

MAINTENANCE MANUAL

OEC/OAC SERIES

MODELS: OEC-1.2 OEC-3 OEC-6 OEC-12 OEC-30
OAC-1.2 OAC-2.4 OAC-6 OAC-12 OAC-24

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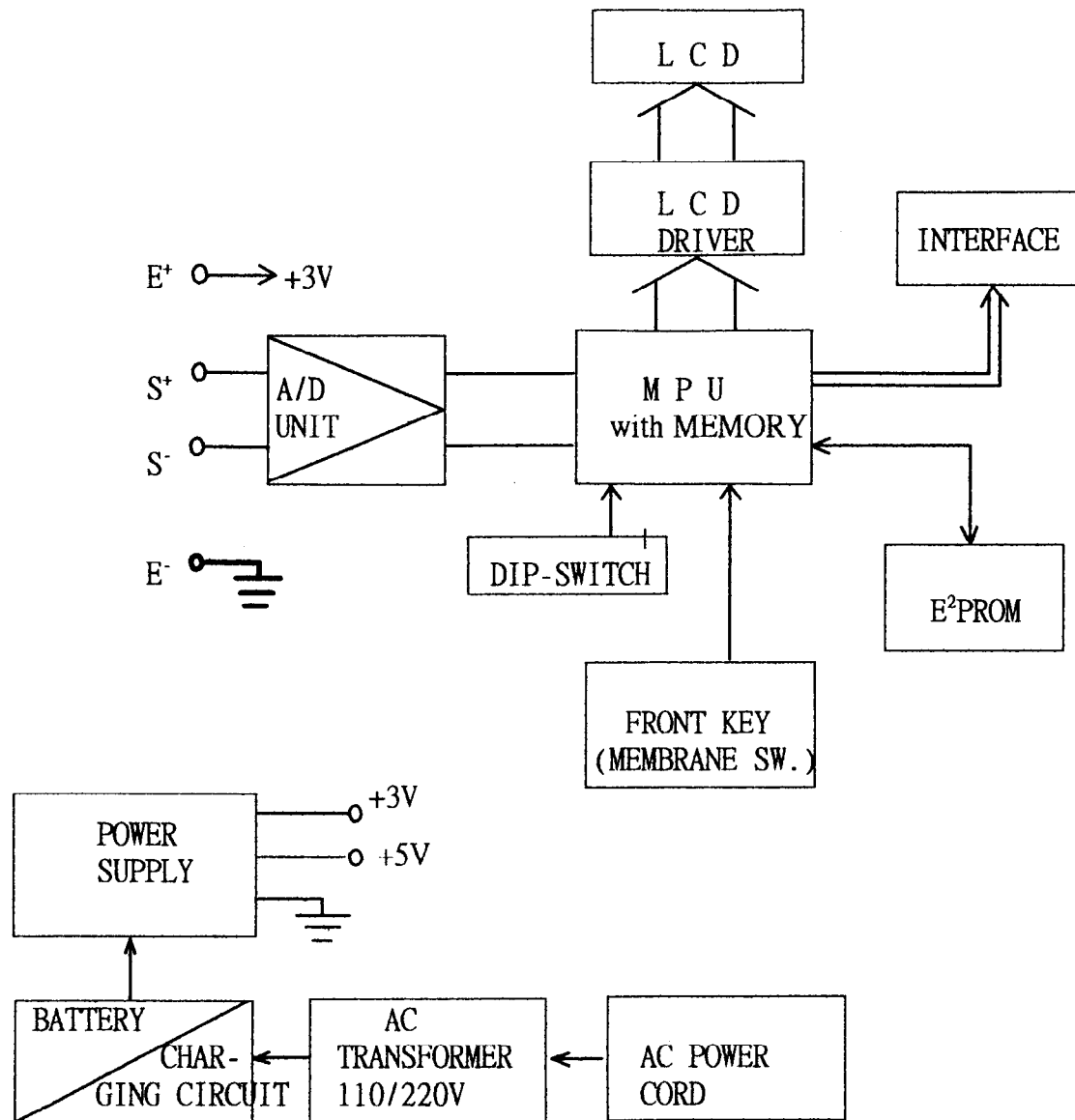
OEC/OAC SERIES - ELECTRONIC COUNTING SCALE

1. FEATURES:

- * Full Tare
- * Tare indicator
- * Zero indicator
- * Negative value indicator
- * 2 types of Calibration
- * Dip switch to prevent end-user calibration
- * Sealable
- * Bubble level
- * Adjustable feet
- * Optional backlighting
- * Built-in rechargeable battery operated
- * Low-battery signal
- * Auto power saving function
- * AC power cord included
- * Overload protection for positive and negative force
- * Capacity: OEC SERIES
1.2kg,3kg,6kg,12kg,30kg for 1/6000 resolution
- OAC SERIES
1.2kg,2.4kg,6kg,12kg,24kg for 1/12000 resolution

2. SPECIFICATION

1. SYSTEM BLOCK DIAGRAM



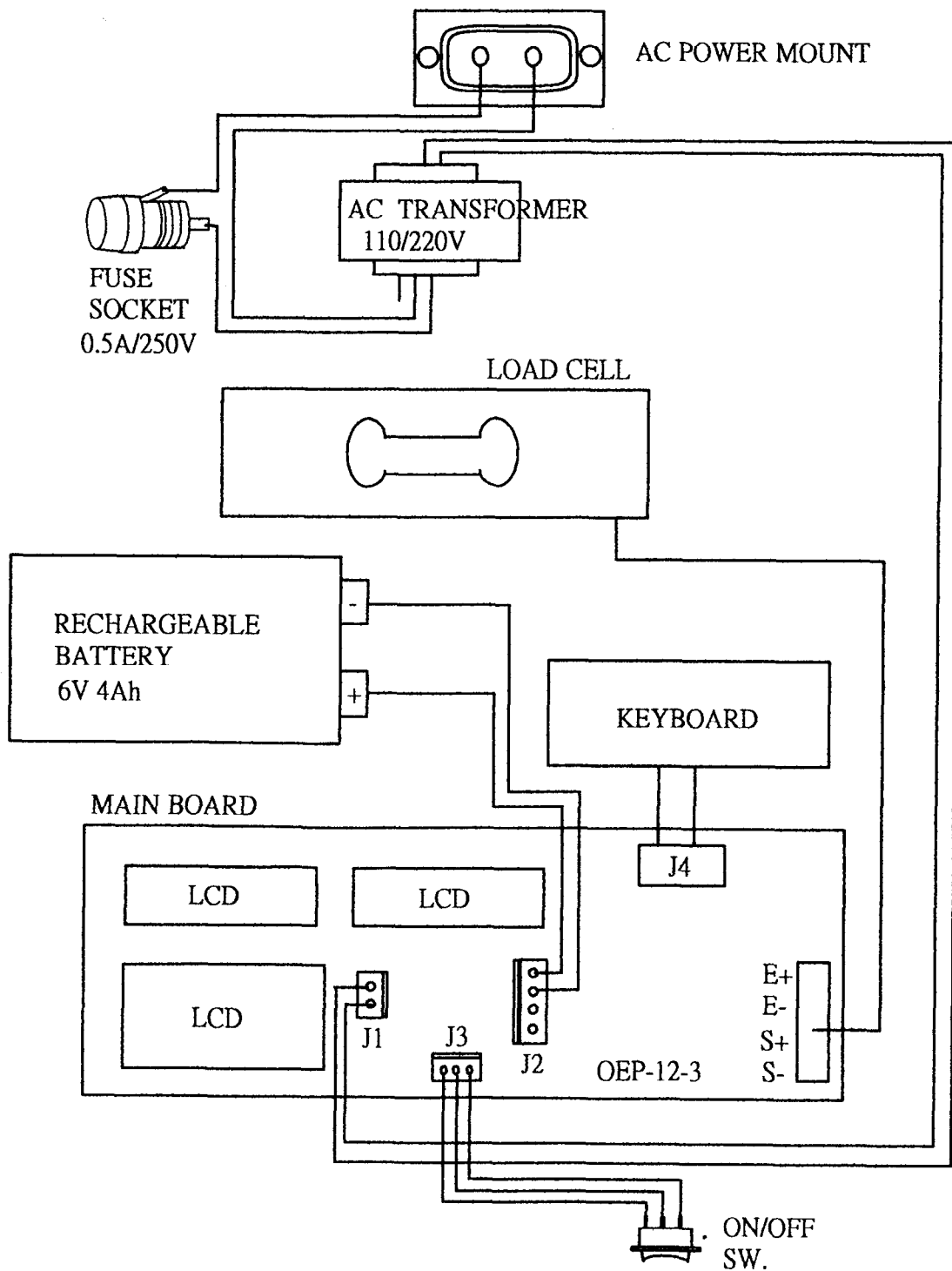
DESCRIPTION:

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.

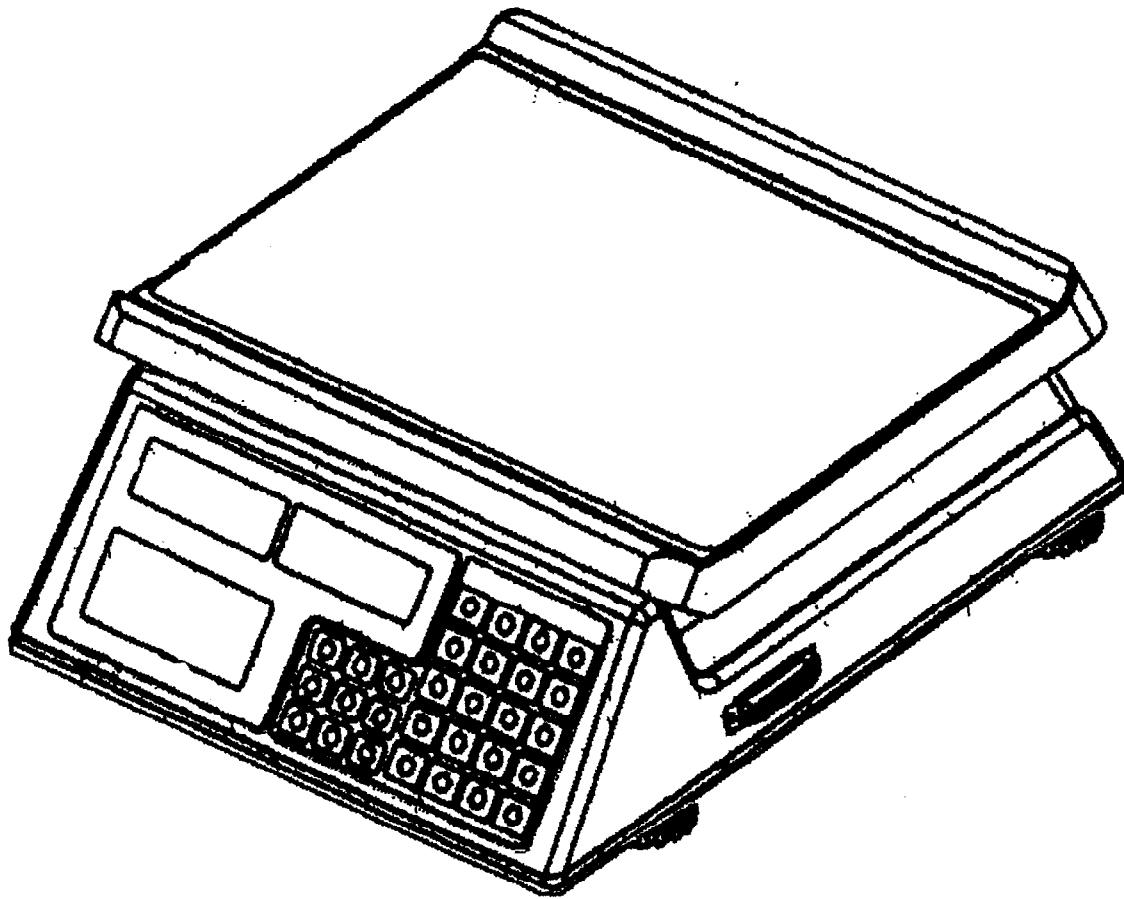
2. PHYSICAL LAYOUT OF ELECTRICAL CONNECTION



2. SPECIFICATION

3. GENERAL SPECIFICATION

3.1 Overall View



2. SPECIFICATION

3. GENERAL SPECIFICATION

3.2 Dimension

* Platter size

Platter A: 250 x 296mm

Platter B: 282 x 337mm

* Overall size: 336 x 296 x 118mm

3.3 Model specification

Model name: OEC/OAC series

Display resolution: 1/6000(1.2kg, 3K, 6kg, 12kg, 30kg)--OEC

1/12000(1.2kg, 2.4kg, 6kg, 12kg, 24kg)--OAC

Internal resolution: 1/30000

Display: Single-sided

Weight display --> 5 digits

Unit Price display --> 5 digits

Total Price display--> 6 digits

3.4 Operation condition

* Power source: Rechargeable battery(6V 4Ah) or AC power cord(110V/220V)

* Operating Temperature: 0 °C ~ 40 °C

* Operating Humidity : 15 ~ 85% RH

* Power Consumption : 0.1W
5W When charge

3.5 Main Components used

* Micro Processor : 89C52

* Crystal Oscillator : 6 MHz

* Display device : Liquid Crystal Display(LCD)

* Loadcell : 350 resistance loadcell

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 3V

* SPEED OF A/D CONVERSION : 10 times/sec

* INTERNAL RESOLUTION : 30000

3.7 Model VS. Capacity & division

MODEL NO.	CAPACITY	EXTERNAL DIVISION
		1/6000
OEC-1.2	1.2kg	0.2g
OEC-3	3kg	0.5g
OEC-6	6kg	1g
OEC-12	12kg	2g
OEC-30	30kg	5g

2. SPECIFICATION

MODEL NO.	CAPACITY	EXTERNAL DIVISION
		1/12000
OAC-1.2	1.2kg	0.1g
OAC-2.4	2.4kg	0.2g
OAC-6	6kg	0.5g
OAC-12	12kg	1g
OAC-24	24kg	2g

1. INTERNAL FUNCTIONS AND ALTERNATE DIVISION

INTERNAL FUNCTION TABLE

Function	Symbol	Description
1	F.1	Span value reading and dealer calibration
2	F.2	Full display segment and max. capacity check
3	F.3	Check offset value and scale configuration
4	F.4	Auto power off setting

HOW TO ENTER THE REQUIRED FUNCTION MODE

- a. Turn scale off.
- b. Press and hold NUMBER/SET, then turn scale on. Scale display F.1
- c. Press NUMBER/SET until the required function number appears.
- d. Press @WT/SET
- e. Press @WT/SET until the required setting appears.
- f. Press NUMBER/SET 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

- a. Simply enter F.1 to read the A/D counts.
- b. Press ZERO to clear the A/D counts, then test mass onto the platter, the span value of the test mass will be displayed.
- c. Refer to Dealer Calibration procedures for dealer calibration.

