DOT MATRIX PRINTER

NX-2415II
LC24-15II

TECHNICAL MANUAL

[THIRD EDITION]

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INTRODUCTION

This manual describes dot matrix printers as shown below.
It is intended for use as a reference for periodic inspections and maintenance procedures.
This manual is prepared for use at a technical level and not for the general user.

Model	Destination
NX-2415II MULTI-FONT	For American and Asian market
LC24-15II MULTI-FONT	For European market

- This manual is divided into the following sections:

- First edition : Oct. 1993
  Second edition : Sep. 1995
  Third edition : Apr. 1996

CHAPTER 1
GENERAL SPECIFICATIONS

1

1. General Specifications

Printing system	Serial Impact Dot-matrix		
Printing speed	Pica	Elite	Semi-condensed
Draft	200 cps	240 cps	300 cps
Letter Quality	67 cps	80 cps	100 cps
Print direction	Bi-directional, logic-seeking Uni-directional, logic-seeking (selectable)		
Print head	24 pins		
Line spacing	1/6, 1/8, n/60, n/70, n/180, n/216, n/360 inches		
Font styles	Draft, Roman, Sanserif, Courier, Prestige, Script		
Characters	ASCII	96	
	International	16 sets (*)	
	IBM special	111	
	IBM block graphic	50	
	IBM code page	6 sets (**)	
	Download	256	

* USA, France, Gemany, England, Denmark I, Sweden, Italy, Spain I, Japan, Norway, Denmark II, Spain II, Latin America, Korea, Ireland, Legal
** #437 (USA), #850 (Multi-Lingual), #860 (Portuguese), #861 (Icelandic), #863 (Canadian French), #865 (Nordic)

Number of columns		
Pica (10 CPI)	136	
Elite (12 CPI)	163	
Semi-condensed (15 CPI)	204	
Condensed pica (17 CPI)	233	
Condensed elite (20 CPI)	272	
Proportional	Variable	
Character matrix	Draft	LQ
Pica	24 × 9	24 × 31
Elite	24 × 9	24 × 27
Semi-condensed	16 × 7	16 × 21
Condensed pica	24 × 9	24 × 16
Condensed elite	24 × 9	24 × 16
Proportional	—	24 × n
Bit image dot-matrix		
8-pin normal (60 DPI)	8 × 816	
8-pin double (120 DPI)	8 × 1632	
8-pin high-speed double (120 DPI)*	8 × 1632	
8-pin quadruple (240 DPI)*	8 × 3264	
8-pin CRT I (80 DPI)	8 × 1088	
8-pin CRT II (90 DPI)	8 × 1224	
24-pin normal (60 DPI)	24 × 816	
24-pin double (120 DPI)	24 × 1632	
24-pin CRT III (90 DPI)	24 × 1224	
24-pin Triple (180 DPI)	24 × 2448	
24-pin Hex (360 DPI)*	24 × 4896	

* It is impossible to print adjacent dots in a mode marked with an asterisk (*).

GENERAL SPECIFICATIONS

Paper specifications	
Cut sheet	
Width	7.17" - 16.54" (182.0 - 420. 0 mm)
Length	5.5" - 14.0" (139.7 - 355.6 mm)
Thickness	0.08 - 0.12 mm
Weight	60 - 90 g/m^2, 52 - 77 kg, 16 - 24 lb
Fanfold (continuous)	
Width	4.0" - 16.0" (101.6 - 406.4 mm)
Length	Minimum 5.5" (139.7 mm)
Thickness	Single-ply paper 0.07 - 0.11 mm Total for multi-part forms 0.25 mm
Weight	52 - 82 g/m^2, 45 - 70 kg, 14 - 22 lb
Copies	Original +2 copies
Maximum buffer size	Without Download 40.0 kB With Download 256 Bytes
Emulations	
Standard mode	Epson LQ-1060, NEC 24-wire Graphics commands
IBM mode	IBM Proprinter XL24E
Interface	Centronics parallel (standard) RS-232C serial (option)
Ribbon type	On-carriage, dedicated Monochrome (Black only)
Ribbon life	
Monochrome (Z24HD)	3 million characters (draft pica)
Long life monochrome (LZ24HD)	4 million characters (draft pica)
Dimensions and Weight	
Width	590 mm (23.2")
Depth	332 mm (13.1")
Height	127 mm (5.0")
Weight	7.65 kg (16.9 lb)
Power supply	120VAC, 220VAC, 230VAC, 240VAC, 50/60 Hz (varies according to the country of purchase)
Options	Automatic Sheet Feeder (SF-15DJ) Pull Tractor Unit (PT-15XJ) Serial-Parallel Converter (SPC-8K)

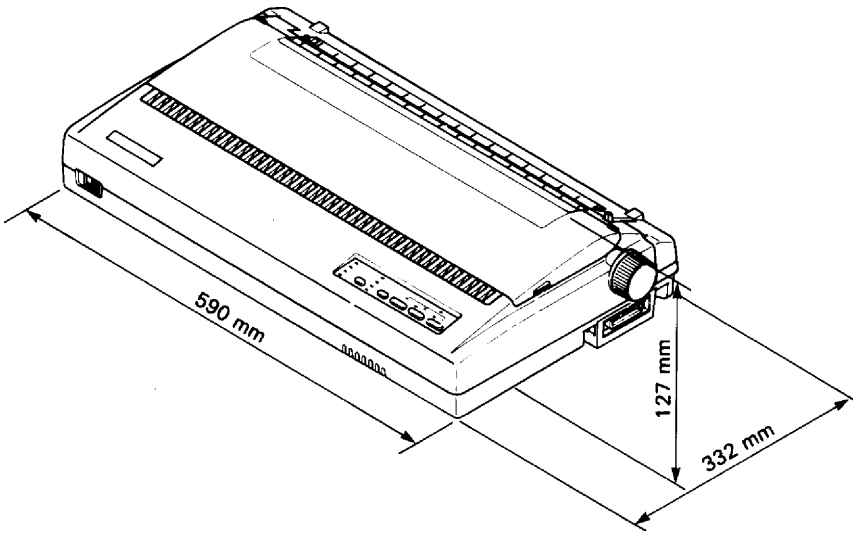


Fig. 1-1 External dimensions

2. External Appearance and Composition

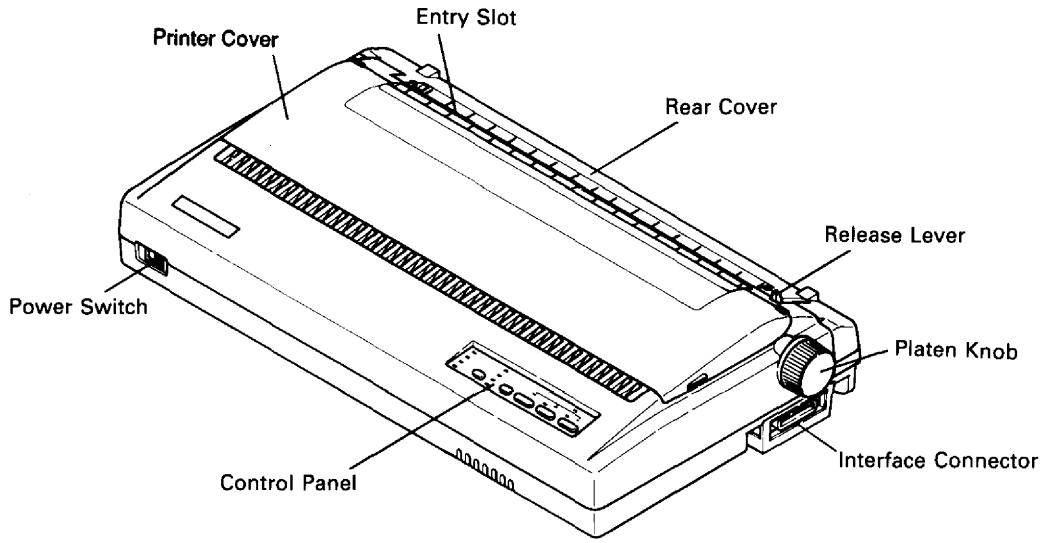


Fig. 1-2 Front View of the Printer

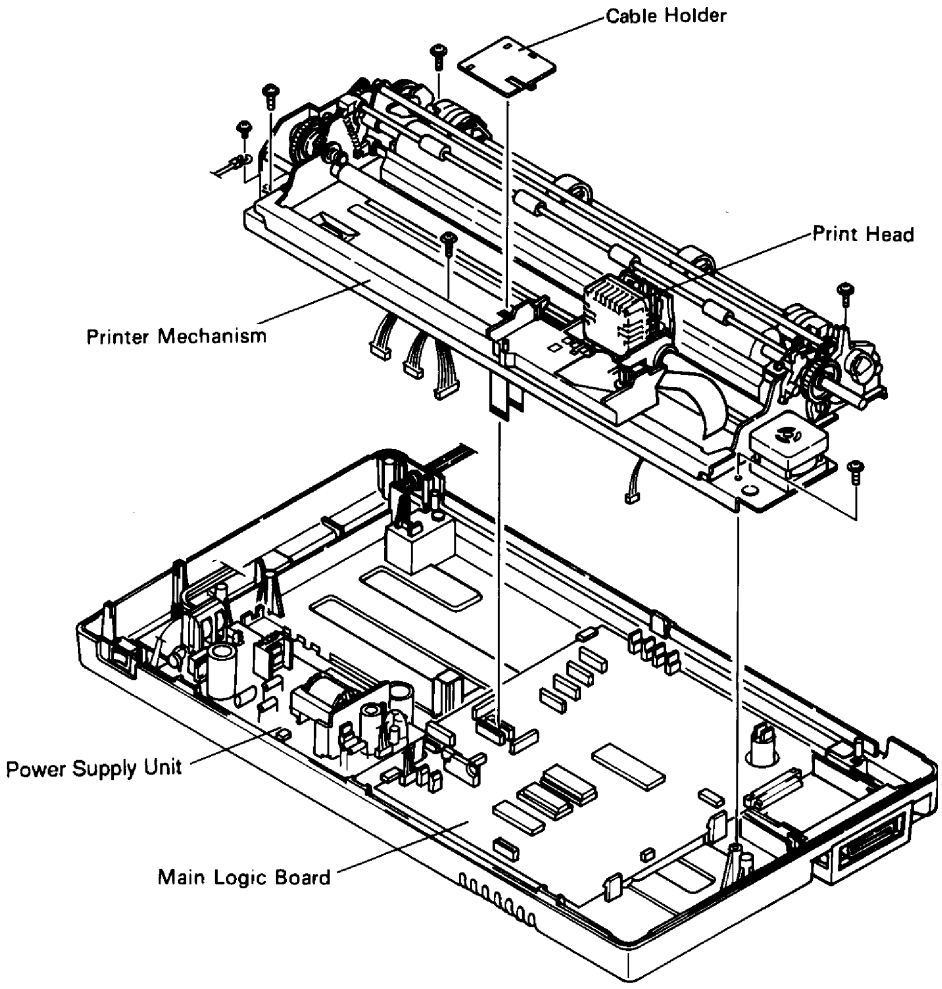


Fig. 1-3 Diagram of Internal Composition

3. Control Panel

3-1 Switch Combination Function

1) At power on

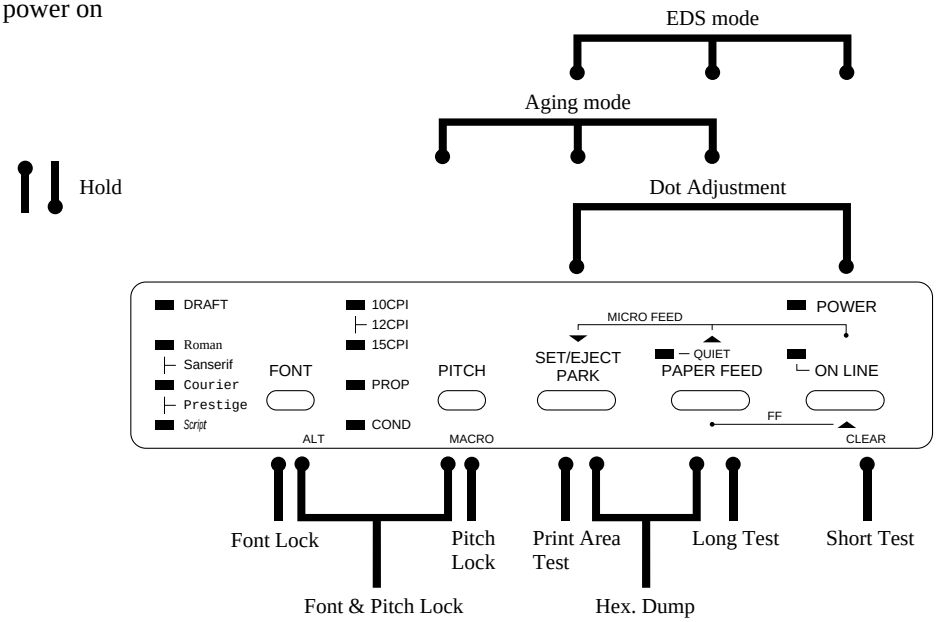


Fig. 1-4 Switch Combination Functions at Power-on

2) At off line

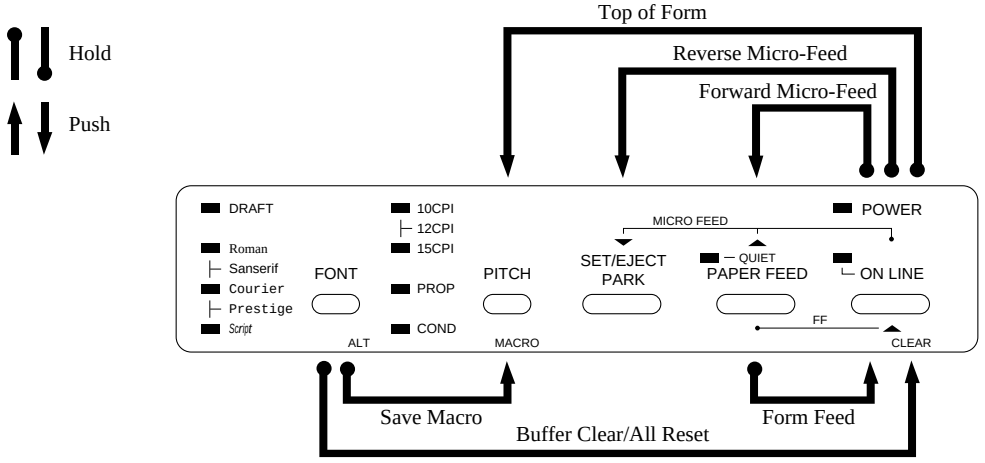


Fig. 1-5 Switch Combination Function at Off-line

3-2. Error Messages of LED

LED Indication	Buzzer Sound	Meaning
“DRAFT” lamp blink	2 seconds, 1 time	Abnormal temperature error of printer head
“ROMAN” lamp blink	2 seconds, 1 time	Carriage motor error at power on (including home position error)
“SCRIPT” lamp light	0.1 second, 1 time	Software interrupt error (CPU error)
“10 CPI” lamp blink	2 seconds, 1 time	EE-PROM and RAM check error
“PROP” lamp light	0.1 second, 1 time	Watch dog timer error (CPU error)
“COND” lamp blink	2 seconds, 1 time	Bail-lever error

3-3. EDS Mode Settings

The EDS mode in this printer has 16 functions that you can set as the power-on default settings.

Turn the printer on while simultaneously holding down the (SET/EJECT), (PAPER FEED), and (ON LINE) buttons. You will hear an acknowledging beep as power comes on. This indicates that you have entered the EDS mode.

In EDS mode, the buttons on the control panel are used as shown below in Figure 1-6.

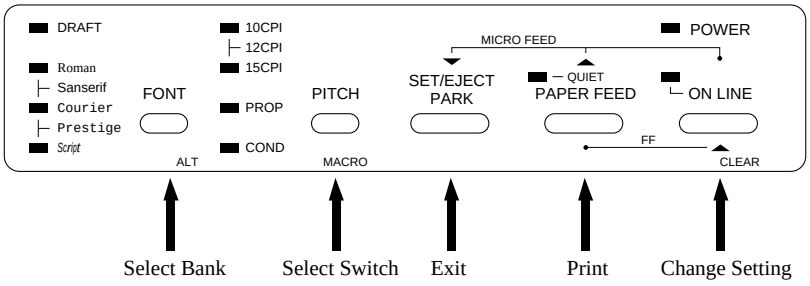


Fig. 1-6 Button Functions in the EDS Mode.

Bank-Switch	Function	ON	OFF
A-1	Emulation	Standard/Epson	IBM
A-2	AEC Mode	Enabled	Disabled
A-3	RAM Usage	Input Buffer	Download buffer
A-4	Automatic Sheet Feeder	Not installed	Installed
A-5	Auto LF with CR	Disabled	Enabled
B-1	Graphics Direction	Bi-directional	Uni-directional
B-2	Paper-out	Enabled	Disabled
B-3	Printable Area	Type A	Type B
B-4	Strobe timing	Normal	Reverse
B-5	CR Centering	Disabled	Enabled
C-1	Page Length	(See next page)	
C-2			
C-3			
C-4	Print Pitch	(See next page)	
C-5			
D-1	Print Mode	Letter Quality	Draft
D-2	Character Table Standard mode IBM mode	 Graphics IBM #2	 Italics IBM #1
D-3	Code page or	(See next page)	
D-4	International		
D-5	Character Set		
E-1	LQ Font Selection	(See next page)	
E-2			
E-3			
E-4	(Reserved)	Leave ON	
E-5	(Reserved)	Leave ON	

NOTE: The default is **ON** for all functions at purchase except B-1 and B-3 which are set to the **OFF** position.

Page Length	C-1	C-2	C-3
11 inches/Letter	ON	ON	ON
8 inches	OFF	ON	ON
11.7 inches/A4	ON	OFF	ON
12 inches	OFF	OFF	ON
8.5 inches	ON	ON	OFF
14 inches/Legal	OFF	ON	OFF
10.5 inches/Executive	ON	OFF	OFF
7.25 inches	OFF	OFF	OFF

Print Pitch	C-4	C-5
10 CPI	ON	ON
12 CPI	ON	OFF
15 CPI	OFF	ON
17 CPI	OFF	OFF

When the EDS switch D-2 is set ON.

Code Page	D-3	D-4	D-5
#437 U.S.A.	ON	ON	ON
#850 Multi-lingual	OFF	ON	ON
#860 Portuguese	ON	OFF	ON
#861 Icelandic	OFF	OFF	ON
#863 Canadian French	ON	ON	OFF
#865 Nordic	OFF	ON	OFF

When the EDS switch D-2 is set OFF.

Country	D-3	D-4	D-5
U.S.A.	ON	ON	ON
France	OFF	ON	ON
Germany	ON	OFF	ON
England	OFF	OFF	ON
Denmark I	ON	ON	OFF
Sweden	OFF	ON	OFF
Italy	ON	OFF	OFF
Spain I	OFF	OFF	OFF

Font Name	E-1	E-2	E-3
Roman	ON	ON	ON
Sanserif	OFF	ON	ON
Courier	ON	OFF	ON
Prestige	OFF	OFF	ON
Script	ON	ON	OFF

4. Parallel Interface

4-1. General Specifications

Item	Specifications
Synchronization System	Via externally supplied $\overline{\text{STROBE}}$ pulses
I/F Protocol	By $\overline{\text{ACK}}$ and BUSY signals
Logic Level	Compatible with TTL level

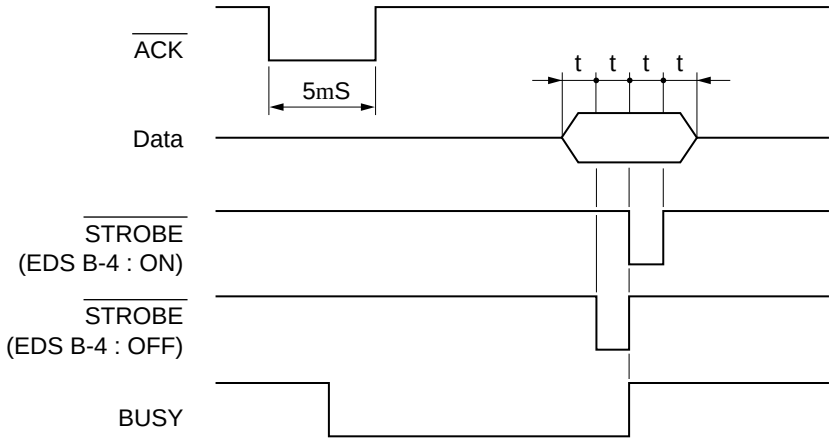


Fig. 1-7 Timing Charts of Parallel Interface

4-2. Connector Signals

Pin No	Signal Name	Function Description
1	$\overline{\text{STROBE}}$	Goes from high to low (for ≥ 0.5 μs) when active
2	DATA0	High when active
3	DATA1	High when active
4	DATA2	High when active
5	DATA3	High when active
6	DATA4	High when active
7	DATA5	High when active
8	DATA6	High when active
9	DATA7	High when active
10	$\overline{\text{ACK}}$	5μs low pulse acknowledges receipt of data
11	BUSY	Low when printer ready to receive data.
12	PAPER	High when paper out. Can be disabled with EDS setting.
13	SELECT	High when printer is on-line
14,15	NC	
16	SIGNAL GND	Signal ground
17	CHASSIS GND	Chassis ground (isolated from signal ground)
18	+5V	+5V DC output from printer
19 ~ 30	GND	Twisted pair ground return
31	$\overline{\text{RESET}}$	When this input signal is low, printer is reset
32	$\overline{\text{ERROR}}$	Outputs low when printer cannot continue, due to an error
33	EXT GND	External ground
34,35	NC	
36	$\overline{\text{SELECT IN}}$	Always high

5. Serial Interface (option)

5-1. General Specifications

Item	Specifications
Interface	RS-232C level
Synchronization System	Asynchronous
Baud rate	150-19,200 bit per second (BPS) [selectable] 150, 300, 600, 1200, 2400, 4800, 9600, 19200BPS
Word length Start bit: Data bit: Parity bit: Stop bit:	 1 bit 7 or 8 bits (selectable) Odd, Even or None (selectable) More then 1 bit length
Signal polarity Mark: Space:	 Logic “1” (–3V to –15V) Logic “0” (+3V to +15V)
Handshaking	DTR XON/XOFF ETX/ACK
Data buffer	8KB (standard)

5-2. Connector Signal and Functional Descriptions

Pin No.	Signal name	Direction	Function
1	GND	—	Printer’s chassis ground.
2	TXD	OUT	This pin carries data from the printer.
3	RXD	IN	This pin carries data to the printer.
4	RTS	OUT	Always space.
5	CTS	—	This pin is Space when the computer is ready to send data. This printer does not check this pin.
6	NC		Unused.
7	GND	—	Signal ground.
8 ~ 10	NC		Unused.
11	RCH	OUT	This printer turns this pin Space when it is ready to receive data. This line carries the same signal as pin 20.
12	NC		Unused.
13	GND	—	Signal ground.
14 ~ 19	NC		Unused.
20	DTR	OUT	The printer turns this pin Space when it is ready to receive data.
21 ~ 25	NC		Unused.

5-3. DIP Switch Settings

Switch	ON	OFF
1	8 data bits	7 data bits
2	No parity	Parity checked
3	Handshaking protocols - see table below	
4		
5	Odd parity	Even parity
6	Data transfer rate - see table below	
7		
8		

All switches are set ON when the printer leaves the factory.

Protocol	Switch 3	Switch 4
DTR mode	ON	ON
X_{ON}/X_{OFF} mode	ON	OFF
ETX/ACK mode	OFF	ON

Baud rate	Switch 6	Switch 7	Switch 8
150	OFF	OFF	OFF
300	OFF	OFF	ON
600	OFF	ON	OFF
1200	OFF	ON	ON
2400	ON	OFF	OFF
4800	ON	OFF	ON
9600	ON	ON	OFF
19200	ON	ON	ON

6. EE-PROM mode

6-1. Outline

These settings can be changed in the EE-PROM mode by writing data directly to the EE-PROM on the main logic board:

- EDS (electric DIP switch) settings
- Misalignment correction
- Top margin in autoloading
- Correction of the tear-off function
- The EE-PROM mode for writing to the EE-PROM is designed for use by trained technicians, not for general users.
- This mode is subject to change without notice.

Setting EE-PROM mode

- Send <ESC><SUB>(09)H command.

Canceling EE-PROM mode

- Initialize the printer by sending <ESC>@

6-2. Explanation of Special Control Codes

<ESC>@ Exits printer from EE-PROM mode and initializes the printer.

<ESC>M@ Returns all data in the EE-PROM to the factory settings. After the buffer is cleared, the buzzer sounds. If the printer is powered off before the buzzer sounds, all data in the buffer is not cleared. If all data is not cleared from the buffer, operation is not guaranteed. Be sure to allow the buzzer to sound before you turn the printer off!

Code	Function	Address	Capacity
<ESC>MW0<data>	Stores data into entire area of EE-PROM.	00H-7FH	128bytes
<ESC>MW1nm	Stores data (m) into the address (n)	nH	1byte
<ESC>MW2<data>	Stores auto-start software data into EE-PROM.		

<ESC>MWn

- The data (m) used in the commands above are stored in the specified address in order (n).
- When the data to be stored exceeds the specified caracity, subsequent data are ignored.
- Data are stored in the EE-PROM according to the memory map. (See section 6-3.)
- After all data are stored, a beep indicates the completion of storage.
- If the printer is powered off during data storage, data stored before power off are valid, but subsequent operation of the printer is not guaranteed.

Do not power off the printer while data is being stored!

<ESC>MR Dumps all data in the EE-PROM to a hard copy.

For an example of using these control codes, see section 6-4. For the corresponding EE-PROM addresses, see the EE-PROM memory map in section 6-3.

6-3. EE-PROM Map

<table>
<tr><th>Address</th><th>Function</th><th>Factory data</th></tr>
<tr><td>00H</td><td>EDS setting
<table>
<tr><th>Bit</th><th>Function</th><th>1</th><th>0</th></tr>
<tr><td>b0</td><td>Emulation</td><td>STANDARD/EPSON</td><td>IBM</td></tr>
<tr><td>b1</td><td>AEC mode</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>b2</td><td>RAM usage</td><td>Input butter</td><td>Download buffer</td></tr>
<tr><td>b3</td><td>Auto Sheet Feeder</td><td>Not installed</td><td>Installed</td></tr>
<tr><td>b4</td><td>Auto LF with CR</td><td>Disabled</td><td>Enabled</td></tr>
</table></td><td>FFH</td></tr>
<tr><td>01H</td><td>EDS setting
<table>
<tr><th>Bit</th><th>Function</th><th>1</th><th>0</th></tr>
<tr><td>b0</td><td>Graphics direction</td><td>Bi-directional</td><td>Uni-directional</td></tr>
<tr><td>b1</td><td>Paper-out</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>b2</td><td>Printable area</td><td>Type A</td><td>Type B</td></tr>
<tr><td>b3</td><td>Strobe timing</td><td>Normal</td><td>Reverse</td></tr>
<tr><td>b4</td><td>CR Centering</td><td>Disable</td><td>Enable</td></tr>
</table></td><td>FAH</td></tr>
<tr><td>02H</td><td>EDS setting
<table>
<tr><th>b0</th><th>b1</th><th>b2</th><th>Page length</th></tr>
<tr><td>1</td><td>1</td><td>1</td><td>11"/Letter</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>8.5"/Letter</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>8"</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>14"/Legal</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>11.7"/A4</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>10.5"/Executive</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>12"</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>7.25"/Executive</td></tr>
</table>
<table>
<tr><th>b3</th><th>b4</th><th>Print pitch</th></tr>
<tr><td>1</td><td>1</td><td>10CPI</td></tr>
<tr><td>1</td><td>0</td><td>12CPI</td></tr>
<tr><td>0</td><td>1</td><td>15CPI</td></tr>
<tr><td>0</td><td>0</td><td>17CPI</td></tr>
</table></td><td>FFH</td></tr>
<tr><td>03H</td><td>EDS setting
<table>
<tr><th>Bit</th><th>Function</th><th>1</th><th>0</th></tr>
<tr><td>b0</td><td>Print mode</td><td>LQ</td><td>Draft</td></tr>
</table>
b1 bit Character table
1: Graphics (Standard mode)
Set #2 (IBM mode)
0: Italics (Standard mode)
Set #1 (IBM mode)</td><td>FFH</td></tr>
</table>

<table>
<tr><th>Address</th><th>Function</th><th>Factory data</th></tr>
<tr><td>03H</td><td>In the italic character set
<table>
<tr><th>b2</th><th>b3</th><th>b4</th><th>Country</th></tr>
<tr><td>1</td><td>1</td><td>1</td><td>U.S.A.</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>France</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>Germany</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>England</td></tr>
</table>
<table>
<tr><th>b2</th><th>b3</th><th>b4</th><th>Country</th></tr>
<tr><td>1</td><td>1</td><td>0</td><td>Denmark-1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>Sweden</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>Italy</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>Spain-1</td></tr>
</table>
Except in the italic character set
<table>
<tr><th>b2</th><th>b3</th><th>b4</th><th>IBM code page</th></tr>
<tr><td>1</td><td>1</td><td>1</td><td>#437</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>#850</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>#860</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>#861</td></tr>
</table>
<table>
<tr><th>b2</th><th>b3</th><th>b4</th><th>IBM code page</th></tr>
<tr><td>1</td><td>1</td><td>0</td><td>#863</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>#865</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>(Option-1)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>(Option-2)</td></tr>
</table></td><td>FFH</td></tr>
<tr><td>04H</td><td>EDS setting LQ font selection
<table>
<tr><th>b0</th><th>b1</th><th>b2</th><th>b3</th><th>b4</th><th>Front</th></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Roman</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Sanserif</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>Courier</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>Prestige</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>Script</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>(Reserved)</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>(Reserved)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>(Reserved)</td></tr>
</table></td><td>FFH</td></tr>
<tr><td>05H</td><td>Misalignment correction (1/720" pitch) 60DPI (Full dot)</td><td>08H</td></tr>
<tr><td>06H</td><td>Misalignment correction (1/720" pitch) 80DPI (Full dot)</td><td>08H</td></tr>
<tr><td>07H</td><td>Misalignment correction (1/720" pitch) 120DPI (Half dot)</td><td>08H</td></tr>
<tr><td>08H</td><td>Misalignment correction (1/720" pitch) 120DPI (Full dot)</td><td>08H</td></tr>
<tr><td>09H</td><td>Misalignment correction (1/720" pitch) 180DPI (Half dot)</td><td>08H</td></tr>
<tr><td>0AH</td><td>Misalignment correction (1/720" pitch) 180DPI (Full dot)</td><td>08H</td></tr>
<tr><td>0BH</td><td>Misalignment correction (1/720" pitch) 240DPI (Half dot)</td><td>08H</td></tr>
<tr><td>0CH</td><td>Misalignment correction (1/720" pitch) 360DPI (Half dot)</td><td>08H</td></tr>
<tr><td>0DH</td><td>Misalignment correction (1/720" pitch) 60DPI (Full dot) First dot mode</td><td>08H</td></tr>
<tr><td>0EH</td><td>Misalignment correction (1/720" pitch) 80DPI (Full dot) First dot mode</td><td>08H</td></tr>
<tr><td>0FH</td><td>Misalignment correction (1/720" pitch) 120DPI (Half dot) First dot mode</td><td>08H</td></tr>
<tr><td>10H</td><td>Misalignment correction (1/720" pitch) 120DPI (Full dot) First dot mode</td><td>08H</td></tr>
<tr><td>11H</td><td>Misalignment correction (1/720" pitch) 180DPI (Half dot) First dot mode</td><td>08H</td></tr>
<tr><td>12H</td><td>Misalignment correction (1/720" pitch) 180DPI (Full dot) First dot mode</td><td>08H</td></tr>
<tr><td>13H</td><td>Misalignment correction (1/720" pitch) 240DPI (Half dot) First dot mode</td><td>08H</td></tr>
<tr><td>14H</td><td>Misalignment correction (1/720" pitch) 360DPI (Half dot) First dot mode</td><td>08H</td></tr>
<tr><td>15H,
16H,
17H</td><td>Set macro area : Standard mode</td><td>00H, 00H, 00H</td></tr>
</table>

Address	Function	Factory data
18H 19H	Top margin in auto-loading : Standard mode : Tractor (Paper feed at a pitch of 1/360 of an inch)	00H 00H
1AH 1BH	Top margin in auto-loading : Standard mode : Function (Paper feed at a pitch of 1/360 of an inch)	00H 00H
1CH 1DH	Top margin in auto-loading : Standard mode : ASF (Paper feed at a pitch of 1/360 of an inch)	00H 00H
1EH 1FH 20H	Set marco area : IBM mode	00H 00H 00H
21H 22H	Top margin in auto-loading : IBM mode : Tractor (Paper feed at a pitch of 1/360 of an inch)	00H 00H
23H 24H	Top margin in auto-loading : IBM mode : Friction (Paper feed at a pitch of 1/360 of an inch)	00H 00H
25H 26H	Top margin in auto-loading : IBM mode : ASF (Paper feed at a pitch of 1/360 of an inch)	00H 00H
27H, 28H	Initial Conditions Area	FFH, FFH
29H, 2AH	Correction of short-tear-off	00H, 80H
2BH to 53H	Auto-start software area : Standard mode (41bytes)	ALL 00H
54H to 7CH	Auto-start software area : IBM mode (41bytes)	ALL 00H
7DH	Not used	00H
7EH	Change FFH code (00H;NUL, others;DEL)	00H
7FH	Check code	10H

- Details of Misalignment Correction

Address	Function	Data (H)	Factory data
05H to 14H	Bidirectional test/adjustment mode (+/–8 steps)		08H
	Current –5:–8/720 inch correction	00	
	Current –4:–7/720 inch correction	01	
	Current –4:–6/720 inch correction	02	
	Current –3:–5/720 inch correction	03	
	Current –3:–4/720 inch correction	04	
	Current –2:–3/720 inch correction	05	
	Current –2:–2/720 inch correction	06	
	Current –1:–1/720 inch correction	07	
	Current 0:No correction	08	
	Current +1:+1/720 inch correction	09	
	Current +2:+2/720 inch correction	0A	
	Current +2:+3/720 inch correction	0B	
	Current +3:+4/720 inch correction	0C	
	Current +3:+5/720 inch correction	0D	
	Current +4:+6/720 inch correction	0E	
	Current +4:+7/720 inch correction	0F	
	Current +5:+8/720 inch correction	10	

6-4. Rewriting the EE-PROM

Follow this procedure to rewrite the EE-PROM.

(1) Turn the printer on.
(2) Load a BASIC disk in the computer.
(3) Turn the computer on.
(4) Set a sheet of paper in the printer, and press SET/EJECT.
(5) Enter the program listed below and run the program.

```
10  LPRINT CHR$ (27) ; CHR$ (26) ; CHR$ (&H09)
20  LPRINT CHR$ (27) ; “MW1” ; CHR$ (&H03) ; CHR$ (&HFE)
30  LPRINT CHR$ (27) ; “MR”
```

BASIC Program Code	What It Does
10 LPRINT CHR$ (27); CHR$ (26);CHR$ (&H09)	Enters the EE-PROM mode.
20 LPRINT CHR$ (27);”MW1";	Start rewriting the EE-PROM.
CHR$ (&H03);	Address data from &H03 will show EDS mode from the EE-PROM memory map.
CHR$ (&HFE)	Data from &HFF to &HFE changes print quality from LQ to Draft.
30 LPRINT CHR$ (27); ”MR”	Dumps all EE-PROM data to hexadecimal.

(6) To complete the setting, turn the printer off.

CHAPTER 2
THEORY OF OPERATION

2

1. Block Diagram

The block diagram of this printer is shown in Fig. 2-1.

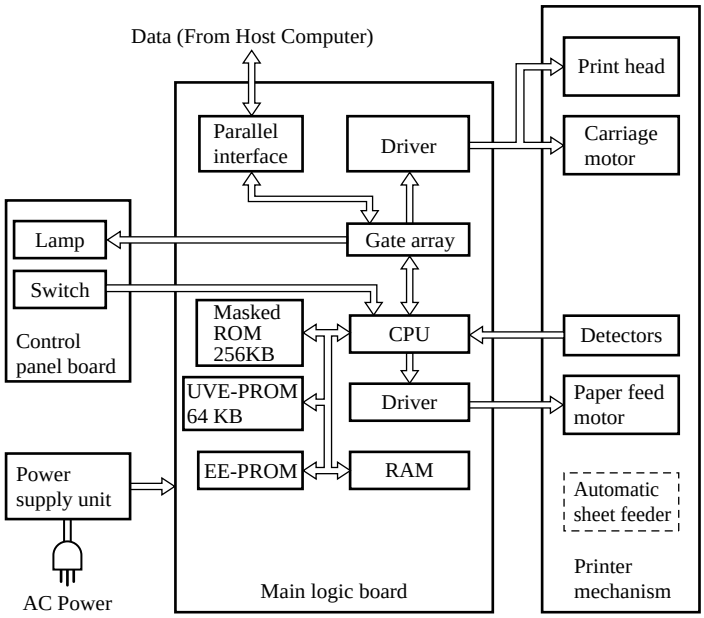


Fig. 2-1 Block Diagram

(1) Main Logic Board

This board receives data from the host computer and stores it in the RAM in the order of arrival. The CPU on this board reads the data from the RAM, and edits it according to the program stored in the ROM.

When the editing is completed, various drive signals from the CPU are sent to the printer mechanism to perform printing.

<Explanation>

1 CPU TMP90C041
- Controls this printer.

2 UVE-PROM 27512 64K bytes
- Contains the program which executes control of the printer.
- For some version of the software, the UVE-PROM is not included.

3 Masked ROM 256K bytes
- Contains the character font and the program.

4 EE-PROM BR93C46 64 × 16 bits
- Contains the data (EDS data and so on) in the memory switch.

5 RAM, 64K bytes
- Used as stack area, work area and data buffer of the CPU.

6 Parallel interface

7 Gate array (custom IC)
- Inputs or outputs several signals.

8 Driver
- The data edited by the CPU and gate array are sent to the printer mechanism after conversion to the signal for the print head drive and motor drives.

(2) Control Panel Board

This panel circuit is for manual operation of the printer respectively.

(3) Printer Mechanism

The printer mechanism consists of a print head, carriage motor, paper feed motor, ribbon feed motor and detectors.

(4) Power Supply Unit

AC power is converted to 33VDC and 5VDC.

2. Main Logic Board

2-1. Data Input Operation

2-1-1. Parallel Interface

Communications between the host computer and this printer are facilitated via parallel connectors. This section explains the handshake of this interface.

The data input circuit of this interface is shown in Fig. 2-2.

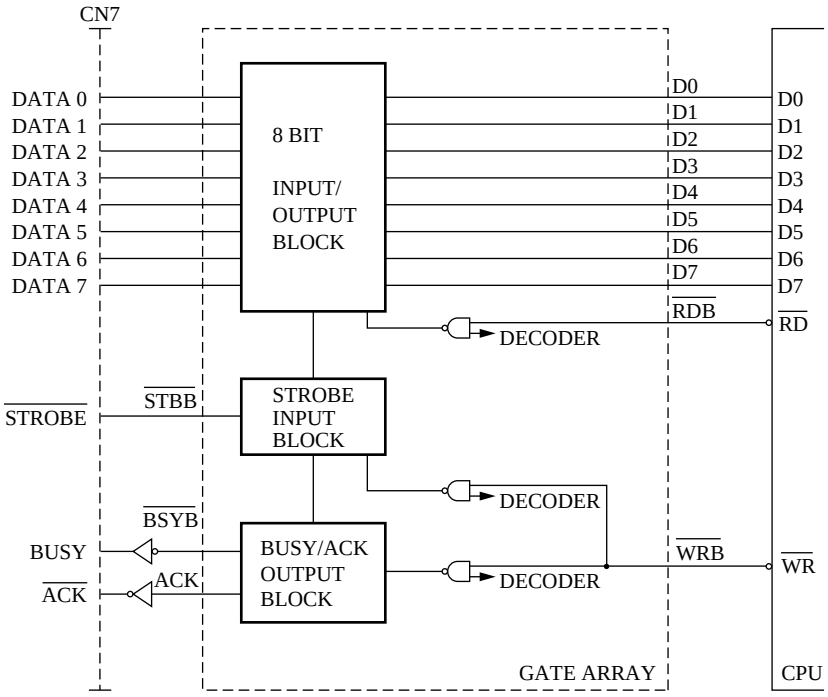


Fig. 2-2 Data Input Circuit with Parallel Interface

The following is an explanation of this handshake.

