MAINTENANCE MANUAL

APM DIGITAL WEIGHING BENCH SCALE
NTEP APPROVED VERSION

CONTENTS

AUGUST 2002 REV 4

Specifications and Function Subject to Change without Notice

1. INTRODUCTION

The APM series is designed and programmed according to the NTEP Class III requirements.

This scale is sealed to prevent unauthorized access to internal parts. Ender users should be advised not to undertake any trouble shooting except those listed on the operation manual.

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.

The internal jumper (JP1) 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 meteorological and approval requirements. Here are some features of the APM series.

1. Designed to meet NTEP class III requirements.
2. 15kg~300kg free capacity.
3. 1/3000 external resolution.
4. Zero indicator.
5. Tare indicator.
6. Negative value indicator.
7. Subtractive tare function.
8. Power on zero function.
9. Manual zero function.
10. Auto Power Saving Function.
11. WTN LCD display, 25mm height(5 1/2 digits).
12. Low battery warning signal.
13. 2 points Calibration.
14. Mini jumper to prevent end-user calibration.
15. Optional EL backlights.
16. Accumulation function.
17. Bubble level
18. Adjustable feet
19. Built-in rechargeable battery operated
20. AC adaptor included
21. Overload protection for positive and negative force
22. Multi Indicator Mounting Methods

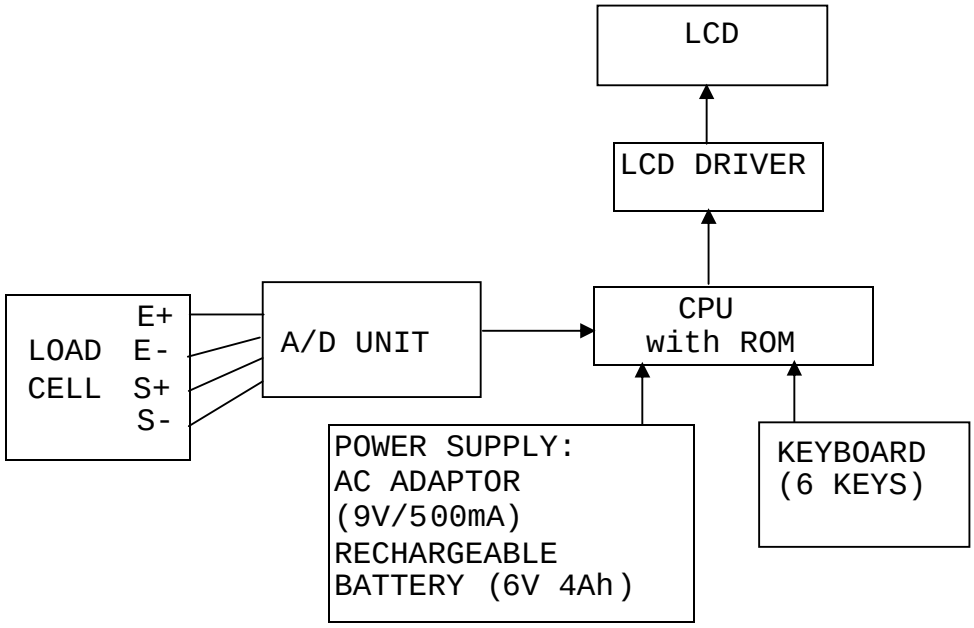
2. SPECIFICATIONS

MODEL SPECIFICATIONS

Model No.	APM-15	AMP-30	APM-60	APM-150
Capacity (kg/lb)	15/30	30/60	60/150	150/300
Division (kg/lb)	0.005/0.01	0.01/0.02	0.02/0.05	0.05/0.1
Tare Range (kg)	-4.995	-9.99	-19.98	-49.95
Power-on Zero Range (kg)	±1.5	±3	±6	±15
Zero Range (kg)	±0.3	±0.6	±1.2	±3
Min. Load (kg)	0.1	0.2	0.4	1
Power voltage requirements	6.0 VDC BY EXTERNAL DC 9V POWER ADAPTOR OR RECHARGEABLE BATTERY			
Operation Environment	-10°~40℃ Non-condensed. R.H.≦ 85%			

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

2.1 SYSTEM BLOCK DIAGRAM



DESCRIPTION:

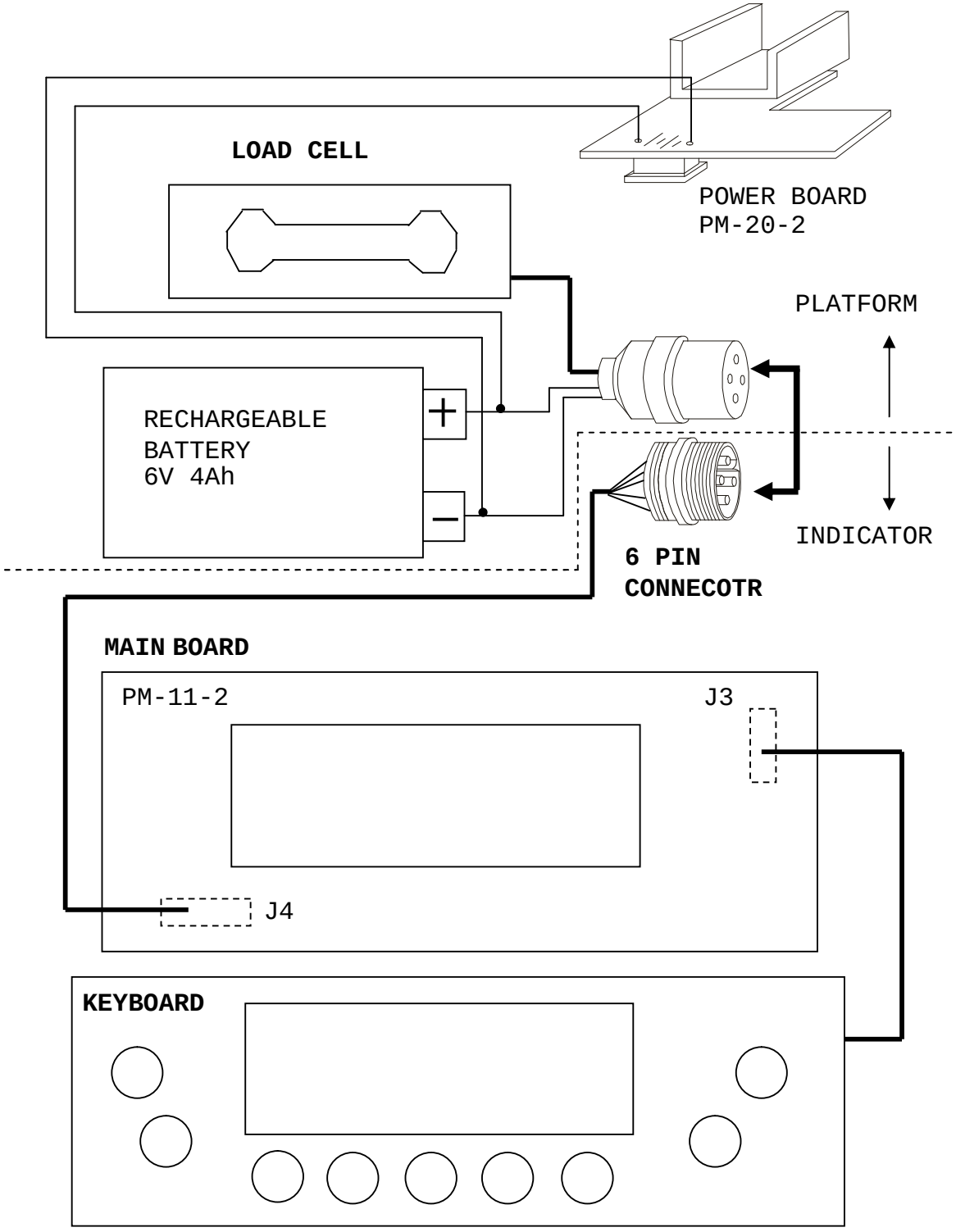
When a load is applied to the load cell. The resistance to the excitation current in the strain gauge changes and the analog output signal varies.

It is amplified and digitalized continuously by the A/D converter into a digital signal.

Subsequently, the resulting count is processed and managed by the CPU.

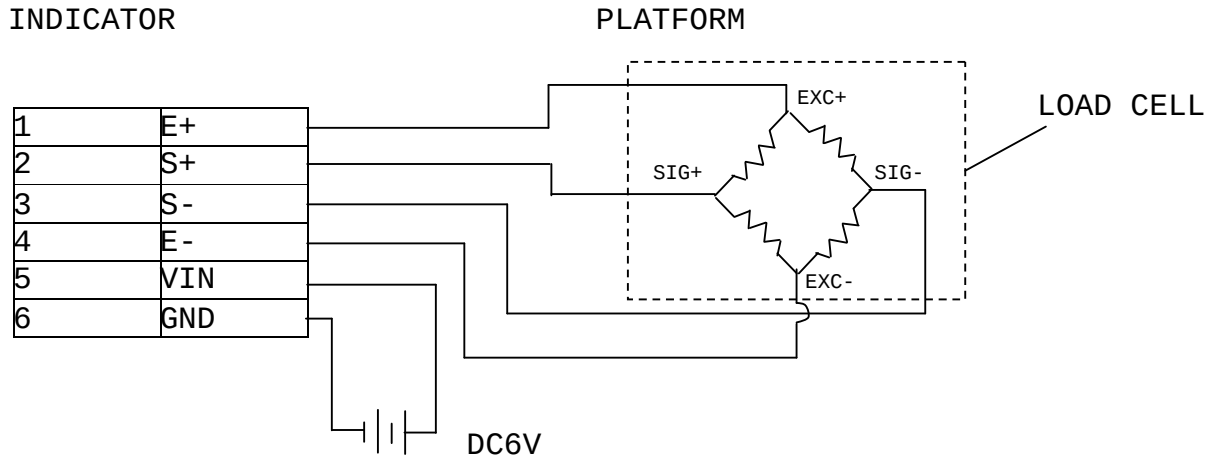
The CPU refers to the instructions from the keyboard, and then conveys the output data to LCD driver which formats the data into a readout for the display.

