REV : 00
DECEMBER 29, 1997

ND SERIES

SERVICE MANUAL

C A S CORPORATION

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CHAPTER-I
THE GENERAL INTRODUCTIONS

A. THE PREFACE

Thank you for purchasing our CAS scale.
This scale has been designed with CAS reliability, under rigid quality control and with outstanding performance.
Your departments can enjoy with this high quality reliable CAS product.
This electronic load cell scale eliminates all the moving parts and furnish an accurate digital display of all information.
We believe that your needs will be satisfied and you will have proper reliability with in variable weight.
This manual will help you with proper operations and care of the ND-300 series.
Please keep it handy for the future references.

B. THE PRECAUTIONS

1. Check the power voltage.
2. Put the scale on a flat and stable place.
3. Level the scale with four adjusters.
   An air bubble of the level should be centered.(see fig.)
4. Plug into an AC outlet 10 minutes before operations.
5. Keep the scale away from strong E.M.I. noises.
6. This scale must be installed in a dry and liquid free environment.
7. Do not expose the scale to sudden temperature change.
8. Do not expose the scale to sudden impact.

LEVEL GAUGE

CORRECT INCORRECT

When the air bubble is inclined, loosen the opposite legs

C. THE SPECIFICATIONS

MODEL	N D - 3 0 0
MAXIMUM CAPACITY	3 0 0 Kg
MINIMUM SCALE DIVISION	1 0 0 g
MEASUREMENT TYPE	LOAD CELL TYPE
DISPLAY	5 DIGITS
MAX. TARE DEDUCTION	- 3 0 0.0 Kg (FULL TARE)
OPERATING TEMPERATURE	0℃ ~ 40℃
POWER REQUIREMENTS	AC 110/220V, 50Hz/60Hz
POWER CONSUMPTION	APPROX. 10 W
PRODUCT WEIGHT	APPROX. 45 Kg
DIMENSIONS (mm)	716(W) × 456(D) × 840(H)

D. SEALING METHOD

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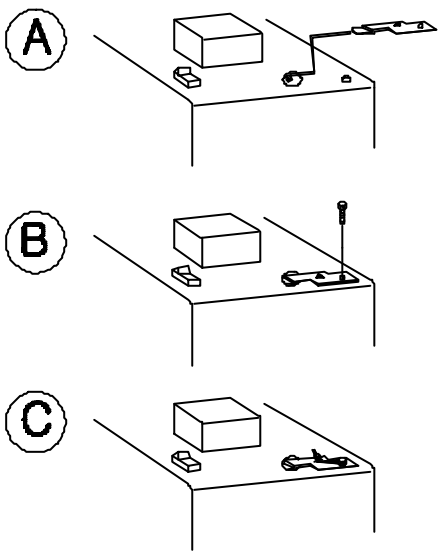
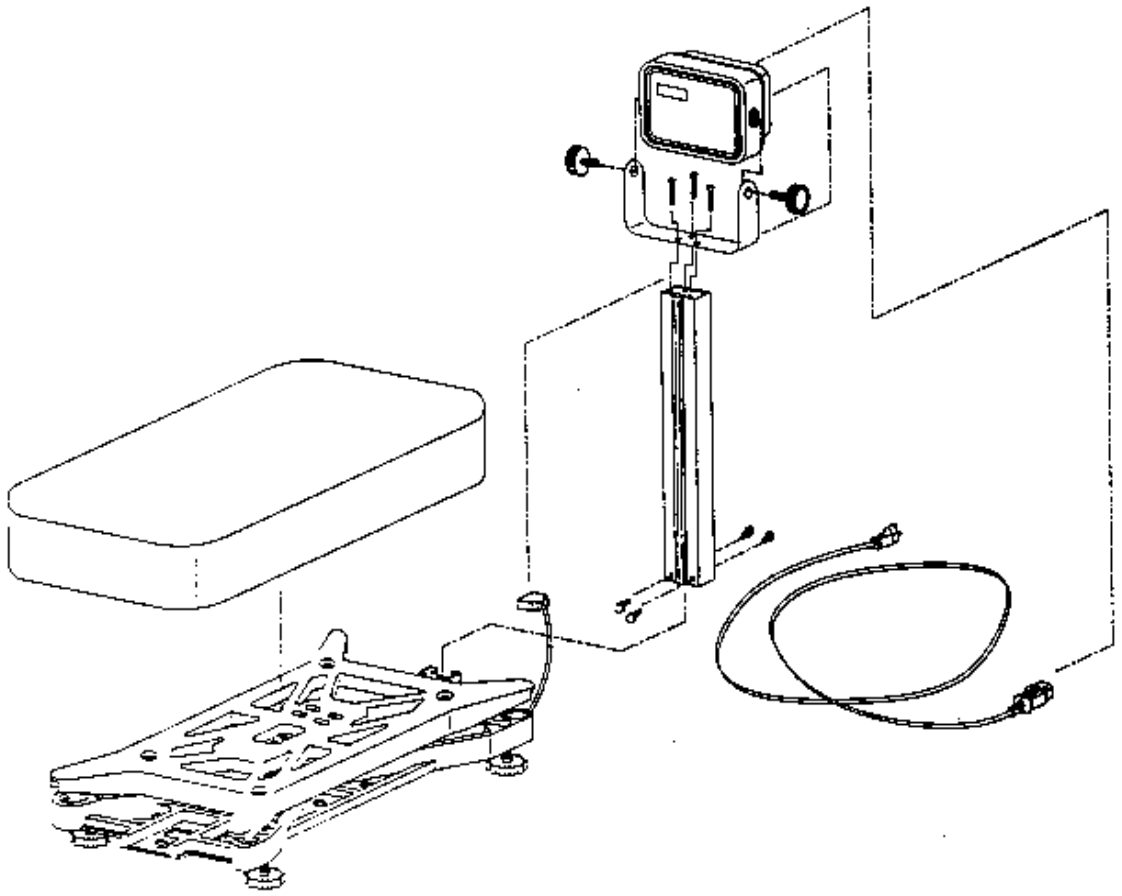


E. INSTALLATION

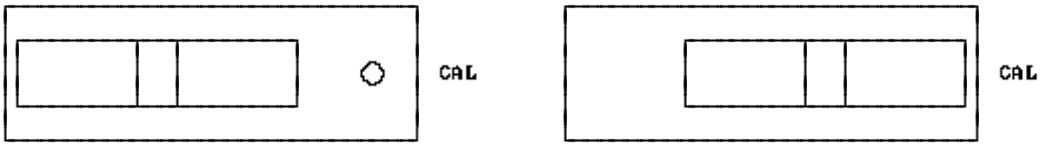
1) Screw the four adjustable legs at the bottom holes of body.
2) Set the air bubble in level vial to be centered by turning each legs at the bottom.
3) Erect body and tighten the bolt and nut.
4) Insert limit bolt into the body.
5) Adjust the bracket hole to the body hole and assemble the bracket to body by M6×20L bolt with spring washer.
6) Stand supporter behind assembled bracket and put them together with M6×10L bolt with plate washer.
7) Adjust holes on head guide and top of supporter. Next, assemble head guide to the supporter with M5×10L screw.
8) Put the head on the head guide, and fix head ass'y with head guide by using stop-bolt.



