

***DOT MATRIX PRINTER***  
***SP320S SERIES***

**TECHNICAL MANUAL**

**[SECOND EDITION]**



# CONTENTS

Chapter 1	General Specifications
Chapter 2	Theory of Operation
Chapter 3	Adjustments
Chapter 4	Parts Replacement
Chapter 5	Maintenance and Lubrication
Chapter 6	Parts List

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1

2

3

4

5

6

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# CHAPTER 1

## GENERAL DESCRIPTION

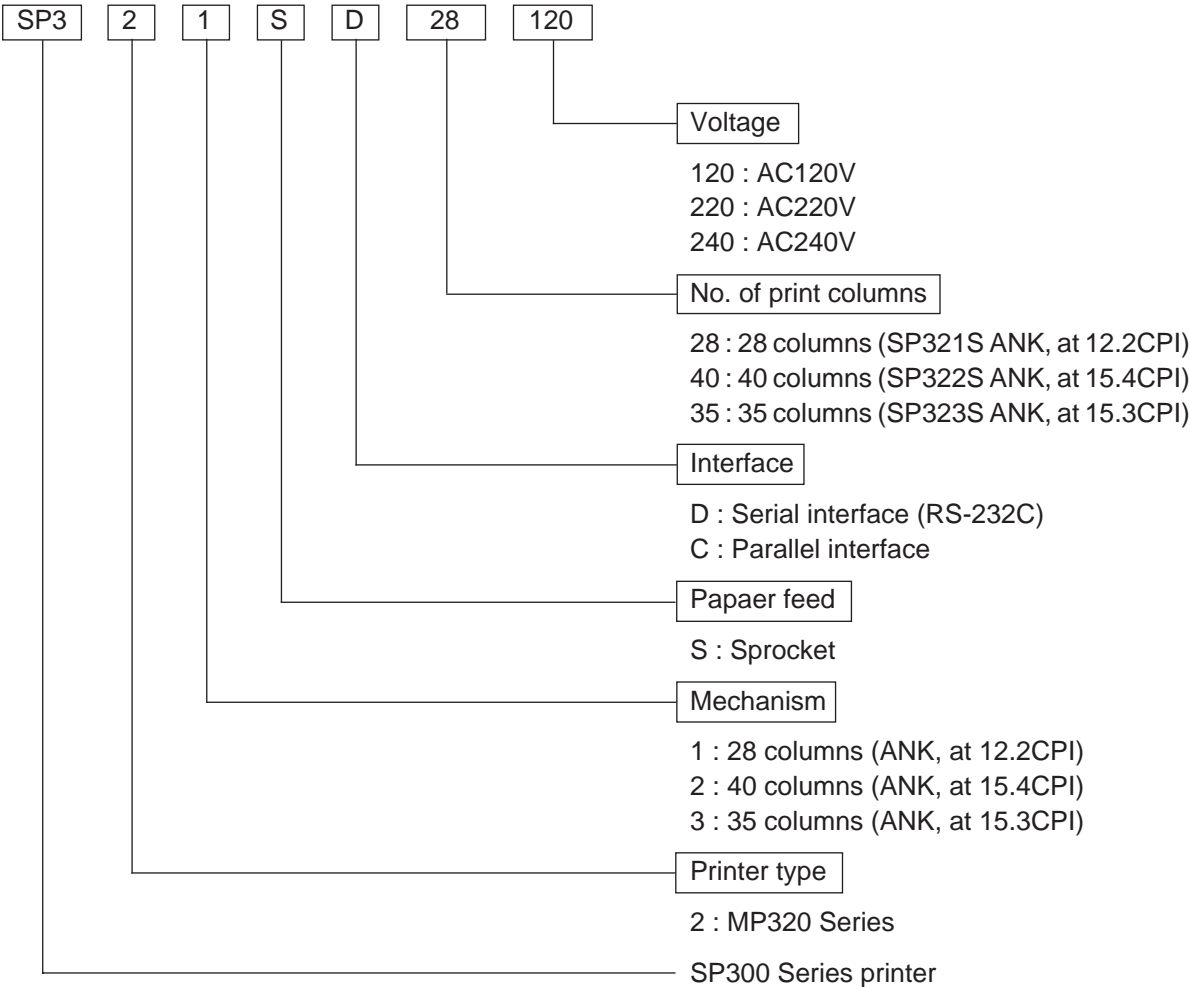
1.1	General description .....	1-1
1.2	Model name notation .....	1-1
1.3	Instructions apply models .....	1-2



**1.1 General description**

This manual describes the SP320S series dot matrix printers listed in section 1.3. The manual includes sections on principles of operation, adjustments, part replacement, maintenance and lubrication as well as a list of parts. This manual has been prepared for use by a maintenance staff carrying out regular inspections or repairs when abnormalities occur. This manual has been prepared for maintenance staff operating in the field and not for ordinary users.

**1.2 Model name notation**



## GENERAL DESCRIPTION

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### 1.3 Instructions apply models

Serial interface	Parallel interface
SP321SD28-120	SP321SC28-120
SP321SD28-220	SP321SC28-220
SP321SD28-230	SP321SC28-230
SP321SD28-240	SP321SC28-240
SP322SD40-120	SP322SC40-120
SP322SD40-220	SP322SC40-220
SP322SD40-230	SP322SC40-230
SP322SD40-240	SP322SC40-240
SP323SD35-120	SP322SC35-120
SP323SD35-220	SP323SC35-220
SP323SD35-230	SP323SC35-230
SP323SD35-240	SP323SC35-240



# CHAPTER 2

## THEORY OF OPERATION

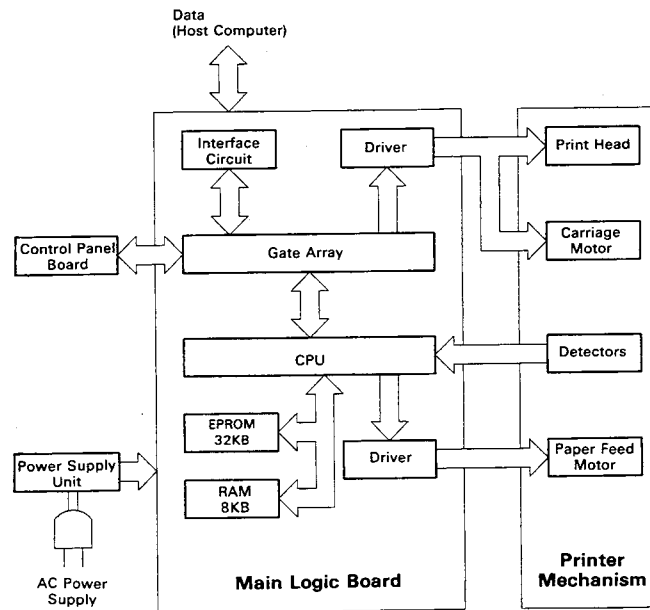
This chapter explains the electric circuits and the mechanisms.

<b>2.1 Block Diagram .....</b>	<b>2-1</b>
<b>2.2 Main Logic Board .....</b>	<b>2-2</b>
<b>2.2.1 Interface Circuit .....</b>	<b>2-2</b>
<b>2.2.2 Print Head Driving Circuit .....</b>	<b>2-4</b>
<b>2.2.3 Print Head Temperature Detection Circuit .....</b>	<b>2-5</b>
<b>2.2.4 Carriage Motor Driving Circuit .....</b>	<b>2-6</b>
<b>2.2.5 Paper Feed Motor Driving Circuit .....</b>	<b>2-7</b>
<b>2.2.6 Power On Reset Circuit .....</b>	<b>2-8</b>
<b>2.2.7 Protection circuit .....</b>	<b>2-9</b>
<b>2.3 Power Supply Unit .....</b>	<b>2-10</b>
<b>2.3.1 Fuse Board .....</b>	<b>2-10</b>
<b>2.4 Mechanism .....</b>	<b>2-11</b>
<b>2.4.1 Print Head Mechanism .....</b>	<b>2-11</b>
<b>2.4.2 Print Head Carriage Mechanism .....</b>	<b>2-12</b>
<b>2.4.3 Paper Feed Mechanism .....</b>	<b>2-14</b>
<b>2.4.4 Ink Ribbon Feed Mechanism .....</b>	<b>2-15</b>
<b>2.4.5 Detectors .....</b>	<b>2-16</b>



## 2.1 Block Diagram

The block diagram of this printer is shown in Figure 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 EPROM. When the editing is completed, various drive signals from the CPU are sent to the printer mechanism to perform printing.

< Explanation >

- a. CPU TMP90C41
  - Controls this printer.
- b. EPROM 27256 32K-bytes
  - Contains the program which executes control of the printer.
- c. RAM 6264 8K-bytes
  - Used as stack area, work area of the CPU and data buffer.
- d. Interface circuit
- e. Gate array (custom IC)
  - Inputs or outputs several signals.
- f. 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.

### 2. Control Panel board

This panel board is for manual operation of the printer.

### 3. Printer Mechanism

The printer mechanism is made up of a print head, carriage motor, paper feed motor, and detectors.

### 4. Power Supply Unit

AC power is converted to DC25V and DC5V.

# THEORY OF OPERATION

## 2.2 Main Logic Board

### 2.2.1 Interface circuit

#### 2.2.1.1 Serial Interface

When the voltage level is changed on this circuit (RS-232C  $\leftrightarrow$  TTL), the data transfer method (Serial  $\leftrightarrow$  Parallel) also changes.

IC9 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 the RXD terminal to IC9 and is input to the CPU. Serial data input to the CPU is converted into parallel data and output to the main board.

Conversely, parallel data received by the CPU is converted there into serial data and output to the TXD terminal via IC9.

The CTS terminal is hardware-connected, not software-connected. (This signal is not checked.)

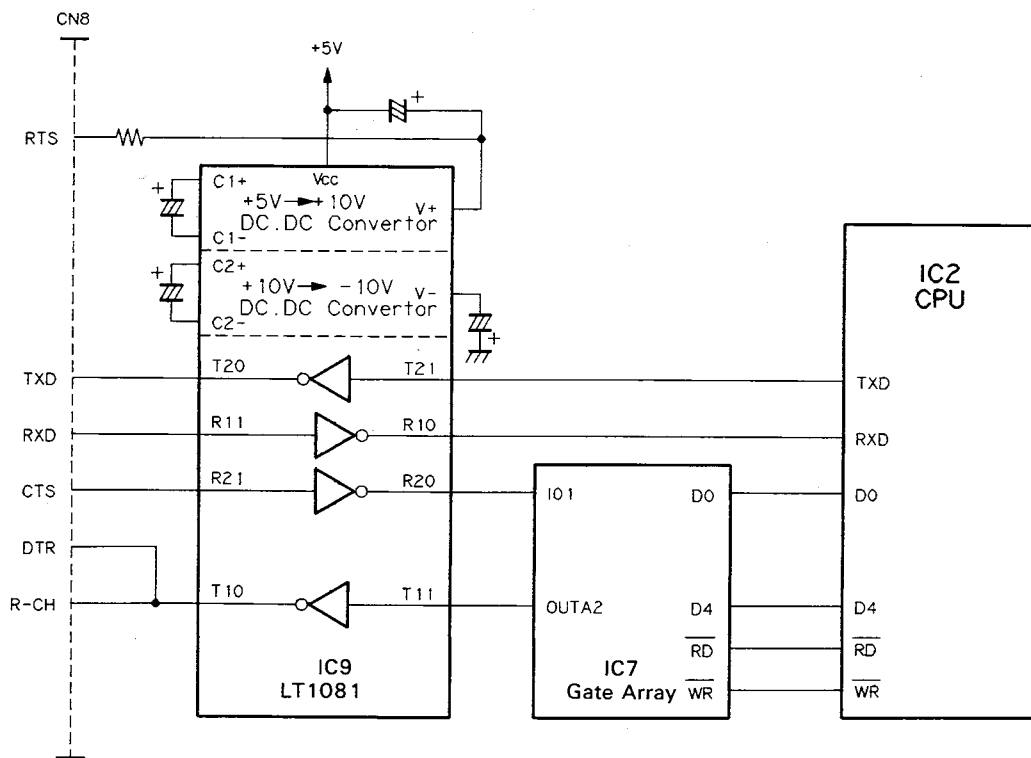


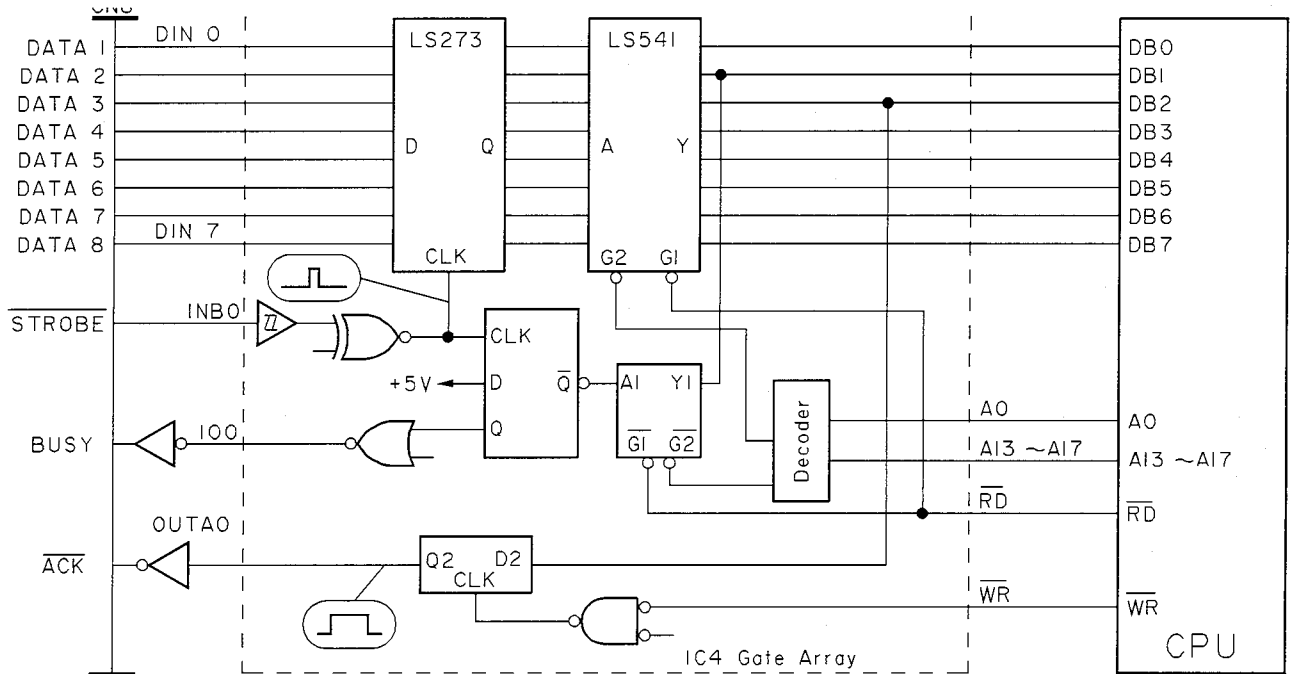
Fig. 2-2-A Serial Interface

## 2.2.1.2 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 below.



**Fig. 2.2.B 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 CN8. 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  $0.5 \mu\text{s}$ .
- (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 IO0 and DB1 signals to low.
- (3) When the IO0 signal of the gate array is set to LOW, the BUSY signal of connector CN8 will be turned to HIGH, notifying the host computer that data cannot be accepted. When the DB1 signal becomes LOW, the CPU is notified that  $\overline{\text{STROBE}}$  signal has fallen. The CPU will set the  $\overline{\text{RD}}$  signal to LOW, and the gate array data will be read into the CPU.
- (4) Upon completion of the data reading, the CPU notifies the host computer of the data receivable state by setting the BUSY signal of connector CN8 and the  $\overline{\text{ACK}}$  signal to LOW for a certain period of time.

# THEORY OF OPERATION

## 2.2.2 Print Head Driving Circuit

Edited print data is output to terminal Q of the 8-bit latch in the gate array through the CPU data bus, as regulated by the issue timing of a  $\overline{WR}$  signal. When all the data is received for printing, an energized time control signal is output from port T04 of the CPU. This allows the print data to be output to HD1 ~ HD9 of the gate array. When the print data (HD1) is high, the transistor TR19 will be turned ON for 340  $\mu s$ , energizing the print head solenoid to drive the print head.

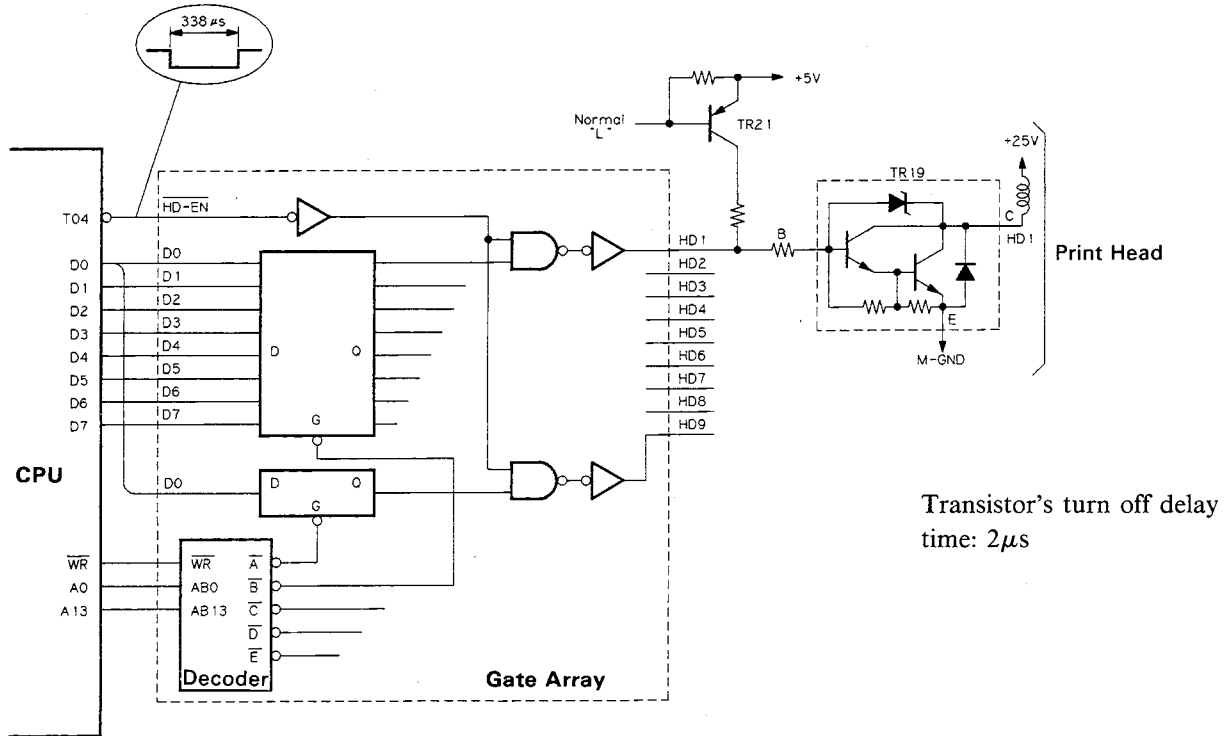


Fig. 2-3 Print Head Driving Circuit

## 2.2.3 Print Head Temperature Detection Circuit

The print head temperature detection circuit protects against damage when the print head heats up abnormally. Figure 2-4 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  $V_{RFE}$  (+5V) to evaluate the temperature of the head solenoids and carries out one of the following operations depending on the temperature.

1.  $T < 110^{\circ}\text{C}$ 
  - Bi-directional printing
2.  $110^{\circ}\text{C} \leq T$ 
  - Stop the printing operation and turn on the alarm lalmp. When the thermistor's temperature falls below  $110^{\circ}\text{C}$ , bi-directional printing is resumed.

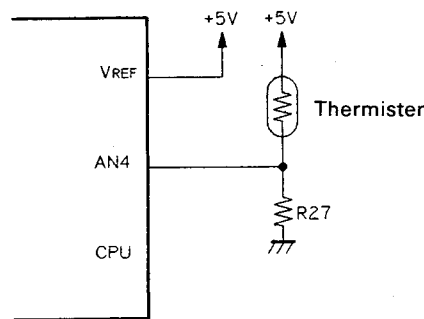


Fig. 2-4 Print Head Temperature Detection Circuit

# THEORY OF OPERATION

## 2.2.4 Carriage Motor Driving Circuit

This printer employs a DC motor as the carriage motor. The DC motor has two operating modes.

1. Drive: Voltage is applied across the motor terminals to make the motor turn.
2. Brake: The motor pins are shorted together to configure the motor as an electric generator. In this configuration, the motor acts as a dynamic brake that generates torque, working against the rotation of the motor and the motor stops rapidly.

The gate array selects between these operations by setting its output port OUTB7 high or low.

	Gate Array OUTB7	TR10	TR11	Motor
Drive	HIGH	ON	OFF	Rotation
Brake	LOW	OFF	ON	Sudden Stop

Figure 2-5 shows the carriage motor driving circuit.

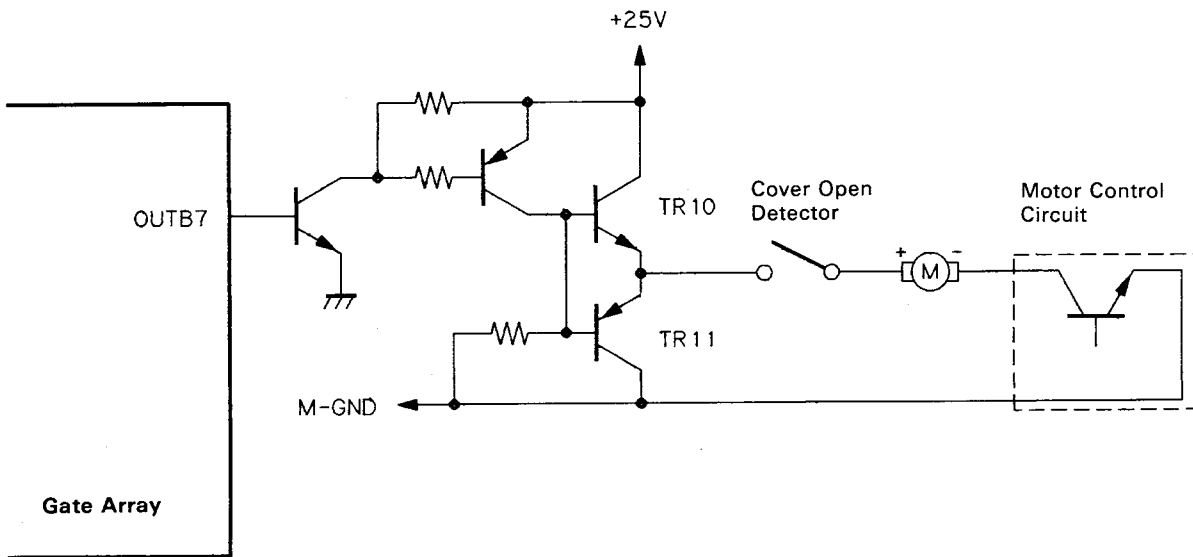


Fig. 2-5 Carriage Motor Driving Circuit



2.2.5 Paper Feed Motor Driving Circuit

This printer employs a stepping motor as the paper feed motor. The stepping motor turns a certain angle when a drive pulse is received. This 4-phase stepping motor is controlled by the four phase excitation method. The following is the description of the paper feed motor drive circuit and the control signal generated by the four phase excitation method.

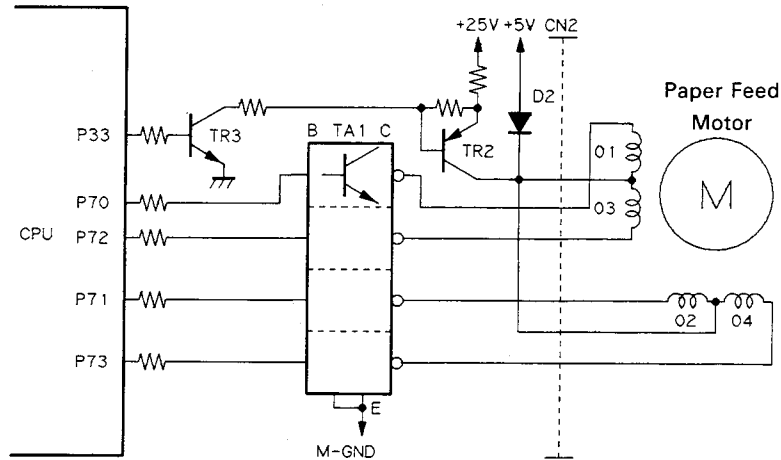


Fig. 2-6 Paper Feed Motor Driving Circuit

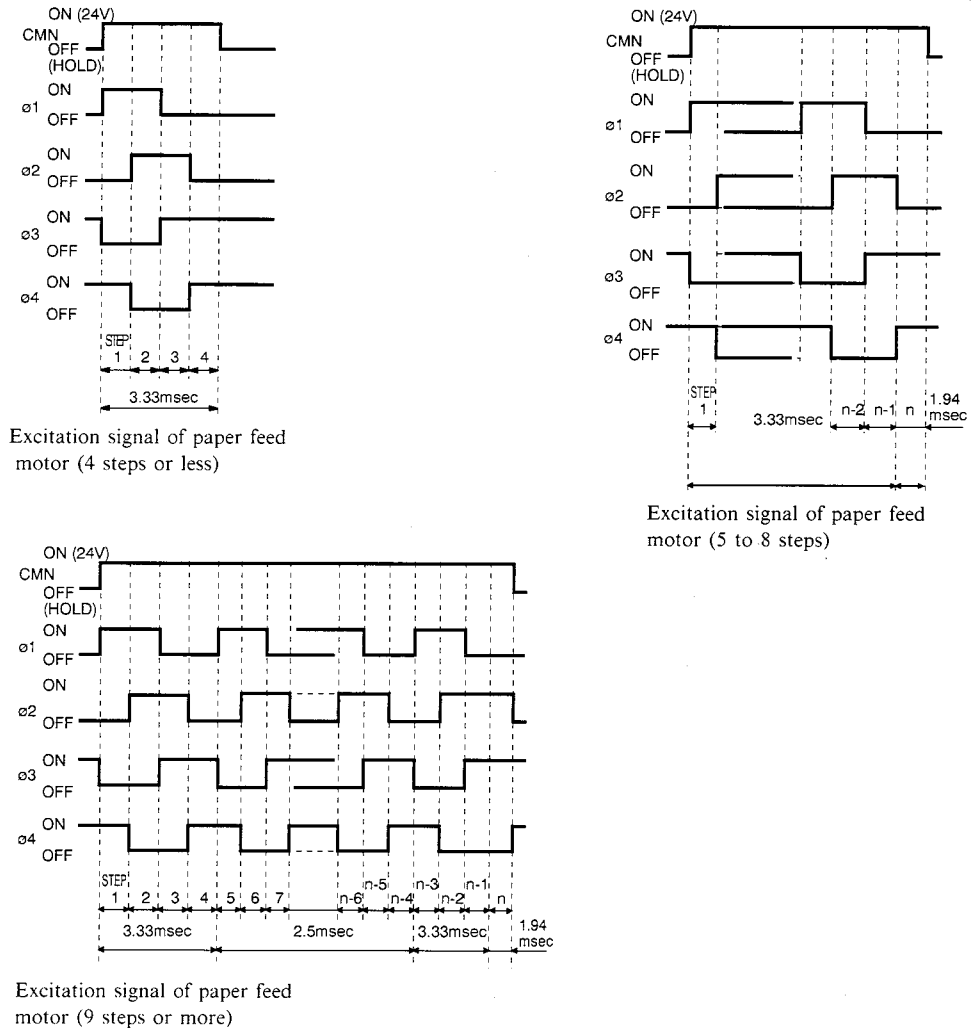


Fig. 2-7 Paper Feed Motor Driving Signals

# THEORY OF OPERATION

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

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

Voltages to the paper feed motor are changed by setting CPU port P33 to low or high and by turning transistors TR3 and TR2 on or off.

When TR2 is turned on, +25V is applied to the motor via transistor TR2.

When TR2 is turned off, +5V is supplied to the motor via diode D2.

## 2.2.6 Power On Reset Circuit

The power on reset signal initializes the circuit elements and prevents operation errors when the power is turned on. The power reset signal is output for approximate 3.4 ms when the power is turned on.

