OLYMPIA

CM 1810 plus

Technical Manual

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Version 1.0

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1. INTRODUCTION

1.1 Principal Specifications

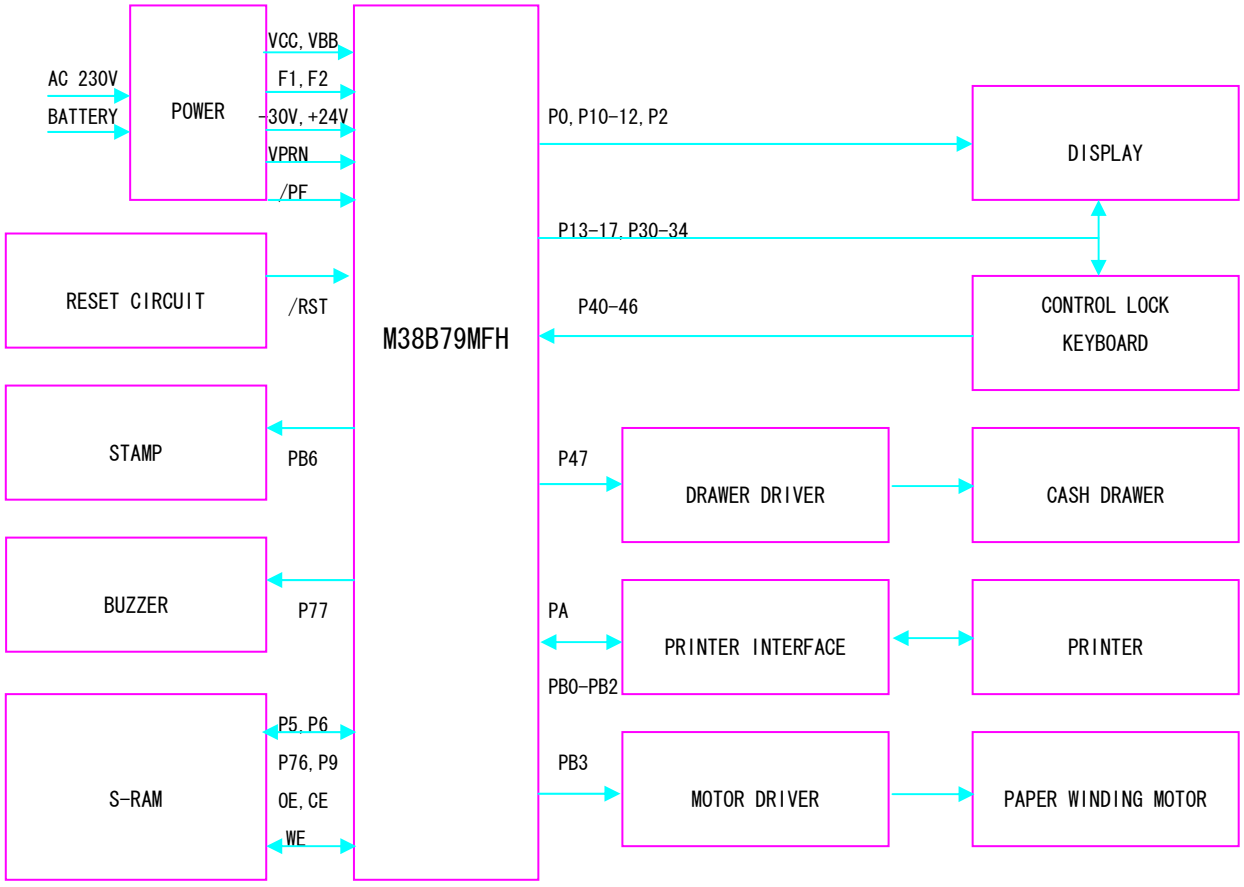
Primary Power	230V ± 10%, 50Hz or 60Hz
Maximum Power Consumption	21.0W
Backed-up Power	Ni-cd Battery 3.6V, 270mAh
Printer	EPSON M405R
Microcontroller	MITSUBISHI M38B79MFH 60K ROM and 2K RAM
Roll Paper	58(W)*50(D) mm
Display Panel	Front and Rear Fluorescent Tube, 10 digits
Keyboard	49 KEYS
External Dimension	430(L)410(W)275(H) mm
Weight	12.5 ± 0.5Kg

1.2 Basic Function

This kinds of ECR uses a 8-bits single chip microcontroller M38B79MFH.It utilizes 60k bytes of mask ROM On-Chip and 2K bytes of RAM On-Chip. This terminal also has a battery-backed up clock which keeps track of the year, month, date, hour , minute and seconds.

Keyboard	49 Keys
Number of departments	10/20 Department
Number of PLU	500
Printer	EPSON M405R, 13 columns

1.3 System Block Diagram



2. CIRCUIT

2.1 Power Supply Circuit

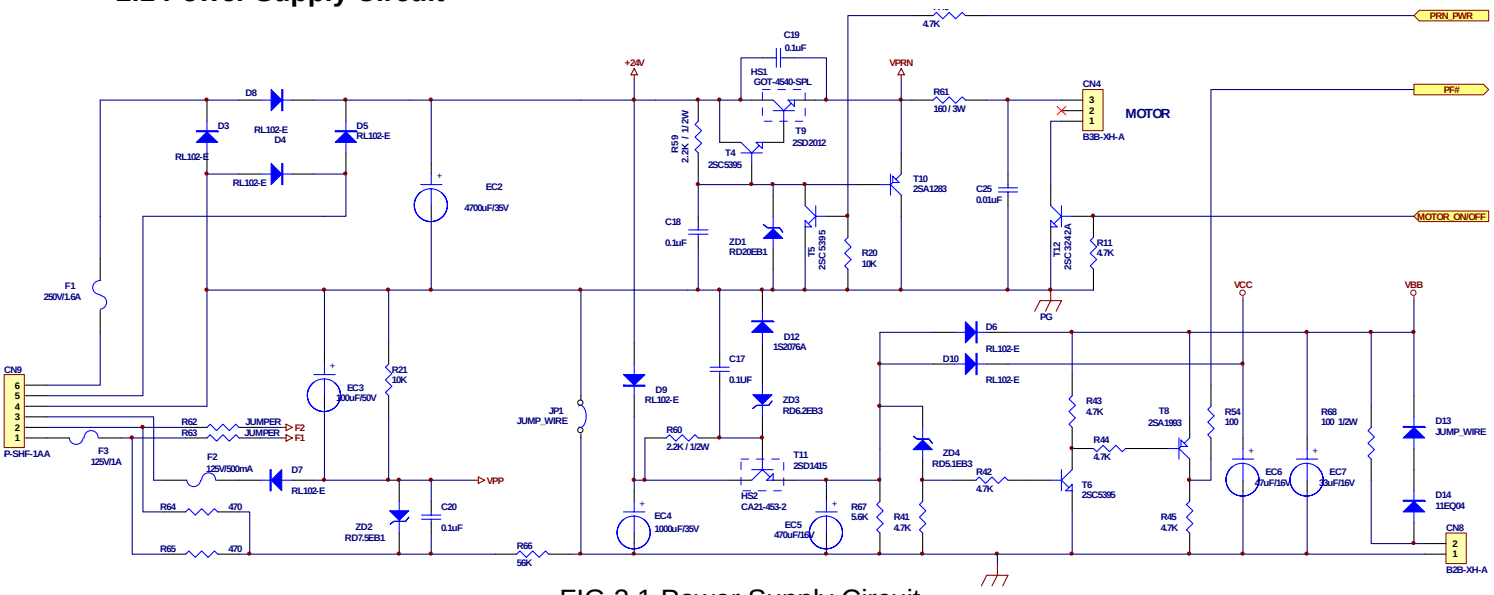


FIG 2.1 Power Supply Circuit

+24V

+24V is used as the power source for the cash drawer and stamp solenoid, 20.5V AC inputted into pin 5 and 6 of CN9 is rectified by diode D3,D4,D5,D8 and smoothed by EC2 4700uF.

VPRN(+17V)

+17V the Printer motor voltage is generated using the +24V DC. It applies to the collector of T4, a 2SC5395 transistor. It is also dropped across R59, a 2.2Kohm resistor, and ZD1. This provided a bias voltage of about 17.7V DC on the base of T4 and amplified of T9 and outputed emitter of T9. The output voltage is 17V DC.

VCC(+5V)

The circuit generating the +5V uses the +24V. It applies to the collector of T11 a D1415 transistor. It is also dropped across R60, a 2.2Kohm resistor, and D12, ZD3. This provided a bias voltage of about 6.8V DC on the base of T11. The output voltage is supplied to the emitter of transistor T11. This voltage is through the D10 diode, output voltage is 5.3V.

VPP(-30V)

The -30V circuit uses 25.5V AC across pins 3 and 4 of CN9. This AC voltage is rectified by D7 a RL102 diode, and filtered by EC3. The output voltage is approximately -30V DC. This voltage is used by the buzzer.

Filament Voltage(F1,F2)

The filament voltage is used by the display tube. Its AC input is 4.2V, and uses a ground reference -23V from the -28V circuit dropped across ZD2 and R64, R65, at 470ohm register.

VBB

VBB a normal condition is supplies through the D6 from T11 emitter. When power failure to shutout of D6 is supply through D14 from battery.

2.2 Transformer Wiring Diagram

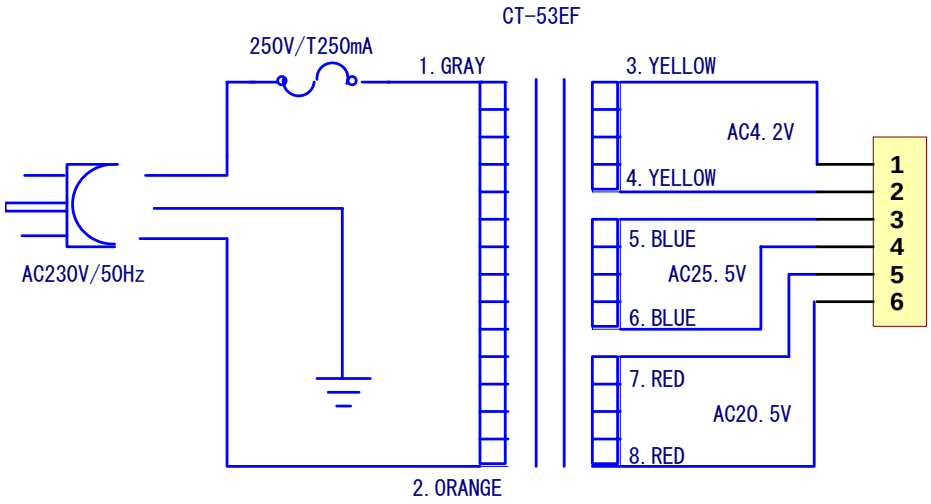


FIG 2.2 Transformer Wiring Diagram

2.3 Power Supply Specifications

Input-Power Consumption

	Standing by	Maximum 11.0 watts
	Printing	Maximum 21.0 watts

Output-Rated Voltage

+24V to GND	Voltage	25.0V ± 4.0V
	Ripple	Less than 0.5V p-p
	Stability	Line regulation - Less than 4.0V
		Temp regulation - Less than 4.0V
+VPRN to GND	Voltage	12.0V ± 0.85V
	Ripple	Less than 1.0V p-p
+VBB to GND	Voltage	5.2V ± 0.2V
	Ripple	Less than 0.2V p-p
	Stability	Line regulation - Less than 0.2V
		Temp regulation - Less than 0.2V
+VCC to GND	Voltage	5.2V ± 0.2V
	Ripple	Less than 0.2V p-p
	Stability	Line regulation - Less than 0.2V
		Temp regulation - Less than 0.2V
VPP to GND	Voltage	-30V ± 3.0V
	Ripple	Less than 1.0V p-p
	Stability	Line regulation - Less than 2.0V
		Temp regulation - Less than 2.5V
F1 to F2	Voltage	4.2V ± 0.3V AC
	Stability	Line regulation - Less than 1.0V

2.4 Main Circuit

2.4.1 CPU

GENERAL DESCRIPTION

The M38B79MFH is a 8-bit microcomputer with 60K Bytes ROM, 2K Bytes RAM, and incorporate many hardware peripherals such as an VFD controller/driver,10 bit resolution A/D converter, serial interface, timer counter and interrupt function integrated on one chip.