(1) When the BUSY signal is LOW (Ready), the host computer outputs 8-bit data 0 through 7 to the connector CN7. The host computer carries the $\overline{\text{STROBE}}$ pulse signal to the printer. This signal is normally held HIGH by the host computer. When the host computer has data ready for the printer, it sets this signal to LOW for at least 0.5 μS.

(2) The gate array of the main logic board reads data 0 through 7 at the time of $\overline{\text{STROBE}}$ signal fall, and then turns the $\overline{\text{BSYB}}$ signal to LOW.

(3) When the $\overline{\text{BSYB}}$ signal of the gate array is set to LOW, the BUSY signal of connector CN7 will be turned to HIGH, notifying the host computer that data cannot be accepted.

(4) The CPU is informed via the data line that the $\overline{\text{BSYB}}$ signal is LOW. The CPU then set the $\overline{\text{RD}}$ signal to LOW and read the data.

(5) Upon completion of the data reading, the CPU notifies the host computer of the data receivable state by setting the BUSY signal of connector CN7 and the $\overline{\text{ACK}}$ signal to LOW. This concludes the explanation of the parallel interface handshake. The following chart shows the timing chart of the handshake.

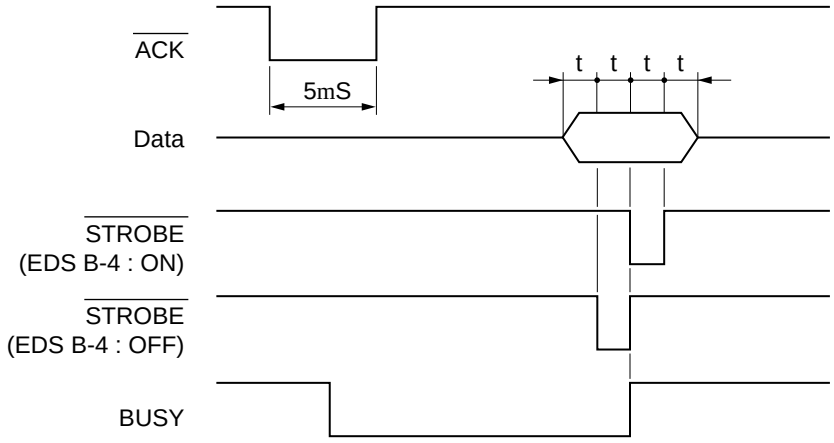


Fig. 2-3 Timing Chart of Parallel Interface

2-1-2. Serial Interface (option)

When the serial interface is used, an optional Serial Interface Board is required to be installed. The board will change the voltage level (RS-232C ↔ TTL) and the data transfer method (Serial ↔ parallel).

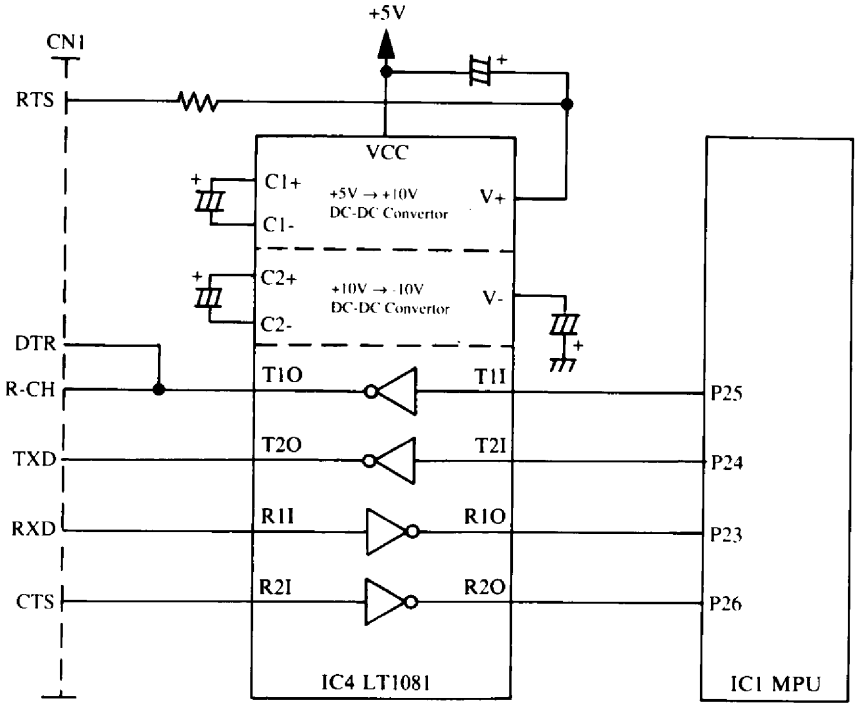


Fig. 2-4 Serial Interface

IC4 is a dual RS-232C driver/receiver which includes a capacitive voltage generator to supply RS-232C voltage levels from a single 5V supply.
Data from the host computer is sent from RXD via IC4 and is input to the MPU. Serial data input to the MPU is converted into parallel data, and output to the main logic board. Conversely, parallel data received by the MPU is converted there into serial data, and output to the TXD terminal via IC4.
The CTS terminal is hardware-connected, not software- connected. (This signal is not checked.)
This printer employs 3 different transfer methods, which can be selected using the dip switches. (Refer to Chapter 1, 5-3 Setting Dip Switches)

(1) DTR method
The DTR signal is considered a BUSY signal at the handshake, and when the data buffer capacity is 256 bytes or less, the DTR signal is given a marked status, meaning it cannot receive data.
When the capacity of the data buffer increases to 512 bytes or more during printing, the DTR signal is given a space status, which indicates that it can receive data.

(2) X_{ON}/X_{OFF} method
When a handshake is carried out with the host computer, the X_{ON}/X_{OFF} method makes use of ASCII codes (DC1) and (DC3). (DC1 and DC3 are called X_{ON} and X_{OFF}, respectively.) When the printer buffer is full, DC3 (ASCII code 19) is output to the TXD terminal, and the computer receives a request to stop data transfer. The printer outputs DC3 until it (the computer) stops data transfer. During printing, when the buffer full status is cancelled and data can be received, DC1 (ASCII code 17) is output to the TXD terminal. When DC1 is output from the printer, the computer follows the data format, and begins data transfer. Data transfer will continue until DC3 is output again.

(3) ETX/ACK method
The data block is configured as shown below, but the initial STX code is not necessary. When an STX code is sent from the host computer, that 1 byte is ignored. When the ETX code is received, that 1 byte is not regarded as data, an ACK or NACK code is sent to the TXD terminal, and the host computer is informed that data reception has been completed.
Data block form:

STX	DATA (8 KB or less)	ETX

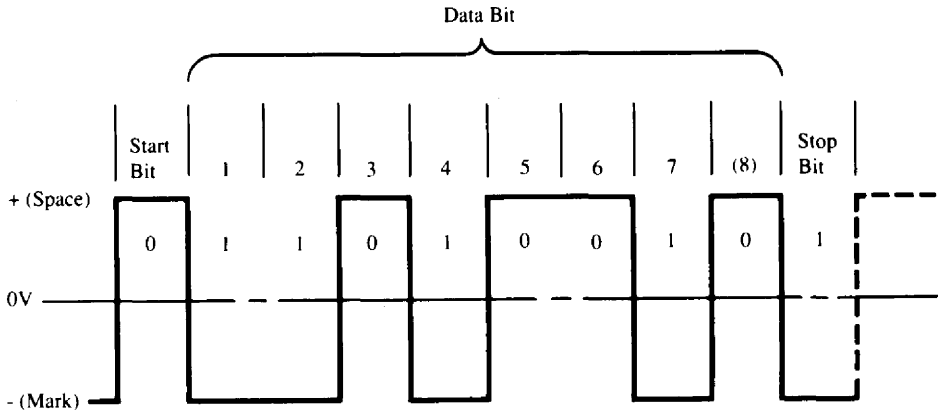
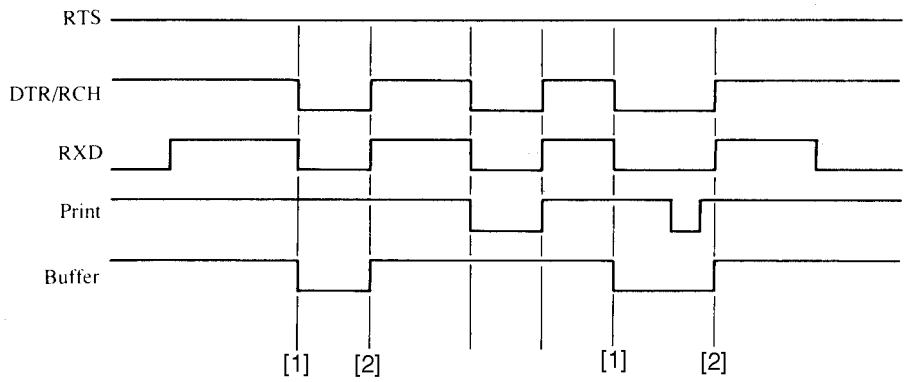


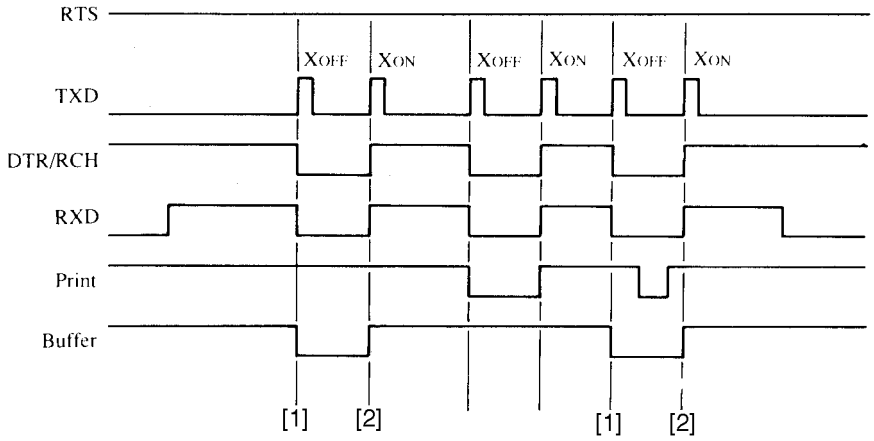
Fig. 2-5 Data Format

(1) DTR method



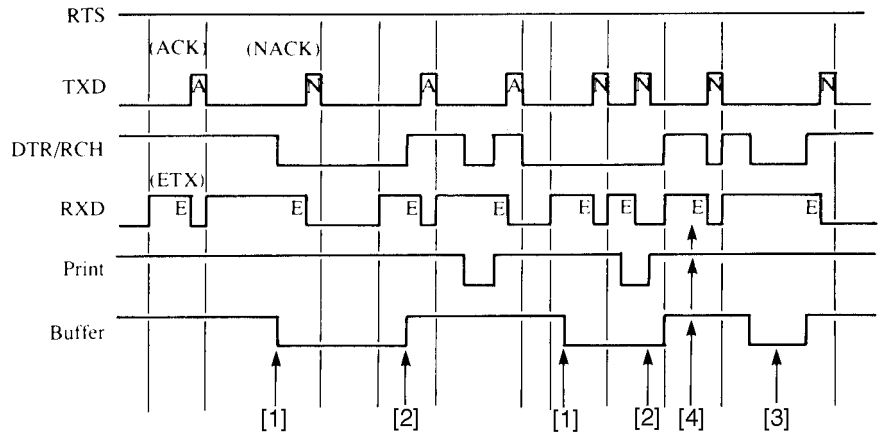
[1]Near Full (when the empty area in the data buffer becomes 256 bytes or less.)
[2]Near Empty (when the empty area in the data buffer becomes 512 bytes or more.)

(2) XON/XOFF method



[1]Near Full (when the empty area in the data buffer becomes 512 bytes or less.)
[2]Near Empty (when the empty area in the data buffer becomes 1024 bytes or more.)

(3) ETX/ACK method



[1]Near Full (when the empty area in the data buffer becomes 256 bytes or less.)
[2]Near Empty (when the empty area in the data buffer becomes 512 bytes or more.)
[3]Empty (when the data buffer becomes empty.)
[4]Parity Error, Framing Error, Buffer Over flow

Fig. 2-6 Data Input Timing Chart with Serial Interface

2-2. General Flow Chart

A general flow chart of editing and printing operations is shown in Fig. 2-7.

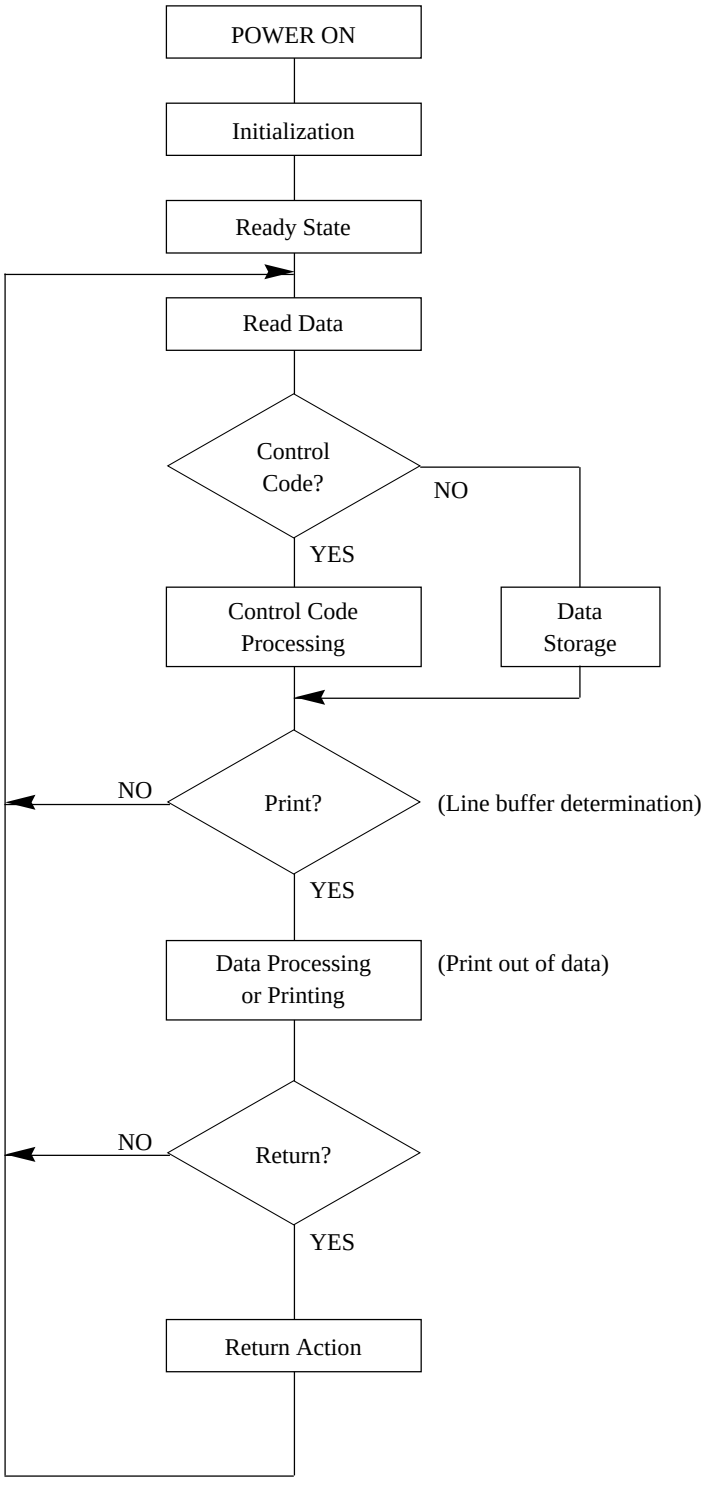


Fig. 2-7 General Flow Chart of Editing and Printing

2-2-1. Editing

Data stored in the RAM is read out sequentially by the CPU and then edited according to a function code that has been specified in advance.
This editing takes places until the CR or CR + LF code appears or the line buffer becomes full.

2-2-2. Print Head Driving Circuit

There are 24 needles on this print head, and each of these has a solenoid. Printing is carried out by turning the solenoids either ON or OFF.
The circuit which drives the head solenoid HD1 is shown below.

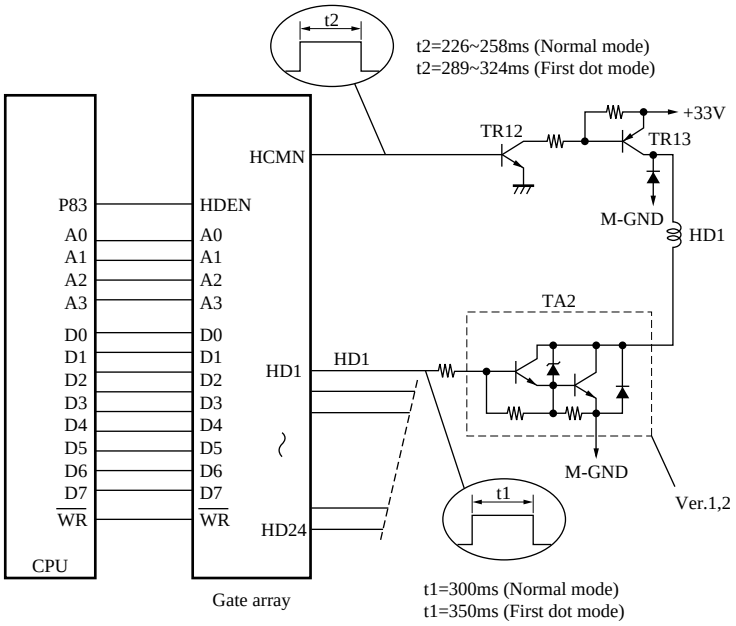


Fig. 2-8 Print Head Driving Circuit

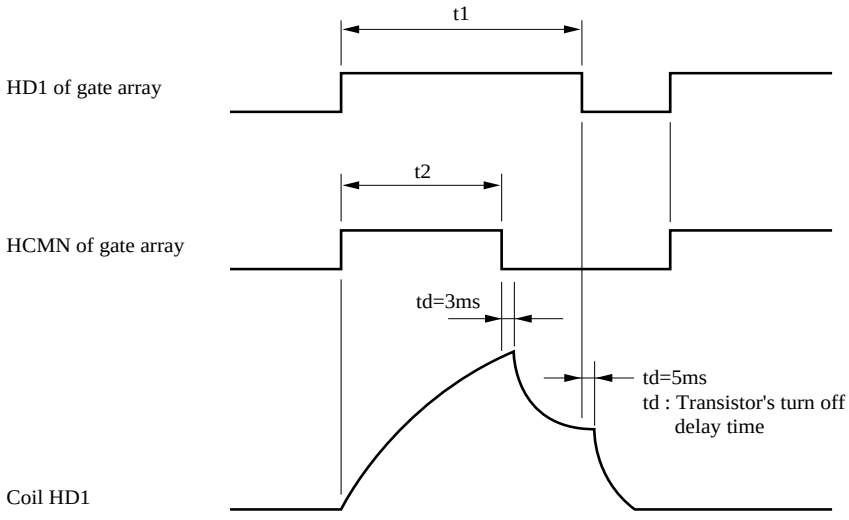


Fig. 2-9 Print Head Power On Timing Chart

- Printing

  [1] With the transistor TR13 of the head common drive and the head drive transistor TA2 set to ON, printing is begun when power reaches the head solenoid HD1.

  [2] Turn OFF TR13, and the energy stored in HD1 will pass TA2.

  [3] Turn OFF TA2, and the energy (60 volts above) stored in HD1 will be pass the zener diode, base and collector in the TA2. And transistor TA2 will turn ON. When the energy stored in HD1 is below 60 volts, TA2 will turn OFF.

  The process described above shows how one dot of printing is carried out. The length of time that the head solenoid HD1 receives power is controlled by the time that the head drive transistor TR13 operates.

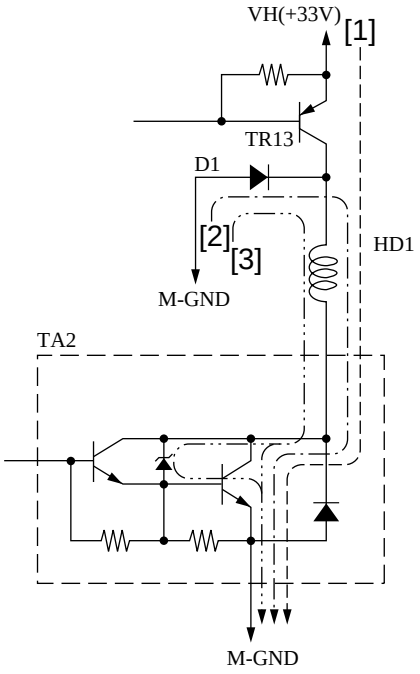


Fig. 2-10 Print Head Power on Timing Chart

- Head Energizing Control Circuit

  The print energy of the print head is greatly influenced by the voltage applied to the solenoids and by the time that the current passes through. The head energizing control circuit holds this energy constant by controlling the head energizing period according to the voltage applied to the print solenoids.

  The figure below shows the head energizing control circuit.

  The applied voltage, VH, is divided between R109 and R110 and input to the CPU's analog input pin P52.

  The CPU compares the voltage input to P52 against the analog reference voltage, VREF, to find the value of VH. Then, it determines the head energizing period according to this voltage.

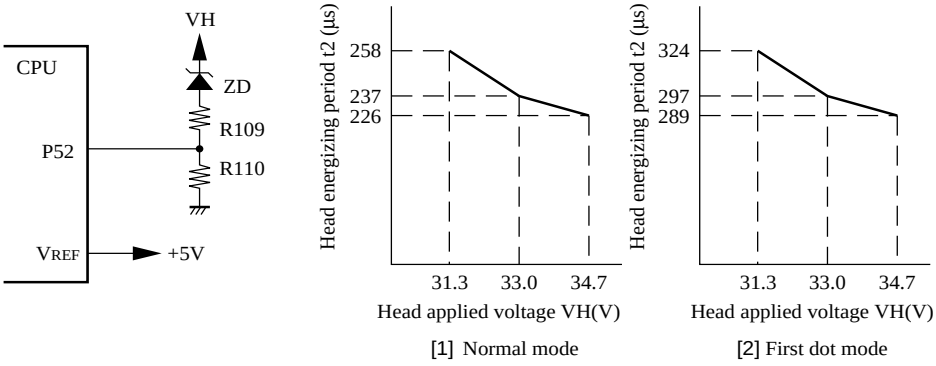


Fig. 2-11 Head Energizing Control Circuit

2-2-3. Print Head Temperature Detection Circuit

The print head temperature detection circuit protects against damage when the print head heats up abnormally. Fig. 2-12 shows this circuit.

The print head has a thermistor to show the temperature of the head solenoids. This thermistor is an element that converts temperature into voltage. Its output voltage is input to an analog pin of the CPU. The CPU compares this input voltage against its reference voltage Vref to find out the temperature of the head solenoids and carries out the following operations depending on the temperature.

[1] T ≤ 130 ˚C (Text), T ≤ 100 ˚C (Graphics)
Bi-directional printing

[2] 130 ˚C < T < 135 ˚C (Text), 100 ˚C < T < 120 ˚C (Graphics)
Unidirectional printing starts. When the temperature falls below, bidirectional printing resumes.

[3] 135˚C ≤ T (Text), 120 ˚C ≤ T (Graphics)
The current line is printed, then printing stops. When the thermistor's temperature falls below, uni-directional printing resumes.

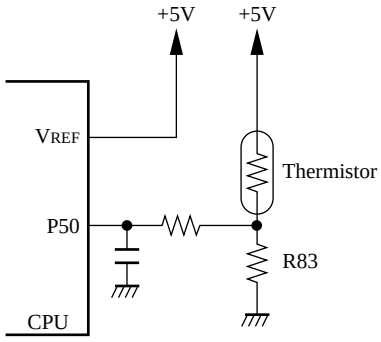


Fig. 2-12 Print Head Temperature Detection Circuit

2-2-4. Carriage Motor Driving Circuit

This printer employs a stepping motor as the carriage motor. Unlike regular motors on the market, this stepping motor will not operate just by connecting it to a power source. The motor operates only when a drive pulse is fed to it, but even then, it turns only a certain angle. This stepping motor is characterized by 4-phase stepping. Control of the motor is facilitated by phase 1-2 excitation. The following shows the carriage motor drive circuit and the control signal generated by the phase 1-2 excitation method.

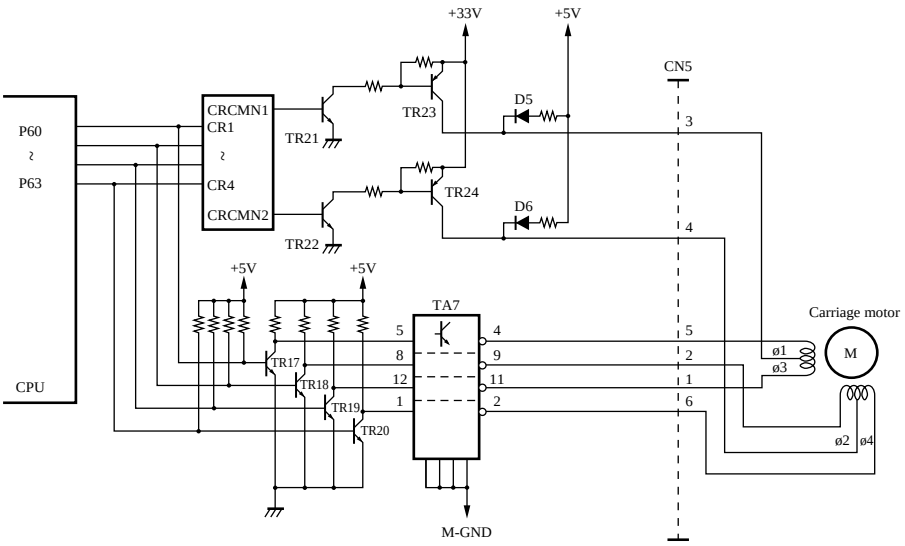


Fig. 2-13 Carriage Motor Driving Circuit

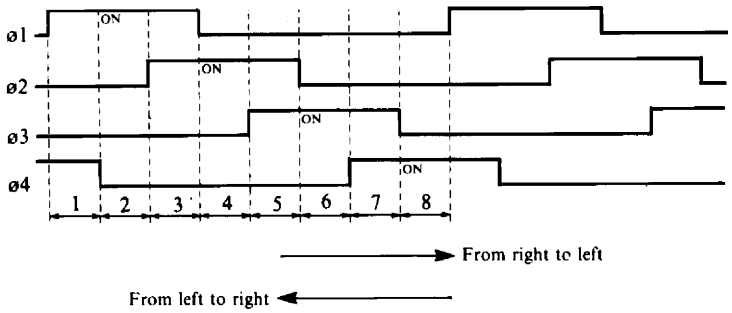


Fig. 2-14 Carriage Motor Driving Signals

The utilization of voltage applied to the carriage motor is described below:

Voltage applied to the carriage motor is changed by setting the port CRCMN1 and the port CRCMN2 of the gate array to HIGH or LOW and by turning transistor array TR23 (TR24) ON or OFF.

When TR23 (TR24) is ON, +33V is supplied to the carriage motor and when TR23 (TR24) is OFF, +5V is supplied to the motor via diode D5, D6.

Mode	Voltage	Application
Operation	+33V	Motor Drive
Standby	+5V	Holding Bias

2-2-5. Carriage Motor Speed Control

Since the carriage motor is a stepping motor, the carriage can be stopped at a desired position by controlling acceleration and deceleration. The carriage can also move backward.

The rotational speed of the carriage motor is set by the number of pulses per time unit. The character pitch (horizontal character size) in each print mode is determined by changing this rotational speed (or carriage transfer speed).

(1) At start-up of the motor:
The number of pulses input to the motor increase in steps, reaching a certain frequency.

(2) To stop the motor:
The number of pulses input to the motor decreases in steps, in order to gradually bring the motor to a halt.

(3) When printing is carried out:
Pulses of a uniform pulse width are supplied for printing.

2-2-6. Paper Feed Motor Driving Circuit

Again, a stepping motor is employed as the paper feed motor, which turns a certain angle only when a drive pulse is received. This 4-phase stepping motor is controlled by the phase 1-2 excitation method. The following is the description of the paper feed motor drive circuit and the control signal generated by the phase 1-2 excitation method.

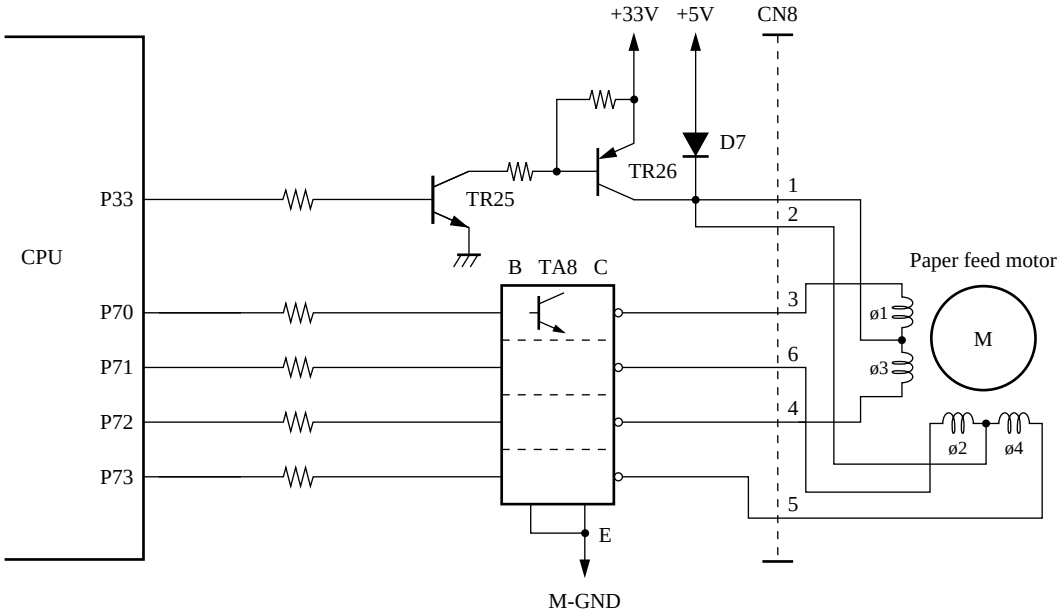


Fig. 2-15 Paper Feed Motor Driving Circuit

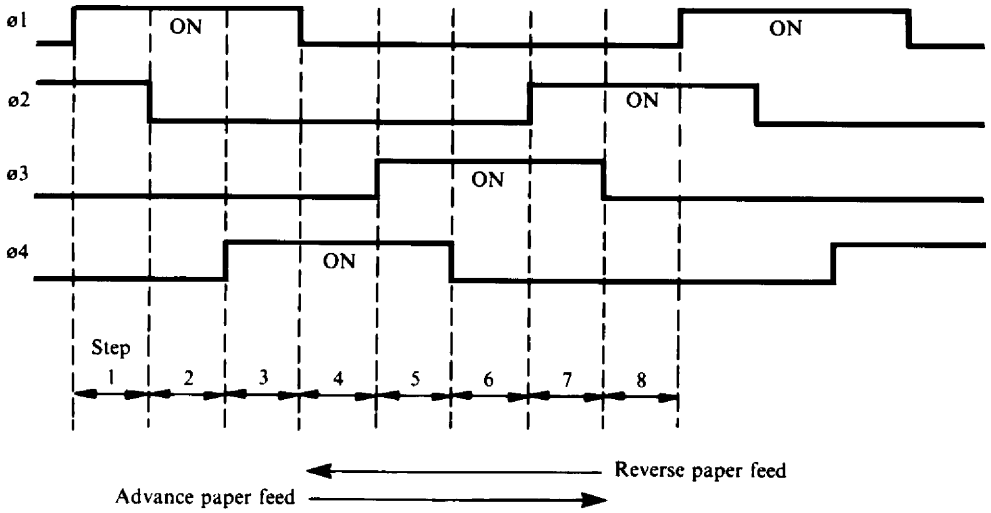


Fig. 2-16 Paper Feed Motor Driving Signals

The utilization of voltage applied to the paper feed motor is described as follows.

Mode	Voltage	Application
Operation	+33V	Motor Drive
Standby:	+5V	Holding Bias

Voltage to the paper feed motor is changed by setting CPU data P33 to HIGH or LOW and by turning transistor TR25 and transistor TR26 ON or OFF.
When TR26 is turned on, +33V is applied to the paper feed motor.
When TR26 is turned off, +5V is supplied to the motor via diode D7.

2-3. Reset Circuit

The RESET signal initializes the circuit elements and prevents operation errors when the power is turned on. The RESET signal is output for approx. 34ms. when the power is turned on, or while the $\overline{\text{RESET}}$ ($\overline{\text{INPUT-PRIME}}$) signal is being output from the host computer.

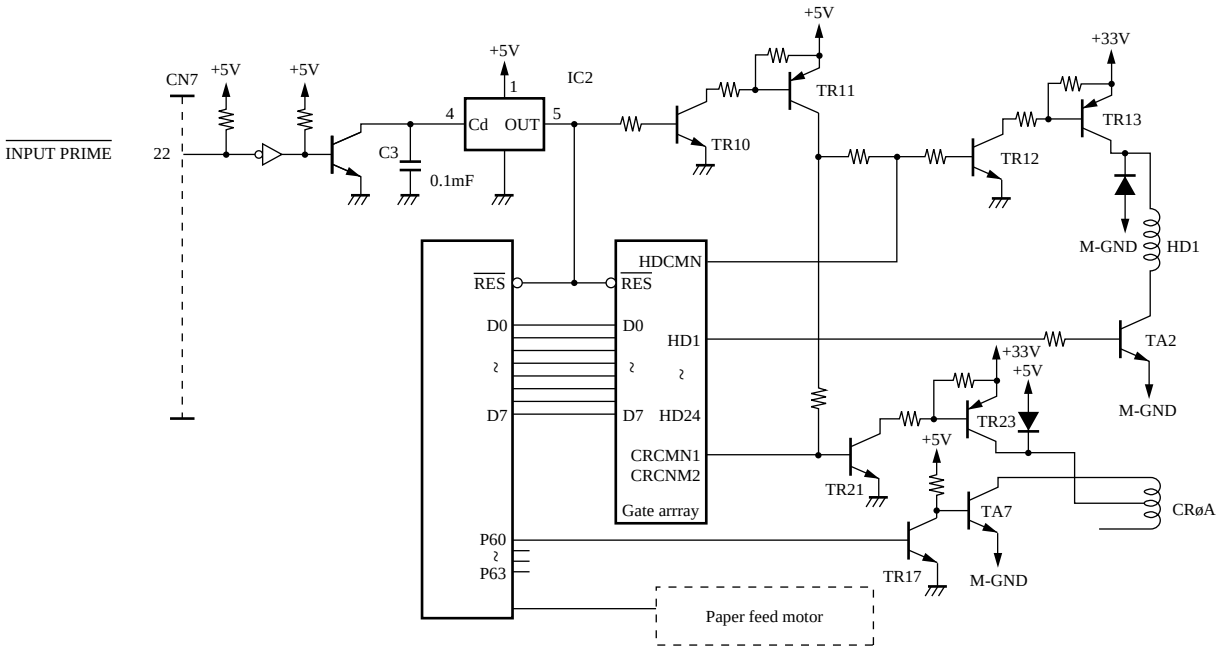


Fig. 2-17 Reset Circuit and Protection Circuit.

• Power On Reset

1 When the power is turned on, the RESET signal output from Pin 5 of IC2 (M51953BL) for approx. 34 msec. This time length is determined by external capacitor C3 (0.1μF), and it can be calculated by the following formula.

$T = 0.34 \times C10\ (pF)\ \mu sec.$

2 This LOW signal triggers RESET command to the CPU and the RESET terminal ($\overline{\text{RES}}$) of the gate array.

3 Resetting the CPU and the gate array will ignore all the drive signals for the carriage motor, the paper feed motor and the print head, preventing operation errors at power ON.

• Reset by Input Prime Signal from Host Computer

1 The input prime signal from the host computer is output to pin 22 of the connector CN7.

2 This signal inputs a low signal to the Cd pin of IC2. This in turn sets IC2's output pin low, triggering the same power on reset as described above.

2-4. Reset by +5V Line Voltage Detection

A voltage-detecting IC (IC2 in Fig.2-17) detects momentary drops in voltage or unstable voltage supply (due to power failures, etc.) on the +5V line. If the voltage on the +5V line falls below 4.25V, the RESET signal appears at the output terminal of the voltage-detecting IC.

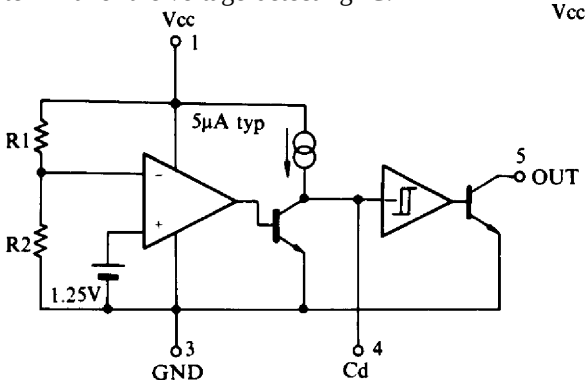


Fig. 2-18 Equivalent Circuit of Voltage-Detecting IC

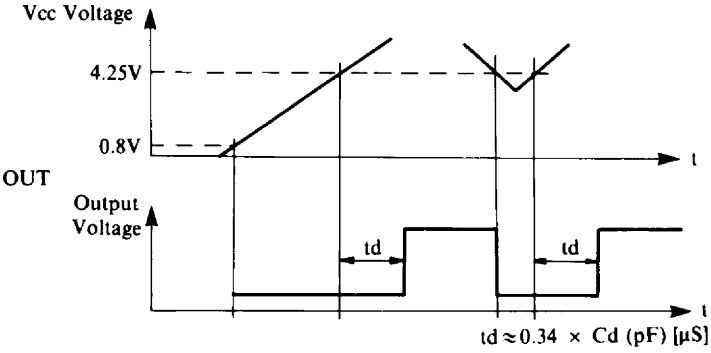


Fig. 2-19 Operational Timing Chart

2-5. Others

This CPU has a watch dog timer function, which is a timer that issues an interrupt if the CPU malfunctions (runs wild), for example due to noise.

This interrupt tells the CPU that there has been a malfunction and it executes its malfunction program. (It cuts off the signals to the print head and the carriage motor, sets the ERROR signal low, etc.)

3. Power Supply Circuit

A ringing choke converter type circuit is used with a dropper type circuit in the power supply unit, fulfilling the input and output conditions described in the chart below.

