

OLYMPIA 

CM 721/6 Plus

Technical Manual

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1. INTRODUCTION

1.1 PRINCIPAL SPECIFICATION

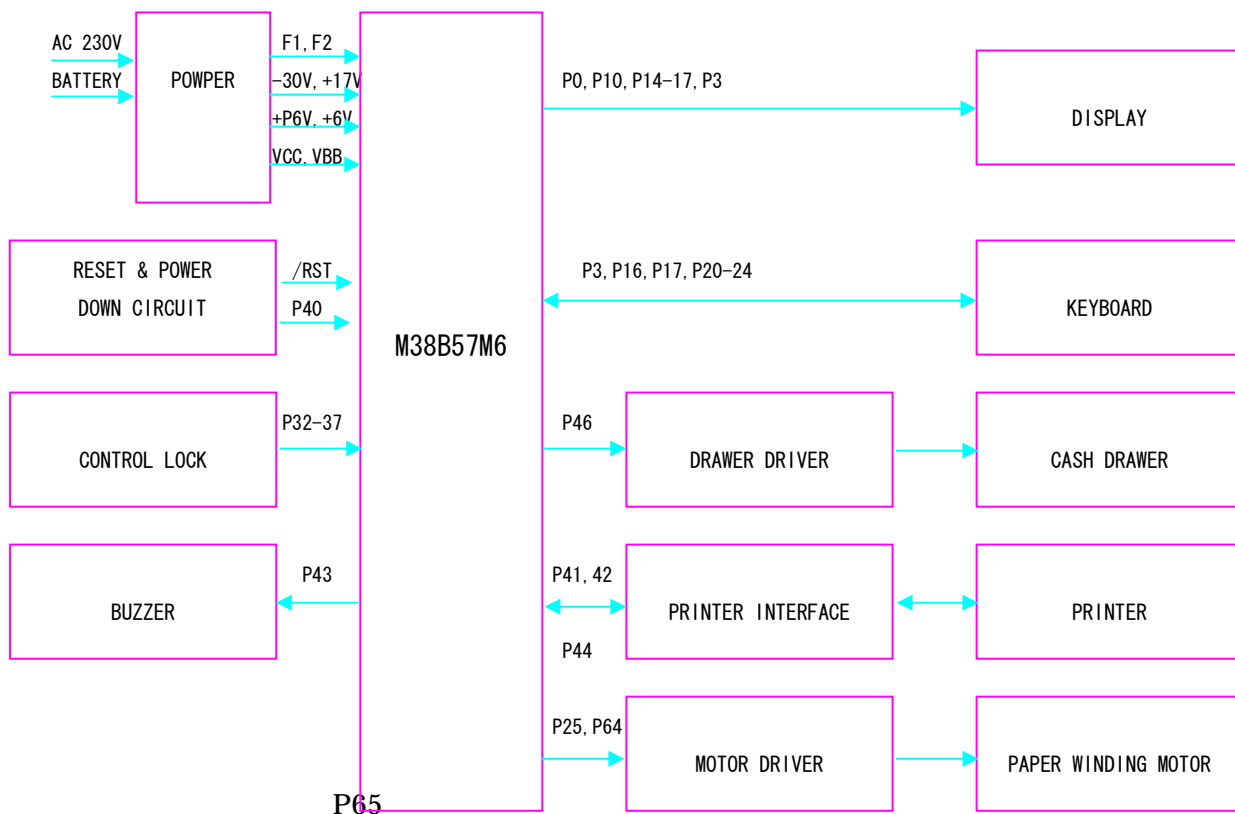
Primary Power	230V ± 10%, 50Hz or 60Hz ± 10%
Maximum Power Consumption	15.0W
Backed-up Power	Ni_Cd Battery 3.6V, 270mAh
Printer	EPSON M-42V
Microcontroller	MITSUBISHI M38B57M6 24K ROM and 1K RAM
Roll Paper	58(W)*50(D) mm
Display Panel of CM721	Front Fluorescent Tube, 12 digits
Display Panel of CM726	Front and Rear Fluorescent Tube, 12 digits
Keyboard	39 KEYS
External Dimension	425(L)325(W)200(H) MM
Weight	5.0 ± 0.5Kg

1.2 BASIC FUNCTION

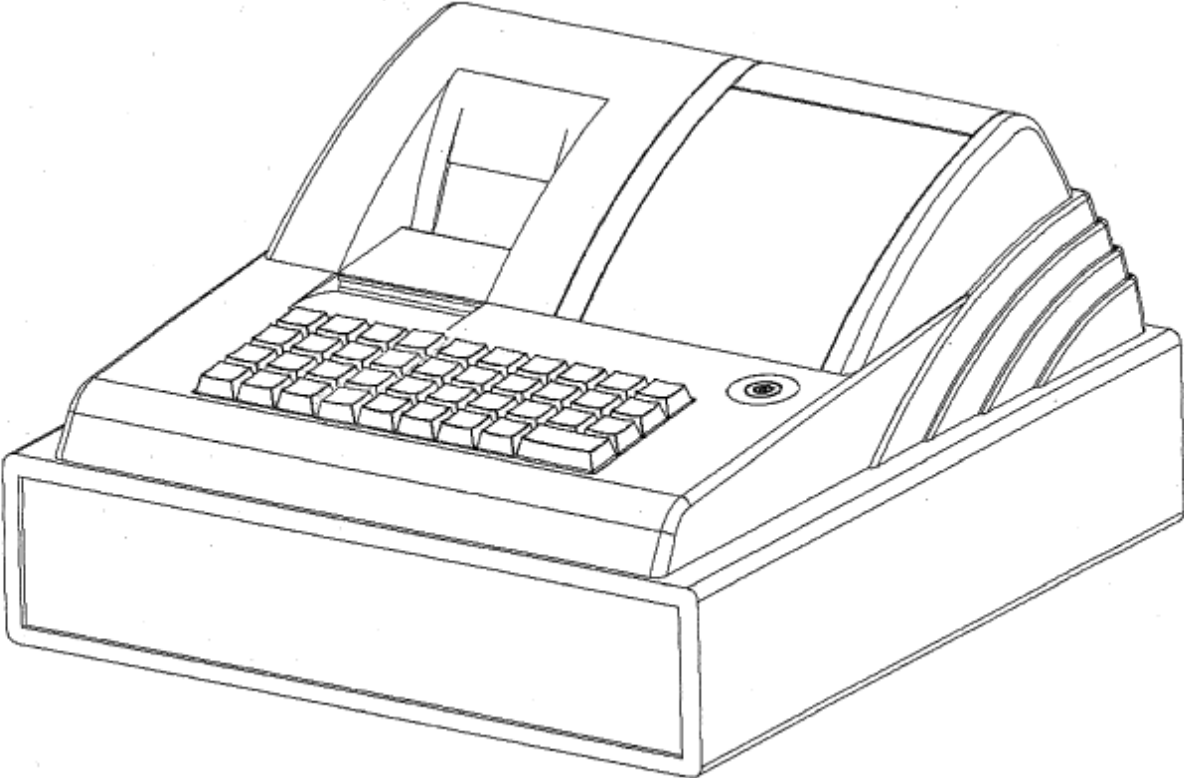
This kind of ECR uses a 8-bits single chip microcontroller M38B57M6. It utilizes 24k bytes of mask ROM On-Chip and 1K bytes of RAM On-Chip. This terminal also has a battery-backed up clock which keeps track of the year, month, date, hour, minute and seconds.