FEATURES

• Number of basic instructions	71
• Memory Size	60K bytes of On-Chip mask ROM
	2K bytes of On-Chip Data RAM
• Instruction execution time	0.48us (minimum instructions, at 4.19MHz)
• Supply power	2.7-5.5V
• Interrupt	22 Interrupt source
• Timers	16-bit TIMERx1, 8-bit TIMERx6
• FLD controller/driver	Segment 28 to 40 lines,Digit 16 to 28 lines
• Programmable I/O ports	75
• Serial I/O	Full duplex serial1,serial2,serial3
• Buzzer output	1kHZ, 2kHZ, 4kHZ(at M-clock 4.19MHZ)
• System Clock output	Main system clock 4.19MHz ,subsystem clock 32.768kHz
• Package	100-pin plastic QFP(14X20mm)

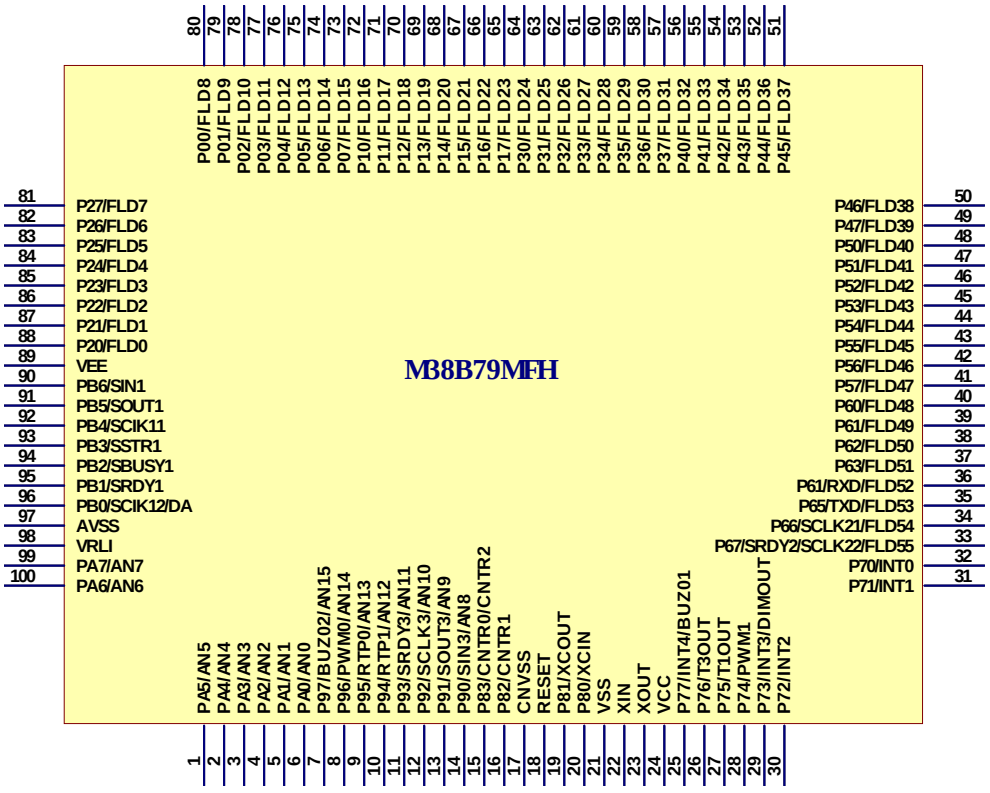


FIG 2.3 CPU Pin Configuration (Top View)

Function of M38B79MFH

Number of basic instructions		71
Instruction execution time		0.48us (minimum instructions, at 4.19MHz of frequency)
Clock frequency		4.19MHz
Memory size	ROM	60K bytes
	RAM	2048 bytes
Input/Output port		
P00~P07	Output	(high-voltage P-channel open drain)
P10~P17	I/O	(high-voltage P-channel open drain)
P20~P27	Output	(high-voltage P-channel open drain)
P30~P37	I/O	(high-voltage P-channel open drain)
P40~P47	I/O	(high-voltage P-channel open drain)
P50~P57	I/O	(high-voltage P-channel open drain)
P60~P63	I/O	(high-voltage P-channel open drain)
P64~P67	I/O	3state CMOS I/O Serial I/O 2
P70~P72	I/O	3state CMOS I/O Inter rupt
P73	I/O	3state CMOS I/O Inter rupt
P74	I/O	3state CMOS I/O PWM out
P75,P76	I/O	3state CMOS I/O Timer out
P77	I/O	3state CMOS I/O Buzzer out
P80,P81	I/O	3state CMOS I/O
P82,P83	I/O	3state CMOS I/O Timer I/O
P90~P93	I/O	3state CMOS I/O Serial I/O 3
P94,P95	I/O	3state CMOS I/O
P96	I/O	3state CMOS I/O PWM out
P97	I/O	3state CMOS I/O Buzzer out
PA0-PA7	I/O	3state CMOS I/O
PB0-PB6	I/O	3state CMOS I/O Serial I/O 1
Comparator circuit		4bit resolution
Pulse width modulator		14-bit×1
Clock generating circuit		Two built-in circuit (ceramic or quarts crystal oscillator)
Supply voltage		2.7~5.5V
Power dissipation		
at high speed operation		35mW(clock frequency Xin=4.19MHz typ.)
at low speed operation		60uW(clock frequency Xcin=32KHz typ.)
Input/Output characteristics		
Input/Output voltage		
Input	P64~P67,P80~P83,P7,P9,PA,PB	-0.3~VCC+0.3V
Input	P1,P3,P4,P5,P60~P63	Vcc-45V~Vcc+0.3V
Output	P0,P1,P2,P3,P4,P5,P60~P63	Vcc-45V~Vcc+0.3V
Output	P64~P67,P80~P83,P7,P9,PA,PB	-0.3~Vcc+0.3V
Operating temperature range		-20~85 °C
Device structure		CMOS silicon gate
Package M38B79MFH		100-pin shrink plastic molded QFP

Port Assign for CM1810 PLUS (M38B79MFH)

PORT	FUNCTION	I/O	REMARK	ACTIV
P00/FLD8	U/J Segment-G	Out	VeeP-ch Out	H
P01/FLD9	U/J Segment-H	Out	VeeP-ch Out	H
P02/FLD10	U/J Segment-J	Out	VeeP-ch Out	H
P03/FLD11	U/J Segment-K	Out	VeeP-ch Out	H
P04/FLD12	U/J Segment-M	Out	VeeP-ch Out	H
P05/FLD13	U/J Segment-N	Out	VeeP-ch Out	H
P06/FLD14	U/J Segment-P	Out	VeeP-ch Out	H
P07/FLD15	U/J Segment-R	Out	VeeP-ch Out	H
P10/FLD16	U/J Segment-DP	Out	VeeP-ch Out/CMOS In	H
P11/FLD17	U/J Segment-Com	Out	VeeP-ch Out/CMOS In	H
P12/FLD18	U/J Segment-UL	Out	VeeP-ch Out/CMOS In	H
P13/FLD19	Strobe-1/Digit-1(R)	Out	VeeP-ch Out/CMOS In	H
P14/FLD20	Strobe-2/Digit-2(R)	Out	VeeP-ch Out/CMOS In	H
P15/FLD21	Strobe-3/Digit-3(R)	Out	VeeP-ch Out/CMOS In	H
P16/FLD22	Strobe-4/Digit-4(R)	Out	VeeP-ch Out/CMOS In	H
P17/FLD23	Strobe-5/Digit-5(R)	Out	VeeP-ch Out/CMOS In	H
P20/FLD0	U/J Segment-A1	Out	VeeP-ch Out	H
P21/FLD1	U/J Segment-A2	Out	VeeP-ch Out	H
P22/FLD2	U/J Segment-B	Out	VeeP-ch Out	H
P23/FLD3	U/J Segment-C	Out	VeeP-ch Out	H
P24/FLD4	U/J Segment-D1	Out	VeeP-ch Out	H
P25/FLD5	U/J Segment-D2	Out	VeeP-ch Out	H
P26/FLD6	U/J Segment-E	Out	VeeP-ch Out	H
P27/FLD7	U/J Segment-F	Out	VeeP-ch Out	H
P30/FLD24	Strobe-6/Digit-6(R)	Out	VeeP-ch Out/CMOS In	H
P31/FLD25	Strobe-7/Digit-7(R)	Out	VeeP-ch Out/CMOS In	H
P32/FLD26	Strobe-8/Digit-8(R)	Out	VeeP-ch Out/CMOS In	H
P33/FLD27	Strobe-9/Digit-9(R)	Out	VeeP-ch Out/CMOS In	H
P34/FLD28	Strobe-10/Digit-10(R)	In	VeeP-ch Out/CMOS In	H
P35/FLD29	Option Switch	In	VeeP-ch Out/CMOS In	
P36/FLD30	Option Switch	In	VeeP-ch Out/CMOS In	
P37/FLD31	Option Switch	In	VeeP-ch Out/CMOS In	
P40/FLD32	Key-Return-1	In	VeeP-ch Out/CMOS In	H
P41/FLD33	Key-Return-2	In	VeeP-ch Out/CMOS In	H
P42/FLD34	Key-Return-3	In	VeeP-ch Out/CMOS In	H
P43/FLD35	Key-Return-4	In	VeeP-ch Out/CMOS In	H
P44/FLD36	Key-Return-5	In	VeeP-ch Out/CMOS In	H
P45/FLD37	Key-Return-6	In	VeeP-ch Out/CMOS In	H
P46/FLD38	Controll In	In	VeeP-ch Out/CMOS In	H
P47/FLD39	Drawer	Out	VeeP-ch Out/CMOS In	H
P50/FLD40	Address 0	Out	VeeP-ch Out/CMOS In	H
P51/FLD41	Address 1	Out	VeeP-ch Out/CMOS In	H
P52/FLD42	Address 2	Out	VeeP-ch Out/CMOS In	H
P53/FLD43	Address 3	Out	VeeP-ch Out/CMOS In	H
P54/FLD44	Address 4	Out	VeeP-ch Out/CMOS In	H
P55/FLD45	Address 5	Out	VeeP-ch Out/CMOS In	H
P56/FLD46	Address 6	Out	VeeP-ch Out/CMOS In	H
P57/FLD47	Address 7	Out	VeeP-ch Out/CMOS In	H
P60/FLD48	Address-8	Out	VeeP-ch Out/CMOS In	H
P61/FLD49	Address-9	Out	VeeP-ch Out/CMOS In	H
P62/FLD50	Address-10	Out	VeeP-ch Out/CMOS In	H