	Voltage Range	Maximum Current output	Service	Type of circuit
Input	120V AC	1.4A		
	220V AC to 240V AC	0.7A		
Output	5VDC ±2.5%	1.17A	For logic circuit drive, For motor holding	Dropper
	33VDC ±5%	2.86A	For print head drive, For motor drive	Ringing choke converter

This circuit is shown in the block diagram below.

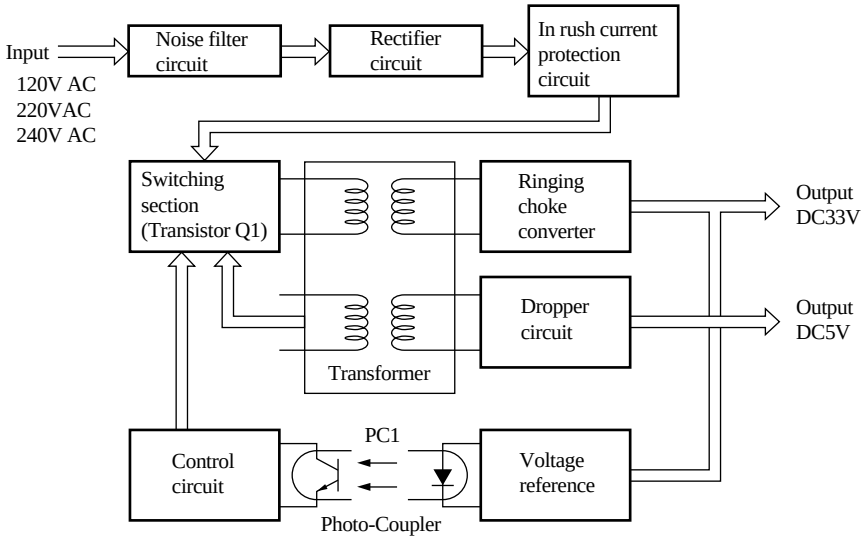


Fig. 2-20 Block Diagram of Power Supply Unit

3-1. Noise Filter Circuit

This circuit filters external noise that enters the AC power line. It consists of choke coils L1, L2, capacitors C1 ~ C4.

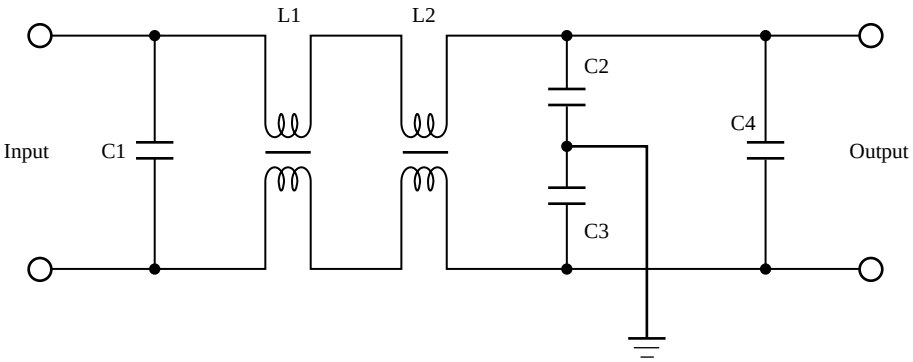


Fig. 2-21 Noise Filter Circuit

3-2. Rectifier Circuit

This full wave rectifier circuit uses bridge diodes.

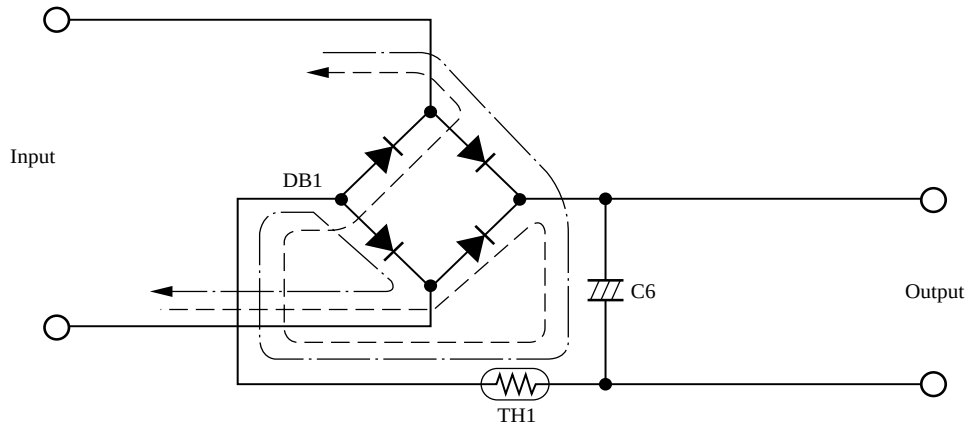


Fig. 2-22 Rectifier Circuit and Rush Current Protection Circuit

The electrical current, shown by the dotted line and the single point broken line, is an AC current which alternates between positive and negative half-cycles, resulting in rectified current in both the positive and negative directions.

3-3. Ringing Choke Converter Circuit

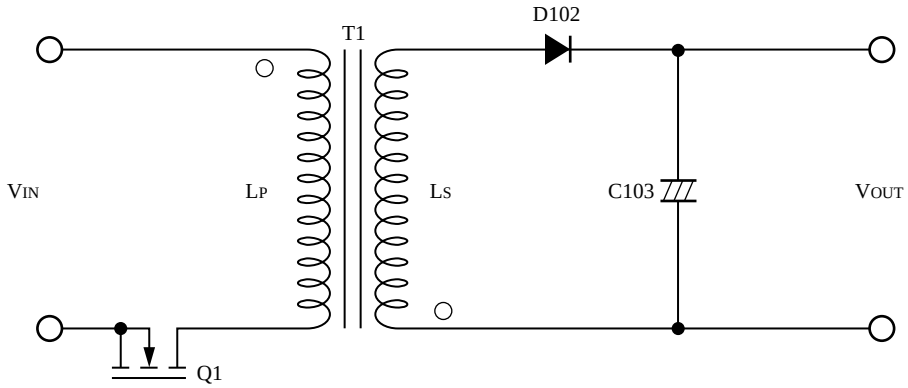


Fig. 2-23 Ringing Choke Converter Circuit

When the switching transistor Q1 is ON, the input voltage is applied to the primary coil (Lp) of the transformer T1. When this happens, the charge in the secondary coil (Ls) of the transformer is reversed so no current flows to diode D102. This results in an accumulation inside the transformer T1 of the all of the energy supplied to the primary coil.
When the switching trasistor Q1 is OFF, the energy which accumulates in the transformer T1 is sent to the diode D102 and discharged on the output side.
The electrical charge which builds up in the transformer T1 while the switching transistor Q1 is ON is equal to the charge output from the secondary side. This allows the output voltage V_{OUT} to be kept constant by controlling the time the switching transistor is ON.

4. Mechanism

4-1. Print Head Mechanism

4-1-1. Character Mechanism

The wiring arrangement of the guide section on the print head styles is depicted in Fig. 2-27. Odd- and even- numbered wires are arranged in two columns. This is a result of the necessity for laying adjacent dots on top of one another.

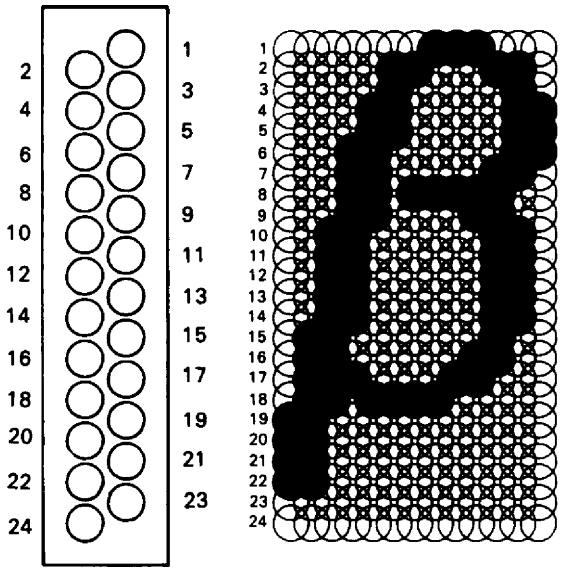


Fig. 2-24 Wiring Arrangement

4-1-2. Print Wire Drive Operation

The print head consists of 24 needle wires and 24 print solenoids.

The following explains how each needle wire operates during printing.

(1) When the print solenoid is energized, the clapper is attracted by the iron core and the needle wire is driven toward the platen.

(2) This needle wire hits the platen via the ink ribbon and paper. A single dot is printed on the paper.

(3) When the print solenoid is de-energized, the needle wire is returned to its original position by rebound energy and spring and clapper holder (leaf spring) force.

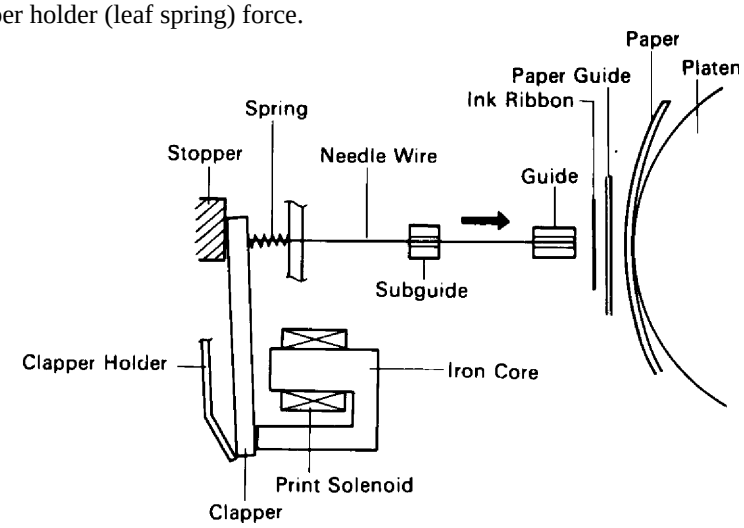


Fig. 2-25 Outline of Print Head Mechanism

4-2. Print Head Carrying Mechanism

The print head carrying mechanism consists mainly of a carriage, timing belt, carriage motor, and home position detector.

(1) Carriage

The carriage is supported horizontally by means of the carriage stay and rear angle, and it moves from side to side with the print head mounted above it. A timing belt is clamped to the base of the carriage and a shield plate is mounted at the base for home position detection.

(2) Timing Belt

The timing belt is suspended between the timing pulley of the carriage motor and the timing pulley of the tension lever, and it maintains a constant tension.

The timing belt is also clamped to the base of the carriage so that it can move the carriage accurately with driving force from the carriage motor.

(3) Carriage Motor

The carriage motor is a HB (Hybrid) type, four-phase and 192-pole pulse motor, which is driven by pulse signals from the control circuit. The rotational rate depends on the number of pulses per unit time. By varying this rotational rate (that is, the carriage carrying rate), the size of the horizontal letters can be changed in each print mode.

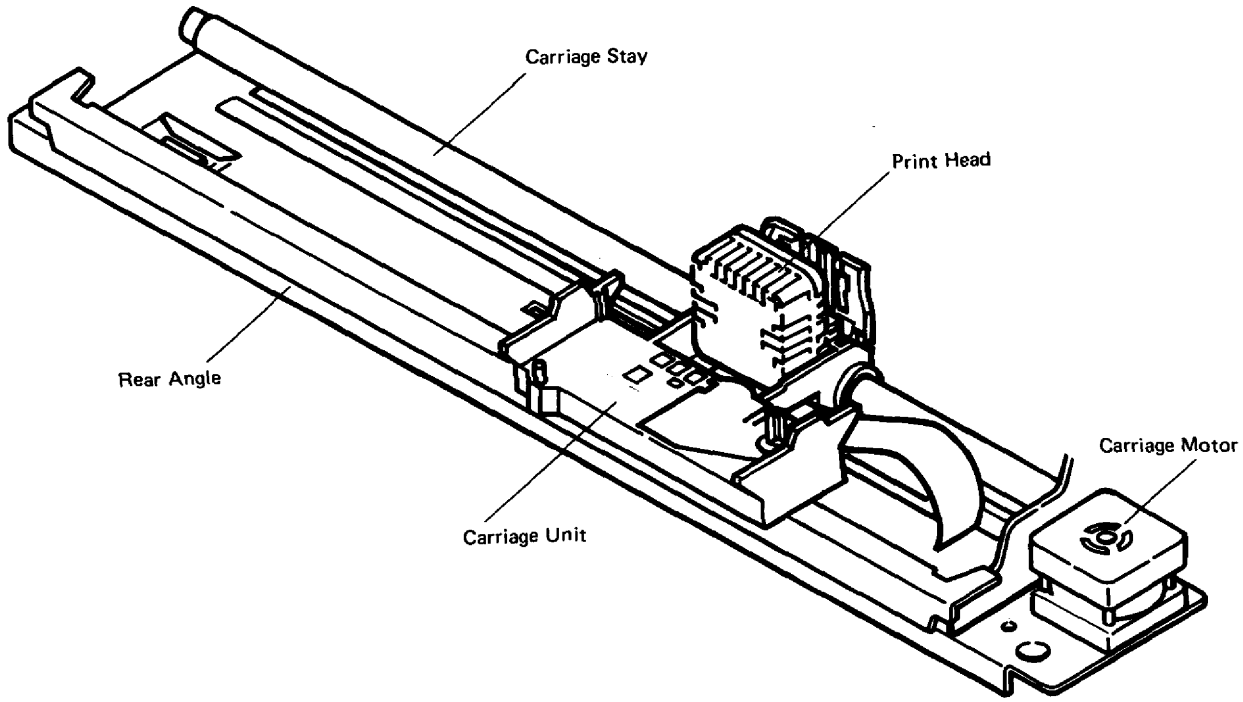


Fig. 2-26 Print Head Carrying Mechanism

4-3. Ink Ribbon Feed Mechanism

The ink ribbon feed mechanism is linked to the print head carrying mechanism described previously so that the ink ribbon is wound up automatically while the carriage moves left or right.

The ribbon feed mechanism is driven by torque from the carriage motor, and carriage movement allows the idler gear to rotate.

This rotation is conveyed sequentially to the gears that work to wind the ribbon. The carriage is equipped with a clutch lever so that the direction of cassette gear rotation remains constant regardless of the direction of the idler gear rotation.

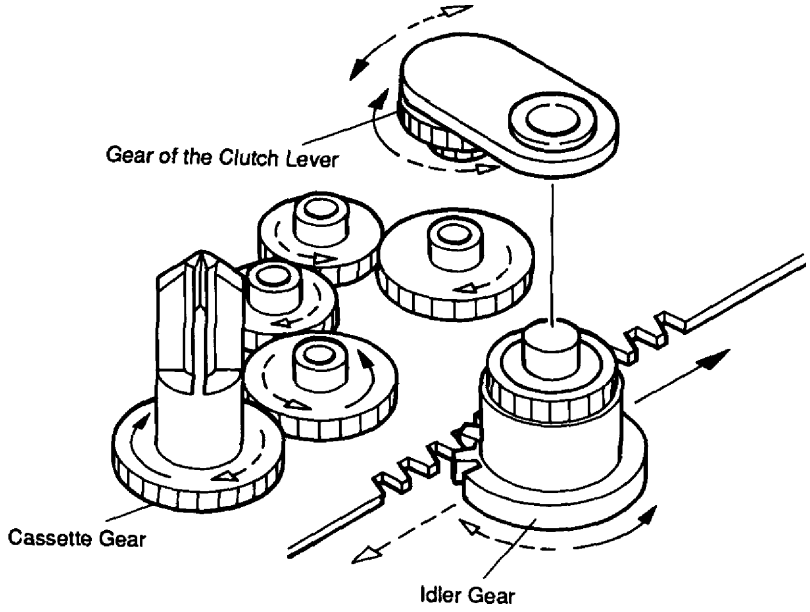


Fig. 2-27 Ribbon Feed Mechanism

4-4. Paper Feed Mechanism

The paper feed motor is a PM (Permanent Magnet) type, four-phase and 48-pole pulse motor.
Minimum paper feed is set at 1/360 inch.
There are two ways of feeding paper available with this printer: Friction method and Tractor method. You can select one of the two methods, using the release lever.

Position of release lever	[1]	[2]
Linkage between tractor gear and tractor clutch	Not	Linked
Platen roller and holder roller	Pressed	Not
Release lever position detector	Closed	Open
Paper feeding method	Friction	Tractor

(1) Friction Method
Friction method is selected when the release lever is position [1].
With this method, paper is pressed between the platen roller and the holder roller; therefore, paper is fed as the rollers turn.
As the paper feed motor is driven, the motor gear, through the idler gear, turns the platen gear in the paper feeding direction. However, since the tractor gear and the tractor clutch are not linked at this time, the tractor unit will not be driven.

(2) Tractor Method
Tractor method is selected when the release lever is position [2].
Paper feeding is facilitated by rotation of the sprocket pin of the tractor unit. When the tractor method is selected, the tractor gear is linked to the tractor clutch, enabling the drive force generated by the paper feed motor to be transferred to the tractor unit via the idler gear and the platen gear.

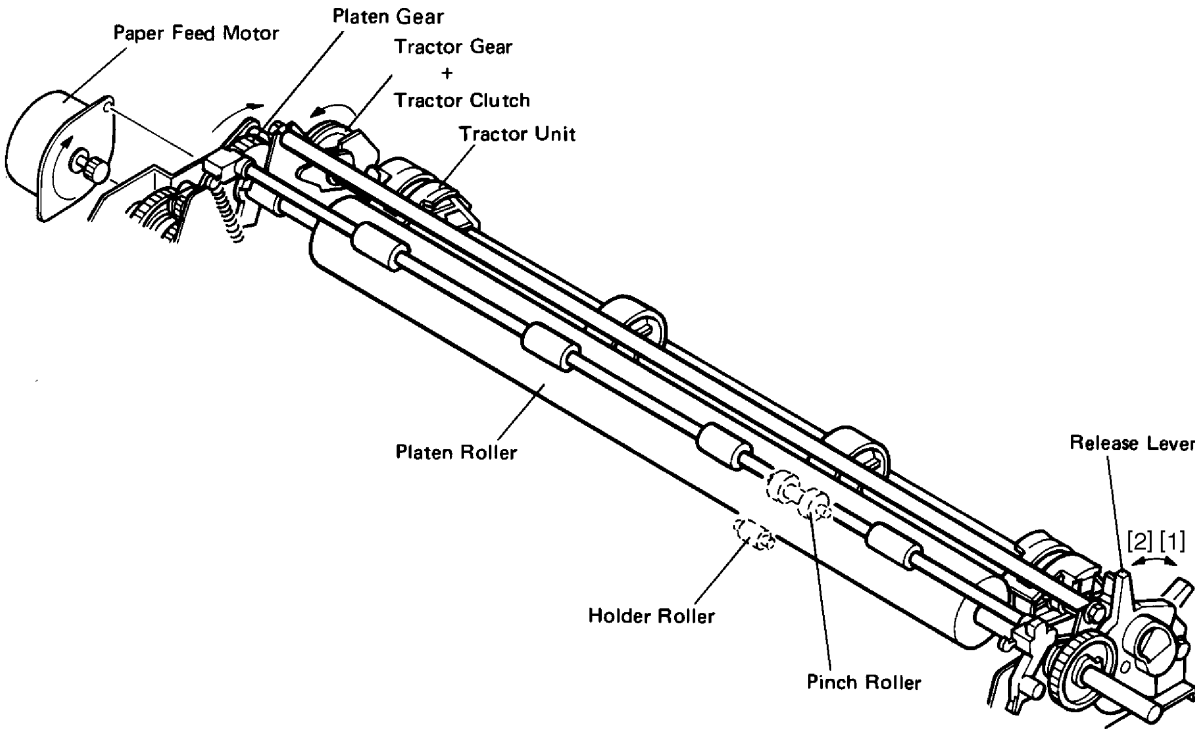


Fig. 2-28 Paper Feed Mechanism

4-5. Detectors

(1) Home Position Detector

A photo-interrupter is used in the home position detector, which is set at the left side of the frame unit. ON/OFF signals are generated according to the position of the shield plate mounted at the base of the carriage, and the printing position is determined by these signals.

(2) Paper Out Detector

Paper out detector is located at the paper insertion slit. When paper is present, the photo transistor with the reflecting type photo sensor goes on. As soon as paper runs out, this transistor goes off, outputting a paper empty signal.

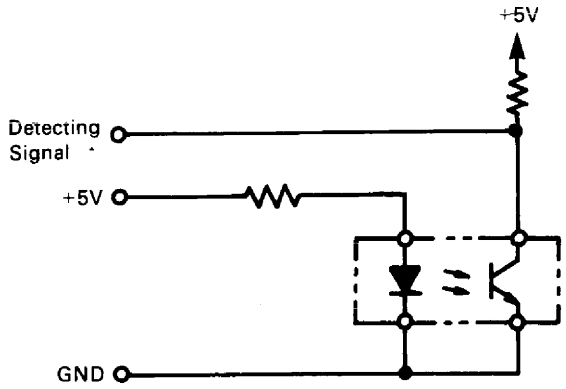


Fig. 2-29 Home Position Detector

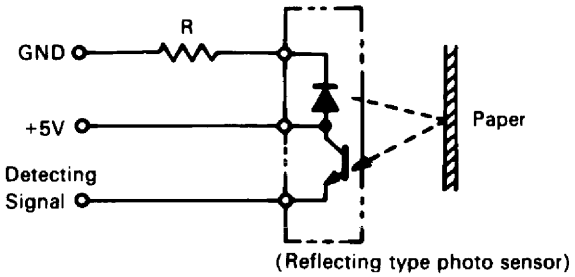


Fig. 2-30 Paper Out Detector

(3) Bail Lever Position Detector

The leaf switch is open when the bail roller is in contact with the platen roller, and it is closed when the bail roller is separated from the platen roller.

(4) Release Lever Position Detector

The leaf switch is closed when the release lever is in the Friction position, and is open in the Tractor position.

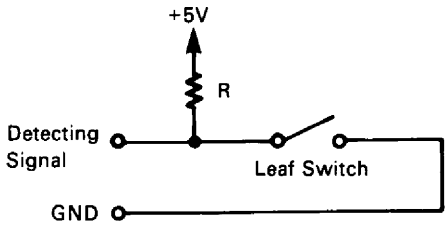


Fig. 2-31 Bail Lever Position Detector

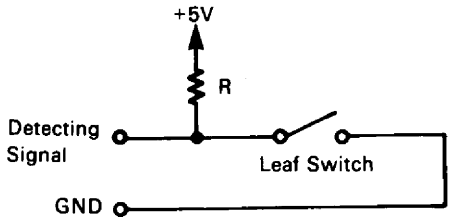


Fig. 2-32 Release Lever Position Detector

CHAPTER 3
ADJUSTMENTS

This printer has undergone various adjustments so that it will achieve standard performance. In this chapter, a brief explanation is given of the methods of adjustments. Please check this explanation when making maintenance inspections or when replacing parts to correct malfunctions.

1. Gap Adjustment Between Print Head and Platen

1-1. Measuring Gap Between Print Head and Platen

(1) Remove the upper case unit according to procedures described in chapter 4.
(2) Set the adjustment lever [1] at step two.
(3) Remove the ribbon guide [2].
(4) Insert a thickness gauge [3] between the print head [4] and the platen [5], and measure the gap.
(5) This measurement must be carried out at the left [L], center [C] and right [R].
(6) The standard gap value is 0.28 to 0.35 mm.
(7) If the gap does not lie within this range,adjust it by following the procedure in item 1-2.

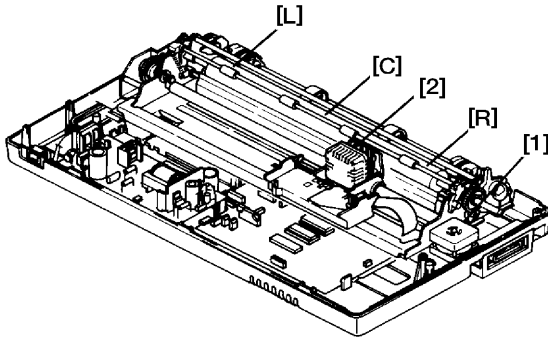


Fig. 3-1 Gap Adjustment

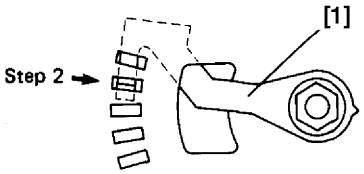


Fig. 3-2 Position of Adjustment Lever

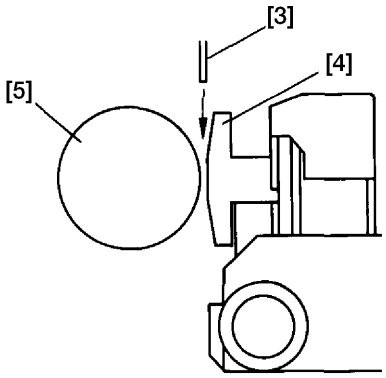


Fig. 3-3 Gap Measurement

1-2. Adjusting Gap Between Print Head and Platen

If the gap does not lie within the standard range, adjust it by carrying out the following procedures.

(1) Remove the printer mechanism according to the procedures described in chapter 4.
(2) Loosen the nut [6].
(3) Insert the shaft in the ø2.5 hole [7].
Adjust the gap at the left by rotating the carriage stay [8] with the shaft.
When the shaft is lowered to the platen side, the gap is reduced, and when lowered to the opposite side, the gap is expanded.
(4) Next, hold the position of the shaft in the ø2.5 hole [7], rotate the right adjustment bush [9] , and adjust the gap at the right.
(5) After adjusting, set the adjustment lever [1] to the position shown in Fig. 3-2 and tighten the nut [6].
(Note) When tightening the nut [6], make sure that the carriage stay [8] does not move.
(6) Install the ribbon guide [2].

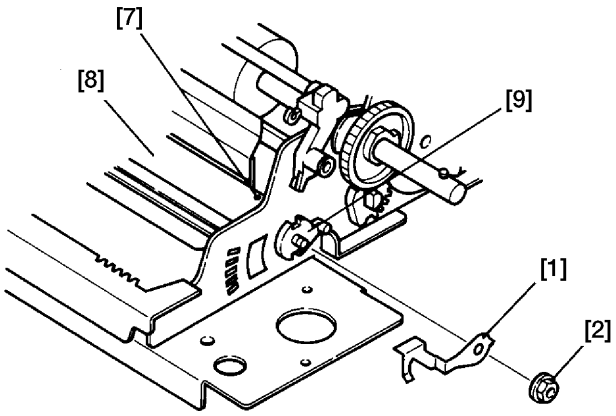


Fig. 3-4 Gap Adjustment

2. Adjustment of Timing Belt Tension

The timing belt tension should be set at from 18g to 21g.
(The belt tension must be measured with the designated tension gauge [1].)
After the belt has been used for a long time, however, it may be difficult to maintain prescribed tension because of belt deterioration or wear. In these cases, make adjustments by following the procedures listed below.

(1) Remove the upper case unit according to the procedures described in chapter 4.
(2) Move the carriage unit [2] right and left two or three times in order to familiarize yourself with the timing belt [3].
(3) Set the adjustment lever [4] at step 2 as shown in Fig. 3-2.
(4) Move the carriage unit [2] to the right end.
(5) Set the arm [5] of the tension gauge [1] 206 mm a part from the frame L.
(6) Move the tension gauge [1] in the opposite direction of the platen [6] until it stops. Then place the arm [5] of the tension gauge on the timing belt [3].
(7) Loosen the screw [7].
(8) Insert a flat-blade screwdriver into the square hole of frame and adjust the belt tension by moving the tension arm [8] left or right.
(9) When the belt has been adjusted to the prescribed tension, tighten the setting screw [7].
(10) If the belt cannot be adjusted to the prescribed tension, replace it with a new timing belt [3].

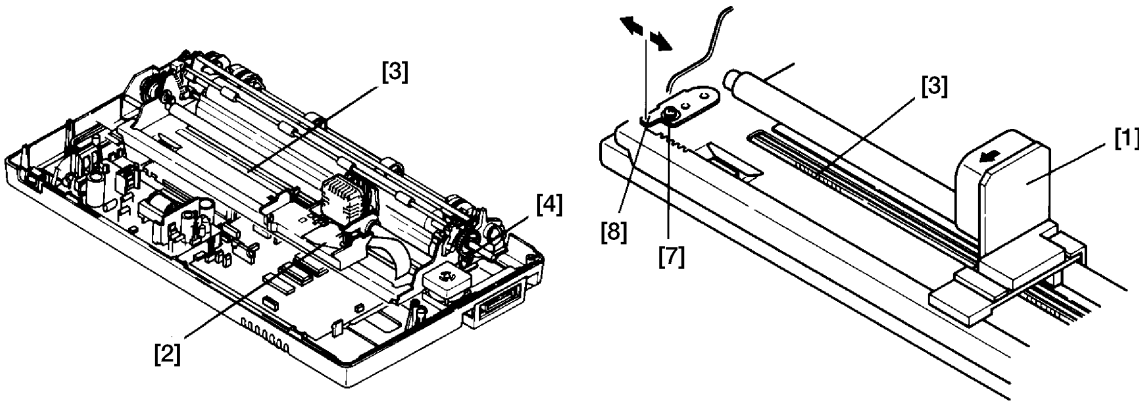


Fig. 3-5 Adjustment of Timing Belt Tension

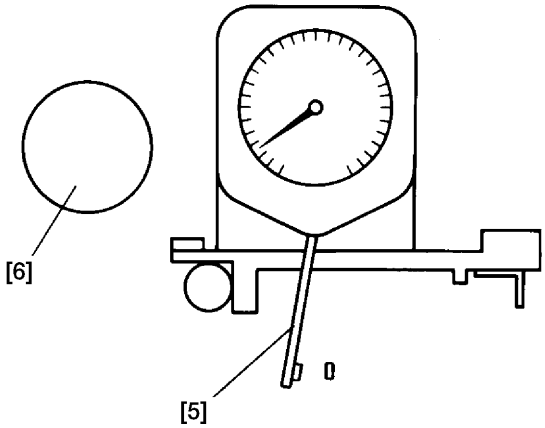


Fig. 3-6 Tension Measurement

3. Adjustment of Home Position Detector

(1) Remove the printer cover.
(2) Loosen the screw [1].
(3) Set the projection [3] of the home position detector [2] between the two lines stamped.
(4) Tighten the screw [1].

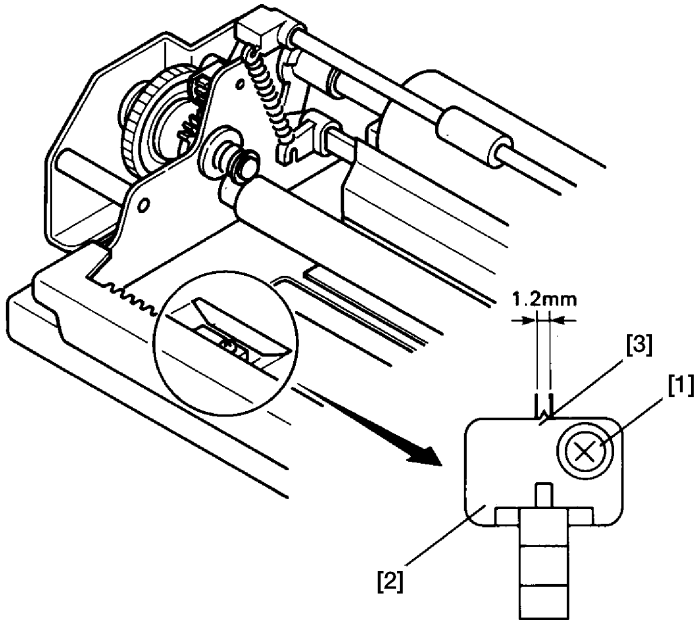
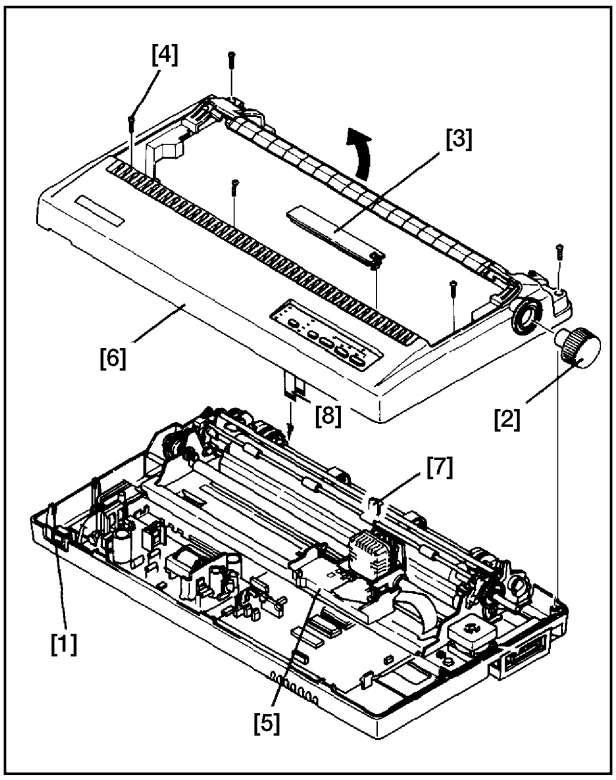


Fig. 3-7 Adjustment of Home Position Detector

CHAPTER 4
PARTS REPLACEMENT

This chapter explains disassembly and reassembly of the printer. Note the following precautions during disassembly and reassembly.

1. Disconnect the printer from the wall outlet before servicing it.
2. Assembly is the reverse of disassembly unless otherwise specified.
3. After reassembly, coat the screw heads with locking sealant.
4. Lubrication information is not provided in this chapter. Refer to item 2 in chapter 5.



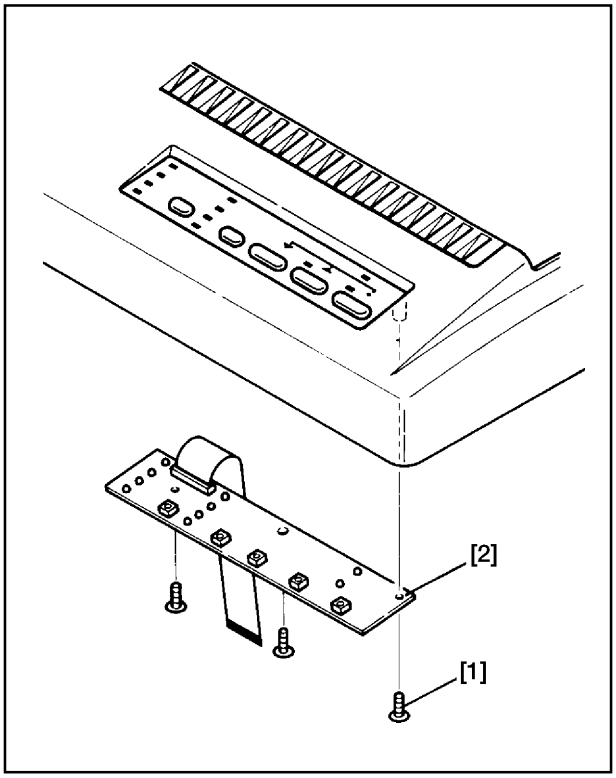
1. Upper Case Unit

(1) Turn off the power switch [1]

(2) Remove
- Printer cover
- Rear cover
- Platen knob [2]
- ROM cover [3]
- Five tapping screws [4]

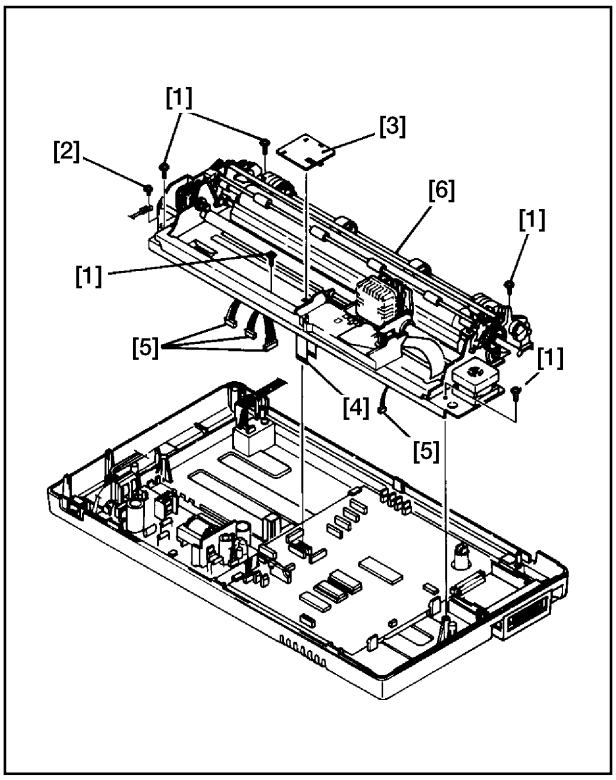
(3) Move the carriage unit [5] over the right so that it aligns with the cut-out of the upper case unit [6].

(4) Remove
- Upper case unit [6]
  Push the hook [7] of the lower case to separate the upper case unit [6] and lower case, next lean the upper case unit [6] forward for removal.
- Cables [8] of control panel board



2. Control Panel Board

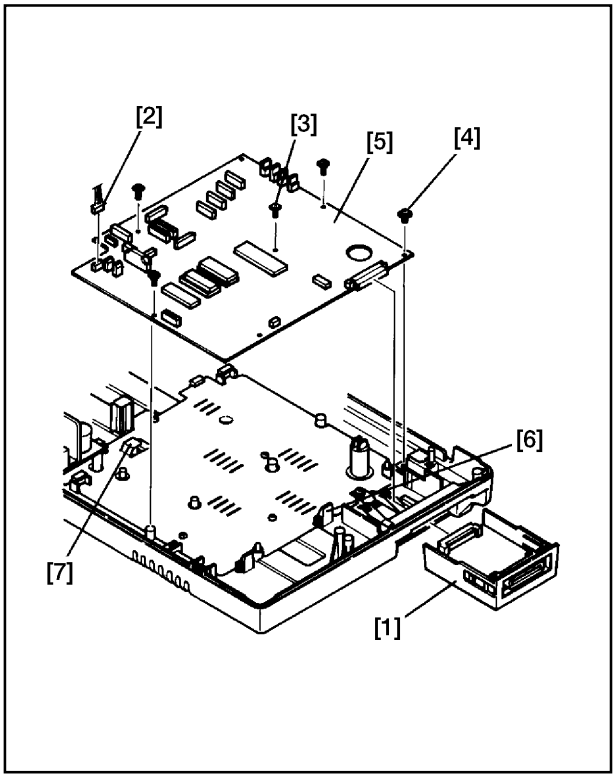
(1) Remove
- Upper case unit according to the procedure described in item 1.
- Three tapping screws [1]
- Control panel board [2]



3. Printer Mechanism

(1) Remove

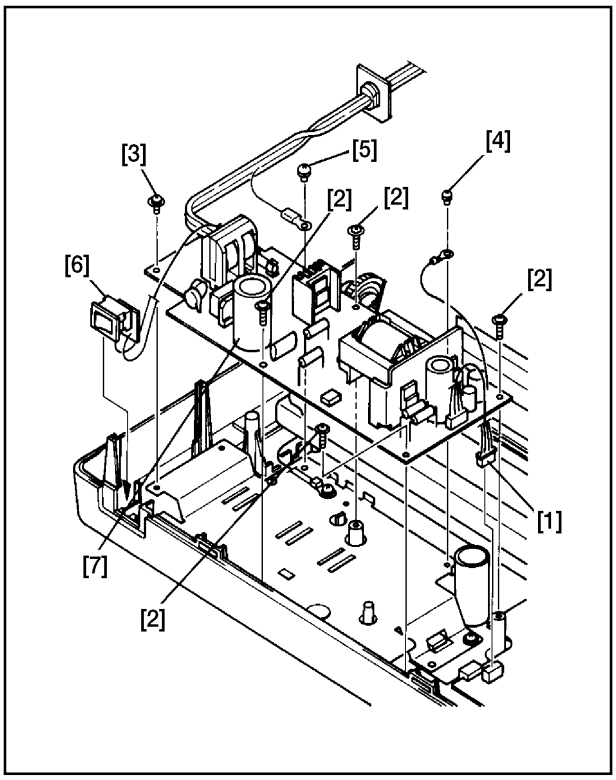
- Upper case unit according to the procedure described in item 1.
- Five tapping screws [1]
- Screw [2]
- Cable holder [3]
  Lift up the tab of the cable holder, and slide it to the left for removal.
- Printer head cable [4]
- Four connectors [5]
- Printer mechanism [6]



4. Main Logic Board

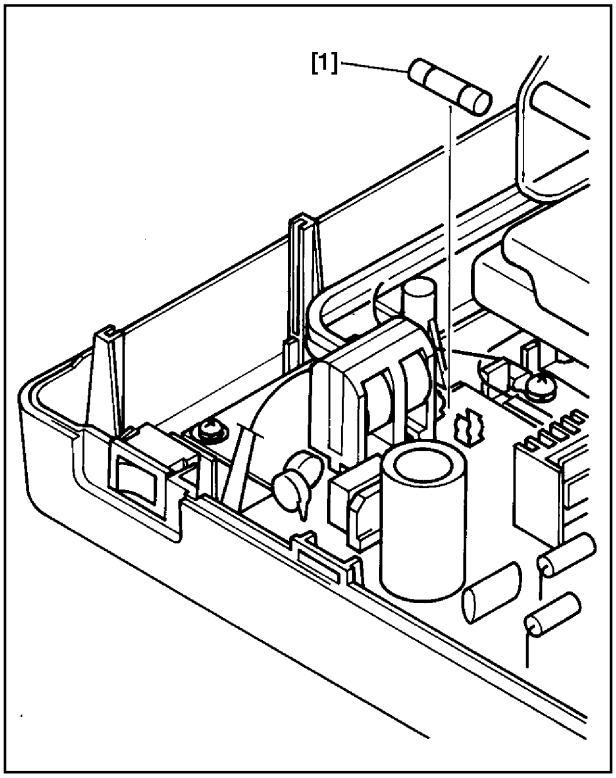
(1) Remove

- Printer mechanism according to the procedure described in item 3.
- I/F cartridge unit [1]
- Connector [2]
- Four screws [3]
- Screw [4]
- Main logic board [5]
  Lift the hooks [6] on the right side fasting the main logic board, move the board right, lift the hooks [7] on the left side and remove the board.



