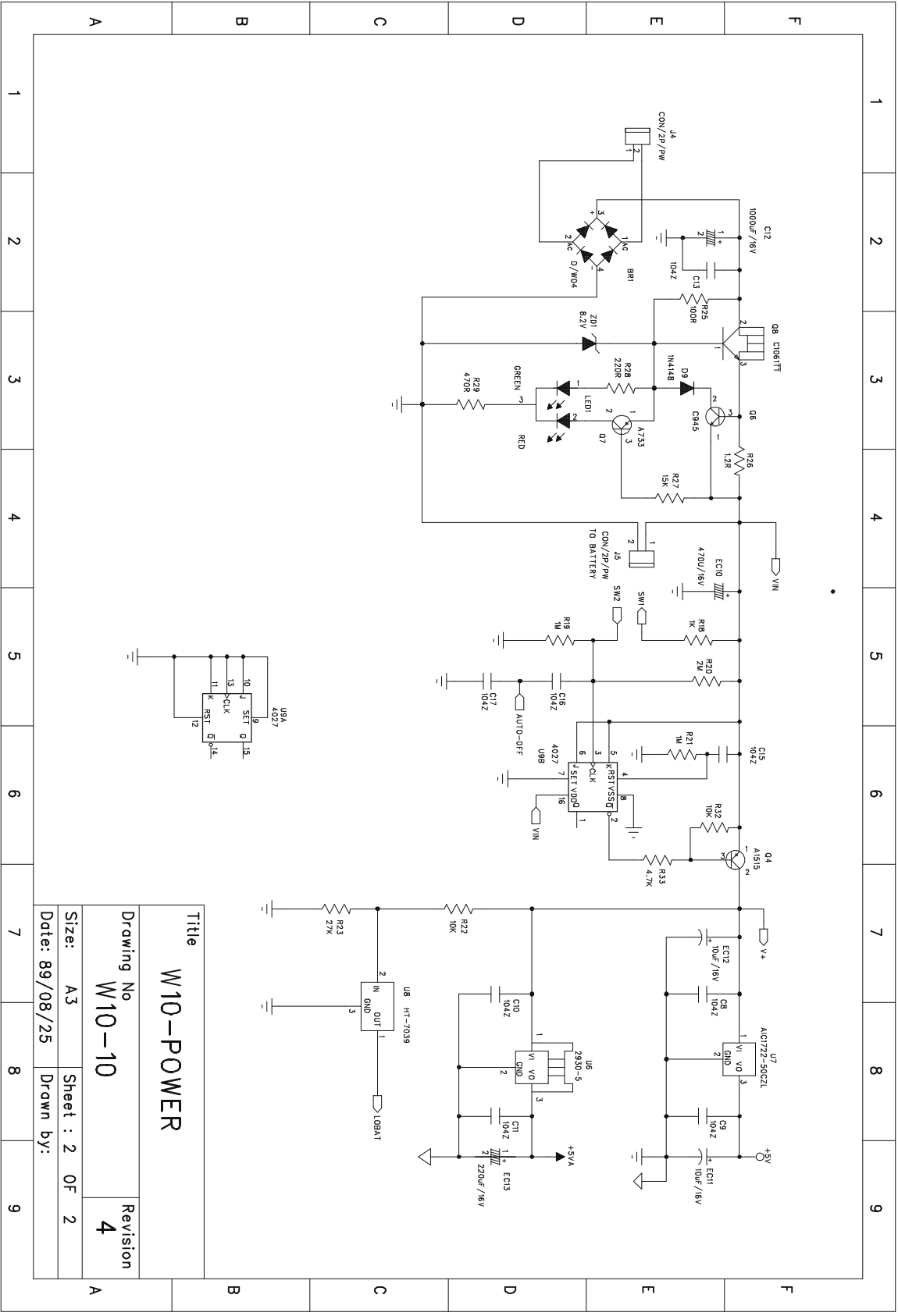
4.2.5.3 Check OP. amplifiers & A/D converter (AD7730).

When no error is found with the above checking procedures, the trouble can be caused by the load cell or the PCB itself. Replace a new one could be better to identify the defectiveness.

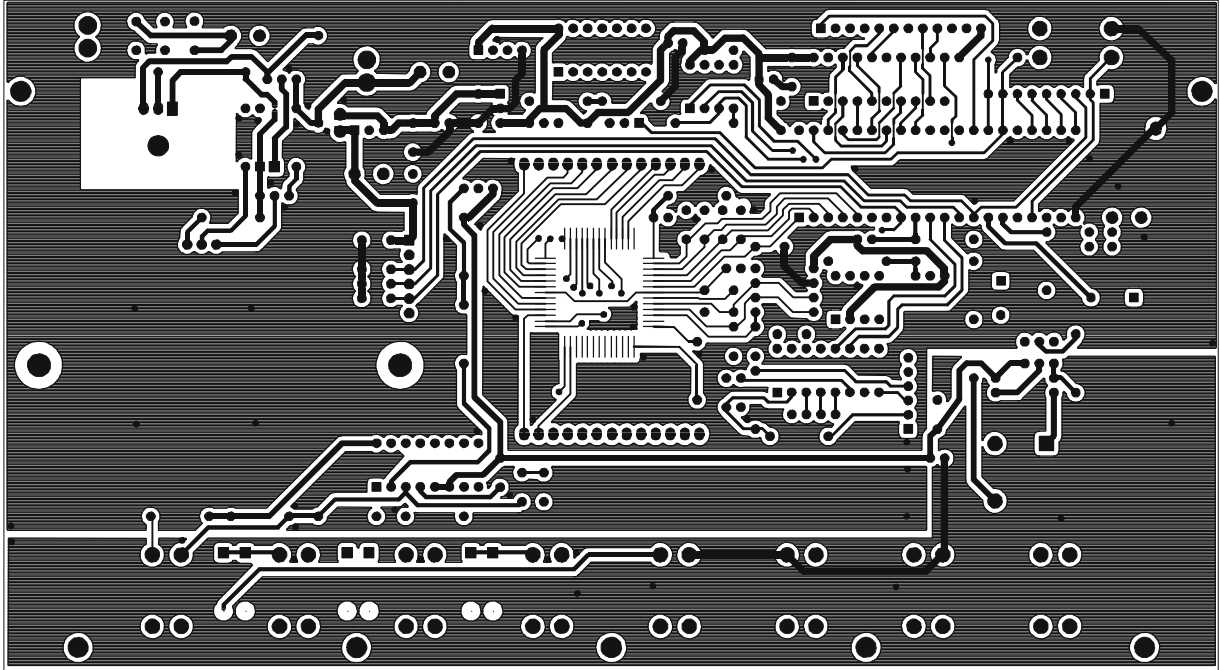
In this way, the readout of weight would be varied because of the output voltage of loadcell and different span value, so re-calibration is necessary after this replacement.

