

**Commodore**

***MPS 1224C***

**Service Manual**

11/88



**Commodore**



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## 1

## Introduction

The MT222 Matrix Printer has been developed for daily correspondence purposes in the office. It has been manufactured according to the highest possible standards and, with proper use, it should provide troublefree operation for many years.

Two high-performance print qualities as well as operation with fanfold paper and cut sheets can be chosen.

The following print qualities are available:

- Draft Print Quality (DPQ): 24 x 9 matrix
- Letter Quality (LQ): 24 x 26 matrix

The electronic part which is controlled by a microcomputer operates needle print head, menu programming, and interfaces.

All parts of the printer control are arranged on a printed circuit board so that only few additional components are required as

- stepping motor for carriage driving,
- stepping motor for paper feed,
- needle print head with 24 needles.

Further requirements are met by the printer with the following options:

- sheet feeder
- multi-colour ribbon
- font cards

## 2 Specifications

Printing method	serial impact dot matrix printing
Print head	24 needles staggered needle diameter 0.2 mm
Printing direction	character mode: bidirectional logical seeking bit image mode: unidirectional (from left to right) printing
Character matrix	DPQ: 24 x 9 + 3 sp LQ: 24 x 26 + 10 sp
Printing speed	DPQ: 220 cps at 10 cpi LQ: 72 cps at 10 cpi
Maximum printing width	345.4 mm (13.6 inches)
Maximum number of characters per line	136 at 10 cpi 163 at 12 cpi 204 at 15 cpi 233 at 17.1 cpi 272 at 20 cpi
Line spacing	6 lpi (standard), 8 lpi, 12 lpi, minimum line feed 1/360 inch
Character sets	Up to 12 character sets to American, British, French, German, Italian, Danish, Norwegian, Spanish, Latin-American, Dutch, Japanese. Each character set consists of up to 256 characters.
Resident font (LQ)	Courier
Font card character sets	Italic, Gothic
Print modes	Normal Proportional Emphasized Double strike Italic Double width Double height Superscript Subscript Underline Overscore Overprint (BS) Needle graphics (DNA) 9/24 needles Print by 8 data bits

## Specifications

Graphic densities	<u>9 needles in use</u>	<u>24 needles in use</u>
	60 dpi	60 dpi
	72 dpi	90 dpi
	80 dpi	120 dpi
	90 dpi	180 dpi
	120 dpi	360 dpi
240 dpi		
Input buffer	12 K bytes	
Forms control	Margins:	left, right, top, bottom
	Horizontal tab stops:	up to 32
	Vertical tab stops:	up to 64
	Form length:	up to 22 inches
Paper transport	friction feed, variable tractor feed	
Forms type	continuous fanfold, edge perforated, cut sheet form sizes DIN A5, DIN A4, US quarto, US legal, multipart	
Fanfold paper	Forms weight:	60 g/m <sup>2</sup> to 90 g/m <sup>2</sup>
	Forms width:	3 inches to 16 inches (76 mm to 406 mm)
	Forms height:	3 inches to 21 inches (76 mm to 533 mm)
Cut sheet paper	Weight:	60 g/m <sup>2</sup> to 80 g/m <sup>2</sup>
	Width:	100 mm to 356 mm (MTF222-2)
		100 mm to 420 mm (MTF222-1)
	Height:	80 mm to 300 mm (MTF222-2)
		76.2 mm to 300 mm (MTF222-1)
Multi parts	1 + 2 copies	
	1st sheet:	45 g/m <sup>2</sup> to 65 g/m <sup>2</sup>
	Other sheets:	45 g/m <sup>2</sup> to 55 g/m <sup>2</sup>
	Thickness:	0.012 inch (0.3 mm)
Envelope	Weight:	60 g/m <sup>2</sup> to 80 g/m <sup>2</sup>
	Height:	76.2 mm minimum
	Thickness:	0.012 inch (0.3 mm)
Ribbon system	exclusive ink ribbon cassette, lifetime approx. 2 million characters - black ribbon cassette, reinking type (standard) - four-track colour ribbon cassette for multi-colour version - four-track black ribbon cassette for multi-colour version	
Test modes	self-test (rolling ASCII), Hex Dump mode, software and hardware ident	
Operational voltage	- 100/117 V AC ± 10 %, 50/60 Hz ± 2 %, or - 220/240 V AC ± 10 %, 50 Hz ± 2 %	
Power consumption	operation:	100 W (Watts)
	stand-by:	40 W (Watts)

Noise level	< 55 dB (A)
Dimensions	600 mm x 400 mm x 130 mm (W x D x H)
Weight	approx. 12 kg
Temperature range	operating: 5 °C to 40 °C storage: 20 °C to 60 °C
Relative humidity	operating: 20 % to 80 % (non-condensing) storage: 5 % to 85 % (non-condensing)
Operating position	horizontal
Shock resistance	1 G or less (within 1 msec.)
Vibration conditions	0.25 G or less, 55 Hz
MTBF	4000 hours (excluding print head and ribbon)
Print head life	200 million draft characters
Ribbon life	2 million draft characters
Interfaces	parallel C interface, and serial RS-232C interface
Parallel interface	8-bit parallel interface (Centronics compatible) transmission rate: 8 kHz
Serial interface	synchronization: asynchronous transmission rate: 150 Baud to 19200 Baud 6-pin DIN socket
Data buffer size	menu programmable to Line Small 1 K byte Medium 6 K byte Large 12 K byte

### 3 Functional Description

#### 3.1 Mechanical Functions

The printer mechanism consists of one print head, one stepping motor of carriage and ribbon driving, one stepping motor of paper feed mechanism, three sensors and a frame.

The frame of the mechanism, on which the components are positioned, is unified with the bottom casing.

One of the stepping motors drives the print head carriage and the ribbon, and the other stepping motor feeds paper. Paper feed is effected by a built-in pin feed mechanism, utilizing a variable tractor unit, and a built-in friction feed mechanism, utilizing a platen and pressure roller. Two of the three built-in sensors respectively detect the print head carriage home position and the paper end, and the other serves as the paper auto load switch.

In the following sections the functional blocks of the printer mechanism will be described:

- Print head (section 3.1.1.)
- Print head movement (section 3.1.2.)
- Ribbon drive (section 3.1.3.)
- Paper feed (section 3.1.4.)
- Sensors (section 3.1.5.)



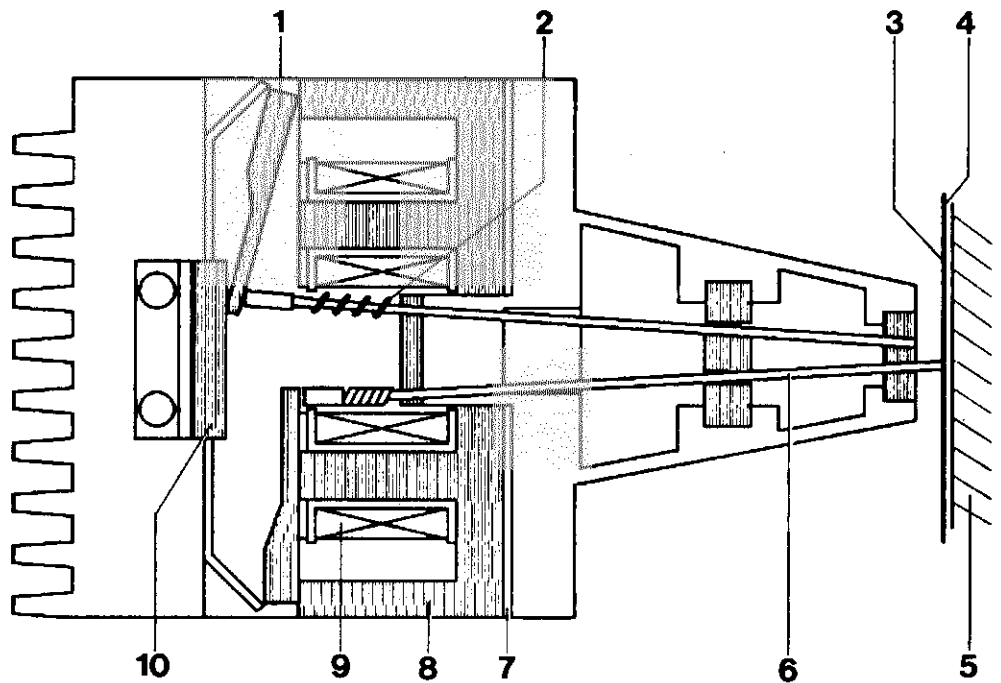
# Print Head

## 3.1.1 Print Head

The printing is done with the print head, which is mounted on the head base. The print head is connected to the main control P.W.B. unit via a flexible cable. It is driven by a print signal. Described below is the operating principles for needle actuation.

When the coil 9 is energized, the clapper 1 is attracted toward the iron core 8, tipping the needle 6, which is resting on the tip of the clapper 1, against the platen 5. The needle 6 hits the platen 5 across the inked ribbon 3 and paper 4. One dot appears. After printing, the needle 6 bounces off and is returned by the clapper return spring 2 to the tip of the clapper 1, which has already returned.

The needle is kept at stand-by in this state.

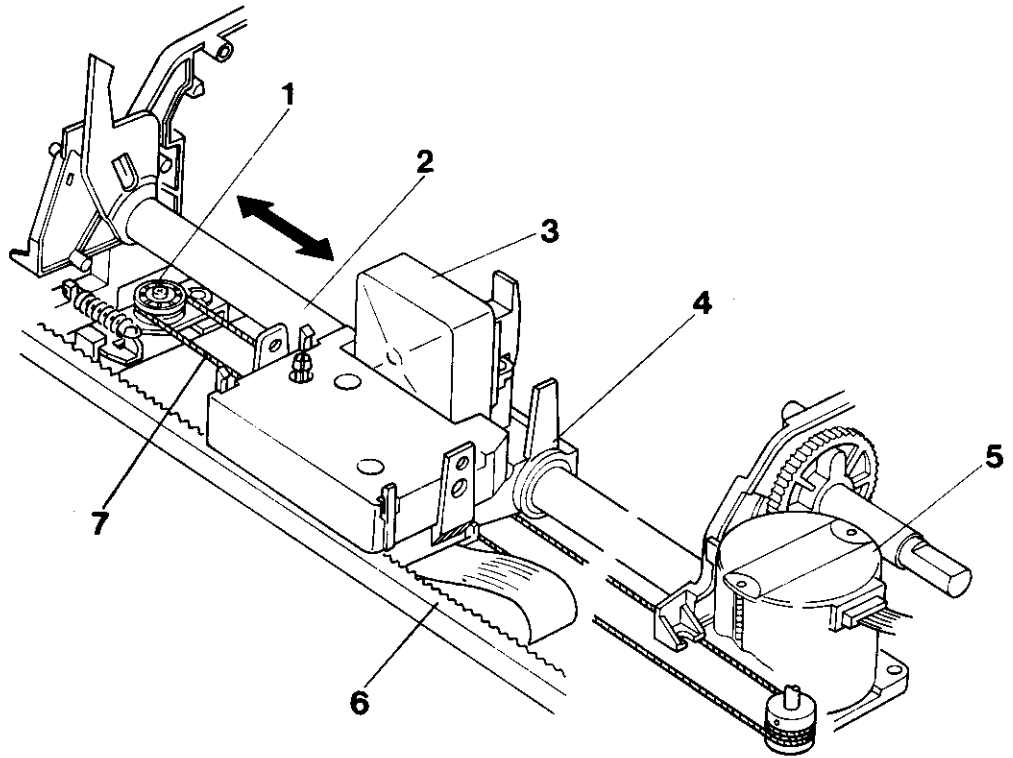


- |                         |             |
|-------------------------|-------------|
| 1 Clapper               | 6 Needle    |
| 2 Clapper return spring | 7 F.P.C.B.  |
| 3 Ink ribbon            | 8 Iron core |
| 4 Paper                 | 9 Coil      |
| 5 Platen                | 10 Stopper  |

## 3.1.2 Print Head Movement

The print head movement is carried out by the carriage mechanism, which mainly consists of the stepping motor 5, the print head base shaft 2, the base plate 6 and the wire 7.

The print head base 4 is firmly fixed to the wire 7 which is extended between the stepping motor 5 and the tension pulley 1. It travels to the right and left as the stepping motor 5 turns in the normal and reverse directions.



- |                         |                  |
|-------------------------|------------------|
| 1 Tension pulley        | 5 Stepping motor |
| 2 Print head base shaft | 6 Base plate     |
| 3 Print head            | 7 Wire           |
| 4 Print head base       |                  |

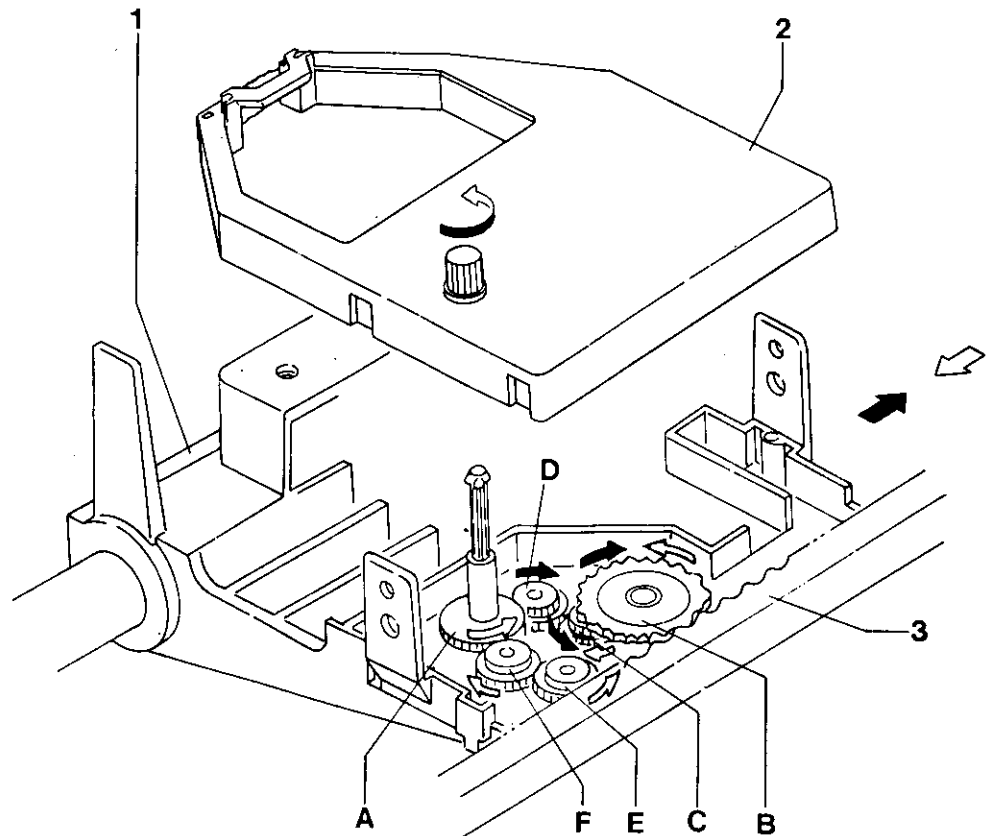
# Ribbon Drive

## 3.1.3 Ribbon Drive

The ribbon drive mechanism consists of 6 gears and is mounted on the head base 1.

Ribbon drive gear **B** interlocks with the base plate gears fixed to the main unit and the gears rotate in normal and reverse direction in accordance with horizontal movement of the print head.

The direction of the rotation on the gears is determined in relation to the interlocking of the gear and the ribbon drive gear always rotates in the same direction.



- 1 Head base
- 2 Ribbon cassette
- 3 Base plate

A to F Gears

Head base movement

Gear operation

from left to right (»)

ribbon drive gear **B** » gear **C** » gear **D** » ribbon drive gear **A**

from right to left (»)

ribbon drive gear **B** » gear **C** » gear **E** » gear **F** » ribbon drive gear **A**

## 3.1.4 Paper Feed

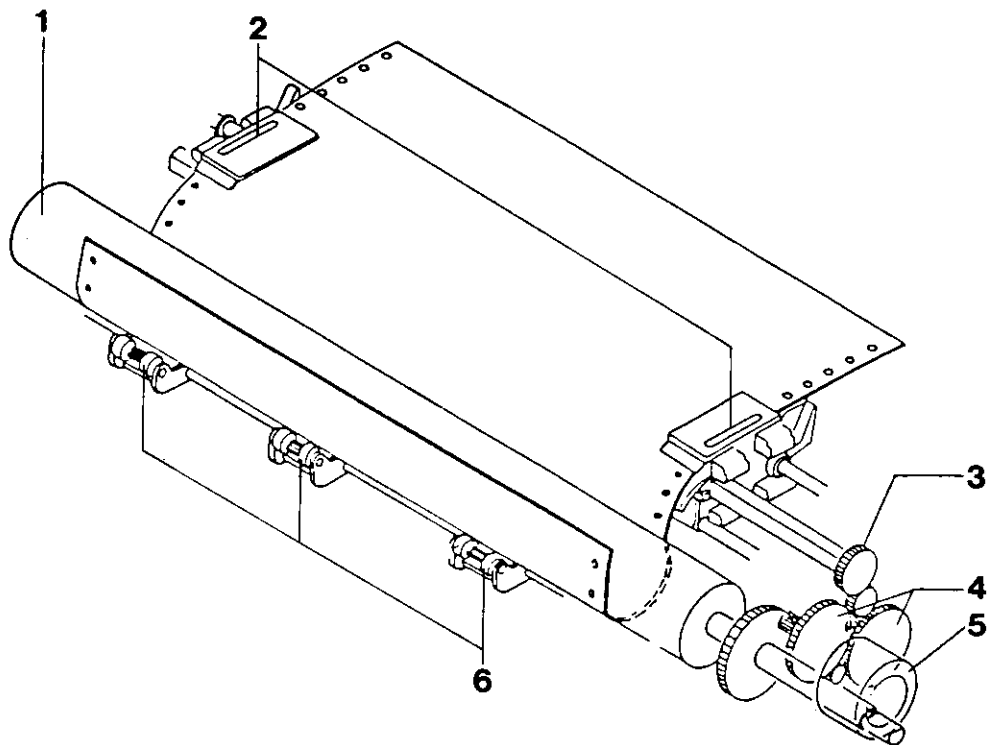
The main components of the paper feed mechanism are the stepping motor 5, decelerate gears 4, paper feed sprockets 2, the platen 1 and the pressure rollers 6.

The printer mechanism is capable of two types of paper feed:

- tractor feed using the tractor mechanism, and
- friction feed through interaction of platen and pressure rollers.

With the tractor feed system, the tractor shaft is operated by reduction of speed from the stepping motor 5 through the decelerate gears 4 and the tractor shaft gear 3. The paper is fed by means of the rotation of the sprockets 2.

With the friction feed system, the platen is similarly operated by speed reduction of the stepping motor 5 by means of the decelerate gears 4, while paper is fed by the pressure rollers 6 rotating against the platen 1.

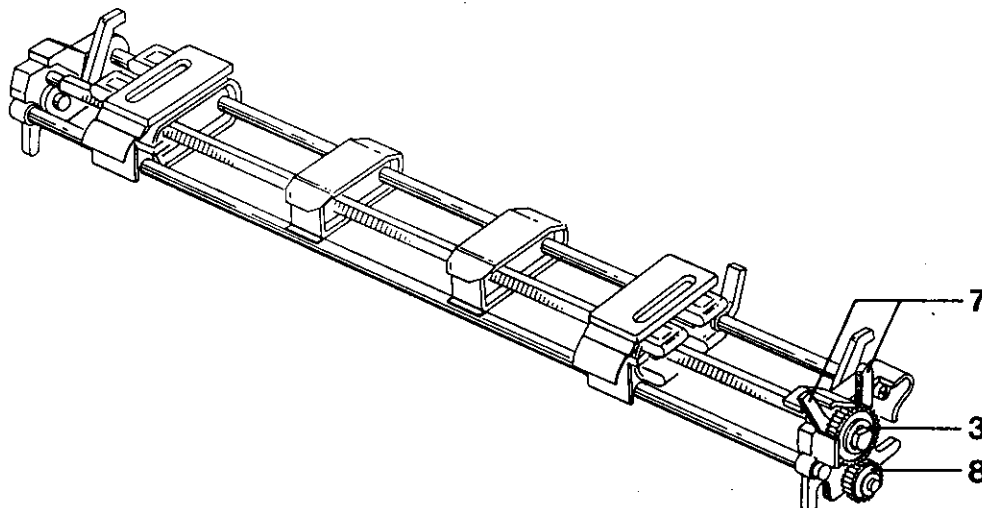


- |                       |                   |
|-----------------------|-------------------|
| 1 Platen              | 4 Decelerate gear |
| 2 Paper feed sprocket | 5 Stepping motor  |
| 3 Tractor shaft gear  | 6 Pressure roller |

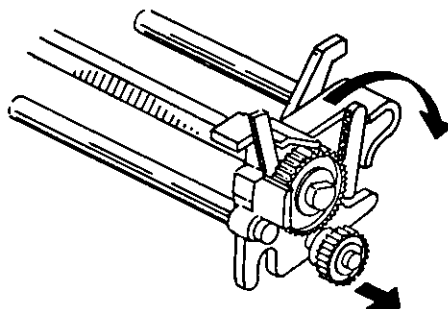
## Paper Feed

### Clutch Lever

This double-armed spring lever 7 is activated by the rear cover. When in flat position (tractor feed operation), the tractor shaft gear 3 is operated by the idle gear 8.



When snapped up at a 60° angle (friction feed operation), the rear cover activates the clutch lever 7 via its front arm which disengages the idle gear 8 from the tractor shaft gear 3.



When a sheet feeder is installed, the sheet feeder activates the clutch lever 7 via its rear arm. This disengages the idle gear 8 from the tractor shaft gear 3.



## 3.1.5 Sensors

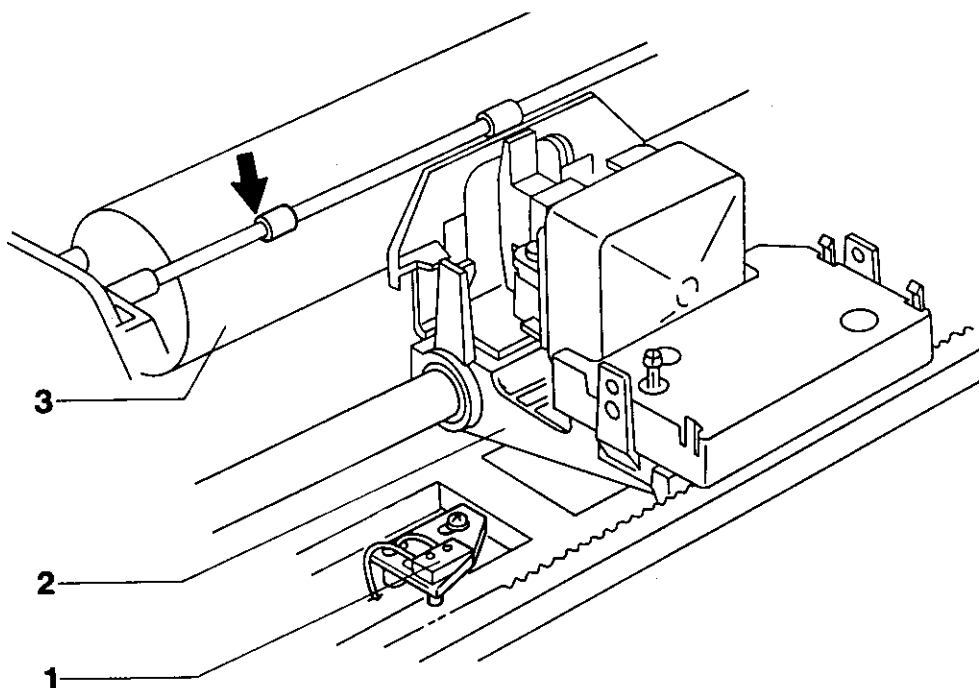
The sensor system consists of three sensors:

- the home position sensor,
- the paper end sensor, and
- the auto load switch sensor.

Microswitches and a lead switch (paper end sensor) are incorporated in these sensors. Each sensor is formed into a block and mounted on the printer mechanism.

### Home Position Sensor

The home position sensor 1 generates a signal to serve as the standard print starting position. It turns ON when the print head base 2 is positioned at the left edge of the platen 3.

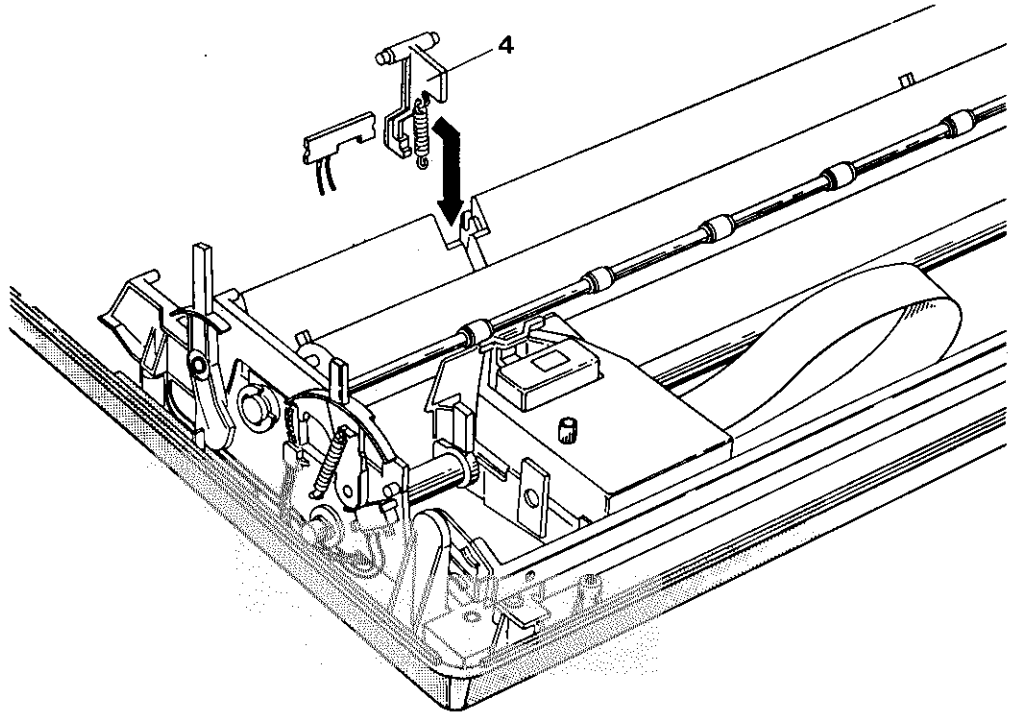


- 1 Home position sensor
- 2 Print head base
- 3 Platen

## Sensors

### Paper End Sensor

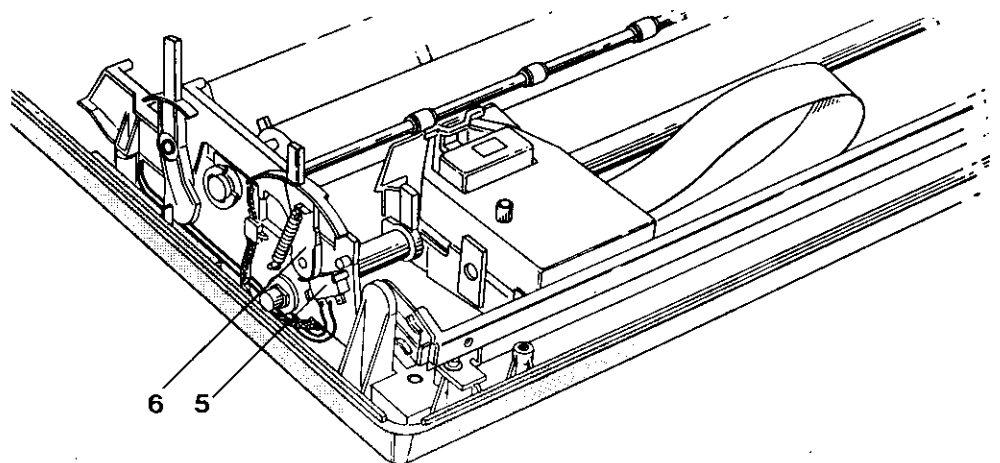
The paper end sensor 4 prevents accidental printing when paper is not loaded in the printer. The paper end sensor signal sets to ON when paper is not inserted in the printer and to OFF when paper is loaded.



4 Paper end sensor

### Auto Load Switch Sensor

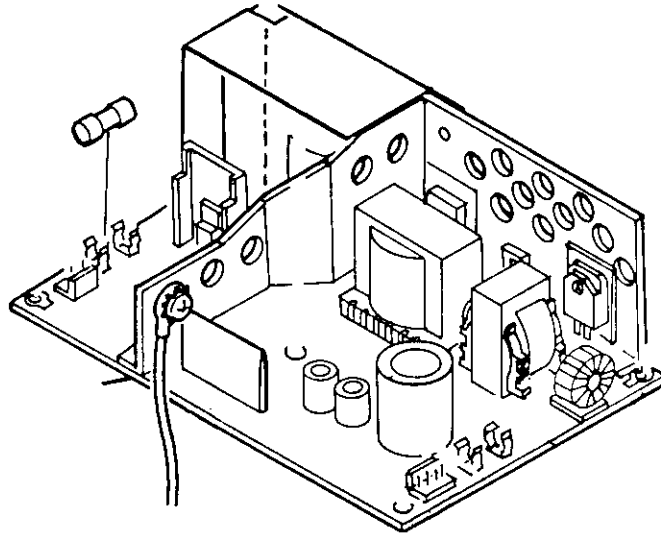
The auto load switch sensor 5 turns ON when the bail roller lever 6 is set at the open position (away from the platen) and generates the auto load trigger signal.



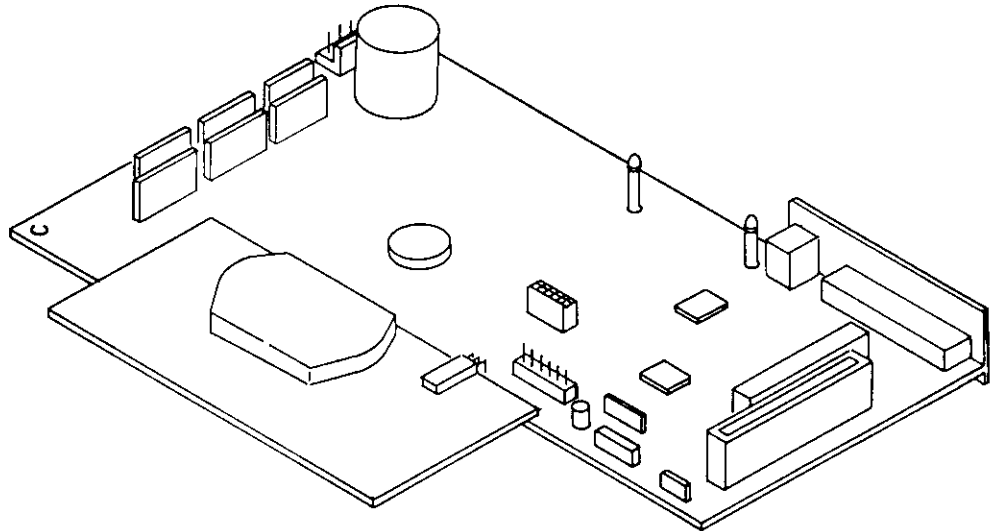
5 Auto load switch sensor  
6 Bail roller lever

### 3.2 Electronic Functions

The power supply unit employs a switching power source and supplies all the voltages required for operation. It is fixed to the bottom casing at the left-hand side in the rear of the printer and is designed to keep down both internal printer noise as well as noise from interfaced equipment.



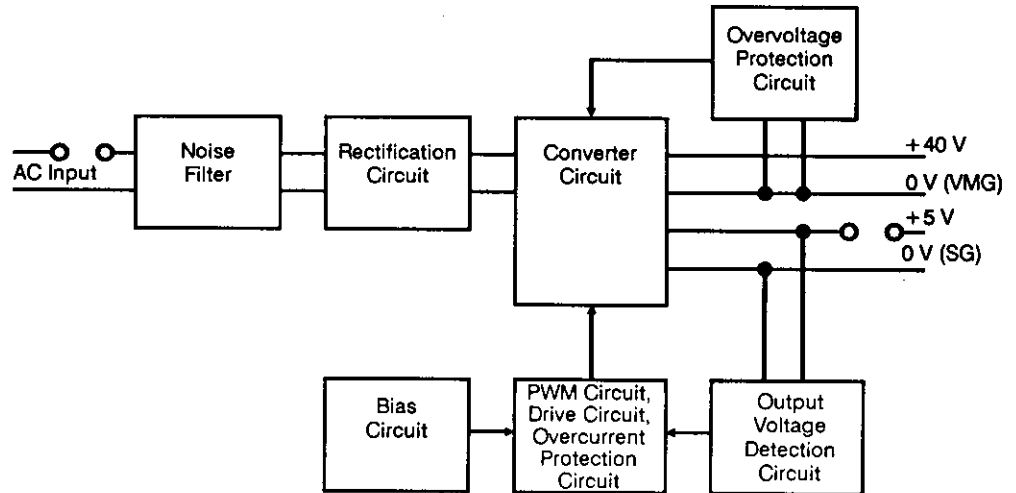
The major function of the printer is controlled by the main control P.W.B., fixed to the bottom casing at the right-hand side in the rear of the printer.



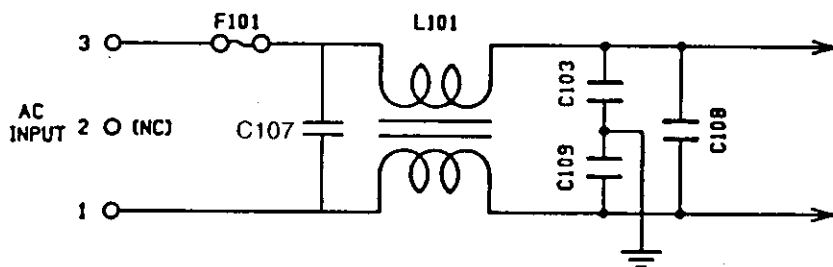
# Power Supply Unit

## 3.2.1 Power Supply Unit

Major circuits of the power supply unit are described in this section in accordance with the following block diagram.