5. Power Supply Unit

(1) Remove
- Upper case unit according to the procedure described in item 1.
- Connector [1]
- Four tapping screws [2]
- Screw [3]
- Screw [4]
- Screw [5]
- Power switch [6]
- Power supply unit [7]



6. Fuses

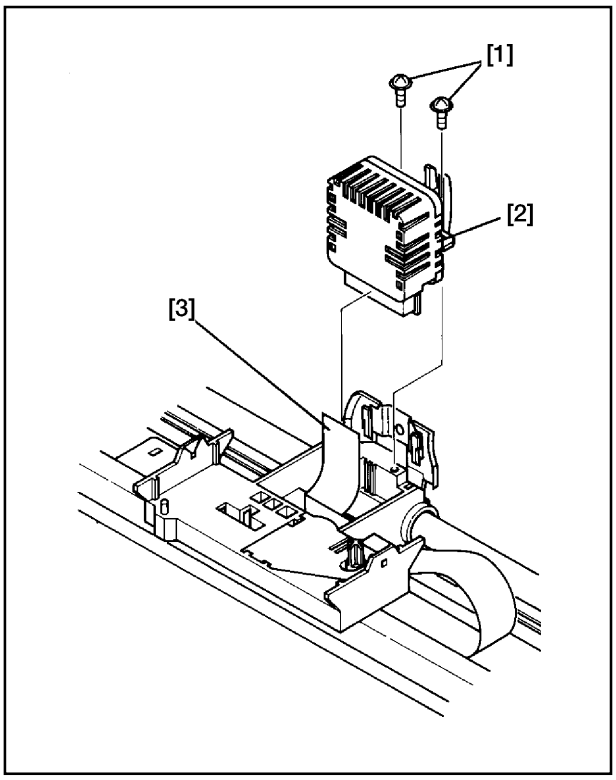
(1) Remove
- Upper case unit according to the procedure described in item 1.

(2) Inspect
- Fuse F1 [1]

Defective → Replace fuse as follows:

AC voltage	F1
120V	5TT3A
220V to 240V	215 - 1.6A-250V

New fuse blown → Inspect circuit

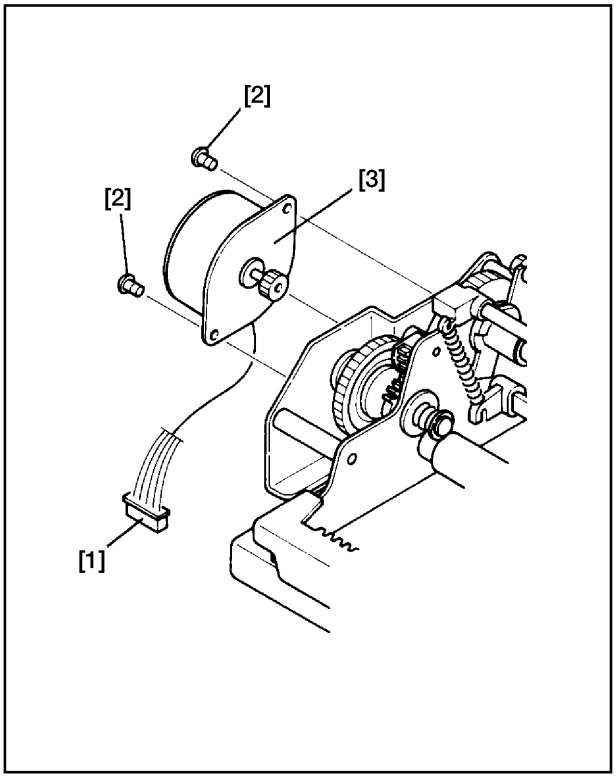


7. Print Head

(1) Remove
- Printer cover
- Ink ribbon cartridge
- Two tapping screws [1]
- Print head [2]
- Head cable [3]

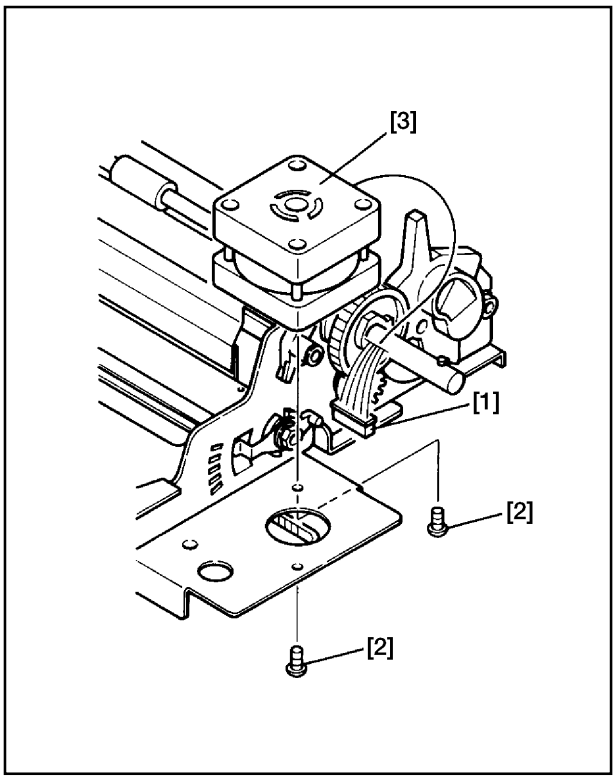
WARNING: The print head become hot after printing so wait for it to cool before removing it.

(2) Adjust
- Gap between print head and platen.
  Refer to item 1 of Chapter 3.



8. Paper Feed Motor Unit

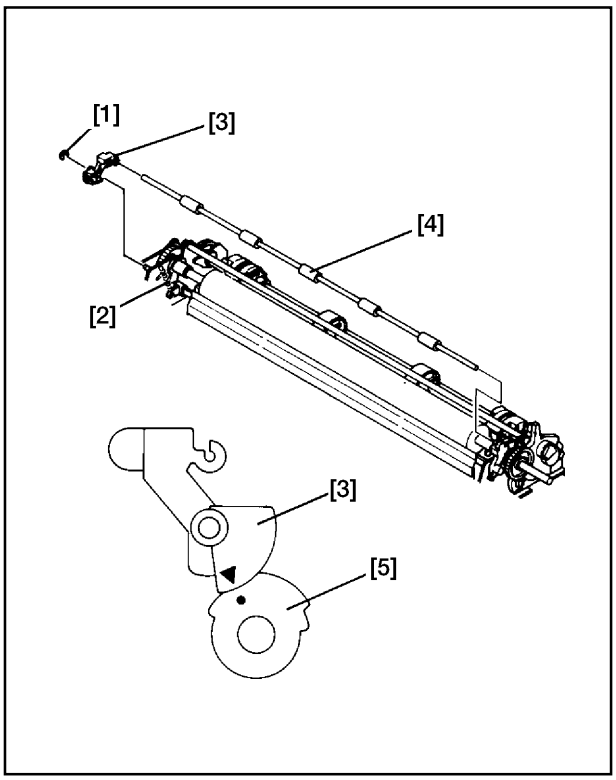
(1) Remove
- Printer mechanism according to the procedure described in item 3.
- Cord fastener binding the lead wires.
- Connector [1]
- Two screws [2]
- Paper feed motor unit [3]



9. Carriage Motor Unit

(1) Remove
- Printer mechanism according to the procedure described in item 3.
- Cord fastener binding the lead wires.
- Connector [1]
- Two screws [2]
- Carriage motor unit [3]

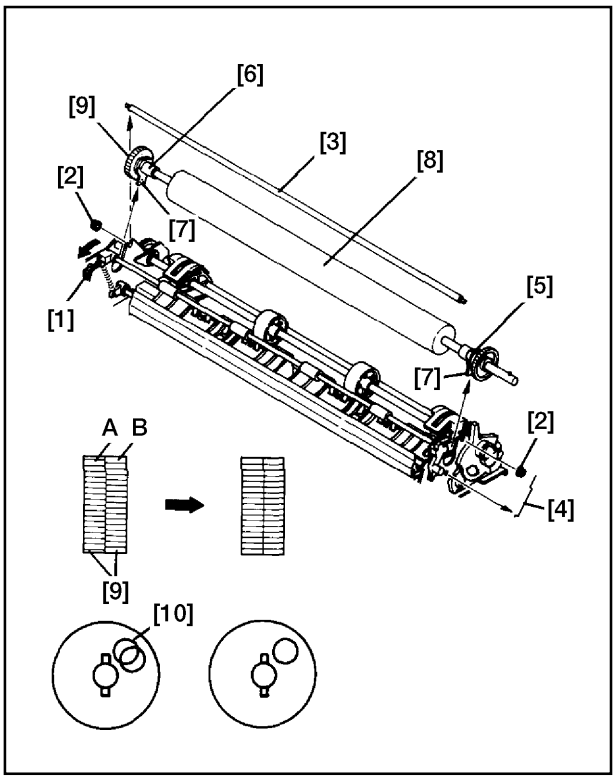
(2) Adjust
- Timing belt tension
  Refer to item 2 of Chapter 3.



10. Bail Roller Shaft Unit

(1) Remove
- Upper case unit according to the procedure described in item 1.
- Stop ring SE3 [1]
- Spring [2]
- Bail Lever L [3]
- Bail roller shaft unit [4]

Note :
- Align the ▲ mark on the bail lever L [3] with the ● mark on the gear [5] to install the bail lever L 3 .



11. Platen Unit

(1) Remove
- Upper case unit according to the procedure described in item 1.

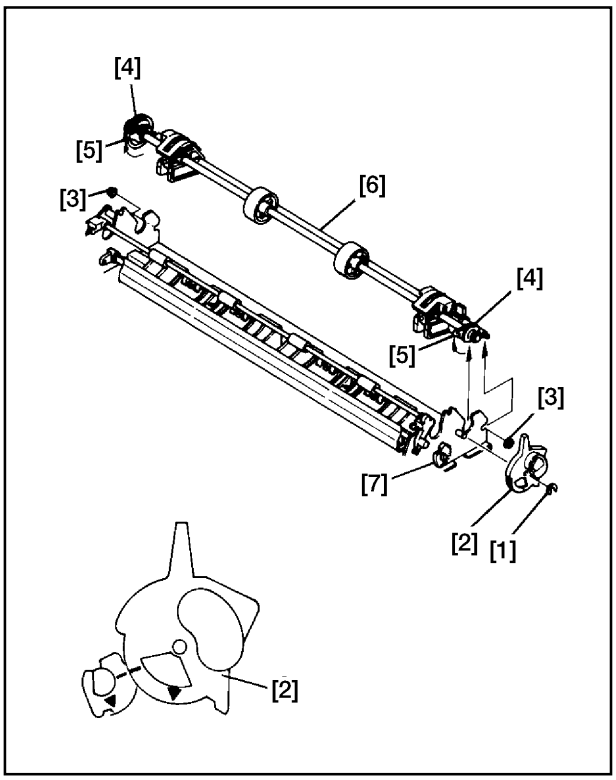
(2) Move the bail lever [1] forward.

(3) Remove
- Two nuts [2]
- Tractor stay [3]
- Ground contact spring [4]
- Platen holder R [5]
- Platen holder L [6]
  Lift the tabs [7] of platen holders R and L to allow removal of platen holders R and L from the frame.
- Platen unit [8]

Caution in assembly:

When assembling the platen gear assembly [9] on the idler gear, align the teeth of gear A and gear B (be sure to align the holes [10] in the two gears.)

(4) Adjust
- Gap between print head and platen.
  Refer to item 1 of chapter 3.



12. Tractor Unit

(1) Remove
- Platen unit according to the procedure described in item 11.
- Stop ring [1]
- Release lever [2]
- Two nuts [3]
- Two tractor bushings [4]
  Lift the tab [5] of the tractor bush to allow removal of the tractor bush from the frame.
- Tractor unit [6]

Caution in assembly:

Aligen the mark (▮) on the release lever [2], with the mark (▮) on the release gear [7] to install the release lever [2].

CHAPTER 5
MAINTENANCE AND LUBRICATION

1. Maintenance

In order to maintain the optimum performance of this printer and to prevent trouble, maintenance must be carried out according to the following items.

1-1. Cleaning

(1) Removal of dirt

Wipe off dirt with a soft cloth soaked in alcohol or benzine.

*Note: Do not use thinner, trichlene or ketone solvents because they may damage plastic parts. Also during cleaning, be careful not to moisten or damage electronic parts, wiring, or mechanical parts.

(2) Removal of dust, pile, etc.

Vacuum cleaning (with an electric cleaner) is preferred. Remove all dust, etc., inside the printer.

*Note: After cleaning, check the oil level. If it is not adequate due to cleaning, replenish it.

1-2. Checks

Checks must be carried out at two levels: “a daily check” which the operator can easily carry out during operation, and “periodic check” which an expert should carry out.

(1) Daily check

When the printer is used on a daily basis, check that the printer is used properly. Make sure that the printer is operating under the best conditions.

- Is any paper stuck in the paper box or printer case?
- Is the cartridge ribbon set at the right position?
- Is there any foreign matter inside the printer? (Remove if any.)
- Is the print head getting excessively dirty?

(2) Periodic check

After 6 months or printing 1 million lines, the periodic check and lubrication must be carried out.

- Check for deformation of springs.
- Check the gap between the platen and the print head.
- Remove dust, dirt, etc., around the detectors.

2. Lubrication

Lubrication is very important to maintain optimum performance and to prevent trouble.

2-1. Lubricant

The type of lubricant greatly affects the performance and durability of the printer, especially in a low temperature environment. We recommend use of the grease and lubrication oils listed below for this printer.

Product name	Maker
FLOIL GB-TS-0	Kanto Chemicals Co., Ltd.
KF96-1000CS	Shinetsu Chemical Industry
MOLYKOTE (R) EM-50L	Dow Corning Corporation
Mobil 1	Mobil oil

2-2. Lubricating Method

When lubrication is carried out in assembly and disassembly, wash parts well to remove dust and dirt before lubrication. Lubrication must be carried out regularly once every 6 months or after 1 million lines have been printed. Lubrication is necessary irrespective of the regular lubrication whenever lubricant becomes deficient after cleaning or whenever parts have been disassembled or replaced.

2-3. Lubricated Areas

NO.	Lubricating Point	Grease/Oil
[1]	Rubbing surfaces of idler gear 16 × 60 × 0.5 and idler gear shaft A	GB-TS-0
[2]	Rubbing surfaces of gear 40 × 0.5 and gear shaft	GB-TS-0
[3]	Rubbing surfaces of tractor shaft and tractor bushing	GB-TS-0
[4]	Rubbing surfaces of tractor shaft and release lever	GB-TS-0
[5]	Rubbing surfaces of carriage stay and bushing 14 × 16 × 10	Mobil 1
[6]	Rubbing surfaces of clutch shaft and gear 22 × 1.0	KF96-1000CS
[7]	Rubbing surfaces of release shaft and roller holder	GB-TS-0
[8]	Rubbing surfaces of roller holder and lower case	GB-TS-0
[9]	Rubbing surfaces of ribbon cassette gear and carriage	GB-TS-0
[10]	Rubbing surfaces of PF idler gear and shaft	GB-TS-0
[11]	Rubbing surfaces of PF idler gear and shaft B 16 × 1 - 40 × 0.3 and carriage	GB-TS-0
[12]	Rubbing surfaces of gear 48 × 0.3 and shaft	GB-TS-0
[13]	Rubbing surfaces of idler gear 17 × 41 × 0.3 and gear shaft C	GB-TS-0
[14]	Rubbing surfaces of pulley cap and pulley shaft	GB-TS-0
[15]	Rubbing surfaces of timing pulley and stop ring	GB-TS-0
[16]	Rubbing surfaces of tractor holder and tractor cover	KF96-1000CS
[17]	Rubbing surfaces of adjusting lever and frame	EM-50L
[18]	Rubbing surfaces of idler gear 24 × 40 × 0.5 and gear shaft	GB-TS-0
[19]	Rubbing surfaces of rear roller and shaft	GB-TS-0
[20]	Rubbing surfaces of clutch shaft and bushing	GB-TS-0
[21]	Rubbing surfaces of index lever and release lever	GB-TS-0
[22]	Rubbing surfaces of release shaft and frame	GB-TS-0

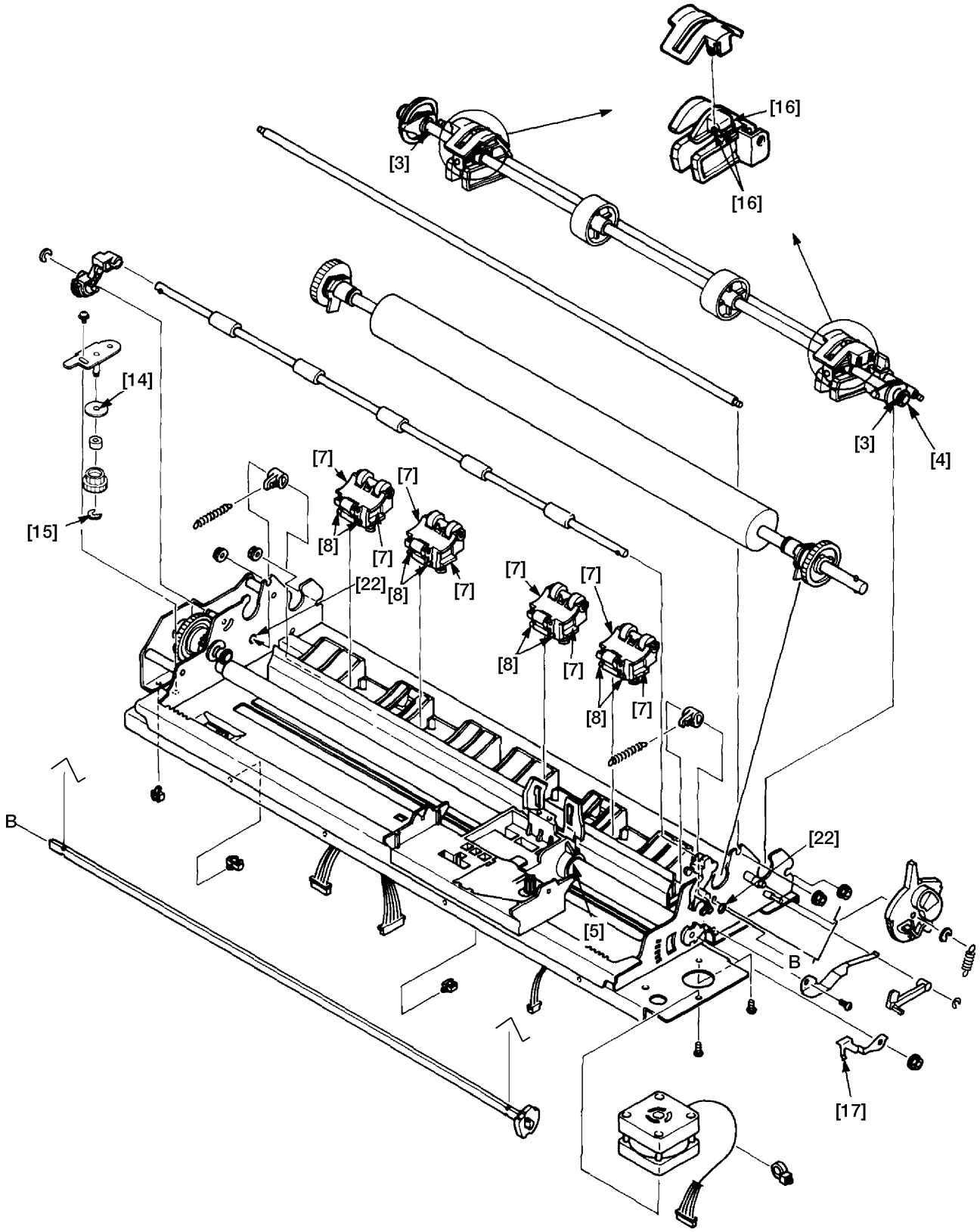


Fig. 5-1 Lubricated Areas 1

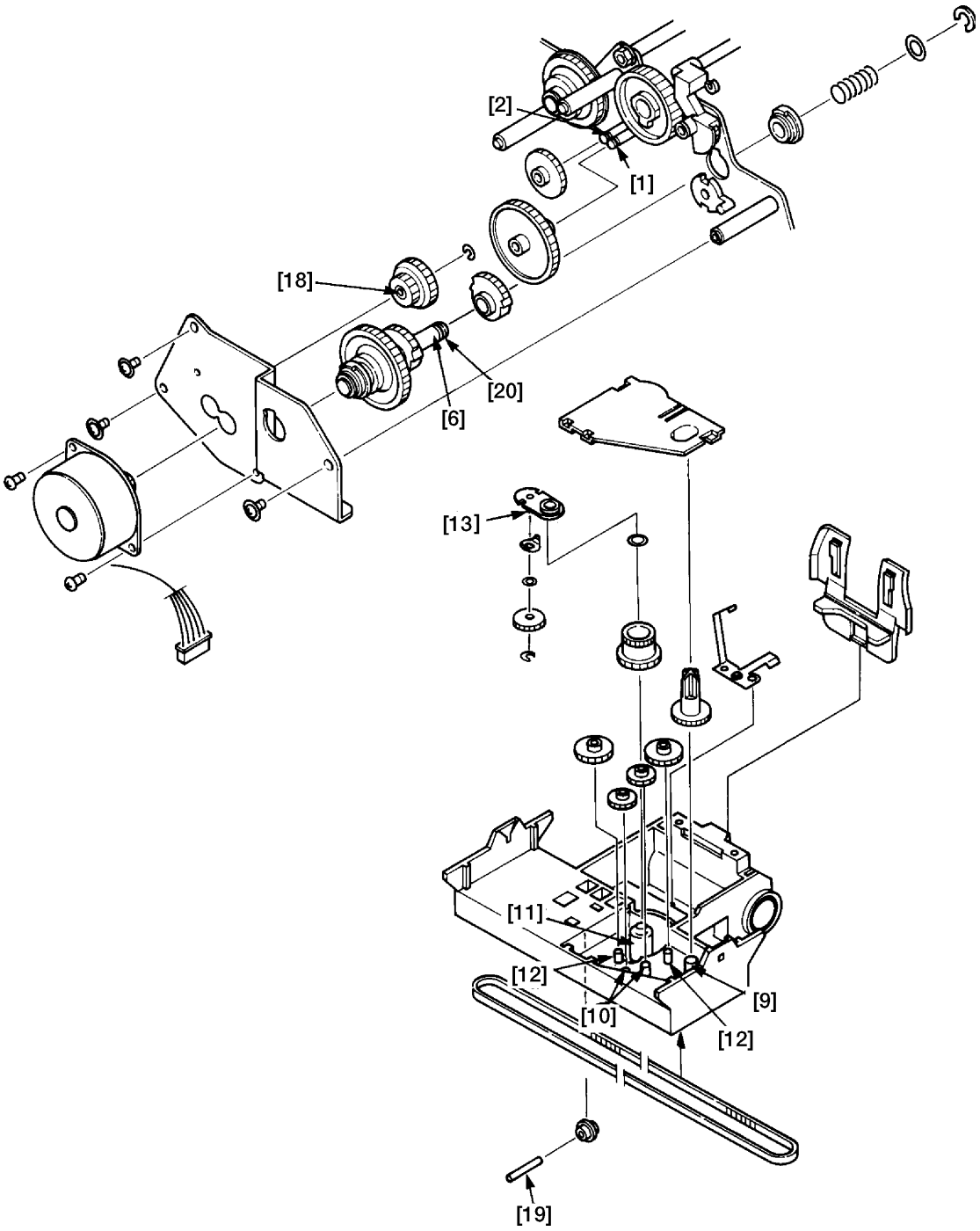


Fig. 5-2 Lubricated Areas 2

CHAPTER 6
TROUBLESHOOTING

1. Troubleshooting Procedures

Troubleshooting is never easy because various problems arise depending upon the particular location of the breakdown, but the following procedures should be adhered to in making repairs.

(1) At the first stage, conduct repairs through unit replacements. The two display codes appearing in the flow chart are defined as follows: 1) indicates main logic board replacement; and 2) indicates printer mechanism replacement, to be carried out if the problem has not been corrected.

1)	Main Logic Board Replacement
2)	Printer Mechanism Replacement

Check again at this time whether the replaced unit is malfunctioning. (This is done to rule out trouble caused by improper contact of connectors.)

Replaceable units consist of the following:

- Power supply unit
- Main logic board
- Printer mechanism
- Control panel board

In replacing these units, always refer to the unit replacement flow chart.

(2) At the second stage, use the flow chart for repair by parts replacement to replace defective elements inside a particular unit.

(Note 1) Before starting to repair, be sure to check visually the contact of the connector and the mounting of the IC in the IC socket.

(Note 2) Always turn off power source and remove power plug before replacing any units or parts.

(Note 3) If any check items appear on the flow chart, be sure to always check them. Otherwise, newly mounted parts or units may become damaged.

(Note 4) If, in the process of making repairs, there is any confusion about proper procedures, start to do the job again from the beginning.

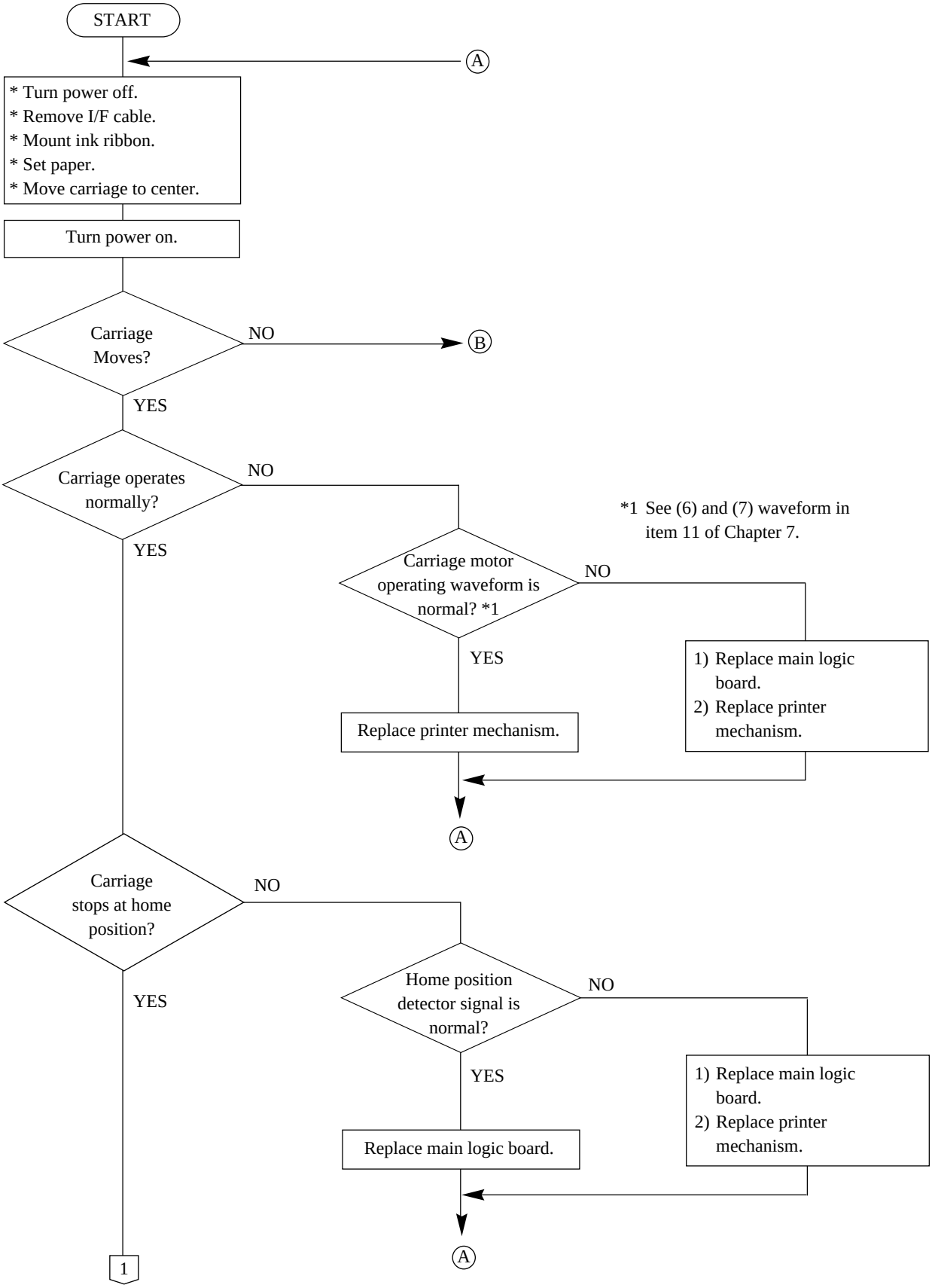
(Note 5) Be careful to avoid injury from static electricity when handling ICs and main logic boards.

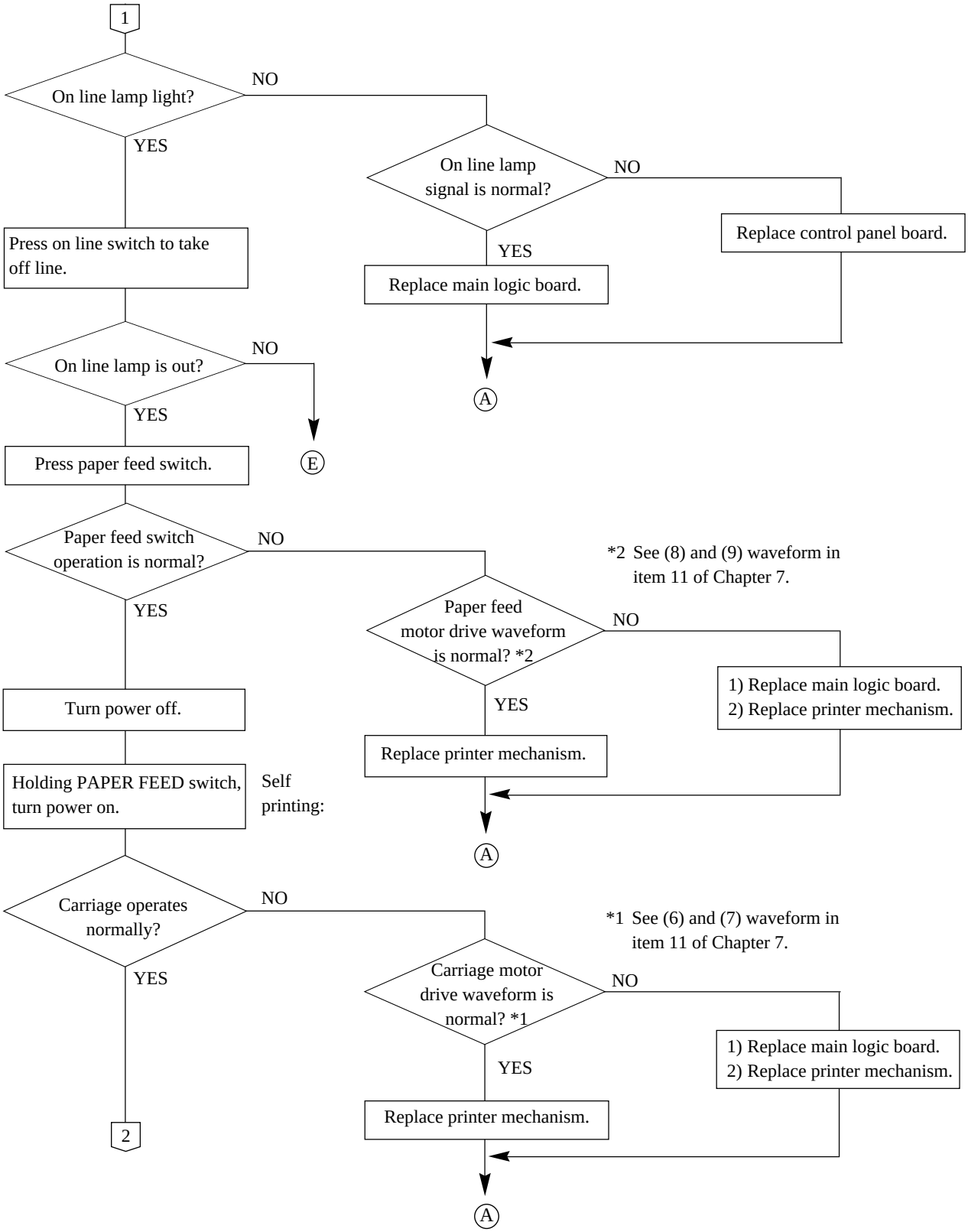
2. Unit Replacement Flow Chart

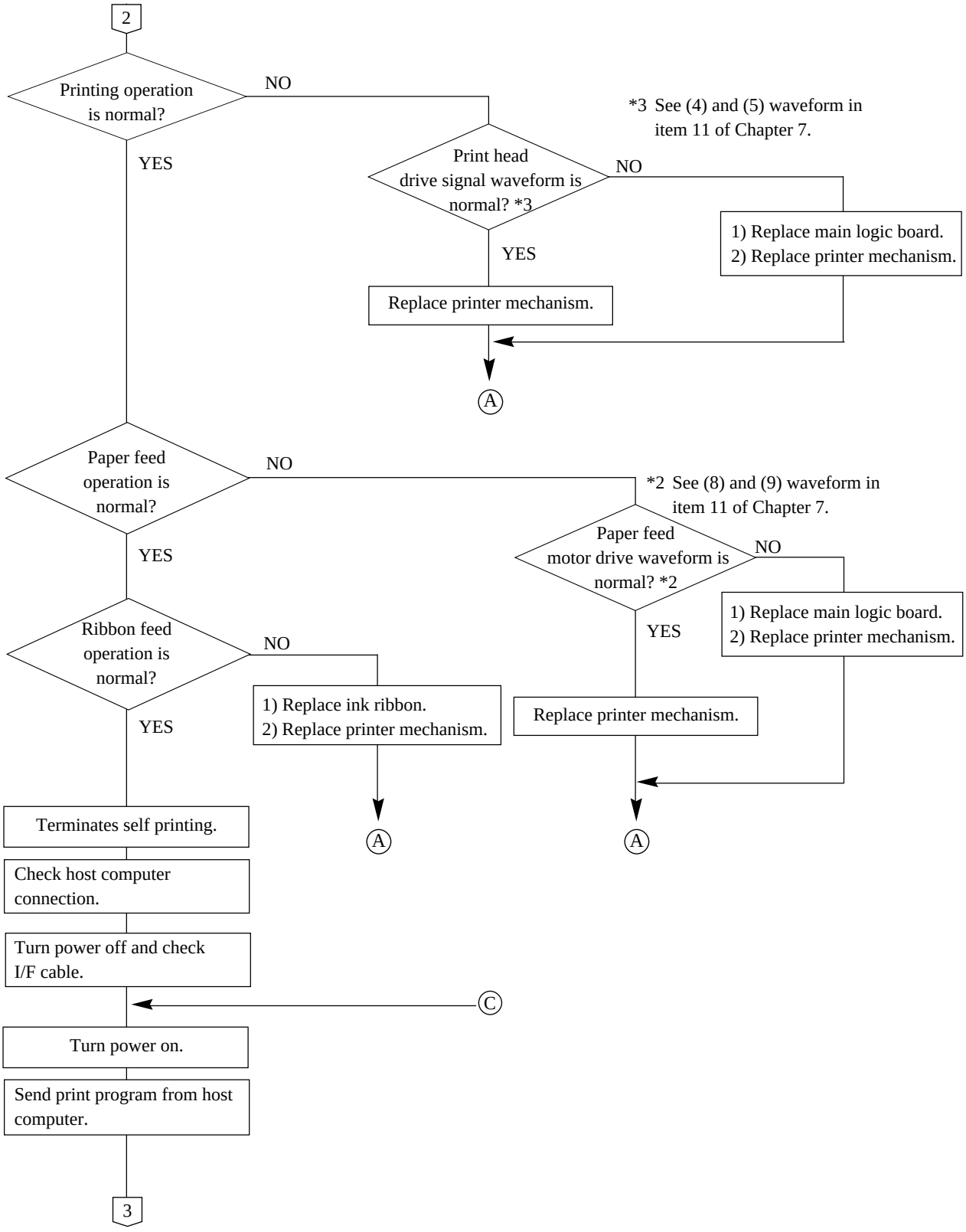
Category	Problem Details	Unit Exchange Sequence				Remarks
		Power supply unit	Main logic board	Printer mechanism	Control panel board	
Operation related	Specific display lamp only will not glow		2		1	
	Specific switch only cannot be input		2		1	
	Buzzer does not sound (sound volume inadequate)		1			
Motor related	Strange sounds during operation		1	2		
	No motor holding power (power very weak)	2	1			
Print head related	Dots skipped		2	1		
	Print is too light		2	1		Ink ribbon
	Ink ribbon entanglement (wire sticks out)		2	1		Gap check
Detector related	Absence of paper not detected		2	1		
	Lever position not detected		1	2		
Interface related and others	Incorrect printing		1			Check I/F cable
	Ink ribbon not forwarded			1		
	No operation at EDS mode setting		1		2	EDS mode
	Faulty operation when power is turned on/off		1			
	Abnormal motor operating speed (slow)		1	2		
	Fuse blown during operation	3	1	2		
Display LED message	Head temperature error		2	1		“DRAFT” lamp blink
	CR H.P. error			1		“ROMAN” lamp blink
	S. W. I. CPU error		1			“SCRIPT” lamp light
	RAM check error		1			“10CPI” lamp blink
	Watch dog timer error		1			“PROP” lamp light
	Bail lever error			1		“COND” lamp blink

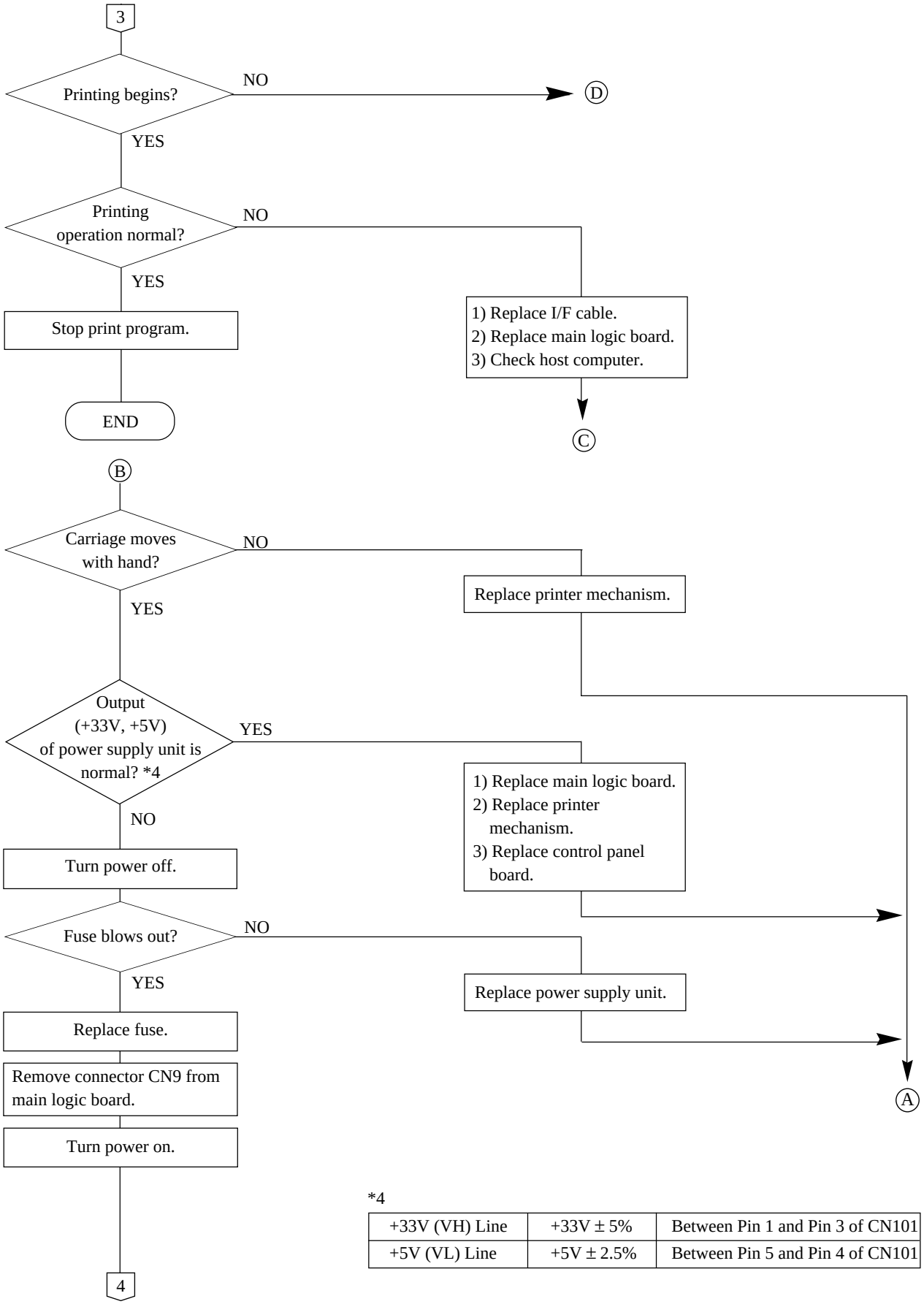
Note: The figures 1, 2 and 3 mean the priority of replacement.