Keyboard	39 Keys
Number of departments	6/12 Department
Number of PLU	100
Printer	EPSON M-42V, 19 columns

1.3 SYSTEM BLOCK DIAGRAM



1.4 OUTLINE



2. CIRCUIT

2.1 POWER SUPPLY CIRCUIT

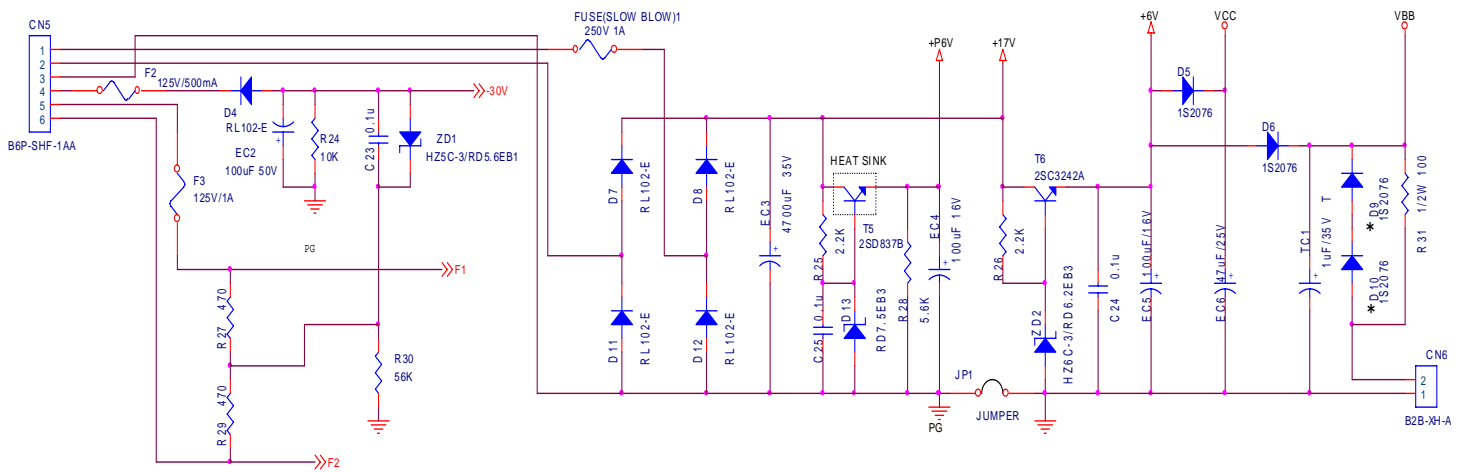


FIG 2.1 Power Supply Circuit

+17V

+17V is used as the power source for the cash drawer and buzzer.

15.6V AC inputted into pin 1 and 2 of CN5 is rectified by diode D7,D8,D11,D12 and filtered by EC3 4700uF to become +17V DC unstable power source.

+P6V

This voltage is made from 17V. It applies to the collector of T5, a 2SD837B transistor.

It is also dropped across R25 an 2.2K ohm resistor, and D13 rated at 7.5V. This provided a bias voltage of about 7.5V DC on the base of T5. This output voltage is filtered by EC4, a 100uF capacitor.

+6V

This voltage is made from 17V. It applies to the collector of T6, a 2SC3242A transistor.

It is also dropped across R26 an 2.2K ohm resistor, and ZD2 rated at 6.2V. This provided a bias voltage of about 6.2V DC on the base of T6. This output voltage is filtered by EC5, a 100uF capacitor.

VCC (+5.0V)

The circuit generates the VCC by a diode (1S2076) to +6V. +6V applies to the "A" of D5, D5'S Output is VCC. This voltage is used by U1(LB1268) and U3(HD14001BP).

VBB(+5.0V)

When the voltage at +6V has dropped, voltage back-up is provided by the battery.

This voltage is used by CPU and external RAM.

-30V

The -30V circuit uses 27V AC across pins 3 and 4 of CN5. This AC voltage is rectified by D4 a RL102-E diode, and filtered by EC2, a 100uF capacitor.

-30V is approximately -30V DC. This voltage is used by the display and CPU.

Filament Voltage (F1, F2)

The display tube uses the filament voltage F1, F2.

Its AC input is 4.0V, and uses a ground reference -25V from the -30V circuit dropped across ZD1 and R27, R29 470 ohm register.

2.2 TRANSFORMER WIRING DIAGRAM

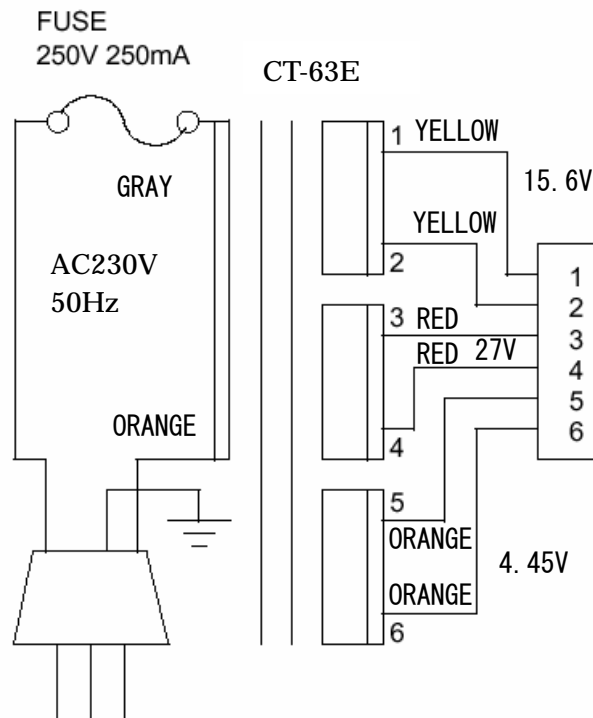


FIG 2.2 Transformer Wiring Diagram

2.3 POWER SUPPLY SPECIFICATION

Input-Power Consumption

	Standing by	Maximum 6.5 watts
	Printing	Maximum 15.0 watts

Output-Rated Voltage

+17V to GND	Voltage	12V \pm 0.85V
	Ripple	Less than 1.0V p-p
+P6V to GND	Voltage	6.0V \pm 0.2V
	Ripple	Less than 0.3V p-p
	Stability	Line regulation - Less than 0.3V Temp regulation - Less than 0.3V
+6V to GND	Voltage	6.0V \pm 0.2V
	Ripple	Less than 0.3V p-p
	Stability	Line regulation - Less than 0.3V Temp regulation - Less than 0.3V
+VCC to GND	Voltage	5.0V \pm 0.5V
	Ripple	Less than 0.1V p-p
	Stability	Line regulation - Less than 0.2V Temp regulation - Less than 0.2V
-30V to GND	Voltage	-30V \pm 2V
	Ripple	Less than 4.0V p-p
	Stability	Line regulation - Less than 8V Temp regulation - Less than 2V
F1 to F2	Voltage	4.0V \pm 0.2V AC (on -18V)
	Stability	Line regulation - Less than 1.0V

2.4 MAIN CIRCUIT

2.4.1 CPU

GENERAL DESCRIPTION

The M38B57M6 is a 8-bit microcomputer with 24K Bytes ROM, 1K Bytes RAM, and incorporate many hardware peripherals such as an VFD controller/driver, 8 bit resolution A/D converter, serial interface, timer counter and interrupt function integrated on one chip..

FEATURES

• Number of basic instructions	71
• Memory Size	24K bytes of On-Chip mask ROM 1K bytes of On-Chip Data RAM
• Instruction execution time	0.48us (minimum instructions, at 4.19MHz)
• Supply power	2.7-5.5V
• Interrupt	21 Interrupt source
• Timers	16-bit TIMERX, 8-bit TIMER1-6
• FLD controller/driver	Segment 15 to 25 lines, Digit 8 to 20 lines
• Programmable I/O ports	55
• Serial I/O	Full duplex serial1, serial2
• Buzzer output	1kHz, 2kHz, 4kHz(at M-clock 4.19MHz)
• Power Saving Modes	M-clock HALT ,STOP,S-clock HALT mode
• System Clock output	Main system clock 4.19MHz ,subsystem clock 32.768kHz
• Package	80-pin plastic QFP(14X20mm)

PIN ARRANGEMENT (TOP VIEW)