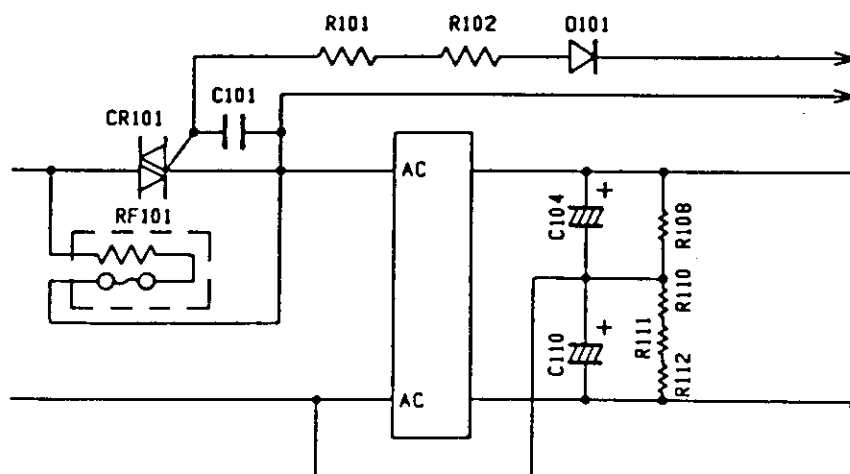


### Noise Filter Block



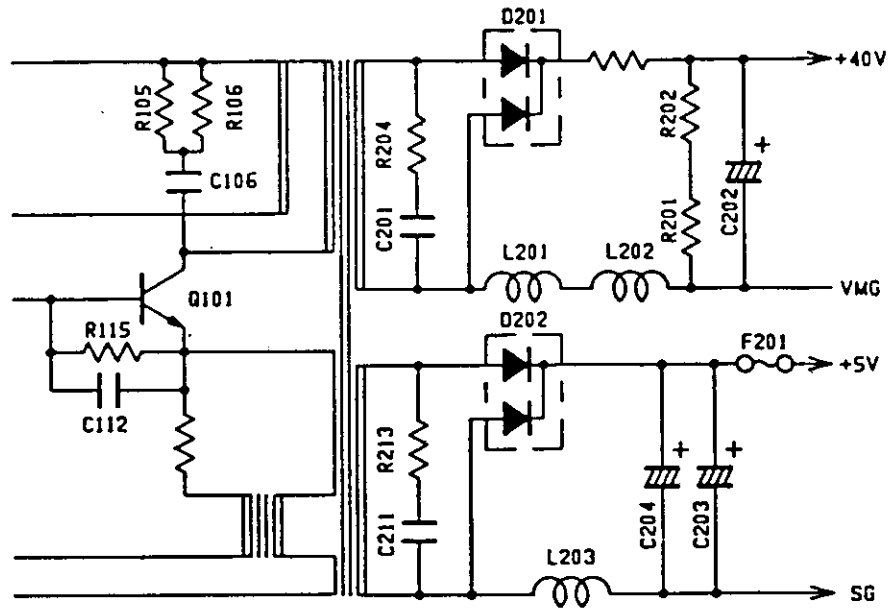
AC input goes through line fuse (F101) and is led to the rectification circuit through the line filter consisting of C107, L101, C103, C109, and C108. The line filter prevents the noise generated inside the line filter from feeding back through the AC line and also prevents spike voltage in the AC input from interfering with the power supply unit.

### Rectification Circuit Block



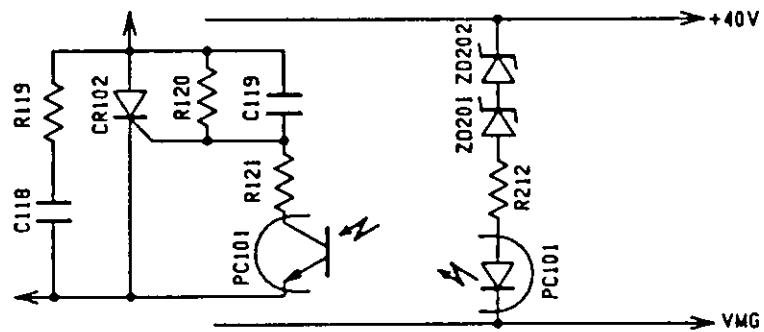
After passing through the noise filter, AC input is sent through the rush-in prevention circuit. Once input is rectified by doubling the voltage at D102, it is smoothed out at C104 and C110 and then supplied to the converter circuit.

Converter  
Circuit Block



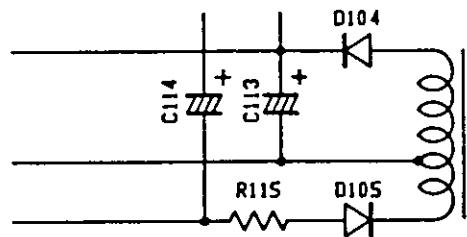
The converter circuit of this unit employs a signal system feed-forward type converter. As shown in the circuit diagram, when transistor Q101 on the primary side is ON, diodes D201 and D202 have continuity and current energy is supplied for the load through inductance at L201, L202 and L203. When Q101 is OFF, energy accumulated by inductance at L201, L202 and L203 is discharged through the lower part of diodes D201 and D202; simultaneously, current energy is supplied for the load. Output voltage +40 V is used for carriage motor drive, line feed motor drive and print head drive; +5 V for LSI, IC, buzzer, head temperature detection.

Overvoltage  
Protection  
Circuit Block



Zener diodes ZD201, ZD202 detect overvoltage for 40 V output from the secondary side and CR102 is turned on through photocoupler PC101. This eliminates the initialization voltage at IC101 and stops oscillation.

Bias Circuit  
Block

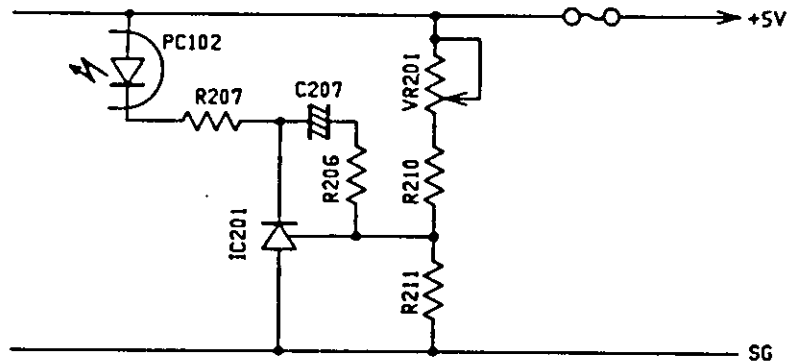


On initialization, the DC voltage which is smoothed out at C104 and C110 is split through resistors and then added to IC101 as initial voltage for pulse generation. When switching operation begins and when the power supply unit initializes, operating voltage is supplied from the bias circuit.



# Power Supply Unit

## Output Voltage Detection Circuit



With the power supply unit, the output voltage circuit detects +5 V. The detected signal is fed back to PWM circuit through photocoupler PC102.

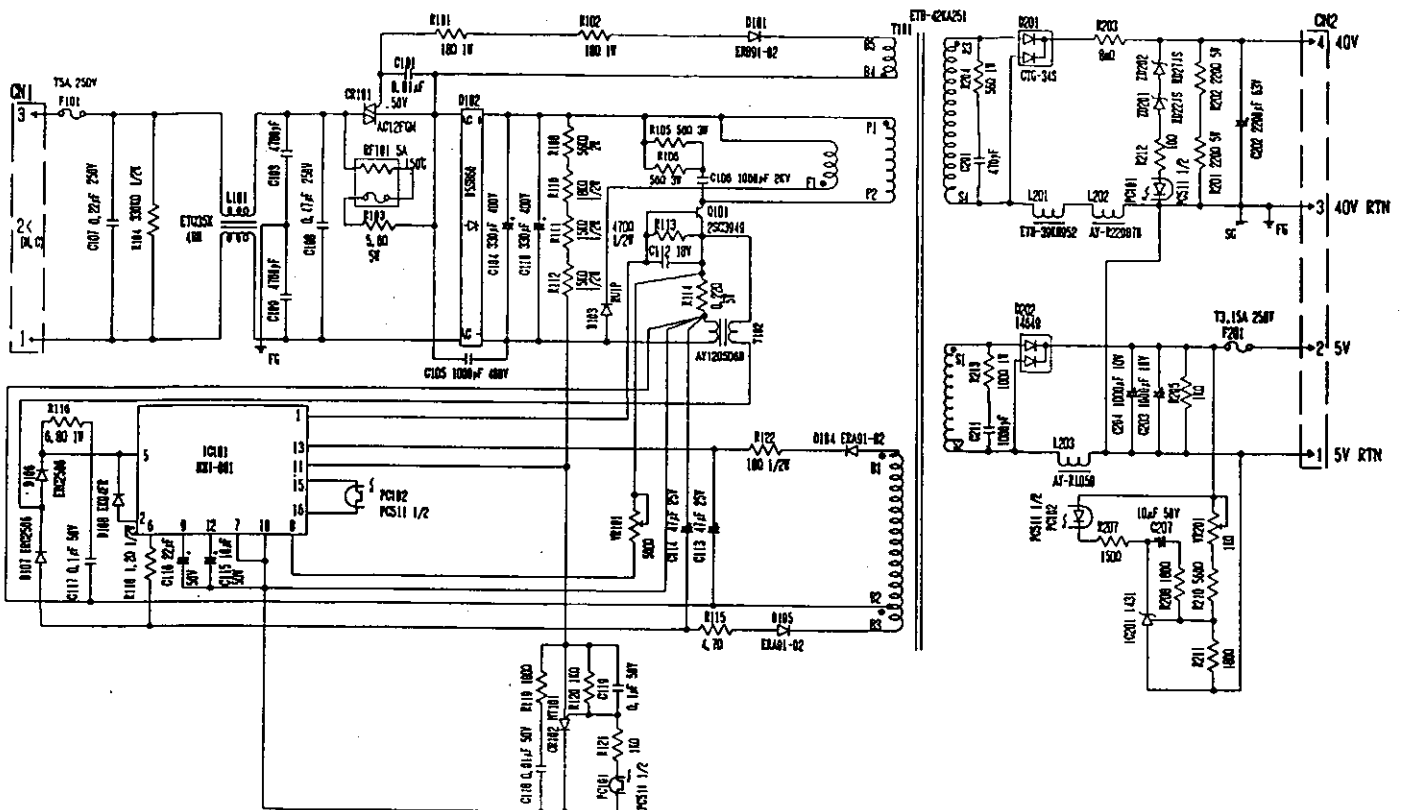
## PWM Circuit, Driver Circuit, Overcurrent Protection Circuit

The signal detected by the output voltage detection circuit is fed back to PWM circuit by photocoupler PC102. The duty ratio of the pulse is varied according to fluctuation of the output voltage. The drive circuit amplifies the signal using the duty ratio from the PWM circuit and, simultaneous with driving the main transistor Q101, it also reduces switching loss at Q101.

The overcurrent protection circuit detects the emitter current from the main transistor Q101 on the primary side using the resistor R114. When overcurrent is detected, oscillation is stopped and output is shut off to protect the power supply unit from overload. (The output automatically resets in 1 to 2 seconds).

## Power Supply Circuit Diagram

For complete power supply circuit diagram refer to Chapter 8, "Spare Parts and Schematics".



### 3.2.2 Control Module

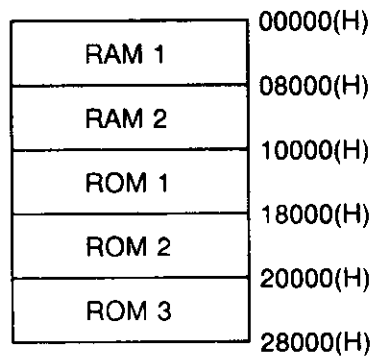
In the following the various circuits of the main control P.W.B. are described. For complete circuit diagrams refer to Chapter 8, "Spare Parts and Schematics".

#### MPU and Related Circuit

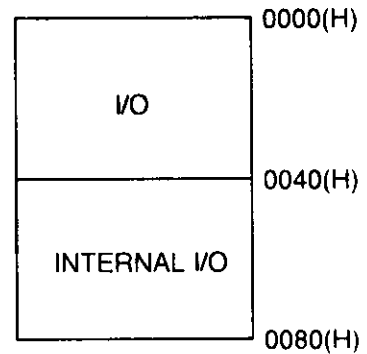
MPU (64B180) used to control printer operations is housed on one chip which features a high-speed CPU, a memory control unit, a DMA controller timer, asynchronous serial communication interface (ASCI) and asynchronous serial I/O port (C SI/O). The entire operations of the MPU are controlled by programs stored in ROM on the memory board.

#### Memory Configuration

Memory map

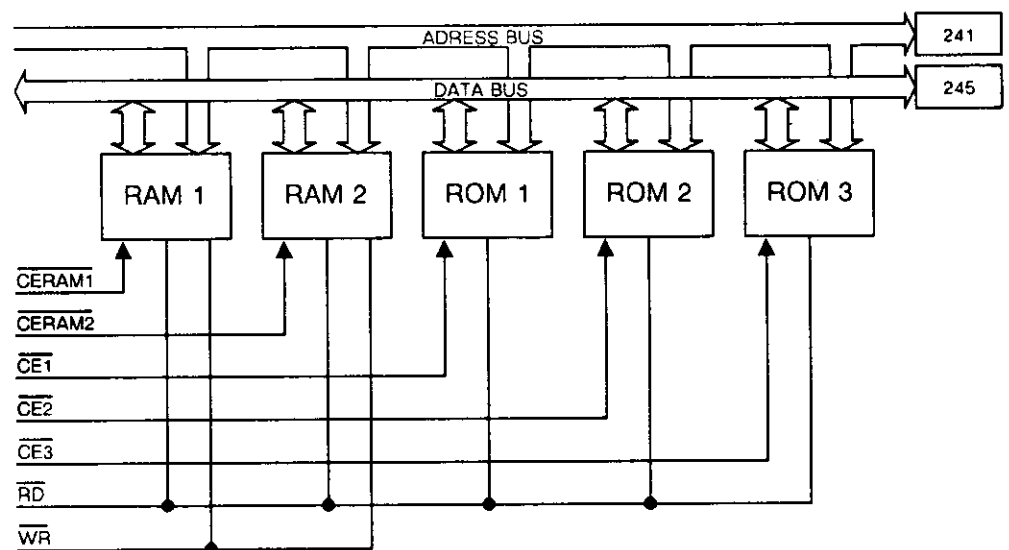


I/O map



The memory and I/O maps for the MPU follow the above configuration. Addresses in the maps are used to access the memory and I/O functions. All the registers (excluding the general and specific register) exist in the I/O space and are accessed by I/O commands.

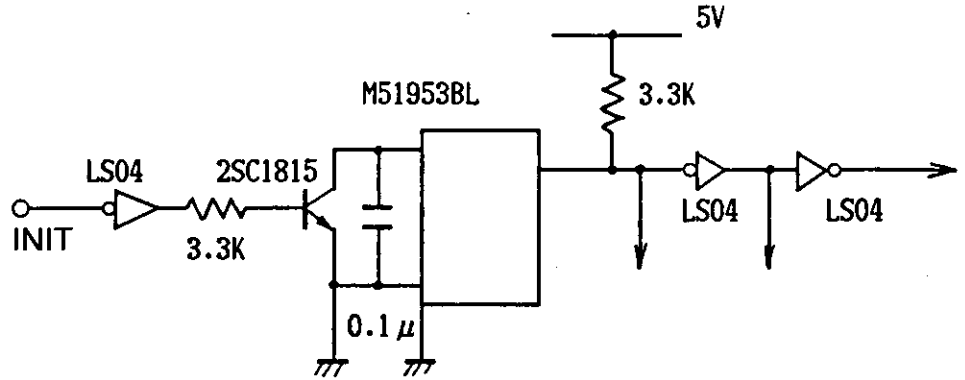
The memory block consists of three ROMs, two RAMs (one optional) and BUS Buffer as shown in the following figure.



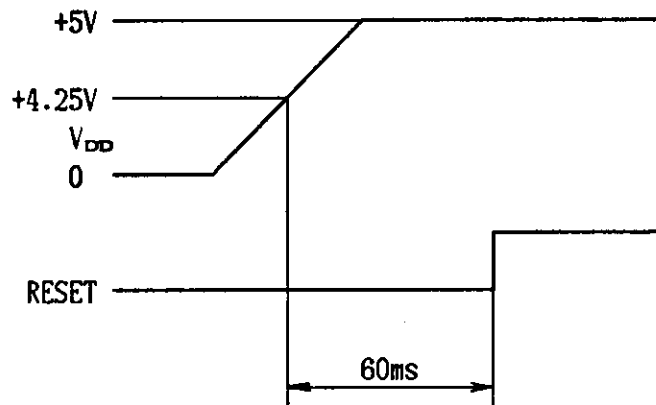
# Main Control P.W.B.

## Reset Circuit

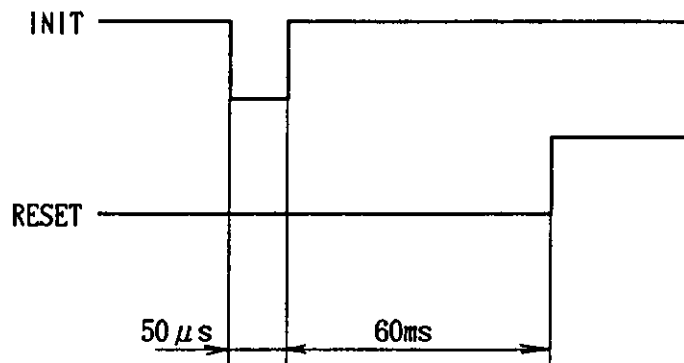
The reset circuit resets the MPU and other ICs when power is turned on. The INIT signal from the host computer operates the reset IC through transistor 74LS04.



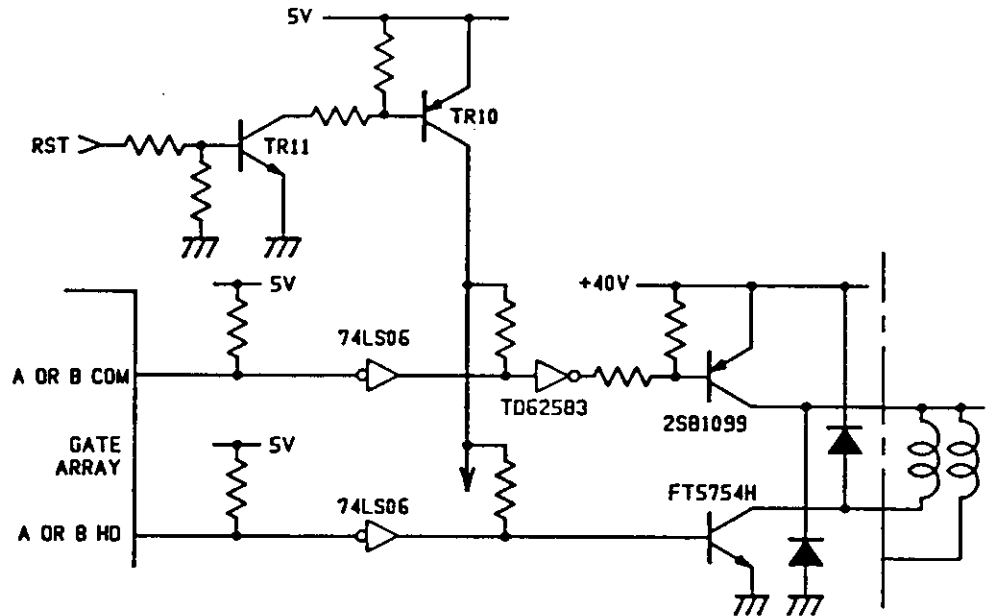
When power is turned on:



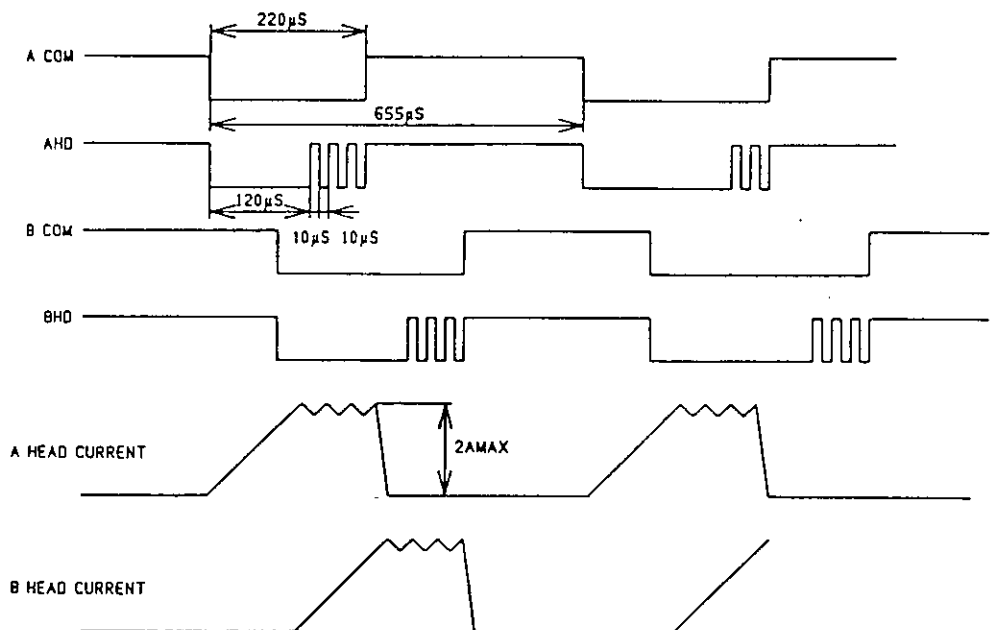
When initial signal is input:



Head Drive Circuit



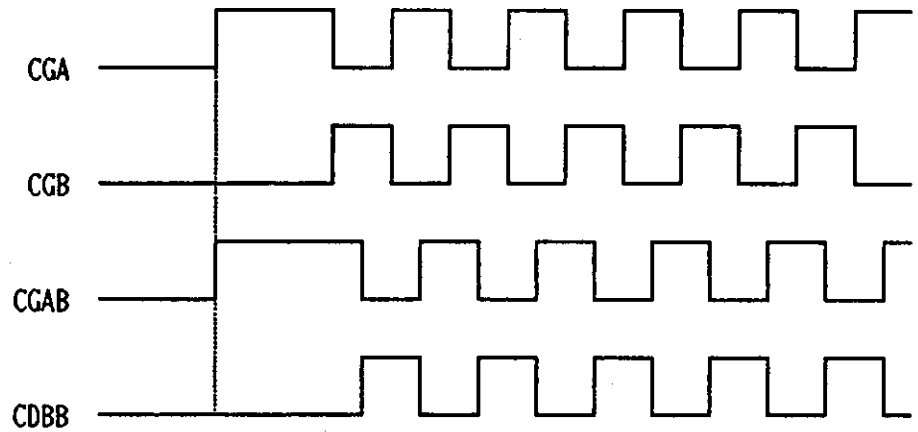
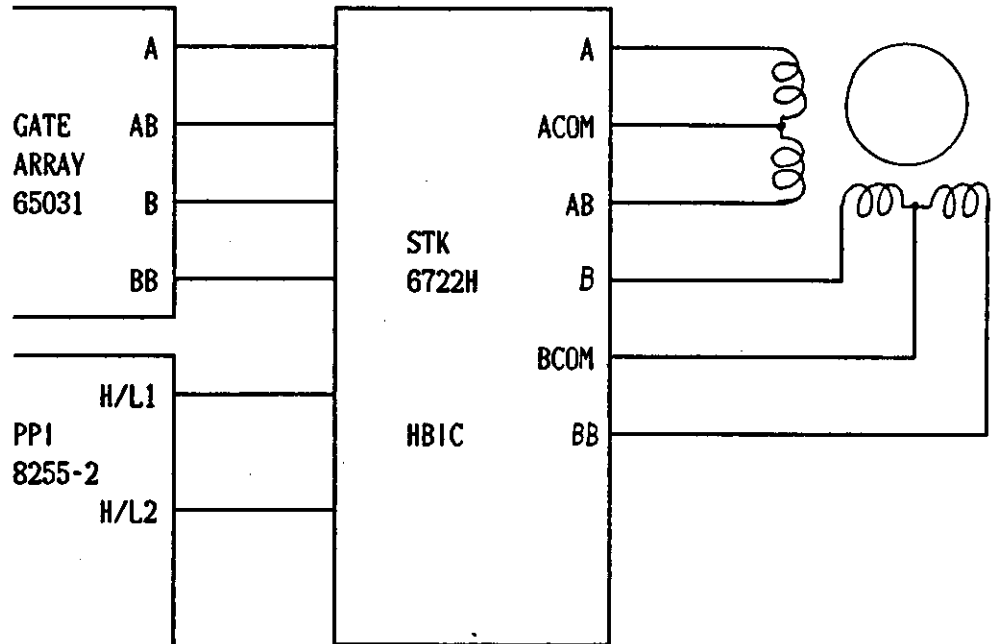
The head is driven by common signal output from the gate array and head signal output to each needle. Two common control signals control energizing for the A and B sides of the head. 12 head signals are output respectively for both the A and B sides to energize the needles. When Pin 1 on the A side is energized, for example, "Low" level is output through the ACOM terminal of the gate array and, simultaneously, an "Low" level signal is output from the AH1 terminal of the gate array. Also, for the AH and BH signals, following an "Low" level of 120 microseconds, "Low" and "High" cycles are repeated in 10 microseconds cycles.



# Main Control P.W.B.

## Carriage Motor Drive Control Circuit

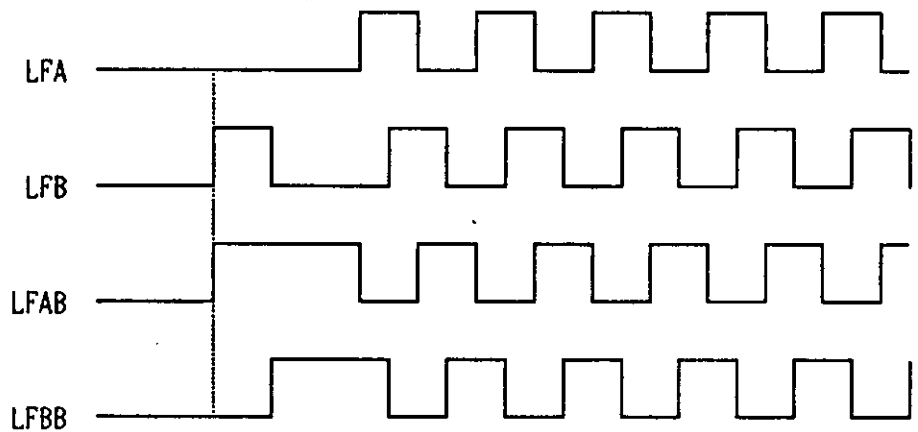
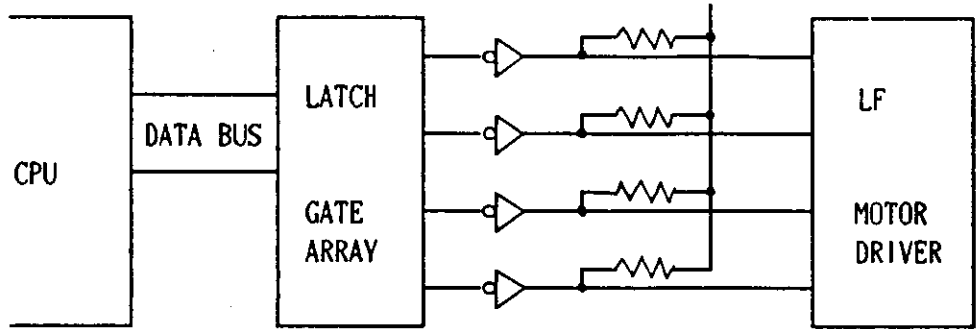
The carriage motor drive control is operated by signals from the gate array. The current for the carriage motor is switched between four levels by H/L1 and H/L2 of PPI output. When the outputs for PPI are at level "Low", the current at carriage motor increases. The driver level employs a hybrid IC which performs current limiting by selfexcitation type chopping.





**Paper Feed Motor  
Drive Control Circuit**

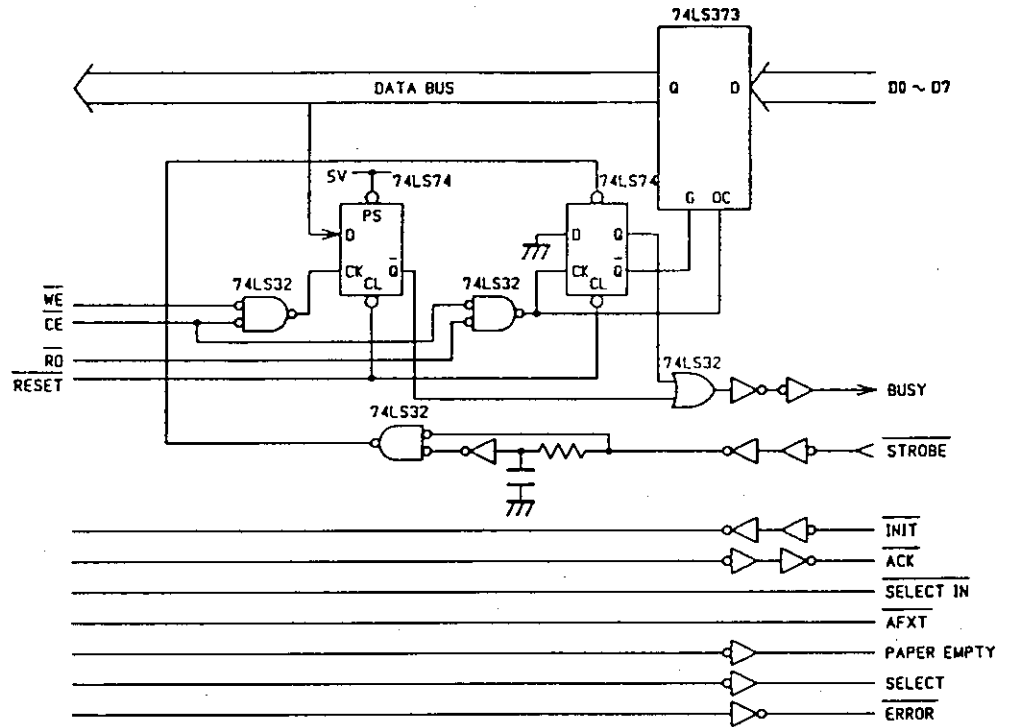
Each phase of the paper feed motor (the LF motor) is driven by data sent from the CPU through the latch circuit in the gate array. Latch timing and phase switching are controlled by DATA BUS and CONTROL signals.



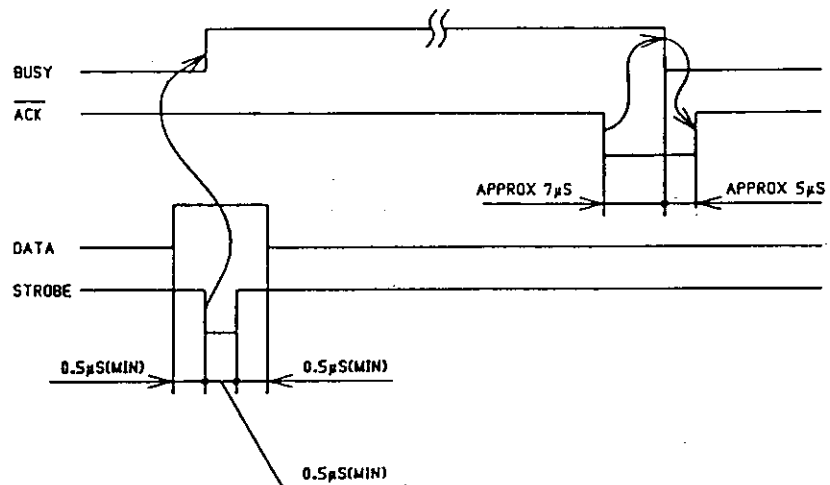
# Main Control P.W.B.

## Interface - Parallel I/O

The parallel I/O consists of transistors 74LS373, 74LS74, 74LS33 and an inverter circuit and is structured as shown in the following diagram.



Data transfer timing chart



<b>Input Signal</b>	<b>Function</b>
AFXT	At LOW the paper is automatically fed one line after printing is completed.
D1...D8	These signals are used to transfer data to the printer. The printer reads the levels of these lines when it receives the data strobe signal, STROBE/. The levels of these signals must not change while STROBE/ is LOW.
INIT/	This signal is used to initialize the printer. If this signal is received during printer operation, operation stops immediately. The printer is initialized when the signal is in the LOW level.
STROBE/	This is the signal which makes the printer read the levels of signals D1 to D8. The strobe signal must not be output until BUSY becomes LOW.
SLCT IN	LOW sets the printer to the select state; HIGH sets it to the deselect state; output it through the SLCT signal.
<b>Output Signal</b>	<b>Function</b>
ACKNLG/	This signal is output by the printer in response to the STROBE/ signal from the computer. The signal is output upon completion of data input or when the BUSY state is cleared.
BUSY	This signal indicates whether or not the printer is ready for operation. When it is HIGH, the printer is busy; when it is LOW, the printer is ready. This signal becomes HIGH under the following conditions: <ul style="list-style-type: none"><li>■ When the printer is processing data.</li><li>■ When an alarm condition occurs (such as when the printer runs out of paper).</li><li>■ When the printer is in the deselected (offline) state.</li></ul>
ERROR/	This signal becomes LOW under any of the following conditions. <ul style="list-style-type: none"><li>■ When the printer runs out of paper.</li><li>■ When printing is disabled because the carriage stops in an abnormal manner.</li></ul>
PE	This signal indicates whether the printer has run out of paper. If the printer runs out of paper while the SLCT signal is HIGH, printing is interrupted and the level of this signal changes from LOW to HIGH.

---

## Main Control P.W.B.

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<b>Output Signal</b>	<b>Function</b>
SLCT	<p>When HIGH, this signal indicates that the printer is not in an alarm condition and that it is selected (operating or ready for operation). When the printer enters the deselected state, this signal drops to LOW, the BUSY signal becomes HIGH, and the ERROR/ signal becomes LOW. The printer is switched to the selected state under the following conditions.</p> <ul style="list-style-type: none"><li>■ When the power is turned on or the printer is initialized after receiving the INIT/ signal (provided no alarm condition exists and that paper is set).</li><li>■ When the Online/Offline button is pressed while the printer is in the deselected state.</li></ul>

### Interface-Serial I/O

The serial I/O consists of the RS-232C driver/receiver IC and ASCII in the MPU.

## 4 Test Modes

### 4.1 Self-Test Mode

To set the printer into the test mode, hold down the Font/LF button while switching the power switch on.

The format of the test print is dependent on the print quality and character density settings you have made on the control panel.

The Online/Offline button interrupts the test print-out and you can then change the print quality as desired. Press the Online/Offline button to recommence the print example.

To leave the test mode completely, switch off the printer. The examples were printed with a character density of 10 cpi, first in draft quality and then, below, in letter quality (LQ).

#### Examples

##### DRAFT

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abc
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcd
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcde
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdef
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefg
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefgh
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghi
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghij
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijk
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijkl
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklm
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmn
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmno
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
```

##### LQ

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abc
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcd
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcde
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdef
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefg
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefgh
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghi
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghij
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijk
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijkl
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklm
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmn
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmno
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN OPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
```

# Hex Dump Mode

## 4.2 Hex Dump Mode

To set the printer into the hex dump mode, hold down the CPI/FF button while switching the printer's power switch on.

In this mode, all received data from the computer will be printed out in hexadecimal code form. The characters are not represented as in the ASCII table form but in their hexadecimal values. This is also true for the control codes which will not be executed and are also printed in hexadecimal form and are printed underlined. For example, instead of the capital letter "A", the hexadecimal "41", which is the code number which represents "A" for the printer, will be printed.

To leave the hex dump mode, switch off the power switch of the printer.

### Example

20 20 <u>0D 0A</u> 54 68 69 73 20 69 73 20 61 6E 20 20	..This is an
65 78 61 6D 70 6C 65 20 67 69 76 65 6E 20 20 20	example given
66 6F 72 20 61 20 68 65 78 20 64 75 6D 70 2E 20	for a hex dump.
20 20 20 20 20 20 20 20 20 20 20 20 20 20 20	
20 20 20 20 20 20 20 20 20 20 20 20 20 20 20	
20 20 20 20 <u>0D 0A</u> 54 68 65 20 68 65 78 61 2D 20	..The hexa-
64 65 63 69 6D 61 6C 20 6E 75 6D 62 65 72 73 20	decimal numbers
73 68 6F 77 6E 20 6F 6E 20 74 68 65 20 20 20 20	shown on the
6C 65 66 74 20 72 65 70 72 65 73 65 6E 74 20 20	left represent
74 68 65 20 41 53 43 49 49 20 76 61 6C 75 65 73	the ASCII values
6F 66 20 74 68 65 <u>0D 0A</u> 20 63 68 61 72 61 63 2D	of the.. charac-
20 20 74 65 72 73 20 6F 66 20 74 68 65 73 65 20	ters of these
20 20 74 77 6F 20 73 65 6E 74 65 6E 63 65 73 2E	two sentences.
20 20 43 6F 6E 74 72 6F 6C 20 63 6F 64 65 73 20	Control codes
61 72 65 20 70 72 69 6E 74 65 64 20 75 6E 2D 20	are printed un-
64 65 72 6C 69 6E 65 64 <u>0D 0A</u> 2E 20 20 20 20 20	derlined...