3. Repair by Unit Replacement



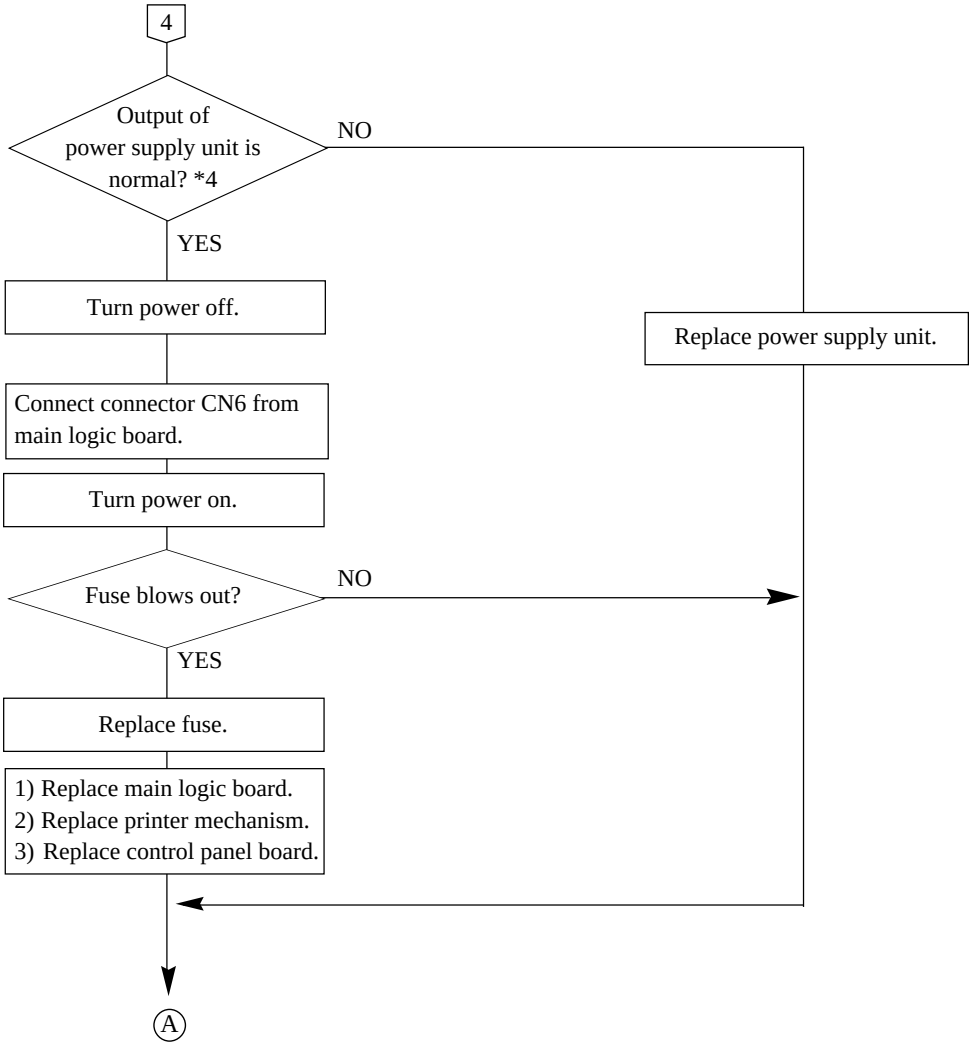

1
On line lamp light?
NO
YES
On line lamp signal is normal?
NO
Replace control panel board.
YES
Replace main logic board.
Press on line switch to take off line.
On line lamp is out?
NO
YES
A
E
Press paper feed switch.
Paper feed switch operation is normal?
NO
YES
*2 See (8) and (9) waveform in item 11 of Chapter 7.
Paper feed motor drive waveform is normal? *2
NO
YES
1) Replace main logic board.
2) Replace printer mechanism.
Replace printer mechanism.
Turn power off.
Holding PAPER FEED switch, turn power on.
Self printing:
A
Carriage operates normally?
NO
YES
*1 See (6) and (7) waveform in item 11 of Chapter 7.
Carriage motor drive waveform is normal? *1
NO
YES
1) Replace main logic board.
2) Replace printer mechanism.
Replace printer mechanism.
2
A


2
Printing operation is normal?
NO
YES
*3 See (4) and (5) waveform in item 11 of Chapter 7.
Print head drive signal waveform is normal? *3
NO
YES
1) Replace main logic board.
2) Replace printer mechanism.
Replace printer mechanism.
A
Paper feed operation is normal?
NO
YES
*2 See (8) and (9) waveform in item 11 of Chapter 7.
Paper feed motor drive waveform is normal? *2
NO
YES
1) Replace main logic board.
2) Replace printer mechanism.
Ribbon feed operation is normal?
NO
YES
1) Replace ink ribbon.
2) Replace printer mechanism.
Replace printer mechanism.
A
A
Terminates self printing.
Check host computer connection.
Turn power off and check I/F cable.
C
Turn power on.
Send print program from host computer.
3



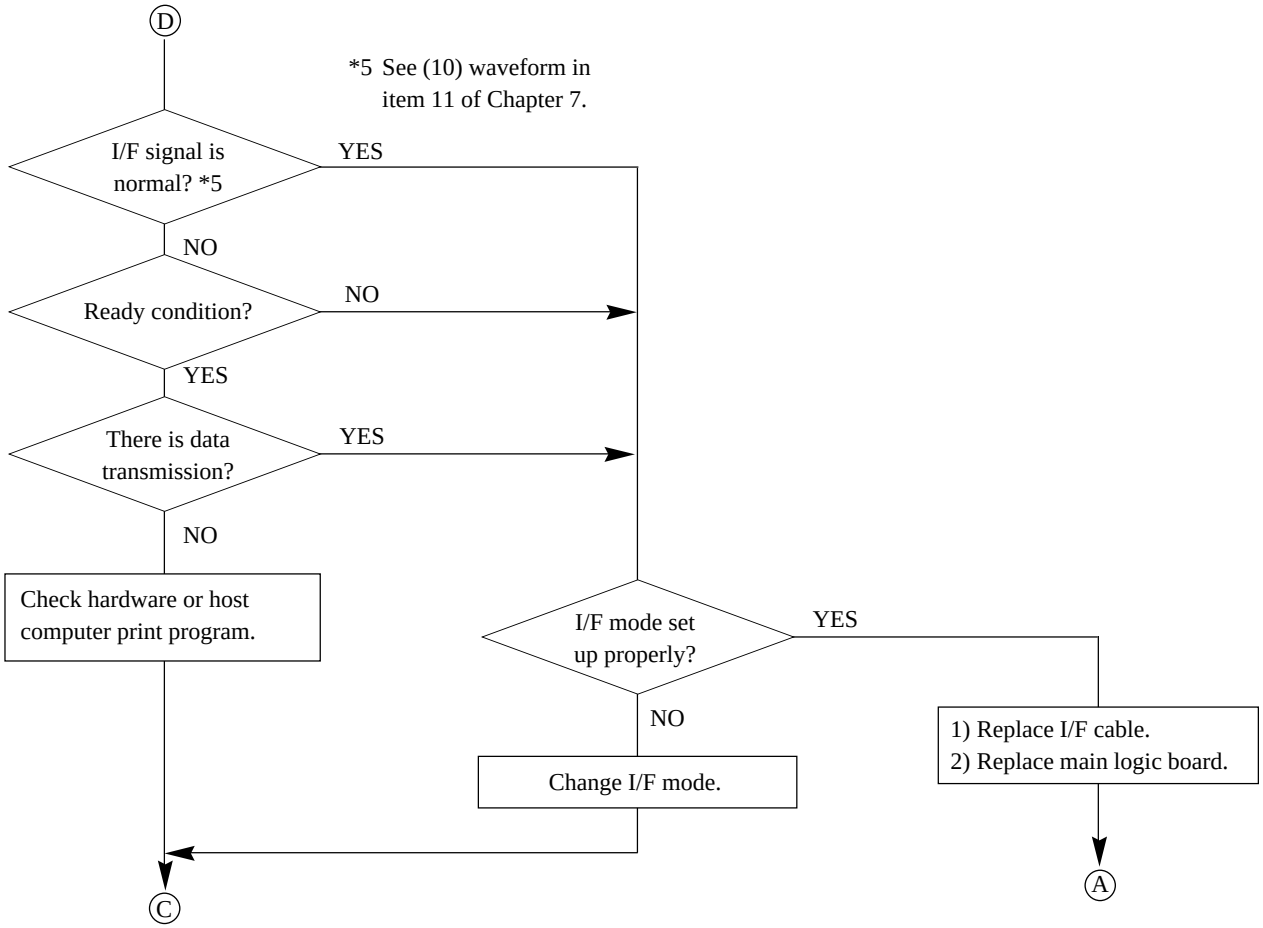
*4

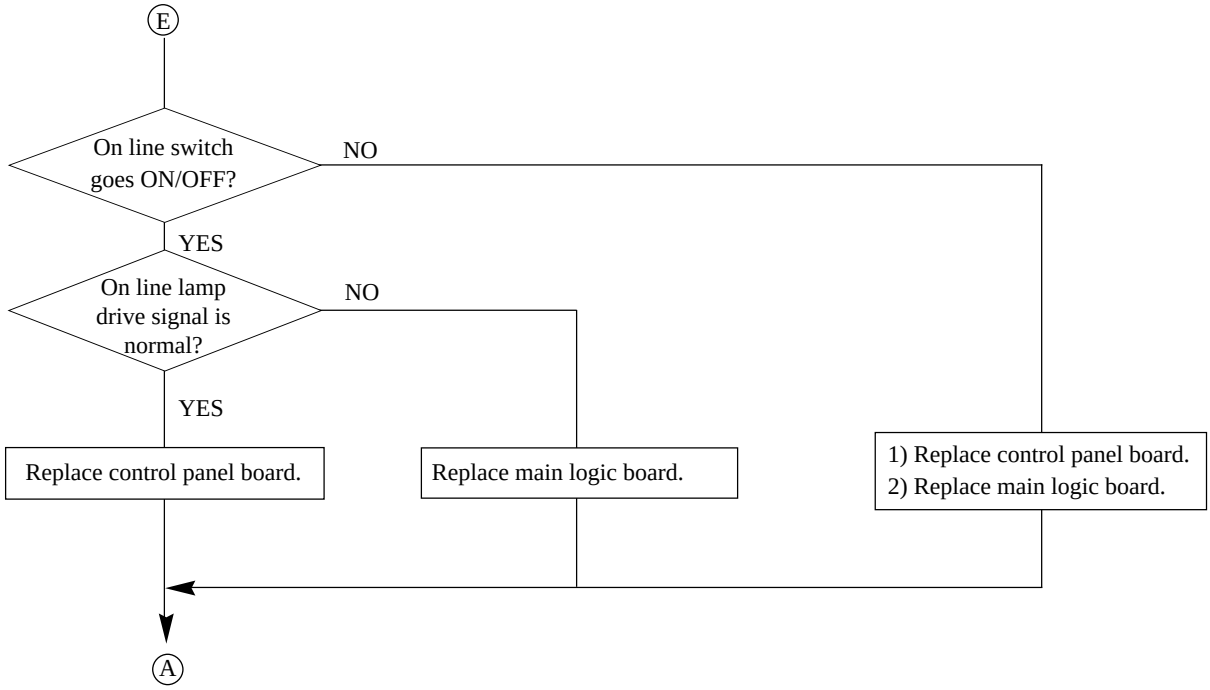
+33V (VH) Line	+33V ± 5%	Between Pin 1 and Pin 3 of CN101
+5V (VL) Line	+5V ± 2.5%	Between Pin 5 and Pin 4 of CN101



*4

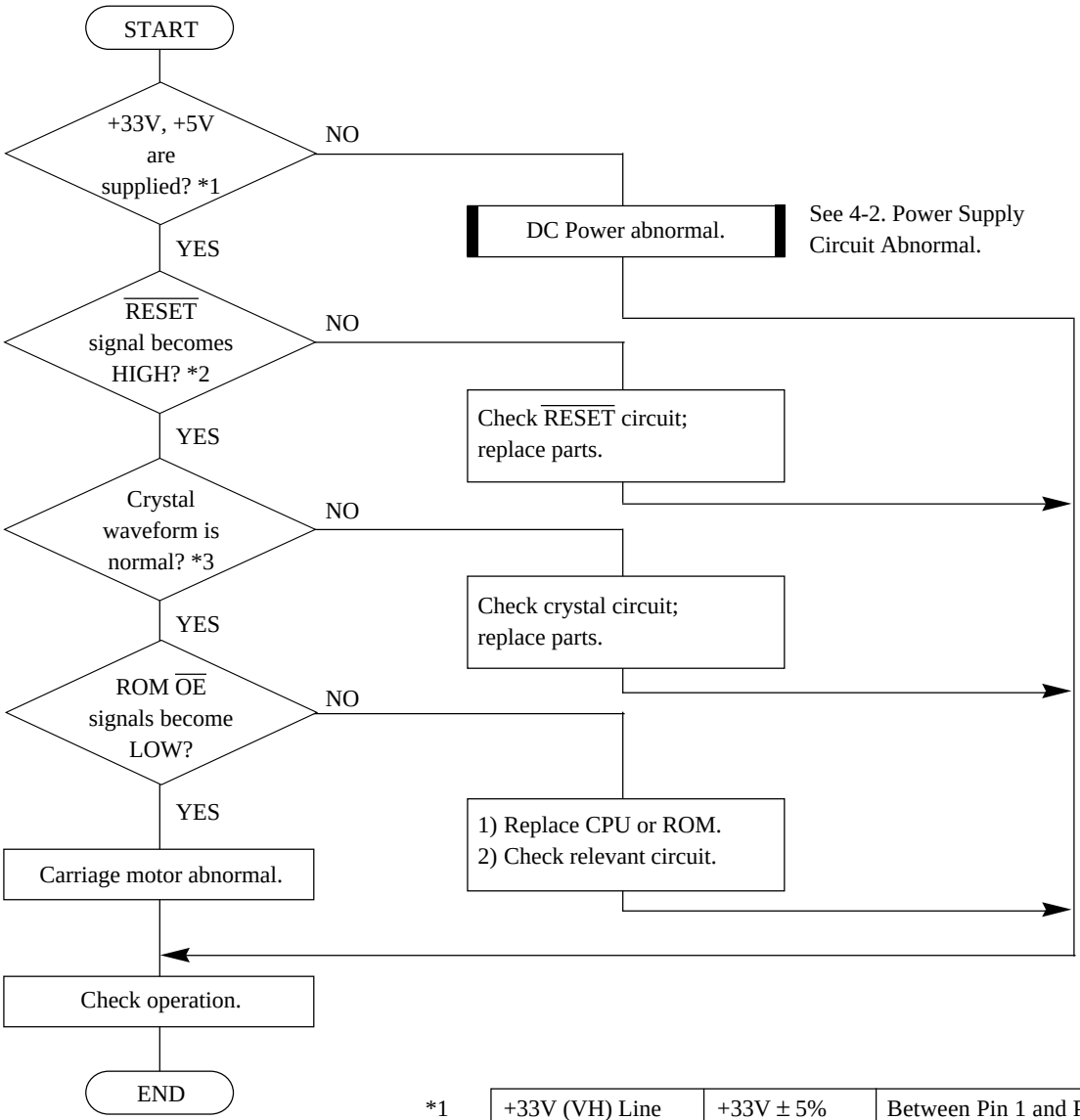
+33V (VH) Line	+33V ± 5%	Between Pin 1 and Pin 3 of CN101
+5V (VL) Line	+5V ± 2.5%	Between Pin 5 and Pin 4 of CN101


D
*5 See (10) waveform in item 11 of Chapter 7.
I/F signal is normal? *5
YES
NO
Ready condition?
NO
YES
There is data transmission?
YES
NO
Check hardware or host computer print program.
I/F mode set up properly?
YES
NO
Change I/F mode.
1) Replace I/F cable.
2) Replace main logic board.
A
C


E
On line switch goes ON/OFF?
NO
YES
On line lamp drive signal is normal?
NO
YES
Replace control panel board.
Replace main logic board.
1) Replace control panel board.
2) Replace main logic board.
A

4. Repair by Parts Replacement

4-1. Does not Operate at All with Power on



*1

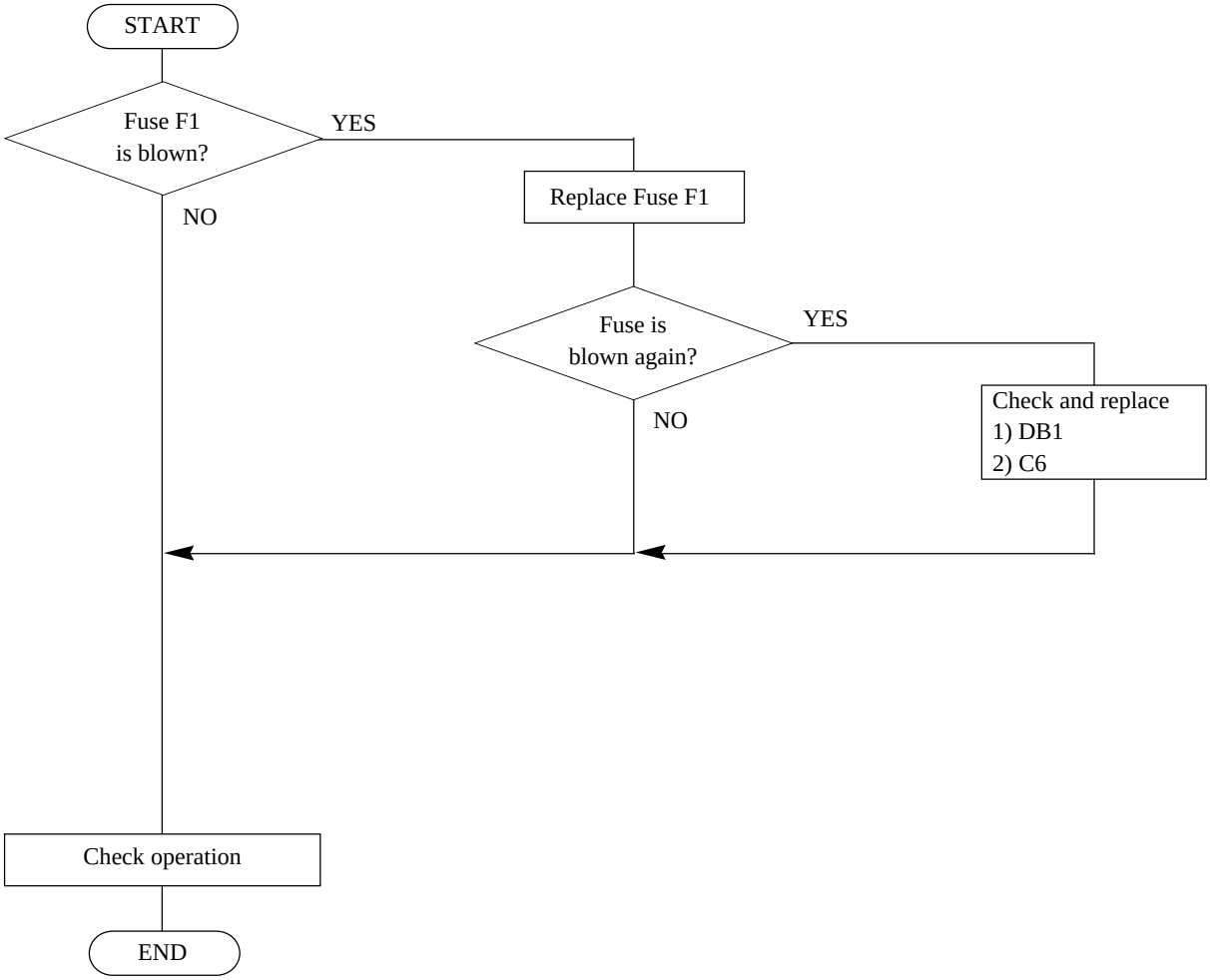
+33V (VH) Line	+33V ± 5%	Between Pin 1 and Pin 3 of CN101
+5V (VL) Line	+5V ± 2.5%	Between Pin 5 and Pin 4 of CN101

*2 See (2) waveform in item 11 of Chapter 7.

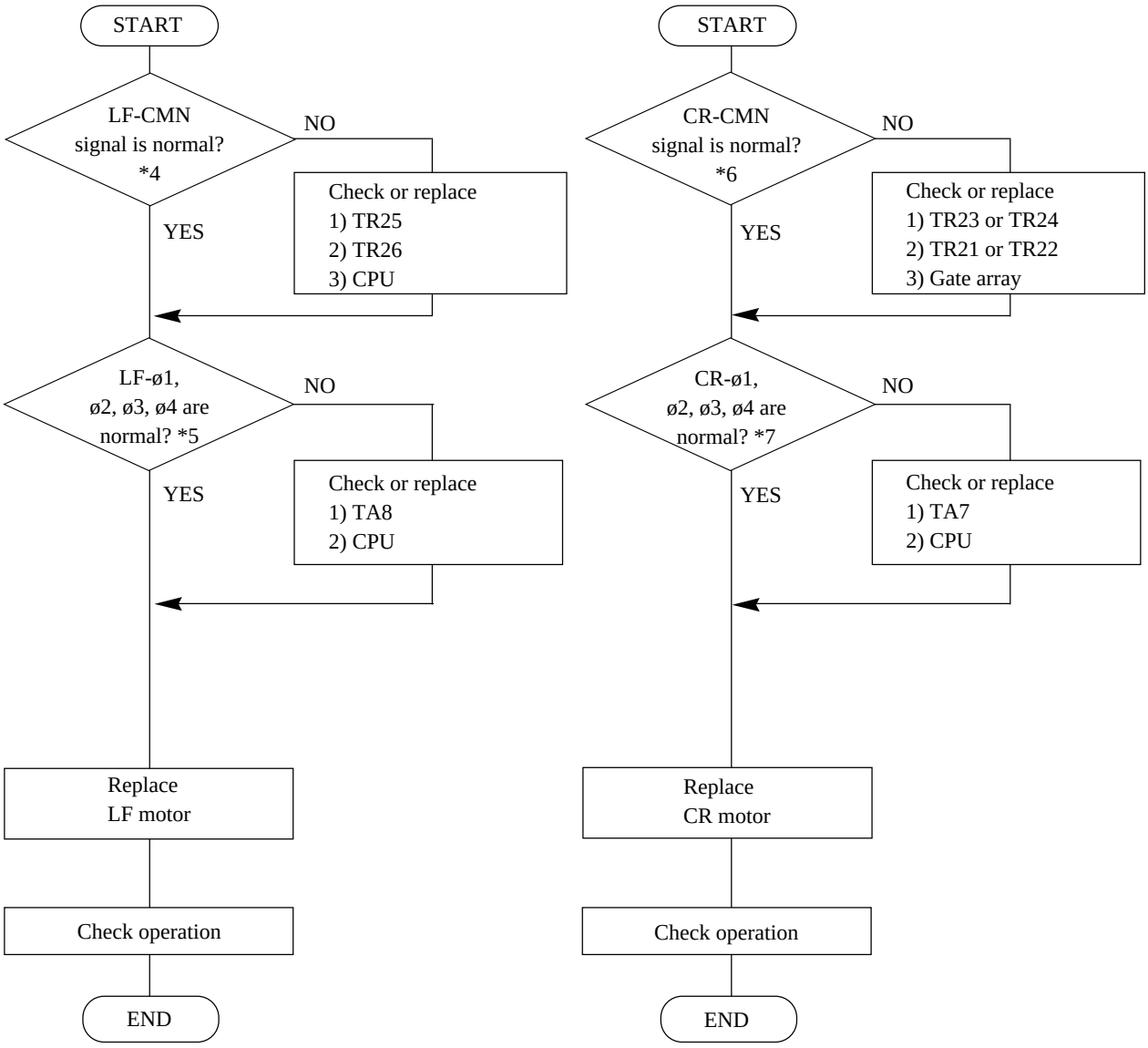
*3 See (1) waveform in item 11 of Chapter 7.

4-2. Power Supply Circuit Abnormal

(1) Remove connector CN9 from the main logic board.

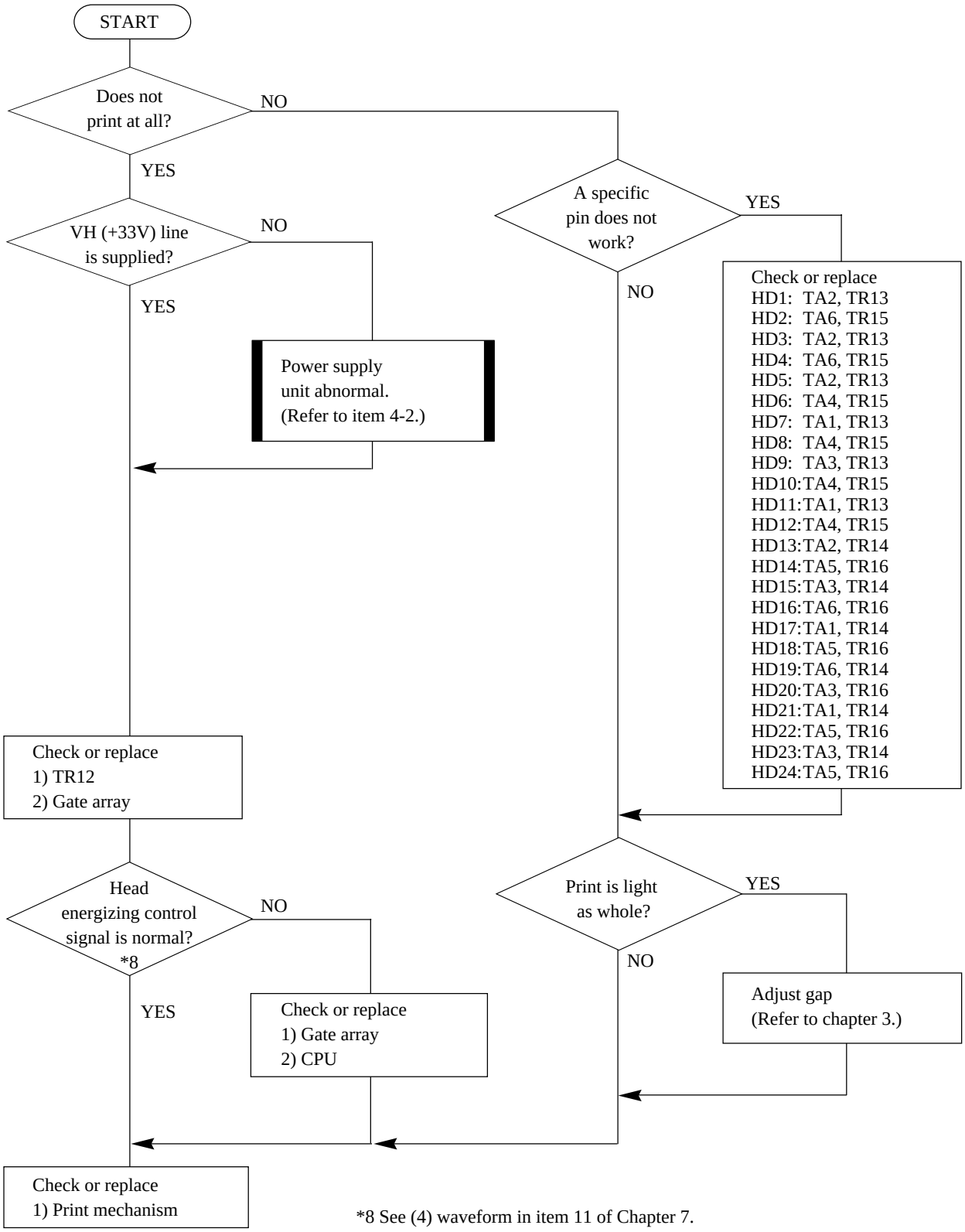


4-3. Defective Motor Operation



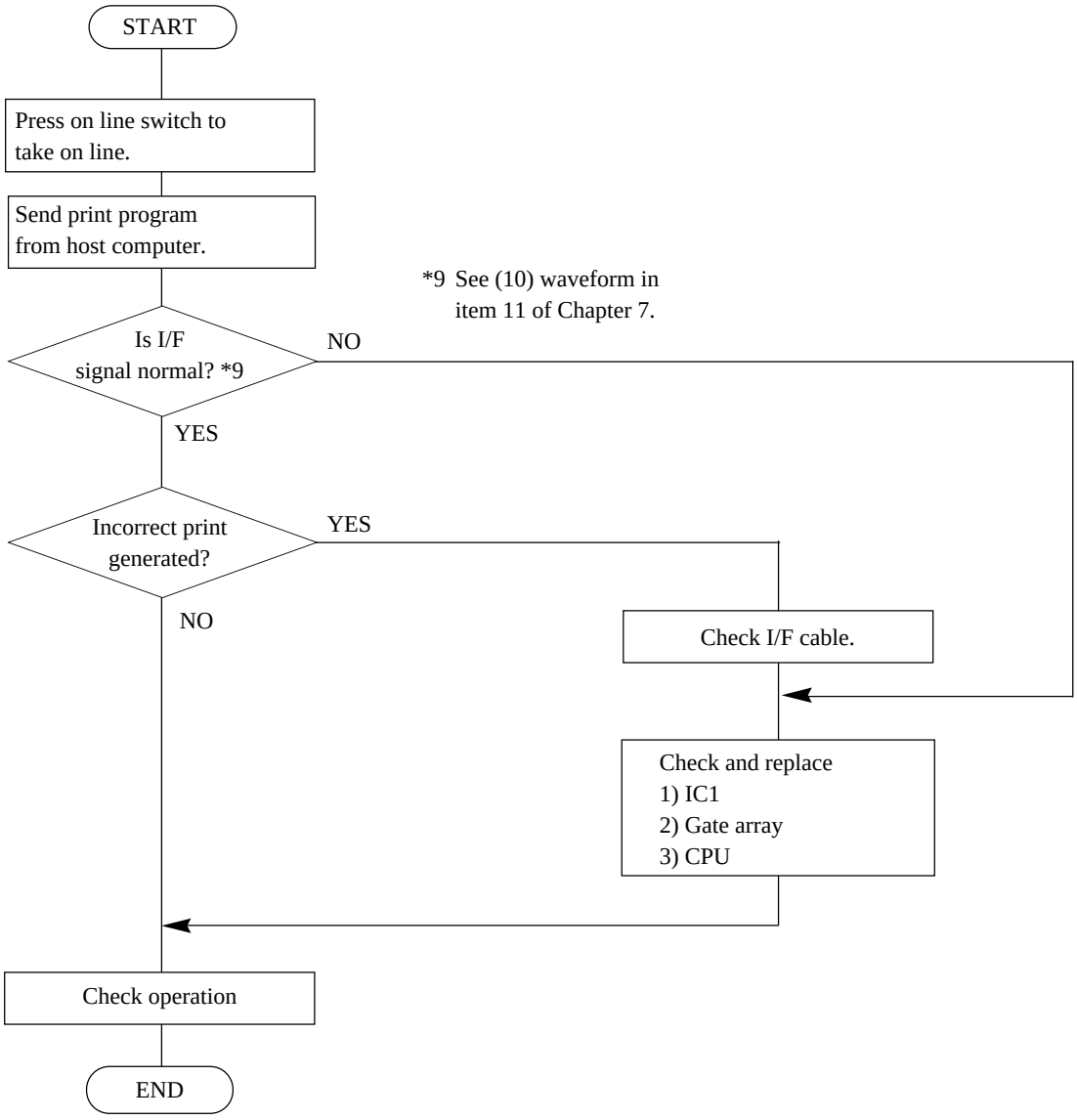
*4 See (8) waveform in item 11 of Chapter 7.
*5 See (9) waveform in item 11 of Chapter 7.
*6 See (6) waveform in item 11 of Chapter 7.
*7 See (7) waveform in item 11 of Chapter 7.

4-4. Defective Print Head Operation



*8 See (4) waveform in item 11 of Chapter 7.

4-5. Defective Parallel Interface Operation



CHAPTER 7
PARTS LIST

HOW TO USE PARTS LIST

(1) DRWG. NO.
This column shows the drawing number of the illustration.

(2) REV.
This column shows a revision number.
Part that have been added in the revised edition are indicated with "#".
Part that have been abolished in the revised edition are indicated with "*".
#1: First edition→Second edition *1: First edition → Second edition

(3) PARTS NO.
Parts numbers must be notified when ordering replacement parts.

(4) PARTS NAME
Parts names must be notified when ordering replacement parts.

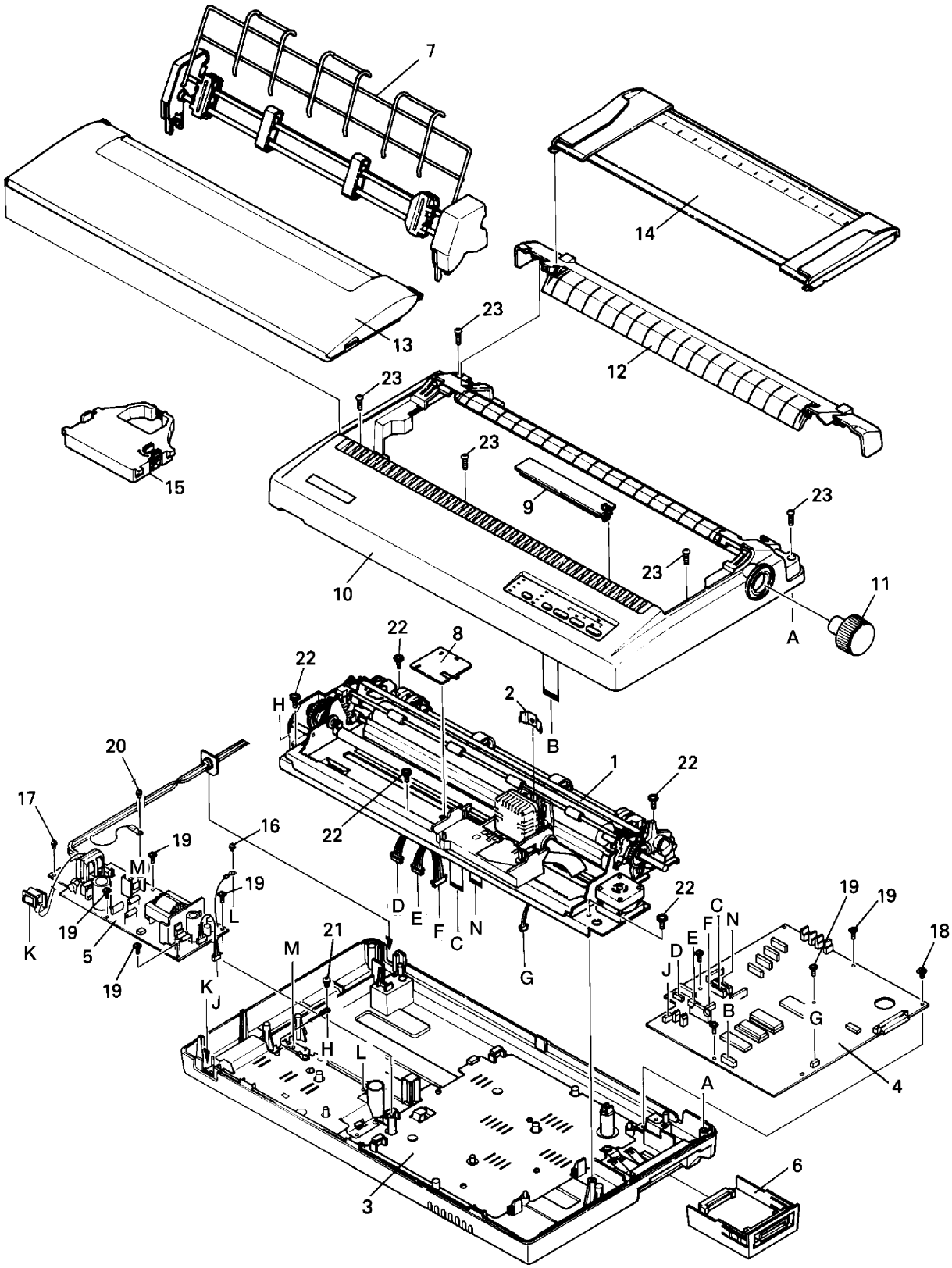
(5) Q'TY
This column shows the number of the part used as indicated in the figure.

