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## MICROLINE 320/321 TURBO PRINTER

### Service Manual

## PREFACE

This Service Manual describes how to maintain the Microline 320/321 Turbo printer in the field.

It is intended for service personnel.

Refer to the user documentation for information on handling and operating the printer.

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# 1. CONFIGURATION

## 1.1. Standard Printer Configuration

This printer consists of the following assemblies:

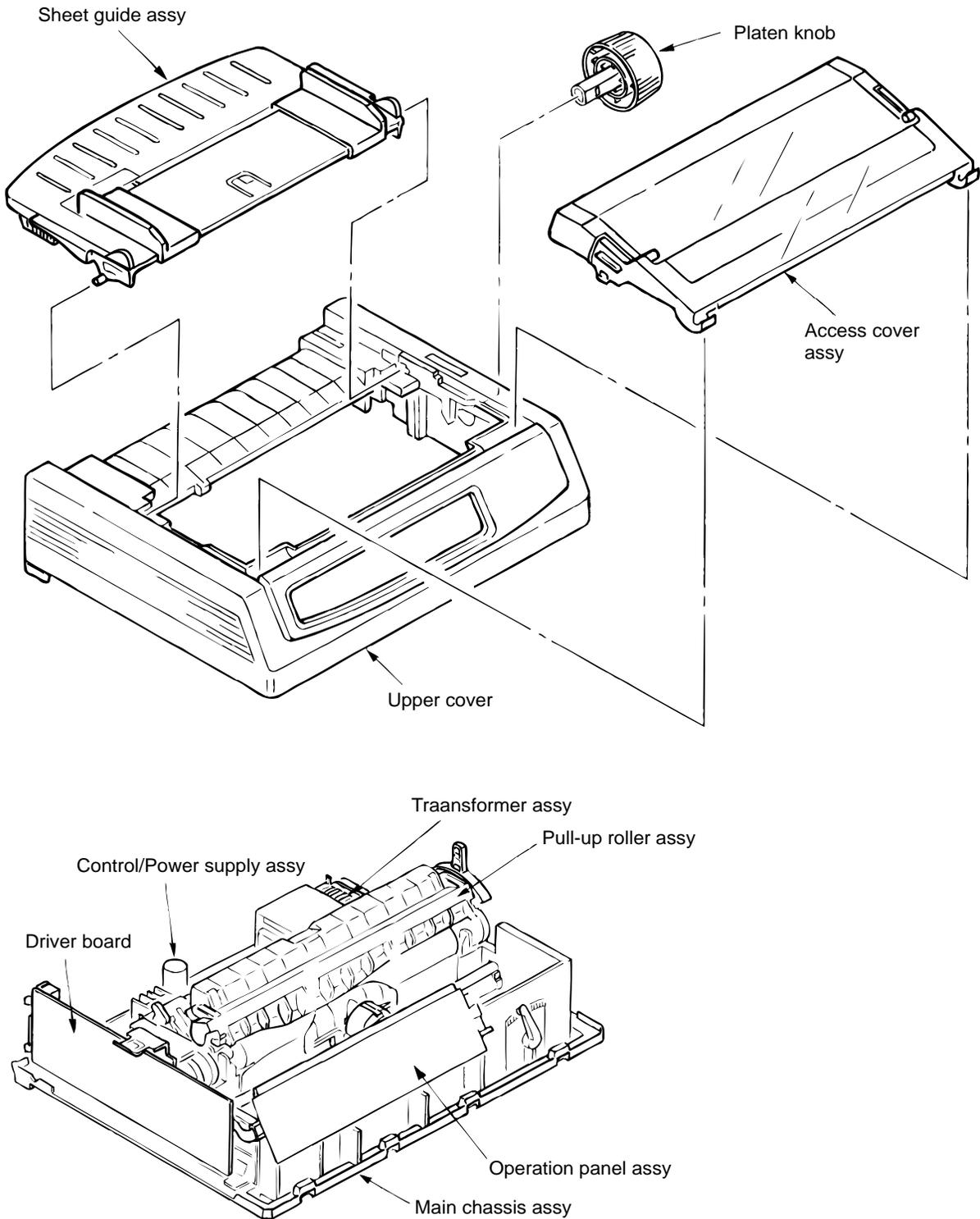
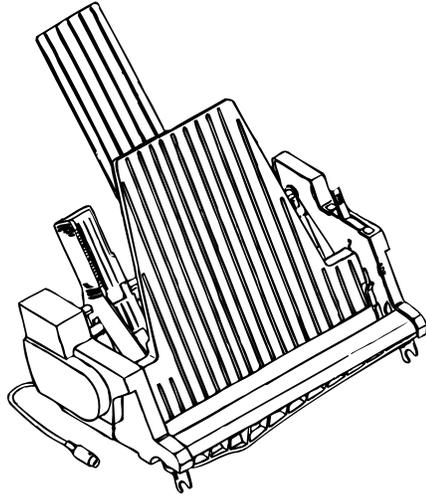


Figure 1-1 Configuration

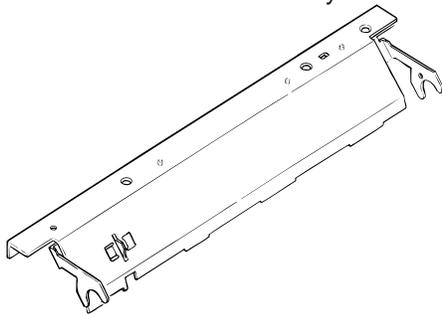
## 1.2 Options

### (1) Cut sheet feeder unit (CSF)

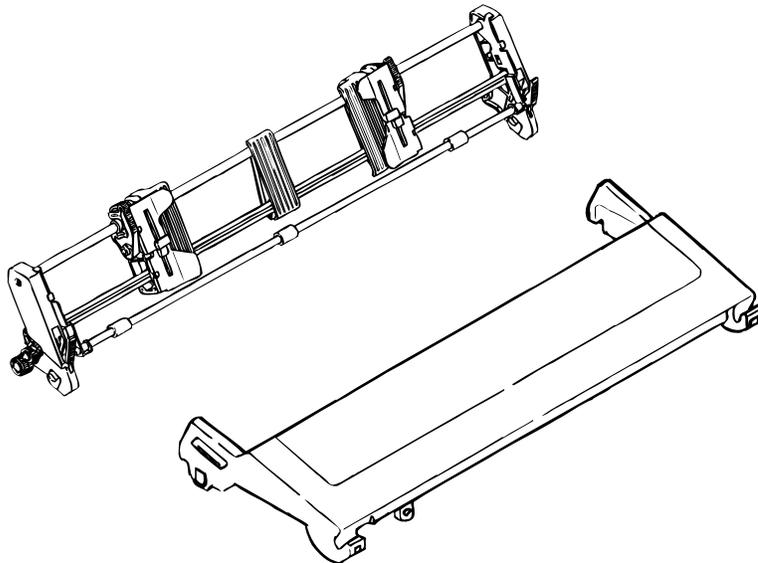
Single-bin CSF



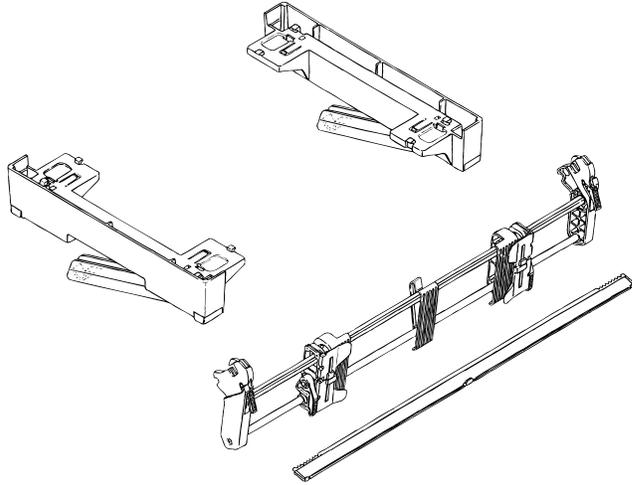
Attachment assy



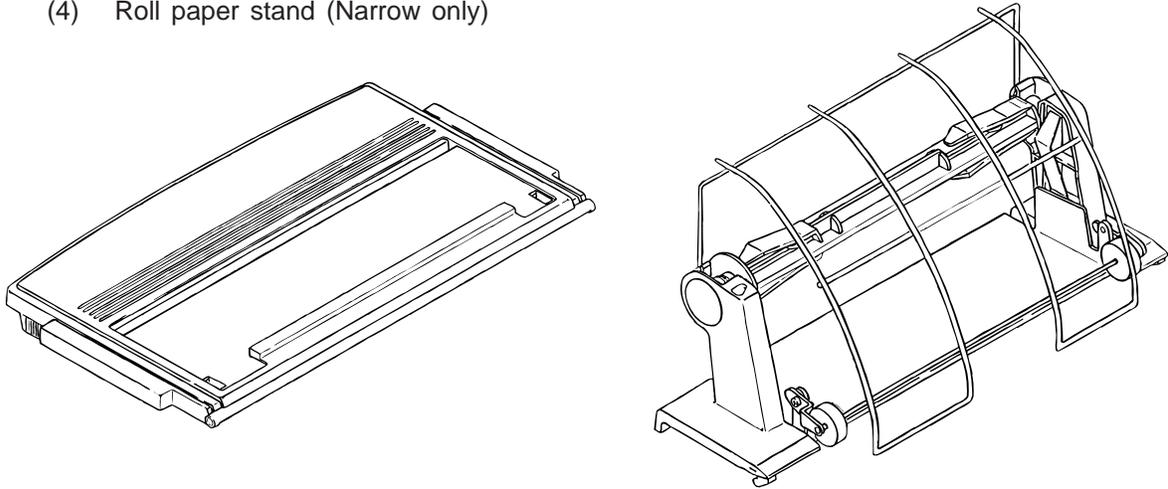
### (2) Pull-tractor assy



(3) Bottom push tractor unit

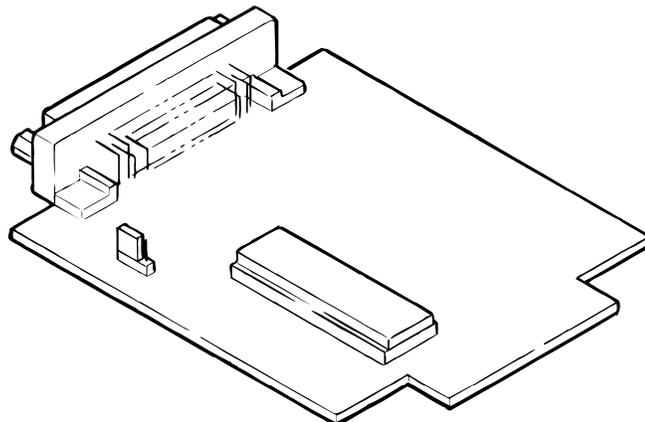


(4) Roll paper stand (Narrow only)



(5) Serial I/F

- RS-232C



## 2. THEORY OF OPERATION

### 2.1 Electrical Operation

This section describes the electrical operation of the printer circuit.

#### 2.1.1 Summary

Fig. 2-1 shows the block diagram of the printer.

The control board is made up of the microprocessors, peripheral circuits, drive circuits, sensors and interface connectors.

The power to the control board is supplied by the power board through the connector cord.

The power to other electrical parts is also distributed through the connectors within the control board.

#### 2.1.2 Microprocessor and the Peripheral Circuit

##### (1) Microprocessor (Q7: 67X640)

This processor is a CMOS single-chip computer with integrated peripheral device functions and a 16-bit MPU core, all OKI original architecture.

The processor has a 20-bit address bus and a 16-bit data bus.

It is capable of accessing up to 1M word program memory and 1M bytes of data memory.

The following characteristics are also provided:

- Built-in type data memory of 512 bytes
- 8-bit 4-channel A/D converter × 1
- 16-bit automatic reload timer × 2
- 8-bit serial port × 2
- 8-bit parallel port × 3 (bitwise I/O specification available)

And others.

The function of this microprocessor is to provide a central mechanism for the entire printer by executing the control program through the LSI and driver circuits.