P63/FLD51	Address-11	Out	VeeP-ch Out/CMOS In	H
P64/RxD/FLD52	Address-12	Out	CMOS In/Out	H
P65/TxD/FLD53	Address-13	Out	CMOS In/Out	H
P66/Sclk21/FLD54	Address-14	Out	CMOS In/Out	H
P67/Srdy2/Sclk22/FLD55	Address-15	Out	CMOS In/Out	H
P70/INT0	Power Failure-	In	CMOS In/Out	
P71/INT1	Printer TP	In	CMOS In/Out	
P72/INT2		In	CMOS In/Out	
P73/INT3/DIMout	RAM CE-	Out	CMOS In/Out	L
P74/PWM1	RAM WR-	Out	CMOS In/Out	L
P75/T1out	RAM OE-	Out	CMOS In/Out	L
P76/T3out	Address-16	Out	CMOS In/Out	H
P77/INT4/Buz01	Buzzer	Out	CMOS In/Out	L
P80/Xcin	Xcin		CMOS In/Out	
P81/Xcout	Xcout		CMOS In/Out	
P82/CNTR1		In	CMOS In/Out	
P83/CNTR0/CNTR2	Printer Power	Out	CMOS In/Out	L
P90/Sin3/AN8	Data-0	In/Out	CMOS In/Out	
P91/Sout3/AN9	Data-1	In/Out	CMOS In/Out	
P92/Sclk3/AN10	Data-2	In/Out	CMOS In/Out	
P93/#Srdy3/AN11	Data-3	In/Out	CMOS In/Out	
P94/RTP1/AN12	Data-4	In/Out	CMOS In/Out	
P95/RTP0/AN13	Data-5	In/Out	CMOS In/Out	
P96/PWM0/AN14	Data-6	In/Out	CMOS In/Out	
P97/Buz02/AN15	Data-7	In/Out	CMOS In/Out	
PA0/AN0	Printer MG3	Out	CMOS In/Out	H
PA1/AN1	Printer MG4	Out	CMOS In/Out	H
PA2/AN2	Printer MG5	Out	CMOS In/Out	H
PA3/AN3	Printer MG6	Out	CMOS In/Out	H
PA4/AN4	Printer MG7	Out	CMOS In/Out	H
PA5/AN5	Printer MG8	Out	CMOS In/Out	H
PA6/AN6	Printer MG9	Out	CMOS In/Out	H
PA7/AN7	Printer MG10	Out	CMOS In/Out	H
PB0/Sclk12/DA	Printer MG11	Out	CMOS In/Out	H
PB1/Srdy1	Printer MG12	Out	CMOS In/Out	H
PB2/Sbusy1	Printer MG13	Out	CMOS In/Out	H
PB3/Sstb1		In	CMOS In/Out	
PB4/Sclk11		In	CMOS In/Out	
PB5/Sout1		In	CMOS In/Out	
PB6/Sin1	Stamp	Out	CMOS In/Out	H

2.4.2 Reset Circuit

The reset circuit prevents the CPU from starting to operate before the system is fully powered-up and initialized. Then 5m sec after power is applied, reset goes high and the CPU can begin functioning.

When power is first applied to the circuit, the +VBB begins charging EC1 a 1µF capacitor. While EC1 is charging. Once EC1 is fully charged, the voltage drops across the capacitor.

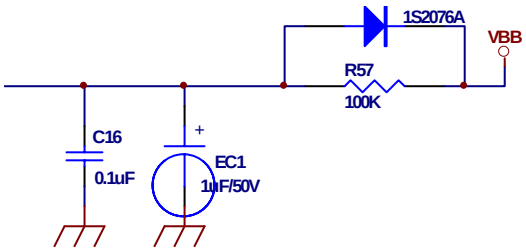


FIG 2.4 Reset Circuit

2.4.3 Power Fail Circuit

Power fall signal is generated by a circuit using the +VCC voltage.
When power is on and the system is operating normally, the power fall signal stays at a high level.
The CPU watches power failure signals all the time. when power failure is detected, the cpu commands to stop the Main clock and switch to Sub clock, under which it consumes about 20µA.
During the power failure, count up of the clock and power failure signals are kept watched.
The power failure circuit controls chip selection of the RAM and it keeps Low level under normal condition and High level during power failure.

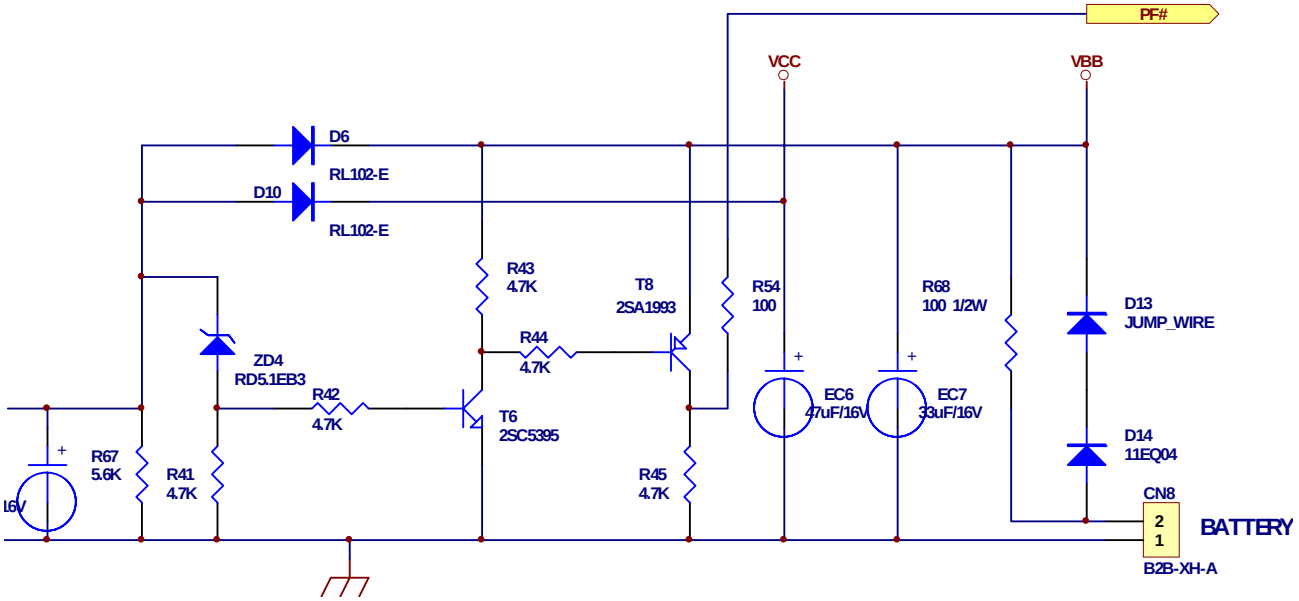


FIG 2.5 Power Fail Circuit

2.4.4 Display Circuit

Display control is done by timer interrupt routine of CPU. Cycle of the timer is about 680µsec.
Scan signal for the display outputs from P13-P17 and P30-P34 of CPU. Go to display grid signals 1G-10G.
P00-P07, P20-P27 and p10-p12 indicates segment signal and these are connected to each segment of the digit.
Along with Segment signal and Grid signal, High level segment is turned on.
I/O port of the CPU, which controls Segment, is high-voltage port and directly drives fluorescent display.
High-voltage port is special I/O port designed for fluorescent display and Vee level (-30V) will be output as a low level.
Front display and Rear display are connected in parallel.

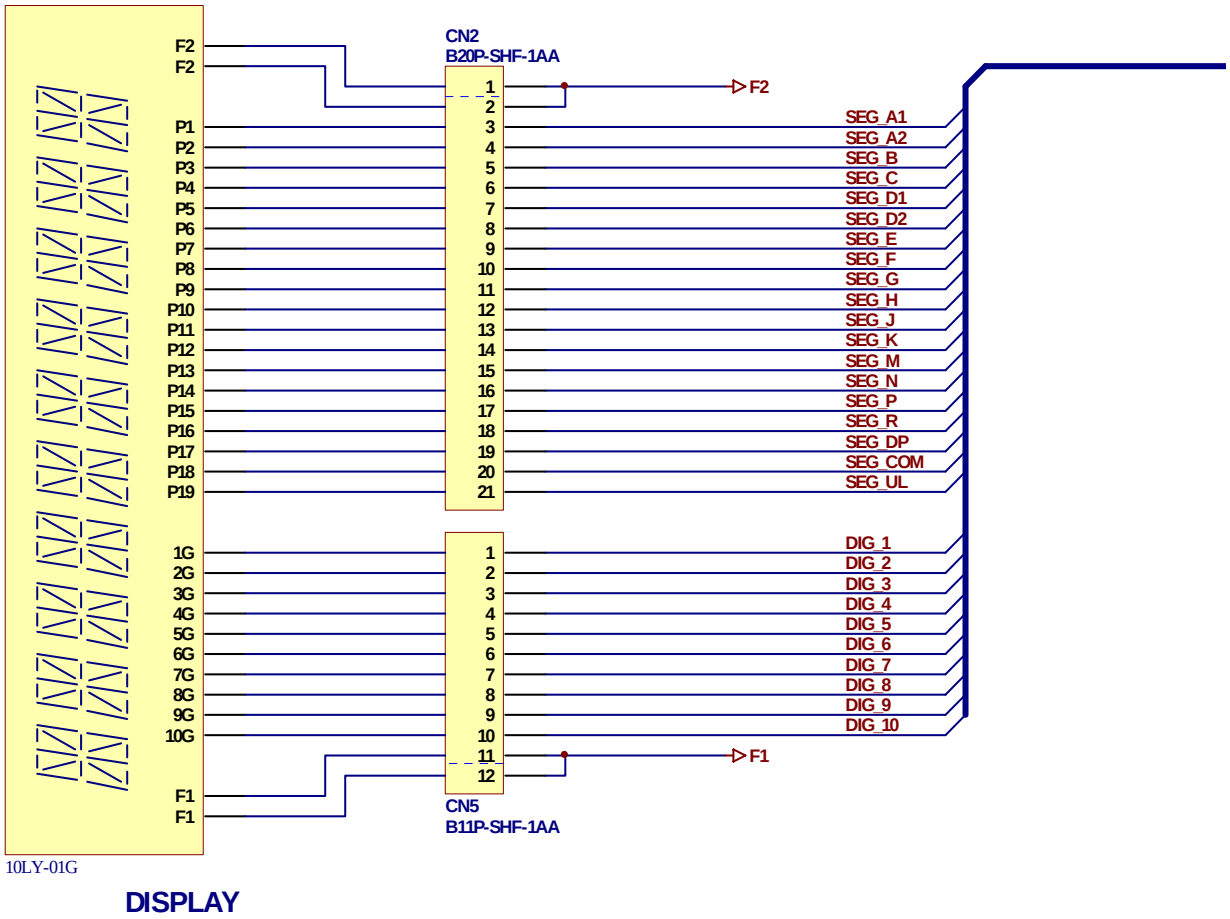


FIG 2.6 Display Circuit

2.4.5 Drawer and Stamp Circuits

The solenoid for a drawer is activated using the signal P47 from the CPU.
This signal is normally Low, and goes High to cause the drawer to run. When P47 is High, T2 is on.
Current flow through the transistor cause the collector to be held Low, near grand potential.
The solenoid for a stamp is activated using the signal PB6.