(6) REMARKS
When there are differences in the specifications of the fuse, destinations, etc., the differences are described in words or indicated by two letters.
US ..... U.S.A. EC ..... EC UK .....United Kingdom HK ..... Hong Kong
The seal number of ROM is described in this column. The "**" mark of seal number is a variable representing on the software version.

(7) RANK
Parts marked "S" are service parts. Service parts are recommended to be in stock for maintenance.

1. Printer Assembly

1-1. Disassembly Drawing



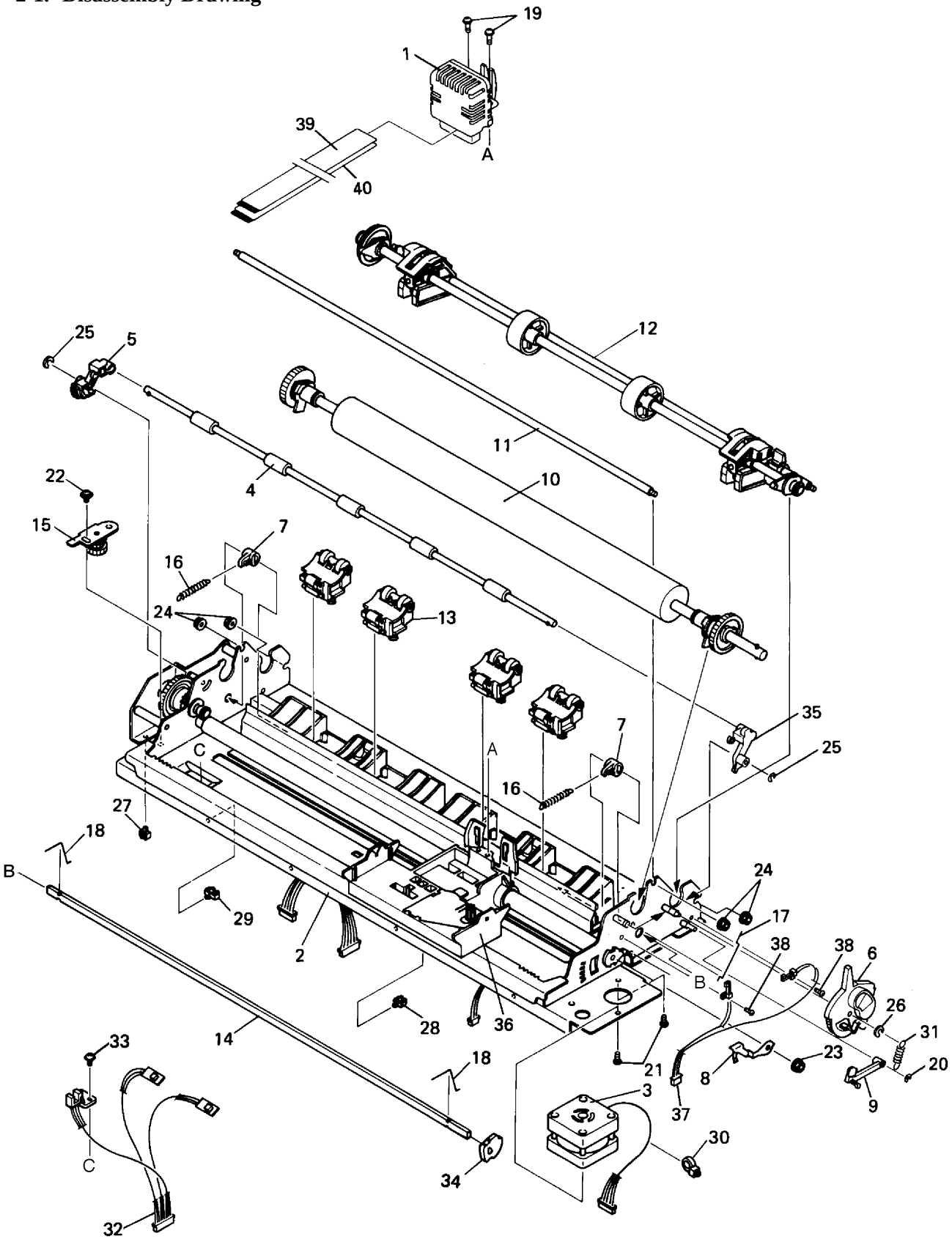
1-2. Parts List

Printer Assembly

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
1	*1	89424710	MECHANISM WITH HEAD DP795	1		S
	#1	89424711	MECHANISM WITH HEAD DP795B	1		S
2		82900813	RIBBON HOLDER 921	1		S
3		87811110	LOWER CASE UNIT XBL-15II	1	EXCEPT FOR EC	S
		87811160	LOWER CASE UNIT XBL-15II EC	1	FOR EC	S
4		87812320	MAIN LOGIC BD UNIT XBL-15II HK	1	FOR HK	S
	#1	87812400	MAIN LOGIC BD UNIT XBL-15II SU	1	FOR SU	S
		87812250	MAIN LOGIC BD UNIT XBL-15II	1	EXCEPT FOR HK,SU	S
5		87813250	POWER SUPPLY UNIT XBL-15II US	1	FOR US	S
		87813260	POWER SUPPLY UNIT XBL-15II EC	1	FOR EC	S
		87813430	POWER SUPPLY UNIT XBL-15II UK	1	FOR UK	S
		87813410	POWER SUPPLY UNIT XBL-15II HK	1	FOR HK	S
6		87808010	CARTRIDGE PAR UNIT Z15	1		S
		87299220	SERIAL CARTRIDGE IS-8XL UPC	1	FOR US :OPTION	
		87299240	SERIAL CARTRIDGE IS-8XL JAN HK	1	FOR HK :OPTION	
		87299230	SERIAL CARTRIDGE IS-8XL JAN	1	EXCEPT US,HK :OPTION	
		89597010	BUFFER CARTRIDGE IP-128XL UPC	1	FOR US :OPTION	
		89597030	BUFFER CARTRIDGE IP-128XLHKJAN	1	FOR HK :OPTION	
		89597020	BUFFER CARTRIDGE IP-128XL JAN	1	EXCEPT US,HK :OPTION	
7		87299190	PULL TRACTOR UNIT PT-15XJ JAN	1	EXCEPT FOR US:OPTION	
		87299160	PULL TRACTOR UNIT PT-15XJ UPC	1	FOR US :OPTION	
8		83910912	CABLE HOLDER 921	1		S
9		83025810	ROM COVER XBL-15II	1		S
10		87810200	UPPER CASE UNIT XBL-15II US	1	FOR US,HK	S
		87810210	UPPER CASE UNIT XBL-15II EC	1	FOR EC,UK	S
11		87816230	PLATEN KNOB UNIT XBL-15II	1		S
12	*1	83025800	REAR COVER XBL-15II	1		S
	#1	83025801	REAR COVER XBL-15II	1		S
13	*1	83023420	PRINTER COVER NX-1500	1		S
	#1	83023421	PRINTER COVER NX-1500	1		S
14		87816240	PAPER GUIDE UNIT XBL-15II	1		S
15		80982030	INK RIBBON CARTRIDGE JAN Z24	1	EXCEPT FOR US:OPTION	S
		80982270	INK RIBBON CARTRIDGE UPCLZ24HD	1	FOR US :LONG LIFE	
		80982410	INK RIBBON CARTRIDGE JANLZ24HD	1	EXCEPT US :LONG LIFE	
16		01903088	SCREW TAT 3-6 WS	1		S
17		01903086	SCREW TAT 3-8 WS/WF	1		S
18		01903055	SCREW TR 3-8 WS/WF	1		S
19		01903038	SCREW TAT 3-10 PT-FL	8		S
20		01914036	SCREW TR 4-5 WS	1		S
21		01914034	SCREW TAT 4-8 CT-WF	1		S
22		01914031	SCREW TAT 4-12 PT-FL	5		S
23		01914030	SCREW TAT 4-15 PT	5		S
-		89590183	ASF SF-15DJ US	1	FOR US :OPTION	
		89590181	ASF SF-15DJ WG	1	FOR EC :OPTION	
		89590180	ASF SF-15DJ UK	1	FOR UK :OPTION	
		89590186	ASF SF-15DJ HK	1	FOR HK :OPTION	

2. Printer Mechanism

2-1. Disassembly Drawing



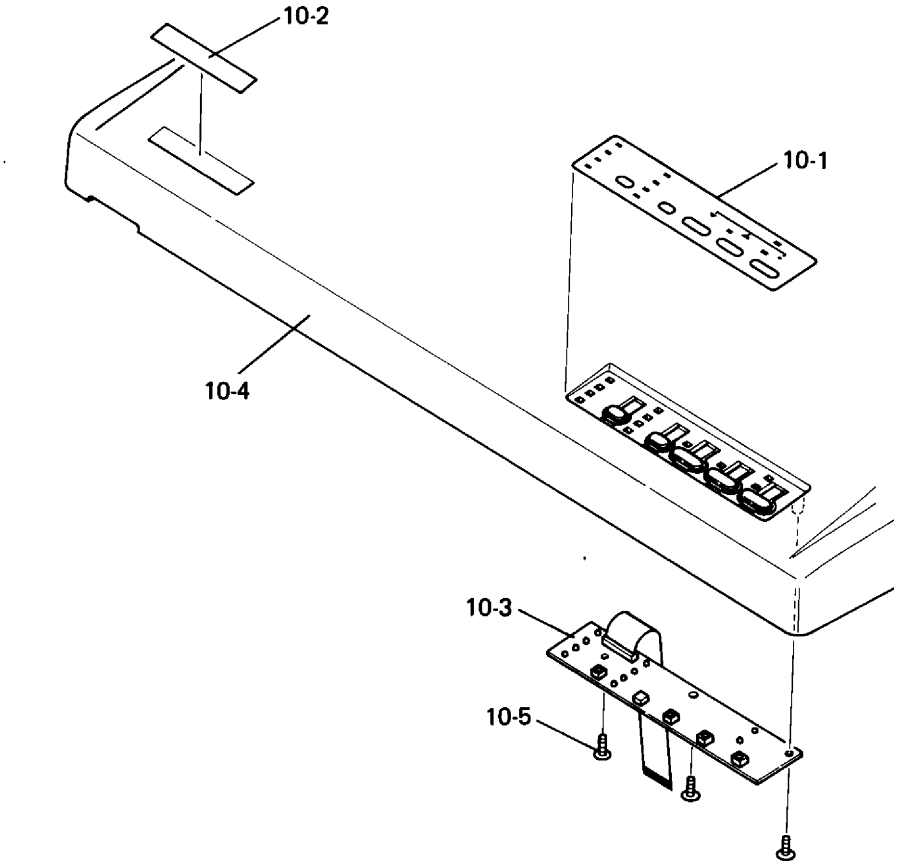
2-2. Parts List

Printer Mechanism

DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
1		89149910	PRINT HEAD DP790B		1		S
2	*2	87420090	FRAME UNIT	795	1		
3		87421030	CARRIAGE MOTOR UNIT	795	1		S
4		87067170	BAIL ROLLER SHAFT UNIT	935	1		
5		83400650	BAIL LEVER L	935	1		S
6		83400471	RELEASE LEVER	921	1		S
7		83400670	SPRING HOLDER LEVER	935	2		
8		82401141	ADJUSTING LEVER	935	1		
9		83401230	INDEX LEVER	795	1		
10		87063070	PLATEN UNIT	925	1		S
11		81370660	TRACTOR STAY	935	1		
12		87066050	TRACTOR UNIT	935	1		S
13		87067180	ROLLER HOLDER UNIT	935	4		S
14		81380520	RELEASE SHAFT	935	1		
15	*1	87067030	TENSION LEVER UNIT	921	1		
	#1	87427020	TENSION LEVER UNIT	741	1		
16	*1	80510930	SPRING E056-060-0397		2		S
	#1	80510931	SPRING E056-060-0397		2		S
17		80530571	GROUND CONTACT SPRING	921	1		S
18		80530661	HOLDER SPRING	935	2		S
19		01903068	SCREW TAT 3-12 CT		2		S
20		04020010	STOP RING SE2.0		1		S
21		00830604	SCREW TR 3-6		2		S
22		01903018	SCREW TR 3-6 WS/WF		1		S
23		02040404	FLANGED NUT NHW4.0-S		1		S
24		02020401	HEXAGON NUT NH4-2		4		S
25		04020015	STOP RING SE3.0		2		S
26		04020016	STOP RING SE4.0		1		S
27		04991214	MINI CORD CLAMP UAMS-05-0		1		S
28		04991230	MINI CORD CLAMP UAMS-05-SN		1		S
29		04991232	MINI CORD CLAMP UAMS-05SN-W		2		S
30		04991204	FASTENER T18S		3		S
31		80511110	SPRING E065-090-0229		1		S
32		87060780	DETECTOR UNIT A ASSY	925	1		
33		01903073	SCREW TR 3-6 FL SPECIAL		1		
34		83100612	RELEASE GEAR	921	1		
35		83400660	BAIL LEVER R	935	1		
36		87420440	CARRIAGE UNIT	795	1		
37		87060700	DETECTOR UNIT B ASSY	935	1		
38		00926603	SCREW TAT 2.6-6 CT		2		
39		80755340	HEAD CABLE S	7905	1		S
40		80755350	HEAD CABLE L	7905	1		S

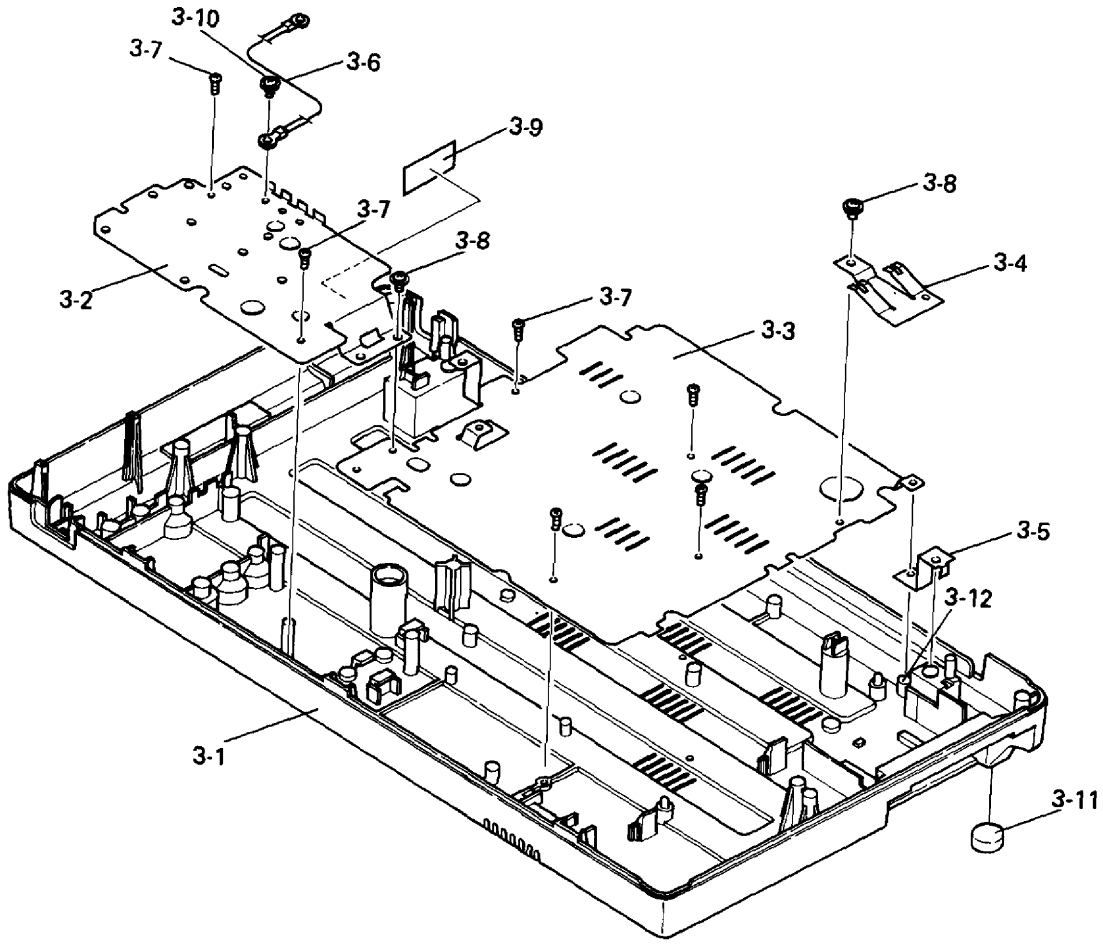
3. Sub-assembly

3-1. Upper Case Unit



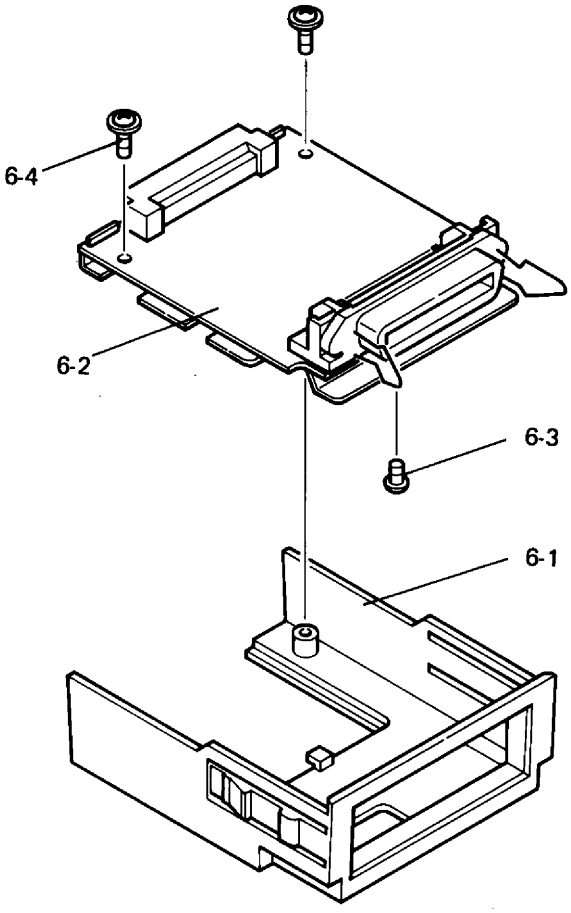
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
10-1		80087830	OPERATION SHEET XBL-15II	1		S
10-2		80060140	BRAND SEAL XBL-15II US	1	FOR US,HK	S
		80060150	BRAND SEAL XBL-15II EC	1	FOR EC,UK	S
10-3		87810580	CONTROL PANEL BD UNIT XBL-15II	1		S
10-4	*1	83025780	UPPER CASE XBL-15II	1		
	#1	83025781	UPPER CASE XBL-15II	1		
10-5		01903038	SCREW TAT 3-10 PT-FL	3		S
-		80992560	SHEET U1 NX-2415	1		
	*1	80992570	SHEET U2 NX-2415	1		
	#2	80992571	SHEET U2 NX-2415	1		
		80992740	SHEET U3 NX-2415	1		
	*1	80992750	SHEET U4 NX-2415	1		
	#1	80992751	SHEET U4 NX-2415	1		
	*1	80991850	SHEET U4 NX-2400	1		
	#2	80991851	SHEET U4 NX-2400	1		

3-2. Lower Case Unit



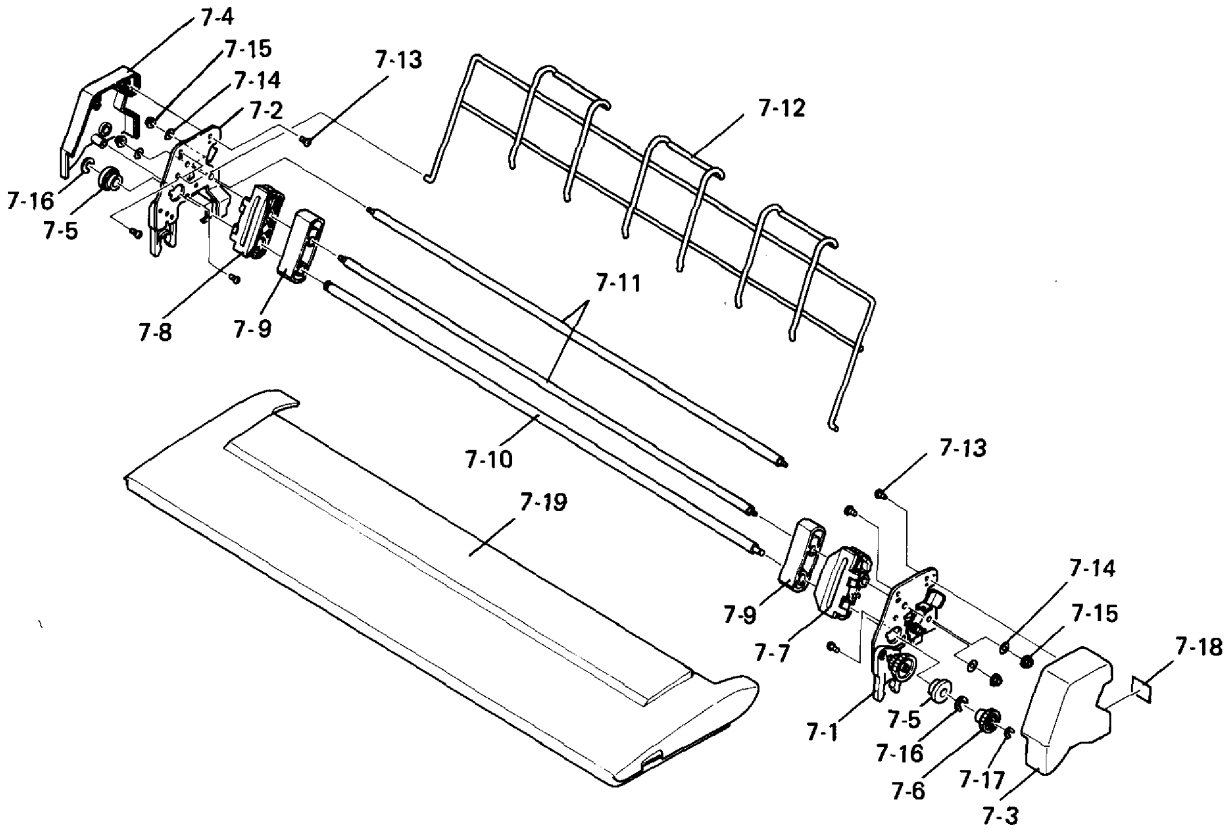
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
3-1	*1	83025790	LOWER CASE XBL-15II	1	WITHOUT 3-12	
	#1	83025791	LOWER CASE XBL-15II	1	WITHOUT 3-12	
3-2		82011570	POWER CHASSIS XBL-15II	1		
3-3		82010930	BOARD CHASSIS NX-2415	1		
3-4		82501050	GROUND SPRING NX-1500	1		
3-5	*2	82901420	GROUND BRACKET NX-2415	1		
	#2	82901421	GROUND BRACKET NX-2415	1		
3-6		80925381	MESHED GROUND WIRE 80-A	1		
3-7		00930803	SCREW TAT 3-8 PT	6		
3-8		01914034	SCREW TAT 4-8 CT-WF	2		
3-9		80086480	CAUTION SEAL LC-10II SC	1	FOR EC	
3-10		01903088	SCREW TAT 3-6 WS	1		
3-11		80991610	RUBBER FOOT NB24-10	6		
3-12		80290070	HEAT PRESSURE HOLDER M3-6	1		
-	*1	80992580	SHEET L1 NX-2415	1		
	#1	80992581	SHEET L1 NX-2415	1		
		80992770	SHEET L2 NX-2415	1		
	*1	80992780	SHEET L3 NX-2415	1		
	#1	80992781	SHEET L3 NX-2415	1		
	*1	80992790	SHEET L4 NX-2415	1		
	#1	80992791	SHEET L4 NX-2415	1		

3-3. Interface Cartridge Unit



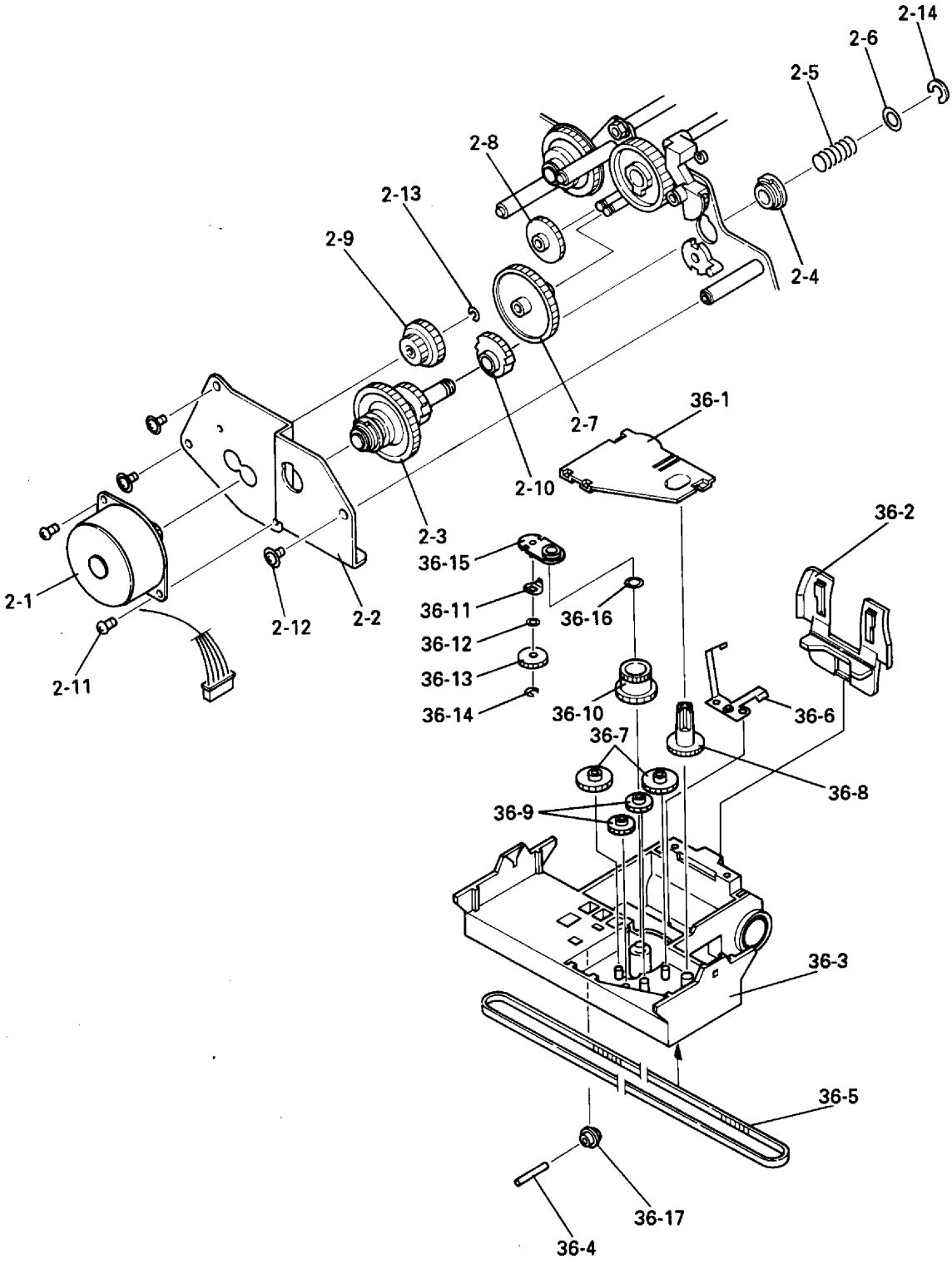
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
6-1	*1	83024920	INTERFACE COVER ZB-15	1		
	#1	83024921	INTERFACE COVER ZB-15	1		
6-2		87297030	PARALLEL IF BOARD UNIT NX-1500	1	WITHOUT BUFFER	S
		87299260	SERIAL I/F BOARD UNIT X15	1	EXCEPT FOR HK	
		87299270	SERIAL I/F BOARD UNIT X15 HK	1	FOR HK	
		87590060	BUFFER BOARD UNIT IP-128XL	1	EXCEPT FOR HK	
		87590070	BUFFER BOARD UNIT IP-128XL HK	1	FOR HK	
6-3		01903064	SCREW TAT 3-5 CT	1		S
6-4		01903038	SCREW TAT 3-10 PT-FL	2		S

3-4. Pull Tractor Unit (option)



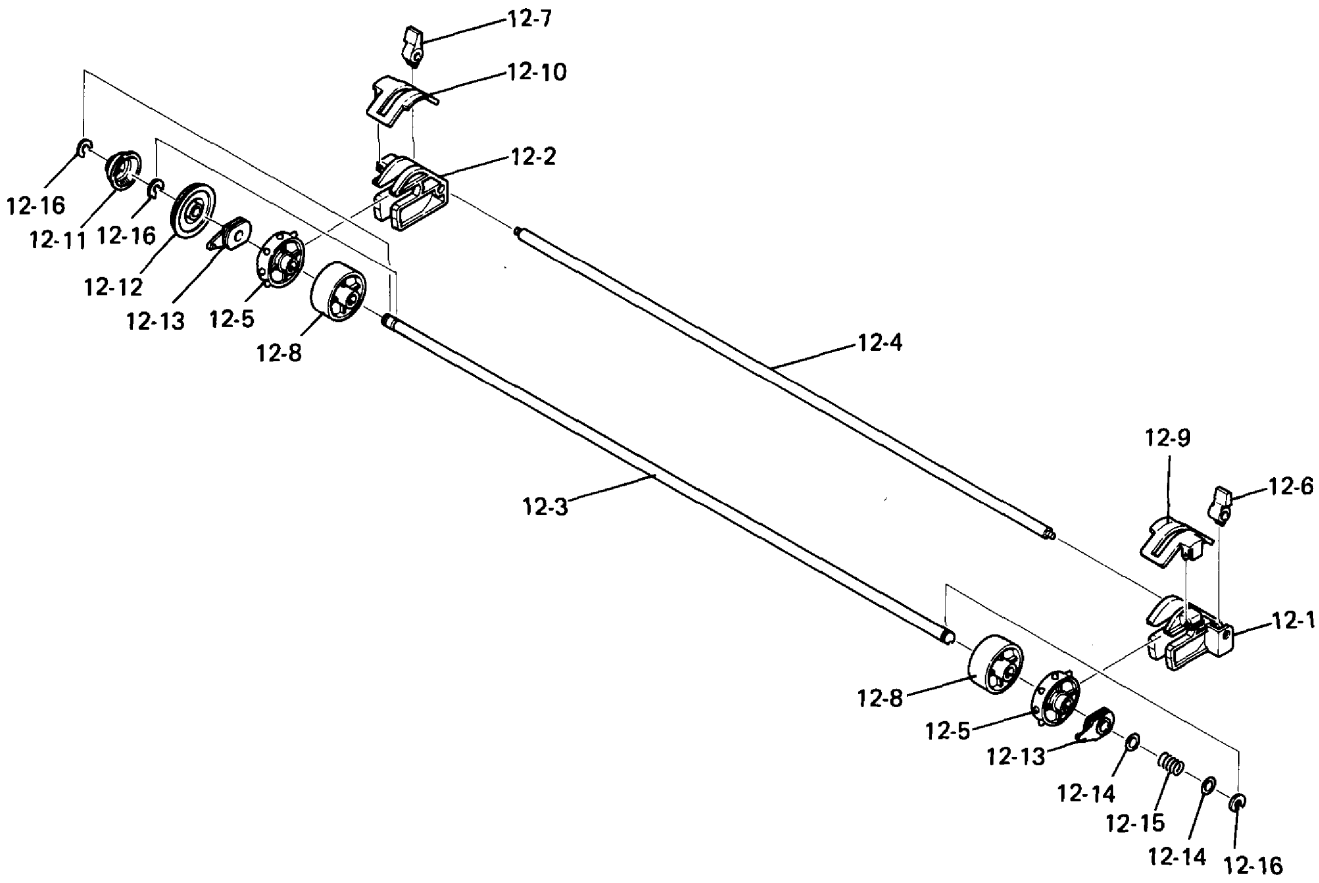
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
7-1		87299340	FRAME R UNIT PT-15X	1		
7-2		87299350	FRAME L UNIT PT-15X	1		
7-3		83023560	TRACTOR COVER R PT-15X	1		
7-4		83023570	TRACTOR COVER L PT-15X	1		
7-5		83200090	BUSHING 848	2		
7-6		83101140	GEAR 32X0.5 PT-15X	1		
7-7		80906030	TRACTOR UNIT R 905	1		
7-8		80906040	TRACTOR UNIT L 905	1		
7-9	*1	83911060	SHEET GUIDE 905	2		
	#1	83911061	SHEET GUIDE 905	2		
7-10	*1	81360640	TRACTOR SHAFT PT-15X	1		
	#1	81360641	TRACTOR SHAFT PT-15X	1		
7-11		81370670	TRACTOR STAY PT-15X	2		
7-12		80530750	PAPER GUIDE PT-15X	1		
7-13		01902609	SCREW TAT 2.6-5 PT	6		
7-14		02440401	WAVE WASHER WW4X8X0.2X1.5H	4		
7-15		02040301	FLANGED NUT NHW3	4		
7-16		04020017	STOP RING SE5.0	2		
7-17		04020015	STOP RING SE3.0	1		
7-18		80082570	BRAND SEAL PT-15XJ	1		
7-19		83023620	PRINTER COVER PT-15X	1		

3-5. Frame Unit



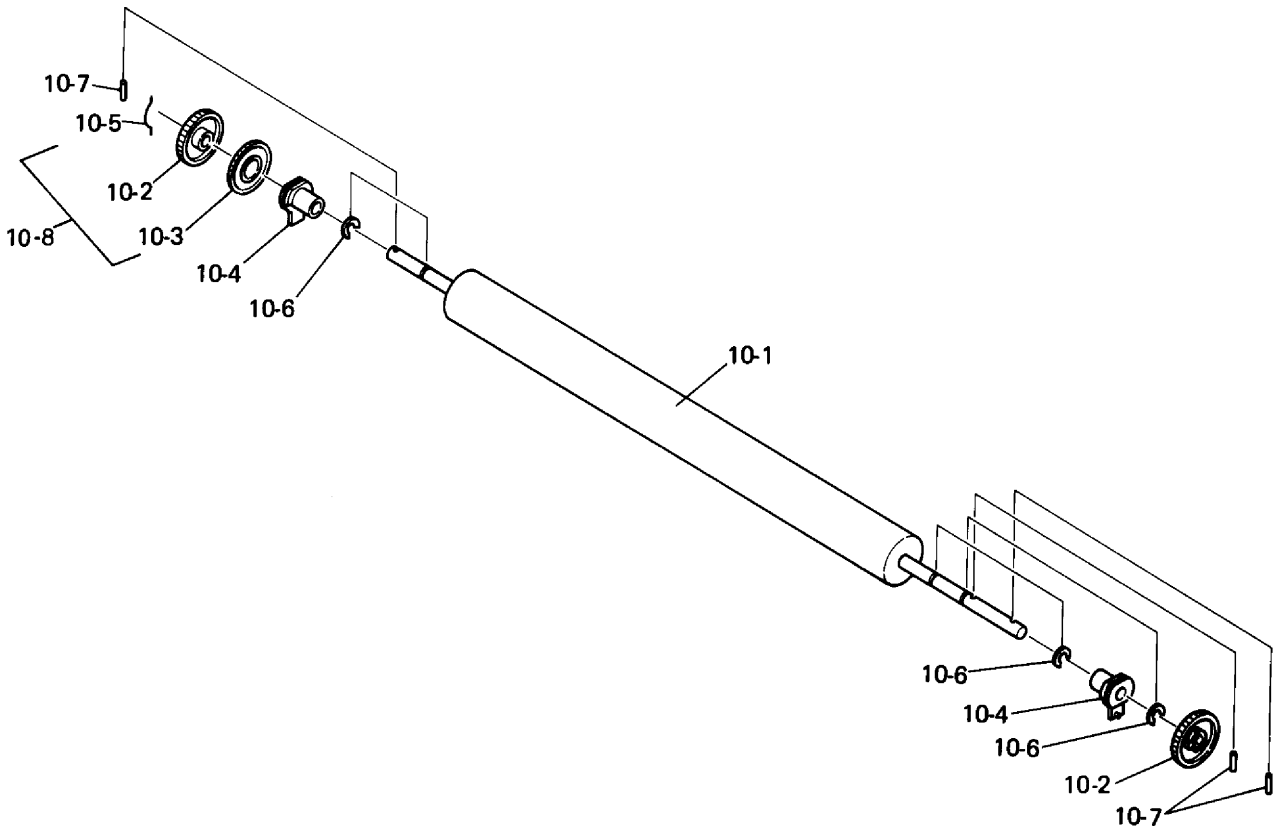
DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
2-1	*1	87060760	PAPER FEED MOTOR ASSY	925	1		S
	#1	87420690	PAPER FEED MOTOR ASSY	795	1		S
2-2		87060770	PF MOTOR PLATE ASSY	925	1		S
2-3		87060751	CLUTCH SHAFT ASSY	935	1		S
2-4		83200490	BUSHING F7X16X6.5		1		
2-5		80520640	SPRING C080-035-0216		1		
2-6		02307050	POLY-SLIDER WP7X0.5		1		
2-7		83100580	IDLER GEAR 16X60		1		
2-8		83100510	GEAR 40X0.5		1		
2-9		83101100	IDLER GEAR 24X40X0.5	935	1		S
2-10		83101090	GEAR 22X1.0	935	1		
2-11		01903064	SCREW TAT 3-5 CT		2		S
2-12		01903031	SCREW TR 3-6 FL		3		
2-13		04020010	STOP RING SE2.0		1		S
2-14		04020017	STOP RING SE5.0		1		
36-1		83912220	GEAR COVER	795	1		S
36-2		83902300	CARD HOLDER	935	1		S
36-3		87420660	CARRIAGE ASSY	795	1		
36-4		81302831	ROLLER SHAFT	981	1		
36-5		80902140	TIMING BELT HTD102 524X4.8		1		
36-6		82501420	GROUND SPRING	795	1		
36-7		83101370	GEAR 48X0.3	965	2		
36-8		83120470	RIBBON CASSETTE GEAR	921	1		S
36-9		83100721	RF IDLER GEAR 37X0.3	905	2		S
36-10	*1	83100600	IDLER GEAR 16X1-40		1		S
	#1	87420730	GEAR ASSY	795B	1		S
36-11		82210031	WAVE WASHER	891	1		S
36-12		02303026	POLY-SLIDER WP3X8X0.25		1		S
36-13		83100541	IDLER GEAR 17X41X0.3		1		S
36-14		04020002	STOP RING SE1.5		1		S
36-15		87412910	CLUTCH PLATE ASSY	102	1		S
36-16		02305025	POLY-SLIDER WP5X0.25		1		
36-17		83200990	REAR ROLLER	981	1		