2.2 PHYSICAL LAYOUT OF ELECTRICAL CONNECTION



2.2.1 Connection between indicator and platform

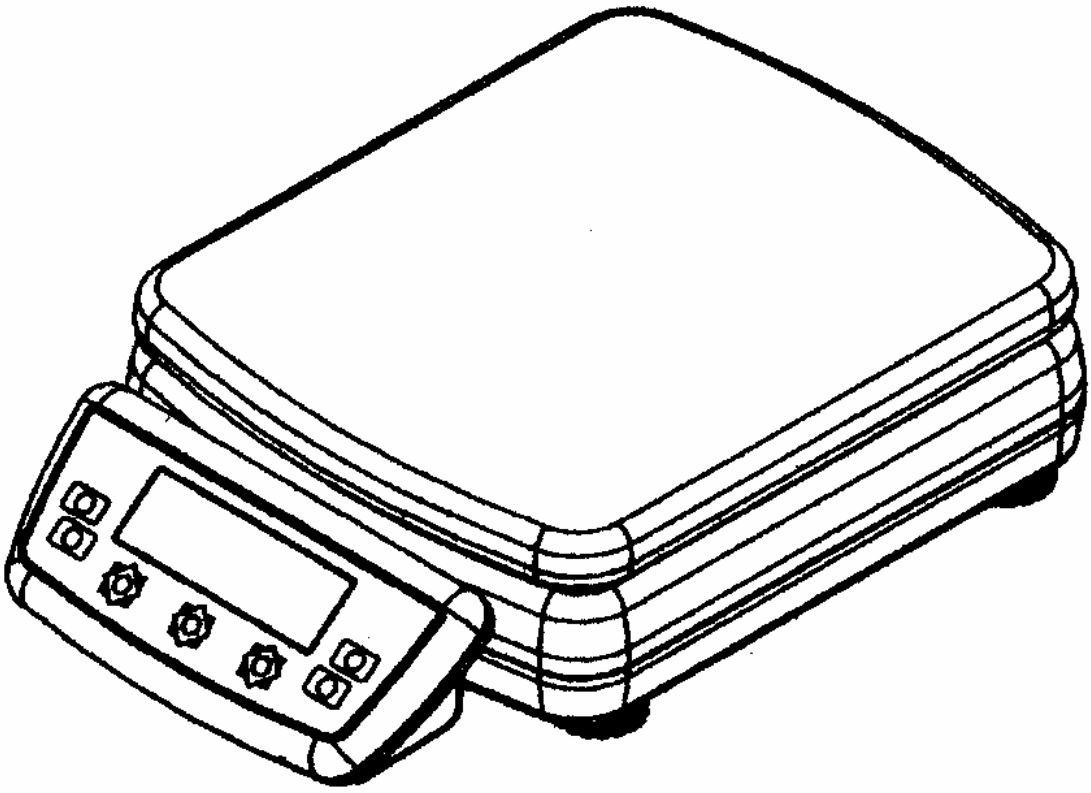
PIN ASSIGNMENT



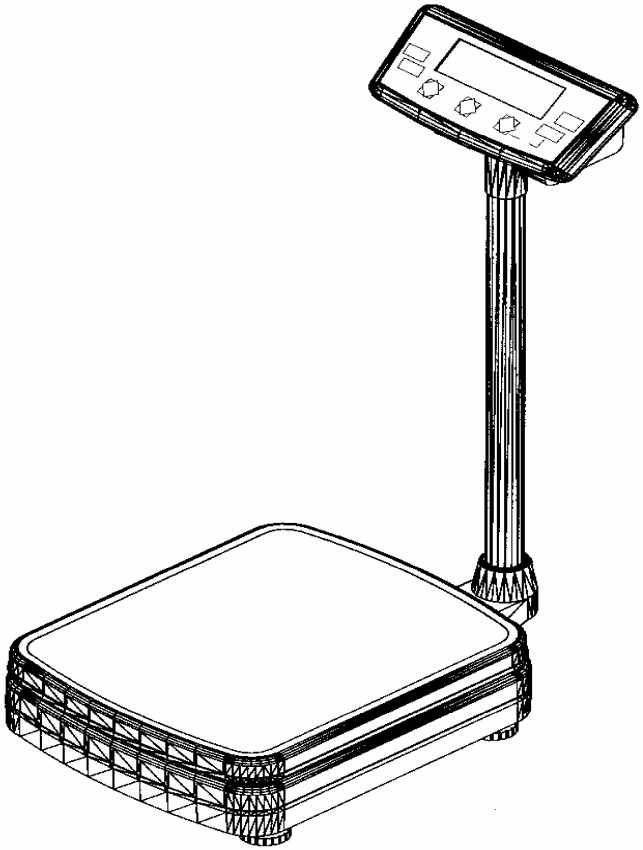
2.3 GENERAL SPECIFICATION

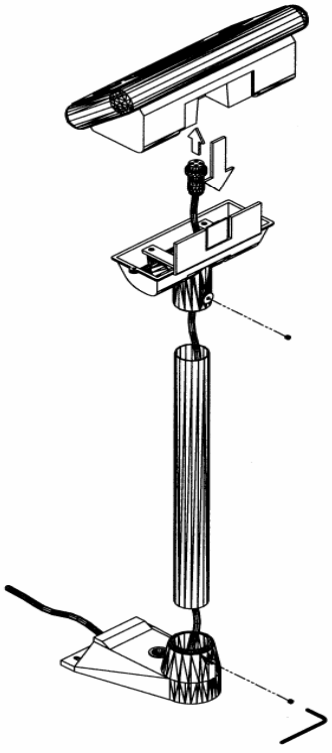
2.3.1 Overall view

A. Desk Top Mount

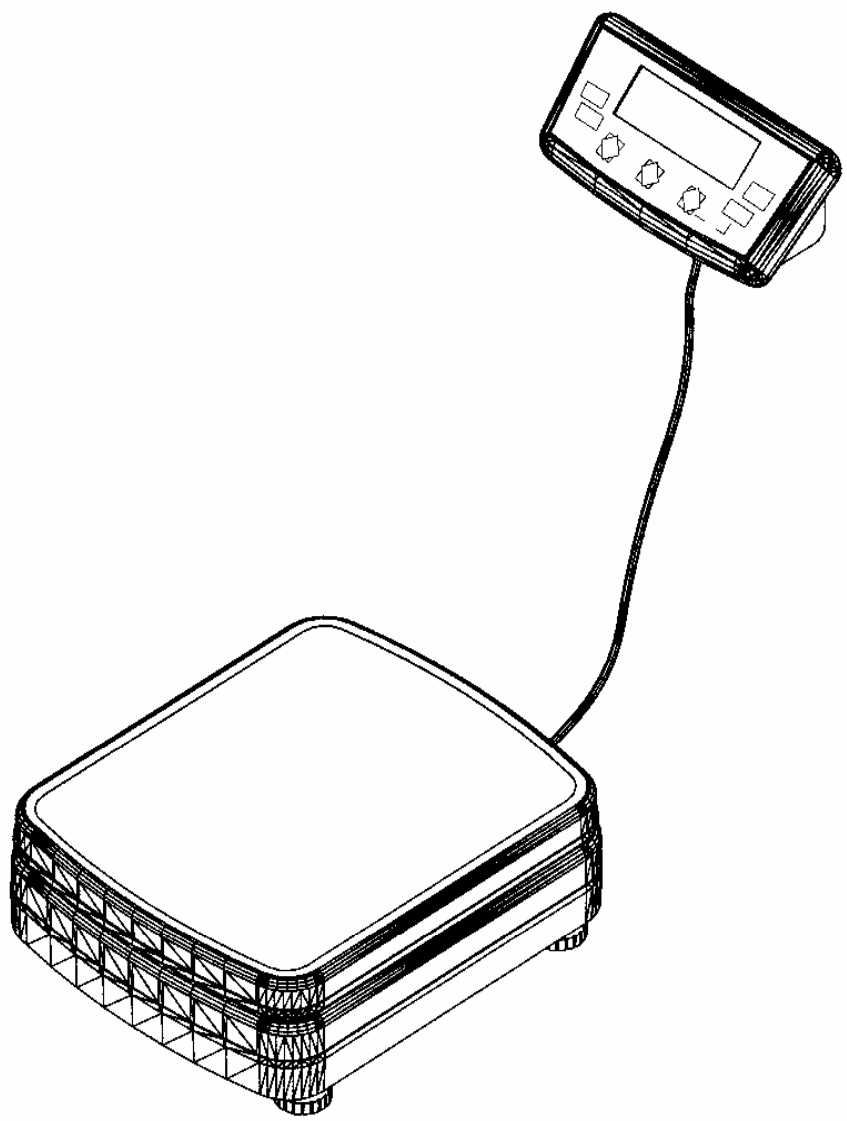


B. Platform Mount





C. Wall Mount



2.3.2 Dimensions

A. Desk top Mount
   * Platter size: 330 x 280mm
   * Overall size: 420(D) x 300(W) x 100(H)mm

B. Platform Mount
   * Platter size: 330 x 280mm
   * Overall size: 420(D) x 300(W) x 640(H)mm

2.3.3 Model specification

Model name: APM-series
Display resolution: 1/3000
Display: Single-sided
Weight display--> 5 digits

2.3.4 Operation condition

* Power source: Rechargeable battery(6V 4Ah) or AC adaptor (DC 9-12V,500mA)
* Operating Temperature: -10^{o}~40^{o}C
* Operating Humidity: 15 ~ 85% RH
* Power Consumption: 0.1W (5W When charge)

2.3.5 Main Components used

* Micro Processor: 89C52
* Crystal Oscillator: 11.0592 MHz
* Display device: Liquid Crystal Display (LCD)
* Load cell: 350 resistance load cell

2.3.6 Analog Specification

* INPUT SENSITIVITY: 2mV/V
* ZERO ADJUST RANGE: 2% R.O.
* ZERO BALANCE RANGE: +/-5% R.O.
* L/C APPLIED VOLTAGE: DC 5V
* SPEED OF A/D CONVERSION: 10 times/sec

3.INITIAL SETUP

3.1 INTERNAL FUNCTION AND SETTING METHODS

INTERNAL FUNCTION TABLE

Function	Symbol	Description
1	F.1	Span value reading
2	F.2	Full display segment check
3	F.3	Scale configuration
4	F.4	Auto power off setting
5	F.9	Auto Tare setting

HOW TO ENTER THE REQUIRED FUNCTION MODE

a. Turn scale off.
b. Press and hold TARE, then turn scale on. Scale display F.1
c. Press TARE until the required function number appears.
d. Press MODE
e. Press MODE until the required setting appears.
f. Press TARE to confirm.
g. Repeat step c to f for other function setting, or
h. Press ZERO to save settings and return to normal operation.

F.1 Span Value Reading and Dealer Calibration

Simply enter F.1, then put on the designated mass to check Span Value or keep going to do Dealer Calibration.

F.2 Full display segment check

When function is entered, scales will display all segments. Check and make sure that no segment is missed.

F.3 Scale Configuration

1 Enter F.3, scale displays the previous setting.
2 Scale displays capacity and division configuration.
3 Press MODE until the required configuration obtained.
Note: In some countries, only the metric weight unit is available.
To employ all (metric and pound) weight units, press MODE until lb appears. To disable pound weight unit, press MODE until kg appears.
4 Press ZERO to save setting and back to normal operation status.

F.4 Auto Power Off Setting

Two modes are available: (Default=4_OFF)
0._OFF = Auto Power Off function is disabled.
4._OFF = Scale will automatically turned off after 4 minutes unused.

3.2 CALIBRATION

ACCEPTABLE LOAD FOR CALIBRATION

Model Number	External Division	Acceptable Calibration Load	
		1st CAL.STAGE	2nd CAL. STAGE
APM-15	1/3000	5kg	15kg
APM-30	1/3000	10kg	30kg
APM-60	1/3000	20kg	60kg
APM-150	1/3000	50kg	150kg

Calibration Procedures:

1. Turn scale off
2. Press and hold MODE, then turn scale on.
3. Scale displays CAL._1
4. Press MODE
5. Scale displays “YES” then “Zero”
6. When zero point calibration is done, scale will display “Load” “XXXX”(XXXX is the 1st calibration load that has listed on above table)
7. Place calibration load onto the platform.
8. Press MODE
9. Wait until the scale displays CAL._2.
10. Press MODE to go proceeding 2nd calibration stage.(If only One-Point-Calibration is required, press TARE to escape calibration and return to normal operation)
11. Scale displays “Yes” then “Load” “XXXX”(XXXX is the 2nd calibration load)
12. Load calibration weight as required.
13. Press MODE
14. When 2nd point calibration is done, Scale will display load weight and is ready for operation.

3.3 DISABLE CALIBRATION AND INTERNAL FUNCTIONS SETTING WITH JUMPER

The JP1 is used to control calibration and internal functions setting(F.1 and F.3). move this jumper to CAL-LOCK position to disable calibration and internal functions setting.

3.4 OFFSET AND SPAN VALUE DATA

OFFSET AND SPAN VALUE DATA TABLE

Models	Offset Value (Thousand)	Span Value (Thousand) during calibration	Offset Control	Span Control
All	Below 14	40~48 at 1/3 Max.	R1, R2	R9

READING OFFSET VALUE

1. Turn scale off
2. Remove all load from platter
3. Enter F.1 and read the offset value

READING SPAN VALUE

1. Turn scale off
2. Remove all load from platter
3. Enter F.1
4. Press ZERO
5. Apply load to platter. Span value according to load applied will be displayed.

HOW TO ADJUST OFFSET VALUE

In case the offset value is out of range, change the resistors R1,R2 to obtain correct offset value.

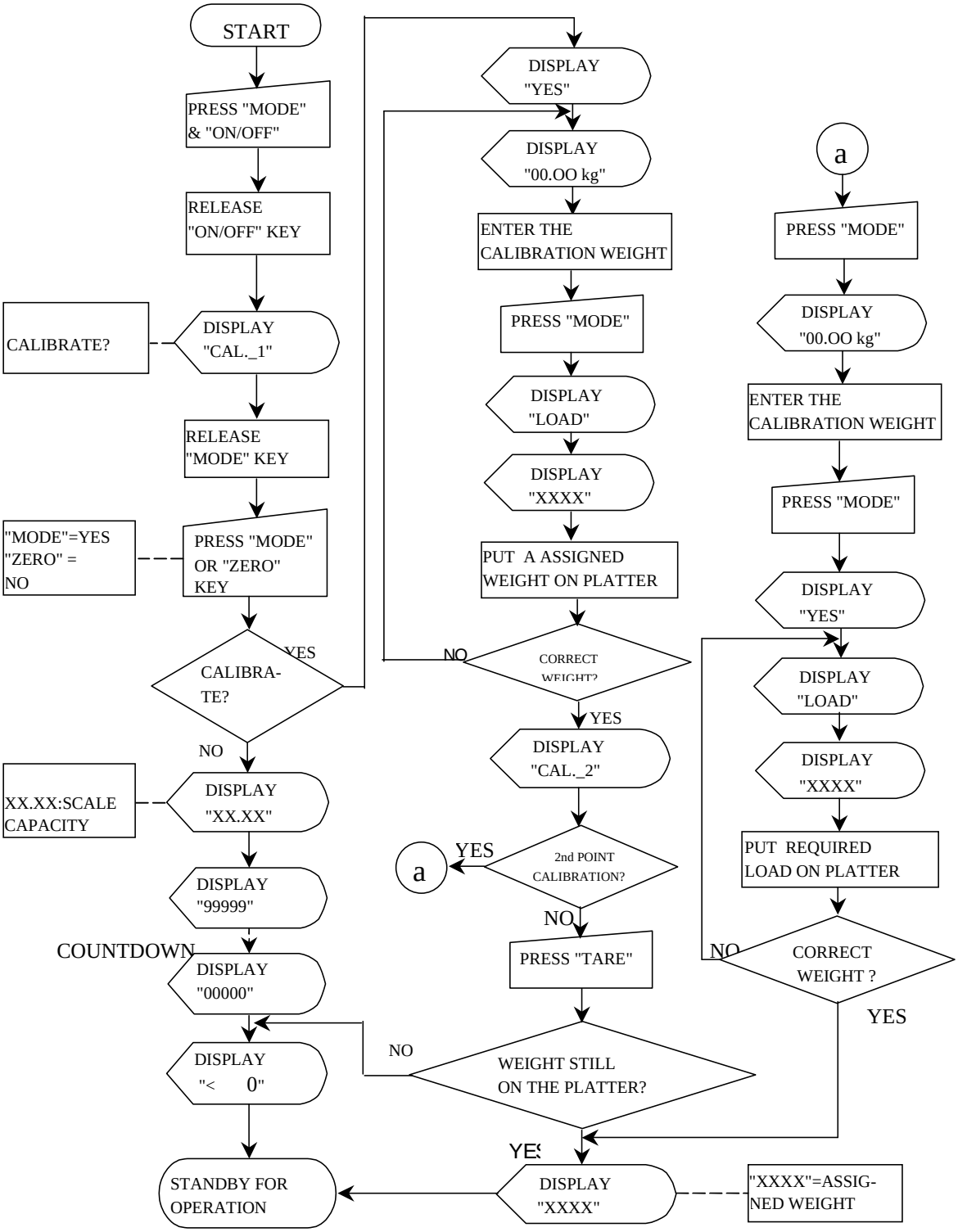
HOW TO ADJUST SPAN VALUE

The span value is controlled by resistor located on R9, standard resistor value of R9 is listed on the above table. If the required span value is not attained, then change R9 resistor according to either case below:

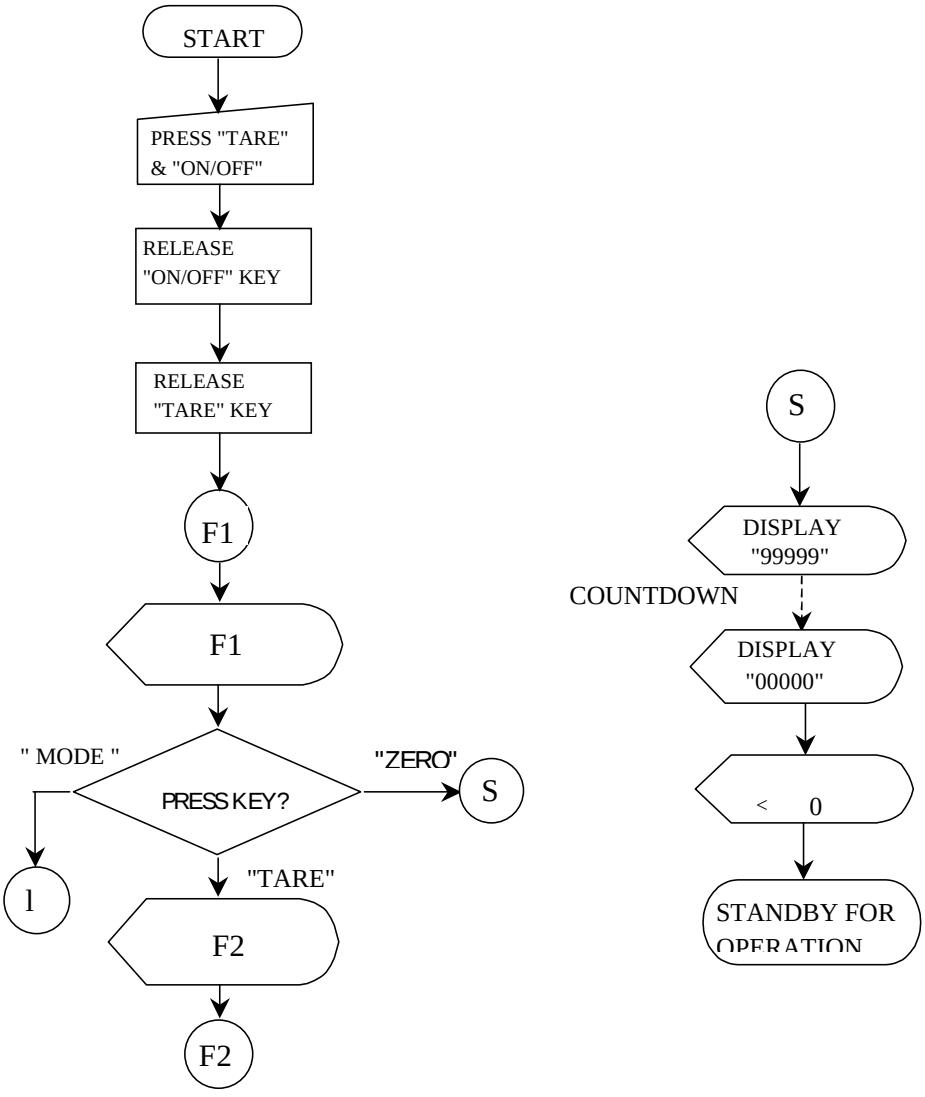
Span value too low: Decrease the resistance of R9.
Span value too high: Increase the resistance of R9.