CHAPTER-II
THE CALIBRATIONS

A. GENERAL SPAN CALIBRATION

TEST BEFORE OPERATING..
When you replace a main board or load cell, the following four tests are required for proper weighing operation.
Empty the pan and set "CAL" switch on the P.C.B. located on the front and left side of upper case.



NORMAL MODE CALIBRATION MODE

A. 1 SET TO AN INITIAL READING

This is the first step for zero-adjustment, auto-span calibration and precise span calibration test on the basis of 1/30,000 resolution. In this step, check the initial zero value and intacted span reading in order to set up the automatic calibration.

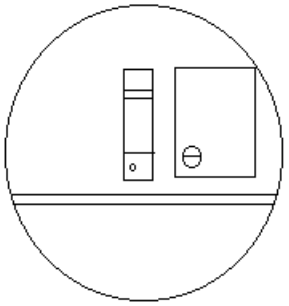
A. Turn the power switch ON, the display will show "CAL" three times and be off.

B. Press TARE key, the indicator will show initial zero value.

A. 2 ZERO POINT ADJUSTMENT

This scale can be operated normally when the zero value is set within 100 through 3,800.
Set the zero point within 2,000 ± 200.

A. Check the zero point. If it is within 2,000 ± 200, you can skip this procedure.
B. If it is exceeds or belows, zero point adjstment should be done to operate the scale normally.
C. In order to do zero-adjustment, remove the span cover located at head rear enclosure.
D. Adjust VR1 by using (-) type screw driver as belows until the number becomes close to 2,000.

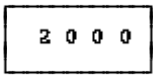


< INSIDE OF HOLE >

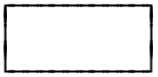
A. 3 SPAN ADJUSTMENT

This is the test to operate the scale normally by adjusting potential errors due to the changes of initially set figure of Load Cell or other parts influenced by the circumstances.

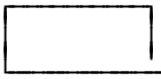
A. Press TARE key, the zero value will be appeared.
If this value isn't within 2,000 ± 200, zero adjustment should be done again.



B. Put full capacity weight of Load Cell and read it. The span value should be within 30,000 through 33,000.



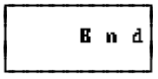
C. Empty the Pan and press ON/OFF key. The display will be blanked.



D. Press ON/OFF key again. The display will show as shown in right.

E. Press ON/OFF key. The display will show without "U" as shown in right.

F. Put a full capacity on the tray and press ON/OFF key to end this procedure.



G. Press ZERO key and return the "CAL" switch to the normal position.

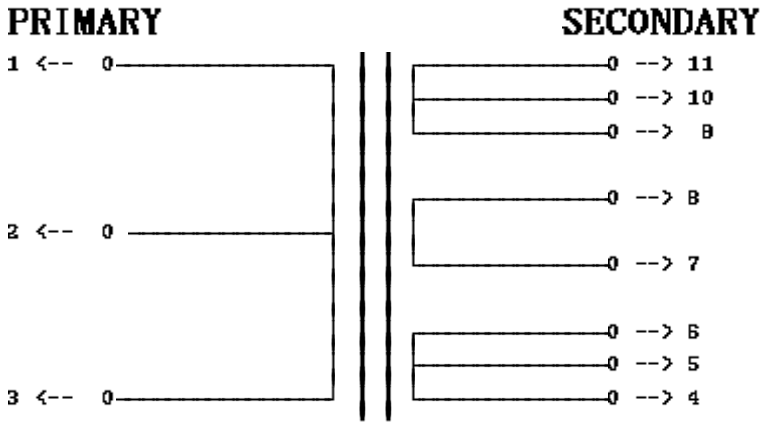
A. 4 FINE SPAN CALIBRATION

※ NOTE : Span calibration should be done before doing this procedure.
And this procedure should be done without turning the power off after finishing power off.

A. Turn the "CAL" switch to the position for calibration.
B. Insert the plug into the outlet.
C. Read the initial zero value by pressing TARE key. And press ZERO key to set the display to "0".
D. Load full capacity on the pan. The value should be within 30,000 ± 1.
E. When the value isn't around 30,000 ± 1, adjust it by pressing HOLD key and ZERO key.
To increase the span value, press HOLD key twice and to decrease, press HOLD key + ZERO key.
F. To complete, press ON/OFF key and ZERO key.
Return the CAL switch to normal position.

CHAPTER-Ⅲ
ELECTRONIC CIRCUIT

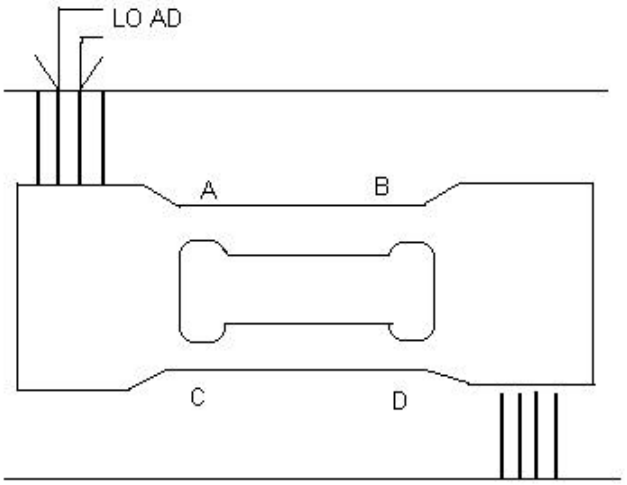
A. THE TRANSFORMER



	NO.	COLOR	VOLTAGE
I N P U T	1	WHITE	0
	2	BROWN	110
	3	RED	220
O U T P U T	4, 6	BLACK, RED	7.7V × 2
	5	BROWN	
	7, 8	ORANGE,YELLOW	28
	9, 11	GREEN,PURPLE	1.57 × 2
	10	BLUE	