3-6. Tractor Unit



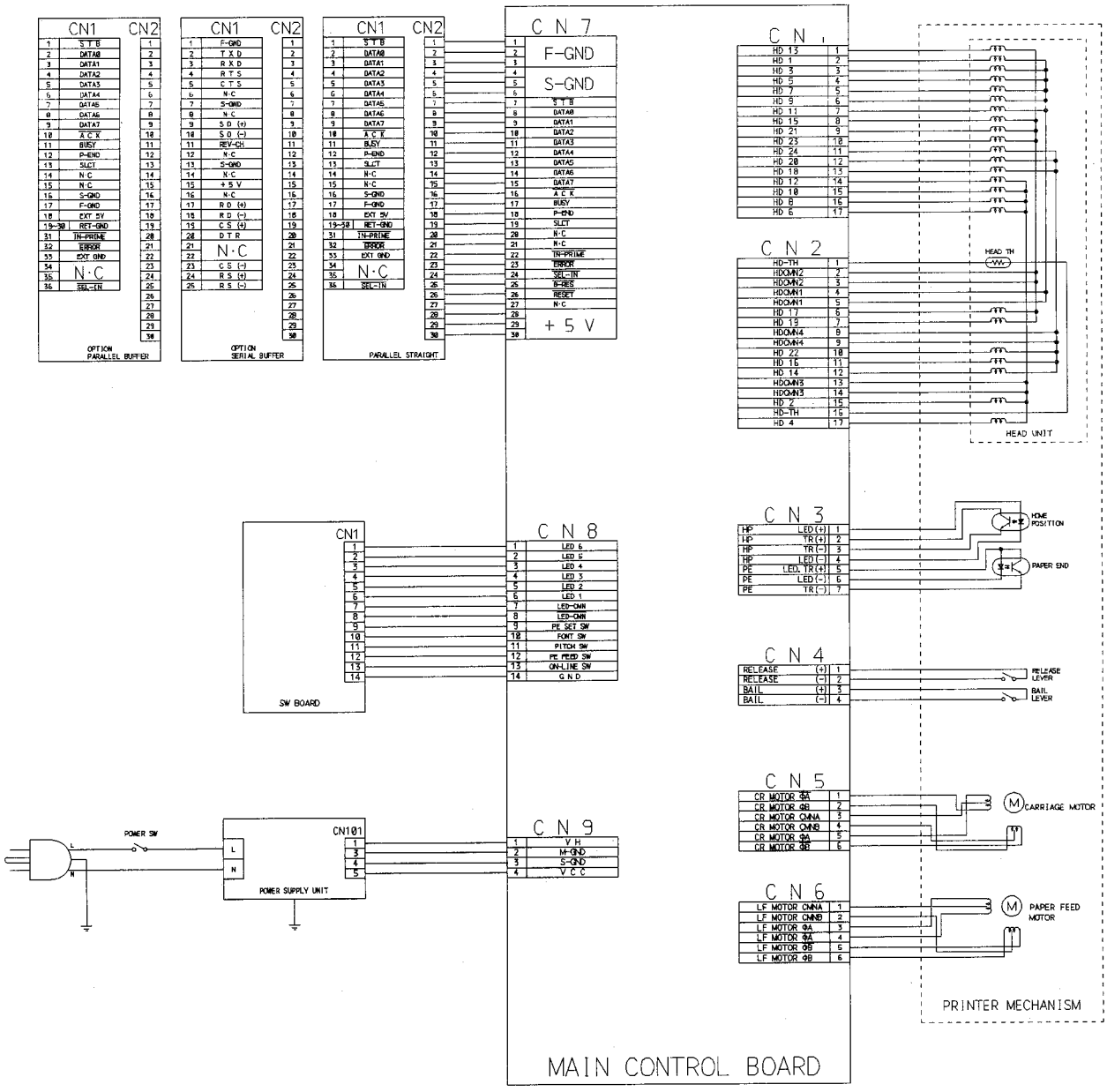
DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
12-1		83901620	TRACTOR HOLDER R	891	1		S
12-2		83901631	TRACTOR HOLDER L	891	1		S
12-3	*1	81360620	TRACTOR SHAFT	935	1		
	#1	81360622	TRACTOR SHAFT	935	1		
12-4		81370660	TRACTOR STAY	935	1		
12-5		83110110	SPROCKET WHEEL	891	2		S
12-6		83400311	CLAMP LEVER R	831	1		S
12-7		83400321	CLAMP LEVER L	831	1		S
12-8	*1	83901600	SHEET GUIDE	891	2		
	#1	83901601	SHEET GUIDE	891	2		
12-9		83910861	TRACTOR COVER R	891	1		S
12-10		83910871	TRACTOR COVER L	891	1		S
12-11		83110100	TRACTOR CLUTCH	891	1		S
12-12		83100530	TRACTOR GEAR 64X0.5		1		S
12-13		83200700	TRACTOR BUSHING	905	2		
12-14		02307050	POLY-SLIDER WP7X0.5		2		S
12-15	*1	80520350	SPRING C090-070-0130		1		S
	#1	80520351	SPRING C090-070-0130		1		S
12-16		04020017	STOP RING SE5.0		3		S

3-7. Platen Unit



DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
10-1		80202111	PLATEN	925	1		
10-2		83100550	PLATEN GEAR A	891	2		S
10-3		83100560	PLATEN GEAR B	891	1		S
10-4		83902310	PLATEN HOLDER	935	2		
10-5		80530520	PLATEN GEAR SPRING	891	1		S
10-6		04020022	STOP RING SE6.0-SUS		3		S
10-7		04012502	ROLL PIN SP2.5X12		3		
10-8		87063340	PLATEN GEAR ASSY	891B	1	WITH 10-2,3,5	S

4. Wiring Scheme of The Printers



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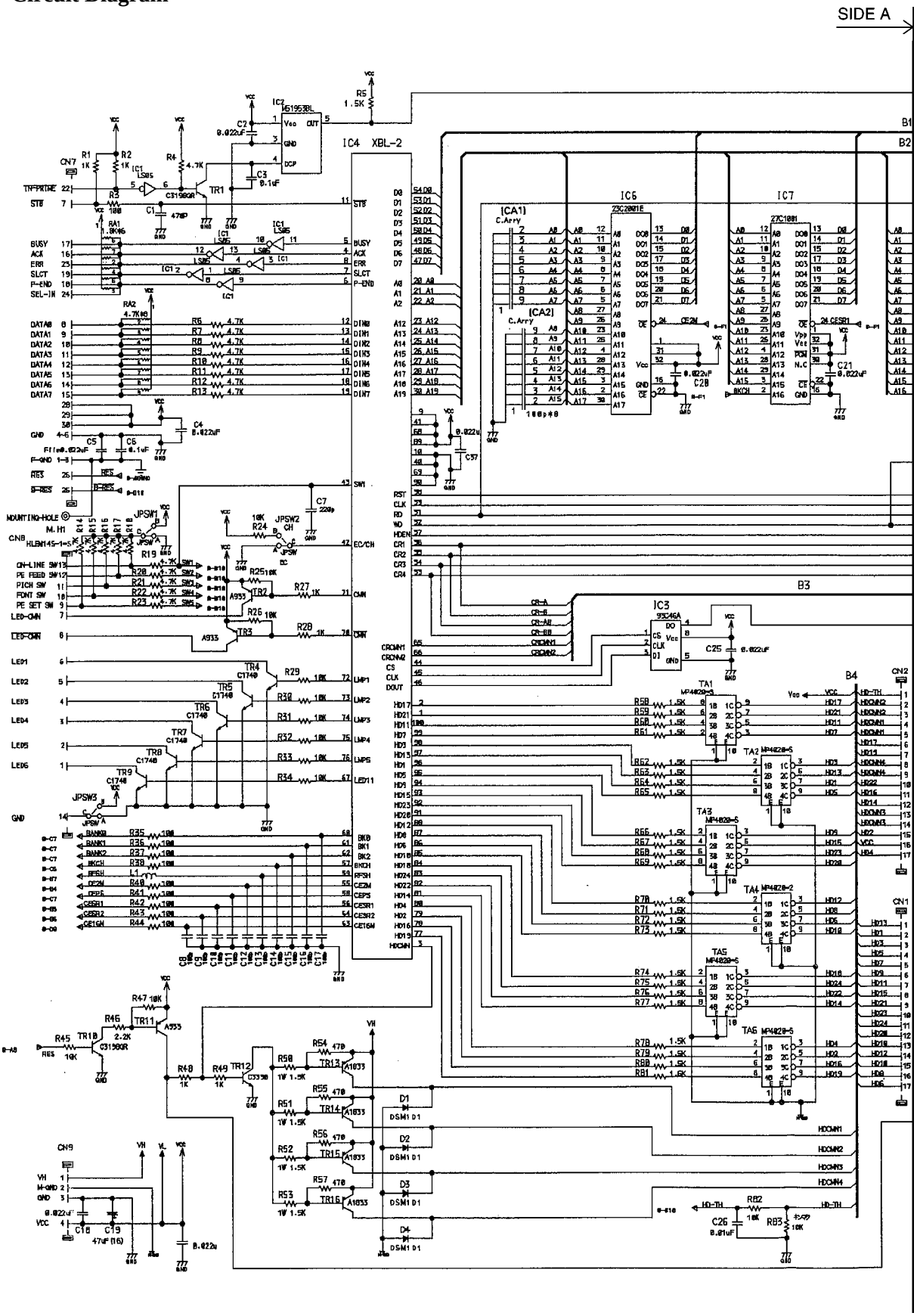
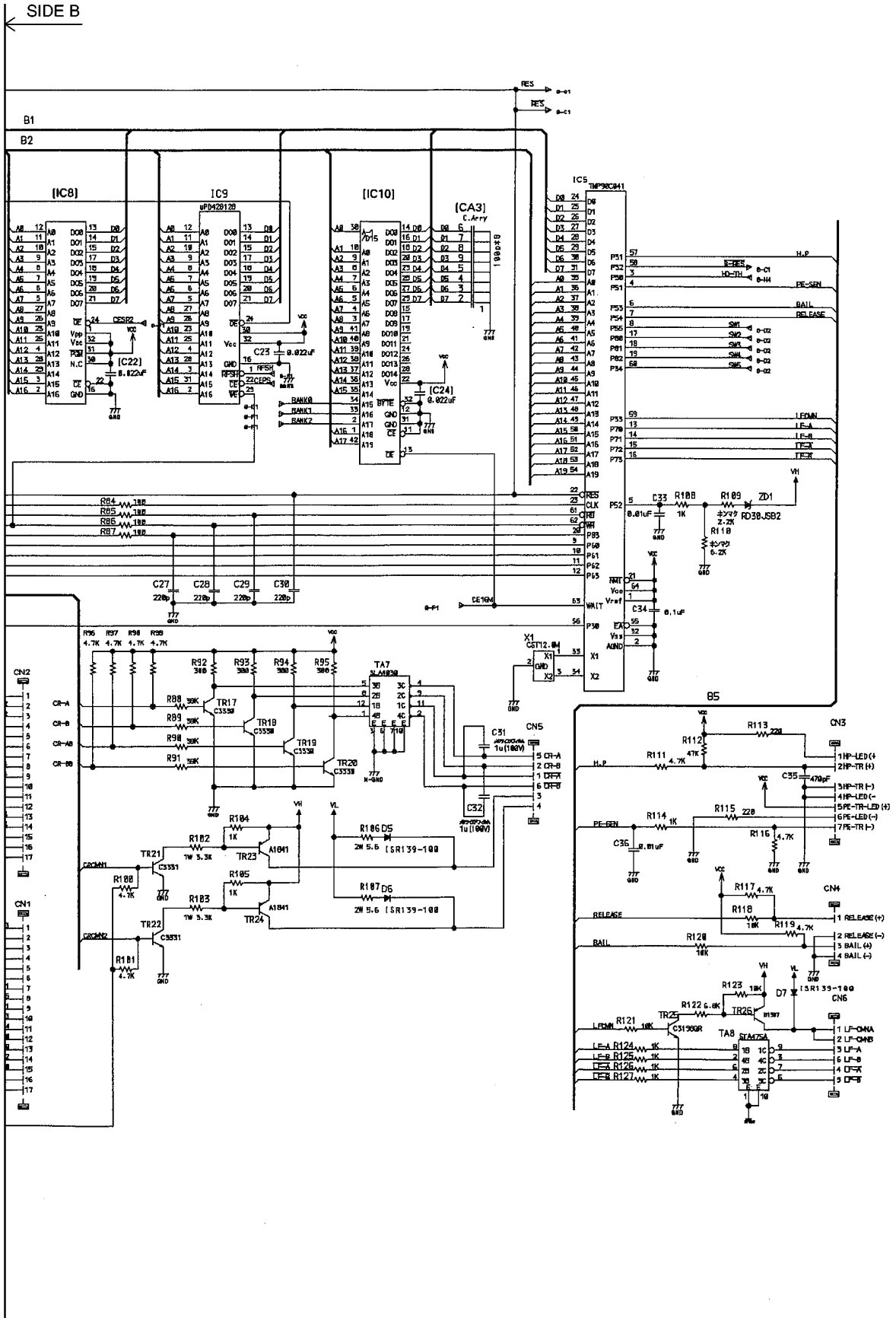
5. Main Logic Board

5-1. Circuit Diagram




SIDE B
B1
B2
[IC8]
IC9
[IC10]
[CA3]
IC5
TMP90C841
[C22]
[C24]
C23
CN1
CN2
CN3
CN4
CN5
CN6
B5
TA7
TA8
X1
ZD1
RD30.JSB2
TR17
TR18
TR19
TR20
TR21
TR22
TR23
TR24
TR25
TR26
D5
D6
D7
C31
C32
C33
C34
C35
C36
R84
R85
R86
R87
C27
C28
C29
C30
R92
R93
R94
R95
R96
R97
R98
R99
R88
R89
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R102
R103
R104
R105
R106
R107
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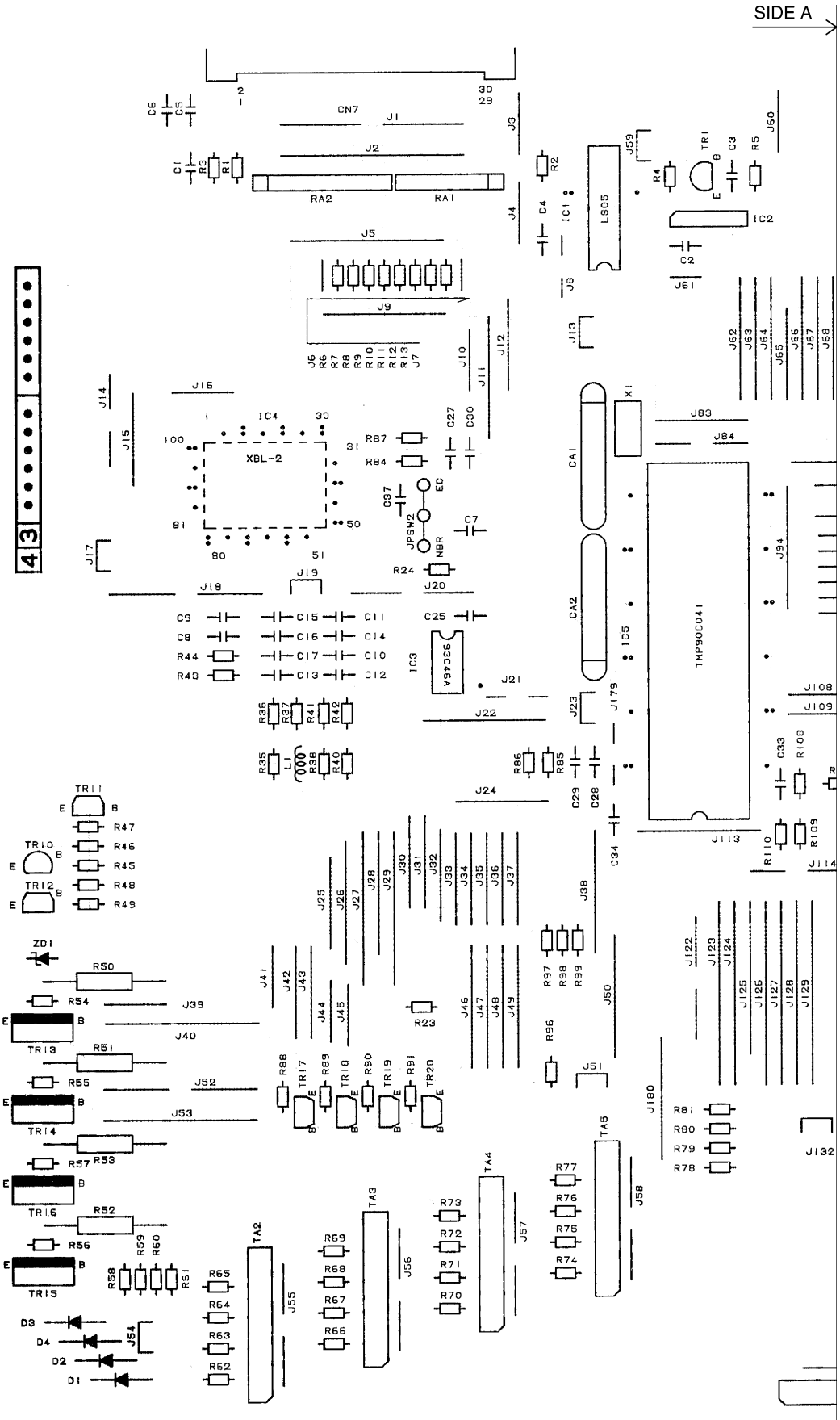
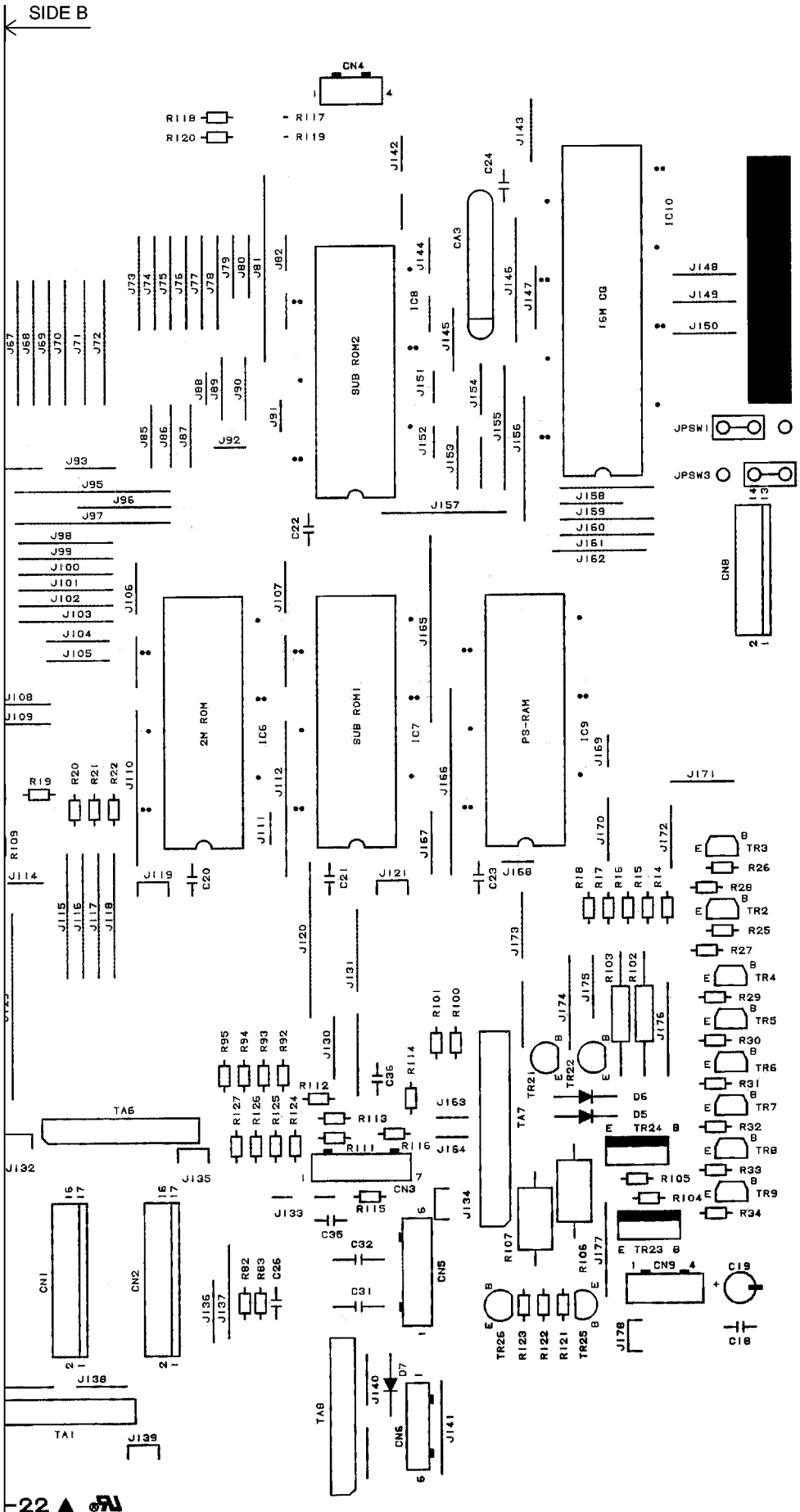
R109
R110
R111
R112
R113
R114
R115
R116
R117
R118
R119
R120
R121
R122
R123
R124
R125
R126
R127
CR-A
CR-B
CR-AB
CR-BB
RES
H.P
PE-SEN
BAIL
RELEASE
LFDMN
LF-A
LF-B
LF-CK
LF-DT
PE-GEN
1HP-LED(+)
2HP-TR(+)
3HP-TR(-)
4HP-LED(-)
5PE-TR-LED(+)
6PE-LED(-)
7PE-TR(-)
1 RELEASE(+)
2 RELEASE(-)
3 BAIL(+)
4 BAIL(-)
1 LF-DMA
2 LF-DMB
3 LF-A
6 LF-B
4 LF-A
5 LF-B

5-2. Component Layout




SIDE B
CN4
R118
R120
R117
R119
J142
J143
C24
IC10
16M CG
SUB ROM2
IC8
CA3
J148
J149
J150
JPSW1
JPSW3
CN8
J157
J158
J159
J160
J161
J162
C22
2M ROM
SUB ROM1
PS-RAM
IC6
IC7
IC9
J165
J166
J167
J168
J169
J170
J171
J172
J173
J174
J175
J176
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR21
TR22
TR23
TR24
TR25
D5
D6
D7
TA5
TA6
TA7
TA8
CN1
CN2
CN3
CN5
CN6
CN9
C19
C20
C21
C23
C25
C26
C31
C32
C35
C36
J132
J133
J134
J135
J136
J137
J138
J139
J140
J141
TA1
22 ▲

5-3. Parts List

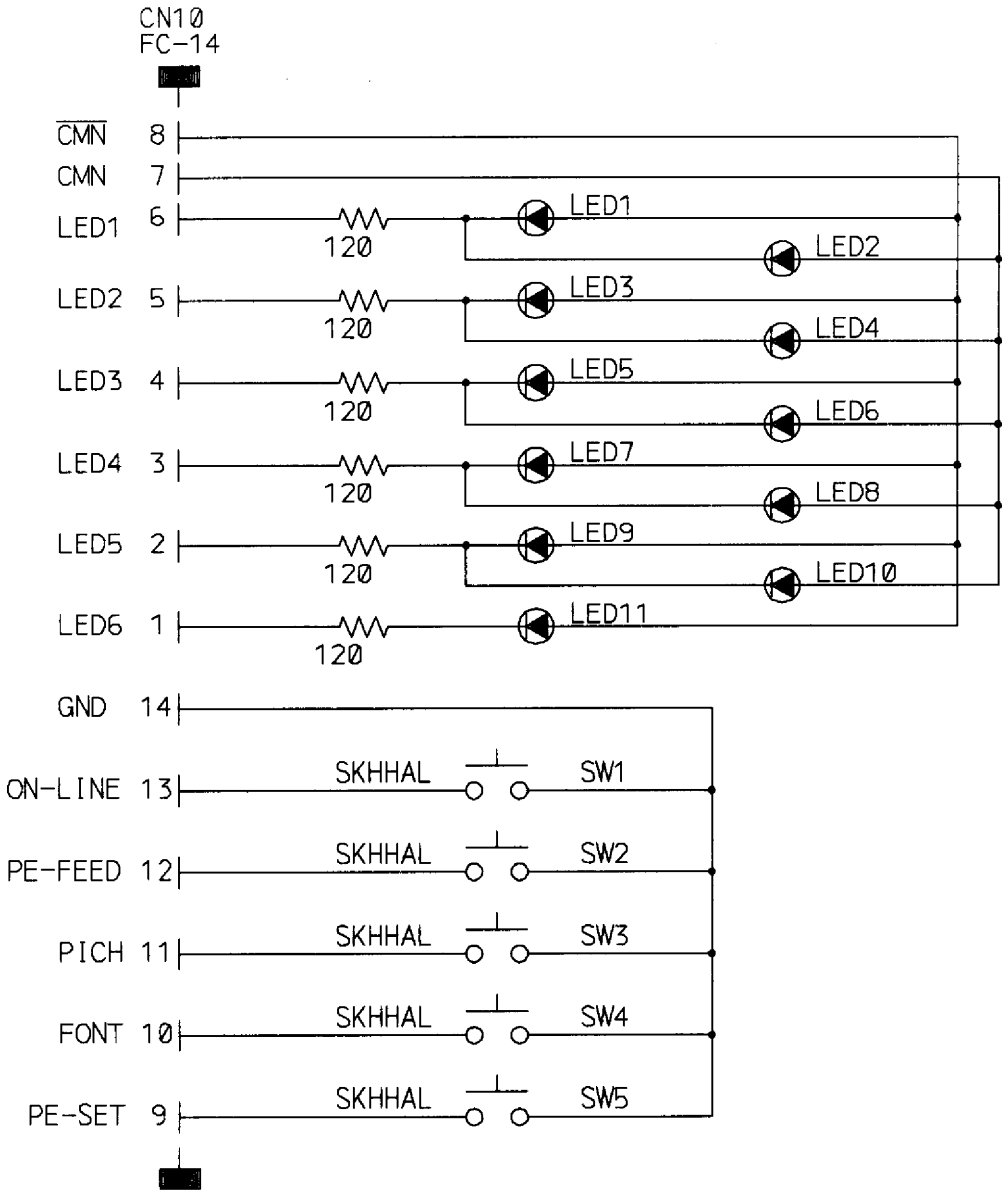
Main Logic Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08210017	TTL IC 74LS05	1		
IC2		08200109	IC-RESET M51953BL	1		
IC3		08222047	EEPROM KM93C46	1		
IC4		08240073	GATE ARRAY LC92015C-XBL3	1		S
IC5		08250007	CPU TMP90C041	1		
IC6		08223190	MASKED ROM 1.0 XBL-15II	1		S
IC7		09110077	IC SOCKET ICS-32-2T	1		
		08220116	EPROM 27512-150NS	1	XBL.15II.**	S
IC8		09110077	IC SOCKET ICS-32-2T	1		
	#1	08222017	EPROM D27C1001D-150NS	1	XBL.15II.SUCG:FOR SU	
IC9		08221041	PSRAM LC33864P-80	1		S
IC10					NOT MOUNTED	
TA1-6		07650054	TRANSISTOR ARRAY MP4020	6		S
TA7		07650053	TRANSISTOR ARRAY SLA4030	1		S
TA8		07650052	TRANSISTOR ARRAY STA45A	1		
TR1		07601002	TRANSISTOR 2SC3198GR*	1		
TR2-3		07009331	TRANSISTOR 2SA933S	2		
TR4-9		07227853	TRANSISTOR 2SC1740SE	6		
TR10		07601002	TRANSISTOR 2SC3198GR*	1		
TR11		07009331	TRANSISTOR 2SA933S	1		
TR12		07233302	TRANSISTOR 2SC3330	1		
TR13-16		07018331	TRANSISTOR 2SA1833	4		S
TR17-20		07233302	TRANSISTOR 2SC3330	4		
TR21-22		07233313	TRANSISTOR 2SC3331ST	2		
TR23-24		07018411	TRANSISTOR 2SA1841	2		
TR25		07601002	TRANSISTOR 2SC3198GR*	1		
TR26		07113871	TRANSISTOR 2SB1387TZ	1		S
D1-4		08000040	DIODE DSM1D1	4		
D5-7		08000044	DIODE 1SR139-100AT	3		
D8		08020099	ZENER DIODE RD30JSB2	1		
RA1		06581824	RESIS. ARRAY 1.8K-OHM 1/8W 6EL	1		
RA2		06584729	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
R1-2		06051025	RD RESISTOR 1 K-OHM 1/6W	2		
R3		06051014	RD RESISTOR 100 OHM 1/6W	1		
R4		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R5		06051525	RD RESISTOR 1.5 K-OHM 1/6W	1		
R6-23		06054725	RD RESISTOR 4.7 K-OHM 1/6W	18		
R24-26		06051034	RD RESISTOR 10 K-OHM 1/6W	3		
R27-28		06051025	RD RESISTOR 1 K-OHM 1/6W	2		
R29-34		06051034	RD RESISTOR 10 K-OHM 1/6W	6		
R35-38		06051014	RD RESISTOR 100 OHM 1/6W	4		
R39					NOT USED	
R40-44		06051014	RD RESISTOR 100 OHM 1/6W	5		
R45		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R46		06052224	RD RESISTOR 2.2 K-OHM 1/6W	1		
R47		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R48-49		06051025	RD RESISTOR 1 K-OHM 1/6W	2		
R50-53		06211521	RN RESISTOR 1.5 K-OHM 1W	4		
R54-57		06054714	RD RESISTOR 470 OHM 1/6W	4		
R58-81		06051525	RD RESISTOR 1.5 K-OHM 1/6W	24		
R82		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R83		06251034	RN RESISTOR 10 K-OHM 1/6W 1%	1		
R84-87		06051014	RD RESISTOR 100 OHM 1/6W	4		
R88-91		06053934	RD RESISTOR 39 K-OHM 1/6W 2%	4		
R92-95		06053014	RD RESISTOR 300 OHM 1/6W 2%	4		
R96-101		06054725	RD RESISTOR 4.7 K-OHM 1/6W	6		

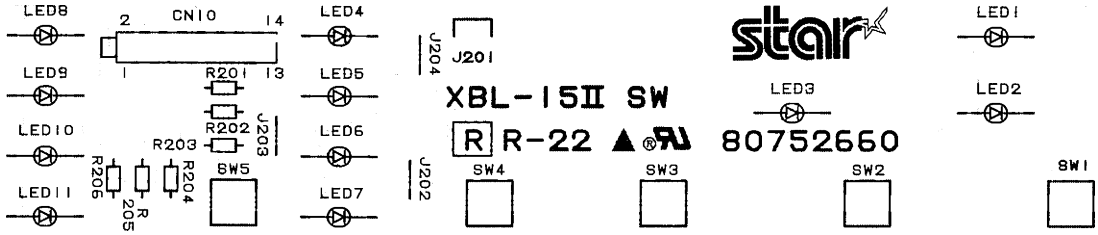
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R102-103		06213321	RN RESISTOR 3.3 K-OHM 1W 2%	2		
R104-105		06051025	RD RESISTOR 1 K-OHM 1/6W	2		
R106-107		06200561	RN RESISTOR 5.6 OHM 2W 2%	2		
R108		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R109		06252224	RN RESISTOR 2.2 K-OHM 1/6W 1%	1		
R110		06256221	RN RESISTOR 6.2 K-OHM 1/6W 1%	1		
R111		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R112		06054734	RD RESISTOR 47 K-OHM 1/6W	1		
R113		06052211	RD RESISTOR 220 OHM 1/6W	1		
R114		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R115		06052214	RD RESISTOR 220 OHM 1/6W 2%	1		
R116		06054724	RD RESISTOR 4.7 K-OHM 1/6W 2%	1		
R117		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R118		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R119		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R120-121		06051034	RD RESISTOR 10 K-OHM 1/6W	2		
R122		06056824	RD RESISTOR 6.8 K-OHM 1/6W	1		
R123		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R124-127		06051025	RD RESISTOR 1 K-OHM 1/6W	4		
CA1-3					NOT MOUNTED	
C1		05154714	CERA. CAPA. 470PF 50V	1		
C2		05532234	CAPACITOR 0.022UF 25V	1		
C3		05131044	CERA. CAPA. 0.1UF 25V	1		
C4		05532234	CAPACITOR 0.022UF 25V	1		
C5					NOT MOUNTED	
C6		05131044	CERA. CAPA. 0.1UF 25V	1	EXCEPT FOR HK	
					NOT MOUNTED:FOR HK	
C7		05152212	CERA. CAPA. 220PF 50V	1		
C8-17		05151015	CERA. CAPA. 100PF 50V	10		
C18		05152234	CERA. CAPA. 0.022UF 50V	1		
C19		05024764	CHEM. CAPA. 47UF 16V	1		
C20		05152234	CERA. CAPA. 0.022UF 50V	1		
C21		05152234	CERA. CAPA. 0.022UF 50V	1		
C22		05152234	CERA. CAPA. 0.022UF 50V	1		
C23		05152234	CERA. CAPA. 0.022UF 50V	1		
C24					NOT MOUNTED	
C25		05152234	CERA. CAPA. 0.022UF 50V	1		
C26		05151033	CERA. CAPA. 0.01UF 50V	1		
C27-30		05152212	CERA. CAPA. 220PF 50V	4		
C31-32		05291052	FILM CAPA. 1UF 100V	2		
C33		05151033	CERA. CAPA. 0.01UF 50V	1		
C34		05131044	CERA. CAPA. 0.1UF 25V	1		
C35		05154714	CERA. CAPA. 470PF 50V	1		
C36		05151033	CERA. CAPA. 0.01UF 50V	1		
X1		09250040	CERA. OSCILLATOR CST12.0MTW	1		
CN1-2		09100378	CONNECTOR HLEM17S-1	2		
CN3		09100475	CONNECTOR 53014-0770	1		
	#1	09100370	CONNECTOR 53014-0710	1		
CN4	*1	09100476	CONNECTOR 53014-0470	1		
CN5		09100267	CONNECTOR 5483-06A	1		
CN4	#1	09100342	CONNECTOR 53014-0410	1		
CN6		09100573	CONNECTOR 53253-0610	1		
CN7		09100328	CONNECTOR AKD-30DLFD	1		
CN8		09100400	CONNECTOR HLEM14S-1	1		
CN9		09100317	CONNECTOR 5483-04A	1		
L1		09990705	BEADS INDUCTOR B01-RT	1		
J1-180		93930006	JUMPER WIRE STP122	-	L=5,10,15,20,25,30mm	
J201-204		93930006	JUMPER WIRE STP122	-	L=5mm	
JPSW1-3		93930006	JUMPER WIRE STP122	-	L=5mm	

6. Control Panel Board

6-1. Circuit Diagram



6-2. Component Layout



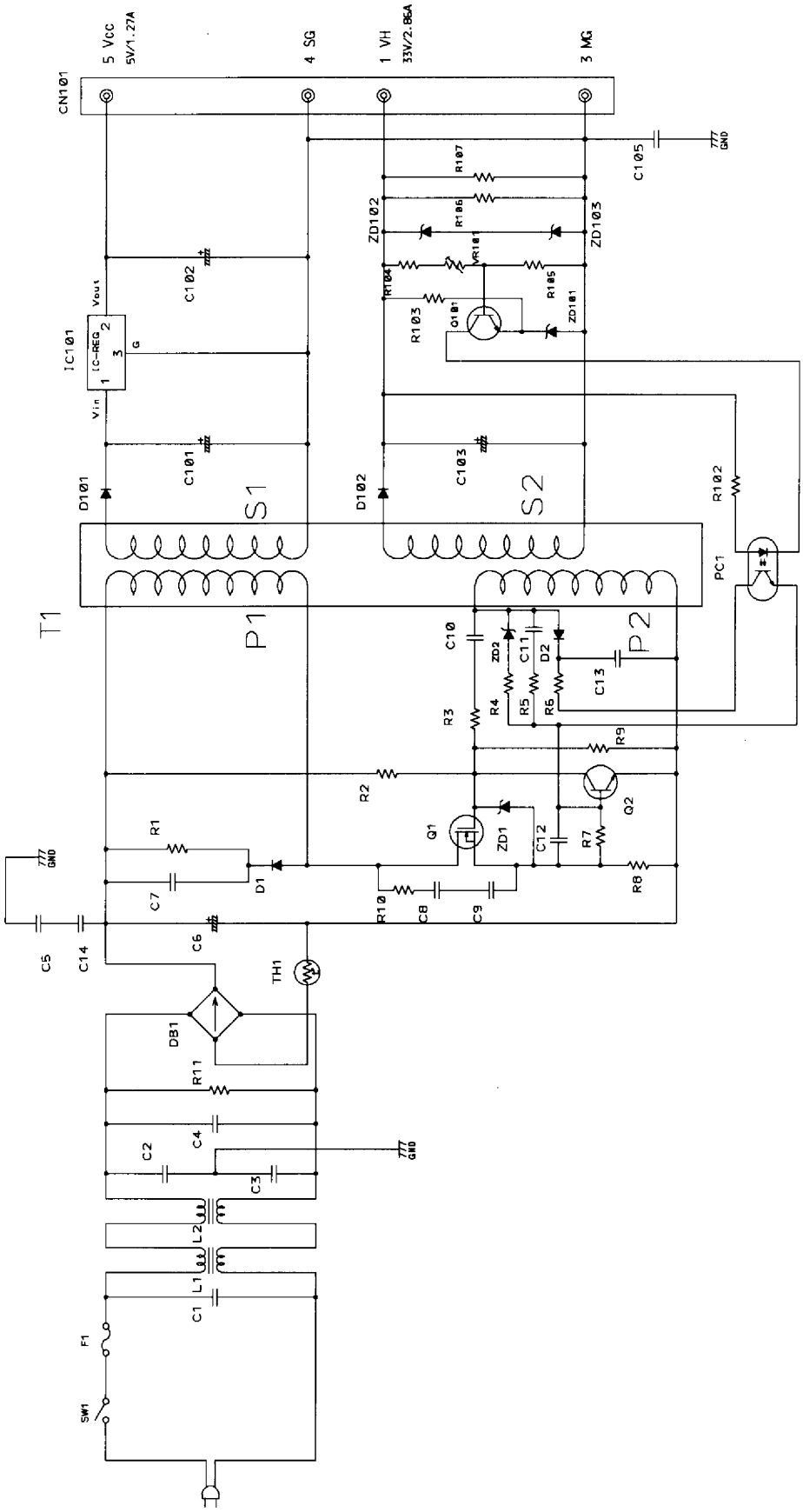
6-3. Parts List

Control Panel Board

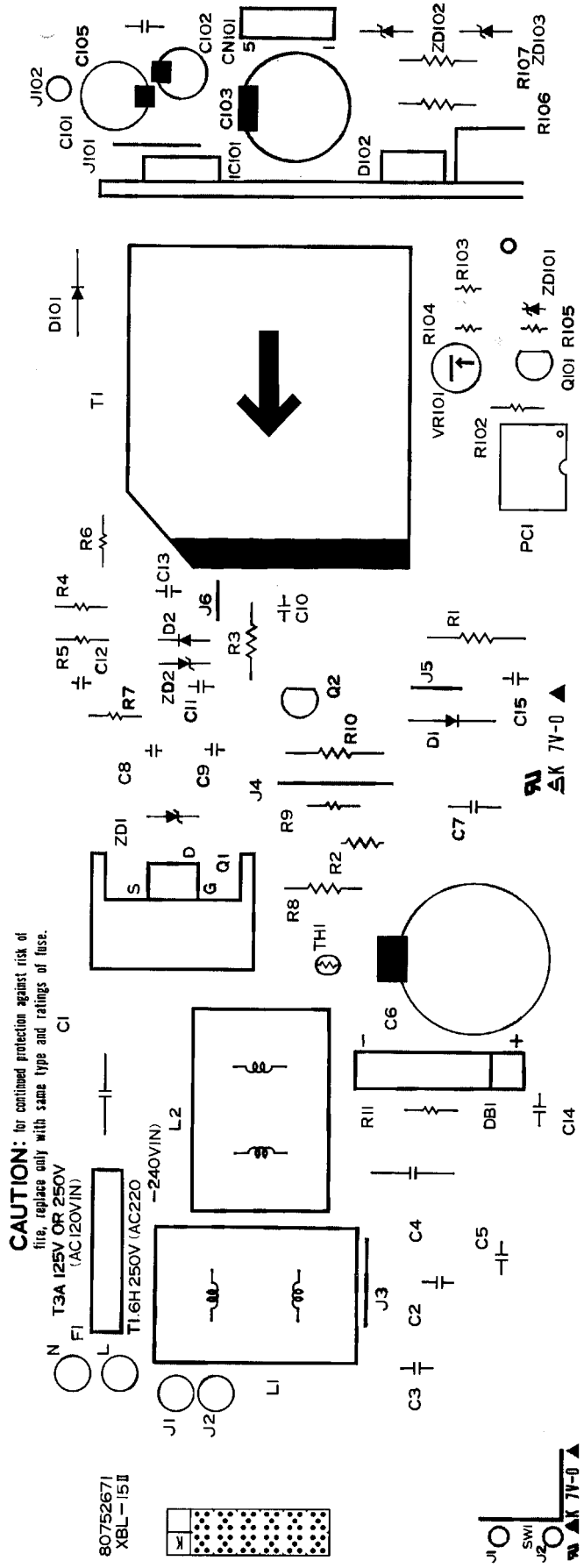
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
LED1		08300058	LED LT-1E21A	1		
LED2-3		08300055	LED LT-1H11A	2		
LED4-11		08300058	LED LT-1E21A	8		
R201-206		06051214	RD RESISTOR 120 OHM 1/6W	6		
SW1-5		09010043	PUSH SWITCH SKHHAL=S	5		
CN10		09100576	CONNECTOR 5062-14	1		
-		80705350	CABLE UNIT 14X140CC XBL-15II	1		