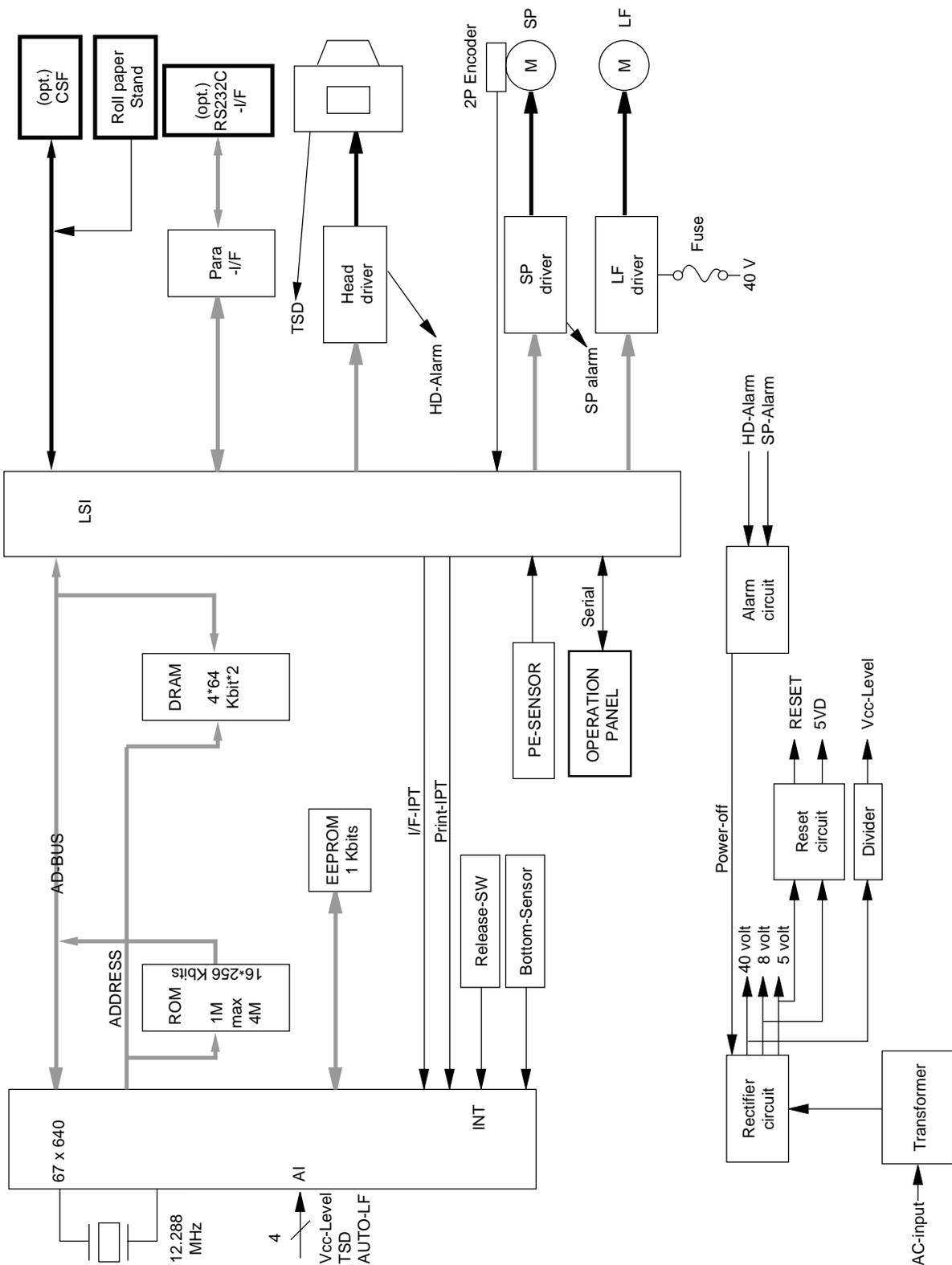


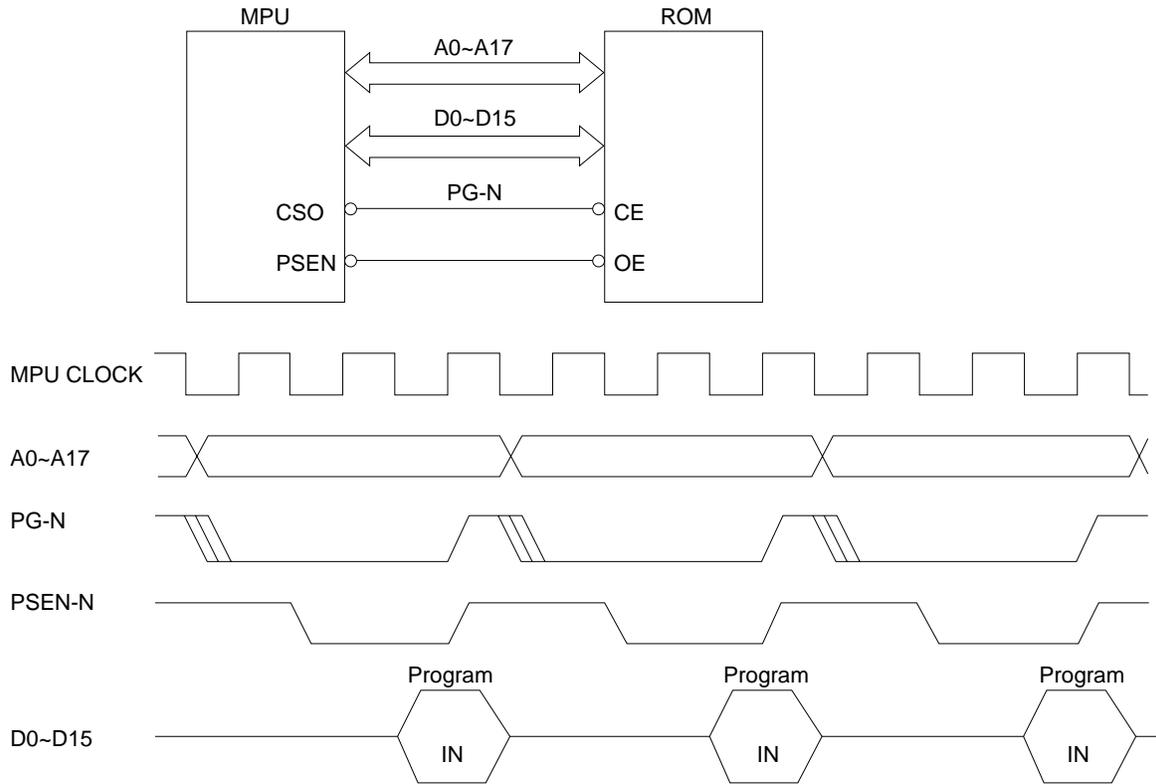
Figure 2-1

(2) Program ROM

This is a  $256 \times 16$  bits (4M bit) [MAX] EPROM with the control program for the printer stored. The MPU executes instructions under this program.

The program ROM is assigned to the program memory area of the MPU and is fetched by the PSEN signal of the MPU.

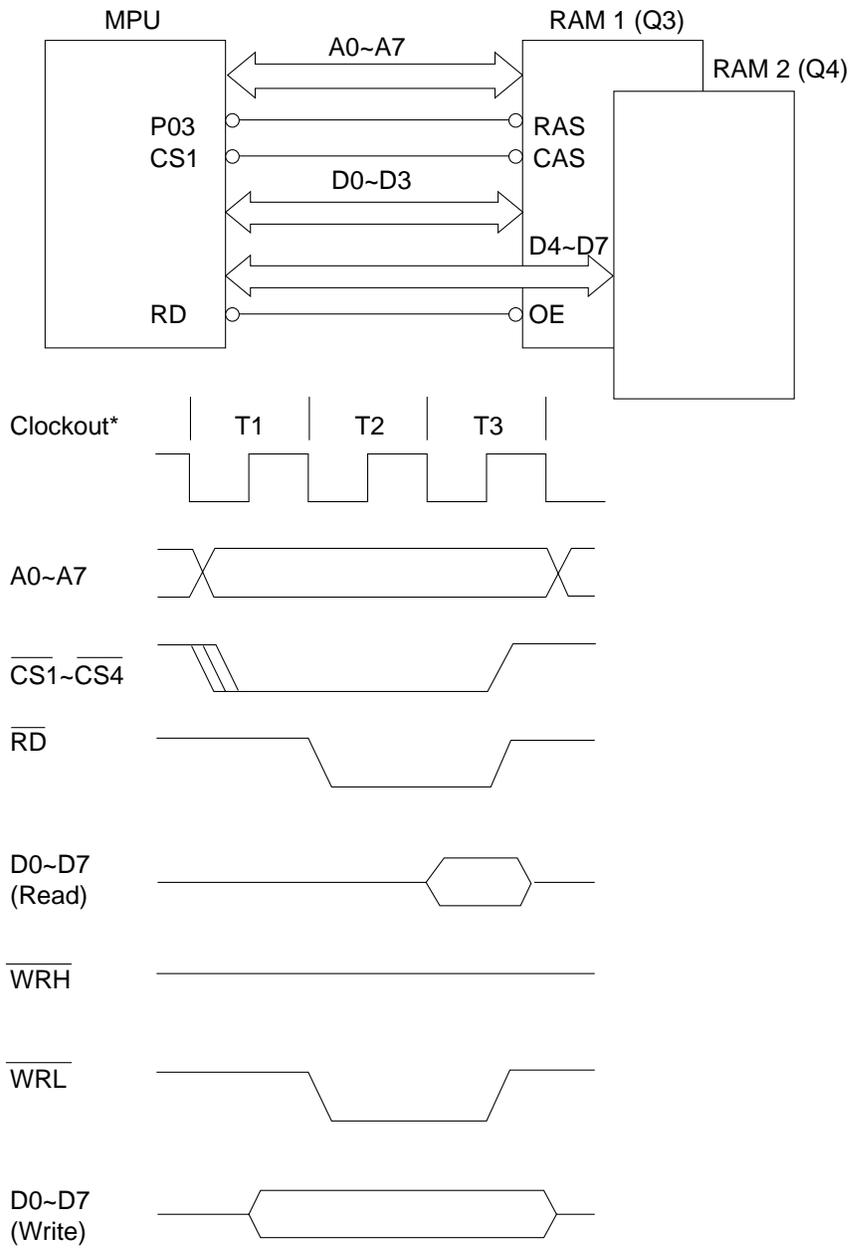
The following shows the operation of the memory access.



(3) RAM (MSM51C464A-80RS)

The RAM is CMOS dynamic RAM with  $(64K \times 4\text{-bit}) \times 2$  configuration, and used as buffers (such as receiving buffer, printing buffer, DLL buffer and working buffer).

The following shows examples of the memory access operation.



8-bit bus, byte instruction

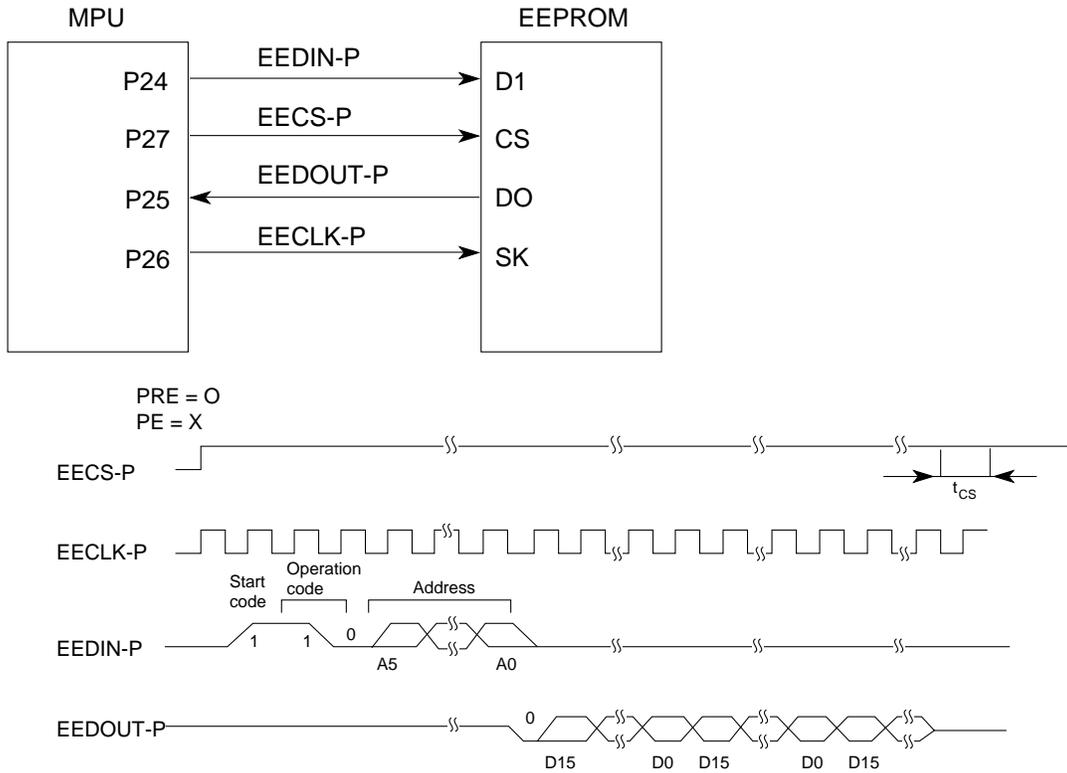
\* Clockout is provided when the original excitation is selected.