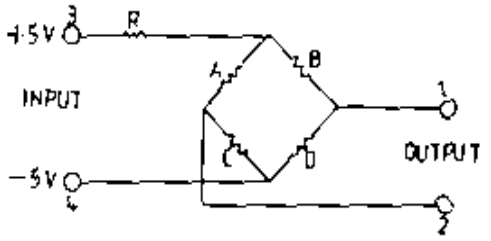
B. LOAD CELL

The load cell consist of four strain gauges attached to an aluminum frame. An electric output proportioned to the weight of a load applied to the Load Cell is generated. When a load is applied, the aluminum frame is deformed proportionally to the loaded weight. As a result and their values of resistance increase A and D increase. If strain gauges B and C decrease proportionately, their values of resistance decrease. These four strain gages make a wheatstone bridge as shown in below. They pick up the difference between the values of resistance influenced by the load as a voltage.



A, B, C, D → STRAIN GAUGE

If unloaded, the output of a voltage within the range is less than 500 μV.



When the full capacity weight is applied, rated output is 1.3 mV/V.
The impedance between pin 1 and 2 is 350 ohms, and between pin 3 and 4 is about 410 ohms.
"R" represents the temperature compensating resistance.

NOTE..
* If the Load Cell is to be replaced :
A. The ZERO and the SPAN adjustment may be needed.
B. The Load Cell should be in mounted level.
C. Be careful not to allow other wires to come in contact with the Load Cell.
D. Be sure to connect the Load Cell wire correctly.
E. Tighten the screws securely.

The following faults may occur if the circuit breaks down.

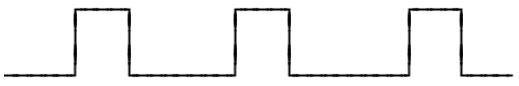
A. Weight is unstable.
B. Weight deflects. As long as the input voltage is normal, there is no way to repair it without replacing the Load Cell.
C. The weight is not displayed. Even it is displayed, it is incorrect.

C. MICRO COMPUTER

All of the signals generated by the keyboard and A/D converting unit, are controlled by this micro computer. The result of output is displayed through its driver circuit.

D. EXTERNAL CLOCK PULSE

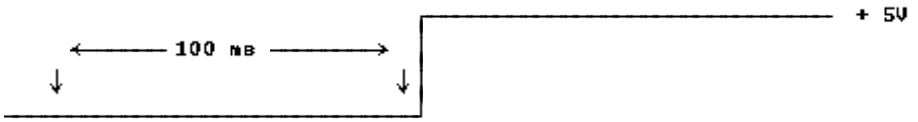
The external clock pulse has a square waveform of 7.200 MHZ.
If this signal fails, it becomes impossible to control the system and the followings or other faults will occur.
A. No display at all
B. A faulty display



Pin NO. 2 : 1.6 V
Pin NO. 3 : 1.0 V
0 V

E. SYSTEM RESET

This signal activates the system when the CPU is switched on. It operates only when power is on. It is highly active.



F. DECODER

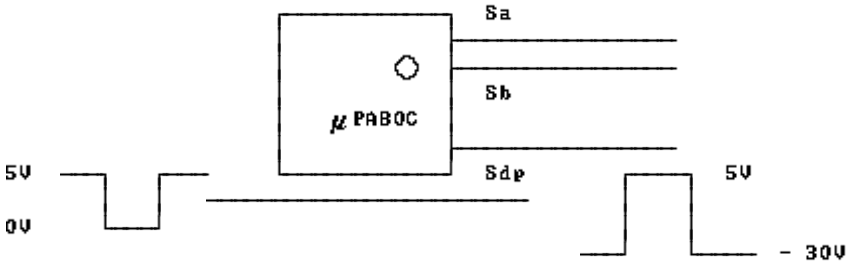
This I.C is 4 to 16 line decode has decode inhibit and the latch function. 74HC4514 I.C gives "L" only to the selected output. When INHIBIT input is "H" the selected output does not exist making all the outputs "H". When STROBE input is "H", the output corresponding to 4 bit input is selected and latched by the transition of STROBE from "H" to "L".

These digit signals T0 - T15 are amplified by the μPA80C and are supplied to the display tube grid. In addition, segment signals which synchronizes the T0 - T15 are supplied to the F.I.P. anode.

The F.I.P. is on when both of them are logically on the high level.

When the F.I.P. is on, the voltage is + 5V.

When the F.I.P. is not on, the voltage is - 30V.



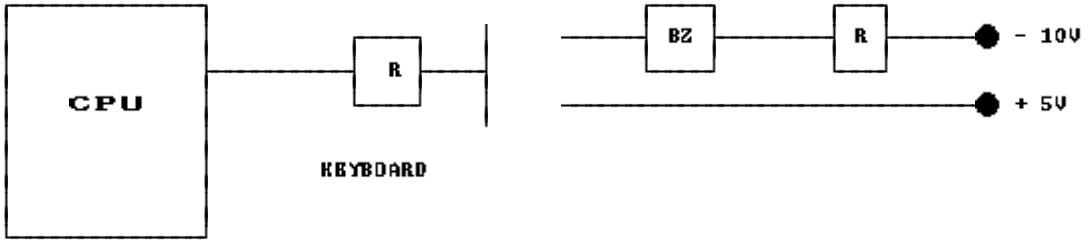
Functional principle of the F.I.P. is same as a triode. In case the filament(heater) is heated, thermion is fired toward the anode, if grid level is "high".

Then the thermion hits anode through grid. A part of anode with "H" level emits with fluorescence.

If any part of F.I.P. is not on, the corresponding signal should be checked.

In addition, AC 3.3 V is supplied to the display heater. DC -30V is supplied to the display tube cathode. When the filament voltage is low, the F.I.P. is dark. When the voltage is high, it is bright but service life is short.