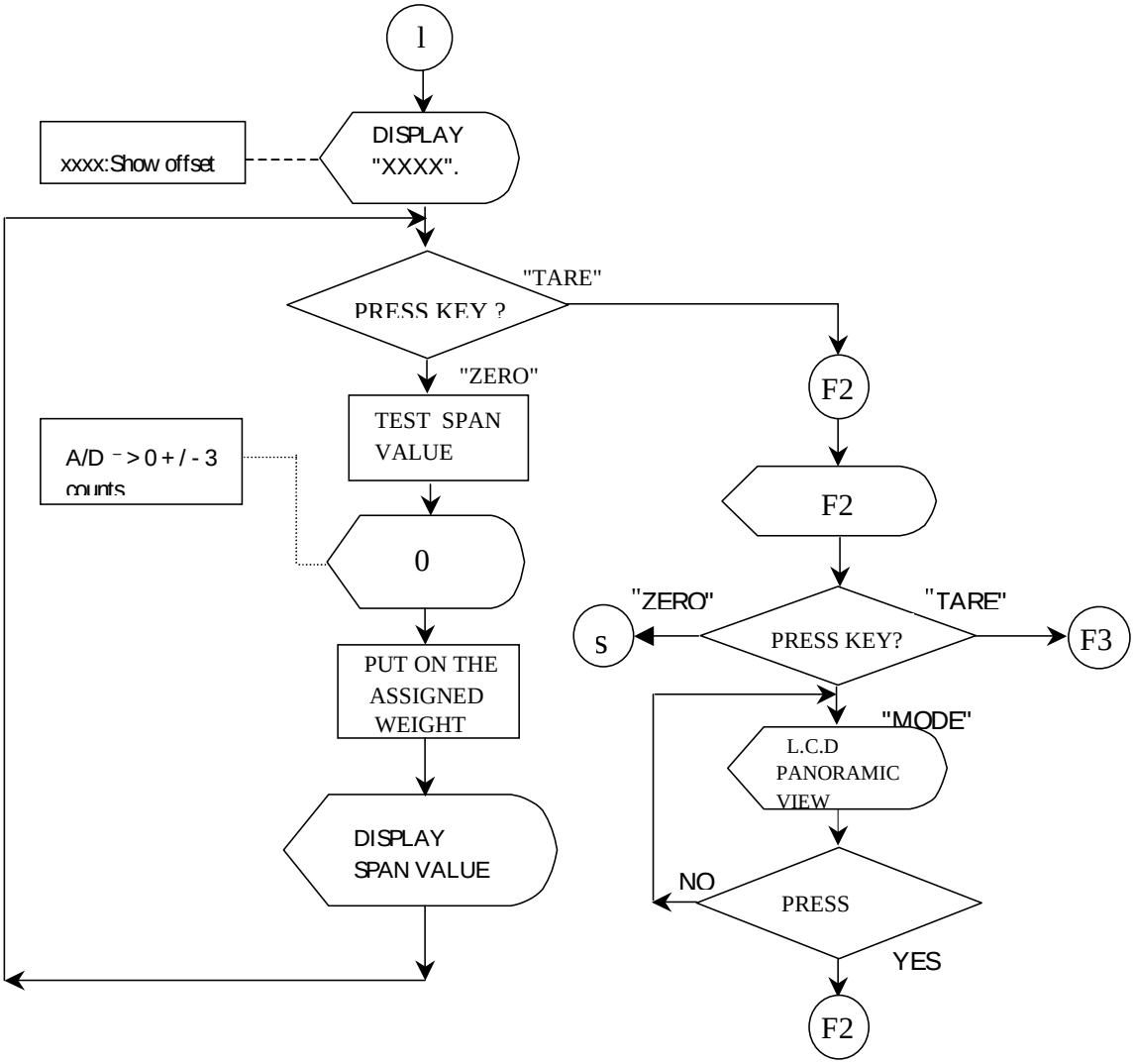
3.5 FLOW CHART

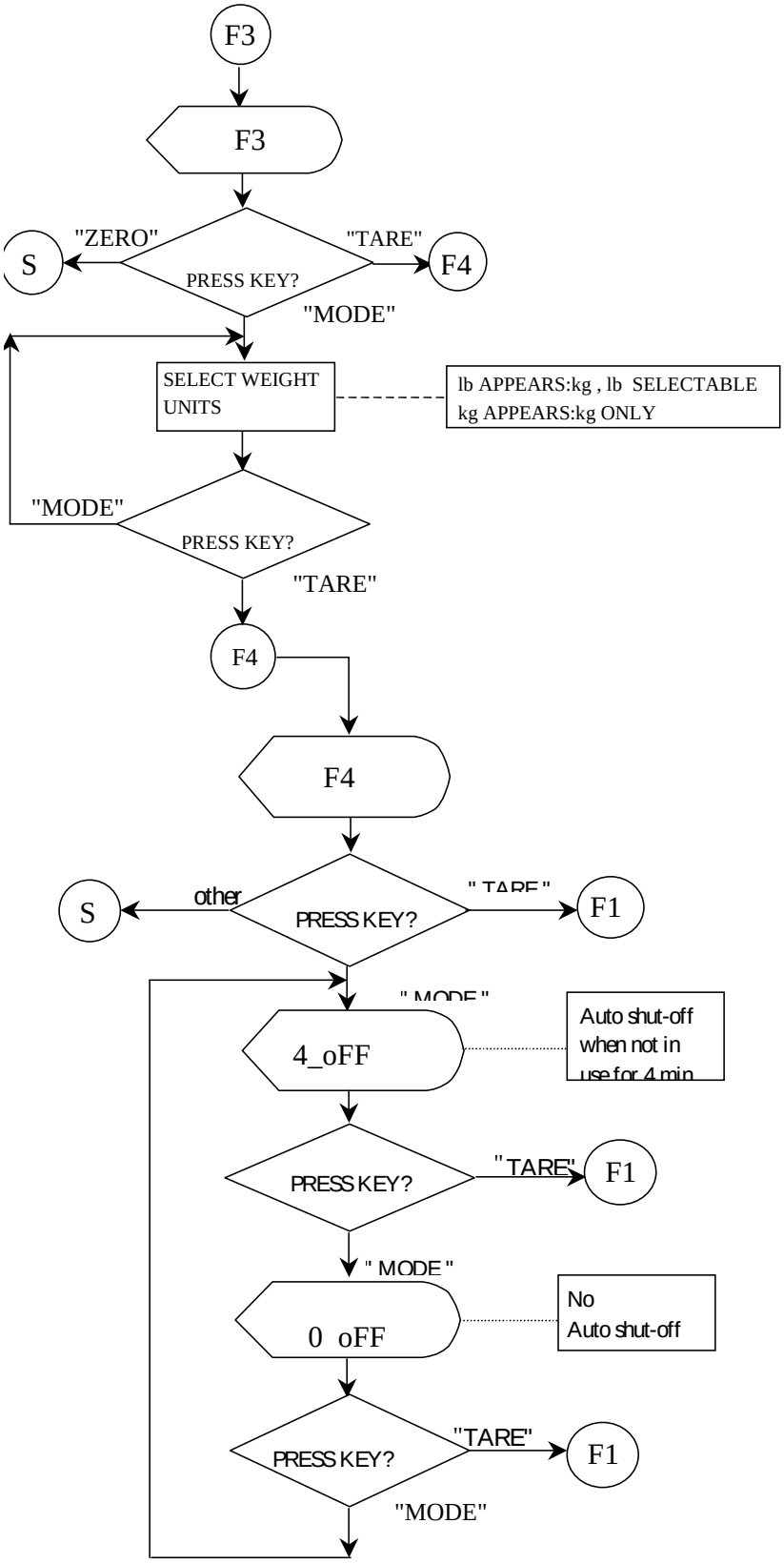
3.5.1 Calibration



3.5.2 Function Test (for technicians only)

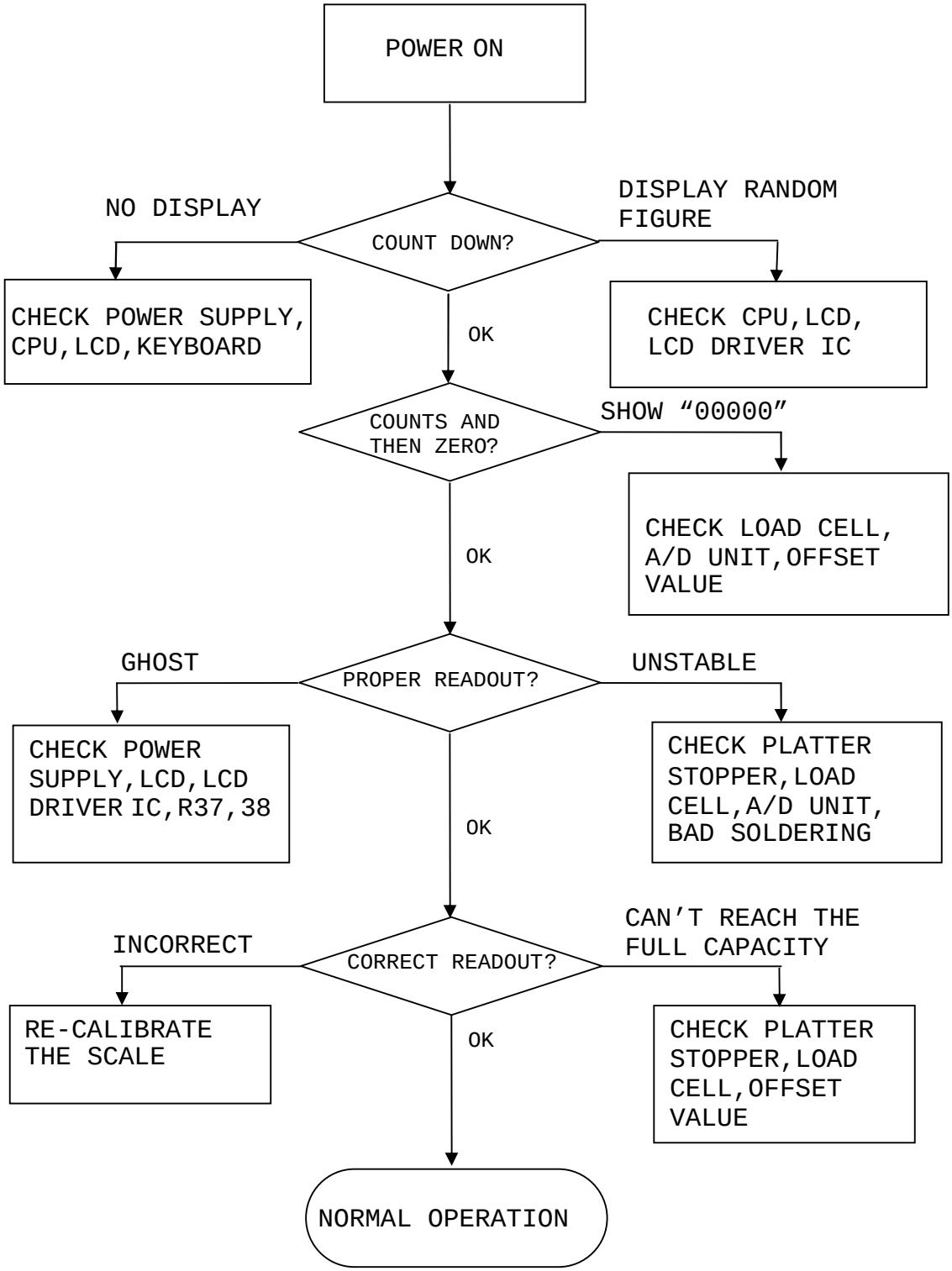



1
DISPLAY
"XXXX".
xxxx: Show offset
"TARE"
PRESS KEY ?
"ZERO"
TEST SPAN
VALUE
A/D -> 0 + / - 3
counts
0
PUT ON THE
ASSIGNED
WEIGHT
DISPLAY
SPAN VALUE
F2
F2
"ZERO"
"TARE"
S
PRESS KEY?
F3
"MODE"
L.C.D
PANORAMIC
VIEW
NO
PRESS
YES
F2


F3
F3
"ZERO"
"TARE"
S
PRESS KEY?
F4
"MODE"
SELECT WEIGHT UNITS
lb APPEARS:kg , lb SELECTABLE
kg APPEARS:kg ONLY
"MODE"
PRESS KEY?
"TARE"
F4
F4
other
PRESS KEY?
" TARE "
S
F1
" MODE "
4_oFF
Auto shut-off when not in use for 4 min
PRESS KEY?
" TARE "
F1
" MODE "
0 oFF
No Auto shut-off
PRESS KEY?
"TARE"
F1
"MODE"

4.TROUBLE SHOOTING

4.1 TROUBLE SHOOTING LOOP

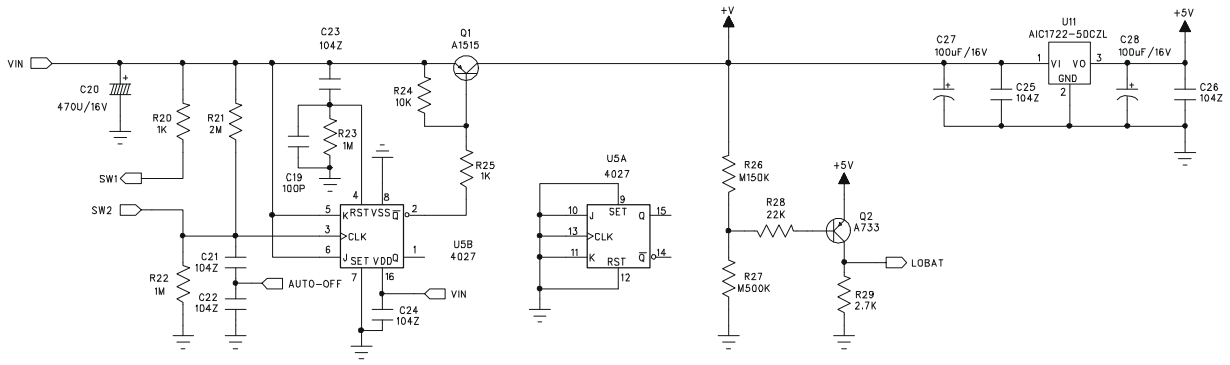


4.2 PARTS AND COMPONENTS TROUBLE SHOOTING

4.2.1 Power Supply Checking

4.2.1.1 Relevant parts:

Main Board (PM-11-X)
Q1 (A1515)
Q2 (A733)
U5 (IC 4027)
U11(AIC 1722-5.0)



Description:

1) Power source: Rechargeable Battery 6V/4Ah or constant DC6V source.

2) +5V power drives analog and digital circuit system.
   U11 (AIC 1722-5.0) is a 5volts Voltage Regulator.

3) Auto-off:
   If the scale is set by 4_oFF of power-saving function or under LO-BAT situation, after fixed time interval, CPU will release a low to high pulse signal to toggle U5, then Q1 cuts off, scale will be shut down immediately.

4) Low Power Detection:
   The Q2(C945) is designed to detect the power level. When battery power is less than 5.5V, the collector pole will become low potential, 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.

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 Platter Stopper 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.

4.2.3 LCD Display Checking

4.2.3.1 Check that it is soldered and connected properly between LCD and driver IC (PCF8576), driver IC (PCF8576) 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 +5V powers are correctly fed to the A/D unit.

4.2.5.2 Check that the signal output of load cell is normal.

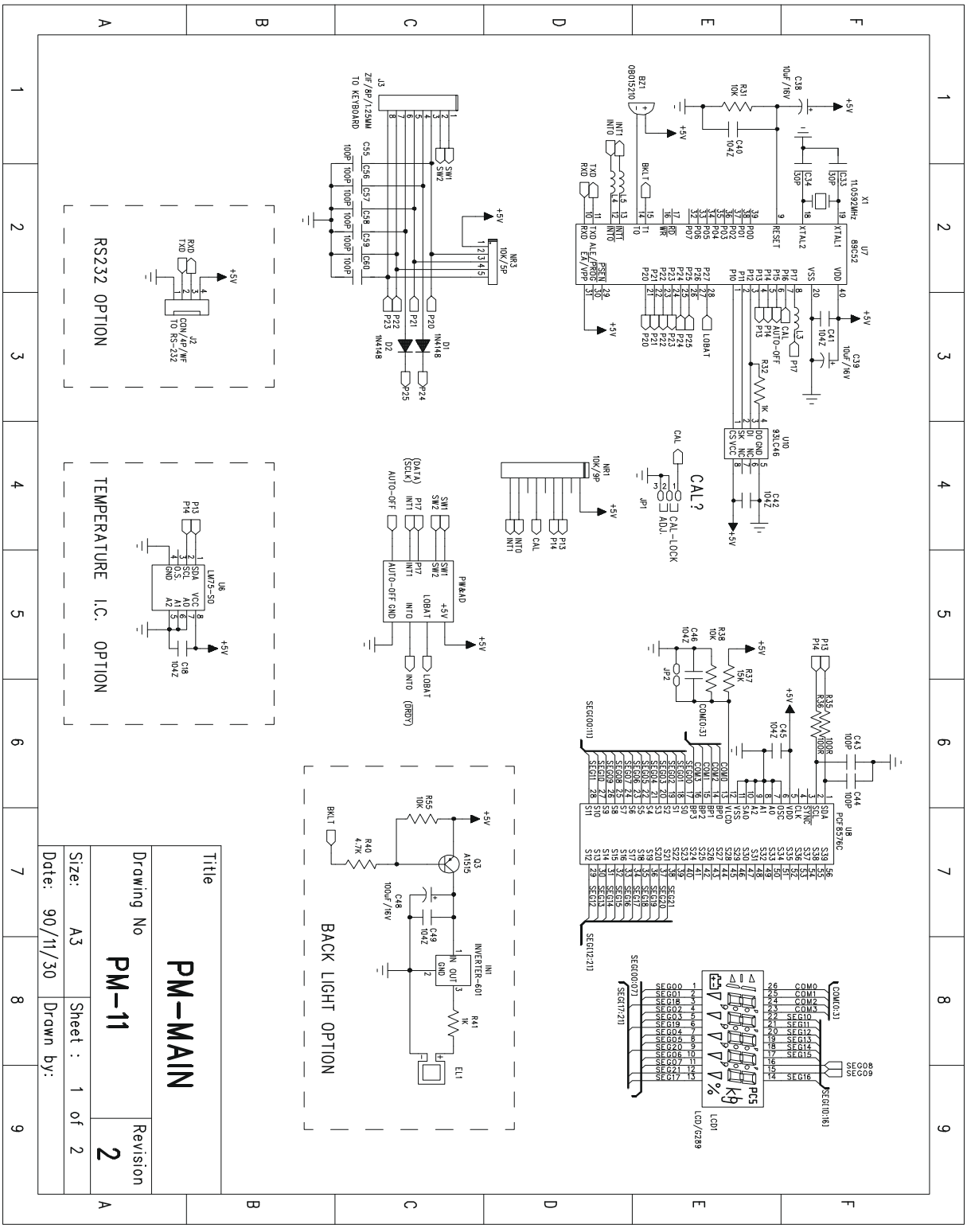
4.2.5.3 Check OP. Amplifiers & A/D Converter (AD7705).

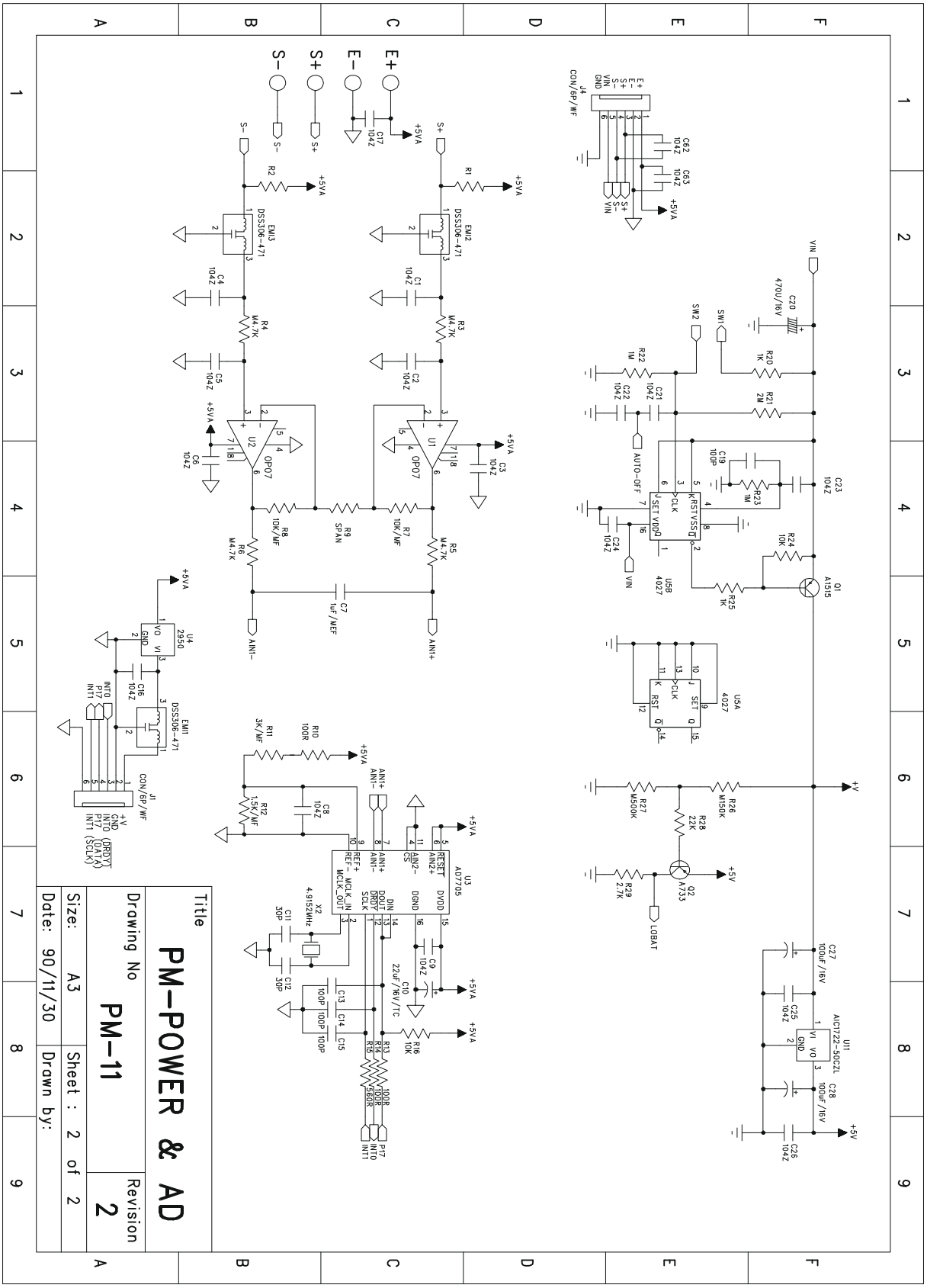
When no error is found with the above checking procedures, the trouble can be caused on the load cell or the PCB itself. Replace a new one could be better to identify the defective.

