

*DOT MATRIX PRINTER*

*SP200F SERIES*

**TECHNICAL MANUAL**

**[FOURTH EDITION]**



# INTRODUCTION

1

This manual describes the dot matrix printer SP200F series.

It is designed for use as a reference for periodic inspections and maintenance procedures to be executed by service personnel. It is not intended for the general user. Users of this manual should have a basic knowledge and understanding of the English language.

2

- This manual is divided into the following sections:

Chapter 1	General Descriptions
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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# CHAPTER 1

## GENERAL DESCRIPTIONS

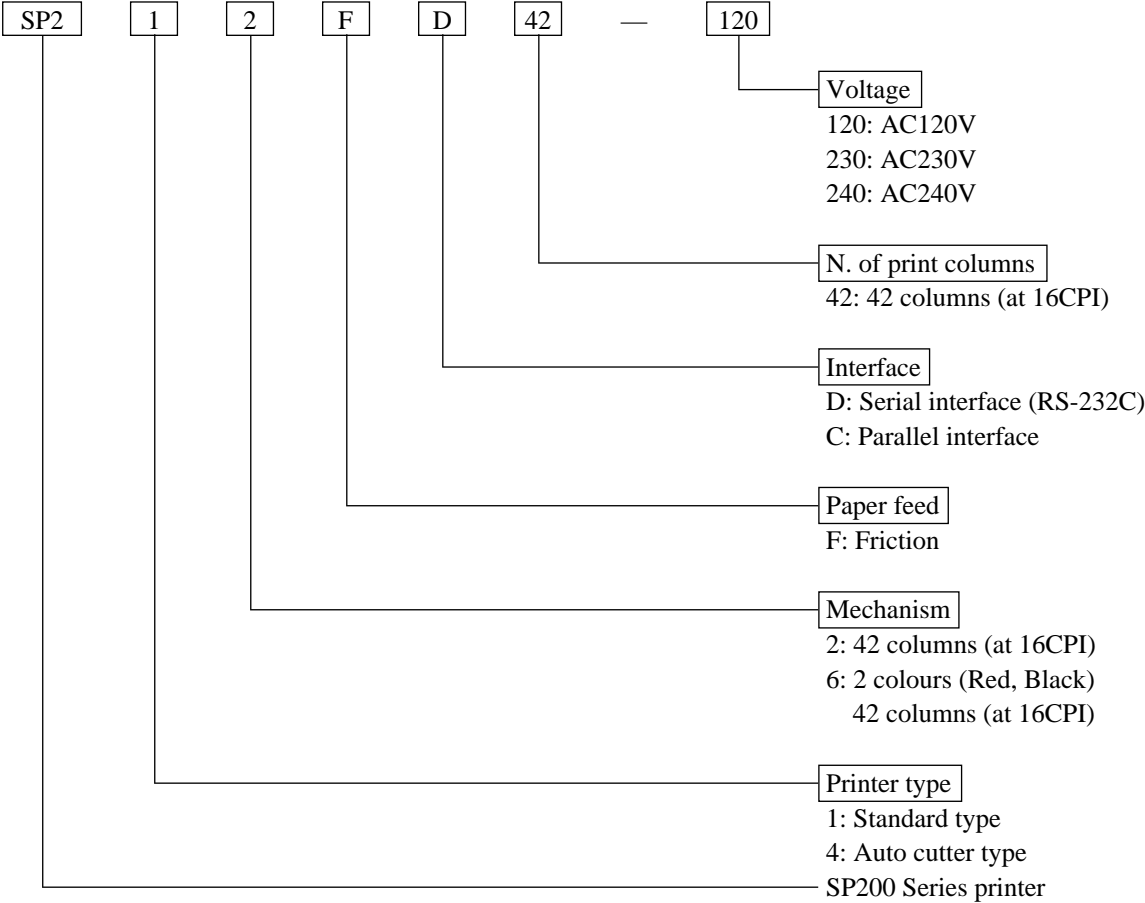
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1.2 Model name notation .....	1-1
1.3 Instructions apply models .....	1-2



### 1.1 General description

This manual describes the SP200F 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



### 1.3 Instructions apply models

Serial interface	Parallel interface
SP212FD42-120	SP212FC42-120
SP212FD42-230	SP212FC42-230
SP212FD42-240	SP212FC42-240
SP216FD42-120	SP216FC42-120
SP216FD42-230	SP216FC42-230
SP216FD42-240	SP216FC42-240

Serial interface	Parallel interface
	SP242FC42-120
	SP242FC42-230
	SP246FC42-120
	SP246FC42-230



# CHAPTER 2

## THEORY OF OPERATION

This chapter explains the electric circuits and the mechanisms.

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<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>
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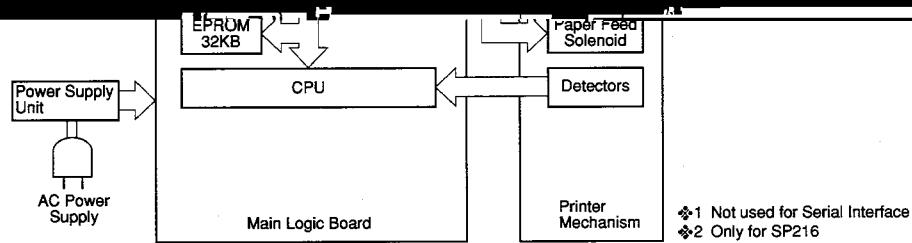


Fig. 2-1 Block Diagram

### 1. Main Logic Board

Data output from the host computer goes through the interface of the control board and is stored in the RAM by the CPU. Then, the CPU reads data in the RAM and edits according to the program stored in the ROM. Upon completion of editing, the CPU outputs the various kinds of drive signals to the printer mechanism and gets the printer to start printing.

#### < Explanation >

- a. CPU M37732S4AFP (CMOS)
  - Controls this printer.
- b. EPROM 27256 32K-bytes
  - Contains the program which executes control of the printer.
- c. Interface circuit
- d. Gate array (parallel interface only)
  - Inputs or outputs several signals.
- e. 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 solenoid drive respectively.

### 2. Printer Mechanism

The printer mechanism is made up of a print head, carriage motor, paper feed solenoid, ribbon shift solenoid (only for SP216) and detectors.

### 3. Power Supply Unit

AC power is converted to DC24V 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 ↔ TTL), the data transfer method (Serial ↔ Parallel) also changes.

IC3 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 IC3 and is input to the CPU. Serial data input to the CPU is converted into parallel data in the CPU.

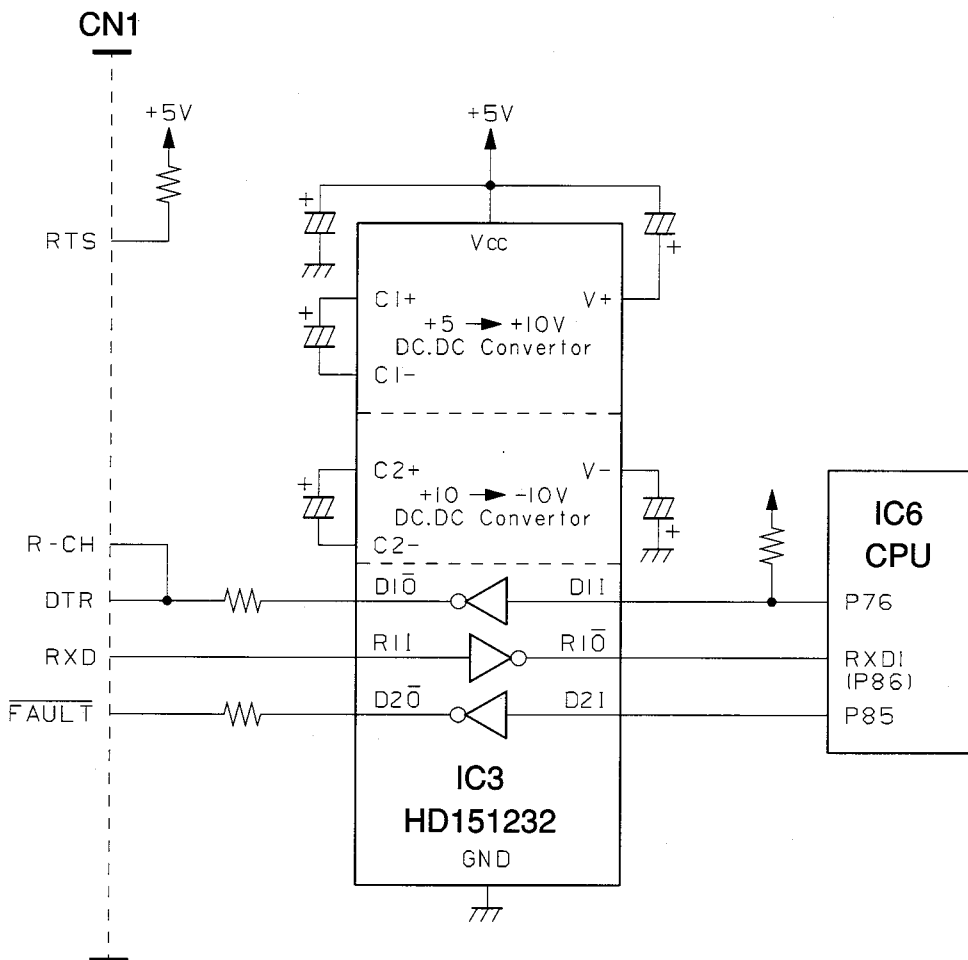


Fig. 2-2.A Serial Interface

# THEORY OF OPERATION

## 2.2.1.2 Parallel Interface

Communications between the host computer and this printer are facilitated via parallel connector.

This section explains the handshake of this interface.

The data input circuit of this interface is shown below.

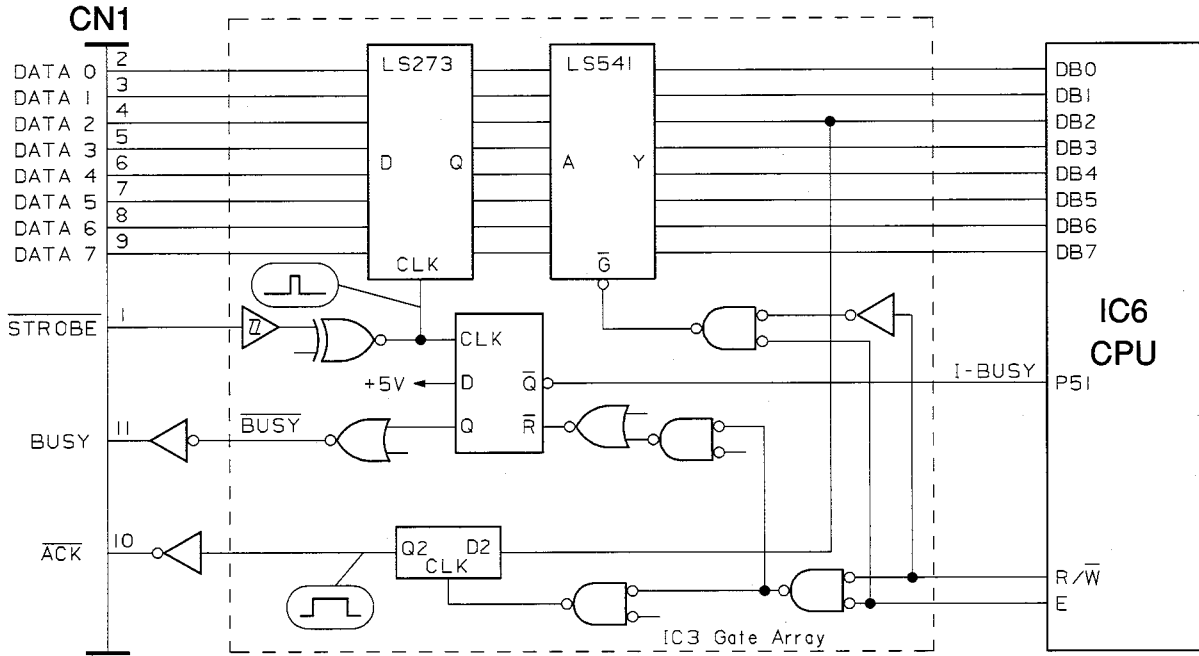


Fig. 2.2.B Parallel Interface

The following is an explanation of this handshake.

- (1) When the BUSY signal is LOW (Ready), the host computer outputs 8-bit data 0 through 7 to the connector CN1. Pin 1 carries the 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  $0.5 \mu s$ .
- (2) The gate array of the main logic board reads data 0 through 7 at the time of STROBE signal fall, and then turns the BUSY and I-BUSY signals to low.
- (3) When the 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. When the I-BUSY signal becomes LOW, the CPU is notified that STROBE signal has fallen, 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 CN1 and the ACK signal to LOW for a certain period of time.

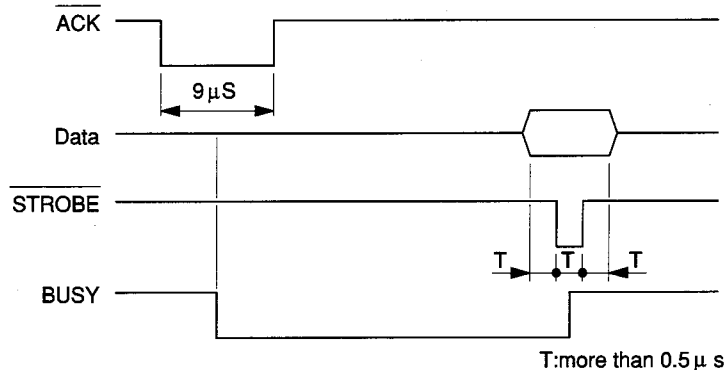


Fig. 2.2.C Data transmission timing chart for the parallel interface

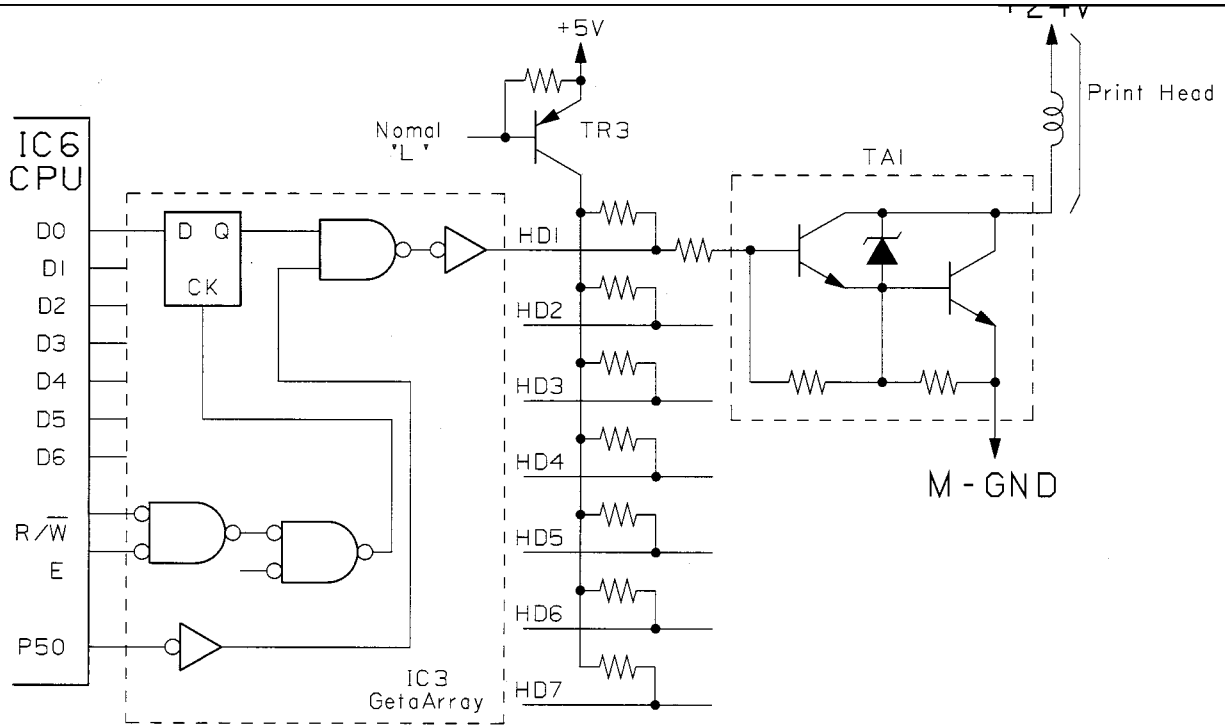


Fig. 2-3.A Print Head Driving Circuit [Parallel]

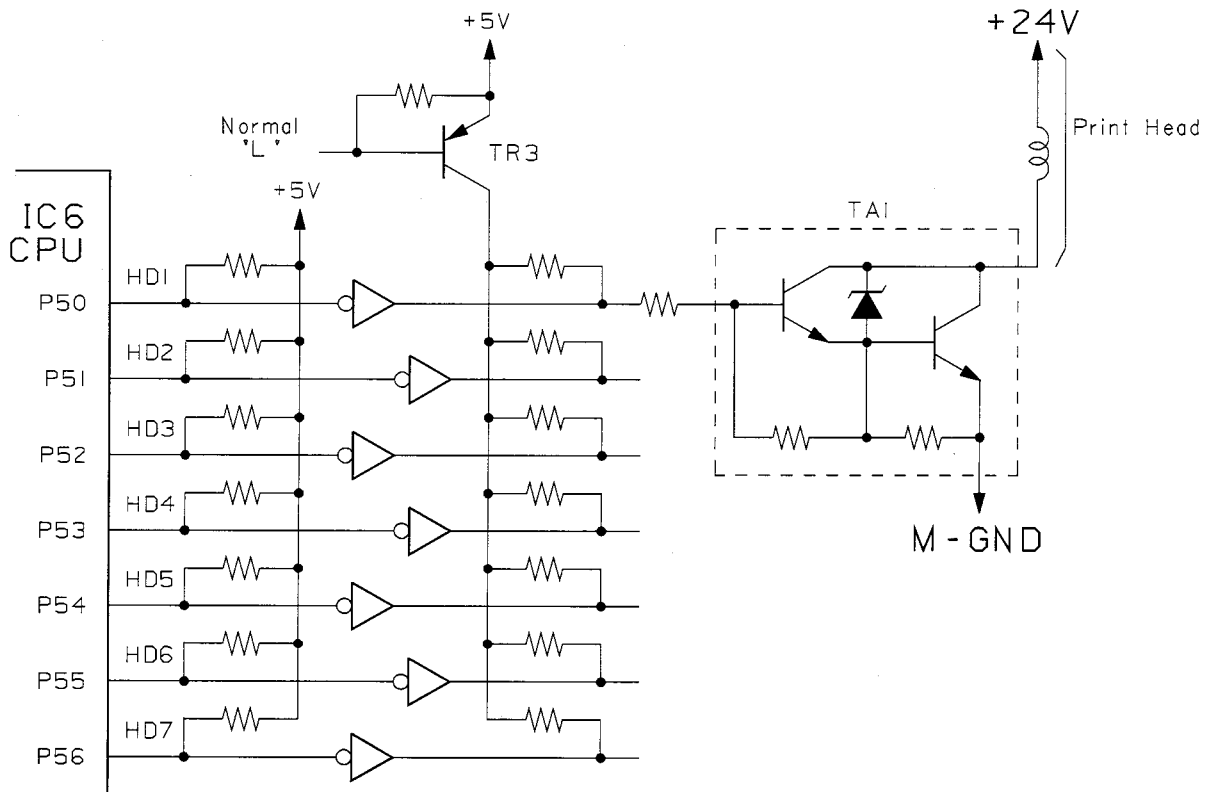


Fig. 2-3.B Print Head Driving Circuit [Serial]

## 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 changes its resistance value according to temperature. Its output voltage is input to an analog pin of the CPU. The CPU compares this input voltage against its reference voltage  $V_{REF}$  (+5V) to evaluate the temperature of the head solenoids and carries out one of the following operations depending on the temperature.

1.  $T < 105^{\circ}\text{C}$ 
  - Bi-directional printing
2.  $105^{\circ}\text{C} \leq T$ 
  - Stop the printing operation and power lamp blinks. When the thermistor's temperature falls below  $105^{\circ}\text{C}$ , bi-directional printing is resumed.

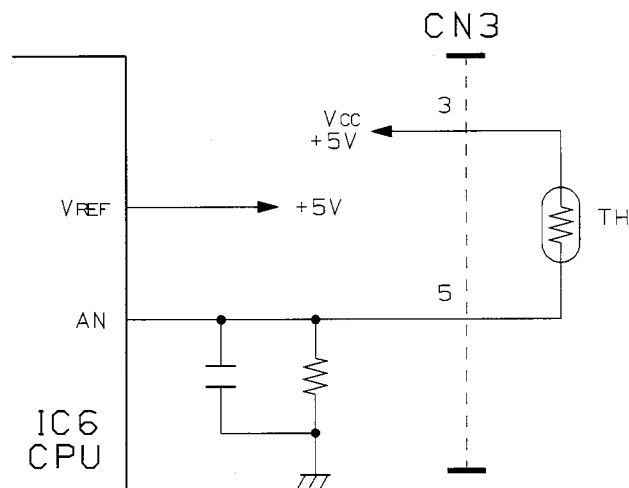


Fig. 2-4 Print Head Temperature Detection Circuit

# THEORY OF OPERATION

## 2.2.4 Carriage Motor Driving Circuit

This printer employs a DC motor as the carriage motor. The DC motor has Drive operating mode and no Brake operating mode.

In the serial model, the LOW signal is output to IC6 P82 and causes the CR motor to start.

In the parallel model, the HIGH signal is output from the output terminal of the gate array and causes the CR motor to start.

Figure 2-5.A.B. shows the carriage motor driving circuit.

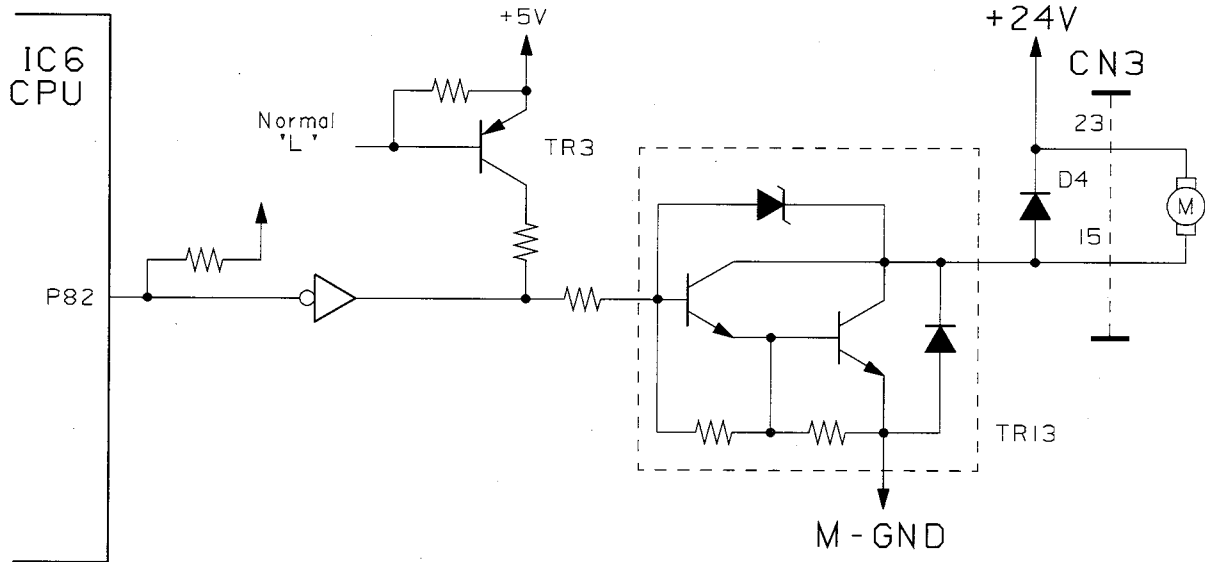


Fig. 2-5.A Carriage Motor Driving Circuit [Serial]

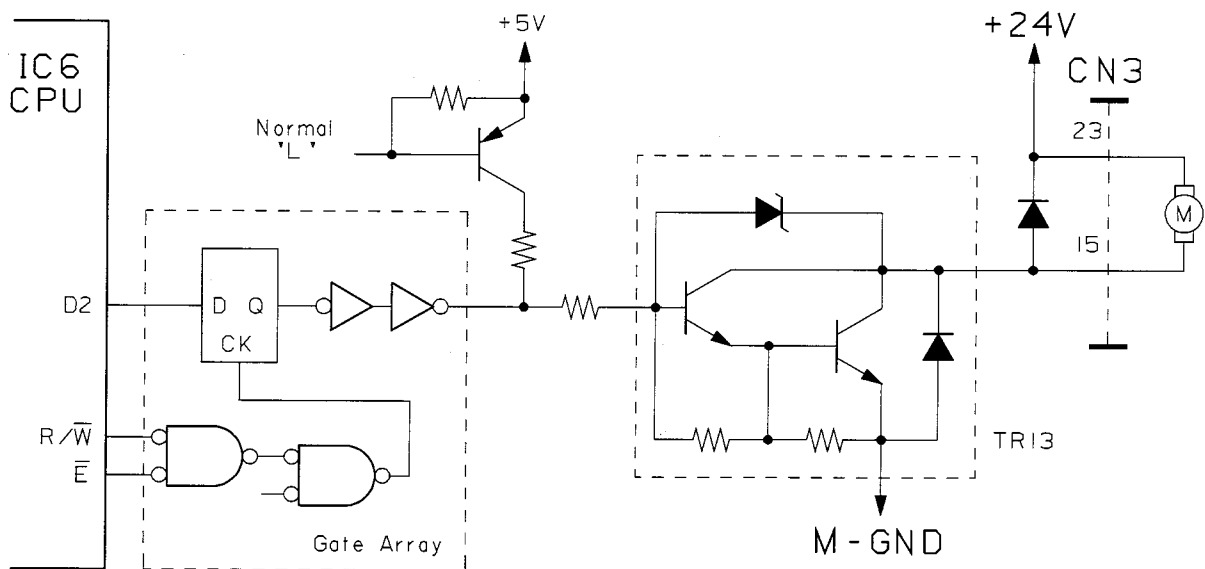


Fig. 2-5.B Carriage Motor Driving Circuit [Parallel]





## THEORY OF OPERATION

The utilization of voltage applied to the paper feed solenoid is +24V.