(4) EEPROM

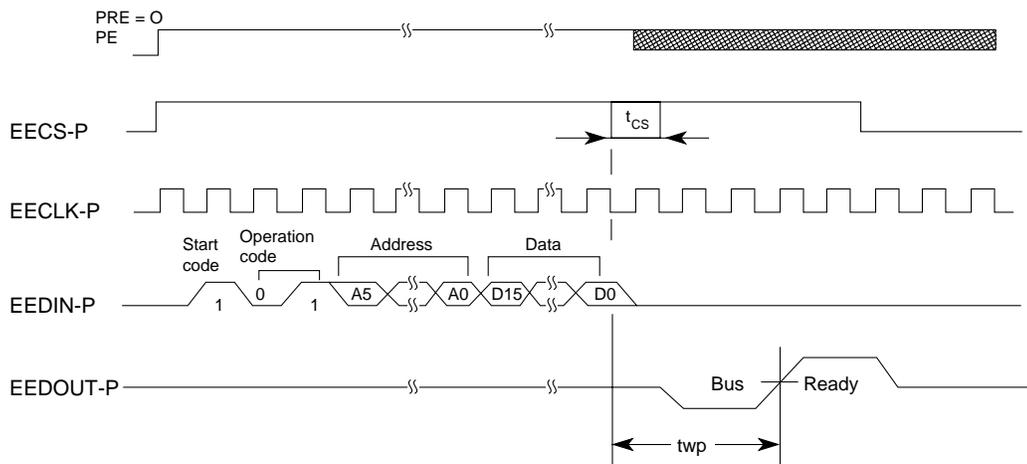
The EEPROM is a CMOS serial I/O type memory which is capable of electrically erasing and writing 1,024 bits.

The EEPROM contains menu data.

The following shows the memory access operation.



Read cycle timing (READ)

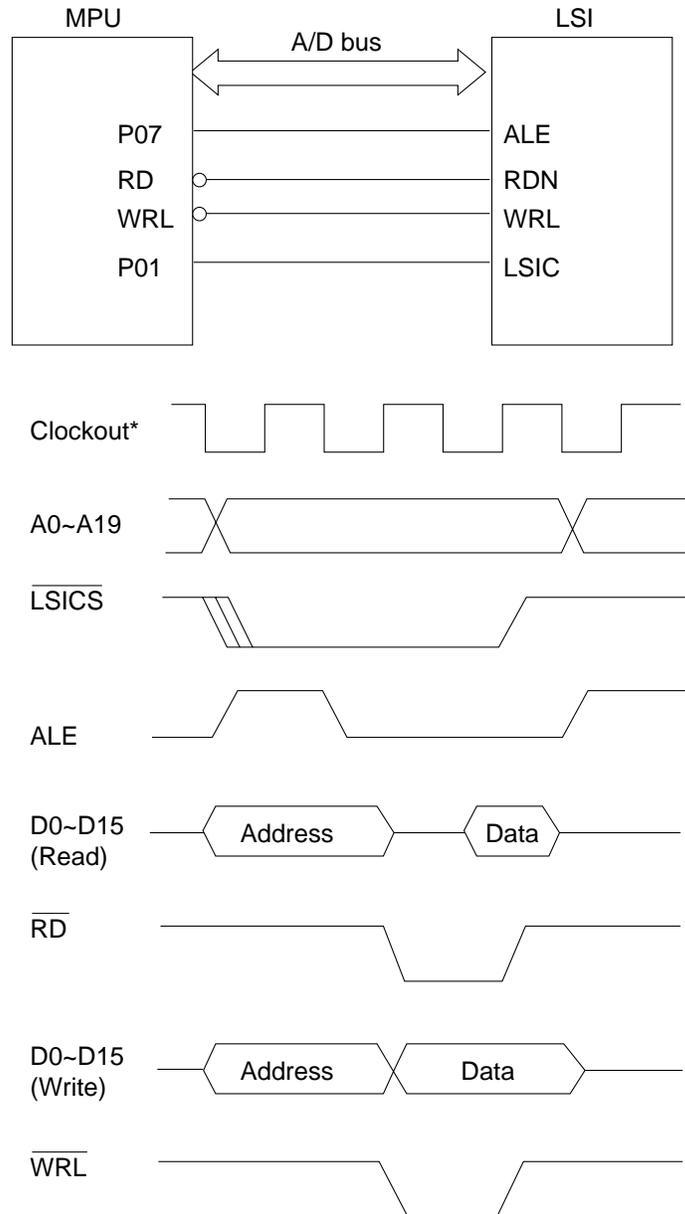


Write cycle timing (WRITE)

(5) LSI

This LSI detects and controls the SP motor speeds by monitoring the two-phase sensor signals obtained from the DC motors and modifying the excitation phases as appropriate.

This LSI is connected in multiplex to the MPU.



\* Clockout is provided when the original excitation is selected.

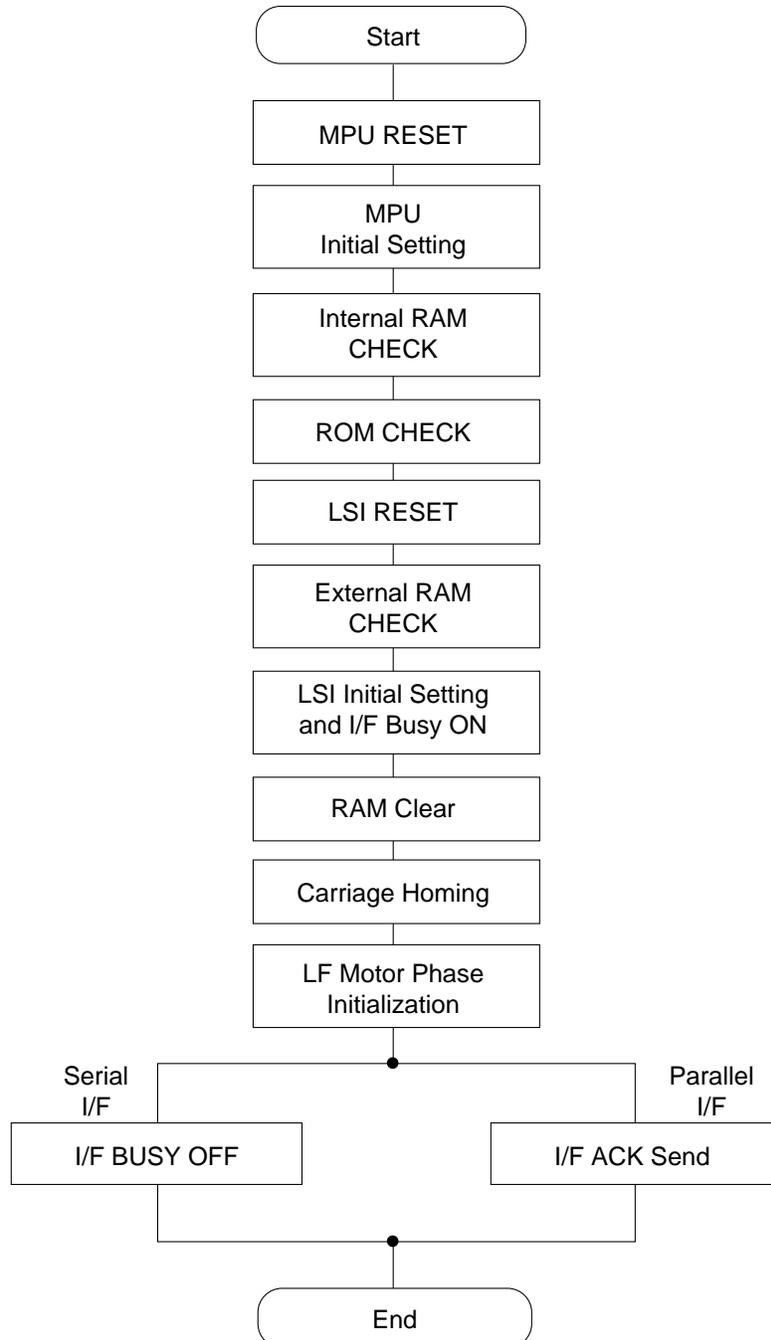
### 2.1.3 Initialization

This printer is initialized when the power is turned on or when the I-PRIME-N signal is input from the host side via the parallel interface.

For the initialize operation, the RST-N signal is first output from the reset circuit to reset the MPUs and LSIs. When resetting ends, the program starts and the LSIs are reset by MPU via LSIRST-N. Reset operation by I-PRIME starts the program to initialize, but does not reset the MPU.

The program sets the mode of the LSI including the MPU, checks the memories (ROMs and RAMs), then carries out carriage homing, and determines the LF motor phase.

Finally, the program establishes the interface signals (P-I/F: ACK-P signal sending, and S-I/F: BUSY-N signal off) and lights the SELECT lamp. When the ready state is set, the host is informed that the printer is ready to receive data.

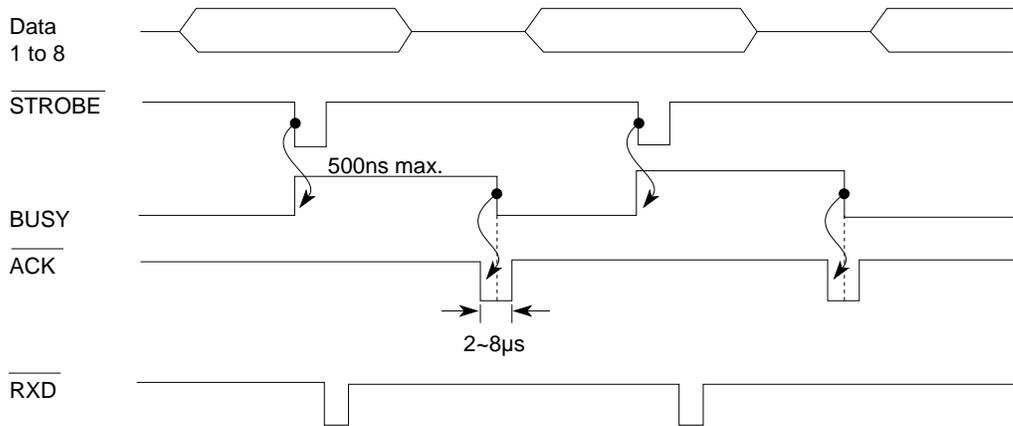
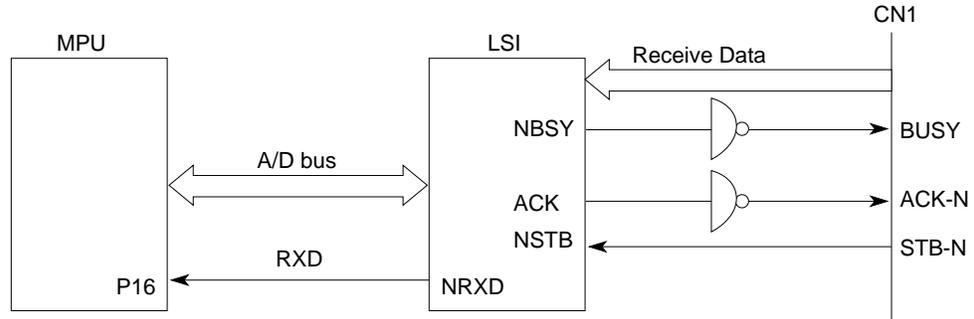


### 2.1.4 Parallel Interface Control

The parallel data input from the host to the interfaced LSI is latched to its internal register at the falling edge of the STROBE-N signal.