5.1 SCHEMATICS

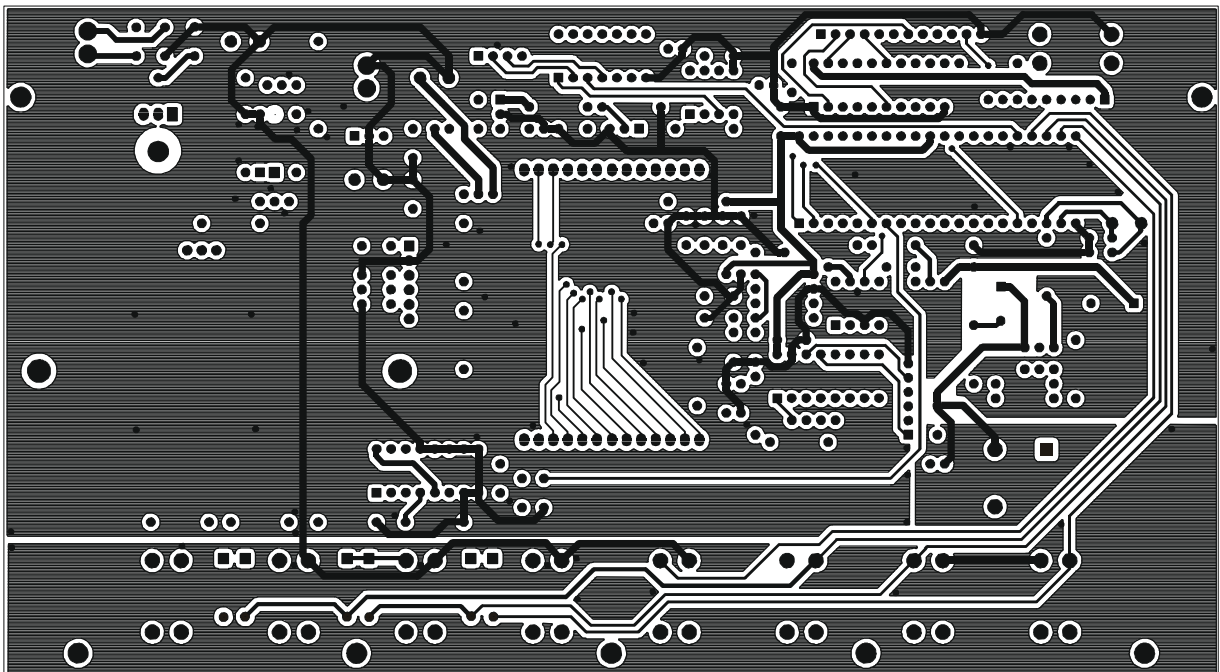




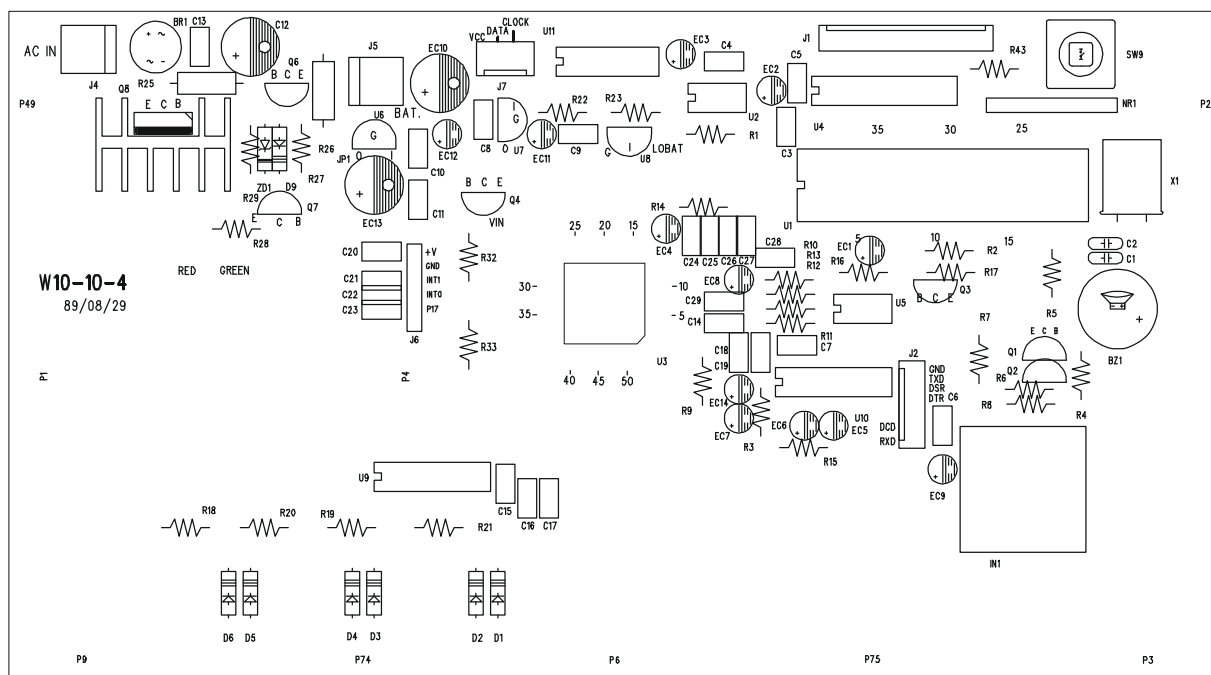
5.2 PCB LAYOUT



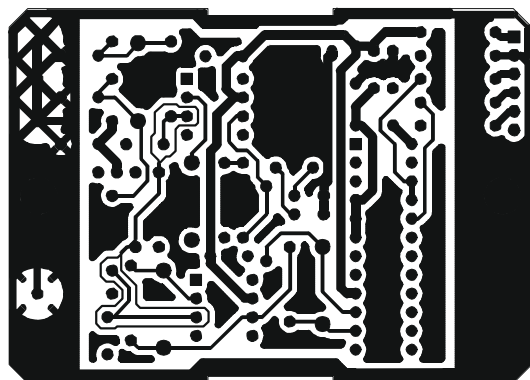
W10-10-4 TOP LAYER



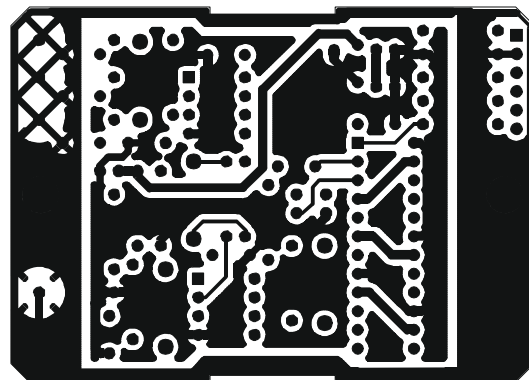
W10-10-4 BOTTOM LAYER



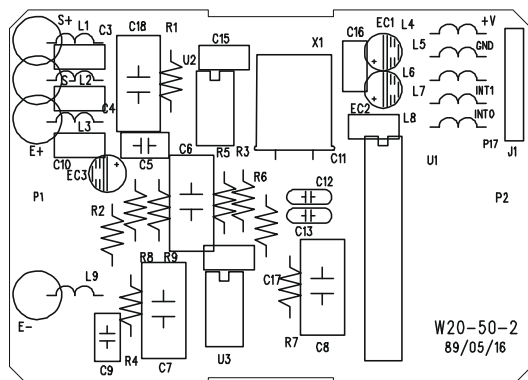
W10-10-4 TOP OVERLAY



W20-50-2 TOP LAYER



W20-50-2 BOTTOM LAYER



W20-50-2 TOP OVERLAY

6. BILL OF MATERIAL

STRUCTURE

Parts No.	Description	Specification	Qty	Remark
A0905600401	CONNECTOR	PLT-164-P	1	
A0905600400	CONNECTOR	PLT-164-R	1	
A0906000210	D.C. JACK	SCD-021	1	
A1204040250	WIRE ARRAY	4 PIN 25cm	1	
A1208020351	BATTERY WIRE ARRAY	2 PIN 35cm(SINGLE HOUSING)	1	
A1600060400	RECHARGEABLE BATTERY	GP4-6/6V 4Ah	1	
A60*****	ADAPTOR	***V/9V 500mA	1	
C1W10010000	PANEL OVERLAY	W10 SERIES	1	
C1W10000000	PANEL PC	W10 SERIES,200x78x2 mm	1	
E9W10000010	P.C.B.	W10-10-X	1	
E9W20000050	P.C.B.	W20-50-X	1	
F0007NBS102	S/S BATTERY CLAMP	NBS SERIES	1	
G0001705200	INDICATOR HOUSING(UPPER)	1705L SERIES	1	
G00010FW000	INDICATOR HOUSING(UNDER)	OFW SERIES	1	
G0003PSP000	INDICATOR FIX PLATE	PSP/OFW SEIES, U SHAPE	1	