F.2 Display Segment and Rated Capacity & Division Check

When function is entered, all segment will be displayed. Check and make sure that no segment are missed.

F.3 Total Internal Count Checking and Scale Configuration

- 1 Enter F.3, scale displays the Offset Value when unloaded.
- 2 Place extra matter onto the platter, the total internal count value will be displayed.
- 5 Press ZERO, then return 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. INITIAL SETUP

2. AUTO AND DEALER CALIBRATION

ACCEPTABLE LOAD FOR AUTO AND DEALER CALIBRATION

Model Number	External Division	Acceptable Auto and Dealer Calibration Load	
OEC-1.2	1/6000	500g	1kg
OEC-3	1/6000	1kg	2kg
OEC-6	1/6000	2kg	5kg
OEC-12	1/6000	5kg	10kg
OEC-30	1/6000	10kg	20kg
OAC-1.2	1/12000	500g	1kg
OAC-2.4	1/12000	1kg	2kg
OAC-6	1/12000	2kg	5kg
OAC-12	1/12000	5kg	10kg
OAC-24	1/12000	10kg	20kg

Dealer Calibration Procedure:

- 1 Turn scale off.
- 2 Press and hold NUMBER/SET, then turn scale on.
- 3 Scale displays F.1
- 4 Press @WT/SET
- 5 Scale displays offset value
- 6 Press ZERO to zero offset value
- 7 Press 1,2,3,4,1
- 8 scale displays a circle on the Weight column donates password is accepted.
- 9 Make sure that the figure being displayed is =0 or 1, if not, press ZERO again.
- 10 Load calibration either load as listed on above table.
- 11 When value displayed is stable, press @WT/SET.
- 12 Wait until the scale start count down.
- 13 Calibration completed and scale is ready for operation.

Auto Calibration Procedure:

- 1 Turn scale off
- 2 Press and hold @WT/SET, then turn scale on.
- 3 Scale displays CAL?
- 4 Press @WT/SET
- 5 Scale displays LOAD XXXX or XXXX
- 6 Load calibration load according to above table.
- 7 Wait until the scale display DONE and start count down.
- 8 Calibration completed and scale is ready for operation.

3. DISABLE CALIBRATION WITH DIP SW.(S1)

The DIP SW.#1 is used to control calibration. Push this switch to ON position to disable calibration.

3. INITIAL SETUP

4. OFFSET AND SPAN VALUE DATA

OFFSET AND SPAN VALUE DATA TABLE

Model Number	External Division	Offset Value (Thousand)	Span Value(Thousand) at Various Load Applied	Offset Control	Span Control(Ohm) R1A
OEC-1.2	1/6000	10~14	13~18 at 500g 26~37 at 1kg	VR1 Trimmer	40K
OEC-3	1/6000	10~14	10~15 at 1kg 20~30 at 2kg	VR1 Trimmer	40K
OEC-6	1/6000	10~14	10~15 at 2kg 26~37 at 5kg	VR1 Trimmer	30K
OEC-12	1/6000	10~14	13~18 at 5kg 26~37 at 10kg	VR1 Trimmer	20K
OEC-30	1/6000	10~14	10~15 at 10kg 20~30 at 20kg	VR1 Trimmer	25K
OAC-1.2	1/12000	10~14	25~30 at 500g 50~60 at 1kg	VR1 Trimmer	38K
OAC-2.4	1/12000	10~14	25~30 at 1kg 50~60 at 2kg	VR1 Trimmer	40K
OAC-6	1/12000	10~14	20~24 at 2kg 50~60 at 5kg	VR1 Trimmer	25K
OAC-12	1/12000	10~14	25~30 at 5kg 50~60 at 10kg	VR1 Trimmer	27K
OAC-24	1/12000	10~14	25~30 at 10kg 50~60 at 20kg	VR1 Trimmer	23.2K

READING OFFSET VALUE

- 1 Turn scale off
- 2 Remove all load from platter
- 3 Enter F.3 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, adjust the trimmer located at VR1 on the mainboard to obtain correct offset value.

HOW TO ADJUST SPAN VALUE

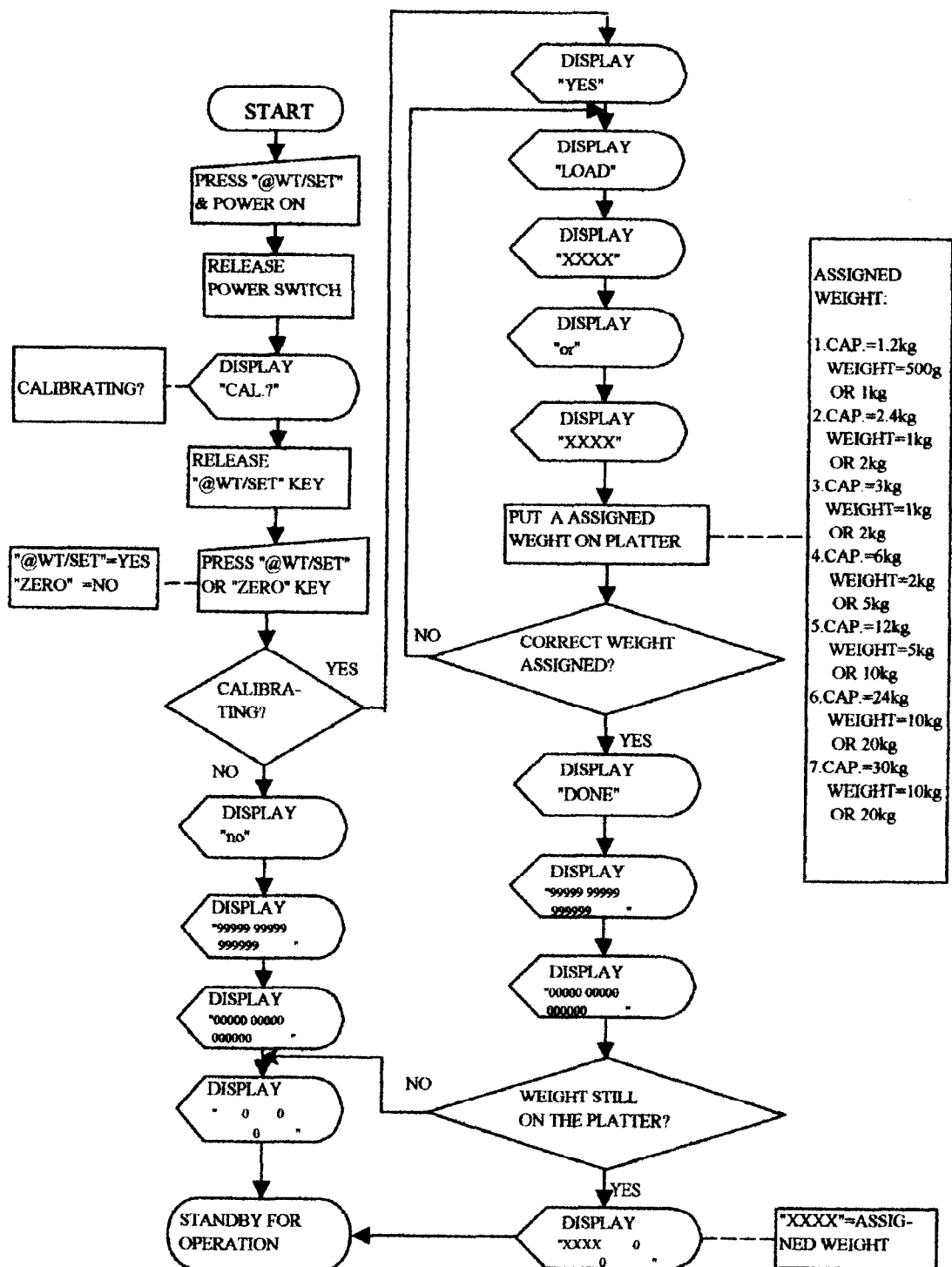
The span value is controlled by resistor located on R1A, standard resistor value of R1A is listed on the above table. If the required span value is not attained, then change R1A resistor according to either case below:

Span value too low : Increase the resistance of R1A.

Span value too high : Decrease the resistance of R1A.

5. FLOW CHART

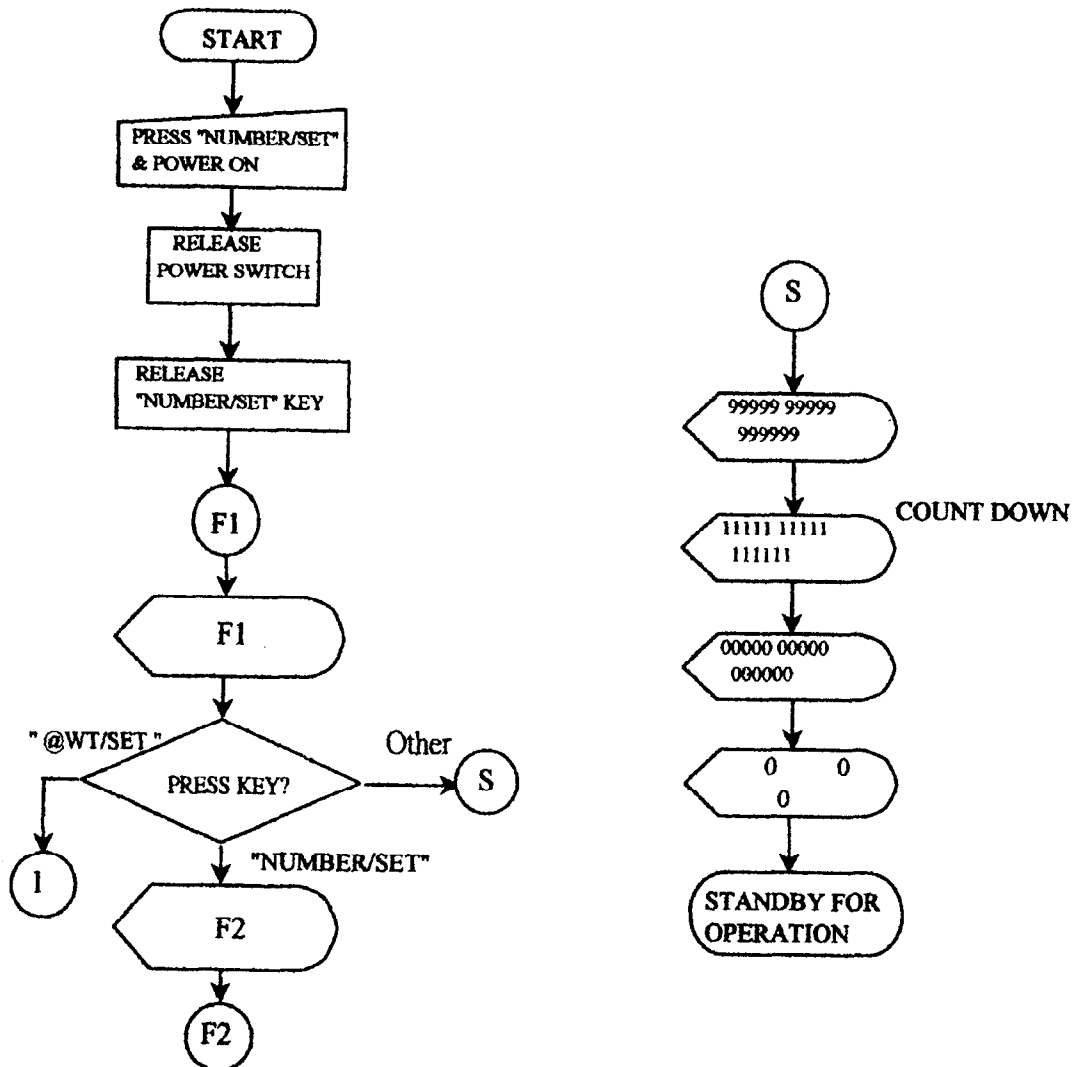
5.1 Auto Calibration(for end-user)