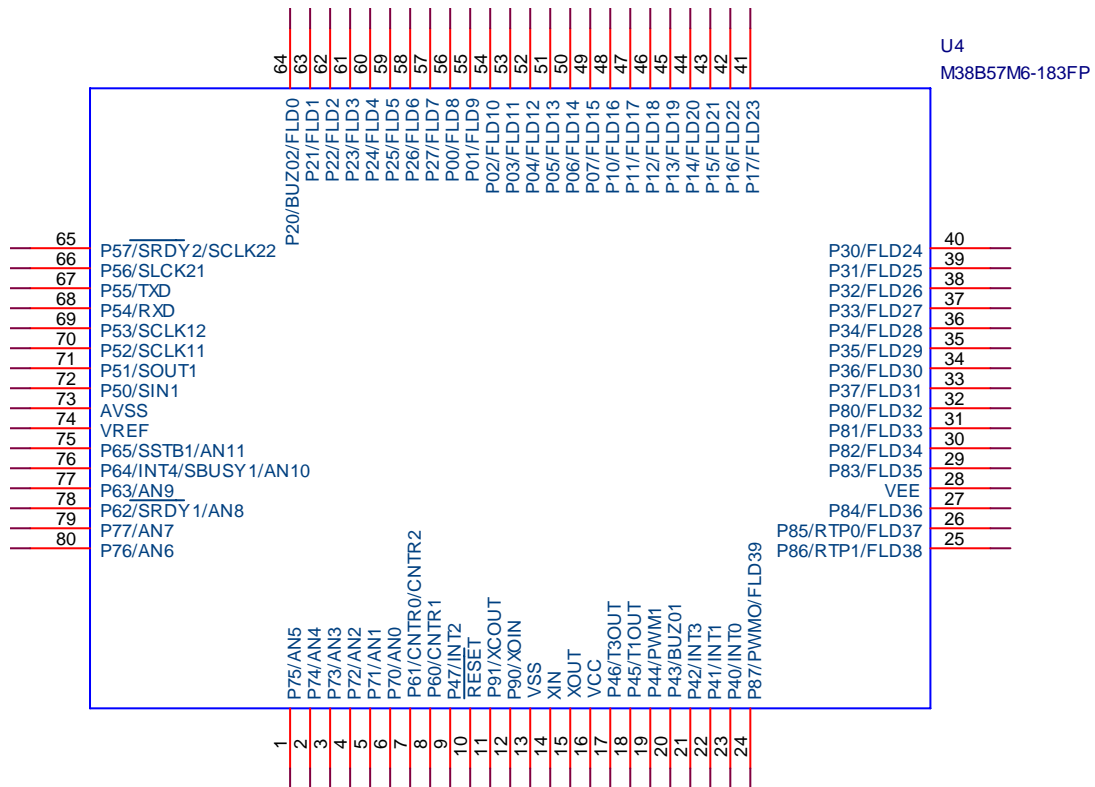


FIG 2.3 CPU Pin Configuration (Top View)

- P00 to P07,P30 to P37,P10 to P17 :Fluorescent indicator panel
- P20 to P27 :Key matrix Retrun(Keyboard)
- P40 to P42 :Interrupt from Peripherals
- P46 :Drawer
- P43 : Buzzer output

- P50 to P56 :ADDRESS BUS(A8 To A14)
- P61 :EXTERNAL RAM 'CS'
- P62 :EXTERNAL RAM 'WR'
- P63 :EXTERNAL RAM 'OE'
- P64 :Printer solenoid drive signal
- P65 :Printer motor drive signal

- P70 to P77 :DATA BUS(D0 to D7)
- P80 to P87 :ADDRESS BUS(A0 To A7)
- XIN,XOUT :Crystal(Main)
- XCOUT,XOIN :Crystal
- RESET :Reset

2.4.2 BEEP AND DRAWER DRIVER CIRCUITS

The solenoid for a drawer is activated using the signal P46 from the CPU.

This signal is normally Low, and goes High to cause the drawer to run. When P47 is High, T4 is on. Current flow through the transistor cause the collector to be held Low, near grand potential.

The buzzer signal from the CPU P43 output is buzzer signal.

Its signal is square wave.

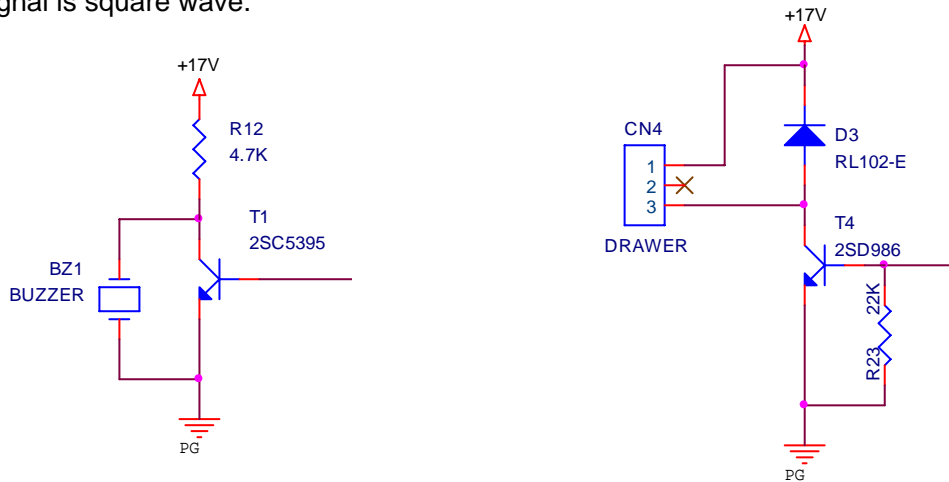


FIG 2.4 beep and drawer driver circuits

2.4.3 RESET CIRCUIT AND POWER DOWN CIRCUIT

The reset circuit prevents the CPU from starting to operate before the system is fully powered-up and initialized.

Then 2uS after power is applied, reset goes high and the CPU can begin functioning.

When power in first applied to the circuit, the VBB begins charging EC1, a capacitor. While EC1 is charge.

Once EC1 is fully charged, the voltage drops scores the capacitor.

A circuit using the +5.4V voltage generates power fall signal.

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 20 μ A. During the power failure, count up of the clock and power failure signals is 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.

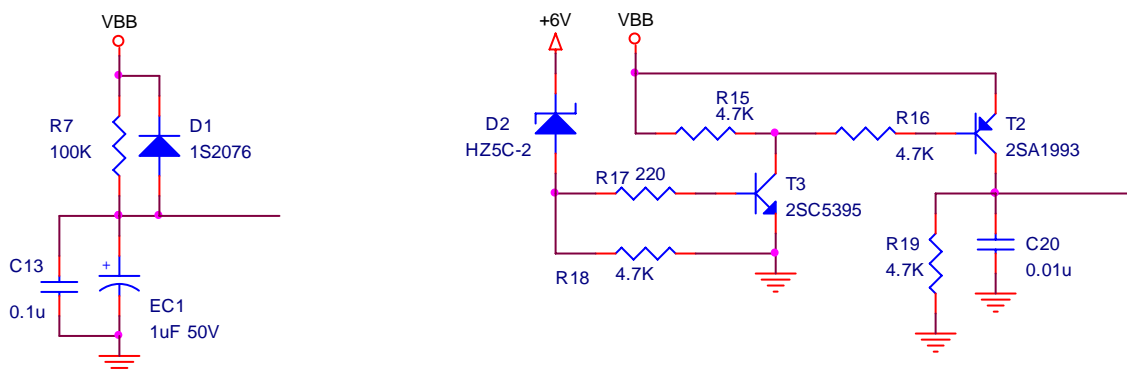


FIG 2.5 Reset And Power down Circuit

2.4.4 DISPLAY CIRCUIT

Scan signal for the display outputs from P30-P37, P14-P17 P21 of CPU. It goes to display grid signals 1G-12G. P00-P07 and P10 indicate 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.