G0030000801	ADJUSTABLE FEET	OFW SERIES, 5/16-24UNFx20L	2	INDICATOR
G0005NBS000	RUBBER WASHER	ψ 27xψ 9x3mm	2	
F0007PSP001	STEEL FIX PLATE	PSP/OFW SEIES	1	
G0004DW0001	RUBBER PAD	ψ 16x3.5t, AR-167	4	DW SERIES

W10-10-X MAINBOARD

E0W10000010	P.C.B.	W10-10-X	1	
A0202093461	I.C.	93C46	1	U2
A0204074042	I.C.	74HC04	1	U11
				(OP-5 OPTION)
A0205040270	I.C.	4027	1	U9
A02070*****	VOLTAGE REGULATOR I.C.	2950-50	1	U11
A0207017220	VOLTAGE REGULATOR I.C.	AIC-1722-50CZL	1	U7
A0208072250	I.C.	UPD7225	1	U3
A0203002322	I.C.	MAX232CPE	1	U10
A0250070390	I.C.	HT7039A	1	U8
A0300000040	I.C. SOCKET	40 PIN	1	U1
A0201089521	I.C.	89C52	1	U1
A0102000289	L.C.D	LCD/G289	1	LCD1
A0401007330	TRANSISTOR	2SA733	2	Q2, Q7
A0401009450	TRANSISTOR	2SC945	2	Q1, Q6
A0401010610	TRANSISTOR	H1061C OR D880	1	Q8
A0401015150	TRANSISTOR	A1515	1	Q4
A0501004148	DIODE	1N4148	7	D1-6, D9
A0502000001	BRIDGE RECTIFIER	W04(1A)	1	BR1
A0503020082	ZENER DIODE	1/2W 8V2(9A3)	1	ZD1
A0701106017	CAPACITOR (EC)	10uF/16V (SS TYPE)	8	EC1-4, EC8-9, EC11-12
A0701108016	CAPACITOR (EC)	1000uF/16V	1	C12
A0701220017	CAPACITOR (EC)	220uF/16V(SS TYPE)	1	EC13
A0701477017	CAPACITOR (EC)	470uF/16V(SS TYPE)	1	EC10