## 4.3 Software and Hardware Ident

To get a print-out listing of the software and hardware configuration of the printer, hold down the buttons Font/LF and Draft/LQ while switching on the power switch of the printer.

### Example

<u>MT 222 24-WIRE DOT MATRIX PRINTER</u>	
ROM(1) .....	44011 REV.: X.4
ROM(2) .....	44012 REV.: X.4
ROM(FONT) .....	NO IDENTIFIER
COLOUR-OPTION .....	YES
OPTIONAL-RAM .....	NO
OPTIONAL-ROM .....	NO
FONT-CARTRIDGE .....	NO
-----	
EE-ROM(DUMP) .....	00 30 8E 30 02 72 00 71
	20 05 00 88 00 00 00 00
	00 00 00 00 00 00 23 A3
	4A B7 0E 01 00 00 01 A8

# 5

## Disassembly and Reassembly

In this chapter disassembly and reassembly procedure for the printer with specific reference to disassembly will be described. Unless otherwise indicated, the reassembly procedure following disassembly is the reverse of the disassembly procedure.

This chapter is basically subdivided into the following four basic sections:

- Top casing (section 5.1)
- Power supply (section 5.2)
- Main control P.W.B. (section 5.3)
- Printer mechanism (section 5.4)

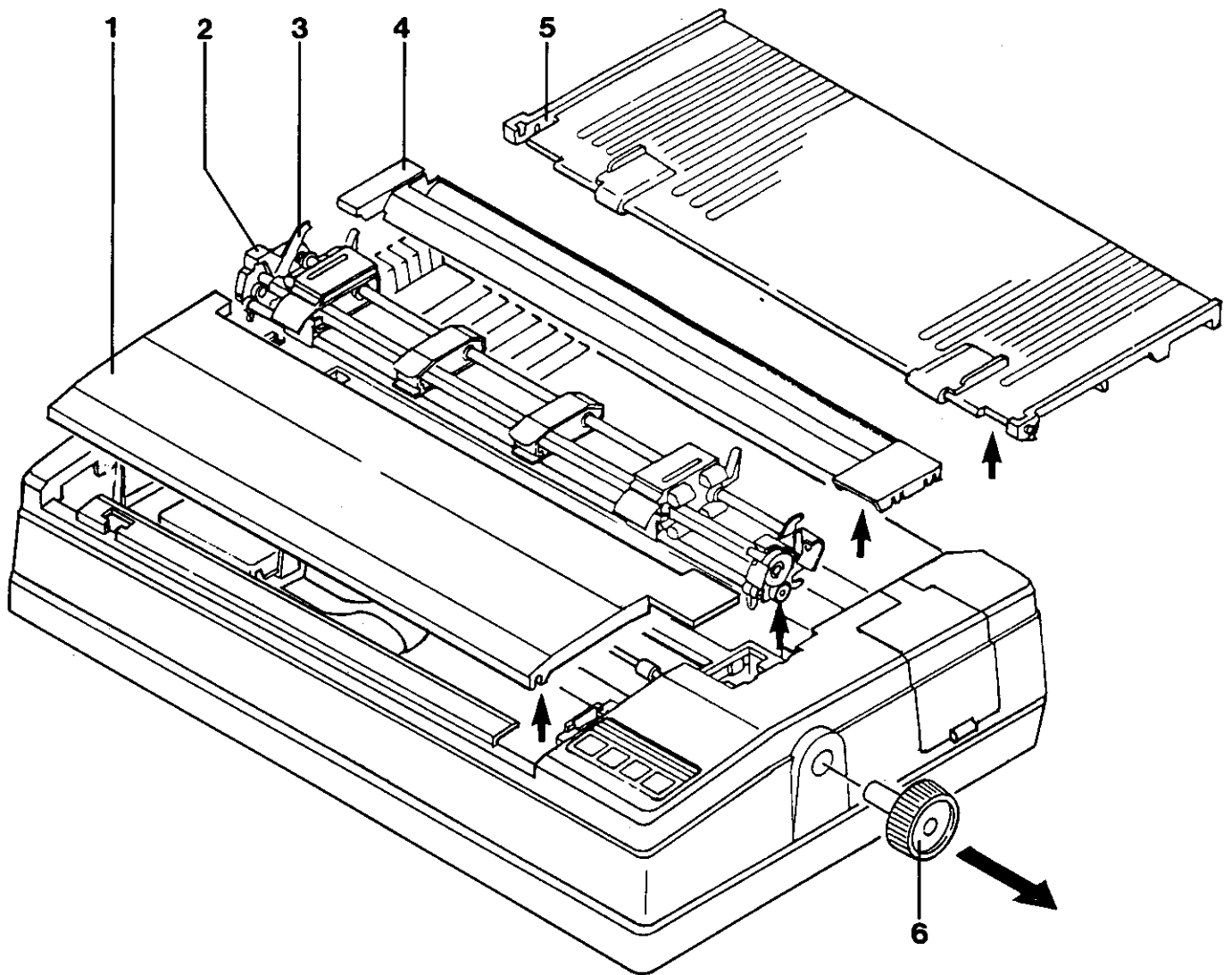
**CAUTION:** Before performing disassembly or reassembly, always switch the power switch of the printer to OFF beforehand, disconnect the power cord and remove the font card from the printer.

## Removing the Top Casing

### 5.1 Removing the Top Casing

Before performing internal checks of the printer, first remove the top casing block in accordance with the procedure outlined below.

- Remove the front cover 1.
- Remove the rear cover 5.
- Remove the platen cover 4.
- Remove paper, if still loaded.
- Remove the tractor unit 2 by pushing backwards while squeezing the black locking levers 3.
- Remove the ribbon cassette.
- Remove the manual feed knob 6.



1 Front cover  
2 Tractor unit

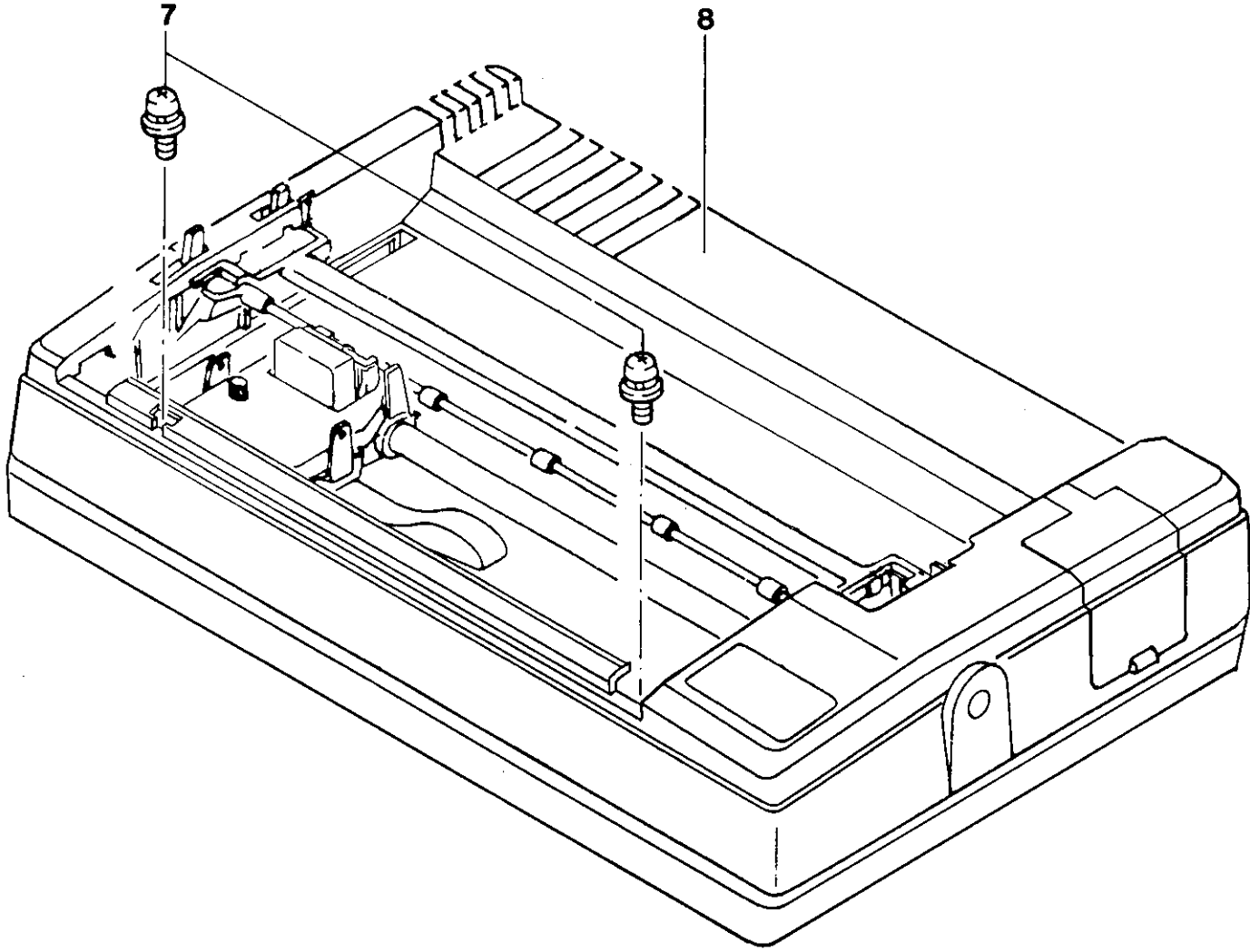
3 Locking lever  
4 Platen cover

5 Rear cover  
6 Manual feed knob



# Removing the Top Casing

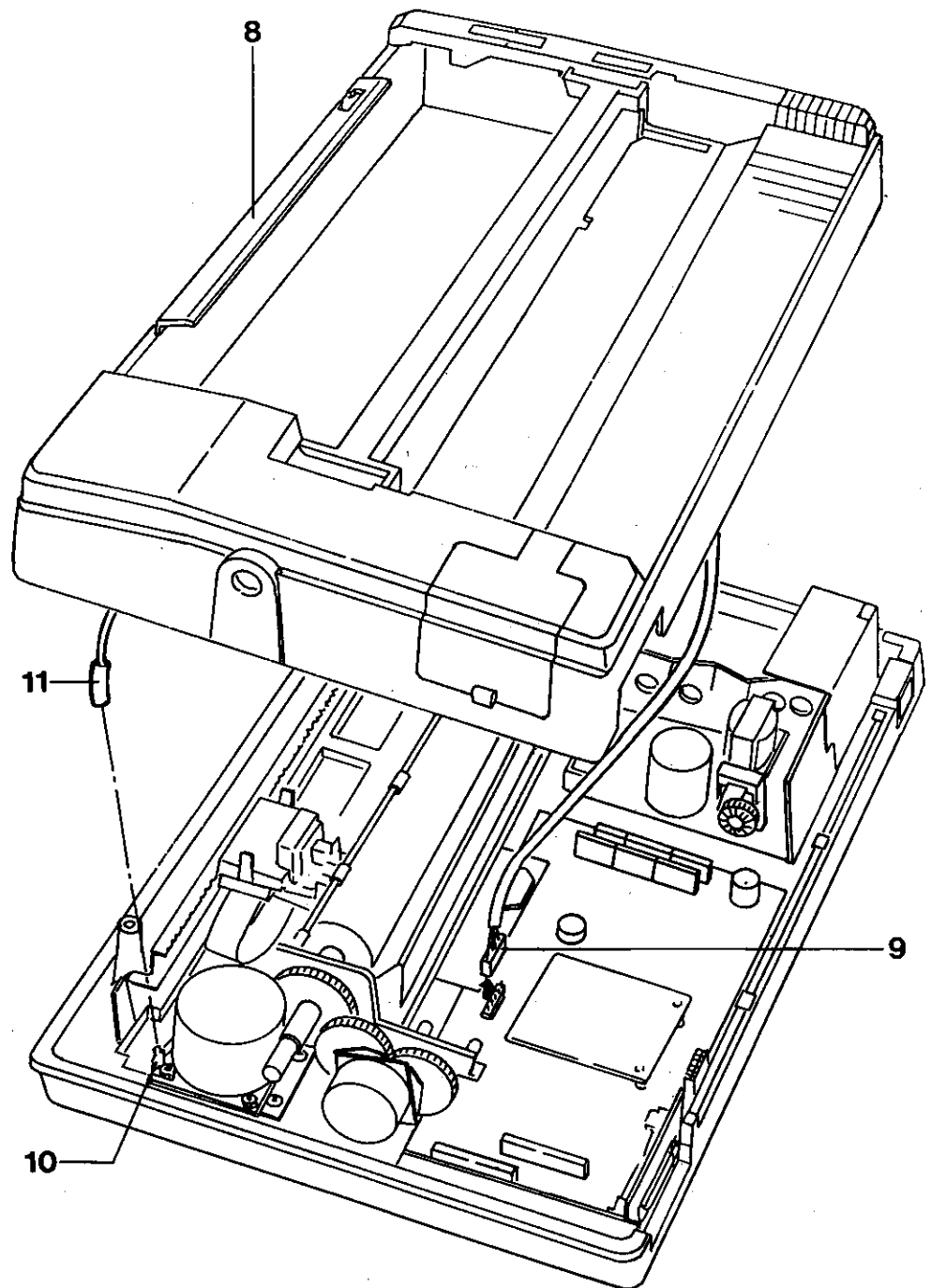
- Remove the two screws 7 fixing the top casing 8 in place.



- 7 Fixing screw
- 8 Top casing

## Removing the Top Casing

- Pull the top casing 8 up slightly outward and remove the frame ground wire 11 from the frame ground connector 10 of the stepping motor.
- Lift up the top casing 8 completely and remove the white 11-pin plug connector 9 attached to the control P.W.B.



- |                         |                           |
|-------------------------|---------------------------|
| 8 Top casing            | 10 Frame ground connector |
| 9 11-pin plug connector | 11 Frame ground wire      |

## Removing the Power Supply Unit

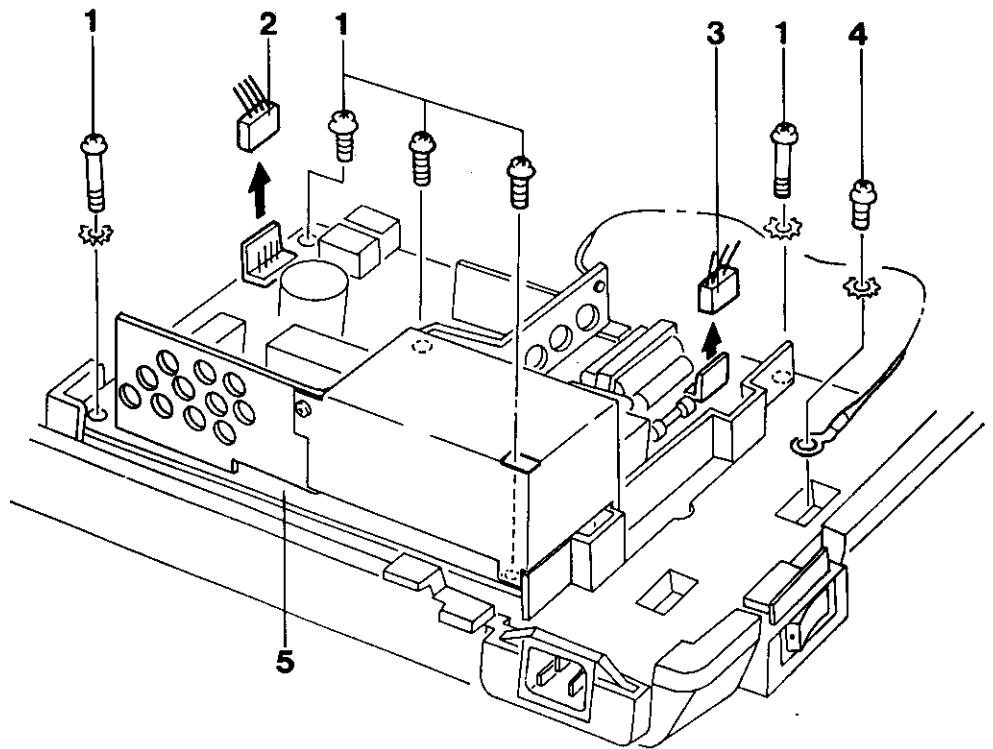
### 5.2 Removing the Power Supply Unit

Before removing the power supply unit, remove the top casing block as described in section 5.1. Remove the power supply unit using the following procedure.

- Remove the white 3-pin plug connector 3 from the power switch and the white 4-pin plug connector 2 from the control P.W.B.

**NOTE:** The plug connectors are fixed by means of incorporated clips. Squeeze to remove the plug connector.

- Remove the five screws 1 holding the power supply unit 5 in place and the screw 4 fixing the frame ground wire, which leads out from the heat sync., to the frame.



1 screw (5x)  
2 4-pin plug connector

3 3-pin plug connector  
4 frame ground wire screw

5 power supply unit

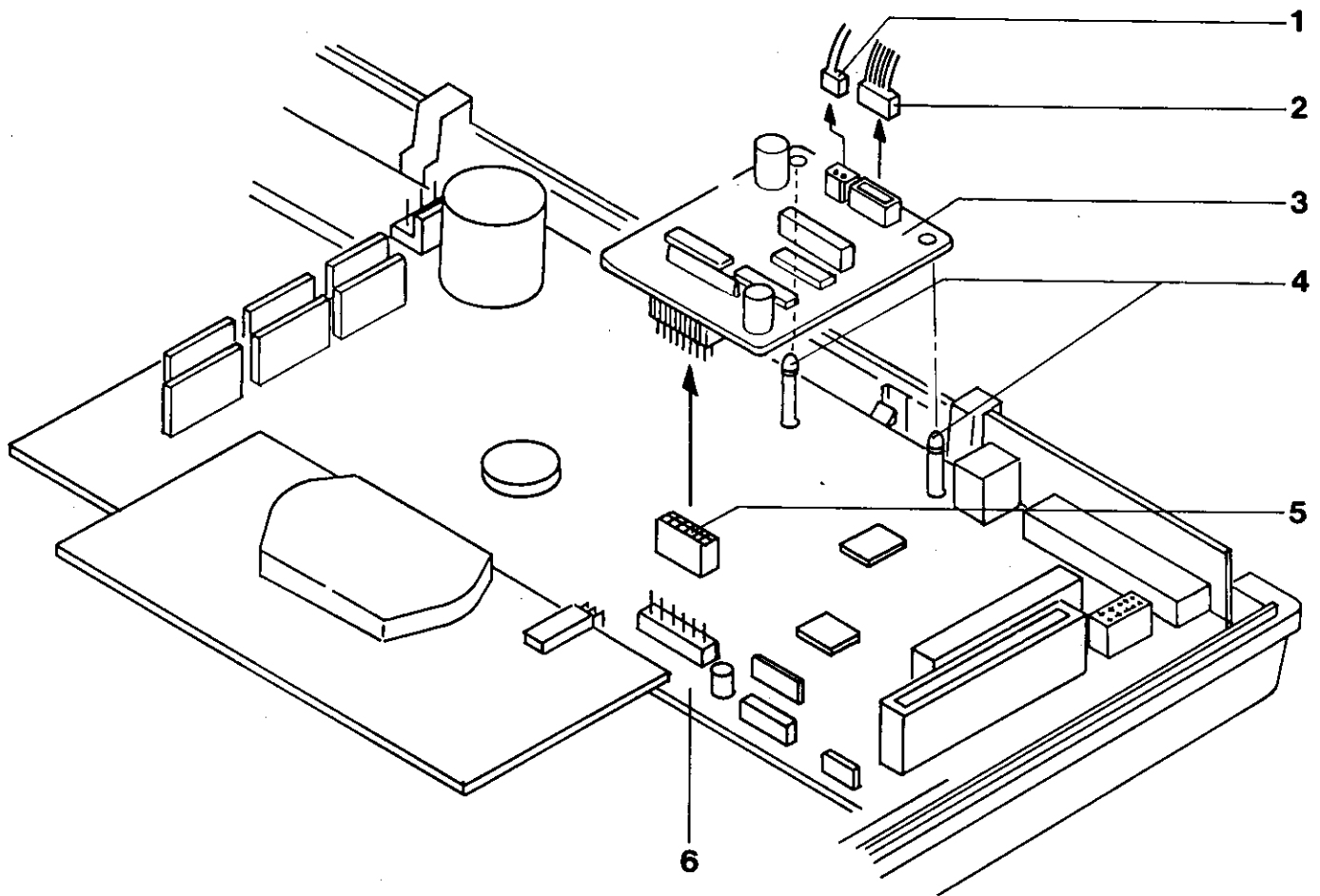
- Remove the bottom casing hooks at one time, then remove the power supply unit 5.

## Removing the Main Control P.W.B.

### 5.3 Removing the Main Control P.W.B.

Before removing the main control P.W.B., remove the top casing block as described in section 5.1 and remove the colour P.W.B. 3 using the following procedure.

- Remove the red 6-pin plug connector 2 for the colour selector motor and the white 2-pin plug connector 1 for the colour sensor.
- The colour P.W.B. 3 is fixed to the main control P.W.B. 6 by a connector 5 and two locking spacers 4. Unhook the lock section at edge of the locking spacer with radio pliers or similar tool, then remove the colour P.W.B. 3



1 2-pin plug connector  
2 6-pin plug connector

3 Colour P.W.B.  
4 Locking spacers

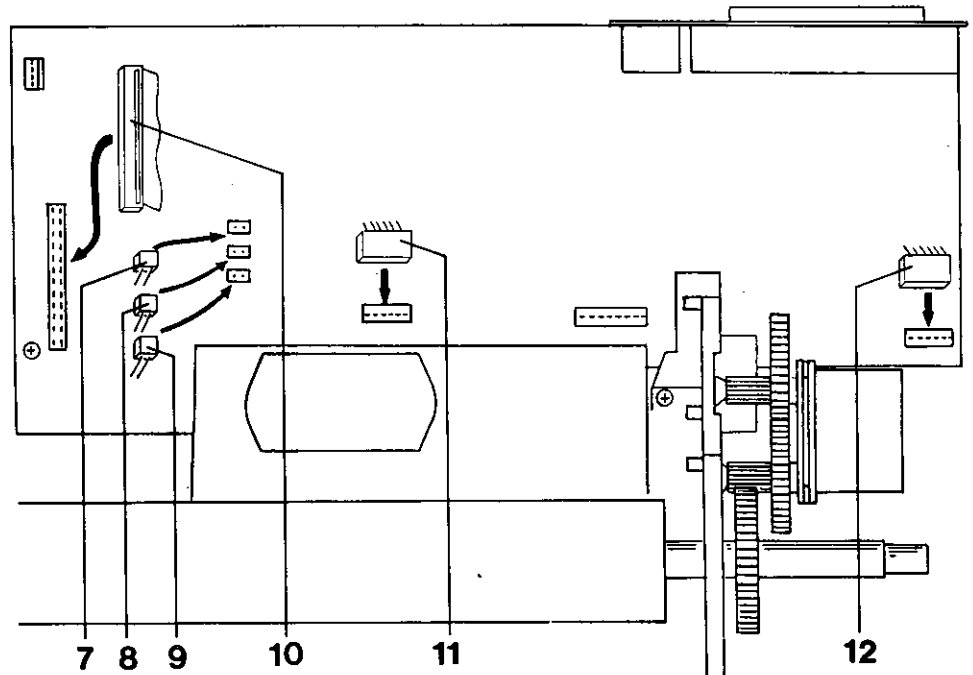
5 Connector  
6 Main Control P.W.B.

Remove the main control P.W.B. using the following procedure.

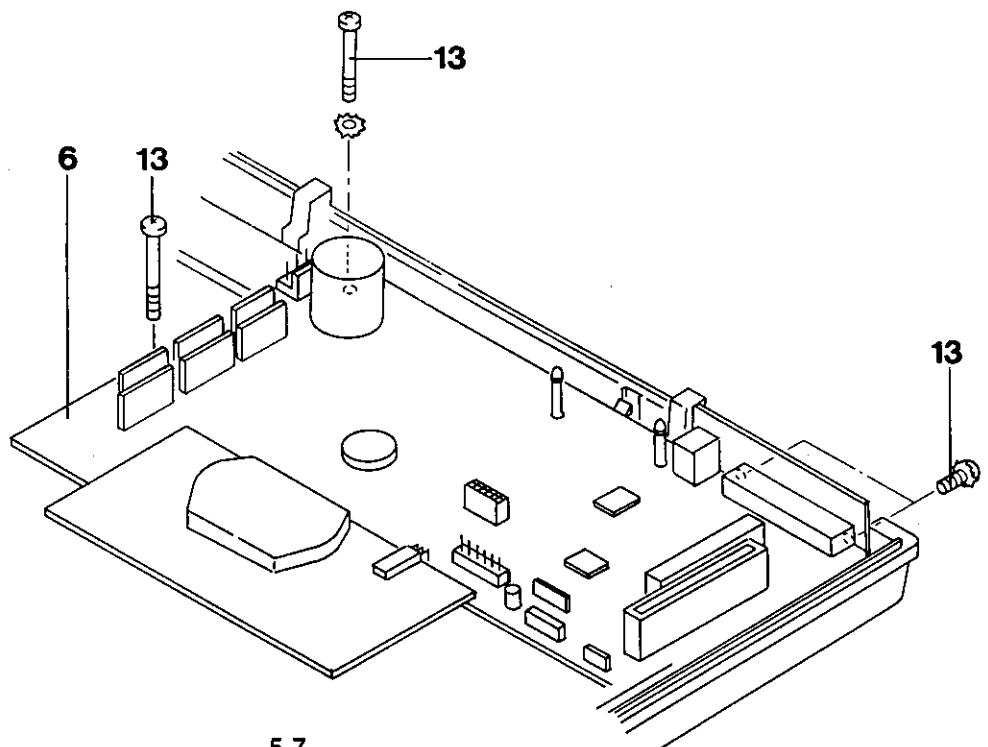
## Removing the Main Control P.W.B.

- Remove the following 6 connectors for the main control P.W.B. 6:

7	Paper end sensor connector	(2-pin, white)
8	Auto load sensor connector	(2-pin, red)
9	Home position sensor connector	(2-pin, black)
10	Print head connector	(40-pin, black)
11	Carriage motor connector	(6-pin, white)
12	Paper feed motor connector	(6-pin, black)



- Remove the three screws 13 holding the main control P.W.B. 6 in place.
- Remove the bottom casing hooks at one time, then remove the main control P.W.B. 6.



# Disassembly and Reassembly of Printer Mechanism - Removing the Print Head

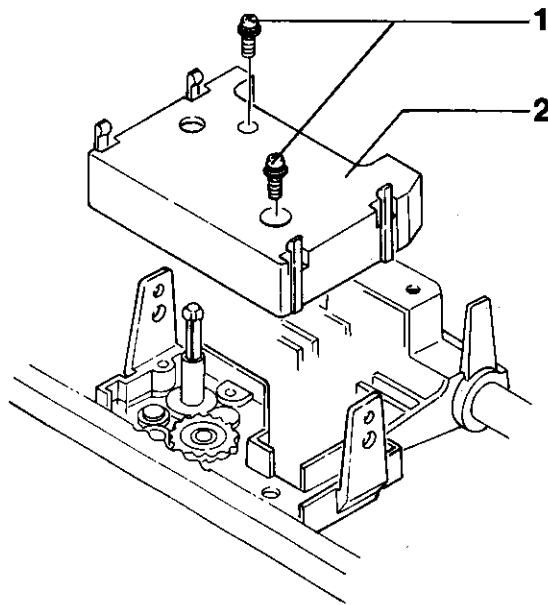
## 5.4 Disassembly and Reassembly of Printer Mechanism

Before disassembly of printer mechanism, the top casing has to be removed as described in section 5.1.

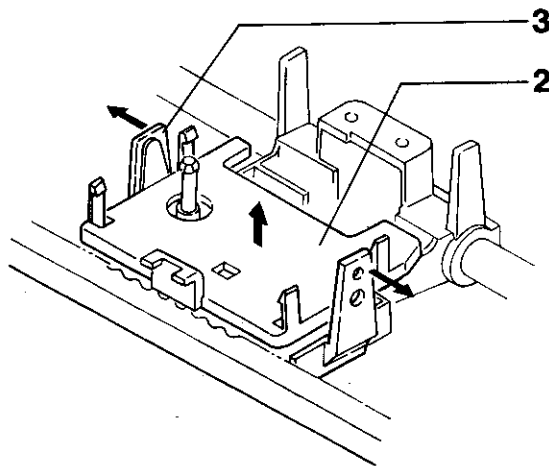
### 5.4.1 Removing the Print Head

Remove the print head using the following procedure.

- Remove the ribbon base 2.
  - For monochrome printer: remove the two screws 1 holding the ribbon base 2 in place.

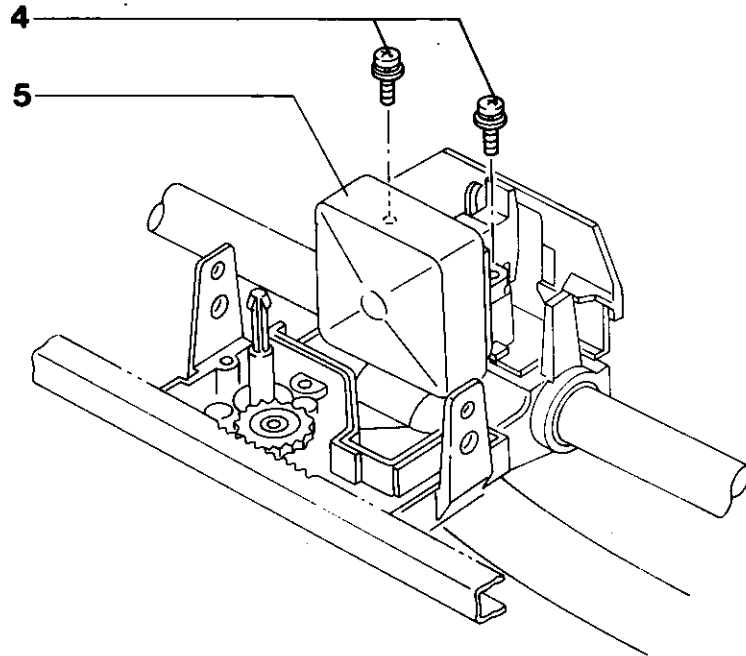


- For multi-colour printer: open the gear case 3 outward and remove the ribbon base 2 by pulling it upward.

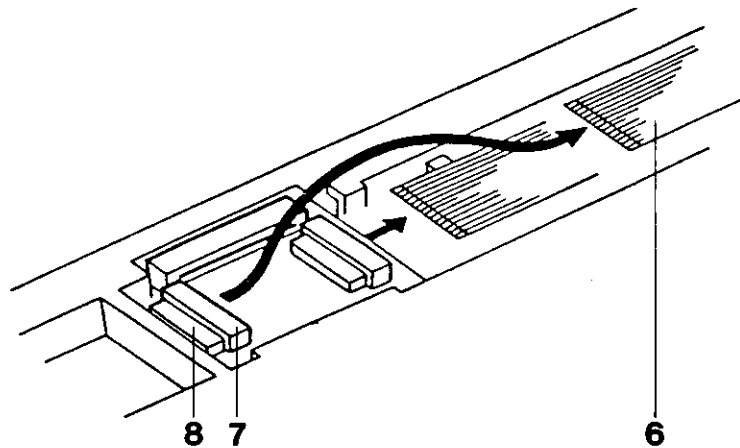


## Removing the Print Head

- Remove the two screws 4 holding the print head 5 in place.



- Remove the connector locks 7 by pulling to the right and off, then carefully remove the two flexible cables 6 from the connectors 8.



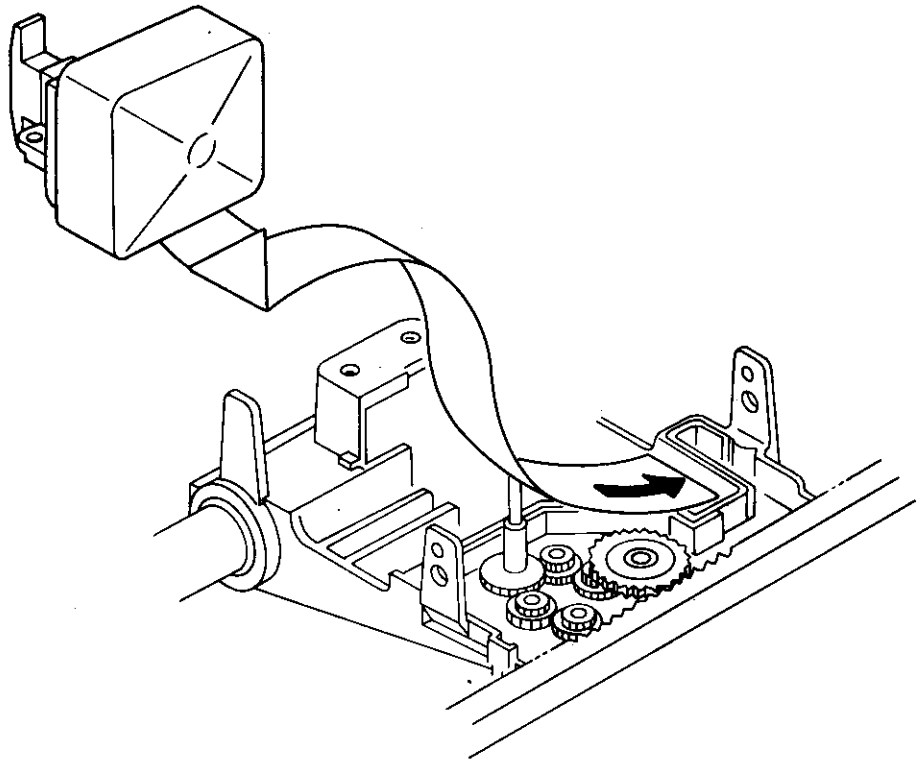
- Carefully remove the flexible cables from the bottom casing guide and from the head base, taking care not to damage cables.

## Mounting and Adjusting the Print Head

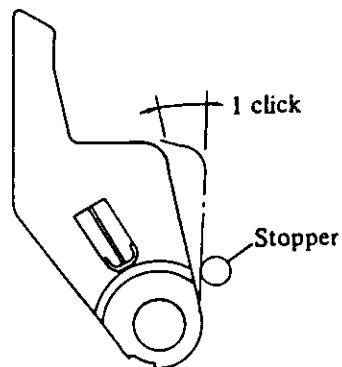
### 5.4.2 Mounting and Adjusting the Print Head

Mount the print head and perform gap adjustment using the following procedure.

- Wire the flexible cable through the head base as illustrated.