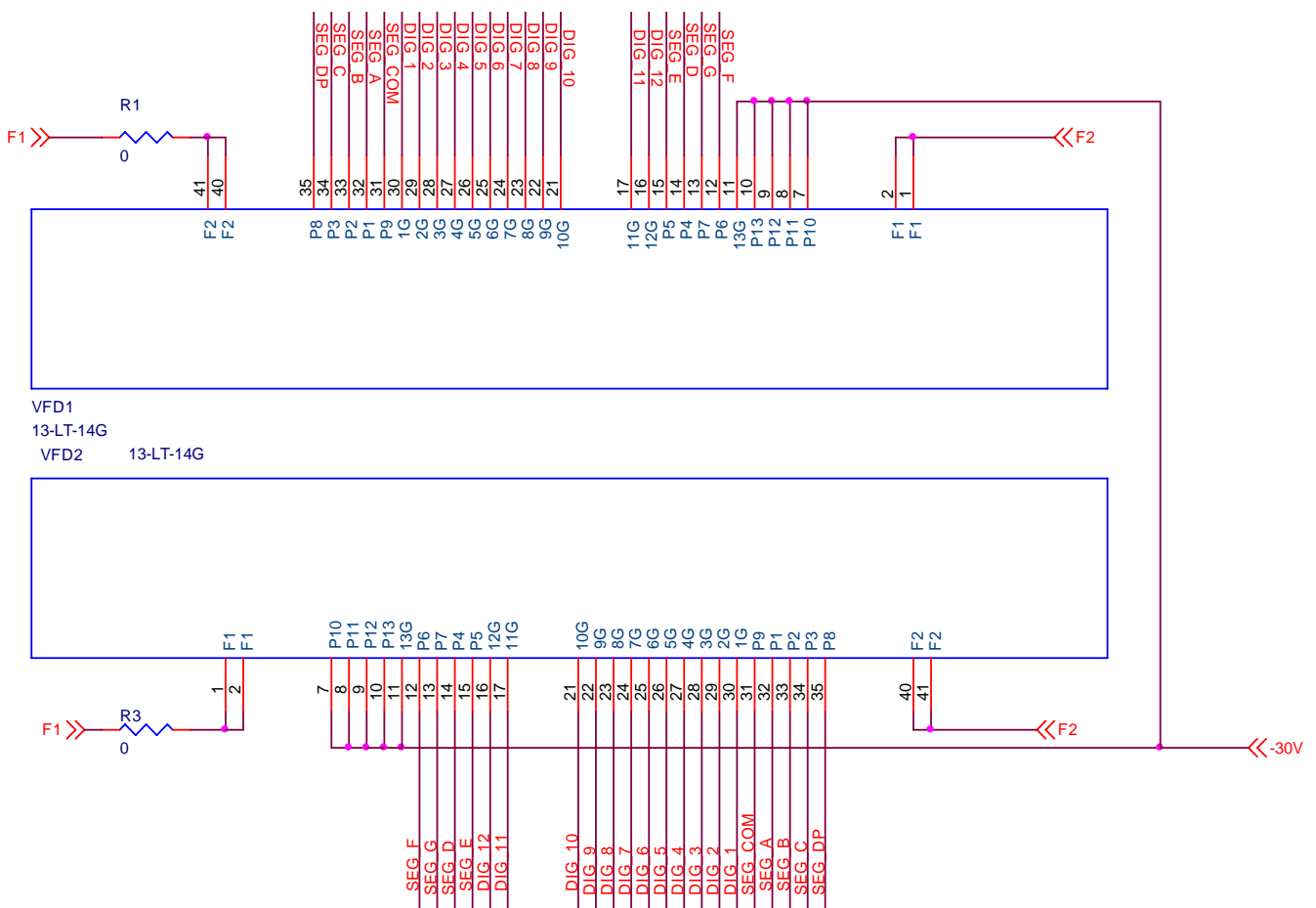


FIG 2.6 Display Circuit

2.4.5 PRINTER CIRCUIT

The printer circuit consists of printer detect and printer drive circuit, printer timing and detection is generated by using U3(HD14001). U1 used for printer driving. U1-6 drives printer motor, the printer motor is activated by using the signal “PRINT” of CPU. The signal is normally low, and goes high to activate the motor. U1-8 drives the printer trigger solenoid, it is activated by “TRIG” of CPU. The paper winding motor is activated by “wind” of CPU.

CN2 socket is used for connecting printer M-42V.

No.1 pin of CN2: Trigger solenoid driver.

No.2 pin of CN2: +P6V power for trigger solenoid.

No.3 pin of CN2: +P6V power for print motor.

No.4 pin of CN2: Printer motor driver.

No.5 pin of CN2: Timing signal T from mechanical switch

No.6 pin of CN2: Reset signal R from mechanical switch.

No.8 pin of CN2: Timing sub-signal t from mechanical switch .

No.7 pin of CN2: Signal(No5,6,8)’s common power 5.4V.

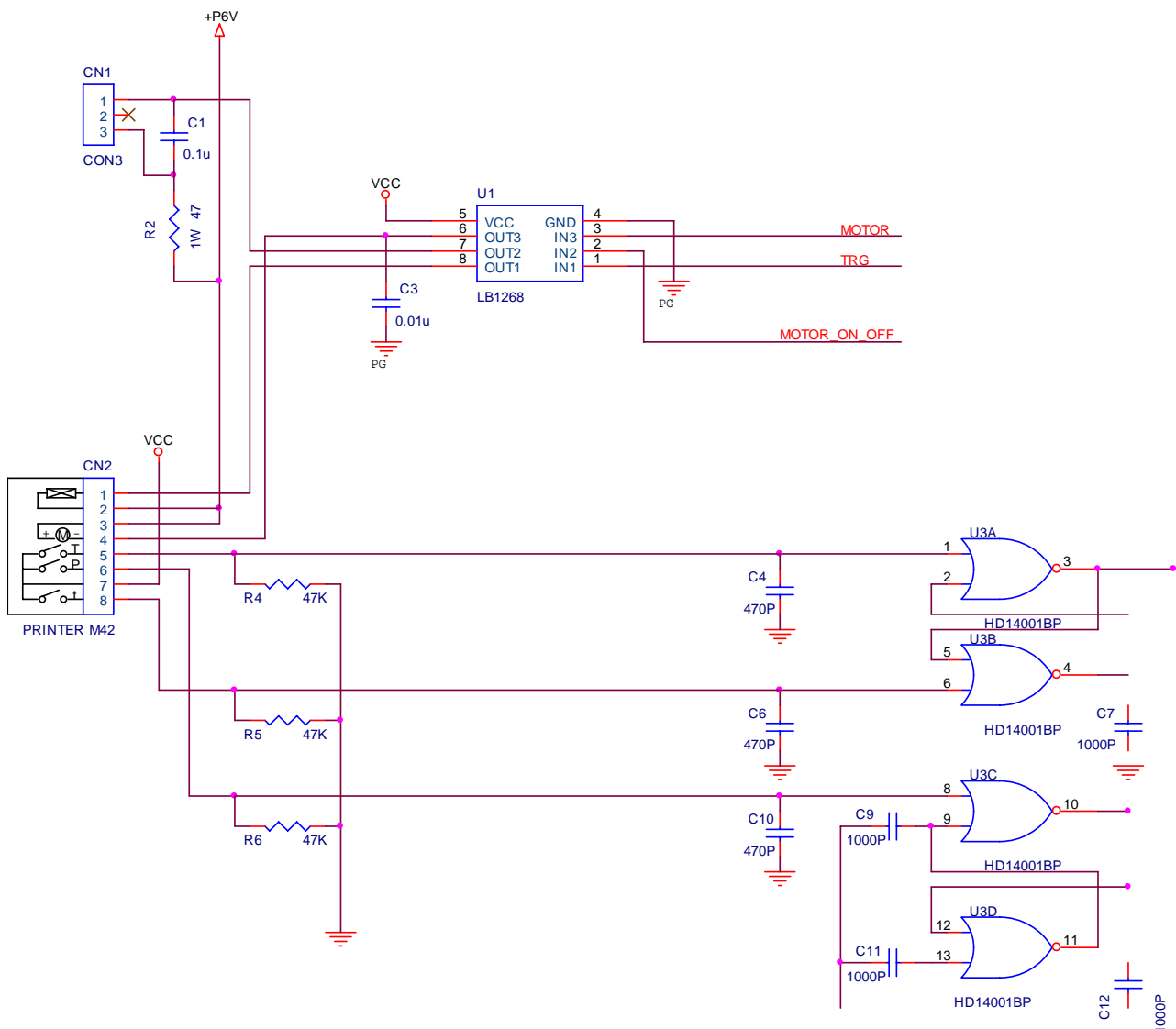


FIG 2.7 printer and printer driver Circuit

2.4.6 KEYBOARD MATRIX

P16,P17,P30-P37 of CPU provide the strobe lines to keyboard,and the keyboard return lines to P20-P24 of CPU.