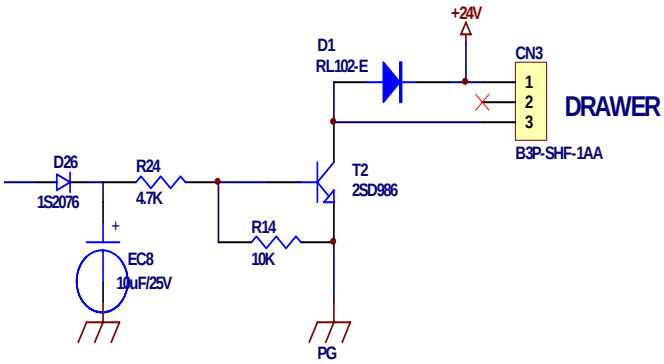


FIG 2.7 Drawer Circuit

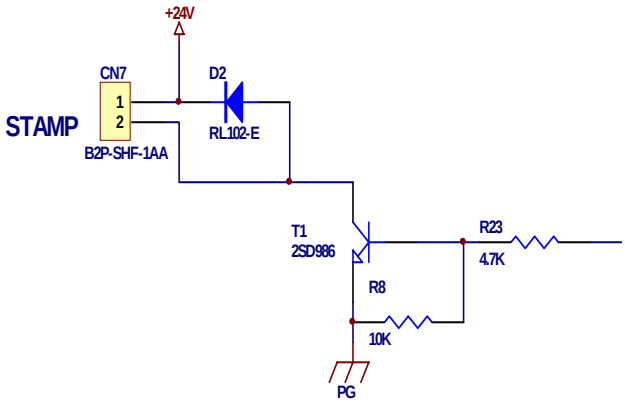


FIG 2.8 Stamp Circuit

2.4.6 Buzzer Circuit

The buzzer circuit uses as its input signal P77 from the CPU.
P77 signal is square wave.

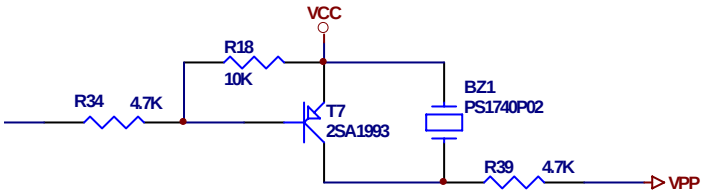


FIG 2.9 Buzzer Circuit

2.4.7 Keyboard Circuit

P13-P17 and P30-P34 are Keyboard scan signals.
P41-P46 are return lines of the key matrix.
P40 is return line of Feed key and Mode lock switch.
It is consist of matrix of Strobe line(10)×Return line(6) and total of 60 keys are assigned.

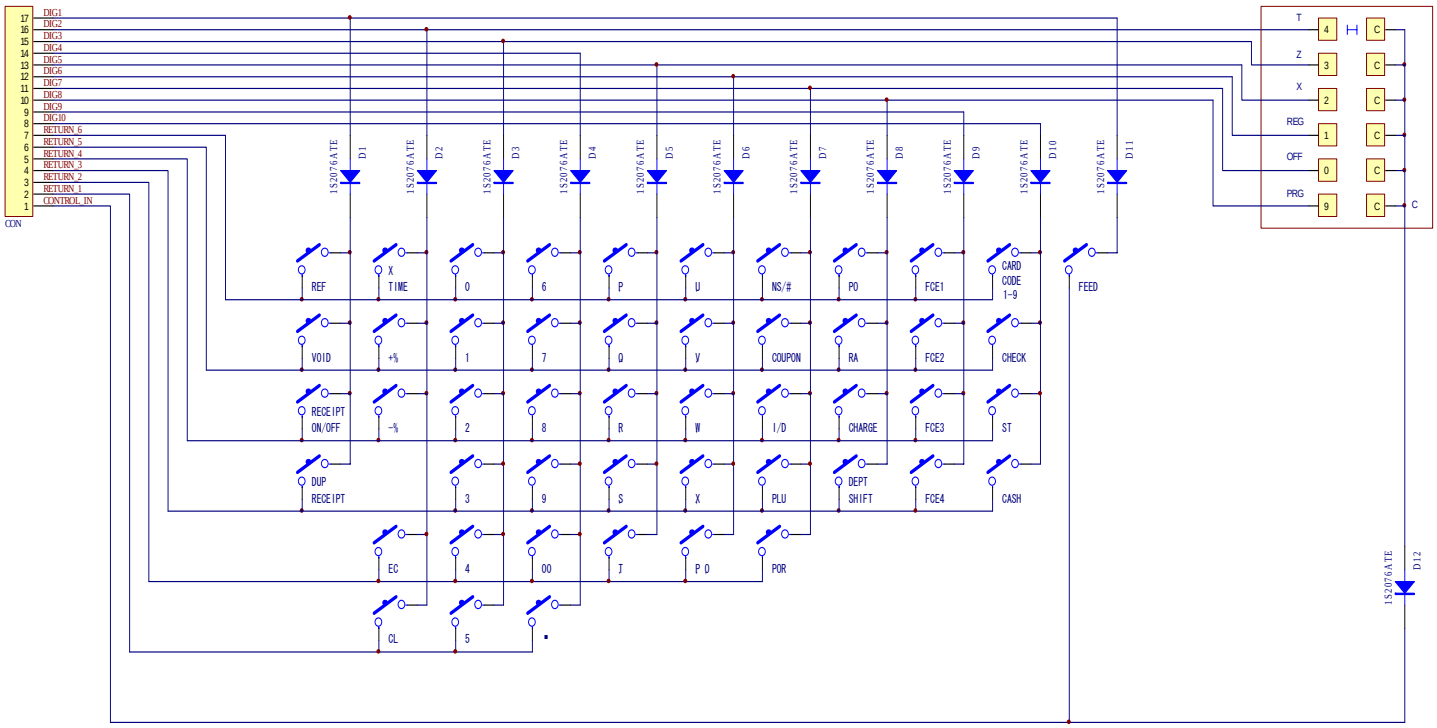


FIG 2.10 Keyboard Circuit

2.4.8 Battery Circuit

When the VCC supply starts dropping, as in a power fail condition, the voltage through the divider network drops accordingly.
When VCC no voltage, D6 is shut off current VBB is through the D14 from battery.
When the voltage at VCC has dropped, voltage back-up is provided by the battery.
The battery voltage VBB goes to the CPU and external RAM.

Battery specification
Type : Ni-cd
Voltage : 3.6V
Rating : 270mAh

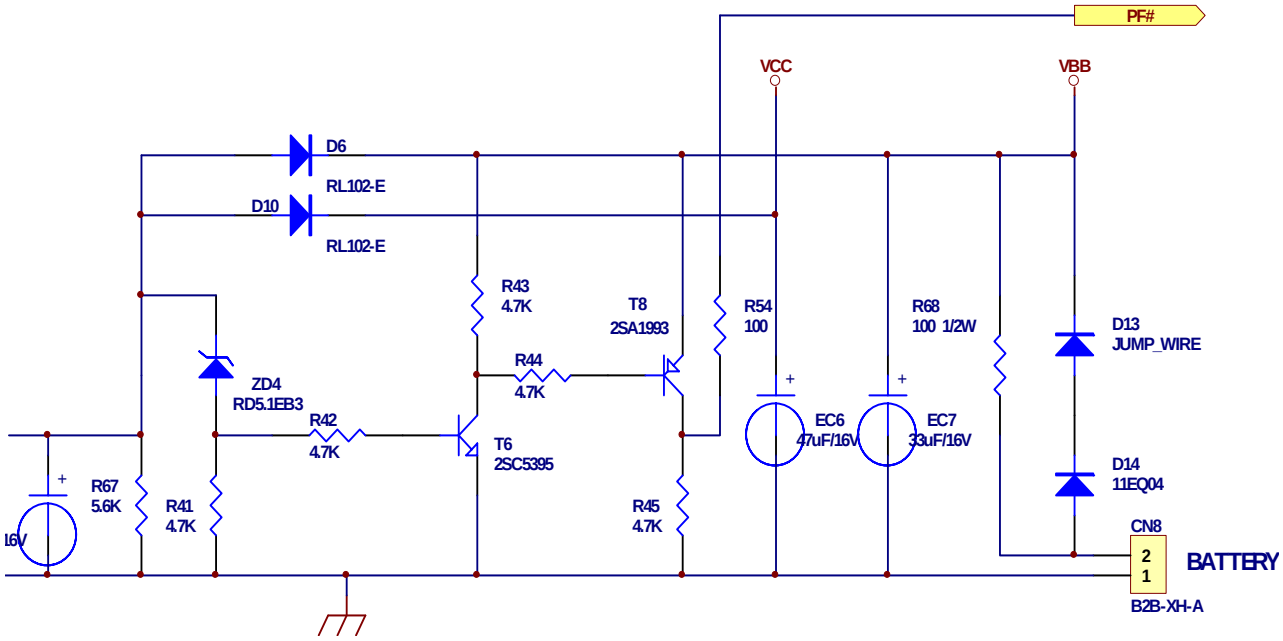


FIG 2.11 Battery Circuit

2.4.9 External Memory Circuit

128K bytes S-RAM(UPD431000AGW-70) used as an external RAM.
I/O port of CPU is used for access to the S-RAM and it is controlled by software.
P90-P97 are multiplex bus consists of data bus(D1-D8).
P50-P57, P60-P67 and P76 are High address signal(A0-A16).
P75 is used for Output Enable, P74 is used for Write Enable control.
At Power Failure, Vcc of S-RAM is backed-up and data is maintained.

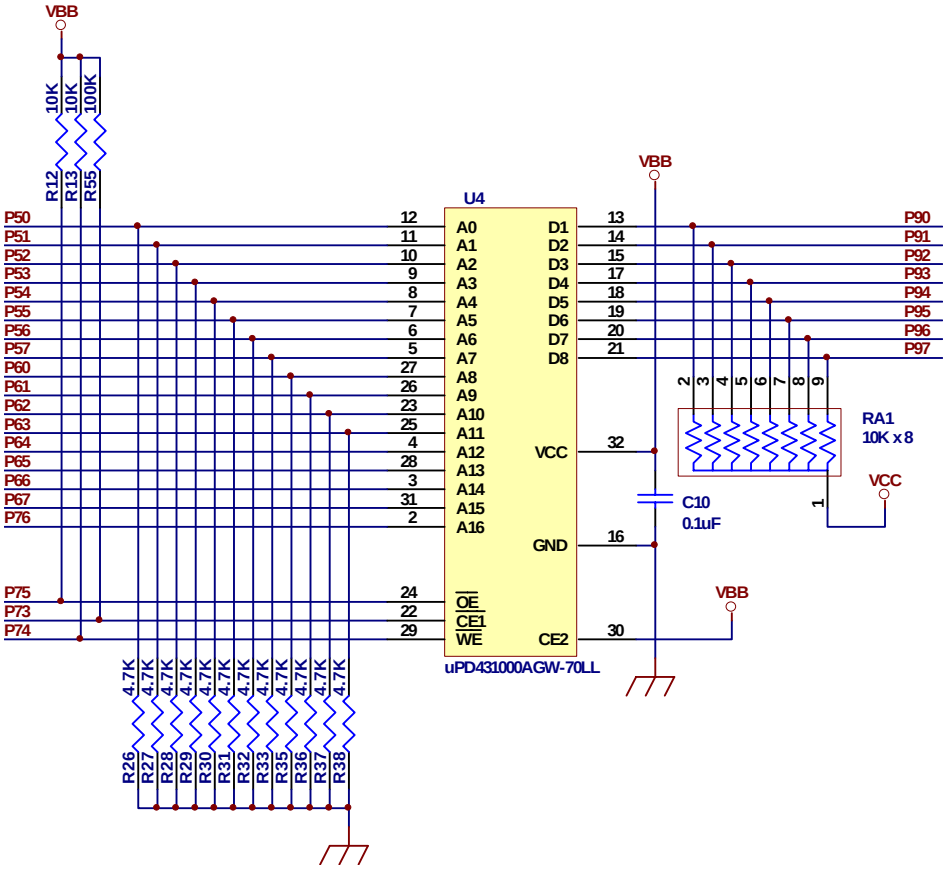
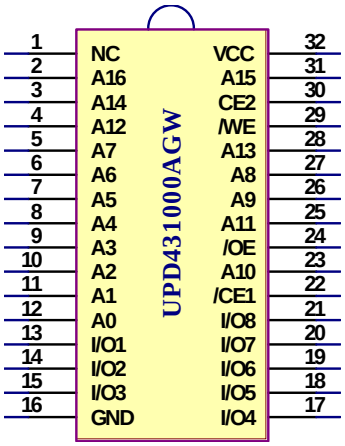


FIG 2.12 External Memory Circuit

External Memory Circuit continued



(Top View)

D0-D7	Data Input/Output
A0-A14	Address Input/Output
WE	Read/Write input
OE	Output Enable
CE	Chip Select Input
VCC	Power +5V
GND	Ground
Features	Very low power static RAM. 131072 words by 8 bits Retains data with power supply voltage, as low as 2.0V

FIG 2.13 S-RAM Pin Configuration

2.4.10 Printer Circuit

Motor Control

The printer motor is activated using the signal P83 from the CPU.