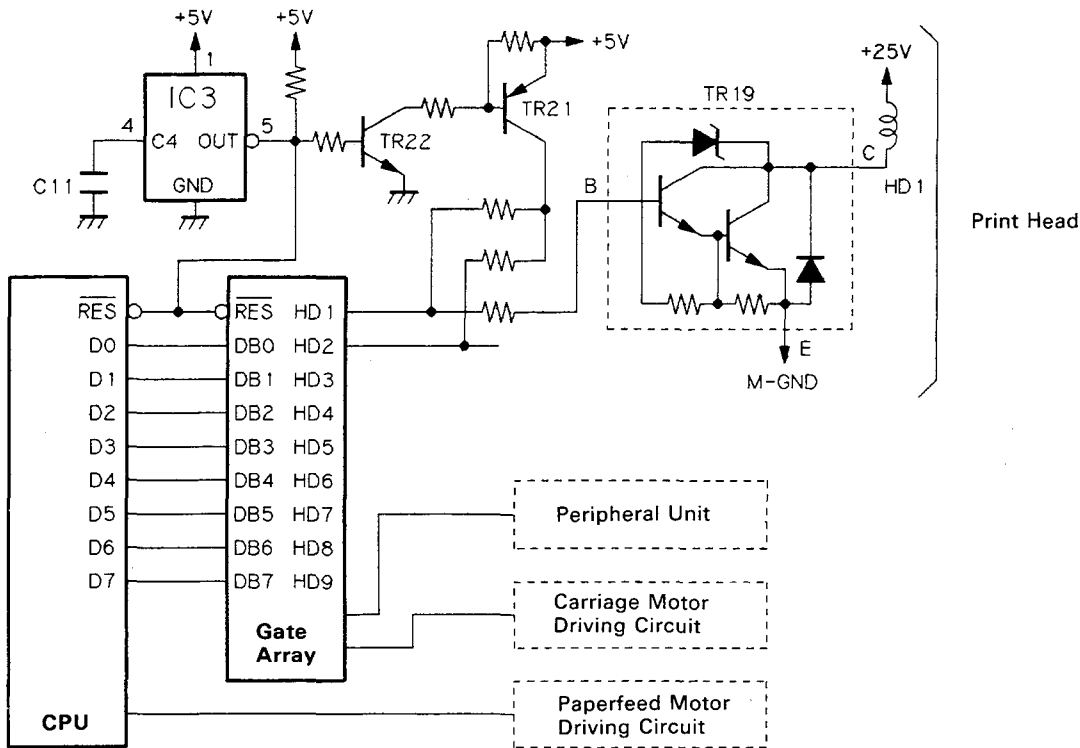


Fig. 2-8 Power On Reset Circuit

- When the power is turned on, the RESET signal is output from the terminal 5 of IC3 (M51953BL) for approximate 3.4 ms. This is determined by external capacitor C11 (0.01 $\mu$ F), and it can be calculated by the following formula.  

$$T = 0.34 \times C11 \text{ (pF)} [\mu\text{sec.}] = 3.4 \text{ msec.}$$
- This LOW signal triggers  $\overline{\text{RESET}}$  terminal of the CPU and gate array.
- Resetting the CPU and gate array will cause all the drive signals for carriage motor, the paper feed motor, peripheral units and the print head to be ignored, preventing operation errors when the power is switched on.

## 2.2.7 Protection Circuit

1. A voltage detecting IC (IC3 in Figure 2-8) 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 voltage detecting IC.

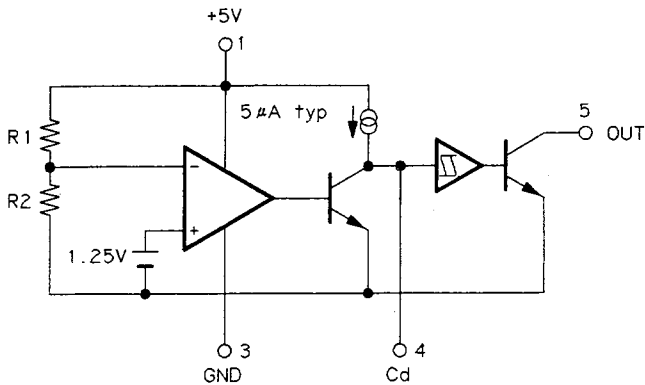


Fig. 2-9 Equivalent Circuit of Voltage Detecting IC

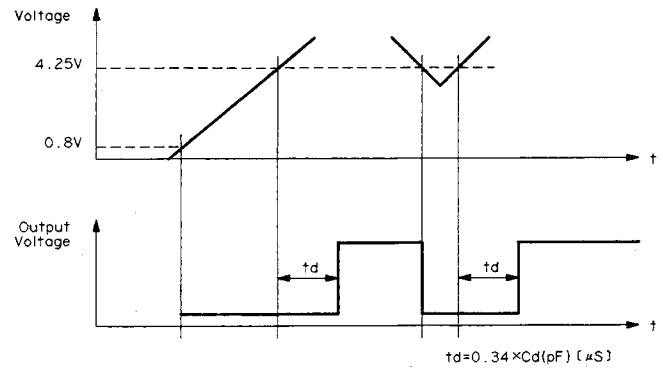


Fig. 2-10 Operational Timing Chart

2. This CPU has watch dog timer function, which is a timer that issues an interrupt if the CPU malfunctions (lost-micro). 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.)

# THEORY OF OPERATION

## 2.3 Power Supply Unit

As the figure below shows, the power supply unit comprises of the fuse board, transformer, and power supply board.

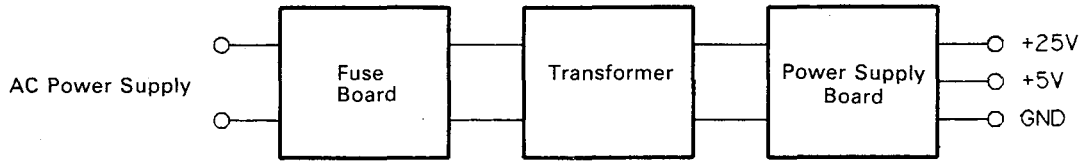


Fig. 2-11 Power Supply Unit Configuration

### 2.3.1 Fuse Board

The AC power passes through the fuse, is filtered by C1, passes through the LC noise prevention circuit, and is fed to the primary winding of the transformer.

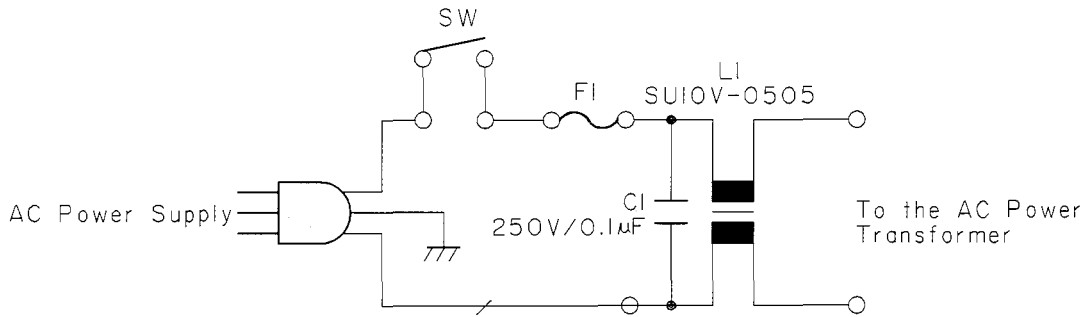


Fig. 2-12 Fuse Board

## 2.4 Mechanism

### 2.4.1 Print Head Mechanism

The print head consists of 9 needle wires and 9 print solenoids. The following is an explanation of the operation of a single needle wire 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 and 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 by the force of the spring and clapper holder (leaf spring).

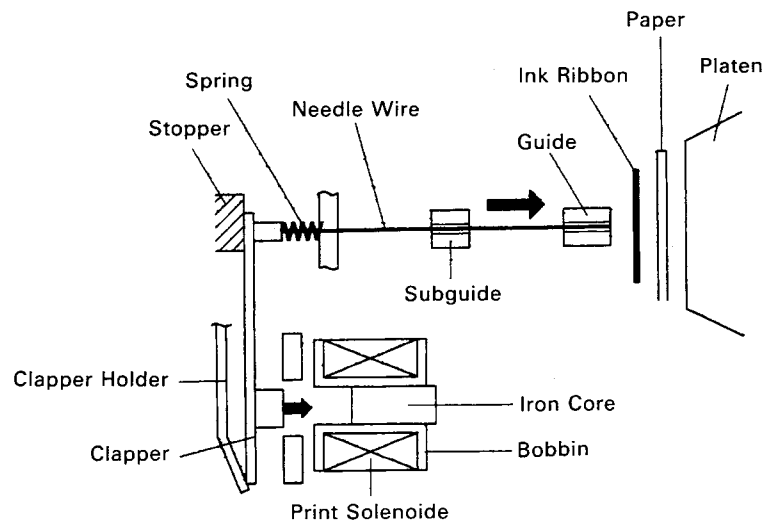


Fig. 2-13 Outline of Print Head Mechanism

# THEORY OF OPERATION

## 2.4.2 Print Head Carriage Mechanism

This print head carriage mechanism consists mainly of the carriage, carriage motor, gear train, home position detector, and timing detectors. When the carriage motor rotates, the drive shaft (cylindrical cam) is rotated by the reduction gear. The print head supported by the carriage moves right and left. The print head position is determined by timing signals generated by the timing detectors and the home position signal generated by the home position detector.

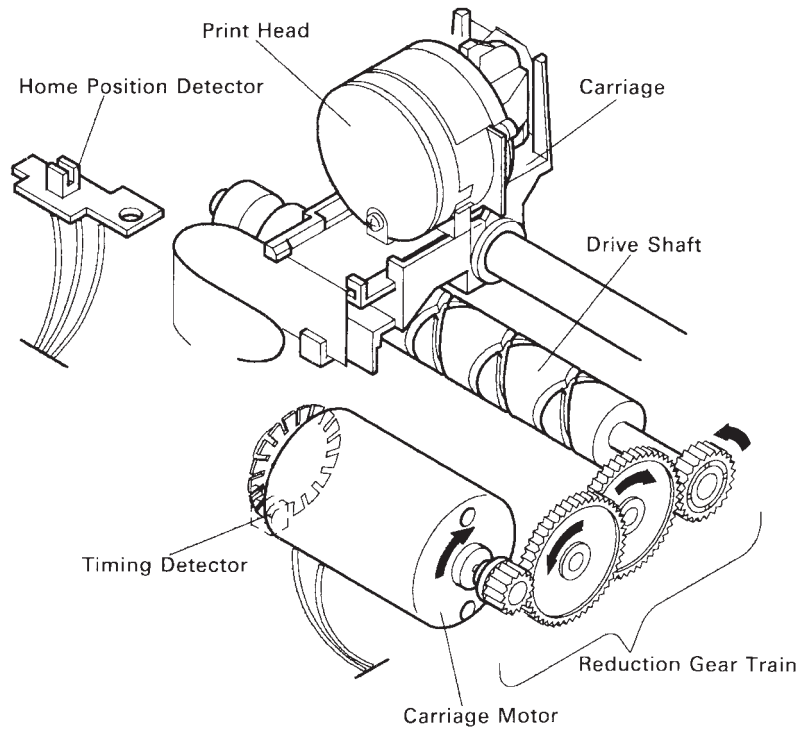


Fig. 2-14 Print Head Carrying Mechanism

## 1. Timing Detectors 1 and 2

These detectors comprise of the pulse plate attached to the motor shaft, the photo-interrupter on the terminal board, and the waveforming circuit. When the pulse plate cuts off the light from the photo-interrupter LED, the photo-interrupter's photo-transistor goes off.

## 2. Home position detector

This detector comprises of the detector plate under the carriage and the photo-interrupter on the home position detection board. When the carriage is at the home position, the photo-interrupter's photo-transistor goes off.

## 3. Motor control circuit

This circuit holds the motor to the correct printing speed. This circuit mainly comprises of power transistor TR2 and the electronic governor IC (IC1) on the terminal board.

The speed of the carriage motor is measured from Timing Signal 1. This signal is compared to the reference signal. The result of this comparison controls the voltage applied to the carriage motor, thus holding the printing speed steady.

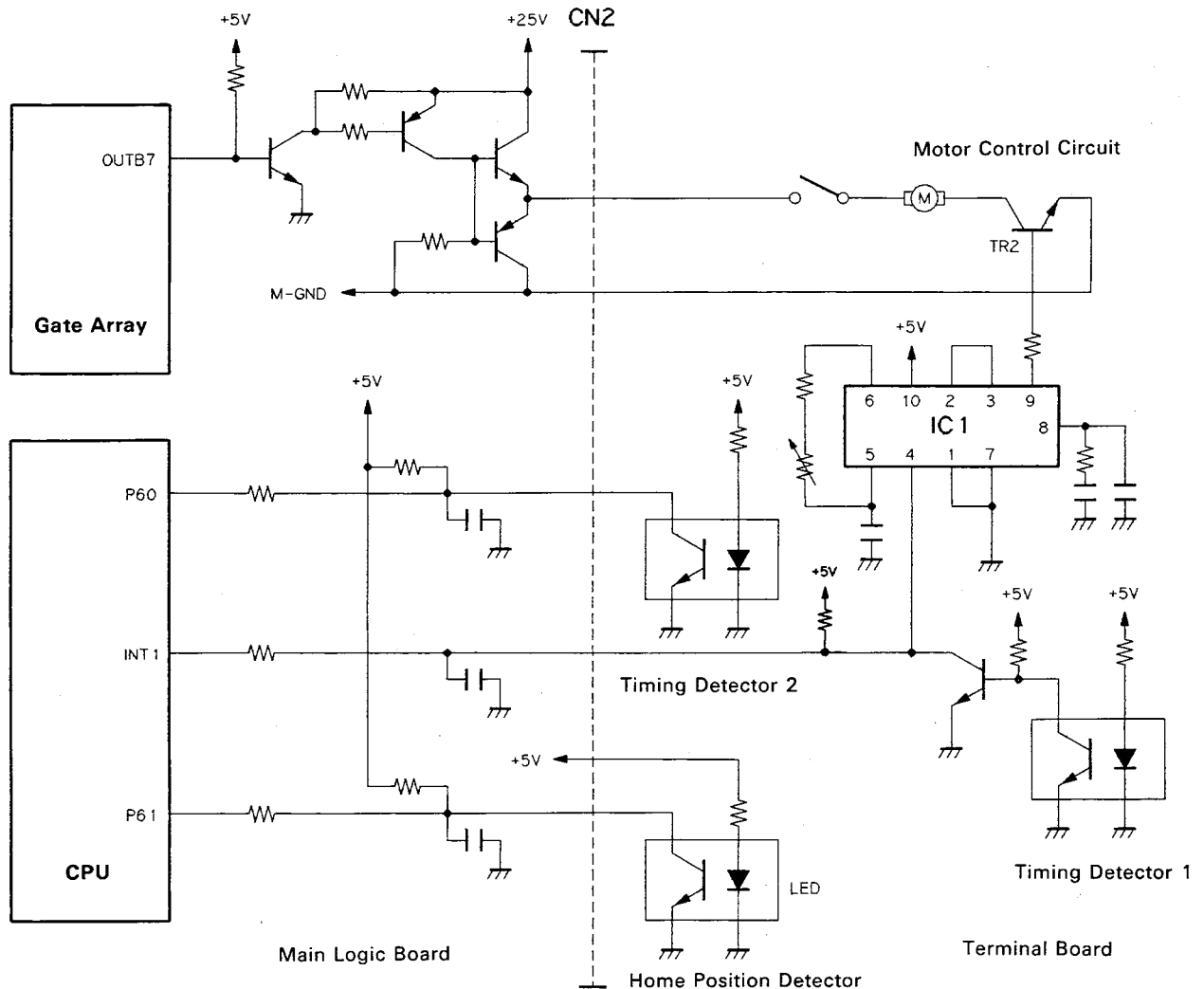


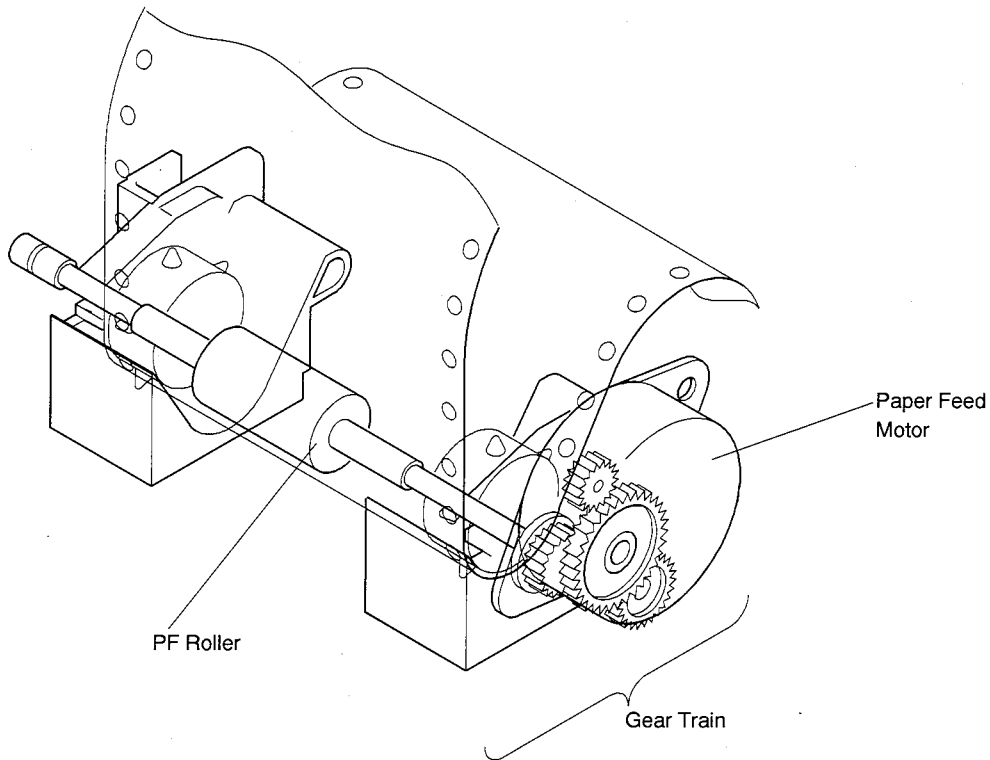
Figure 2-15 Circuits Related to the Print Head Movement Mechanism

# **THEORY OF OPERATION**

## **2.4.3 Paper Feed Mechanism**

The paper feed mechanism comprises of the paper feed motor, the gear train, the paper feed roller, and the holder roller. The gear train transmits the rotation of the paper feed motor to the paper feed roller. The paper sandwiched between the paper feed roller and the holder roller is driven upwards.

The paper feed motor is a permanent magnet, 4-phase 48-pole stepping motor. One step of this motor drives the paper 1/72 inch.

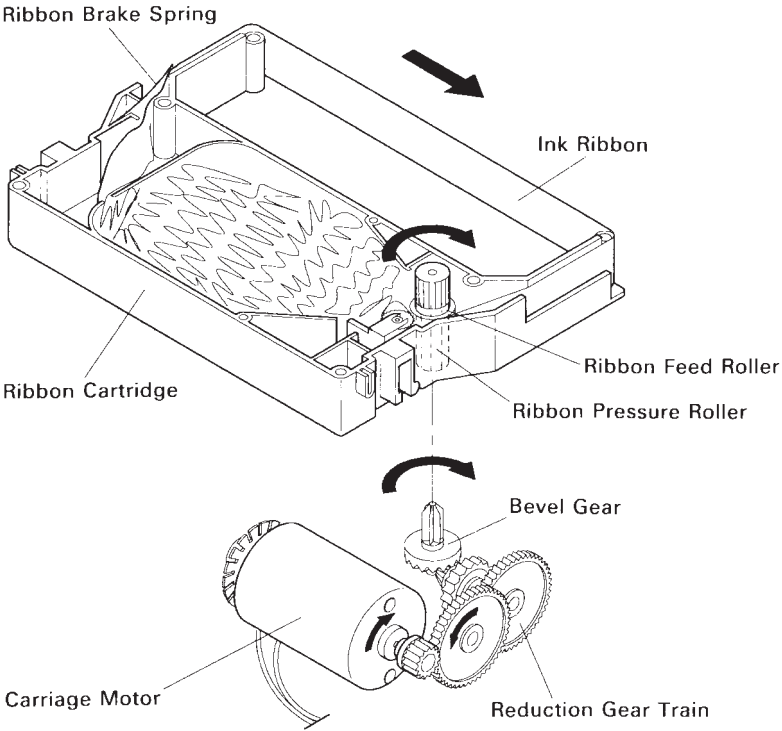


**Figure 2-16 Paper Feed Mechanism**



**2.4.4 Ink Ribbon Feed Mechanism**

The ink ribbon feed mechanism comprises of the ribbon cartridge, the carriage motor, and the gear train. The gear train transmits the rotation of the carriage motor to the bevel gear. the ribbon is contained in the ribbon cartridge and tied into an endless loop. When the bevel gear turns the ribbon feed roller, the ink ribbon sandwiched between the ribbon feed roller and the ribbon pressure roller is wound up. The ribbon brake spring keeps slack out of the ribbon.



**Fig. 2-17 Ribbon Feed Mechanism**

# THEORY OF OPERATION

## 2.4.5 Detectors

Besides the timing detectors and home position detector discussed in 2.4.2, there are also the following detectors:

### 1. Cover open detector

This detector shows whether or not the front cover is installed. When it is installed, the precision snap-acting switch is closed. When the cover is removed, the precision snap-acting switch is open and the carriage motor circuit is cut off.

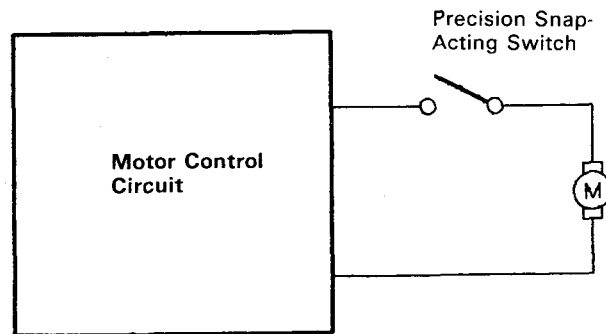


Figure 2-18 Cover Open Detector

### 2. Paper out detector

The paper out detector is installed on the bottom case.

When there is paper, the leaf switch is open, but when the paper runs out, it is closed.

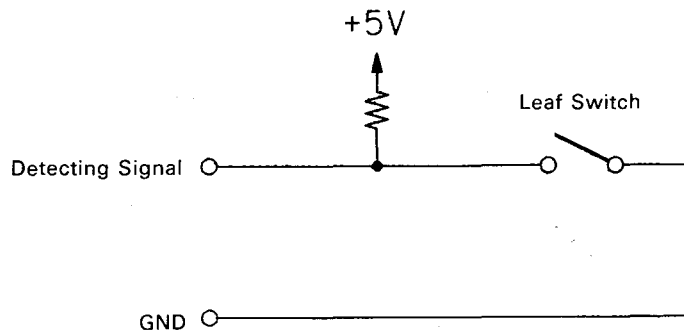


Figure 2-19 Paper out Detector

# CHAPTER 3

## ADJUSTMENT

This printer is adjusted in a variety of ways to obtain the prescribed performance. This chapter explains those adjustments. When replacing parts during maintenance inspections or after a problem occurs, double check the adjustments afterwards.

<b>3.1 Tools and Measuring Instruments .....</b>	<b>3-1</b>
<b>3.2 Adjusting the Gap between the Print Head and the Platen .....</b>	<b>3-2</b>
<b>3.2.1 Measuring the Gap between the Print Head</b>	
<b>and the Platen .....</b>	<b>3-2</b>
<b>3.2.2 Adjusting the Gap between the Print Head</b>	
<b>and the Platen .....</b>	<b>3-3</b>
<b>3.3 Adjusting the Print Speed .....</b>	<b>3-4</b>
<b>3.4 Adjusting the Column Displacement</b>	
<b>for Bi-Directional Printing .....</b>	<b>3-5</b>
<b>3.4.1 Adjustment A .....</b>	<b>3-5</b>
<b>3.4.2 Adjustment B .....</b>	<b>3-6</b>



### 3.1 Tools and Measuring Instruments

1. The adjustments in Chapter 3 and the parts replacements in Chapter 4 require the tools and measuring instruments shown in Table 3-1 and Table 3-2.
2. After completing the adjustments in Chapter 3 and the parts replacements in Chapter 4, apply locktite to any screws or nuts. Refer to Figure 5-1 and Figure 5-2.

**Table 3-1 Tool List**

Tool	Remark
Phillips screwdriver	for M2 to M4 screws
Flat-blade screwdriver	for removing stop ring
Cutting pliers	
Tweezers	
Soldering iron (20W)	
Thickness gauge (0.33 mm)	
Thickness gauge (0.42 mm)	

**Table 3.2 Measurement Instruments**

Measurement Instrument	Remark
Frequency counter	For measuring the printing speed

# ADJUSTMENT

## 3.2 Adjusting the Gap between the Print Head and the Platen

This adjustment secures the optimum print quality.

### 3.2.1 Measuring the Gap between the Print Head and the Platen

1. Remove the printer mechanism according to the procedure described in Section 4.2.
2. Set the adjustment lever ② to the seventh-stage position. (Refer to figures 3-2 and 3-3)  
In order to facilitate removal of the ribbon separator ①, push the adjustment lever ② in the direction opposite to that of the platen ③. Push the sections indicated by arrows on both sides of the ribbon separator ① alternately toward the inside to remove the ribbon separator from the catches and then pull it up and out. Since the ribbon separator becomes bent upon removal, do not use again after removal.
3. Remove the ribbon separator ①. (Do not reuse a removed ribbon separator ① that has been deformed during removal.)
4. Set the adjustment lever ② to the second-stage position.
5. Insert the thickness gauge ⑤ between the print head ④ and the platen ③ and measure the gap. (Refer to the figure 3-4)
6. Measure at the left end and the right end of the platen.
7. The standard value for the gap is 0.33 – 0.42 mm.
8. If the gap is not within this range, adjust it as explained in 3.2.2.

If the gap is within this range, attach a new ribbon separator. Push in until both ends of the bottom of the ribbon separator contact the pawls. (Refer to the figure 3-3)

Next, push in further while pushing the sections indicated by arrows on both sides toward the inside until the hole on the ribbon separator enters the pawl section on the carriage.

Be careful at this time not to bend the ribbon separator.

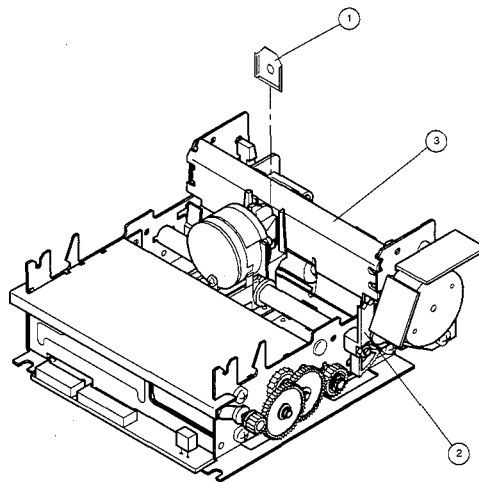
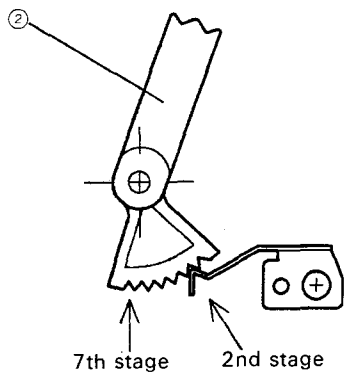
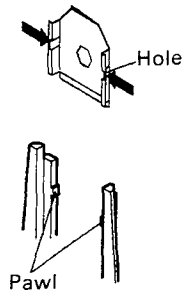


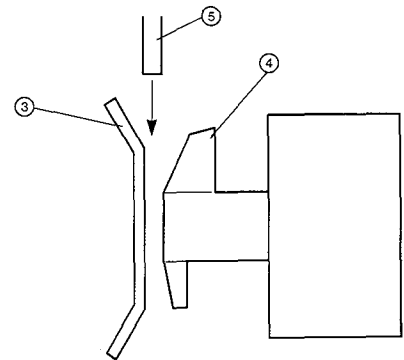
Figure 3-1 Ribbon separator removal



**Figure 3-2**  
Adjustment Lever Position



**Figure 3-3**  
Rubber separator



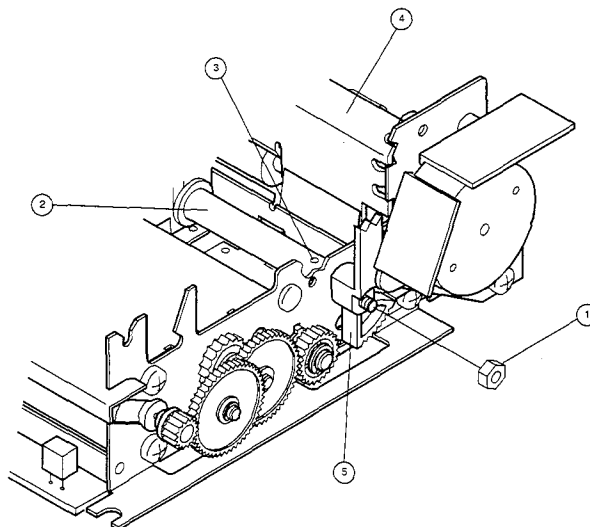
**Figure 3-4**  
Gap Measurement Method

### 3.2.2 Adjusting the Gap between the Print Head and the Platen

If the gap is not between 0.33 and 0.42 mm, adjust it with the following method.