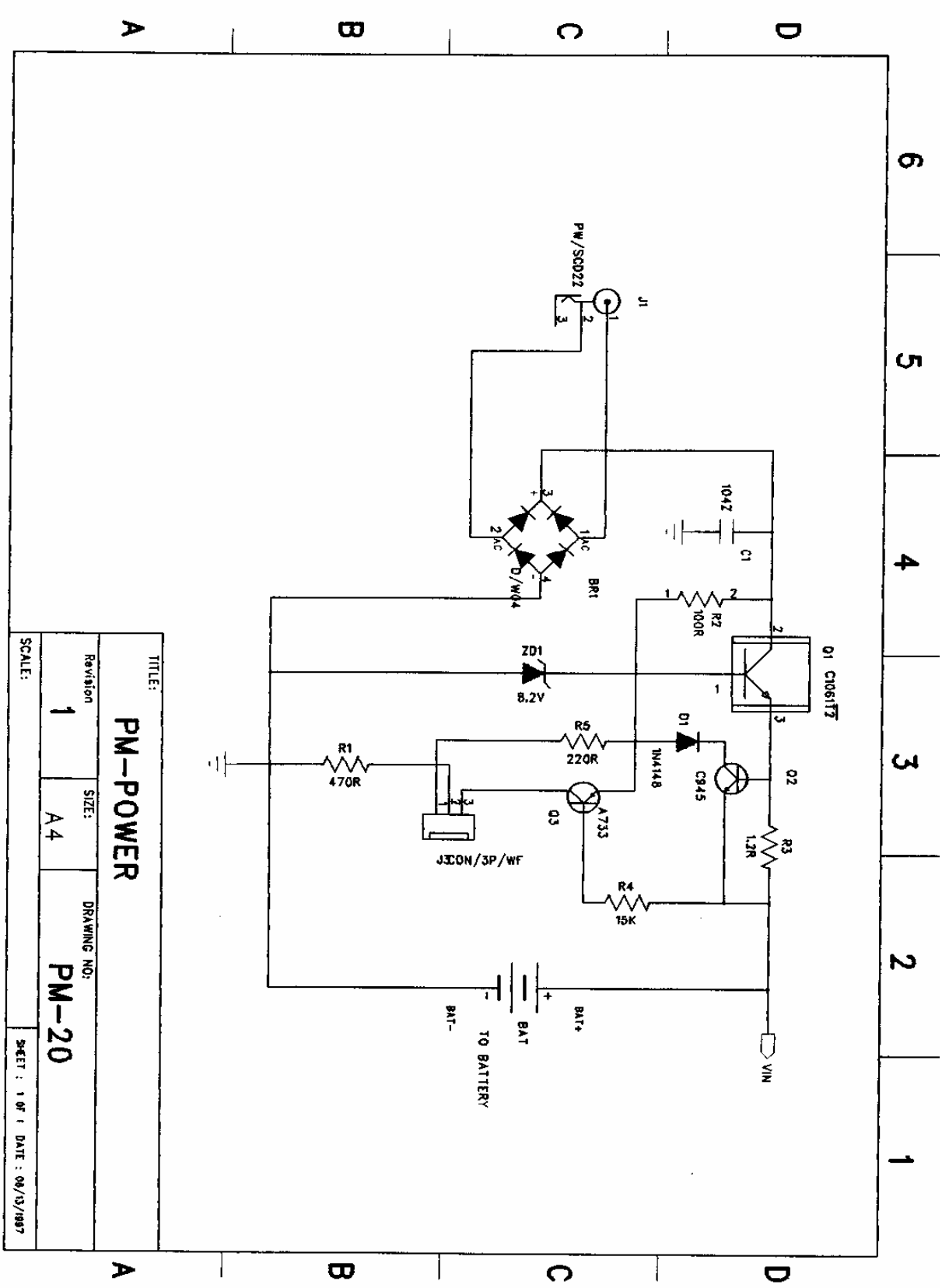
In this way, the readout of weight would be varied because of the output voltage of load cell and different span value, so re-calibration is required after this replacement.

5.ELECTRICAL CIRCUITRY

5.1 SCHEMATICS

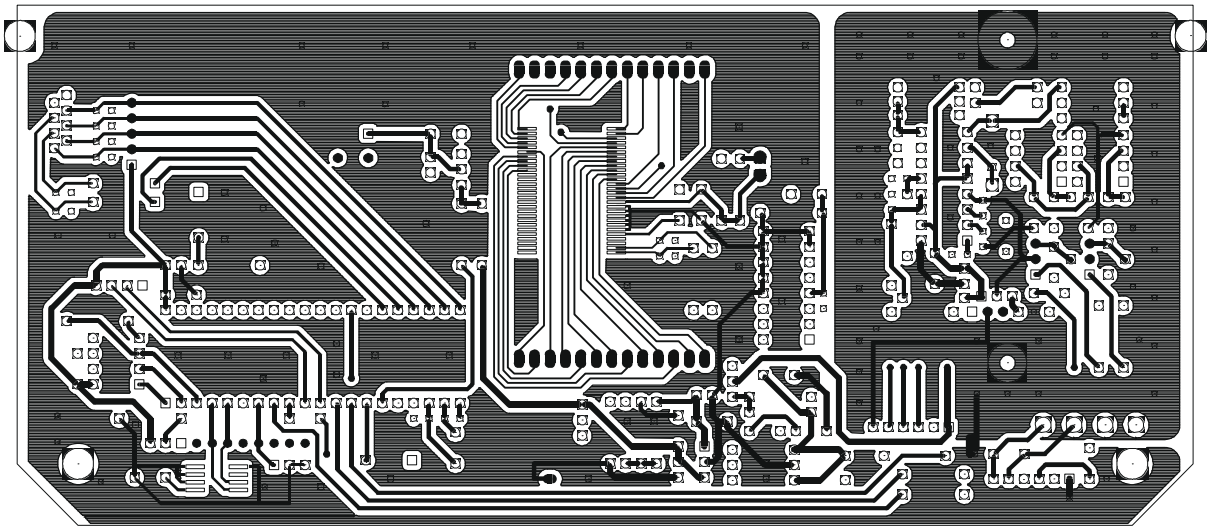



Title
PM-POWER & AD
Drawing No
PM-11
Revision
2
Size: A3
Sheet : 2 of 2
Date: 90/11/30
Drawn by:


PW/SCD22
J1
1042
C1
BR1
D/W04
100R
R2
ZD1
8.2V
Q1 C1061T3
R5
220R
D1
1N4148
C945
Q2
R1
470R
Q3
A733
R3
1.2R
JSCON/3P/WF
R4
15K
BAT
BAT+
BAT-
TO BATTERY
VIN
TITLE:
PM-POWER
Revision
1
SIZE:
A4
DRAWING NO:
PM-20
SCALE:
SHEET : 1 OF 1 DATE : 08/13/1997

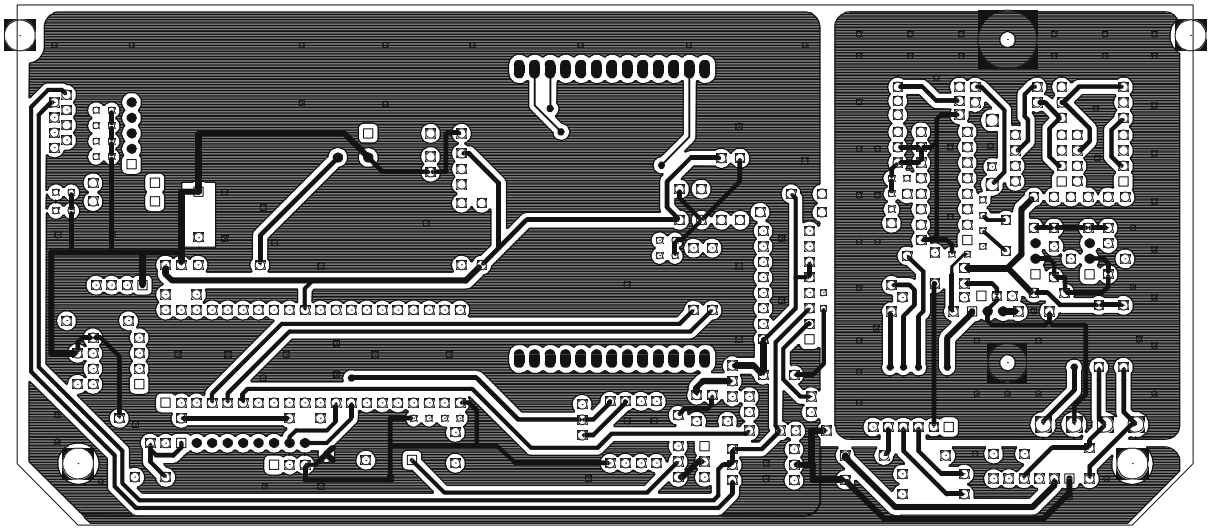
1.2 PCB LAYOUT

COMPONENT SIDE (1)



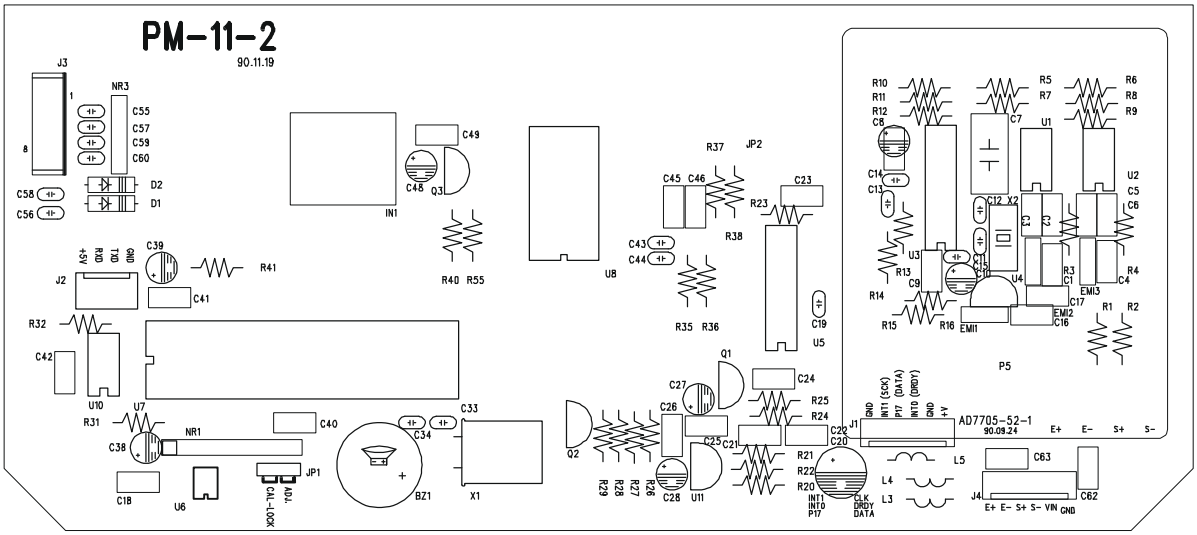
PM-11-2 TOP LAYER

SOLDER SIDE (2)



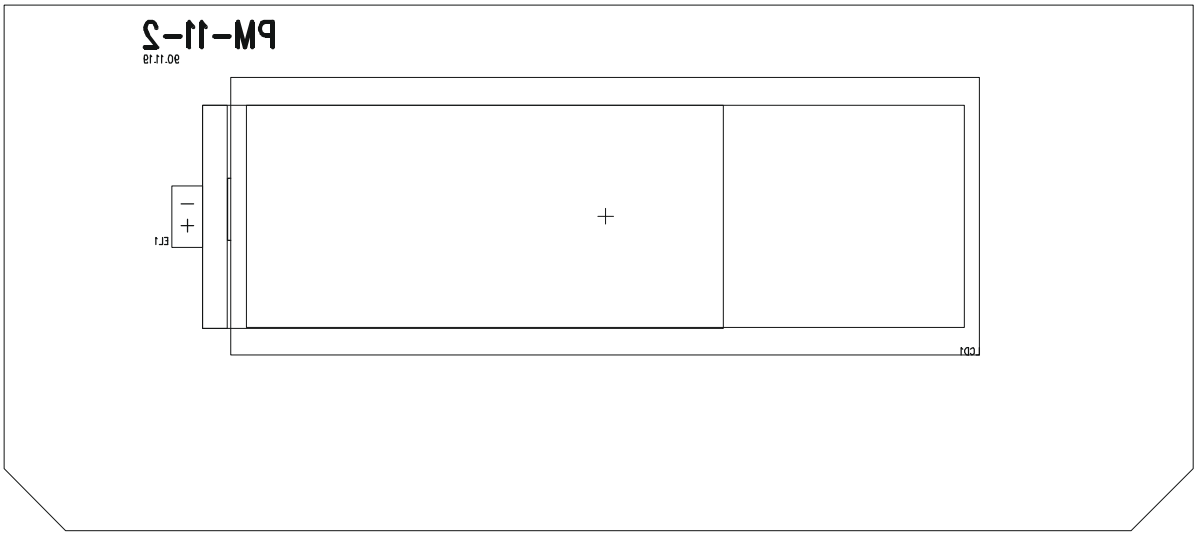
PM-11-2 BOTTOM LAYER

COMPONENT SILK SCREEN (11)

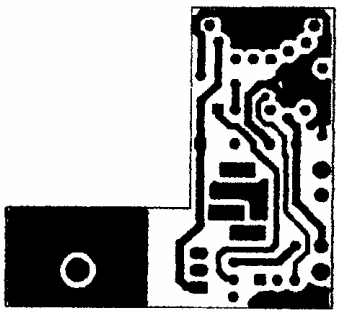


PM-11-2 TOP OVERLAY

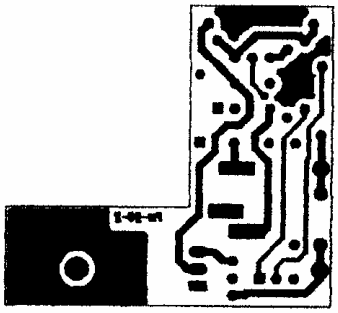
SOLDER SILK SCREEN (17)