This signal is normally Low, and goes High to cause the motor to run. When P83 is High, it transistor T5 on. Current flow through the transistor cause the collector to be held Low, near ground potential. T4, T9 are OFF, and no voltage is applied to either the motor or the driver chips for the printer magnets.

When P83 is Low, T5 turns OFF, T4. T9 are ON.

The +24V is dropped across R59 and ZD1, applying approximately 17.7V to the base of T4. T4 switches ON, resulting +17V on the emitter,applied to the motor, the printer magnets,and as the input voltage to U1 and U2. T10 is brake, when base is High, it turn transistor T10 ON, current flow through the transistor cause the emitter to be held Low.

Printing Magnets

The signals PA0-PA7 and PB0-PB2 from the CPU are the input for the printer magnets.

These normally High signals drop low with a printer signal.

U1. U2 are the printer magnet drivers. When the motor is running, +17V is applied to one side of the printer magnets.

The driver chips cause the other side of the magnets to drop to ground, causing current flow in the coil and energizing that magnet assembly, This drop the type wheels at the locations determined by the timing of the signals.

Timing Signal

The printer generates, through the use of a photodiode assembly, a timing signal that is returned to the CPU through the P71 line.

A sector wheel passes through the light emitted by the LED, cleating a square wave. This signal is inverted by T3, and is sent to the CPU.

The CPU uses this returning signal from the printer as the basis for timing the printer magnets signals, the motor drive, paper feed, and drawer signal.

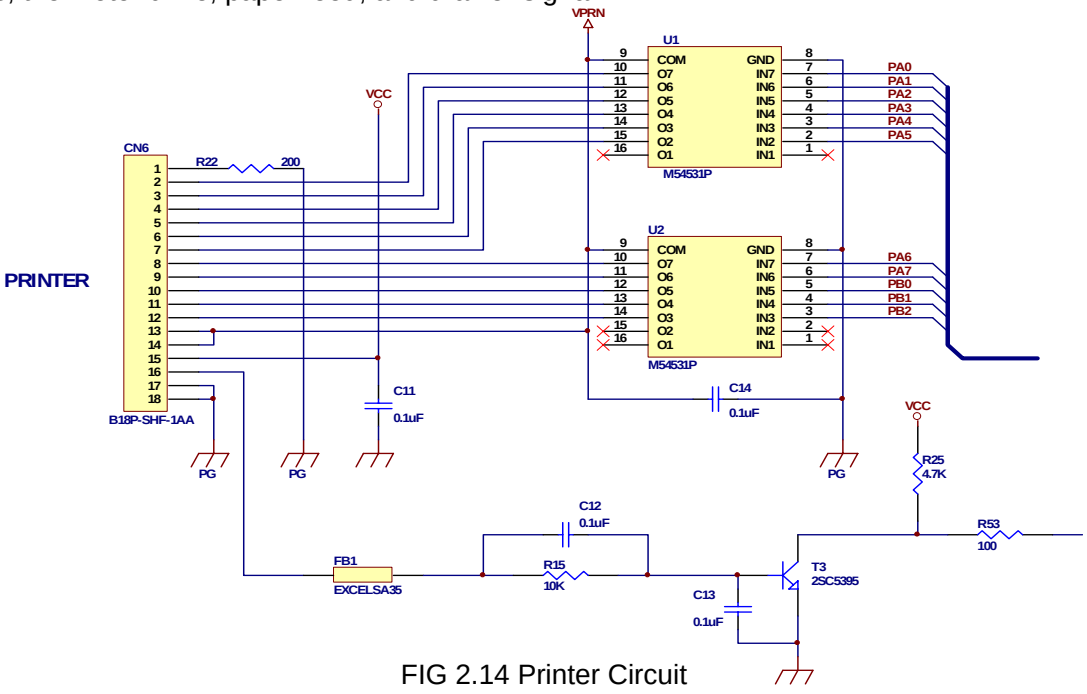


FIG 2.14 Printer Circuit

3. TROUBLE SHOOTING PROCEDURE

In the Event Following Abnormal Symptom Happened Upon Turning Power On

** Trouble shooting should be fixed by service personnel**

- The ECR does not respond at all, no display, no print

Actions: (Please check the ECR in the following sequence)

a) To check electric conductivity of AC cable and AC plug.

b) To check transformer

c) To check fuse F1,F2,F3 at parts side.

d) To check voltages at logic PCB.

e) To check logic PCB in detail.

- The ECR prints but does not show any on display

Actions: (Please check the ECR in the following sequence)

a) To check display tube.

b) To check the voltage of F1,F2,-30V, if they are abnormal,to check ,D7,ZD2.

c) To check transformer.

- The ECR display but printer does not print any

Actions: (Please check the ECR in the following sequence)

a) To check connector between logic PCB to printer.

b) To check printer.

c) To check printer control circuit in PCB U1,U2

d) To check the voltage of +24V, if they are abnormal,to check fuse F1.

- The ECR display erroneous figures or abnormal sign

Actions: (Please check the ECR in the following sequence)

a) To check display connected circuit in PCB

- The printer prints abnormally

Actions: (Please check the ECR in the following)

a) To check printer.

b) To check printer circuit of PCB, U1,U2.

- The data error in memory (the data displayed on the VFD is incorrect; the data printed is not corresponding with what you want)

Actions: (Please check in the following sequence)

a) To check software version resistor R69-74 (confirm your version is USA or UNIVERSAL version).

4. PRINTER INFORMATION

4.1 General Specifications

<table>
<tr><td>Printing Method</td><td colspan="3">Character wheel selecting type</td></tr>
<tr><td>Number of columns</td><td colspan="3">13</td></tr>
<tr><td>Character position</td><td colspan="3">12</td></tr>
<tr><td>Printer speed</td><td colspan="3">Typ. 3.2 line/s</td></tr>
<tr><td>Character selection method</td><td colspan="3">Energize the character selection solenoid corresponding to each column</td></tr>
<tr><td>Character spacing</td><td colspan="3">Column spacing: 2.8mm Line spacing: 5.2mm</td></tr>
<tr><td>Character size</td><td colspan="3">1.6mm(w) x 2.8mm(h) (Max)</td></tr>
<tr><td>Paper feeding</td><td colspan="3">Normal speeding: 1 line is fed automatically during each print cycle
Paper release mechanism: The paper can be pulled out straight toward the front.</td></tr>
<tr><td>Paper</td><td colspan="3">57.5mm wide, normal quality paper</td></tr>
<tr><td>Inking</td><td colspan="3">A 1-color ribbon is used, and is fed automatically. Either a cassette ribbon or a spool ribbon can be used</td></tr>
<tr><td rowspan="2">Motor</td><td rowspan="2">The motor is stopped in the standby position. The motor is started and stopped by turning the motor power supply On and OFF.</td><td>Mean current: Typ. 0.15A (Terminal voltage 17V, 25° C)</td></tr>
<tr><td>Terminal voltage: 17V±7%</td></tr>
<tr><td rowspan="4">Character selection solenoids:
12 Solenoids</td><td>Terminal voltage:</td><td colspan="2">17V±7% (Use the same power supply as that for the motor)</td></tr>
<tr><td>DC resistance:</td><td colspan="2">250 ohms ±10% (25° C)</td></tr>
<tr><td>Drive pulse</td><td colspan="2">From the leading edge of timing signal Tn to that of Tn +1 Drive pulse</td></tr>
<tr><td>Current suppressor:</td><td colspan="2">Diode (supplied by the user)</td></tr>
<tr><td>Detector</td><td colspan="3">The detector consists of a LED and a photo IC, and generates timing signals T0 to T12 corresponding to the 12 characters on the character wheel, and timing signal Ts which determines the position at which the motor power supply is cut off.
Voltage: 5 to 15V
Current: Typ. 30mA (circuit total current at 5V, 25° C)</td></tr>
<tr><td rowspan="3">Connections</td><td>Printer side</td><td colspan="2">Distributing board (terminal holes and copper pads for soldering are arranged using a 2.54mm pitch</td></tr>
<tr><td>User side</td><td colspan="2">A parallel cable can be used (supplied by the user)</td></tr>
<tr><td>Terminal arrangement</td><td colspan="2"></td></tr>
<tr><td>Operating temperature</td><td colspan="3">0 to 50° C (Good print quality: 5 to 40° C)</td></tr>
<tr><td>Reliability</td><td colspan="3">MCBF 1 million lines</td></tr>
<tr><td>Overall dimensions</td><td colspan="3">100.8mm(W) x 125.3mm(D) x 54.0mm(H)</td></tr>
<tr><td>Weight</td><td colspan="3">Approx. 500 g</td></tr>
</table>

4.2 Detailed Specifications

1.Character arrangement:

Column No.	13 12 11 ---------- 6 5	4 3	2 1
Character	Numerals + decimal point + hyphen	Symbol	Space

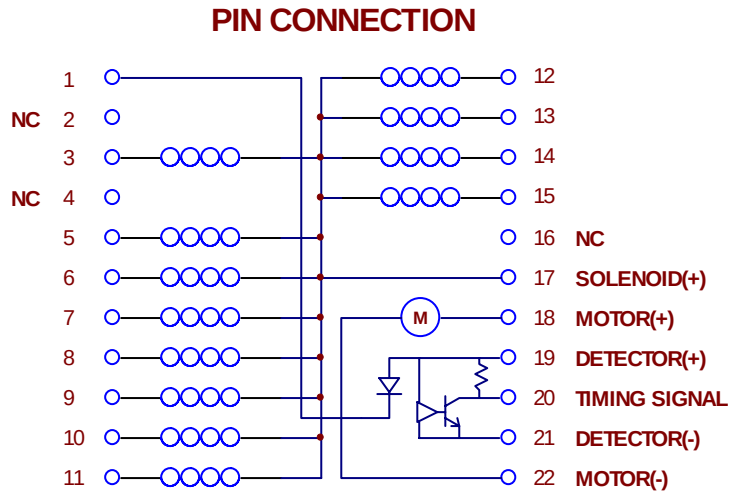
2.Paper

1). Type	Normal quality paper
2). Paper size	Width: 57.5 ± 0.5mm
3). Weight	47 to 64g/m² is recommended (Equal. 40 to 55kg/1000 sheets/1091mm x 788mm)
4). Thickness	0.06 to 0.085mm is recommended