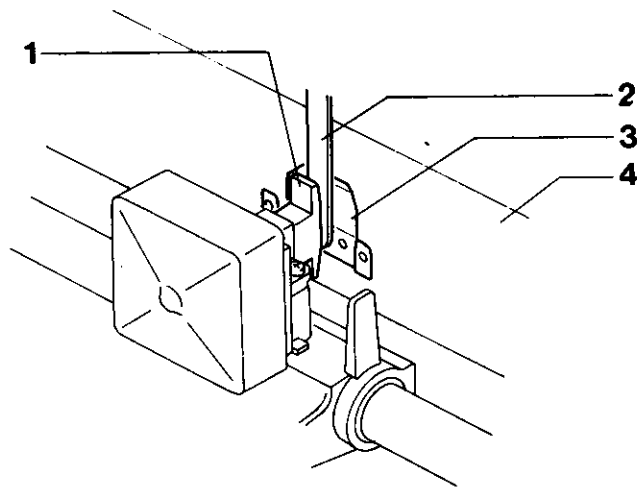
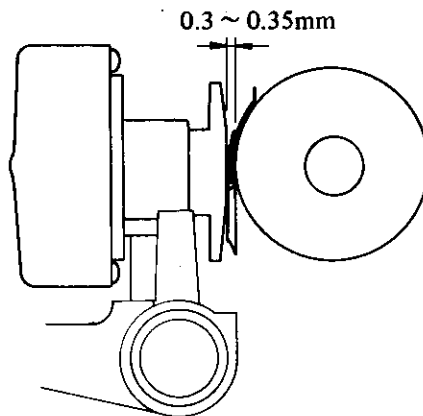
- Place the print head on the head base and fix it in place lightly with the two screws.
- Insert the flexible cables into the connector and lock them by pushing the connector locks in place.
- Set the paper thickness compensation lever in the normal position (the longest, raised mark - one click past the stopper).





## Mounting and Adjusting the Print Head

- Loosen the two screws holding the print head in place again and insert a 0.3 + 0.05 mm thickness gauge (or equivalent gauge) between the head nozzle and the ribbon guide as illustrated.



- |                   |                |
|-------------------|----------------|
| 1 Head nozzle     | 3 Ribbon guide |
| 2 Thickness gauge | 4 Platen       |

- Fix the print head and mount the head base.

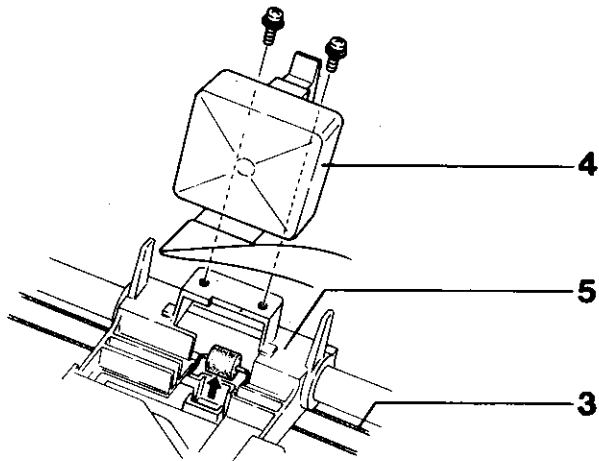
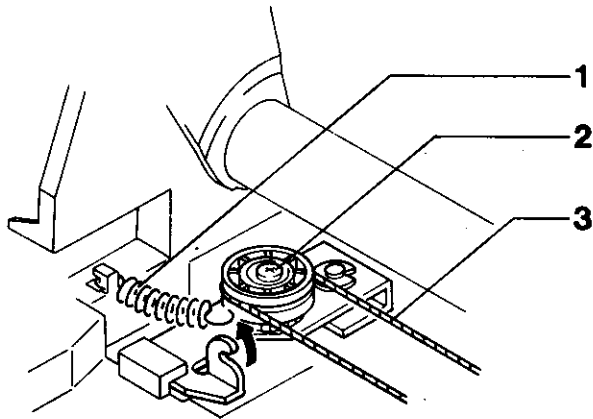
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## Removing the Carriage Stepping Motor Block

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### 5.4.3 Removing the Carriage Stepping Motor Block

- For multi-colour printer: remove the colour unit as described in section 5.4.8.
- Remove the print head 4 as described in section 5.4.1.
- Remove the tension plate spring 1.



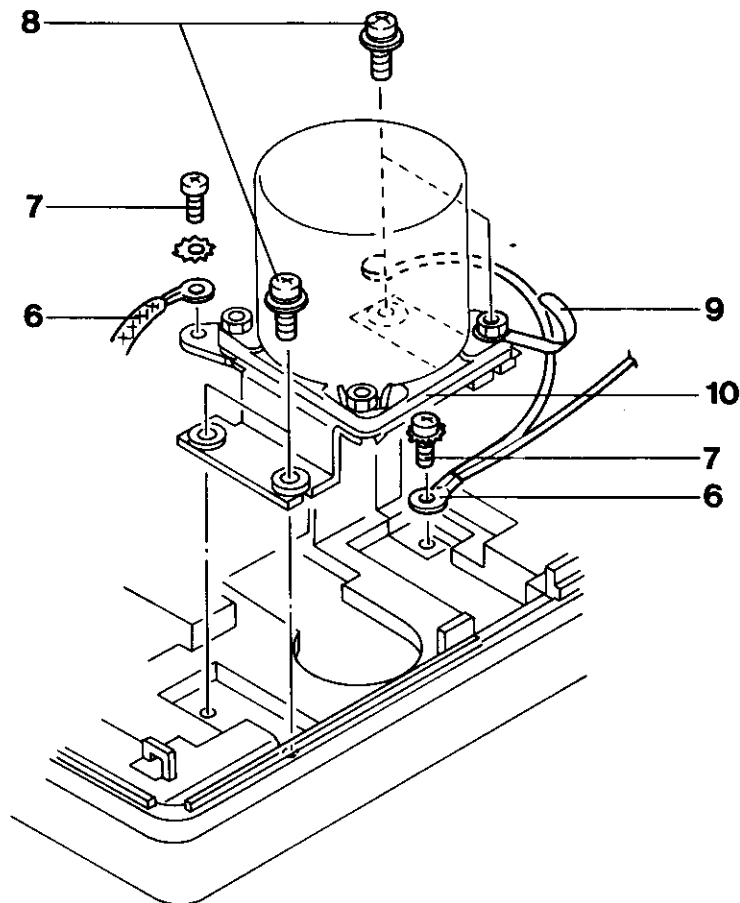
- Disconnect the wire 3 from the head base 5 and lift the wire 3 off the wire tension pulley 2.

---

## Removing the Carriage Stepping Motor Block

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- Bend the cord fixation **9** open.
- Remove the four screws **8** holding the carriage stepping motor mount plate **10** in place, then remove the screws **7** attaching the frame ground lead wire **6** to the shield plate.

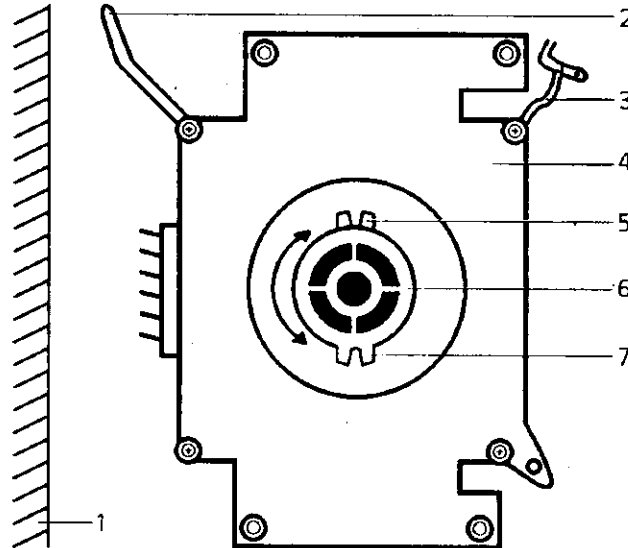


- Remove the carriage stepping motor block.
- Remove the wire **3** (see opposite page for corresponding figure) completely.

## Mounting the Carriage Stepping Motor Block

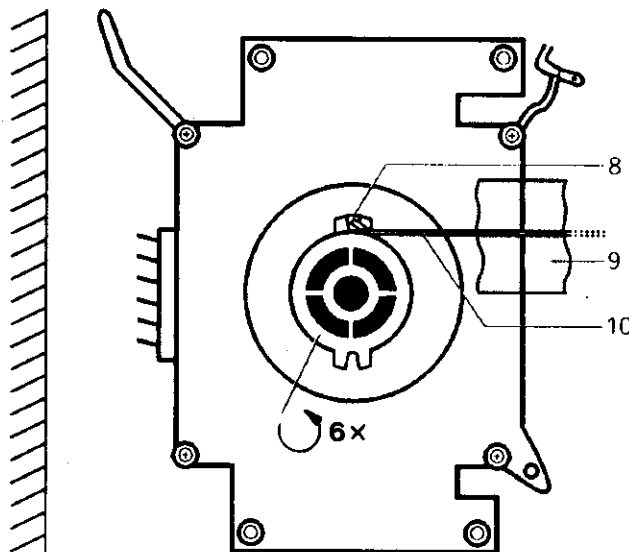
### 5.4.4 Mounting the Carriage Stepping Motor Block

- Turn the carriage stepping motor block upside down and place it right-hand outside the bottom casing 1 as illustrated in the following top view.



- |                          |  |                     |
|--------------------------|--|---------------------|
| 1 Bottom casing          | 4 Carriage stepping motor<br>mount plate | 6 Motor pulley      |
| 2 Cord fixation          | 5 Lower wire holder                      | 7 Upper wire holder |
| 3 Frame ground lead wire |  |                     |

- Turn the motor pulley 6 until the lower wire holder 5 is directed towards the rear and the upper wire holder 7 is in front of you, as illustrated above. The position of the motor pulley 6 you get this way, is the start position for installing the wire.
- Fasten the small ball 8 at the end of the longer part of the wire 10 (relating to the rubber bush) to the lower wire holder 5 of the motor pulley 6, then turn the motor pulley 6 six turns counterclockwise and fix this position using a self-adhesive tape 9 as illustrated below.

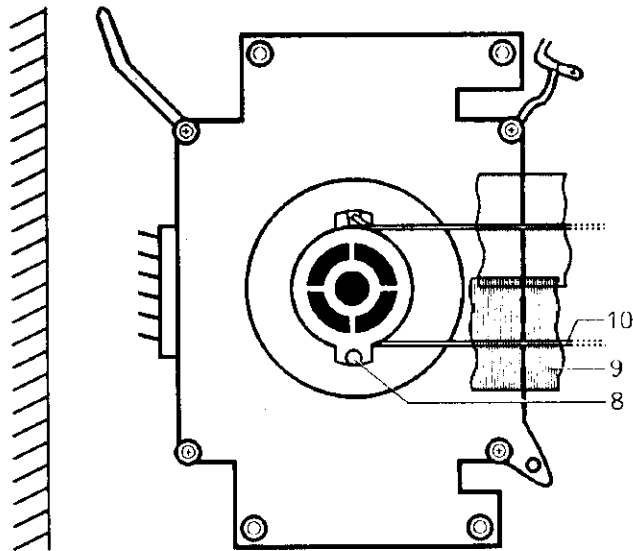


- |                      |                      |         |
|----------------------|----------------------|---------|
| 8 Small ball of wire | 9 Self-adhesive tape | 10 Wire |
|----------------------|----------------------|---------|

## Mounting the Carriage Stepping Motor Block

- Fasten the small ball **8** at the other end of the wire **10** to the upper wire holder **7** of the motor pulley **6**, then **wind the wire** five turns counterclockwise around the motor pulley **6** and fix this position using a self-adhesive tape **9** as illustrated below.

Now, there must be 11 windings around the motor pulley; six clockwise windings and five counterclockwise windings.

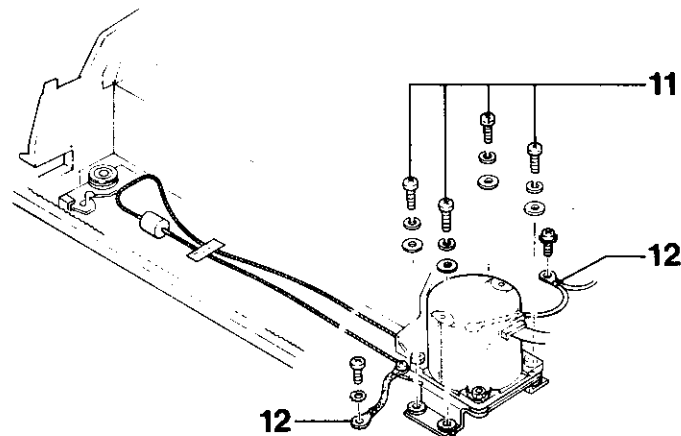


**8** Small ball of wire

**9** Self-adhesive tape

**10** Wire

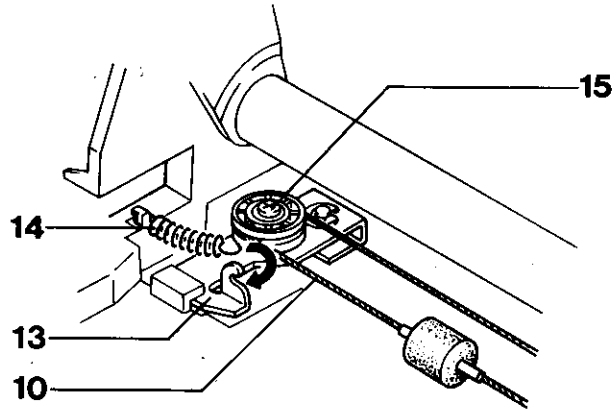
- Turn the carriage stepping motor block to its normal position.
- Lead the wire while keeping it in parallel and set the carriage stepping motor block on the shield plate.
- Untwist the wire, if twisted, and fix it to the bottom casing using a adhesive tape. Do not tight the wire too much when fixing, because the tapes at the bottom of the carriage stepping motor block fixing the wire windings may be loosen. This would be result in repeating the wire installing procedure completely.



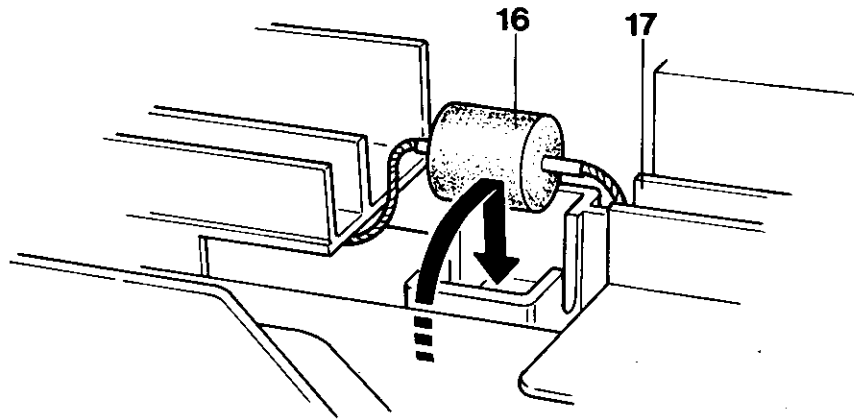
- Fix the four screws **11** in place and connect the frame ground lead wires **12**.

## Mounting the Carriage Stepping Motor Block

- Attach the wire 10 to the tension pulley 15 and attach the spring 14 to the tension plate 13.



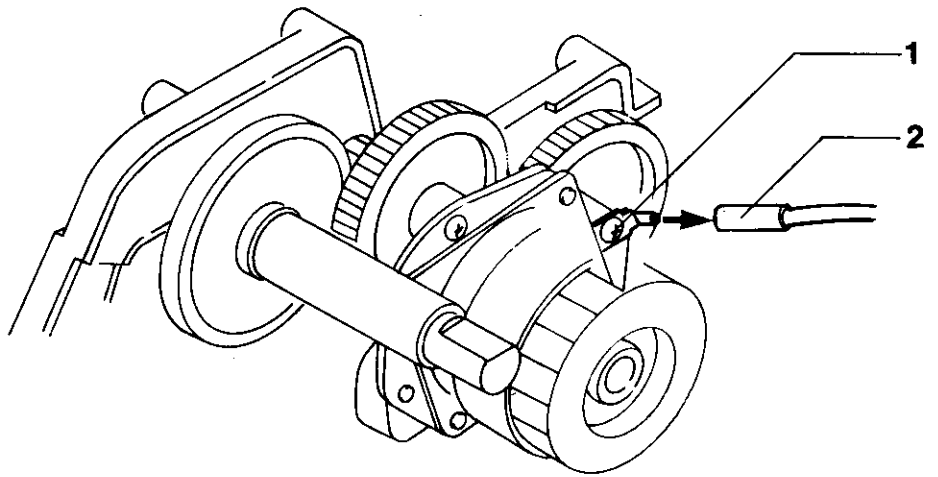
- Remove the tapes at the bottom of the carriage stepping motor block.
- Shift the carriage sideways as desired and mount the rubber bush 16 on the wire to the head base 17.



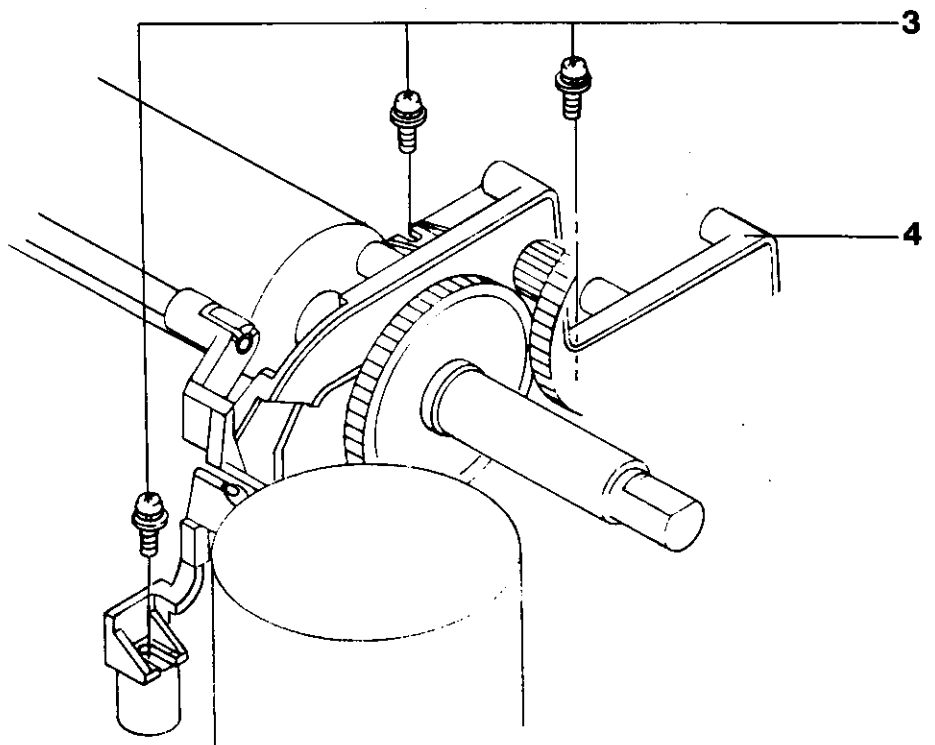
## Removing the Paper Feed Stepping Motor Block

### 5.4.5 Removing the Paper Feed Stepping Motor Block

Remove the frame ground lead wire 2 from the rag terminal 1.

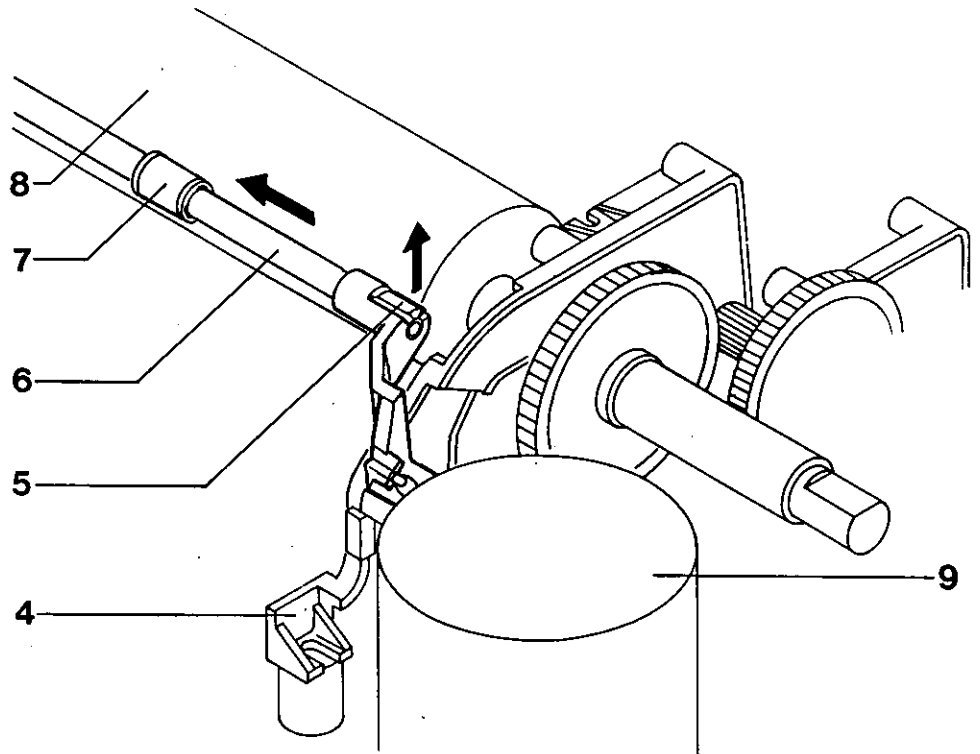


- Remove the three screws 3 holding the R frame 4 in place.

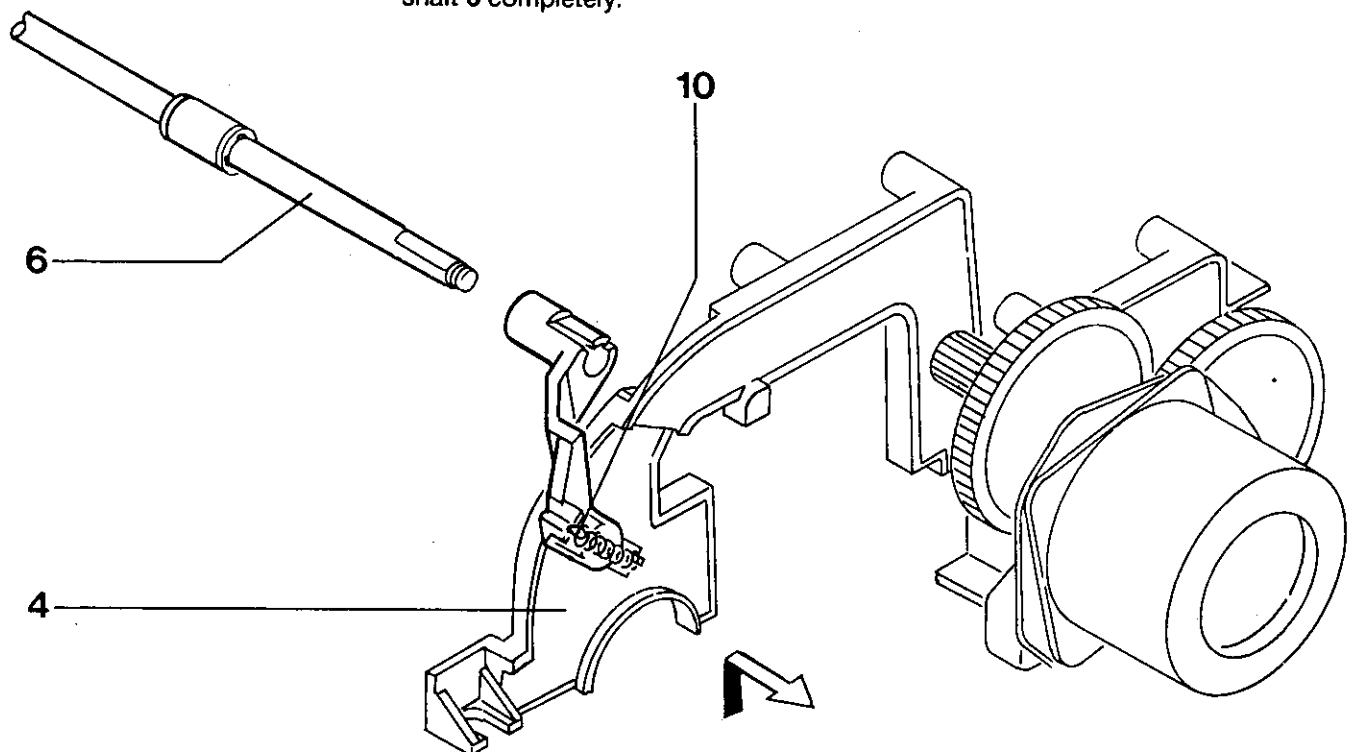


## Removing the Paper Feed Stepping Motor Block

- Pull the bail roller lever towards you to set the paper bail roller 7 away from the platen 8. Slightly open the lever pawl 5 and slide the bail roller shaft 6 slightly to the left; do not yet remove it completely!



- Unhook the tension spring 10 and lift up the R frame block 4 to the top of the carriage stepping motor 9, then slide it outwards and remove the bail roller shaft 6 completely.



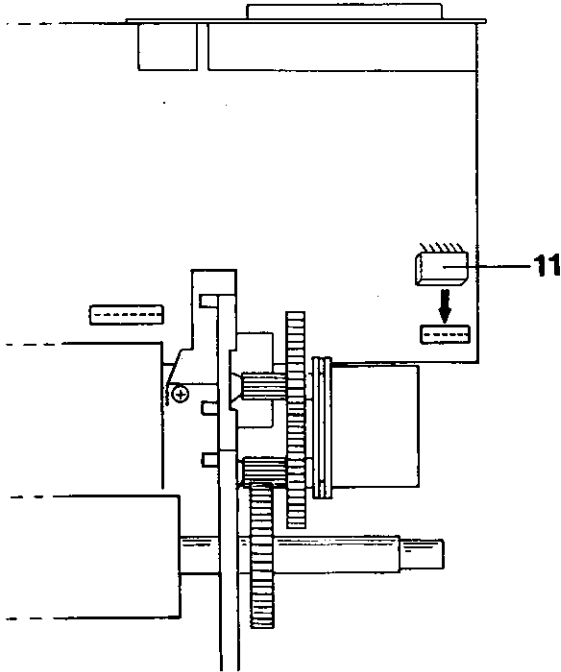


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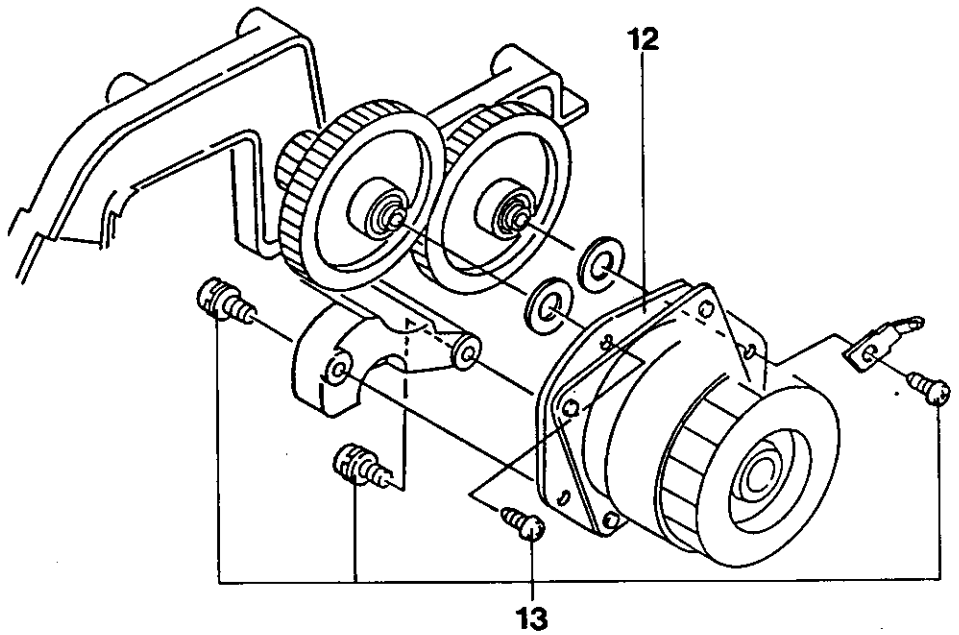
## Removing the Paper Feed Stepping Motor Block

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- Remove the 6-pin black connector 11 from the main control P.W.B.



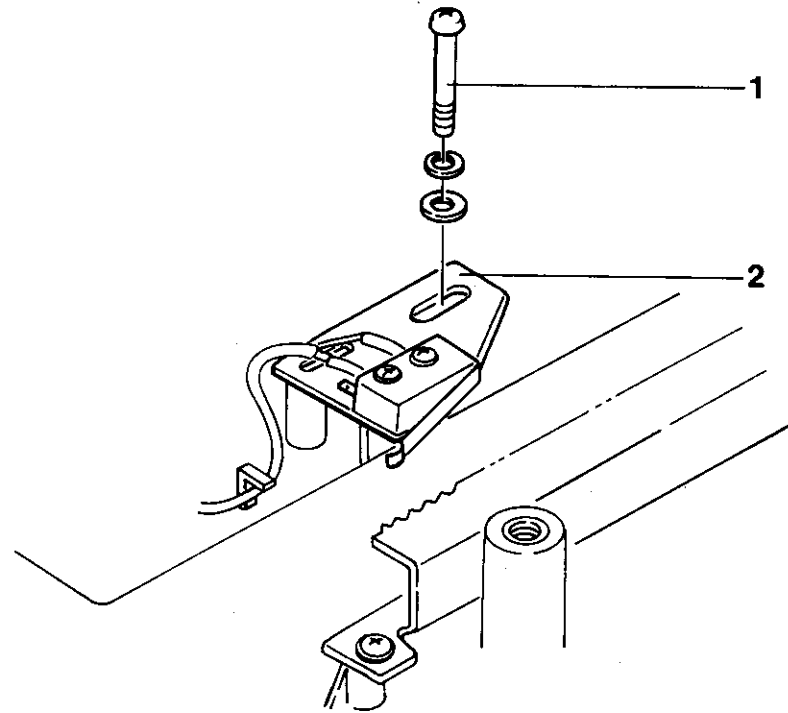
- Remove the four screws 13 holding the paper feed stepping motor mount plate 12 in place.



## Removing / Mounting and Adjusting the Carriage Home Position Sensor Block

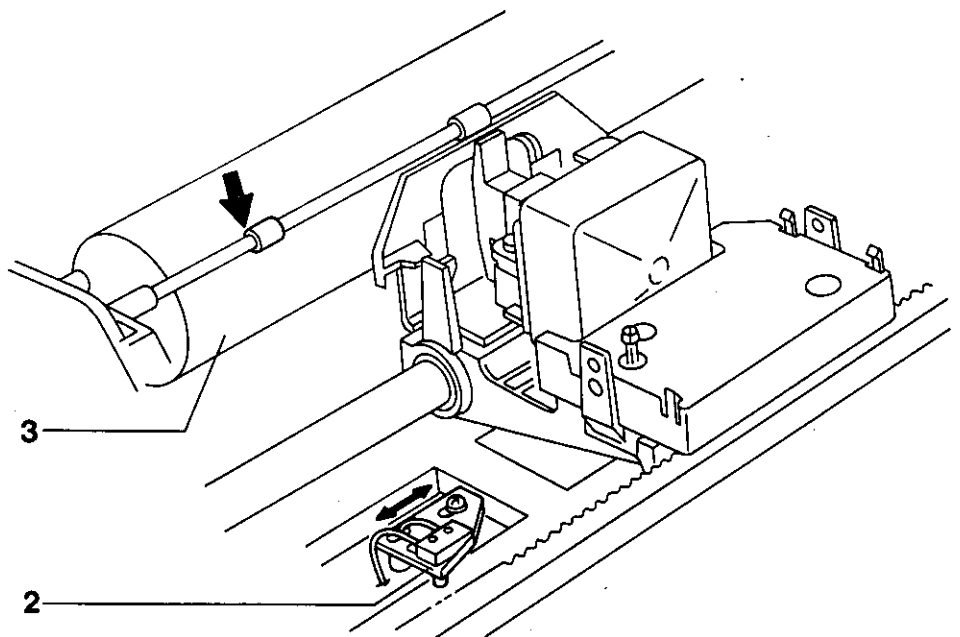
### 5.4.6 Removing the Carriage Home Position Sensor Block

- Loosen the screw 1 holding the carriage home position sensor block 2 in place and remove the block.



### 5.4.7 Mounting and Adjusting the Carriage Home Position Sensor Block

- When mounting the carriage home position sensor block 2, also you need to adjust the print start position. For adjustment, move the sensor block laterally, then adjust it so that the print start position comes to the left edge of guide ball roller 3.



## 6 Maintenance

### 6.1 Tools and Measuring Instruments Required

Prepare the following tools and measuring instruments before the maintenance of the printer.

#### Tools

- (+) Screwdriver No.1
- (+) Screwdriver No.2
- (-) Screwdriver No.3
- Hexagonal wrench 1.5 mm
- Tweezers
- Electric soldering iron
- Radio cutting pliers
- ET holder (#2 ~ #5)
- Thickness gauge  $t = 0.3$  mm
- Tension gauge (2 kg)
- Scale (15 cm)
- Box screwdriver (opposite sides: 7 mm)
- Brush
- Washing brush

#### Measuring Instruments

- Oscilloscope 50 MHz
- Tester

### 6.2 Maintenance

To maintain the printer unit keep in peak performance condition for as long as possible and to minimize troubles and to ensure years of lasting service, perform the following maintenance procedures after every 50,000 lines of printing or after each year of operation.

#### Cleaning

- Printer external parts (exclusive of print head contact section):  
Clean the printer casing and other external parts of the printer with a soft cloth moistened with water and a mild detergent solution.

**NOTE: Use neither a rough cloth, a strong detergent nor any alcohol-based cleaner.**

- Printer internal parts  
Remove all dust and paper residue from the internal printer mechanisms and P.W.B.s with a soft brush.

**NOTE: When cleaning inside the printer, be extremely careful that you clean gently so as not to damage the electrical wiring.**

- Print head (contact section)  
Remove all dust, ribbon and paper residue from the print head contact section with a soft brush.

# Lubrication

## Checks

- Remove all dust and dirt from the head base shaft a soft brush, then oil the head base shaft with K-147P oil.

**NOTE: Do not oil the head base shaft with oil other than K-147P. Only oil sections designated for lubrication.**

- Remove all dust and dirt from the ribbon gear section and grease the section with CE-13.
- Check that the gap between print head and platen is 0.3 + 0.05 mm.
- Check for wearing and deformation, etc., of the springs of various parts.

## 6.3 Lubrication

Lubricate the printer as specified below in order to keep it in peak performance condition for as long as possible and to minimize trouble during operation.

### Types of Lubricants

- Oil: K-147P, 40 cc, special order from supplier
- Grease: CE-13, 40 g, special order from supplier

### Lubrication Standards

When lubricating parts during disassembling and assembling the unit, be sure to clean parts before lubricating. For the types of lubricants to be used and the specified parts to oil, refer to the next paragraph, "Parts to Lubricate", and to Chapter 8, "Spare Parts and Schematics".

Parts should be periodically lubricated as specified below ("Lubrication Periods").

#### Lubrication Periods:

- ☒ Once every year or after every 50,000 lines of printing.
- ☒☒ On overhauling the unit or after every 300,000 lines of printing.

### Parts to Lubricate

Oil numbers below refer to the place to oil as shown in Chapter 8, "Spare Parts and Schematics").

No.	Part to Lubricate	Lubricant	Lubrication Period
Oil 1	Head base shaft	K-147P	☒
Oil 2	Base plate	CE-13	☒
Oil 3	Ribbon gear section	CE-13	☒
Oil 4	Rotating shaft of idling gear A	CE-13	☒☒
Oil 5	Section of pressure roller	CE-13	☒☒
Oil 6	Section of colour selector plate	CE-13	☒☒
Oil 7	Rotating shaft of colour selector plate	CE-13	☒☒

## 7 Troubleshooting

It is not easy to do troubleshooting, because many problems may be caused by defect parts by parts, however, the unit is designed to get easily checked and repaired with the ways as follows.