1. Loosen the nut ①.
2. Insert a shaft into the 2-mm diameter hole ③, then turn the carriage stay ② so that the gap is 0.33 – 0.42 mm. Dropping the inserted shaft towards the platen side ④ reduces the gap and dropping the inserted shaft in the opposite direction increases the gap.
3. After the adjustment, set the adjustment lever ⑤ to the second-stage position as shown in Figure 3-2 and tighten the nut ①.
4. Install the new ribbon Separator.

**Note:** When tightening the nut ①, make sure that the shaft inserted into the 2-mm diameter hole ③ is held steady so that the carriage stay ② and adjustment lever ⑤ does not turn.



**Figure 3-5** Gap Adjustment

# ADJUSTMENT

## 3.3 Adjusting the Print Speed

The printing speed is critical to ensure maximum reliability of the printer.

If the printing is too fast, the print head cannot keep up and the wires get caught on the ribbon.

1. Remove the printer mechanism according to the procedure described in Section 4.2.
2. Leave the ribbon cartridge installed.
3. To disable the cover open detector, connect Pins 1 and 2 of connector CN4 ① together (for example by putting a clip between them).
4. Apply the voltages shown below to the pins of printer mechanism connector CN2 ②. The carriage motor turns and the carriage moves left or right.  
Pin No. 7 (or No. 8) ..... 24 VDC  
Pin No. 9 (or No. 10) ..... Ground  
Pin No. 12 ..... 5 VDC  
Pin No. 18 ..... Ground
5. The printing speed is calculated from the timing signal frequency.  
Connect the measurement terminals of the frequency counter to connector CN2 ② as indicated below and measure the timing signal frequency.  
Pin No. 16 ..... frequency counter input terminal  
Pin No. 18 ..... ground
6. If the timing signal frequency is not within the range of 1600 Hz to 1700 Hz (for a sampling period of one second), use the Phillips screwdriver ③ to turn the knob for the variable resistor ④ on the terminal board and adjust the frequency of the timing signal.
7. Remove the connector between Pins 1 and 2 of connector CN4 ① and install the printer mechanism on the main unit by reversing the procedure with which you removed it.

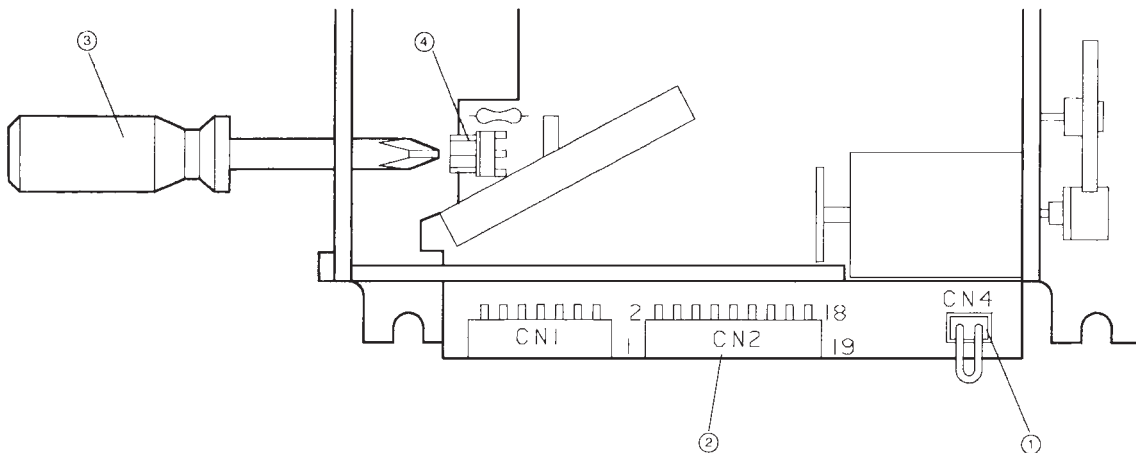


Fig. 3-6 Print Speed Adjustment



## 3.4 Adjusting the Column Displacement for Bi-Directional Printing

This procedure adjusts the displacement (x shown in figure 3-7) between the center of the left-most dot when printing from left to right and the center of the left-most dot when printing from right to left. This displacement must be no greater than 1/3 the horizontal distance between the center of neighboring dots (the pitch).

### 3.4.1 Adjustment A

1. Print and check the size of the column displacement.
2. Remove the printer mechanism according to the procedure described in Section 4.2.
3. To disable the cover open detector, connect pin 1 and 2 of connector CN4 ① together, (for example by putting a clip between them).
4. Loosen the two terminal board installation screws ②.
5. If the return printing is to the right of the going printing, move the terminal board ③ in direction of the black arrow  $\blacktriangleright$ . If the return printing is to the left of the going printing, move the terminal board ③ in direction of the white arrow  $\triangleleft$ .
6. Tighten the two terminal board installation screws ②.
7. Print and check the size of the column displacement. If it does not satisfy the requirement, repeat this procedure from Step 2.
8. If you can not get the print column displacement adjusted correctly, use Adjustment B in 3.4.2.
9. When Adjustment A is complete, install the printer mechanism on the main unit by reversing the procedure with which you removed it.

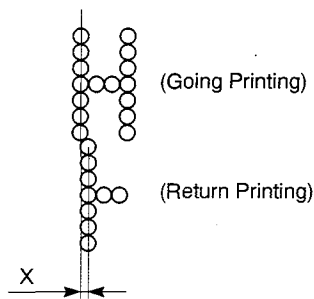


Figure 3-7 Column Displacement Adjustment

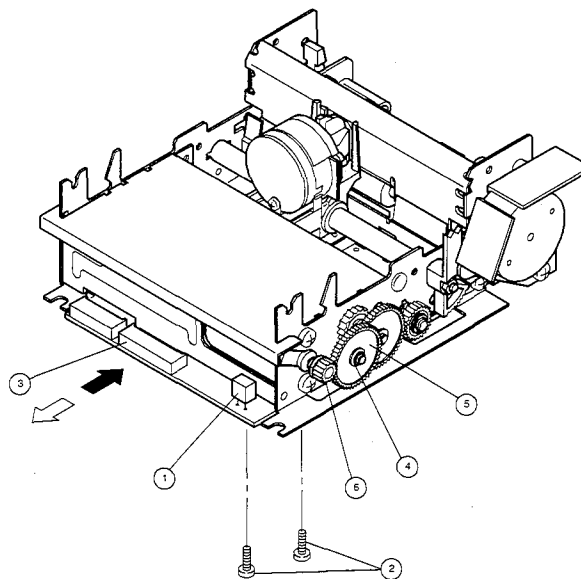


Figure 3-8 Column Displacement Adjustment A

# ADJUSTMENT

## 3.4.2 Adjustment B

1. Remove the stop ring ④, then remove the idler gear ⑤.
2. Turn the motor gear ⑥ one tooth, then install the idler gear ⑤ and the stop ring ④. This operation changes the relative the positions of the idler gear ⑤ and the motor gear ⑥ (the relation between the  $\Delta$  on the idler gear and the  $\square$  on the motor gear) as Figure 3-9 shows.

The  $\Delta$  and  $\square$  marks were not always identical at the factory.

If the return printing starts at the position right to the going printing start position, turn the motor gear one tooth clockwise. If the return printing starts at the position left to the going printing start position, turn the motor gear one tooth counterclockwise.

However, do not make extreme changes to the gear setting. Referto to Section 4.13.

3. Repeat Adjustment A as explained in 3.4.1.

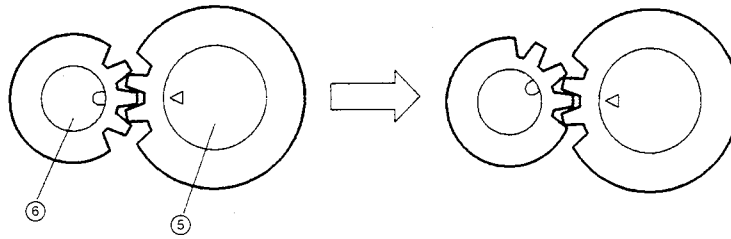


Figure 3-9 Column Displacement Adjustment B

# CHAPTER 4

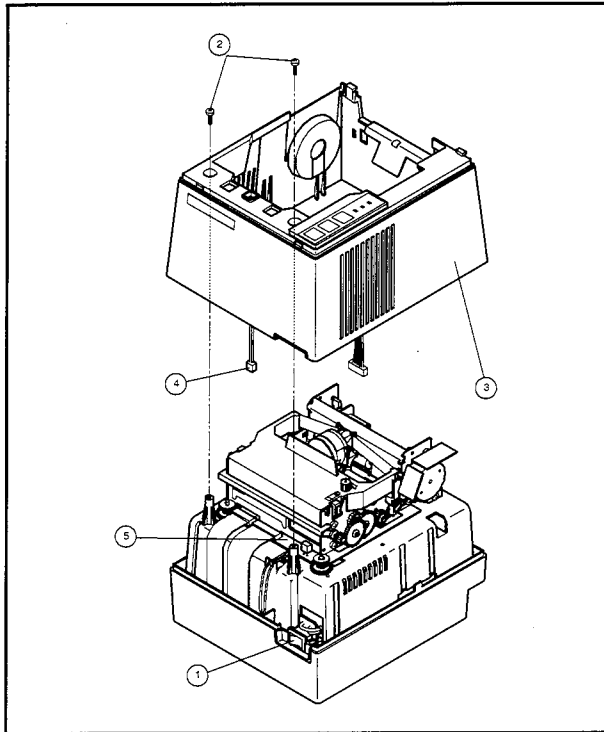
## PARTS REPLACEMENT

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

1. Disconnect the printer power cord plug 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 Section 5.2.

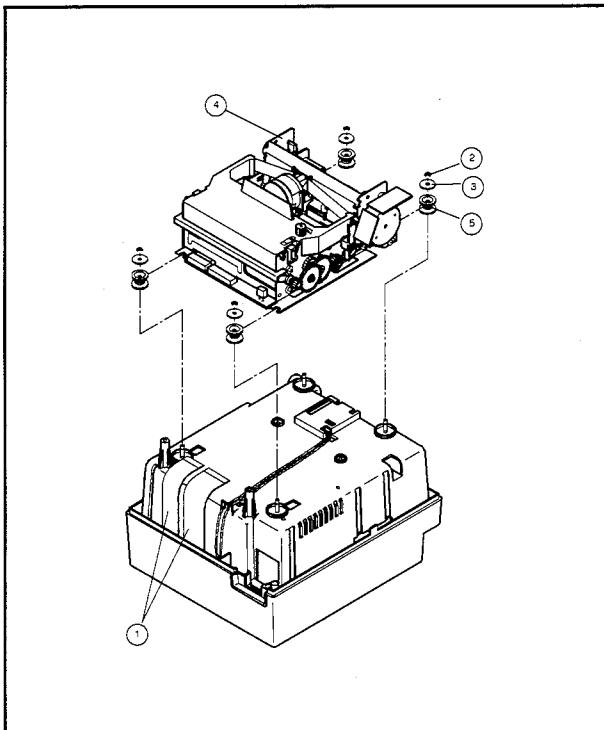
<b>4.1</b>	<b>Upper Case Unit .....</b>	<b>4-1</b>
<b>4.2</b>	<b>Printer Mechanism .....</b>	<b>4-1</b>
<b>4.3</b>	<b>Control Panel Board .....</b>	<b>4-2</b>
<b>4.4</b>	<b>Main Logic Board .....</b>	<b>4-2</b>
<b>4.5</b>	<b>Power Supply Unit .....</b>	<b>4-3</b>
<b>4.6</b>	<b>Fuses .....</b>	<b>4-3</b>
<b>4.7</b>	<b>Print Head .....</b>	<b>4-4</b>
<b>4.8</b>	<b>Drive Shaft Unit .....</b>	<b>4-4</b>
<b>4.9</b>	<b>Terminal Board Unit .....</b>	<b>4-5</b>
<b>4.10</b>	<b>Carriage Motor Unit .....</b>	<b>4-5</b>
<b>4.11</b>	<b>Paper Feed Motor Unit .....</b>	<b>4-6</b>
<b>4.12</b>	<b>Home Position Detector Board Unit .....</b>	<b>4-6</b>
<b>4.13</b>	<b>Gears .....</b>	<b>4-7</b>





## 4.1 Upper Case Unit

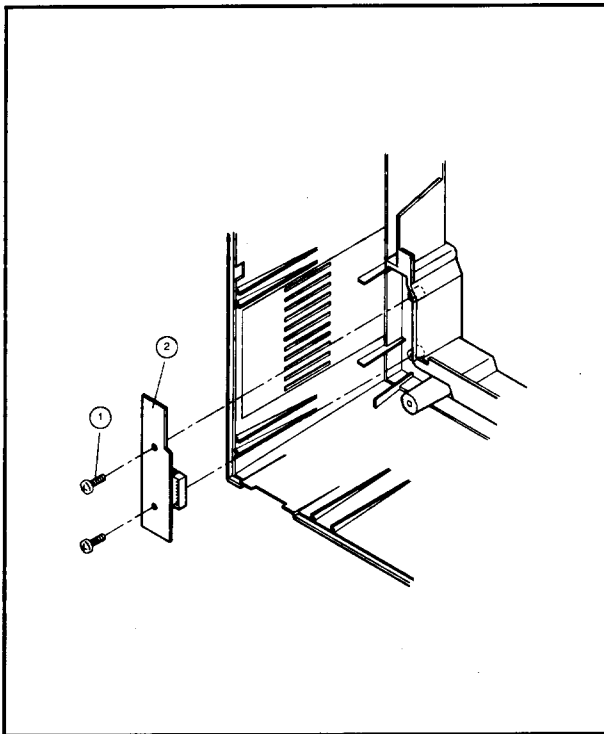
1. Turn off the power switch ①, disconnect the power cord from the wall outlet.
2. Remove
  - Extract the knob horizontally.
  - Two tapping screws.
  - Incline the upper case ③ and remove the connector ④ from the terminal board ⑤.
  - Remove the control panel board connector (inside the upper case).



## 4.2 Printer Mechanism

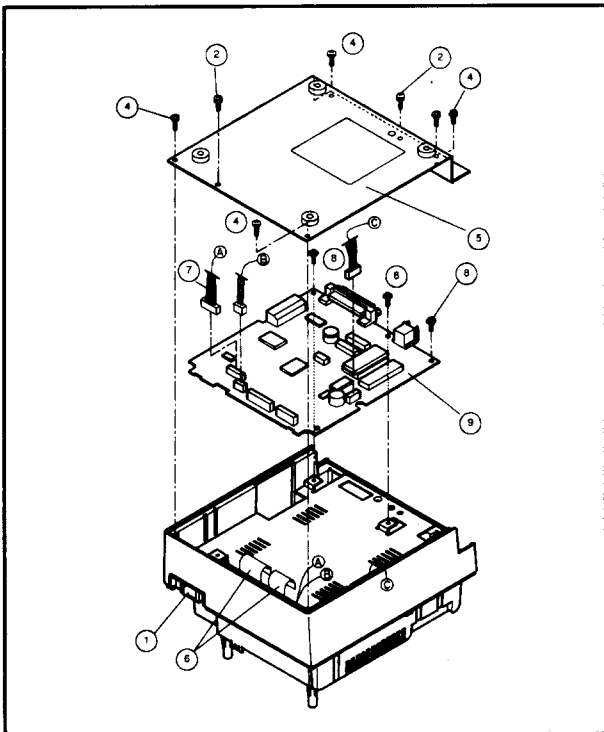
1. Remove
  - Upper case unit according to the procedure described in Section 4.1.
  - Cable Unit ①
  - Four stop rings SE2 ②
  - Four washers ③
  - Printer mechanism ④
  - Four rubber feet ⑤

## PARTS REPLACEMENT



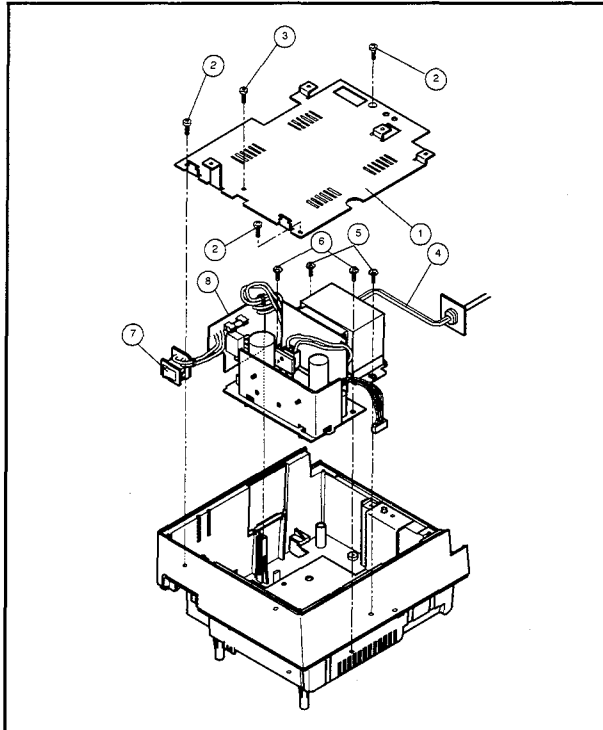
### 4.3 Control Panel Board

1. Remove
  - Upper case unit according to the the procedure described in Section 4.1.
  - Two tapping screws ①
  - Control panel board ②



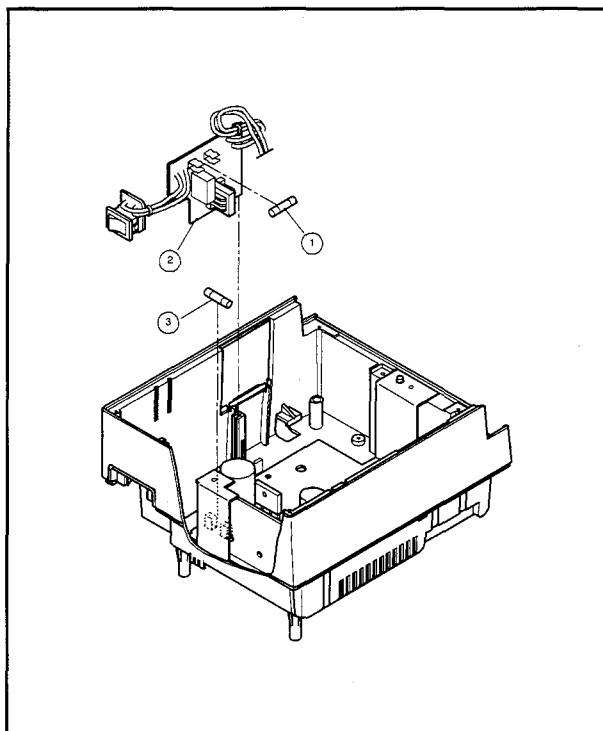
### 4.4 Main Logic Board

1. Turn off the power switch ①, disconnect the power cord from the wall outlet.
2. Remove
  - Two screws with wire ②
  - Four tapping screws ④
  - Base plate unit ⑤
  - Two cable units ⑥
  - Three connectors ⑦
  - Three screws ⑧
  - Main logic board ⑨



## 4.5 Power Supply Unit

1. Remove
  - Main logic board according to the procedure described in Section 4.4.
  - Remove the board chassis ①
  - Three tapping screws ②
  - One screw with wire ③
  - Power supply cord ④
  - Remove the two screws for transformer ⑤ and remove the PCB.
  - Remove the upper case according to the procedure described in Section 4-1. (This procedure is not instructed in the diagram.)
  - Remove the power supply unit ⑦ by sliding it.
  - Remove the high voltage circuit ③ of the power supply unit by sliding it.



## 4.6 Fuses

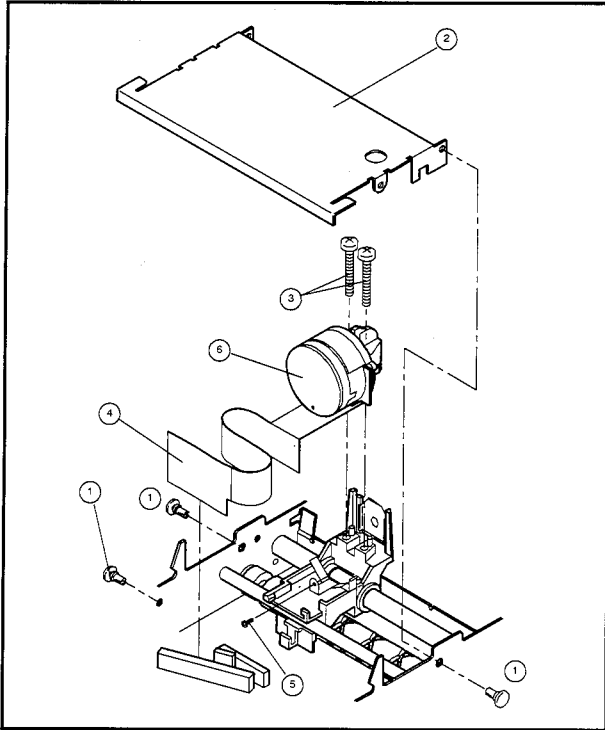
1. Remove
  - Board chassis according to the procedure described in Section 4.5.
  - F1 ① can also be removed with the high voltage circuit ③ of the power supply unit kept pulled upwards.
2. Inspect
  - F1 ①
  - F2 ②

If a fuse is defective, replace with the correct type of fuse as listed below:

AC voltage	F1	F2
120V	5TT1A	5TT3A
220V	EAWK 630MA	EAK3.15A
240V	EAWK 630MA	5TT3A

Note: If the new fuse blows, inspect the circuit.

# PARTS REPLACEMENT



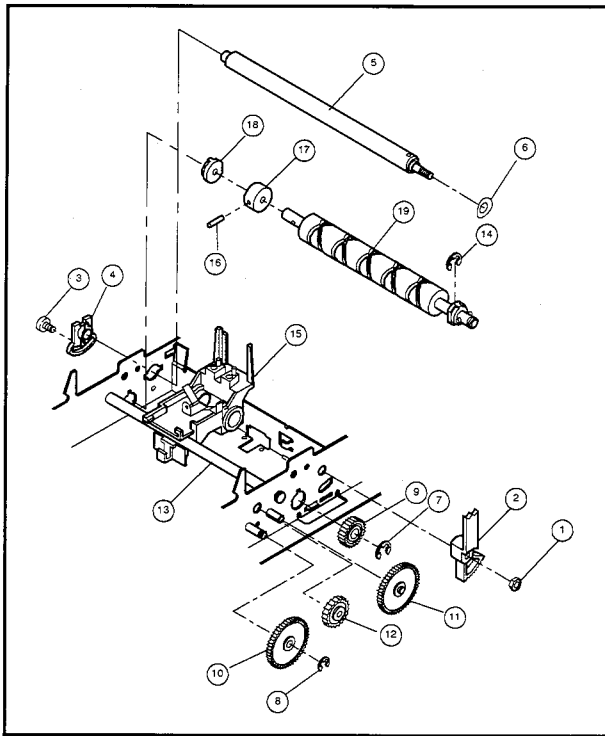
## 4.7 Print Head

1. Turn off the power switch, disconnect the power cord from the wall outlet.
2. Remove
  - Upper case unit (not shown in the figure) according to the procedure described in Section 4.1.
  - Three bush rivets ①
  - Terminal PCB cover ②
  - Two tapping screws ③
  - Head cable ④
  - Screw ⑤
  - Print head ⑥

### WARNING

The print head becomes hot after printing so wait for it to cool before removing it.

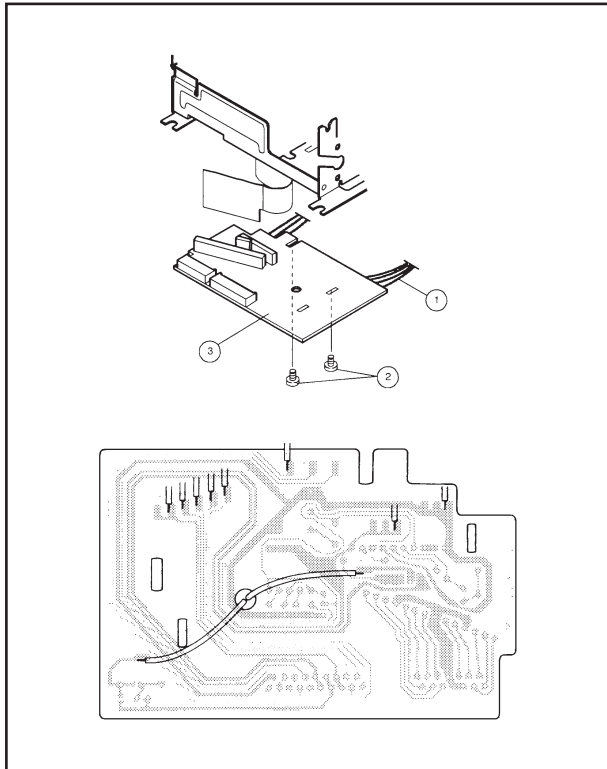
3. Adjust
  - Gap between print head and platen (Refer to Section 3.2.)



## 4.8 Drive Shaft Unit

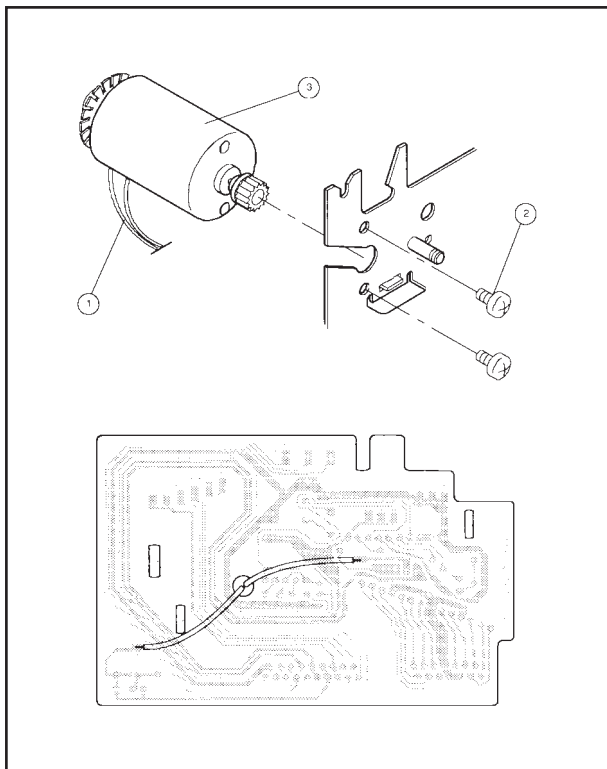
1. Remove
  - Upper case unit according to the procedure described in Section 4.1.
  - Print head according to the procedure described in Section 4.7.
  - Nut ①
  - Adjusting lever ②
  - Screw ③
  - Adjusting bushing ④  
Rotate the adjusting bushing by 90 degrees and remove protruding portion from the frame.
  - Carriage stay (1) ⑤
  - Wave washer ⑥
  - Stop ring ⑦, ⑧
  - Gear ⑨, ⑩, ⑪, ⑫
  - Carriage stay (2) ⑬
  - Stop ring SE4 ⑭
  - Carriage unit ⑮
2. Loosen the screw ⑯ with the hexagonal wrench.
3. Remove
  - Adjusting collar ⑰
  - Drive shaft bearing ⑱
  - Drive shaft unit ⑲
4. Adjust
  - Column displacement  
Refer to Section 3.4.