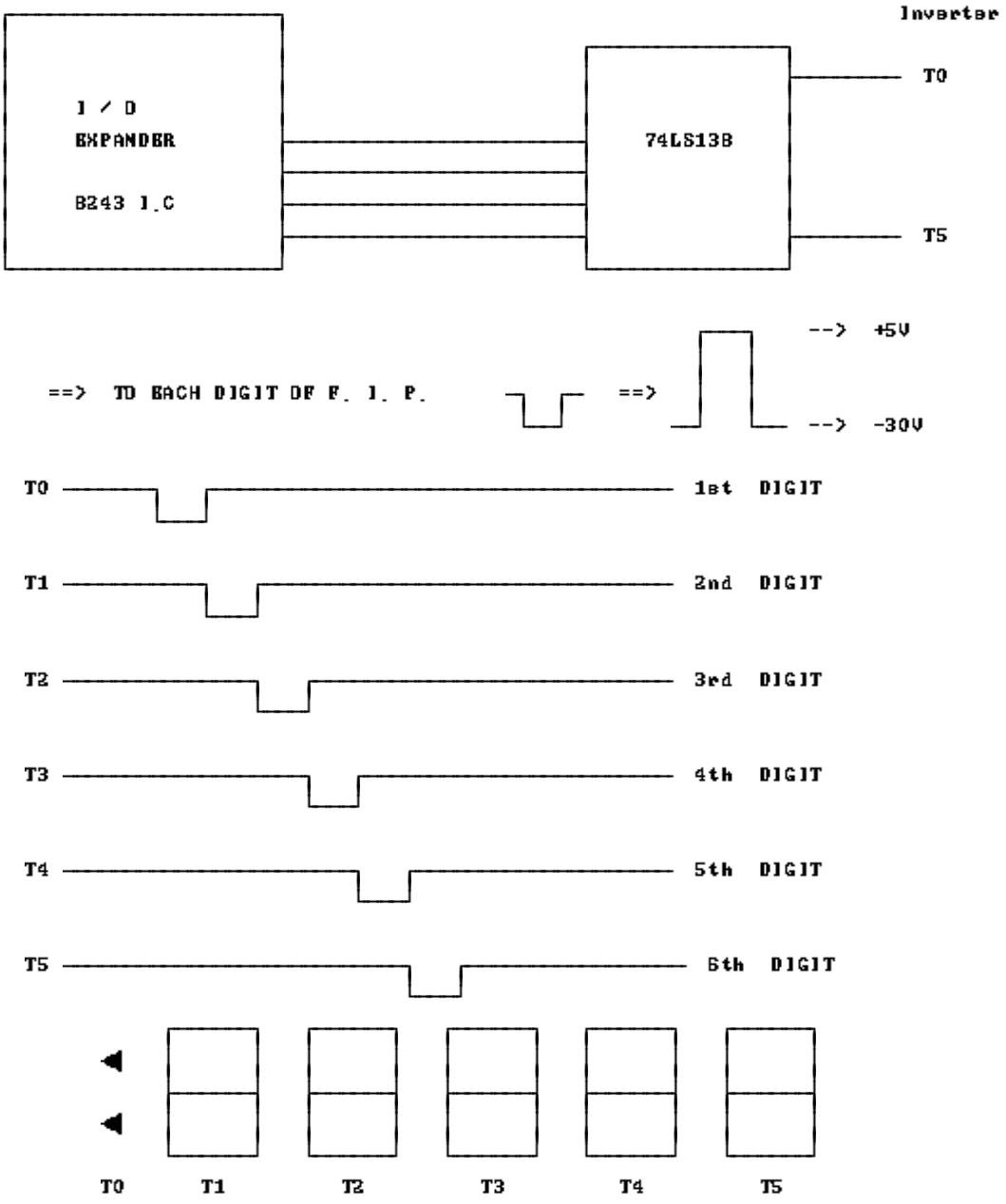
G. BUZZER



H. I/O EXPANDER (8243 I.C)

This I.C receives data from Micro-computer and transmits it to display driver I.C.
Also, receives data from keyboard and transmits it to Micro-Computer.