### Troubleshooting Procedures

Symptom	Indication	Systematic Isolation procedure	Corrective action
1. No power.	Control panel indicators not lit.	1. Check that power switch is ON.	Set power switch to ON.
		2. Check that power cord is plugged in.	Connect power cord to power outlet.
		3. Verify the power at power outlet with a known good lamp.	Notify user.
		4. Set power switch to OFF and remove top casing. Check that the cables at CN1 and CN2 are connected on power supply unit.	Connect cables on power supply unit.
		5. Set power switch to OFF and remove top casing. Check that the cable at CN14 is connected on the main control P.W.B.	Connect cable on main control P.W.B.
		6. Set power switch to OFF and remove top casing. Check that the fuses are brown on power supply unit. a. Line Fuse (F101) b. Secondary Fuse (F201)	Replace defective fuse(s).
		7. Use multimeter. a. Measure +5 V between CN2-1 and CN2-2 on power supply unit when power is switched ON without the cable at CN2. b. Measure +40 V between CN2-3 and CN2-4 on power supply unit when power is switched ON without the cable at CN2. c. Measure +5 V between CN14-1 and CN14-2 on main control P.W.B. when power is switched ON under normal load. d. Measure +40 V between CN14-3 and CN14-4 on main control P.W.B. when power is switched ON under normal load.	
2. Power, but initialization not completed.	Power indicator is lit, but no tones from buzzer.	1. Main control P.W.B. failed.	Replace main control P.W.B.
3. Power, but no operation.	Alarm indicator is flashing and buzzer sounds.	1. A continuous series of single short tones signifies a ROM/RAM mistake.	Replace main control P.W.B.
		2. A long uninterrupted tone signifies a mistake of the font card.	Replace font card/main control P.W.B.
		3. A continuous series of double short tones signifies that the print head has been restricted, i.e. a drive circuit error is indicated. Refer also to symptom No.5.	Check restrictions, replace main control P.W.B.
4. Power, but no operation.	Alarm indicator is lit, six tones from the buzzer.	1. Paper-end detected.	Load paper, Alarm indicator goes OFF.
		2. Paper-end sensor failed.	Install new sensor.
		3. Main control P.W.B. failed.	Replace main control P.W.B.

# Troubleshooting Procedures

Symptom	Indication	Systematic Isolation procedure	Corrective action
5. Power, but no operation	Carriage "chatters" in and out of left margin position several times.	1. Paper jammed in print head path.	Clear blocked path of print head and carriage.
		2. Paper "chad" built-up on carriage shaft.	Clear carriage shaft with dry lint-free cloth.
		3. Extraneous material in carriage path.	Remove blocking material.
		4. Home position sensor not connected at main control P.W.B. (connector CN10).	Remove top casing. Connect home position sensor at CN10.
		5. Home position sensor failed.	Replace home position sensor.
		6. Main control P.W.B. failed.	Replace main control P.W.B.
6. Power, but no operation.	Colour ribbon carriage "chatters" up and down to the home position.	1. Colour ribbon carrier blocked from going to home position.	Clear device blocking the colour ribbon carrier.
		2. Colour sensor failed.	Replace colour sensor.
7. Power, but no operation.	Alarm indicator in ON steady.	1. RAM read/write or RAM check sum error at power ON.	Replace main control P.W.B.
8. Only cut sheet paper will advance.	Overprinting of same line when using fanfold paper.	1. Paper not inserted properly in tractor causing tear-out of transport holes.	Insert paper correctly.
		2. Gear teeth on tractor drive gear or the intermediate drive gear are worn or broken off.	Replace worn or broken gear.
9. Neither the fanfold paper nor cut sheets advances printer power.	When rear cover snapped up, fanfold paper can be advanced manually, and when snapped down, cut sheets can be advanced manually.	1. Verify that LF motor or LF motor cable is the failed device as follows: a. With carriage at mid point, set power to ON. Carriage moves to home position. b. If carriage does not move, go to troubleshooting symptom No.1.	Set power to OFF, CRG motor to mid point to verify voltage is present. If voltage is present, the carriage goes to home position. Go to Step 2. If no carriage movement, voltage is no present.
		2. Remove top casing. Check that LF motor is connected to main control P.W.B. (connector CN1).	Properly seat cables.
		3. Main control P.W.B. failed.	Replace main control P.W.B.
		4. LF motor failed.	Replace LF motor.
10. Carriage will not move to the home position.	Alarm indicator is ON steady, buzzer sounds.	1. Verify that carriage moves freely on head base shafts with power OFF. Hold the home position sensor closed while setting power to ON. After the printer initializes, release the switch and observe that Alarm indicator does not light. Press the LF button and observe that paper is advanced.	If paper advanced, go to Step No.2. If paper not advance, go to troubleshooting symptom No.1
		2. Remove top casing. Check main control P.W.B. CN9 to carriage motor.	Replace main control P.W.B.
		3. Main control P.W.B. failed.	Replace main control P.W.B.
		4. Carriage motor failed.	Replace carriage motor.
11. Paper not loaded by bail roller lever.	Replaced paper will also not be loaded by pulling the bail roller lever.	1. Remove top casing. Check seating at main control P.W.B. CN11 to the auto load switch sensor cable.	Properly seat cable.
		2. Auto load switch sensor failed.	Replace sensor.

## Troubleshooting Procedures

Symptom	Indication	Systematic isolation procedure	Corrective action
12. No printing, but paper feeds, carriage moves.	Carriage moves to home position and side to side during self-test. No printing, Alarm indicator is off, buzzer does not sound.	1. Remove top casing. Check seating at main control P.W.B. connector CN13.	Properly seat and lock cable.
		2. Print head failed.	Replace print head.
		3. Main control P.W.B. failed.	Replace control P.W.B.
13. Colour ribbon will not raise or lower.	Alarm indicator is off. Colour ribbon carriage does not go to home position at power ON, buzzer does not sound. Printer acts like a monochrome printer.	1. Check colour P.W.B. installed on main control P.W.B.	Set power to OFF, then install colour P.W.B.
14. Colour ribbon will not raise or lower.	Alarm indicator is off. Colour ribbon carriage does not go to home position at power ON, buzzer sounds.	1. Remove top casing. Isolate failed area as follows: <ol style="list-style-type: none"> <li>a. Hold colour sensor closed while power is applied and initialization is being performed by the printer.</li> <li>b. If buzzer still sounds, colour P.W.B. and main control P.W.B. not connect.</li> </ol>	Set power to OFF, then install colour P.W.B.
		2. If buzzer does not sound in above test, connect a replacement change motor to colour P.W.B. connector, then set power to ON. <ol style="list-style-type: none"> <li>a. If the change motor gear turns at power ON, change motor is failed.</li> <li>b. If replacement change motor does not turn during the test, the colour P.W.B. is failed.</li> </ol>	Replace change motor. Replace colour P.W.B.
		3. Main control P.W.B. is failed.	Replace control P.W.B.
15. Some print wires are not fired during the printout.	Alarm indicator is off. The buzzer does not sound during the printout.	1. Check a self-test printout. If the same dots are missing, locate failed area as follows: <ol style="list-style-type: none"> <li>a. Check print head cable connections.</li> <li>b. If the missing dots are still in the same pattern, the print head may be failed.</li> </ol>	Properly connect and lock. Replace print head.
		2. If the above tests do not correct the missing dots, remove the top casing. Disconnect and reconnect the main control P.W.B. connector CN13, then repeat the self-test. <ol style="list-style-type: none"> <li>a. If dots are still missing, main control P.W.B. may be failed.</li> <li>b. If dots are still missing, intermediate P.W.B. may be failed.</li> </ol>	Replace main control P.W.B. Replace intermediate P.W.B.

# 8

## Spare Parts and Schematics

The spare parts catalogue of the printer given in this chapter is subdivided into 7 main assemblies, the general arrangement is given in section 8.1. All parts which do not appear on assemblies in sections 8.2 to 8.7 are directly marked on assembly in section 8.1.

Each assembly has a parts list, illustrated breakdown or assembly drawing as well as a circuit schematic for electronic assemblies. The numbers in the drawings correspond with the numbers in the parts list.

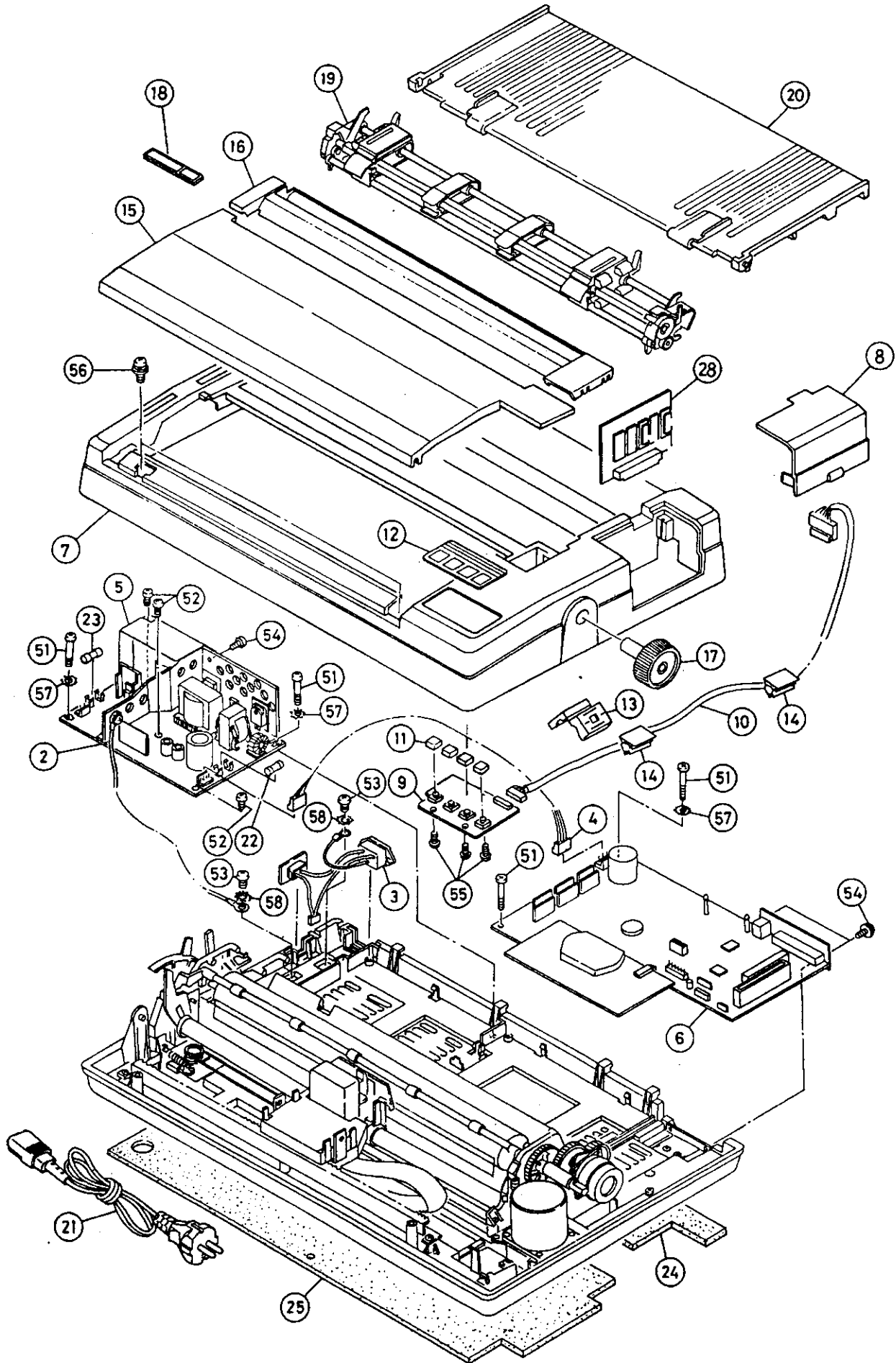
A capital letter "B" in front of the part numbers shows that this is a part of the "Recommended Spare Parts List".

When ordering parts it is essential to specify an identification number and designation.

The spare parts catalogue for printer options is given in Chapter 9.



# General Parts



**8.1 General Parts**

No. in Fig.	Part No.	Part
3		Power switch block assembly
4		Connector assembly
5		Power supply shield case
6		Main P.W.B. assembly
7		Top casing assembly
8		Font card cover
9		Control panel P.W.B. assembly
10		Lead wire
11		Key top
12		Control panel
13		Ferrite core
14		Wire clammer
15		Top lid 'A' assembly
16		Top lid 'B' assembly
17		Manual knob
18		Logo plate
19		Tractor unit
20		Rear cover assembly
24		Sound absorption materials A
25		Sound absorption materials B
28		Memory P.W.B. assembly

**Power Supply Parts AC 117 V**

No. in Fig.	Part No.	Part
2		Power supply
21		Power cord
22		Fuse
23		Fuse

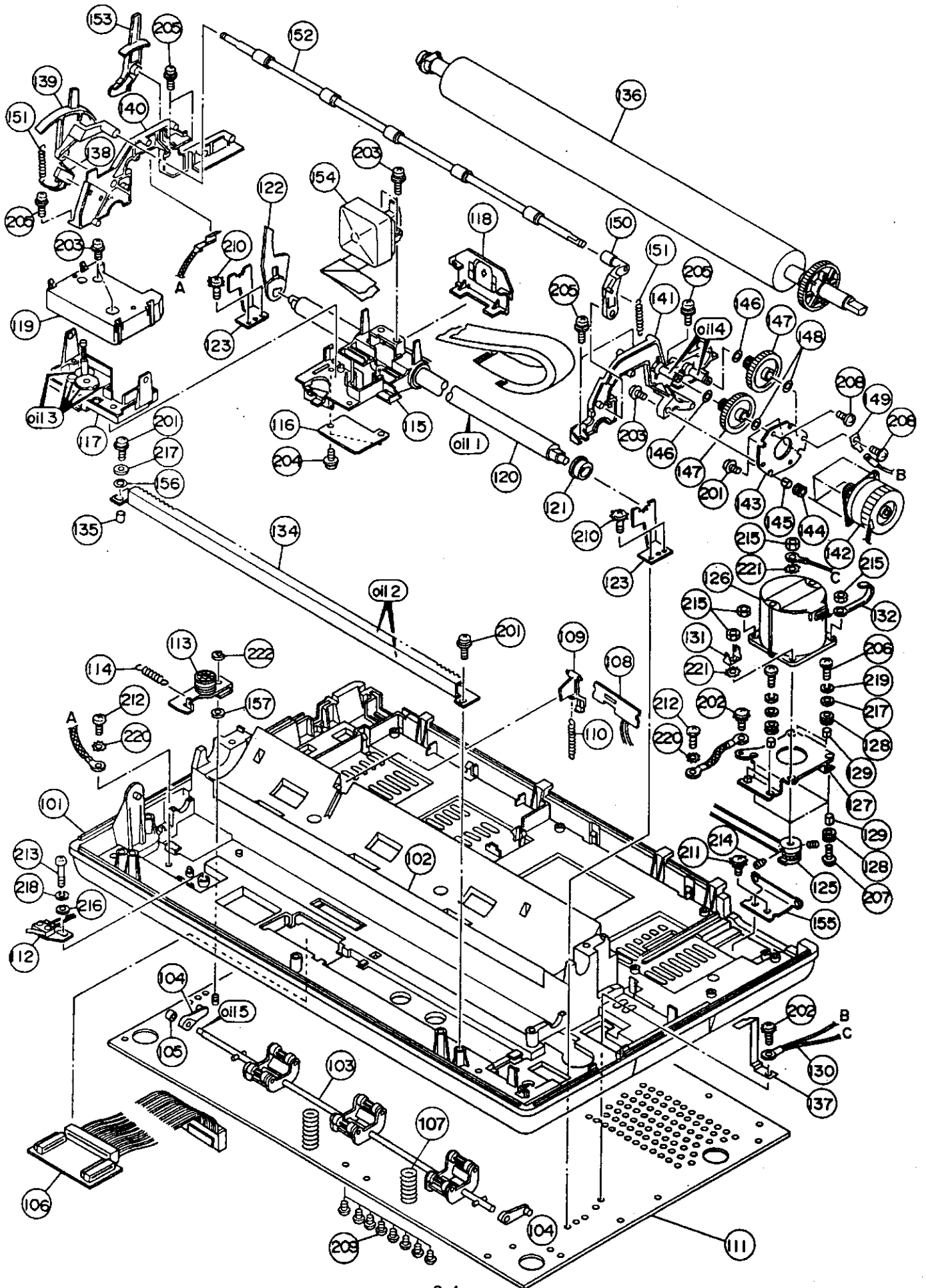
**Power Supply Parts AC 220 V**

No. in Fig.	Part No.	Part
2		Power supply
22		Fuse
23		Fuse

**Screws, Washers**

No. in Fig.	Part No.	Part
51		Screw M3x20
52		Screw EJOT-PT3x6
53		Screw M4x6
54		Screw M3x6
55		Screw EJOT-PT2,5x6
56		Screw M4x8
57		Lock washer A 3,2
58		Lock washer A 4,2

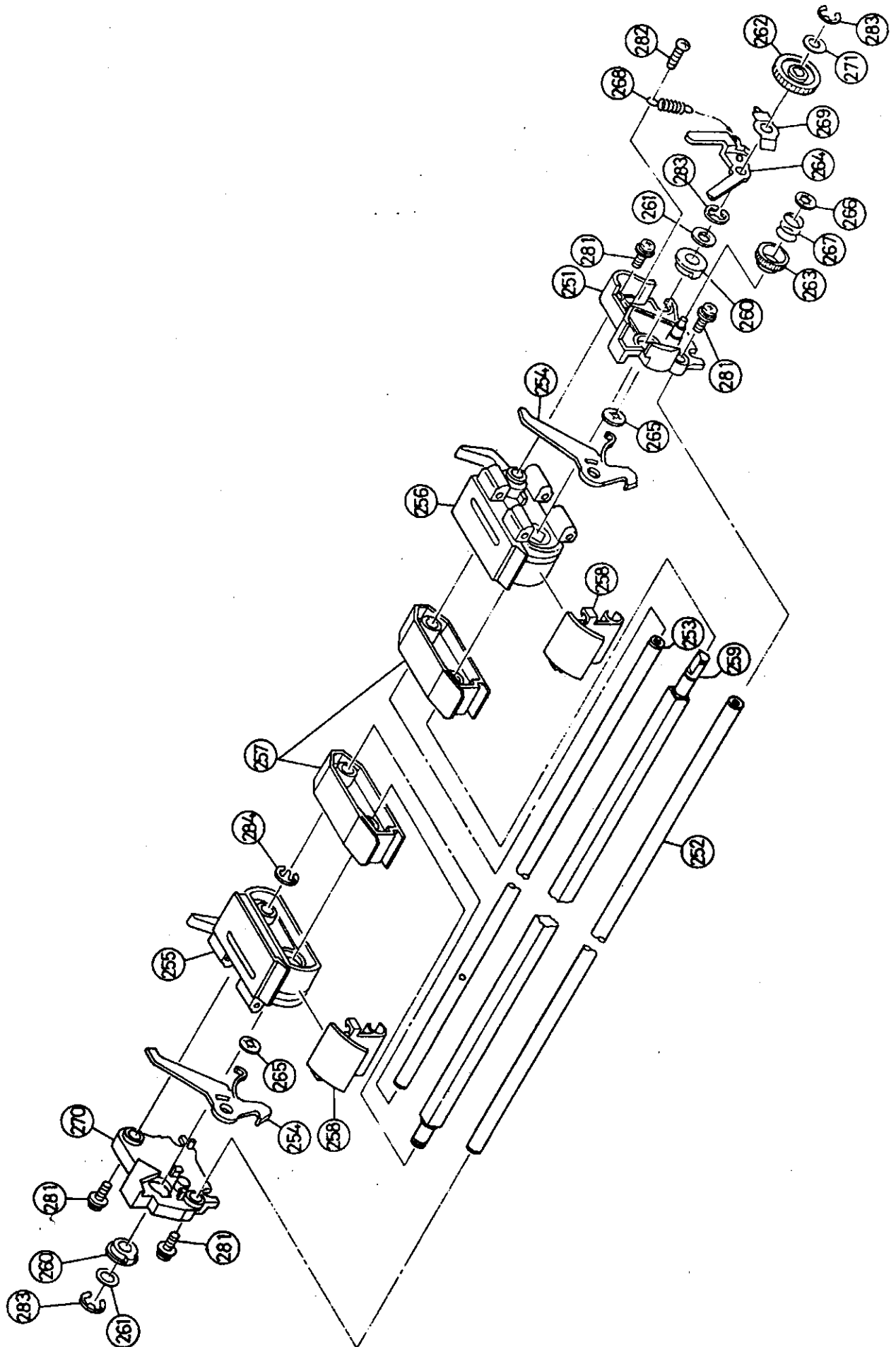
# Printer Mechanism Parts



**8.2 Printer Mechanism Parts** (For screws, washers and 'E' rings, see two pages later).

No. in Fig.	Part No.	Part
101		Bottom casing assembly
102		Paper guide
103		Pressure roller block assembly
104		Pressure roller arm
105		Bush
106		Intermediate P.W.B. assembly
107		Spring
108		Paper-end sensor P.W.B. assembly
109		Paper-end sensor assembly
110		End sensor spring
111		Shield plate assembly
112		Carriage sensor assembly
113		Tension plate assembly
114		Spring
115		Head base assembly
116		Flexible cable hold plate
117		Gear case block assembly
118		Front mask assembly
119		Ribbon base plate
120		Head base shaft
121		Eccentric bush
122		Paper thickness compensation lever
123		FG plate
125		Carriage pulley assembly
126		Carriage step motor
127		Carriage step motor plate
128		Rubber bush
129		Rubber bush spacer
130		Vinyl wire
131		Ground tab
132		Cord fixation
134		Base plate
135		Spacer
136		Platen block assembly
137		Platen earth plate 'B'
138		Sensor assembly
139		Bail roller arm, left
140		Frame left
141		Frame right
142		LF step motor assembly
143		LF step motor plate
144		Rubber bush
145		Spacer
147		Idle gear 'A'
149		Tab
150		Bail roller arm, right
151		Bail roller arm spring
152		Bail roller shaft assembly
153		Feed mode lever
154		Print head assembly
155		Connector plate 'A'
215		Nut

# Tractor Unit Parts



Screws, Washers, 'E' Rings (of Printer Mechanism Parts, continued)

No. in Fig.	Part No.	Part
146		Washer B 8,4
148		Spring washer 10 Ø
201		Screw M3x8
202		Screw M4x6
203		Screw M3x8
204		Screw M3x6
205		Screw M3x8
206		Screw M4x12
207		Screw M4x20
208		Screw EJOT-PT2,5x6
209		Screw M3x8
210		Screw M3x5

No. in Fig.	Part No.	Part
211		Screw M3x6
212		Screw M3x10
213		Screw M3x20
214		Set screw M3x5
215		Nut M4
216		Plain washer A 3,2
217		Plain washer A 4,3
218		Spring washer B 3
219		Spring washer B 4
220		Lock washer A 3,2
221		Lock washer A 4,2
222		'E' ring 5

8.3 Tractor Unit Parts

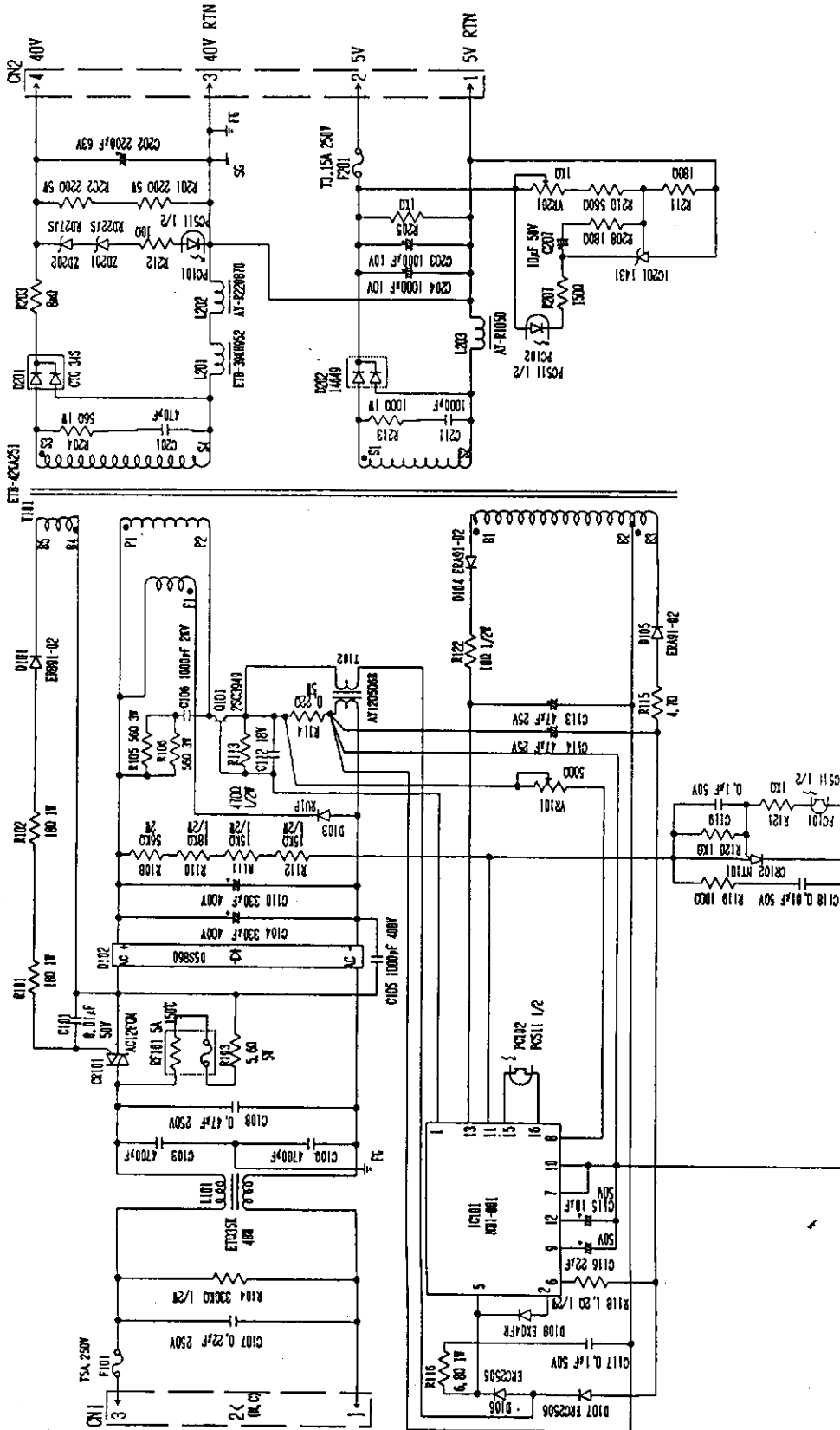
No. in Fig.	Part No.	Part
251		Tractor frame 'R'
252		Tractor support shaft
253		Tractor guide shaft
254		Tractor stopper
255		'L' tractor unit
256		'R' tractor unit
257		Paper supply assembly
258		Tractor paper guide
259		Tractor shaft
260		Wheel shaft bearing
262		Tractor gear
263		Idle gear 'C'
264		Clutch lever
265		Push nut
266		Push nut
267		Idle gear spring
268		Clutch lever spring
269		Lever set spring
270		Tractor frame 'L'

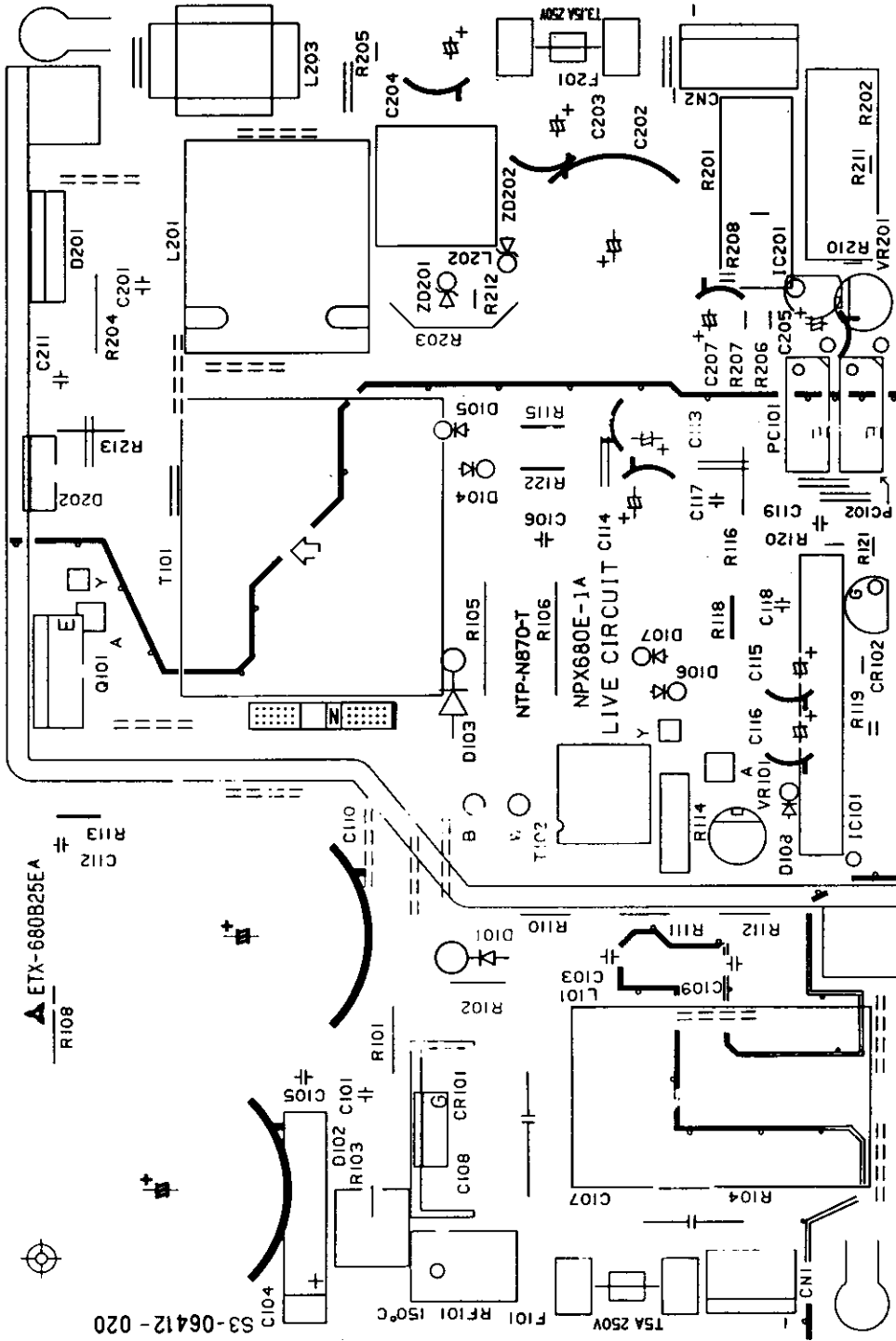
Screws, Washers, 'E' Rings

No. in Fig.	Part No.	Part
271		Cum shaft washer
281		Screw M3x8
282		Screw EJOT-PT2x6
283		'E' ring 5
284		'E' ring 6

# Power Supply P.W.B.

## 8.4 Power Supply P.W.B.







# Power Supply P.W.B.

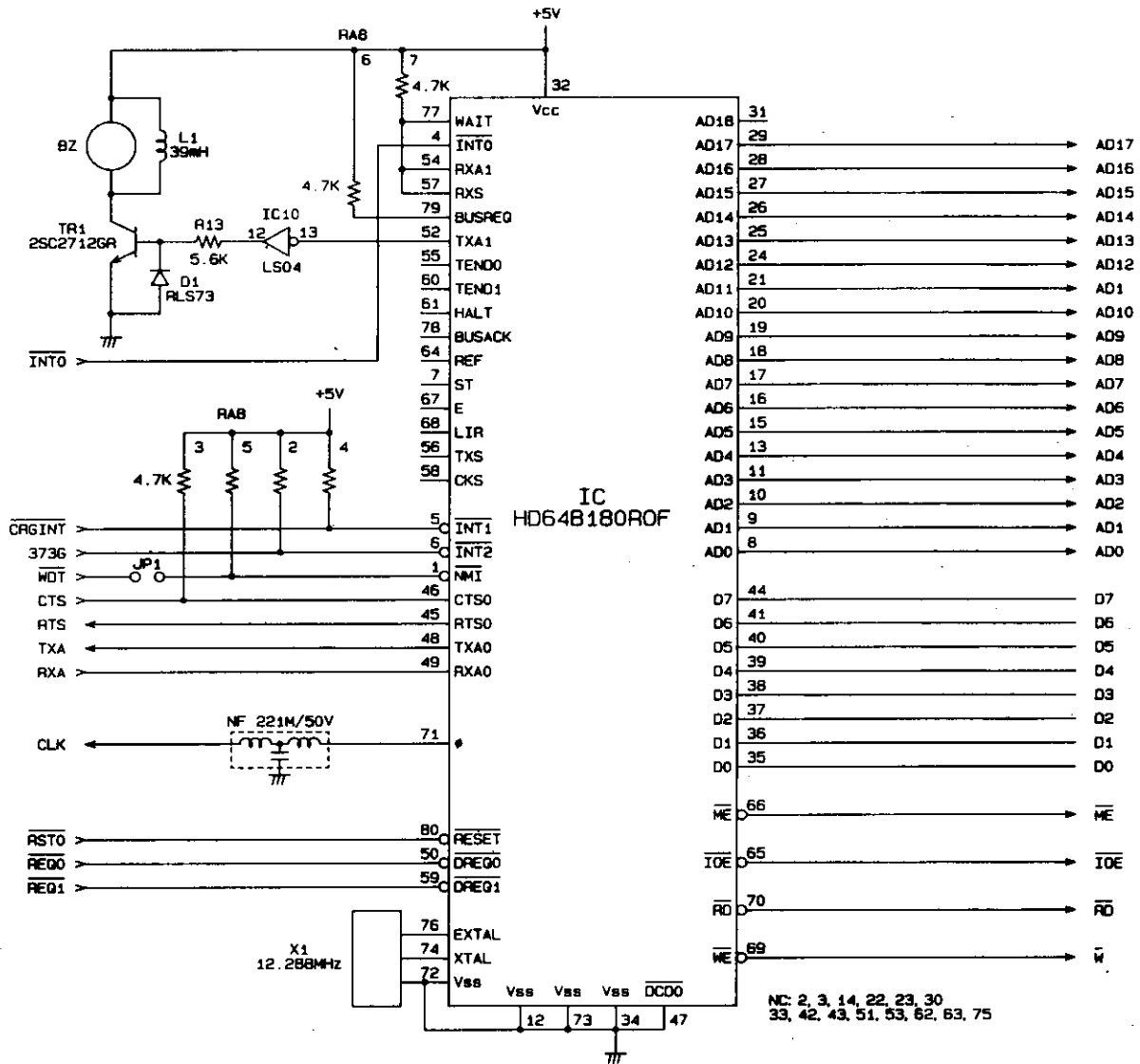
Component	Part No.	Part			
CR101		Triac AC 12F	600 V	12 A	
CR102		Trigger device NT101	0.15 A	10 V	
C101		Capacitor	0.01 $\mu$ F	50 V	
C103		Capacitor	4700 pF	50 V	
C104		Capacitor	330 $\mu$ F	100 V	
C105		Capacitor	1000 pF	100 V	
C106		Capacitor	1000 pF	2 kV	
C107		Capacitor	0.22 $\mu$ F	250 V	
C108		Capacitor	0.47 $\mu$ F	250 V	
C109		Capacitor	4700 pF	250 V	
C110		Capacitor	330 $\mu$ F	400 V	
C112		Varistor	18 V		
C113		Capacitor	47 $\mu$ F	25 V	
C114		Capacitor	47 $\mu$ F	25 V	
C115		Capacitor	10 $\mu$ F	50 V	
C116		Capacitor	22 $\mu$ F	50 V	
C117		Capacitor	0.1 $\mu$ F	50 V	
C118		Capacitor	0.01 $\mu$ F	50 V	
C119		Capacitor	0.1 $\mu$ F	50 V	
C201		Capacitor	470 pF		
C202		Capacitor	2200 $\mu$ F	63 V	
C203		Capacitor	1000 $\mu$ F	10 V	
C204		Capacitor	1000 $\mu$ F	10 V	
C207		Capacitor	10 $\mu$ F	50 V	
C211		Capacitor	1000 pF		
D101		Diode ERB91-02	1.0 A	200 V	
D102		Diode D5SB60	2.5 A	600 V	
D103		Diode RU1P	0.4 A	1 kV	
D104		Diode ERA91-02	0.5 A	200 V	
D105		Diode ERA91-02	0.5 A	200 V	
D106		Diode ERC2506	1.2 A	600 V	
D107		Diode ERC2506	1.2 A	600 V	
D108		Diode EK04FR	1.0 A	40 V	
D201		Diode CTG-34S			
D202		Diode MA649			
F101		Fuse	5 A	250 V	
F201		Fuse	3.15 A	250 V	
IC101		Integrated Circuit MHI-001			
IC201		Integrated Circuit 1431			
L101		Choke ETQ 35K4BH			
L201		Choke ETB-39KH952X 1)			
L202		Choke AY-R220870			
L203		Choke AY-R1050			
PC101		Optoisolator PC511			
PC102		Optoisolator PC511			
Q101		Transistor 2SC03948	10 A	900 V	
RF101		Thermal cutoff with Resistor	5.0 A	250 V	150 °C
R101		Resistor	18 $\Omega$	1 W	
R102		Resistor	18 $\Omega$	1 W	