## 4.9 Terminal Board Unit

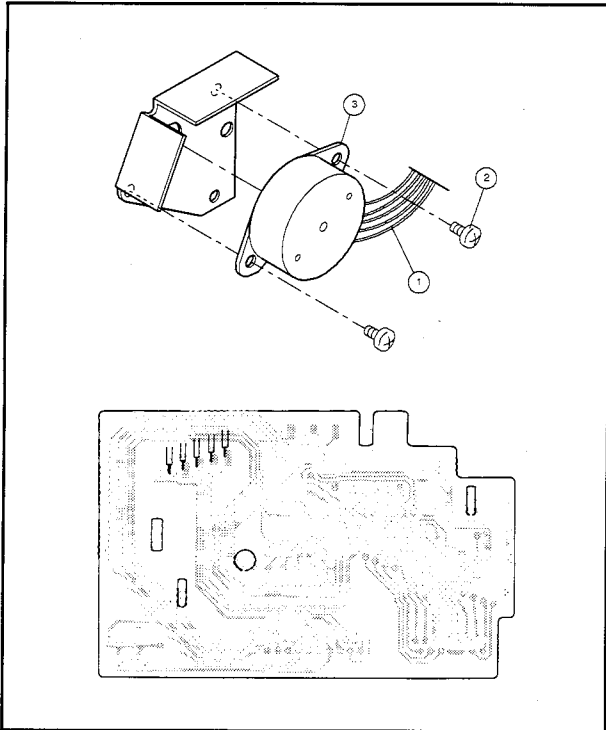
1. Remove
  - Printer mechanism according to the procedure described in Section 4.2.
  - The ten soldered lead wires ① with the soldering iron.
  - Two screws ②
  - Terminal board unit ③
2. Adjust
  - Column displacement (Refer to Section 3.4.)



## 4.10 Carriage Motor Unit

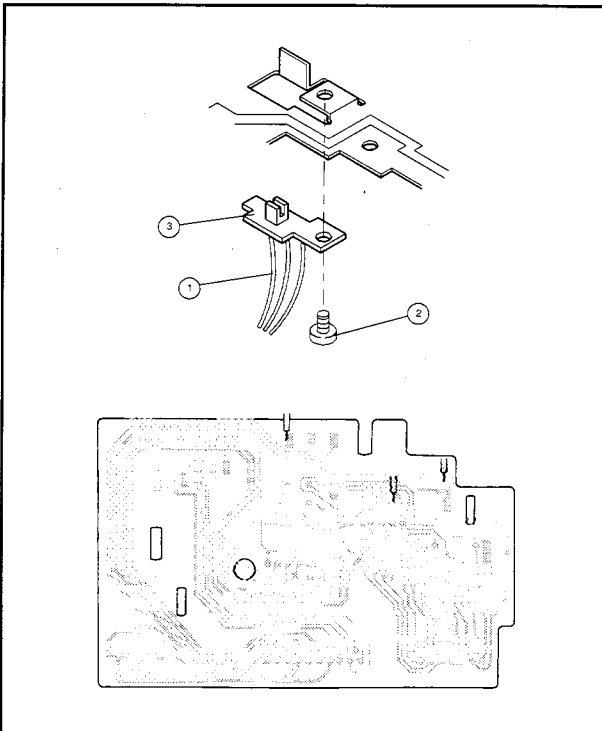
1. Remove
  - Printer mechanism according to the procedure described in Section 4.2.
  - The two soldered lead wires ① with the soldering iron. (black, red)
  - Two screws ②
  - Carriage motor unit ③
2. Adjust
  - Printing speed (Refer to Section 3.3.)
  - Column displacement (Refer to Section 3.4.)

## PARTS REPLACEMENT



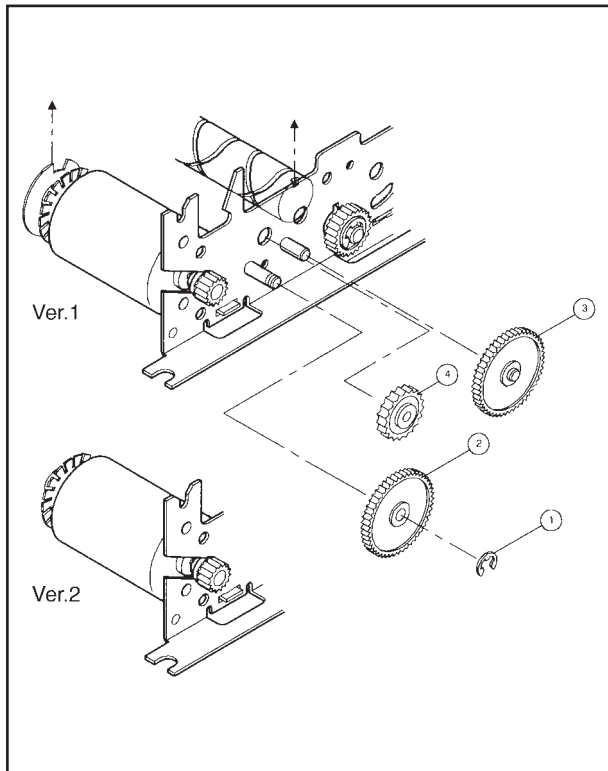
### 4.11 Paper Feed Motor Unit

1. Remove
  - Printer mechanism according to the procedure described in Section 4.2.
  - Cut the wire band for fixing the lead wires.
  - The five soldered lead wires ① with the soldering iron.  
(red, brown, black, yellow, orange)
  - Two screws ②
  - Paper feed motor unit ③



### 4.12 Home Position Detector Board Unit

1. Remove
  - Printer mechanism according to the procedure described in Section 4.2.
  - The three soldered lead wires ① with the soldering iron.  
(yellow, orange, green)
  - Screw ②
  - Home position detector board unit ③



## 4.13 Gears

1. Remove
  - Upper case unit according to the procedure described in Section 4.1.
  - Stop ring SE4 ①
  - Gear ②
  - Gear ③
  - Gear ④
2. Assembly (Ver.1)
 

Move the carriage to the left end. Align the gear wheels so that the cut-out section of the drive shaft and one end of the cut-out section of the timing pulse plate are facing upward as shown in the figure. Secure the gears with the stop rings.
3. Adjust
  - Column displacement  
(Refer to Section 3.4.)



# CHAPTER 5

## MAINTENANCE AND LUBRICATION

<b>5.1 Maintenance .....</b>	<b>5-1</b>
<b>5.1.1 Cleaning .....</b>	<b>5-1</b>
<b>5.1.2 Checks .....</b>	<b>5-1</b>
<b>5.2 Lubrication .....</b>	<b>5-2</b>
<b>5.2.1 Type of oil .....</b>	<b>5-2</b>
<b>5.2.2 Lubrication method .....</b>	<b>5-2</b>
<b>5.2.3 Lubrication locations .....</b>	<b>5-2</b>
<b>5.3 Screw Sealing .....</b>	<b>5-3</b>



## 5.1 Maintenance

Carry out the maintenance control items listed below to maintain the original performance of this printer and prevent trouble from occurring.

### 5.1.1 Cleaning

1. Removal of dirt.

Clean the dirt with tissue or soft cloth.

**Note:** Do not use thinners or trichlene/ketone base solvents for cleaning as they can damage plastic parts.

Be careful not to damage electrical parts, wired areas or mechanisms and avoid getting them wet.

2. Removal of dust, pile, etc.

Clean with a vacuum cleaner.

**Note:** Check the amount of oil after cleaning and lubricate if necessary.

### 5.1.2 Checks

Maintenance checks for this printer is divided into the two areas of “daily check” that the person using the printer carries out during normal use and “regular check” that can be done only by an experienced person with a knowledge of the equipment.

1. Daily check:

Check that the printer is being properly used.

- Is the ribbon cassette set in the correct position?
- Is the paper set correctly?
- Is there any dirt or foreign object in the printer?

2. Regular check:

Carry out regular check and lubrication after six months use or after printing 1 million lines.

- Check for bending of springs.
- Remove any dirt or dust in the area of the detectors.
- Remove dirt around the drive shaft and lubricate.
- Check the gap between the platen and the print head.

# MAINTENANCE AND LUBRICATION

## 5.2 Lubrication

Lubrication is extremely important for preserving the original performance of the printer over a long period of time.

### 5.2.1 Type of oil

The type of oil used has a major influence on the performance and durability of the printer. You should pay particular attention to the cold temperature properties of the oil. We recommend use of the grease and lubrication oils listed below for this printer.

Type of oil	Product name	Manufacturer
Grease	Molykote EM-50L	Dow Corning Corp.
	FLOIL GB-100	Kanto Chemicals Co., Ltd.
Lubricant	Mobil 1	Mobil Oil Co.,Ltd

### 5.2.2 Lubrication method

When lubricating during disassembly or assembly operations, be sure to wash and clean the equipment well prior to lubrication to remove dirt and dust.

Lubricate the equipment at regular intervals of six months or after every one million lines. Be sure to lubricate equipment after disassembling or replacing parts when oil has been removed by cleaning.

### 5.2.3 Lubrication locations

Refer to Figure 5-1.

	Lubrication location	Type of oil
①	Contact surfaces between cassette ratchet and gear angle	Molykote EM-50L
②	Contact surfaces between gear $12 \times 49 \times 0.5$ and gear shaft (A)	Molykote EM-50L
④	Contact surfaces between gear $6 \times 40 \times 0.5$ and gear shaft (C)	Molykote EM-50L
⑤	Contact surfaces between gear $16 \times 48 \times 0.5$ and gear shaft (D)	Molykote EM-50L
⑥	Contact surfaces between carriage stay (2) and carriage	Molykote EM-50L
⑦	Contact surfaces between PF roller and PF roller bearing	Molykote EM-50L
⑩	Contact points between gear $28 \times 0.5$ and gear $12 \times 49 \times 0.5$	Molykote EM-50L
⑪	Contact points between gear $12 \times 49 \times 0.5$ and gear $16 \times 48 \times 0.5$	Molykote EM-50L
⑫	Cog surfaces of gear $16 \times 48 \times 0.5$	Molykote EM-50L
⑬	Cross section of drive shaft grooves	FLOIL GB-100
⑮	Contact surface between drive shaft and drive shaft bearing	Mobil 1
⑯	Contact surfaces between carriage stay (1) and CR bearing	Mobil 1
⑰	Contact surfaces between half nut and CR bearing	Mobil 1
⑱	Contact surfaces between bavel gear $12 \times 0.5$ and fram R	Molykote EM-50L



## 5.3 Screw Sealing

Screw sealant is applied to parts so that the screws in the printer will not come loose from vibration during shipment. When carrying out replacement of parts, apply sealant to the following screws, in accordance with Figure 5-1 and 5-2.

<b>a</b>	Adjustment spring retention screw	<b>k</b>	Sensor PCB HP retention screw
<b>b</b>	Adjustment bush retention screw	<b>l</b>	Terminal PCB retention screws (2)
<b>c</b>	Platen retention screws (left, right)	<b>m</b>	Print head retention screws (2)
<b>d</b>	Paper guide shaft (1) retention screws (left, right)	<b>o</b>	Terminal PCB quare hole
<b>e</b>	Gear angle retention screw	<b>p</b>	Main logic board retention screws (3)
<b>g</b>	Adjustment bar retention nut	<b>q</b>	Power supply unit retention screws (4)
<b>h</b>	PF motor retention screws (2)	<b>r</b>	Power Chassis retention screws (3)
<b>i</b>	PF motor plate retention screws (2)	<b>s</b>	Base plate retention screws (5)
<b>j</b>	Carriage motor retention screws (2)		

# MAINTENANCE AND LUBRICATION

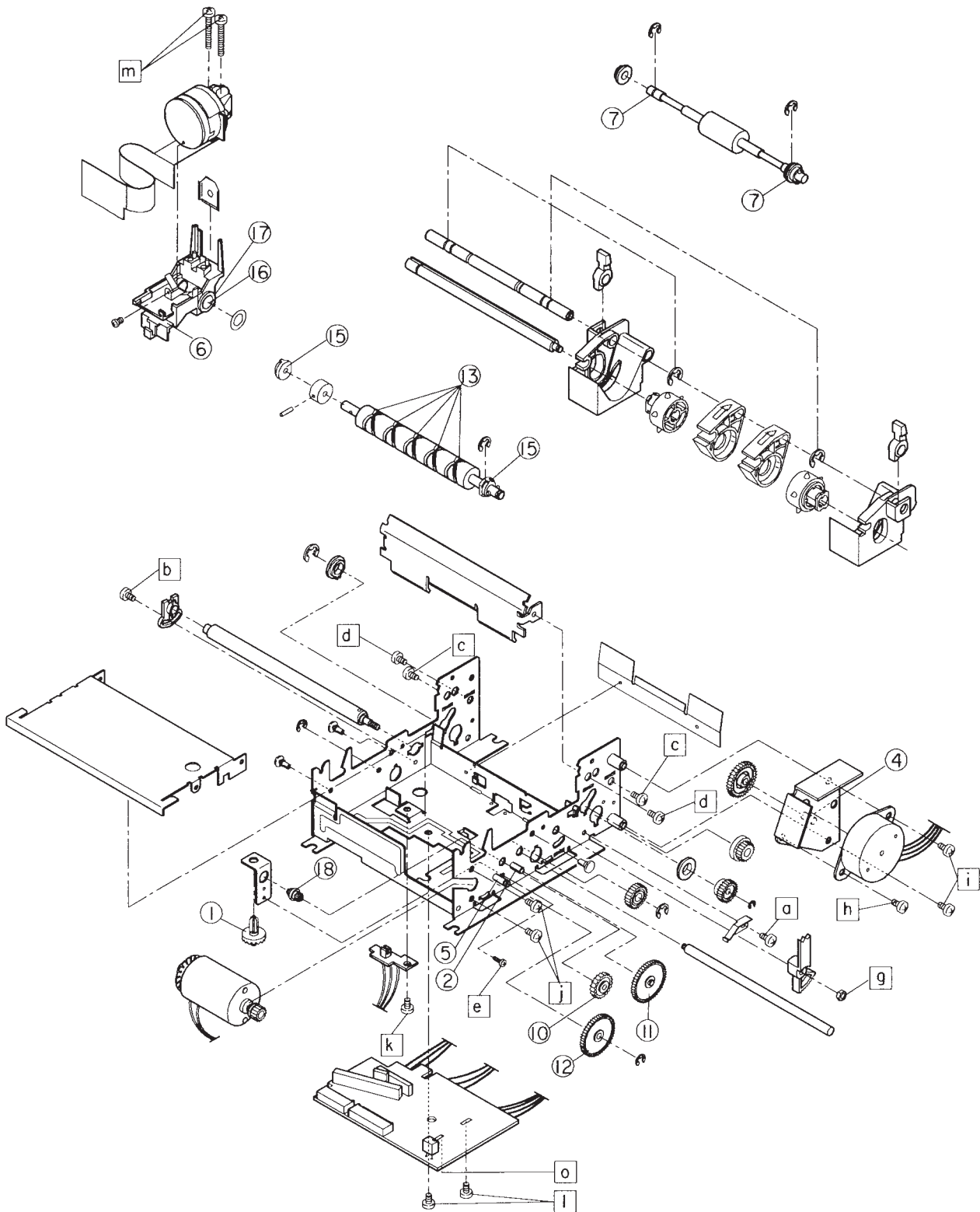


Fig. 5-1. Lubrication and screw sealing positions

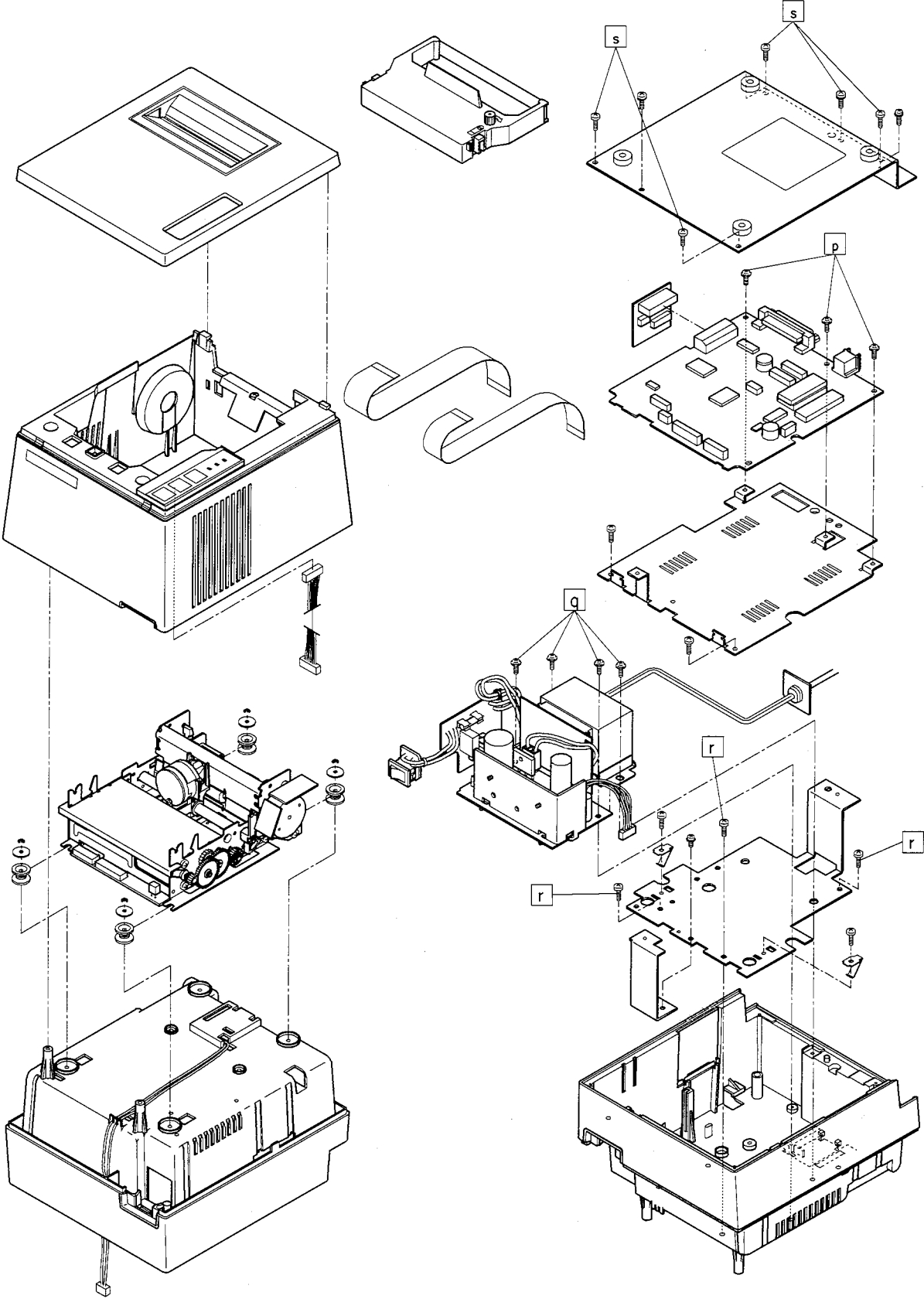


Figure 5-2 Screw sealing positions



# CHAPTER 6 PARTS LIST

## HOW TO USE PARTS LIST

1. DRWG. NO.

This column shows the drawing number of the illustration.

2. REVISED EDITION MARK

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 editon

3. PARTS NO.

Parts numbers must be indicated when ordering replacement parts. Parts described as “NPN” have no parts number and are not in stock, i.e., unavailable.

4. PARTS NAME

Parts names must be indicated when ordering replacement parts.

5. Q`TY

This column shows the number of the part used indicated in the figure.

6. REMARKS

Where 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 ... Unied Kingdom      HK ... Hong Kong

The seal number of ROM is described in this column. The “\*\*” mark of seal number is variable depending on the software version.

7. RANK

Parts marked “S” are service parts.

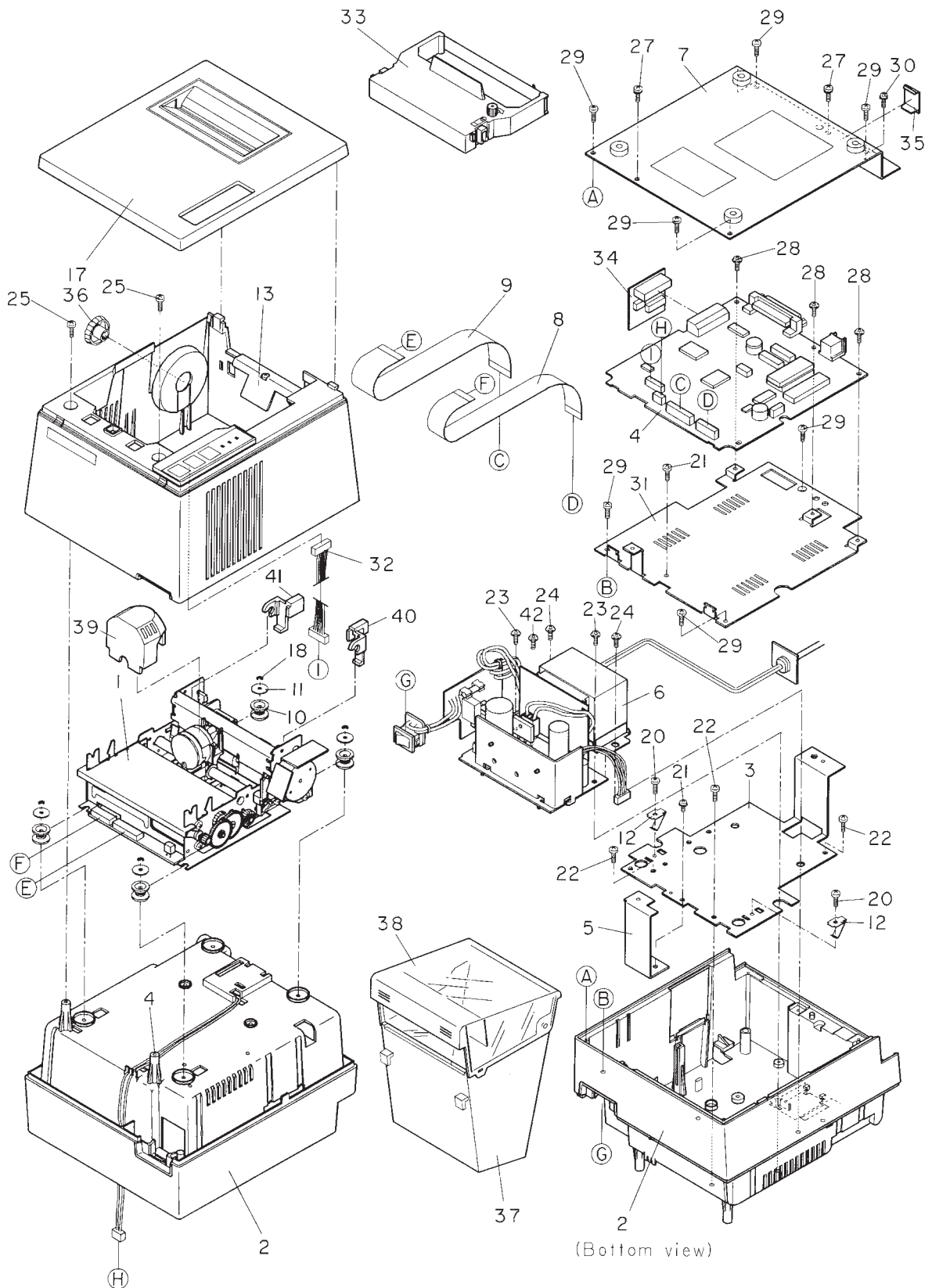
Service parts are recommended for maintenance.

<b>6.1</b>	<b>Printer Assembly</b>	<b>6-1</b>		<b>6.7</b>	<b>Power Supply Unit (Except for H.K.)</b>	<b>6-29</b>
	6.1.1 Assembly Drawing .....	6-1			6.7.1 Circuit Diagram .....	6-29
	6.1.2 Parts List .....	6-3			6.7.2 Component List .....	6-30
					6.7.3 Parts List .....	6-31
<b>6.2</b>	<b>Printer Mechanism</b>	<b>6-5</b>		<b>6.8</b>	<b>Power Supply Unit (For H.K.)</b>	<b>6-32</b>
	6.2.1 Assembly Drawing .....	6-5			6.8.1 Circuit Diagram .....	6-32
	6.2.2 Parts List .....	6-6			6.8.2 Parts List .....	6-33
<b>6.3</b>	<b>Sub-assembly</b>	<b>6-8</b>		<b>6.9</b>	<b>Terminal Board</b>	<b>6-34</b>
	6.3.1 Upper Case Unit .....	6-8			6.9.1 Circuit Diagram .....	6-34
	6.3.2 Lower Case Unit .....	6-9			6.9.2 Component List .....	6-35
					6.9.3 Parts List .....	6-36
<b>6.4</b>	<b>Wiring Schematic of Printer</b>	<b>6-10</b>		<b>6.10</b>	<b>Home Position Detector Board</b>	<b>6-37</b>
	6.4.1 For Serial Interface .....	6-10			6.10.1 Circuit Diagram .....	6-37
	6.4.2 For Parallel Interface .....	6-11			6.10.2 Component Layout .....	6-37
					6.10.3 Parts List .....	6-37
<b>6.5</b>	<b>Main Logic Board</b>	<b>6-12</b>		<b>6.11</b>	<b>R422 Interface Board (BD320K): option</b>	<b>6-38</b>
	6.5.1 Serial Interface .....	6-12			6.11.1 Circuit Diagram .....	6-38
	6.5.1.1 Circuit Diagram .....	6-12			6.11.2 Component Layout .....	6-38
	6.5.1.3 Parts List .....	6-16			6.11.3 Parts List .....	6-38
	6.5.2 For Parallel Interface .....	6-20		<b>6.12</b>	<b>Current Loop Board (BD320L): option</b>	<b>6-39</b>
	6.5.2.1 Circuit Diagram .....	6-20			6.12.1 Circuit Diagram .....	6-39
	6.5.2.2 Component Layout .....	6-24			6.12.2 Component Layout .....	6-39
	6.5.2.3 Parts List .....	6-25			6.12.3 Parts List .....	6-39
<b>6.6</b>	<b>Control Panel Board</b>	<b>6-28</b>				
	6.6.1 Circuit Diagram .....	6-28				
	6.6.2 Component Layout .....	6-28				
	6.6.3 Parts List .....	6-28				