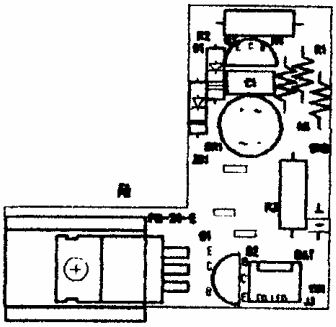
PM-11-2 BOTTOM OVERLAY



PM-20-2
TOP LAYER



PM-20-2
BOTTOM LAYER



PM-20-2
TOP OVERLAY

6.BILL OF MATERIAL

STRUCTURE

Parts No.	Description	Specification	Qty	Remark
G0001BW1000	PLASTIC HOUSING:BASE	BW SERIES(GRAY)	1	
G0001BW1100	PLASTIC HOUSING:UPPER	BW SERIES(WHITE)	1	
G0002BW1000	PLASTIC PLATTER	BW SERIES	1	
F0003BW1001	L/C ALUMINUM LOWER SUPPORT	BW SERIES(M4 OPENINGS)	1	
F0003BW1000	L/C ALUMINUM UPPER SUPPORT	BW SERIES(5MM OPENNINGS)	1	
A0071000***	LOAD CELL	1022 OR EQUIVALENT	1	
G0005BW1000	PLATTER BEARING RUBBER	BW SERIES	6	
A1600060400	RECHARGEABLE BATTERY	6V 4AH	1	
G0009EM0002	BATTERY COVER	EM SERIES(GRAY)	1	
A1205010210	CONDUCTIVE WIRE	21cm(BLACK)	1	
A1205010212	CONDUCTIVE WIRE	21cm(RED)	1	
A1206060001	SIGNAL CABLE(6 WIRES,COILED)	10x20x30cm, 5mm, BW SERIES	1	
A0905600601	CONNECTOR	6 PIN(PLT-166-P)	1	
G0004BW1000	ADJUSTABLE FEET	BW SERIES	4	
G0003PM0001	PLASTIC SUPPORT	L SHAPE NYLON (GRAY)	1	
F0002PM0000	S/S PLATTER COVER	PM SERIES	1	
G0030BW1000	PILLAR SUPPORT	BW SERIES, PLASTIC	1	
A5001000700	CABLE MOUNTING PLATE	WC-1, FOR PILLAR SUPPORT	1	
G0030BW1001	PILLAR SWIVEL BASKET	BW SERIES	1	
F0004BW1000	S/S PILLAR	25mm x 475mm	1	
T0010000025	HEXAGON SCREW DRIVER	2.5mm	1	
Z6BW1000010	PACKING BOX	FOR OPTIONAL PARTS	1	
X1PM0000000	OPERATION MANUAL	PM SERIES	1	
Z6BW1000000	PACKING CARTON	BW SERIES	1	
A0905600600	CONNECTOR	6 PIN(PLT-166-R)	1	
A1007000004	FERRITE CODE	T-28.3*13.8*13.5mm	1	FOR WIRE ARRAY
A1202060401	WIRE ARRAY(SINGLE HOUSING)	6 PIN 40cm	1	
B0BW1000000	KEYBOARD	BW SERIES 9KEY	1	
C1BW1000000	PANEL PC	BW SERIES 119x40.5x1mm	1	
G0001BW1001	PLASTIC HOUSING(UNDER)	BW SERIES (GRAY)	1	
G0001BW1101	PLASTIC HOUSING(UPPER)	BW SERIES (WHITE)	1	
G0004BW1100	RUBBER PAD	BW SERIES	4	
C1PM0030***	OVERLAY PC	PM SERIES	1	
E1PM0000030	P.C.B. KIT	PM-11-2 MAINBOARD	1	
E1PM0010000	P.C.B. KIT	PM-20-2 POWER BOARD	1	
A60********	ADAPTOR	***V/9V, 500mA	1	

PM-11-2 MAINBOARD

E0PM0000030	P.C.B.	PM-11-2	1	
A0102000289	L.C.D.	G289	1	LCD1
A0201089521	I.C.	89C52	1	U4
A0202093461	I.C.	93C46	1	U10
A0205040270	I.C.	4027	1	U5
A0207017225	VOLTAGE REGULATOR I.C.	AIC1722-50CZT	1	U11
A0208085760	I.C.	PCF8576CT	1	U8
A0300000040	I.C. SOCKET	40 PIN	1	U7
A0401007330	TRANSISTOR	A733	1	Q2
A0401015150	TRANSISTOR	A1515	1	Q1
A0501004148	DIODE	1N4148	2	D1-2
A0701106017	CAPACITOR (EC)	10uF/25V(SS TYPE)	2	C38-39
A0701107016	CAPACITOR (EC)	100uF/16V	2	C27-28
A0701477016	CAPACITOR (EC)	470uF/16V	1	C20
A0730104050	CAPACITOR (MLC)	104Z	13	C21-26,C40-42,C45-46
A0730104050	CAPACITOR (MLC)	104Z		C62-63
A0740030050	CERAMIC CAPACITOR (CC)	30pf/50V(30)	2	C33-34
A0740101050	CERAMIC CAPACITOR (CC)	100pf/50V(101)	9	C19,C43-44,C55-60
A0804041503	METAL FILM RESISTOR	150KΩ 1/4W	1	R26
A0804045003	METAL FILM RESISTOR	500KΩ 1/4W	1	R27
A0805041101	CARBON FILM RESISTOR	100Ω 1/4W	2	R35-36
A0805041102	CARBON FILM RESISTOR	1KΩ 1/4W	3	R20,R25,R32
A0805041103	CARBON FILM RESISTOR	10KΩ 1/4W	3	R24,R31,R38
A0805041105	CARBON FILM RESISTOR	1MΩ 1/4W	2	R22-23
A0805041153	CARBON FILM RESISTOR	15KΩ 1/4W	1	R37
A0805041205	CARBON FILM RESISTOR	2MΩ 1/4W	1	R21
A0805041223	CARBON FILM RESISTOR	22KΩ 1/4W	1	R28
A0805041272	CARBON FILM RESISTOR	2.7KΩ 1/4W	1	R29
A0802010305	RESISTOR NETWORK	10KΩ 5 PIN	1	NR3
A0802010309	RESISTOR NETWORK	10KΩ 9 PIN	1	NR1
A0901010060	CONNECTOR	6 PIN WAFER	1	J4
A0907010030	CONNECTOR	1 * 3 PIN 180°	1	JP1
A0910000080	CONNECTOR	8 PIN (ZIF)	1	J3
A0910100130	SOCKET STRIPS	SIP 1*13 (FEMALE)	2	LCD1
A0910111020	MINI JUMPER	PITCH 2.54	1	JP1
A1005030512	FERRITE BEAD	3.5*6*0.8m	3	L3-5
A1100211059	CRYSTAL	11.0592MHZ	1	X1
A1500000004	BUZZER	OBO-15210	1	BZ1

BACK LIGHT OPTION

A0401015150	TRANSISTOR	A1515	1	Q3
A1401005000	BACK LIGHT INVERTER	5V/90 ㎝ 2	1	IN1
A0701107016	CAPACITOR (EC)	100uF/16V	1	C48
A0730104050	CAPACITOR (MLC)	104Z	1	C49
A0805041102	CARBON FILM RESISTOR	1KΩ 1/4W	1	R41
A0805041103	CARBON FILM RESISTOR	10KΩ 1/4W	1	R55
A0805041472	CARBON FILM RESISTOR	4.7KΩ 1/4W	1	R40
A1400000006	BACK LIGHT(EL)	130.0*44 mm	1	EL1

A/D SECTION

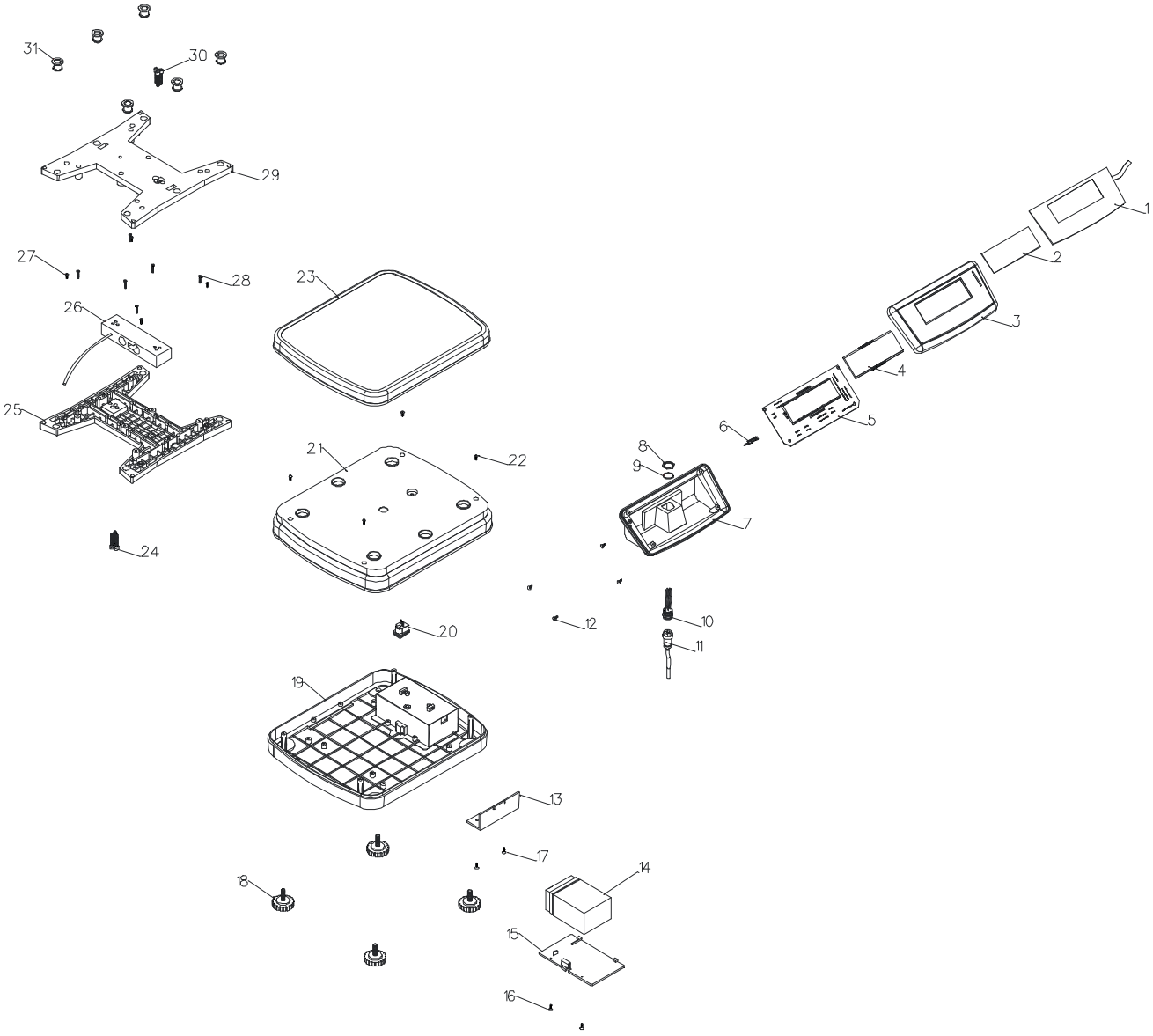
A0203077050	I.C.	AD7705AN	1	U3
A0206000072	I.C	OP177	2	U1-2
A0207029500	VOLTAGE REGULATOR I.C.	AS2950AW	1	U4
A0702226016	CAPACITOR (TC)	22uF/16V(226)	1	C10
A0713105063	POLYESTER FILM CAPACITOR(MEF)	1uF/63V (105)	1	C7
A0730104050	CAPACITOR (MLC)	104Z	10	C1-6,C8-9,C16-17
A0740030050	CERAMIC CAPACITOR (CC)	30pf/50V(30)	2	C11-12
A0740101050	CERAMIC CAPACITOR (CC)	100pf/50V(101)	3	C13-15
A0803041002	METAL FILM RESISTOR	10KΩ 1/4W	2	R7-8
A0803041501	METAL FILM RESISTOR	1.5KΩ 1/4W	1	R12
A0803043001	METAL FILM RESISTOR	3KΩ 1/4W	1	R11
A080304XXXX	METAL FILM RESISTOR	XKΩ 1/4W	1	R9 (SPAN)
A0804044701	METAL FILM RESISTOR	4.7KΩ 1/4W	4	R3-6
A0805041101	CARBON FILM RESISTOR	100Ω 1/4W	3	R10,R13-14
A0805041103	CARBON FILM RESISTOR	10KΩ 1/4W	1	R16
A0805041561	CARBON FILM RESISTOR	560Ω 1/4W	1	R15
A1008000001	EMI FILTER	DSS-306-55Y5S471M100	3	EMI1-3
A1100249152	CRYSTAL	4.9152MHZ	1	X2
F0015000012	PROTECTION BOX	7705-52-1 (UPPER)	1	
F0015000013	PROTECTION BOX	7705-52-1 (UNDER)	1	
Z0010000305	SCREW	M3*6	2	