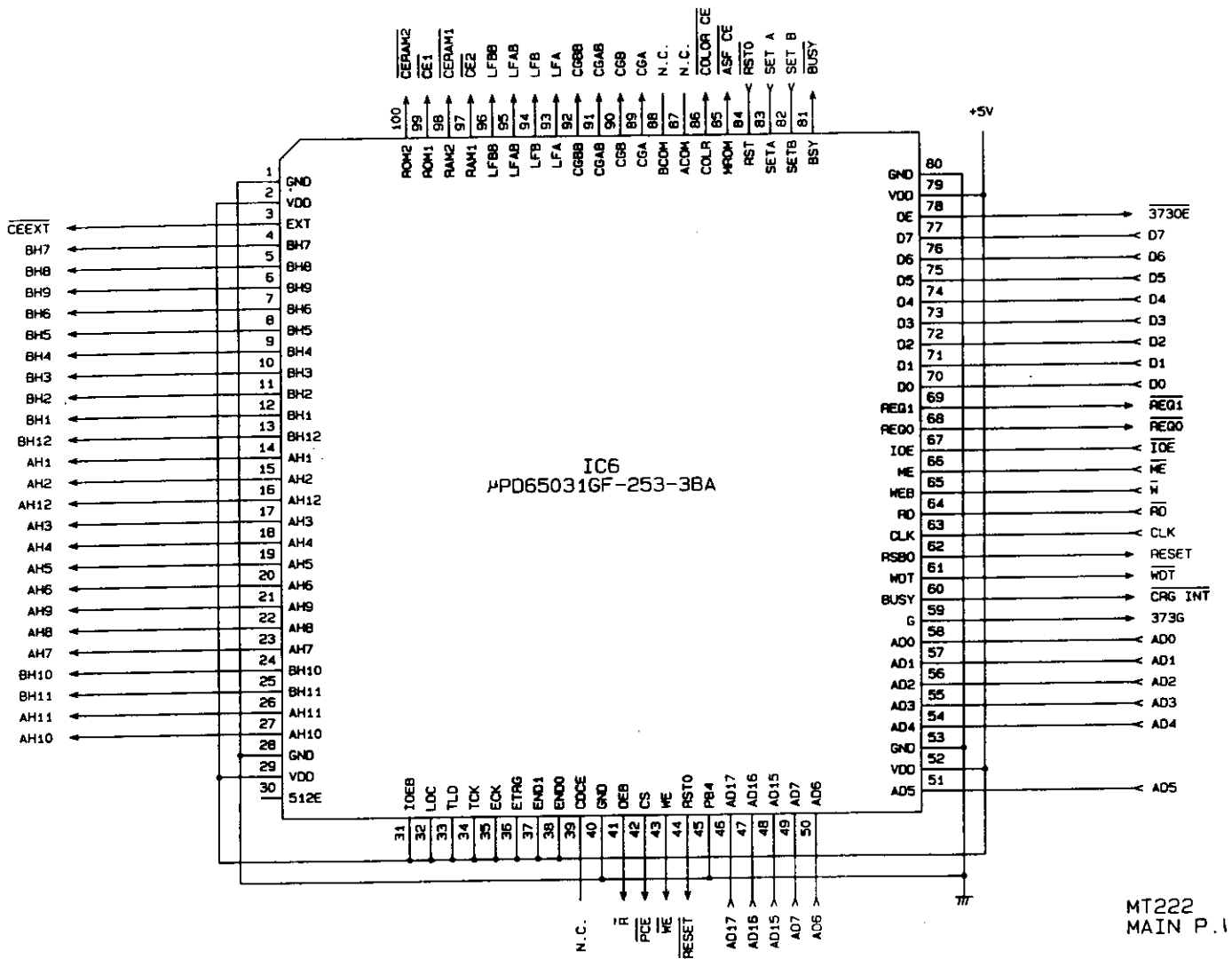
1) X is the suffix A.B.C. ... or nothing

Component	Part No.	Part
R103		Resistor 5.6 $\Omega$ 5 W
R104		Resistor 330 k $\Omega$ 0.5 W
R105		Resistor 56 $\Omega$ 3 W
R106		Resistor 56 $\Omega$ 3 W
R108		Resistor 56 k $\Omega$ 2 W
R110		Resistor 18 k $\Omega$ 0.5 W
R111		Resistor 15 k $\Omega$ 0.5 W
R112		Resistor 15 k $\Omega$ 0.5 W
R113		Resistor 470 $\Omega$ 0.5 W
R114		Resistor 0.22 $\Omega$ 5 W
R115		Resistor 4.7 $\Omega$ 0.25 W
R116		Resistor 6.8 $\Omega$ 1 W
R118		Resistor 1.2 $\Omega$ 0.5 W
R119		Resistor 100 $\Omega$ 0.25 W
R120		Resistor 1.0 k $\Omega$ 0.25 W
R121		Resistor 1.0 k $\Omega$ 0.25 W
R122		Resistor 10 $\Omega$ 0.5 W
R201		Resistor 220 $\Omega$ 5 W
R202		Resistor 220 $\Omega$ 5 W
R203		Resistor 8 $\Omega$
R204		Resistor 56 $\Omega$ 1 W
R205		Resistor 1.0 k $\Omega$ 0.25 W
R207		Resistor 150 $\Omega$ 0.25 W
R208		Resistor 180 $\Omega$ 0.25 W
R210		Resistor 560 $\Omega$ 0.25 W
R211		Resistor 180 $\Omega$ 0.25 W
R212		Resistor 10 $\Omega$ 0.25 W
R213		Resistor 100 $\Omega$ 1 W
T101		Transformer ETB 42 KA/X 1)
T102		Transformer AY 120506 B
VR101		Resistor 500 $\Omega$ 0.3 W
VR201		Resistor 1 k $\Omega$ 0.3 W
ZD201		Zener diode RD22JS
ZD202		Zener diode RD27JS

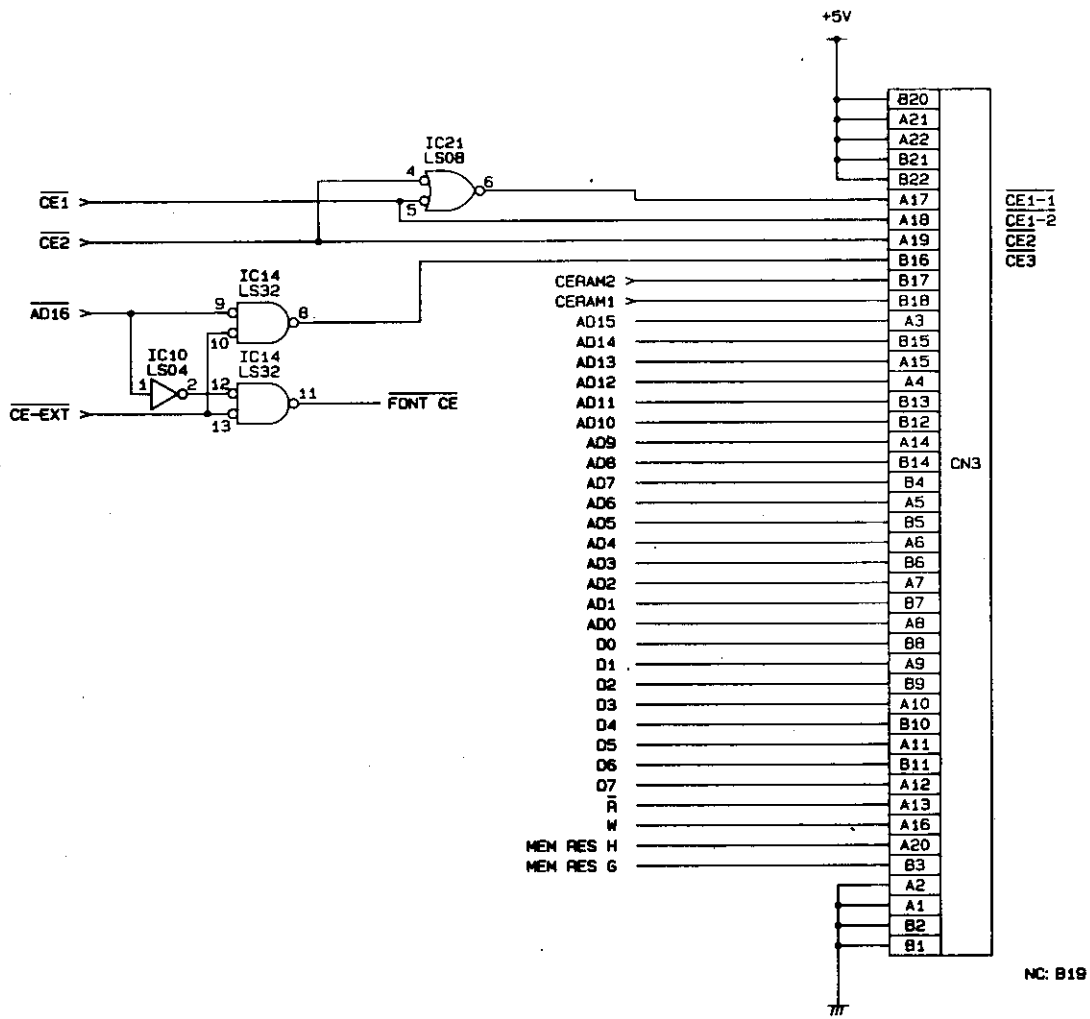
1) X is the suffix A.B.C. ... or nothing

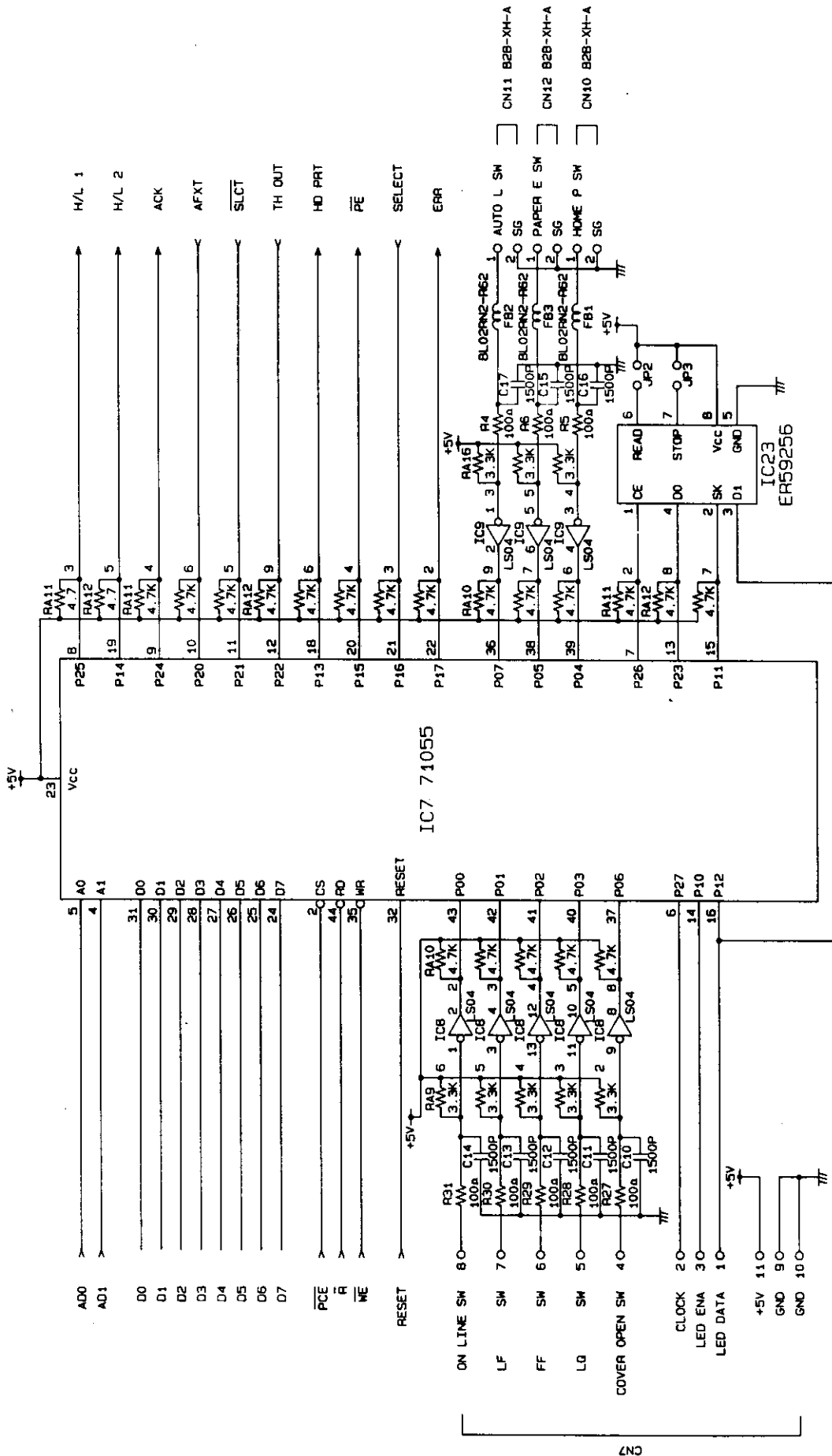
8.5  
Main Control P.W.B.

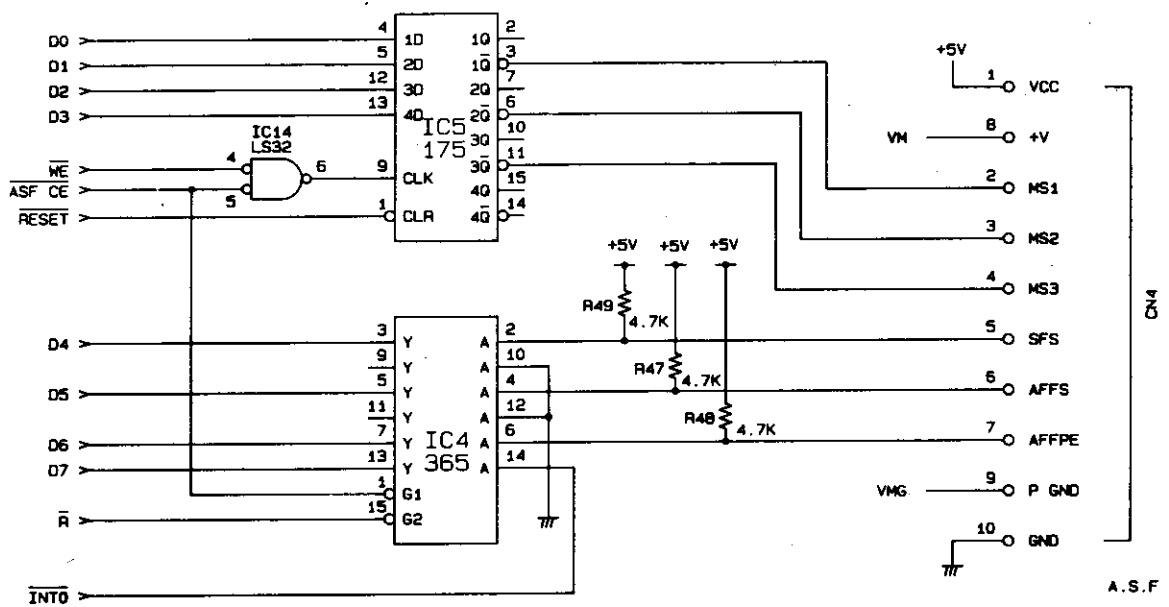
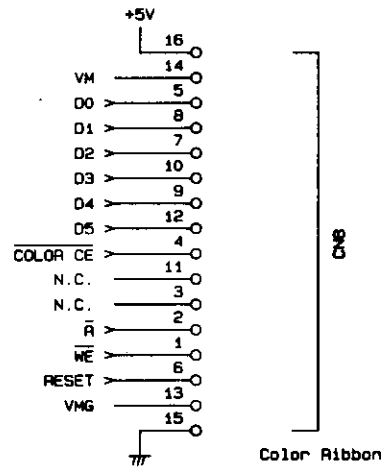