## 6.1 Printer Assembly

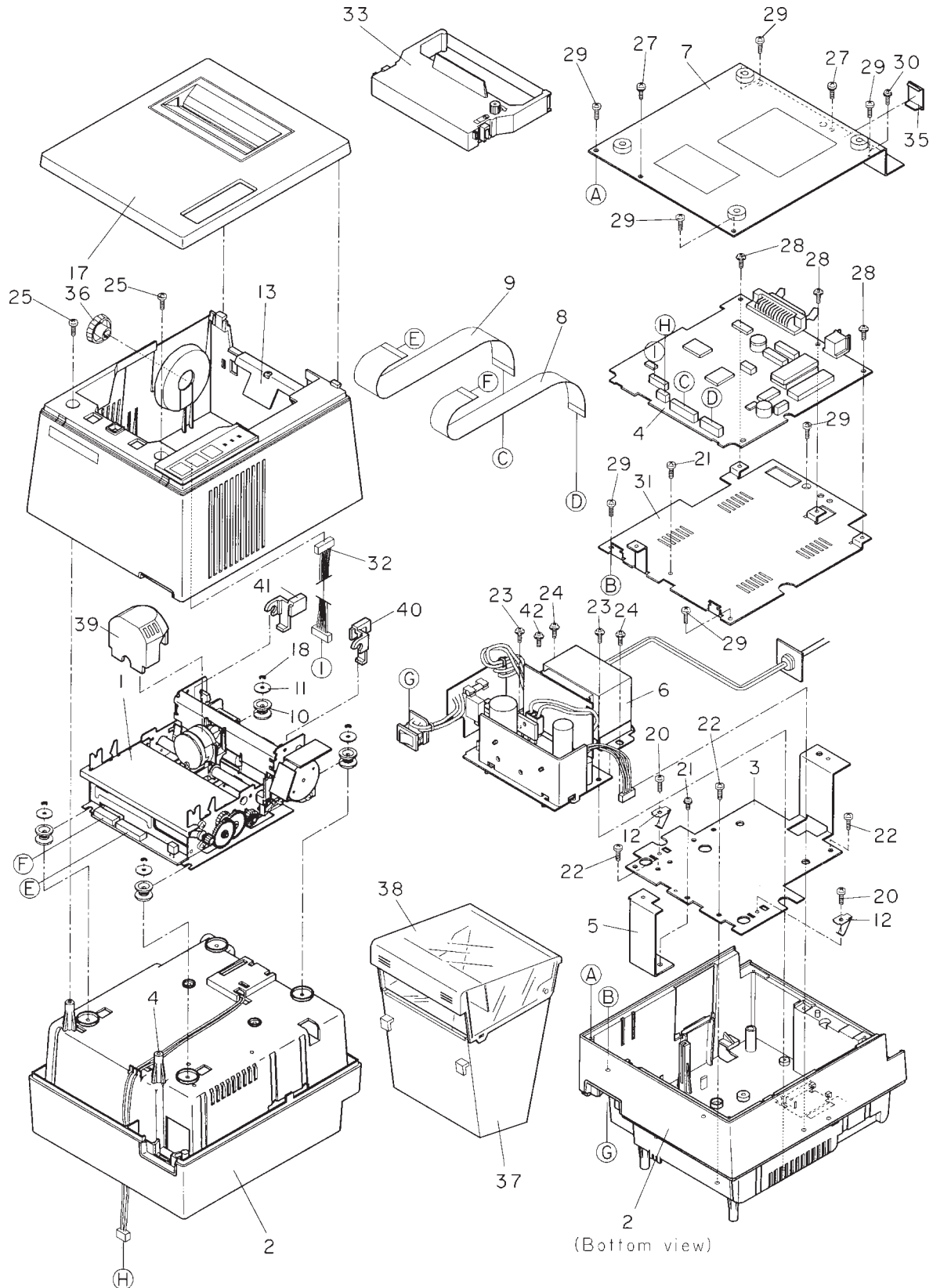
### 6.1.1 Assembly Drawing

#### A. SP321SD, SP322SD, SP323SD



# PARTS LIST

## B. SP321SC, SP322SC, SP323SC



## 6.1.2 Parts List

## Printer Assembly

DRWG. NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
1		89113120	PRINTER MECHANISM MP321S-24	1	SP321	S
		89113140	PRINTER MECHANISM MP322S-24	1	SP322	S
		89113160	PRINTER MECHANISM MP323S-24	1	SP323	S
2		87211060	LOWER CASE UNIT SP321S	1		S
3		82011310	POWER CHASSIS SP321S	1		
4		87212240	CONTROL BOARD UNIT BD321SD-24	1	SERIAL	S
		87212260	CONTROL BOARD UNIT BD321SC-24	1	PARALLEL	S
5		82902230	GROUND PLATE SP321S	1		
6		87213090	POWER SUPPLY UNIT SP321S-120US	1	FOR US	S
		87213100	POWER SUPPLY UNIT SP320-230EC	1	FOR EC(220V)	S
	#1	87213230	POWER SUPPLY UNIT SP320-230EC	1	FOR EC(230V)	S
		87213110	POWER SUPPLY UNIT SP321S-240UK	1	FOR UK(240V)	S
	#1	87213240	POWER SUPPLY UNIT SP320-230UK	1	FOR UK(230V)	S
	#1	87213140	POWER SUPPLY UNIT SP322-220KR	1	FOR HK	S
7		87215040	BASE PLATE UNIT SP321S	1	SERIAL INTERFACE	
		87215050	BASE PLATE UNIT SP321SC	1	PARALLEL INTERFACE	
8		80703940	CABLE UNIT 14X185 SP321S	1		S
9		80703950	CABLE UNIT 19X185 SP321S	1		S
10		80200430	RUBBER FOOT 8340	4		S
11		82200270	WASHER 3.1X13 8340	4		S
12		82501320	GROUND SPRING SP321S	2		S
13		87210110	UPPER CASE UNIT SP321S	1	FOR US, HK	S
		87210130	UPPER CASE UNIT SP321S EC	1	FOR EC, UK	S
17		87217060	COVER UNIT SP321S	1		S
18		04020010	STOP RING SE2.0	4		S
20		00930403	SCREW TAT 3-4 CT	2		S
21		01903018	SCREW TR 3-6 WS/WF	1	EXCEPT FOR HK	S
	#1	00630504	SCREW TR 3-5	1	FOR HK	S
22		00930603	SCREW TAT 3-6 PT	3		S
23		01903060	SCREW TAT 3-8 PT-FL	2		S
24		01914003	SCREW TR 4-10 WS/WF	2		S
25		01903058	SCREW TAT 3-10 PT	2		S
27		01903085	SCREW TAT 3-7 WS	2		S
28	*1	01903077	SCREW TAT 3-5 CT-FL	3		S
	#1	01903069	SCREW TAT 3-5 ST-FL	3		S
29		00930803	SCREW TAT 3-8 PT	7		S
30		01903026	SCREW TR 3-5 WB	1		S
31		82011320	BOARD CHASSIS SP321S	1		
32		80703740	CABLE UNIT 8X215CC SP300SD	1		
33		80980980	INK RIBBON CARTRIDGE RC300P	1	PURPLE	
		80981610	INK RIBBON CARTRIDGE RC300B	1	BLACK :OPTION	
		80982440	INK RIBBON CARTRIDGE RC300D	1	BLACK :OPTION	
34	*1	87219160	CONTROL BOARD BD320K	1	RS-422A :OPTION	
	#1	87219161	CONTROL BOARD BD320K	1	RS-422A :OPTION	
		87219170	CONTROL BOARD BD320L	1	CURRENT LOOP :OPTION	
35		83911720	CONNECTOR COVER SP312	1		
36		83903490	PLATEN KNOB SP321S	1		
37	*1	83024990	PAPER HOLDER SP321S	1		
	#1	83024991	PAPER HOLDER SP321S	1		
38		83025000	PAPER HOLDER COVER SP321S	1		
39	#1	83911451	HEAD COVER 8901D	1	FOR EC	



# PARTS LIST

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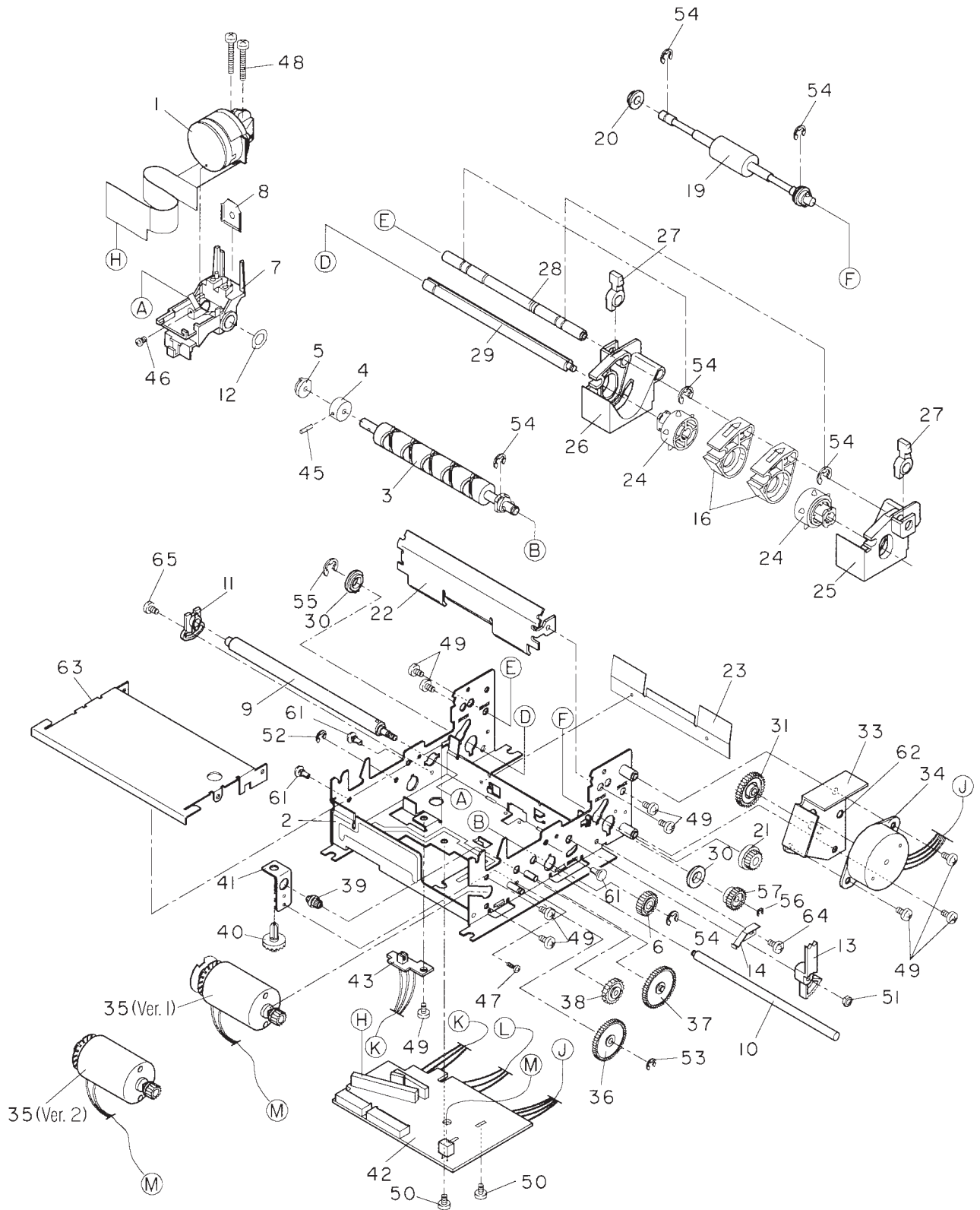
## Printer Assembly

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
40	#1	83912240	GUIDE CAP R SP321S	1	FOR EC	
41	#1	83912251	GUIDE CAP L SP321S	1	FOR EC	
42	#1	01914036	SCREW TR 4-5 WS	1	FOR EC	S
-		04020016	STOP RING SE4.0	2	SP321,SP323	
	#1	09990723	FERRITE CORE TFC-23-11-14	1	EC,UK :ACCESSARY	
	#1	04991204	FASTENER T18S	1	EC,UK :ACCESSARY	

## 6.2 Printer Mechanism

### 6.2.1 Assembly Drawing

MP321S, MP322S, MP323S



# PARTS LIST

## 6.2.2 Parts List

## Printer Mechanism

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
1		89130040	PRINT HEAD DP8901D	1		S
2		87110190	FRAME UNIT MP321S	1		
3		87111190	DRIVE SHAFT UNIT MP311	1	MP321	
		87111170	DRIVE SHAFT UNIT MP312	1	MP322	
		87111200	DRIVE SHAFT UNIT MP323S	1	MP323	
4		81210240	ADJUSTING COLLAR MP300	1		
5		80203041	DRIVE SHAFT BEARING MP300	1		
6		83100940	DRIVE SHAFT GEAR MP300	1		
7	*1	87111182	CARRIAGE UNIT MP300	1		
	#1	87111183	CARRIAGE UNIT MP300	1		
8		82091091	RIBBON SEPARATOR MP300	1		S
9		81370610	CARRIAGE STAY 1 MP300	1		
10		81360580	CARRIAGE STAY 2 MP300	1		
11		83200821	ADJUSTING BUSHING MP300	1		
12		82500040	WAVE WASHER 1 DT	1		
13		83400630	ADJUSTING LEVER MP300	1		S
14		82501000	ADJUST SPRING MP300	1		
16		83911210	SHEET GUIDE M MP321S	1		
19		87116180	PF ROLLER UNIT MP321S	1		
20		83911200	PF ROLLER SHAFT HOLDER MP300	1		
21		83100980	PF ROLLER GEAR MP321S	1		
22		82902130	PLATEN MP321S	1	MP321,MP323	
		82902140	PLATEN MP322S	1	MP322	
23	*1	80993160	PAPER HOLDER MP321S	1		
	#1	80993161	PAPER HOLDER MP321S	1		
24		83120590	SPROCKET WHEEL MP321S	2		
25		83911251	PAPER GUIDE R SP321S	1		
26		83911261	PAPER GUIDE L SP321S	1		
27		83400621	LOCK LEVER MP300	2		S
28		81380610	PAPER GUIDE SHAFT MP321S	1		
29		81360840	SPROCKET SHAFT 2 MP321S	1		
30		83911271	SPROCKET SHAFT HOLDER MP300	2		
31		83100990	GEAR 16X40X0.5 MP321S	1		
33		87112500	PF MOTOR PLATE ASSY MP321S	1		
34		87112490	PAPER FEED MOTOR ASSY MP321S	1		S
35	*1	87112260	CARRIAGE MOTOR UNIT MP321S	1	MP321 :VER.1	S
	#1	87112261	CARRIAGE MOTOR UNIT MP321S	1	MP321 :VER.2	S
	*1	87112250	CARRIAGE MOTOR UNIT MP322S	1	MP322,MP323 :VER.1	S
	#1	87112251	CARRIAGE MOTOR UNIT MP322S	1	MP322,MP323 :VER.2	S
36		83101020	GEAR 16X48X0.5 MP300	1		
37		83101030	GEAR 12X49X0.5 MP300	1		
38		83100960	GEAR 28X0.5 MP300	1		
39		83101010	BEVEL GEAR 12X0.5 MP300	1		
40		87119170	CASSETTE RATCHET UNIT MP300	1		S
41		82901161	GEAR ANGLE MP300	1		
42	*1	87117220	TERMINAL BOARD UNIT MP321S	1	NOTE1 VER.1	S
	#1	87117221	TERMINAL BOARD UNIT MP321S	1	NOTE1 VER.2	S
43		87117210	DETECTOR BOARD UNIT HP MP311	1	MP321,MP323	S
		87117180	DETECTOR BOARD UNIT HP MP300	1	MP322	S
45		00330404	SCREW TF 3-4	1		S
46		00717144	SCREW TR 1.7-1.4	1		S

# PARTS LIST

## Printer Mechanism

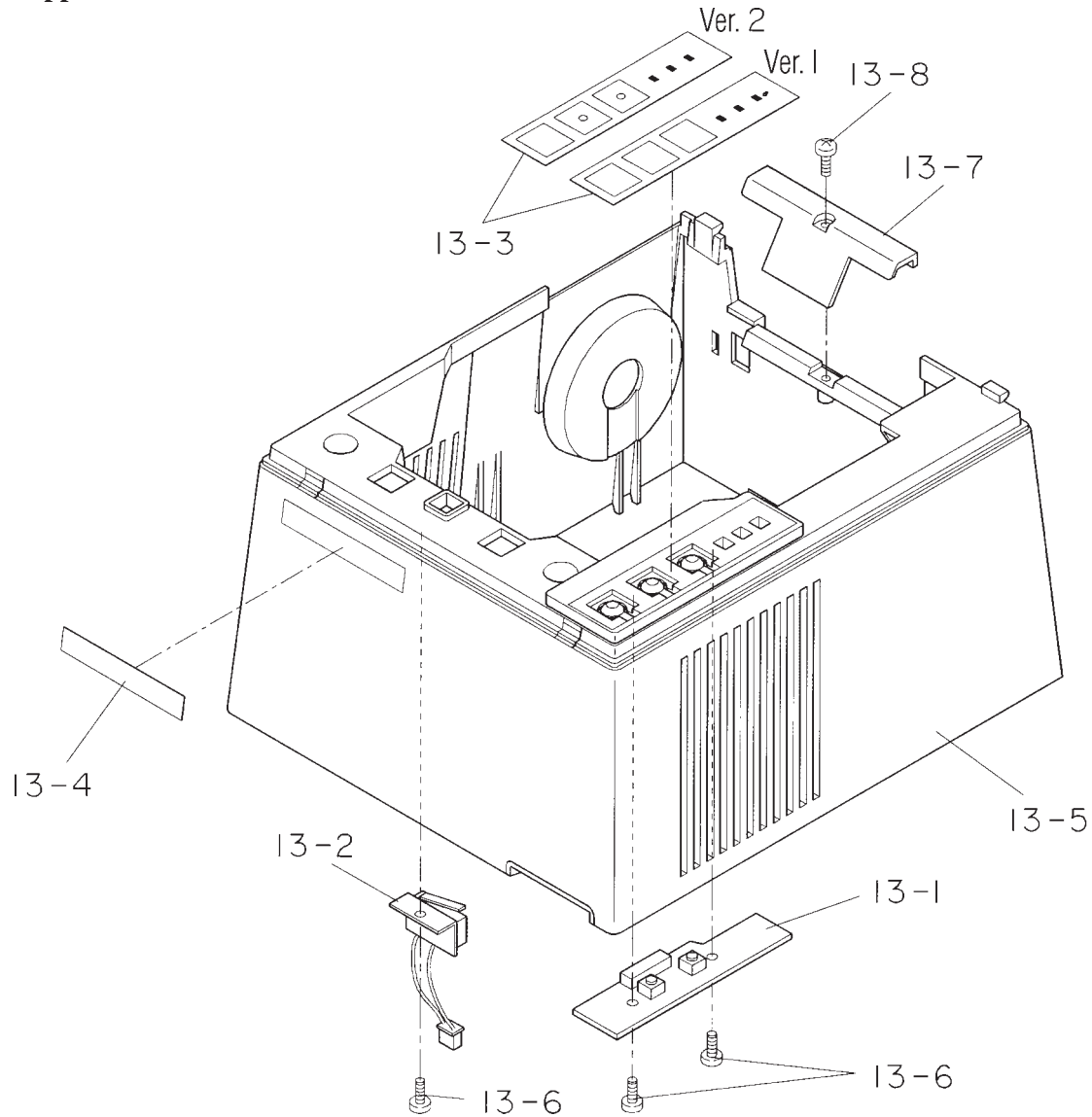
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
47		00820404	SCREW TR 2-4	1		S
48		01902612	SCREW TAT 2.6-16 PT	2		S
49		00630404	SCREW TR 3-4	9		S
50		01903048	SCREW TR 3-5 WF	2		S
51		02020301	HEXAGON NUT NH3-2	1		S
52		04020010	STOP RING SE2.0	1		S
53		04020015	STOP RING SE3.0	1		S
54		04020016	STOP RING SE4.0	6		S
55		04020017	STOP RING SE5.0	1		S
56		04020004	STOP RING SE2.5	1		S
57		83101050	SPROCKET GEAR MP321S	1		
61		04033001	PUSH RIVET P3035B	3		S
63		82020422	TERMINAL BOARD COVER MP342	1		
64		00930403	SCREW TAT 3-4 CT	1		S
65	*1	01903077	SCREW TAT 3-5 CT-FL	1		S
	#1	01903069	SCREW TAT 3-5 ST-FL	1		S
-		04991225	FASTENER PLT0.7M	1		S

**Note1: When assembling the parts in drawing 35 and 42, do not mix the version 1 parts and the version 2 parts.**

# PARTS LIST

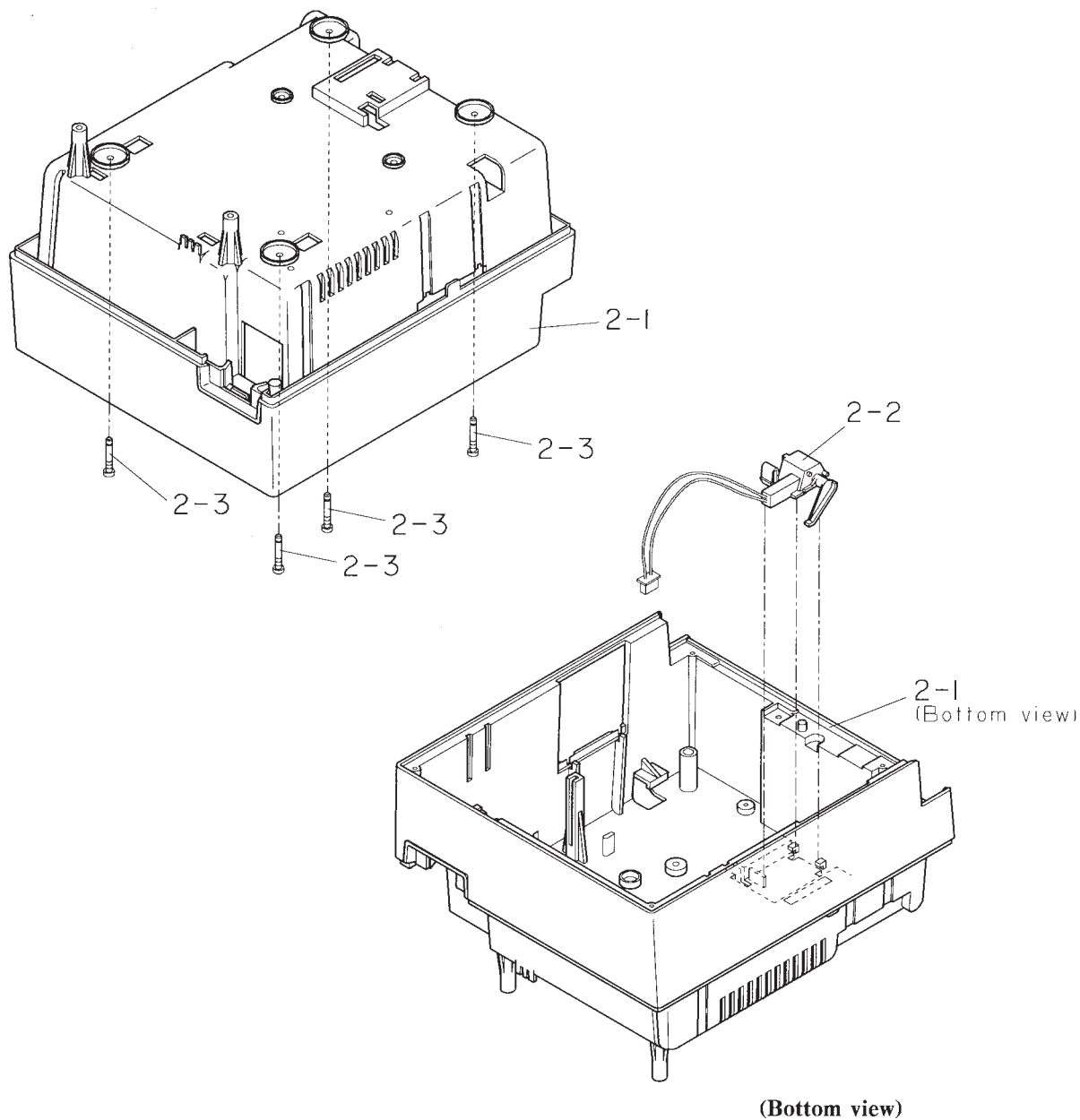
## 6.3 Sub-assembly

### 6.3.1 Upper Case Unit



DRWG. NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
13-1		87210330	CONTROL PANEL ASSY SP321S	1		
13-2		87210320	MICRO SWITCH ASSY SP300	1	FOR US, HK	
		87210340	MICRO SWITCH ASSY SP321S	1	FOR EC, UK	
13-3	*1	80087310	OPERATION SHEET SP321S	1	VER. 1	
	#1	80087312	OPERATION SHEET SP321S	1	VER. 2	
13-4		80084240	BRAND PLATE SP321S	1		
13-5	*1	83024950	UPPER CASE SP321S	1	VER. 1	
	#1	83024952	UPPER CASE SP321S	1	VER. 2	
13-6		00930603	SCREW TAT 3-6 PT	3		
13-7		83025010	PAPER GUIDE A SP321S	1		
13-8		00930803	SCREW TAT 3-8 PT	1		

6.3.2 Lower Case Unit

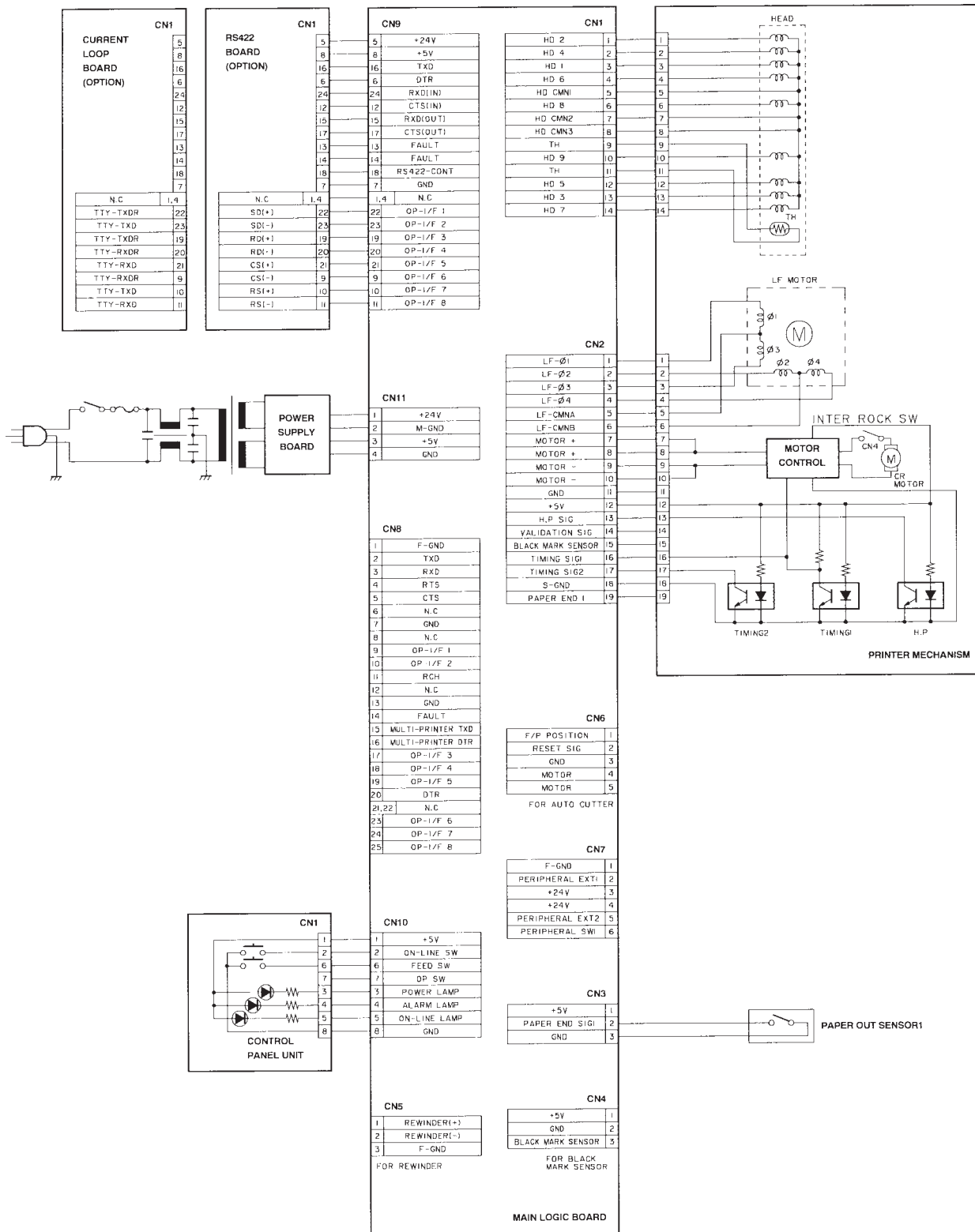


DRWG. NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
2-1	*1	83024960	LOWER CASE SP321S	1		
	#1	83024961	LOWER CASE SP321S	1		
2-2		09090048	LEAF SWITCH MPS10130B	1		S
2-3		81310750	MECHANISM HOLDER PIN 8340	4		