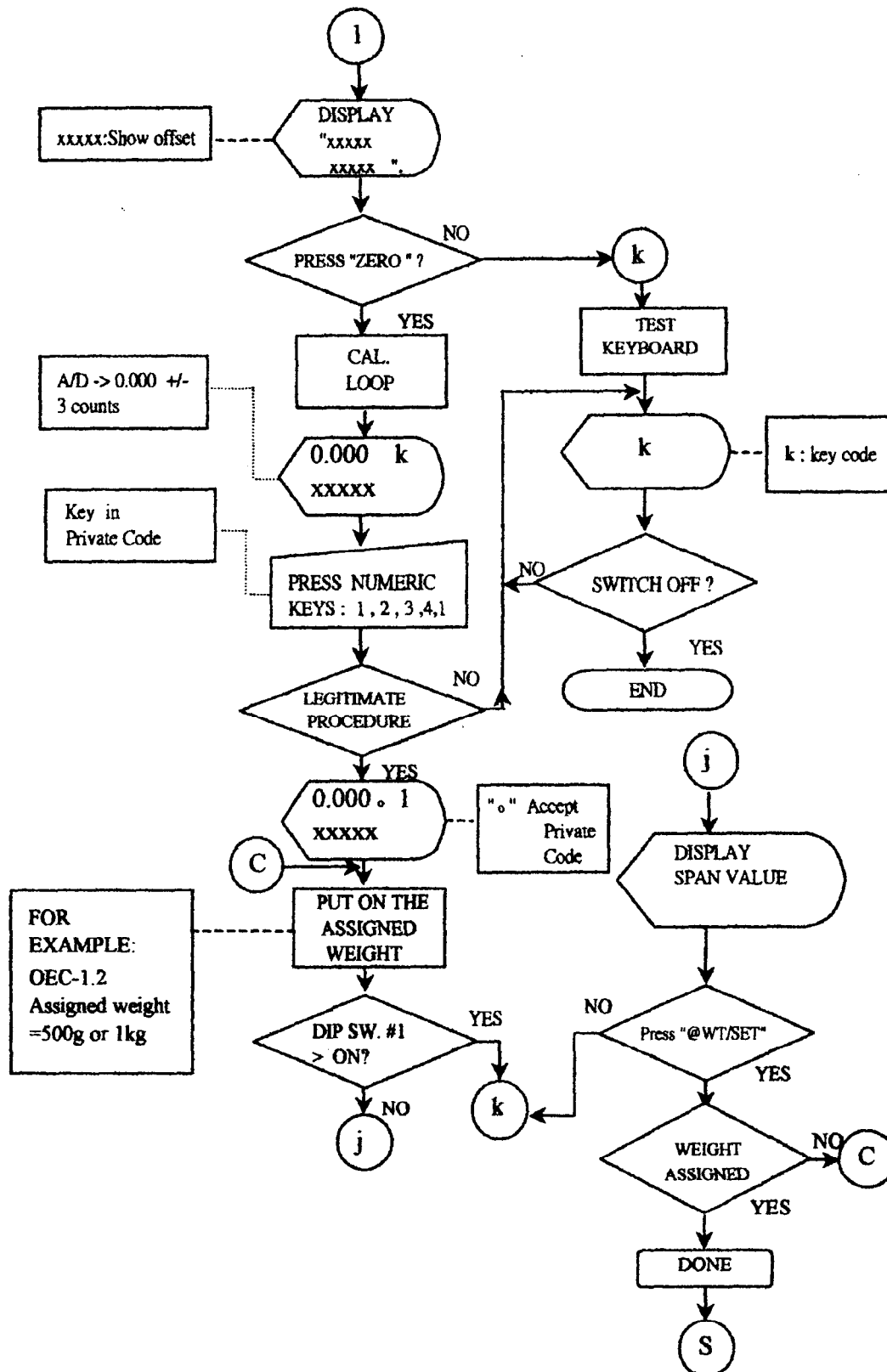


3. INITIAL SETUP

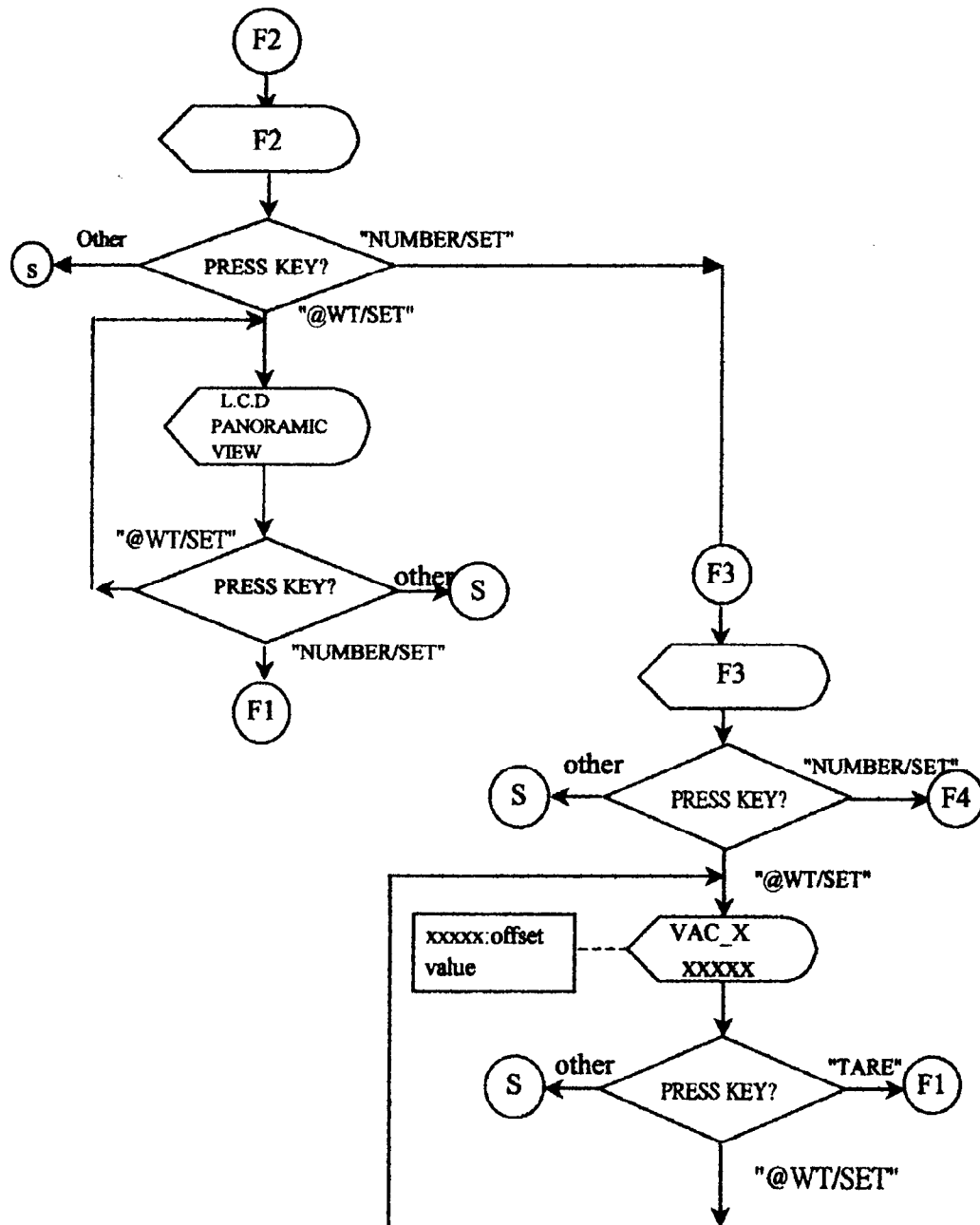
5. FLOW CHART

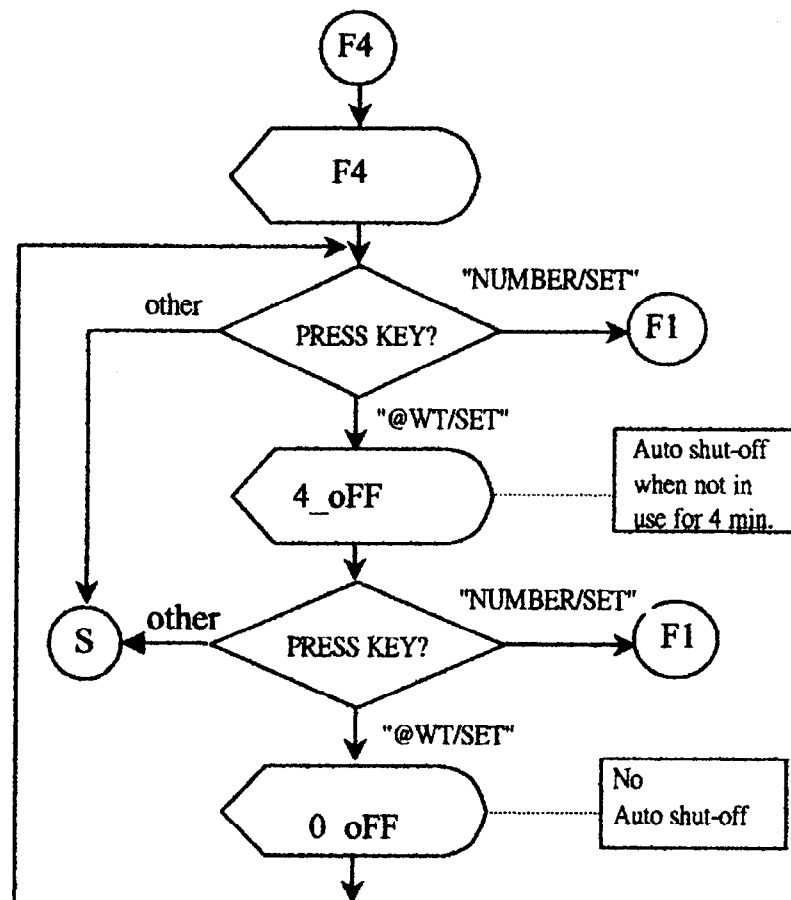
5.2 Function Test(for technicians only)





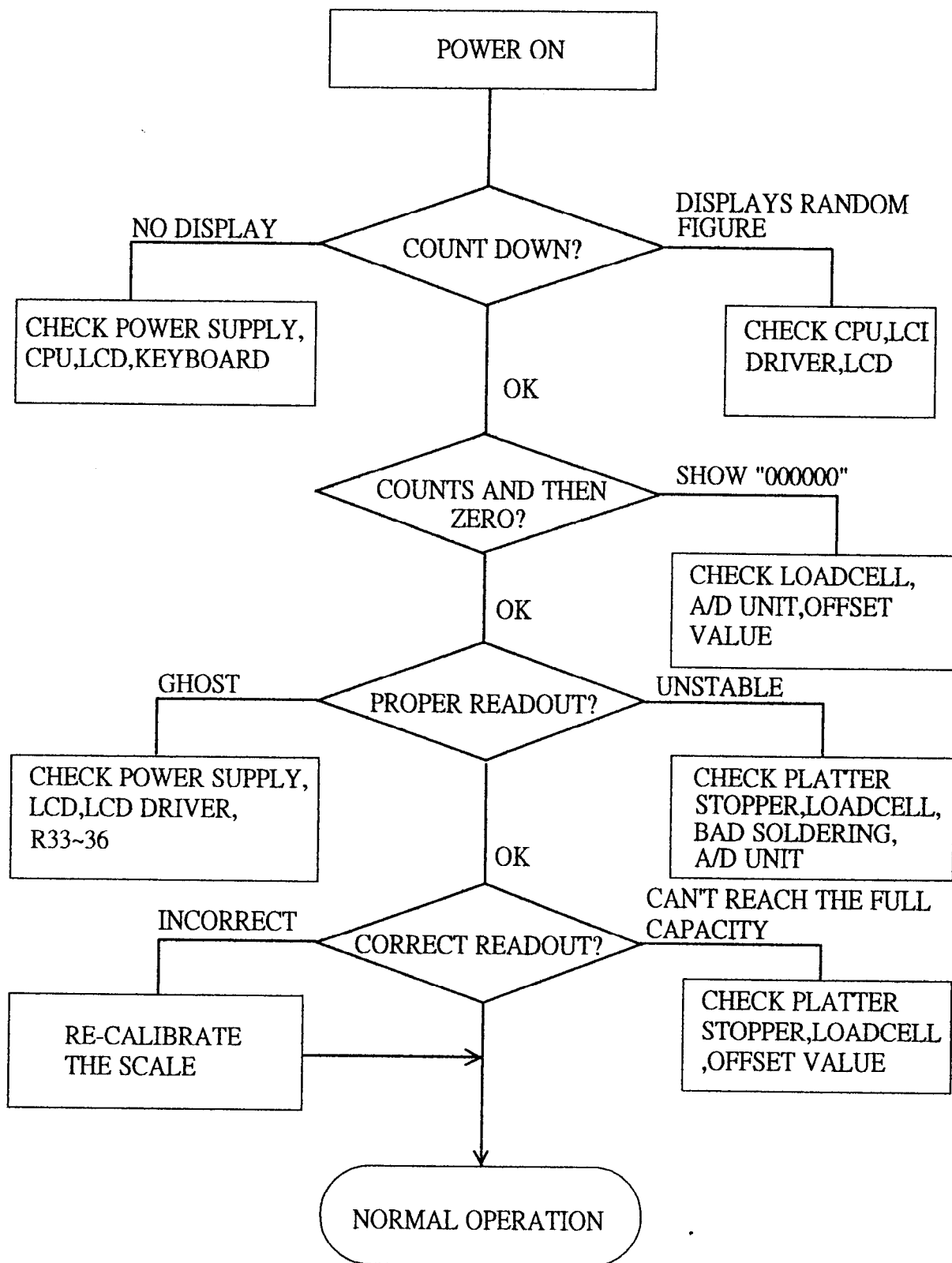
3. INITIAL SETUP





4. TROUBLE SHOOTING

1. TROUBLE SHOOTING LOOP



4. TROUBLE SHOOTING

2. PARTS AND COMPONENTS TROUBLE SHOOTING

2.1 Power Supply Checking

2.1.1 Relevant parts:

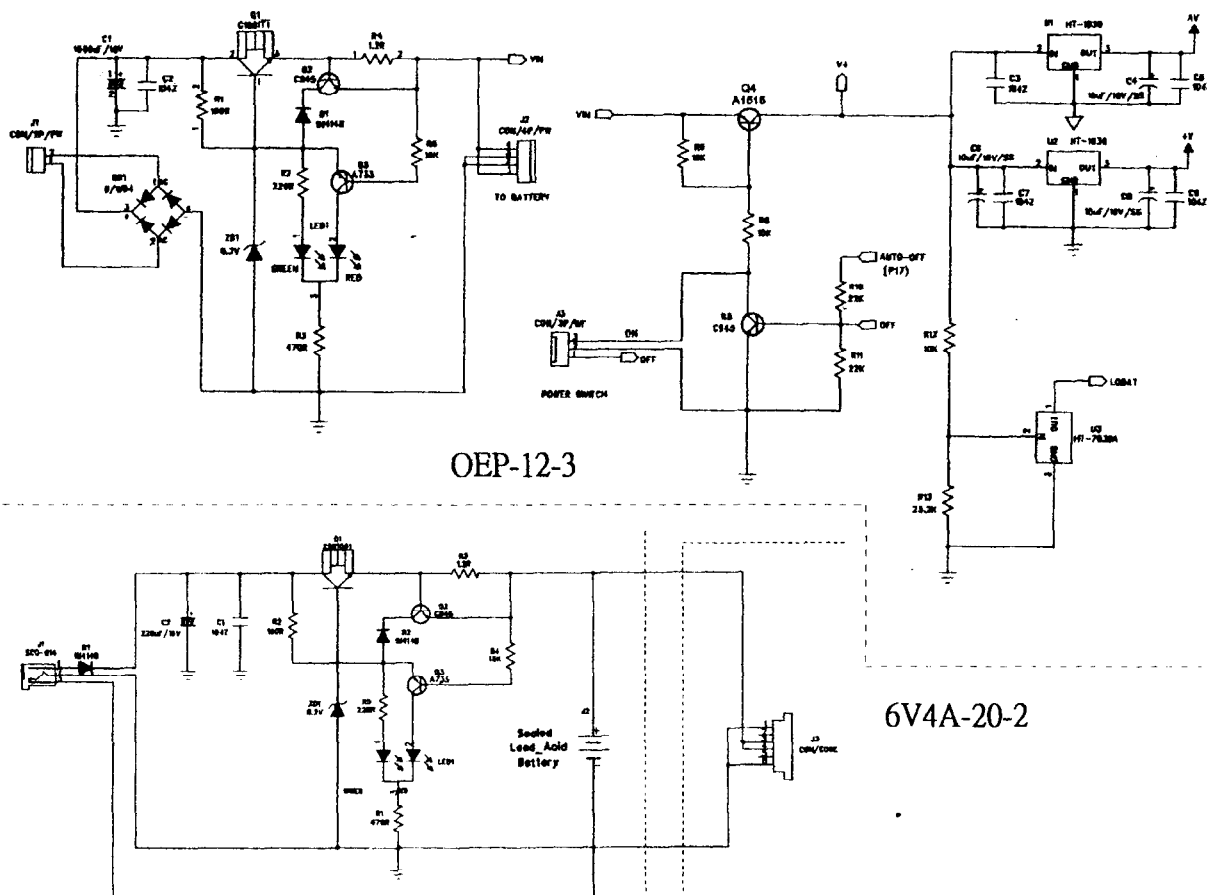
Main Board(OEP-12-3)

Q1(C1061)
ZD1(8.2V)
R4(1.2 ohm,1/2W)
Q2(C945)
Q4(A733)
Q5(C945)
U3(HT-7039)
U1(HT-1030)
U2(HT-1030)

Optional Battery Pack

Battery Charging Board(6V4A-20)

Q1(C1061)
ZD1(8.2V)
R3(1.2 ohm,1/2W)
Q2(C945)
DC-JACK(SCD-14)



4. TROUBLE SHOOTING

Description:

1) AC Transformer: This AC Transformer(FW-0.6) provides power for AC110V/220V -Primary
AC 8V -Secondary.