PM-20-2 POWER BOARD

E0PM0010000	P.C.B.	PM-20-2	1	
A0730104050	CAPACITOR(MLC)	0.uF/50V(104Z)	1	C1
A0502000001	BRIDGE RECTIFIER	W04(1A)	1	BR1
A0501004148	DIODE	1N4148	1	D1
A0401009450	TRANSISTOR	2SC945	1	Q2
A0401010610	TRANSISTOR	H1061C OR D880	1	Q1
A0401007330	TRANSISTOR	A733	1	Q3
A0906000220	D.C. JACK	SCD-022(BLACK)	1	J1
A0805041153	CARBON FILM RESISTOR	15KΩ,1/4W	1	R4
A0805041221	CARBON FILM RESISTOR	220Ω,1/4W	1	R5
A0805041471	CARBON FILM RESISTOR	470Ω,1/4W	1	R1
A0805020120	CARBON FILM RESISTOR	1.2Ω,1/2W	1	R3
A0805021101	CARBON FILM RESISTOR	100Ω,1/2W	1	R2
A0503020082	ZENER DIODE	1/2W 8.2V(9A3)	1	ZD1
A0504000002	HEAT SINK	MB-204-20	1	Q1
Z0011000308	SCREW	M3 x 8	1	
Z0016000003	NUT	M3	1	

7.APPENDIX

PARTS EXPLOSION:



ITEM	PART NO.	PART NAME	DESCRIPTION	QTY
1	F0002PM0000	STAINLESS PLATTER	PM SERIES	1
2	G0002BW1000	PLASTIC PLATTER	BW SERIES	1
3	G0001BW1100	PLASTIC HOUSING:UPPER	BW SERIES(WHITE)	1
4	F0003BW1000	L/C ALUMINUM UPPER SUPPORT	BW SERIES(5MM OPENNINGS)	1
5	A0071000***	LOAD CELL	T.H. 1022 OR EQUIVALENT	1
		APM-15	LOAD CELL CAPACITY = 20kg	
		APM-30	LOAD CELL CAPACITY = 35kg	
		APM-60	LOAD CELL CAPACITY = 100kg	
		APM-150	LOAD CELL CAPACITY = 200kg	
6	F0003BW1001	L/C ALUMINUM LOWER SUPPORT	BW SERIES(M4 OPENINGS)	1
7	G0001BW1000	PLASTIC HOUSING:BASE	BW SERIES(GRAY)	1
8	E1PM0010000	P.C.B. KIT	PM-20-2 POWER BOARD	1
9	G0003PM0001	PLASTIC SUPPORT	L SHAPE NYLON (GRAY)	1
10	A1600060400	RECHARGEABLE BATTERY	6V 4AH	1
11	G0009EM0002	BATTERY COVER	EM SERIES(GRAY)	1
12	G0004BW1000	ADJUSTABLE FEET	BW SERIES	4
13	G0004BW1100	RUBBER PAD	BW SERIES	4
14	B0BW1000000	KEYBOARD	BW SERIES 9KEY	1
15	C1BW1000000	PANEL PC	BW SERIES 119x40.5x1mm	1
16	G0001BW1101	PLASTIC HOUSING(UPPER)	BW SERIES (WHITE)	1
17	A0102000289	L.C.D.	G289	1
18	E1PM0000030	P.C.B. KIT	PM-11-2 MAINBOARD	1
19	G0001BW1001	PLASTIC HOUSING(UNDER)	BW SERIES (GRAY)	1
20	A1202060401	WIRE ARRAY(SINGLE HOUSING)	6 PIN 40cm	1
21		NUT	6 PIN(PLT-166-R)	1
22		WASHER	6 PIN(PLT-166-R)	1
23	A0905600600	CONNECTOR	6 PIN(PLT-166-R)	1
24	A1206060001	SIGNAL CABLE(6 WIRES,COILED)	10x20x30cm, 5mm, BW SERIES	1
25		SCREW	M3x10(TAPED)	16
26		SCREW	M6x25	6
27		SCREW	M4x20, NYLOK	6

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

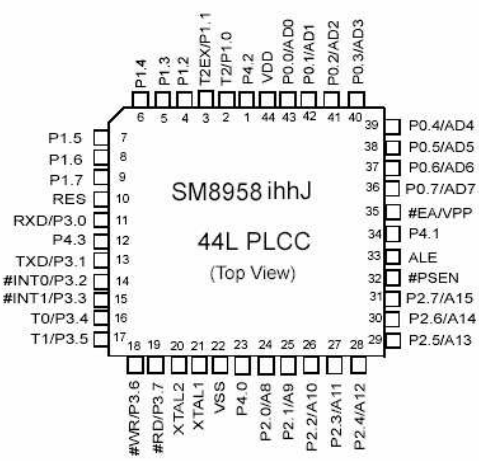
- Working voltage: 3.0V ~ 3.6V For L Version
  4.5V ~ 5.5V For C Version
- General 8052 family compatible
- 12 clocks per machine cycle
- 32 KB internal flash memory
- 1024 bytes data RAM
- 3 16 bit timers/counters
- Four 8-bit I/O ports for PDIP package
- Four 8-bit I/O ports + one 4-bit I/O ports for 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)

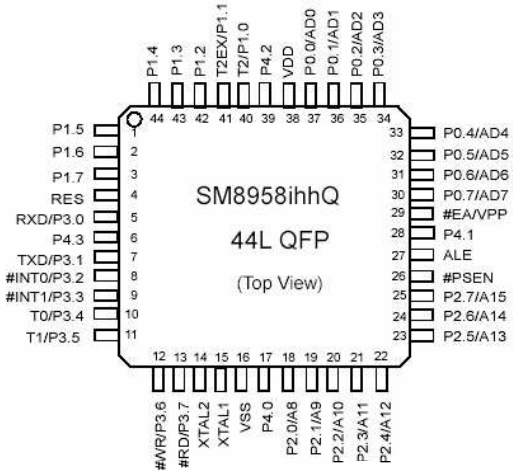
Taiwan
4F, No. 1 Creation Road 1,
Science-based Industrial Park,
Hsinchu, Taiwan 30077

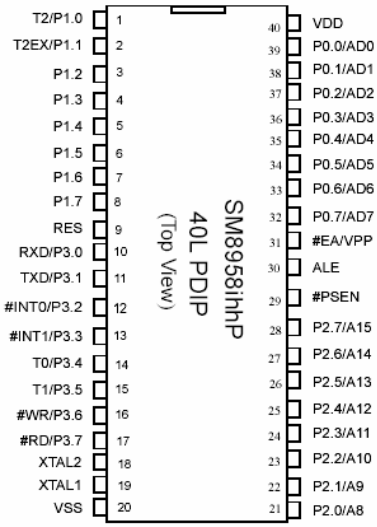
TEL: 886-3-579-2926
886-3-579-2988
FAX: 886-3-579-2960
886-3-578-0493

Specifications subject to change without notice,contact your sales representatives for the most recent information.

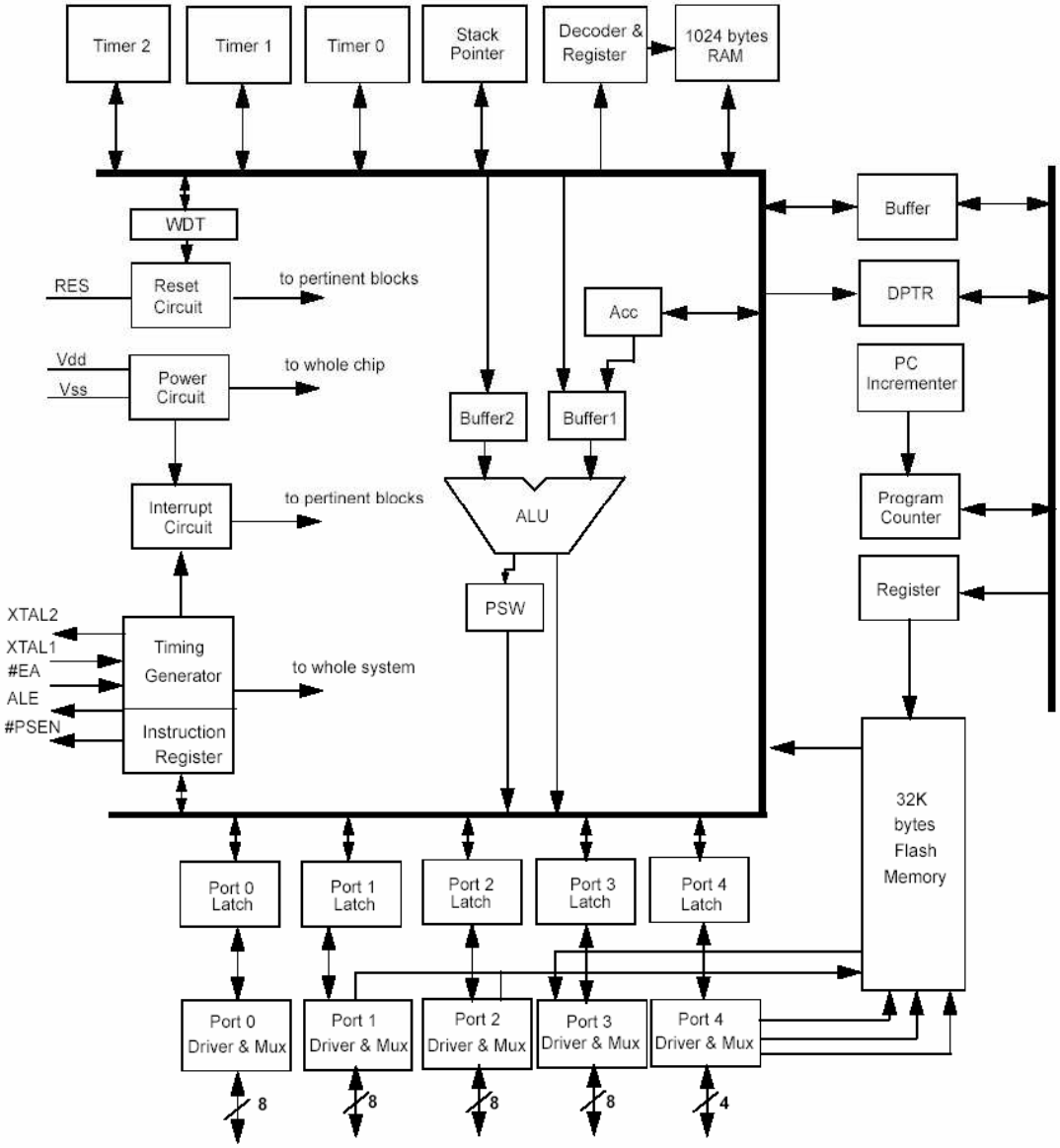
Pin Configurations







Block Diagram



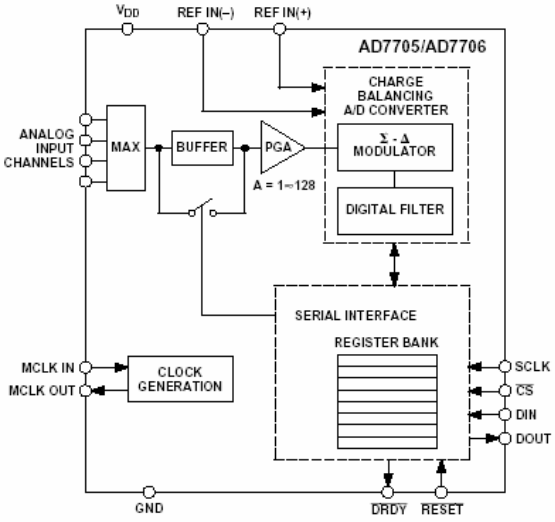
3 V/5 V, 1 mW
2-/3-Channel 16-Bit, Sigma-Delta ADCs

AD7705/AD7706*

FEATURES

AD7705: Two Fully Differential Input Channel ADCs
AD7706: Three Pseudo Differential Input Channel ADCs
16 Bits No Missing Codes
0.003% Nonlinearity
Programmable Gain Front End
Gains from 1 to 128
Three-Wire Serial Interface
SPI™, QSPI™, MICROWIRE™ and DSP Compatible
Schmitt Trigger Input on SCLK
Ability to Buffer the Analog Input
2.7 V to 3.3 V or 4.75 V to 5.25 V Operation
Power Dissipation 1 mW max @ 3 V
Standby Current 8 μA max
16-Lead DIP, 16-Lead SOIC and TSSOP Packages

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The AD7705/AD7706 are complete analog front ends for low frequency measurement applications. These two-/three-channel devices can accept low level input signals directly from a transducer and produce a serial digital output. They employ a sigma-delta conversion technique to realize up to 16 bits of no missing codes performance. The selected input signal is applied to a proprietary programmable gain front end based around an analog modulator. The modulator output is processed by an on-chip digital filter. The first notch of this digital filter can be programmed via an on-chip control register allowing adjustment of the filter cutoff and output update rate.

The AD7705/AD7706 operate from a single 2.7 V to 3.3 V or 4.75 V to 5.25 V supply. The AD7705 features two fully differential analog input channels while the AD7706 features three pseudo differential input channels. Both devices feature a differential reference input. Input signal ranges of 0 mV to +20 mV through 0 V to +2.5 V can be incorporated on both devices when operating with a V_{DD} of 5 V and a reference of 2.5 V. They can also handle bipolar input signal ranges of ±20 mV through ±2.5 V, which are referenced to the AIN(–) inputs on the AD7705 and to the COMMON input on the AD7706. The AD7705/AD7706, with 3 V supply and a 1.225 V reference, can handle unipolar input signal ranges of 0 mV to +10 mV through 0 V to +1.225 V. Its bipolar input signal ranges are ±10 mV through ±1.225 V. The AD7705/AD7706 thus perform all signal conditioning and conversion for a two- or three-channel system.