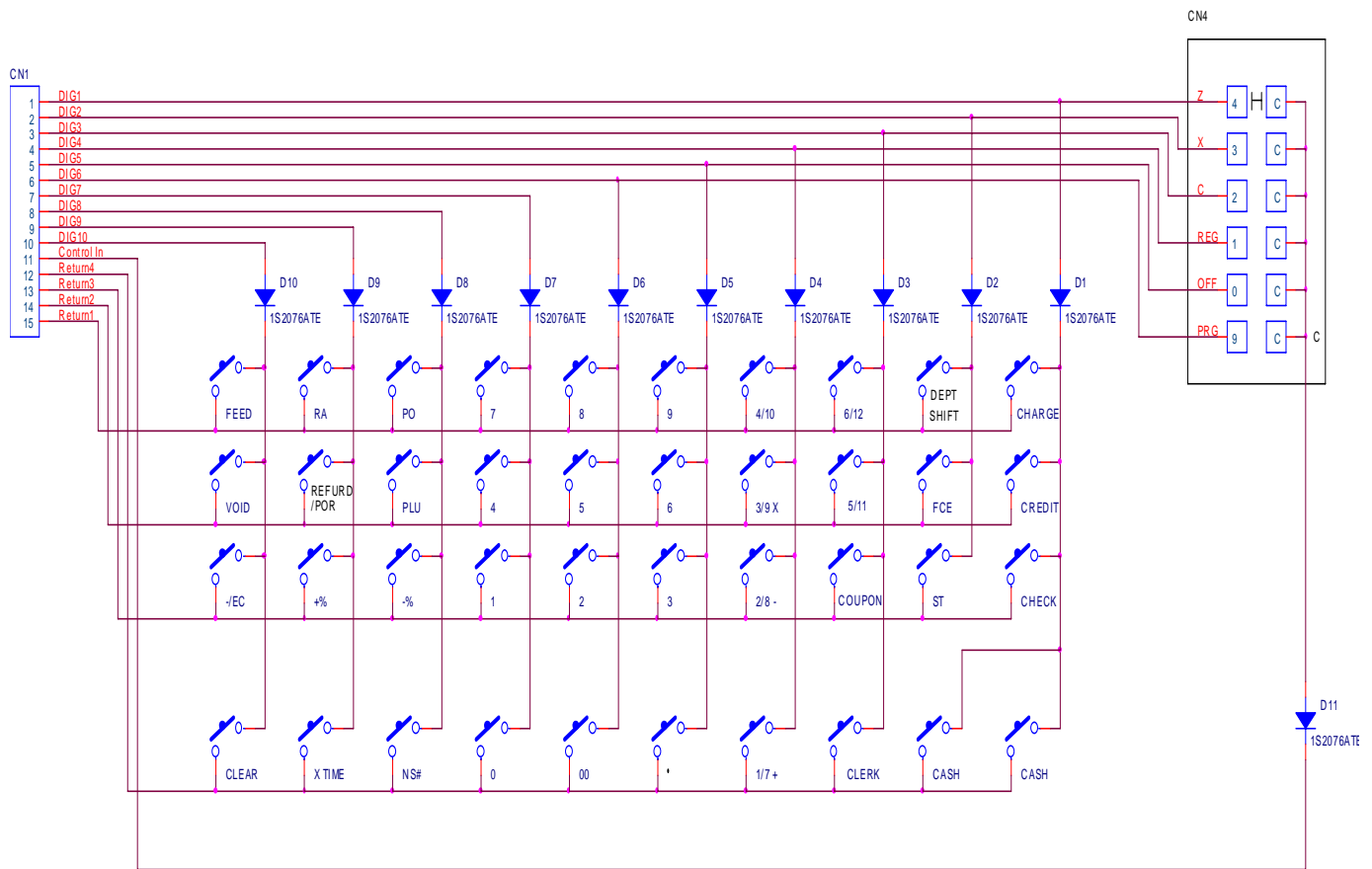


FIG 2.8 Keyboard Circuit

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 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 ,D4,ZD1.
- 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,U3.

- 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 detector circuit of PCB, U3

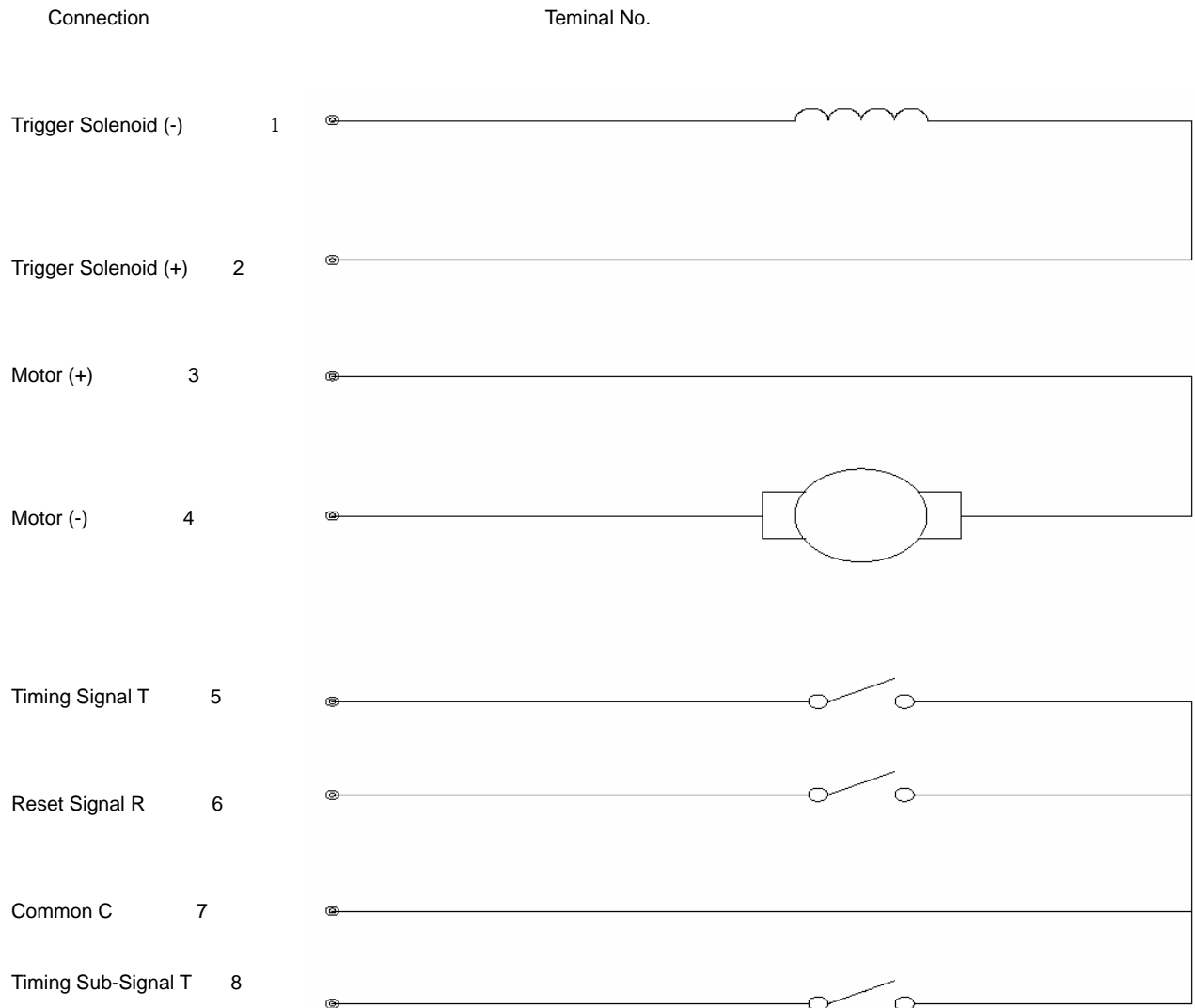
- The data error in memory (the data displayed on the VFD is incorrect; the data printed is not corresponding with what you want)

Actions: (Please check in the following sequence)

- a) To check software version resistor R8-11(confirm your version is USA or UNIVERSAL version).

4. PRINTER INFORMATION

- Printing Method : Character wheel type serial printer
- No. of printed columns : Maximum 19 columns(2 symbol columns are included)
- Character Types : Symbol 13 positions +1 spaces
Numeral 14 positions
- Character Size : 1.6mm(W)X2.8mm (H)
- Character Intervals
 - 1) Between columns : between numerals 2.1mm
between numeral and symbol 2.6mm
between symbols 2.3mm
 - 2) Between Lines : 4.6mm
- Printing Speed : (average printing speed at 6.0 VDC)
 - 1) For 19-column printing : Typ. 0.9 line/sec)
 - 2) For 7-column printing : Typ. 2.2 line/sec)
- Paper : High quality paper of 57.5mm width
- Paper feeding : Fast feeding can be performed at typically 8.0 lines/sec
Provided with a paper free mechanism
- Inking Method : Ink roll method
- Motor
 - 1) Terminal voltage : 6.0+0.5/-2.0VDC
Restarting-up voltage 4V or less (at 25°C)
 - 2) Mean current : Typ. 0.25A (6.0 VDC AT 25C,19 columns 7 position shift printing)
 - 3) Driving : Motor shall be controlled by switching on-off Motor Drive Signal
- Detectors : Mechanical contact point
The detectors generate the Reset signal R, Timing signal T, and Timing Sub-signal t.
- Trigger Solenoid
 - 1) Terminal voltage : 6.0+0.5/-2.0 VDC
 - 2) DC resistance : 20±2 Ω
 - 3) Drive circuit : Diode is used as current suppressor Diode should be prepared by customers.(1S2075K equivalent)
- Connection Method (on printer side) : By jumper wire
- Operating Temperature : 0 to 50°C
- Reliability : MCBF=700000 lines
- Terminal Assignment
Note: Terminal in detector side is numbered 1.