In the serial mode, P80 in the port of the CPU is switched between HIGH and LOW and this turns OFF and ON the transistor array TA2.

When TA2 is on, the +24V are supplied to the solenoid via the transistor array TA2.

In the parallel mode, the same control described above is performed by the terminal of the gate array of IC3.

### 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 7.4 ms when the power is turned on.

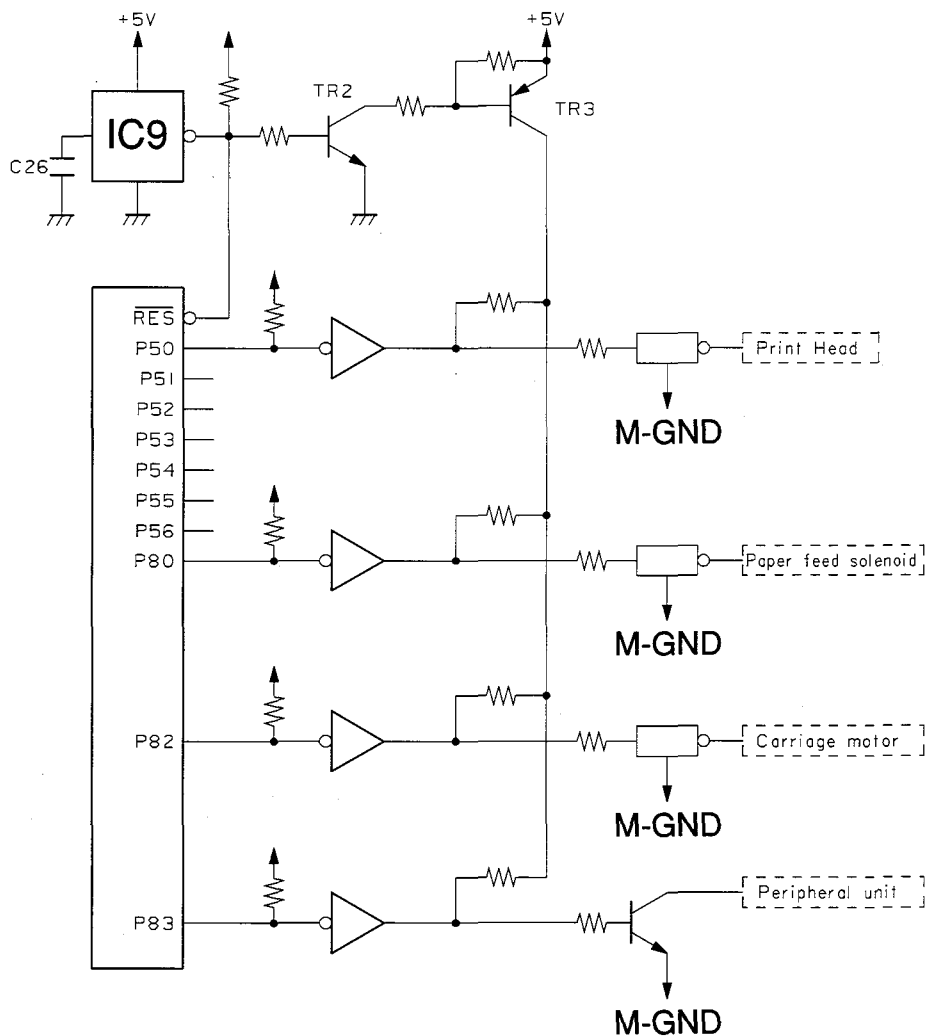


Fig. 2-8 Power On Reset Circuit

- When the power is turned on, the RESET signal is output from the terminal 5 of IC9 (M51953BL) for approximate 7.4 ms. This is determined by external capacitor C26 ( $0.022\mu\text{F}$ ), and it can be calculated by the following formula.  
$$T = 0.34 \times C26 (\text{pF}) [\mu\text{sec.}] = 7.4 \text{ msec.}$$
- This LOW signal triggers 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 solenoid, peripheral units and the print head to be ignored, preventing operation errors when the power is switched on.

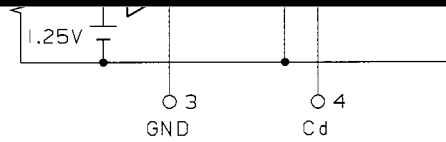


Fig. 2-9 Equivalent Circuit of Voltage Detecting IC

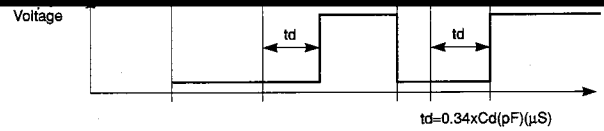


Fig. 2-10 Operational Timing Chart

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

## 2.2.8 Ribbon Position Detection Circuit and Ribbon Color Selection Driving Circuit (only for SP216)

This printer employs a ribbon shift solenoid for switching the ribbon colors. When power to the ribbon shift solenoid comes on, the trigger comes out from the clutch pawl wheel and the clutch mechanism activates so that the cam gear rotates. There is a cam which changes the ribbon position up and down on the cam gear. The ribbon color is switched by rotating this cam.

The ribbon position detector consists of the mechanical SW.

When the ribbon is black, the mechanical SW comes ON.

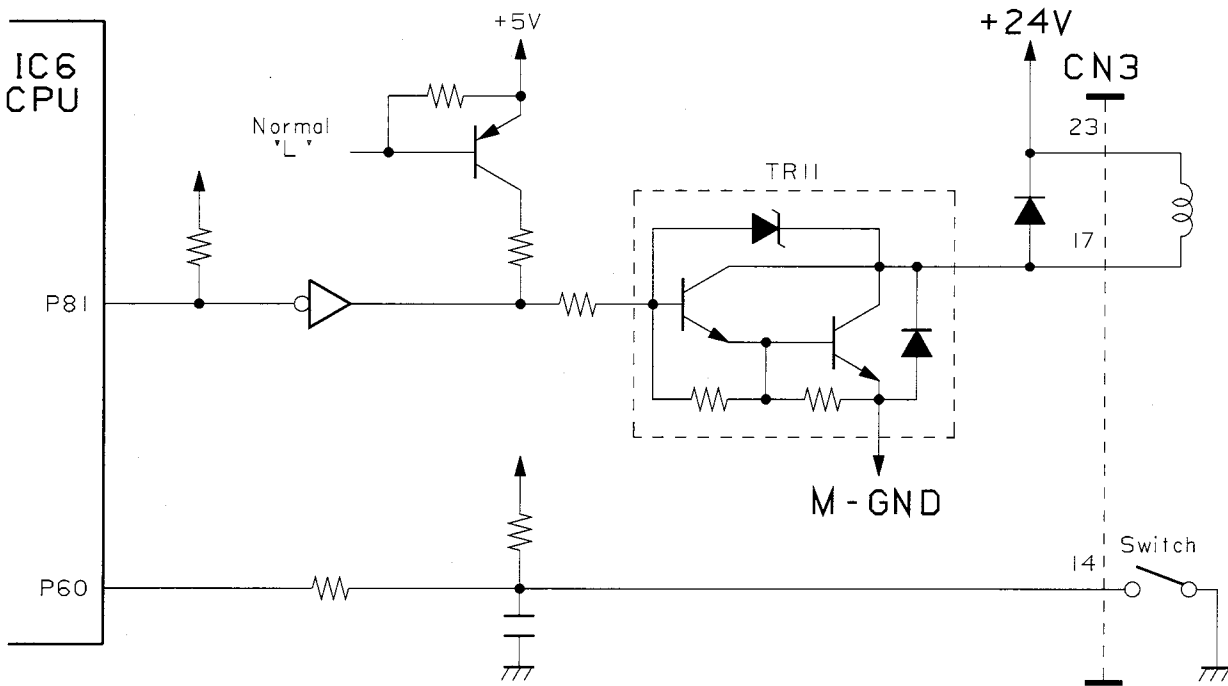
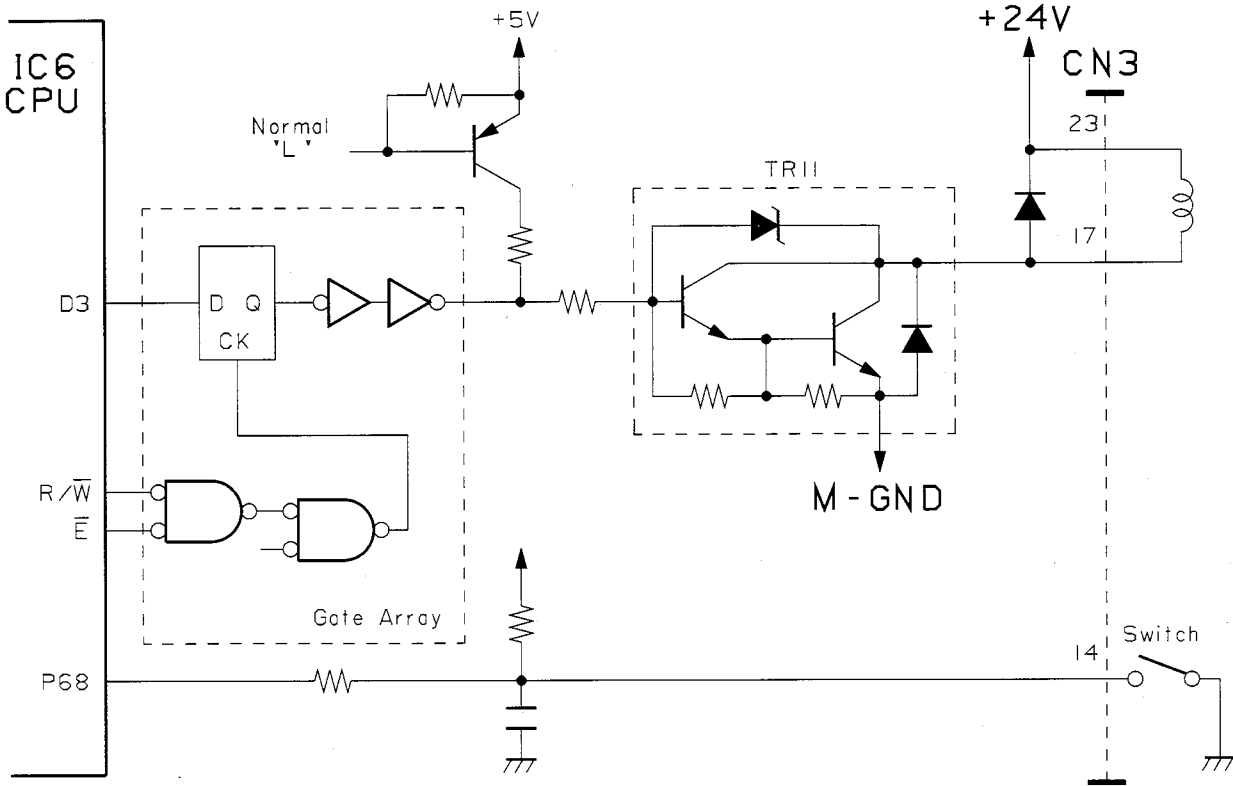


Fig. 2-11.A Ribbon Position Detection Circuit and Ribbon Color Selection Driving Circuit [Serial]

**THEORY OF OPERATION**



**Fig. 2-11.B Ribbon Position Detection Circuit and Ribbon Color Selection Driving Circuit [Parallel]**

# THEORY OF OPERATION

## 2.3 Power Supply Board

As the figure below shows, the power supply unit consists of the fuse circuit, transformer, and power supply circuit.

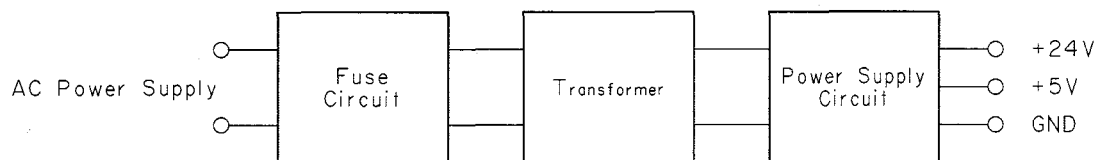


Fig. 2-12 Power Supply Unit Configuration

### 2.3.1 Fuse Circuit

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.

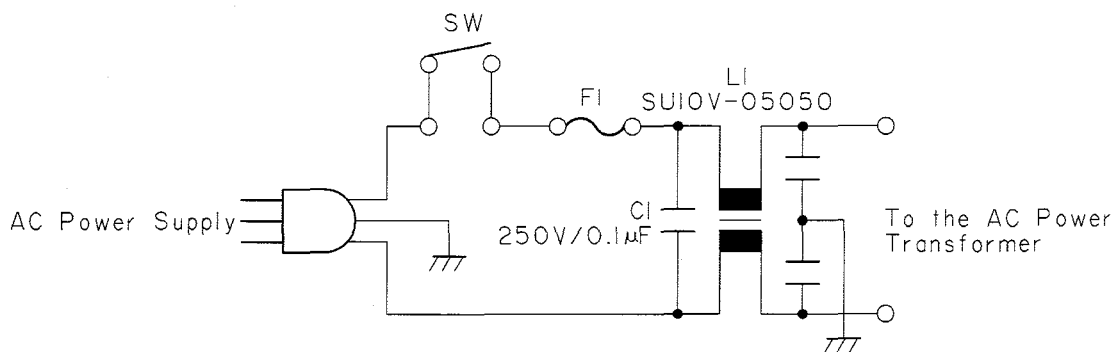


Fig. 2-13 Fuse Circuit

## 2.4 Mechanism

### 2.4.1 Print Head Mechanism

The print head consists of 7 needle wires and 7 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).

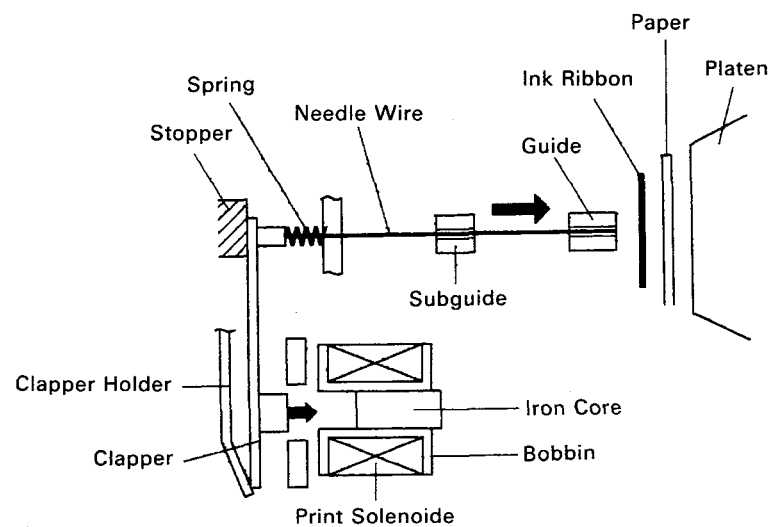
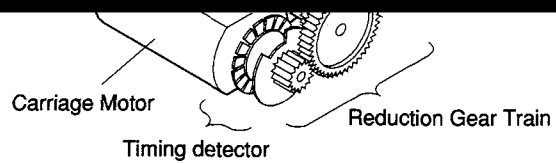


Fig. 2-14 Outline of Print Head Mechanism



**Fig. 2-15 Print Head Carrying Mechanism**



## THEORY OF OPERATION

### 1. Timing Detectors 1 and 2

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

### 2. Home position detector

The home position detector is composed of a mechanical switch. When the carriage is at the home position, the mechanical switch goes ON.

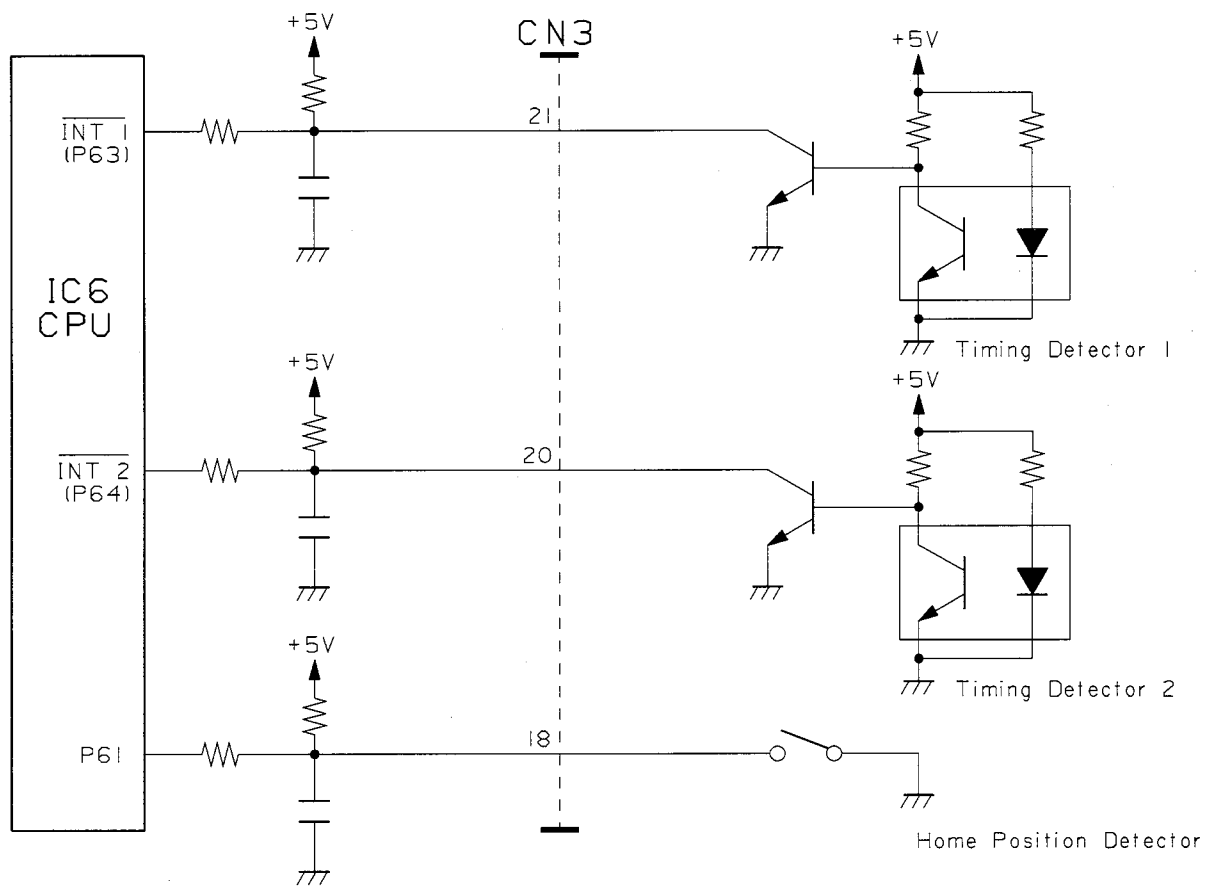


Figure 2-16 Circuits Related to the Print Head Movement Mechanism

# THEORY OF OPERATION

## 2.4.3 Paper Feed Mechanism

The paper feed mechanism comprises of the carriage motor, the paper feed solenoid, the paper feed clutch, the gear train, the paper feed roller, and the holder roller. The gear train transmits the rotation of the carriage motor to the paper feed roller. By applying power to the paper feed solenoid, the clutch mechanism activates and the paper feed clutch rotates. The paper sandwiched between the paper feed roller and the holder roller is driven upwards. One step of the paper feed solenoid drives the paper 1/6 inch.

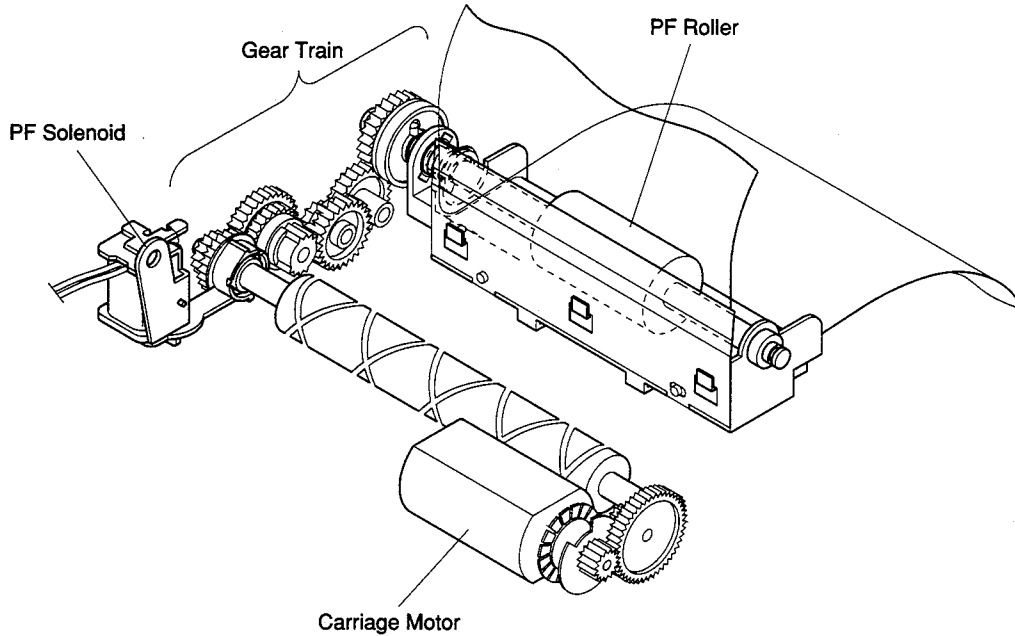
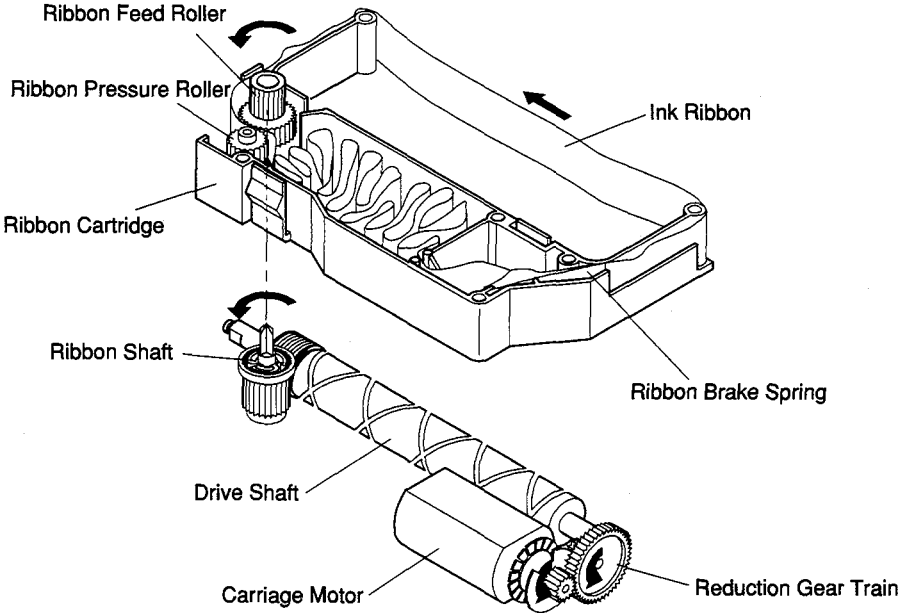


Figure 2-17 Paper Feed Mechanism

**2.4.4 Ink Ribbon Feed Mechanism**

The ink ribbon feed mechanism comprises of the ribbon cartridge, the carriage motor, the drive shaft, and the gear train. The gear train transmits the rotation of the carriage motor to the ribbon shaft. The ribbon is contained in the ribbon cartridge and tied into an endless loop. When the ribbon shaft 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.