The AD7705/AD7706 are ideal for use in smart, microcontroller or DSP-based systems. They feature a serial interface that can be configured for three-wire operation. Gain settings, signal polarity and update rate selection can be configured in software using the input serial port. The part contains self-calibration and system calibration options to eliminate gain and offset errors on the part itself or in the system.

CMOS construction ensures very low power dissipation, and the power-down mode reduces the standby power consumption to 20 μW typ. These parts are available in a 16-lead, 0.3 inch-wide, plastic dual-in-line package (DIP), a 16-lead wide body (0.3 inch) small outline (SOIC) package and also a low profile 16-lead TSSOP.

PRODUCT HIGHLIGHTS

1. The AD7705/AD7706 consumes less than 1 mW at 3 V supplies and 1 MHz master clock, making it ideal for use in low power systems. Standby current is less than 8 μA.
2. The programmable gain input allows the AD7705/AD7706 to accept input signals directly from a strain gage or transducer, removing a considerable amount of signal conditioning.
3. The AD7705/AD7706 is ideal for microcontroller or DSP processor applications with a three-wire serial interface reducing the number of interconnect lines and reducing the number of opto-couplers required in isolated systems.
4. The part features excellent static performance specifications with 16 bits, no missing codes, ±0.003% accuracy and low rms noise (<600 nV). Endpoint errors and the effects of temperature drift are eliminated by on-chip calibration options, which remove zero-scale and full-scale errors.

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MICROWIRE is a trademark of National Semiconductor.

REV. A

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Tel: 781/329-4700 World Wide Web Site: http://www.analog.com
Fax: 781/326-8703
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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

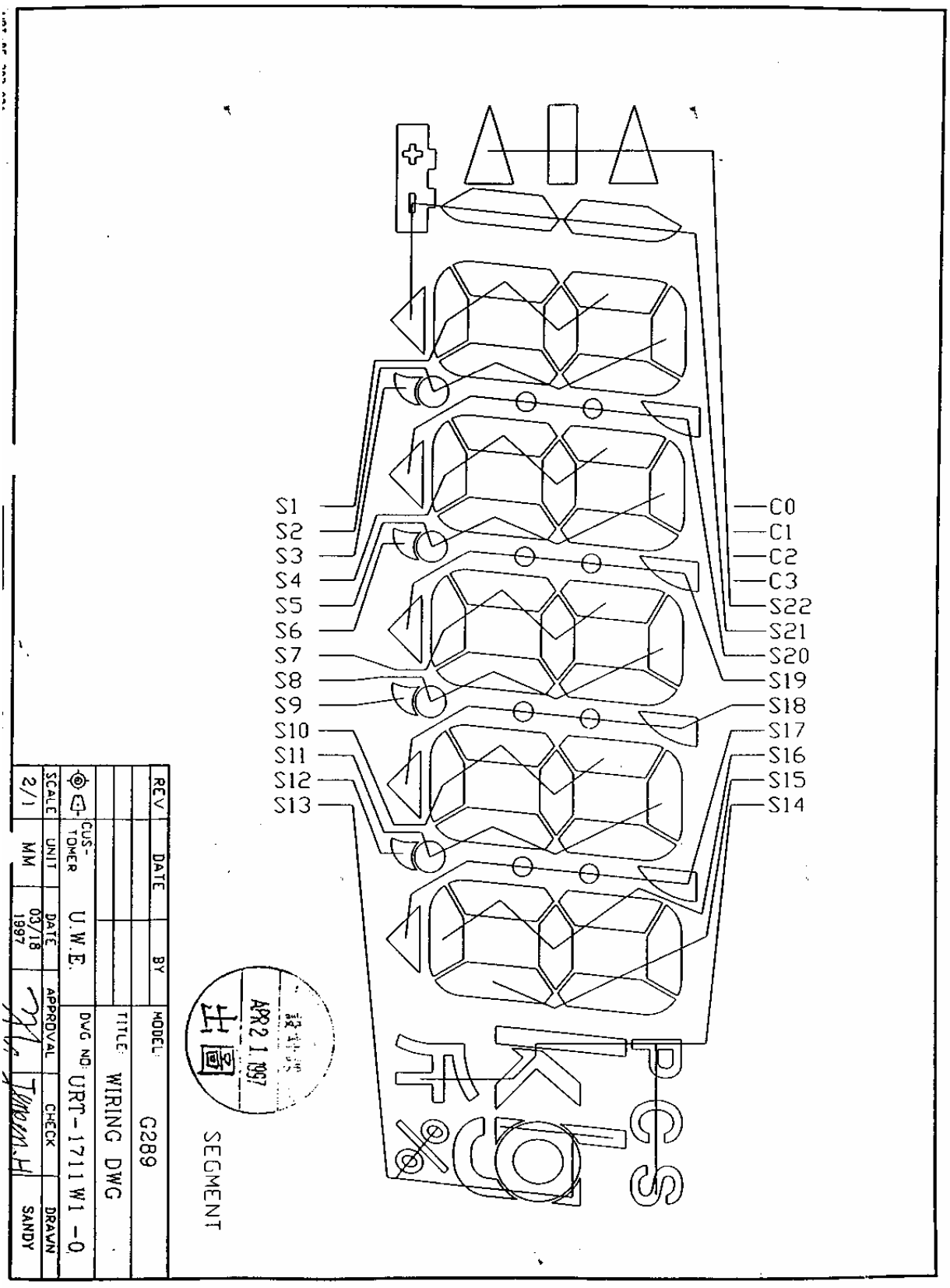
- May be cascaded for large LCD applications (up to 2560 segments possible)
- Cascadable with 24-segment LCD driver PCF8566
- Optimized pinning for plane wiring in both single and multiple PCF8576 applications
- Space-saving 56-lead plastic very small outline package (VSO56)
- Very low external component count (at most one resistor, even in multiple device applications)
- Compatible with chip-on-glass technology
- Manufactured in silicon gate CMOS process.

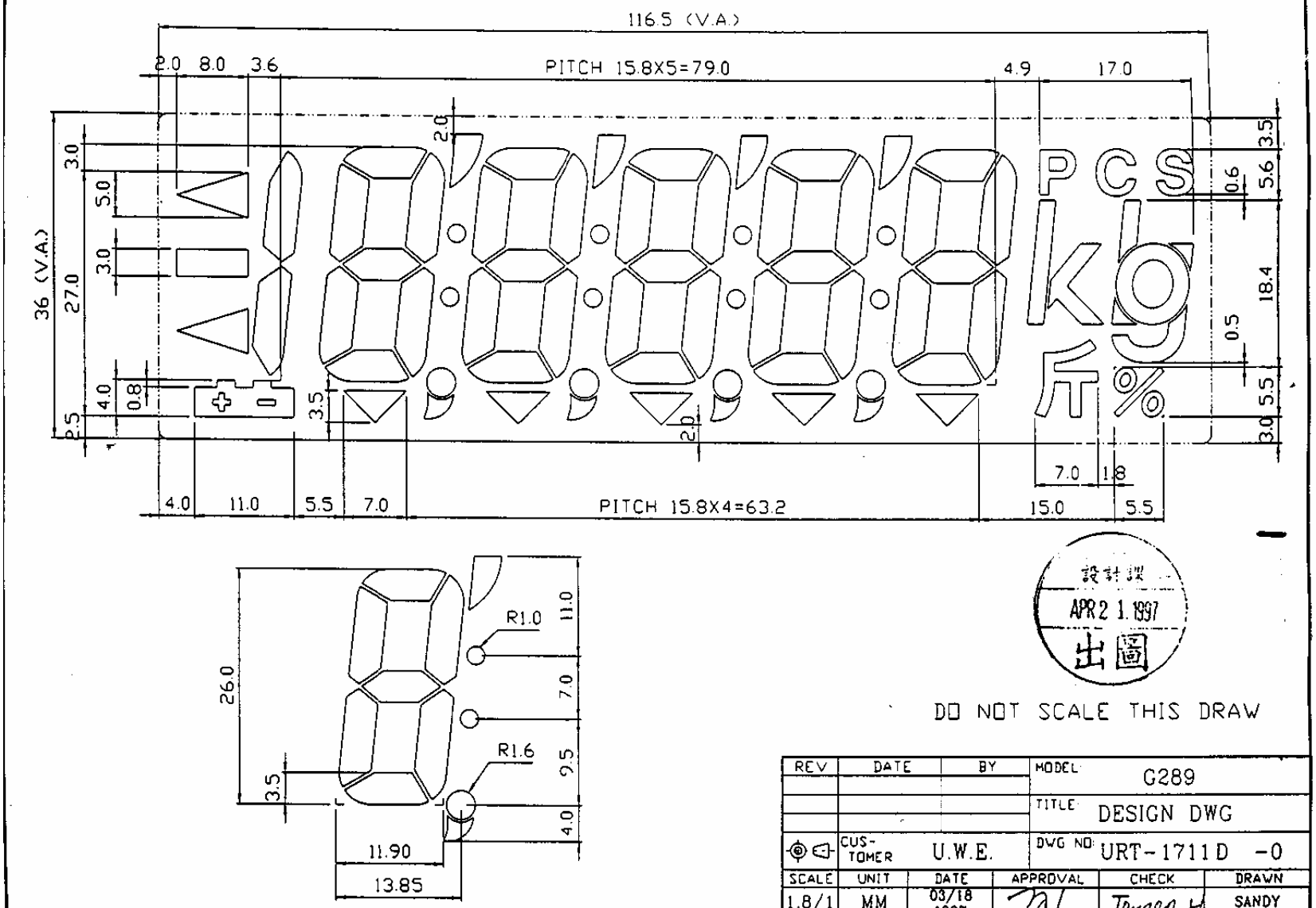
2 GENERAL DESCRIPTION

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)	–


S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
C0
C1
C2
C3
S22
S21
S20
S19
S18
S17
S16
S15
S14
SEGMENT
APR 2 1 1997
REV
DATE
BY
MODEL: G289
TITLE: WIRING DWG
DWG NO: URT-1711W1-0
CUS-TOMER
U.W.E.
SCALE 2/1
UNIT MM
DATE 03/18 1997
APPROVAL
CHECK
DRAWN SANDY



設計課
APR 2 1 1997
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DO NOT SCALE THIS DRAW

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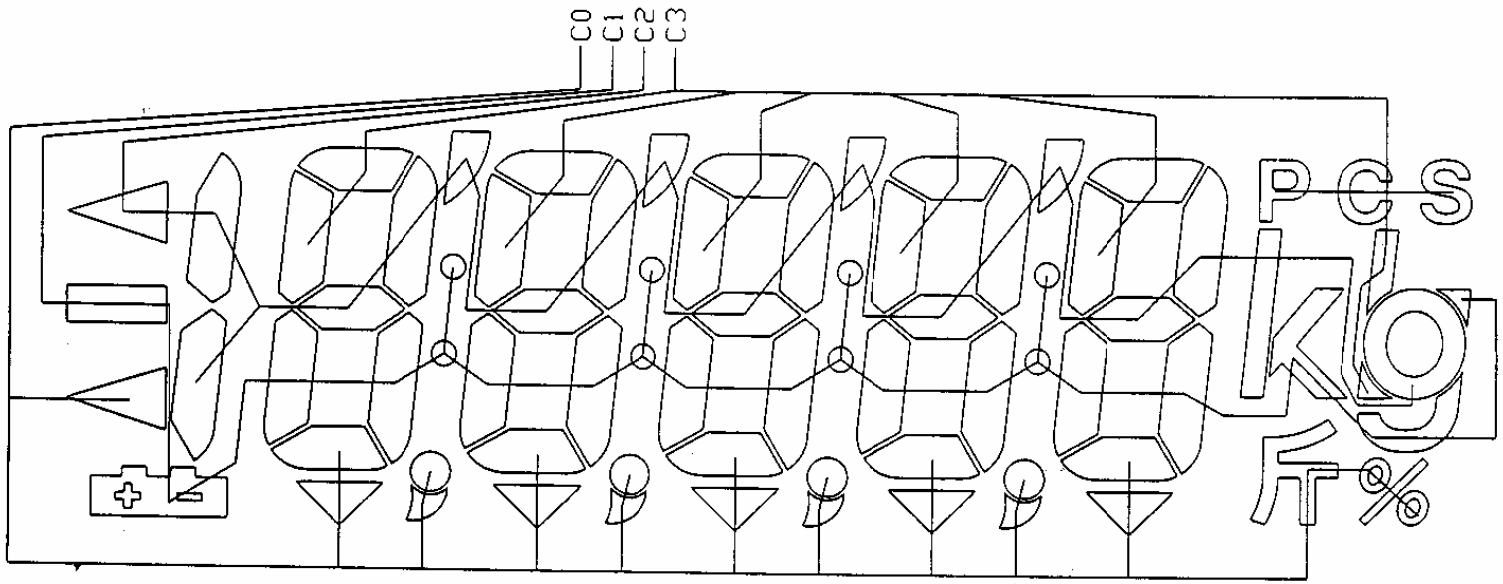
			TITLE	DESIGN DWG
	CUS-TOMER	U.W.E.	DWG NO	URT-1711D -0

SCALE	UNIT	DATE	APPROVAL	CHECK	DRAWN
1.8/1	MM	03/18 1997		Jensen.H	SANDY



APR 21 1997
出圖

COMMON

REV	DATE	BY	MODEL: G289
			TITLE: WIRING DWG
			DWG NO: URT-1711W2-0
CUS-TOMER	U.W.E.		

SCALE	UNIT	DATE	APPROVAL	CHECK	DRAWN
2/1	MM	03/18 1997		Jenson H	SANDY

URT-BE-303-02A