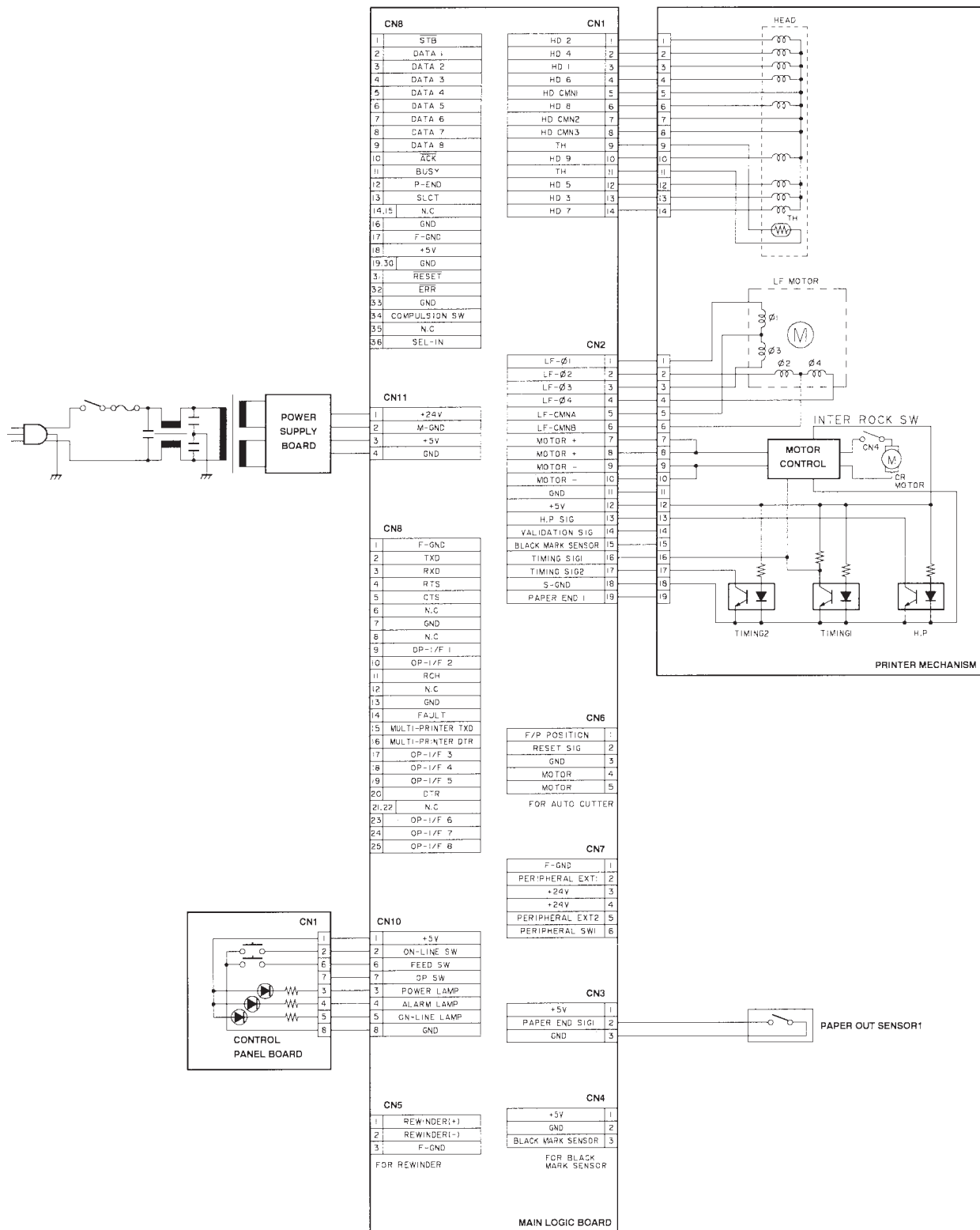
# PARTS LIST

## 6.4 Wiring Schematic of Printer

### 6.4.1 For Serial Interface



6.4.2 For Parallel Interface





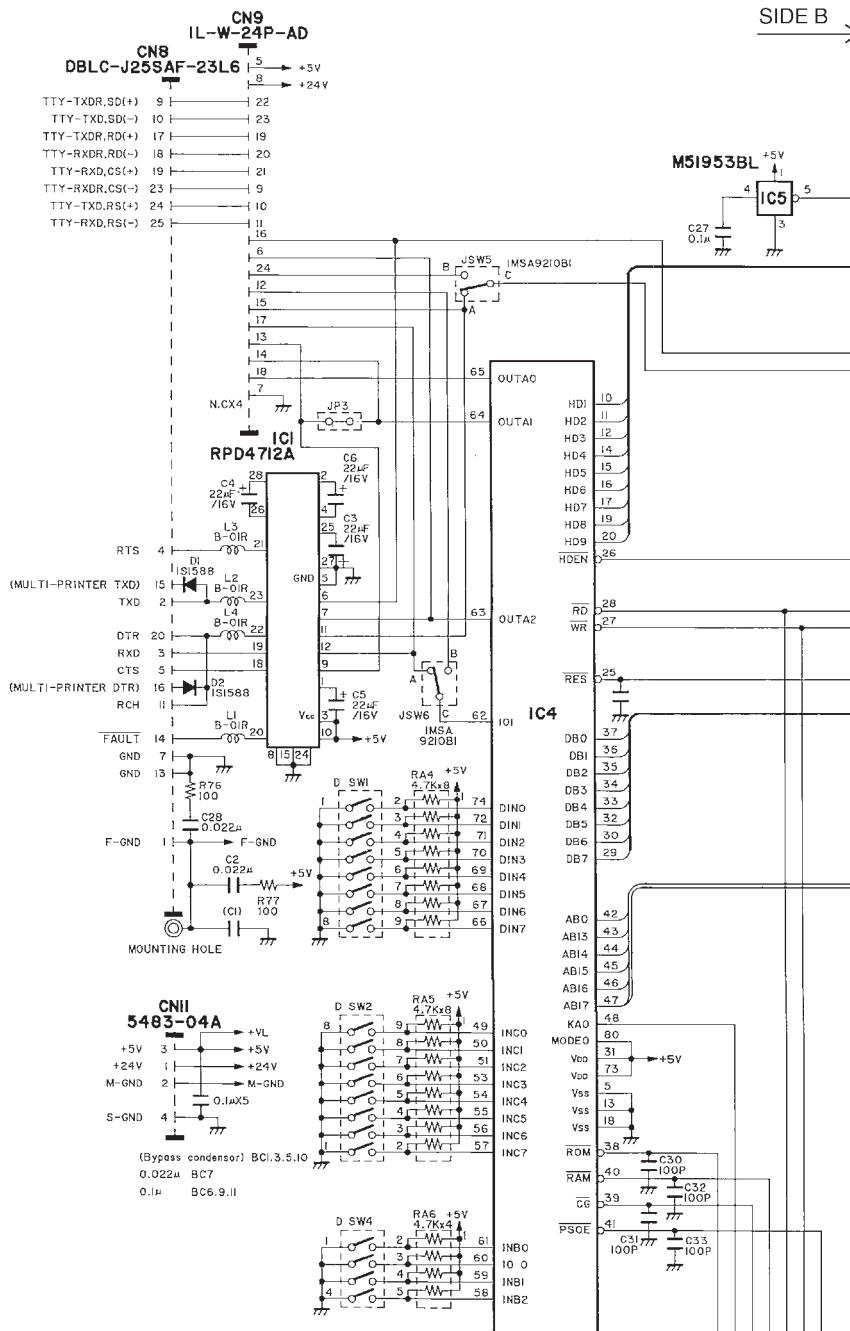
# PARTS LIST

## 6.5 Main Logic Board

### 6.5.1 Serial Interface

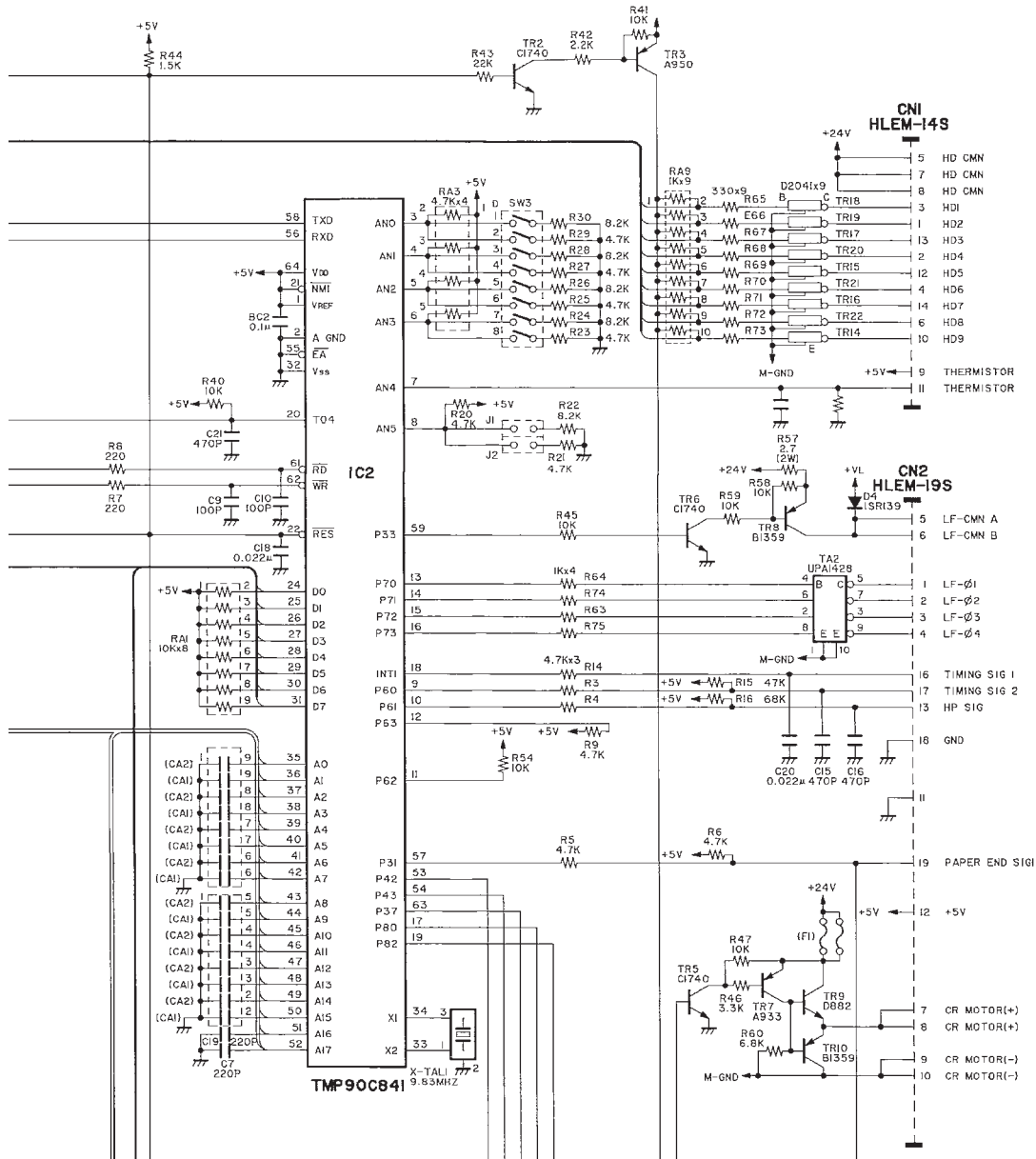
#### 6.5.1.1 Circuit Diagram

A



C

SIDE A

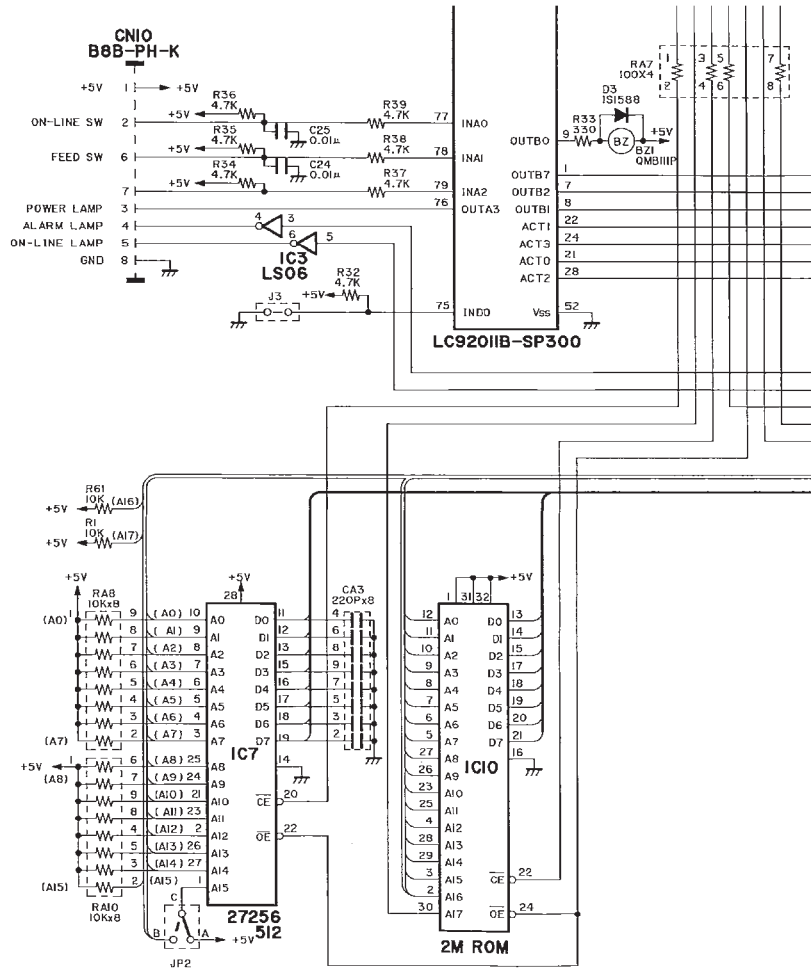


B

D

# PARTS LIST

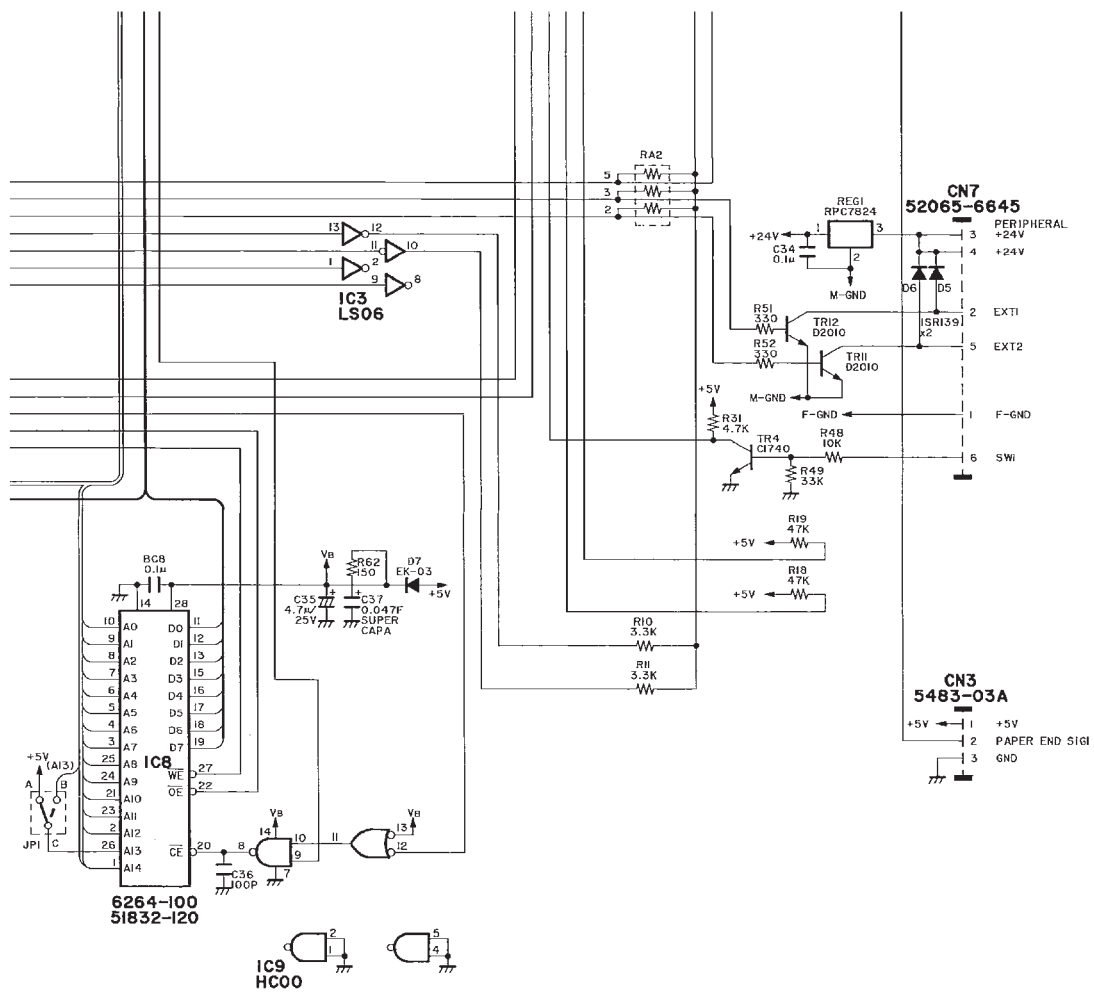
A ↑



C

- <Note 1> The unit of resistor and resistor array is "Ω", and no indication of wattage means 1/6W, 1/8W respectively.
- <Note 2> The unit of capacitor and capacitor array is "F", and no indication of voltage means 50V.
- <Note 3> The components in bracket ( ) depend on the printer type if it is installed or not on the board. Refer to parts list.

SIDE D →



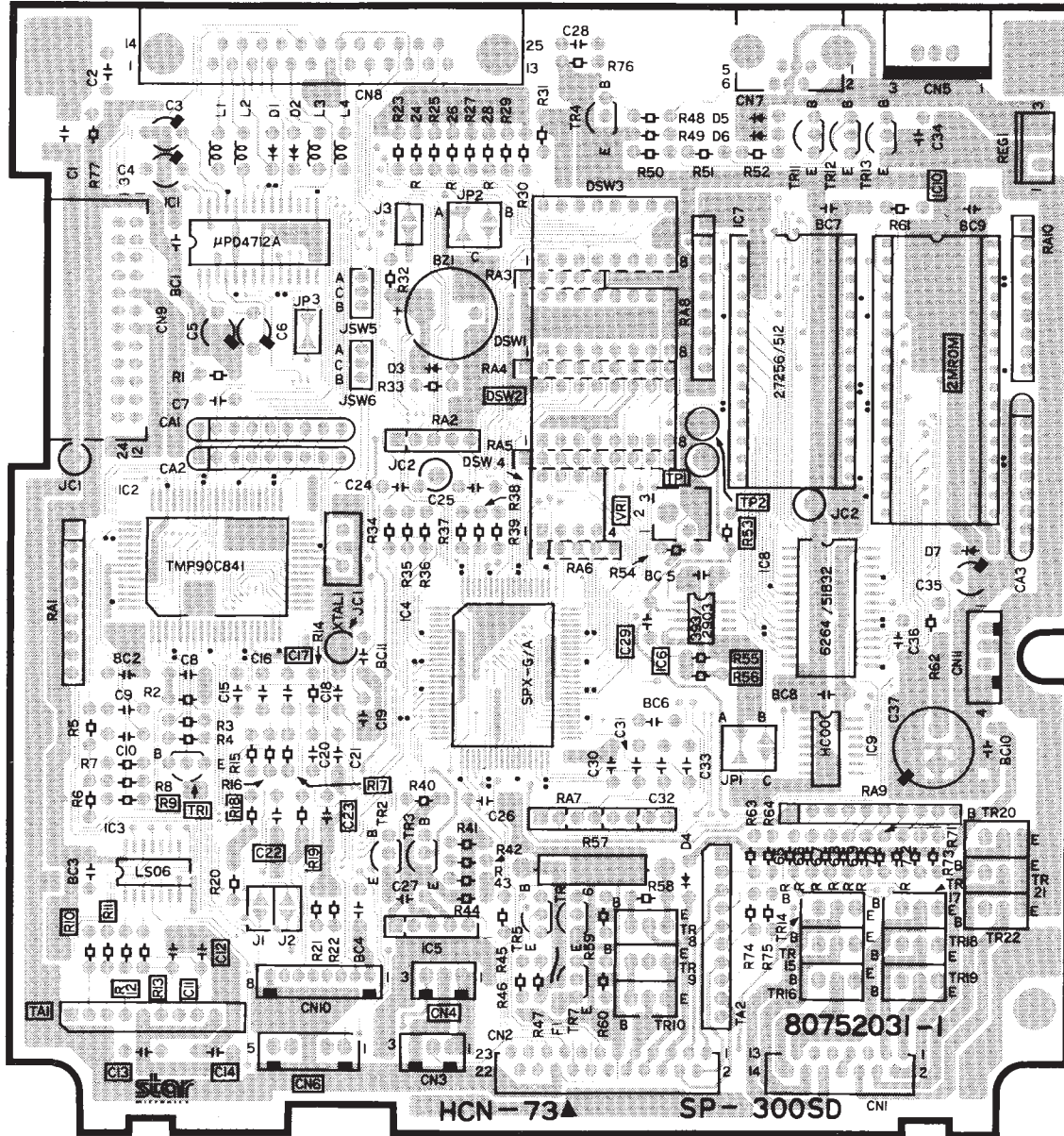
↑  
B

D

←  
SIDE C

# PARTS LIST

## 6.5.1.2 Component Layout



## 6.5.1.3 Parts List

## Main Logic Board (Serial Interface)

DRWG. NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1	*1	08200140	IC-I/F D4712AGT	1		S
	#1	08200156	IC-I/F D4712AGT*E2	1		S
IC2		08250009	CPU TMP90C041F	1		S
IC3	*1	08210116	TTL IC 74LS06 (FLAT TYPE)	1		
	#1	08210144	TTL IC 74LS06FP*TL	1		
IC4		08240019	GATE ARRAY LC92011B-SP300	1		
IC5		08200109	IC-RESET M51953BL	1	NOTE 1	S
IC6					NOT MOUNTED	
IC7		08222026	EPROM 27256-150NS	1	SP3S.S.**	S
		09110024	IC SOCKET ICS-28-2T	1		
IC8	*1	08221021	SRAM HM6264LFP-100NS	1		
	#1	08221043	SRAM 6264FP-100NS*EL	1		
IC9	*1	08230038	CMOS 74HC00AF	1		
	#1	08230058	CMOS 74HC00AF*TL1	1		
IC10		09110077	IC SOCKET ICS-32-2T	1		
REG1		08202011	IC-REG UPC7824	1		S
TA1					NOT MOUNTED	
TA2	*1	07650029	TRANSISTOR ARRAY MP4001	1		S
	#1	07650056	TRANSISTOR ARRAY UPA1428AH	1		S
TR1					NOT MOUNTED	
TR2		07227853	TRANSISTOR 2SC1740SE	1		
TR3		07009502	TRANSISTOR 2SA950	1		
TR4-6		07227853	TRANSISTOR 2SC1740SE	3		
TR7		07009331	TRANSISTOR 2SA933S	1		S
TR8		07113591	TRANSISTOR 2SB1359	1		S
TR9		07308821	TRANSISTOR 2SD882P	1		S
TR10		07113591	TRANSISTOR 2SB1359	1		S
TR11-12		07320101	TRANSISTOR 2SD2010	2		S
TR13					NOT MOUNTED	
TR14-22		07320411	TRANSISTOR 2SD2041	9		S
D1-3		08000024	DIODE 1S1588-T	3		
D4-6		08000044	DIODE 1SR139-100AT	3		
D7		08030006	SCHOTTKY DIODE EK-03	1		
RA1		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
RA2		06581023	RESIS. ARRAY 1 K-OHM 1/8W 4EL	1		
RA3		06584721	RESIS. ARRAY 4.7K-OHM 1/8W 4EL	1		
RA4-5		06584723	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	2		
RA6		06584721	RESIS. ARRAY 4.7K-OHM 1/8W 4EL	1		
RA7		06581013	RESIS. ARRAY 100 OHM 1/8W 4ES	1		
RA8		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
RA9		06581022	RESIS. ARRAY 1 K-OHM 1/8W 9EL	1		
RA10		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
R1		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R2		06251034	RN RESISTOR 10 K-OHM 1/6W	1		
R3-6		06054725	RD RESISTOR 4.7 K-OHM 1/6W	4		
R7-8		06052211	RD RESISTOR 220 OHM 1/6W	2		
R9		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R10-11		06053324	RD RESISTOR 3.3 K-OHM 1/6W	2		
R12-13					NOT MOUNTED	

**Note1:** After replacing IC7, turn the power ON while depressing the FEED switch and ON LINE switch on the control panel to clear the data buffer.

# PARTS LIST

## Main Logic Board (Serial Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R14		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R15		06054734	RD RESISTOR 47 K-OHM 1/6W	1		
R16		06056834	RD RESISTOR 68 K-OHM 1/6W	1		
R17					NOT MOUNTED	
R18-19		06054734	RD RESISTOR 47 K-OHM 1/6W	2		
R20-21		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R22		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R23		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R24		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R25		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R26		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R27		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R28		06058224	RD RESISTOR 8.2 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		
R31-32		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R33		06053314	RD RESISTOR 330 OHM 1/6W	1		
R34-39		06054725	RD RESISTOR 4.7 K-OHM 1/6W	6		
R40-41		06051034	RD RESISTOR 10 K-OHM 1/6W	2		
R42		06052224	RD RESISTOR 2.2 K-OHM 1/6W	1		
R43		06052234	RD RESISTOR 22 K-OHM 1/6W	1		
R44		06051525	RD RESISTOR 1.5 K-OHM 1/6W	1		
R45		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R46		06053324	RD RESISTOR 3.3 K-OHM 1/6W	1		
R47-48		06051034	RD RESISTOR 10 K-OHM 1/6W	2		
R49		06053334	RD RESISTOR 33 K-OHM 1/6W	1		
R50					NOT MOUNTED	
R51-52		06053314	RD RESISTOR 330 OHM 1/6W	2		
R53					NOT MOUNTED	
R54		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R55-56					NOT MOUNTED	
R57		06200271	RN RESISTOR 2.7 OHM 2W 2%	1		
R58-59		06051034	RD RESISTOR 10 K-OHM 1/6W	2		
R60		06056824	RD RESISTOR 6.8 K-OHM 1/6W	1		
R61		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R62		06051514	RD RESISTOR 150 OHM 1/6W	1		
R63-64		06051025	RD RESISTOR 1 K-OHM 1/6W	2		
R65-73		06053314	RD RESISTOR 330 OHM 1/6W	9		
R74-75		06051025	RD RESISTOR 1 K-OHM 1/6W	2		
R76-77		06051014	RD RESISTOR 100 OHM 1/6W	2		
CA1-2					NOT MOUNTED	
CA3		05652212	CAPA. ARRAY 220PF 50V 8EL	1		
C1					NOT MOUNTED	
C2		05252232	FILM CAPA. 0.022UF 50V	1		
C3-6		05022264	CHEM. CAPA. 22UF 16V	4		
C7		05152212	CERA. CAPA. 220PF 50V	1		
C8		05151033	CERA. CAPA. 0.01UF 50V	1		
C9-10		05151015	CERA. CAPA. 100PF 50V	2		
C11-14					NOT MOUNTED	
C15-16		05154714	CERA. CAPA. 470PF 50V	2		
C17					NOT MOUNTED	

# PARTS LIST

## Main Logic Board (Serial Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C18		05152234	CERA. CAPA. 0.022UF 50V	1		
C19		05152212	CERA. CAPA. 220PF 50V	1		
C20		05152234	CERA. CAPA. 0.022UF 50V	1		
C21		05154714	CERA. CAPA. 470PF 50V	1		
C22-23					NOT MOUNTED	
C24-25		05151034	CERA. CAPA. 0.01UF 50V	2		
C26		05152234	CERA. CAPA. 0.022UF 50V	1		
C27		05131044	CERA. CAPA. 0.1UF 25V	1		
C28		05252232	FILM CAPA. 0.022UF 50V	1		
C29					NOT MOUNTED	
C30-33		05151015	CERA. CAPA. 100PF 50V	4		
C34		05251044	FILM CAPA. 0.1UF 50V	1		
C35		05034756	CHEM. CAPA. 4.7UF 25V	1		
C36		05151015	CERA. CAPA. 100PF 50V	1		
C37		05994791	BACK-UP CAPA. EECS5R5V473	1		
BC1-6		05131044	CERA. CAPA. 0.1UF 25V	6		
BC7		05532234	CAPACITOR 0.022UF 25V	1		
BC8-11		05131044	CERA. CAPA. 0.1UF 25V	4		
DSW1-3		09090034	DIP SWITCH KSS08-1	3		
DSW4		09090033	DIP SWITCH KSS04-1	1		
BZ1		45060201	BUZZER QMB-111P	1		
XTAL1		09250037	CERA. OSCILLATOR CST9.83MT	1		
L1-4		09990705	BEADS INDUCTOR B01-RT	4		
VR1					NOT MOUNTED	
TP1-2					NOT MOUNTED	
JSW1-4					NOT USED	
JSW5-6		09100428	CONNECTOR IMSA9210B1-03GF	2	WITH 09100429	
CN1		09100400	CONNECTOR HLEM14S-1	1		
CN2		09100419	CONNECTOR HLEM19S-1	1		
CN3		09100269	CONNECTOR 5483-03A	1		
CN4-6					NOT MOUNTED	
CN7		09100421	CONNECTOR 52065-6645	1		
CN8	*1	09100337	CONNECTOR DBLC-J25SAF-23L6	1		
	#1	09100579	CONNECTOR DT11321-L5	1		
CN9		09100508	CONNECTOR IL-W-24P-AD	1		
CN10		09100420	CONNECTOR B8B-PH-K	1		
CN11		09100317	CONNECTOR 5483-04A	1		
JC1-2		80700140	WIRE 20UL1015BLK110	2		
-		00630804	SCREW TR 3-8	1	FOR CN8	