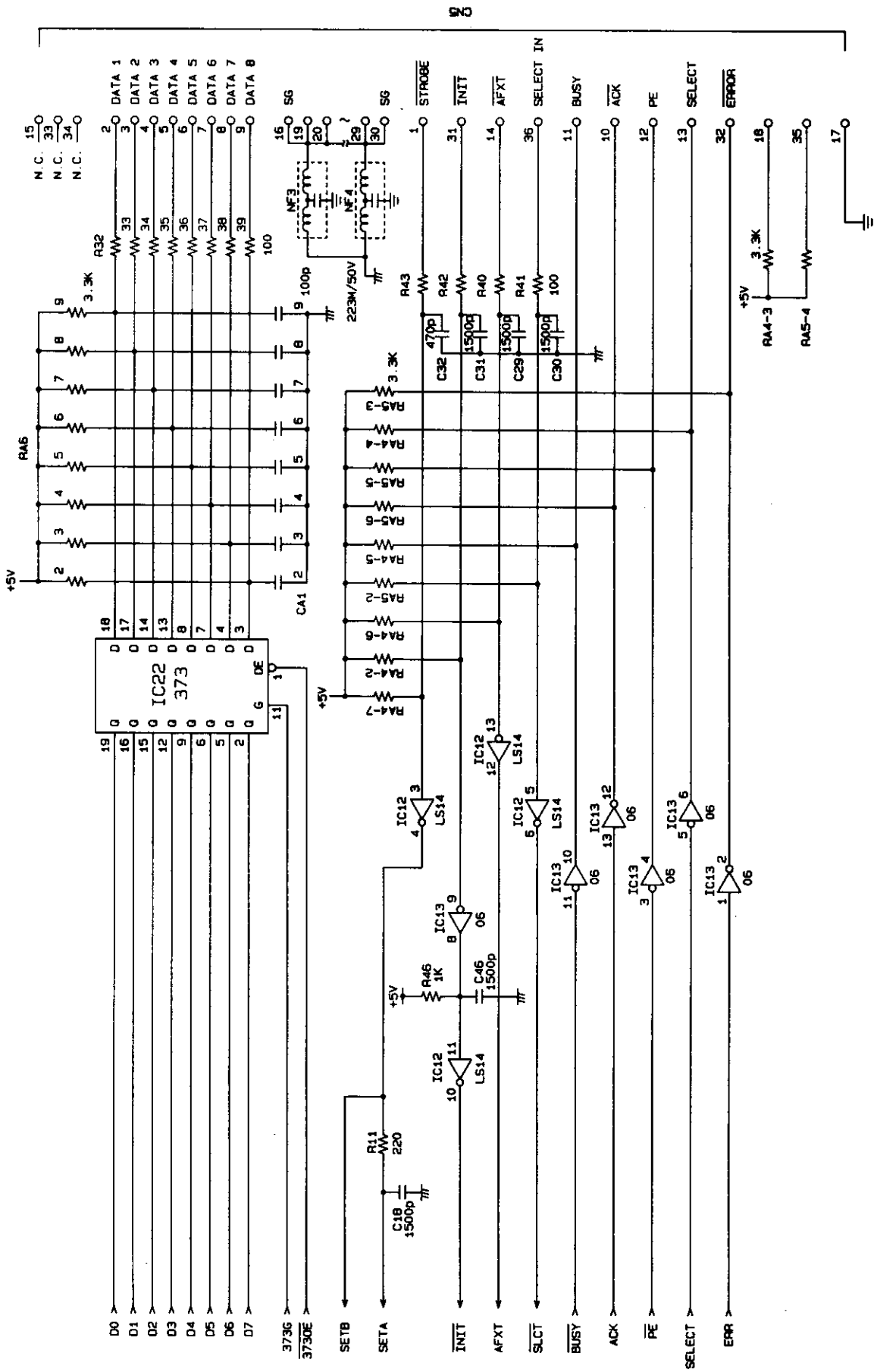


MT222  
MAIN P.1

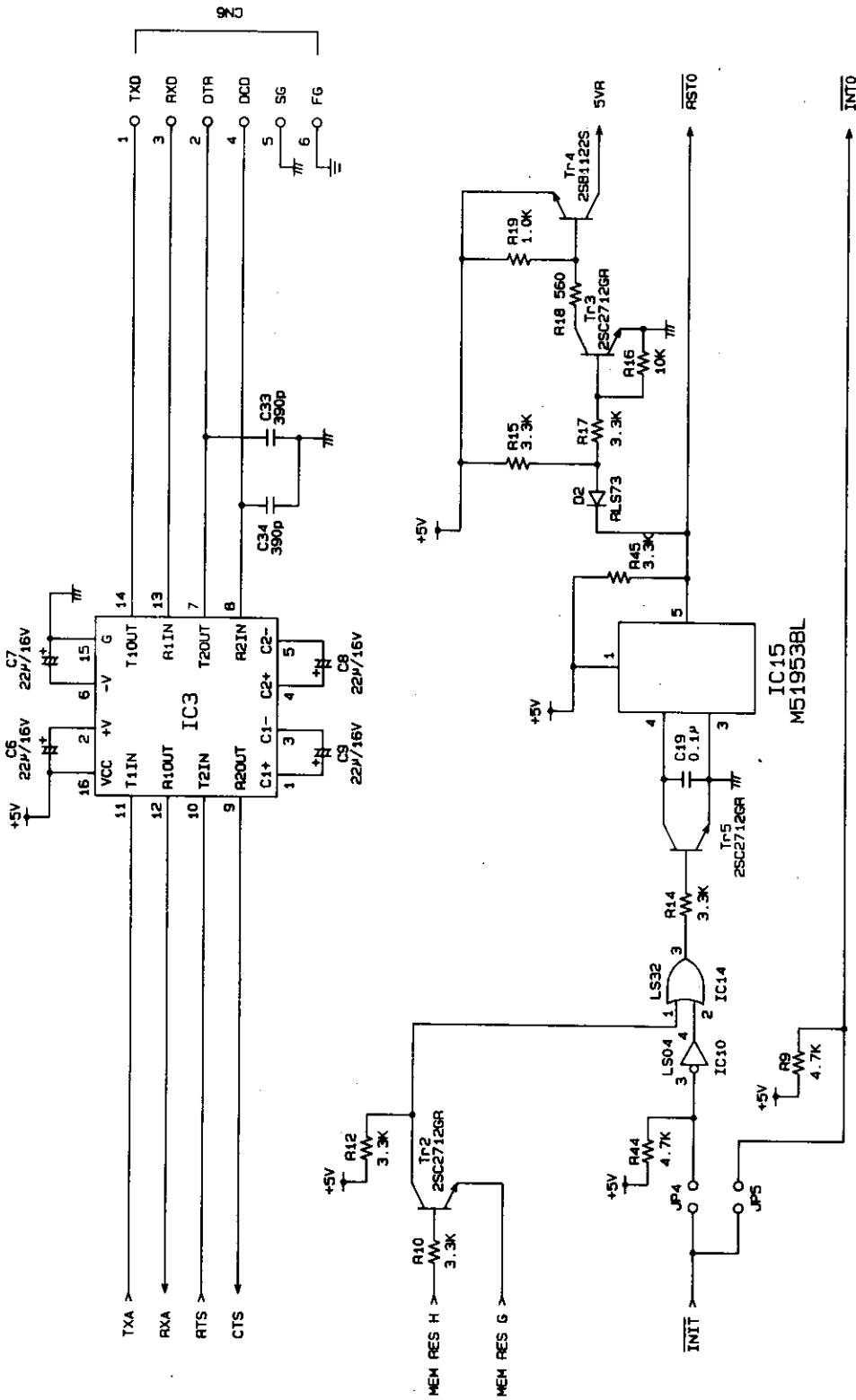


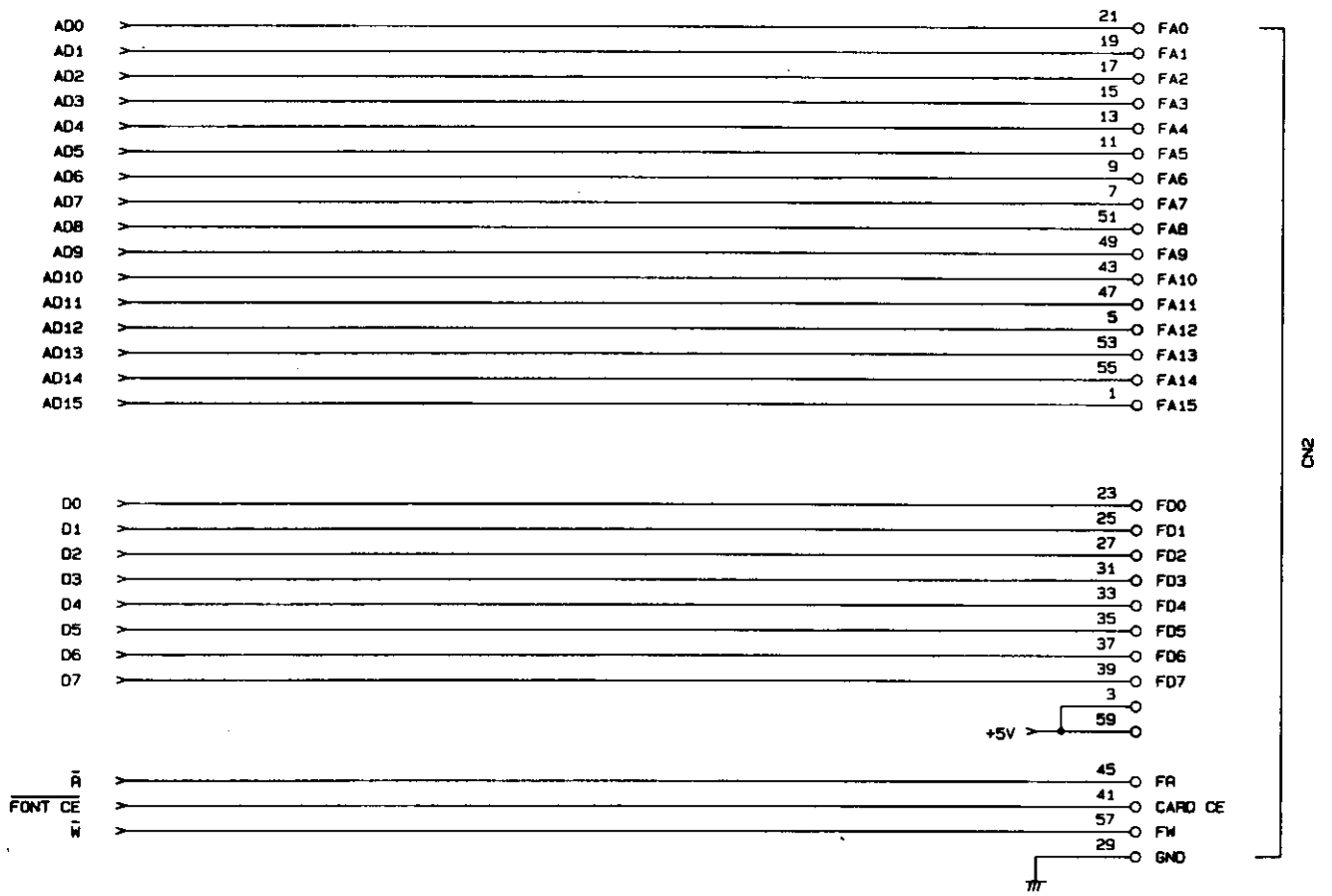


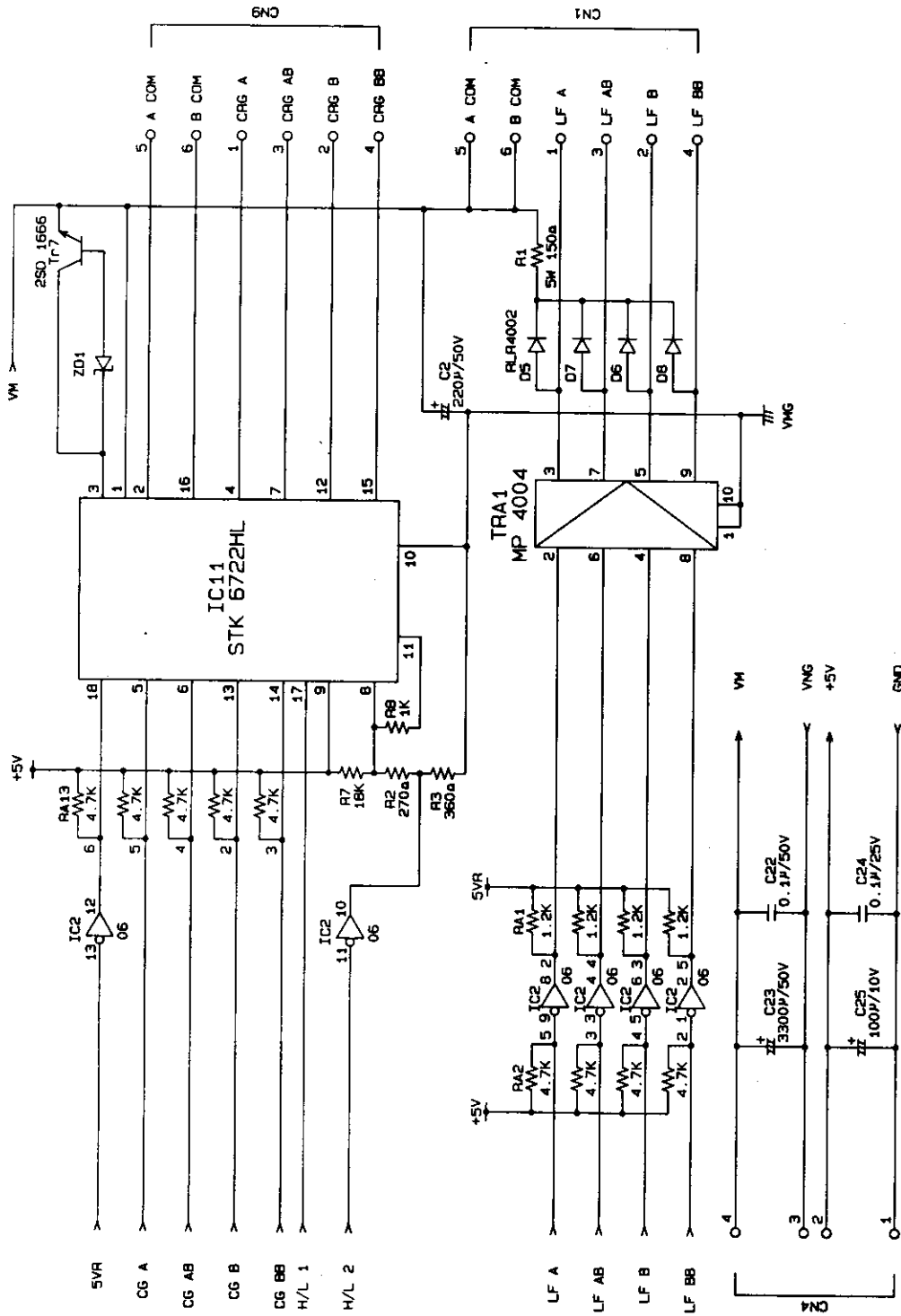


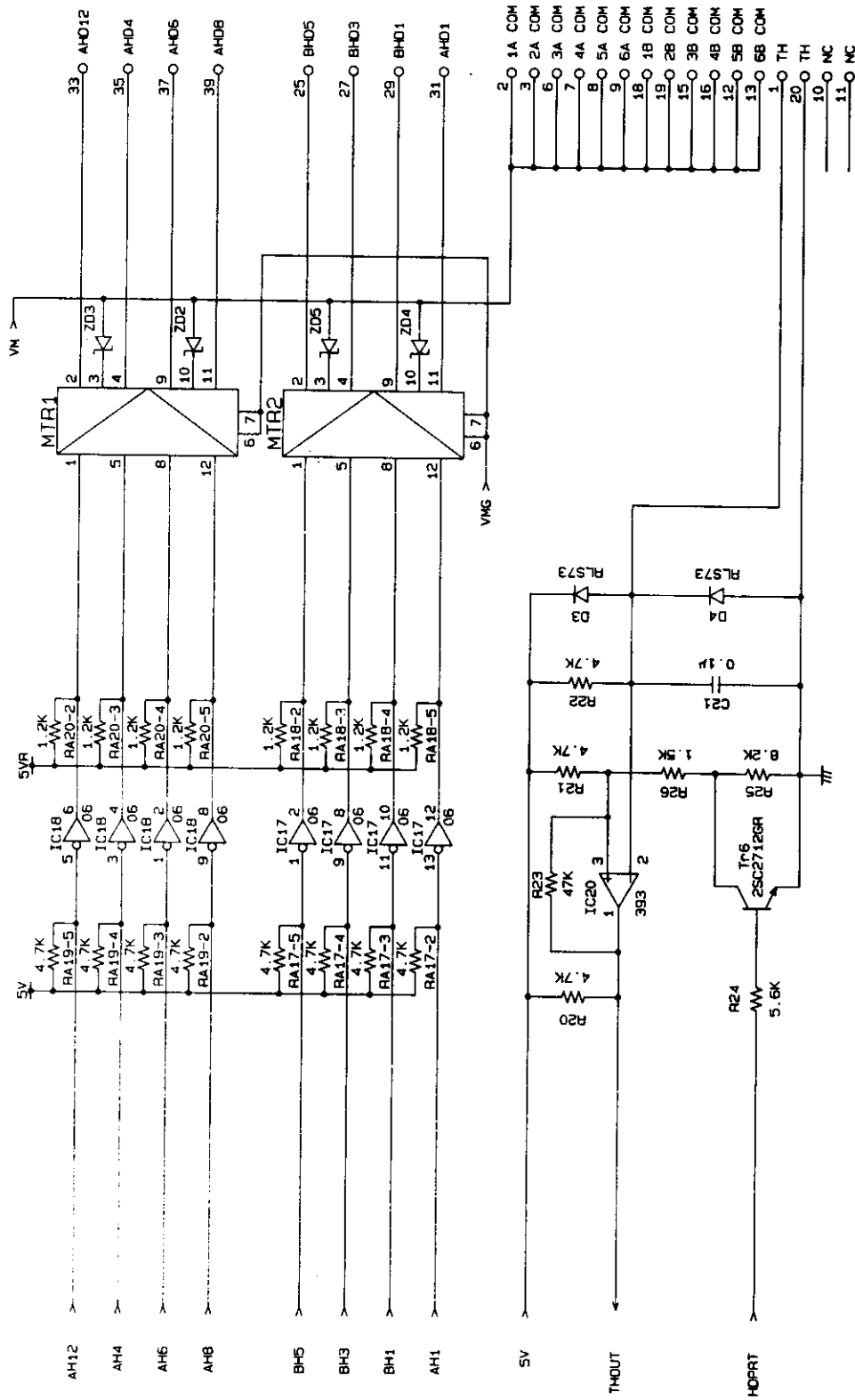


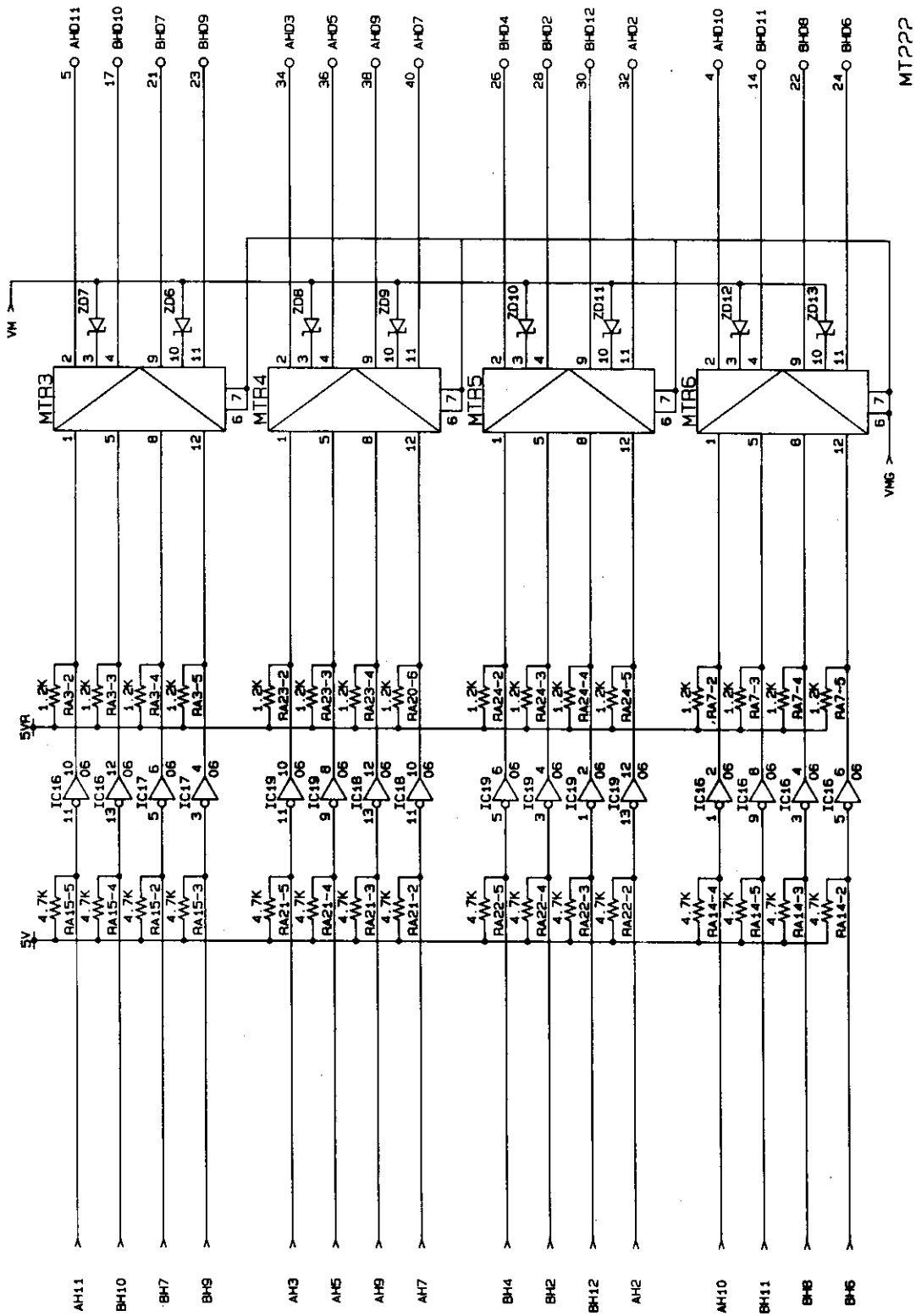


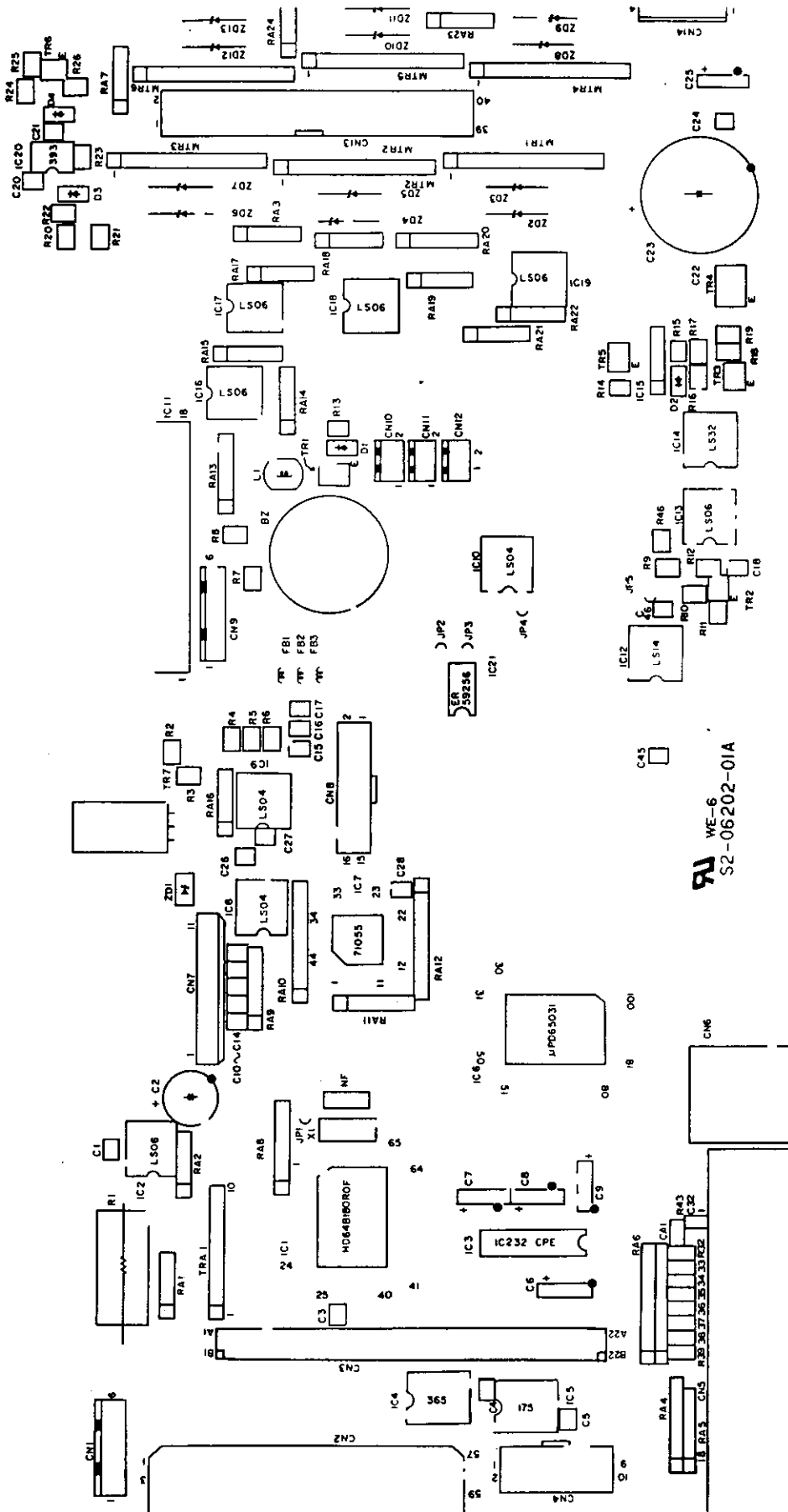




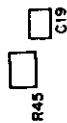
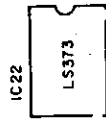
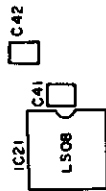
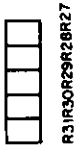
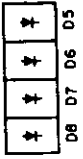








WE-6  
S2-06202-01A



Component	Part No.	Part
BZ		Buzzer PKM 22EFP4001
C1		Capacitor 0.1 $\mu$ F 25 V
C2		Capacitor 220 $\mu$ F 50 V
C3		Capacitor 0.1 $\mu$ F 25 V
C4		Capacitor 0.1 $\mu$ F 25 V
C5		Capacitor 0.1 $\mu$ F 25 V
C6		Capacitor 22 $\mu$ F 16 V
C7		Capacitor 22 $\mu$ F 16 V
C8		Capacitor 22 $\mu$ F 16 V
C9		Capacitor 22 $\mu$ F 16 V
C10		Capacitor 1500 pF 50 V
C11		Capacitor 1500 pF 50 V
C12		Capacitor 1500 pF 50 V
C13		Capacitor 1500 pF 50 V
C14		Capacitor 1500 pF 50 V
C15		Capacitor 1500 pF 50 V
C16		Capacitor 1500 pF 50 V
C17		Capacitor 1500 pF 50 V
C18		Capacitor 1500 pF 50 V
C19		Capacitor 0.1 $\mu$ F 25 V
C20		Capacitor 0.1 $\mu$ F 25 V
C21		Capacitor 0.1 $\mu$ F 25 V
C22		Capacitor 0.1 $\mu$ F 50 V
C23		Capacitor 3300 $\mu$ F 50 V
C24		Capacitor 0.1 $\mu$ F 25 V
C25		Capacitor 100 $\mu$ F 10 V
C26		Capacitor 0.1 $\mu$ F 25 V
C27		Capacitor 0.1 $\mu$ F 25 V
C28		Capacitor 0.1 $\mu$ F 25 V
C29		Capacitor 1500 pF 50 V
C30		Capacitor 1500 pF 50 V
C31		Capacitor 1500 pF 50 V
C32		Capacitor 470 pF 50 V
C33		Capacitor 390 pF 50 V
C34		Capacitor 390 pF 50 V
C35		Capacitor 0.1 $\mu$ F 25 V
C36		Capacitor 0.1 $\mu$ F 25 V
C37		Capacitor 0.1 $\mu$ F 25 V
C38		Capacitor 0.1 $\mu$ F 25 V
C39		Capacitor 0.1 $\mu$ F 25 V
C40		Capacitor 0.1 $\mu$ F 25 V
C41		Capacitor 0.1 $\mu$ F 25 V
C42		Capacitor 0.1 $\mu$ F 25 V
C43		Capacitor 0.1 $\mu$ F 25 V
C44		Capacitor 0.1 $\mu$ F 25 V
C45		Capacitor 0.1 $\mu$ F 25 V
C46		Capacitor 1500 pF 50 V
C47		Capacitor 22 pF 50 V
C48		Capacitor 100 pF 50 V
C49		Capacitor 100 pF 50 V
C50		Capacitor 100 pF 50 V
C51		Capacitor 100 pF 50 V



# Main Control P.W.B.

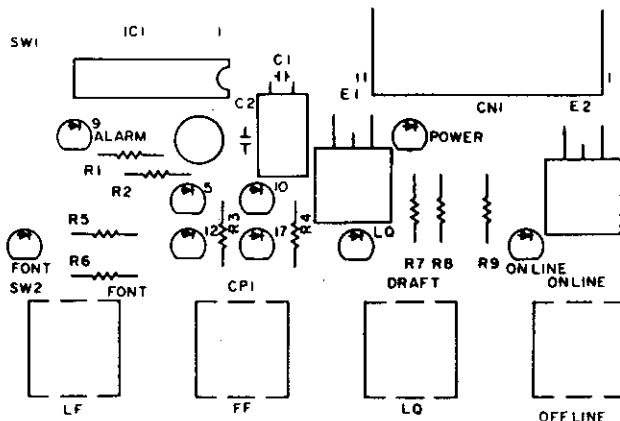
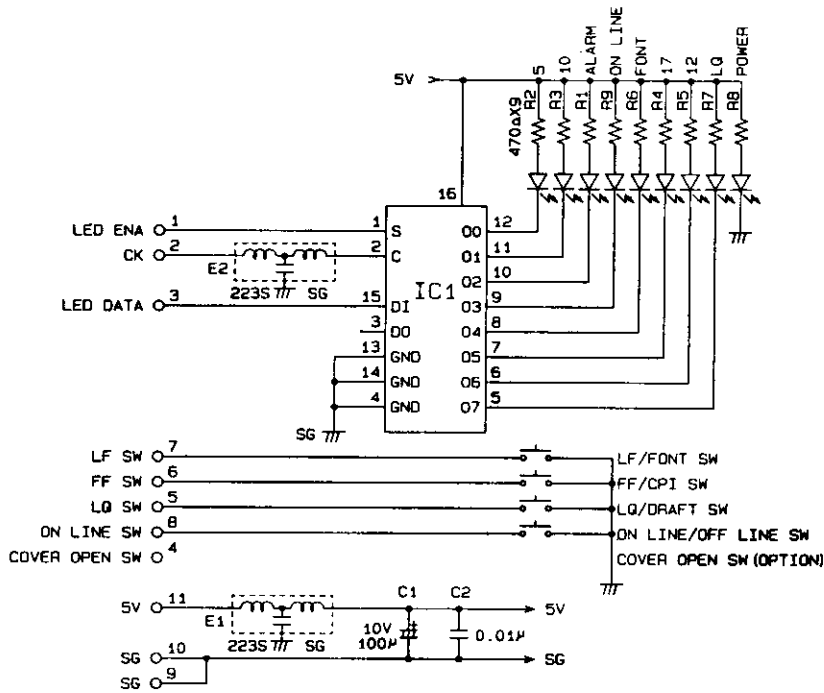
Component	Part No.	Part
CA1		Capacitor 100 pF
CA2		Capacitor 100 pF
D1		Diode RLS73TE-11
D2		Diode RLS73TE-11
D3		Diode RLS73TE-11
D4		Diode RLS73TE-11
D5		Diode RLR4002TE-21
D6		Diode RLR4002TE-21
D7		Diode RLR4002TE-21
D8		Diode RLR4002TE-21
FB1		Choke BLM41A04PT
FB2		Choke BLM41A04PT
FB3		Choke BLM41A04PT
FB4		Choke BLM41A04PT
FB5		Choke BLM41A04PT
FB6		Choke BLM41A04PT
FB7		Choke BLM41A04PT
IC1		LSI HD64B180ROF
IC2		TTL IC MALS06FP-31A
IC3		RS232 MAX232
IC4		TTL IC M74LS365A
IC5		TTL IC M74LS175
IC6		LSI $\mu$ PD65031GF-253
IC7		A2 LSI $\mu$ PD71055G
IC8		TTL IC M74LS04FP-31A
IC9		TTL IC M74LS04FP-31A
IC10		TTL IC M74LS04FP-31A
IC11		STK6722HL
IC12		TTL IC M74LS14FP-31A
IC13		TTL IC M74LS06FP-31A
IC14		TTL IC M74LS32FP-31A
IC15		RESET IC M51953BL
IC16		TTL IC M74LS06FP-31A
IC17		TTL IC M74LS06FP-31A
IC18		TTL IC M74LS06FP-31A
IC19		TTL IC M74LS06FP-31A
IC20		LINER IC $\mu$ PC393G-T1
IC21		TTL IC LS08
IC22		TTL IC LS373
L1		Choke 39 mH RC-875 393 k
MTR1		Transistor
MTR2		Transistor
MTR3		Transistor
MTR4		Transistor
MTR5		Transistor
MTR6		Transistor
R1		Resistor 150 $\Omega$ 5 W
R2		Resistor 270 $\Omega$ 0,125 W
R3		Resistor 360 $\Omega$ 0,125 W
R4		Resistor 100 $\Omega$ 0,125 W
R5		Resistor 100 $\Omega$ 0,125 W

Component	Part No.	Part
R6		Resistor 100 $\Omega$ 0,125 W
R7		Resistor 18 k $\Omega$ 0,125 W
R8		Resistor 1 k $\Omega$ 0,125 W
R9		Resistor 4.7 k $\Omega$ 0,125 W
R10		Resistor 3.3 k $\Omega$ 0,125 W
R11		Resistor 220 $\Omega$ 0,125 W
R12		Resistor 3.3 k $\Omega$ 0,125 W
R13		Resistor 5.6 k $\Omega$ 0,125 W
R14		Resistor 3.3 k $\Omega$ 0,125 W
R15		Resistor 3.3 k $\Omega$ 0,125 W
R16		Resistor 10 k $\Omega$ 0,125 W
R17		Resistor 3.3 k $\Omega$ 0,125 W
R18		Resistor 560 $\Omega$ 0,125 W
R19		Resistor 1 k $\Omega$ 0,125 W
R20		Resistor 4.7 k $\Omega$ 0,125 W
R21		Resistor 4.7 k $\Omega$ 0,125 W
R22		Resistor 4.7 k $\Omega$ 0,125 W
R23		Resistor 47 k $\Omega$ 0,125 W
R24		Resistor 5.6 k $\Omega$ 0,125 W
R25		Resistor 8.2 k $\Omega$ 0,125 W
R26		Resistor 1.5 k $\Omega$ 0,125 W
R27		Resistor 100 $\Omega$ 0,125 W
R28		Resistor 100 $\Omega$ 0,125 W
R29		Resistor 100 $\Omega$ 0,125 W
R30		Resistor 100 $\Omega$ 0,125 W
R31		Resistor 100 $\Omega$ 0,125 W
R32		Resistor 100 $\Omega$ 0,125 W
R33		Resistor 100 $\Omega$ 0,125 W
R34		Resistor 100 $\Omega$ 0,125 W
R35		Resistor 100 $\Omega$ 0,125 W
R36		Resistor 100 $\Omega$ 0,125 W
R37		Resistor 100 $\Omega$ 0,125 W
R38		Resistor 100 $\Omega$ 0,125 W
R39		Resistor 100 $\Omega$ 0,125 W
R40		Resistor 100 $\Omega$ 0,125 W
R41		Resistor 100 $\Omega$ 0,125 W
R42		Resistor 100 $\Omega$ 0,125 W
R43		Resistor 100 $\Omega$ 0,125 W
R44		Resistor 4.7 k $\Omega$ 0,125 W
R45		Resistor 3.3 k $\Omega$ 0,125 W
R46		Resistor 1.0 k $\Omega$ 0,125 W
R47		Resistor 4.7 k $\Omega$ 0,125 W
R48		Resistor 4.7 k $\Omega$ 0,125 W
R49		Resistor 4.7 k $\Omega$ 0,125 W
RA1		Resistor 1.2 k $\Omega$
RA2		Resistor 4.7 k $\Omega$
RA3		Resistor 1.2 k $\Omega$
RA4		Resistor 3.3 k $\Omega$
RA5		Resistor 3.3 k $\Omega$
RA6		Resistor 3.3 k $\Omega$
RA7		Resistor 1.2 k $\Omega$

## Main Control P.W.B.

Component	Part No.	Part
RA8		Resistor 6x4.7 kΩ
RA9		Resistor 6x3.3 kΩ
RA10		Resistor 8x4.7 kΩ
RA11		Resistor 5x4.7 kΩ
RA12		Resistor 8x4.7 kΩ
RA13		Resistor 5x4.7 kΩ
RA14		Resistor 4x4.7 kΩ
RA15		Resistor 4x4.7 kΩ
RA16		Resistor 4x3.3 kΩ
RA17		Resistor 4x4.7 kΩ
RA18		Resistor 4x1.2 kΩ
RA19		Resistor 4x4.7 kΩ
RA20		Resistor 5x1.2 kΩ
RA21		Resistor 4x4.7 kΩ
RA22		Resistor 4x4.7 kΩ
RA23		Resistor 4x1.2 kΩ
RA24		Resistor 4x1.2 kΩ
TR1		Transistor 2SC2712GR
TR2		Transistor 2SC2712GR
TR3		Transistor 2SC2712GR
TR4		Transistor 2SB1122S
TR5		Transistor 2SC2712GR
TR6		Transistor 2SC2712GR
TR7		Transistor 2SD1666W
TRA1		Transistor MP 4004
X1		Crystal FAR-C4SB-12.288000-MHz
ZD1		Zener diode GZA-43Y
ZD2		Zener diode AUOI-33F
ZD3		Zener diode AUOI-33F
ZD4		Zener diode AUOI-33F
ZD5		Zener diode AUOI-33F
ZD6		Zener diode AUOI-33F
ZD7		Zener diode AUOI-33F
ZD8		Zener diode AUOI-33F
ZD9		Zener diode AUOI-33F
ZD10		Zener diode AUOI-33F
ZD11		Zener diode AUOI-33F
ZD12		Zener diode AUOI-33F
ZD13		Zener diode AUOI-33F

8.6  
Control Panel P.W.B.



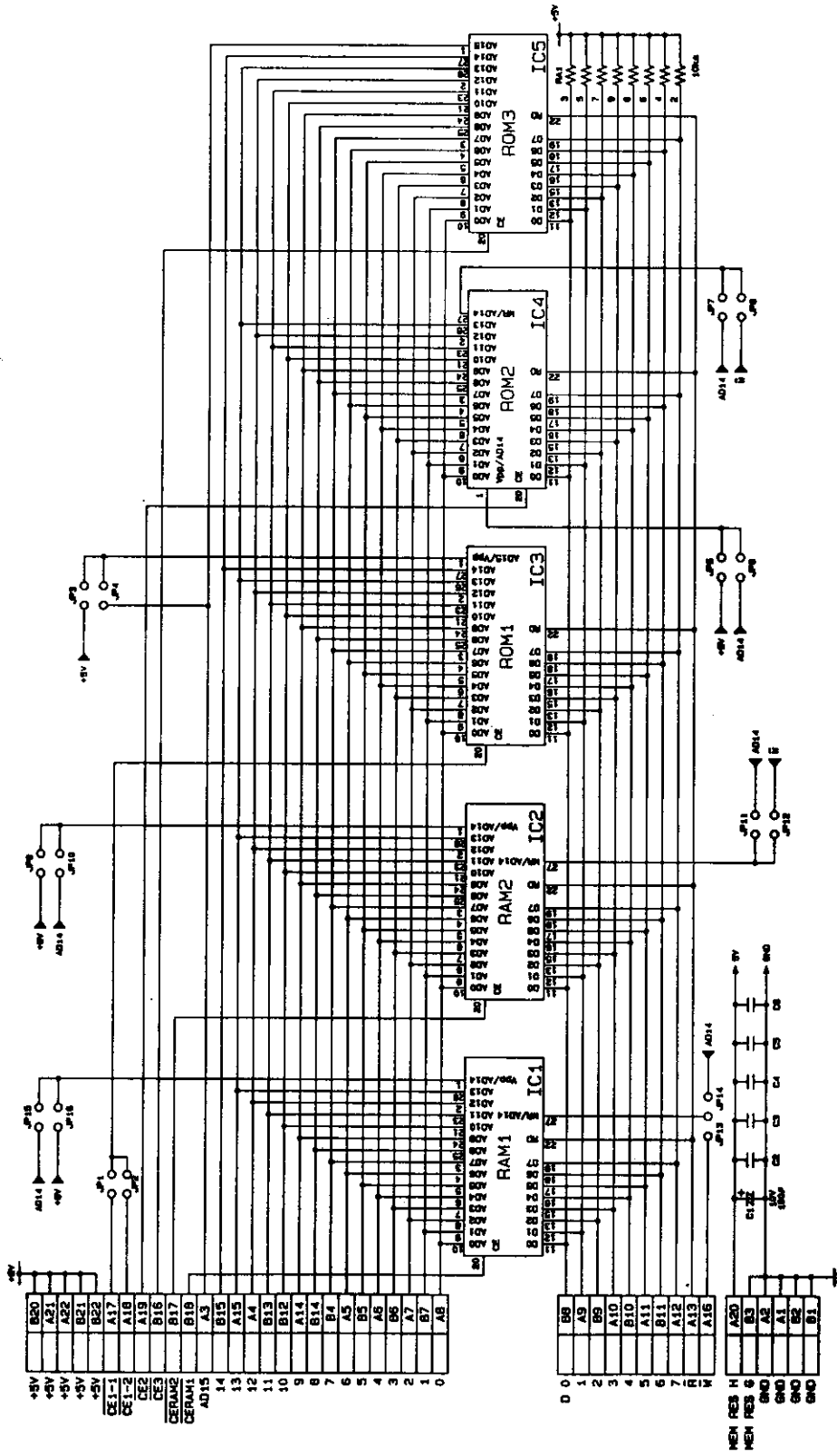
S3-06814-010



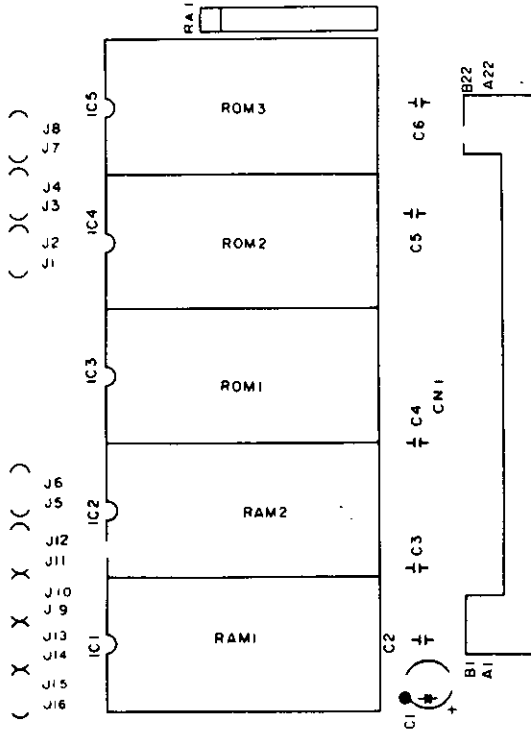
## Control Panel P.W.B.

Component	Part No.	Part
C1		Capacitor 100 $\mu$ F 10 V
C2		Capacitor 0.01 $\mu$ F
E1		EMI Filter
E2		EMI Filter
IC1		BA823
R1...R8		Resistors 470 $\Omega$ 0.25 W
ALARM		LED red
POWER		LED green
FONT		LED green
5		LED green
10		LED green
12		LED green
17		LED green
LQ		LED green
ON LINE		LED green
FONT/LF		Switch
CPI/FF		Switch
DRAFT/LQ		Switch
ON LINE/ OFF LINE		Switch

8.7  
Memory P.W.B.  
(Control Module)



# Memory P.W.B. (Control Module)



S3-0725I-01A WE-6

Component	Part No.	Part
C1		Capacitor 100 $\mu$ F 10 V
C2		Capacitor 0,01 $\mu$ F
C3		Capacitor 0,01 $\mu$ F
C4		Capacitor 0,01 $\mu$ F
C5		Capacitor 0,01 $\mu$ F
C6		Capacitor 0,01 $\mu$ F
IC1		RAM
IC2		RAM
RA1		Resistor 10 k $\Omega$

### 9

## Options - Spare Parts and Schematics

The spare parts catalogue of the printer options is given in this chapter.

Each assembly has a parts list, illustrated breakdown or assembly drawing as well as a circuit schematic for electronic assemblies. The numbers in the drawings correspond with the numbers in the parts list.

A capital letter "B" in front of the part numbers shows that this is a part of the "Recommended Spare Parts List".

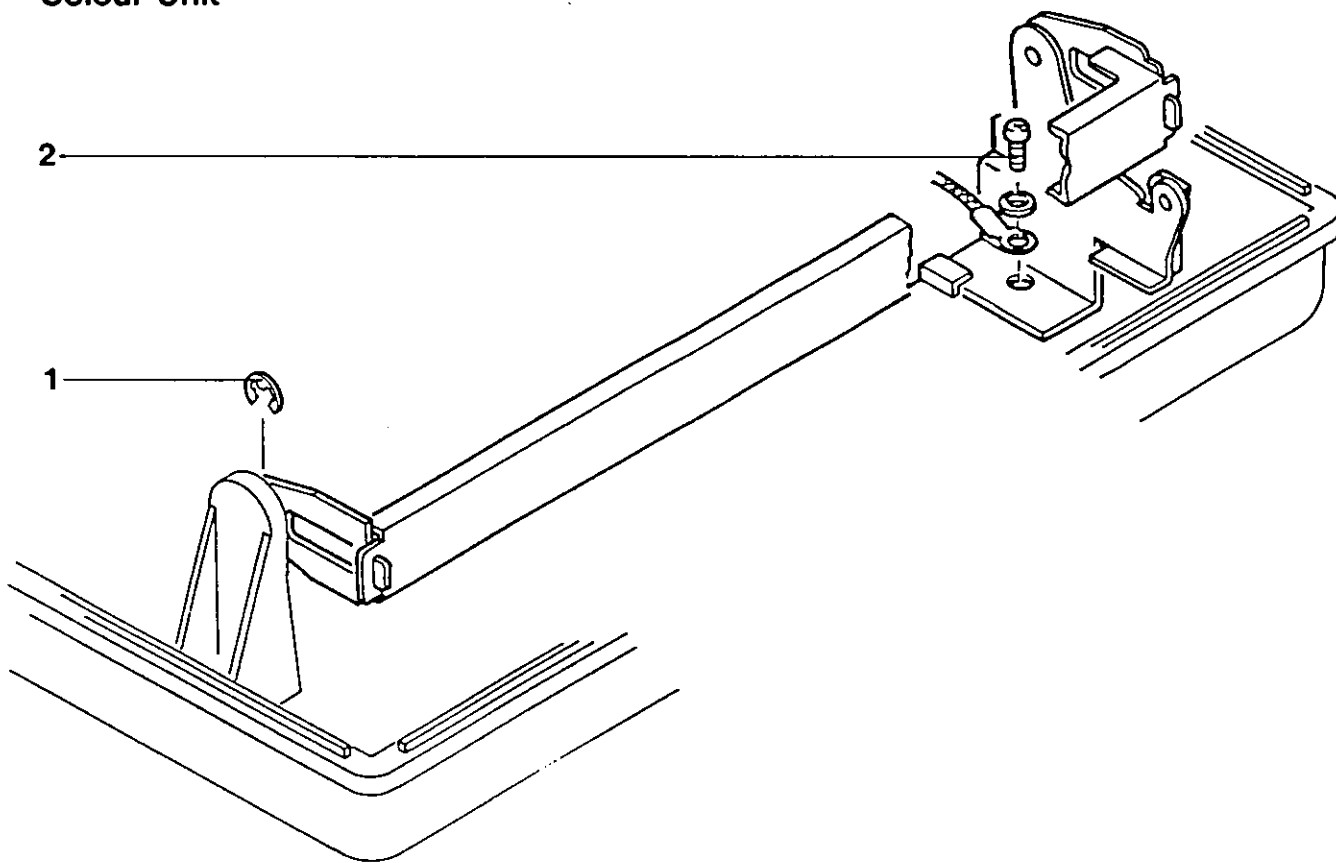
When ordering parts it is essential to specify an identification number and designation.



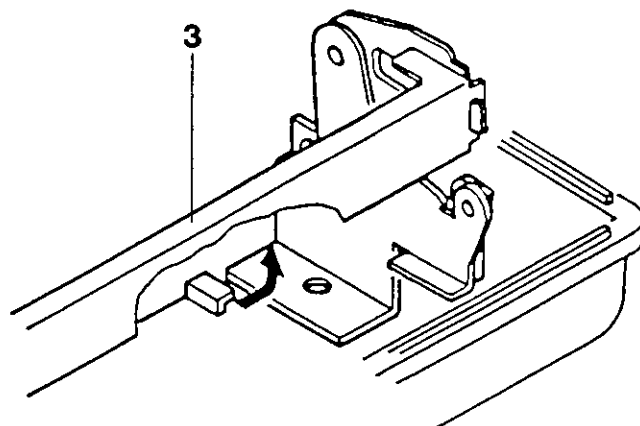
## Removing the Colour Unit

### 9.1 Removing the Colour Unit

- Remove the screw 2 and the "E" ring 1.

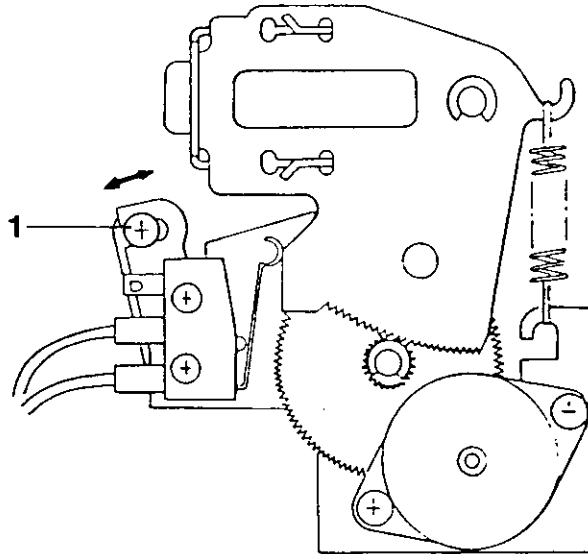


- Slide the entire unit 3 to the right and lift it out.



### 9.1.1 Colour Printing Adjustment

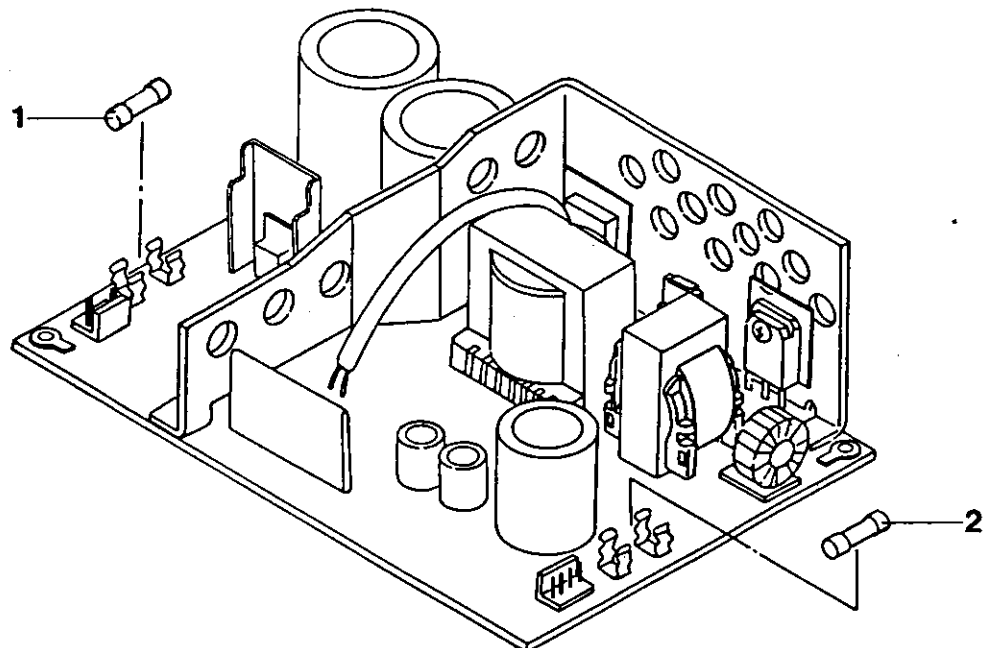
After attaching the colour unit, perform a self test print to check the colours are printed correctly and are not mixed, misaligned etc. When the self test print is performed, colours are printed in the order of RED - BLUE - PURPLE - YELLOW - ORANGE - GREEN. If the colours are not printed correctly, are mixed, misaligned etc., turn the power off and adjust the colour sensor by loosening the screw 1 as shown in the diagram below. Slide the sensor to the right to raise the ribbon position and to the left to lower the ribbon position.