7. Power Supply Unit

7-1. Circuit Diagram



7-2. Component Layout



7-3. Parts List

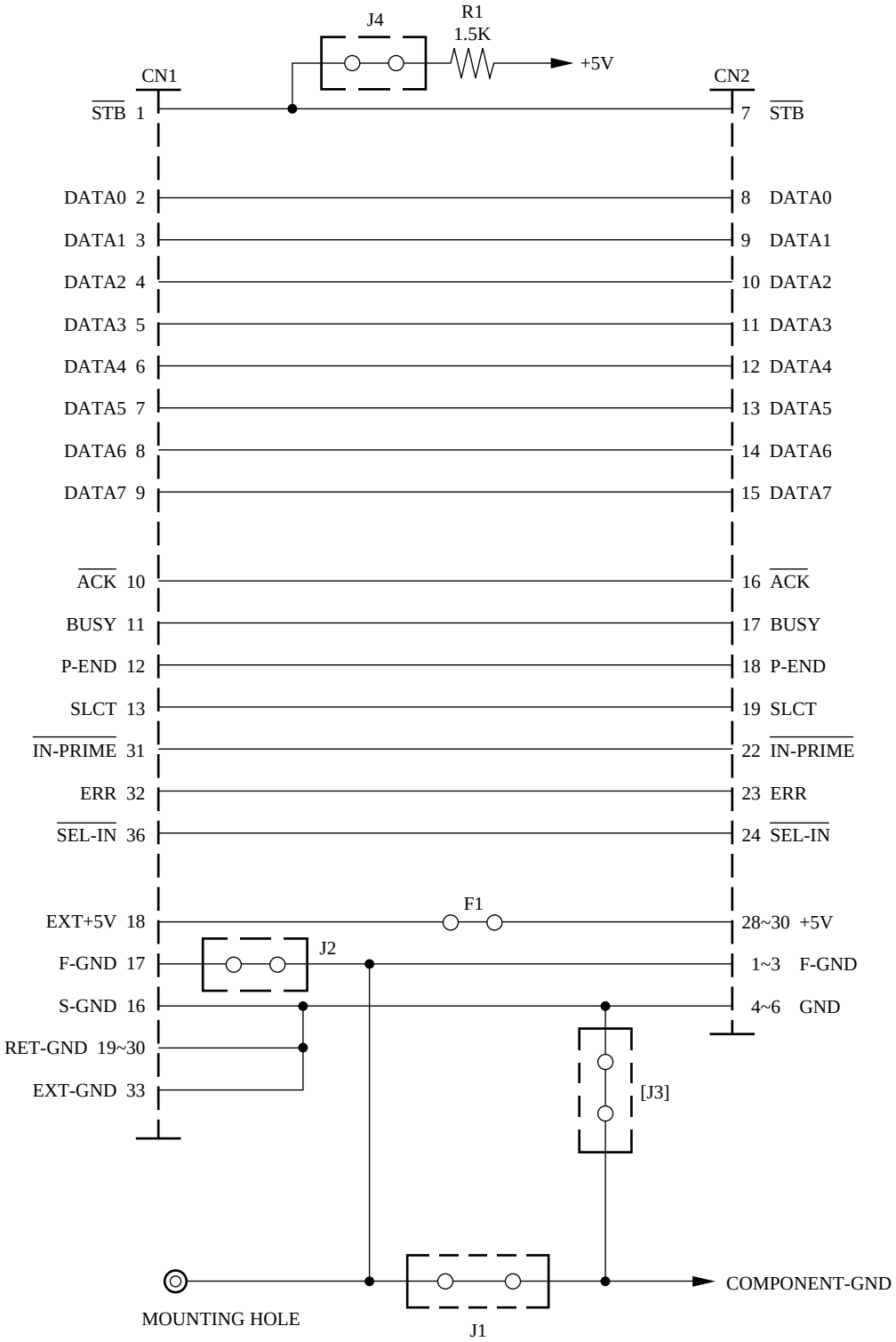
Power Supply Unit

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
Q1		08040012	FET 2SK1446	1	FOR US	
		08040011	FET 2SK2056	1	EXCEPT FOR US	
Q2		07312071	TRANSISTOR 2SD1207	1		
Q101		07227853	TRANSISTOR 2SC1740SE	1		
IC101		08202026	IC-REG PQ05RH11	1		
DB1		08990219	DIODE STACK D3SBA60	1		
ZD1		08020087	ZENER DIODE RD15EB3T	1		
ZD2		08020078	ZENER DIODE RD20EB3	1		
ZD101		08020117	ZENER DIODE RD6.2JSB2	1		
ZD102		08020125	ZENER DIODE RD12FB2	1		
ZD103		08020063	ZENER DIODE RD24FB2T	1		
D1		08030035	FAST DIODE RU1P	1		
D2		08000039	DIODE 1S1588	1		
D101		08030037	SCHOTTKY DIODE RK34	1		
D102		08030036	FAST DIODE FMX-12S	1		
VR101		93930006	JUMPER WIRE STP122	1	P=5mm	
R1		06233031	RN RESISTOR 30 K-OHM 3W	1	FOR US	
		06236232	RN RESISTOR 62 K-OHM 3W	1	EXCEPT FOR US	
R2		06046844	RD RESISTOR 680 K-OHM 1/4W	1	FOR US	
		06042054	RD RESISTOR 2 M-OHM 1/4W	1	EXCEPT FOR US	
R3		06201014	RN RESISTOR 100 OHM 2W	1	FOR US	
		06201814	RN RESISTOR 180 OHM 2W	1	EXCEPT FOR US	
R4		06041526	RD RESISTOR 1.5 K-OHM 1/4W	1	FOR US	
		06041325	RD RESISTOR 1.3 K-OHM 1/4W	1	EXCEPT FOR US	
R5		06048214	RD RESISTOR 820 OHM 1/4W	1		
R6		06045605	RD RESISTOR 56 OHM 1/4W	1		
R7		06045114	RD RESISTOR 510 OHM 1/4W	1	FOR US	
		06043315	RD RESISTOR 330 OHM 1/4W	1	EXCEPT FOR US	
R8		06930021	WIRE RESISTOR 0.22 OHM 3W	1	FOR US	
		06930041	WIRE RESISTOR 0.47 OHM 3W	1	EXCEPT FOR US	
R9		06044735	RD RESISTOR 47 K-OHM 1/4W	1	FOR US	
		06041045	RD RESISTOR 100 K-OHM 1/4W	1	EXCEPT FOR US	
R10		06231011	RN RESISTOR 100 OHM 3W	1		
R11		06046844	RD RESISTOR 680 K-OHM 1/4W	1		
R101					NOT USED	
R102		06042226	RD RESISTOR 2.2 K-OHM 1/4W	1		
R103		06055625	RD RESISTOR 5.6 K-OHM 1/6W	1		
R104		06251034	RN RESISTOR 10 K-OHM 1/6W 1%	1		
R105		06252724	RN RESISTOR 2.7 K-OHM 1/6W 1%	1		
R106-107		06235611	RN RESISTOR 560 OHM 3W	2		
C1		05291045	FILM CAPA. 0.1UF 275V	1	FOR US	
		05292240	FILM CAPA. 0.22UF 250V	1	EXCEPT FOR US	
C2		05192225	CERA. CAPA. 2200PF 400V	1	FOR US	
		05194724	CERA. CAPA. 4700PF 400V	1	EXCEPT FOR US	
C3		05192225	CERA. CAPA. 2200PF 400V	1	FOR US	
		05194724	CERA. CAPA. 4700PF 400V	1	EXCEPT FOR US	
C4		05291045	FILM CAPA. 0.1UF 275V	1		
C5		93930006	JUMPER WIRE STP122	1	FOR US	
		05192225	CERA. CAPA. 2200PF 400V	1	EXCEPT FOR US	
C6		05094774	CHEM. CAPA. 470UF 200V	1	FOR US	
		05092273	CHEM. CAPA. 220UF 400V	1	EXCEPT FOR US	
C7		05294734	FILM CAPA. 0.047UF 630V	1		
C8		05194714	CERA. CAPA. 470PF 1KV	1	FOR US	
		05192214	CERA. CAPA. 220PF 1KV	1	EXCEPT FOR US	
C9		05194714	CERA. CAPA. 470PF 1KV	1	FOR US	
		05192214	CERA. CAPA. 220PF 1KV	1	EXCEPT FOR US	

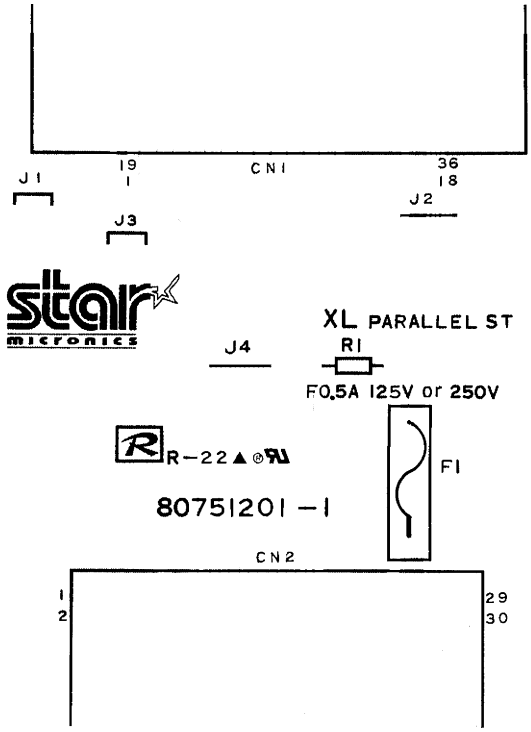
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C10-11		05251037	FILM CAPA. 0.01UF 50V	2		
C12		05251544	FILM CAPA. 0.15UF 50V	1	FOR US	
		05252244	FILM CAPA. 0.22UF 50V	1	EXCEPT FOR US	
C13		05252235	FILM CAPA. 0.022UF 50V	1		
C14		05192225	CERA. CAPA. 2200PF 400V	1		
C15					NOT MOUNTED	
C101		05011084	CHEM. CAPA. 1000UF 10V	1		
C102		05014771	CHEM. CAPA. 470UF 10V	1		
C103		05043385	CHEM. CAPA. 3300UF 35V	1		
C104					NOT USED	
C105		93930006	JUMPER WIRE STP122	1	P=7.5mm:EXCEPT HK	
					NOT MOUNTED:FOR HK	
TH1		08990113	THERMISTOR 5D-11	1	FOR US	
		08990119	THERMISTOR 16D-13	1	EXCEPT FOR US	
L1		09251130	NOISE FILTER HR-24-123	1		
L2		09251130	NOISE FILTER HR-24-123	1	FOR US	
		93930006	JUMPER WIRE STP122	1	EXCEPT FOR US	
PC1		08300057	OPTCOUPLER PC113LY	1		
SW1		09030027	SEESAW SWITCH T881SGSS9	1		
F1		09990054	FUSE 5TT3A 125V	1	FOR US	
		09990083	FUSE 215-1.6A-250V	1	EXCEPT FOR US	
T1		09241470	CONVERTER TRANSFORMER QBF-H US	1	FOR US	
		09241480	CONVERTER TRANSFORMER QBF-H EC	1	EXCEPT FOR US	
CN101	*1	80702240	CABLE UNIT 4X60	1		
	#2	87770050	CABLE UNIT 04X060 (D)	1		
J1-2	*2	80701060	WIRE 20UL1015BLK105T	2		
	#1	87770040	CABLE UNIT 01X105T (D)	2		
J3		93930006	JUMPER WIRE STP122	1	P=15mm	
J4		93930006	JUMPER WIRE STP122	1	P=20mm	
J5					NOT MOUNTED	
J6		93930006	JUMPER WIRE STP122	1		
J101		93930006	JUMPER WIRE STP122	1		
J102	*1	80700800	WIRE 18UL1007BLK100T	1		
	#1	87770140	CABLE UNIT 01X100T (D)	1		
-	*1	09110098	CORD SET US-PN ZX-10CL	1	FOR US	
	#1	09110144	CORD SET US-PN HA-10	1	FOR US	
	*1	09110102	CORD SET EC-PN ZBL	1	FOR EC,SU	
	*2	09110102	CORD SET EC-PN ZBL	1	FOR SU	
	*2	09110143	CORD SET EC-PN HA-10	1	FOR EC	
	#2	09110143	CORD SET EC-PN HA-10	1	FOR EC,SU	
		09110067	CORD SET UK-PN LC	1	FOR UK	
		09110136	CORD SET HK-PN QBA	1	FOR HK	
		04991256	CORD BUSHING SR-4N-6	1	FOR US	
		04991220	CORD BUSHING SR-5N-4	1	EXCEPT FOR US	
	*2	82020440	POWER CORD COVER ZL-10	1		
	#1	82020441	POWER CORD COVER ZL-10	1		
		04991204	FASTENER T18S	1		
		09990708	FERRITE CORE ESD-R-16C	1	FOR US	
		04991304	HEAT RADIATING BD OSH-2425-SPL	1	Q1	
		80086720	WARNING SEAL ZBL-10	1	Q1	
		82911190	RADIATION PLATE QBS-10	1	IC101	
		01903012	SCREW TR 3-9 WS/WF	4	Q1,IC101,D102	

8. Parallel Straight Board

8-1. Circuit Diagram



8-2. Component Layout



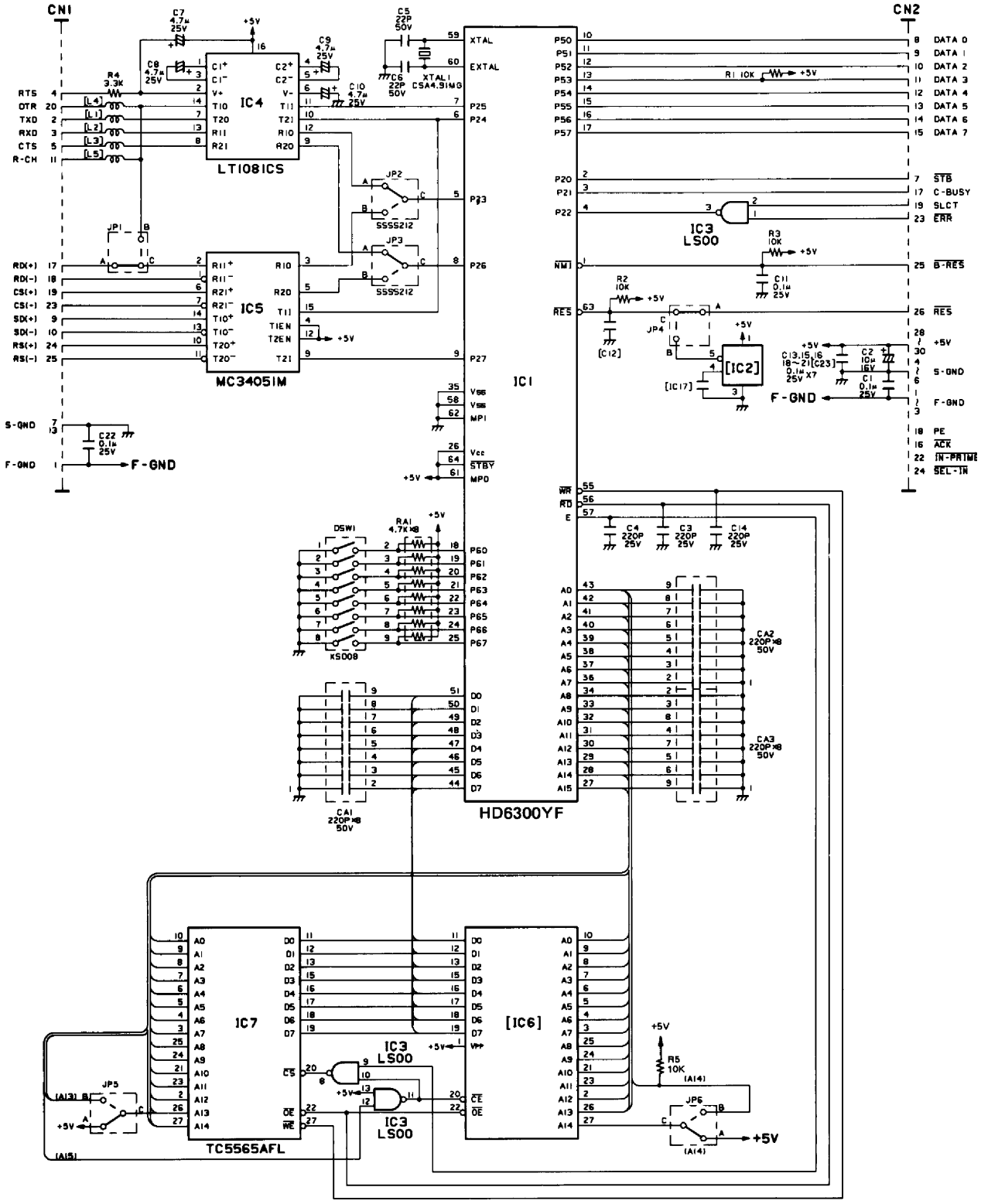
8-3. Parts List

Parallel Straight Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R1		06041521	RD RESISTOR 1.5 K-OHM 1/4W	1		
CN1		09100155	CONNECTOR 57L-40360-770B-D147	1		
CN2		09100327	CONNECTOR AKD-30DLMDB2R	1		
J1-2		93930001	JUMPER WIRE STP123	2		
J3					NOT MOUNTED	
J4		93930001	JUMPER WIRE STP123	1		
F1		93930001	JUMPER WIRE STP123	1	P=15mm	

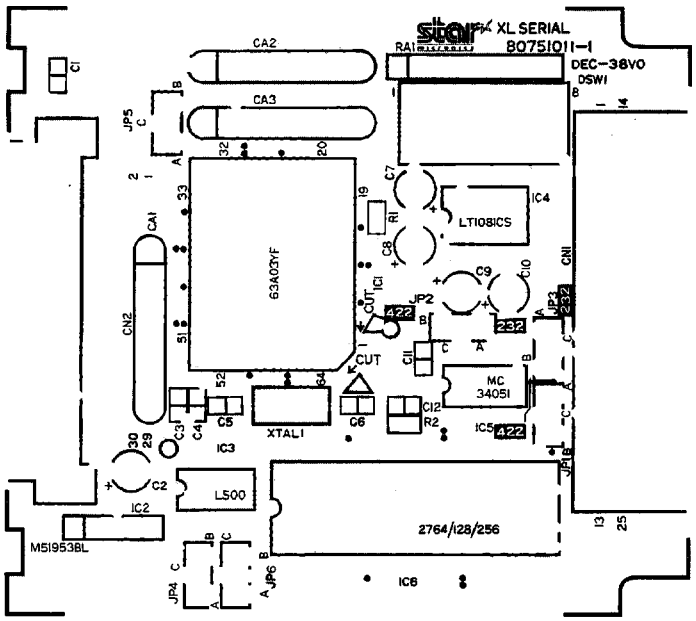
9. Serial Buffer Board (option)

9-1. Circuit Diagram

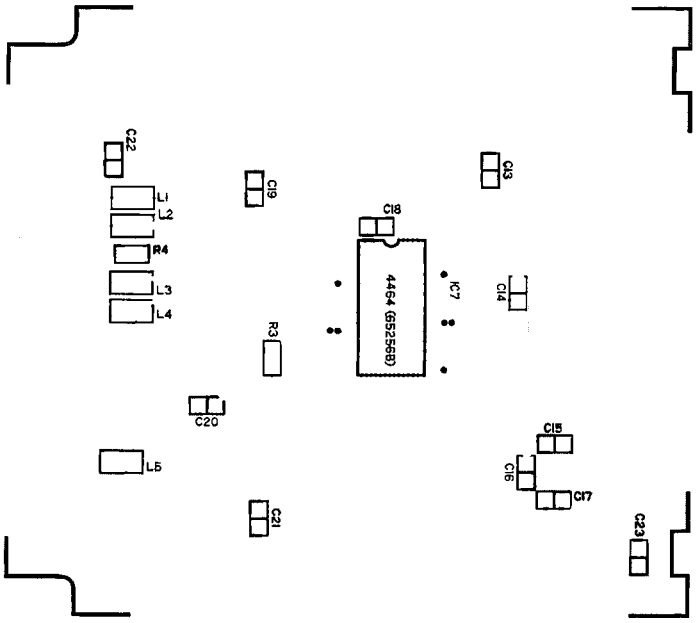


<Note 1> The unit of resistor and resistor arrot is "Ω",and no indication of wattage means 1/8w respectively.
<Note 2> The components in bracket are not installed the board.

9-2. Component Layout



[Parts side]



[Solder side]

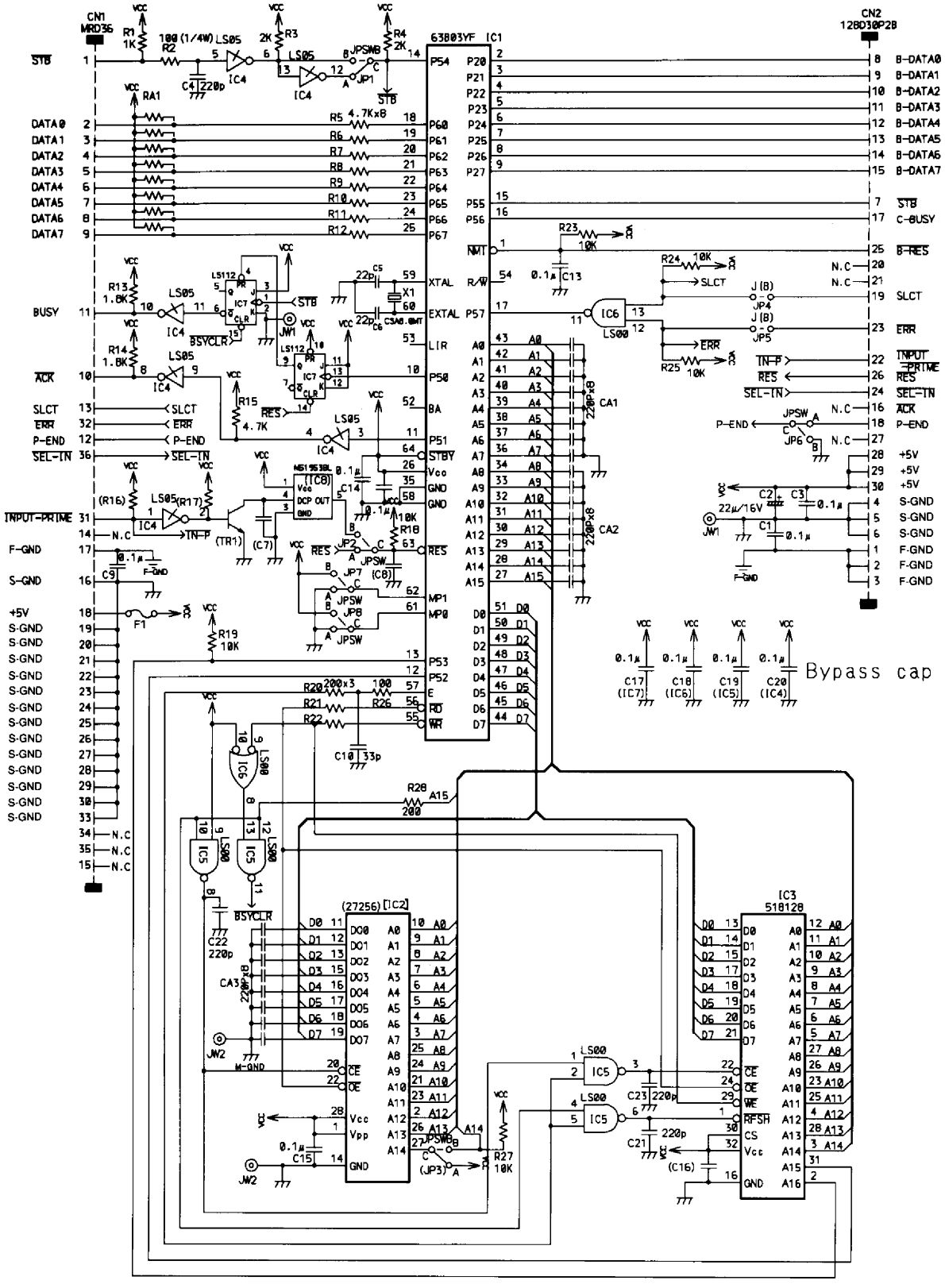
9-3. Parts List

Serial Buffer Board

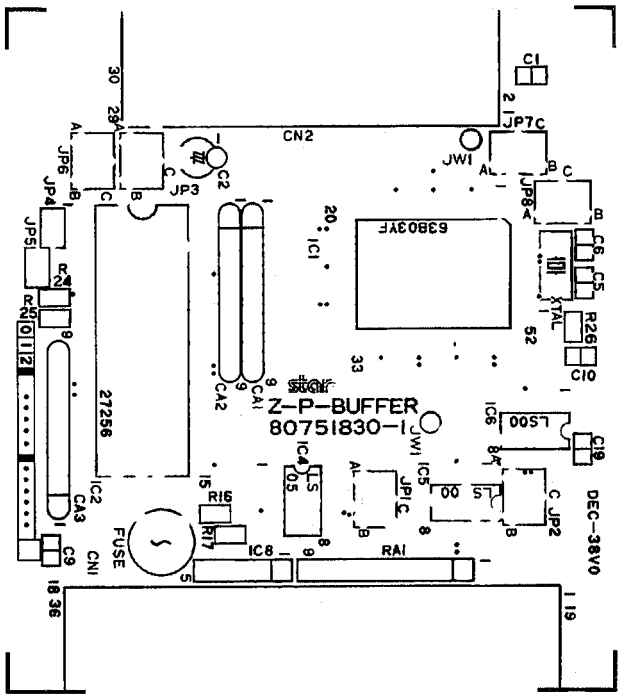
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08250011	MASKED CPU HD63B01YF-IF	1	IC6 IS NOT MOUNTED	
IC2					NOT MOUNTED	
IC3		08210112	TTL IC 74LS00 (FLAT TYPE)	1		
IC4		08200126	IC-I/F LT1081CS	1		
IC5		08200127	IC-I/F MC34051M	1		
IC6					NOT MOUNTED	
IC7		08221016	SRAM M5M5165FP-12	1		
RA1		06584723	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
R1-3		06781032	CHIP RESISTOR 10 K-OHM 1/8W	3		
R4		06783324	CHIP RESISTOR 3.3 K-OHM 1/8W	1		
R5		06051036	RD RESISTOR 10 K-OHM 1/6W (W)	1		
CA1-3		05652212	CAPA. ARRAY 220PF 50V 8EL	3		
C1		05731042	CERA. CAPA. CHIP 0.1UF 25V	1	EXCEPT FOR HK	
					NOT MOUNTED :FOR HK	
C2		05021066	CHEM. CAPA. 10UF 16V	1		
C3-4		05732211	CERA. CAPA. CHIP 220PF 25V	2		
C5-6		05752201	CERA. CAPA. CHIP 22PF 50V	2		
C7-10		05034755	CHEM. CAPA. 4.7UF 25V	4		
C11		05731042	CERA. CAPA. CHIP 0.1UF 25V	1		
C12					NOT MOUNTED	
C13		05731042	CERA. CAPA. CHIP 0.1UF 25V	1		
C14		05732211	CERA. CAPA. CHIP 220PF 25V	1		
C15-16		05731042	CERA. CAPA. CHIP 0.1UF 25V	2		
C17					NOT MOUNTED	
C18-21		05731042	CERA. CAPA. CHIP 0.1UF 25V	4		
C22		05731042	CERA. CAPA. CHIP 0.1UF 25V	1	EXCEPT FOR HK	
					NOT MOUNTED :FOR HK	
C23					NOT MOUNTED	
DSW1		09090018	DIP SWITCH KSD08	1		
XTAL1		09250029	CERA. OSCILLATOR CSA4.91MG	1		
CN1		09100337	CONNECTOR DBLC-J25SAF-23L6	1		
CN2		09100327	CONNECTOR AKD-30DLMDB2R	1		
JP1		93930001	JUMPER WIRE STP123	1	L=5mm	
JP2-3		09000037	SLIDE SWITCH SSSS212	2		
JP4					NOT MOUNTED	
JP5-6		93930001	JUMPER WIRE STP123	2	L=5mm	
-	*1	80086510	BOARD ID SEAL HK	1	FOR HK ONLY	

10. Parallel Buffer Board (option)

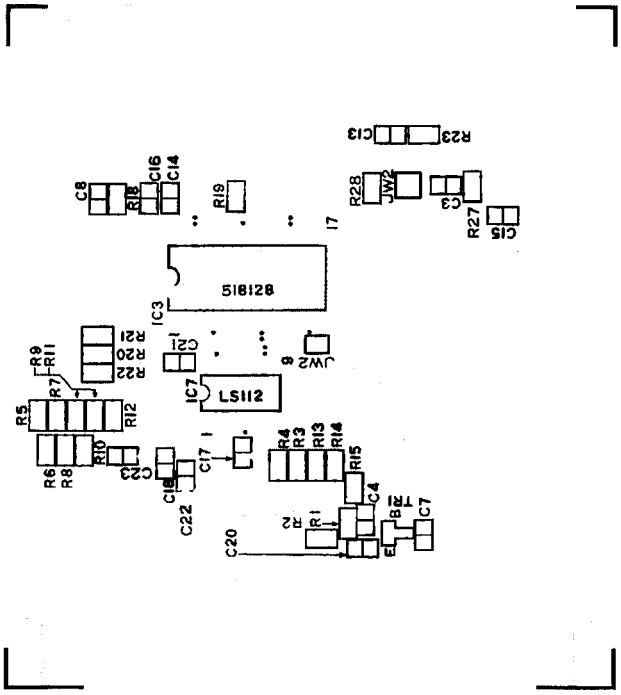
10-1. Circuit Diagram



10-2. Component Layout



[Parts side]



[Solder side]

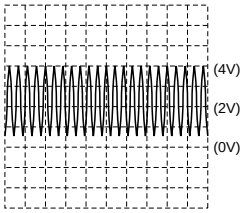
10-3. Parts List

Parallel Buffer Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08250011	MASKED CPU HD63B01YF-IF	1		
IC2					NOT MOUNTED	
IC3		08221033	PSRAM TC518128AFL-80	1		
IC4		08210113	TTL IC 74LS05 (FLAT TYPE)	1		
IC5-6		08210112	TTL IC 74LS00 (FLAT TYPE)	2		
IC7		08210114	TTL IC 74LS112 (FLAT TYPE)	1		
IC8					NOT MOUNTED	
TR1					NOT MOUNTED	
R1		06751021	CHIP RESISTOR 1 K-OHM 1/10W	1		
R2		06781011	CHIP RESISTOR 100 OHM 1/8W	1		
R3-4		06782021	CHIP RESISTOR 2 K-OHM 1/8W	2		
R5-12		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	8		
R13-14		06781824	CHIP RESISTOR 1.8 K-OHM 1/8W	2		
R15		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R16-17					NOT MOUNTED	
R18-19		06751031	CHIP RESISTOR 10 K-OHM 1/10W	2		
R20-22		06781812	CHIP RESISTOR 180 OHM 1/8W	3		
R23-25		06751031	CHIP RESISTOR 10 K-OHM 1/10W	3		
R26		06781011	CHIP RESISTOR 100 OHM 1/8W	1		
R27		06751031	CHIP RESISTOR 10 K-OHM 1/10W	1		
R28		06781812	CHIP RESISTOR 180 OHM 1/8W	1		
RA1		06584723	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
C1		05731041	CERA. CAPA. CHIP 0.1UF 25V	1	EXCEPT FOR HK	
					NOT MOUNTED:FOR HK	
C2		05022261	CHEM. CAPA. 22UF 16V	2		
C3		05731041	CERA. CAPA. CHIP 0.1UF 25V	1		
C4		05732211	CERA. CAPA. CHIP 220PF 25V	1		
C5-6		05752201	CERA. CAPA. CHIP 22PF 50V	2		
C7-8					NOT MOUNTED	
C9		05731041	CERA. CAPA. CHIP 0.1UF 25V	1	EXCEPT FOR HK	
					NOT MOUNTED:FOR HK	
C10		05753004	CERA. CAPA. CHIP 30PF 50V	1		
C11-12					NOT USED	
C13-15		05731041	CERA. CAPA. CHIP 0.1UF 25V	3		
C16					NOT MOUNTED	
C17-20		05731041	CERA. CAPA. CHIP 0.1UF 25V	4		
C21-23		05732211	CERA. CAPA. CHIP 220PF 25V	3		
C24		05551045	CAPACITOR 0.1UF 50V (W)	1		
CA1-3		05652212	CAPA. ARRAY 220PF 50V 8EL	3		
F1		09990066	FUSE PICOII 0.5A-125V	1		
XTAL1		09250027	CERA. OSCILLATOR KBR8.0MHZ	1		
CN1		09100155	CONNECTOR 57L-40360-770B-D147	1		
CN2		09100327	CONNECTOR AKD-30DLMDB2R	1		
JW1		80924700	WIRE 26UL1007BLK060	1		
JW2		80700440	WIRE 28UL1007BLK035	1		
JP1		09000037	SLIDE SWITCH SSSS212	1		
JP2		93930006	JUMPER WIRE STP122	1	L=14mm	
JP3-5					NOT MOUNTED	
JP6		09000037	SLIDE SWITCH SSSS212	1		
JP7-8		93930006	JUMPER WIRE STP122	2	L=14mm	

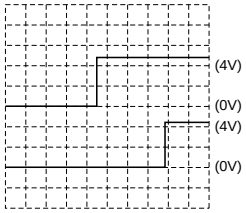
11. Waveform with Oscilloscope

(1) Crystal (10 MHz)



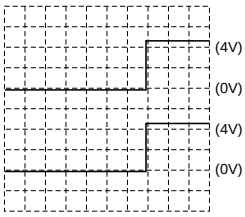
Crystal (Pin 33 of IC10)
Time/Div : 0.2 µs
Volt/Div : 1V

(2) $\overline{\text{RESET}}$ (Power on reset)



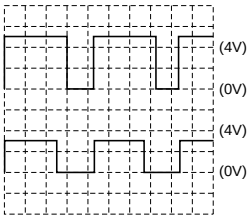
Upper : RESET input (Pin 4 of IC5)
Lower : RESET output (Pin 5 of IC5)
Time/Div : 10 ms
Volt/Div : 2V

(3) Protection Circuit



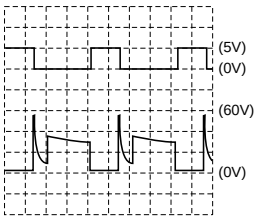
Upper : RESET output (Pin 5 of IC5)
Lower : Drive (Collector of TR2)
Time/Div : 0.5 ms
Volt/Div : 2V

(4) Head Energizing Control Signal



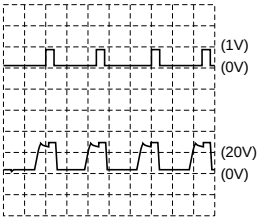
Upper : $\overline{\text{HD-EN}}$ (Pin 48 of IC3)
Lower : HD CMN (Pin 1of IC2)
Time/Div : 0.1 ms
Volt/Div : 2V

(5) Print Head Control Signal and Waveform



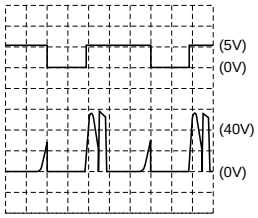
Upper : HD1 Data (Pin 13 of IC3)
Lower : HD1 (Pin 10 of CN9A)
Time/Div : 0.2 ms
Volt/Div : Upper 2V
Lower 20V

(6) Carriage Motor Common Control Signal and Driving Signal



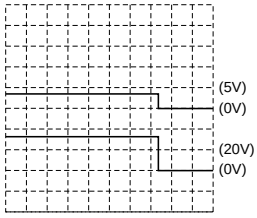
Upper : CR-CMN Control Signal (Pin 1 of IC3)
Lower : CR CMN Driving Signal (Pin 2of CN7)
Time/Div : 0.5 ms
Volt/Div : Upper 2V
Lower 10V

(7) Carriage Motor Control Signal and Driving Signal



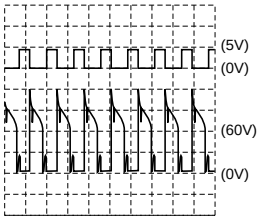
Upper : Carriage-ø1 Control Signal (Pin 9 of IC10)
Lower : Carriage-ø1 Driving Signal (Pin 3 of CN7)
Time/Div : 1 ms
Volt/Div : Upper 5V
Lower 20V

(8) Paper Feed Motor Common Control Signal and Driving Signal



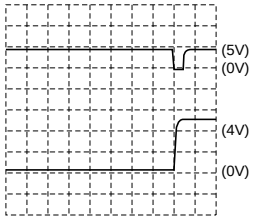
Upper : LF-CMN Control Signal (Pin 98 of IC9)
Lower : LF-CMN Driving Signal (Pin 1 of CN8)
Time/Div : 10 ms
Volt/Div : Upper 5V
Lower 10V

(9) Paper Feed Motor Control Signal and Driving Signal



Upper : LF-ø1 Control Signal (Pin 13 of IC10)
Lower : LF-ø1 Driving Signal (Pin 3 of CN8)
Time/Div : 5 ms
Volt/Div : Upper 5V
Lower 20V

(10) Parallel Interface (parallel type Only)



Upper : $\overline{\text{STB}}$ (Pin 7 of CN1)
Lower : BUSY (Pin 17 of CN1)
Time/Div : 50 ms
Volt/Div : Upper 5V
Lower 2V

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