1. General Specifications

Printing

Printing method	Serial impact dot matrix	
Printing speed	150 characters per second (in Draft pica) 37.5 characters per second (in NLQ pica)	
Data buffer	4K bytes when not used for download characters 1-Line buffer when using download	
Paper feed	2.8 inches/second (during page feed) Friction and push-tractor feed	
Printing direction	Draft: bi-directional or unidirectional (selectable), logic seeking NLQ and graphics: unidirectional, logic seeking	
Character set Standard character set IBM character set Downloadable characters International character sets *1	 96 ASCII character 244 characters (ASCII, international characters, symbols, block graphics) Max. 192 (draft) or 74 (NLQ) 14 sets (USA, France, Germany, England, Denmark I, Denmark II, Sweden, Italy, Spain I, Spain II, Japan, Norway, Latin America, Denmark/Norway)	
Dot matrix size Character matrix Normal Double High-speed double Quadruple CRT I CRT II Plotter Double-plotter	 9 × 11 (Draft) 18 × 23 (NLQ) DPI (8 or 9) × 480 60 (8 or 9) × 960 120 (8 or 9) × 960 120 (8 or 9) × 1920 240 (8 or 9) × 640 80 (8 or 9) × 720 90 (8 or 9) × 576 72 (8 or 9) × 1152 144	
Line spacing	1/6 inch standard	1/8, n/72, or n/216 inch programmable
Column width	80, normal pica 137, condensed pica	96, normal elite 160, condensed elite

*1 In the case of Russian version, the international character sets are eliminated.

Paper

Single sheets	5.5 ~ 8.5 inches wide	0.07 ~ 0.10 mm thick
Fanfold paper	4 ~ 10 inches wide Max, 0.28mm thick (3-ply)	0.07 ~ 0.10 mm thick (single-ply)

Printer

Dimensions	Height 120 mm (4.7 inches) Width 396 mm (15.6 inches) Depth 301 mm (11.8 inches)
Weight	5.1 kg (11.2 pounds)
Power	120 VAC±10%, 60 Hz. 220 VAC±10%, 50/60Hz. 240 VAC±10%, 50/60Hz.
Power consumption	Typ. 36 W. Max. 80 W
Environment	Operating temperature: 5 to 40°C (41 to 104°F) Operating humidity: 10 to 80%, non condensation Storage temperature: –30 to 65°C (–22 to 149°F) Storage humidity: 10% to 95% (at 40°C) (no condensation)
Print head	9 pins Life: 100 million dots
Ribbon	Fabric ribbon cartridge Life: 1 million draft characters
Option	Automatic sheet feeder Serial-Parallel converter (SPC -8K)

Parallel interface

Interface	Centronics-compatible
Synchronization	By external supplied strobe pulses
Handshaking	By $\overline{\text{ACK}}$ or BUSY signals
Logic level	TTL
Connector	57-30360 Amphenol

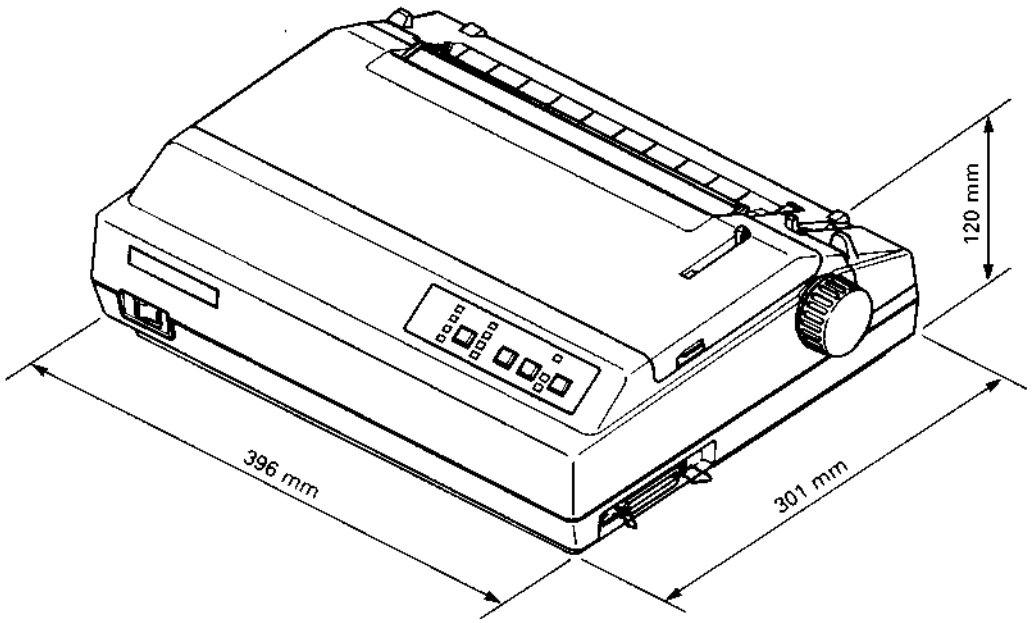


Fig. 1-1 External Dimensions

2-2. DIP Switch Settings

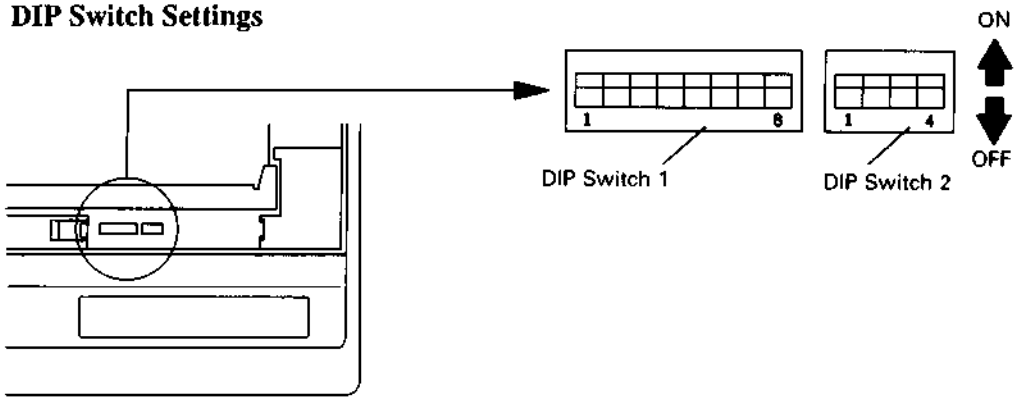


Fig. 1-4 The DIP Switches are located under the Printer Cover

1) Except for Russian version

Switch	Function	ON	OFF
1-1	Printer mode	Standard	IBM
1-2	Usage of RAM	Buffer	Download
1-3	Auto LF	No	Yes
1-4	Auto sheet feeder	Inactive	Active
1-5	Paper-out detector	Enabled	Disabled
1-6	Orator lower case	Small caps	Lower case
1-7	Page length	(See right)	
1-8			
2-1	Character set (Standard mode)	Graphics	Italics
	Character set (IBM mode)	Set #2	Set #1
2-2	International character set (See right)		
2-3			
2-4			

Page length:

Page length	1-7	1-8
11 inches	ON	ON
8 inches	OFF	ON
A4 size	ON	OFF
12 inches	OFF	OFF

International character set:

Country	2-2	2-3	2-4
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

* Denmark/Norway when switc 2-1 is ON.

2) For Russian version

Switch	Function	ON	OFF
1-1	Printer mode	Standard	IBM
1-2	Usage of RAM	Buffer	Download
1-3	Auto LF	No	Yes
1-4	Auto sheet feeder	Inactive	Active
1-5	Paper-out detector	Enabled	Disabled
1-6	Character/Command	(See right)	
1-7			
1-8	Page Length	11 inches	12 inches
2-1	Character set	Set #1	Set #2
2-2	Code page	(See right)	
2-3			
2-4	Not used		

Character/Command: (when switch 1-1 is on)

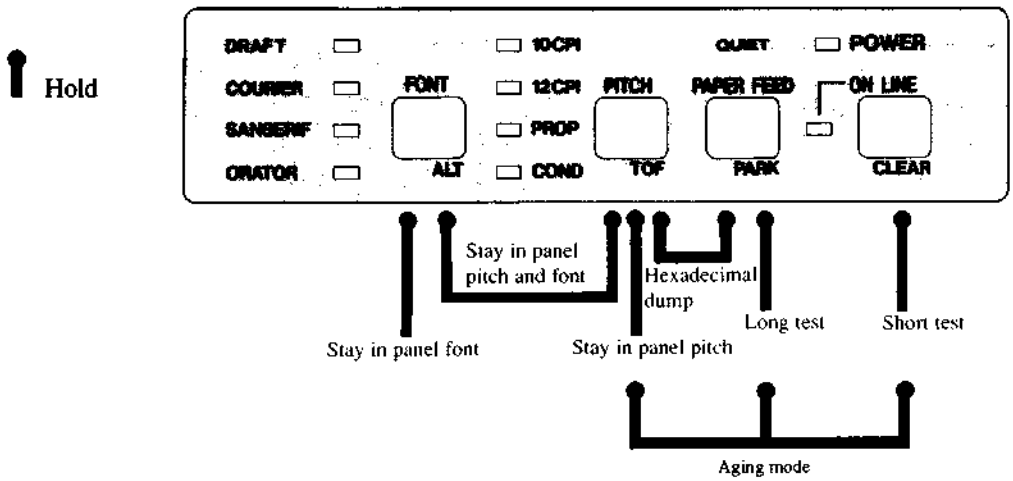
Character/Command	1-6	1-7
Italic cancel	ON	ON
Italic select	OFF	ON
MSB not control	ON	OFF
MSB=1	OFF	OFF

Code page:

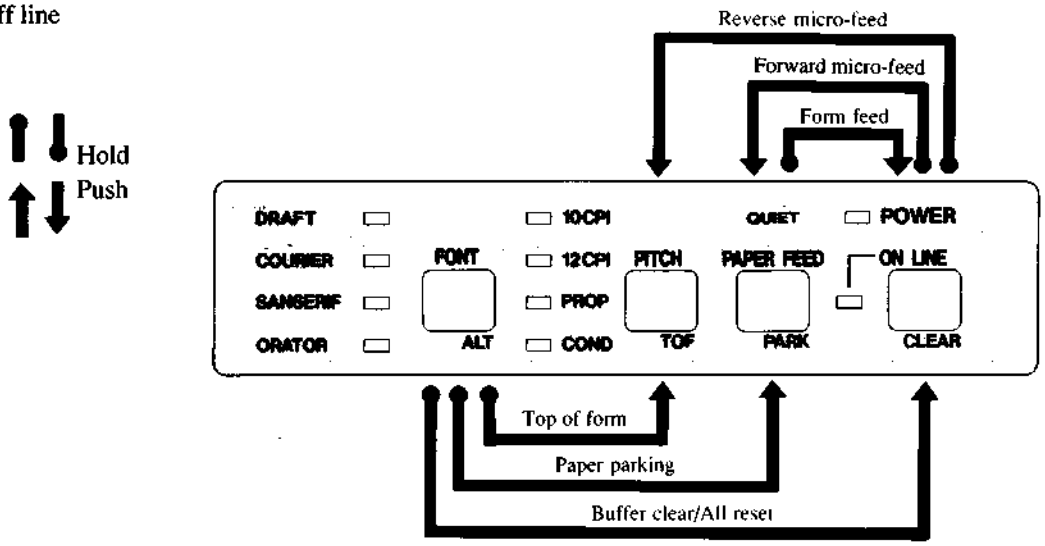
Code page	2-2	2-3
#866 Russian	ON	ON
	ON	OFF
#3840 IBM-Russian	OFF	ON
Gost	OFF	OFF

2-3. Control Panel Combination

1) At power on



2) At off line



*1 In the case of Russian version, "ORATOR" font is eliminated.

3. Parallel Interface

3-1. General Specifications

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

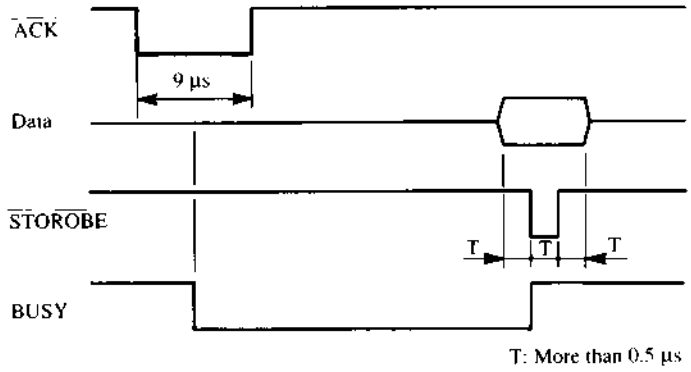


Fig. 1-5 Timing Charts of Parallel Interface

3-2. Connector Signals

Pin No	Signal Name	Function Description
1	$\overline{\text{STROBE}}$	Goes from high to low (for≥ 0.5µs) when active
2	DATA1	High when active
3	DATA2	High when active
4	DATA3	High when active
5	DATA4	High when active
6	DATA5	High when active
7	DATA6	High when active
8	DATA7	High when active
9	DATA8	High when active
10	$\overline{\text{ACK}}$	9µs 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 DIP switch 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

4. Serial Interface (option)

When using the serial interface, the optional Serial-Parallel Converter must be connected with the printer.

4-1. 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, 19200 BPS
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)

4-2. Connector Signals 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 – 19	NC		Unused.
20	DTR	OUT	The printer turns this pin space when it is ready to receive data.
21 – 25	NC		Unused.

4-3. 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 switched are set ON when the printer leaves the factory.

Protocol	Switch 3	Switch 4
DTR mode	ON	ON
XON/XOFF 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

1. Block Diagram

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

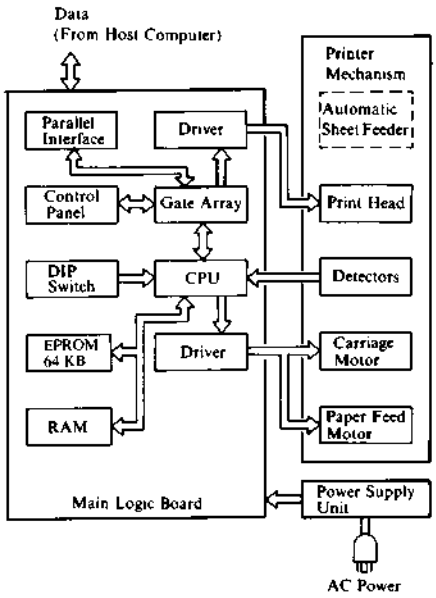


Fig. 2-1 Block Diagram

(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 M50734SP
- Controls this printer.

2 EPROM μPD27C512 64K-byte
- Contains the program which executes control of the printer.

3 RAM HM6264 8K-byte
- Used as stack area, work area and data buffer of the CPU.

4 Parallel interface

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

6 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, carriage motor drive and paper feed motor drive respectively.

7 Control Panel Board
- This panel circuit is for manual operation of the printer.

(2) Printer Mechanism

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

(3) Power Supply Unit

AC power is converted to 25VDC 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.

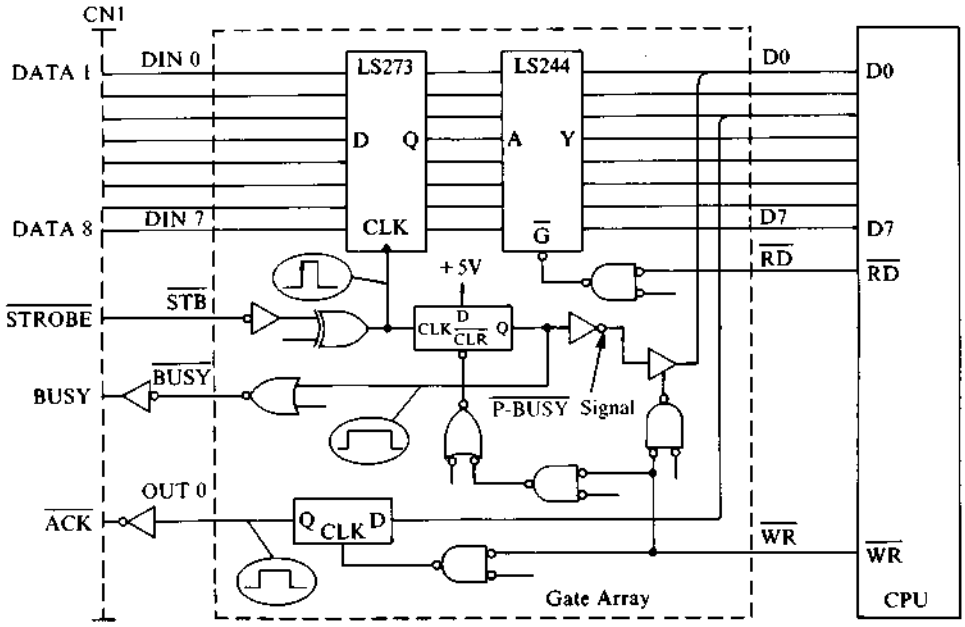


Fig. 2-2 Data Input Circuit with Parallel Interface

The following is an explanation of this handshake.

(1) When the BUSY signal is LOW (Ready), the host computer outputs 8-bit data 1 through 8 to the connector CN1. Pin 1 carries the $\overline{\text{STROBE}}$ pulse signal from the host computer 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 1 through 8 at the time of $\overline{\text{STROBE}}$ signal fall, and then turns the $\overline{\text{BUSY}}$ signal and $\overline{\text{P-BUSY}}$ signal to LOW.

(3) When the $\overline{\text{BUSY}}$ signal of the gate array is set to LOW, the BUSY signal of connector CN1 will be turned to HIGH, notifying the host computer that data cannot be accepted.

(4) The CPU is informed via the D0 data line that the $\overline{\text{P-BUSY}}$ 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 CN1 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.

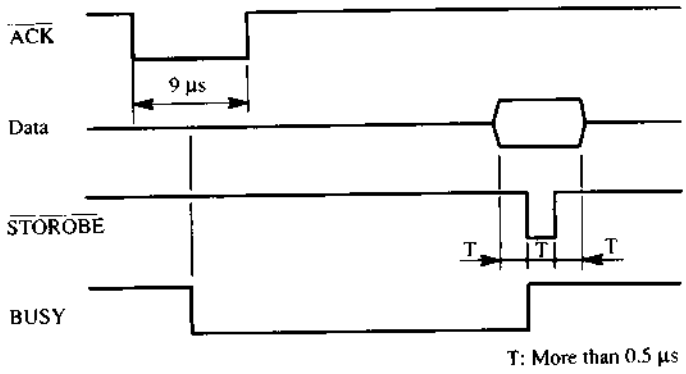


Fig. 2-3 Timing Chart of Parallel Interface

2-1-2. Serial Interface (option)

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

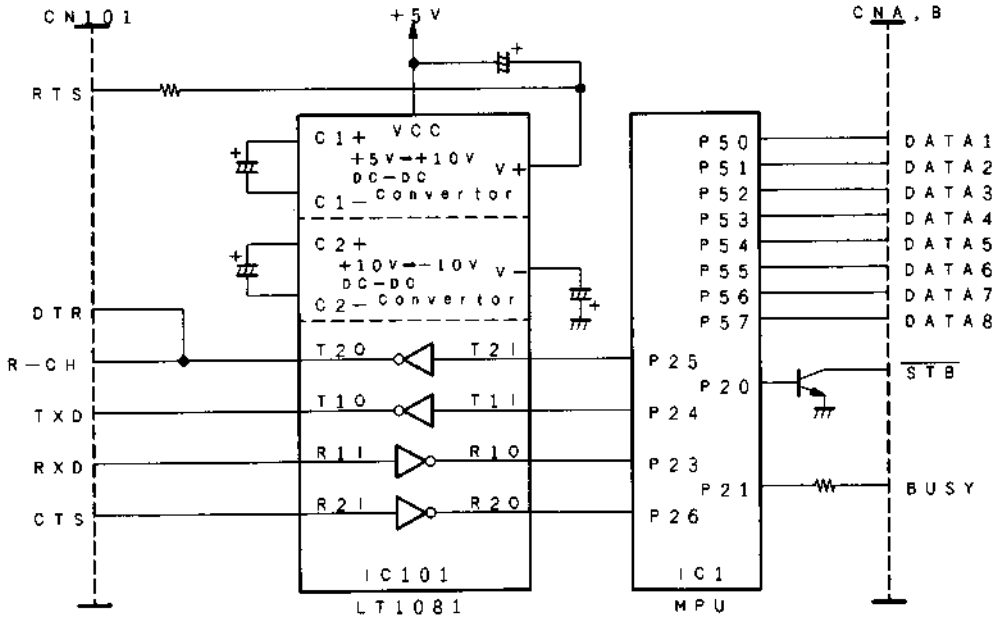


Fig. 2-4 Serial Interface (in the Serial-Parallel Converter)

The IC101 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 IC101 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 IC101.