**Figure 2-18 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. Paper out detector

The paper out detector is installed on the printer mechanism.

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

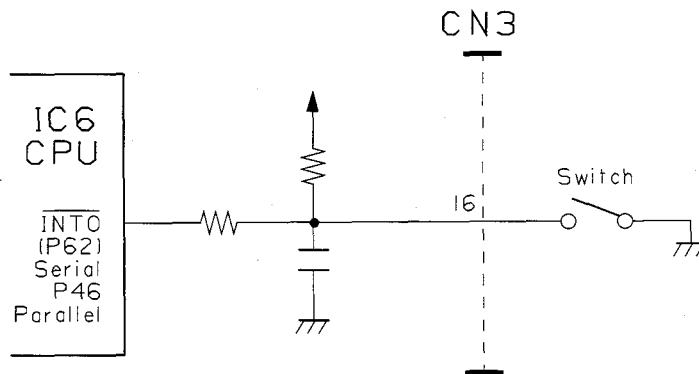


Figure 2-19 Paper out Detector

### 2. Ribbon Position Detector (only for SP216)

The ribbon position detector is attached to the lower terminal PCB which is located at the ribbon base (W). When selecting black (at the time of shift down), the leaf switch is "CLOSED". When selecting red (at the time of shift up), the leaf switch is "OPEN".

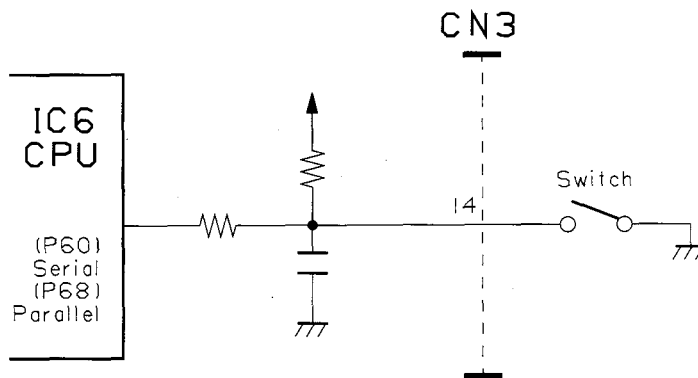


Figure 2-20

and the ribbon base (w). The rotation of the carriage motor is transmitted to the cam gear by rotating the gear train. Then the ribbon shift solenoid is turned on by the ribbon color selecting command, the trigger comes out from the clutch pawl wheel and the cam gear rotates half a turn, and the cam is driven up and down, and the ribbon color is changed.

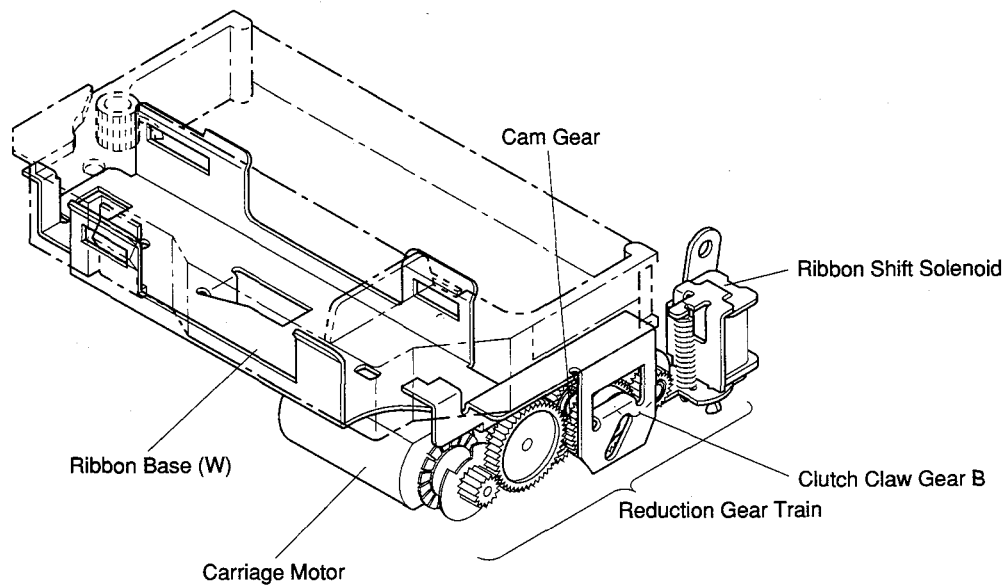


Figure 2-21



# CHAPTER 3

## ADJUSTMENTS

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.

3.1 Tools and Measuring Instruments .....	3-1
3.2 Adjusting the Gap between the Print Head and the Platen .....	3-2
3.2.1 Adjusting the Gap between the Print Head and the Platen .....	3-2
3.3 Adjusting the Column Displacement for Bi-Directional Printing .....	3-4
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3.4.2 Adjustment B .....	3-5
3.4 Adjustment of Cam Position of Ribbon Color Change Mechanism (only for SP216/246) .....	3-6





Soldering iron (20W)

Thickness gauge (0.6 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 Adjusting the Gap between the Print Head and the Platen

1. Remove the printer mechanism according to the procedure described in Section 4.2.
2. Remove the screw ① at two places.
3. Remove the head cover ②.
4. Loosen the screw ③ fixing the print head and the carriage Ass'y.
5. Insert the thickness gauge between the print head and the platen and measure the gap. (Refer to the figure 3-2)
6. The standard value for the gap is 0.5 – 0.6 mm.
7. After adjustment of the gap, securely fix the print head and the carriage Ass'y with the screw ③.

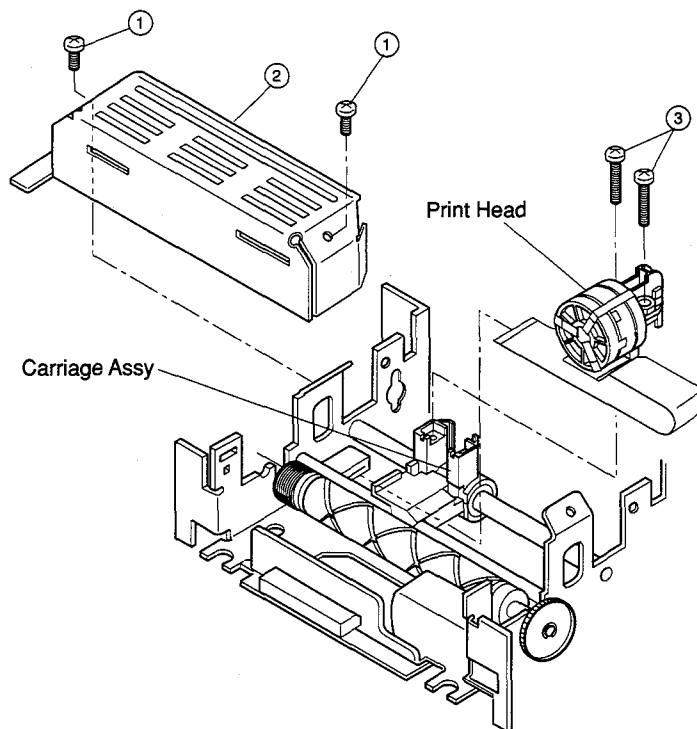
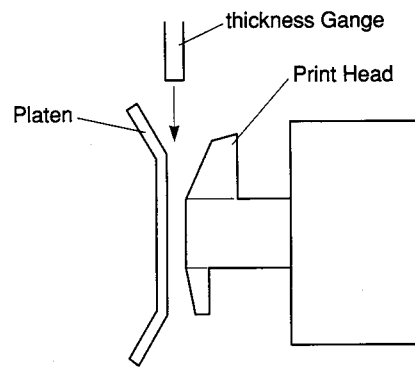


Figure 3-1 Head Cover removal



**Figure 3-2 Gap Measurement Method**

# ADJUSTMENT

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

This procedure adjusts the displacement ( $x$  shown in figure 3-3) 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).

### 3.3.1 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. Loosen the timing detector board screw ①.
4. If the return printing is to the right of the going printing, move the timing detector ② in direction of the black arrow  $\blacktriangleright$ . If the return printing is to the left of the going printing, move the timing detector ② in direction of the white arrow  $\triangleleft$ .
5. Tighten the timing detector board screw ①.
6. Print and check the size of the column displacement. If it does not satisfy the requirement, repeat this procedure from Step 2.
7. If you can not get the print column displacement adjusted correctly, use Adjustment B in 3.3.2.
8. When Adjustment A is complete, install the printer mechanism on the main unit by reversing the procedure with which you removed it.

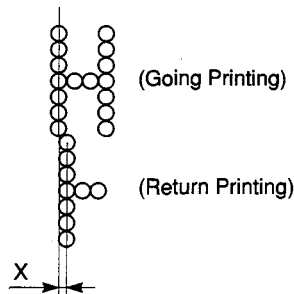


Figure 3-3 Column Displacement Adjustment

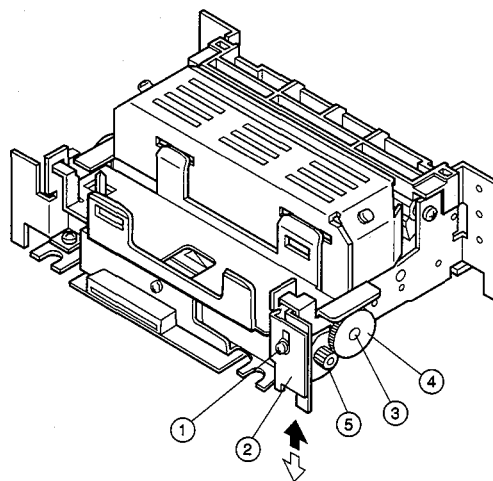


Figure 3-4 Column Displacement Adjustment A

## 3.3.2 Adjustment B

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

3. Repeat Adjustment A as explained in 3.3.1.

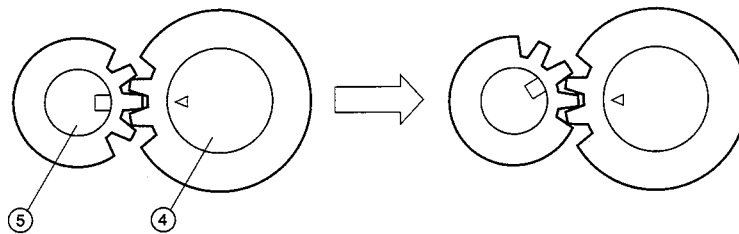


Figure 3-5 Column Displacement Adjustment B

## ADJUSTMENT

### 3.4 Adjustment of Cam Position of Ribbon Color Change Mechanism (only for SP216)

This is an adjustment of the cam gear to obtain a normal printing track in black and red when carrying out maintenance and servicing the ribbon color change mechanism.

1. Rotate the speed reduction gear train in clockwise direction of the carriage motor till the clutch pawl wheel of the RS clutch unit contacts with the trigger of the ribbon shift solenoid.
2. In the above condition, engage the cam gear and the clutch gear (R) of the RS clutch unit so that the circular cam of the cam gear comes right below (or right above).
3. In this condition, attach the ribbon base (W) to the cam section of the cam gear and the frame, then secure with a stop spring.

Note: Apply grease on the cam surface and the hook sections (two locations) of the ribbon base (W). (Molykote EM30L)

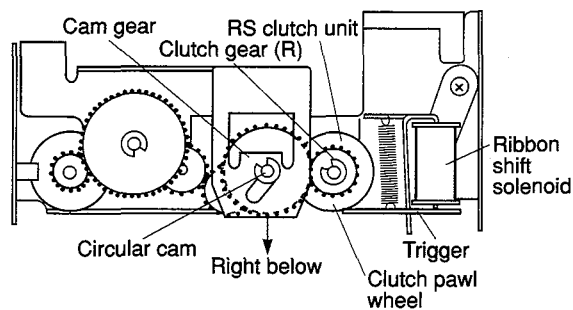


Figure 3-6 Cam transmission adjustment

# CHAPTER 4

## PARTS REPLACEMENT

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

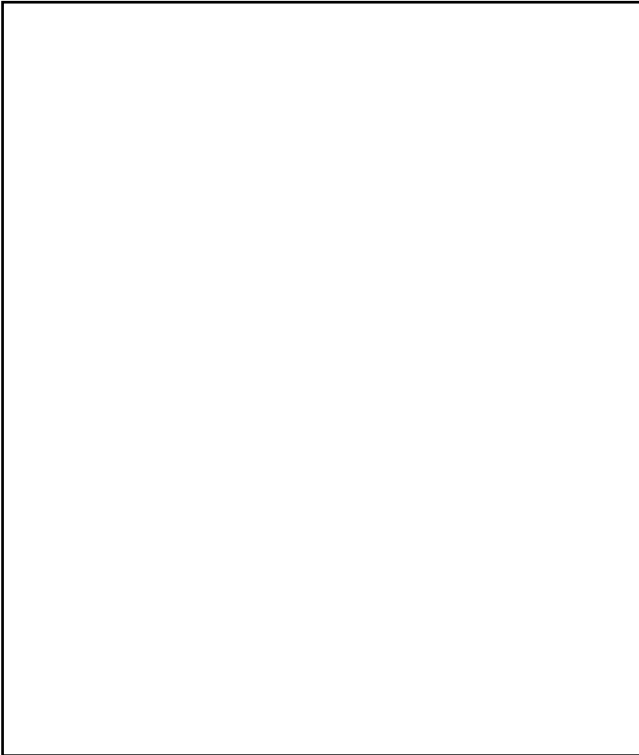
1. Disconnect the printer power cord plug from the wall outlet before servicing it.
2. Assembly is the reverse of disassembly unless otherwise specified.
3. After reassembly, coat the screw heads with locking sealant.
4. Lubrication information is not provided in this chapter, Refer to Section 5.2

<b>4.1 Upper Case Unit.....</b>	<b>4-1</b>
<b>4.2 Printer Mechanism .....</b>	<b>4-2</b>
<b>4.3 Main Logic Board .....</b>	<b>4-3</b>
<b>4.4 Power Supply Unit.....</b>	<b>4-3</b>
<b>4.5 Fuses .....</b>	<b>4-4</b>
<b>4.6 Auto Cutter .....</b>	<b>4-4</b>
<b>4.7 Print Head.....</b>	<b>4-5</b>
<b>4.8 Drive Shaft Unit.....</b>	<b>4-5</b>
<b>4.9 Thermal Board Unit .....</b>	<b>4-6</b>
<b>4.10 Carriage Motor Unit .....</b>	<b>4-6</b>
<b>4.11 Paper End Switch Board Unit .....</b>	<b>4-7</b>
<b>4.12 Ribbon Color</b>	
<b>Change Mechanism (only for SP216/246) .....</b>	<b>4-8</b>





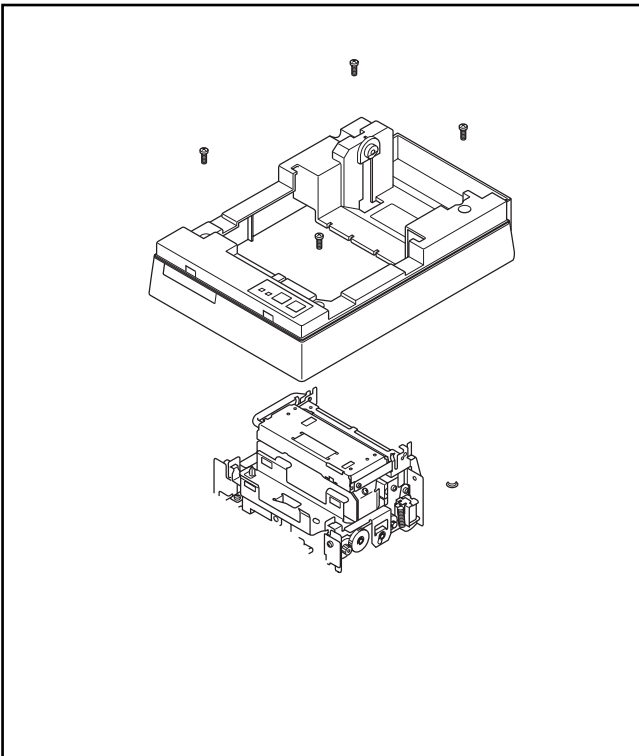
**<SP212/216>**



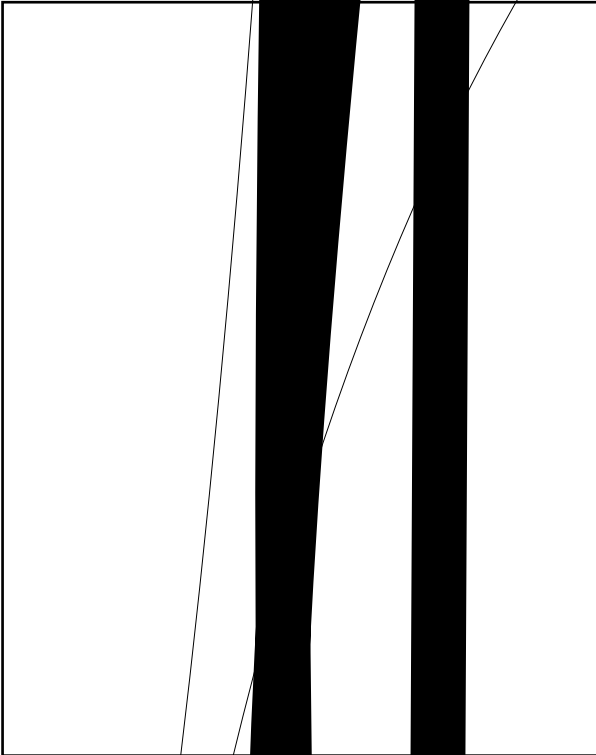
## 4.1 Upper Case Unit

1. Turn off the power switch ①, disconnect the power cord from the wall outlet.
2. Remove
  - Four tapping screws ②.

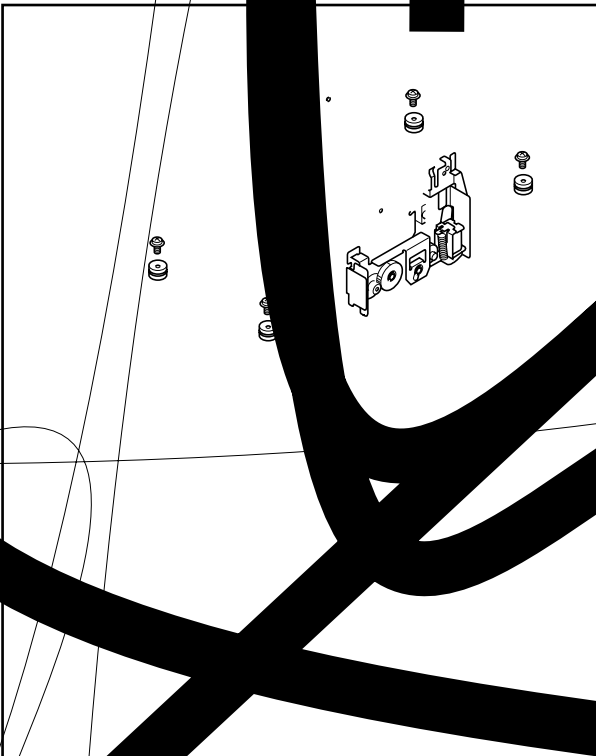
**<SP242/246>**



<SP212/216>



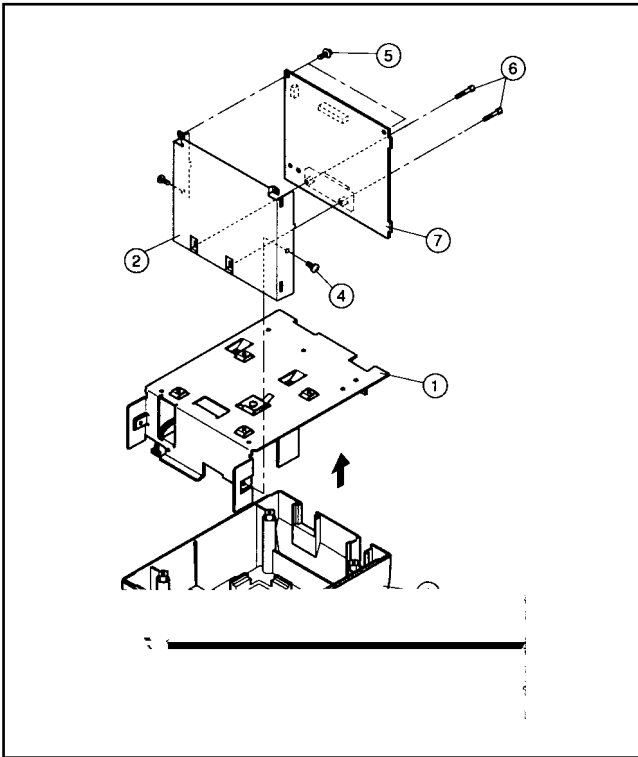
<SP242/246>



## 4.2 Printer Mechanism

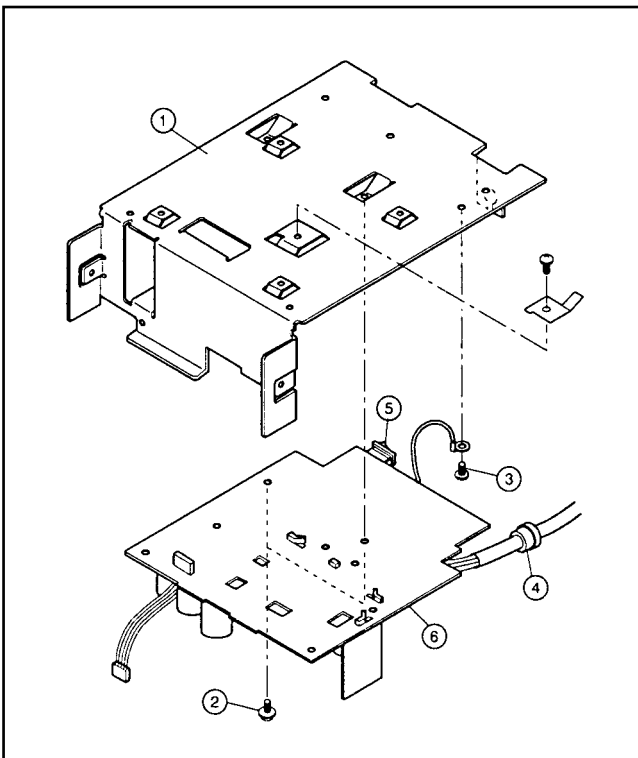
1. Remove
  - Upper case unit according to the procedure described in Section 4.1
  - Cable Unit ①
  - Four screws SP2 ②
  - Printer mechanism ③
  - Four rubber feet ④

### 4.3 Main Logic Board



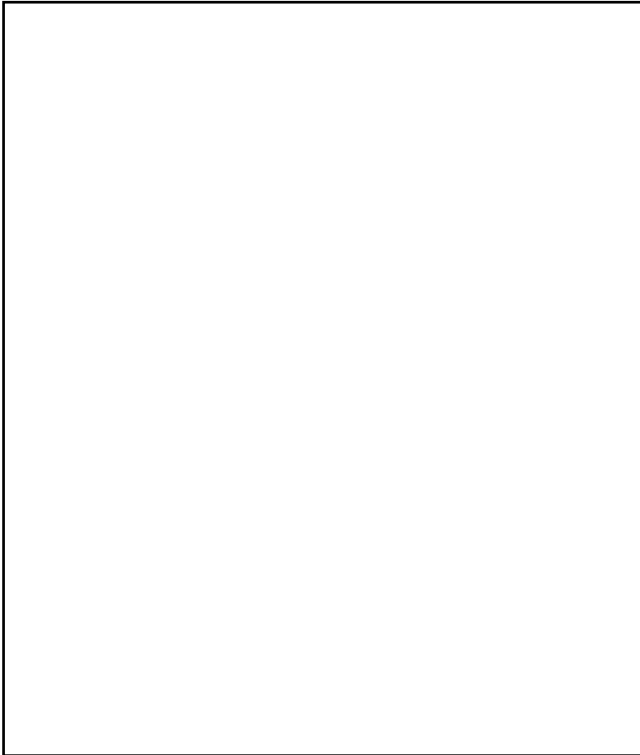
1. Turn off the power switch, disconnect the power cord from wall outlet.
2. Remove
  - Printer Mechanism according to the procedure described in Section 4.2
3. Main Chassis ① and Board Chassis ② from Lower Case ③.
4. Remove
  - Cable unit and connector
  - Two screws(Main chassis) ④
  - Two screws(Board) ⑤
  - Two screws and spacers(interface connector) ⑥
  - Main logic board ⑦

### 4.4 Power Supply Unit



1. Remove
  - Main chassis ① according to the procedure described in Section 4.3.
  - One screw with wire ③
  - Two screws ② for transformer
  - Remove the power supply cord ④, the power switch ⑤ and the power supply unit ⑥ by sliding it.