A0702105035	CAPACITOR (TC)	1uF/35V	4	EC5-7, EC14
A0730104050	CAPACITOR (MLC)	104Z	16	C3, 4, 6-11, 13-19, 29
A0740020050	CAPACITOR (CC)	20pF	2	C1-2
A0740101050	CAPACITOR (CC)	100pF(101)	5	C24-28
A0802047309	RESISTOR NETWORK	47KΩ 9 PIN	1	NR1
A0804042702	METAL FILM RESISTOR	27KΩ 1/4W	1	R23
A0805020120	CARBON FILE RESISTOR	1.2Ω 1/2W	1	R26
A0805021101	CARBON FILE RESISTOR	100Ω 1/2W	1	R25
A0805041102	CARBON FILE RESISTOR	1KΩ 1/4W	3	R1, R7, R18
A0805041103	CARBON FILE RESISTOR	10KΩ 1/4W	6	R2, R10-R12, R22, R32
A0805041104	CARBON FILE RESISTOR	100KΩ 1/4W	1	R37
A0805041105	CARBON FILE RESISTOR	1MΩ 1/4W	2	R19, R21
A0805041153	CARBON FILE RESISTOR	15KΩ 1/4W	1	R27
A0805041180	CARBON FILE RESISTOR	18Ω 1/4W	1	R8
A0805041183	CARBON FILE RESISTOR	18KΩ 1/4W	1	R13
A0805041205	CARBON FILE RESISTOR	2MΩ 1/4W	1	R20
A0805041221	CARBON FILE RESISTOR	220Ω 1/4W	1	R28
A0805041203	CARBON FILE RESISTOR	20KΩ 1/4W	1	R43
A0805041223	CARBON FILE RESISTOR	22KΩ 1/4W	2	R5-6
A0805041273	CARBON FILE RESISTOR	27KΩ 1/4W	1	R23
A0805041334	CARBON FILE RESISTOR	330KΩ 1/4W	1	R9
A0805041471	CARBON FILE RESISTOR	470Ω 1/4W	1	R29
A0805041472	CARBON FILE RESISTOR	4.7KΩ 1/4W	3	R4, R14, R33
A0625050000	L.E.D.	ROUND, 5mm, (RED, GREEN)	1	LED1
A0901010040	CONNECTOR	4 PIN WAFER	1	J7(OP-5)
A0901010060	CONNECTOR	6 PIN WAFFER	1	J2
A0902010020	CONNECTOR	2 PIN WAFER, PITCH=3.9mm	2	J4-5
1100211059	CRYSTAL	11.0952MHZ	1	X1
A1202060301	WIRE ARRAY(SINGLE HOUSING)	6PIN 30cm	1	RS-232
A0904120090	CONNECTOR	D-SUB 9PIN(FEMALE)	1	RS-232
A1306000003	TACT SW.	KPT-1104B	9	SW1-9
A1400000006	BACK LIGHT	EL-13044 (134*44mm)	1	EL1
A1401005120	BACK LIGHT INVERTER	5V TO 120V	1	IN1
A1500000004	BUZZER	OB0-15210	1	BZ1
A5004000003	HEAT SINK	MB-207-20	1	Q8

W10-10-X MAINBOARD (PRINTER OPTION)

A0204743742	I.C.	74HC374	1	U4
A0730104050	CAPACITOR (MLC)	104Z	1	C5
A0901010120	CONNECTOR	12 PIN WAFFER	1	J2
A1250251220	WIRE ARRAY(SINGLE HOUSING+DSUB 25PIN)	12PIN	1	PRINTER