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, 4-3 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) XON/XOFF method

When a handshake is carried out with the host computer, the XON/XOFF method makes use of ASCII codes (DC1 and DC3). (DC1 and DC3 are called XON and XOFF, 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

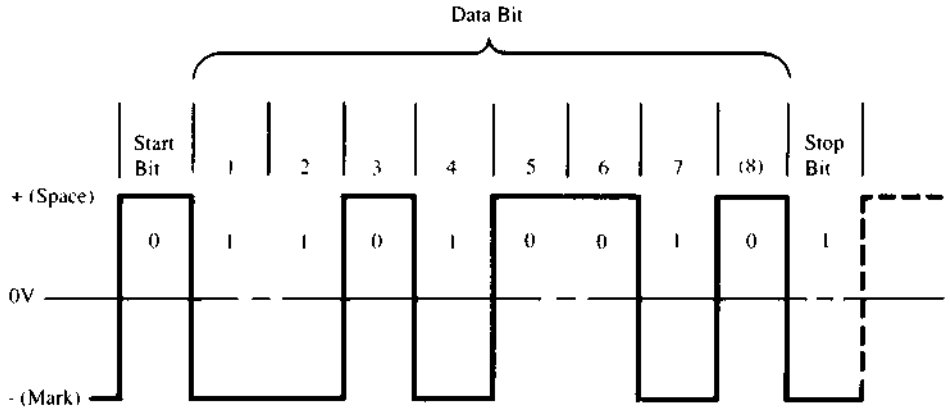
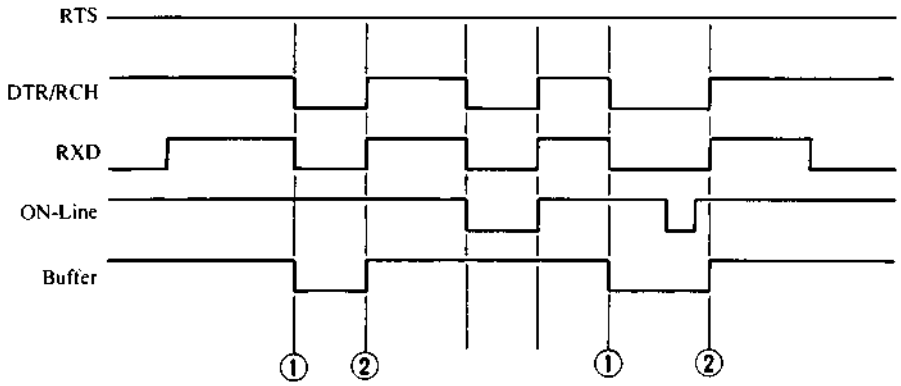


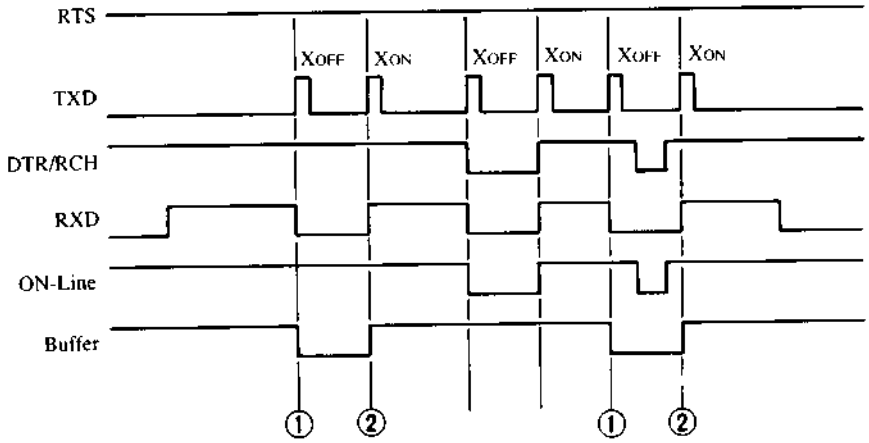
Fig. 2-5 Data Format

(1) DTR method



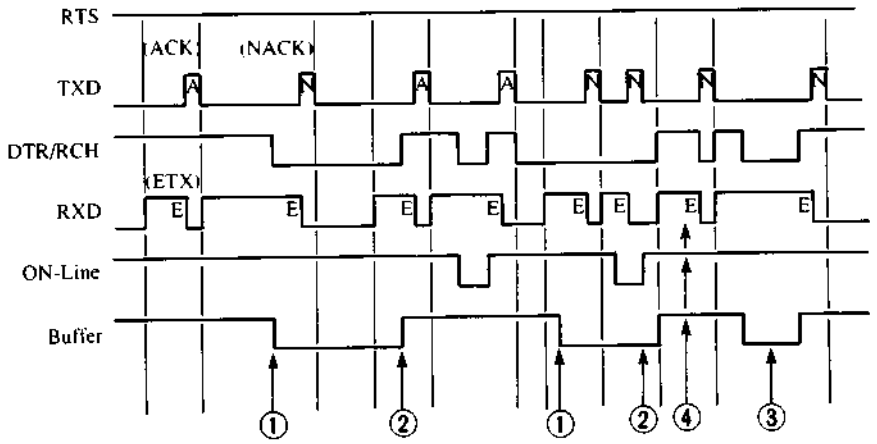
① Near Full (when the empty area in the data buffer becomes 256 bytes or less.)
② Near Empty (when the empty area in the data buffer becomes 512 bytes or more.)

(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 presented in Fig. 2-7.

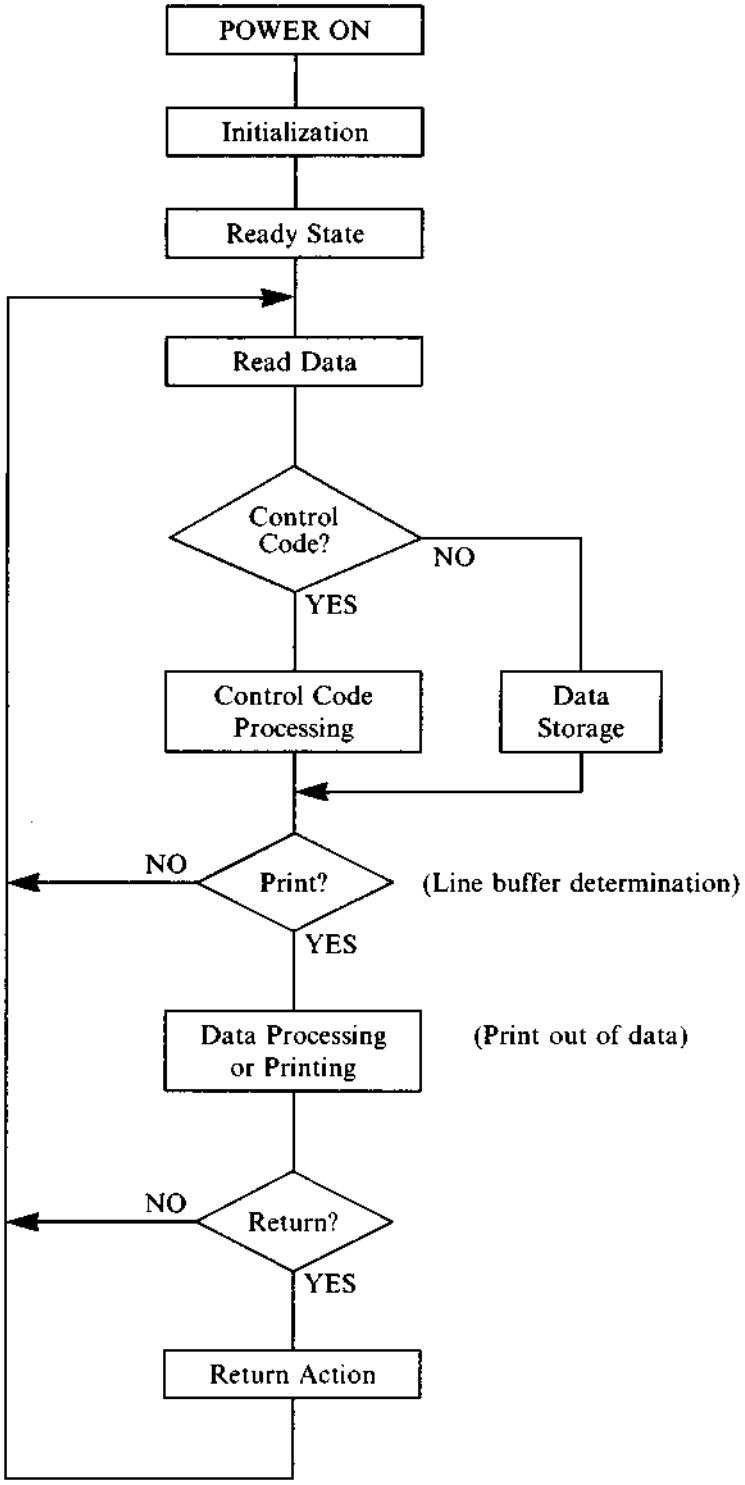


Fig. 2-7 General Flow Chart of Editing and Printing

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

Edited print data is output to terminal Q of LS273 in the gate array through the CPU data bus, as regulated by the issue timing of a $\overline{WR}$ signal. However, as for pin 9 (HD9) of the print head, the data is output to the terminal Q of LS74 upon issue of the next WR signal. When all the data is received for printing, an energized time control signal is output from port P04 of the CPU. This allows the print data to be output to HD-1 ~ 9 of the gate array. When the print data is HIGH, the transistor TR8 will be turned ON for 335 μS, energizing the print head solenoid to drive the print head.

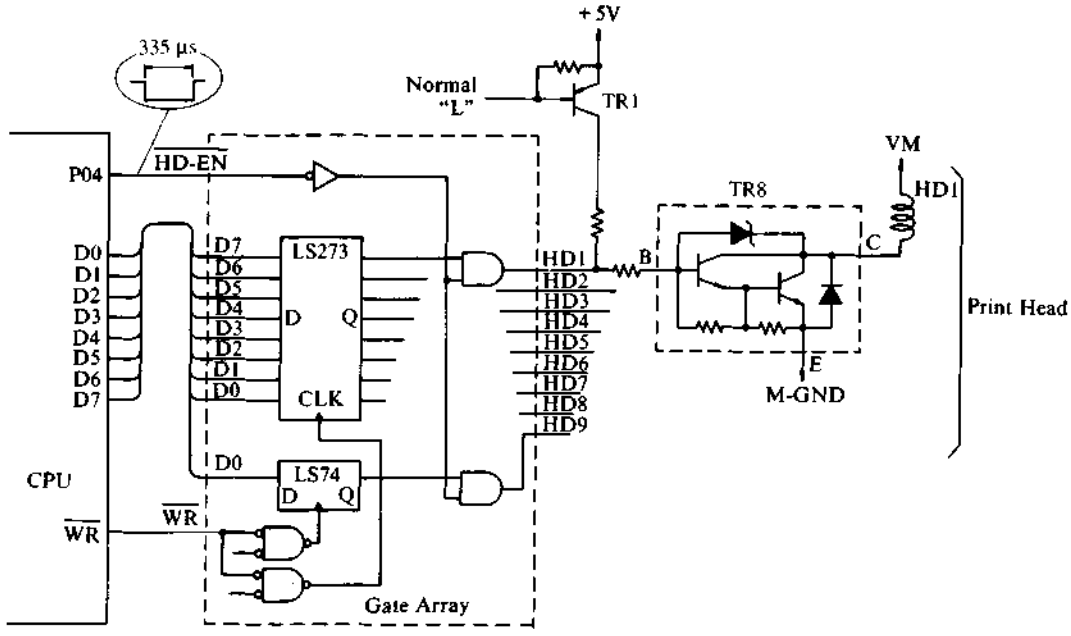


Fig. 2-8 Print Head Driving Circuit

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. 2-9 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 V_{REF} to find out the temperature of the head solenoids and carries out the following operations depending on the temperature.

① $T \leqq 95$ °C
- Normal print operations

② 95 °C < T < 105 °C
- Interval printing; The print head stays for approximately 0.5 second whenever it finishes 1-line. When the temperature falls bellow 95°C, normal printing is resumed.

③ 105 °C ≦ T
- The line being printed is completed, then printing stops. When the thermistor's temperature falls below 105 °C, interval printing is resumed.

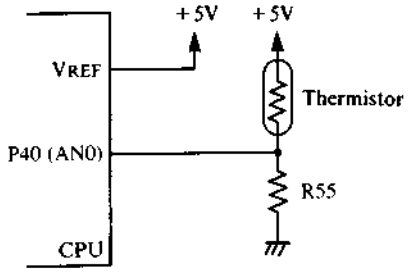


Fig. 2-9 Print Head Temperature Detection Circuit

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.

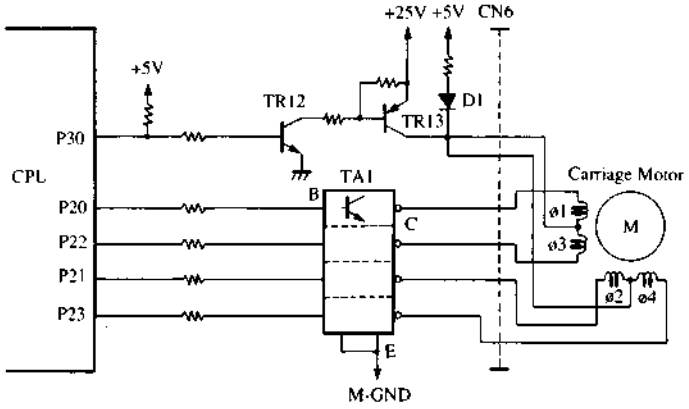


Fig. 2-10 Carriage Motor Driving Circuit

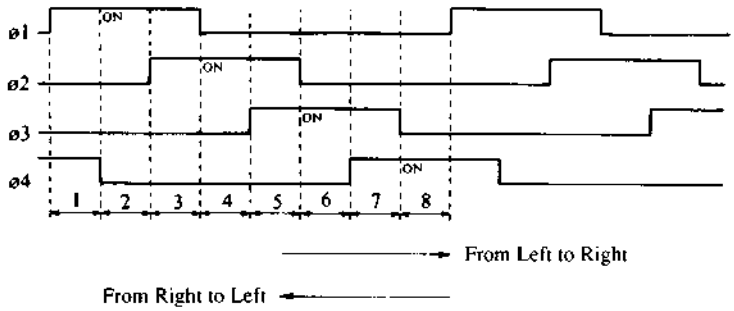


Fig. 2-11 Carriage Motor Driving Signals

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

Voltage applied to the carriage motor is changed by setting port P30 of the CPU to HIGH or LOW and by turning transistors TR12 and TR13 ON or OFF.

When TR13 is ON, +25V is supplied to the carriage motor and when TR13 is OFF, +5V is supplied to the motor via diode D1.

Mode	Voltage	Application
Operation:	+25VDC	Motor Drive
Standby:	+5VDC	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 shows the paper feed motor drive circuit and the control signal generated by the phase 1-2 excitation method.

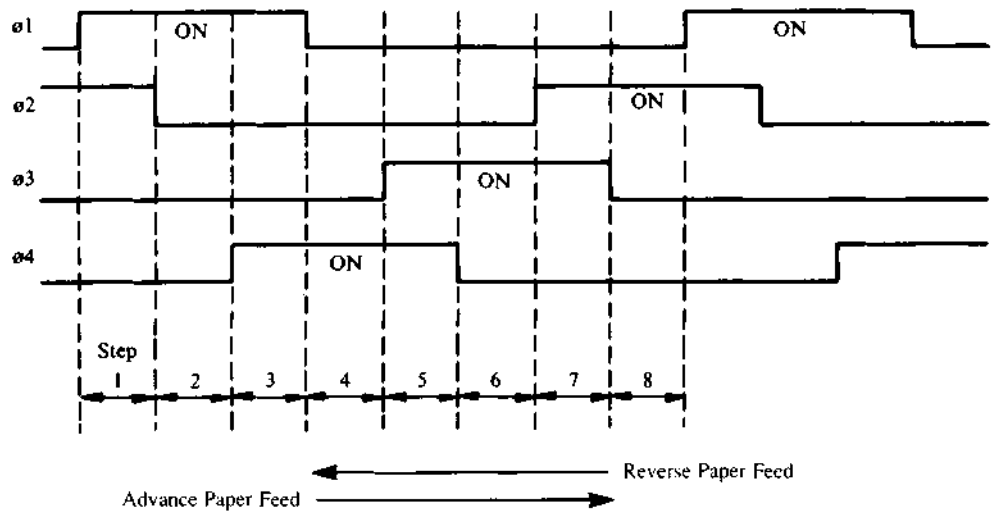


Fig. 2-12 Paper Feed Motor Driving Circuit

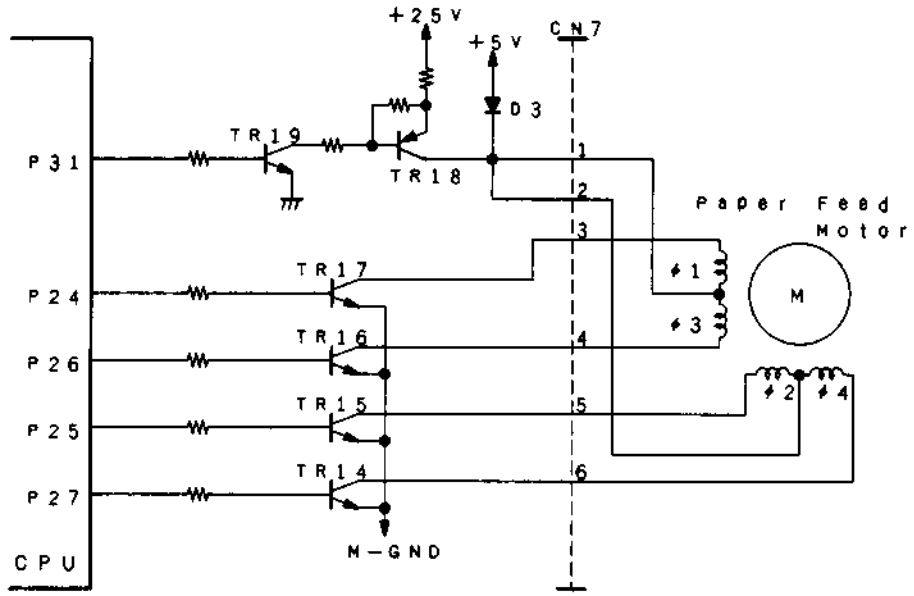


Fig. 2-13 Paper Feed Motor Driving Signals

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

Mode	Voltage	Application
Operation	+25VDC	Motor Drive
Standby:	+5VDC	Holding Bias

Voltage to the paper feed motor is changed by setting CPU port P31 to LOW or HIGH and by turning transistors TR19 and TR18 ON or OFF.
When TR18 is turned on, +25V is applied to the paper feed motor.
When TR18 is turned off, +5V is supplied to the motor via diode D3.

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 RESET (INPUT-PRIME) signal is being output from the host computer.