### 4.5 Fuses



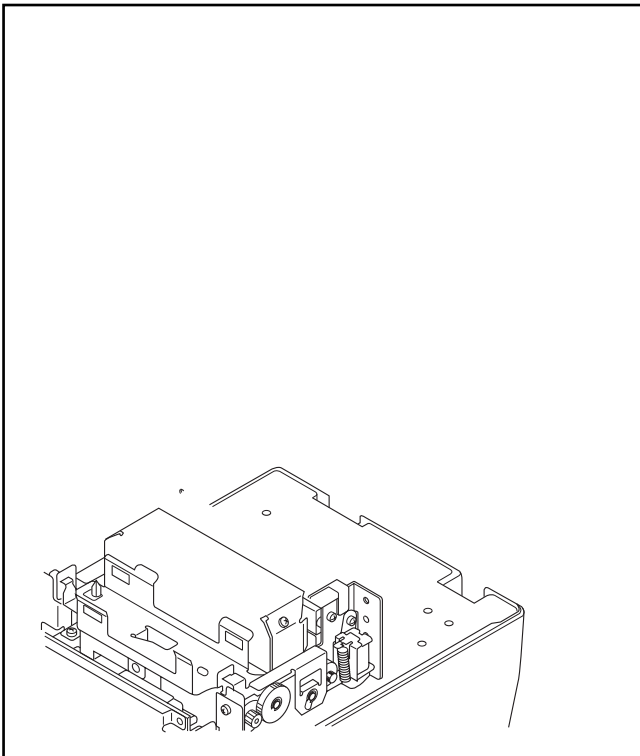
1. Remove
  - Printer supply unit according to the procedure described in Section 4.4.
2. Inspect
  - F1 ①
  - F2 ②

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

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

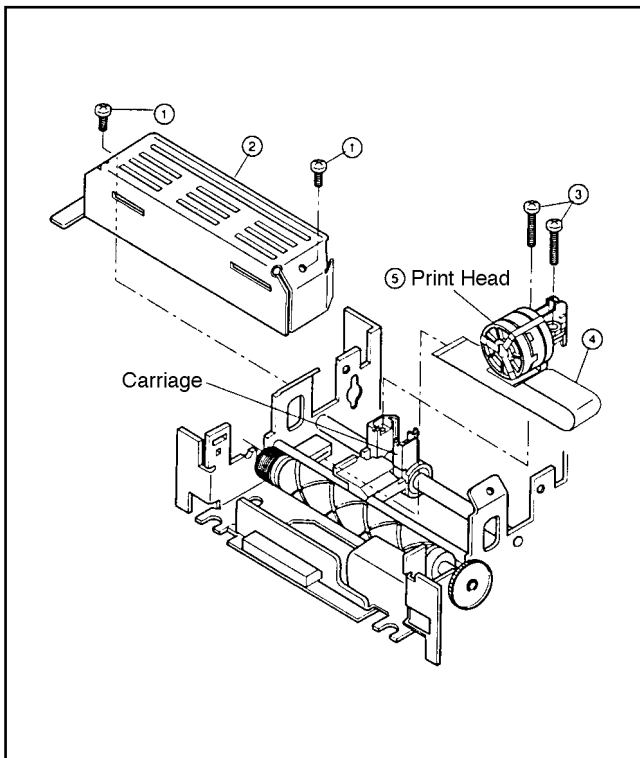
\*: Fuse F2 is to only be replaced with Bell Fuse Inc., Type 5TT3A, rated 3A, 125V.

### 4.6 Auto Cutter



1. Turn off the power switch, disconnect the power cord from wall outlet.
2. Remove
  - Upper case unit according to the procedure described in Section 4.1.
  - Two screws ①
  - Holder plate unit (L) ②
  - Holder plate unit (R) ③
  - Auto cutter ④

### 4.7 Print Head



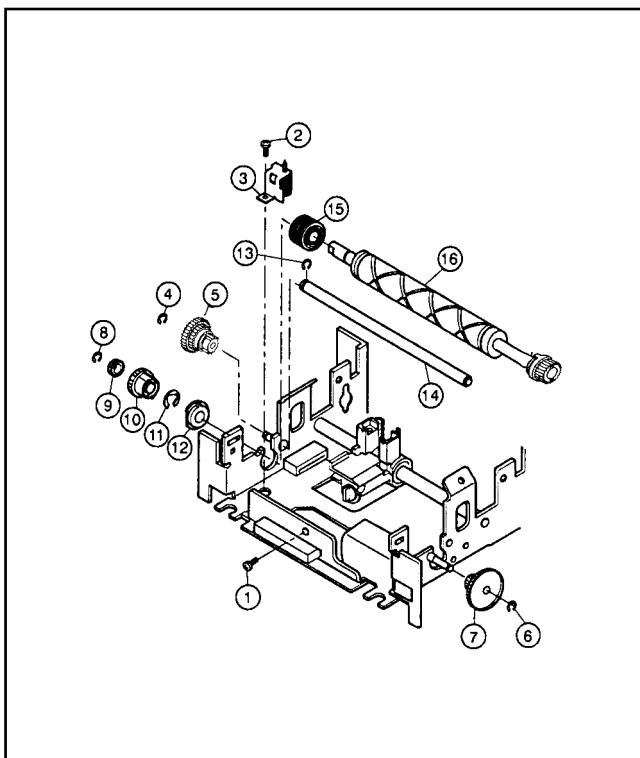
1. Turn off the power switch, disconnect the power cord from wall outlet.
2. Remove
  - Upper case unit(not shown in the figure)according to the procedure described in Section 4.1.
  - Two screws ①
  - Head cover ②
  - Two tapping screws ③
  - Head cable ④
  - Print head ⑤

#### WARNING

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

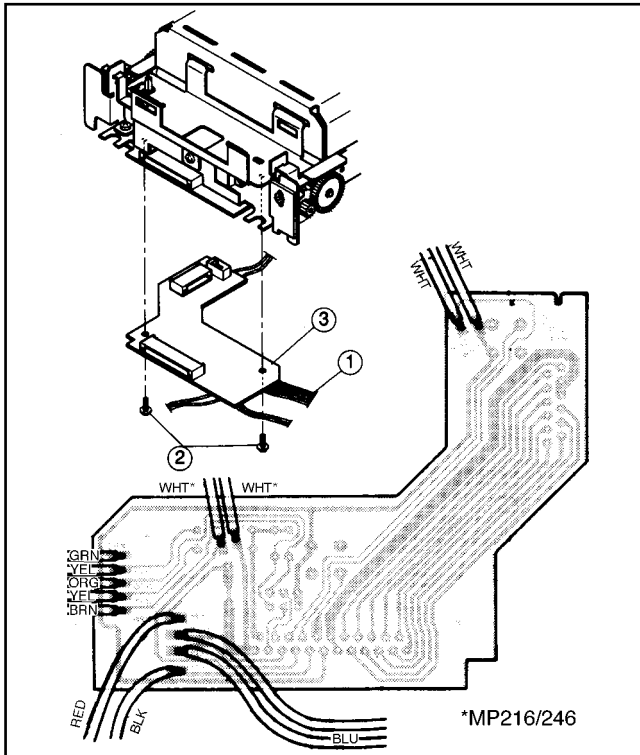
3. Adjust
  - Gap between print head and platen (Refer to Section 3.2.)
  - Column displacement for bi-directional printing (Refer to Section 3.3.)

### 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.
  - One screw ① (Ribbon Base)
  - Ribbon base (not shown in the figure)
  - One screw ② (Ribbon shaft guide ③ )
  - Stop ring ④
  - Paper feed clutch unit ⑤
  - Stop ring ⑥
  - Gear ⑦
  - Stop ring ⑧
  - Drive shaft gear L ⑨
  - Clutch claw gear ⑩
  - Stop ring ⑪
  - Drive shaft bearing ⑫
  - Stop ring ⑬
  - Carriage guide stay ⑭
  - Worm gear ⑮
  - Drive shaft unit ⑯
2. Adjust
  - Column displacement Refer to Section 3.3.

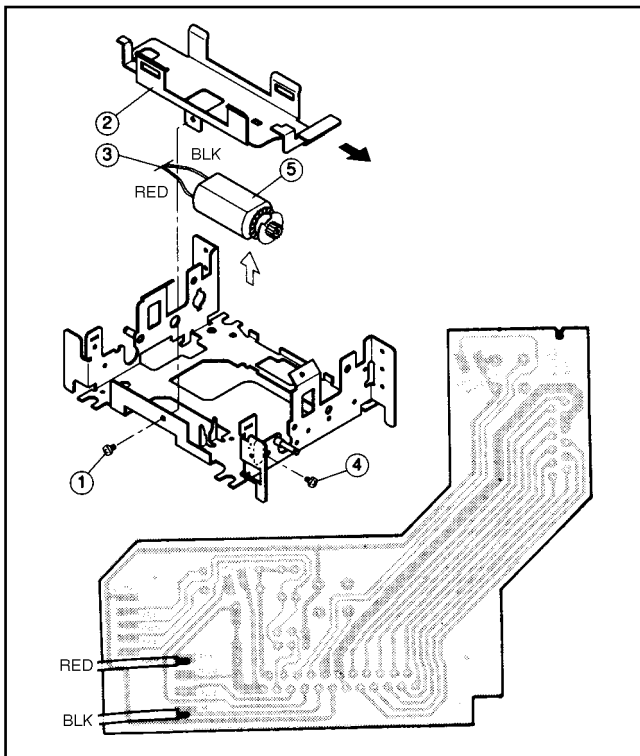
### 4.9 Thermal Board Unit



1. Remove
  - Printer mechanism according to the procedure described in Section 4.2.
  - The eleven soldered lead wires ① with the soldering iron.(MP212/242)
  - The thirteen soldered lead wires ① with the soldering iron.(MP216/246)
  - Two screws ②
  - Thermal board unit ③

### 4.10 Carriage Motor Unit

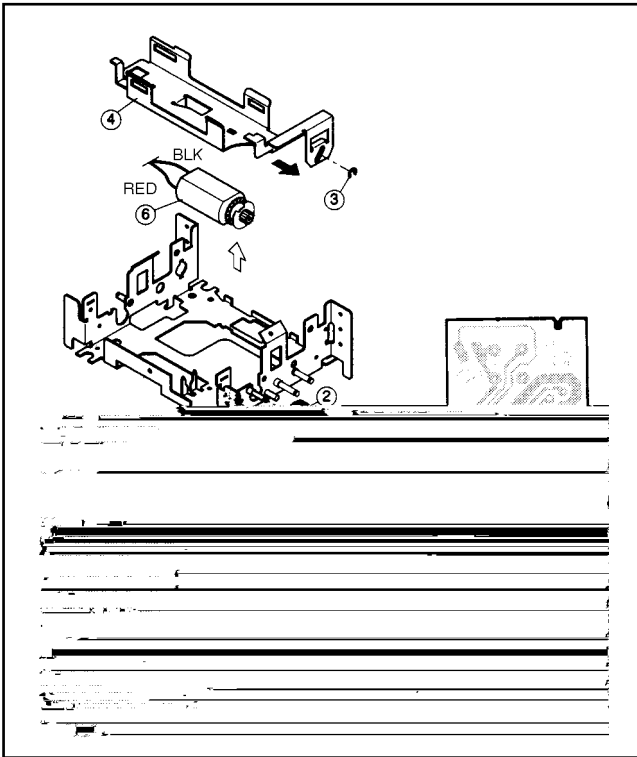
<SP212/242>



1. Remove
  - Printer mechanism according to procedure described in Section 4.2.
  - Screw ① and the ribbon base ② after sliding blackarrow ➡ direction.
  - The two soldered lead wires ③ with the soldering iron. (black,red)
  - Screw ④
  - Lift the unit to white arrow ⇧ direction after wildering the frame.
  - Carriage motor unit ⑤ .
2. Adjustment
 

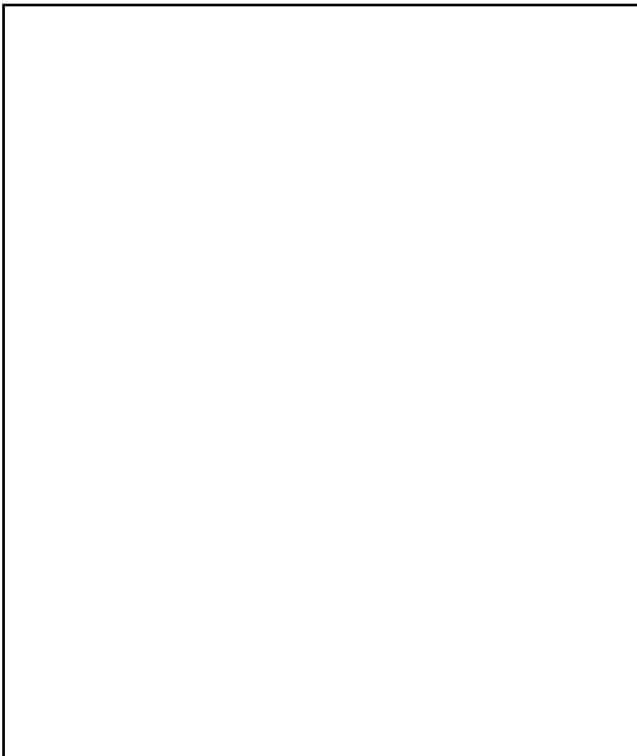
After assembling,adjust the column displacement according to the procedure described in 3.3.

## &lt;SP216/246&gt;



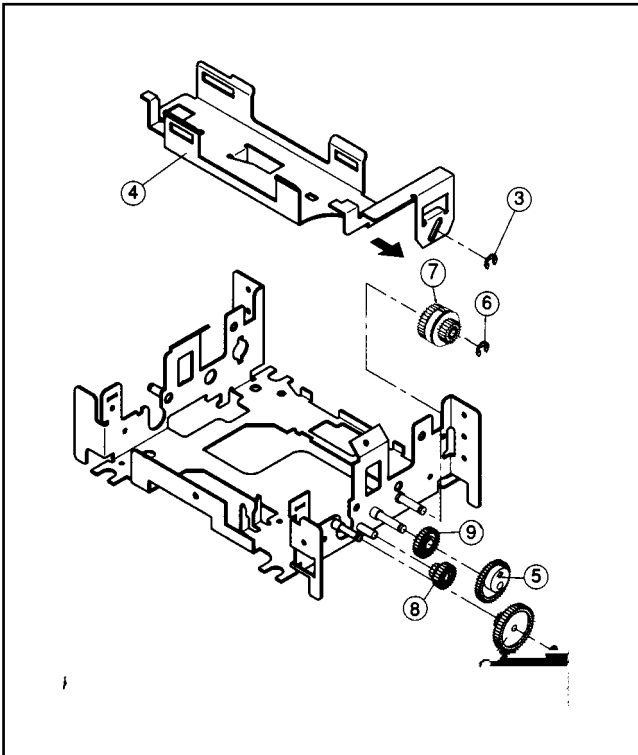
1. Removal
  - Remove the printer mechanism according to the procedure of item 4.2.
  - Two soldered lead wires (Black and red)
  - Stop ring ①
  - Gear ②
  - Stop ring ③
  - Slide the ribbon base (W) ④ in the direction of the black arrow ➡ and remove it.
  - Screw ⑤
  - Secure the frame and forcibly open the carriage motor unit in the direction of the white arrow ↑.
  - Carriage motor unit ⑥
2. Adjustment
  - After assembling, adjust the cam position of the ribbon color change mechanism by referring to item 3.4.
    - After that, adjust the column slippage by referring to item 3.3.


## 4.11 Paper End Switch Board Unit



1. Remove
  - Printer mechanism according to the procedure described in Section 4.2.
  - The two soldered lead wires ① with the soldering iron. (White)
  - Screw ②
  - Paper end switch board unit ③

### 4.12 Ribbon Color Change Mechanism (only for SP216/246)



1. Removal
  - Remove the printer mechanism according to the procedure of item 4.2.
  - Stop ring ①
  - Gear ②
  - Stop ring ③
  - Slide the ribbon base (W) ④ in the direction of the black arrow  and remove it.
  - Cam gear ⑤
  - Stop ring ⑥
  - RS clutch unit ⑦
  - Gear 12x24x0.4 ⑧
  - Gear 28x0.4 ⑨
2. Adjustment
  - After assembling, adjust the cam position of the ribbon color change mechanism by referring to item 3.4.
  - After that, adjust the column slippage by referring to item 3.3.



# 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>
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<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.

equipment after disassembling or replacing parts when oil has been removed by cleaning.

### 5.2.3 Lubrication locations

Refer to Figure 5-1, Figure 5-2.

① ② ③ ④ ⑤ ⑥ and ⑦ are only for SP216.

	Lubrication location	Type of oil
①	Contact surfaces between ribbon shaft and ribbon shaft guide	Molykote EM-30L
②	Contact surfaces between gear $12 \times 45 \times 0.4$ and gear shaft (A)	Molykote EM-30L
③	Contact surfaces between PF clutch and gear shaft (B)	Molykote EM-30L
④	Contact surfaces between worm wheel and frame	Molykote EM-30L
⑤	Contact surfaces between carriage guide stay and carriage	Molykote EM-30L
⑥	Contact surfaces between holder roller and holder roller spring	Molykote EM-30L
⑦	Contact points between worm gear and worm wheel	Molykote EM-30L
⑧	Contact points between clutch spring and clutch gear D1	Molykote EM-30L
⑨	Contact points between trigger and solenoid base	Molykote EM-30L
⑩	Cross section of drive shaft grooves	Molykote EM-30L
⑩	Cross section of drive shaft grooves	Molykote EM-30L
⑪	Surface of gear bore diameter $12 \times 24 \times 0.4$	Molykote EM-30L
⑫	Gear bore diameter $28 \times 0.4$	Molykote EM-30L
⑬	Contacting surface of the clutch spring and the clutch gear (D2)	Molykote EM-30L
⑭	Bore diameter of RS clutch assembly	Molykote EM-30L
⑮	Bore diameter of the cam gear and outer diameter of the circular cam	Molykote EM-30L
⑯	Combining hole section of the hook of the ribbon base (W) and the frame (two locations)	Molykote EM-30L
⑰	Attachment stop ring section of the ribbon base (W)	Molykote EM-30L

## 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.

a	Adjustment head retention screw Screws to fasten the printing head (2)
b	Only for SP216 Ribbon base arm sections (2 places)
c	Set screw for the timing detector BD unit
d	Set screw for the terminal board unit (two)
e	Motor retention screw



# 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.

Parts that have been added in the revised edition are indicated with “#”.

Parts that have been abolished in the revised edition are indicated with “\*”.

#1: First edition → Second edition      #2: Second edition → Third edition

\*1: First edition → Second edition      \*2: Second edition → Third edition

#### 3. PARTS NO.

Parts numbers must be indicated when ordering replacement parts.

#### 4. PARTS NAME

Parts name 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

When there are differences in the specifications of the fuse, destinations, etc., the differences are described in words or indicated by two letters.

US ... U.S.A. EC ... EC      UK ... United Kingdom      AS ... Australia

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.

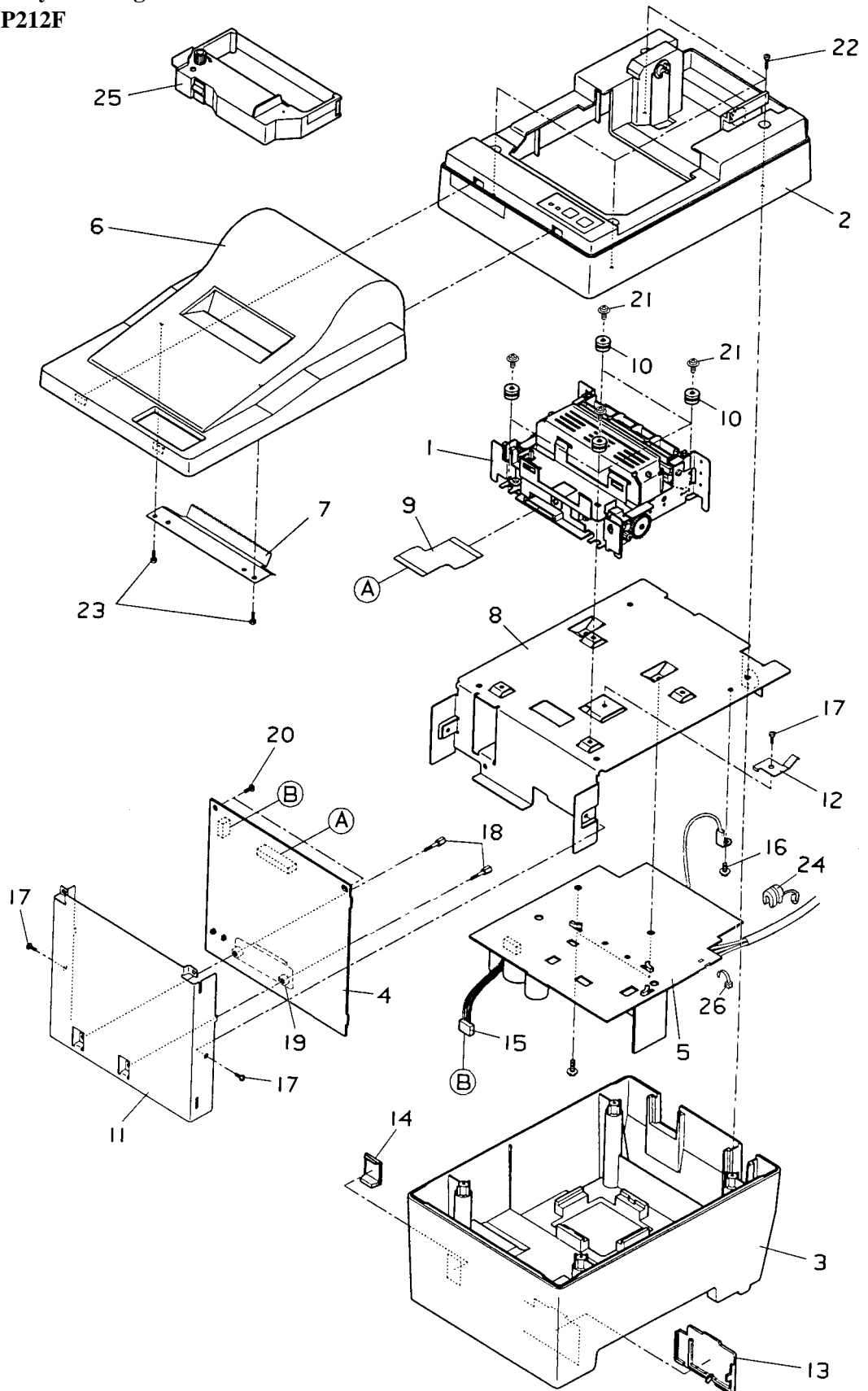
Service parts are recommended for maintenance.