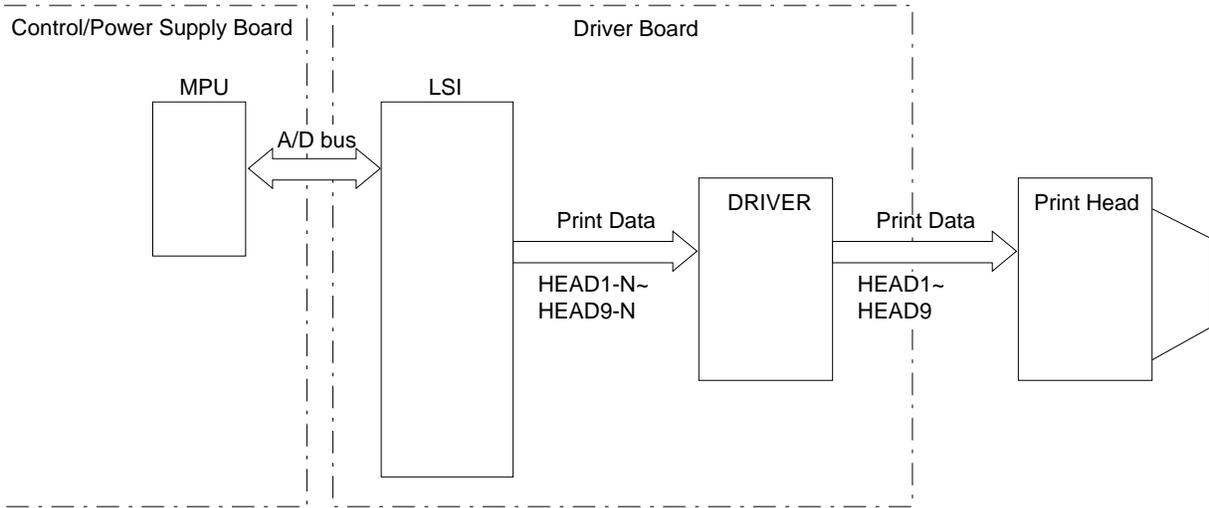
At the same time, the LSI sets the BUSY signal to the high level to inform the host that the data is being processed, and outputs the RXD signal to inform the MPU of data reception. The data is read upon receiving the RD-N signal from the MPU.

When the data processing ends, the BUSY signal is set to off and the ACK-N signal is sent to request the next data. When reception is impossible because the buffer is full, the BUSY signal is sent to stop data transmission.

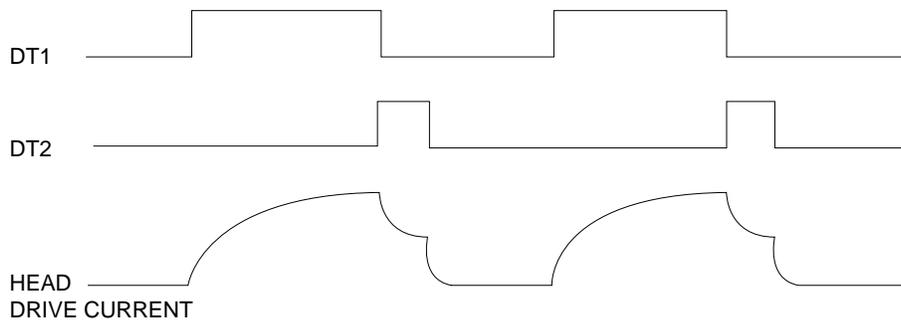


### 2.1.5 Print Control

Print data is transmitted as parallel data (HEAD1~HEAD9) from the LSI to the print head. The LSI generates the print timing and drive time.



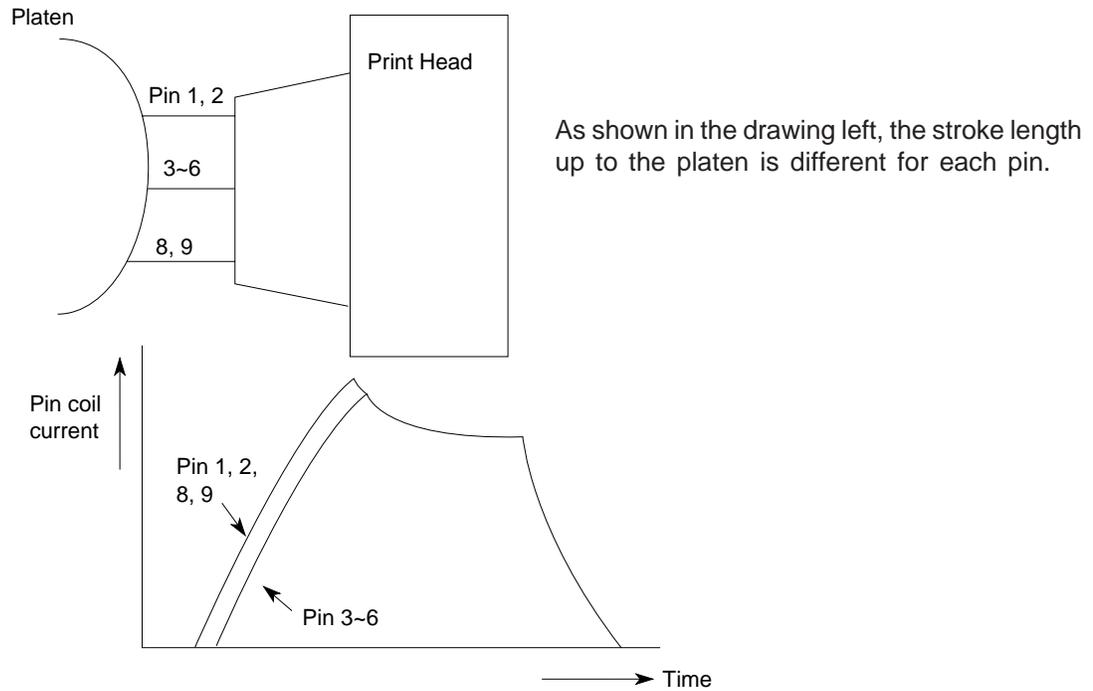
### HEAD DRIVE TIMING CHART



## Print Compensation Control

The print compensation methods are shown below:

- (a) Voltage compensation (See 2.1.8 "Alarm Circuit.")
- (b) Temperature compensation (See 2.1.8 "Alarm Circuit.")
- (c) Pin stroke compensation



- (d) Simultaneous Compensation of the number of impact pins

The MPU is provided with the compensation table for each pin to compensate as necessary.

Number of impact pins	Few ← → Many
Drive time	Short ← → Long

(e) Print mode compensation

According to the thickness of the printing medium, the print mode is compensated as shown in the table below:

Head Gap Range	1	2	3	4	5
Print speed	100%	95%	85%	85%	80%
Drive time	Short ← → Long				

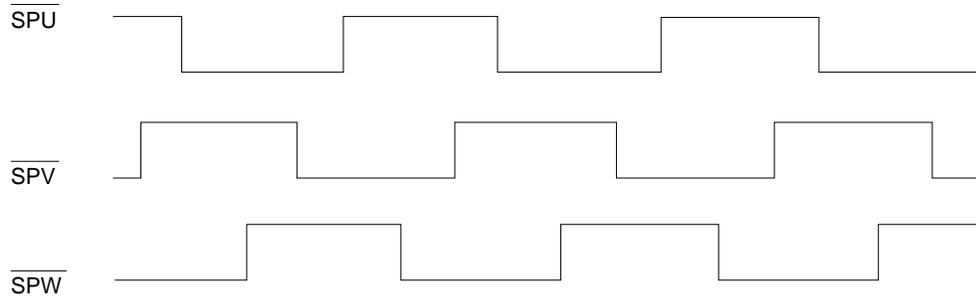
→ (Drive time lengthens at each step.)

## 2.1.6 SP/LF Motor Control

### (1) Space motor control

The SP motor driver (HA13412) drives the three-phase brushless motor based on the phase signal (SPU, SPV and SPW) and the speed instruction data from the LSI. The MPU can identify the current speed of the space motor by measuring through the LSI the pulse length of the output ( $\phi A$ ,  $\phi B$ ) of the slit encoder included in the space motor.

By comparing the target speed for each print mode with the actual current speed to change the speed instruction data, the motor speed is increased or decreased to maintain the specified speed for each print mode.



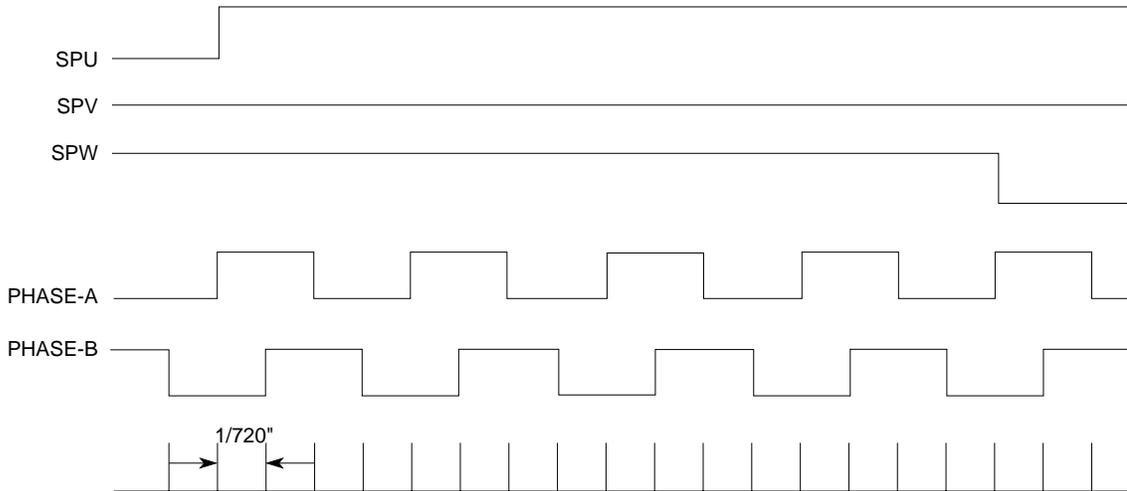
SP truth table

HALL			OUTPUT		
AMP	INPUT		U	V	W
$\overline{SPU}$	$\overline{SPV}$	$\overline{SPW}$			
H	H	L	OPEN	L	H
H	L	L	L	OPEN	H
H	L	H	L	H	OPEN
L	L	H	OPEN	H	L
L	H	H	H	OPEN	L
L	H	L	H	L	OPEN

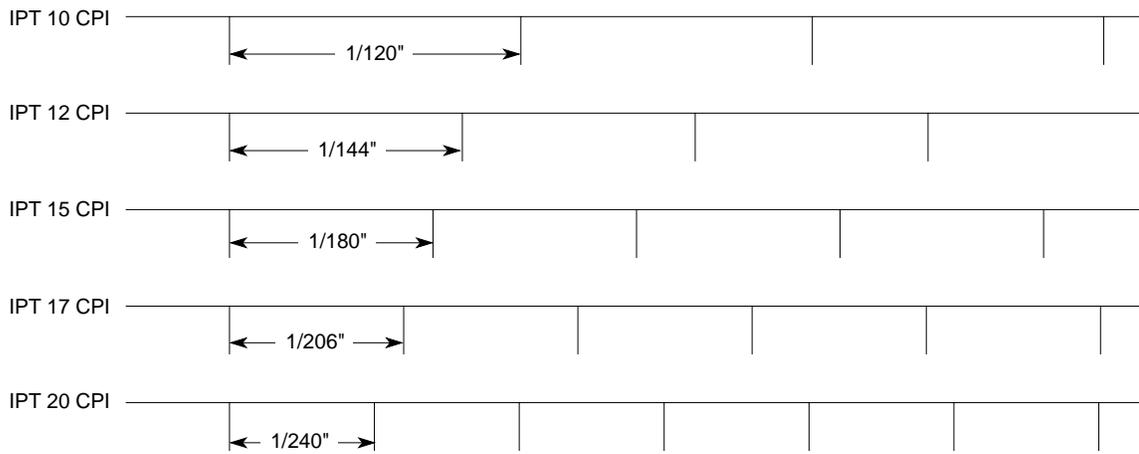
(2) Encoder disk

In the operation of the spacing motor, the PHASE-A and PHASE-B signals are generated when the encoder disk interrupts the photo sensor.

The LSI divides these edge pulse signals in accordance with the print pitch, and sends the IPT signal to provide dot-on timing and carriage position detection timing.