3.Ink ribbon

1). Color	1-color ink ribbon (purple)	
2). Dimensions	Width:	13mm
	Length:	6000mm
3). Recommended ribbon	Material:	Nylon
	Quantity of ink	Heavy
4). Spool standard	Epson standard ribbon spool	
5). Cassette standard	Epson standard ribbon cassette	

4.3 Printer Connection and Character Wheel Layout



Character Wheel Layout

←Columns

←Positions	13	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0	0	0	T I	#		
1	1	1	1	1	1	1	1	1	1	T II	RT		
2	2	2	2	2	2	2	2	2	2	CK	@		
3	3	3	3	3	3	3	3	3	3	CA	TL		
4	4	4	4	4	4	4	4	4	4	RA	VD		
5	5	5	5	5	5	5	5	5	5	PO	CH		
6	6	6	6	6	6	6	6	6	6	NS	X		
7	7	7	7	7	7	7	7	7	7	GT	Z		
8	8	8	8	8	8	8	8	8	8	CD	TS		
9	9	9	9	9	9	9	9	9	9	%	CG		
10	▪	▪	▪	▪	▪	▪	▪	▪	▪	ST	VD		
11	—	—	—	—	—	—	—	—	—	比率	比率		

5. DISPLAY INFORMATION

Itron Type Name : 10-LY-01G

1) Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temp.	To	-20	-	+70	ºC
Storage Temp.	Ts	-55	-	+80	ºC
Filament Voltage	Ef	3.51	3.9	4.29	Vac
Grid Voltage	ec	-	23.0	30.0	Vp-p
Anode Voltage	eb	-	23.0	30.0	Vp-p

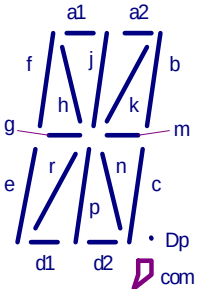
2) Electrical Characteristics

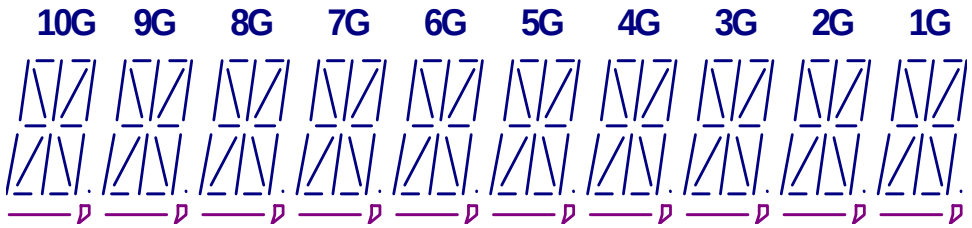
Parameter	Sym.	Test Condition	Minimum	Typical	Maximum	Unit
Filament Current	I f	Ef=3.9 Vac eb=ec=0V	135	150	165	mA
Grid Current	I c 1-10G	Ef=3.9 Vac ec=23.0 Vp-p eb=23.0 Vp-p	-	 7.0	 14.0	mA
Anode Current	I b 1-10G	Ef=3.9 Vac ec=23.0 Vp-p eb=23.0 Vp-p	-	7.5	15.0	mA
Luminance	L (G)	Ef=3.9 Vac ec=23.0 Vp-p eb=23.0 Vp-p	290 (85)	580 (170)	- -	cd/m² (fL)
Grid Cut-off Voltage	Ecco	Ef=3.9 Vac Eb=23.0 Vdc Ec=Vary	-4.8	-	-	Vdc
Anode Cut-off Voltage	Ebco	Ef=3.9Vac ec=23.0vp-p eb=Vary	-4.8	-	-	Vdc

- Effective value at 50 or 60 Hz sine wave.
- Test Condition : Duty factor (DV) = 1/12
  : Pluse width (tp) = 100 usec
- Unless specified. the grid and anode current are measured per each grid. When all anodes turned on.
- With respect to center-tap of filament transformer.

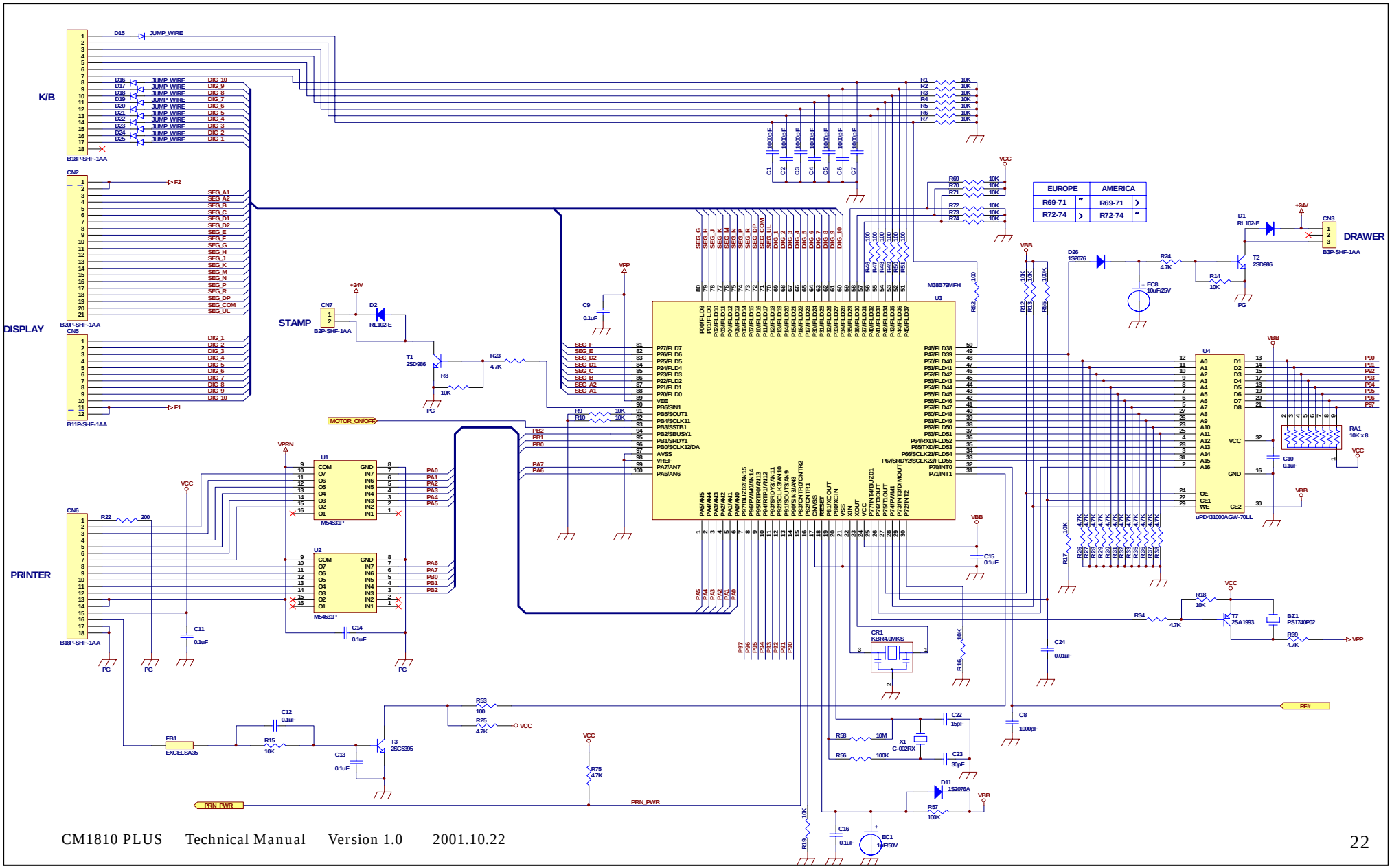
PIN CONNECTION

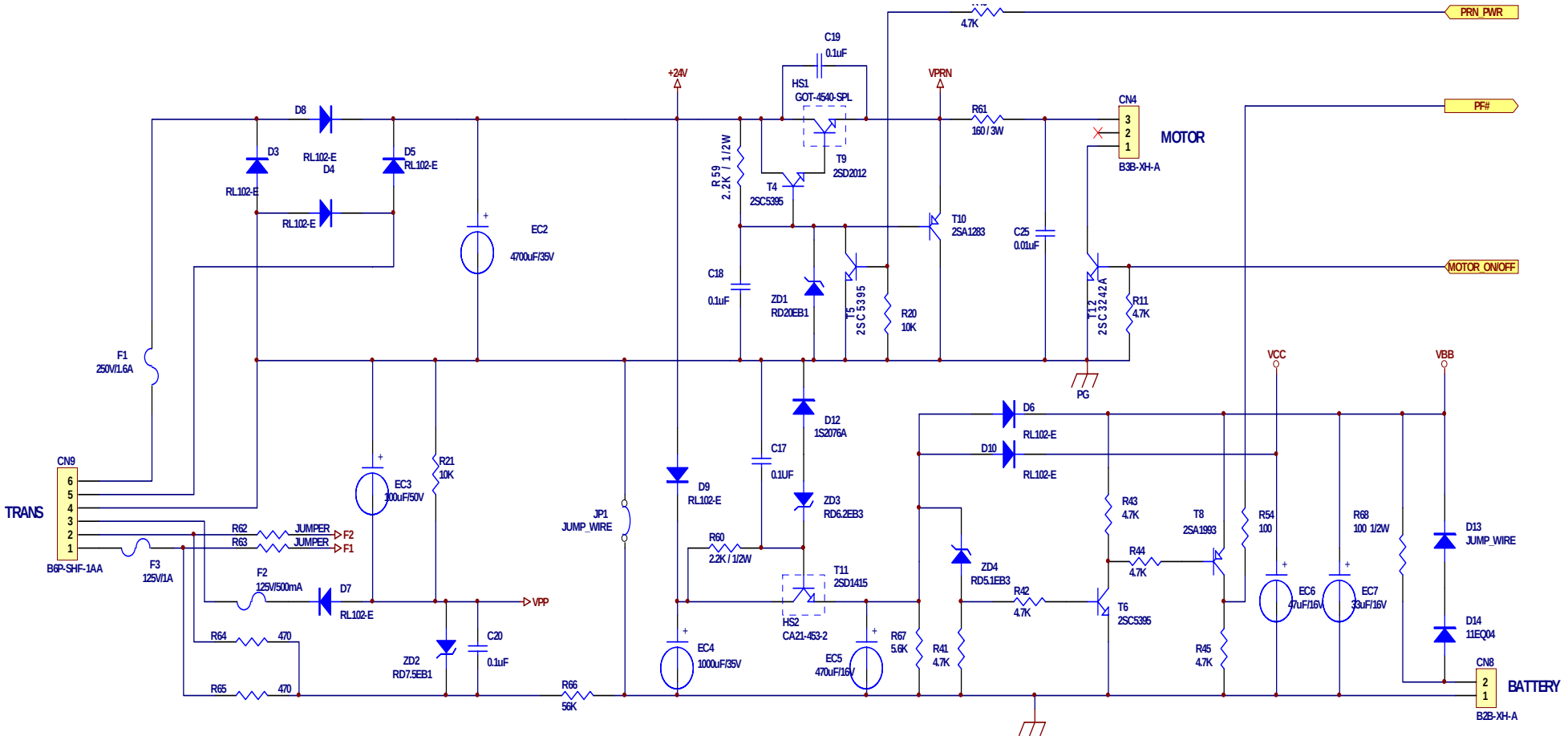
PIN No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
CON.	F1	F2	NP	NP	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G	NC	NC	P19	P18	P17	P16	P15	P14	P13	P12	P11	P10	P9	P8	P7	P6	P5	P4	P3	P2	P1	NP	NP	F2	F2