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6.1.2	Parts List .....	6-5
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## 6.1 Printer Assembly

### 6.1.1 Assembly Drawing

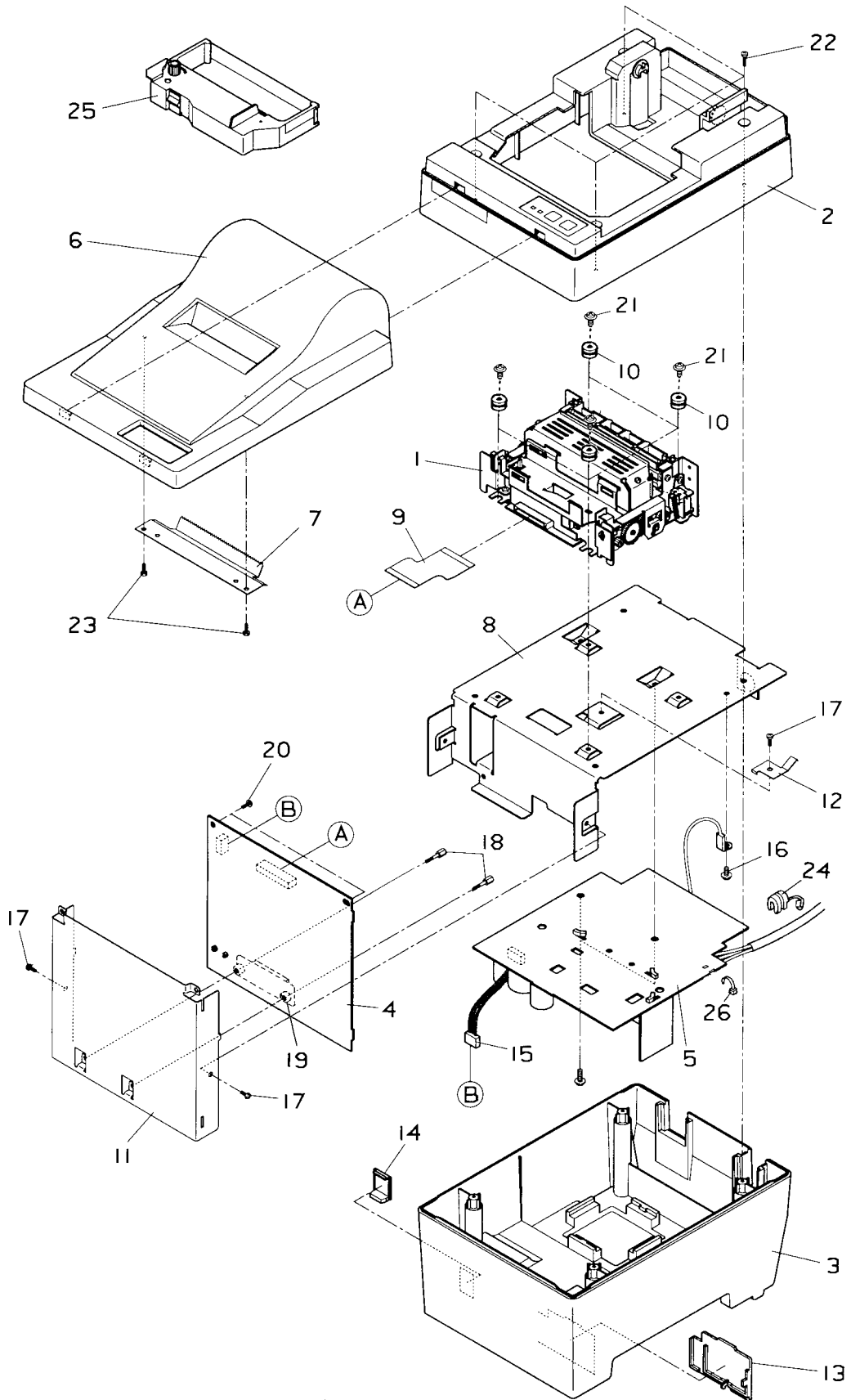
#### A. SP212F



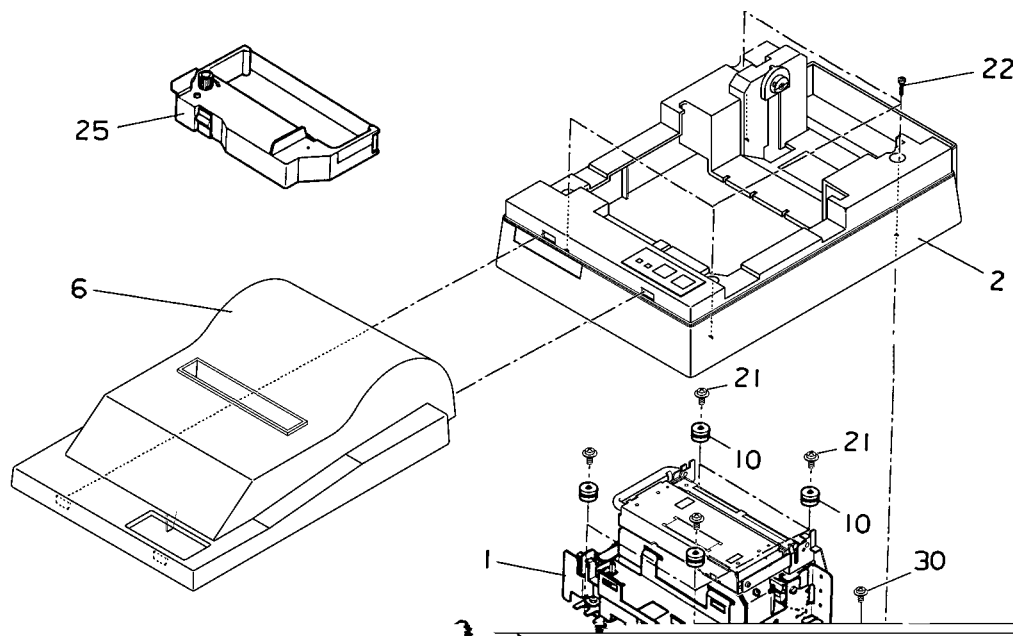


# PARTS LIST

## B. SP216F

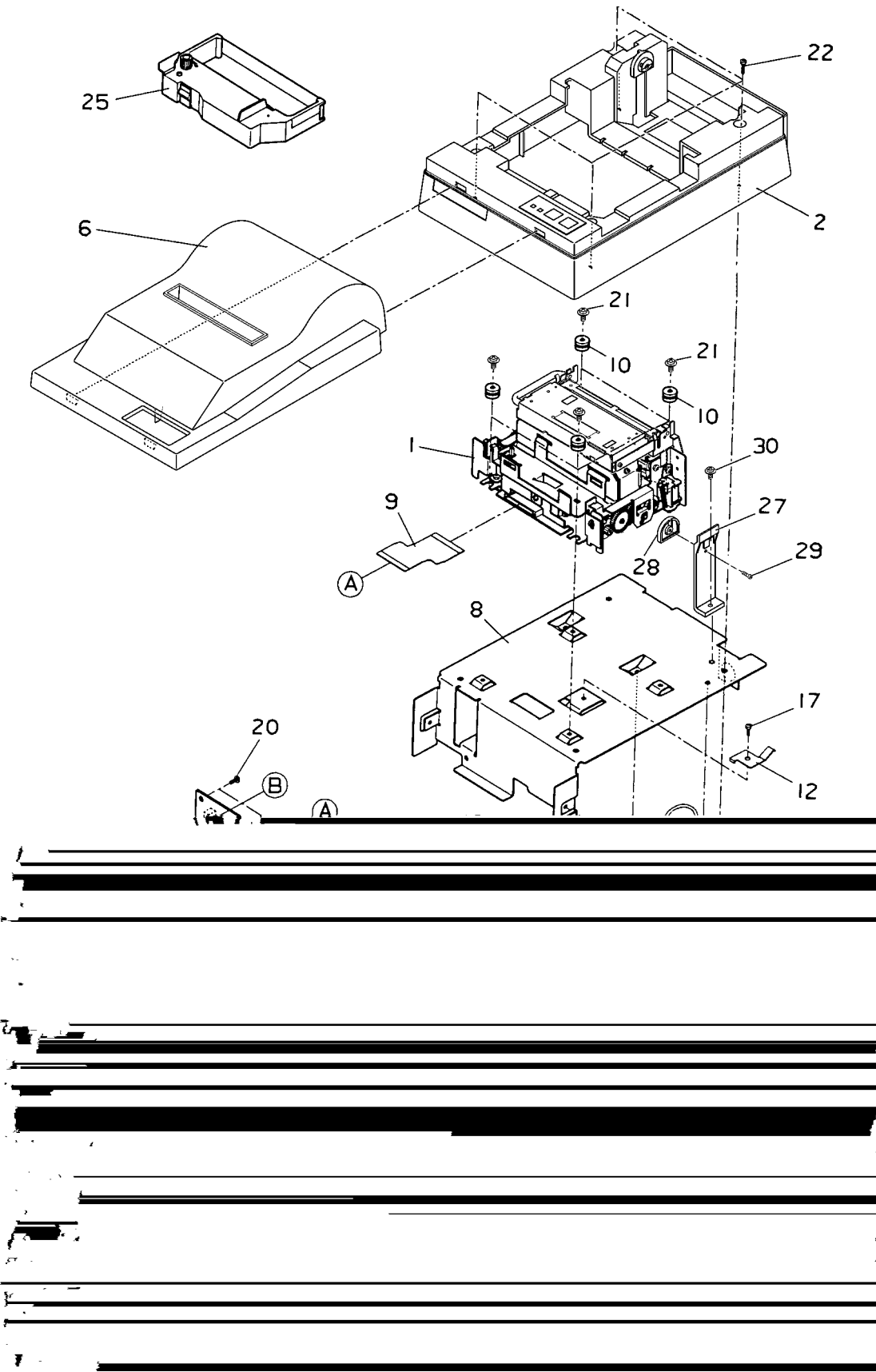


C. SP242F



# PARTS LIST

## D. SP246F



# PARTS LIST

---

1		38000210	MP212FP-24	1	SP212	S
	#1	38000610	MP216FP-24	1	SP216	S

---

# PARTS LIST

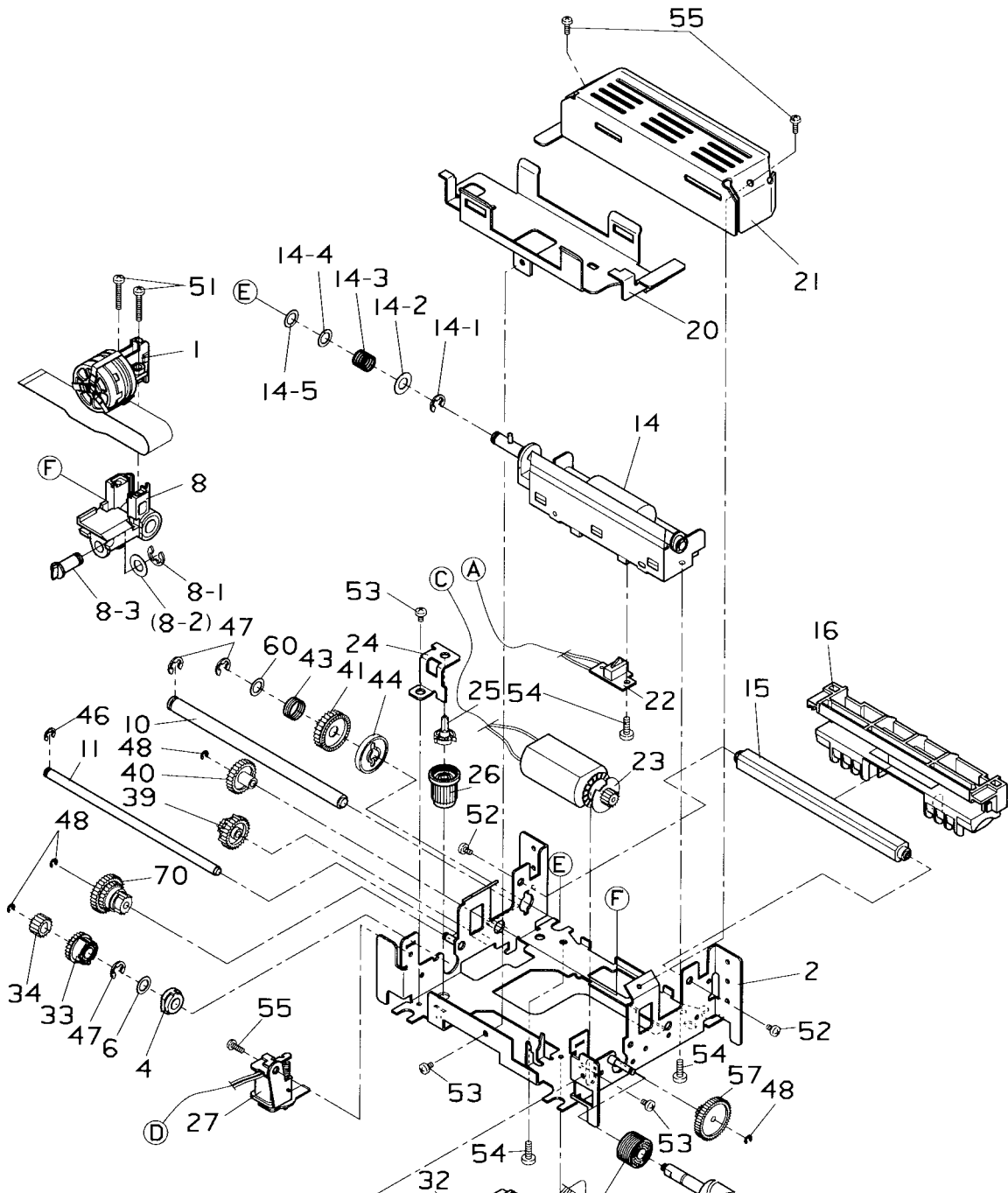
## Printer Assembly

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
25	*3	30980210	INK RIBBON CARTRIDGE RC200BR	1	BLACK/RED	
	#3	30980211	INK RIBBON CARTRIDGE RC200BR	1	BLACK/RED	
26		04991204	FASTENER T18S	1		S
27	#3	33400010	HOLDER LEVER SP24	1	SP242/246	S
28	#3	33910150	HOLDER SP24	1	SP242/246	S
29	#3	00920803	SCREW TAT 2-8 PT	1	SP242/246	S
30	#3	01903055	SCREW TR 3-8 WS/WF	1	SP242/246	S
-	#2	09990723	FERRITE CORE TFC-23-11-14	1	FOR EC,UK(230V)	
	#2	04991204	FASTENER T18S	1	FOR EC,UK(230V)	
	*2	37300610	TERMINAL COVER UNIT SP2	1	OPTION	
	#2	37300611	TERMINAL COVER UNIT SP2	1	OPTION :SP212/216	

## 6.2 Printer Mechanism

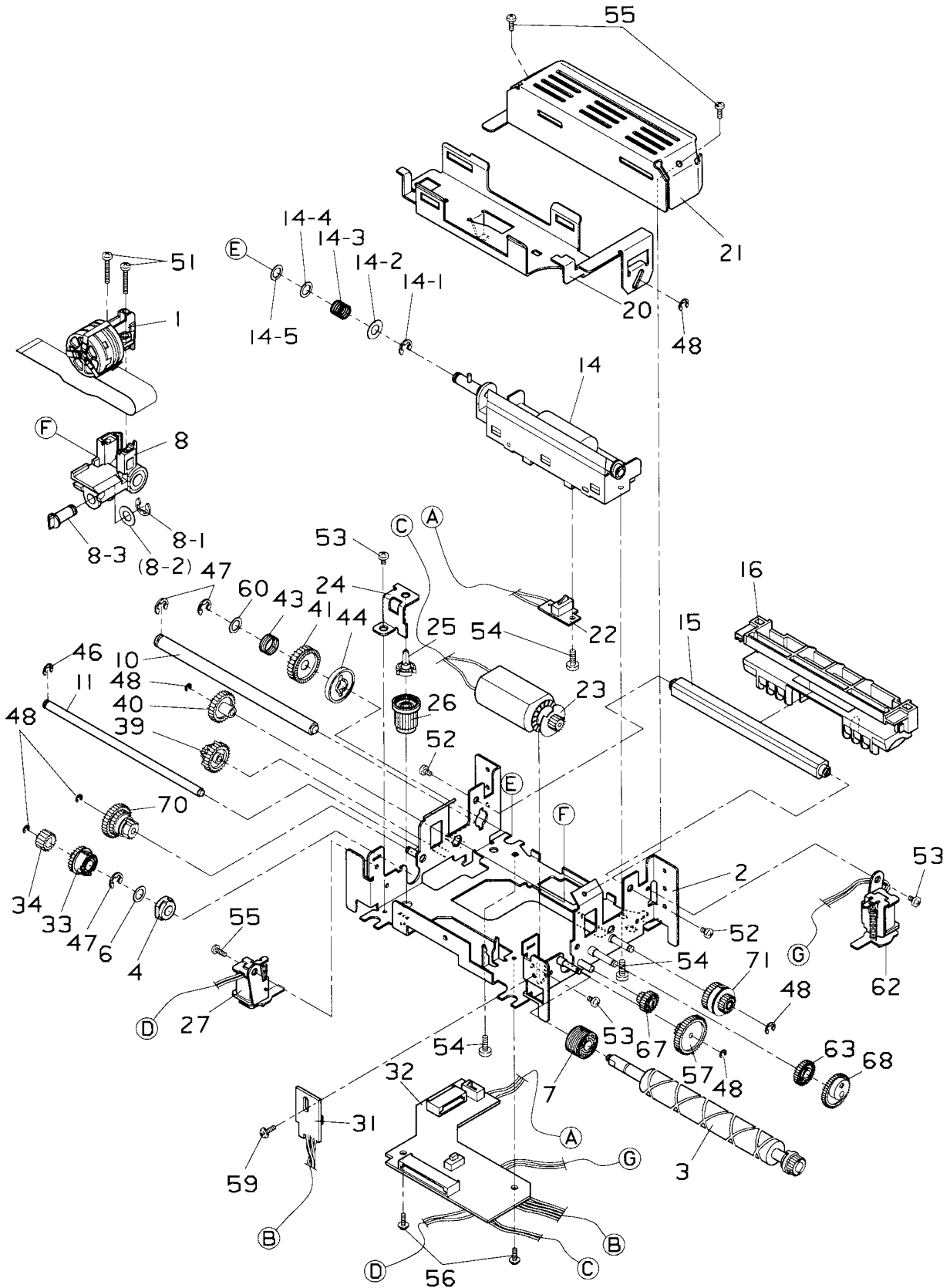
### 6.2.1 Assembly Drawing

#### A. MP212FP

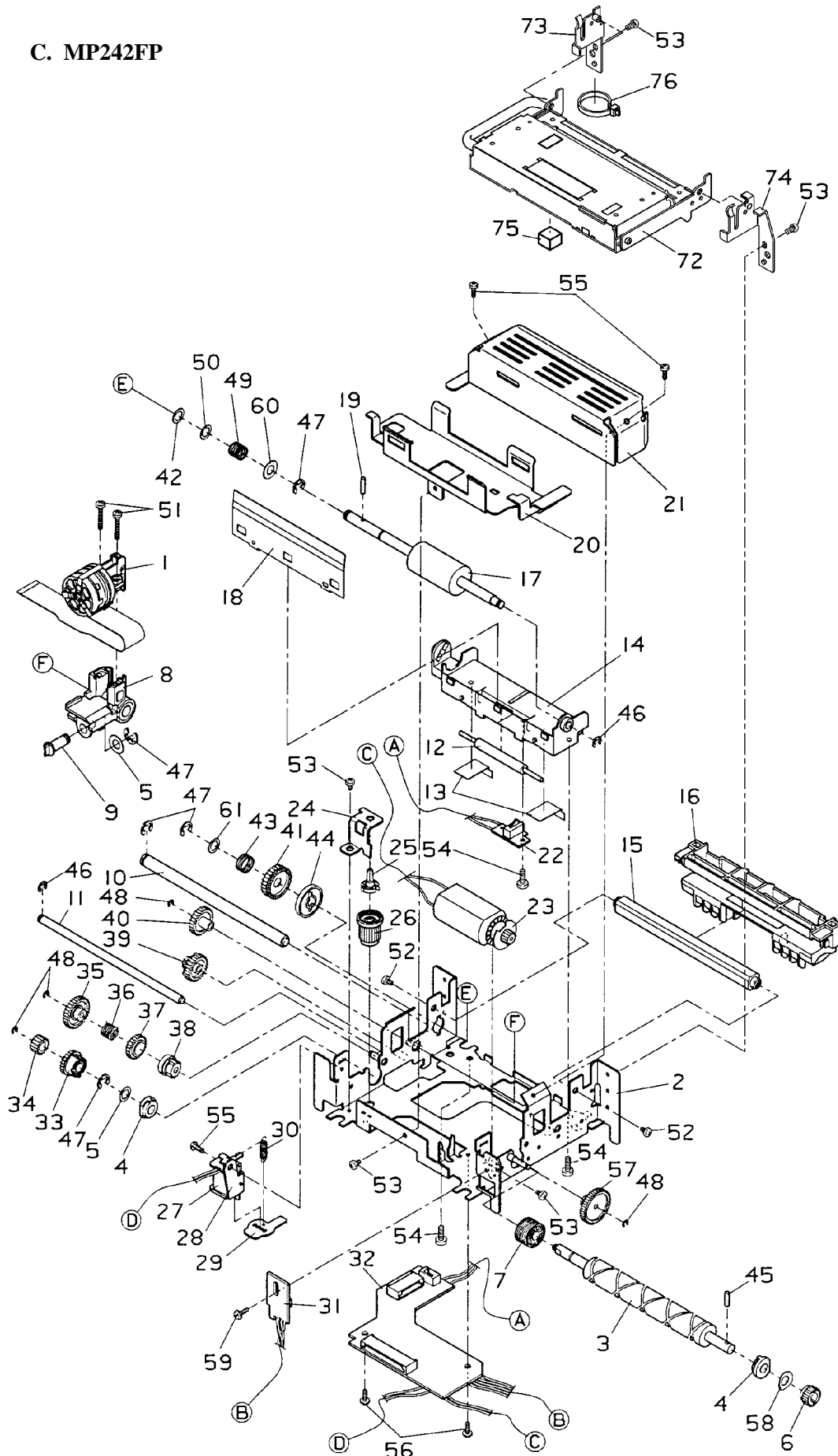


# PARTS LIST

## B. MP216FP



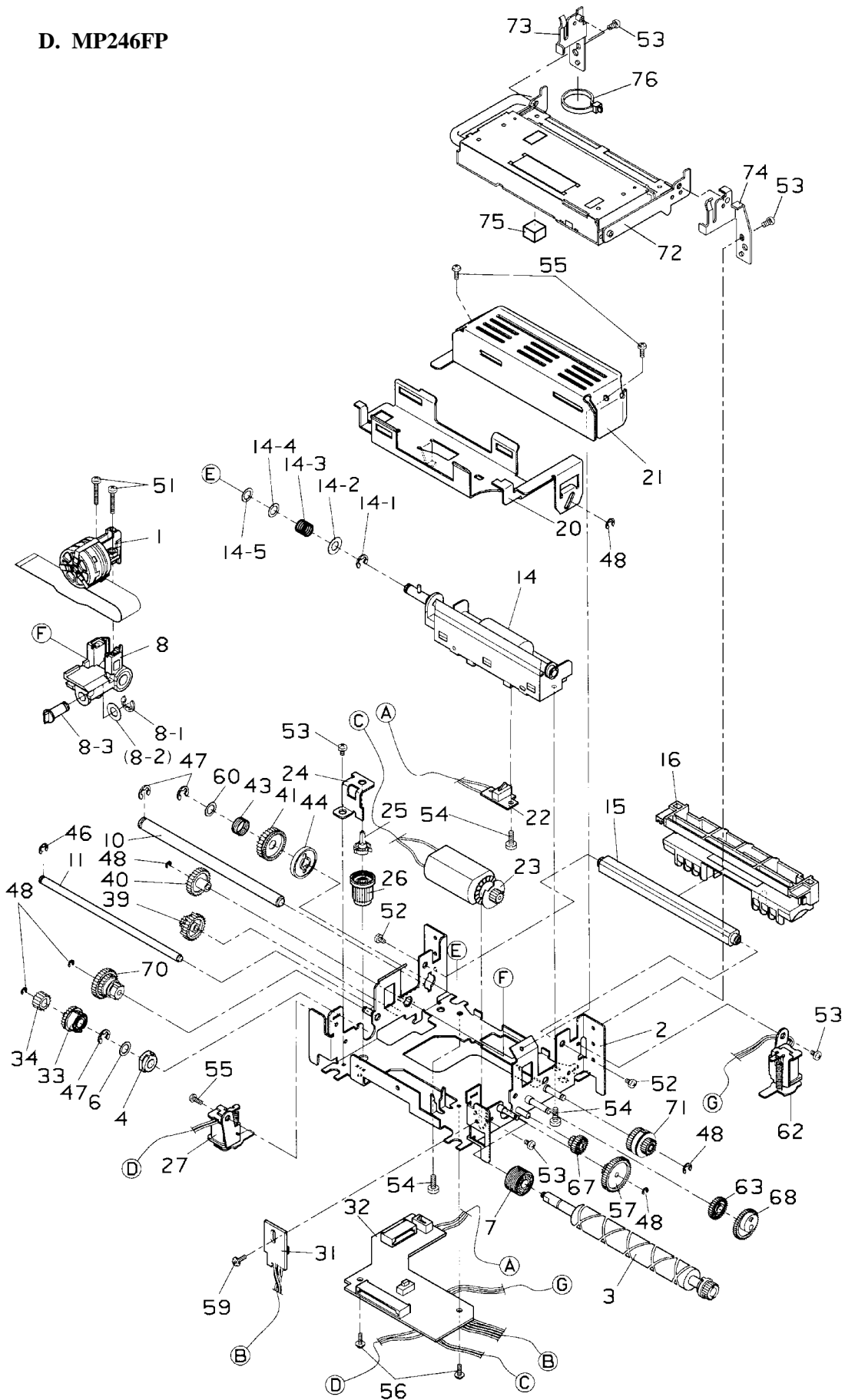
C. MP242FP





# PARTS LIST

## D. MP246FP



## 6.2.2 Parts List

## Printer Mechanism

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
1		38100110	DP200-24	1		S
2		37000010	FRAME UNIT	MP2	1	MP212/242
	#1	37000020	FRAME UNIT	MP216	1	MP216/246
3	*2	34920010	DRIVE SHAFT	MP2	1	
	#2	37001010	DRIVE SHAFT UNIT	MP2	1	
4		80203041	DRIVE SHAFT BEARING	MP300	1	
6		82500040	WAVE WASHER 1	DT	1	
7		33140010	WORM GEAR	MP2	1	
8	*2	37001310	CARRIAGE ASSY	MP2	1	VER.1
	#2	37001111	CARRIAGE UNIT	MP2	1	VER.2
8-1		04020016	STOP RING SE4.0		1	S
8-2	*2	82500040	WAVE WASHER 1	DT	1	VER.1
	#2					NOT USED :VER.2
8-3	*2	81301760	HALF-NUT	MP300	1	VER.1
	#2	81301761	HALF-NUT	MP300	1	VER.2
10		31360111	CARRIAGE STAY	MP2	1	
11		31360121	CARRIAGE GUIDE STAY	MP2	1	
14	*2	33910011	PAPER GUIDE	MP2	1	
	#2	37003010	PAPER GUIDE UNIT	MP2	1	
14-1		04020016	STOP RING SE4.0		1	S
14-2		02205002	PLAIN WASHER WF5X10X0.8		1	
14-3		30520120	SPRING C070-060-0140		1	
14-4		02305025	POLY-SLIDER WP5X0.25		1	S
14-5	*1	82500430	WASHER 5.2X0.15	832	3	
	#1	82500430	WASHER 5.2X0.15	832	1	
15		31375010	PLATEN	MP2	1	
16		33902010	PLATEN BASE	MP2	1	
20		32980010	RIBBON BASE S	MP2	1	MP212/242
	*2	32980020	RIBBON BASE W	MP2	1	MP216/246
	#2	32980021	RIBBON BASE W	MP2	1	MP216/246
21		32910010	HEAD COVER	MP2	1	
22		37002020	PE SWITCH UNIT	MP2	1	S
23		37002010	MOTOR 24V UNIT	MP2	1	S
24		32981010	RIBBON SHAFT GUIDE	MP2	1	
25		33980010	RIBBON SHAFT	MP2	1	
26		33140110	WORM WHEEL	MP2	1	
27	*2	37008310	COIL 24V ASSY	MP2	1	S
	#2	37008010	SOLENOID 24V UNIT	MP2	1	S
31		37007610	TIMING DETECTOR BD UNIT	MP2	1	S
32	*3	37007010	TERMINAL BOARD UNIT	MP2	1	MP212/242
	#3	37007011	TERMINAL BOARD UNIT	MP2	1	MP212/242
	*3	37007020	TERMINAL BOARD UNIT	MP216	1	MP216/246
	#3	37007021	TERMINAL BOARD UNIT	MP216	1	MP216/246
33	*1	33101120	CLUTCH CLAW GEAR	MP2	1	
	*1	33101120	CLUTCH CLAW GEAR	MP2	1	
	#1	33101121	CLUTCH CLAW GEAR	MP2	1	
34		33100020	DRIVE SHAFT GEAR L	MP2	1	
39		33101220	INTERMITTENT GEAR R	MP2	1	
40		33102110	GEAR 28X0.5	MP2	1	
41		33102010	PAPER FEED GEAR	MP2	1	
43	*2	30520110	SPRING C095-060-0090		1	
	#2	30520100	SPRING C094-060-0073		1	
44		33110010	PAPER FEED RATCHET	MP2	1	