I. DIGIT/SEGMENT SIGNAL



CHAPTER-Ⅳ
THE SCHEMATICS AND THE DIAGRAMS

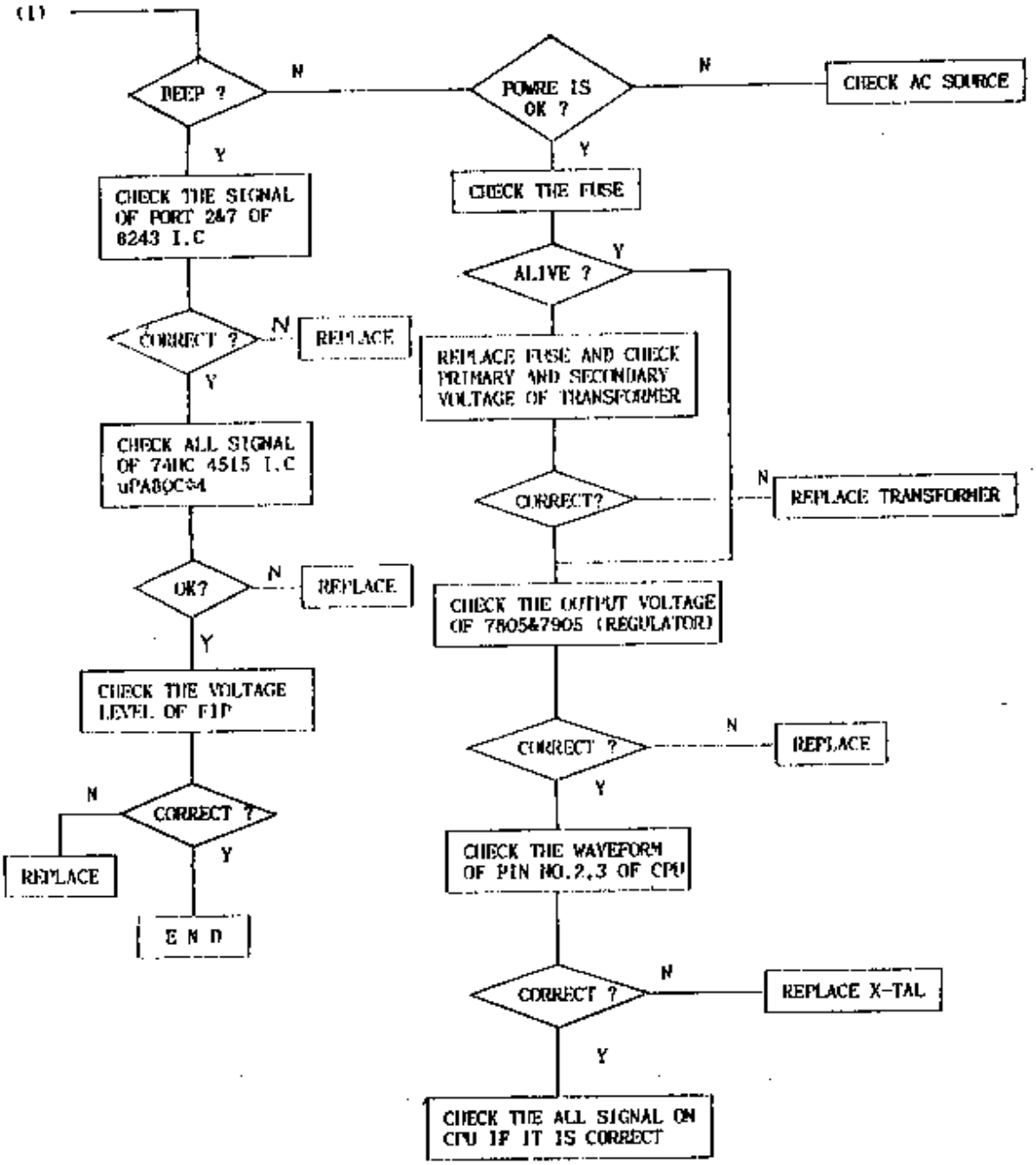
A. SCHEMATICS

A. 1 MAIN CIRCUIT DIAGRAM

A. 2 DISPLAY CIRCUIT DIAGRAM

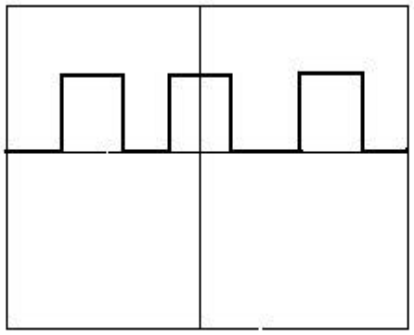
CHAPTER-V
TROUBLESHOOTING

A. FLOW CHART


(1)
BEEP ?
N
Y
POWRE IS OK ?
N
CHECK AC SOURCE
Y
CHECK THE SIGNAL OF PORT 2&7 OF 8243 I.C
CHECK THE FUSE
ALIVE ?
Y
CORRECT ?
N
REPLACE
Y
REPLACE FUSE AND CHECK PRIMARY AND SECONDARY VOLTAGE OF TRANSFORMER
CHECK ALL SIGNAL OF 74HC 4515 I.C uPA80C84
CORRECT?
N
REPLACE TRANSFORMER
OK?
N
REPLACE
Y
CHECK THE OUTPUT VOLTAGE OF 7805&7905 (REGULATOR)
CHECK THE VOLTAGE LEVEL OF FIP
CORRECT ?
N
REPLACE
Y
N
CORRECT ?
Y
REPLACE
CHECK THE WAVEFORM OF PIN NO.2,3 OF CPU
E N D
CORRECT ?
N
REPLACE X-TAL
Y
CHECK THE ALL SIGNAL ON CPU IF IT IS CORRECT

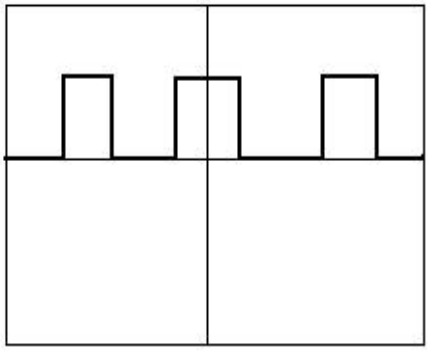
B. WAVEFORM

(1)



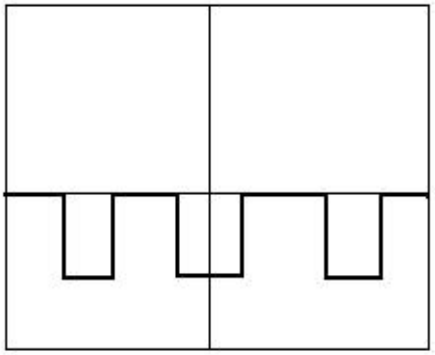
35V

(2)



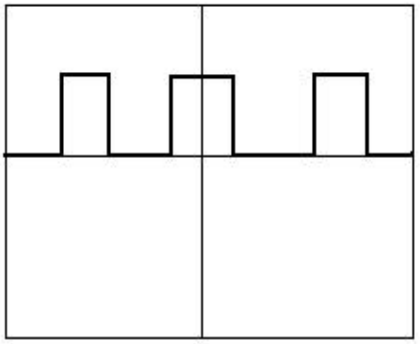
35V

(3)



5V

(4)



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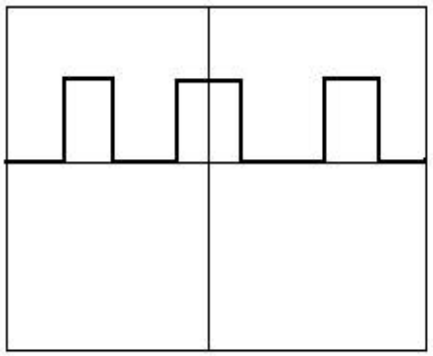

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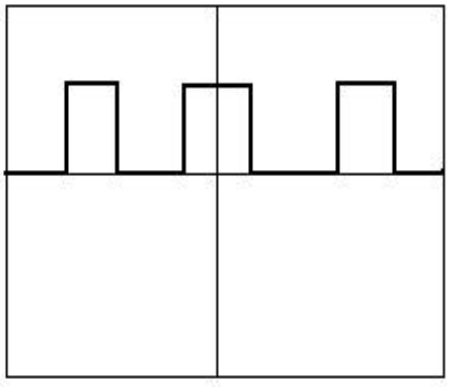

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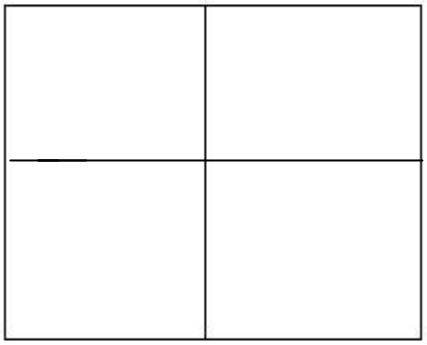

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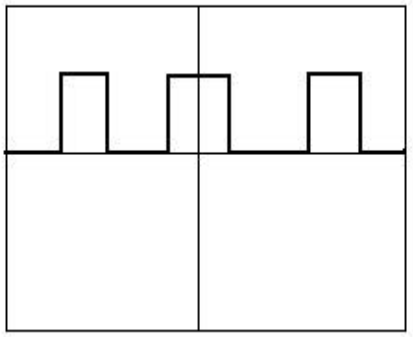