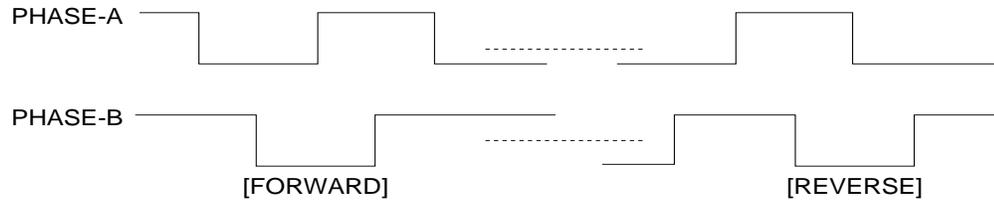
- UTILITY MODE



(3) LF motor control

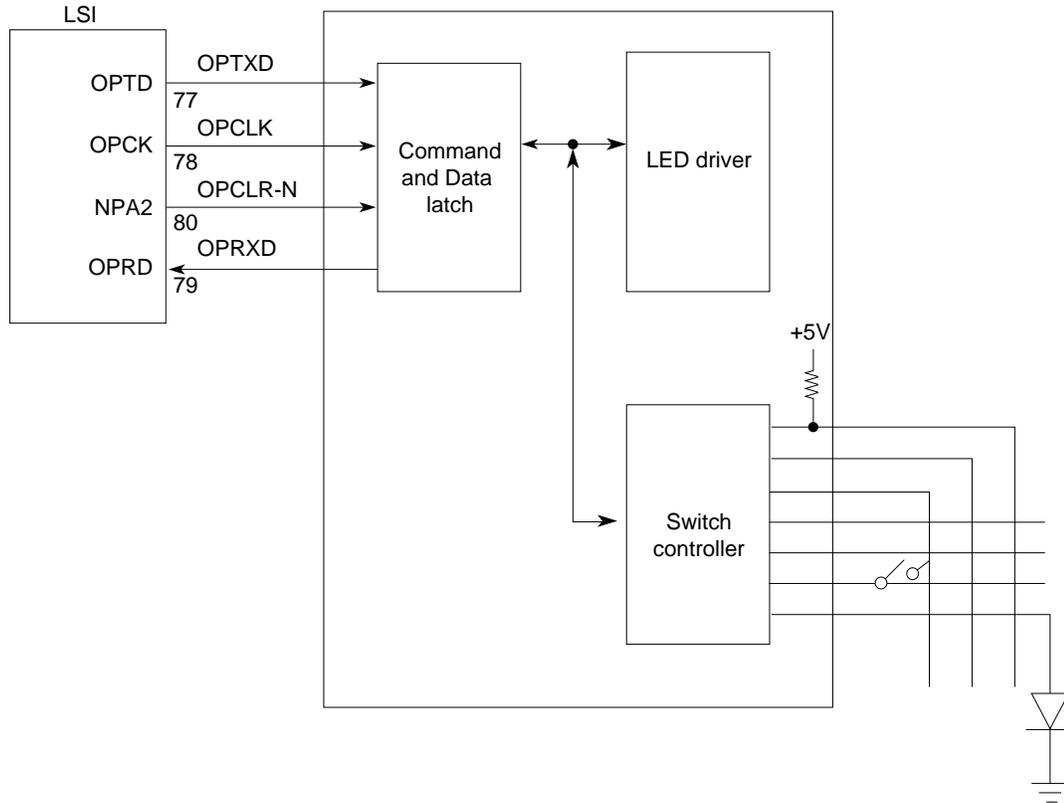
The LF motor driver (MTD2005F) drives the LF motor in two-phase or 1-2 phase bipolar, based on the phase changeover data and the output current data from the LSI.

The data from the LSI is processed by a specific register contained in the LF motor driver to measure the overdrive time and to change the phase.



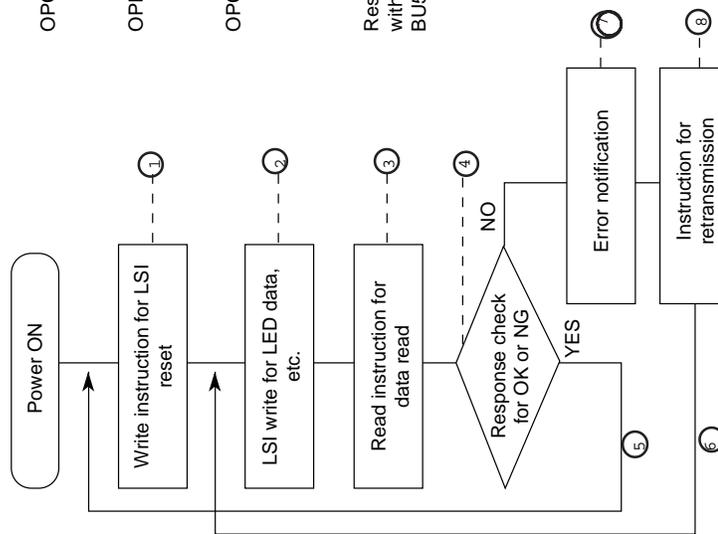
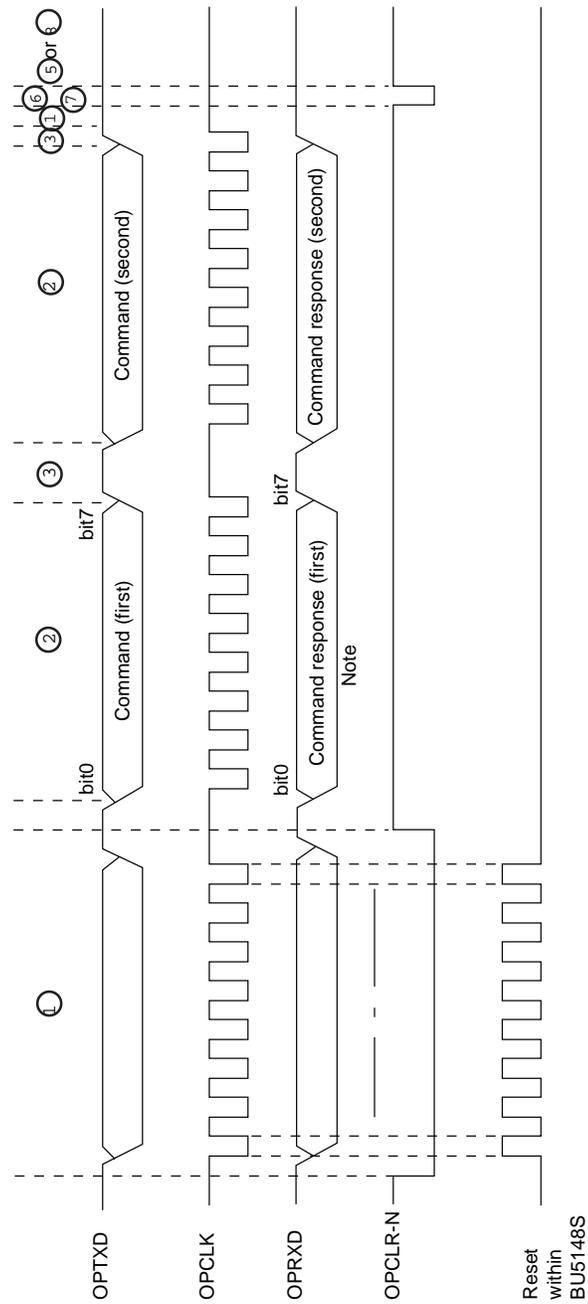
### 2.1.7 Operation Panel

The clock synchronization OPCLK signal of the LSI is used to input the switch data and output the LED data through the operation panel control LSI (IC1: BU5148S).



A 2-byte (15 bits + 1 even parity bit) command signal (OPTXD) is transmitted to the LSI (BU5148S) in synchronization with the OPCLK signal. The LSI decodes this command and when it is found to be legal, returns a 2-byte command response back to the LSI which includes data on Switch information, LED status, receive command ACK/NAK and 1 odd parity bit.

Any transmission errors found cause the command to be reissued after the transmission of the OPCLR-N signal.



**Note:** From the illustration above, you can see that the command and the command response are output at the same time. This is because the bit 0 to bit 3 of the OPRXD signal are fixed so that the response can be returned before decoding the command.

## 2.1.8 Alarm Circuit

### (1) Head drive time alarm circuit

This circuit monitors the drive time using the HDALM signal interlocked with the overdrive signal of each drive circuit.

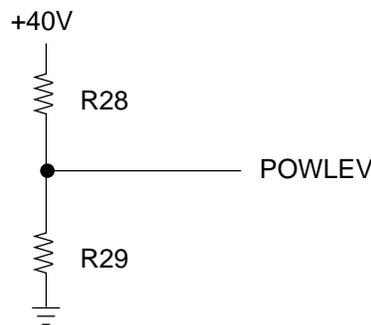
If the drive time of any drive circuit exceeds the specified time, the drive fault alarm circuit sends an ALARM-N signal to turn on the SCR (SO).

This causes the secondary coil (40V) of the transformer to short-circuit, causing an overcurrent to flow through the primary coil and open the AC fuse (transformer assy).

### (2) Alarm processing when DC power is low.

+ 40V is converted into the POWLEV signal (0V to +5V) by R28 and R29 and input into the A/D port of the MPU to control the drive time and the print speed (pass number) of the head.

#### (a) Head drive time



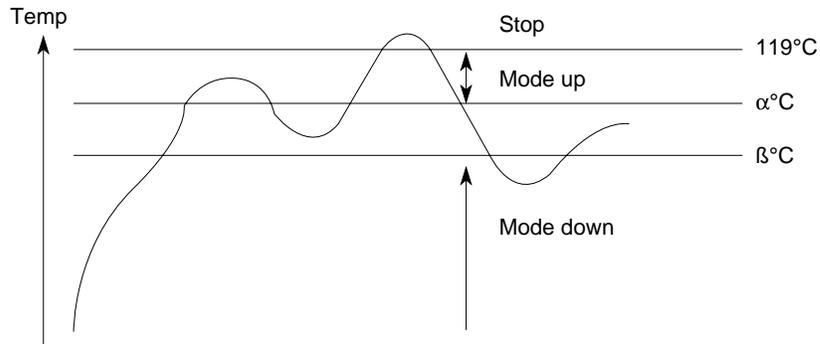
The head drive time is lengthened to compensate for the amount of voltage drop by monitoring the POWLEV signal once every 500  $\mu$  sec. to control and maintain the impact necessary for each printing pin at the fixed value.

#### (b) Print speed

Voltage, +40V	Pass number	Print speed
38V or more	1 Pass	100%
25V to 37V	1 Pass	100~30%
25V or less	1 Pass	30%

(3) Head overheat alarm

The voltage of the output TSD signal of the thermistors, one of which is in the printhead and the other in the printhead driver, is monitored by the CPU/AD port to control the voltage



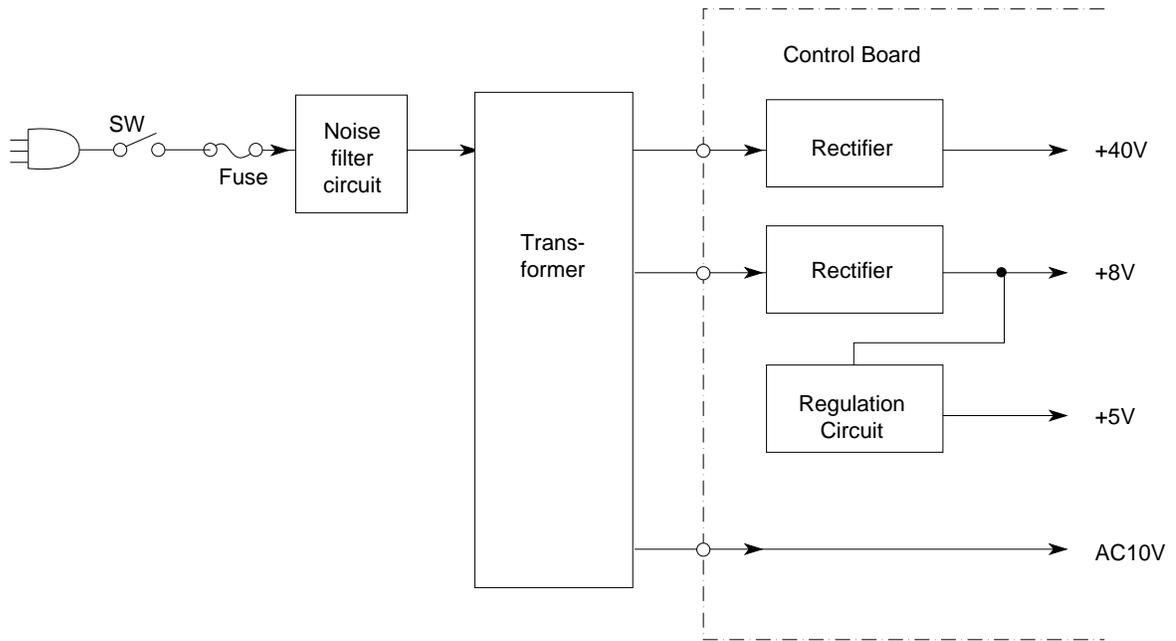
Mode and print control

Mode	Speed	Pass	Direction	
1	100%	1	Bi	
2	85%	1	Bi	
3	70%	1	Bi	
4	55%	1	Bi	
5	40%	1	Bi	
6	30%	1	Bi	1.5 Sec Stop
(7)	Stop			

- When the temperature is between  $\alpha^{\circ}\text{C}$  and  $119^{\circ}\text{C}$ , the mode switches sequentially to higher level. When the temperature falls below  $\beta^{\circ}\text{C}$ , the mode switches to lower level.
- When the temperature exceeds  $119^{\circ}\text{C}$ , printing stops.
- When temperature gradient is steep, the higher mode is specified directly.