# PARTS LIST

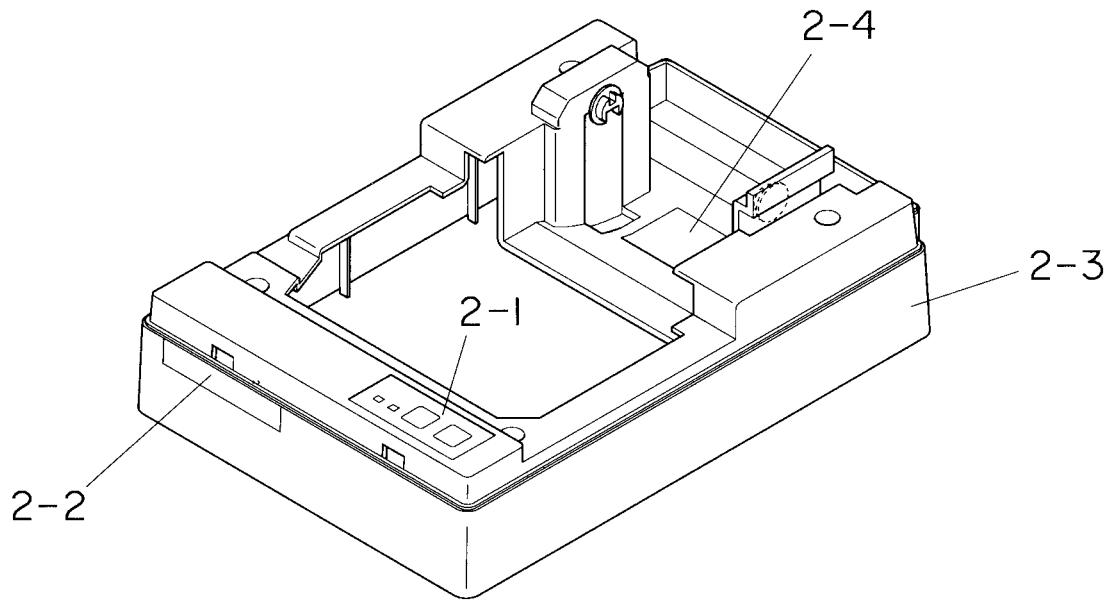
## Printer Mechanism

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
46		04020015	STOP RING SE3.0	1		S
47		04020016	STOP RING SE4.0	3		S
48		04020010	STOP RING SE2.0	4	MP212/242	
	#1	04020010	STOP RING SE2.0	5	MP216/246	
51	*2	01902620	SCREW TAT 2.6-14 PT	2		S
	#2	01902631	SCREW TAT 2.6-14 PT-WF	2		S
52		00626404	SCREW TR 2.6-4	2		S
53		00926503	SCREW TAT 2.6-5 CT	3	MP212/216	S
	#3	00926503	SCREW TAT 2.6-5 CT	5	MP242/246	S
54		00926803	SCREW TAT 2.6-8 PT	3		S
55	*2	01902617	SCREW TAT 2.6-5 CT-FL	3		
	#2	01902618	SCREW TAT 2.6-4	3		
56		01902617	SCREW TAT 2.6-5 CT-FL	2		S
57		33100110	GEAR 12X45X0.4	MP2 1		
59		01902622	SCREW TAT 2.6-5 WF	1		
60		02205001	PLAIN WASHER WF5X12X0.8	1		
62	*2	37008320	COIL 24V ASSY	MP216 1	MP216/246	S
	#2	37008020	SOLENOID 24V UNIT	MP216 1	MP216/246	S
63	#1	33102120	GEAR 28X0.4	MP216 1	MP216/246	
67	#1	33100120	GEAR 12X24X0.4	MP216 1	MP216/246	
68	#1	33101310	CAM GEAR	MP216 1	MP216/246	
70	#1	37006020	PAPER FEED CLUTCH UNIT	MP2 1		
71	#1	37004010	RS CLUTCH UNIT	MP216 1	MP216/246	
72	#3	37002620	CUTTER ACS230 UNIT	MP24 1	MP242/246	
73	#3	37000560	HOLDER PLATE UNIT L	MP24 1	MP242/246	
74	#3	37000550	HOLDER PLATE UNIT R	MP24 1	MP242/246	
75	#3	30290110	STOPPER RUBBER	MP2 1	MP242/246	
76	#3	04991204	FASTENER T18S	1	MP242/246	

**6.3 Sub-assembly**

**6.3.1 Upper Case Unit**

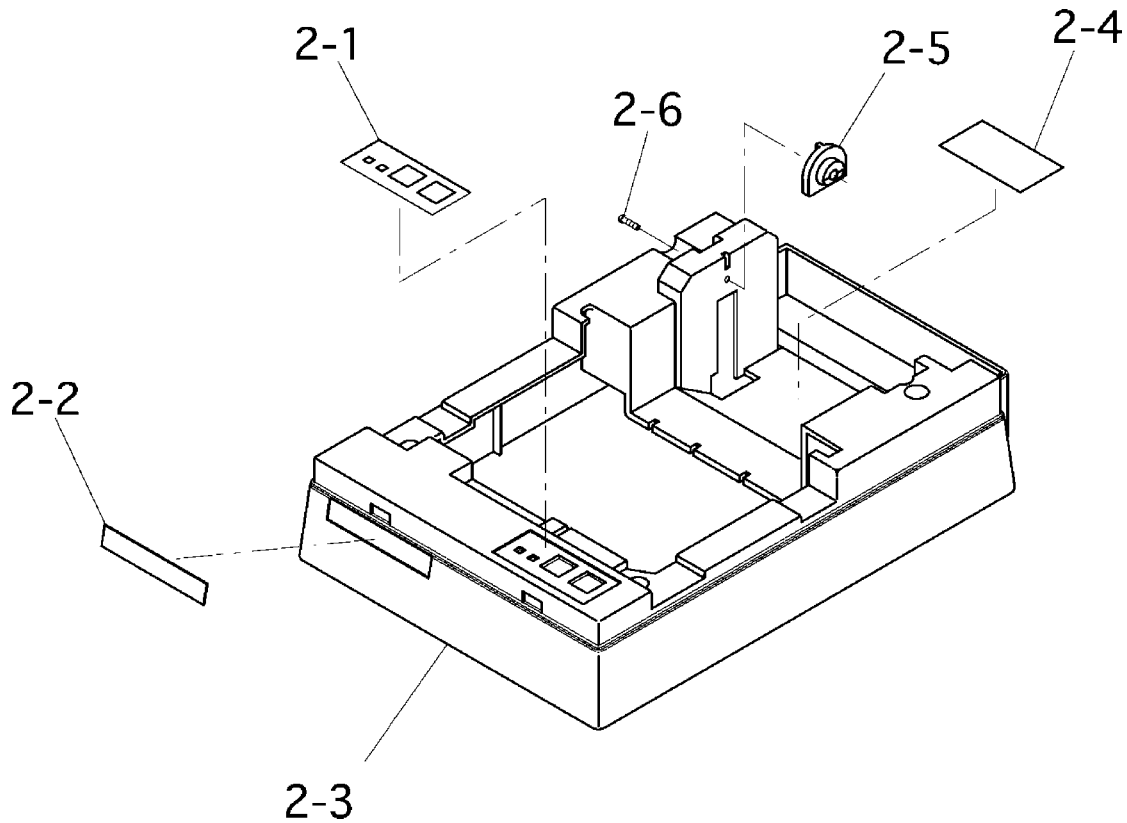
**A. SP212/216**



DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
2-1		30060010	OPERATION SHEET	SP2	1	
2-2		30070010	BRAND SEAL	SP2	1	
2-3	*2	33021020	UPPER CASE	SP2	1	
	#2	33021022	UPPER CASE	SP2	1	
2-4		30060110	PAPER SET SEAL	SP2	1	

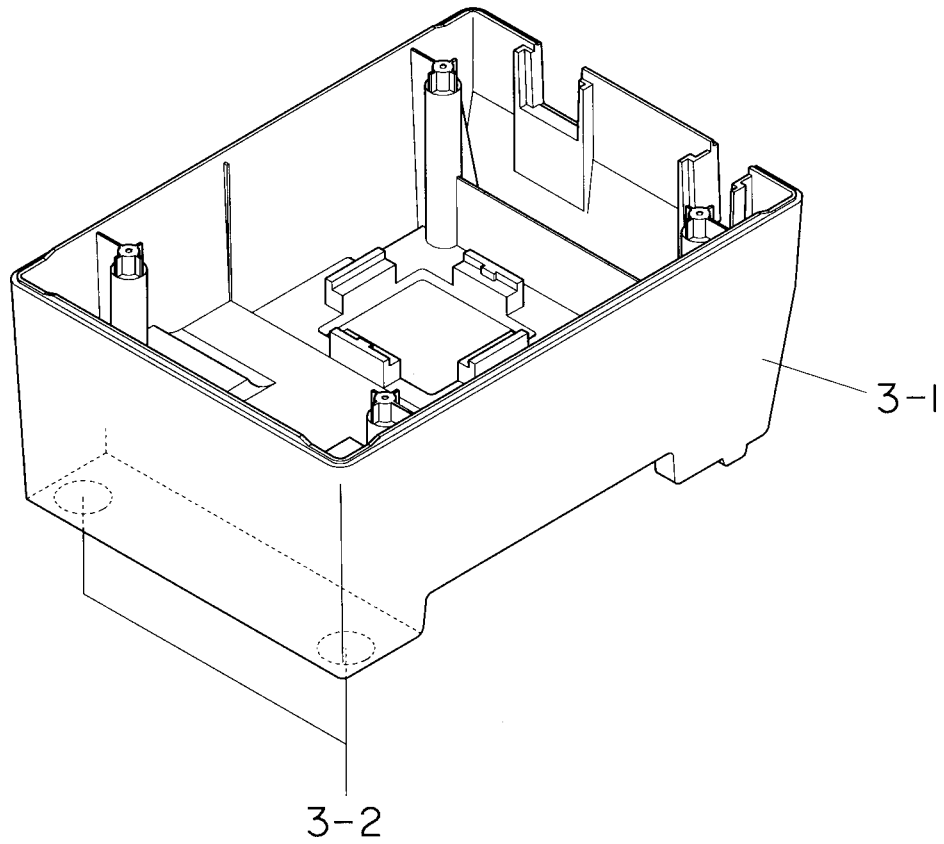
# PARTS LIST

## B. SP242/246



DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
2-1		30060010	OPERATION SHEET	SP2	1	
2-2		30070010	BRAND SEAL	SP2	1	
2-3		33021080	UPPER CASE	SP24	1	
2-4		30060110	PAPER SET SEAL	SP2	1	
2-5		33910150	HOLDER	SP24	1	
2-6		00920803	SCREW TAT 2-8 PT		1	

**6.3.2 Lower Case Unit**

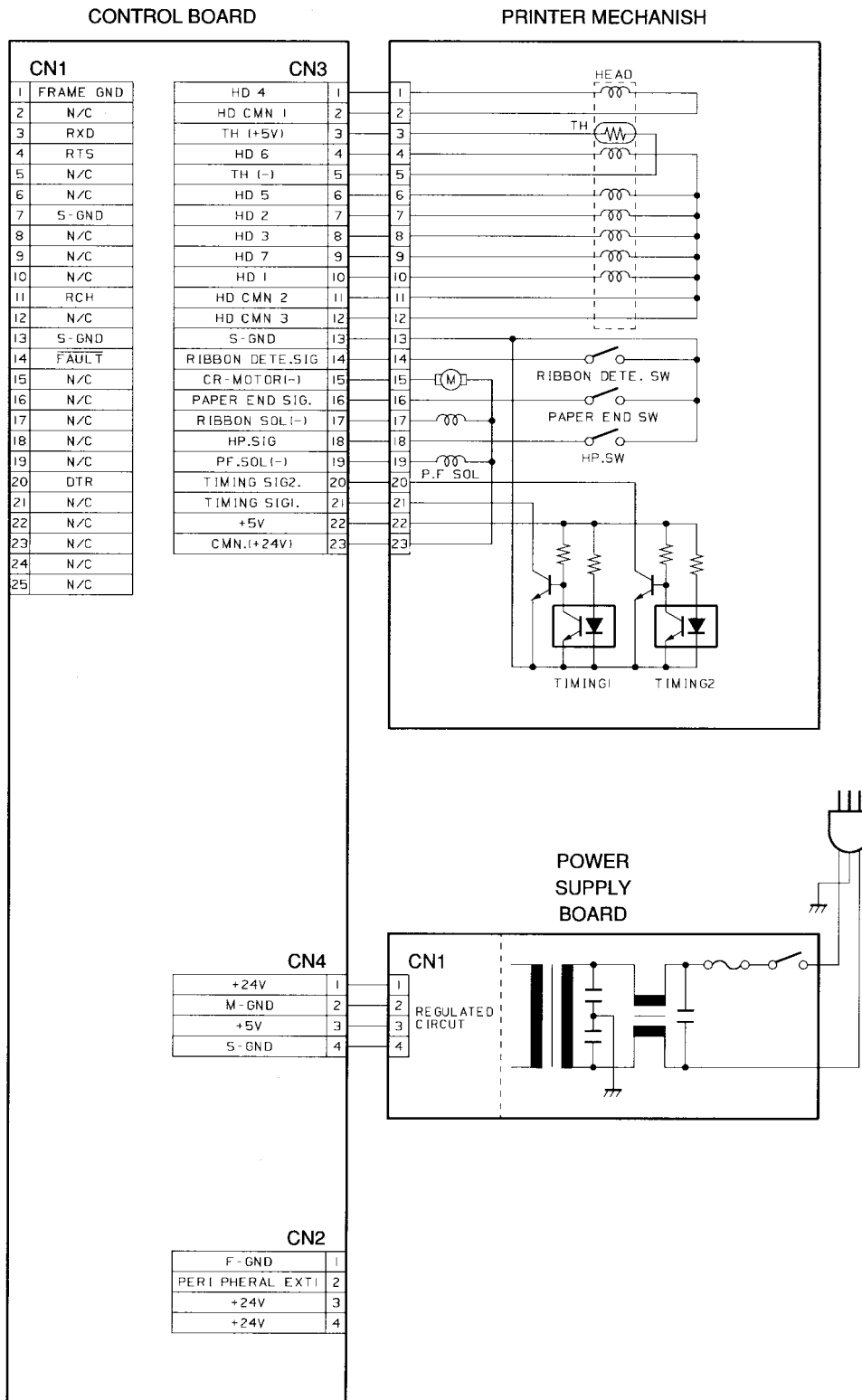


DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
3-1	*2	33021010	LOWER CASE SP2	1		
	#2	33021011	LOWER CASE SP2	1		
3-2		80991610	RUBBER FOOT NB24-10	2		