2) Battery: Built-in Rechargeable Battery 6V 4Ah.

3) 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 If battery full charged when voltage reached.

Q2(C945) and R3(1.2R,1/2W) provide Over-Current protection.

4) +3V power drives analog circuit system.

U1(HT-1030) is a 3volts Voltage Regulator.

5) +3V power drives digital circuit system.

U2(HT-1030) is a 3volts Voltage Regulator.

6) +5V is to drive the printer interface.

+5V power is created by using LED2 to pull-up for about 2 volts with +3V power.

7) Auto-off:

If the scale is set on 4_off or even under LO-BAT situation, after some minutes the CPU will release a low potential signal to draw-down the Q3, then Q1 cuts off, the scale to be off immediately.

7) Low Power Detection:

The U3(HT-7039) is designed to detect the power level.

Whenever the battery power 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.

2.1.2 Input voltage: 5.5V or higher

Check and/or charge battery if voltage less than 5.5V.

Check Power Socket or AC Transformer if been defective.

2.1.3 System voltage(Vcc): 3V +/- 10%

Check that the system voltage is within 3V +/- 10%

a) less than 2.7V, the CPU may not work properly.

b) more than 6V, ghost will appear on LCD.

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.

2.3 LCD Display Checking

2.3.1 Check that it is soldered and connected properly between LCD and driver IC(HD61602), driver IC(HD61602) and CPU.

2.3.2 Check whether LCD is broken.

2.4 CPU Checking

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

2.4.2 Check that the Crystal Oscillator works.

2.4.3 Check the RESET is normally low.

2.5 A/D Unit Checking

2.5.1 Check that the +3V power is correctly fed to the A/D unit.

2.5.2 Check that the signal output of loadcell is normal.

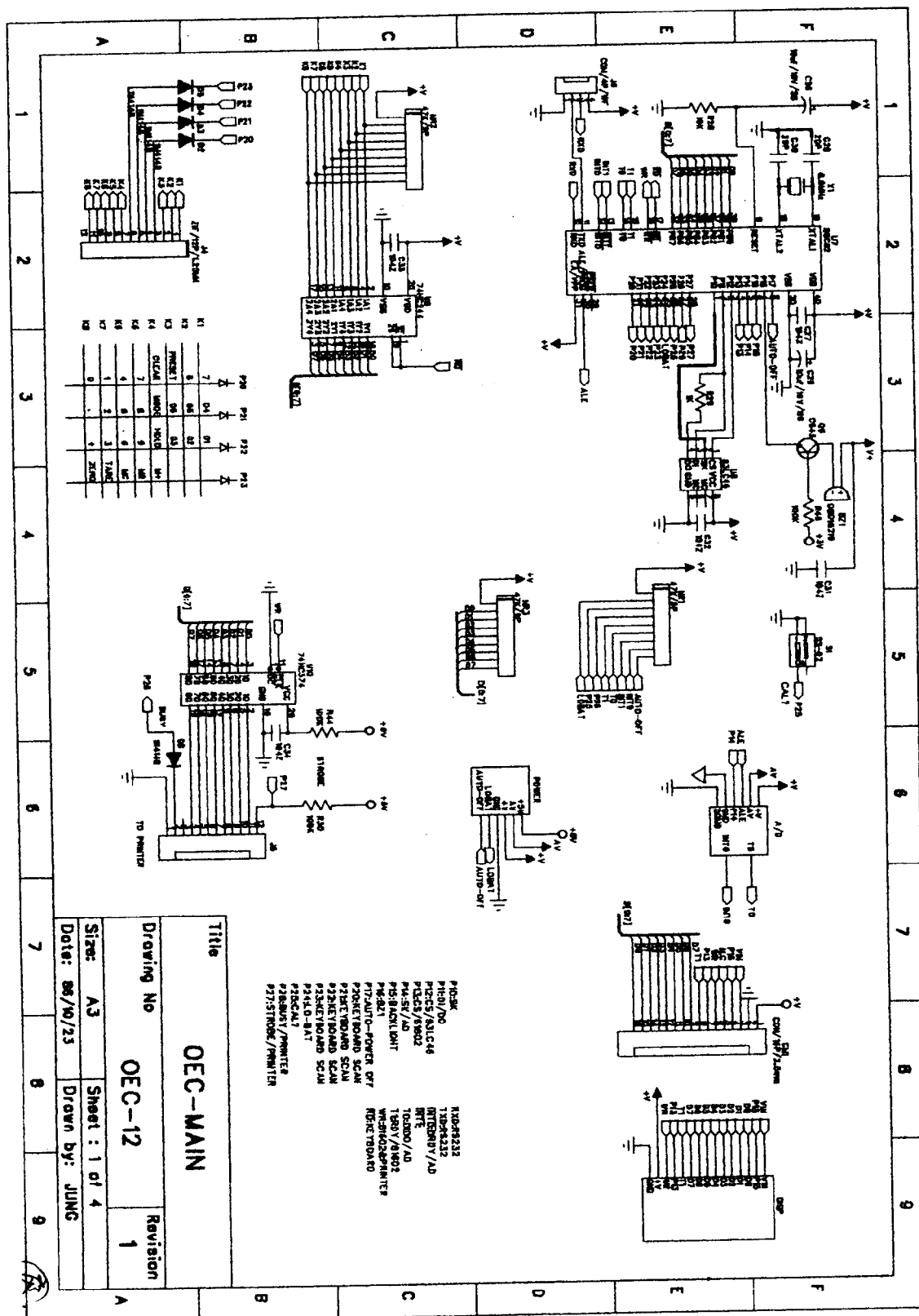
2.5.3 Check OP. Amplifier & A/D Converter(AD7715).

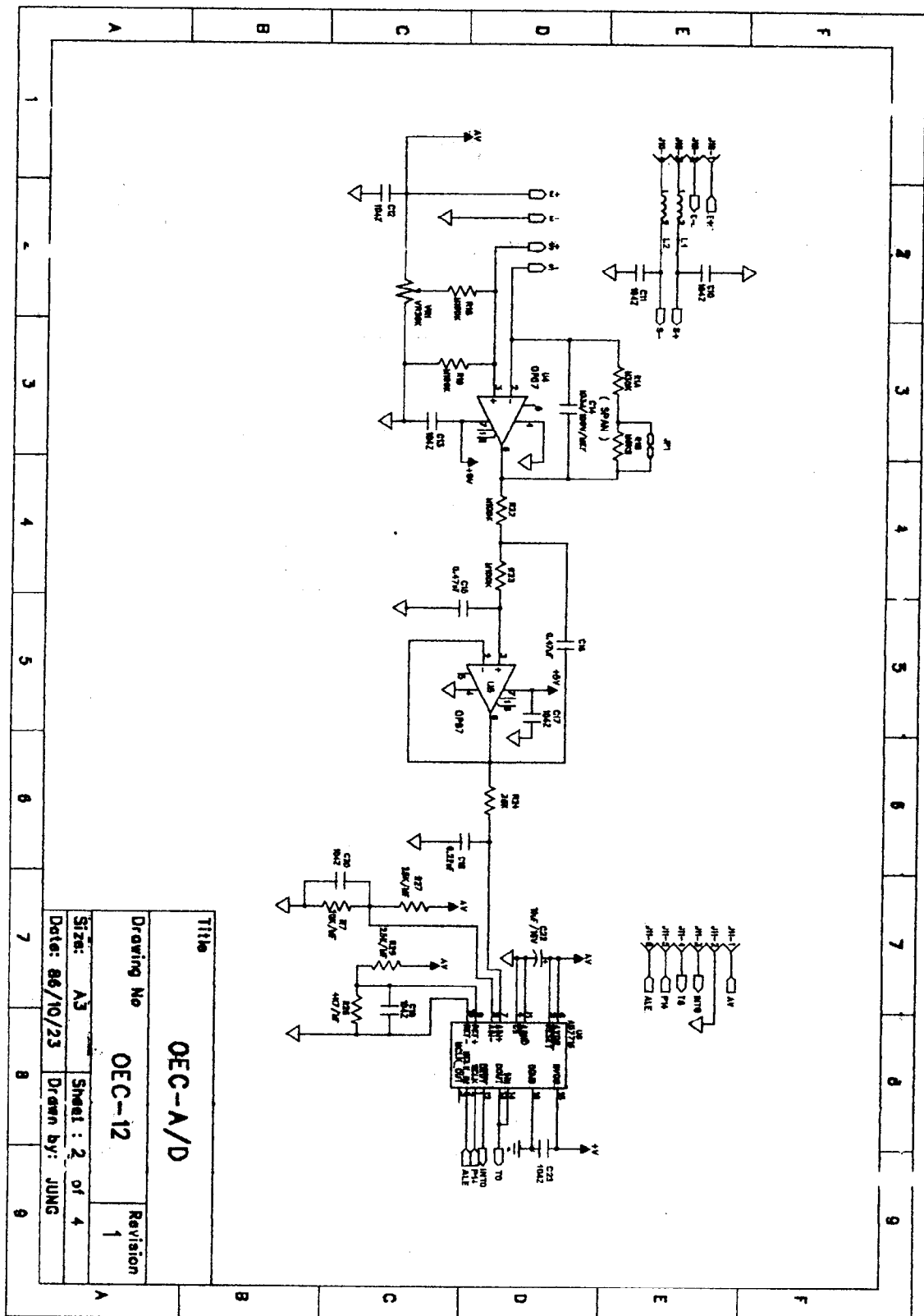
When no error is found with the above checking procedures, the trouble can be caused on the loadcell or the PCB itself. Replace a new one could be better to identify the defective.