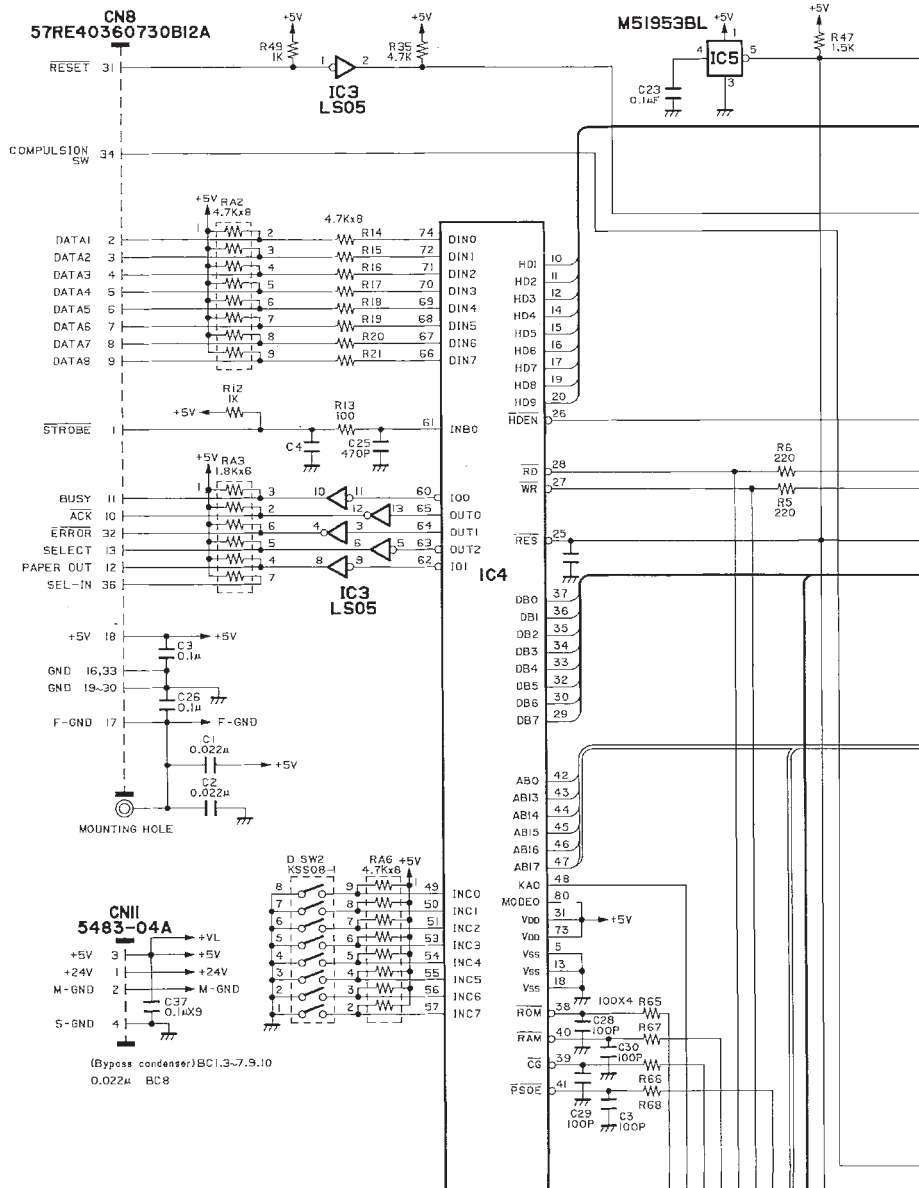
# PARTS LIST

## 6.5.2 For Parallel Interface

### 6.5.2.1 Circuit Diagram

SIDE B →

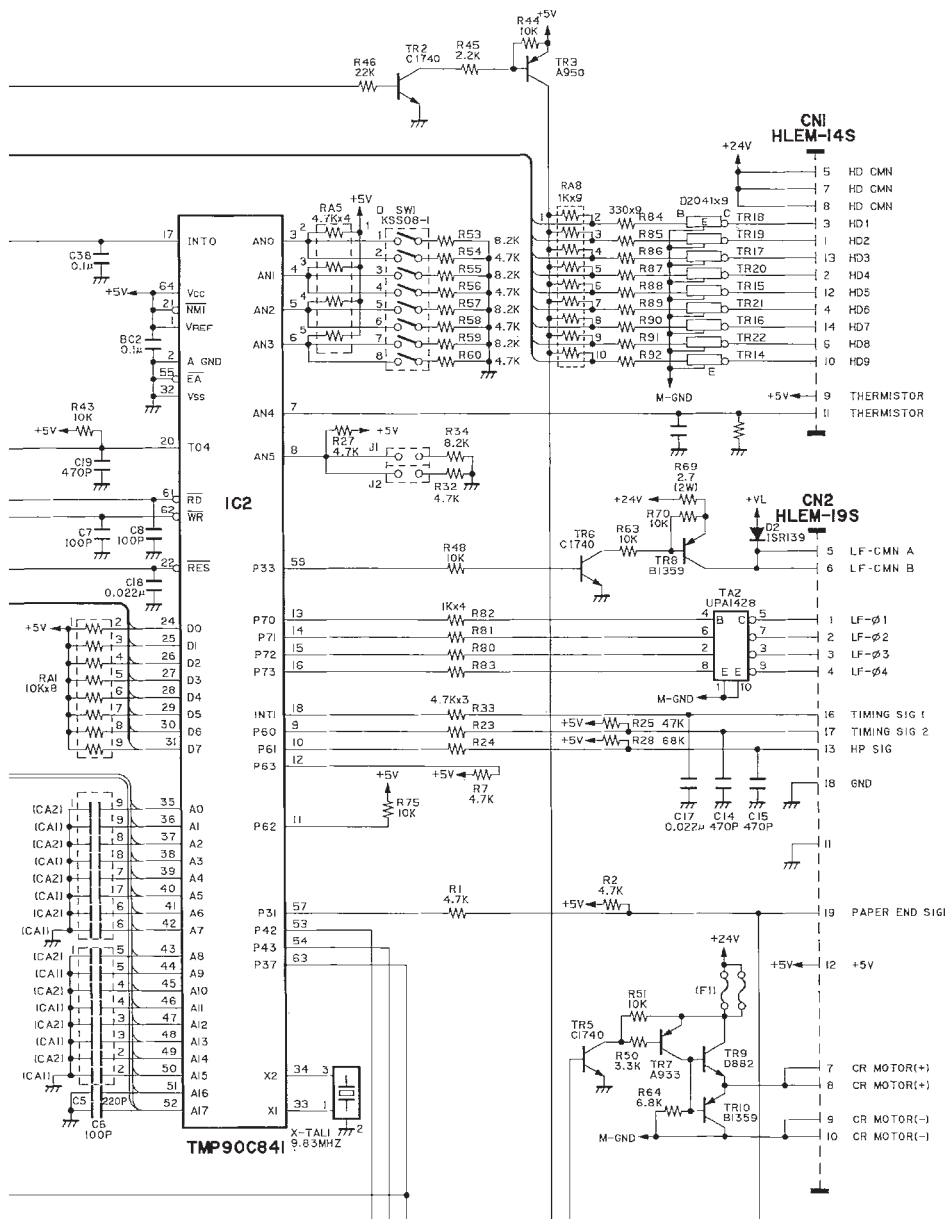
A



C ↓

SIDE A  
←

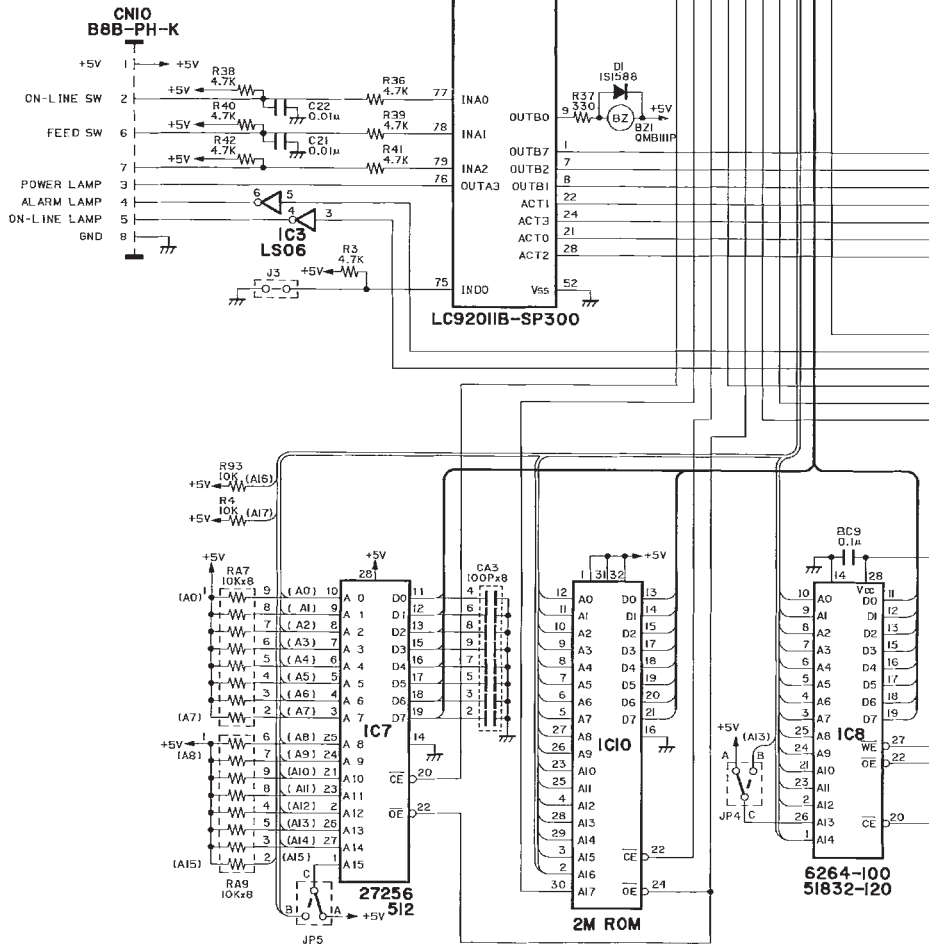
B



↓  
D

# PARTS LIST

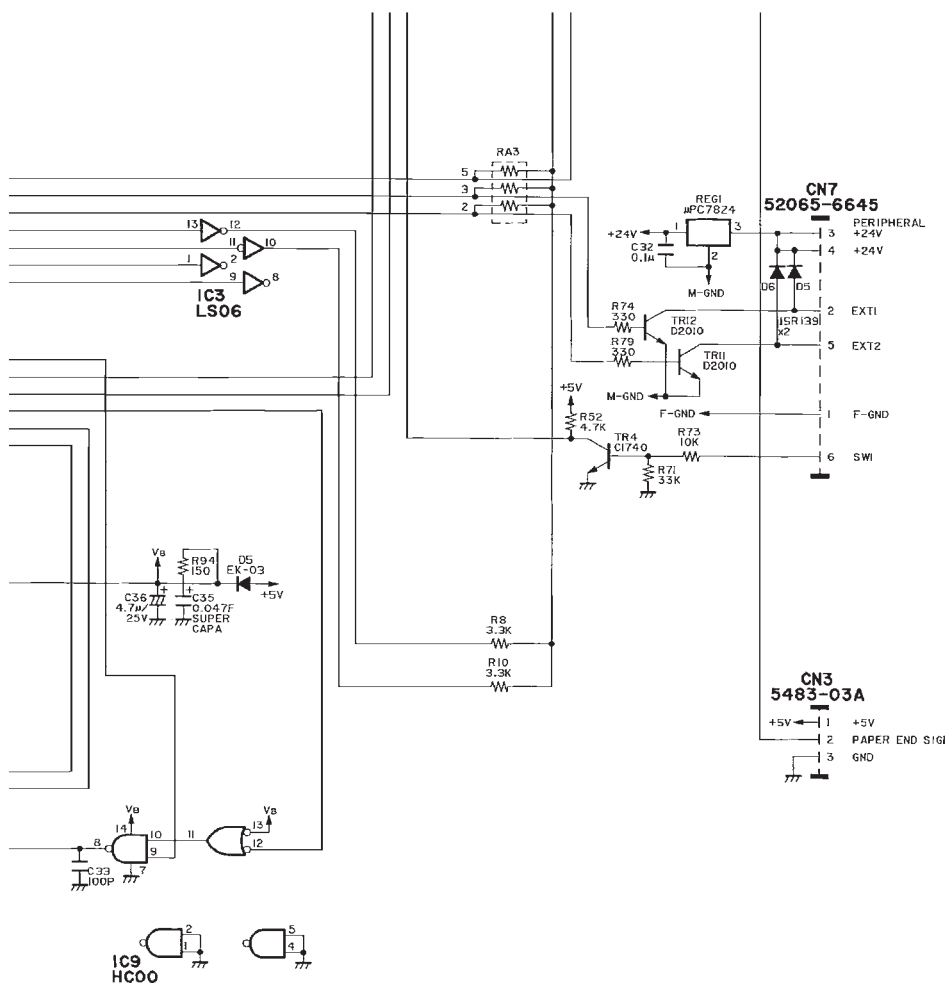
A ↑



C

- <Note 1> The unit of resistor and resistor array is "Ω", and no indication of wattage means 1/6W, 1/8W respectively.
- <Note 2> The unit of capacitor and capacitor array is "F", and no indication of voltage means 50V.
- <Note 3> The components in bracket ( ) depend on the printer type if it is installed or not on the board. Refer to parts list.

SIDE D →



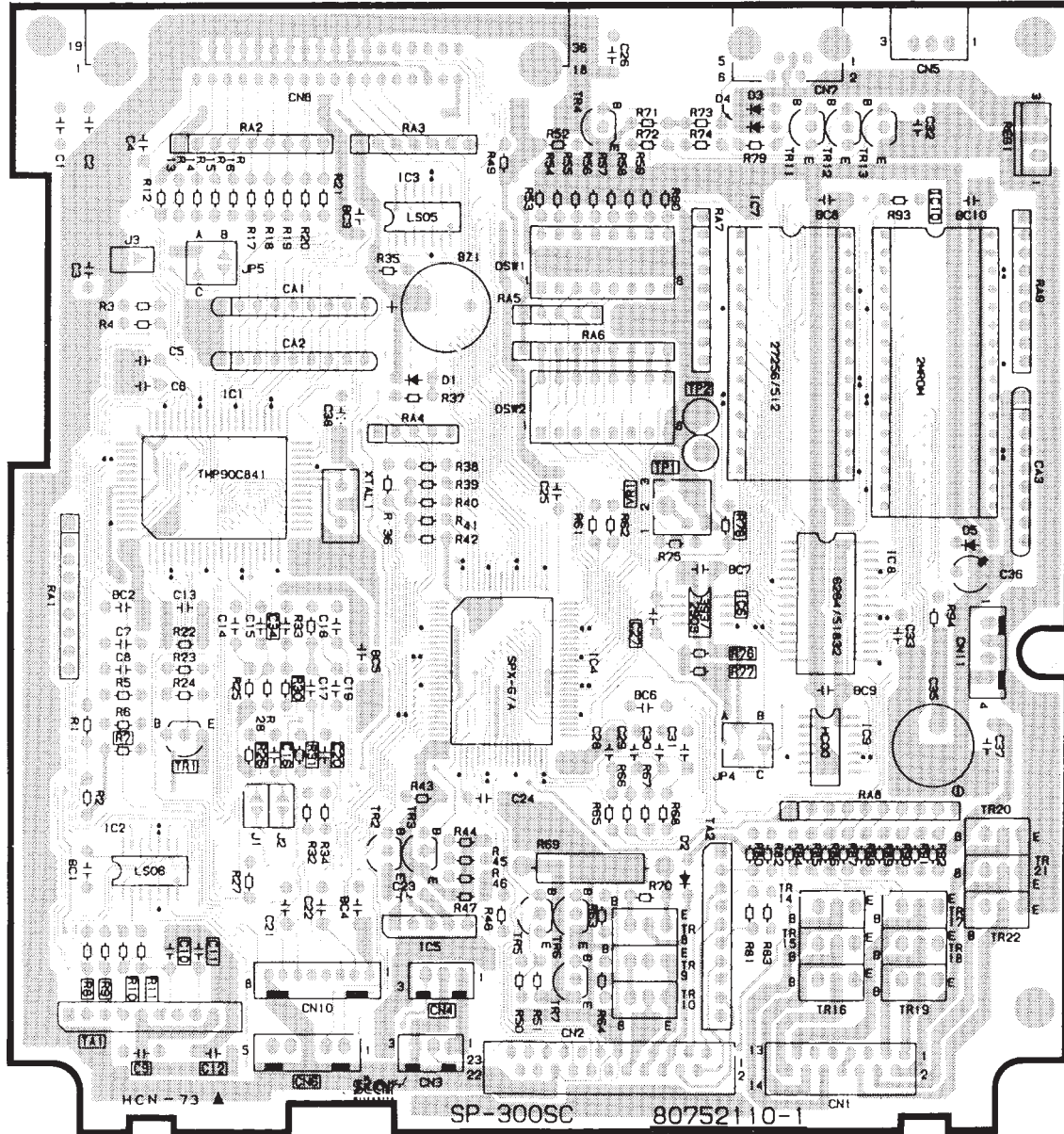
↑  
B

D

←  
SIDE C

# PARTS LIST

## 6.5.2.2 Component Layout



## 6.5.2.3 Parts List

## Main Logic Board (Parallel Interface)

DRWG. NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08250009	CPU TMP90C041F	1		S
IC2	*1	08210116	TTL IC 74LS06 (FLAT TYPE)	1		
	#1	08210144	TTL IC 74LS06FP*TL	1		
IC3	*1	08210113	TTL IC 74LS05 (FLAT TYPE)	1		
	#1	08210142	TTL IC 74LS05FP*TL	1		
IC4		08240019	GATE ARRAY LC92011B-SP300	1		
IC5		08200109	IC-RESET M51953BL	1	S	
IC6					NOT MOUNTED	
IC7		08222026	EPROM 27256-150NS	1	SP3P.S.** :NOTE 1	S
		09110024	IC SOCKET ICS-28-2T	1		
IC8	*1	08221021	SRAM HM6264LFP-100NS	1		S
	#1	08221043	SRAM 6264FP-100NS*EL	1		S
IC9	*1	08230038	CMOS 74HC00AF	1		
	#1	08230058	CMOS 74HC00AF*TL1	1		
IC10		09110077	IC SOCKET ICS-32-2T	1		
REG1		08202011	IC-REG UPC7824	1		S
TA1					NOT MOUNTED	
TA2	*1	07650029	TRANSISTOR ARRAY MP4001	1		S
	#1	07650056	TRANSISTOR ARRAY UPA1428AH	1		
TR1					NOT MOUNTED	
TR2		07227853	TRANSISTOR 2SC1740SE	1		
TR3		07009502	TRANSISTOR 2SA950	1		
TR4-6		07227853	TRANSISTOR 2SC1740SE	3		
TR7		07009331	TRANSISTOR 2SA933S	1		S
TR8		07113591	TRANSISTOR 2SB1359	1		S
TR9		07308821	TRANSISTOR 2SD882P	1		S
TR10		07113591	TRANSISTOR 2SB1359	1		S
TR11-12		07320101	TRANSISTOR 2SD2010	2		S
TR13					NOT MOUNTED	
TR14-22		07320411	TRANSISTOR 2SD2041	9		S
D1		08000024	DIODE 1S1588-T	1		
D2-4		08000044	DIODE 1SR139-100AT	3		
D5		08030006	SCHOTTKY DIODE EK-03	1		
RA1		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
RA2		06584723	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA3		06581823	RESIS. ARRAY 1.8K-OHM 1/8W 6EL	1		
RA4		06581023	RESIS. ARRAY 1 K-OHM 1/8W 4EL	1		
RA5		06584721	RESIS. ARRAY 4.7K-OHM 1/8W 4EL	1		
RA6		06584723	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA7		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
RA8		06581022	RESIS. ARRAY 1 K-OHM 1/8W 9EL	1		
RA9		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
R1-3		06054725	RD RESISTOR 4.7 K-OHM 1/6W	3		
R4		06251034	RN RESISTOR 10 K-OHM 1/6W	1		
R5-6		06051014	RD RESISTOR 100 OHM 1/6W	2		
R7		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R8-11					NOT MOUNTED	
R12		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R13		06051014	RD RESISTOR 100 OHM 1/6W	1		

**Note1:** After replacing IC7, turn the power ON while depressing the FEED switch and ON LINE switch on the control panel to clear the data buffer.

# PARTS LIST

## Main Logic Board (Parallel Interface)

DRWG. NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R14-21		06054725	RD RESISTOR 4.7 K-OHM 1/6W	8		
R22		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R23-24		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R25		06054734	RD RESISTOR 47 K-OHM 1/6W	1		
R26					NOT MOUNTED	
R27		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R28		06056834	RD RESISTOR 68 K-OHM 1/6W	1		
R29					NOT USED	
R30-31					NOT MOUNTED	
R32-33		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R34		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R35-36		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R37		06053314	RD RESISTOR 330 OHM 1/6W	1		
R38-42		06054725	RD RESISTOR 4.7 K-OHM 1/6W	5		
R43-44		06051034	RD RESISTOR 10 K-OHM 1/6W	2		
R45		06052224	RD RESISTOR 2.2 K-OHM 1/6W	1		
R46		06052234	RD RESISTOR 22 K-OHM 1/6W	1		
R47		06051525	RD RESISTOR 1.5 K-OHM 1/6W	1		
R48		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R49		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R50		06053324	RD RESISTOR 3.3 K-OHM 1/6W	1		
R51		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R52		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R53		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R54		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R55		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R56		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R57		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R58		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R59		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R60-62		06054725	RD RESISTOR 4.7 K-OHM 1/6W	3		
R63		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R64		06056824	RD RESISTOR 6.8 K-OHM 1/6W	1		
R65-68		06051014	RD RESISTOR 100 OHM 1/6W	4		
R69		06200271	RN RESISTOR 2.7 OHM 2W 2%	1		
R70		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R71		06053334	RD RESISTOR 33 K-OHM 1/6W	1		
R72					NOT MOUNTED	
R73		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R74		06053314	RD RESISTOR 330 OHM 1/6W	1		
R75		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R76-78					NOT MOUNTED	
R79		06053314	RD RESISTOR 330 OHM 1/6W	1		
R80-83		06051025	RD RESISTOR 1 K-OHM 1/6W	4		
R84-92		06053314	RD RESISTOR 330 OHM 1/6W	9		
R93		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R94		06051514	RD RESISTOR 150 OHM 1/6W	1		
VR1					NOT MOUNTED	
CA1-2					NOT MOUNTED	
CA3		05651012	CAPA. ARRAY 100PF 50V 8EL	1		
C1-2		05252232	FILM CAPA. 0.022UF 50V	2		

## Main Logic Board (Parallel Interface)

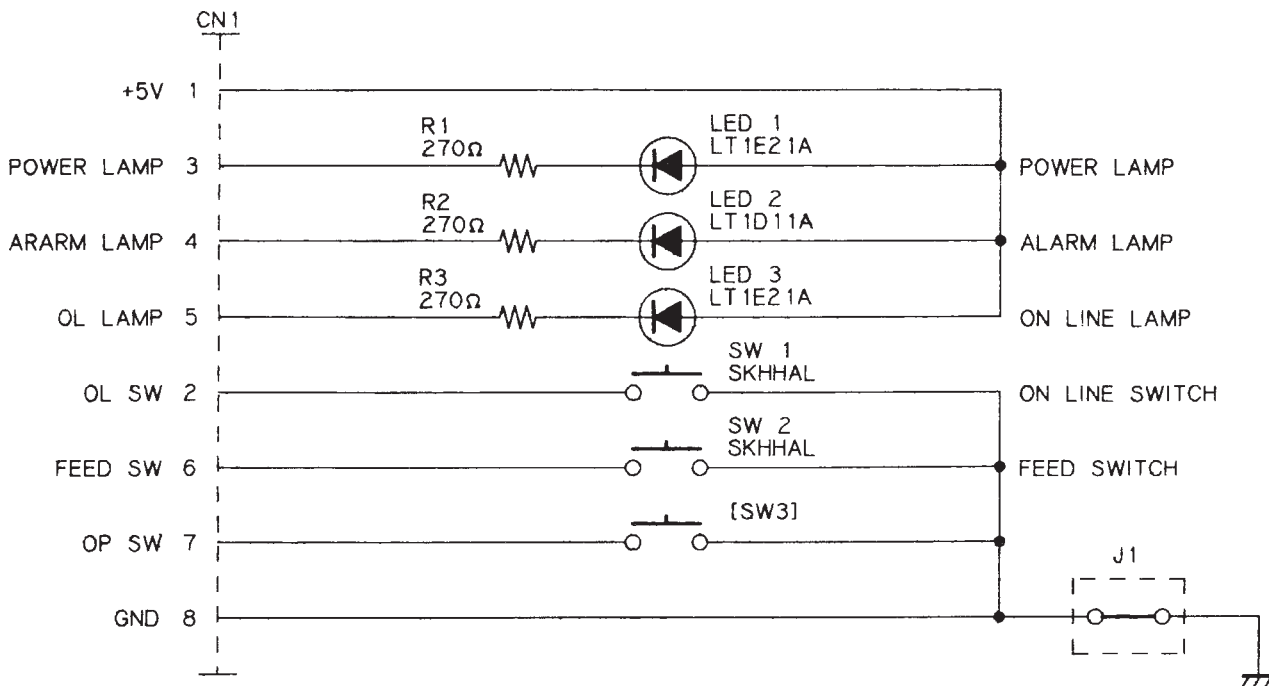
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C3		05131044	CERA. CAPA. 0.1UF 25V	1		
C4					NOT MOUNTED	
C5-8		05151015	CERA. CAPA. 100PF 50V	4		
C9-12					NOT MOUNTED	
C13		05151033	CERA. CAPA. 0.01UF 50V	1		
C14-15		05154714	CERA. CAPA. 470PF 50V	2		
C16					NOT MOUNTED	
C17-18		05152234	CERA. CAPA. 0.022UF 50V	2		
C19		05154714	CERA. CAPA. 470PF 50V	1		
C20					NIT MOUNTED	
C21-22		05151034	CERA. CAPA. 0.01UF 50V	2		
C23		05131044	CERA. CAPA. 0.1UF 25V	1		
C24		05152234	CERA. CAPA. 0.022UF 50V	1		
C25		05154714	CERA. CAPA. 470PF 50V	1		
C26		05131044	CERA. CAPA. 0.1UF 25V	1		
C27					NOT MOUNTED	
C28-31		05151015	CERA. CAPA. 100PF 50V	4		
C32		05251044	FILM CAPA. 0.1UF 50V	1		
C33		05151015	CERA. CAPA. 100PF 50V	1		
C34					NOT MOUNTED	
C35		05994791	BACK-UP CAPA. EECS5R5V473	1		
C36		05034756	CHEM. CAPA. 4.7UF 25V	1		
C37-38		05131044	CERA. CAPA. 0.1UF 25V	2		
BC1-7		05131044	CERA. CAPA. 0.1UF 25V	7		
BC8		05532234	CAPACITOR 0.022UF 25V	1		
BC9-10		05131044	CERA. CAPA. 0.1UF 25V	2		
DSW1-2		09090034	DIP SWITCH KSS08-1	2		
BZ1		45060201	BUZZER QMB-111P	1		
TXAL1		09250037	CERA. OSCILLATOR CST9.83MT	1		
TP1-2					NOT MOUNTED	
CN1		09100400	CONNECTOR HLEM14S-1	1		
CN2		09100419	CONNECTOR HLEM19S-1	1		
CN3		09100269	CONNECTOR 5483-03A	1		
CN4-6					NOT MOUNTED	
CN7		09100421	CONNECTOR 52065-6645	1		
CN8		09100448	CONNECTOR 57RE40360-730B12A	1		
CN9					NOT USED	
CN10		09100420	CONNECTOR B8B-PH-K	1		
CN11		09100317	CONNECTOR 5483-04A	1		