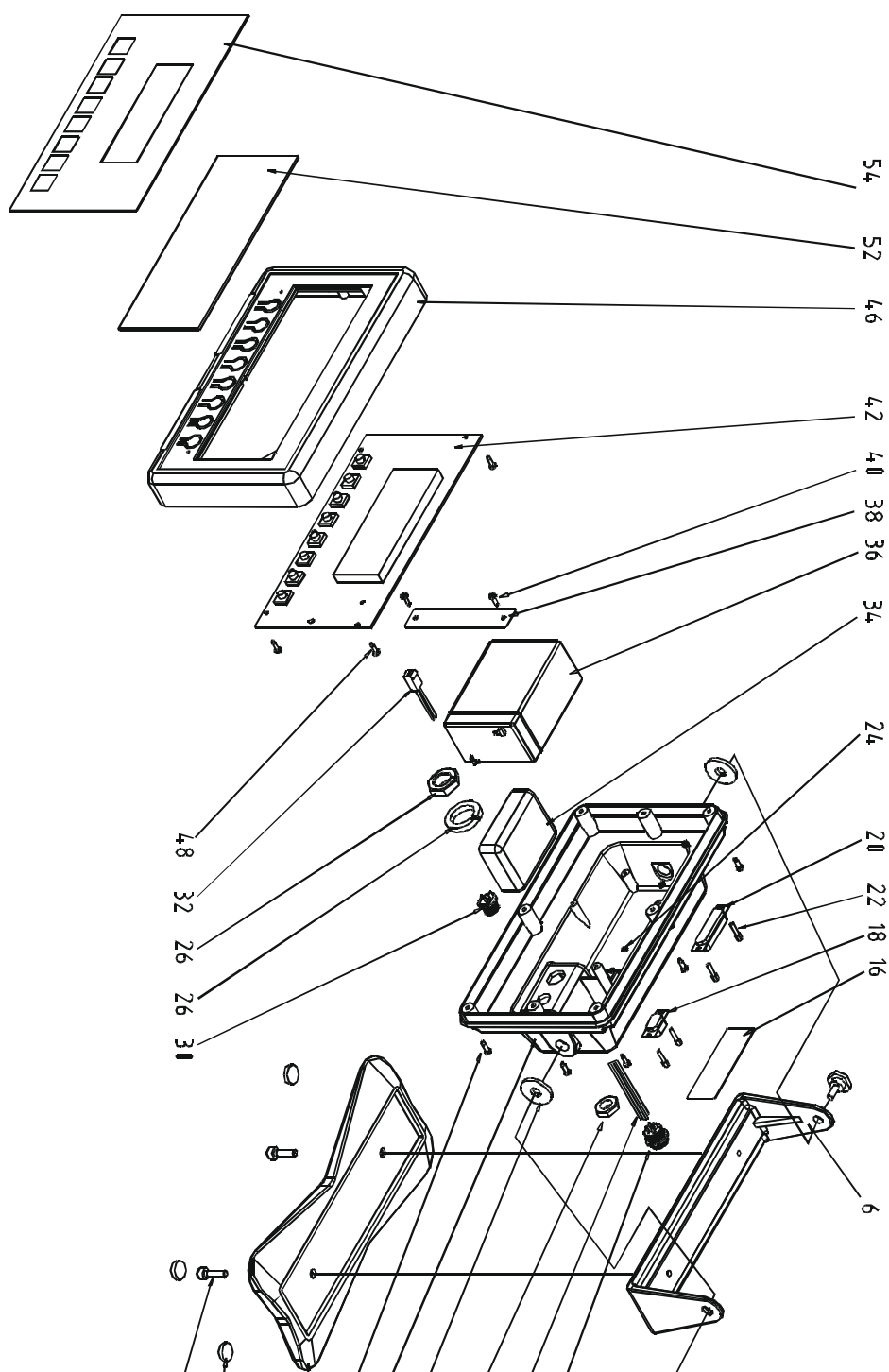
W20-50-X A/D BOARD

E0W20010000	P.C.B.	W20-50-X	1	
A0203077300	I.C.	AD7730BN	1	U1
A0206000072	I.C.	OP-177CP	2	U2-3
A0702106010	CAPACITOR (TC)	10uF/16V	3	EC1-3
A0710104101	CAPACITOR (MEF)	0.1uF/100V(104)	2	C6-7
A0710224101	CAPACITOR (MEF)	0.22uF/100V(224)	2	C8, C18
A0720103101	CAPACITOR (PEI)	0.01uF/100V(103J)	2	C5, C9
A0730104050	CAPACITOR (MLC)	104Z	7	C3-4, C10-11, C15-17
A0740020050	CAPACITOR (CC)	20pF	2	C12-13
A0750122050	CAPACITOR (CCFT)	1200pF/50V	4	
A0803041002	METAL FILM RESISTOR(10PPM)	10KΩ 1/4W	1	R5
A0803043001	METAL FILM RESISTOR(10PPM)	30KΩ 1/4W	2	R3-4
A0804041000	METAL FILM RESISTOR	100Ω 1/4W	2	R6-7
A0804044701	METAL FILM RESISTOR	4.7KΩ 1/4W	2	R1-2
A0805040105	CARBON FILE RESISTOR	100KΩ 1/4W	2	R8-9
A0901010060	CONNECTOR	6 PIN WAFFER	1	J2
A1005030512	FERRITE BEAD	3.5*6*0.8m	9	L1-9
A1007000001	FERRITE CORE	TR-16*9*28mm	2	
A1100249152	CRYSTAL	4.9152MHZ	1	X1
A1202060301	WIRE ARRAY(SINGLE HOUSING)	6PIN 30cm	1	
F0015000004	A/D PROTECTION BOX	EM SERIES (UPPER)	1	
F0015000005	A/D PROTECTION BOX	EM SERIES (UNDER)	1	

=====

7. APPENDIX

PARTS EXPLOSION:



ITEM	PART NO.	PART NAME	SPECIFICATION	QTY
2	F0007PSP001	STEEL FIX PLATE	PSP/OFW SEIES	1
4	G0004DW0001	RUBBER PAD	16x3.5t, AR-167	4
6	G0003PSP000	INDICATOR FIX PLATE	PSP/OFW SEIES, U SHAPE	1
8	Z0014100620	S/S SCREW	M6*12	2
10	G0005NBS000	RUBBER WASHER	27x9x3mm	2
12	G00010FW000	INDICATOR HOUSING(UNDER)	OFW SERIES	1
14	G0030000801	ADJUSTABLE FEET	OFW SERIES, 5/16-24UNFx20L	2
16	D0BS0500001	NAME PLATE(PC)	BS,BW SERIES	1
18	A0904120090	CONNECTOR	D-SUB 9PIN(FEMALE)	1
20	A0904120251	CONNECTOR	D-SUB 25PIN(DSD TYPE)	1
22		SCREW	1/8-40UNC	4
24		NUT	1/8-40UNC	4
26	A0905600400	CONNECTOR	PLT-164-R	1
28	A1204040250	WIRE ARRAY	4 PIN 25cm	1
30	A0906000210	D.C. JACK	SCD-021	1
32	A1208020351	BATTERY WIRE ARRAY	2 PIN 35cm(SINGLE HOUSING)	1
34	E9W20000050	P.C.B.	W20-50-X	1
36	A1600060400	RECHARGEABLE BATTERY	GP4-6/6V 4Ah	1
38	F0007NBS102	S/S BATTERY CLAMP	NBS SERIES	1
40	Z0010001308	SCREW	M3*8 TAPPED	2
42	E9W10000010	P.C.B.	W10-10-X	1
46	G0001705200	INDICATOR HOUSING(UPPER)	1705L SERIES	1
52	C1W10000000	PANEL PC	W10 SERIES, 200x78x2mm	1
54	C1W10010000	PANEL OVERLAY	W10 SERIES	1