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

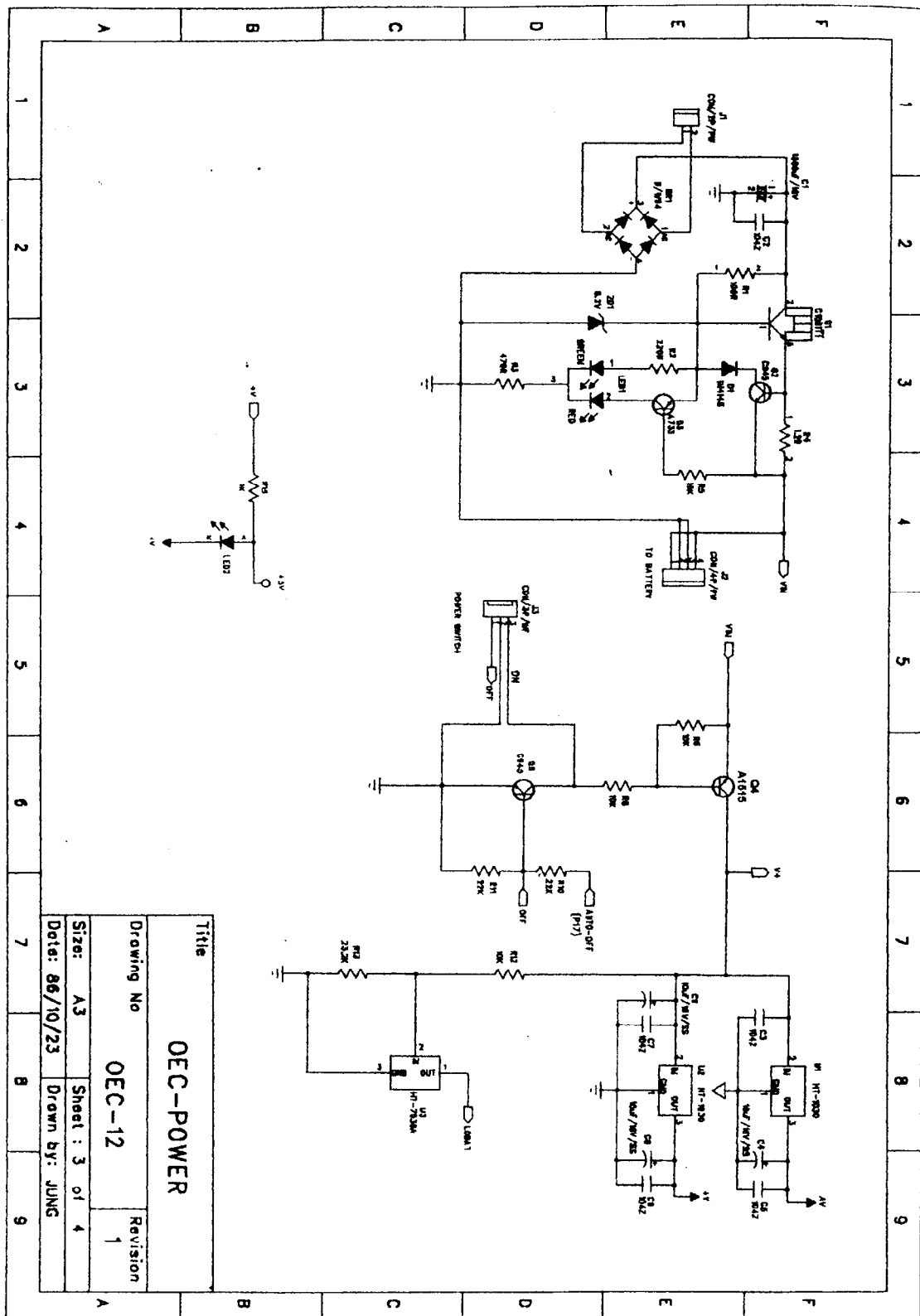
5. ELECTRICAL CIRCUITRY

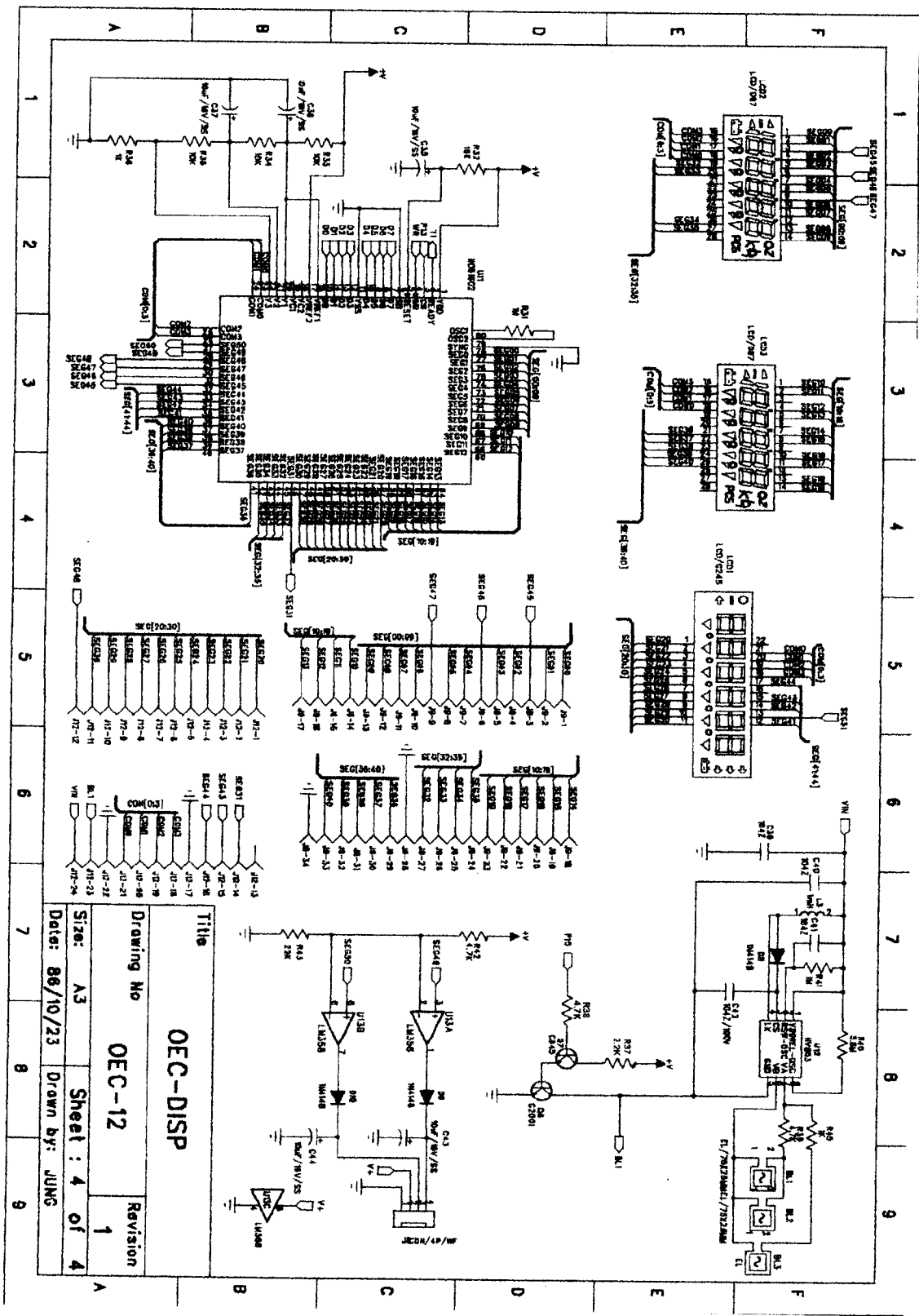
1. SCHEMATICS



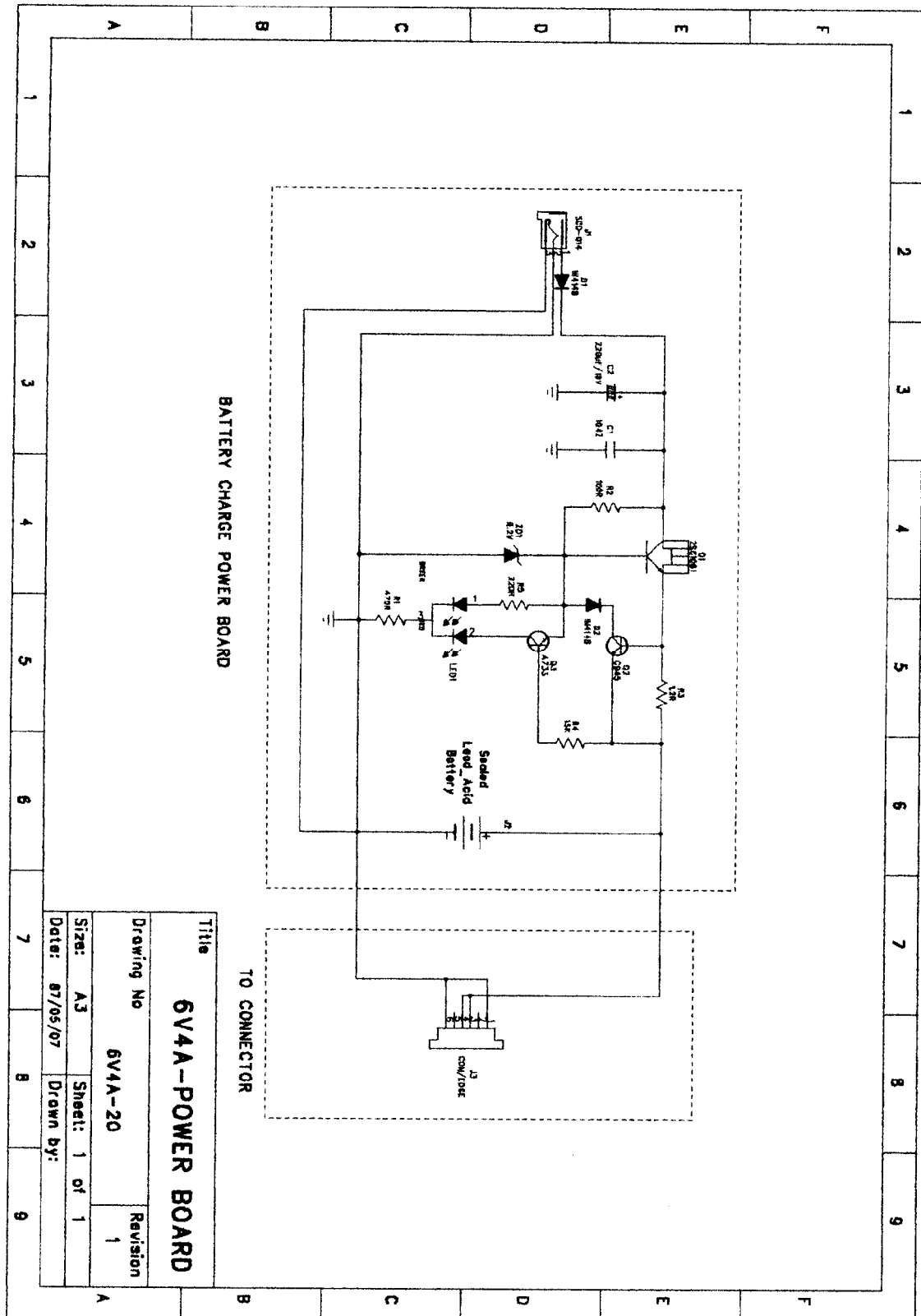


5. ELECTRICAL CIRCUITRY

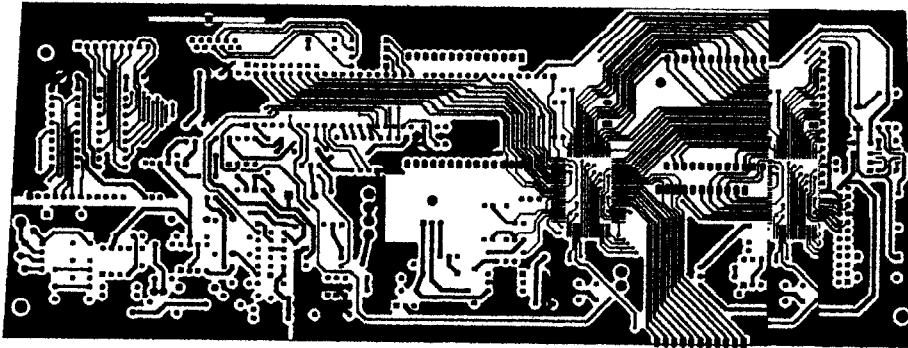




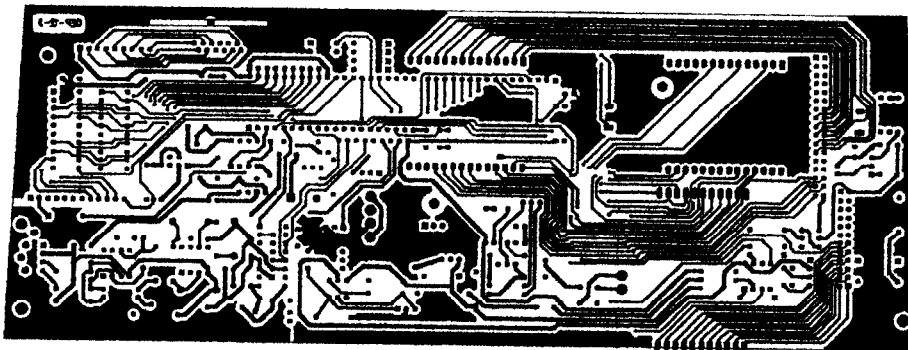
5. ELECTRICAL CIRCUITRY



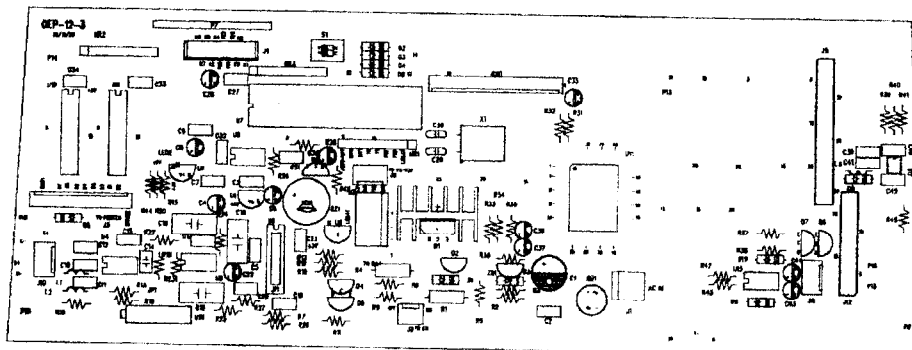
2. PCB LAYOUT



OEP-12-3
TOP LAYER

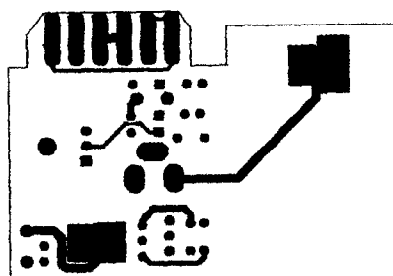


OEP-12-3
BOTTOM LAYER

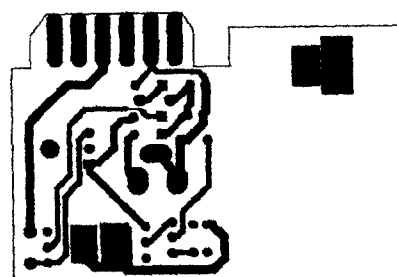


OEP-12-3
TOP OVERLAYER

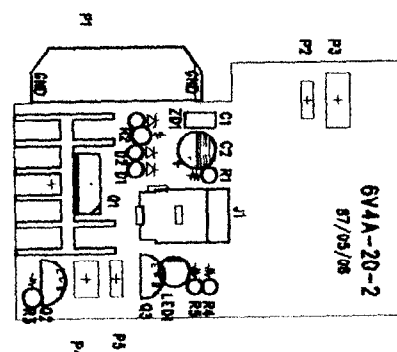
5. ELECTRICAL CIRCUITRY



**6V4A-20-2
TOP LAYER**



**6V4A-20-2
BOTTOM LAYER**



**6V4A-20-2
TOP OVERLAYER**

OEC/OAC SERIES PARTS LIST

STRUCTURE

Parts No.	Description	Specification	Qty	Remark
G0001EC1000	PLASTIC HOUSING: BASE	EC SERIES(GRAY)	1	
G0001OEC100	PLASTIC HOUSING: UPPER	EC SERIES(WHITE)	1	
G0002OEC000	PLASTIC PLATTER	OEC SERIES	1	
F0003OEC101	L/C ALUMINUM LOWER SUPPORT	OEC,EC SERIES	1	
F0003OEC100	L/C ALUMINUM UPPER SUPPORT	OEC,EC SERIES	1	
A0014*****	LOADCELL			
	C2G1 OR EQUIVALENT	CAPACITY=3kg	1	OEC-1.2 OAC-1.2
	C2G1 OR EQUIVALENT	CAPACITY=6kg	1	OEC-3 OAC-2.4
	C2G1 OR EQUIVALENT	CAPACITY=10kg	1	OEC-6 OAC-6
	C2G1 OR EQUIVALENT	CAPACITY=15kg	1	OEC-12 OAC-12
	C2G1 OR EQUIVALENT	CAPACITY=35kg	1	OEC-30 OAC-24
G0005OEC000	PLATTER BEARING RUBBER	OEC SERIES	4	
G0004OEC001	ADJUSTABLE FEET	E SERIES	4	
A1201300106	POWER CORD	SY-001+034 OR AL-101+507	1	
A5007000000	AC SOCKET	2P,PANEL MOUNT	1	
A1001000051	TRANSFORMER	FW0.6	1	
A1004140431	SURGE ABSORPTOR	14K 431	1	
A5002000521	FUSE	0.5A 20mm(UL)	1	
A5003000001	FUSE SOCKET	R3-12	1	
A1300000002	ROCK SW.	R19A-180	1	
B00EC000000	KEYBOARD	OEC/OEP SERIES 29 KEYS	1	
C1OEC*****	FRONT PANEL PC(DISPLAY)	OEC SERIES	1	
C1OEC*****	FRONT PANEL PC(KEYBOARD)	OEC SERIES	1	
C1OEC*****	BACK PANEL PC	OEC SERIES	1	
A1600060400	RECHARGEABLE BATTERY	GP4-6/6V 4Ah	1	
E1OEC000010	P.C.B. KIT	OEP-12-X MAINBOARD	1	
Z7OEC000000	DUST COVER	OEC SERIES	1	
A1202030251	WIRE ARRAY	3 PIN 25cm	1	J3
Z0001010007	POLYFORM PLATE	42 x 27 x 10mm	4	FOR EL LAMP