• Character Lay

←Columns

←Positions

	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	+
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	K	X
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	√	÷
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	P	◇
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	D	*
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	⁵ / ₄	S
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	M	T
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	△	M
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	+	C
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	-	=
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	-
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	↕	%
13	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	A	E

5. DISPLAY INFORMATION

Itron Type Name : 13-LT-14G

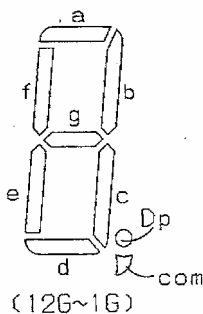
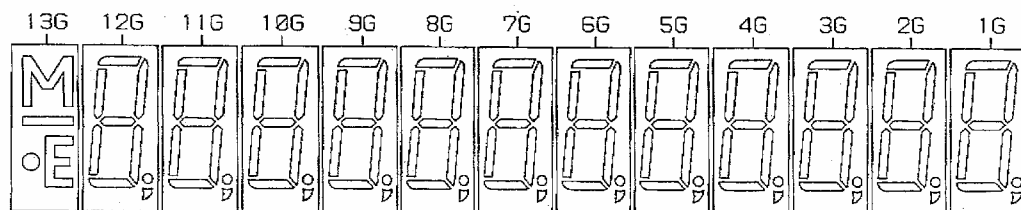
1) Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temp.	To	-20	-	+70	°C
Storage Temp.	Ts	-55	-	+80	°C
Filament Voltage	Ef	3.6	4.0	4.4	Vac
Grid Voltage	ec	-	26.0	31.0	Vp-p
Anode Voltage	eb	-	26.0	31.0	Vp-p

2) Electrical Characteristics

Parameter	Sym.	Test Condition	Minimum	Typical	Maximum	Unit
Filament Current	I f	Ef=4.0 Vac eb=ec=0V	135	150	165	mA
Grid Current	I c 13G 1-12G	Ef=4.0 Vac ec=26.0 Vp-p eb=26.0 Vp-p	-	5.5 6.0	11 12	mA
Anode Current	I b	Ef=4.0 Vac ec=26.0 Vp-p eb=26.0 Vp-p	-	4.5	9.0	mA
Luminance	L (G)	Ef=4.0 Vac ec=26.0 Vp-p eb=26.0 Vp-p	240 (70)	580 (170)	- -	cd/m ² (fL)
Grid Cut-off Voltage	Ecco	Ef=4.0 Vac Eb=26.0 Vdc Ec=Vary	-4.8	-	-	Vdc
Anode Cut-off Voltage	Ebco	Ef=4.0Vac ec=26.0vp-p eb=Vary	-4.8	-	-	Vdc

- Effective value at 50 or 60 Hz sine wave.
- Test Condition : Duty factor (DV) = 1/17.5
: Pluse width (tp) = 80 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.

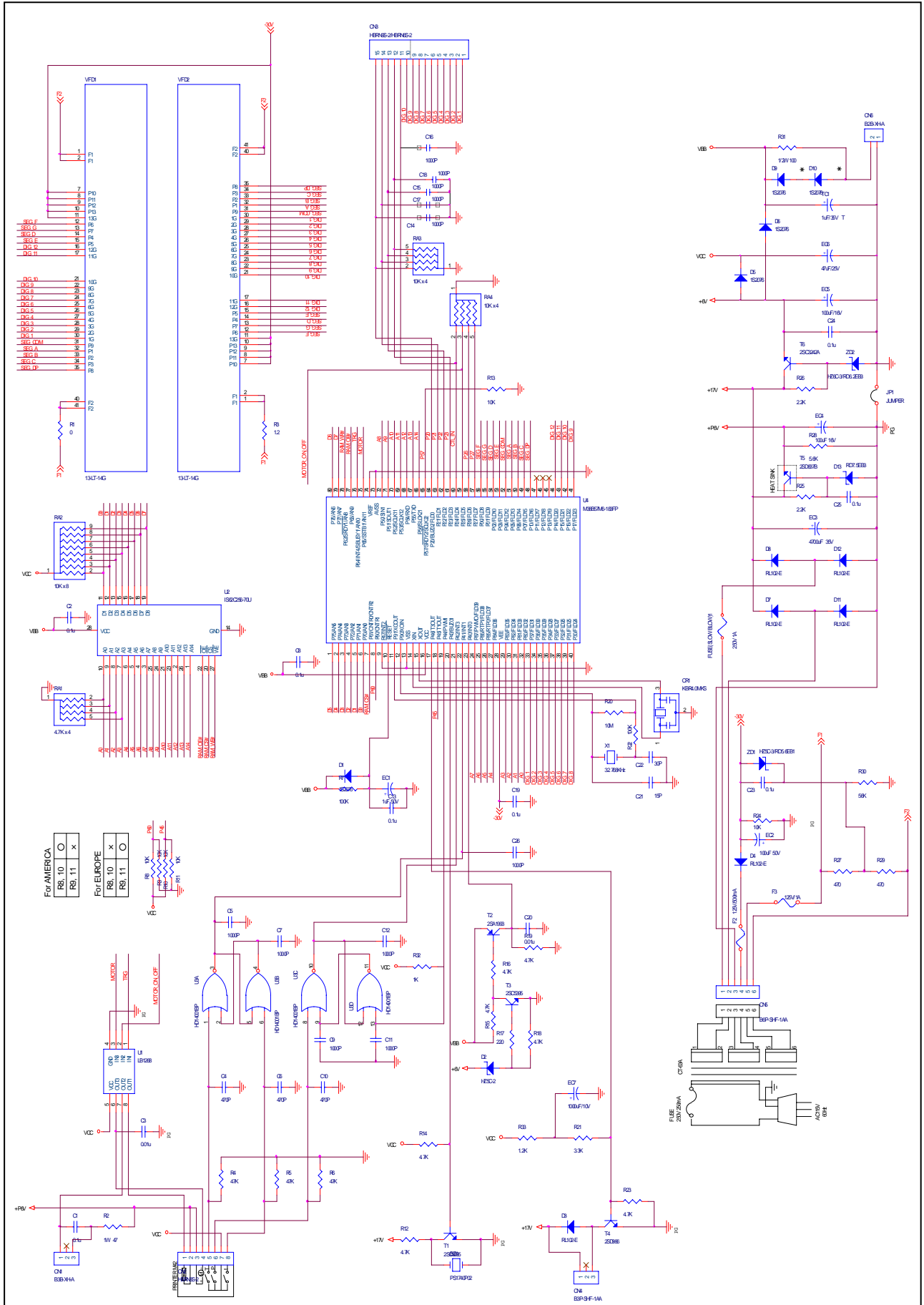


PIN CONNECTION

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	11	11	11	11	11	12	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4
CONNECTION	F	F	N	N	N	N	N	P	P	P	P	P	P	P	P	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

- NOTE
- 1) F1, F2 --- Filament
 - 2) NP --- No pin
 - 3) NX --- No extend pin
 - 4) DL --- Datum Line