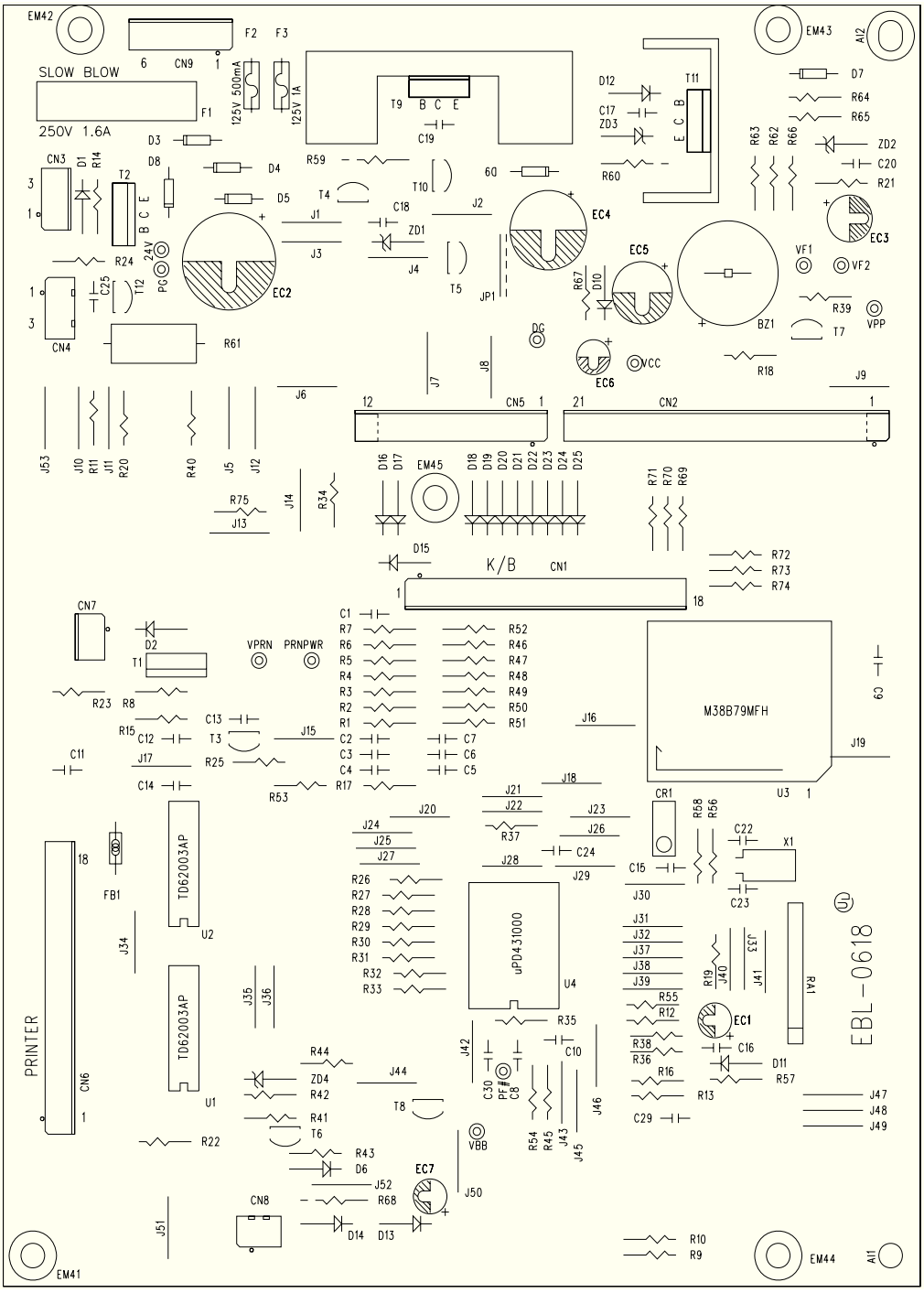


6. CIRCUIT DIAGRAM

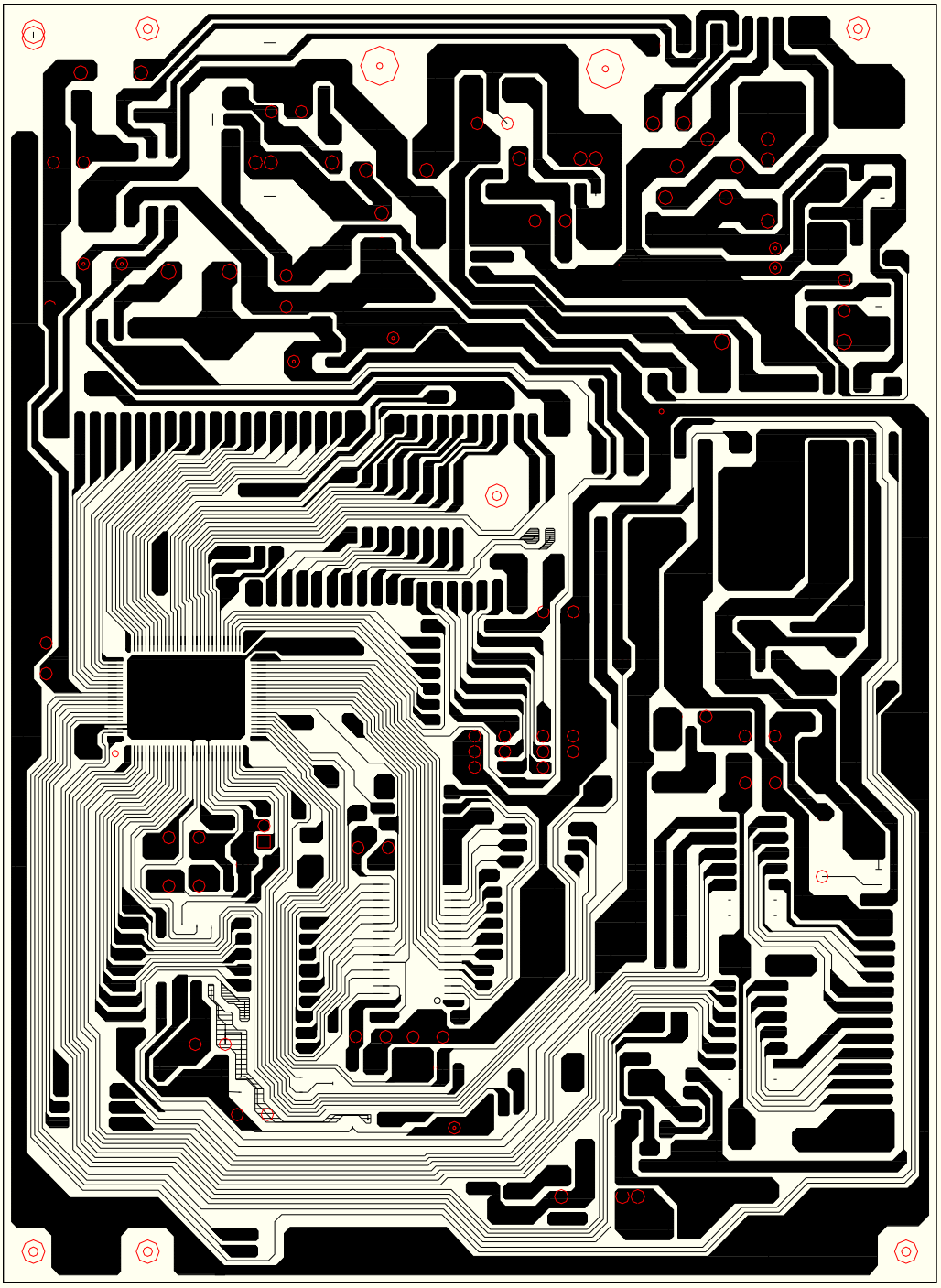



PRN_PWR
PF#
MOTOR_ON/OFF
MOTOR
B3B-XH-A
CN4
BATTERY
B2B-XH-A
CN8
TRANS
B6P-SHF-1AA
CN9
+24V
VPRN
VCC
VBB
VPP
PG
HS1
GOT-4540-SPL
HS2
CA21-453-2
F1
250V/1.6A
F2
125V/500mA
F3
125V/1A
JUMPER
JUMPER
JP1
JUMP_WIRE
D3
RL102-E
D4
RL102-E
D5
RL102-E
D6
RL102-E
D7
RL102-E
D8
RL102-E
D9
RL102-E
D10
RL102-E
D12
1S2076A
D13
JUMP_WIRE
D14
11EQ04
EC2
4700uF/35V
EC3
100uF/50V
EC4
1000uF/35V
EC5
470uF/16V
EC6
47uF/16V
EC7
33uF/16V
T4
2SC5395
T5
2SC5395
T6
2SC5395
T8
2SA1993
T9
2SD2012
T10
2SA1283
T11
2SD1415
T12
2SC3242A
ZD1
RD20EB1
ZD2
RD7.5EB1
ZD3
RD6.2EB3
ZD4
RD5.1EB3
R59
2.2K / 1/2W
R60
2.2K / 1/2W
R61
160 / 3W
R62
R63
R64
470
R65
470
R66
56K
R67
5.6K
R68
100 1/2W
R54
100
R11
4.7K
R20
10K
R21
10K
R41
4.7K
R42
4.7K
R43
4.7K
R44
4.7K
R45
4.7K
C17
0.1UF
C18
0.1uF
C19
0.1uF
C20
0.1uF
C25
0.01uF

7. PCB LAYOUT


EM42
EM43
SLOW BLOW
250V 1.6A
F1
F2
F3
125V 500mA
125V 1A
CN9
CN3
CN4
CN5
CN2
CN1
CN6
CN7
CN8
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
EC1
EC2
EC3
EC4
EC5
EC6
EC7
BZ1
JP1
VF1
VF2
VPP
VCC
VBB
PG
DG
VPRN
PRNPWR
K/B
PRINTER
M38B79MFH
TD62003AP
TD62003AP
μPD431000
FB1
X1
CR1
RA1
EM41
EM44
EM45
EBL-0618