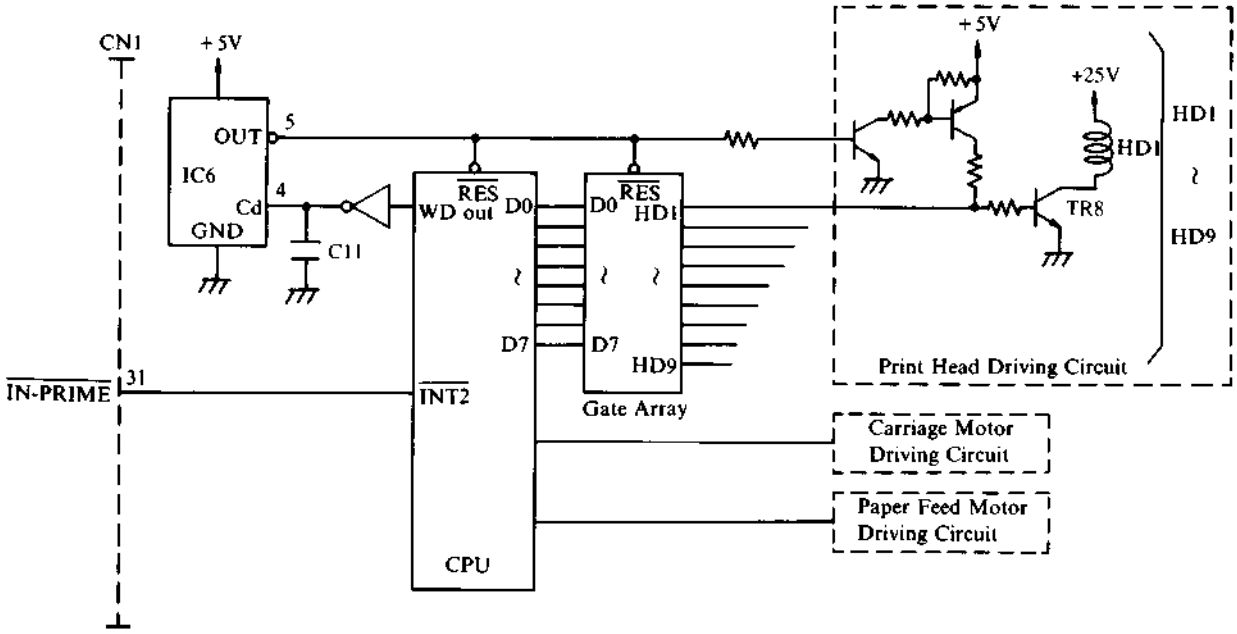


Fig. 2-14 Reset Circuit and Protection Circuit.

- Power On Reset

1 When the power is turned on, the RESET signal is output to Pin 5 of IC6 (M51953BL) for approx. 34 msec. This time length is determined by external capacitor C11 (0.1μF), and it can be calculated by the following formula.
$T = 0.34 \times C11\ (pF)\ \mu sec.$

2 This LOW signal triggers RESET command to the CPU and the RESET terminal ($\overline{RES}$) 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 31 of the connector CN1.

2 This output signal will set the terminal $\overline{INIT\ 2}$ of the CPU to LOW, executing interruption. Then, the CPU will be initialized.

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

A voltage-detecting IC (IC6 in Fig. 2-14) 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.

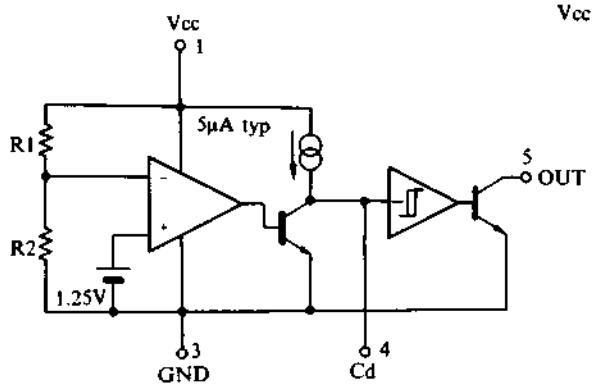


Fig. 2-15 Equivalent Circuit of Voltage-Detecting IC

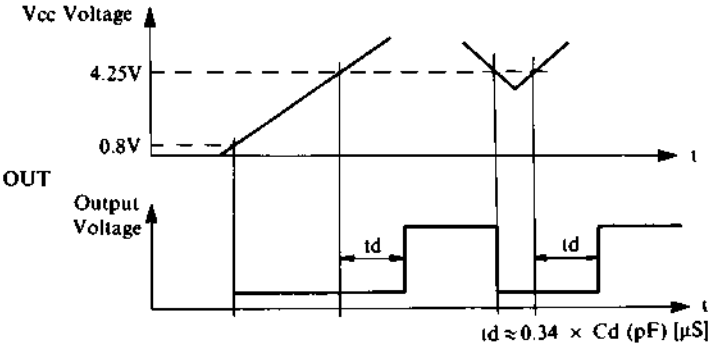


Fig. 2-16 Operational Timing Chart

2-5. Protection Circuit

This printer is provided with a protection circuit which shuts off the print head and motor driving circuits in the event of a CPU malfunction. (Refer to Fig.2-14)

The CPU normally outputs a LOW level signal from the terminal (WD OUT).
However, if the CPU malfunctions, it can not output this signal.

When the LOW level signal is not output from the CPU, the input terminal (Cd) of the voltage-detecting IC goes to LOW and the RESET signal is output from the output terminal (OUT) of the voltage-detecting IC. By this signal, the CPU and the gate array are reset; and the print head, the carriage motor and paper feed motor driving signals are ignored, protecting the printer from the CPU runaway.

3. Power Supply Unit

Fig. 2-17 shows the power supply unit.

The AC power is stepped down to Vs1 and Vs2 by the power transformer. The Vs1 power is full-wave rectified by the DB1 rectifier stack and smoothed by electrolysic capacitor C4. The smoothed DC power is converted into the stable 25VDC power by the chopper circuit, whose main component is IC1. The Vs2 power is full-wave rectified by the DB2 rectifier stack and smoothed by the electrolysic capacitor C10. Part of this smoothed Vs2 output is converted into the stable 5VDC power by fixed voltage IC2.

	Voltage Range	Maximum Current output	Service	Type of circuit
Input	120VAC	0.8A		
	220VAC and 240VAC	0.5A		
Output	5VDC ±2.5%	0.83A	For logic circuit drive, For motor holding	Dropper
	25VDC ±5%	1.89A	For print head drive, For motor holding	Chopper

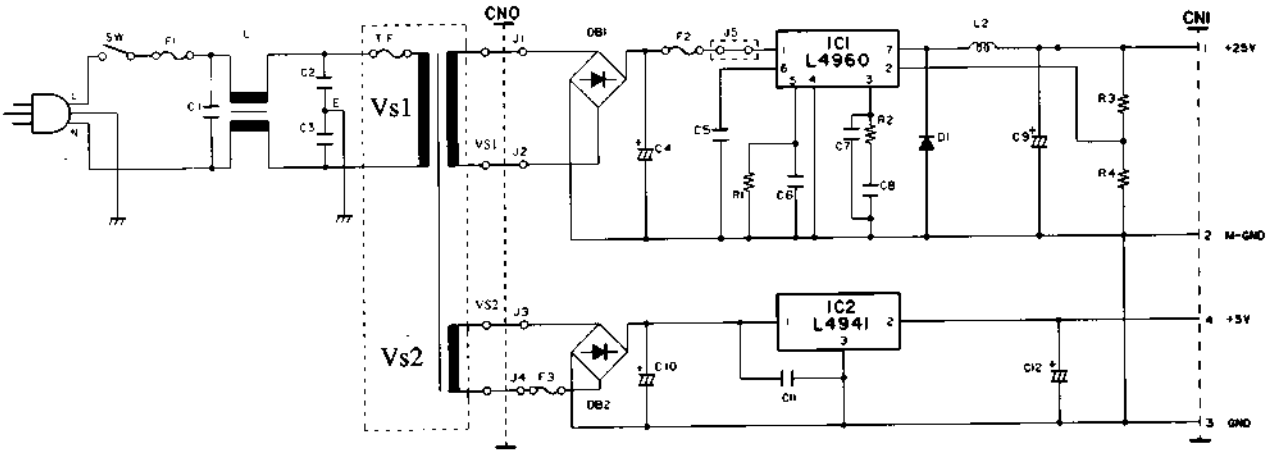


Fig. 2-17 Power Supply Unit

THEORY OF OPERATION

We will explain the chopper circuit in terms of Fig. 2-18, a simplified version of Fig. 2-17. IC1 is a pulse-width control switching regulator. It has a reference voltage section, oscillation section, pulse-width control section, and power transistors. Fig. 2-19 shows an equivalent circuit for IC1.

The chopper circuit switches the power transistors in IC1 on and off to divide input voltage VIN into pulses and smoothes those pulses with choke coil L2 and capacitor C9 to obtain the desired output voltage VOUT.

Since the pulse width control section determines the ratio of the time that the power transistors are on and off by comparing the output voltage with the reference voltage, the output voltage can be held steady.

In order words, if the output voltage falls below the reference voltage, the pulse width controller extends the time that the power transistors are on, thus raising the output voltage. The output voltage VOUT can be expressed with the following equation.

$$V_{OUT} = V_{IN} \cdot \frac{T_{ON}}{T_{ON} + T_{OFF}} = V_{IN} \cdot \frac{T_{ON}}{T}$$

TON : Duration the power transistors are on
TOFF : Duration the power transistors are off
T : TON + TOFF (constant)

Diode D1 forms a pathway through which the energy accumulated on choke coil L2 while the power transistor are on is discharged while the power transistors are off.

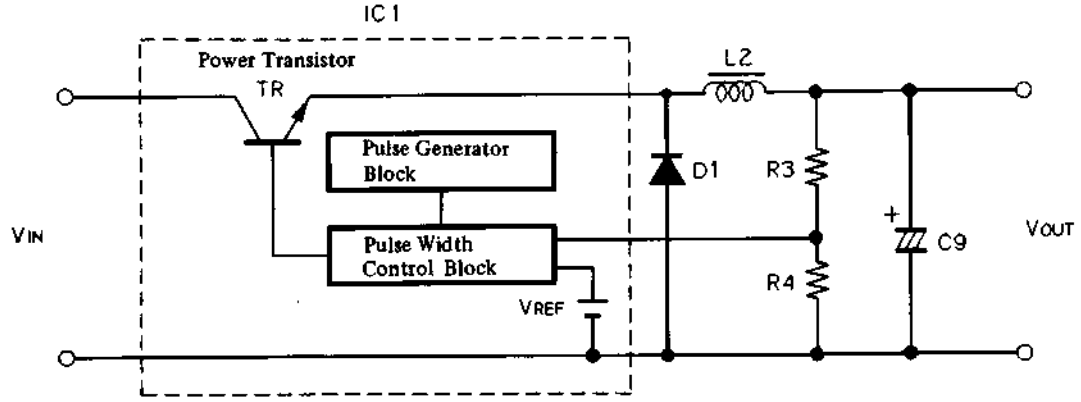


Fig. 2-18 Chopper Circuit

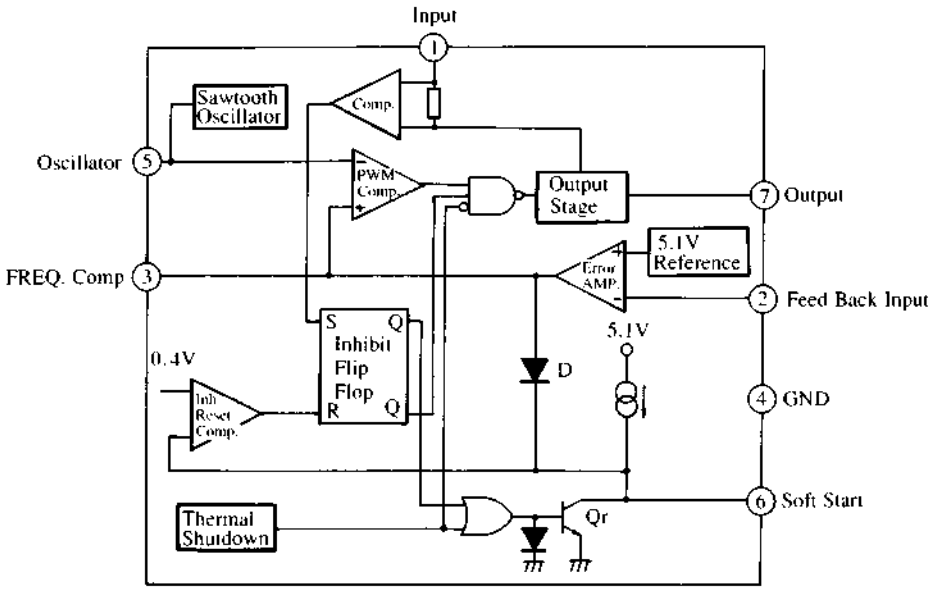


Fig. 2-19 Equivalent Circuit for Voltage Regulator IC1

4-5. Detectors

(1) Home Position Detector

A leaf switch is used in the home position detector, which is set at the left side of the frame unit. Open/Close 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

A paper out detector is located at the paper insertion slit. When paper is present, the precision snap-acting switch of the detector is CLOSE. As soon as paper runs out, the switch is set to OPEN, outputting a paper empty signal.

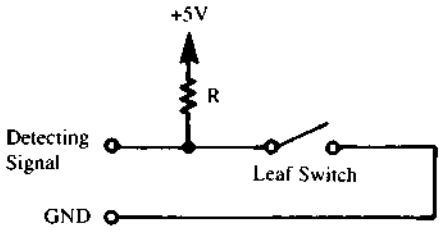


Fig. 2-24 Home Position Detector

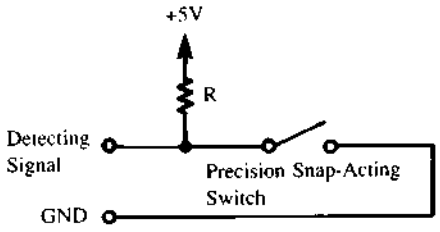


Fig. 2-25 Paper Out Detector

(3) Bail Lever Position Detector

Upon detecting the position of the bail lever, the auto loading operation will be activated. The leaf switch is open when the bail rollers is in contact with the platen roller, and it is closed when the bail roller is separated form 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.

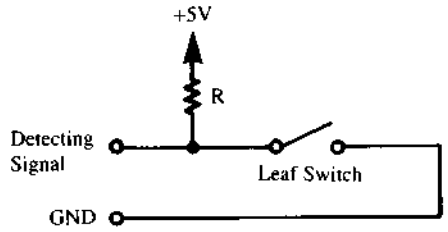


Fig. 2-26 Bail Lever Position Detector

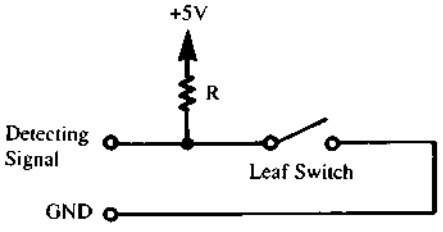


Fig. 2-27 Release Lever Position Detector

1. Troubleshooting Procedures

Troubleshooting is never easy because various problems arise depending upon the particular location of the breakdown. The following procedures should be taken in making repairs.

(1) The first method is to make repairs through unit replacements. The two display codes appearing in the flow chart are defined as follows: ①indicates main logic board replacement; and ②indicates printer mechanism replacement, to be carried out if 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 connector.)

Replaceable units include the following:

- Power supply unit
- Main logic board
- Printer mechanism

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

(2) The second method is to make repairs 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) All check items shown in the flow chart must be checked. 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, restart the job from the beginning.

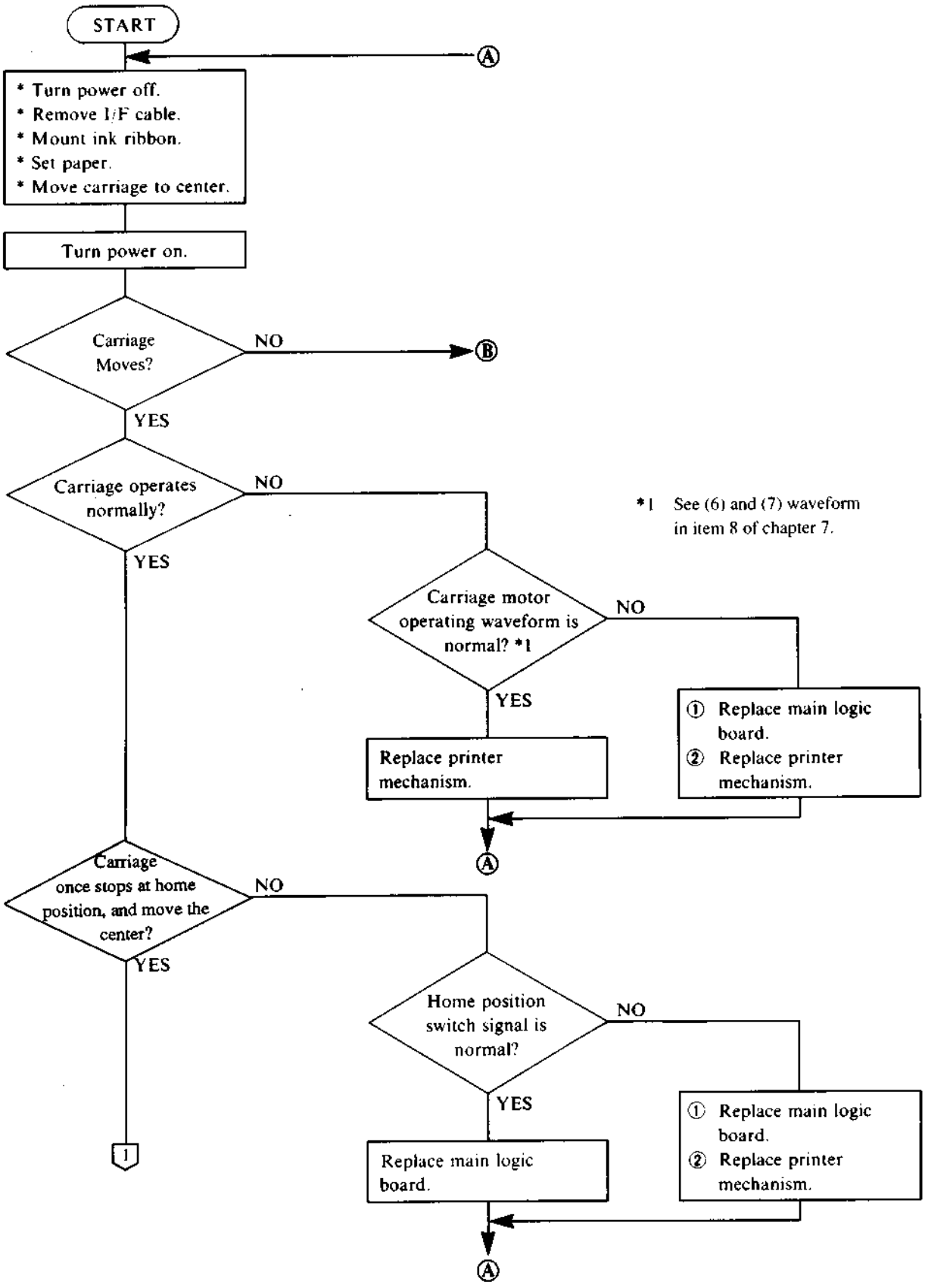
(Note 5) Be careful to avoid injury from static electricity when handling ICs and main logic board.