6. CIRCUIT DIAGRAM



7. REMOVAL, RE-ASSEMBLE

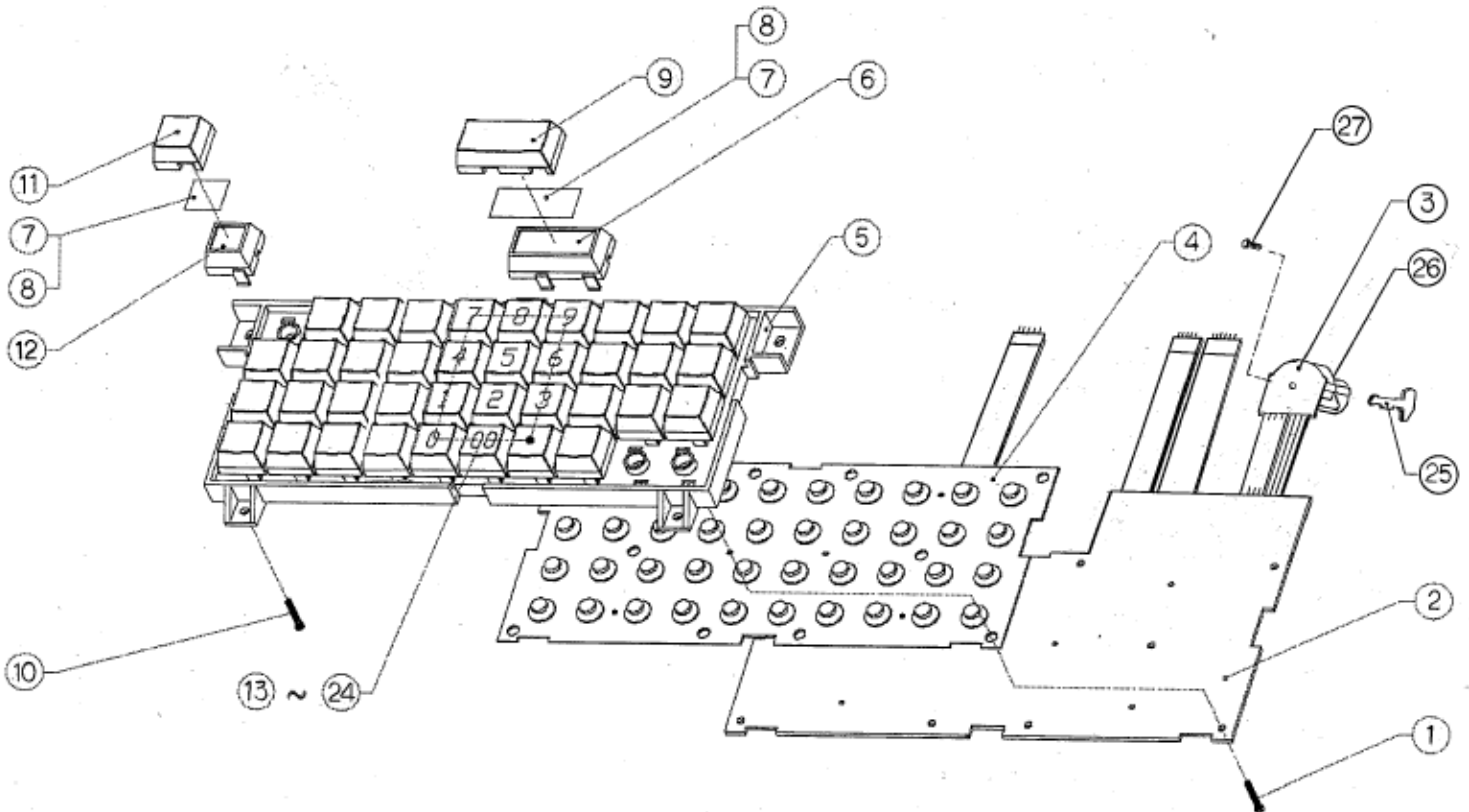
7.1 Keyboard Assembly

Removal:

- 1) Unscrew the 5-screws (10), 10 screw (1) and remove keyboard PCB (2), rubber key (4).
- 2) Remove 1 double key cap (9) and 1 double key-top (6) and 12 number keys (13)~(24).
- 3) Remove the 26-transparency key caps (11), key label (7) or (8) and 26 single key-tops (12).
- 4) Unscrew the 2-screws (27) and remove control lock (26).

Re-assemble:

Reverse the procedure described above.



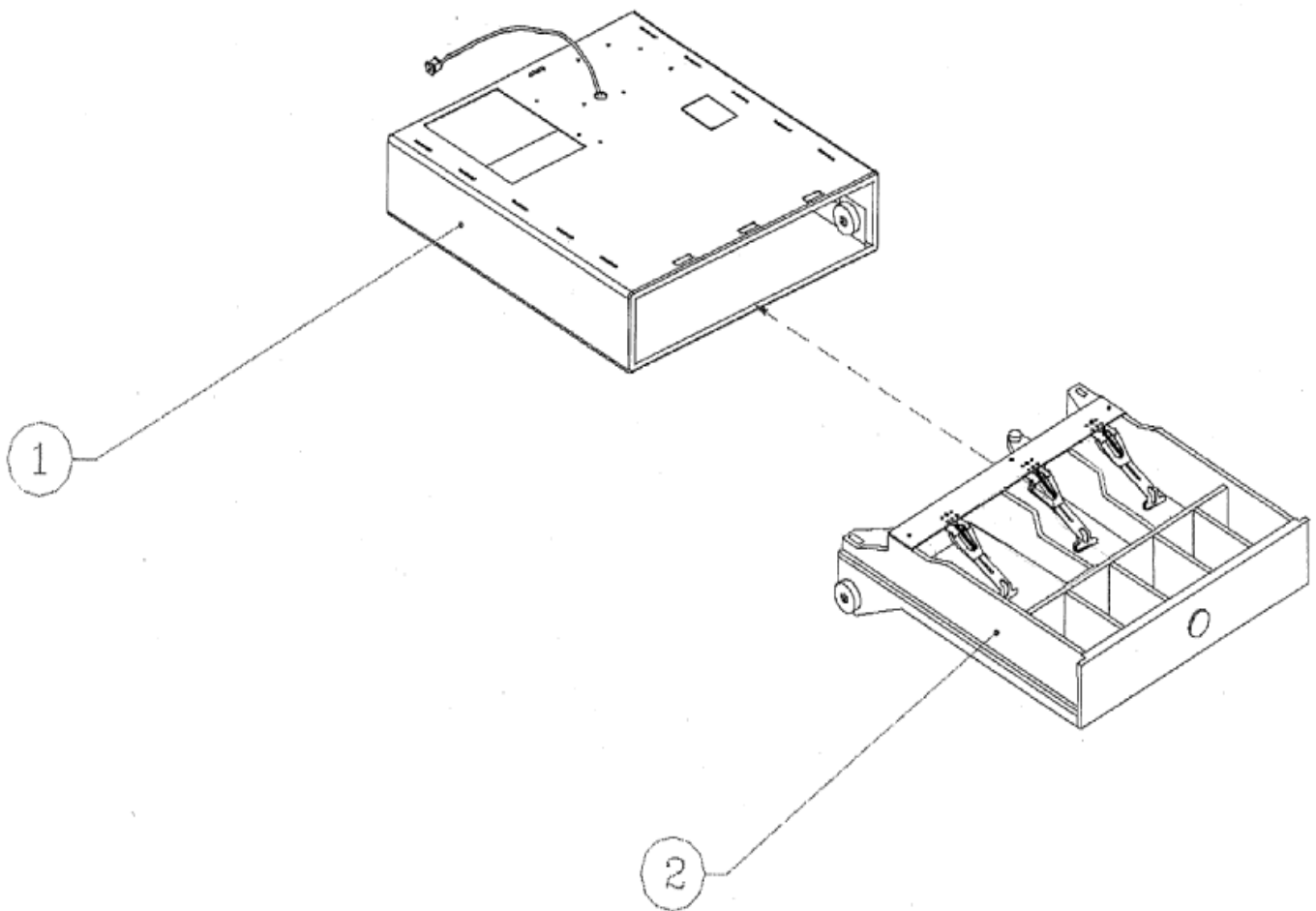
7.2 Cash Drawer Assembly

Removal:

- 1) Remove cash drawer tray (2)

Re-assemble:

Reverse the procedure described above.