### 2.1.9 Power Supply Circuit

This power supply circuit supplies the +5VDC, +8VDC, +40VDC, 10VAC.



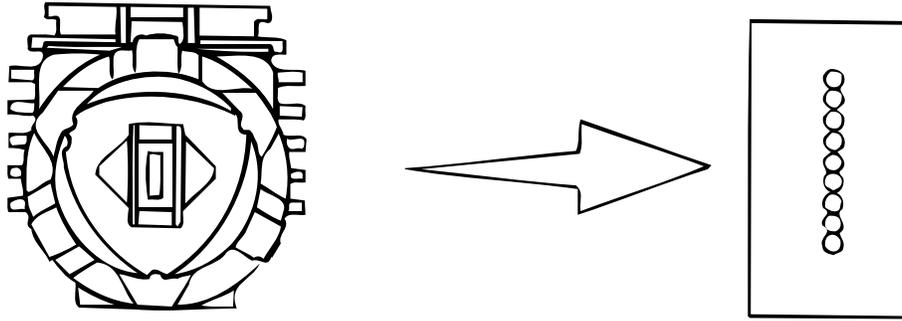
The uses of output voltages and signals are described below.

Voltage/signal	Use
+5V	Logic IC/LED drive voltage
+8V	Serial interface line voltage and SP motor driver
+ 40V	Printhead, LF motor drive voltage, SP motor drive voltage
AC 10V	Option board

## 2.2 Mechanical Operation

### 2.2.1 Printhead Mechanism and Operation (See Figure 2-2.)

The printhead is a spring charged 9-pin driving head using a permanent magnet. It is attached to the carriage, which moves parallel to the platen. Electrically, this unit is connected to the control circuits through the control board.



**Figure 2-2 Arrangement of the head pins  
View from the tip of the printhead**

(1) The printhead configuration

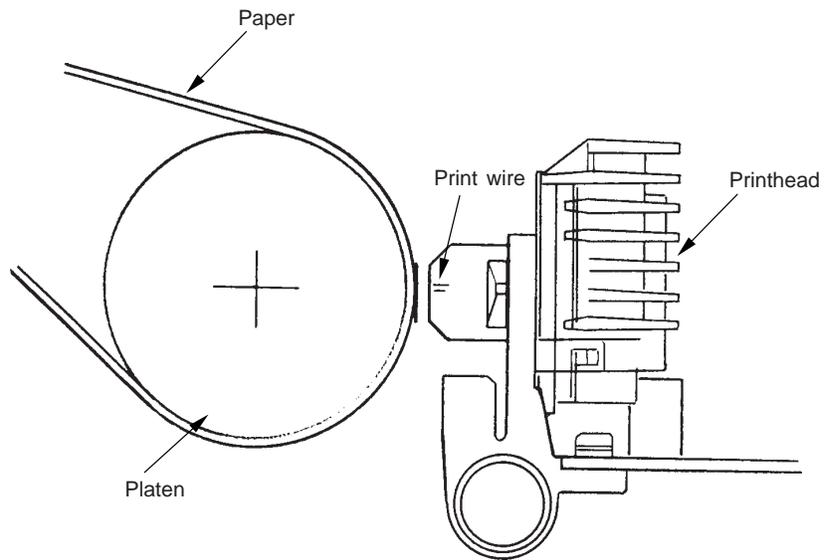
The printhead is composed of the following parts:

- (a) Wire guide
- (b) Spring assembly (Wire, Armature, Spring, Yoke, Spacer)
- (c) Magnet assembly (Magnet, Core, Coil, Yoke)
- (d) Printed circuit board
- (e) Fin

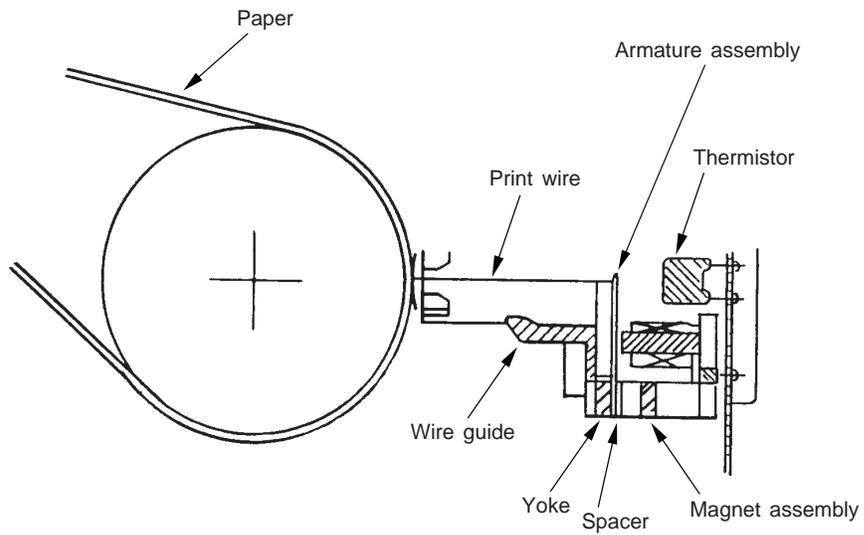
(2) Printhead Operation (See Figure 2-3.)

- (a) When the printhead is idle, the armature is attracted by a permanent magnet and the spring fixing the armature is compressed. The print wires fixed to each armature are thus concealed under the wire guide.
- (b) When a signal for a character to be printed is detected, a current flows through the coil. When the coil is activated, the magnetic flux (caused by the permanent magnet between the armature and the core) is canceled to eliminate the attracting force. The armature is driven in the direction of the platen by the force of the armature spring. The print wire fixed to the armature protrudes from the tip of the wire guide, strikes the paper through the ribbon and prints a dot on the paper.
- (c) After the character has been printed, the armature is magnetically attracted again and the print wires are again concealed under the wire guide.

A thermistor in the printhead prevents burning caused by over-heating of the coil during extended continuous bi-directional printing. When the temperature of the coil exceeds a pre-determined limit (about 119°C) the control circuit detects a thermistor signal. Printing will then be intermittent or stop completely until the coil temperature falls below the limit value.



(1) When printing



(2) When not printing

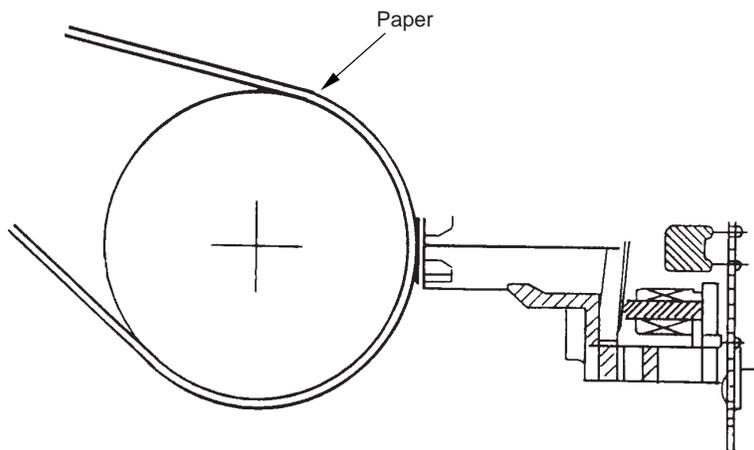


Figure 2-3

### 2.2.2 Spacing Operation (See Figure 2-4.)

The spacing mechanism consists of a carriage shaft mounted in parallel with the platen, and a carriage frame that moves along the shaft. It is driven by a DC motor mounted on the bottom of the carriage frame. Items included in the spacing mechanism are as follows:

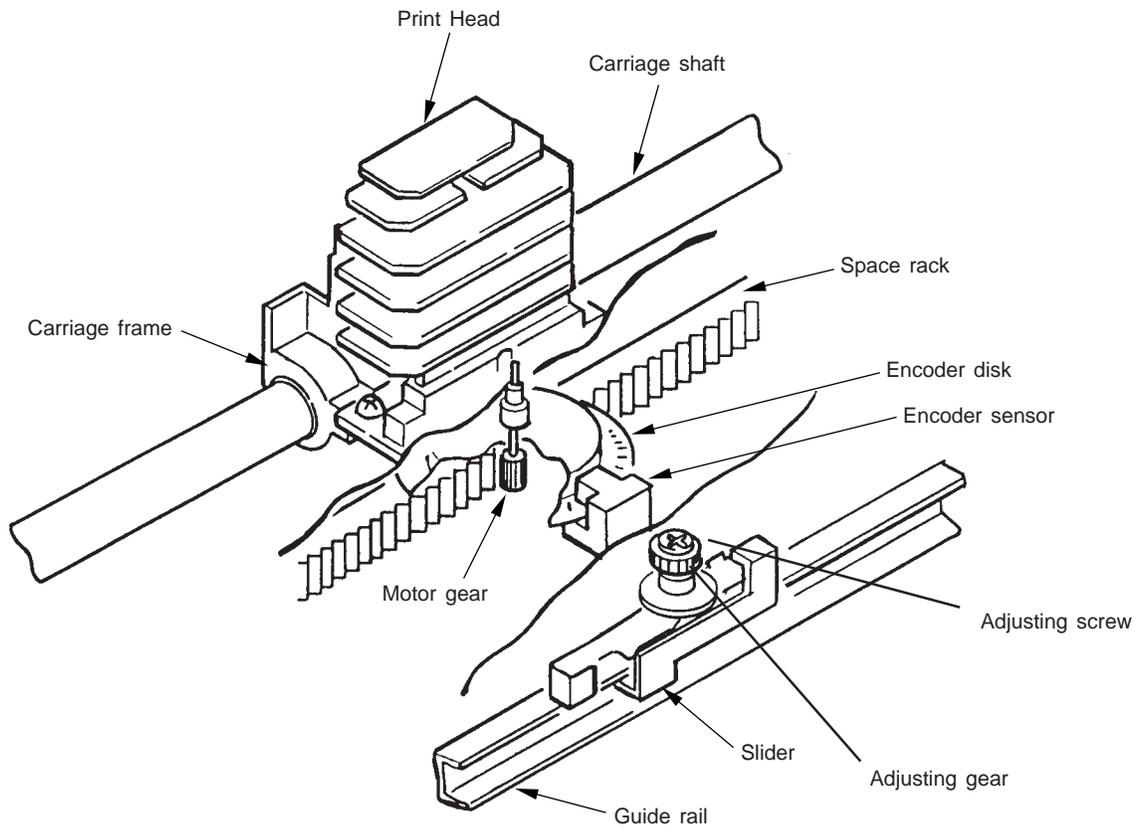
- (a) DC motor with motor gear
  - (b) Carriage frame (stationary yoke and motor driver board included)
  - (c) Carriage shaft
  - (d) Space rack
  - (e) Sensor
  - (f) Encoder disk
- (1) Spacing operation

The carriage frame, on which the printhead and space motor are mounted, moves along the carriage shaft parallel to the platen. When the spacing motor rotates counterclockwise, the driving force is transmitted to the motor gear. As the motor gear rotates, the carriage moves from left to right.

Mechanically, it is designed in such a way that for every revolution of the DC motor, the carriage frame moves 0.8 inch (20.32 mm).

At the same time the encoder disk rotates together with the motor and passes through the sensor. The position of the carriage frame can be determined by counting the interrupts detected by the sensor.

In the same way, the rotation of the space motor can be recognized and controlled by measuring the cycle of interrupts detected by the sensor.