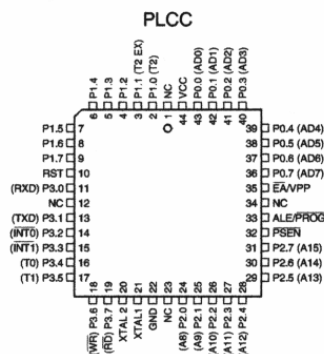
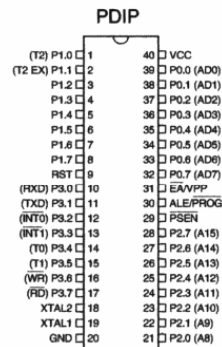
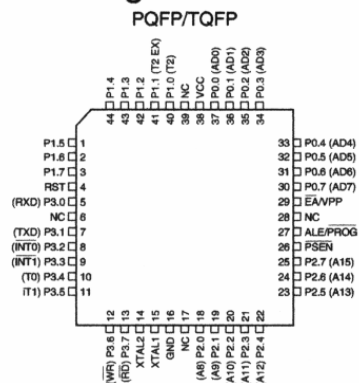
Features

- Compatible with MCS-51™ Products
- 8K Bytes of In-System Reprogrammable Flash Memory
- Endurance: 1,000 Write/Erase Cycles
- Fully Static Operation: 0 Hz to 24 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Programmable Serial Channel
- Low-power Idle and Power-down Modes

Description

The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

Pin Configurations



8-bit Microcontroller with 8K Bytes Flash

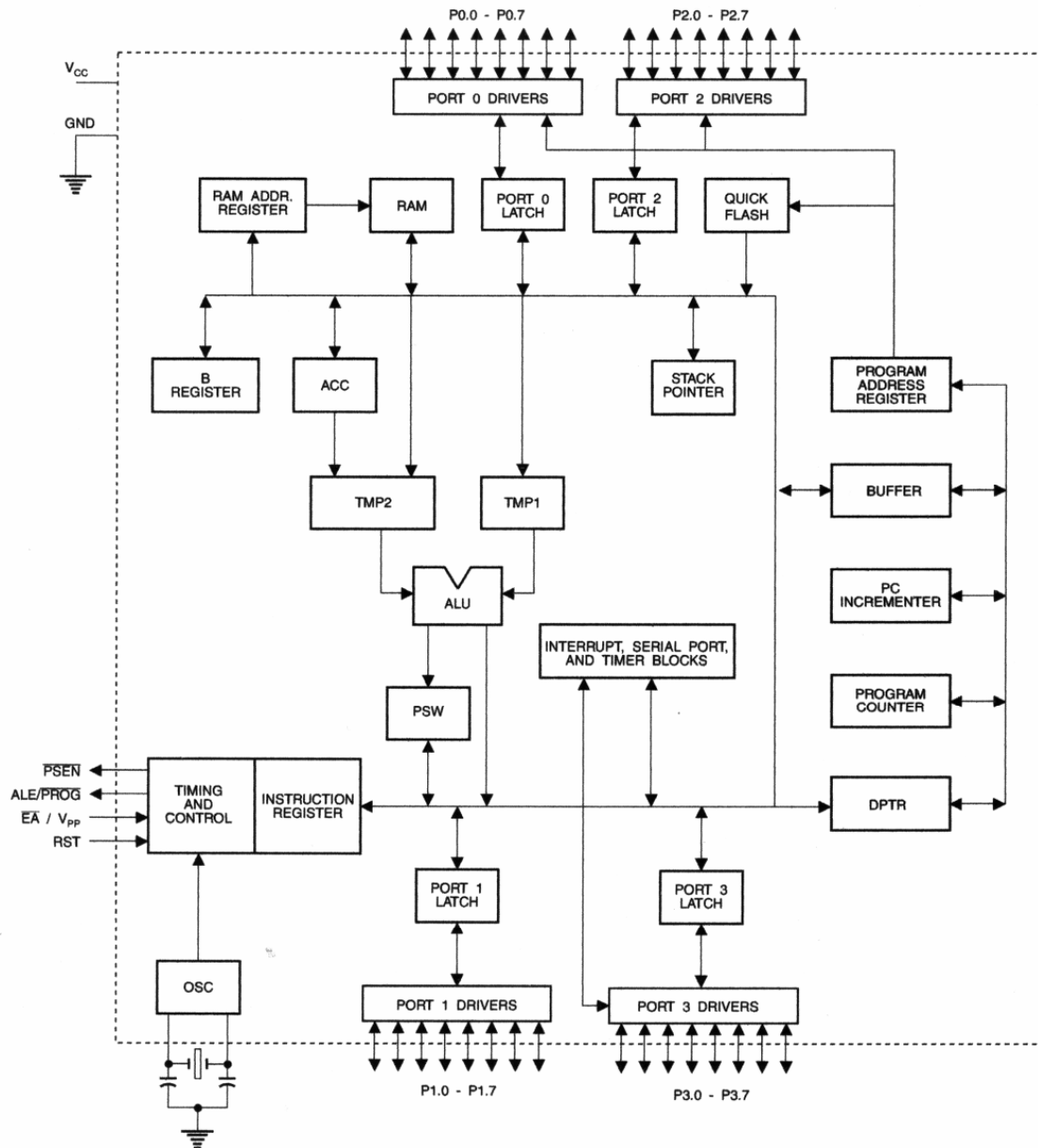
AT89C52

Rev. 0313H-02/00





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
FASTStep™ Mode
AC or DC Excitation
Single Supply Operation

APPLICATIONS

Weigh Scales
Pressure Measurement

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.