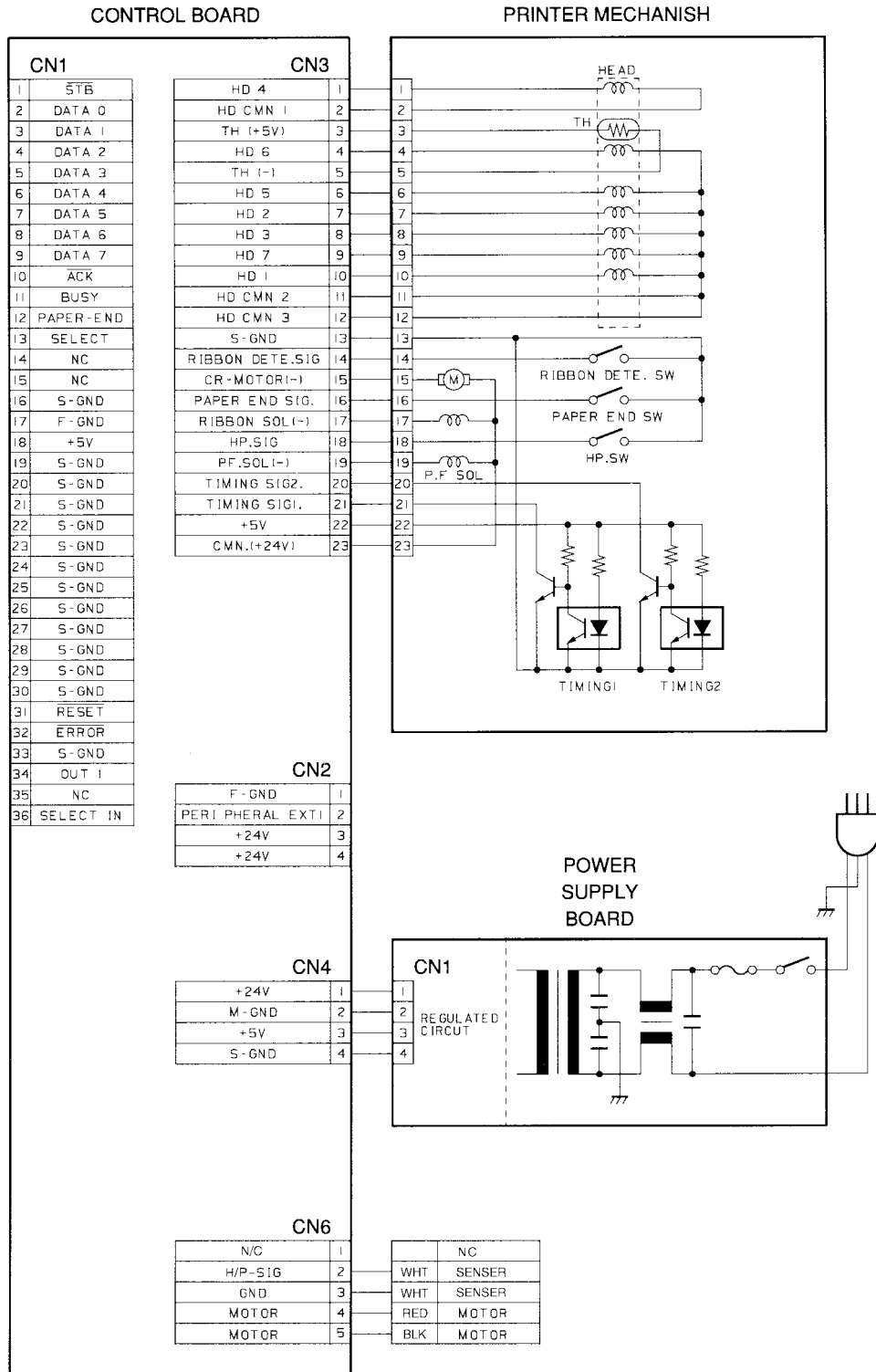
# PARTS LIST

## 6.4 Wiring Schematic of Printer

### 6.4.1 For Serial Interface



6.4.2 For Parallel Interface





# PARTS LIST

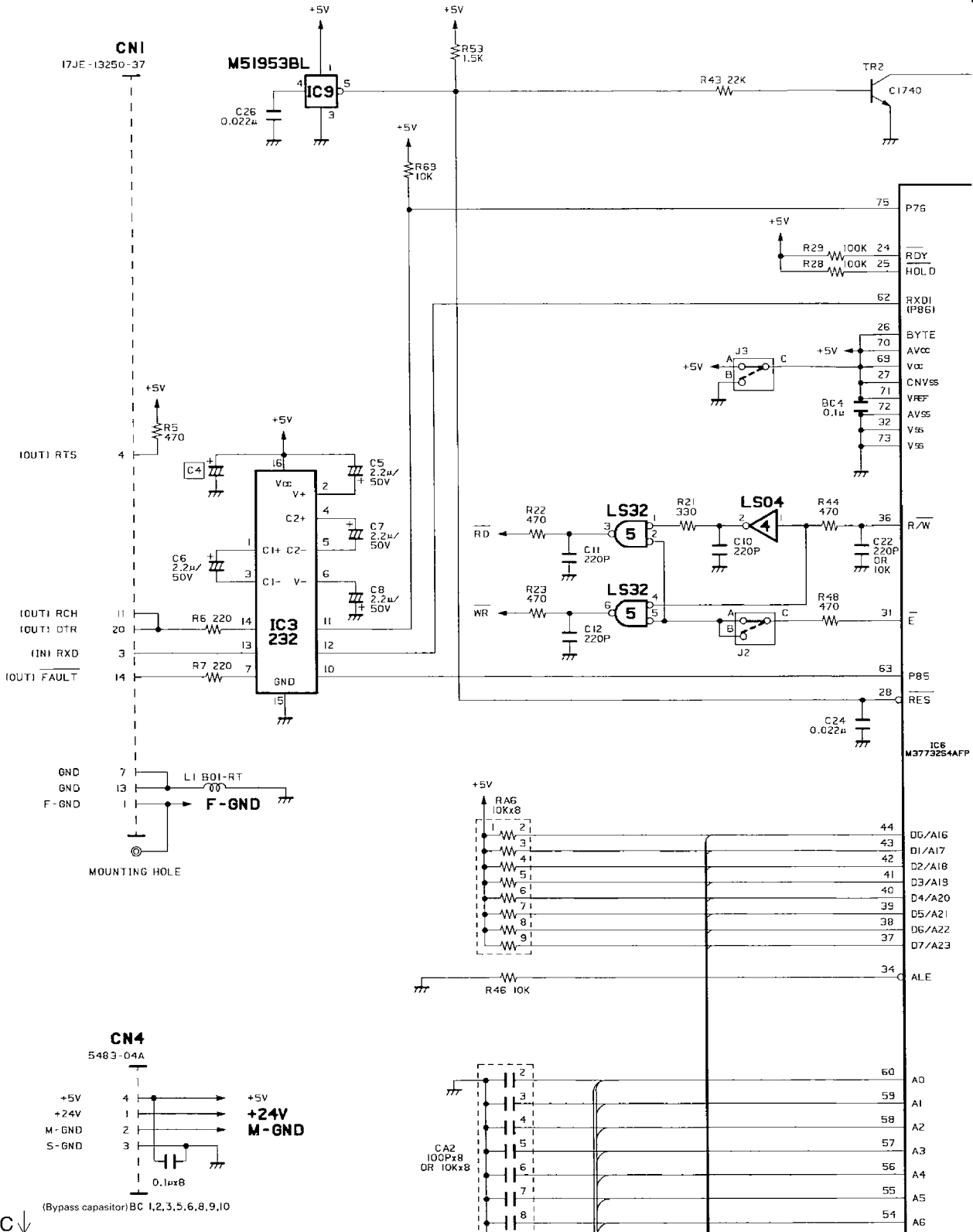
## 6.5 Main Logic Board

### 6.5.1 For Serial Interface

#### 6.5.1.1 Circuit Diagram

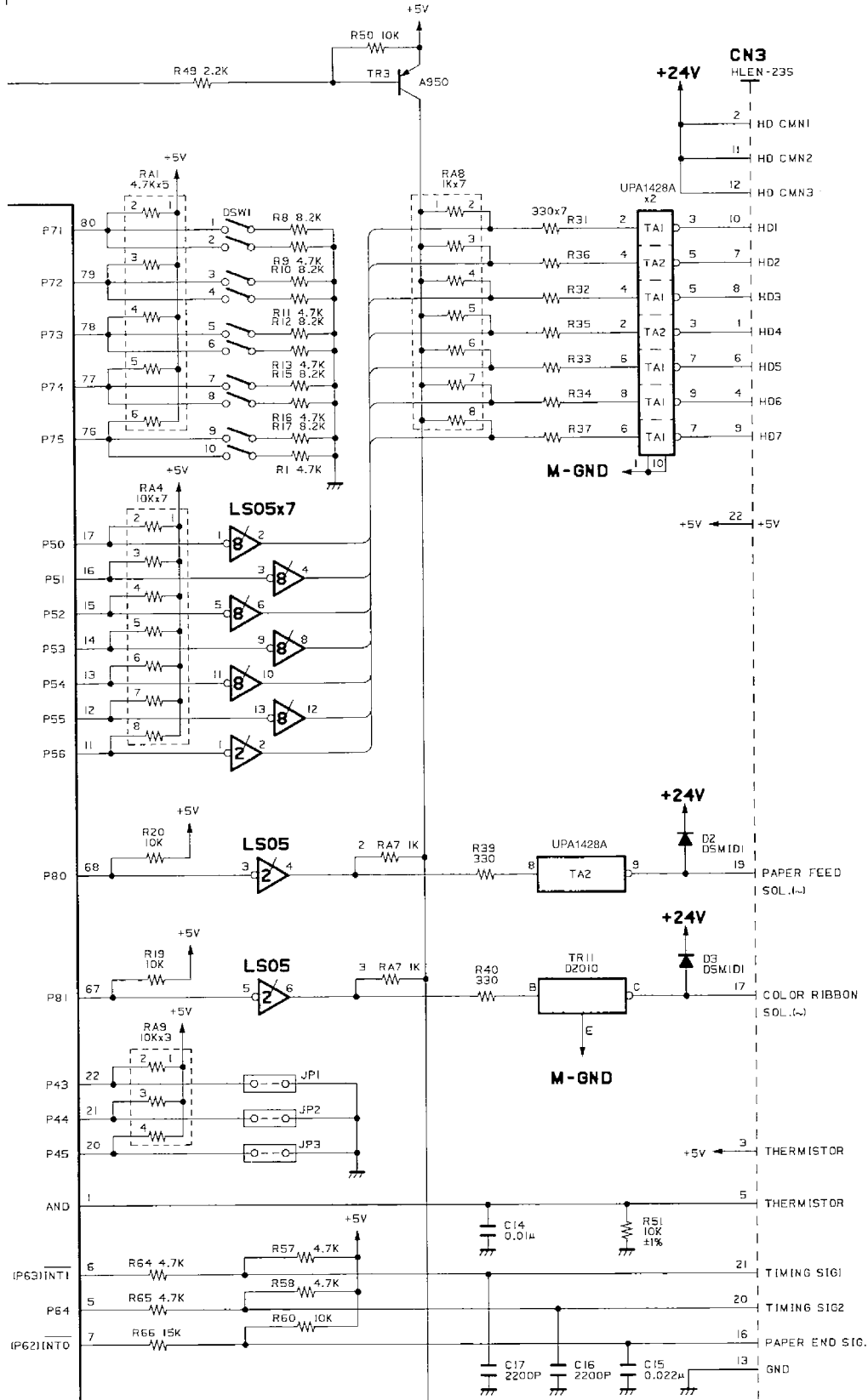
SIDE B

A



← SIDE A

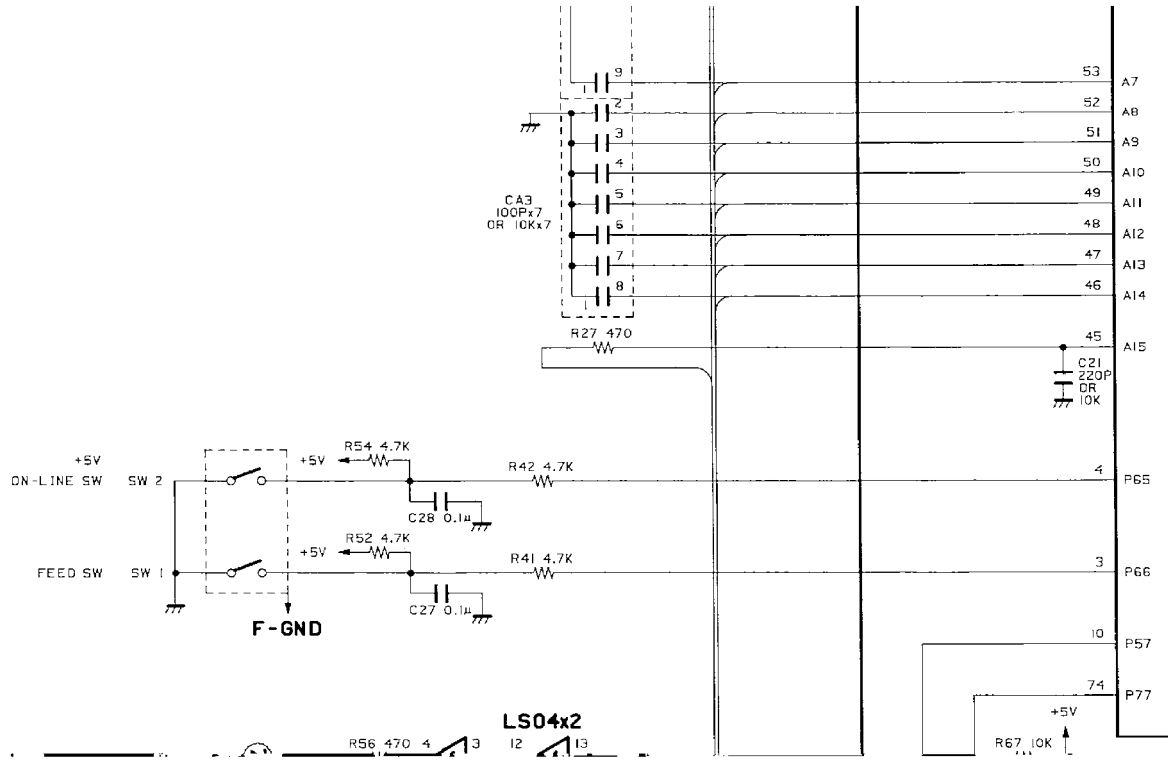
B

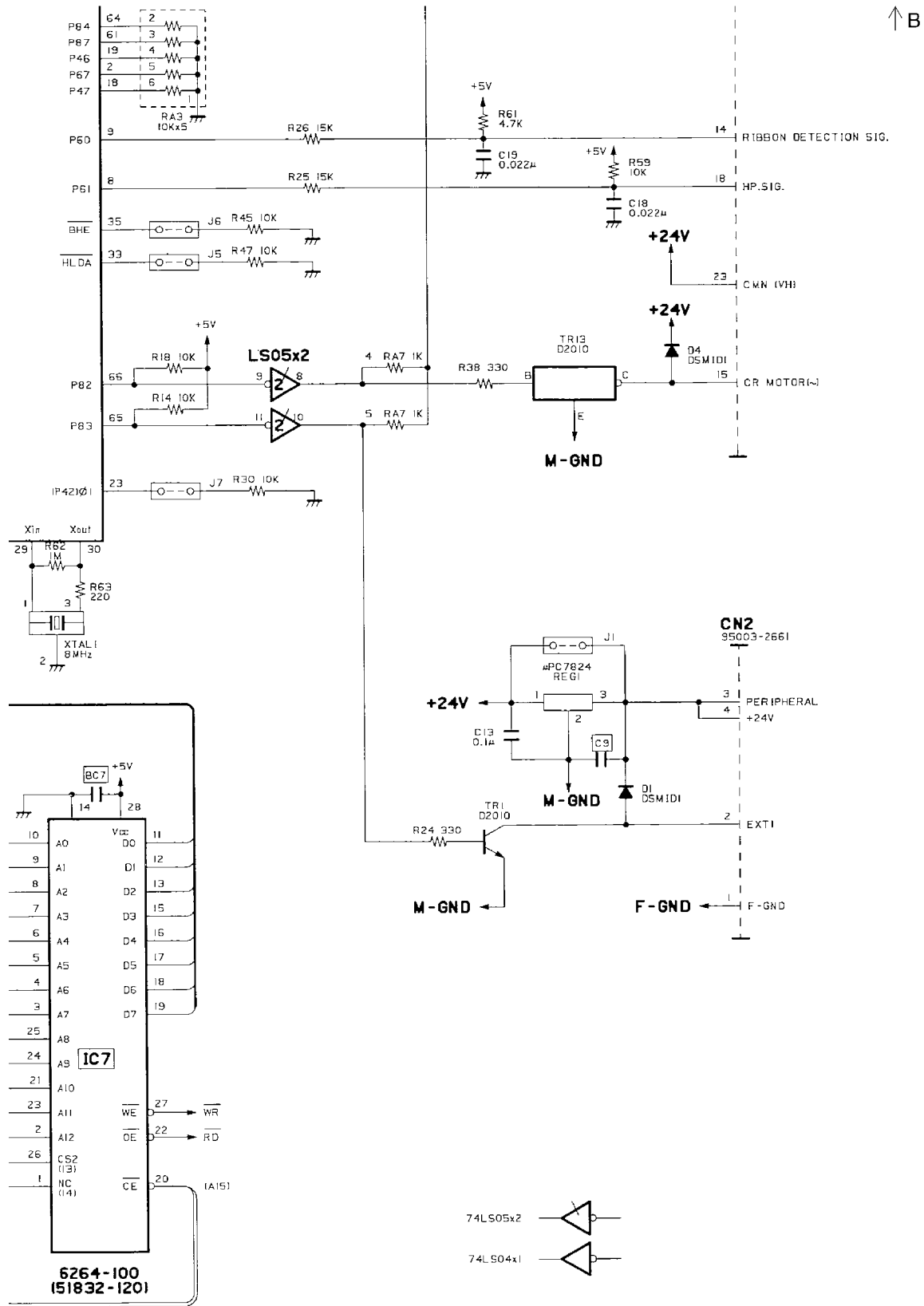


↓ D

# PARTS LIST

A ^

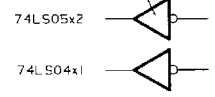




↑ B

← SIDE C

D



# PARTS LIST

## 6.5.1.2 Parts List

## Main Logic Board (Serial Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08222026	EPROM 27256-150NS	1	SP2S.F.**	
IC2	*3	08210142	TTL IC 74LS05FP*TL	1		
	#3	08210126	TTL IC 74LS05FP*EL	1		
IC3	*3	08200155	IC-I/F HD151232FP*TL	1		
	#3	08200157	IC-I/F ADM232LJR*SOL16	1		
IC4	*3	08210141	TTL IC 74LS04FP*TL	1		
	#3	08211037	TTL IC 74LS04FP*EL	1		
IC5	*3	08210143	TTL IC 74LS32FP*TL	1		
	#3	08211038	TTL IC 74LS32FP*EL	1		
IC6		08250018	CPU M37732S4AFP	1		
IC7					NOT MOUNTED	
IC8	*3	08210142	TTL IC 74LS05FP*TL	1		
	#3	08210126	TTL IC 74LS05FP*EL	1		
IC9		08200109	IC-RESET M51953BL	1		
R1		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R2		06054714	RD RESISTOR 470 OHM 1/6W	1		
R3-4					NOT USED	
R5		06054714	RD RESISTOR 470 OHM 1/6W	1		
R6-7		06052211	RD RESISTOR 220 OHM 1/6W	2		
R8		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R9		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R10		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R11		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R12		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R13		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R14		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R15		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R16		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R17		06058224	RD RESISTOR 8.2 K-OHM 1/6W	1		
R18-20		06051034	RD RESISTOR 10 K-OHM 1/6W	3		
R21		06053314	RD RESISTOR 330 OHM 1/6W	1		
R22-23		06054714	RD RESISTOR 470 OHM 1/6W	2		
R24		06053314	RD RESISTOR 330 OHM 1/6W	1		
R25-26		06051535	RD RESISTOR 15 K-OHM 1/6W	2		
R27		06054714	RD RESISTOR 470 OHM 1/6W	1		
R28-29		06051044	RD RESISTOR 100 K-OHM 1/6W	2		
R30		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R31-39		06053314	RD RESISTOR 330 OHM 1/6W	9		
R40	#1	06053314	RD RESISTOR 330 OHM 1/6W	1	SP216	
R41-42		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R43		06052234	RD RESISTOR 22 K-OHM 1/6W	1		
R44		06054714	RD RESISTOR 470 OHM 1/6W	1		
R45-47		06051034	RD RESISTOR 10 K-OHM 1/6W	3		
R48		06054714	RD RESISTOR 470 OHM 1/6W	1		
R49		06052224	RD RESISTOR 2.2 K-OHM 1/6W	1		
R50		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R51		06251034	RN RESISTOR 10 K-OHM 1/6W	1		
R52		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R53		06051525	RD RESISTOR 1.5 K-OHM 1/6W	1		
R54		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R55-56		06054714	RD RESISTOR 470 OHM 1/6W	2		
R57-58		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R59-60		06051034	RD RESISTOR 10 K-OHM 1/6W	2		

# PARTS LIST

## Main Logic Board (Serial Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R61		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R62		06051051	RD RESISTOR 1 M-OHM 1/6W	1		
R63		06052211	RD RESISTOR 220 OHM 1/6W	1		
R64-65		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R66		06051535	RD RESISTOR 15 K-OHM 1/6W	1		
R67-69		06051034	RD RESISTOR 10 K-OHM 1/6W	3		
C1-3					NOT USED	
C4					NOT MOUNTED	
C5-8		05052255	CHEM. CAPA. 2.2UF 50V	4		
C9					NOT MOUNTED	
C10-12		05152212	CERA. CAPA. 220PF 50V	3		
C13		05151042	CERA. CAPA. 0.1UF 50V	1		
C14		05151033	CERA. CAPA. 0.01UF 50V	1		
C15		05152234	CERA. CAPA. 0.022UF 50V	1		
C16-17		05152225	CERA. CAPA. 2200PF 50V	2		
C18		05152234	CERA. CAPA. 0.022UF 50V	1		
C19	*1	05154714	CERA. CAPA. 470PF 50V	1		
	#1	05152234	CERA. CAPA. 0.022UF 50V	1		
C20		05151015	CERA. CAPA. 100PF 50V	1		
C21-22		05152212	CERA. CAPA. 220PF 50V	2		
C23					NOT USED	
C24		05152234	CERA. CAPA. 0.022UF 50V	1		
C25					NOT USED	
C26		05152234	CERA. CAPA. 0.022UF 50V	1		
C27-28		05131044	CERA. CAPA. 0.1UF 25V	2		
BC1		05532234	CAPACITOR 0.022UF 25V	1		
BC2-3		05152234	CERA. CAPA. 0.022UF 50V	2		
BC4		05131044	CERA. CAPA. 0.1UF 25V	1		
BC5-6		05152234	CERA. CAPA. 0.022UF 50V	2		
BC7					NOT MOUNTED	
BC8-10		05152234	CERA. CAPA. 0.022UF 50V	3		
TA1-2	*2	07650048	TRANSISTOR ARRAY STA471A=S	2		
	#2	07650056	TRANSISTOR ARRAY UPA1428AH	2		
TR1		07320101	TRANSISTOR 2SD2010	1		
TR2		07227853	TRANSISTOR 2SC1740SE	1		
TR3		07009502	TRANSISTOR 2SA950	1		
TR4-10					NOT USED	
TR11	#1	07320101	TRANSISTOR 2SD2010	1	SP216	
TR12					NOT USED	
TR13		07320101	TRANSISTOR 2SD2010	1		
REG1		08202011	IC-REG UPC7824	1		
D1-2		08000040	DIODE DSM1D1	2		
D3	#1	08000040	DIODE DSM1D1	1	SP216	
D4		08000040	DIODE DSM1D1	1		
LED1-2		08300136	LED SLZ-390B	2		
RA1		06584724	RESIS. ARRAY 4.7K-OHM 1/8W 5EL	1		
RA2		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
RA3		06581036	RESIS. ARRAY 10 K-OHM 1/8W 5EL	1		
RA4-5		06581037	RESIS. ARRAY 10 K-OHM 1/8W 7EL	2		
RA6		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
RA7		06581023	RESIS. ARRAY 1 K-OHM 1/8W 4EL	1		
RA8		06581026	RESIS. ARRAY 1 K-OHM 1/8W 7EL	1		
RA9		06581030	RESIS. ARRAY 10 K-OHM 1/8W 3EL	1		

# PARTS LIST

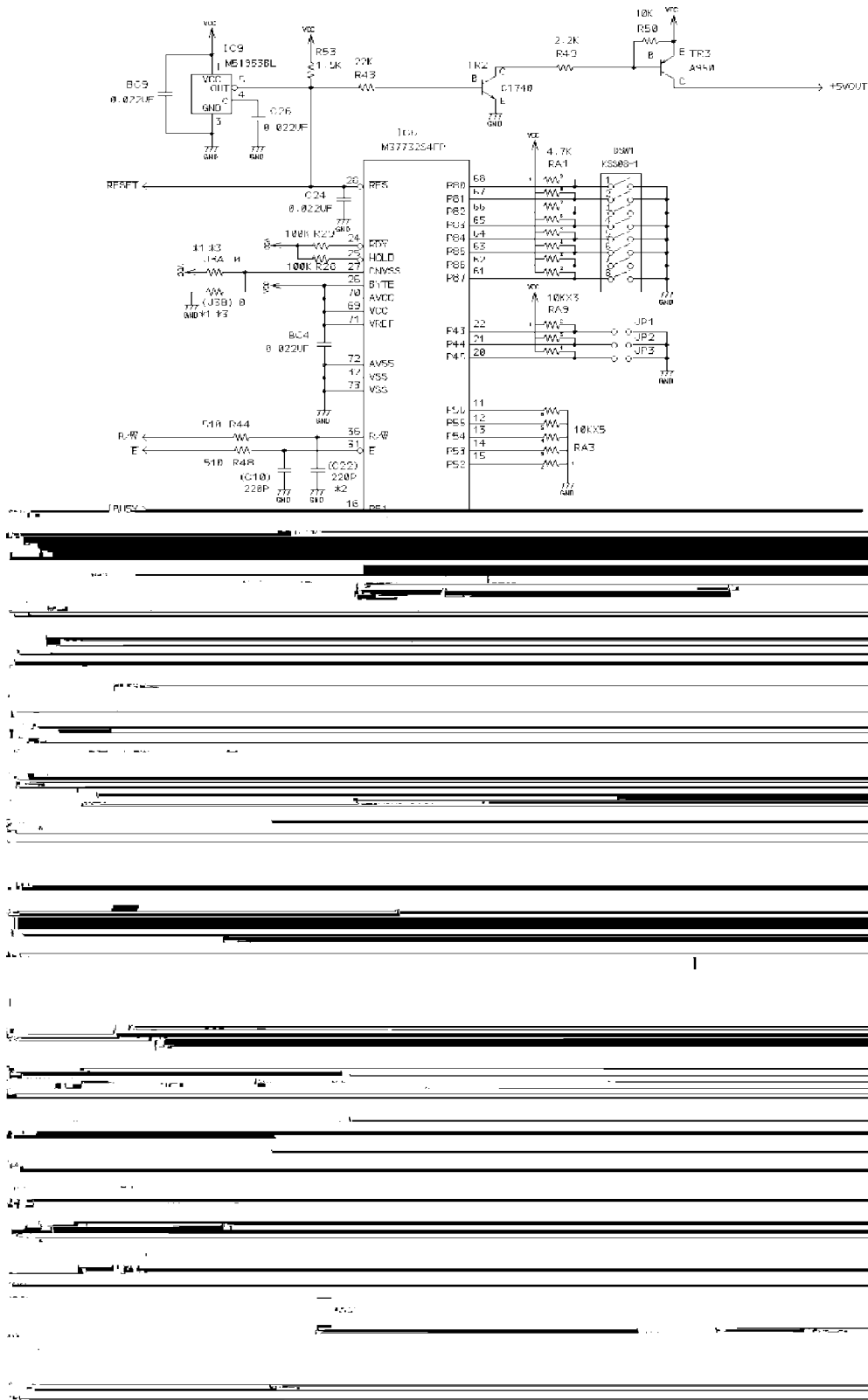
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## Main Logic Board (Serial Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
CA1		05652212	CAPA. ARRAY 220PF 50V 8EL	1		
CA2		05651012	CAPA. ARRAY 100PF 50V 8EL	1		
CA3		05651018	CAPA. ARRAY 100PF 50V 7EL	1		
CN1		09100566	CONNECTOR 17JE-13250-37	1		
CN2		09100567	CONNECTOR 95003-2661	1		
CN3		09100495	CONNECTOR HLEM23S-1	1		
CN4		09100317	CONNECTOR 5483-04A	1		
CN5					NOT USED	
DSW1		09090054	DIP SWITCH SD-10ZL	1		
SW1-2		09010055	PUSH SWITCH SKHHLN	2		
X1		09250047	CERA. OSCILLATOR CST8.0MTW	1		
L1		09990705	BEADS INDUCTOR B01-RT	1		