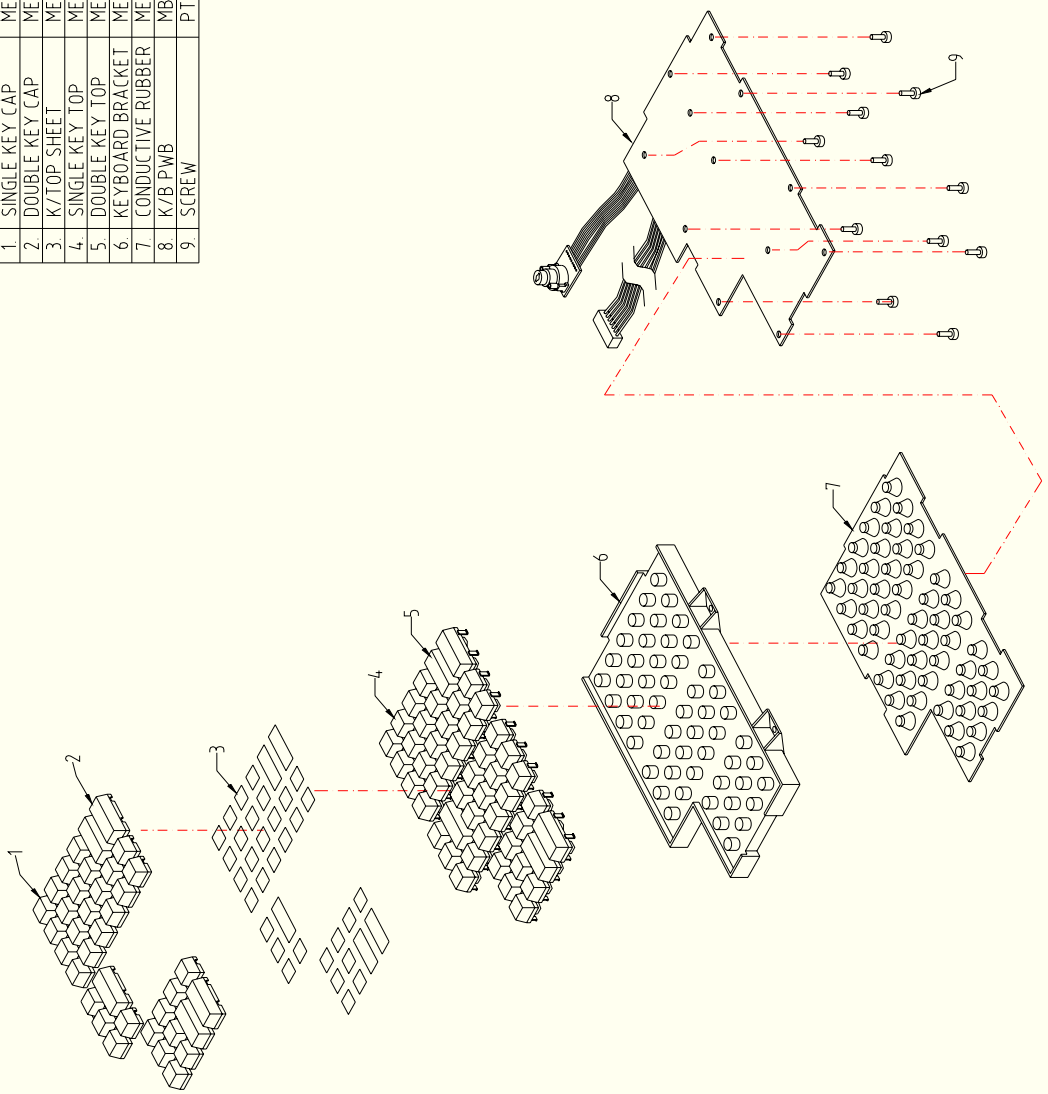
PCB LAYOUT continued



8. INSTALLATION

8.1 Keyboard Assembly

NO	PART NAME	DESCRIPTION	QTY	LOCATION
1.	SINGLE KEY CAP	MEAM-0004	32	KEY TOP
2.	DOUBLE KEY CAP	MEBM-0004	5	KEY TOP
3.	K/TOP SHEET	MEAB-0005	1	KEY TOP
4.	SINGLE KEY TOP	MEAM-0003	32	K/B BRAC
5.	DOUBLE KEY TOP	MEBM-0003	5	K/B BRAC
6.	KEYBOARD BRACKET	MECM-0005	1	
7.	CONDUCTIVE RUBBER	MECM-0006	1	K/B BRAC
8.	K/B PWB	MBK-0023B	1	K/B BRAC
9.	SCREW	PTT-P2X8	12	K/B PWB



MATERIAL			MODEL NAME	CM1810
TREATMENT				
P/NO.			PARTS NAME	KEYBOARD ASSY.
SCALE				
PREPARED	SUGUMAR 08/10/01		DRAW NO.	
TRACKER		REVISION		
CHECKER	HAMADA	AOBA Electronics Co (M) Sdn Bhd		
APPROVED				

8.2 Cash Drawer Assembly

NO	PART NAME	DESCRIPTION	QTY	LOCATION
1.	SCREW	B 3X6 RB M/SC, ETO	4	KEY TOP
2.	SCREW	BTT-P 3X8	3	KEY TOP
3.	BASE PLATE	EBM-0302	1	KEY TOP
4.	ARM F/PIECE	EAM-0092	4	K/B BRAC
5.	ARM SPRING	EAM-0601	4	K/B BRAC
6.	BILL STOPPER	EBM-0085	4	
7.	PARTITION PLATE	EBM-0296B	3	K/B BRAC
8.	8 COIN P/T/PLATE	EBM-0389	6	K/B BRAC
9.	8 COIN TRAY	EDM-0387	1	K/B PWB
10.	BILL COIN TRAY	EDM-0386	1	
11.	URETHANE	EAA-1019 32X20X20	2	
12.	AXLE	EAM-0093	1	
13.	NUT	M6	2	
14.	ROLLER	ER-19	2	
15.	E-RING	EAA-1018	1	
16.	FRONT COVER	ECM-2340	1	
17.	SCREW	F3X4 ST2	2	
18.	CAM LOCK	MEBM-0011	1	
19.	SCREW	B3X10 ISTTI ETO	4	
20.	R/FOOT	EAM-2283	4	
21.	SCREW	B 3X6 RB M/SC ETO	11	
22.	BASE DRAWER	EDM-0913A	1	
23.	STOPPER SET	EBM-0453A	1	
24.	SPRING	EAM-0118A	1	
25.	SCREW	F.P4X16	1	
26.	STOPPER RUBBER	EAA-1135	1	
27.	STOPPER SPRING	EBM-0366B	1	
28.	DC SOLENOID ASSY	EAA-2859IDC-24VI	1	
29.	SCREW	P3X5SW,RB,M/SC	2	
30.	SCREW	F.P4X6,RB,ETO	3	
31.	URETHANE	MAM-0038	2	
32.	NUT	M6	2	
33.	ROLLER	ER-19	2	
34.	HOUSING IDFMI		1	

MATERIAL		MODEL NAME	
TREATMENT		CM1810/20/30	
P/NO.		PARTS NAME	
SCALE		CASH DRAWER ASSY. 4B/8C	
PREPARED	SUGUMAR 08/10/01	DRAW NO	
TRACKER			
CHECKER	HAMADA		
APPROVED			

REVISION

AOBA Electronics Co (M) Sdn Bhd

8.3 General Drawing of CM1810 PLUS

NO	PART NAME	DESCRIPTION	QTY	LOCATION
1	PRINTER COVER	MEDM-0009	1	U/CASE
2	PAPER CUTTER	MEAM-0013	1	P/COVER
3	F/D/LENS	MECM-0010 CM1810	1	U/CASE
4	D/TUBE ASSY	(FRONT)	1	
5	CONTROL SW LABEL	MEAR-0060 CM1810/20	1	C/L/SWITCH
6	UPPER CASE	MEDM-0005	1	
7	SCREW	PTT P 3X8	2	U/C TO C/S
8	SCREW	PTT P 3X10	3	U/C TO L/C
9	R/D/BRACKET	MECM-0008	1	U/CASE
10	D/TUBE ASSY	(REAR)	1	R/D/BRAC
11	R/D/LENS	MECM-0007 CM1810	1	R/D/BRAC
12	SINGLE KEY CAP	MEAM-0004	32	K/BOARD
13	DOUBLE KEY CAP	MEBM-0004	5	K/BOARD
14	KEY TOP SHEET	MEAB-0005	1SET	K/BOARD
15	SINGLE KEY TOP	MEAM-0003	32	K/BOARD
16	DOUBLE KEY TOP	MEBM-0003	5	K/BOARD
17	K/BOARD BRACKET	MECM-0005	1	U/CASE
18	CON/RUBBER	MECM-0006	1	K/BOARD
19	K/B PWB	MBK-0023	1	K/BOARD
20	SCREW	PTT-P 2X8	12	K/B PWB
21	C/KEY SWITCH	S6108-63	1	U/CASE
22	ROLL PAPER	58X50(D)	1	P/WINDER
23	PAPER WINDER	MEBM-0005A	1	P/HOLDER
24	INK RIBBON	L-5M (PURPLE)	1	P/HEAD
25	L-S-S-PLATE	MEAM-0021	1	P/HEAD
26	SCREW	STT-P3X6 M/SCREW	2	P/H TO MOT
27	SCREW	PTT B 4X8	4	P/H TO P/S
28	DC MOTOR	RK-370C-18260	1	P/HOLDER
29	PAPER HOLDER	MEDM-0010	1	P/STAND
30	PRINTER STAND	MEDM-0008	1	DRAWER
31	SCREW	S-TITE 4X10 M/SCREW	6	P/S TO DRA
32	P/HEAD	C41D207291/M-405R-	1	P/STAND
33	SCREW	P-TITE P3X12 J-WAS	2	P/HEAD
34	R/FOOT(PRINTER)	EAM-0893 CM1810	2	P/HEAD
35	SCREW	P 3X4 SW	2	DC SOLENOID
36	LOGO STAMP	XS-41(ENGLISH)	1	DC SOLENOID
37	DC SOLENOID	STC-0630/HP-0630A	1	L.S.S-PLATE
38	L-S-S-PLATE	MEBM-0010	1	P/HEAD
39	SCREW	S-TITE 3X8 J-WASHER	5	LB TO SPACER
40	LOGIC BOARD	EBL-0618 CM1810	1	DRAWER
41	SPACER (PCB)	MEAM-0016	5	L/PWB
42	LOWER CASE	MEDM-0006	1	DRAWER
43	SCREW	B 3X8 RB M/SCREW	8	L/C TO DRA
44	DRAWER ASSY	DMFA01-4/8	1	
45	SCREW	B.S-TITE 4X8SW M/S	2	TRA TO DRA
46	GEAR WASHER	M4	1	TRANSFORM
47	TRANSFORMER	CT-53EF	1	DRAWER
48	SCREW	P 4X8 SW M/SCREW	1	AC TO DRA
49	SCREW	PTT-P 2.3X8	2	F/P TO L/C
50	A/FITTING PIECE	MEAM-0017	1	AC TO L/CA
51	GEAR WASHER	M4	1	AC GROUND
52	AC CORD	MEP-850-E01	1	LOWER CASE
53	SCREW	P-TITE 3X8 J-WASHER	3	K/B TO U/CA
54	NUM KEY	MEAB-0005	1SET	K/BOARD
55	SCREW	B-TITE 3X8	1	U/C TO L/C
56	SCREW	PTT P 2.3X8	4	R/D/BRAC
57	RATING LABEL	MEAR-0056	1	U/CASE
58	NI-CD BATTERY		1	HOUSING
59	WARNING LABEL	MEAR-0059	1	P/COVER
60	SPACER (PRINTER)	MEAM-0022 CM1810	2	P/HEAD
61	FUSE	250V 250MAT	1	F/HOLDER
62	SCREW	PTT P 3X8	1	F/HOLDER
63	FUSE HOLDER	XN1153#01/FH-V-0510	1	L/CASE
64	FUSE LABEL	250V 250MAT	1	F/HOLDER
65	MOTOR ROLLER	MEAM-0002	1	DC MOTOR
66	CUSHION BATTERY	MEAM-0007A	1	BATTERY
67	HARDNESS ASSY.		1	PRIN/TRANS
68	SCREW	P 4X8 SW M/SCREW	1	PRINTER
69	GEAR WASHER	M4	1	PRINTER

PREPARED BY : SUGUMAR (P.E)
DATE : 7/10/01