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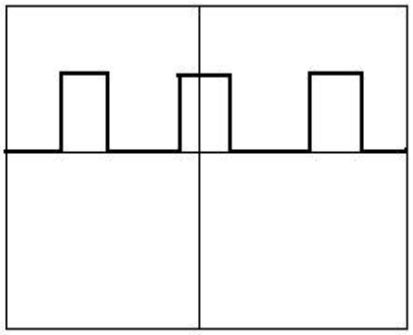

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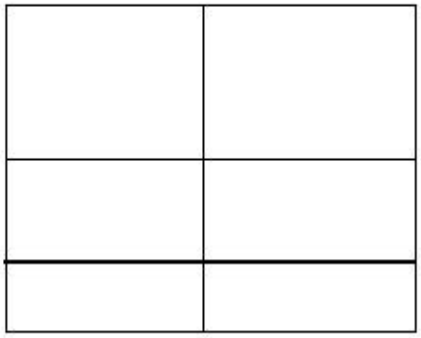

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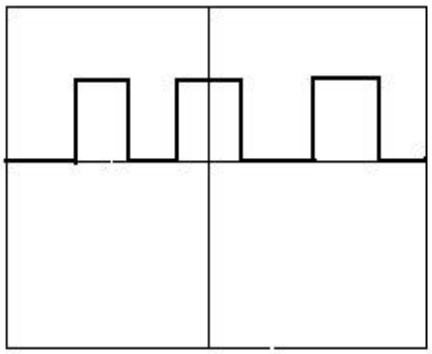
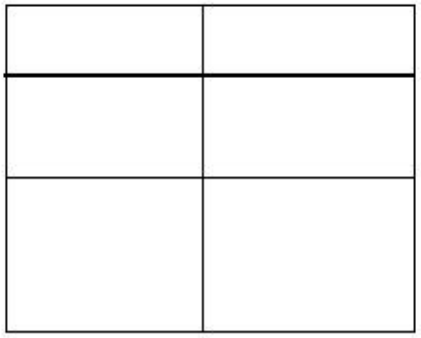


(12)

(13)



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CHAPTER-VI
FULL PARTS LIST

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A. EXPLODED VIEW (MECHANICAL PART)

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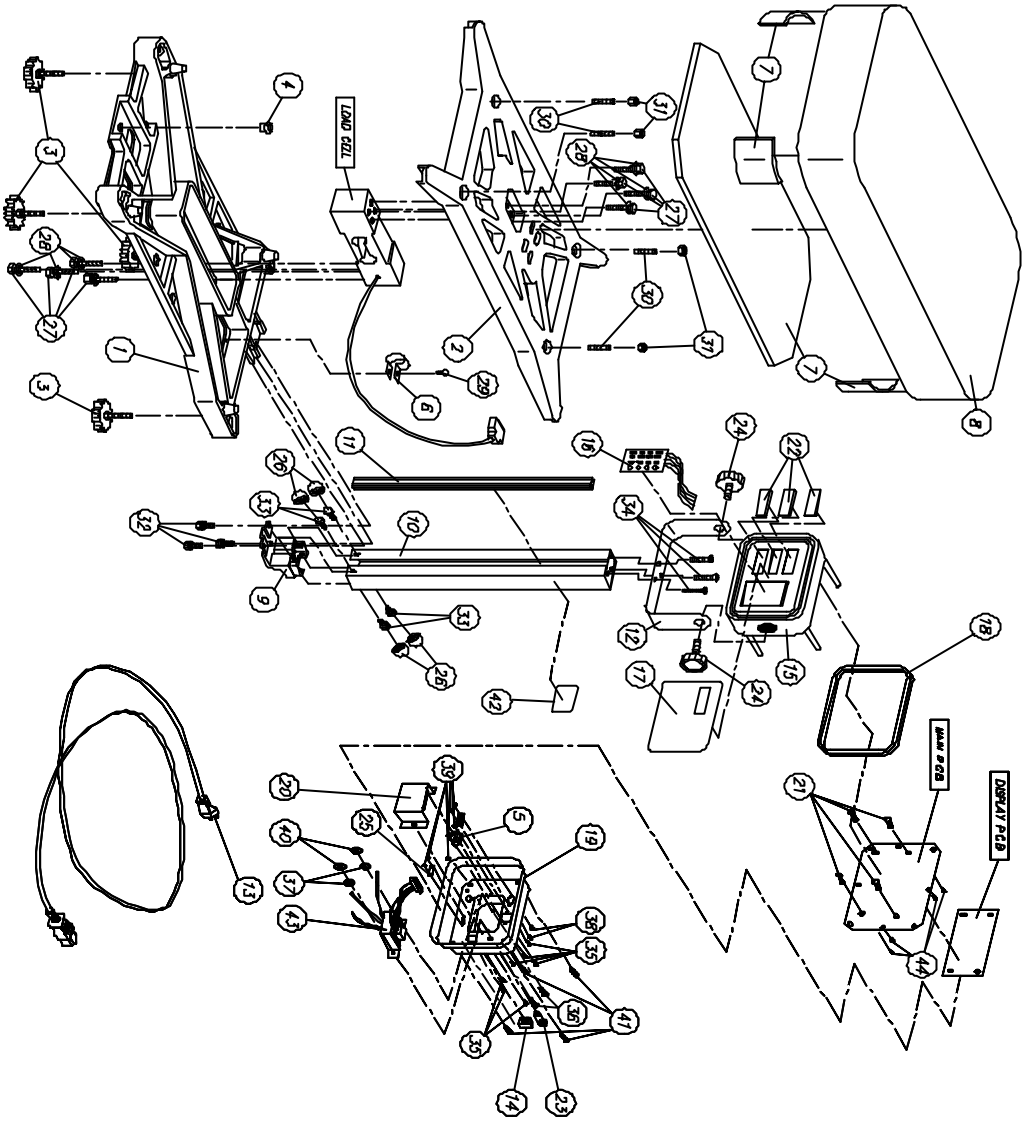