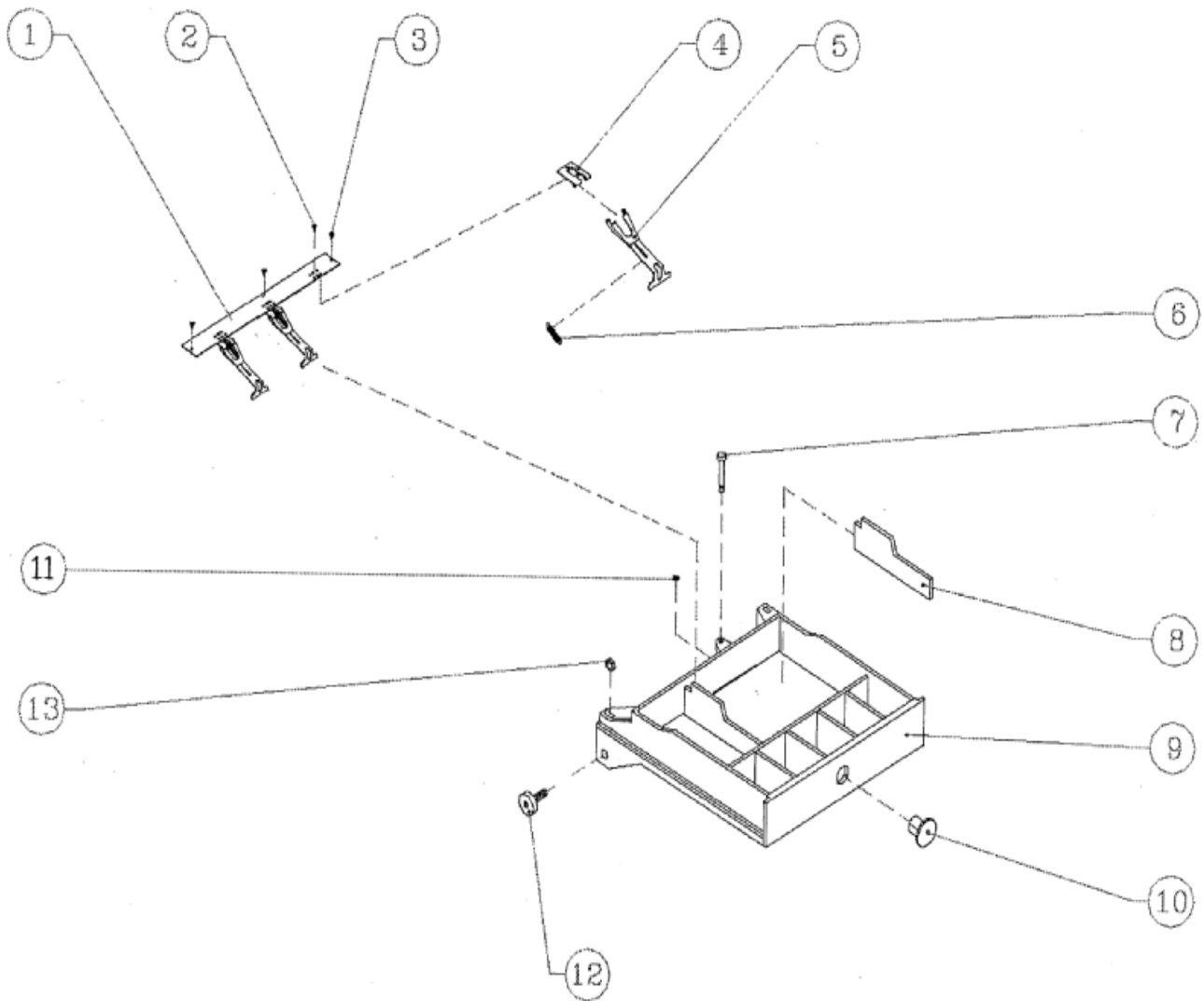
7.3 Cash Drawer Tray Assembly

Removal:

- 1) Unscrew 3 screws (2), remove 3 plastic clip assemblies (4) (5) (6).
- 2) Remove 2 plastic plates (8).
- 3) Unscrew the nut hex (13) then remove it.

Re-assemble:

Reverse the procedure described above.



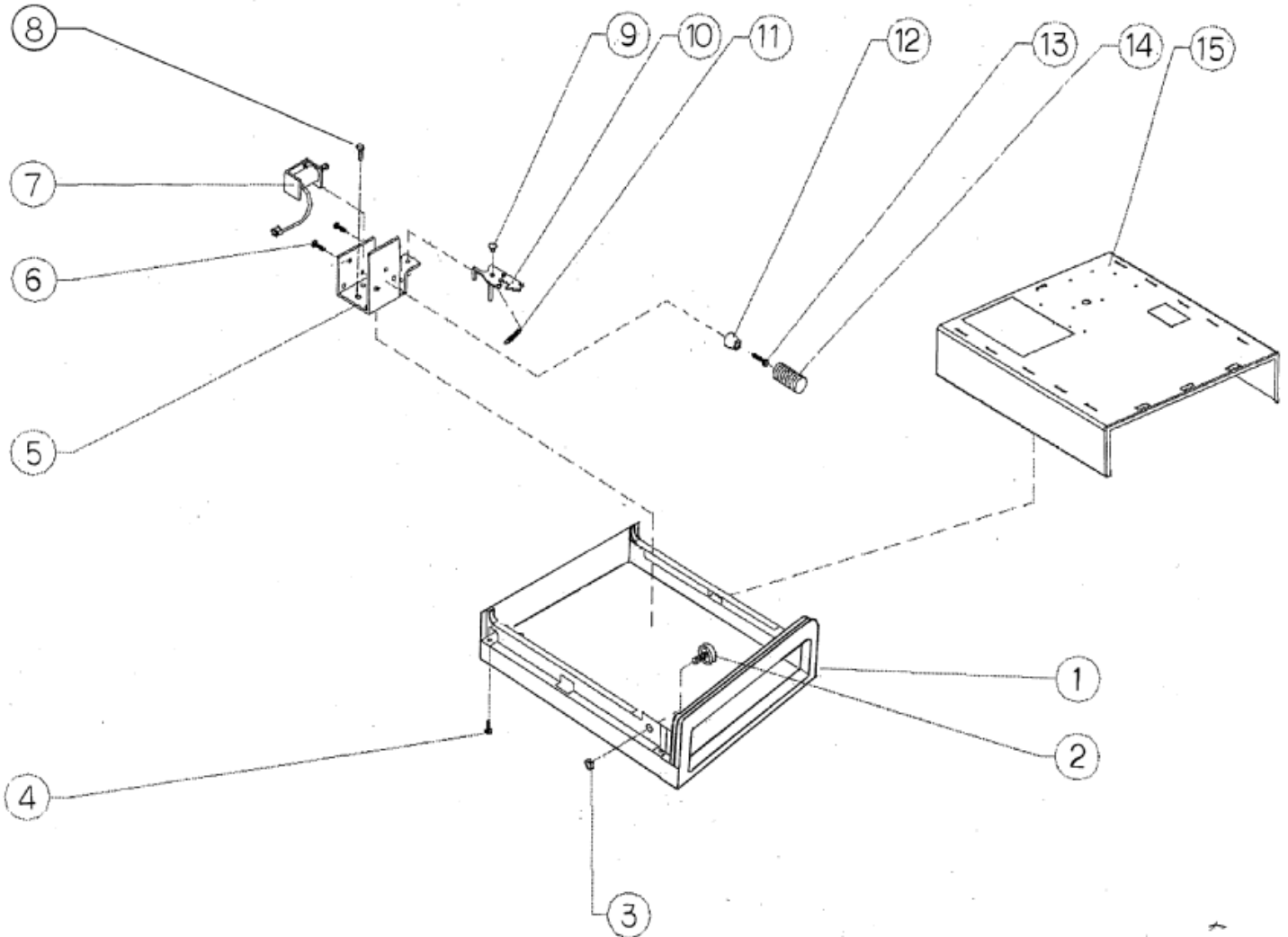
7.4 Cash Drawer Case Assembly

Removal:

- 1) Unscrew the 6-screw (4), remove (15) from others.
- 2) Screw off 2 nuts (3). Then remove the (2).
- 3) Unscrew 3-screws (8), remove (5).
- 4) Unscrew the screws (13), then remove (12), (14).
- 5) Unscrew 2-screws (6) remove all the others.

Re-assemble:

Reverse the procedure described above.



7.5 GENERAL DRAWING of CM721/CM726

Removal:

- 1). Remove the printer cover (6), and unscrew 4 screws (22), 2 screws fixing to cash drawer, and 2 screws fixing to metal support (23), remove the upper housing:
 - a). Remove 5 screws fixing to keyboard assembly (5) and remove (5).
 - b). Remove display lens (15), unscrew 2 screws fixing to control lock assembly (17) and remove them.
- 2). Unscrew the screws (13) and remove motor assembly (14), unscrew 4 screws fixing to mainboard, unscrew the screw (22), remove the paper guider (21) and printer assembly (20).

Note: only front display for CM721.

Re-assemble:

Reverse the procedure described above