OEP-12-X MAINBOARD

A0102000245	L.C.D.	UTN-G245JV	1	LCD1
A0102000097	L.C.D.	MT-097PCS	2	LCD2,3
E00EC000010	P.C.B.	OEP-12-X	1	
A0201089521	I.C.	89C52	1	U7
A0203077150	I.C.	AD7715-3	1	U6
A0206000071	I.C.	OP-07CP	2	U4,5
A0202093462	I.C.	93LC46	1	U8
A0204743742	I.C.	74HC374	1	U10(OPTION)
A0204742442	I.C.	74HC244	1	U9
A0206003580	I.C.	LM358N	1	U13 OPTION

6. PARTS LIST

A0208616020	I.C.	HD61602R	1	U11
A0250008030	I.C.	HV803	1	U12
A0207010301	VOLTAGE REGULATOR I.C.	HT1030	2	U1,2
A0250070390	I.C.	HT7039	1	U3
A0300000040	I.C. SOCKET	40 PIN	1	U7
A0401009450	TRANSISTOR	2SC945	4	Q2,5,7,9
A0401020010	TRANSISTOR	C2001	1	Q6
A0401007330	TRANSISTOR	A733	1	Q3
A0401015150	TRANSISTOR	A1515	1	Q4
A0401010610	TRANSISTOR	H1061C OR D880	1	Q1
A0501004148	DIODE	1N4148	6	D1~5,8
A0502000001	BRIDGE RECTIFIER	W04(1A)	1	BR1
A0503020082	ZENER DIODE	1/2W 8.2V(9A3)	1	ZD1
A0602030000	L.E.D.	RED,ROUND 3mm	1	LED2
A0625050000	L.E.D.	RED/GREEN,ROUND 5mm	1	LED1
A0701108016	CAPACITOR (EC)	1000uF/16V	1	C1
A0701106016	CAPACITOR (EC)	10uF/16V	9	C4,6,8,22,26 ,28,35~37
A0730104050	CAPACITOR (MLC)	104Z	20	C2~3,5,7,9~13 ,17,19~20,23, 27,31~33, 39~41
A0710224101	POLYESTER FILM CAPACITOR(MEF)	0.22uF/100V(224)	1	C18
A0713474063	POLYESTER FILM CAPACITOR(MEF)	0.47uF(474)	2	C15,16
A0720103101	POLYESTER FILM CAPACITOR(PET)	0.01uF/100V(103J)	1	C14
A0740104100	CERAMIC CAPACITOR (CC)	0.1uF/100V	1	C42
A0740020050	CERAMIC CAPACITOR (CC)	20PF	2	C29,30
A0804041003	METAL FILM RESISTOR	100K ohm,1/4W	4	R18~19,22~23
A0804042002	METAL FILM RESISTOR	20K ohm,1/4W	1	R7
A0804042502	METAL FILM RESISTOR	25K ohm,1/4W	2	R25,27
A080404**02	METAL FILM RESISTOR	**K ohm,1/4W	1	R1A(SPAN)
A0804044701	METAL FILM RESISTOR	4.7K ohm,1/4W	1	R26
A0804042232	METAL FILM RESISTOR	22.3K ohm,1/4W	1	R13
A0805020120	CARBON FILM RESISTOR	1.2 ohm,1/2W	1	R4
A0805021101	CARBON FILM RESISTOR	100 ohm,1/2W	1	R1
A0805041102	CARBON FILM RESISTOR	1K ohm,1/4W	4	R15,29,36,45
A0805041103	CARBON FILM RESISTOR	10K ohm,1/4W	8	R6,8,28,32~35
A0805041222	CARBON FILM RESISTOR	2.2K ohm,1/4W	1	R37
A0805041104	CARBON FILM RESISTOR	100K ohm,1/4W	2	R38,48
A0805041104	CARBON FILM RESISTOR	100K ohm,1/4W	2	R30,44 (OPTION)
A0805041105	CARBON FILM RESISTOR	1M ohm,1/4W	2	R31,41
A0805041153	CARBON FILM RESISTOR	15K ohm,1/4W	1	R5
A0805041221	CARBON FILM RESISTOR	220 ohm,1/4W	1	R2
A0805041223	CARBON FILM RESISTOR	22K ohm,1/4W	2	R10~11
A0805041253	CARBON FILM RESISTOR	25K ohm,1/4W	1	R24
A0805041471	CARBON FILM RESISTOR	470 ohm,1/4W	1	R3
A0805041472	CARBON FILM RESISTOR	4.7K ohm,1/4W	2	R38,39
A0805041565	CARBON FILM RESISTOR	5.6M ohm,1/4W	1	R40
A1005030512	FERRITE BEAD	3.5 x 6 x 0.8 mm	2	L1~2(OPTION)
A0802047309	RESISTOR NETWORK	47K ohm,9 PIN	3	NR1~3
A0801001203	TRIMMER	3006P-001-203(20K)	1	VR1
A0910100140	SOCKET STRIPS	SIP 1x14(FEMALE)	4	LCD2~3
A0910100140	SOCKET STRIPS	SIP 1x11(FEMALE)	2	LCD1

6. PARTS LIST

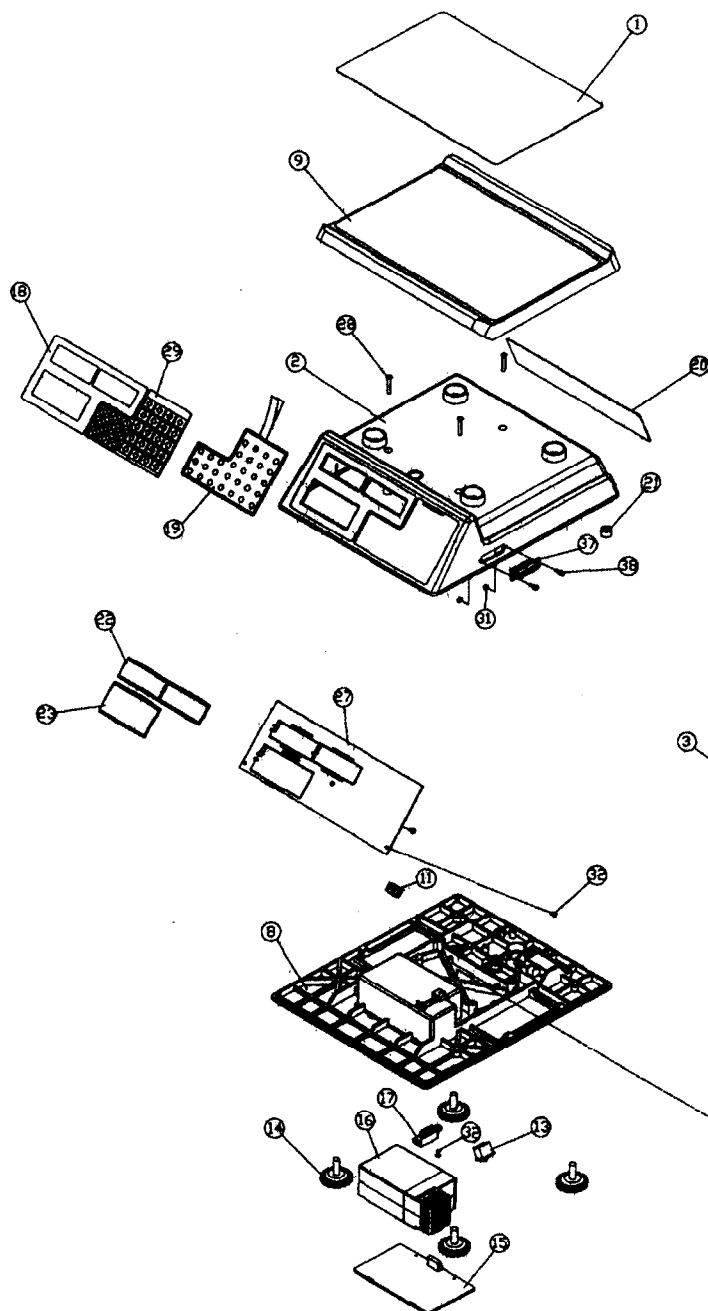
A1301000002	DIP S/W	DS-02(4 PIN)	1	S1(OPTION)
A1100260000	CRYSTAL	6.0MHz	1	X1
A1500000004	BUZZER	OBO-15210	1	BZ1
A1500000003	BUZZER	OBO-20C9	1	BZ1 (UPON REQUEST)
A0910000120	CONNECTOR (FPC)	8 PIN(ZIF) 180°	1	J4
A0901010120	CONNECTOR (WIRE ARRAY)	12 PIN WAFER	1	J5(PRINTER OPTION)
A0901010040	CONNECTOR (WIRE ARRAY)	4 PIN WAFER	2	J6,8(RS232 & OUTPUT OPTION)
A0902010020	CONNECTOR(POWER)	2 PIN,PITCH=3.96mm	2	J1~2
A0902010040	CONNECTOR(POWER)	4 PIN,PITCH=3.96mm	1	J2(DUAL POWER)
A0907020240	CONNECTOR(PIN PLUG)	2 x 12 PIN	1	J12
A0907020340	CONNECTOR(PIN PLUG)	2 x 17 PIN	1	J9
A1002108000	INDUCTOR	1mH	3	L1~3
A1400000002	BACK LIGHT	75 x 25mm	2	BL1~2
A1400000004	BACK LIGHT	103.5 x 40mm	1	BL3
A5004000003	HEAT SINK	MB-207-20	1	Q1

OPTIONAL BATTERY PACK

G00060EP000	PLASTIC BATTERY HOUSING	OEP SERIES(GRAY)	2	
E00EP010000	P.C.B.	6V4A-20-X	1	
A1600060400	RECHARGEABLE BATTERY	GP4-6/6V 4Ah	1	
F00250EP000	BATTERY TRAP	20 x 22 x 2(Dia.)	1	
A0730104050	CAPACITOR (MLC)	0.1uF/50V(104)	1	C1
A0701227017	CAPACITOR (EC)	220uF/16V(SS TYPE)	1	C2
A0502000001	BRIDGE RECTIFIER	W04(1A)	1	BR1
A0501004002	DOODE	1N4002	1	D1
A0501004148	DOODE	1N4148	1	D2
A0401009450	TRANSISTOR	2SC945	1	Q2
A0401010610	TRANSISTOR	H1061C OR D880	1	Q1
A0401007330	TRANSISTOR	A733	1	Q3
A0906000140	D.C. JACK	SCD-014 (BLACK)	1	J1
A0805041153	CARBON FILM RESISTOR	15K ohm,1/4W	1	R4
A0805041221	CARBON FILM RESISTOR	220 ohm,1/4W	1	R5
A0805041471	CARBON FILM RESISTOR	470 ohm,1/4W	1	R1
A0805020120	CARBON FILM RESISTOR	1.2 ohm,1/2W	1	R3
A0805021101	CARBON FILM RESISTOR	100 ohm,1/2W	1	R2
A0503020082	ZENER DIODE	1/2W 8.2V(9A3)	1	ZD1
A5004000003	HEAT SINK	MB-207-20	1	Q1
Z0011000308	SCREW	M3 x 8	2	
A0625050000	L.E.D.	RED/GREEN ROUND 5mm	1	LED1

6. PARTS LIST

PARTS EXPLOSION:



ITEM	PART NAME	DESCRIPTION	QTY
1	STAINLESS STEEL PAD	OEC-SERIES	1
2	PLASTIC UPPER CABINET	OEC-SERIES(WHITE)	1
3	RUBBER PAD	CPR-190803	4
4	LOAD CELL UPPER SUPPORT	OEC-EC-SERIES	1
5	LOAD CELL	CAG1 or 1020	1
6	ALUMINUM PAD	EM-SERIES	1
7	LOAD CELL LOWER SUPPORT	OEC-EC-SERIES	1
8	PLASTIC LOWER CABINET	OEC-SERIES(GRAY)	1
9	PLASTIC PLATTER	OEP-SERIES	1
11	AC SOCKET	2P, PANEL MOUNT	1
13	ROCK SWITCH	N18A-380	1
14	ADJ. FEET	E-SERIES	4
15	BATTERY COVER	EM-SERIES(GRAY)	1
16	RECHARGEABLE BATTERY	1800mAh	1
17	EDGE CONNECTOR	3.96mm, 12 PIN	1
18	FRONT PC PANEL	OEC-SERIES	1
19	MEMBRANE KEYBOARD	OEP-SERIES, 29 KEYS	1
20	BACK PC PANEL	OEC-SERIES	1
21	BUBBLE LEVEL	#14mm	1
22	L.C.D	UTN-134LV-W	4
23	L.C.D	UTN-244LV	2
27	P.C.B	OEP-11-X MAIN BOARD	1
28	SCREW	M4x25, ROUND HEAD	3
29	KEYBOARD OVERLAY	OEC-SERIES	1
31	NUT	M3	4
32	SCREW	A3x10mm, ROUND HEAD	7
33	SCREW	M6x20	4
34	SPRING WASHER	M7	4
35	SCREW	M4x20, FLAT HEAD(NYLOK)	2
37	D-SUB CONNECTOR	PO88-251X(OPTION)	1
38	SCREW	M3, PO88-281X	2
39	SCREW	M4x20, ROUND HEAD	1
40	NUT	M4	1

AT89C52

Features

- Compatible with MCS-51™ Products
- 8 Kbytes 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

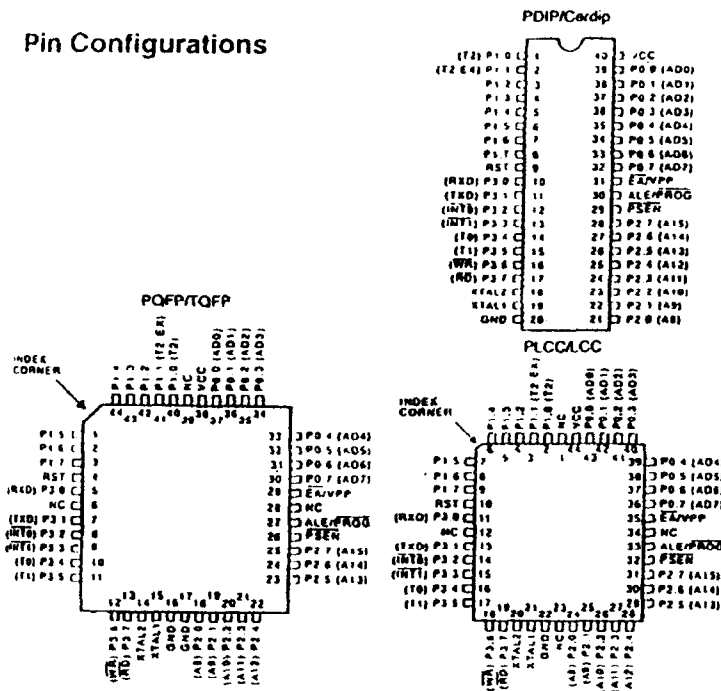
The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8 Kbytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard 80C51 and 80C52 instruction 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.