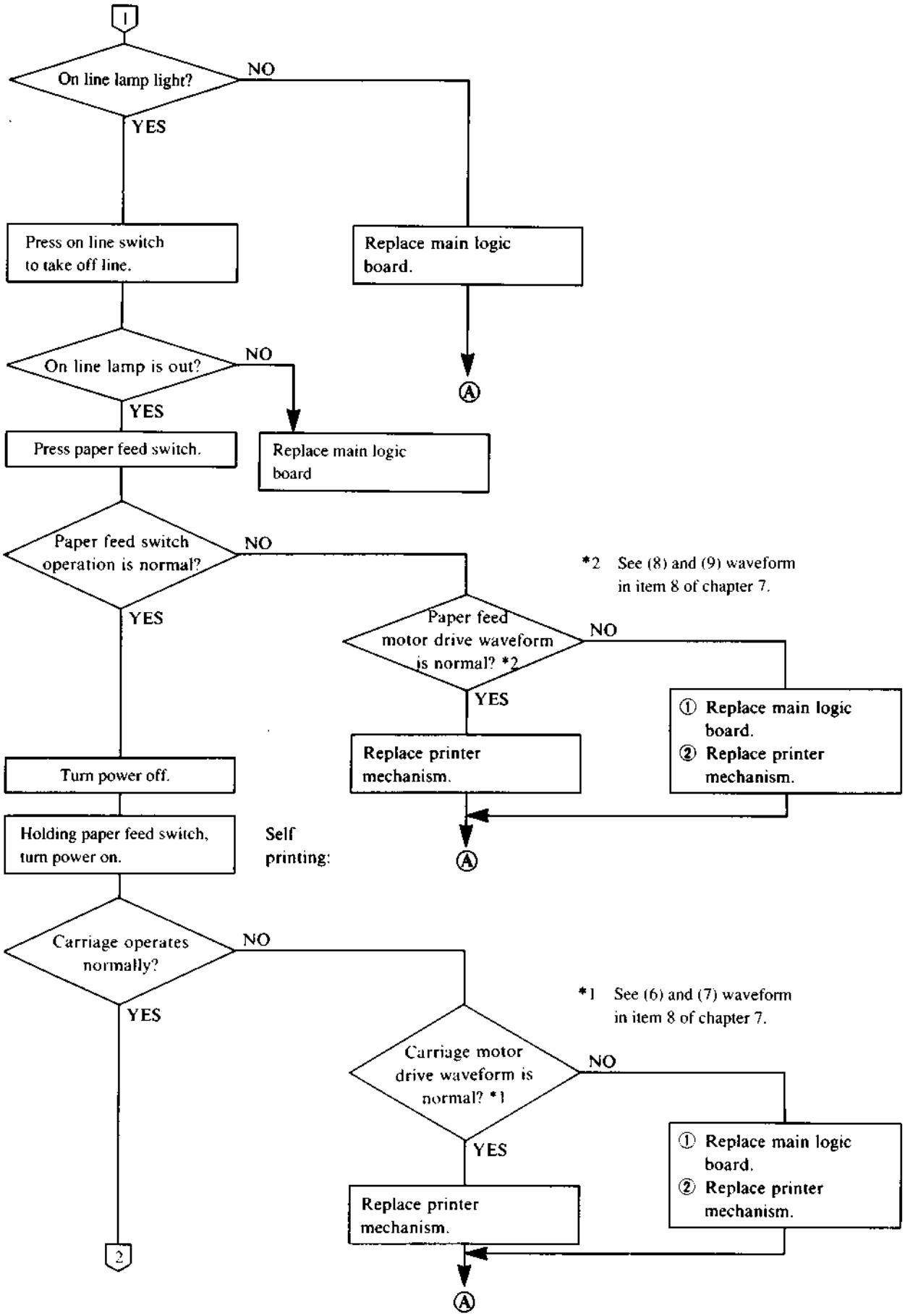
2. Unit Replacement Priority Chart

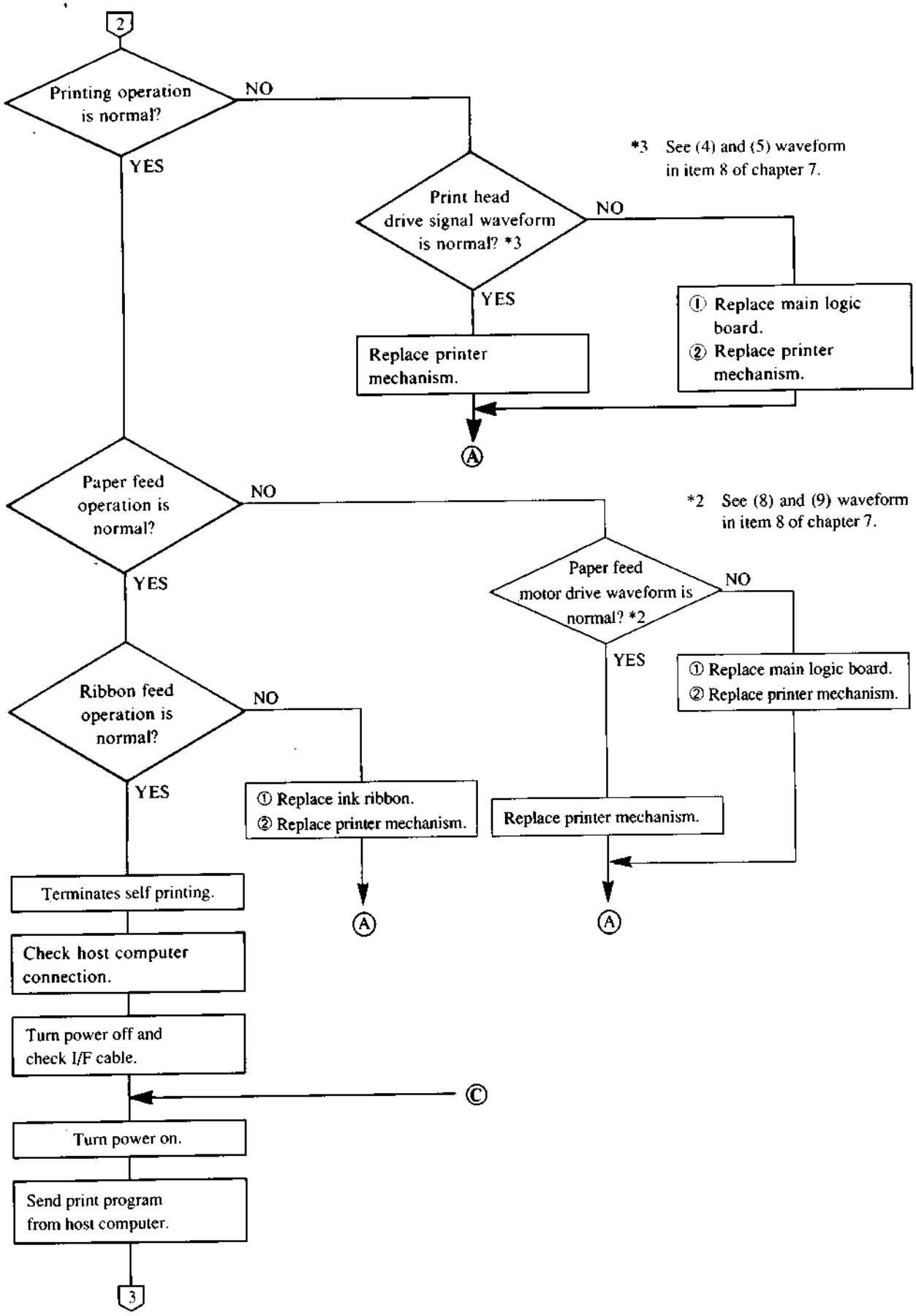
Category	Problem Details	Unit Exchange Sequence			Remarks
		Power supply unit	Main logic board	Printer mechanism	
Operation related	Specific display lamp only will not glow		1		
	Specific switch only cannot be input		1		
	Buzzer does not sound (sound volume inadequate)		1	2	
Motor related	Strange sounds 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	Replace ink ribbon
	Ink ribbon snagged (wire sticks out)		2	1	
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 DIP switch setting		1		
	Faulty operation when power is turned on/off		1		
	Abnormal motor operating speed (slow)		1	2	
	Fuse blown during operation	3	1	2	

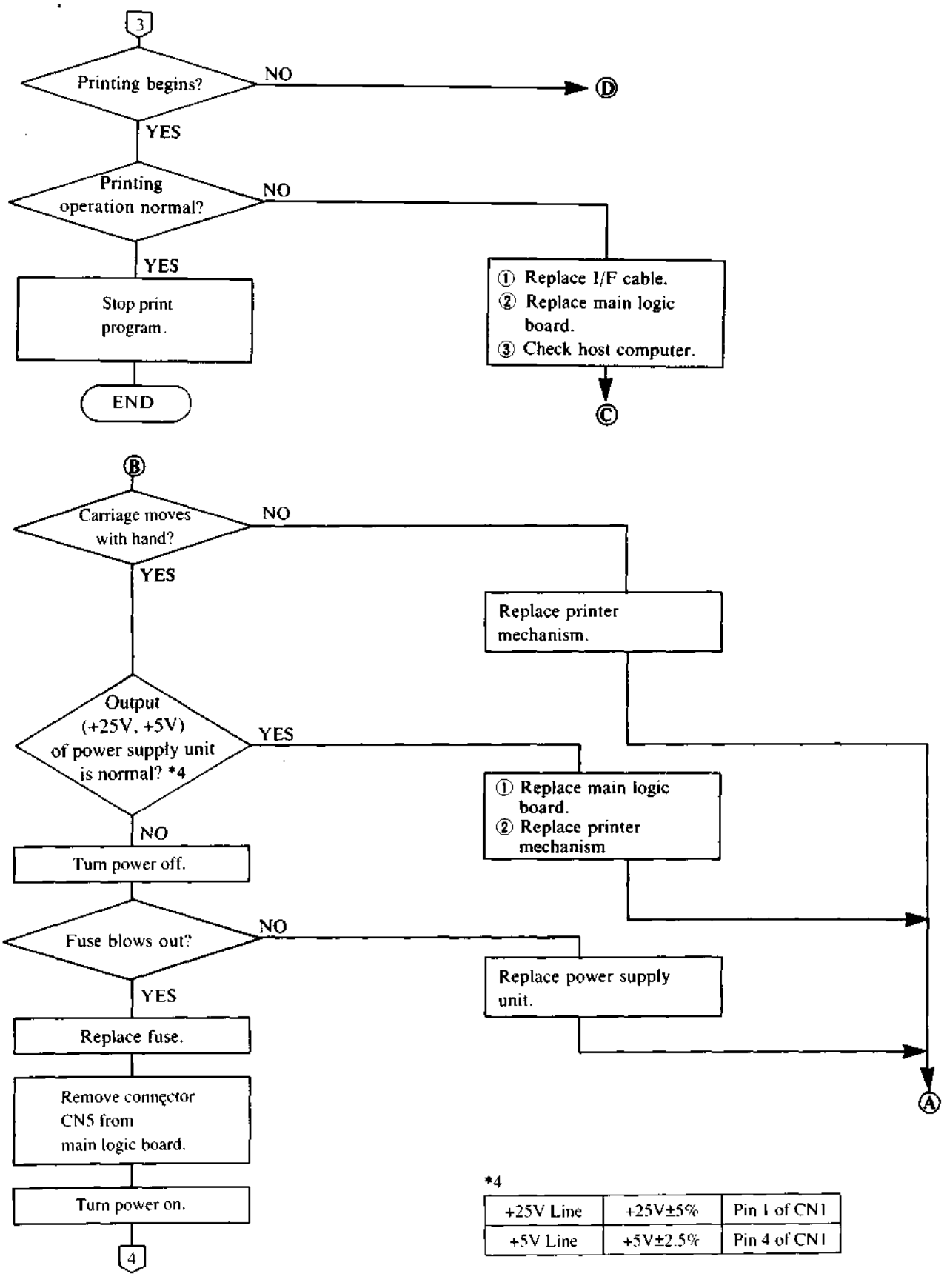
Note: The figures 1, 2 and 3 mean the priority of replacement.

3. Repair by Unit Replacement



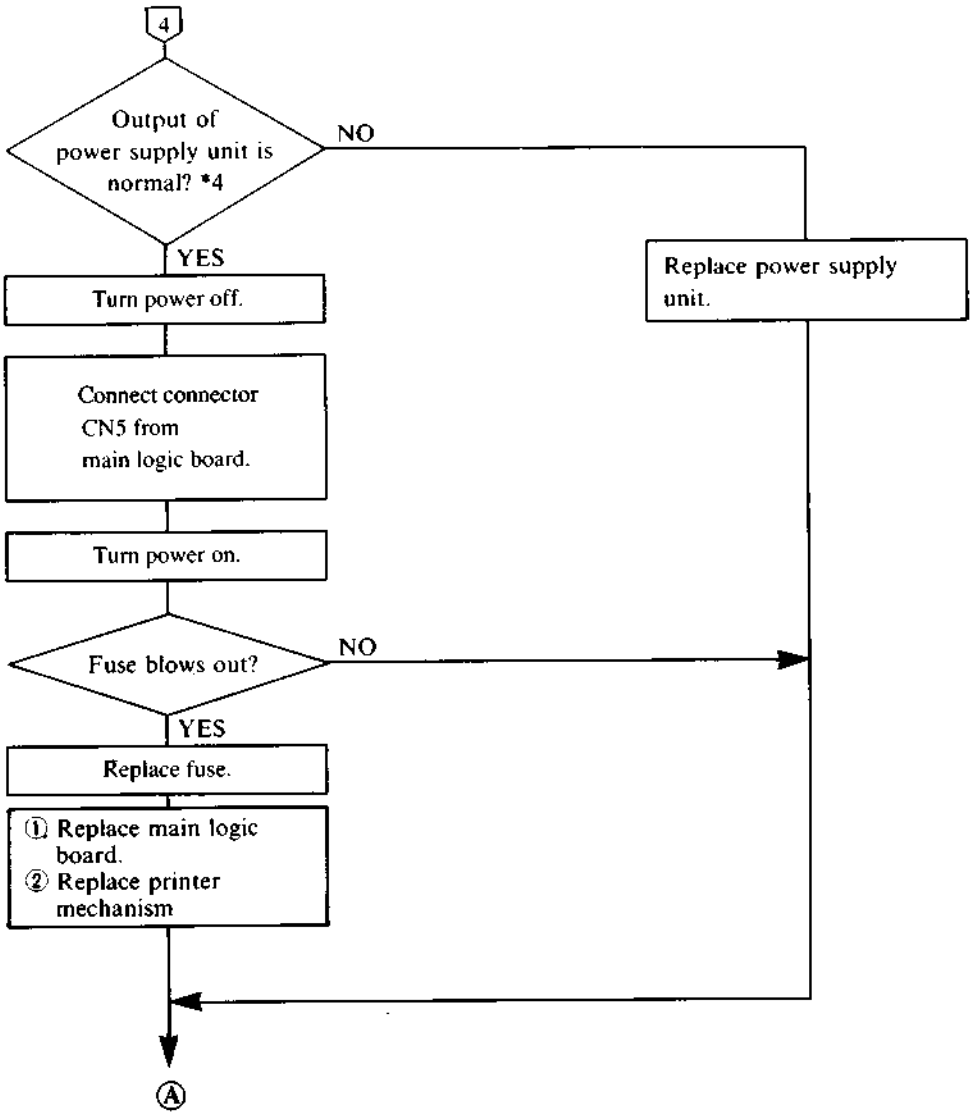

1
On line lamp light?
NO
YES
Press on line switch to take off line.
Replace main logic board.
A
On line lamp is out?
NO
YES
Press paper feed switch.
Replace main logic board
Paper feed switch operation is normal?
NO
YES
*2 See (8) and (9) waveform in item 8 of chapter 7.
Paper feed motor drive waveform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


2
Printing operation is normal?
NO
YES
*3 See (4) and (5) waveform in item 8 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.
Ⓐ
Paper feed operation is normal?
NO
YES
*2 See (8) and (9) waveform in item 8 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.
Ⓐ
Ⓐ
Terminates self printing.
Check host computer connection.
Turn power off and check I/F cable.
Ⓒ
Turn power on.
Send print program from host computer.
3