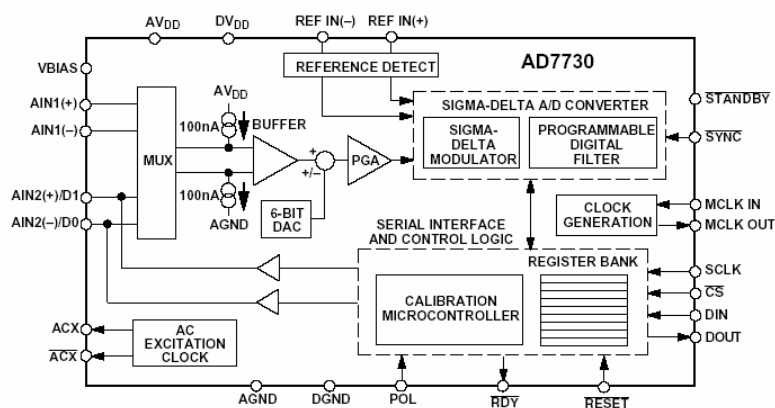
GENERAL DESCRIPTION

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.

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



FASTStep is a trademark of Analog Devices, Inc.

REV. A

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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	Offset Error and Offset Drift Refer to Both Unipolar Offset and Bipolar Zero Errors
Output Noise and Update Rates ²	See Tables I & II		
Integral Nonlinearity	18	ppm of FSR max	
Offset Error ²	See Note 3		
Offset Drift vs. Temperature ²	5	nV/°C typ	
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	Measured with Zero Differential Voltage At DC. Measured with Zero Differential Voltage
Power Supply Rejection	120	dB typ	
Common-Mode Rejection (CMR)	120	dB min	
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 Drift vs. Temperature ⁶	0.5	µV/°C typ	
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	Measured with Zero Differential Voltage At DC. Measured with Zero Differential Voltage At DC. Measured with Zero Differential Voltage
Power Supply Rejection	90	dB typ	
Common-Mode Rejection (CMR) on AIN	100	dB typ	
CMR on REF IN	120	dB typ	
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	
Power Supply Currents			
AV _{DD} Current (Normal Mode)	10.3	mA max	With AGND = 0 V
AV _{DD} Current (Normal Mode)	22.3	mA max	External MCLK. Digital I/Ps = 0 V or DV _{DD}
DV _{DD} Current (Normal Mode)	1.3	mA max	All Input Ranges Except 0 mV to +10 mV and ±10 mV
DV _{DD} Current (Normal Mode)	2.7	mA max	Input Ranges of 0 mV to +10 mV and ±10 mV Only
AV _{DD} + DV _{DD} Current (Standby Mode)	25	µA max	DV _{DD} of 2.7 V to 3.3 V
Power Dissipation			DV _{DD} of 4.75 V to 5.25 V
Normal Mode	65	mW max	Typically 10 µA. External MCLK IN = 0 V or DV _{DD}
	125	mW max	AV _{DD} = DV _{DD} = +5 V. Digital I/Ps = 0 V or DV _{DD}
Standby Mode	125	µW max	All Input Ranges Except 0 mV to +10 mV and ±10 mV
			Input Ranges of 0 mV to +10 mV and ±10 mV Only
			Typically 50 µW. External MCLK IN = 0 V or DV _{DD}

AD7730/AD7730L



SCLK	1		24	DGND
MCLK IN	2		23	DV _{DD}
MCLK OUT	3		22	DIN
POL	4		21	DOUT
SYNC	5		20	RDY
RES	6		19	CS
V _{BIAS}	7		18	STANDBY
AGND	8		17	ACX
AV _{DD}	9		16	ACX
AIN1(+)	10		15	REF IN(-)
AIN1(-)	11		14	REF IN(+)
AIN2(+)/D1	12		13	AIN2(-)/D0

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.

μPD7225 CMOS, Intelligent, Alphanumeric LCD Controller/Driver

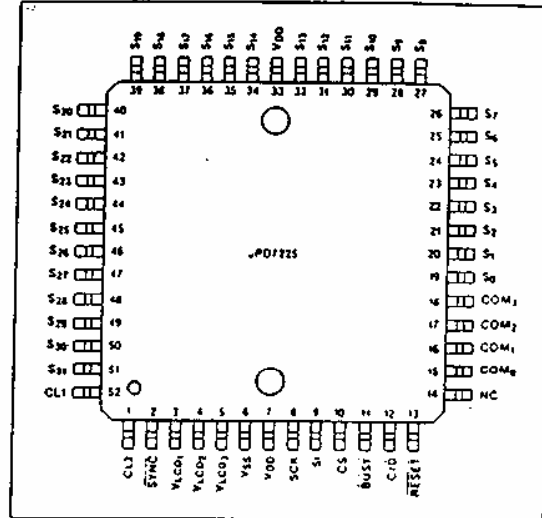
Description

The μPD7225 is an intelligent peripheral device designed to interface most microprocessors with a wide variety of alphanumeric LCDs. It can directly drive any static or multiplexed LCD containing up to 4 backplanes and up to 32 segments and is easily cascaded for larger LCD applications. The μPD7225 communicates with a host microprocessor through an 8-bit serial interface. It includes a 7-segment numeric and a 14-segment alphanumeric segment decoder to reduce system software requirements. The μPD7225 is manufactured with a low power consumption CMOS process allowing use of a single power supply between 2.7 V and 5.5 V. It is available in a space-saving 52-pin plastic flat package.