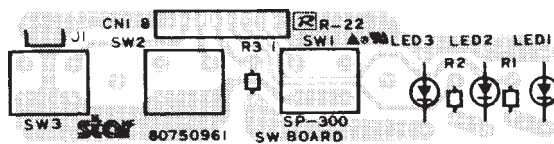
# PARTS LIST

## 6.6 Control Panel Board

### 6.6.1 Circuit Diagram



### 6.6.2 Component Layout



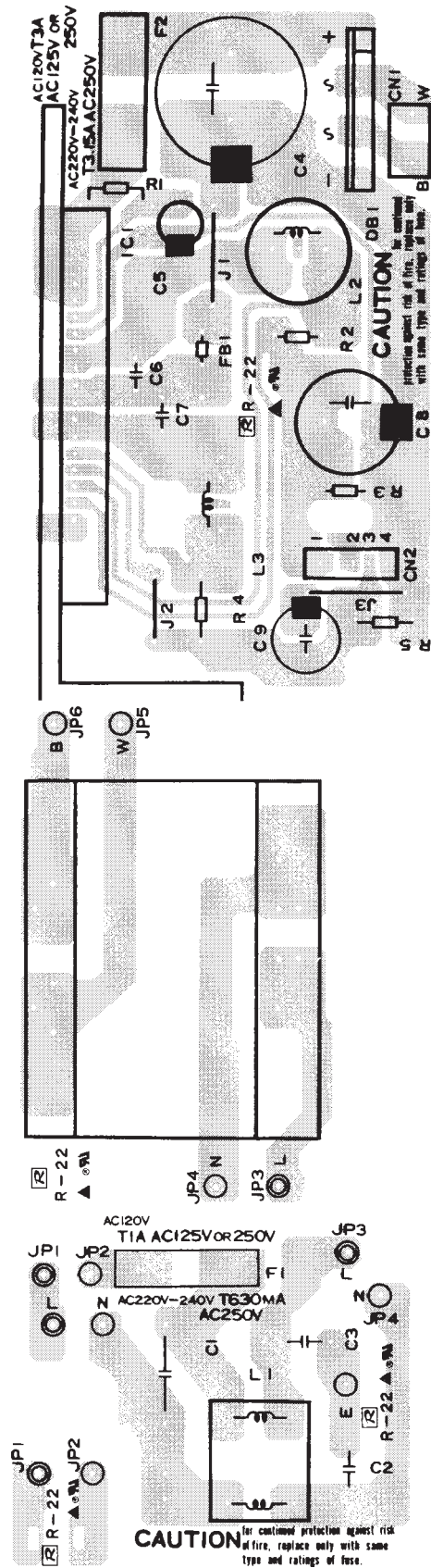
### 6.6.3 Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
LED1		08300058	LED LT-1E21A	1		
LED2		08300081	LED LT-1D11A	1		
R1-3		06052714	RD RESISTOR 270 OHM 1/6W	3		
SW1-2		09010041	PUSH SWITCH SKHHAL	2		
SW3					NOT MOUNTED	
CN1		09100518	CONNECTOR 53025-0810	1		
J1		93930001	JUMPER WIRE STP123	1		



# PARTS LIST

## 6.7.2 Component Layout



## 6.7.3 Parts List

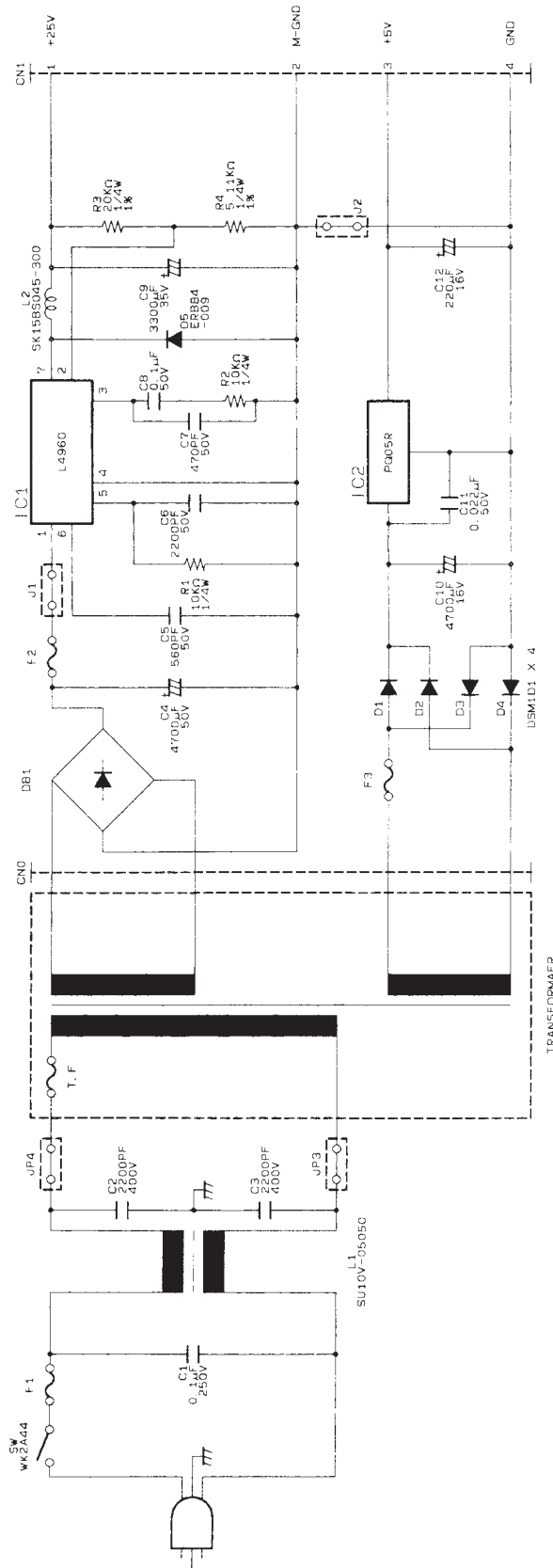
Power Supply Unit (Except for H.K.)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08202016	IC-REG 7573BS	1		S
DB1	*1	08990220	DIODE STACK D3SB10	1		
	#1	08990227	DIODE STACK D3SB20	1		
R1		06214721	RN RESISTOR 4.7 K-OHM 1W	1		
R2		06230021	RN RESISTOR 0.22 OHM 3W	1		
R3		06201022	RN RESISTOR 1 K-OHM 2W	1		
R4		06230031	RN RESISTOR 0.33 OHM 3W	1		
C1		05291045	FILM CAPA. 0.1UF 275V	1	FOR US,UK(240V)	
		05291042	FILM CAPA. 0.1UF 250V	1	FOR EC,UK(230V)	
C2-3		05192224	CERA. CAPA. 2200PF 400V	2		
C4		05054782	CHEM. CAPA. 4700UF 50V	1		
C5		05051058	CHEM. CAPA. 1UF 50V	1		
C6-7		05152223	CERA. CAPA. 2200PF 50V	2		
C8		05043385	CHEM. CAPA. 3300UF 35V	1		
C9		05044771	CHEM. CAPA. 470UF 35V	1		
L1		09251106	LINE FILTER SU10V-05050	1		
L2		09251036	CHOKE COIL NM-16-300	1		
L3		09251037	CHOKE COIL NM-1-200	1		
F1		09990058	FUSE 5TT1A 250V	1	FOR US	S
		09990021	FUSE EAWK630MA 250V	1	FOR EC,UK	S
F2	*1	09990054	FUSE 5TT3A 125V	1	FOR US,UK(240V)	S
	#1	09991011	FUSE 5TT3A 250V	1	FOR US,UK(240V)	S
		09990050	FUSE EAK3.15A 250V	1	FOR EC,UK(230V)	S
CN1		09100249	CONNECTOR 5287-02A	1		
CN2		80703850	CABLE UNIT 4X120TT SP300II	1		
JP1-2		80700340	WIRE 20UL1015BLK095T	2		
JP3		80700640	WIRE 20UL1015BLK120TT	1	US,EC(220V),UK(240V)	
	#1	80701580	WIRE 20UL1015BLK040TT	1	EC(230V),UK(230V)	
JP4		80700650	WIRE 20UL1015WHT120TT	1	US,EC(220V),UK(240V)	
	#1	80701570	WIRE 20UL1015WHT040TT	1	EC(230V),UK(230V)	
JP5-6		80703840	CABLE UNIT 2X110TC SP300II	2		
FB1		09990703	BEADS INDUCTOR B-01A	1		
J1-3		93930006	JUMPER WIRE STP122	3		
SW1		09030019	SEESAW SWITCH T-881SBSS-A1	1		
-		01903087	SCREW TAT 3-14	1		
		04991204	FASTENER T18S	1		
		04991220	CORD BUSHING SR-5N-4	1		
	*1	09110090	CORD SET US-PN SP300	1	FOR US	
	#1	09110158	CORD SET US-PN L=1.8M SP300	1	FOR US	
		09110129	CORD SET EC-PN SP300II	1	FOR EC	
		09110067	CORD SET UK-PN LC	1	FOR UK	
		09240880	TRANSFORMER 120V SP300 US2	1	FOR US	
		09240890	TRANSFORMER 220V SP300 EC2	1	FOR EC(220V)	
	#1	09241780	TRANSFORMER 230V SP320 EC	1	FOR EC(230V),UK(230V)	
		09240900	TRANSFORMER 240V SP300 UK2	1	FOR UK(240V)	
		09990023	FUSE HOLDER UF-0033	1	FOR F1,F2	
		80752091	POWER SUPPLY BOARD SP300II	1		
		82020570	POWER CORD COVER SP321S	1		
		82911071	RADIATION PLATE SP312	1		
		09990708	FERRITE CORE ESD-R-16C	1	EC(230V),UK(230V)	
		80701520	WIRE 18UL1015BLK100TT	1	FOR US,EC,UK(230V)	
	80701510	WIRE 18UL1015BLK067T	1	FOR UK(240V)		

# PARTS LIST

## 6.8 Power Supply Unit (For H.K.)

### 6.8.1 Circuit Diagram



## 6.8.2 Parts List

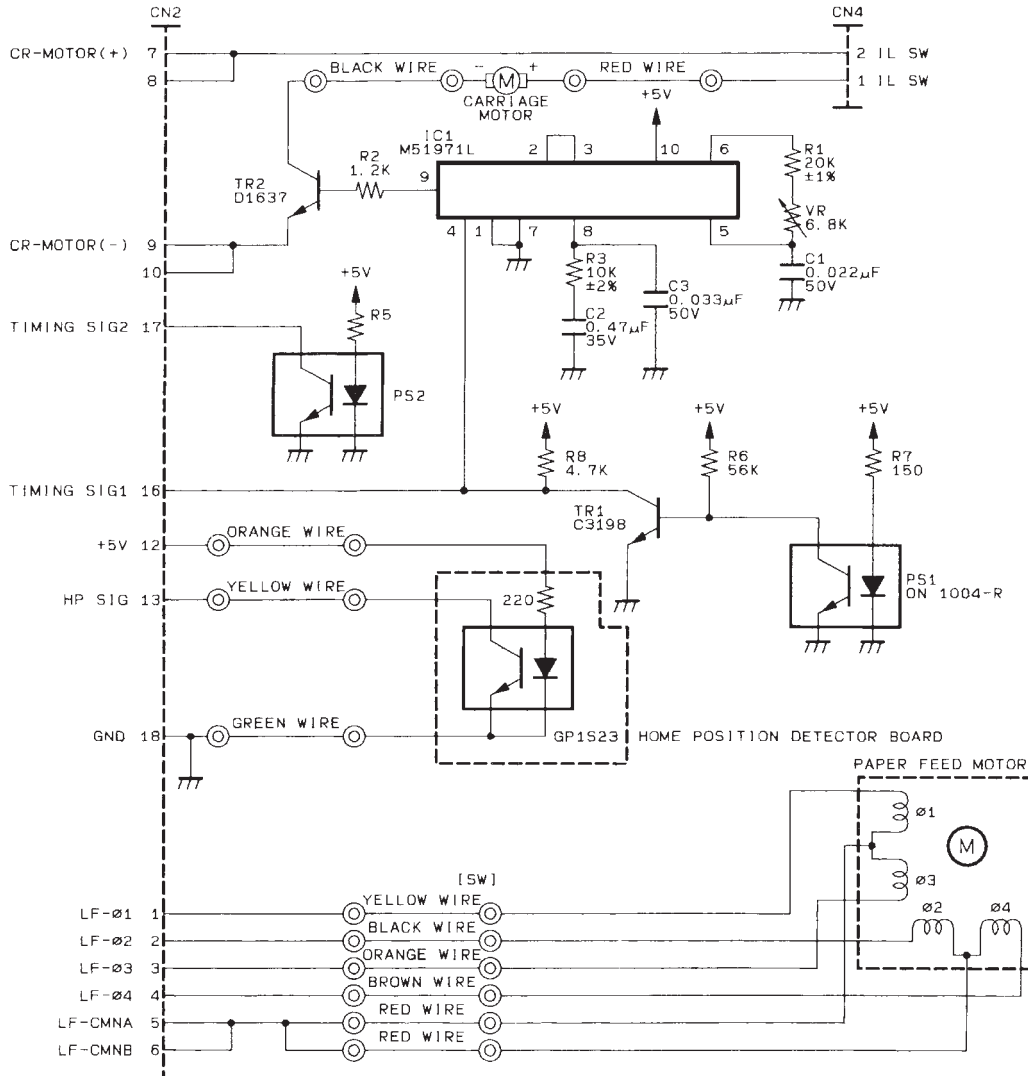
## Power Supply Unit (For H.K.)

DRWG. NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08202008	IC-REG L4960	1		S
IC2		08202024	IC-REG PQ05RF11	1		S
D1-4		08000040	DIODE DSM1D1	4		
D5		08030016	SCHOTTKY DIODE ERB84-009	1		
DB1		08990227	DIODE STACK D3SB20	1		
R1-2		06041031	RD RESISTOR 10 K-OHM 1/4W	2		
R3		06242031	RN RESISTOR 20 K-OHM 1/4W 1%	1		
R4		06245121	RN RESISTOR 5110 OHM 1/4W 1%	1		
C1		05291045	FILM CAPA. 0.1UF 275V	1		
C2-3		05192224	CERA. CAPA. 2200PF 400V	2		
C4		05054782	CHEM. CAPA. 4700UF 50V	1		
C5		05155611	CERA. CAPA. 560PF 50V	1		
C6		05252222	FILM CAPA. 2200PF 50V	1		
C7		05154713	CERA. CAPA. 470PF 50V	1		
C8		05251043	FILM CAPA. 0.1UF 50V	1		
C9		05043385	CHEM. CAPA. 3300UF 35V	1		
C10		05024781	CHEM. CAPA. 4700UF 16V	1		
C11		05152231	CERA. CAPA. 0.022UF 50V	1		
C12		05022271	CHEM. CAPA. 220UF 16V	1		
SW		09030010	SEESAW SWITCH WK2A44	1		
L1		09251106	LINE FILTER SU10V-05050	1		
L2		09251023	CHOKE COIL SK15BS045-300	1		
F1		09990021	FUSE EAWK630MA 250V	1		S
F2-3		09990050	FUSE EAK3.15A 250V	2		S
CN1		80702670	CABLE UNIT 4X100	SP300	1	
CN0		80702820	CABLE UNIT 4X60CT	SP312	1	
		09100036	CONNECTOR 5287-04A		1	
JP1-2		80700340	WIRE 20UL1015BLK095T		2	
JP3		80700650	WIRE 20UL1015WHT120TT		1	
JP4		80700640	WIRE 20UL1015BLK120TT		1	
J1-2		93930006	JUMPER WIRE STP122		2	L=20mm
-		09240510	TRANSFORMER 220V	SP300 EC	1	
		09110091	CORD SET EC-PN	SP300	1	
		82020570	POWER CORD COVER	SP321S	1	
		04991220	CORD BUSHING SR-5N-4		1	
		04991204	FASTENER T18S		1	
		82090350	TRANSISTOR HOLDER PLATE	R-10	1	
		82911071	RADIATION PLATE	SP312	1	
		01903035	SCREW TR 3-10 FL		1	
		09990023	FUSE HOLDER UF-0033		1	
		09991386	HEAT-SHRINK TUBE F2-3.0		1	
		80700640	WIRE 20UL1015BLK120TT		1	
		80705750	CABLE UNIT 01X100TT(A)		1	

# PARTS LIST

## 6.9 Terminal Board

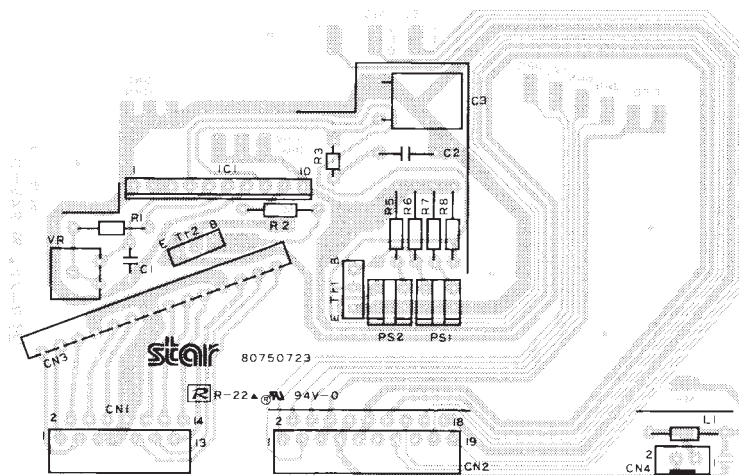
### 6.9.1 Circuit Diagram



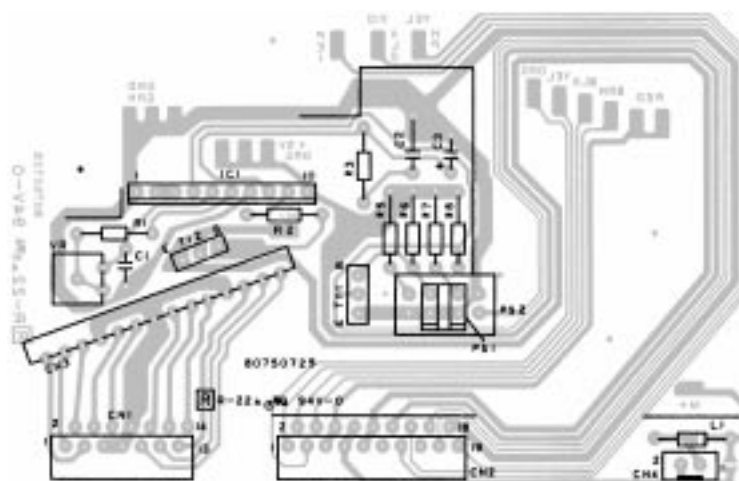
<Note 1> 1. The unit on resistor is "n", and no indication of wattage 1/4W respectively

<Note 2> The components in bracket are not installed the board.

6.9.2 Component List



Ver. 1



Ver. 2



# PARTS LIST

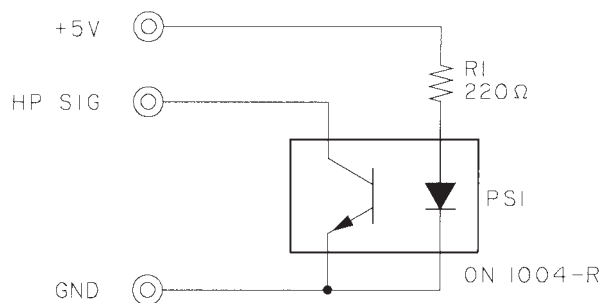
## 6.9.3 Parts List

## Terminal Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08200128	IC-MOTOR M51971L	1		
TR1	*1	07227852	TRANSISTOR 2SC2785FE	1		
	#1	07601002	TRANSISTOR 2SC3198GR*	1		
TR2		07316371	TRANSISTOR 2SD1637	1		
R1	*1	06242038	RN RESISTOR 20 K-OHM 1/4W	1		
	#1	06242034	RN RESISTOR 20 K-OHM 1/4W 1%	1		
R2	*1	06041228	RD RESISTOR 1.2 K-OHM 1/4W	1		
	#1	06041226	RD RESISTOR 1.2 K-OHM 1/4W	1		
R3		06051035	RD RESISTOR 10 K-OHM 1/6W 2%	1		
R4					NOT USED	
R5		06041518	RD RESISTOR 150 OHM 1/4W	1	VER.1	
	#1	06042715	RD RESISTOR 270 OHM 1/4W	1	VER.2	
R6	*1	06045638	RD RESISTOR 56 K-OHM 1/4W	1		
	#1	06045635	RD RESISTOR 56 K-OHM 1/4W	1		
R7	*1	06041518	RD RESISTOR 150 OHM 1/4W	1		
	#1	06041515	RD RESISTOR 150 OHM 1/4W	1		
R8	*1	06044728	RD RESISTOR 4.7 K-OHM 1/4W	1		
	#1	06044727	RD RESISTOR 4.7 K-OHM 1/4W	1		
VR		06496831	RP RESISTOR RH0652C-6.8K	1		
C1	*1	05252234	FILM CAPA. 0.022UF 50V	1		
	#1	05252236	FILM CAPA. 0.022UF 50V	1		
C2		05454741	TANTALUM CAPA. 0.47UF 35V BLU	1		
C3	*1	05253331	FILM CAPA. 0.033UF 50V	1		
	#1	05253335	FILM CAPA. 0.033UF 50V	1		
PS1		08300107	PHOTO-INTERRUPTER ON1004-R	1		
PS2		08300107	PHOTO-INTERRUPTER ON1004-R	1	VER.1	
	#1	08300162	PHOTO-INTERRUPTER CNA1501K	1	VER.2	
CN1		09100383	CONNECTOR HLEM14R-1	1		
CN2		09100413	CONNECTOR HLEM19R-1	1		
CN3		09100414	CONNECTOR HBLB14S-1J	1		
CN4		09100270	CONNECTOR 5483-02A	1		
L1		09990706	BEADS INDUCTOR B-01AT	1	L=20mm	

## 6.10 Home Position Detector Board

### 6.10.1 Circuit Diagram



### 6.10.2 Component Layout



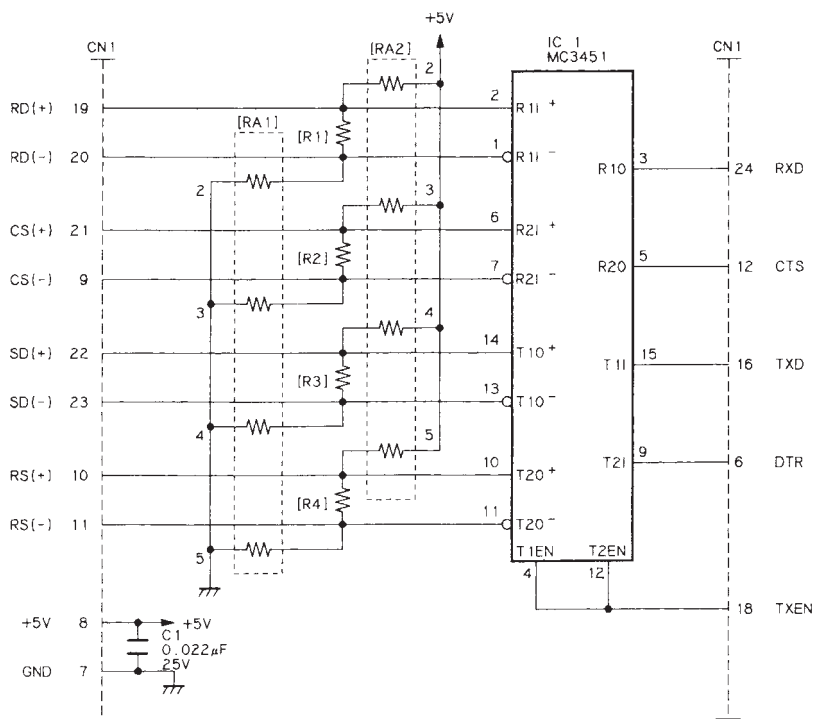
### 6.10.3 Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R1		06052211	RD RESISTOR 220 OHM 1/6W	1		
PS1		08300107	PHOTO-INTERRUPTER ON1004-R	1		
-		80701080	WIRE 26UL1571GRN030	1	SP321, SP323	
-		80700620	WIRE 26UL1571GRN050	1	SP322	
-		80701070	WIRE 26UL1571ORG045	1	SP321, SP323	
-		80700580	WIRE 26UL1571ORG050	1	SP322	
-		80700590	WIRE 26UL1571YEL065	1		

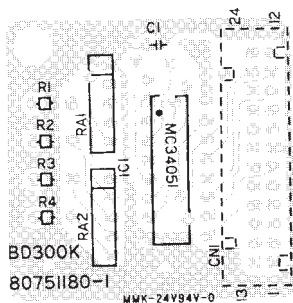
# PARTS LIST

## 6.11 RS422 Interface Board (BD320K): option

### 6.11.1 Circuit Diagram



### 6.11.2 Component Layout



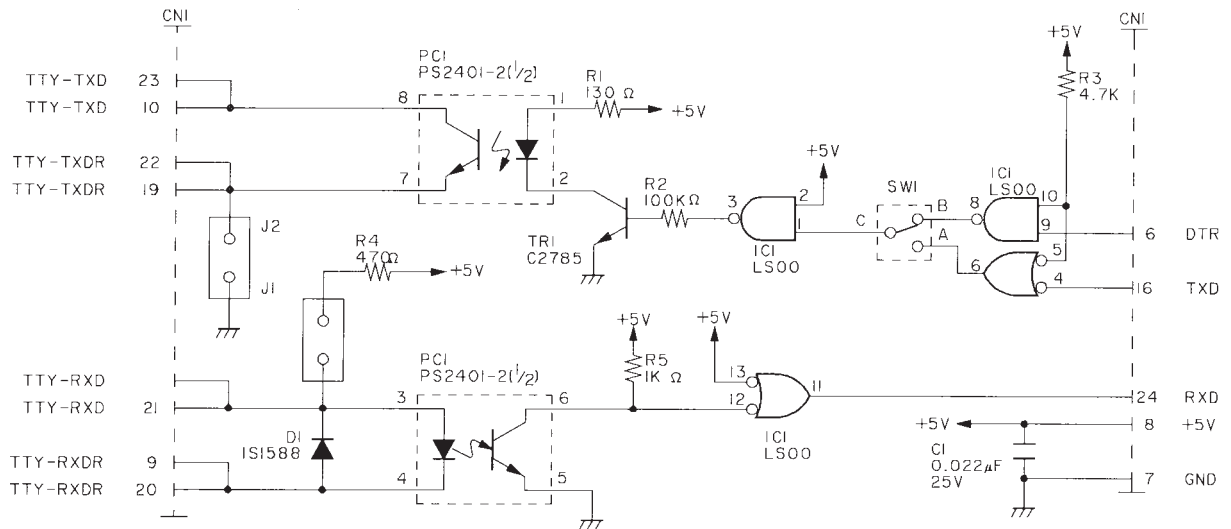
Ver. 1

### 6.11.3 Parts List

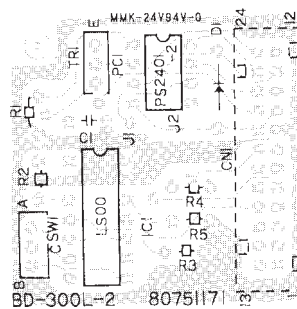
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08200131	IC-I/F MC34051P	1		
RA1-2					NOT MOUNTED :VER.1	
R1-4					NOT MOUNTED :VER.1	
ZNR1-3	#1				NOT MOUNTED :VER.2	
ZNR4	#1	05532234	CAPACITOR 0.022UF 25V	1	:VER.2	
ZNR5-11	#1				NOT MOUNTED :VER.2	
ZNR12	#1	05532234	CAPACITOR 0.022UF 25V	1	:VER.2	
C1		05532234	CAPACITOR 0.022UF 25V	1		
CN1		09100430	CONNECTOR IL-W24S-SD	1		
HOLE		09990513	BOARD SPACER DSPLS-10	1		

## 6.12 Current loop Board (BD320L): option

### 6.12.1 Circuit Diagram



### 6.12.2 Component Layout



### 6.12.3 Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08210001	TTL IC 74LS00	1		
PC1		08300032	OPTCOUPLER PS2401-2	1		
TR1		07227851	TRANSISTOR 2SC2785JHFE	1		
D1	*1	08000001	DIODE 1S1588	1		
	#1	08000096	DIODE 1S2076A*A	1		
R1		06051514	RD RESISTOR 150 OHM 1/6W	1		
R2		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R3		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R4		06054714	RD RESISTOR 470 OHM 1/6W	1		
R5		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
C1		05532234	CAPACITOR 0.022UF 25V	1		
SW1		09000048	SLIDE SWITCH ESD-14345	1		
CN1		09100430	CONNECTOR IL-W24S-SD	1		
-		09990513	BOARD SPACER DSPLS-10	1		





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