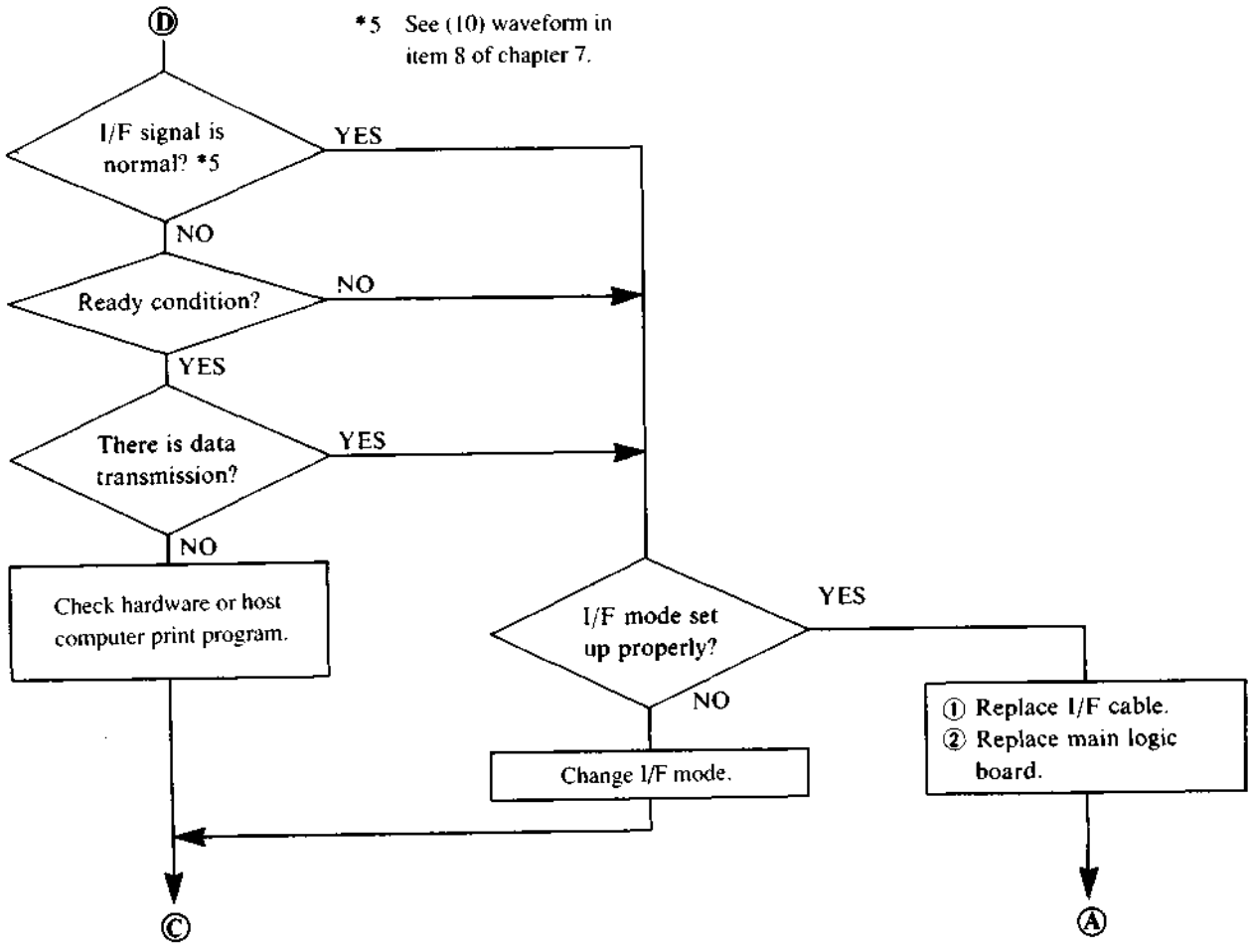
*4

+25V Line	+25V±5%	Pin 1 of CN1
+5V Line	+5V±2.5%	Pin 4 of CN1



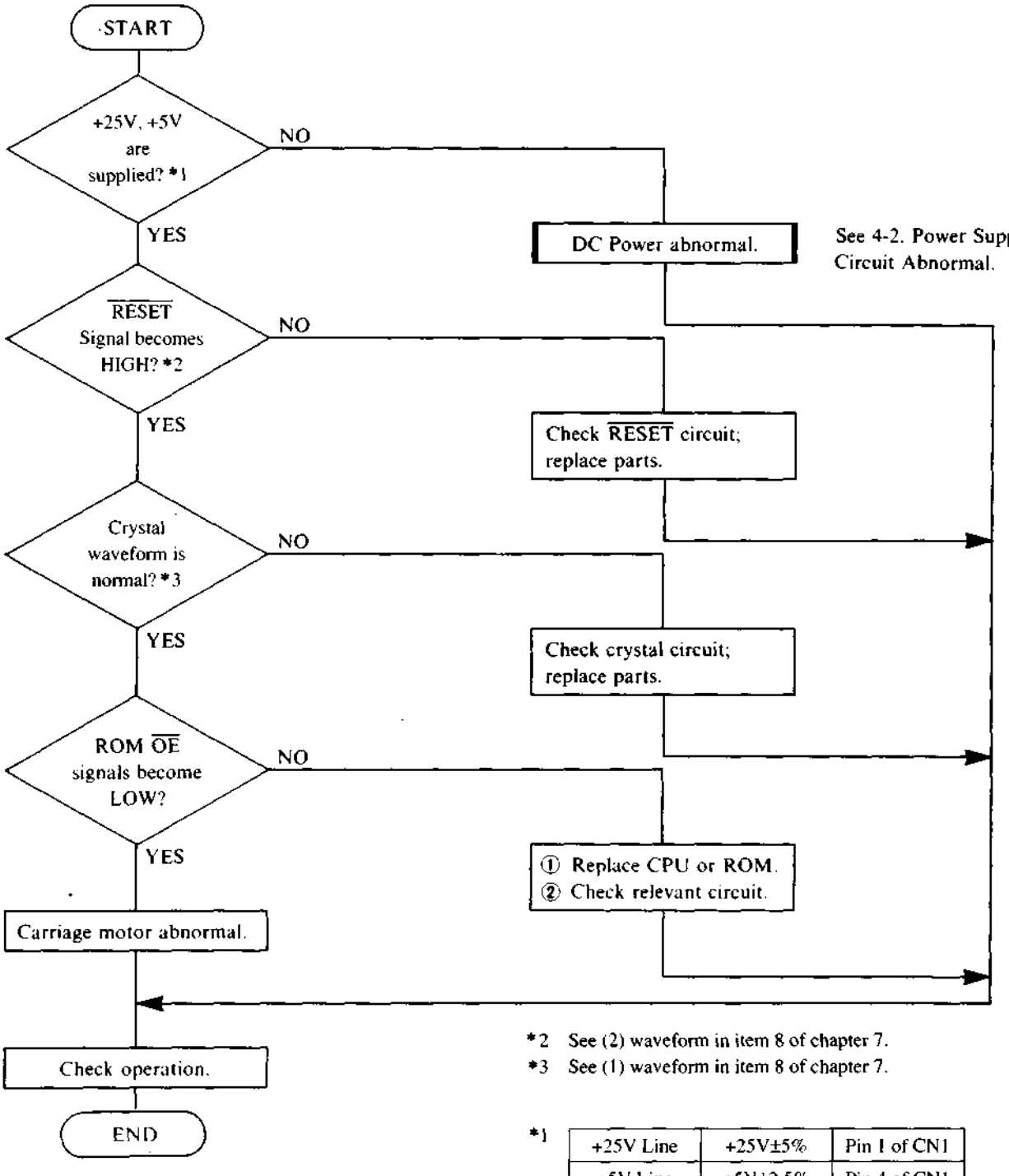
*4

+25V Line	+25V±5%	Pin 1 of CN1
+5V Line	+5V±2.5%	Pin 4 of CN1


Ⓓ
*5 See (10) waveform in item 8 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.
Ⓒ
Ⓐ

4. Repair by Parts Replacement

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



*2 See (2) waveform in item 8 of chapter 7.

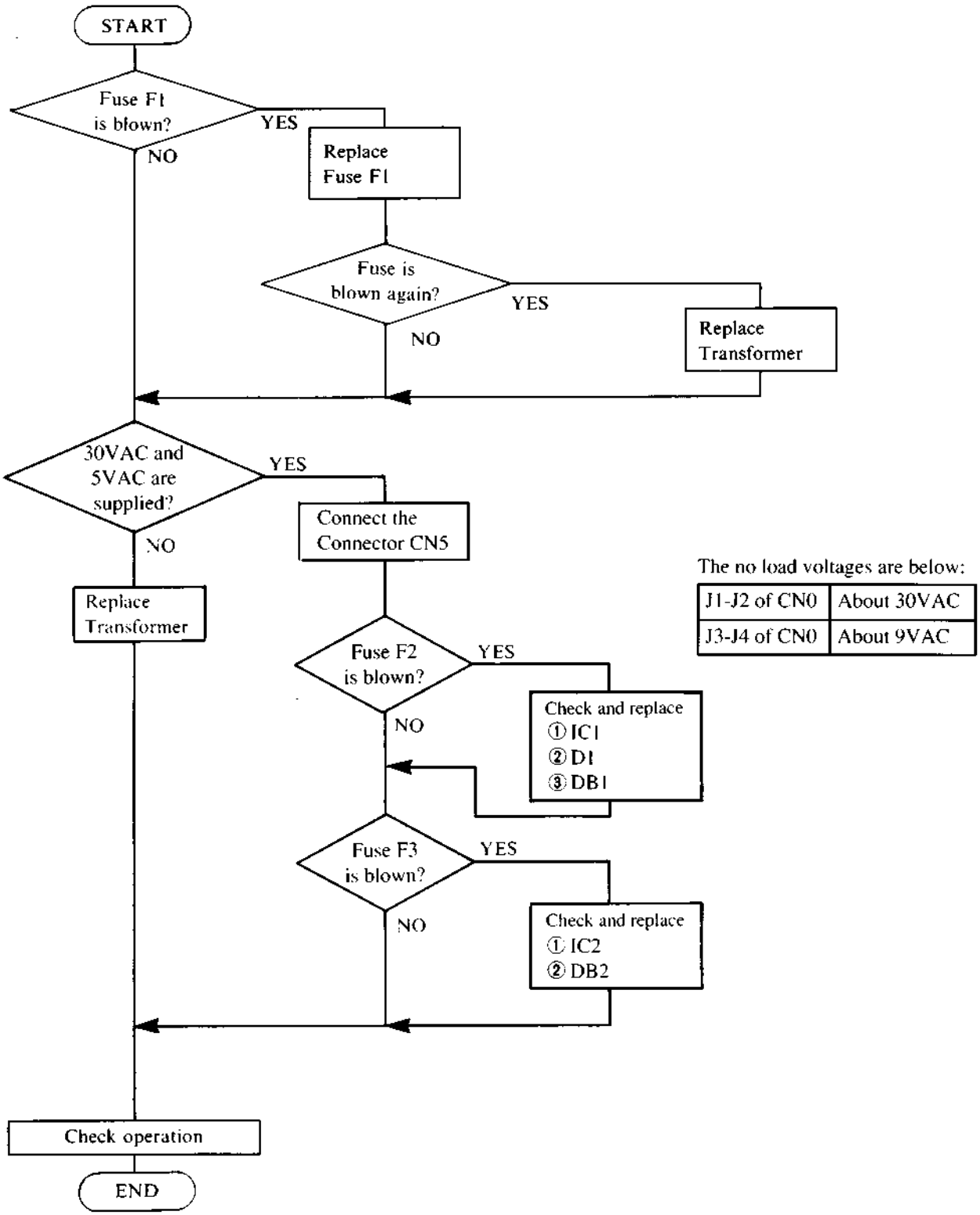
*3 See (1) waveform in item 8 of chapter 7.

*1

+25V Line	+25V±5%	Pin 1 of CN1
+5V Line	+5V±2.5%	Pin 4 of CN1

4-2. Power Supply Circuit Abnormal

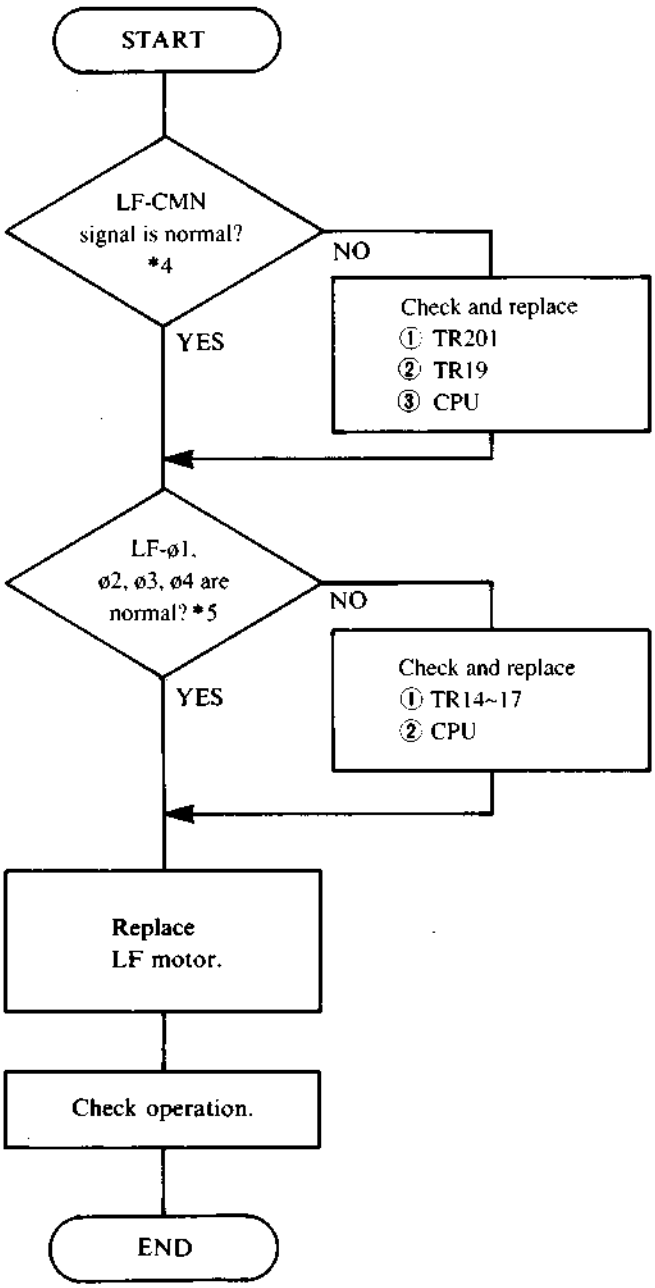
(1) Remove connector CN5 from the main logic board.

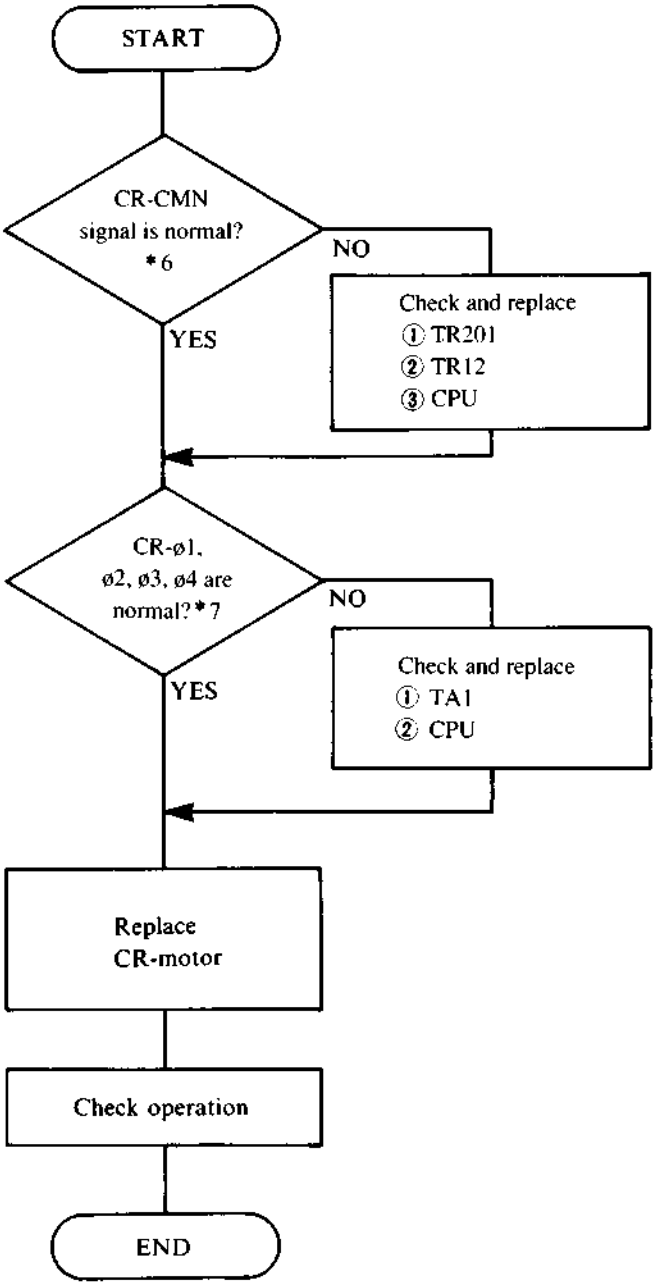


The no load voltages are below:

J1-J2 of CN0	About 30VAC
J3-J4 of CN0	About 9VAC

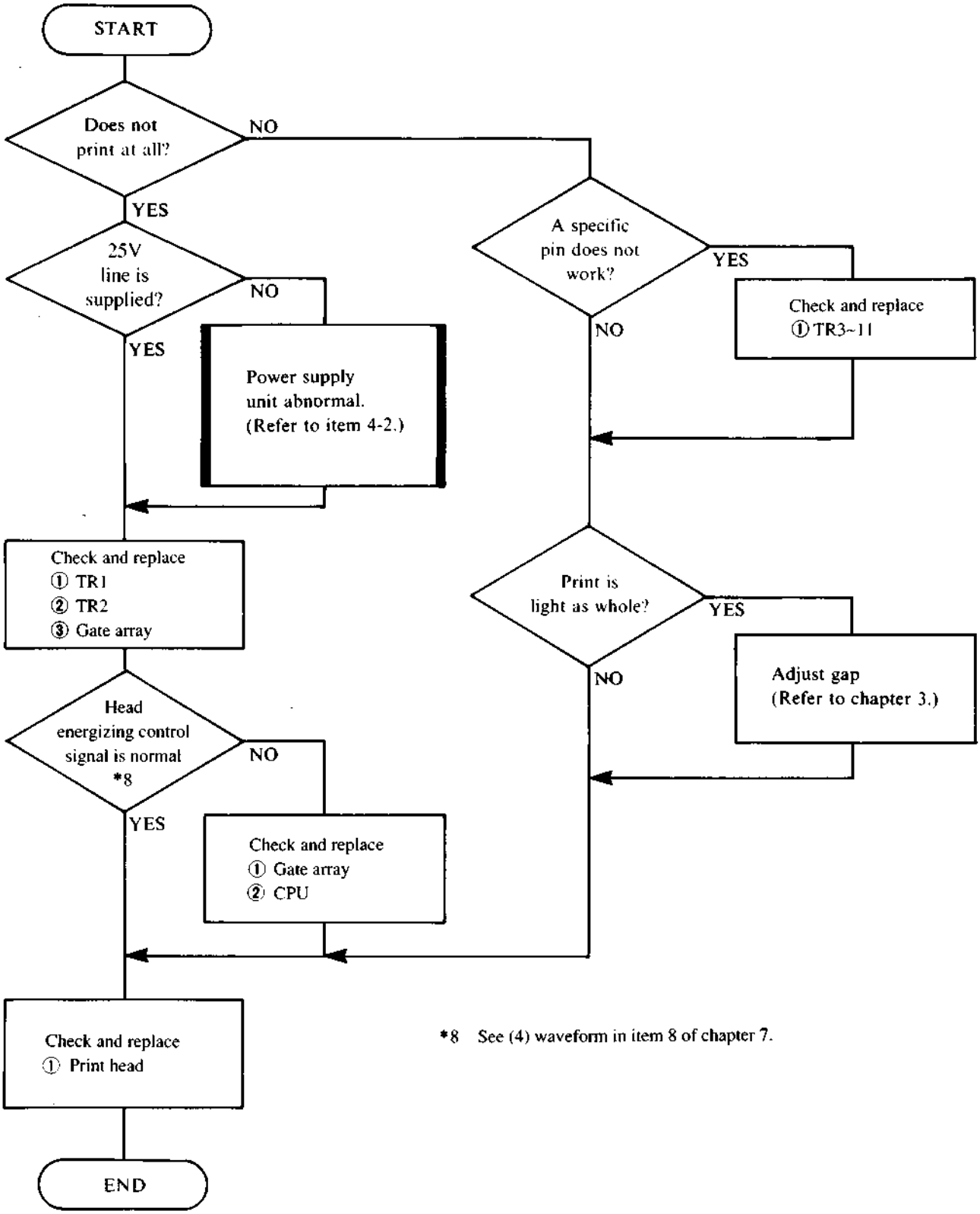
4-3. Defective Motor Operation





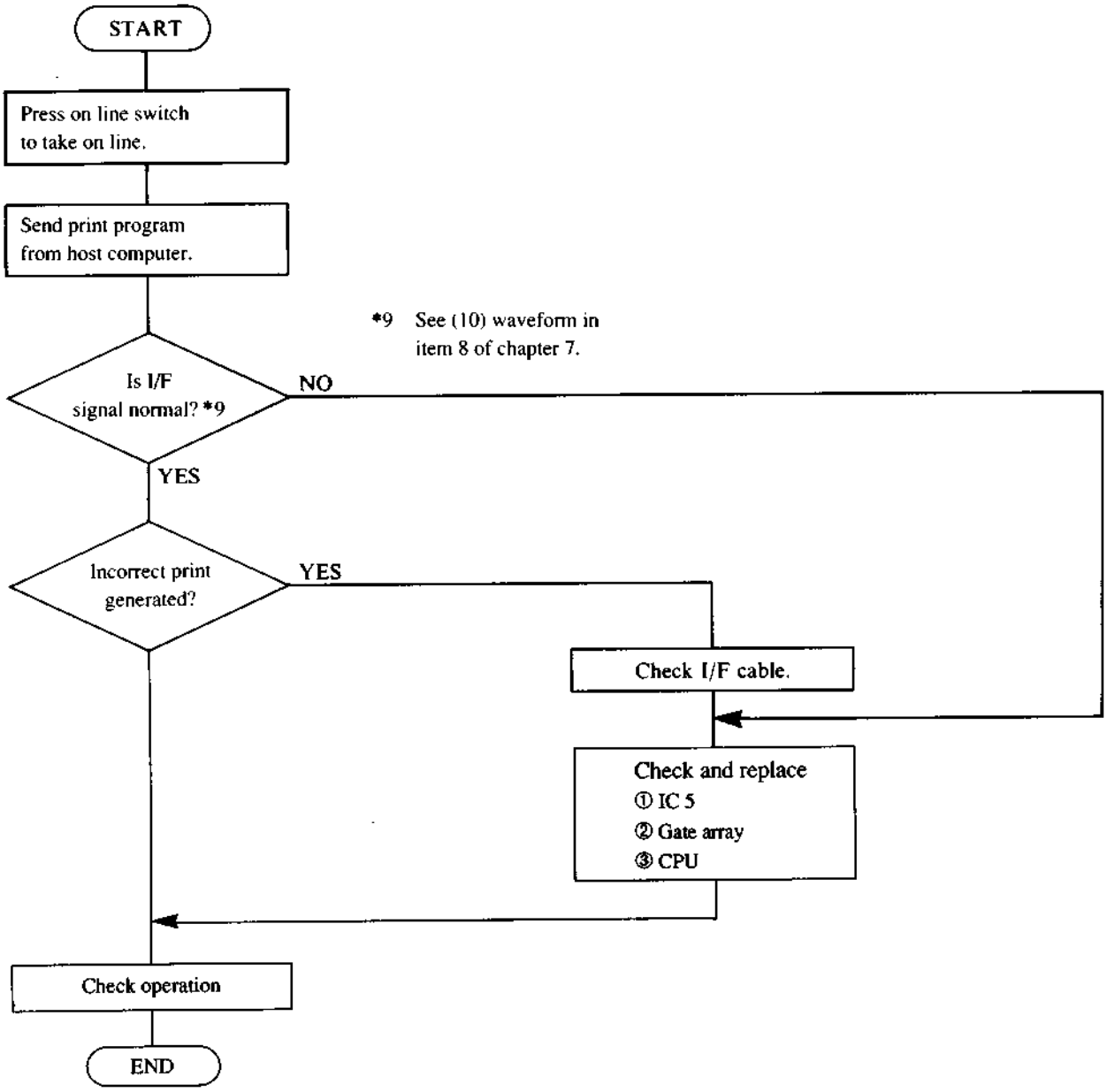
*4 See (8) waveform in item 8 of chapter 7.
*5 See (9) waveform in item 8 of chapter 7.
*6 See (6) waveform in item 8 of chapter 7.
*7 See (7) waveform in item 8 of chapter 7.