The AT89C52 provides the following standard features: 8 Kbytes of Flash, 256 bytes of RAM, 32 I/O lines, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89C52 is

(continued)

8-Bit Microcontroller with 8 Kbytes Flash

Pin Configurations



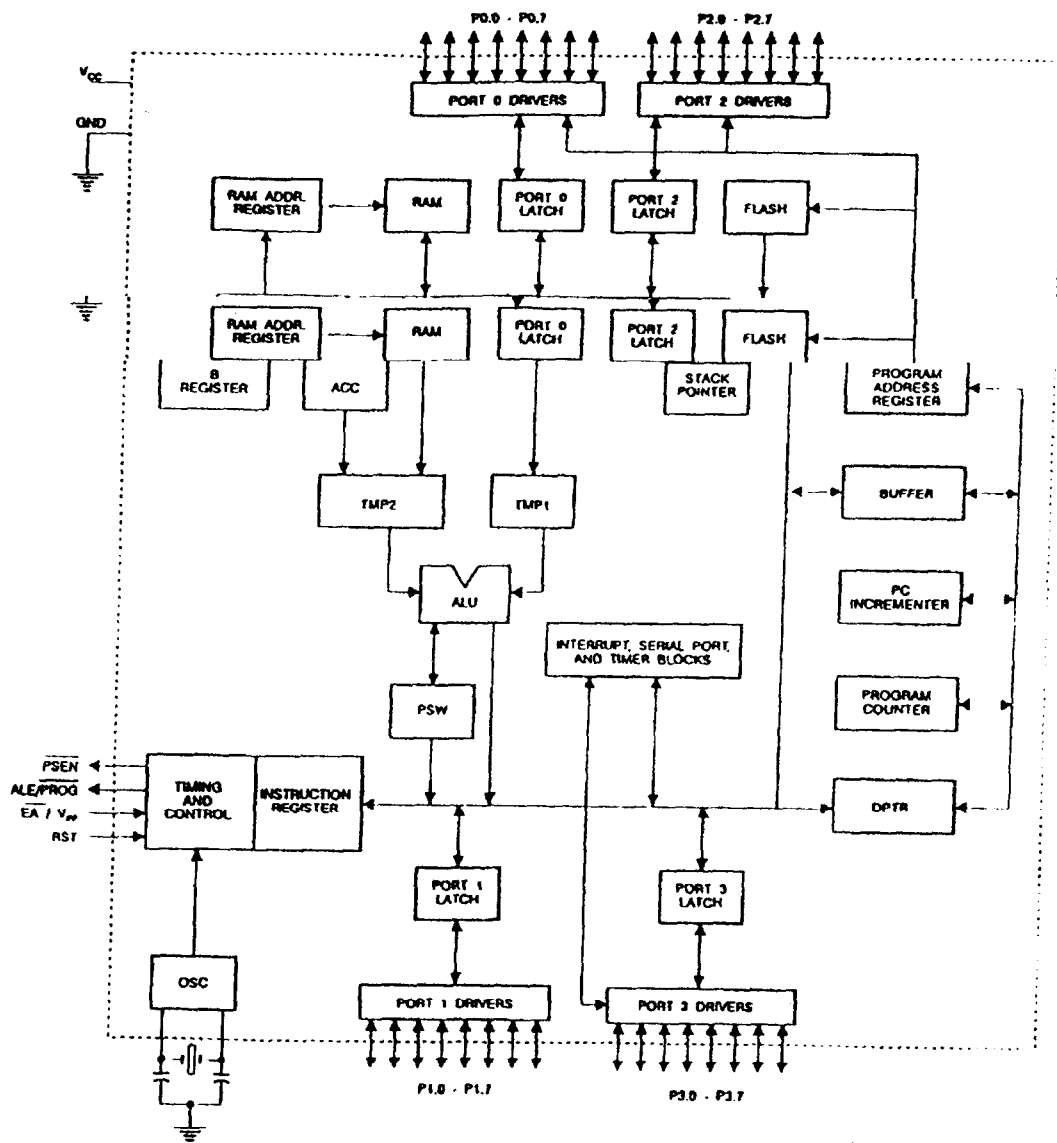
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3-65

7. APPENDIX



Block Diagram



3-66

AT89C52



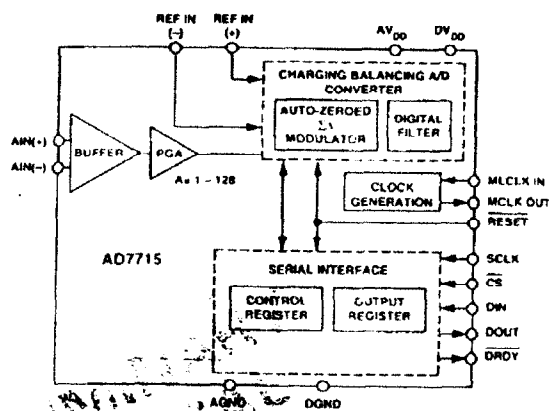
3 V/5 V, Low Cost, Low Power, 16-Bit, Sigma-Delta ADC

AD7715*

FEATURES

Charge-Balancing ADC
 16 Bits No Missing Codes
 0.0015% Nonlinearity
Programmable Gain Front End
 Gains of 1, 2, 32 and 128
Differential Input Capability
 Three-Wire Serial Interface
 Ability to Buffer the Analog Input
 3 V or 5 V Single Supply Operation
 Low Supply Current: 500 μ A max @ 3 V Supplies
 Low-Pass Filter with Programmable Output Update
 16-Pin SOIC/DIP

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The AD7715 is a complete analog front end for low frequency measurement applications. The part can accept low level input signals directly from a transducer and outputs a serial digital word. It employs a sigma-delta conversion technique to realize up to 16 bits of no missing codes performance. The 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 the on-chip control register allowing adjustment of the filter cutoff and output update rate.

The AD7715 features a differential analog input as well as a differential reference input. It operates from a single supply (+3 V or +5 V). It can handle unipolar input signal ranges of 0 mV to +20 mV, 0 mV to +80 mV, 0 V to +1.25 V and 0 V to +2.5 V. It can also handle bipolar input signal ranges of ± 20 mV, ± 80 mV, ± 1.25 V and ± 2.5 V. These bipolar ranges are referenced to the negative input of the differential analog input. The AD7715 thus performs all signal conditioning and conversion for a single-channel system.

The AD7715 is ideal for use in smart, microcontroller or DSP based systems. It features a serial interface which 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 50 μ W typ. The part is available in a 16-pin, 0.3 inch-wide, plastic and hermetic dual-in-line package (DIP) as well as a 16-lead small outline (SOIC) package.

*Protected by U.S. Patent No. 5,134,401.

This is a preliminary data sheet. To obtain the most recent version or complete data sheet, call our fax retrieval system at 1-800-446-6212.

This information applies to a product under development. Its characteristics and specifications are subject to change without notice. Analog Devices assumes no obligation regarding future manufacture unless otherwise agreed to in writing.

PRODUCT HIGHLIGHTS

1. The AD7715 consumes less than 500 μ A in total supply current at 3 V supplies and 1 MHz master clock, making it ideal for use in low-power systems. Standby current is less than 10 μ A.
2. The programmable gain input allows the AD7715 to accept input signals directly from a strain gage or transducer removing a considerable amount of signal conditioning.
3. The AD7715 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. The part contains on-chip registers which allow software control over output update rate, input gain, signal polarity and calibration modes.
4. The part features excellent static performance specifications with 16-bit No Missing Codes, $\pm 0.0015\%$ accuracy and low rms noise (< 450 nV). Endpoint errors and the effects of temperature drift are eliminated by on-chip self-calibration, which removes zero-scale and full-scale errors.

HD61602/HD61603

(Segment Type LCD Driver)

The HD61602 and the HD61603 are liquid crystal display driver LSIs with TTL and CMOS compatible interface. Each of the LSIs can be connected to various micro-computers such as the HMCS6800 series.

The HD61602 incorporates the power supply circuit for liquid crystal display driver. By the software-controlled liquid crystal driving method, several types of liquid crystals can be connected according to the applications.

The HD61603 is a liquid crystal display driver LSI only for static drive and has 64 segment outputs that can display 8 digits per chip.

■ FEATURES

- Wide-range operating voltage

Operates in a wide range of supply voltage 2.2V to 5.5V.

Compatible with TTL interface at 4.5V to 5.5V.

- Low current consumption

Can drive from a battery power supply (100 μ A max. on 5V).

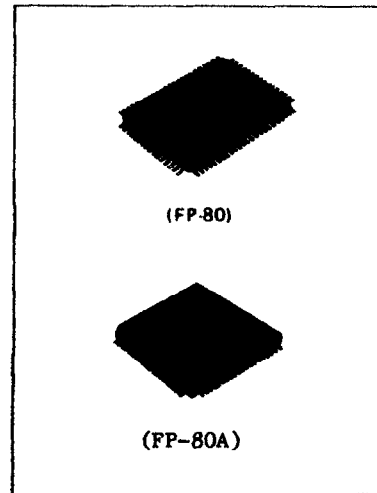
Standby input enables a standby operation at lower current consumption (5 μ A max. on 5V).

- Internal power supply circuit for liquid crystal display driver (HD61602).

Internal power supply circuit for liquid crystal display driver facilitates the connection to a microcomputer system.

- Versatile segment driving capacity

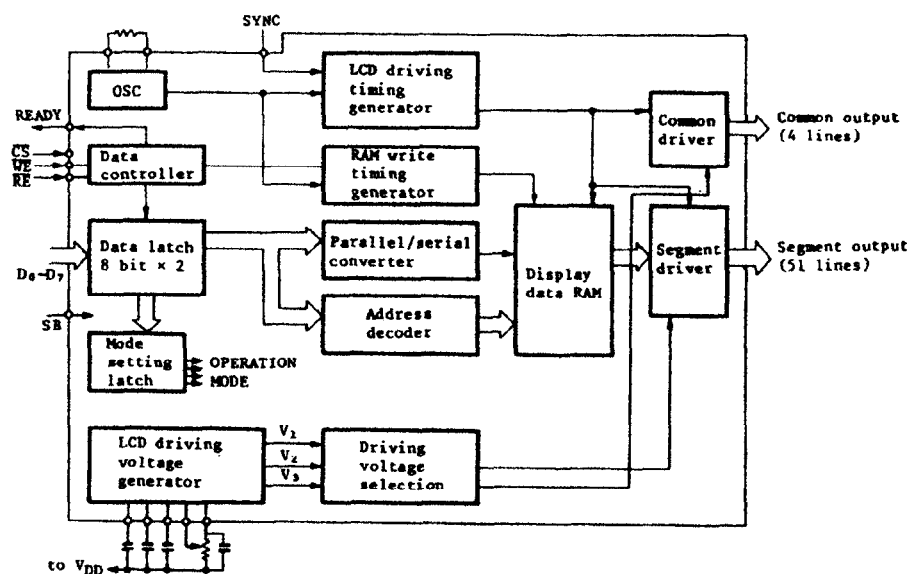
Type No.	Driving method		Display segments	Example of use	Frame freq. (Hz) at fosc=100kHz	Package
HD61602	Static		51	8 segments $\times$ 6 digits +3 marks	33	80-pin Plastic QFP (FP-80 FP-80A)
	1/2 bias	1/2 duty	102	8 segments $\times$ 12 digits +6 marks	65	
	1/3 bias	1/3 duty	153	9 segments $\times$ 17 digits	208	
		1/4 duty	204	8 segments $\times$ 25 digits +4 marks	223	
HD61603	Static		64	8 segments $\times$ 8 digits	33	80-pin Plastic QFP (FP-80)



HD61602/HD61603

■ BLOCK DIAGRAM

HD61602



■ ABSOLUTE MAXIMUM RATINGS

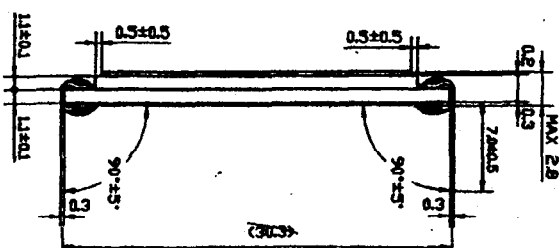
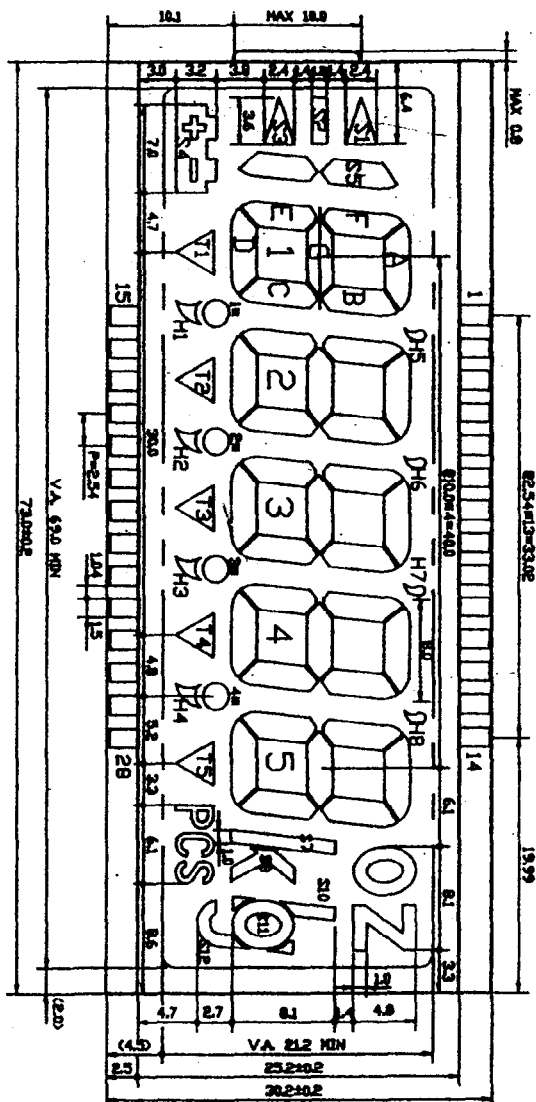
Item	Symbol	Limit	Unit
Power supply voltage*	V_{DD} , V_1 , V_2 , V_3	0.3 ~ +7.0	V
Terminal voltage*	V_T	0.3 ~ $V_{DD} - 0.3$	V
Operating temperature	T_{opr}	-20 ~ +75	°C
Storage temperature	T_{stg}	-55 ~ +125	°C

* Value referred to $V_{GS}=0V$.