**Figure 2-4**

**\*Carriage Assy removed**

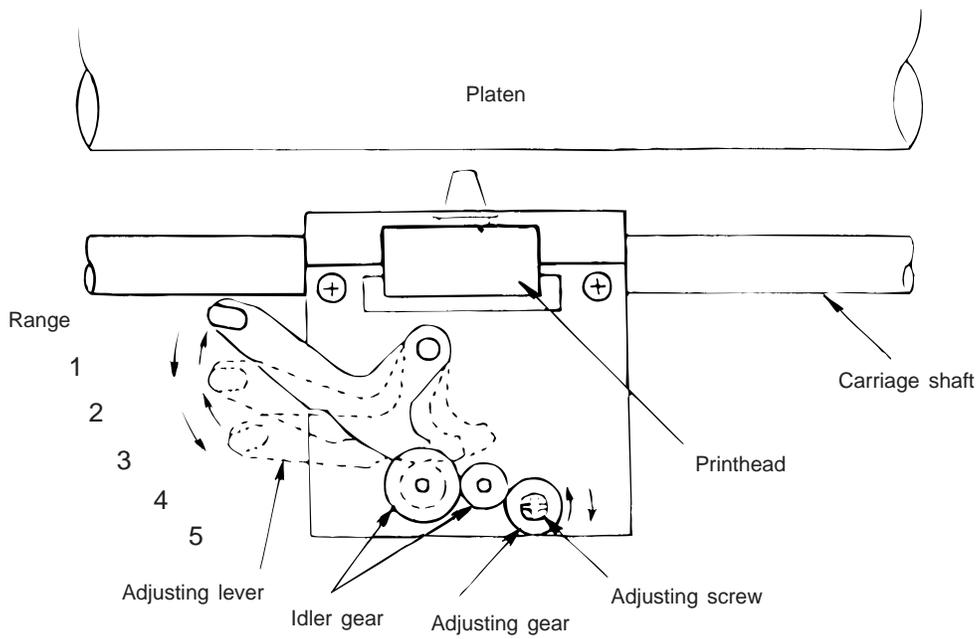
### 2.2.3 Head Gap Adjusting (See Figure 2-5.)

The head gap adjusting lever moves back and forth to tilt the carriage frame, altering the gap between the printhead and the platen.

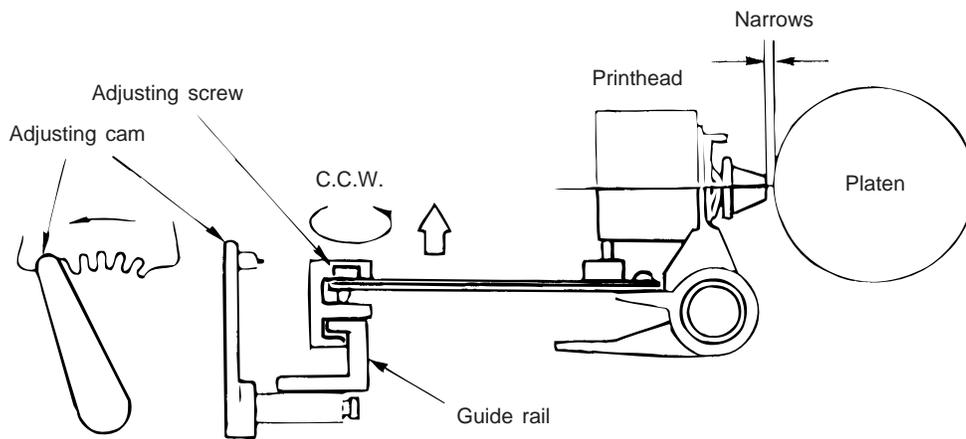
The adjusting screw, which is connected to the adjusting gear rotates when the adjusting lever is moved creating a fine gap adjustment. If the adjusting gear is pushed down, the adjusting screw can be turned with a screw driver to change the coarse gap adjustment.

When the adjusting lever is set to range ② ~ ⑤, the contact attached to the under side of the carriage cover will connect with the contact of the space motor PC board. The printer will reduce the printing speed automatically to ensure that adequate printing pressure is maintained for multipart paper.

Moving the adjusting cam toward the left or right adjusts the guide rail up or down.



Range from 5 to 1



Range from 1 to 5

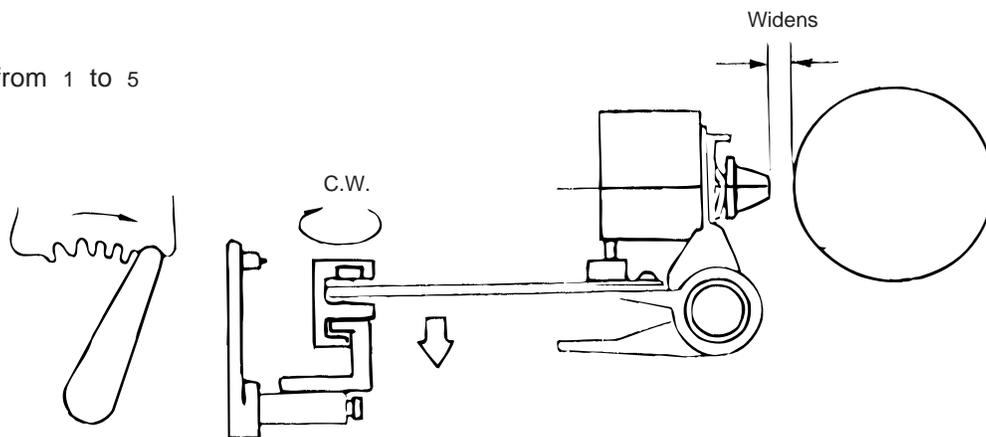


Figure 2-5

#### 2.2.4 Ribbon Drive (See Figure 2-6.)

The ribbon driver mechanism moves the ribbon in synchronization with the space motor operation.

The ribbon drive mechanism consist of the following items:

- (a) Ribbon drive gear assembly
- (b) Ribbon gear (space motor)
- (c) Ribbon cartridge

##### (1) Ribbon cartridge

An endless ribbon with a single direction feed is used. Ink is supplied from an ink reservoir, which is built in to the ribbon cartridge.

##### (2) Ribbon feed operation

When the space motor is activated, the ribbon gear rotates. The rotation is transmitted via the ribbon drive gear assembly to the drive gear in the ribbon cartridge, thus moving the ribbon.

The feed direction of the ribbon is maintained by switching the direction of the gears in the ribbon drive gear assembly. This ensures ribbon movement when bi-directional printing is used.

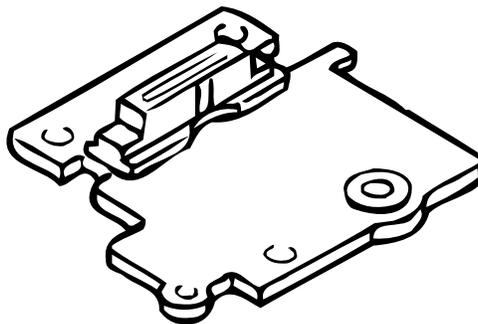
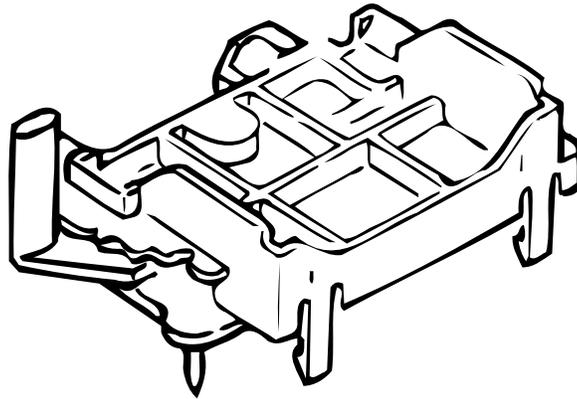
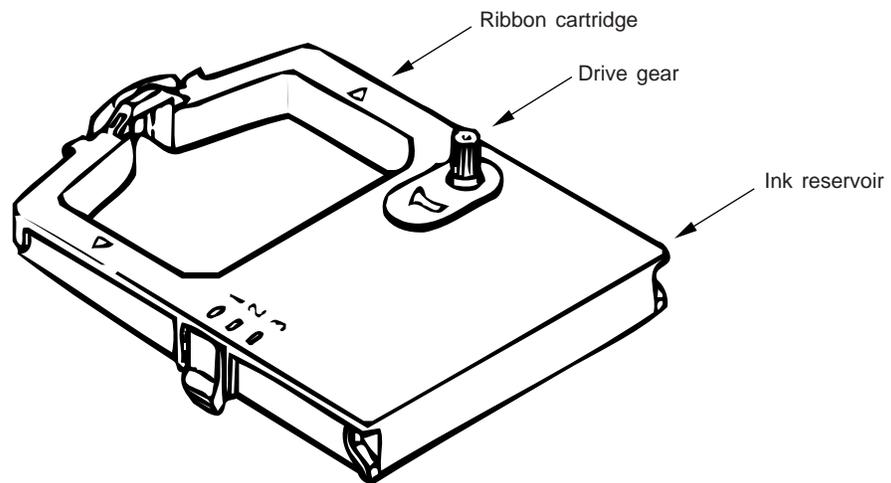


Figure 2-6

### 2.2.5 Paper Feed Operation

Paper is fed by turning the platen and the pin tractor, which is driven by the LF pulse motor.

The paper feed mechanism consists of the following:

- (a) Pulse motor with gears
- (b) Decelerating gear
- (c) Platen
- (d) Tractor feed unit
- (e) Pressure roller

(1) Cut sheet and continuous sheet switching mechanism (See Figure 2-8.)

Three different paper paths can be selected and set by the change lever.

(a) **TOP** (for cut sheets)

When the cut sheet paper is used in the manual mode or fed by the CSF (option), set the change lever at the position marked TOP.

**Operation**

The driving force of the platen gear (R) is transmitted to the idle gear by setting the change lever to the TOP position. However, this causes the idle gear to be disengaged from the change gear, leaving it free.

At this time, the pressure rollers (at the rear and the front) are pressed securely to the platen to feed the sheet. At the same time, the cut sheet detection lever turns on the cut sheet detection switch, to confirm to the control board that you are in the cut sheet mode.

In the cut sheet mode, the control board automatically feeds the sheet up to the print start position after pausing for the wait time stored in the menu.

(b) **REAR** (Continuous sheet from push tractor)

When the change lever is set to REAR position, the change gear is engaged with the idle gear and the tractor gear to transmit the rotation of the platen to the push tractor shaft, and the paper is fed from the push tractor.

At the same time, the switch lever turns on the rear switch, to inform the control board that you are in the continuous sheet mode.

(c) **BOTTOM** (Continuous sheet from bottom feeder) (option)

When the change lever is set in the **BOTTOM** position, the rotation of the platen is transmitted to the drive gear of the bottom tractor feed unit through the idle gear to feed the sheet which set in the bottom tractor feed.

At the same time, the switch lever turns on the bottom switch to inform the control board that you are in the continuous sheet mode.