4-4. Defective Print Head Operation

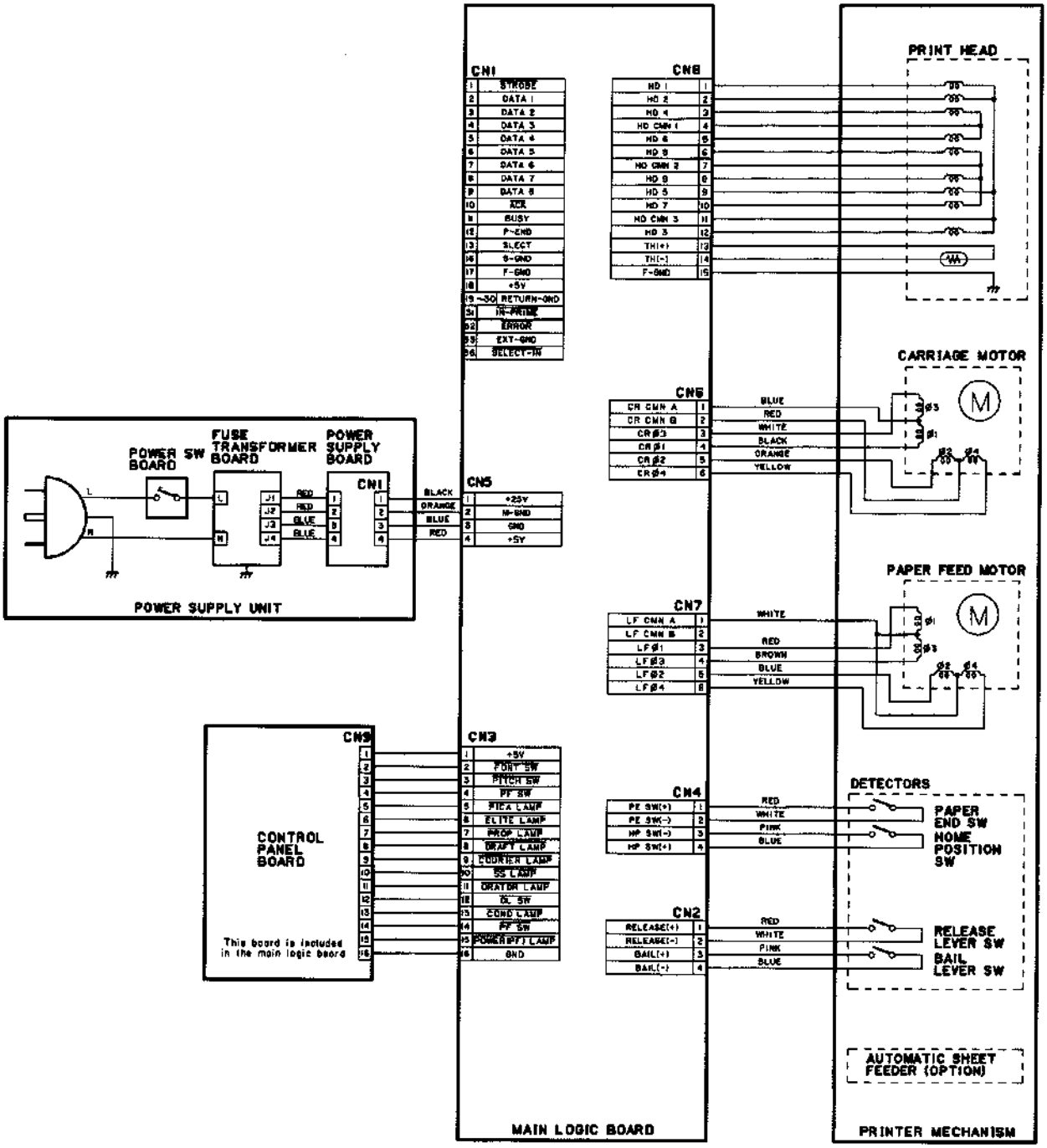


*8 See (4) waveform in item 8 of chapter 7.

4-5. Defective Interface Operation

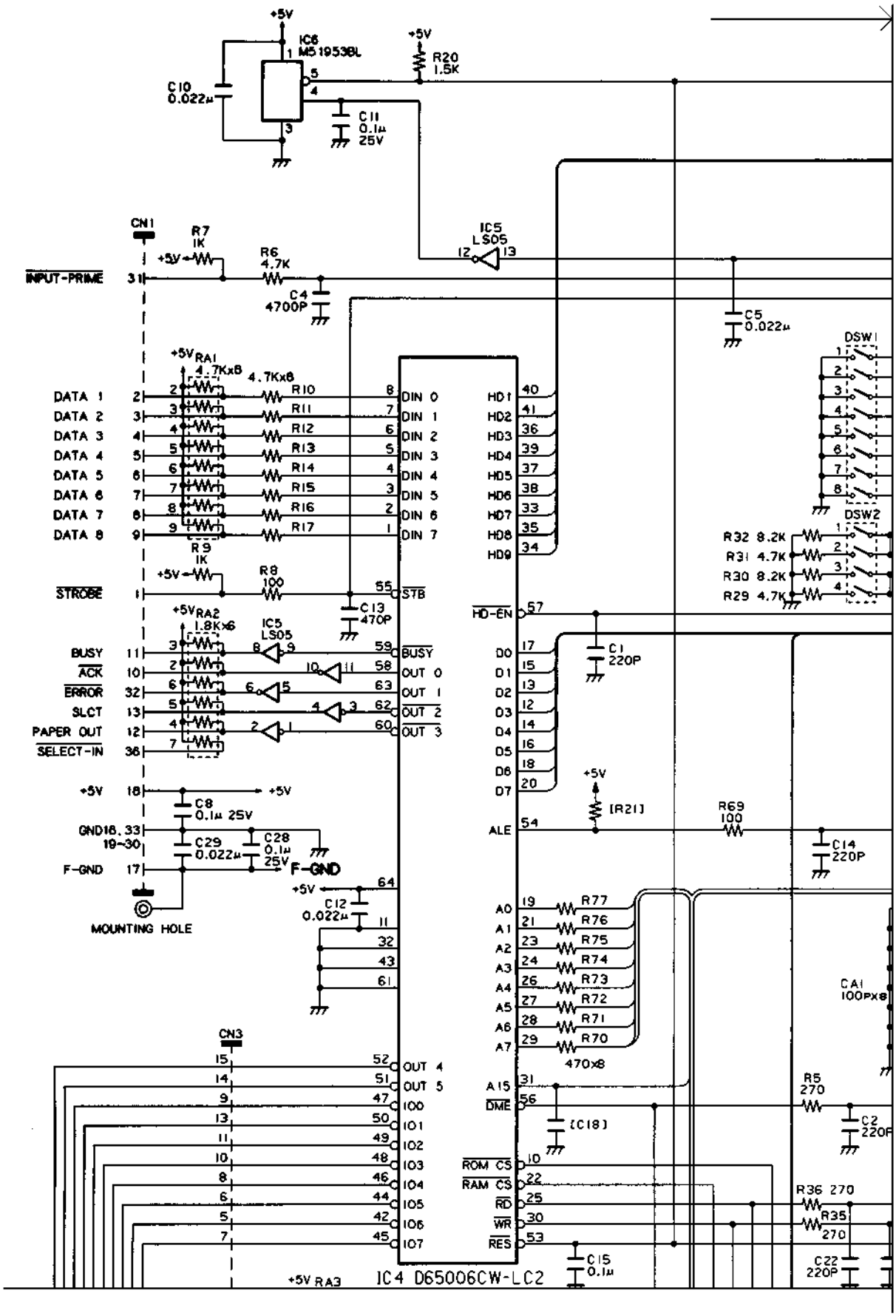


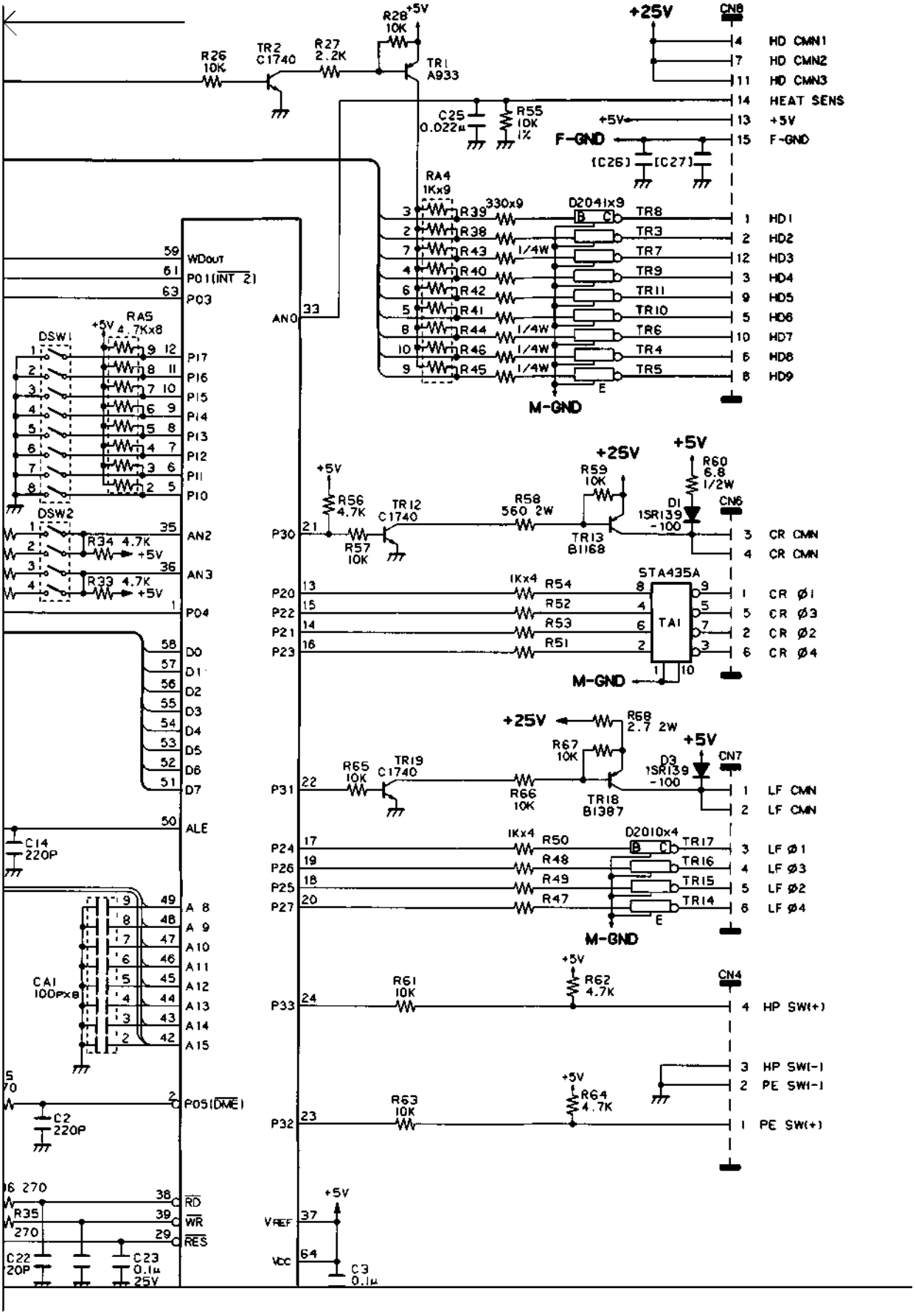
4. Wiring Scheme of Printer

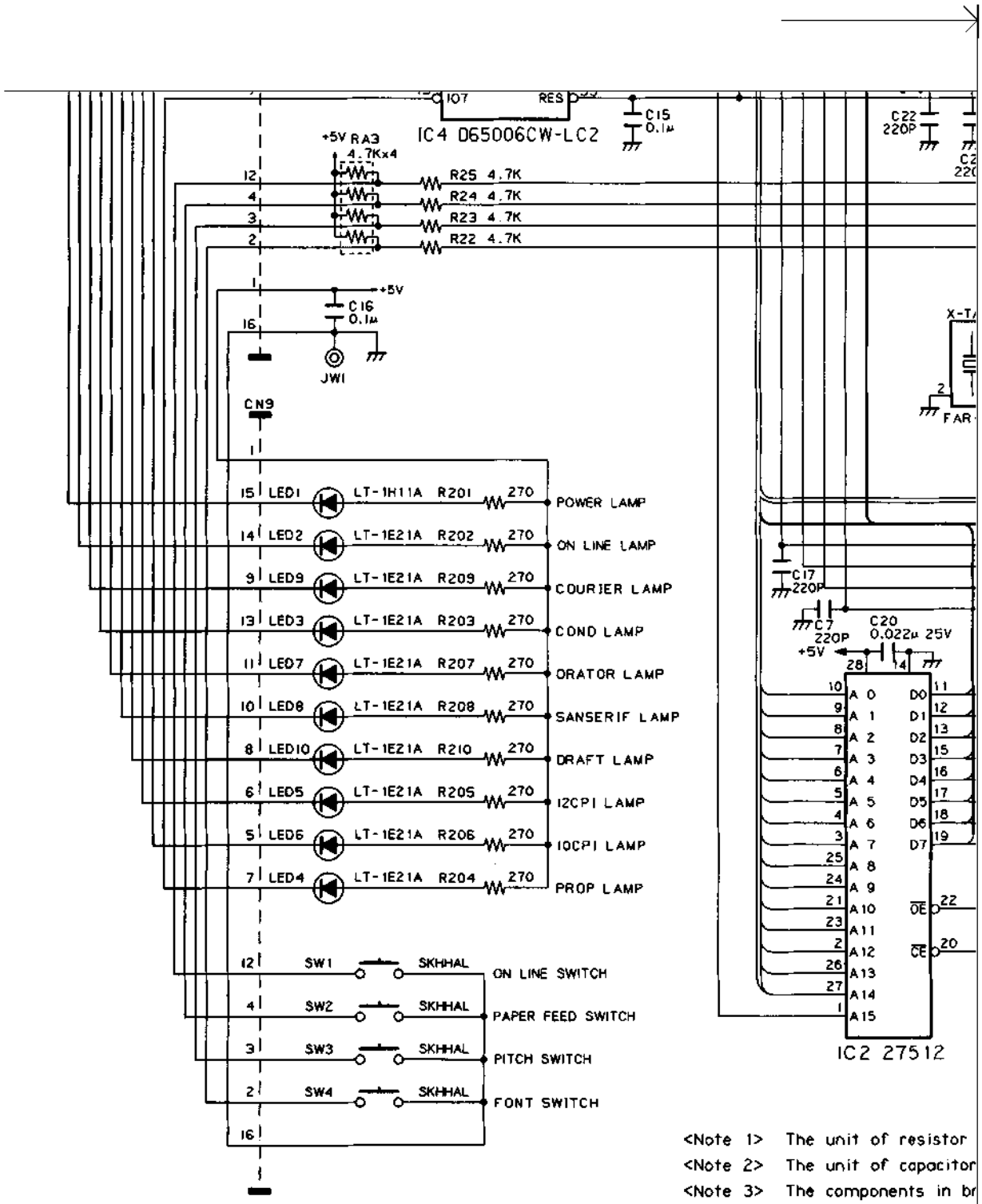


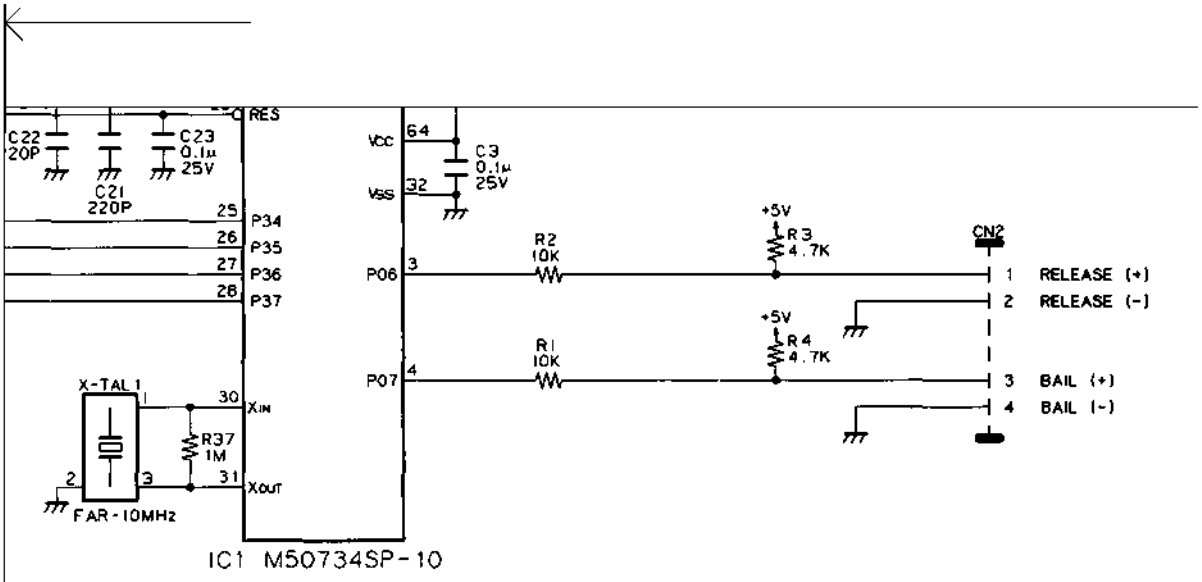
5. Main Logic Board

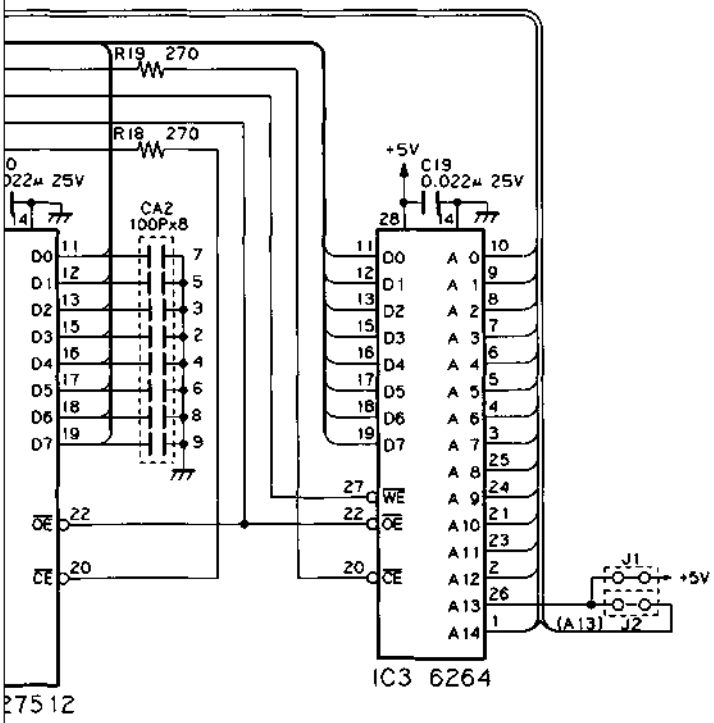
5-1. Circuit Diagram

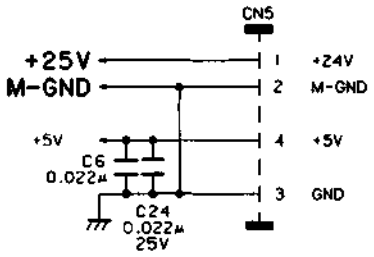



+25V
CN8
HD CMN1
HD CMN2
HD CMN3
HEAT SENS
+5V
F-GND
R28 10K
TR2 C1740
R27 2.2K
TR1 A933
R26 10K
C25 0.022μ
R55 10K 1%
RA4 1Kx9
R39 330x9
D2041x9
TR8
TR3
TR7
TR9
TR11
TR10
TR6
TR4
TR5
HD1
HD2
HD3
HD4
HD5
HD6
HD7
HD8
HD9
M-GND
WDout
P01(INT 2)
P03
AN0
RA5 4.7Kx8
DSW1
DSW2
P17
P16
P15
P14
P13
P12
P11
P10
AN2
AN3
P04
R34 4.7K
R33 4.7K
D0
D1
D2
D3
D4
D5
D6
D7
ALE
C14 220P
CA1 100Px8
A 8
A 9
A10
A11
A12
A13
A14
A15
P05(DME)
C2 220P
RD
WR
RES
R35 270
C22 20P
C23 0.1μ 25V
VREF
VCC
C3 0.1μ
R56 4.7K
TR12 C1740
R57 10K
R58 560 2W
R59 10K
TR13 B1168
R60 6.8 1/2W
D1 1SR139-100
CN6
CR CMN
CR CMN
P30
STA435A
TA1
R54
R52
R53
R51
P20
P22
P21
P23
CR Ø1
CR Ø3
CR Ø2
CR Ø4
R68 2.7 2W
R67 10K
TR18 B1387
R65 10K
TR19 C1740
R66 10K
D3 1SR139-100
CN7
P31
LF CMN
LF CMN
R50
R48
R49
R47
D2010x4
TR17
TR16
TR15
TR14
P24
P26
P25
P27
LF Ø1
LF Ø3
LF Ø2
LF Ø4
R61 10K
R62 4.7K
CN4
P33
HP SW(+)
HP SW(-)
PE SW(-)
R63 10K
R64 4.7K
P32
PE SW(+)