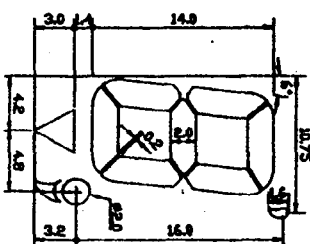
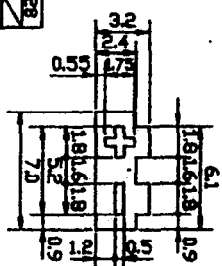
Note: If LSIs are used above absolute maximum ratings, they may be permanently destroyed. Using them within electrical characteristics limits is strongly recommended for normal operation. Use beyond these conditions will cause malfunction and poor reliability.

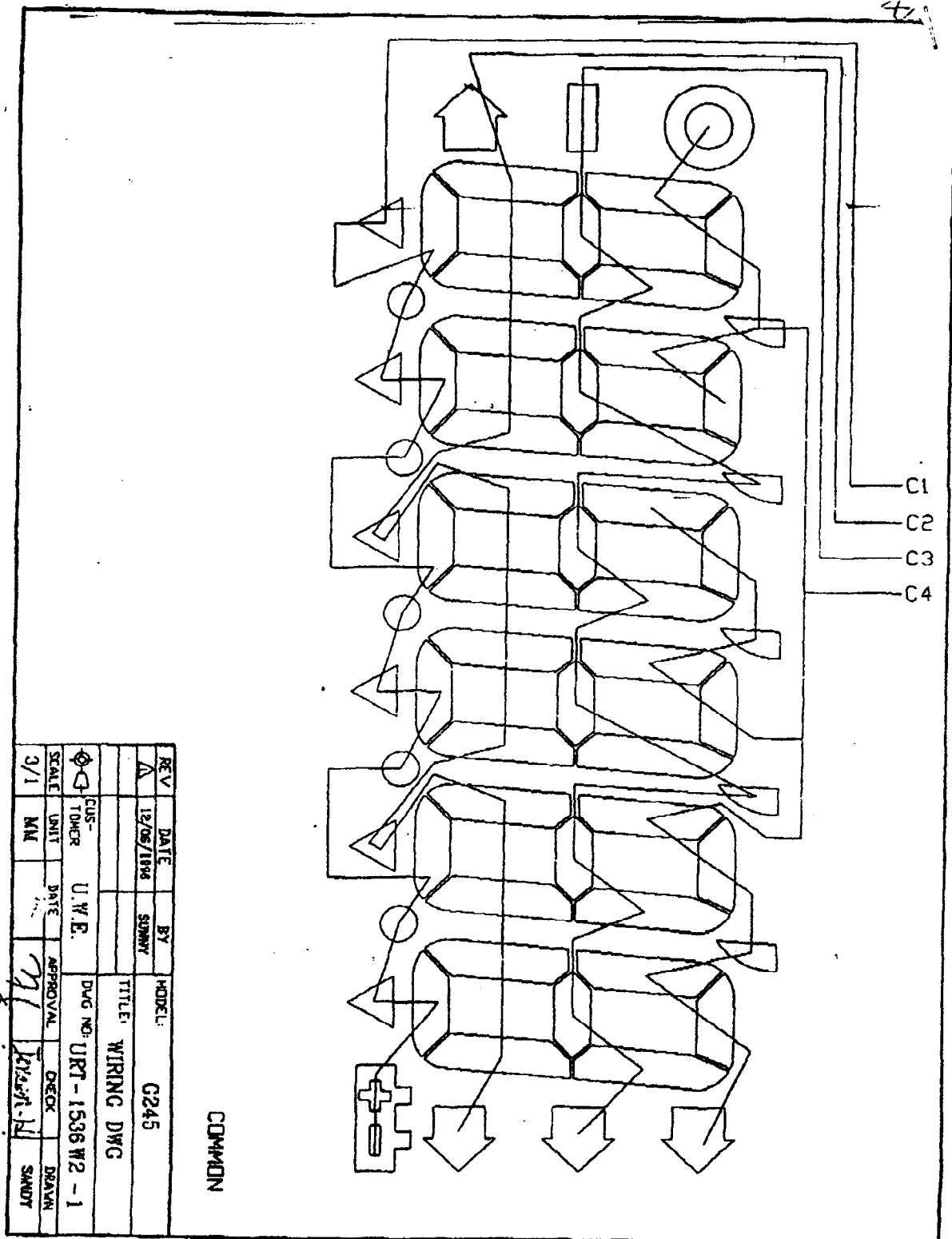
MT-097

Viewing Direction

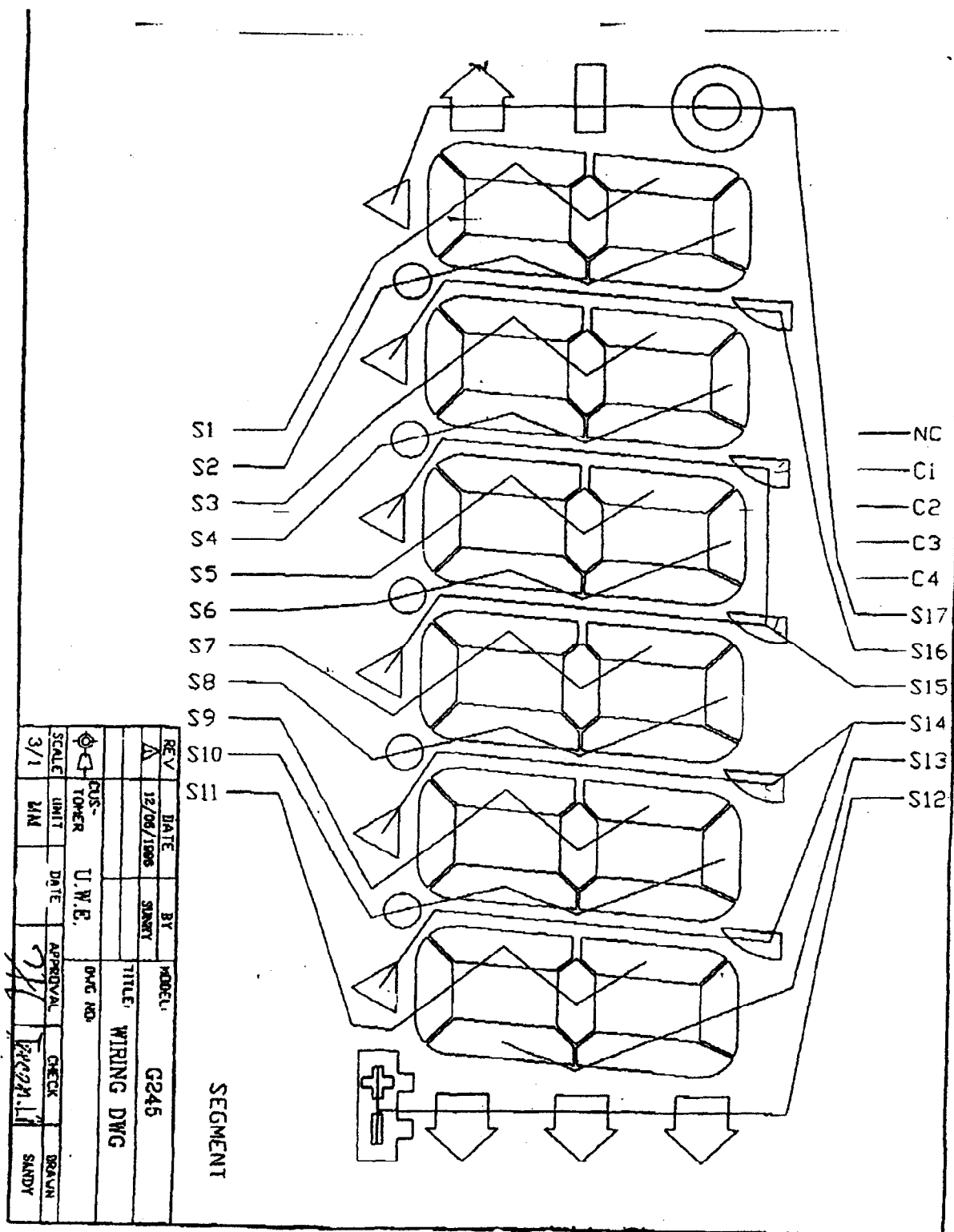


PIN/CD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
CDM 3	1	F	A																									
CDM 2	1	G	B																									
CDM 1	1	H	C																									
CDM 0	1	I	D																									



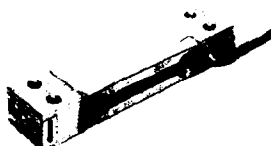


7. APPENDIX



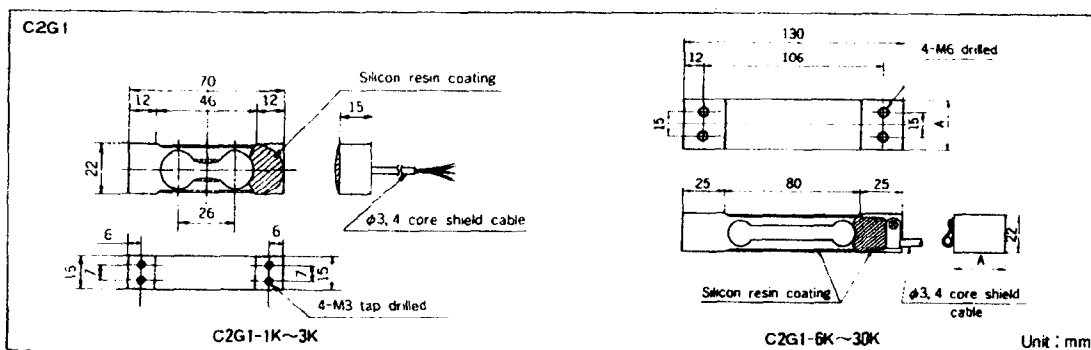
FOR ELECTRONIC SCALE

C2G1
Off-center
load cell



Specifications

MODEL	C2G1-1K~3K	C2G1-6K~30K
Rated capacity	1, 2, 3kgf	6, 10, 12, 15, 20, 25, 30kgf
Rated output	Approx. 1mV/V	Approx. 2mV/V
Non-linearity	0.02%R.O.	0.02%R.O.
Hysteresis	0.02%R.O.	0.02%R.O.
Repeatability	0.02%R.O.	0.02%R.O.
Creep	0.03%R.O./20min	0.02%R.O./20min
Creep Recovery	0.03%R.O./20min	0.02%R.O./20min
Excitation, recommended	10V	12V
Maximum	15V	20V
Zero balance	±5%R.O.	±5%R.O.
Terminal resistance, input	Approx. 400Ω	Approx. 400Ω
output	350±5Ω	350±5Ω
Length of cable	φ3, 40cm (4 core shield cable)	φ3, 40cm (4 core shield cable)
Insulation resistance	2000MΩ or more	2000MΩ or more
Temp. range, compensated	-10~50℃	-10~50℃
Safe	-10~50℃	-10~50℃
Temp. effect on zero balance	0.04%R.O./10℃	0.04%R.O./10℃
Temp. effect on output	0.012%LOAD/10℃	0.012%LOAD/10℃
Safe overload	300%R.C.	150%R.C.
Ultimate overload	400%R.C.	200%R.C.
Weight	Approx. 45g	



Model	(mm)	Rated C.	A	Weight Approx.(g)
C2G1-6K		6 kgf	30	200
C2G1-10K		10kgf	30	200
C2G1-12K		12kgf	30	200
C2G1-15K		15kgf	30	200
C2G1-20K		20kgf	30	200
C2G1-25K		25kgf	40	260
C2G1-30K		30kgf	40	260

LOAD CELLS

2

Type	CB17	C2X1												
Features	Low capacity, and precision accuracy, single point load cell with cost effective price. Small displacement, and easy to treat in various applications.	Low capacity, and middle accuracy, single point load cell with cost effective price. Small displacement, and easy to treat in various applications.												
Specifications														
Rated capacity	600gf, 1, 2, 3kgf	10, 15, 20, 25, 30kgf												
Safe overload	300%R.C	150%R.C												
Ultimate overload	400%R.C	200%R.C												
Rated output	1mV/V $\pm 10\%$	2mV/V $\pm 5\%$												
Non-linearity	0.02%R.O.	0.015%R.O.												
Hysteresis	0.02%R.O.	0.015%R.O.												
Repeatability	0.02%R.O.	0.015%R.O.												
Creep	0.02%R.O./20min	0.02%R.O./3min												
Creep recovery	0.02%R.O./20min	0.02%R.O./3min												
Excitation, recommended	10V	12V												
Excitation, maximum	15V	20V												
Zero balance	$\pm 5\%$ R.O.	$\pm 5\%$ R.O.												
Terminal resistance, input	$420 \pm 20 \Omega$	$420 \pm 20 \Omega$												
Terminal resistance, output	$350 \pm 5 \Omega$	$350 \pm 5 \Omega$												
Insulation resistance	2000M Ω or more	2000M Ω or more (DC 50V)												
Temp. range compensated	-10-50 $^{\circ}$ C	-10-50 $^{\circ}$ C												
Temp. range safe	-10-50 $^{\circ}$ C	-10-50 $^{\circ}$ C												
Temp. effect on zero balance	0.04%R.O./10 $^{\circ}$ C	0.03%R.O./10 $^{\circ}$ C												
Temp. effect on output	0.012%LOAD/10 $^{\circ}$ C	0.05%LOAD/10 $^{\circ}$ C												
Cable length	$\phi 3.2 \pm 0.2$ mm 4 cores shield cable (40cm)	$\phi 3.2 \pm 0.2$ mm 4 cores shield cable (40cm)												
Weight	Approx 40g	Approx 200g												
Outlines														
		Dimensions <table><tr><th>Capacity</th><th>A</th></tr><tr><td>10</td><td>25.5</td></tr><tr><td>15</td><td>26.0</td></tr><tr><td>20</td><td>26.0</td></tr><tr><td>25</td><td>28.0</td></tr><tr><td>30</td><td>28.0</td></tr></table>	Capacity	A	10	25.5	15	26.0	20	26.0	25	28.0	30	28.0
Capacity	A													
10	25.5													
15	26.0													
20	26.0													
25	28.0													
30	28.0													