B. FULL PARTS LIST

REV : 00

NO	MAT'L CODE	PARTS NAME	SPECIFICATION	UNIT	Q'TY	LOCATION
	ELECTRICAL PARTS			SET	1	
	ASS'Y MAIN P.C.B			SET	1	
01	1050-A00-0310	HEAT SINK	2.5D 3t	EA	1	I.C. 11
02	1502-A00-030B	TAPPING SCREW - 2	3 * B	EA	1	
03	6114-A00-0114	MAIN PCB	6114-A00-0114	EA	1	
04	6202-A00-0074	I.C. (C-MOS)	74HC74AP	EA	1	I.C. 4
05	6202-A00-0125	I.C. (C-MOS)	74HC125AP	EA	1	I.C. B
06	6202-A00-0373	I.C. (C-MOS)	74HC373AP	EA	1	I.C. 6
07	6202-A00-0374	I.C. (C-MOS)	74HC374AP	EA	1	I.C. B
08	6202-A00-7135	I.C. (A/D CON.)	7135	EA	1	I.C. 3
09	6204-A00-B040	I.C. (M.C.U)	PB040AHL	EA	1	I.C. 5
10	6218-A00-7805	I.C. (REGULATOR)	7B05	EA	1	I.C. 11
11	6218-A00-7B05	I.C. (REGULATOR)	7B05	EA	1	I.C. 12
12	6218-E00-B054	I.C. (RESET)	B054ALB	EA	1	I.C. 5
13	6222-C00-2764	I.C. (EP-ROM)	27C64	EA	1	I.C. 7
14	6222-C00-B346	I.C. (EEP ROM)	B3C46	EA	1	I.C. 1
15	6214-A00-030B	I.C. (LINEAR)	LM 30BN	EA	1	I.C. 2
16	6216-A00-0077	I.C. (OP-AMP)	OP-77-GP	EA	1	I.C. 1
17	6300-A00-002B	I.C. SOCKET	2B PIN	EA	1	I.C. 7
18	6280-AA0-1050	TRANSISTOR	2SA1015	EA	1	TR1
19	6285-A00-0153	BRIDE DIODE	RB - 153	EA	1	BD-1
20	6286-A00-4004	POWER DIODE	1N 4004	EA	1	D1
21	6288-A00-4736	ZENER DIODE	B.2V/1W	EA	1	ZD1
22	6505-K00-1000	RESISTOR 1/4W	M.F.R 100KΩ -F	EA	4	R5,6,B,10
23	6505-K00-1500	RESISTOR 1/4W	M.F.R 150KΩ -F	EA	2	R3

NO	MAT'L CODE	PARTS NAME	SPECIFICATION	UNIT	Q'TY	LOCATION
24	6505-K00-2000	RESISTOR ¼W	M.F.R 200KΩ -F	EA	1	R4
25	6505-K00-2700	RESISTOR ¼W	M.F.R 270KΩ -F	EA	1	R8
26	6530-FLY-0	PRECISION RESISTOR	FLAY 42.5 KΩ	EA	2	R1, 2
27	6534-A00-0330	RESISTOR ¼W	C.F.R 33Ω	EA	1	R11
28	6534-K00-0022	RESISTOR ¼W	C.F.R 2.2KΩ	EA	1	R7
29	6534-K00-0047	RESISTOR ¼W	C.F.R 4.7KΩ	EA	1	R12
30	6534-K00-0100	RESISTOR ¼W	C.F.R 10KΩ	EA	1	R13
31	6534-K00-0300	RESISTOR ¼W	C.F.R 30KΩ	EA	1	R14
32	6545-E01-8103	NETWORK RESISTOR	NB-1-103J	EA	1	RA2
33	6548-E00-0022	NETWORK RESISTOR	3B-4Z-ME5 2.2/10	EA	1	RA1
34	6570-K00-1000	POTENTIO METER	6BWR 100KΩ	EA	1	VR1
35	6704-A00-0220	ELECTRIC-CONDENSER	220μF/100V	EA	1	C38
36	6704-A10-0100	ELECTRIC-CONDENSER	100μF/16V	EA	1	C35
37	6704-A25-2200	ELECTRIC-CONDENSER	2200μF/25V	EA	2	C37,38
38	6704-A35-0010	ELECTRIC-CONDENSER	10μF/35V	EA	2	C32,33
39	6704-A35-0033	ELECTRIC-CONDENSER	33μF/35V	EA	4	C30,31,36,40
40	6704-A50-0001	ELECTRIC-CONDENSER	1μF/50V	EA	1	C34
41	6710-A00-0010	CERAMIC-CONDENSER	10pF/50V	EA	2	C18,18
42	6710-A00-0100	CERAMIC-CONDENSER	100pF/50V	EA	1	C28
43	6710-U00-0104	CERAMIC-CONDENSER	0.1uF/50V	EA	18	
44	6722-A00-0104	POLYESTER-CON.	0.1uF/63V J-BD	EA	1	C8
45	6722-A00-0105	POLYESTER-CON.	1uF/63V J-BDX	EA	2	C14,15
46	6722-A00-0474	POLYESTER-CON.	0.47uF/63V J-BDX	EA	2	C5,6
47	6724-A00-0474	POLYPROPYLINE-C	DTW-474/100V J	EA	1	C13
48	7004-A00-0070	PIEZO-BUZZER	20SP-4F	EA	1	BZ

NO	MAT'L CODE	PARTS NAME	SPECIFICATION	UNIT	Q'TY	LOCATION
48	7104-A00-7200	CRYSTAL	7.2 MHz	EA	1	X-TAL
50	7744-A00-0002	SLIDE S/W	INCA-2	EA	1	CAL
51	7804-A00-000B	CONNECTOR WAFER	LW 0640-0B	EA	1	CN3
52	7807-A00-7305	CONNECTOR WAFER	5273-05	EA	1	CN1
53	7840-A00-B2B4	CONNECTOR MALE	B2B400-30	EA	0.5	CN2
	DISPLAY P.C.B ASS'Y					
01	2607-A00-0000	F.I.P CUSHION	80*20*2t	EA	1	
02	6124-A00-0074	DISPLAY P.C.B	6124-A00-0074	EA	1	
03	6206-E00-0080	I.C (DRIVER)	uPA80C	EA	4	I.C. 3,4,5,6
04	6206-E00-B243	I.C (I/O EXPAN)	B243	EA	1	I.C. 1
05	6212-E00-4515	I.C (INTERFACE)	HD4515BP	EA	1	I.C. 2
06	6387-A00-414B	SWITCHING DIODE	1N414BP	EA	7	D1 X 7
07	6534-K00-0047	RESISTOR ¼W	C.F.R 4.7KΩ	EA	4	R1 X 4
08	6704-A35-0033	ELECTRIC-CONDENSER	33μF/35V	EA	1	C1
09	6710-U00-0104	CERAMIC-CONDENSER	0.1uF/50V	EA	2	C2,3
10	7204-E00-0615	F.I.P	6D15B	EA	1	
11	7674-A00-0012	P.C.B SUPPORT	DABS - 12R	EA	4	
12	7840-A00-0011	MEMB SW CONNECTD	FCZ254-11S	EA	1	CN2
13	7840-A00-B2B9	CONNECTOR FEMALE	B2B074-30	EA	0.5	CN1