IC4 D65006CW-LC2
RES
C15 0.1μ
+5V RA3 4.7Kx4
R25 4.7K
R24 4.7K
R23 4.7K
R22 4.7K
+5V
C16 0.1μ
JW1
CN9
LED1 LT-1H11A R201 270 POWER LAMP
LED2 LT-1E21A R202 270 ON LINE LAMP
LED9 LT-1E21A R209 270 COURIER LAMP
LED3 LT-1E21A R203 270 COND LAMP
LED7 LT-1E21A R207 270 ORATOR LAMP
LED8 LT-1E21A R208 270 SANSERIF LAMP
LED10 LT-1E21A R210 270 DRAFT LAMP
LED5 LT-1E21A R205 270 12CPI LAMP
LED6 LT-1E21A R206 270 10CPI LAMP
LED4 LT-1E21A R204 270 PROP LAMP
SW1 SKHHAL ON LINE SWITCH
SW2 SKHHAL PAPER FEED SWITCH
SW3 SKHHAL PITCH SWITCH
SW4 SKHHAL FONT SWITCH
C22 220P
C17 220P
C7 220P
C20 0.022μ 25V
+5V
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15
D0 D1 D2 D3 D4 D5 D6 D7
OE CE
IC2 27512
<Note 1> The unit of resistor
<Note 2> The unit of capacitor
<Note 3> The components in br

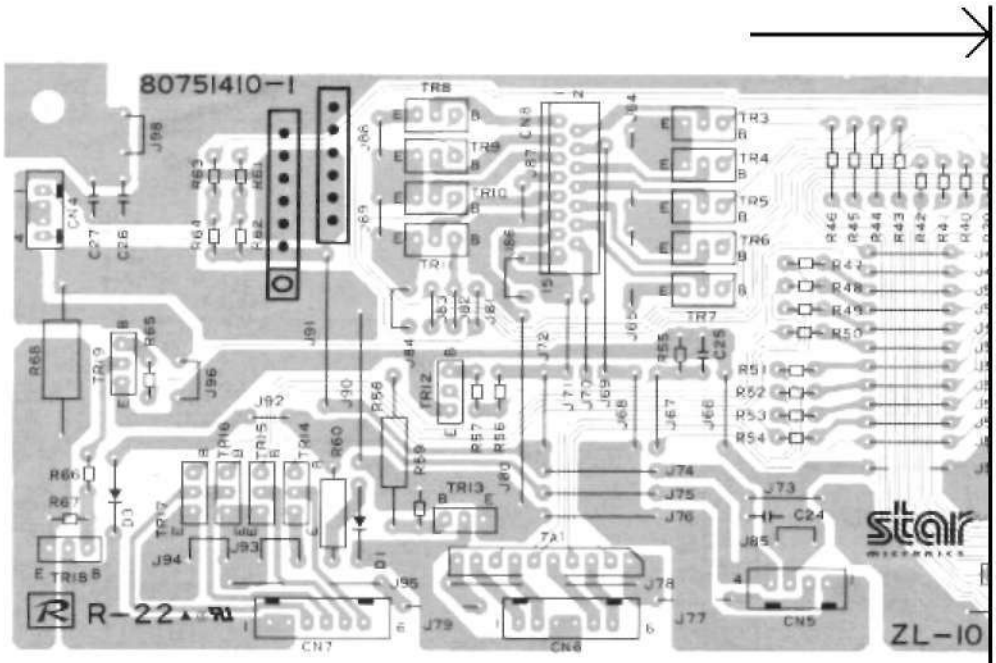


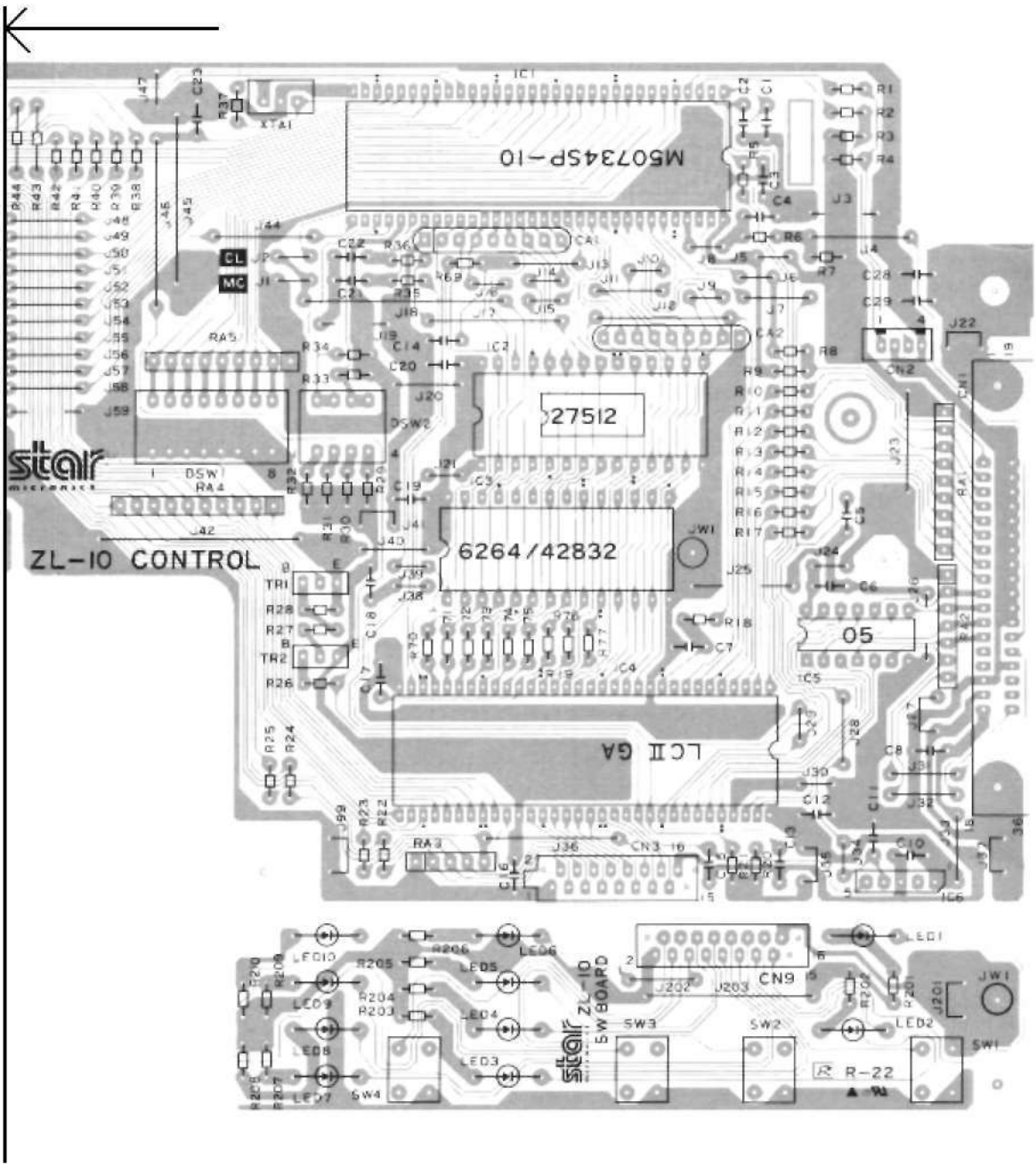




resistor and resistor array is " 0 ", and no indication of wattage means 1/6W, 1/8W respectively.
capacitor and capacitor array is "F", and no indication of voltage means 50V.
ents in bracket are not installed the board.

5-2. Component Layout




M50734SP-10
27512
6264/42832
LCII GA
05
ZL-10 CONTROL
DSW
CL
MC
XTAL
CN9
SW BOARD
ZL-10
R-22

5-3. Parts List

Main Logic Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08250001	CPU M50734SP-10	1		S
IC2		08220116	EPROM 27512-150NS	1	ZL.** :EXCEPT SU	S
	*2	08223110	MASKED ROM 1.3 ZL-10	1	:EXCEPT SU	S
	#2	08223111	MASKED ROM 1.5 ZL-10	1	:EXCEPT SU	S
	#2	08220116	EPROM 27512-150NS	1	ZL.**.SU :FOR SU	S
		09110024	IC SOCKET ICS-28-2T	1		
IC3		08221002	SRAM HM6264P-100NS	1		S
IC4		08240013	GATE ARRAY D65006CW-LC2	1		S
IC5		08210017	TTL IC 74LS05	1		
IC6		08200109	IC-RESET M51953BL	1		S
TR1		07011752	TRANSISTOR 2SA1266*	1		
TR2		07227853	TRANSISTOR 2SC1740SE	1		
TR3-11		07320411	TRANSISTOR 2SD2041	9		S
TR12		07227853	TRANSISTOR 2SC1740SE	1		
TR13		07111682	TRANSISTOR 2SB1168	1		S
TR14-17		07320101	TRANSISTOR 2SD2010	4		S
TR18		07113871	TRANSISTOR 2SB1387TZ	1		S
TR19		07227853	TRANSISTOR 2SC1740SE	1		
TA1		07650036	TRANSISTOR ARRAY STA435A	1		S
D1		08000044	DIODE 1SR139-100AT	1		
D2					NOT USED	
D3		08000044	DIODE 1SR139-100AT	1		
R1-2		06051034	RD RESISTOR 10 K-OHM 1/6W	2		
R3-4		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R5		06052714	RD RESISTOR 270 OHM 1/6W	1		
R6		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R7		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R8		06051014	RD RESISTOR 100 OHM 1/6W	1		
R9		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R10-17		06054725	RD RESISTOR 4.7 K-OHM 1/6W	8		
R18-19		06052714	RD RESISTOR 270 OHM 1/6W	2		
R20		06051525	RD RESISTOR 1.5 K-OHM 1/6W	1		
R21					NOT MOUNTED	
R22-25		06054725	RD RESISTOR 4.7 K-OHM 1/6W	4		
R26		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R27		06052224	RD RESISTOR 2.2 K-OHM 1/6W	1		
R28		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R29		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R30		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R31		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R32		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R33-34		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R35-36		06052714	RD RESISTOR 270 OHM 1/6W	2		
R37		06051051	RD RESISTOR 1 M-OHM 1/6W	1		
R38-42		06053314	RD RESISTOR 330 OHM 1/6W	5		
R43-46		06043315	RD RESISTOR 330 OHM 1/4W	4		
R47-54		06051025	RD RESISTOR 1 K-OHM 1/6W	8		
R55	*1	06251034	RN RESISTOR 10 K-OHM 1/6W	1		
	#1	06241034	RN RESISTOR 10 K-OHM 1/4W 1%	1		
R56		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R57		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R58		06205611	RN RESISTOR 560 OHM 2W	1		
R59		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R60		06220684	RN RESISTOR 6.8 OHM 1/2W	1		
R61		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R62		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R63		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R64		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R65-67		06051034	RD RESISTOR 10 K-OHM 1/6W	3		
R68		06200274	RN RESISTOR 2.7 OHM 2W 2%	1		
R69		06051014	RD RESISTOR 100 OHM 1/6W	1		
R70-77		06054714	RD RESISTOR 470 OHM 1/6W	8		
R201-210		06052714	RD RESISTOR 270 OHM 1/6W	10		
RA1		06584729	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA2		06581823	RESIS. ARRAY 1.8K-OHM 1/8W 6EL	1		
RA3		06584720	RESIS. ARRAY 4.7K-OHM 1/8W 4EL	1		
RA4		06581028	RESIS. ARRAY 1 K-OHM 1/8W 9EL	1		
RA5		06584729	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
C1		05152212	CERA. CAPA. 220PF 50V	1		
C2		05552214	CAPACITOR 220PF 50V	1		
C3		05131044	CERA. CAPA. 0.1UF 25V	1		
C4		05154723	CERA. CAPA. 4700PF 50V	1		
C5-6		05152234	CERA. CAPA. 0.022UF 50V	2		
C7		05552214	CAPACITOR 220PF 50V	1		
C8		05131044	CERA. CAPA. 0.1UF 25V	1		
C9					NOT USED	
C10		05152234	CERA. CAPA. 0.022UF 50V	1		
C11		05131044	CERA. CAPA. 0.1UF 25V	1		
C12		05152234	CERA. CAPA. 0.022UF 50V	1		
C13		05154714	CERA. CAPA. 470PF 50V	1		
C14		05152212	CERA. CAPA. 220PF 50V	1		
C15		05131044	CERA. CAPA. 0.1UF 25V	1		
C16		05551044	CAPACITOR 0.1UF 50V	1		
C17		05152212	CERA. CAPA. 220PF 50V	1		
C18					NOT MOUNTED	
C19-20		05532234	CAPACITOR 0.022UF 25V	2		
C21-22		05552214	CAPACITOR 220PF 50V	2		
C23		05131044	CERA. CAPA. 0.1UF 25V	1		
C24		05532234	CAPACITOR 0.022UF 25V	1		
C25		05152234	CERA. CAPA. 0.022UF 50V	1		
C26-27					NOT MOUNTED	
C28		05131044	CERA. CAPA. 0.1UF 25V	1	EXCEPT FOR HK,SU	
					NOT MOUNTED :HK,SU	
C29		05252232	FILM CAPA. 0.022UF 50V	1	EXCEPT FOR HK,SU	
					NOT MOUNTED :HK,SU	
CA1-2		05651012	CAPA. ARRAY 100PF 50V 8EL	2		
DSW1	*1	09090034	DIP SWITCH KSS08-1	1		
	#1	09090046	DIP SWITCH EAH108L-BLK	1		
DSW2	*1	09090033	DIP SWITCH KSS04-1	1		
	#1	09090045	DIP SWITCH EAH104L-BLK	1		
XTAL1		09250035	CERA. OSCILLATOR CST10.0MT	1		
LED1		08300055	LED LT-1H11A	1		
LED2-10		08300058	LED LT-1E21A	9		
SW1-4		09010043	PUSH SWITCH SKHHAL=S	4		
CN1		09100457	CONNECTOR 57L-40360-770B-D29	1		
CN2	*1	09100342	CONNECTOR 53014-0410	1		
	*3	09100476	CONNECTOR 53014-0470	1		
	#3	09100342	CONNECTOR 53014-0410	1		
CN3		09100464	CONNECTOR 5062-16	1		
CN4	*1	09100342	CONNECTOR 53014-0410	1		
	*3	09100476	CONNECTOR 53014-0470	1		
	#3	09100342	CONNECTOR 53014-0410	1		

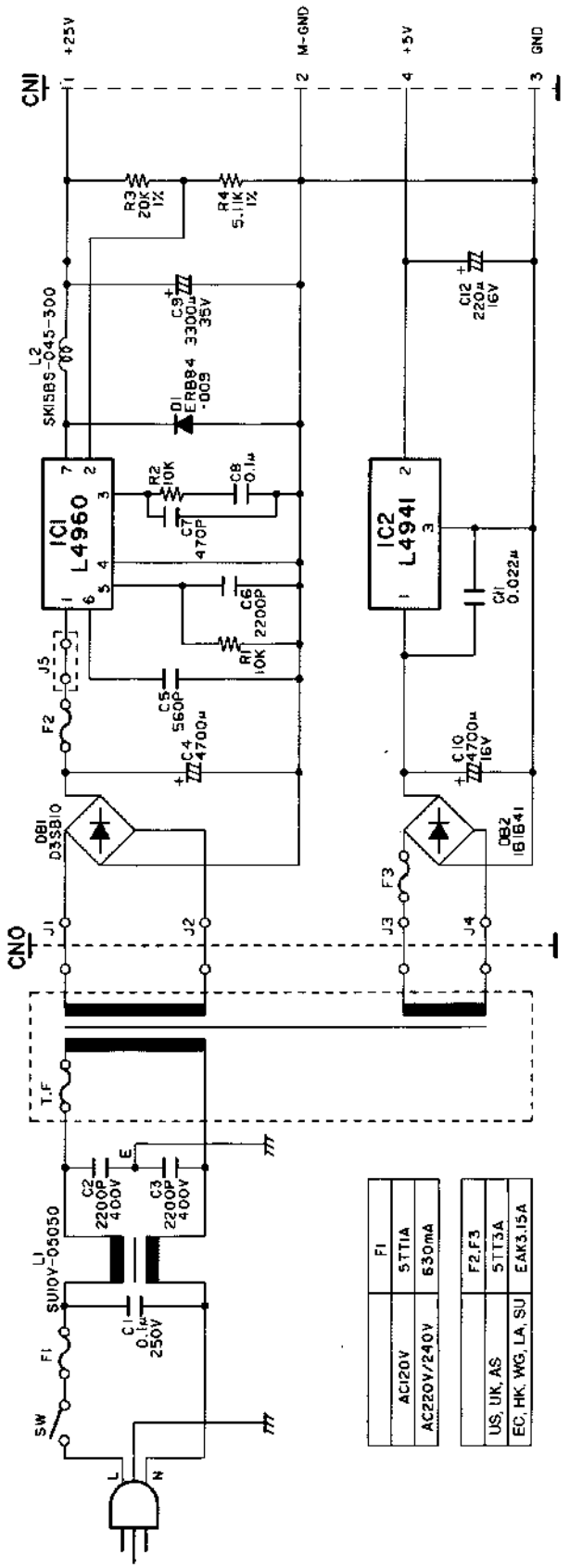
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
CN5		09100317	CONNECTOR 5483-04A	1		
CN6		09100267	CONNECTOR 5483-06A	1		
CN7		09100278	CONNECTOR 5483-06A-RED	1		
CN8		09100384	CONNECTOR HLEM15S-2	1		
CN9		09100464	CONNECTOR 5062-16	1		
		80703201	CABLE UNIT 16X180 ZL-10	1		
JW1	*3	80701170	WIRE 20UL1007BLK230	1		
	#3	87770070	CABLE UNIT 01X230 (D)	1		
J1-42		93930006	JUMPER WIRE STP122	42		
J43					NOT USED	
J44-59		93930006	JUMPER WIRE STP122	16		
J60-63					NOT USED	
J64-96		93930006	JUMPER WIRE STP122	33		
J97					NOT USED	
J98-99		93930006	JUMPER WIRE STP122	2		
J201-205		93930006	JUMPER WIRE STP122	5		
-	*3	80086510	BOARD ID SEAL HK	1	FOR HK,SU	

Note 1: As of March, 1993 the program ROM version on IC2 is shown below.If a ROM other than those described below is mounted, the performance of the printer may differ from that described this manual.