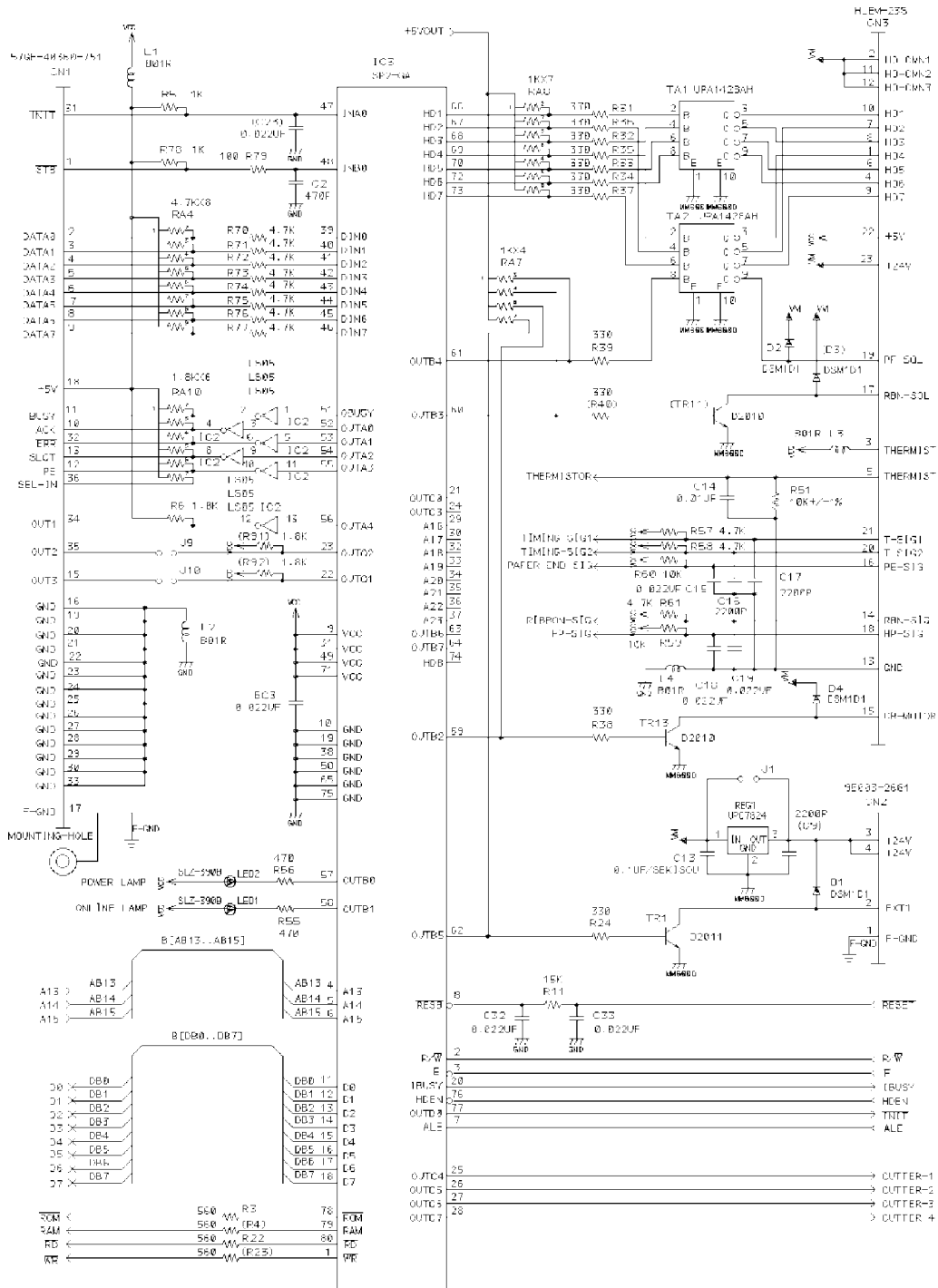
6.5.2 For Parallel Interface

6.5.2.1 Circuit Diagram

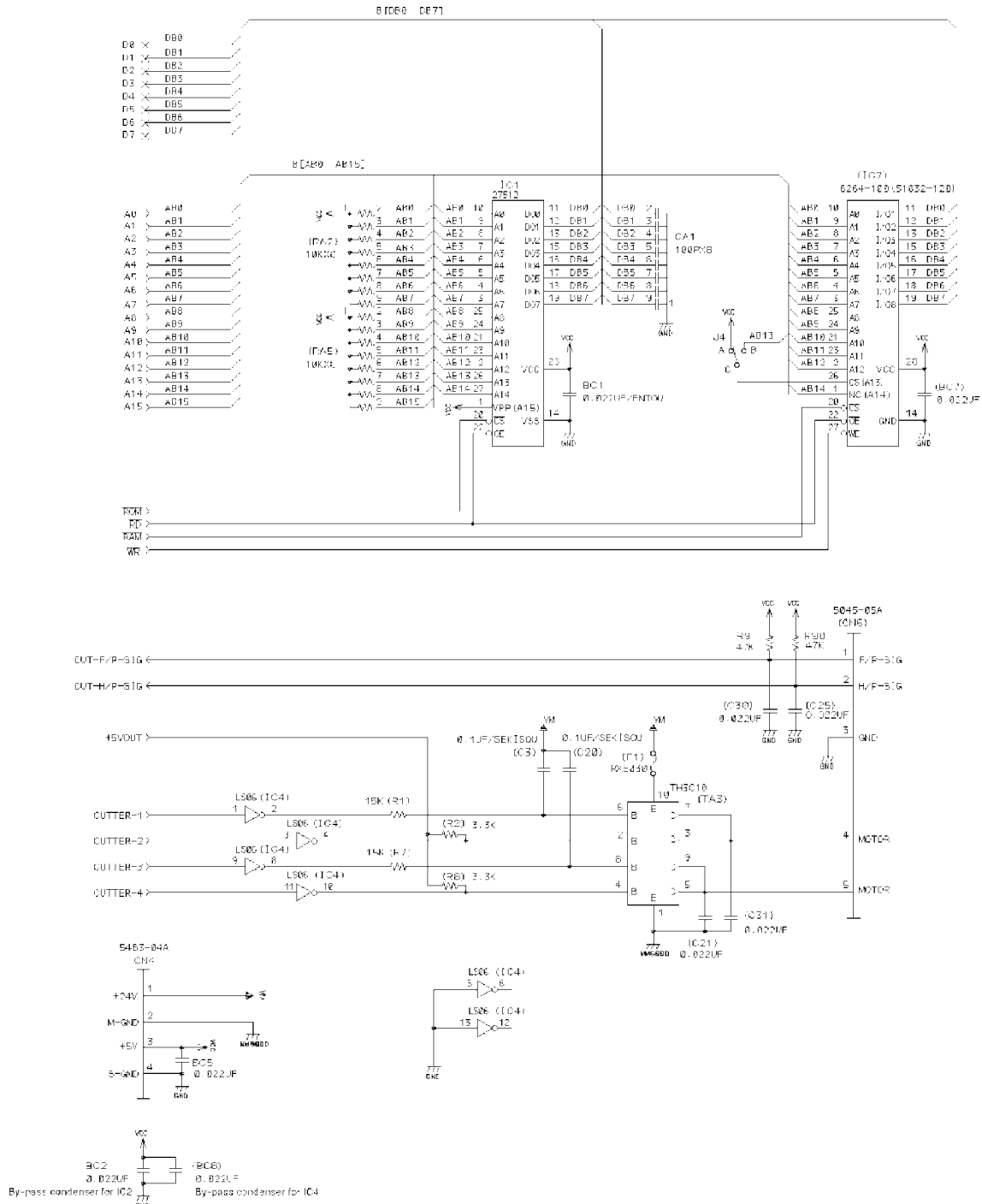




# PARTS LIST



Main Logic Board (Parallel Interface) 2/3



Main Logic Board (Parallel Interface) 3/3

# PARTS LIST

## 6.5.2.2 Parts List

## Main Logic Board (Parallel Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08222026	EPROM 27256-150NS	1	SP2P.F.**	
IC2	*3	08210142	TTL IC 74LS05FP*TL	1		
	#3	08210126	TTL IC 74LS05FP*EL	1		
IC3		08240072	GATE ARRAY HG62E11R77FBSPII	1		
IC4					NOT MOUNTED :SP212/6	
		08210127	TTL IC 74LS06FP*EL	1	:SP242/246	
IC5					NOT USED	
IC6		08250018	CPU M37732S4AFP	1		
IC7					NOT MOUNTED	
IC8					NOT USED	
IC9		08200109	IC-RESET M51953BL	1		
R1					NOT MOUNTED :SP212/6	
	#3	06051535	RD RESISTOR 15 K-OHM 1/6W	1	:SP242/246	
R2					NOT MOUNTED :SP212/6	
	#3	06053324	RD RESISTOR 3.3 K-OHM 1/6W	1	:SP242/246	
R3		06055614	RD RESISTOR 560 OHM 1/6W	1		
R4					NOT MOUNTED	
R5		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R6		06051825	RD RESISTOR 1.8 K-OHM 1/6W	1		
R7					NOT MOUNTED :SP212/6	
	#3	06051535	RD RESISTOR 15 K-OHM 1/6W	1	:SP242/246	
R8					NOT MOUNTED :SP212/6	
	#3	06053324	RD RESISTOR 3.3 K-OHM 1/6W	1	:SP242/246	
R9	#3	06054734	RD RESISTOR 47 K-OHM 1/6W	1		
R10	#3	06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R11		06051535	RD RESISTOR 15 K-OHM 1/6W	1		
R12-21					NOT USED	
R22		06055614	RD RESISTOR 560 OHM 1/6W	1		
R23					NOT MOUNTED	
R24		06053314	RD RESISTOR 330 OHM 1/6W	1		
R25-26		06051535	RD RESISTOR 15 K-OHM 1/6W	2		
R27					NOT USED	
R28-29		06051044	RD RESISTOR 100 K-OHM 1/6W	2		
R30	*3	06051034	RD RESISTOR 10 K-OHM 1/6W	1		
	#3				NOT USED	
R31-39		06053314	RD RESISTOR 330 OHM 1/6W	9		
R40	#3	06053314	RD RESISTOR 330 OHM 1/6W	1	:SP216/246	
R41-42		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R43		06052234	RD RESISTOR 22 K-OHM 1/6W	1		
R44		06055114	RD RESISTOR 510 OHM 1/6W	1		
R45	*3	06051034	RD RESISTOR 10 K-OHM 1/6W	1		
	#3				NOT USED	
R46		06055114	RD RESISTOR 510 OHM 1/6W	1		
R47	*3	06051034	RD RESISTOR 10 K-OHM 1/6W	1		
	#3				NOT USED	
R48		06055114	RD RESISTOR 510 OHM 1/6W	1		
R49		06052224	RD RESISTOR 2.2 K-OHM 1/6W	1		
R50		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R51		06251034	RN RESISTOR 10 K-OHM 1/6W	1		
R52		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R53		06051525	RD RESISTOR 1.5 K-OHM 1/6W	1		
R54		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R55-56		06054714	RD RESISTOR 470 OHM 1/6W	2		

# PARTS LIST

## Main Logic Board (Parallel Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R57-58		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R59-60		06051034	RD RESISTOR 10 K-OHM 1/6W	2		
R61		06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R62		06051051	RD RESISTOR 1 M-OHM 1/6W	1		
R63		06052211	RD RESISTOR 220 OHM 1/6W	1		
R64-65		06054725	RD RESISTOR 4.7 K-OHM 1/6W	2		
R66		06051535	RD RESISTOR 15 K-OHM 1/6W	1		
R67-69					NOT USED	
R70-77		06054725	RD RESISTOR 4.7 K-OHM 1/6W	8		
R78		06051025	RD RESISTOR 1 K-OHM 1/6W	1		
R79		06051014	RD RESISTOR 100 OHM 1/6W	1		
R80-83					NOT USED	
R84		06051034	RD RESISTOR 10 K-OHM 1/6W	1		
R85-87					NOT USED	
R88	#3	06054725	RD RESISTOR 4.7 K-OHM 1/6W	1		
R89					NOT USED	
R90	#3	06054734	RD RESISTOR 47 K-OHM 1/6W	1		
R91-92					NOT MOUNTED	
C1					NOT MOUNTED	
C2		05154714	CERA. CAPA. 470PF 50V	1		
C3					NOT MOUNTED :SP212/6	
	#3	05151042	CERA. CAPA. 0.1UF 50V	1	:SP216/246	
C4-8					NOT USED	
C9-10					NOT MOUNTED	
C11-12					NOT USED	
C13		05151042	CERA. CAPA. 0.1UF 50V	1		
C14		05151033	CERA. CAPA. 0.01UF 50V	1		
C15		05152234	CERA. CAPA. 0.022UF 50V	1		
C16-17		05152225	CERA. CAPA. 2200PF 50V	2		
C18		05152234	CERA. CAPA. 0.022UF 50V	1		
C19	*1	05154714	CERA. CAPA. 470PF 50V	1		
	#1	05152234	CERA. CAPA. 0.022UF 50V	1		
C20					NOT MOUNTED :SP212/6	
	#3	05151042	CERA. CAPA. 0.1UF 50V	1	:SP242/246	
C21					NOT MOUNTED :SP212/6	
	#3	05152234	CERA. CAPA. 0.022UF 50V	1	:SP242/246	
C22-23					NOT MOUNTED	
C24		05152234	CERA. CAPA. 0.022UF 50V	1		
C25					NOT MOUNTED :SP212/6	
	#3	05152234	CERA. CAPA. 0.022UF 50V	1	:SP242/246	
C26		05152234	CERA. CAPA. 0.022UF 50V	1		
C27-28		05131044	CERA. CAPA. 0.1UF 25V	2		
C29					NOT USED	
C30-31					NOT MOUNTED :SP212/6	
	#3	05152234	CERA. CAPA. 0.022UF 50V	2	:SP242/246	
C32-33		05152234	CERA. CAPA. 0.022UF 50V	2		
BC1		05532234	CAPACITOR 0.022UF 25V	1		
BC2-5		05152234	CERA. CAPA. 0.022UF 50V	4		
BC6					NOT USED	
BC7					NOT MOUNTED	
BC8					NOT MOUNTED :SP212/6	
	#3	05152234	CERA. CAPA. 0.022UF 50V	1	:SP242/246	
BC9		05152234	CERA. CAPA. 0.022UF 50V	1		

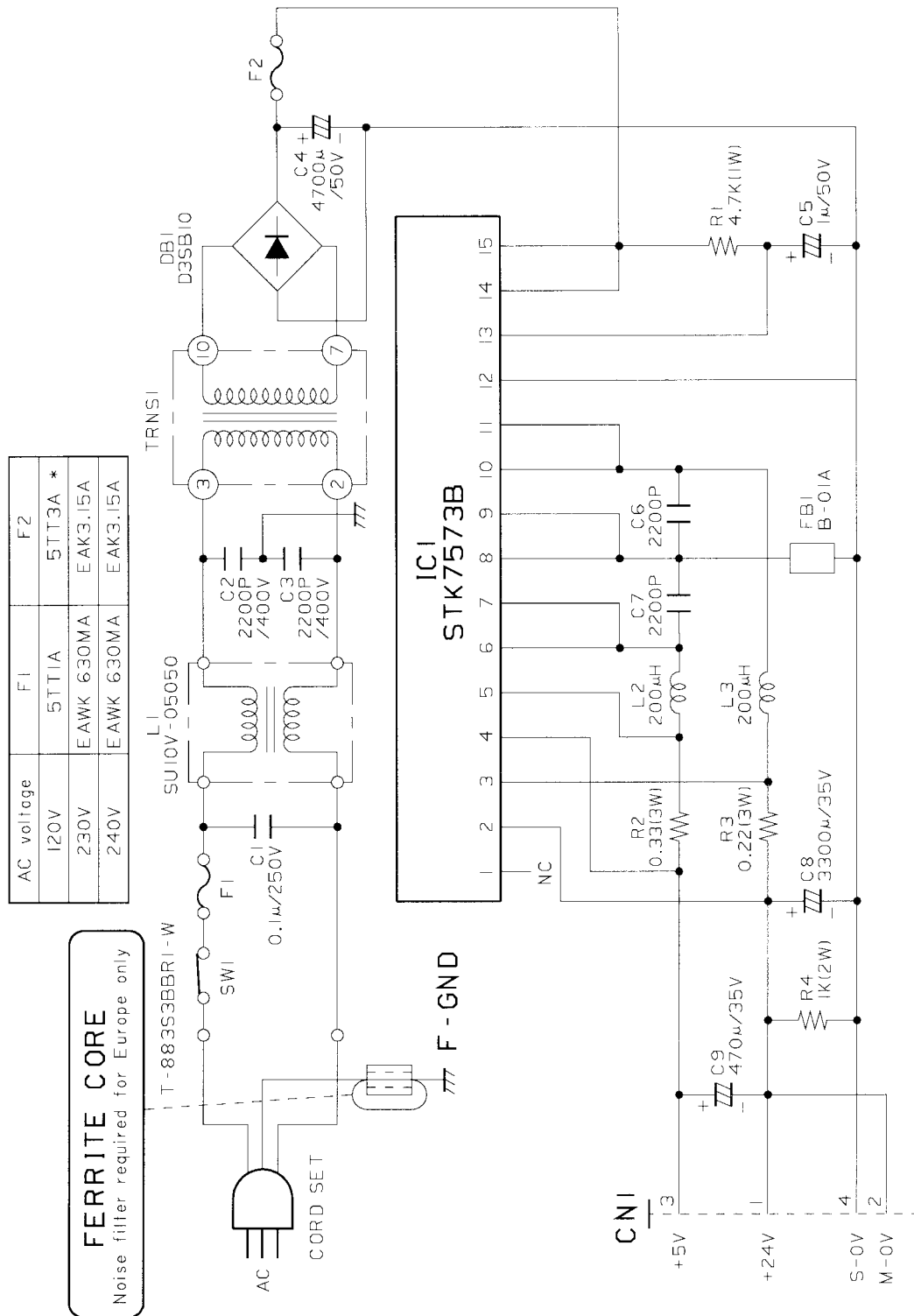
# PARTS LIST

## Main Logic Board (Parallel Interface)

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
TA1-2	*2	07650048	TRANSISTOR ARRAY STA471A=S	2		
	#2	07650056	TRANSISTOR ARRAY UPA1428AH	2		
TA3					NOT MOUNTED :SP212/6	
	#3	07650037	TRANSISTOR ARRAY TH3C10	1	:SP242/246	
TR1		07320111	TRANSISTOR 2SD2011	1		
TR2		07227853	TRANSISTOR 2SC1740SE	1		
TR3		07009502	TRANSISTOR 2SA950	1		
TR4-10					NOT USED	
TR11	#1	07320101	TRANSISTOR 2SD2010	1	SP216/246	
TR12					NOT USED	
TR13		07320101	TRANSISTOR 2SD2010	1		
REG1		08202011	IC-REG UPC7824	1		
D1-2		08000040	DIODE DSM1D1	2		
D3	#1	08000040	DIODE DSM1D1	1	SP216/246	
D4		08000040	DIODE DSM1D1	1		
LED1-2		08300136	LED SLZ-390B	2		
RA1		06584723	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA2					NOT MOUNTED	
RA3		06581036	RESIS. ARRAY 10 K-OHM 1/8W 5EL	1		
RA4		06584723	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA5					NOT MOUNTED	
RA6					NOT USED	
RA7		06581023	RESIS. ARRAY 1 K-OHM 1/8W 4EL	1		
RA8		06581026	RESIS. ARRAY 1 K-OHM 1/8W 7EL	1		
RA9		06581030	RESIS. ARRAY 10 K-OHM 1/8W 3EL	1		
RA10		06581824	RESIS. ARRAY 1.8K-OHM 1/8W 6EL	1		
R11		06581032	RESIS. ARRAY 10 K-OHM 1/8W 8EL	1		
CA1		05651012	CAPA. ARRAY 100PF 50V 8EL	1		
CA2-3		05652212	CAPA. ARRAY 220PF 50V 8EL	2		
CA4		05651012	CAPA. ARRAY 100PF 50V 8EL	1		
CN1		09100582	CONNECTOR 57GE-40360-751	1		
CN2		09100567	CONNECTOR 95003-2661	1		
CN3		09100495	CONNECTOR HLEM23S-1	1		
CN4		09100317	CONNECTOR 5483-04A	1		
CN5					NOT USED	
CN6					NOT MOUNTED :SP212/6	
	#3	09100038	CONNECTOR 5045-05A	1	:SP242/246	
DSW1		09090034	DIP SWITCH KSS08-1	1		
SW1-2		09010055	PUSH SWITCH SKHHLN	2		
X1		09250047	CERA. OSCILLATOR CST8.0MTW	1		
L1-4		09990705	BEADS INDUCTOR B01-RT	4		
JA3	#3	06750004	CHIP RESISTOR 0 OHM 1/10W	1		
F1					NOT MOUNTED :SP212/6	
	#3	09991023	FUSE RXE030*	1	:SP242/246	

## 6.6 Power Supply Unit

### 6.6.1 Circuit Diagram



# PARTS LIST

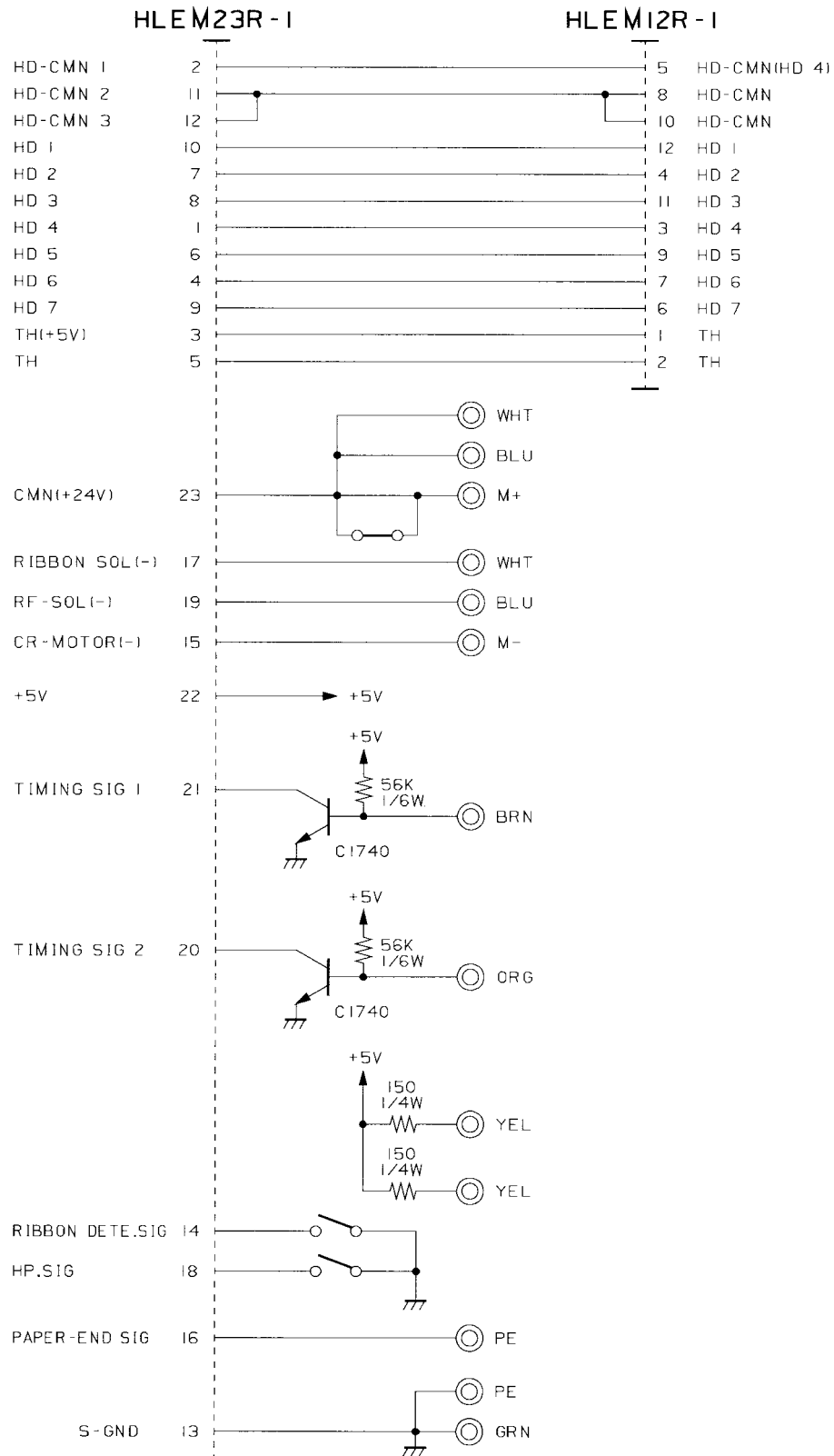
## 6.6.2 Parts List

## Power Supply Unit

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08202025	IC-REG 7573B	1		
DB1	*2	08990220	DIODE STACK D3SB10	1		
	#2	08990227	DIODE STACK D3SB20	1		
R1		06214721	RN RESISTOR 4.7 K-OHM 1W	1		
R2		06230031	RN RESISTOR 0.33 OHM 3W	1		
R3		06230021	RN RESISTOR 0.22 OHM 3W	1		
R4		06201022	RN RESISTOR 1 K-OHM 2W	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		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		
SW1	*3	09030026	SEESAW SWITCH T-883S3BBR1-W	1		
	#3	09030036	SEESAW SWITCH SF-W1P1A03BB2	1		
L1		09251106	LINE FILTER SU10V-05050	1		
L2		09251037	CHOKE COIL NM-1-200	1		
L3		09251036	CHOKE COIL NM-16-300	1		
F1		09990058	FUSE 5TT1A 250V	1	FOR US	S
		09990021	FUSE EAWK630MA 250V	1	FOR EC,UK,AS	S
F2	*2	09990054	FUSE 5TT3A 125V	1	FOR US,UK(240V)	S
	#2	09991011	FUSE 5TT3A 250V	1	FOR US,UK(240V),AS	S
		09990050	FUSE EAK3.15A 250V	1	FOR EC	S
	#1	09990051	FUSE EAK5A 250V	1	FOR UK(230V)	S
CN1		80703850	CABLE UNIT 4X120TT SP300II	1		
TRNS1		30780010	TRANSFORMER 120V SP200 US	1	FOR US	
		30780030	TRANSFORMER 230V SP200 EC	1	FOR EC,UK(230V)	
		30780040	TRANSFORMER 240V SP200 UK	1	FOR UK(240V)	
	#2	30780230	TRANSFORMER 230V SP200W EC	1	FOR AS	
FB1	*2	09990703	BEADS INDUCTOR B-01A	1		
	#2	09990706	BEADS INDUCTOR B-01AT	1		
-		09110090	CORD SET US-PN SP300	1	FOR US	
		09110129	CORD SET EC-PN SP300II	1	FOR EC	
	*3	09110067	CORD SET UK-PN LC	1	FOR UK	
	#3	09110172	CORD SET UK-PN SP300	1	FOR UK	
		09110068	CORD SET AS-PN LC	1	FOR AS	
		04991204	FASTENER T18S	1	FOR US,UK(240V),AS	
		04991204	FASTENER T18S	2	FOR EC,UK(230V)	
		82911071	RADIATION PLATE SP312	1		
		01903087	SCREW TAT 3-14	1		
		09990023	FUSE HOLDER UF-0033	1		
		09990708	FERRITE CORE ESD-R-16C	1	FOR EC,UK(230V)	
		09992307	HEAT-SHRINK TUBE F2-18X30	1	FOR EC,UK(230V)	

## 6.7 Terminal Board

### 6.7.1 Circuit Diagram





# PARTS LIST

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## 6.7.2 Parts List

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
-	*1	06041518	RD RESISTOR 150 OHM 1/4W	2		
	#1	06041515	RD RESISTOR 150 OHM 1/4W	2		
		06055634	RD RESISTOR 56 K-OHM 1/6W	2		
		07227853	TRANSISTOR 2SC1740SE	2		
		09100568	CONNECTOR HLEM23R	1		
		09100569	CONNECTOR HLEM12R	1		
	*3	09040020	MICRO SWITCH MPU10200MLA1	1		
	#3	09040026	MICRO SWITCH MPU10200MLA2	1		
	#1	09040024	MICRO SWITCH MPU10101MLA0	1	SP216/246	



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