Features

- ☐ Single chip LCD controller with direct LCD drive
- ☐ Low cost serial interface to most microprocessors
- ☐ Compatible with
 - 7-segment numeric LCD configurations up to 16 digits
 - 14-segment alphanumeric LCD configurations up to 8 characters
- ☐ Selectable LCD drive configuration:
 - Static, biphased, triplexed, or quadruplexed
- ☐ 32-segment drivers
- ☐ Cascadable for larger LCD applications
- ☐ Selectable LCD bias voltage configuration:
 - Static, 1/2 or 1/3
- ☐ Hardware logic blocks reduce system software requirements
 - 8-bit serial interface
 - Two 32 × 4-bit static RAMs for display data and blinking data storage
 - Programmable segment decoding capability:
 - 16-character, 7-segment numeric decoder
 - 64-character, 14-segment USASCII alphanumeric decoder
 - Programmable segment blinking capability
 - Automatic synchronization of segment drivers with sequentially multiplexed backplane drivers
- ☐ Single power supply, variable from 2.7 V to 5.5 V
- ☐ Low power consumption CMOS technology
- ☐ Extended - 40°C to +85°C temperature range available

Pin Configuration

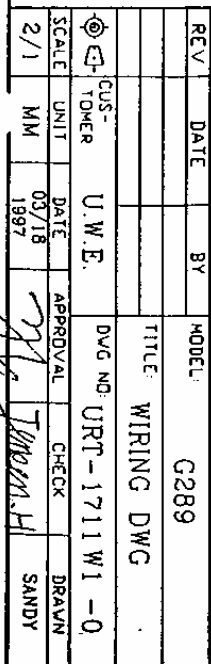


Pin Identification

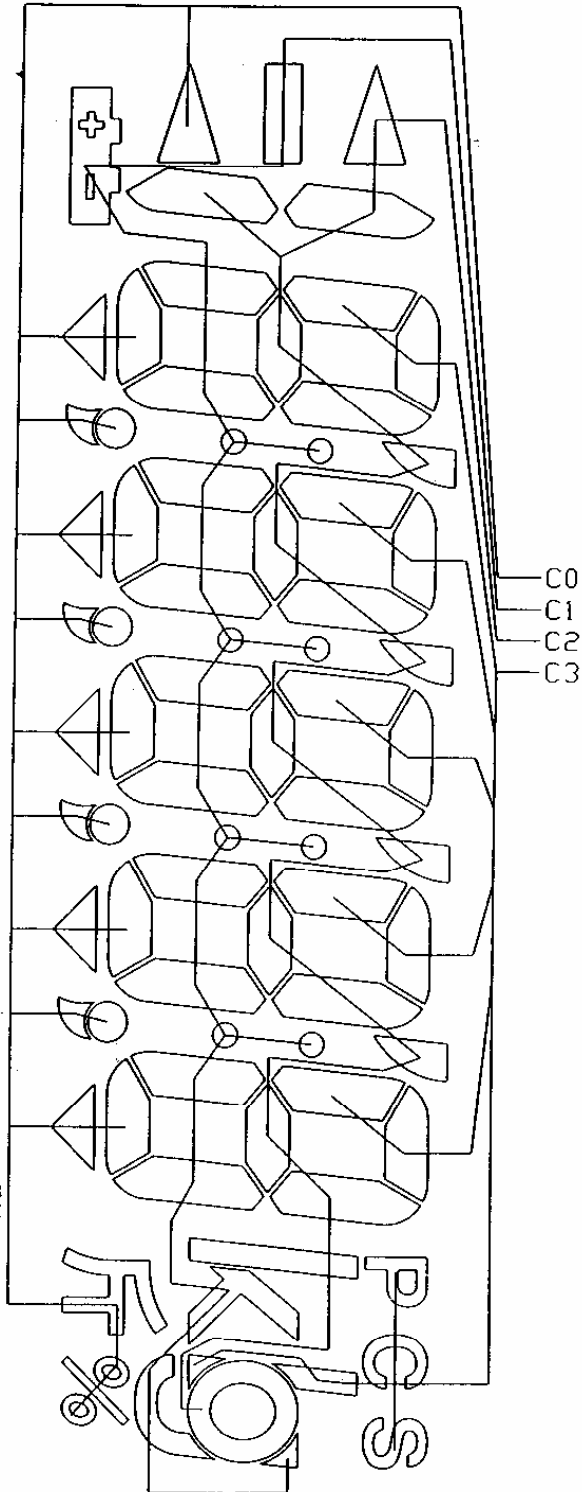
No.	Symbol	Function
1	CL2	System clock output
2	SYNC	Synchronization port
3-5	V _{LCD1} V _{LCD2}	LCD bias voltage supply inputs
6	V _{SS}	Ground
7, 33	V _{DD}	Power
8	SCK	Serial clock input
9	SI	Serial input
10	CS	Chip select
11	BUSY	Busy output
12	C/D	Command or data select input
13	RESET	Reset input
14	NC	No connection
15-18	COM ₀ -COM ₃	LCD backplane driver outputs
19-32, 34-51	S ₀ -S ₃₁	LCD segment driver outputs
52	CL1	System clock input

Ordering Information

Part Number	Package Type	Max Frequency of Operation
μPD7225G-00	52-pin plastic miniflat	1 MHz



SEGMENT



COMMON

REV	DATE	BY	MODEL
			G289
			TITLE: WIRING DWG
			DWG NO: URT-1711 W2 -0
			CUS- TONER U.W.E.
SCALE	UNIT	DATE	APPROVAL
2/1	MM	03/18 1997	CHECK
			DRAWN
			SANDY