Version	Kind	Remark	
1.5	Masked ROM	Except for Russian version	Production
ZL.1.7	EPROM	Except for Russian version	Maintenance
ZL.1.6.SU	EPROM	For Russian version.	Production/Maintenance

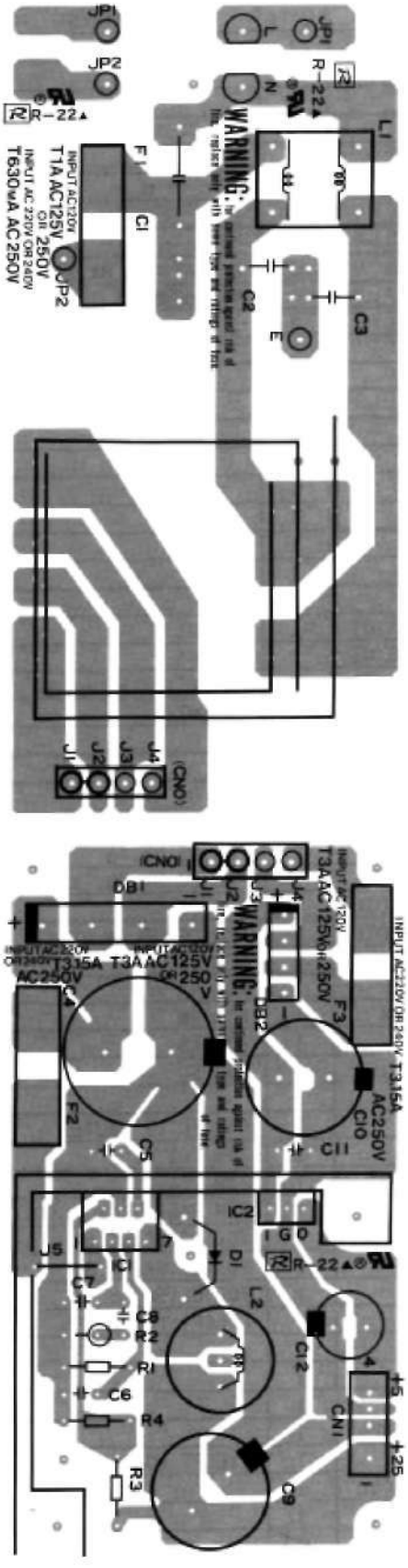
6. Power Supply Unit

6-1. Circuit Diagram

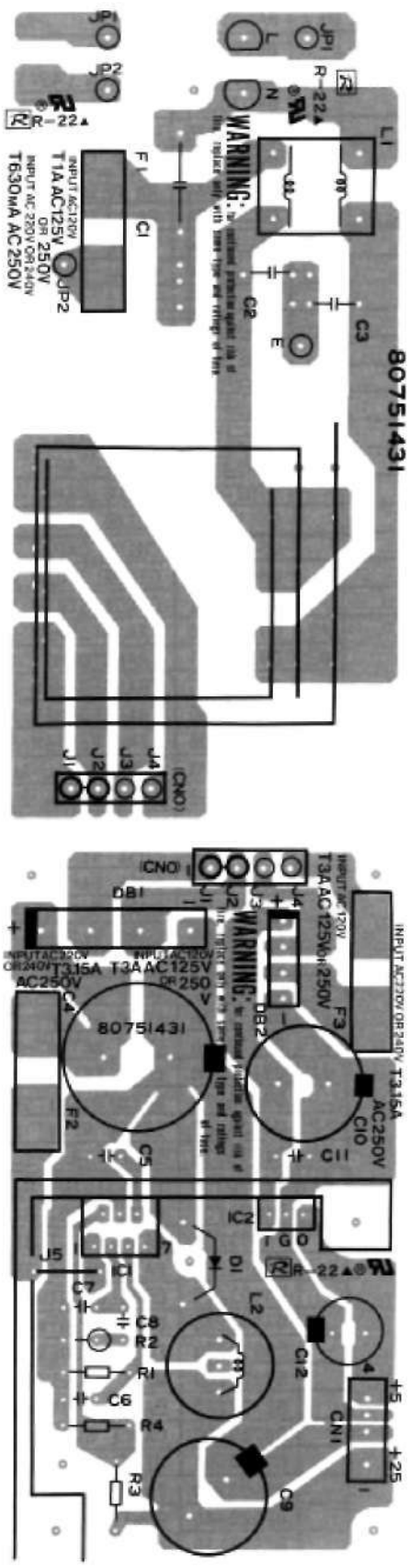


<Note 1> The unit of resistor is "Ω",and no indication of wattage means 1/4W respectively.
<Note 2> The unit of capacitor is "F", and no indication of voltage means 50V.
<Note 3> C2,C3 and E are not installed in HK version.

6-2. Component Layout



Old Board



New Board

6-3. Parts List

Power Supply Unit

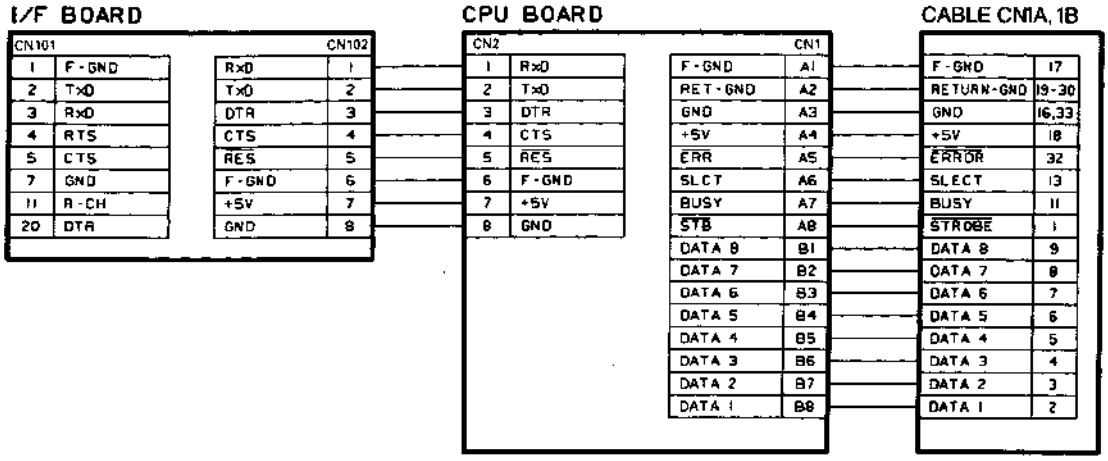
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08202008	IC-REG L4960	1		S
IC2		08202013	IC-REG L4941	1		S
D1		08030016	SCHOTTKY DIODE ERB84-009	1		S
R1		06041035	RD RESISTOR 10 K-OHM 1/4W	1		
R2		06041034	RD RESISTOR 10 K-OHM 1/4W	1		
R3		06242034	RN RESISTOR 20 K-OHM 1/4W 1%	1		
R4		06245124	RN RESISTOR 5110 OHM 1/4W	1		
C1	*3	05291044	FILM CAPA. 0.1UF 250V	1		
	#3	05291045	FILM CAPA. 0.1UF 275V	1		
C2-3		05192224	CERA. CAPA. 2200PF 400V	2	EXCEPT FOR HK,SU	
					NOT MOUNTED :HK,SU	
C4		05054782	CHEM. CAPA. 4700UF 50V	1		
C5		05155614	CERA. CAPA. 560PF 50V	1		
C6		05252224	FILM CAPA. 2200PF 50V	1		
C7		05154714	CERA. CAPA. 470PF 50V	1		
C8		05251044	FILM CAPA. 0.1UF 50V	1		
C9		05043385	CHEM. CAPA. 3300UF 35V	1		
C10		05024781	CHEM. CAPA. 4700UF 16V	1		
C11		05152234	CERA. CAPA. 0.022UF 50V	1		
C12		05022271	CHEM. CAPA. 220UF 16V	1		
DB1	*3	08990220	DIODE STACK D3SB10	1		S
	#3	08990227	DIODE STACK D3SB20	1		S
DB2		08990221	DIODE STACK 1B4B41	1		S
T1	*2	09240710	TRANSFORMER 120V ZL-10-TB US	1	FOR US	
	#2	09240711	TRANSFORMER 120V ZL-10-TB US	1	FOR US	
		09240720	TRANSFORMER 220V ZL-10-P EC	1	FOR EC,HK,WG,LA,SU	
		09240730	TRANSFORMER 240V ZL-10-P UK	1	FOR UK,AS	
L1		09251106	LINE FILTER SU10V-05050	1		
L2		09251023	CHOKE COIL SK15BS045-300	1		
F1		09990058	FUSE 5TT1A 250V	1	FOR US	S
		09990021	FUSE EAWK630MA 250V	1	EXCEPT FOR US	S
F2-3		09990054	FUSE 5TT3A 125V	2	FOR US,UK,AS	S
		09990050	FUSE EAK3.15A 250V	2	FOR EC,HK,WG,LA,SU	S
-	*3	09110098	CORD SET US-PN ZX-10CL	1	FOR US	
	#3	09110144	CORD SET US-PN HA-10	1	FOR US	
	*3	09110099	CORD SET EC-PN ZX-10CL	1	FOR EC,WG,LA	
	*4	09110099	CORD SET EC-PN ZX-10CL	1	FOR WG,LA	
	#4	09110143	CORD SET EC-PN HA-10	1	FOR WG,LA	
	#3	09110143	CORD SET EC-PN HA-10	1	FOR EC	
		09110067	CORD SET UK-PN LC	1	FOR UK	
	*2	09110067	CORD SET UK-PN LC	1	FOR HK	
	#2	09110136	CORD SET HK-PN OBA	1	FOR HK	
	#1	09110068	CORD SET AS-PN LC	1	FOR AS	
	#2	09110060	CORD SET SV-PN L=2M	1	FOR SU	
		09030019	SEESAW SWITCH T-881SBSS-A1	1		
	*2	04033002	SCREW RIVET 1712-3007	2	FOR IC1,2 :NOTE1	
	#2	01903035	SCREW TR 3-10 FL	1	FOR IC1,2	
	#2	82090350	TRANSISTOR HOLDER PLATE R-10	1	FOR IC1,2	
		04033202	RIVET 1801-0408	2	FOR RADIATION PLATE	
		04991204	FASTENER T18S	3	FOR US,EC,WG,LA	
		04991204	FASTENER T18S	2	FOR UK,HK,AS,SU	
		04991219	CORD BUSHING SR-4N-4	1	FOR US,SU	
		04991220	CORD BUSHING SR-5N-4	1	EXCEPT FOR US,SU	
		09990023	FUSE HOLDER UF-0033	6		
		80701060	WIRE 20UL1015BLK105T	2		
		80702240	CABLE UNIT 4X60	1		

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
-		80703120	CABLE UNIT 4X60 ZX-10CL	1		
	*3	80924691	WIRE 18UL1015G/Y100TT	1	EXCEPT FOR HK,SU	
	*4	87770060	CABLE UNIT 01X100TT A (D)	1	EXCEPT FOR HK,SU	
	#4	80705750	CABLE UNIT 01X100TT (A)	1	EXCEPT FOR HK,SU	
	*3	82020440	POWER CORD COVER ZL-10	1		
	#3	82020441	POWER CORD COVER ZL-10	1		
		82911110	RADIATION PLATE ZX-10CL	1		
		93930006	JUMPER WIRE STP122	6		

Note 1: This screw is retightened wuth a 1/16" hexagon screw driver.

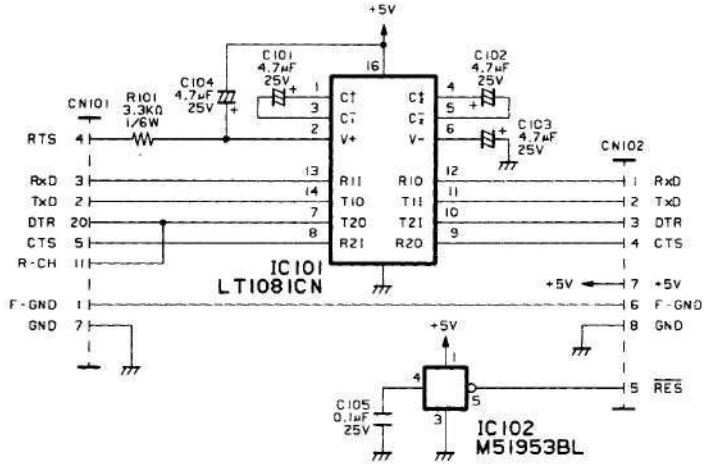
7. Serial-Parallel Converter Board (Option)

7-1. Wiring Scheme

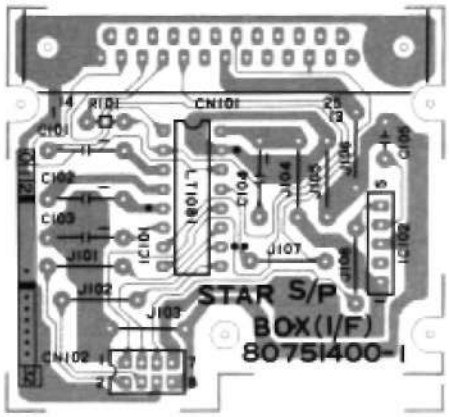


7-2. I/F Board

7-2-1. Circuit Diagram



7-2-2. Component Layout

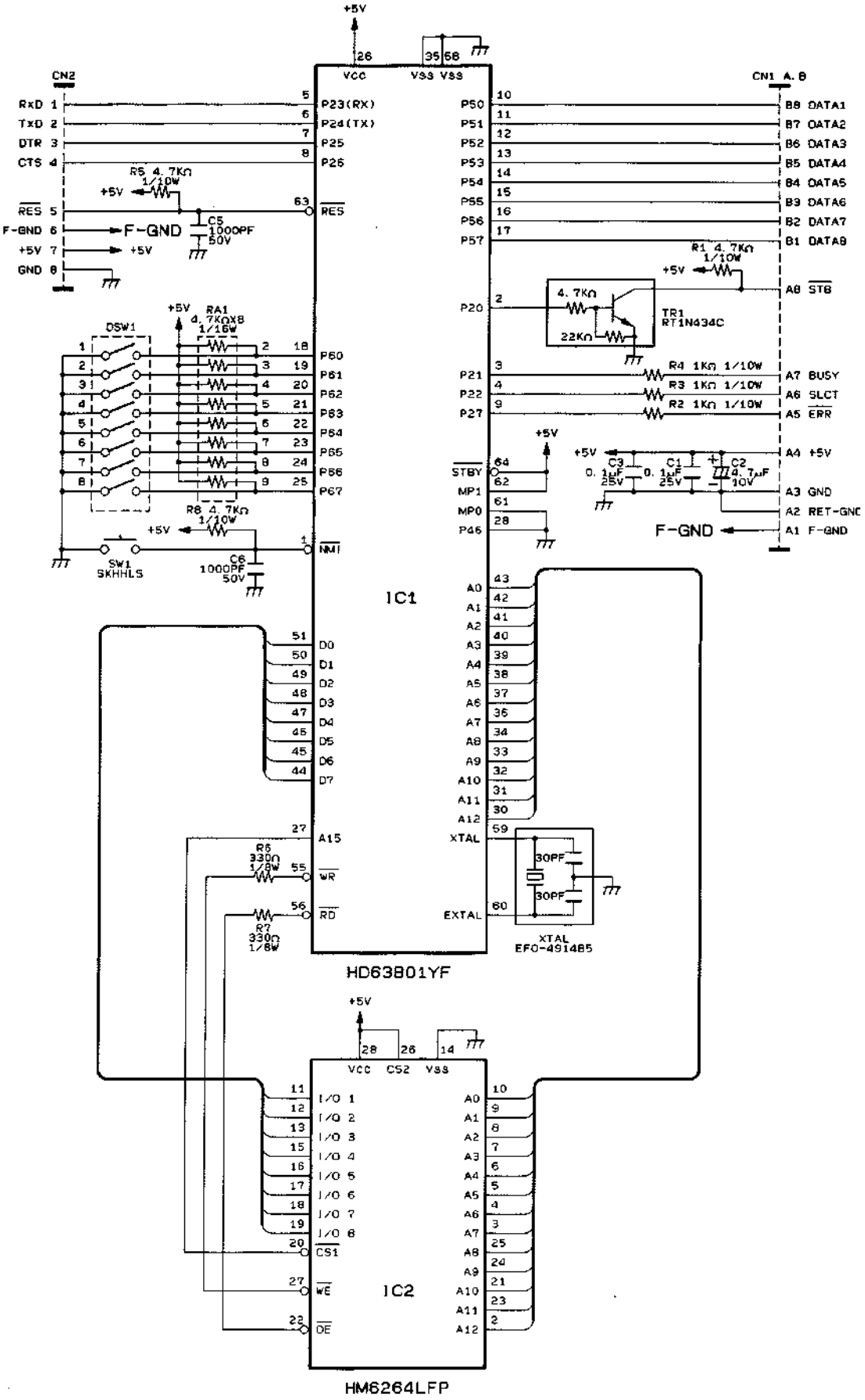


7-2-3. Parts List

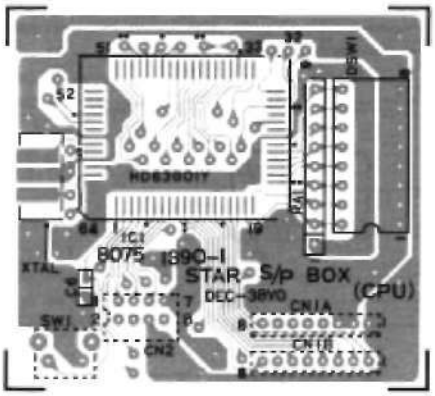
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC101		08200125	IC-I/F LT1081CN	1		
IC102		08200109	IC-RESET M51953BL	1		
R101		06053324	RD RESISTOR 3.3 K-OHM 1/6W	1		
C101-104		05034758	CHEM. CAPA. 4.7UF 25V	4		
C105		05551044	CAPACITOR 0.1UF 50V	1		
CN101		09100461	CONNECTOR DBLC-J25SAF-23L8	1		
CN102		09100462	CONNECTOR 5532-08A	1		
J101-108		93930006	JUMPER WIRE STP122	8	P=10mm	

7-3. CPU Board

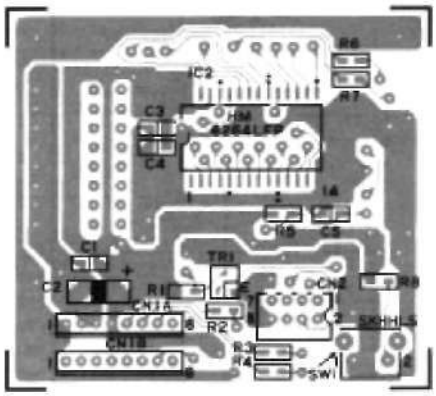
7-3-1. Circuit Diagram



7-3-2. Component Layout



[Parts side]



[Solder side]

7-3-3. Parts List

CPU Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08250011	MASKED CPU HD63B01YF-IF	1		
IC2		08221021	SRAM HM6264LFP-100NS	1		
TR1		07603007	DIGITAL TRANSISTOR RTIN434C-T	1		
R1		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R2-4		06751021	CHIP RESISTOR 1 K-OHM 1/10W	3		
R5		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
R6-7		06783313	CHIP RESISTOR 330 OHM 1/8W	2		
R8		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
RA1		06564721	RESIS. ARRAY 4.7K-OHM 1/16W8EL	1		
C1		05731042	CERA. CAPA. CHIP 0.1UF 25V	1		
C2		05514751	TANTALUM CAPA. CHIP 4.7UF 10V	1		
C3		05731042	CERA. CAPA. CHIP 0.1UF 25V	1		
C4					NOT USED	
C5-6		05751025	CERA. CAPA. CHIP 1000PF 50V	2		
XTAL1		09250039	CERA. OSCILLATOR EFO-W4914B5	1		
DSW1		09090018	DIP SWITCH KSD08	1		
SW1		09010047	PUSH SWITCH SKHHLS0001	1		
CN1A-1B		80706070	INTERFACE CABLE SPC-8K	1		
CN2		09100463	CONNECTOR 5533-08CPB	1		