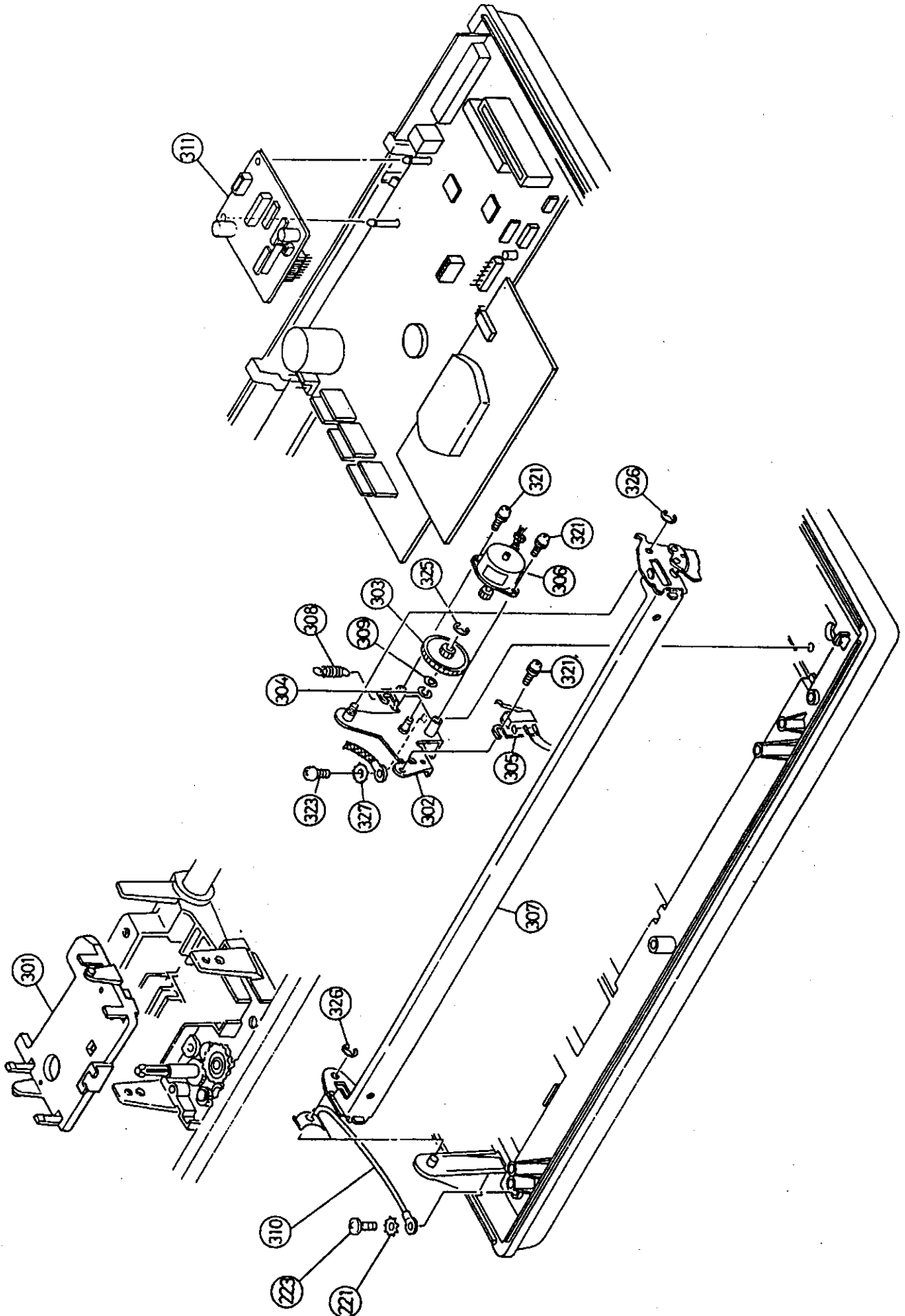
### 9.1.2 Fuse Replacement

Two fuses, the primary side fuse 1 and the secondary side fuse 2 are installed inside the power supply unit.

The types of fuses to use with your power supply unit depend on voltage requirements for your area. Check the voltage specifications for your power supply unit to be sure you have selected the correct fuse for replacement. Refer to Chapter 8, "Spare Parts and Schematics".



# Colour Unit Parts



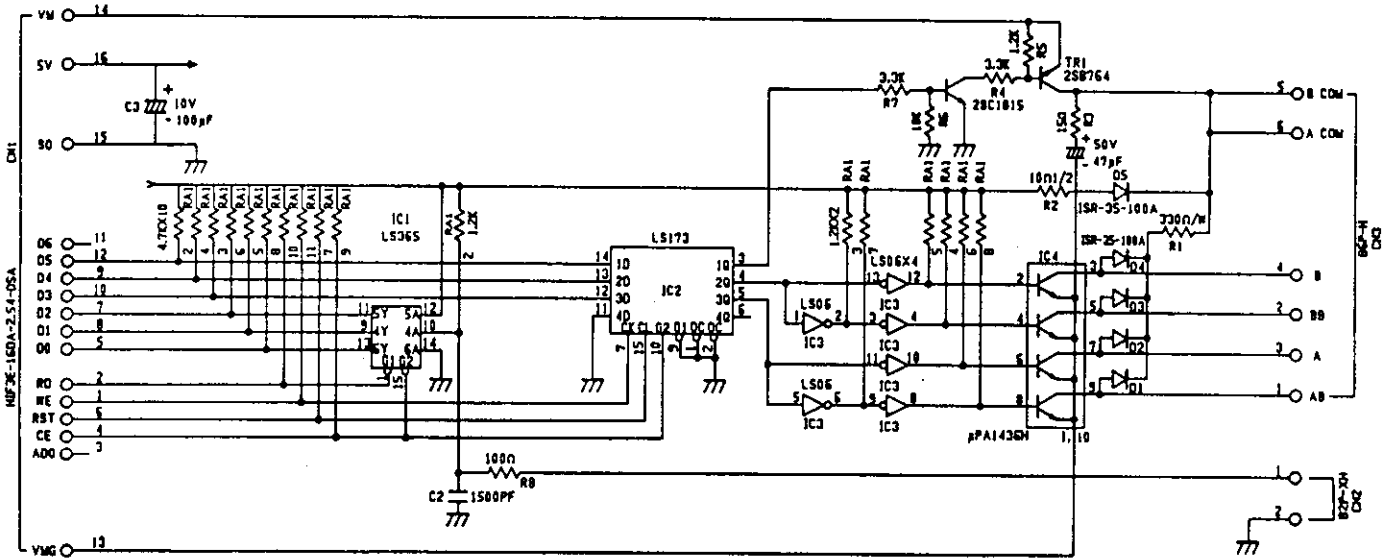
## 9.2 Colour Unit Parts

No. in Fig.	Part No.	Part
301		Colour ribbon base plate
302		Mount plate assembly
303		Change gear
305		Colour sensor assembly
306		Colour change motor assembly
307		Colour change plate assembly
308		Change plate spring
310		FG wire
311		Colour P.W.B. assembly

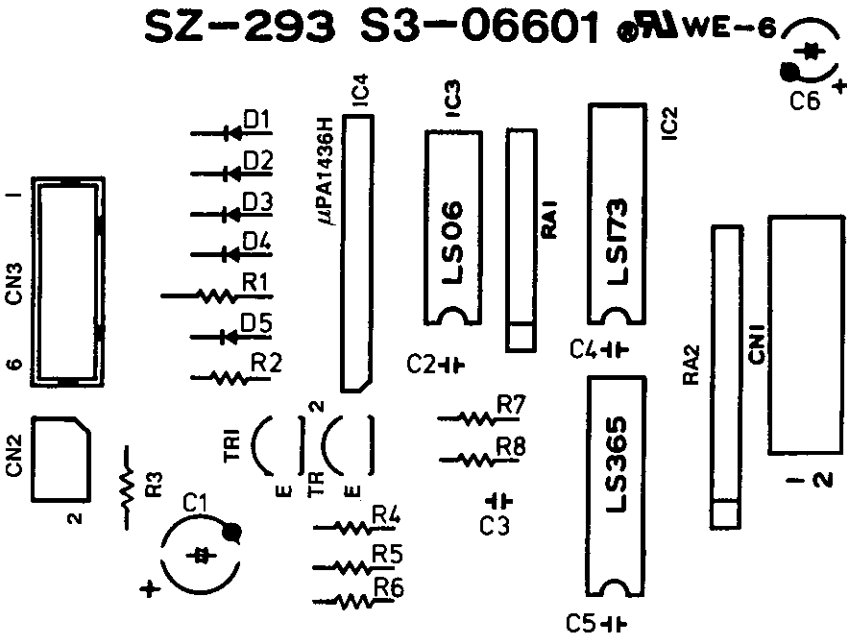
## Screws, Washers, 'E' Rings

No. in Fig.	Part No.	Part
304		Spring washer
309		Space washer
321		Screw M3x6
322		Screw M3x6
323		Screw M3x12
324		Screw M4x20
325		'E' ring 2,5
326		'E' ring 3
327		Lock washer A 3,2
328		Lock washer A 4,2

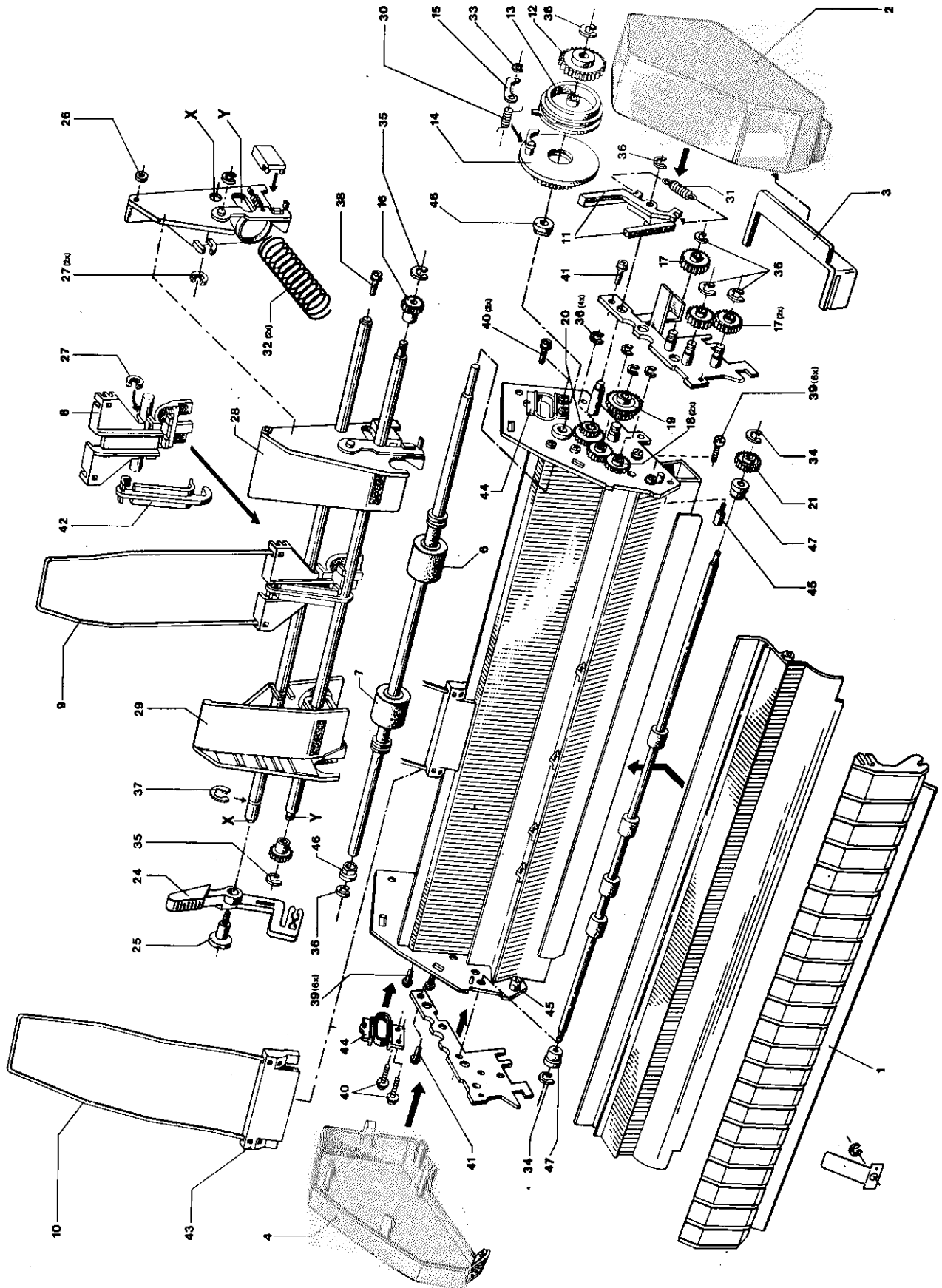
9.3  
Colour P.W.B.



SZ-293 S3-06601 WE-6



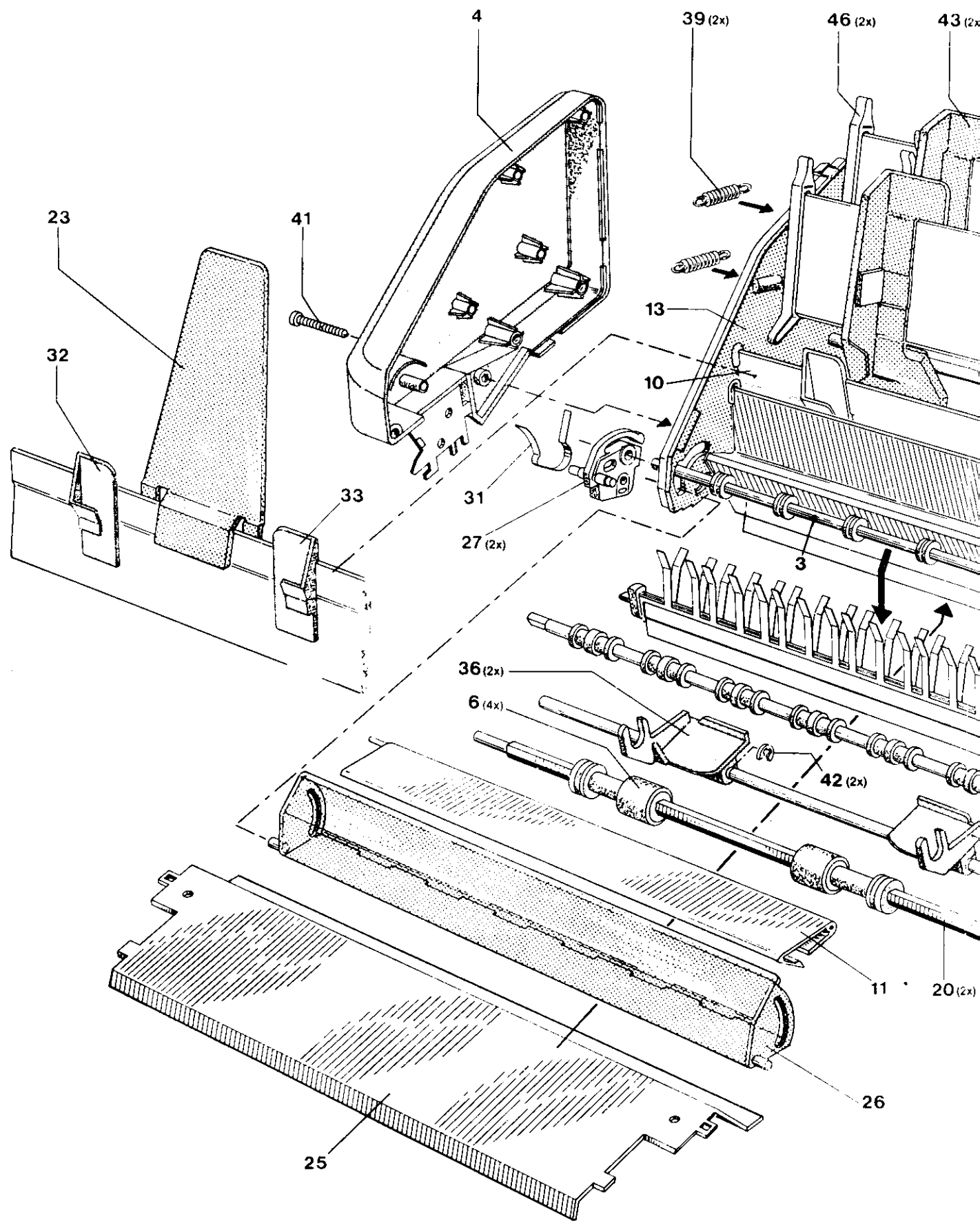
Component	Part No.	Part
C1		Capacitor 47 $\mu$ F 50 V
C2		Capacitor 0.01 $\mu$ F
C3		Capacitor 1.5 nF
C4		Capacitor 0.01 $\mu$ F
C5		Capacitor 0.01 $\mu$ F
C6		Capacitor 100 $\mu$ F 10 V
D1		Diode
D2		Diode
D3		Diode
D4		Diode
D5		Diode
IC1		TTL IC MB74LS365A
IC2		TTL IC M74LS173AP
IC3		TTL IC HD74LS06P
IC4		Transistor MP4004
R1		Resistor 330 $\Omega$ 1 W
R2		Resistor 10 $\Omega$ 0.5 W
R3		Resistor
R4		Resistor 3.3 k $\Omega$ 0.5 W
R5		Resistor 1.2 k $\Omega$ 0.5 W
R6		Resistor 100 $\Omega$ 0.5 W
R7		Resistor 1.3 k $\Omega$ 0.5 W
R8		Resistor 10 k $\Omega$ 0.5 W
RA1		Resistor 1.2 k $\Omega$
RA2		Resistor 4.7 k $\Omega$
TR1		Transistor B764
TR2		Transistor C1815

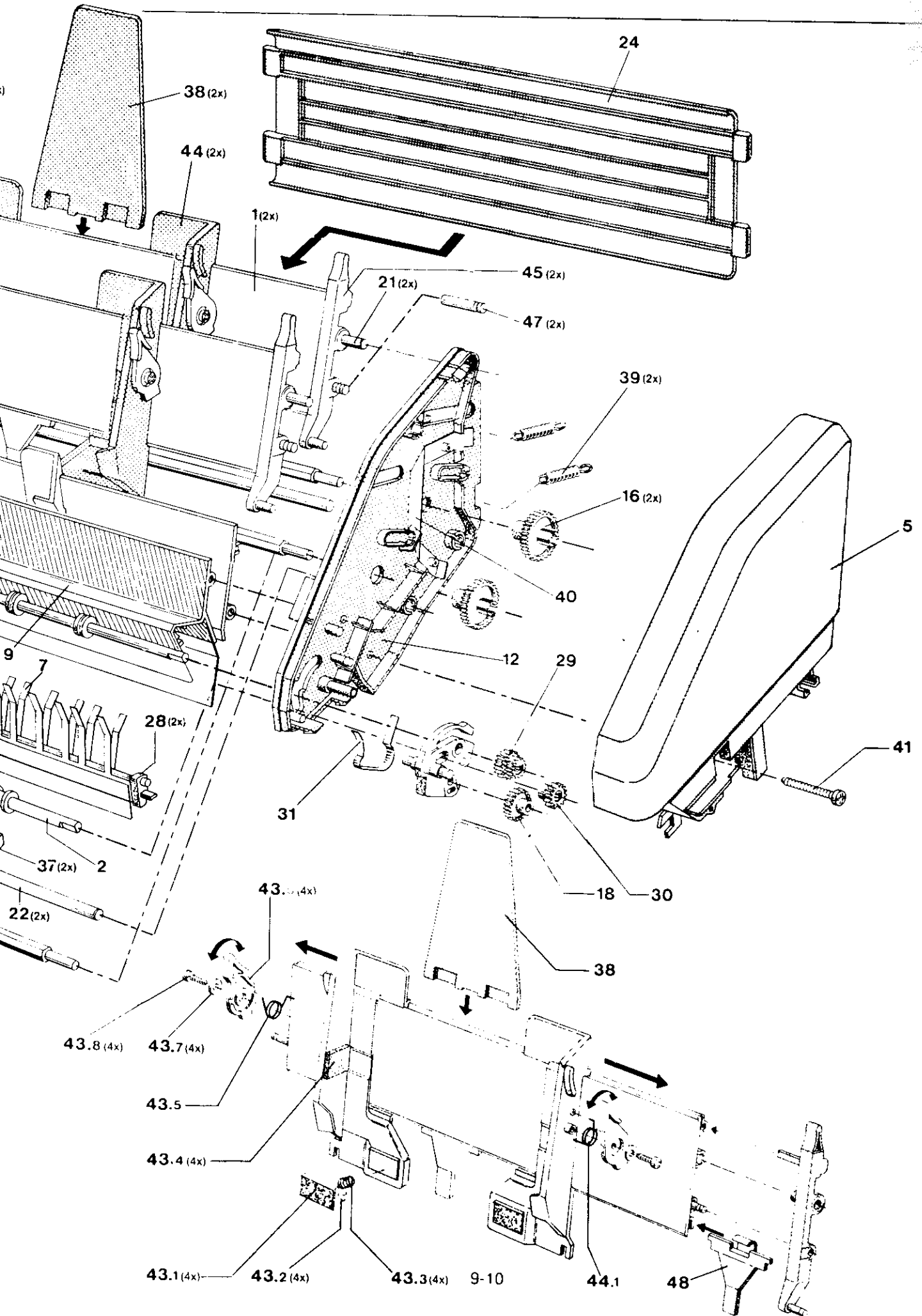


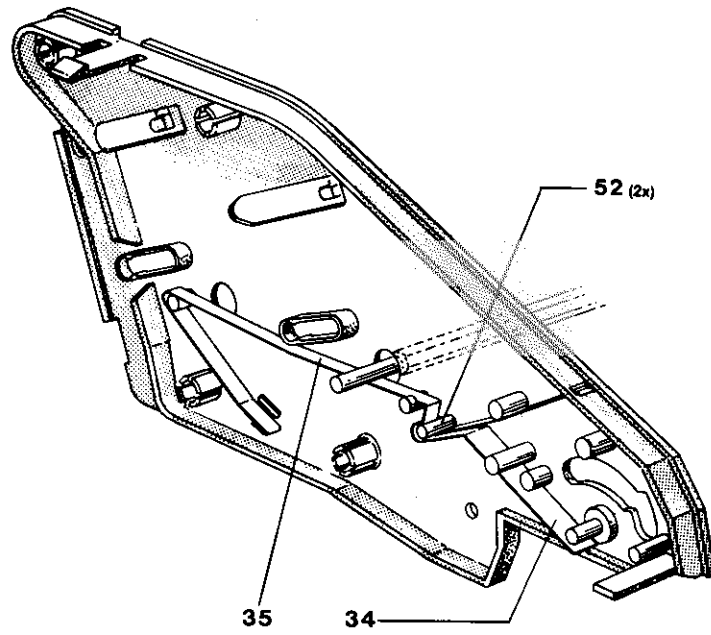
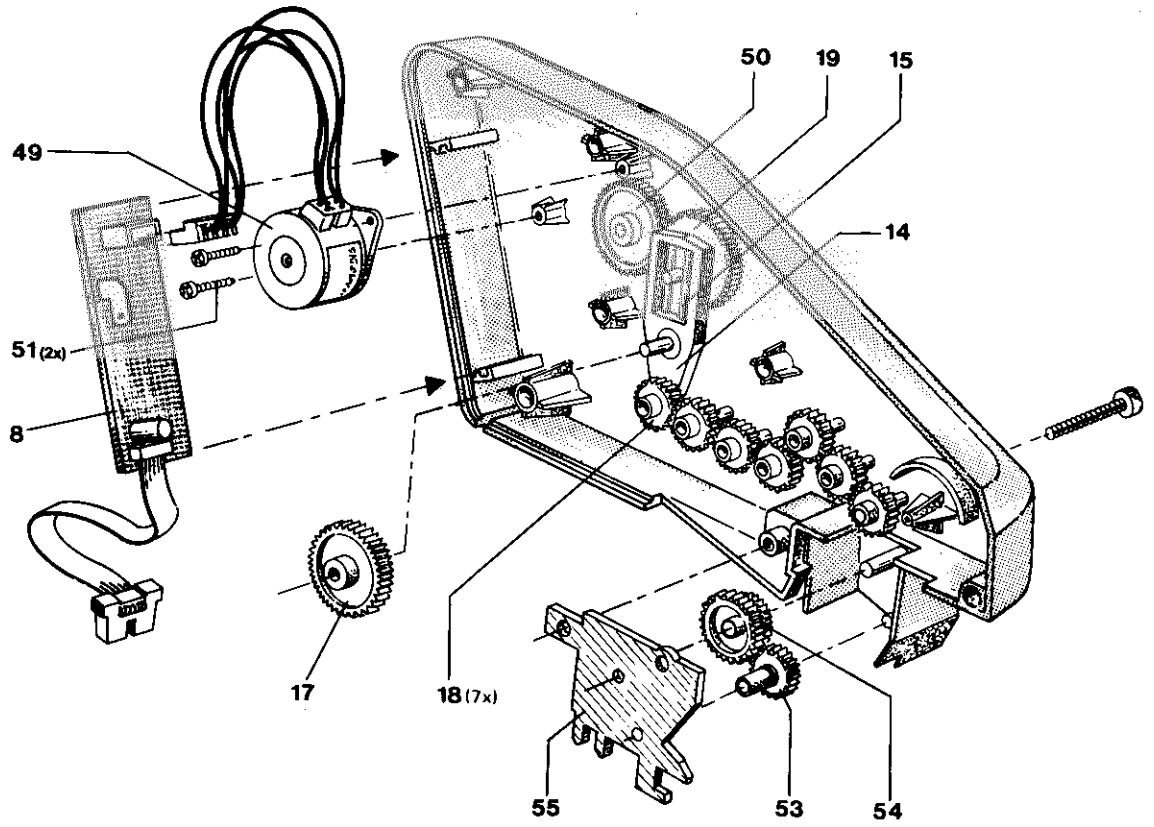
#### 9.4 Single-Bin Sheet Feeder Parts

No. in Fig.	Part No.	Part
1		Front sheet cover unit
2		Side cover (R)
3		Cover (R)
4		Side cover (L)
5		Stacker bottom unit
6		Roller (R) unit
7		Roller (L) unit
8		Hopper supporter
9		Hopper attachment
10		Stacker attachment
11		Brake lever
12		Ratchet
13		Clutch (B)
14		Clutch (A) unit
15		Claw
16		Lever gear
17		Gear G1
18		Gear G2
19		Gear G3
20		Gear G4
21		Gear G5
22		Gear G6
23		Gear G7
24		Lever
25		Lever screw
26		O ring
27		Bushing
28		Pressure plate (R) unit
29		Pressure plate (L) unit
30		Claw spring
31		Lever spring
32		Separatore Spring
33		Stop Ring SE2
34		Stop Ring SE3
35		Stop Ring SE4
36		Stop Ring SE5
37		Stop Ring SE6
38		Screw with flange M3x8
39		Tapping screw M3x8
40		Tapping screw with flange M3
41		Screw with Flange M3x5
42		Supporter
43		Jointer
44		Rack
45		Screw A
46		Bearing A
47		Bearing B









### 9.5 Two-Bin Sheet Feeder Parts

No. in Fig.	Part No.	Part
1		Paper support compl.
2		Roller shaft front
3		Roller shaft rear
4		Side plane LH
5		Side plane RF
6		Roll compl.
7		Paper guide
8		Motor Driver
9		Paper stacker compl.
10		Bin compl.
11		Cover compl.
12		Side plate RH
13		Side plate LH
14		Switching Lever
15		Leg spring
16		Gear t = 39
17		Gear t = 39
18		Gear t = 24
19		Gear
20		Roller shaft
21		Upper guide shaft
22		Lower guide shaft
23		Sliding paper support
24		Backplane
25		Paper guide plate
26		Front stacker
27		Bearing
28		Gear Part
29		Gear t = 18/22
30		Gear t = 18
31		Spring
32		Single sheet guide LH
33		Single sheet guide RH
34		ESD-contact stripe
35		ESD-contact stripe
36		Depressor LH
37		Depressor RH
38		Paper support middle
39		Spring
40		ESD-contact stripe
41		Screw 4.2x36
42		Circlip 6
43		Slide Panel LH compl.
43.1		Cork
43.2		Rocker
43.3		Spring
43.4		Needled felt
43.5		Leg Spring LH
43.6		Fixing lever

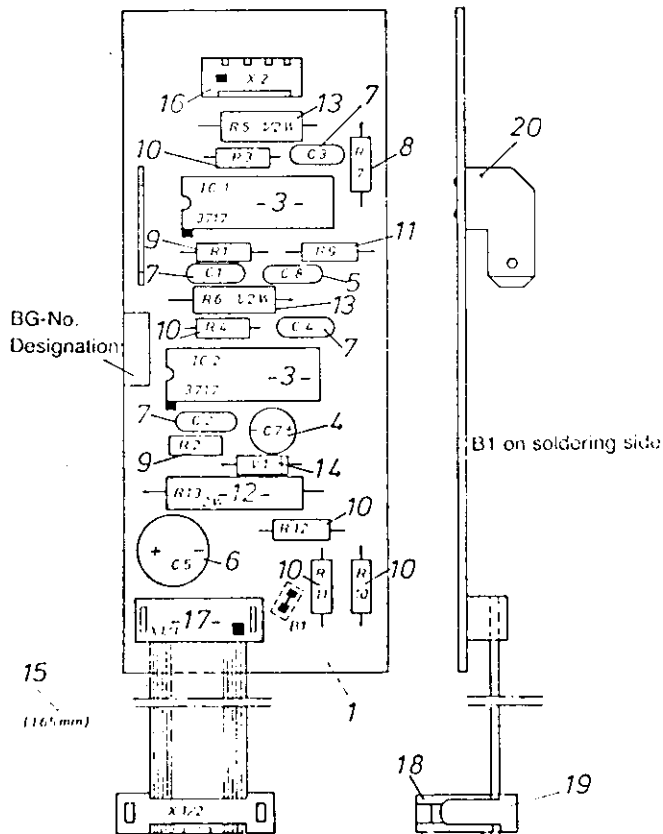
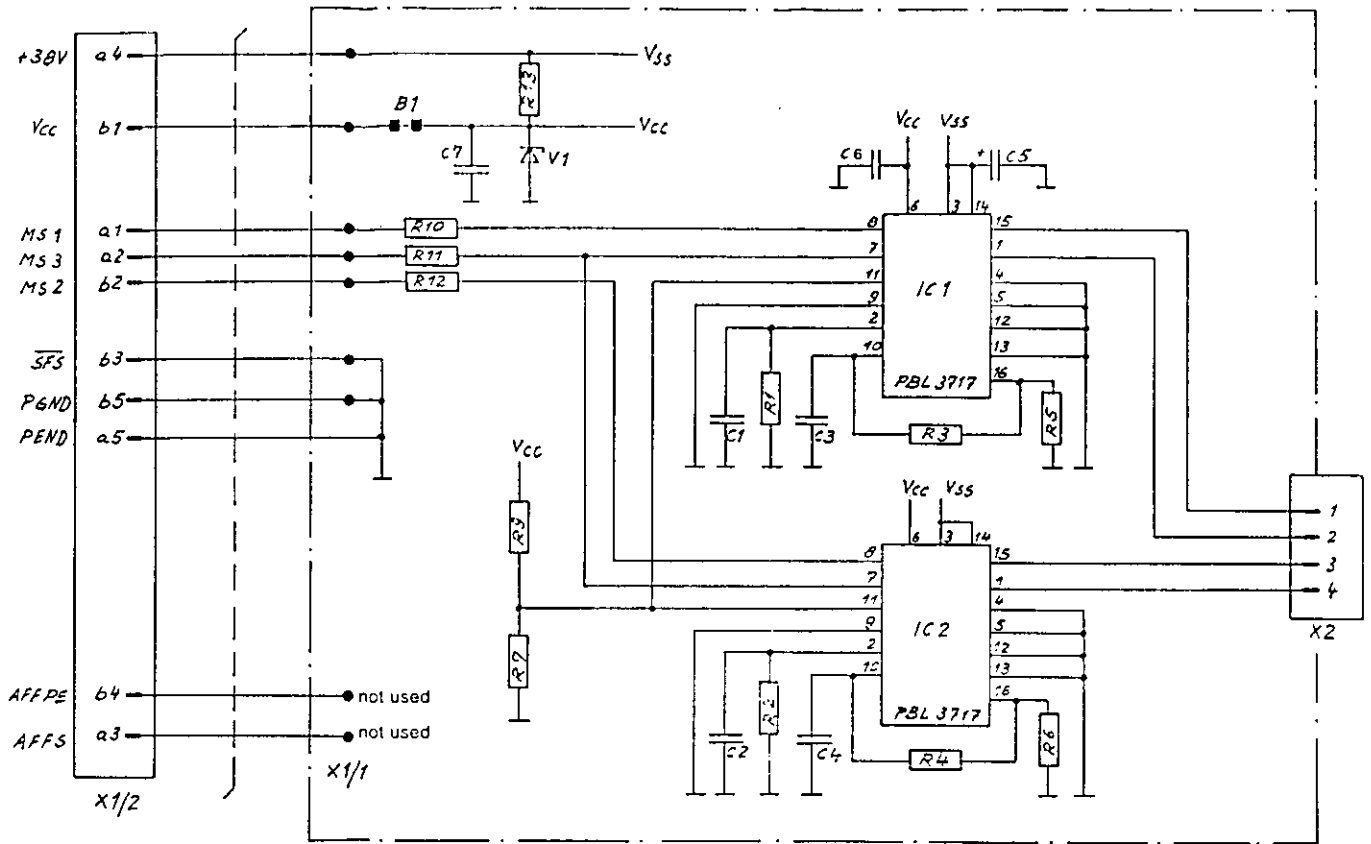
No. in Fig.	Part No.	Part
43.7		Washer B4.3
43.8		Screw 40x8
44		Slide Panel RH compl.
44.1		Leg spring RH
45		Lever RH
46		Lever LH
47		Pin 5x25
48		Slinging paper support
49		Stepper motor compl.
50		Gear t = 62
51		Screw 25x8
52		Pin
53		Gear 40
54		Gear 27/38
55		Plate

## 9.6

## Motor Driver P.W.B.

045 540

No. in Fig.	Component	Part No.	Part
7	C1		Capacitor 1 nF 160 V
7	C2		Capacitor 1 nF 160 V
7	C3		Capacitor 1 nF 160 V
7	C4		Capacitor 1 nF 160 V
6	C5		Capacitor 100 $\mu$ F 40 V
5	C6		Capacitor 100 nF 63 V
4	C7		Capacitor 10 $\mu$ F 16 V
3	IC 1		Motor Driver PBL3717A
3	IC 2		Motor Driver PBL3717A
9	R1		Resistor 56 k $\Omega$
9	R2		Resistor 56 k $\Omega$
10	R3		Resistor 1 k $\Omega$
10	R4		Resistor 1 k $\Omega$
13	R5		Resistor 82 $\Omega$
13	R6		Resistor 82 $\Omega$
8	R7		Resistor 390 $\Omega$
11	R9		Resistor 680 $\Omega$
10	R10		Resistor 1 k $\Omega$
10	R11		Resistor 1 k $\Omega$
10	R12		Resistor 1 k $\Omega$
12	R13		Resistor 1.5 k $\Omega$ 2 W
14	V1		Zener diode BZX83C5V1





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