NO	MAT'L CODE	PARTS NAME	SPECIFICATION	UNIT	Q'TY	LOCATION
	MECHANICAL PARTS					
1	1110-A00-1020	BODY	ND-300	EA	1	
2	1110-A00-1030	PLATFORM	ND-300	EA	1	
3	2600-A00-1101	ADJUST BOLT	M16*74*φ70	EA	4	
4	1715-A00-0010	W/L GAUGE	BLACK	EA	1	
5	7544-A00-0000	AC SOCKET CON.	3P	EA	1	
6	7634-A00-0050	CABLE CLAMP	DA-5N	EA	1	
7	B053-A00-6143	DUST COVER CUSHION	4.5*430*610	EA	1	
	B053-A00-1B06		4.5*1B0*60		4	
8	1000-A00-0060	DUST COVER	642*456*B0*1.5T	EA	1	
9	1110-A00-0070	BRACKET	ND	EA	1	
10	1004-A00-0011	SUPPORT	100*50*5B0*1.0T	EA	1	
11	1730-A00-0060	SUPPORT COVER	33*7.2*5B0	EA	1	
12	1004-A00-0021	HEAD GUIDE	241.5*117*32*2T	EA	1	
13	7564-A00-0001	POWER CORD	Y003-A/Z	EA	1	
14	7745-A00-0112	ON/OFF SWITCH	SL112A	EA	1	
15	1700-A00-2000	HEAD	235***175	EA	1	
16	2100-AN0-0000	MEMBRANE S/W	AN-TYPE	EA	1	
17	2123-ND0-0010	KEY BOARD PAD	ND-300	EA	1	
18	2600-A00-2000	BACK RUBBER RING	231.6*171	EA	1	
19	1004-A00-0000	BACK COVER	231*171.1*0.BT(N-D)	EA	1	
20	1034-A00-0040	TRANS COVER	144*B0*26	EA	1	
21	7674-A00-0012	PCB SUPPORT	DABS-12R	EA	4	
22	1708-A00-2030	DISPLAY COVER	B8.5*31.5*1T	EA	3	
23	7534-A00-0021	FUSE HOLDER(FH-02A)	FH-20(φ13) NEW	EA	1	
24	1706-A00-1030	STOP BOLT	M8*P1.25*28.5(BROWN)	EA	2	

NO	MAT'L CODE	PARTS NAME	SPECIFICATION	UNIT	Q'TY	LOCATION
25	1050-A00-0060	SELECT S/W COVER	30*13*0.5T(AL)	EA	1	
26	1732-A00-0000	HEXGON BOLT CAP	φ14*φ18*12.2(H)	EA	4	
27	1525-A00-1240	HEXAGON BOLT	M12*1.75*40	EA	8	
28	1563-A00-1230	SPRING WASHER	φ12.2*21.5*3	EA	8	
29	1505-A00-0408	PAN SCREW	M4*0.7*8	EA	1	
30	1532-A00-0840	STUD WRENCH BOLT	M8*1.25*40	EA	4	
31	1550-A00-0800	HEXAGON NUT	M8*1.25	EA	4	
32	1527-A00-0623	WASHER HEX BOLT	M6*1.0*23W	EA	3	
33	1527-A00-0610	WASHER HEX BOLT	M6*1.0*10W	EA	4	
34	1511-S00-0510	FLAT SCREW	M5*0.8*10(SUS)	EA	3	
35	1515-N00-0308	TRUSS SCREW	M3*0.5*8(NI)	EA	7	
36	1515-S00-0410	TRUSS SCREW	M4*0.7*10(SUS)	EA	2	
37	1563-A00-0410	SPRING WASHER	φ4.1*7.6*1	EA	2	
38	1518-A00-0307	CONNECTOR BOLT	M3*0.5*7	EA	2	
39	1550-A00-0300	HEXAGON NUT	M3*0.5	EA	7	
40	1550-A00-0400	HEXAGON NUT	M4*0.7	EA	2	
41	1515-S00-0412	TRUSS SCREW	M4*0.7*12(SUS)	EA	4	
42	1810-A00-0040	SPEC PLATE	DOLPHIN	EA	1	
43	7504-A00-0010	POWER TRANS(57)	110/220-50-60Hz	EA	1	
44	1502-A00-0310	TAPPING SCREW	M3*10	EA	4	
		C/T BOX ASS'Y				
45	B050-A00-4017	HEAD GUIDE POLY BAG	170*400*0.07T	EA	1	
46	7524-A00-5016	FUSE	S504-160mA/250V	EA	1	
47	7566-A00-0010	ADAPTOR PLUG	2P (AC)	EA	1	
48	7654-A00-0604	CORD STOPER	SR-GN-4	EA	1	

NO	MAT'L CODE	PARTS NAME	SPECIFICATION	UNIT	Q'TY	LOCATION
49	7874-A01-0115	GROUND TER' ASS'Y	1500mm	EA	1	
50	B002-A00-1060	MANUAL	ND-TYPE	EA	1	
51	B010-A00-0010	WARING STICKER	A.C CORD	EA	1	
52	B050-A00-0605	FUSE POLY BAG	50*60*0.05t	EA	1	
53	B050-A00-4535	HEAD POLY BAG	350*450*0.05T	EA	1	
54	B050-A00-7550	SET POLY BAG	550*750*0.05T	EA	1	
55	B100-A00-0172	C/T BOX - 1	B37*545*377	EA	1	
56	B100-A00-0173	C/T BOX - 2	B57*585*417	EA	1	
57	B120-A00-7450	PAD	740*505	EA	1	
58	B053-A00-0010	SILICAGEL	10g	EA	3	
59	B050-A00-2517	MANUAL POLY BAG	170*250*0.05t	EA	1	
60	B203-A00-5415	STYRDPOL PAD	540*155*82T	EA	1	
61	B203-A00-7415	STYRDPOL PAD	740*155*21T	EA	1	
62	B208-A00-0060	POLYETHYLENE BOX	200*200*210	SET	1	

APPENDIX
DEVICE SPECIFICATIONS