Correlation in Mechanism

Mechanism Lever Position	Rear Switch	Bottom Switch	Idle Gear	Change Gear	Tractor Gear	Sheet Insertion
TOP	OFF	OFF	Rotate	Stop	Stop	Manual/ automatic
						CSF: Operation SW or instruction
REAR	ON	OFF	Rotate	Rotate	Rotate	<ul style="list-style-type: none"> <li>• Operation SW</li> <li>or</li> <li>• instruction</li> </ul>
BOTTOM	OFF	ON	Rotate	Rotate	Stop	<ul style="list-style-type: none"> <li>• Operation SW</li> <li>or</li> <li>• instruction</li> </ul>

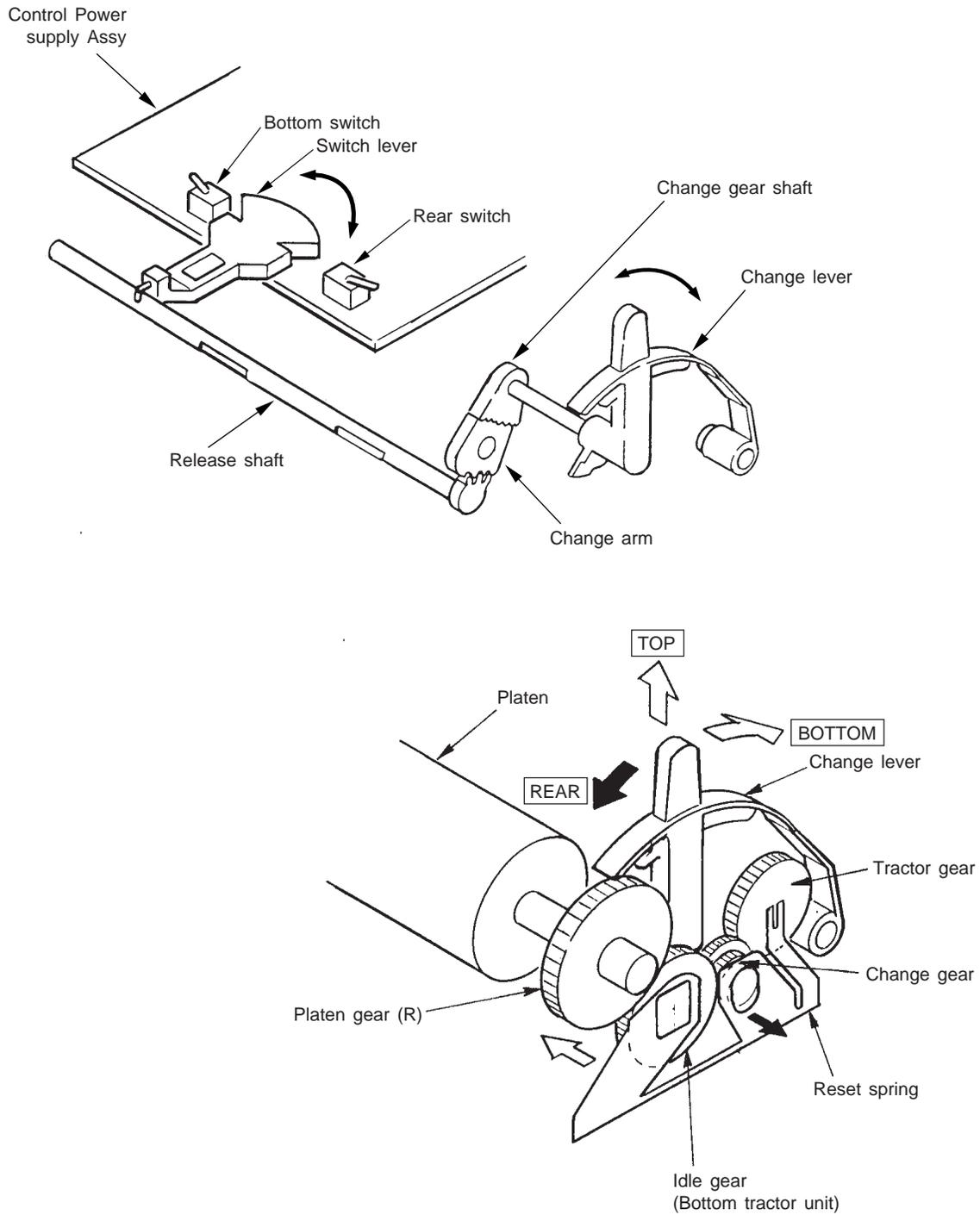
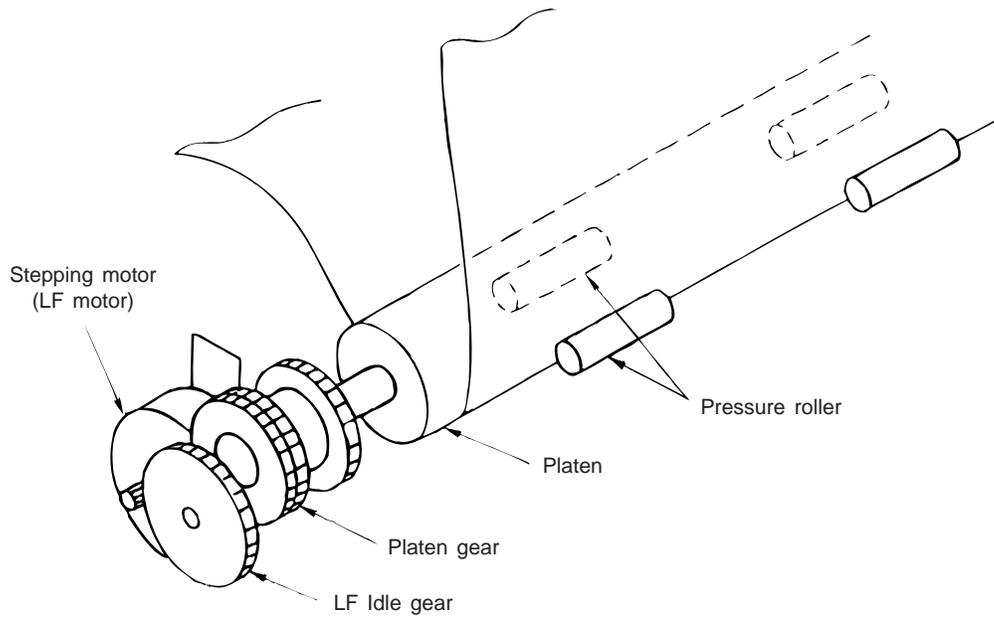


Figure 2-8

(2) Cut-sheet feeder operation (See Figure 2-9.)

The pulse motor used for the paper feed mechanism is mounted on the left of the frame, and the rotation of the motor is transmitted through decelerating gears (LF idle gear, platen gear) to the platen. When using cut-sheet paper, the change lever must be in the **TOP** position to grab the paper, while disengaging the push tractor.

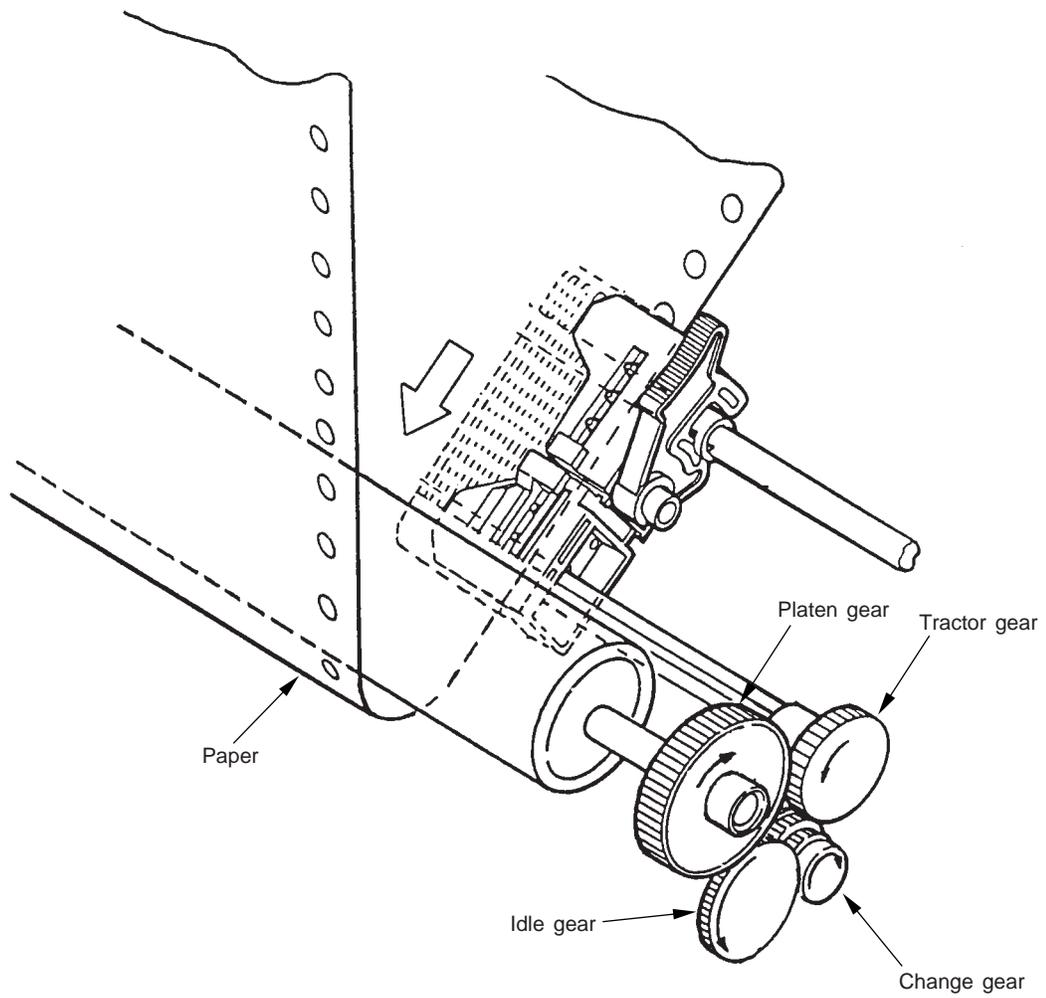
When the change lever is set to the **TOP** position, the paper is automatically fed in up to the print start position after pausing for the wait time stored in the menu.



**Figure 2-9**

(3) Continuous paper feed operation (Rear) (See Figure 2-10.)

The force transmitted to the platen turns the tractor gear by means of the platen gear, the idler gear, and the change gear. The rotation of the tractor gear turns the sheet feeder shaft, which moves the pin tractor belt, feeding the paper.



**Figure 2-10**

(4) Pull tractor (option) and push tractor operation (See Figure 2-11)

This mechanism supports the standard push tractor and an optional pull tractor. It can perform forward and reverse feed by sending paper either to the push tractor (for rear feed) or to the pull tractor (for bottom feed).

The rotation of the platen is transmitted to the push tractor and the pull tractor. Paper can be fed to either tractor.

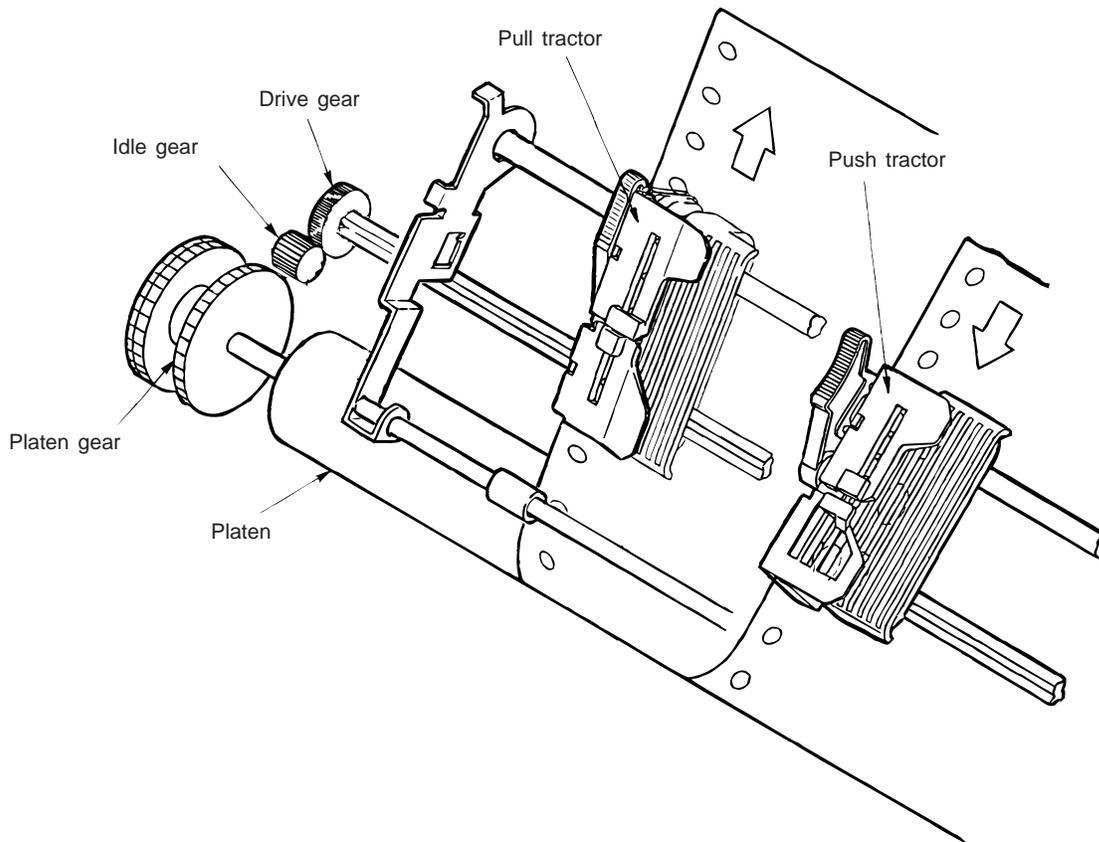


Figure 2-11

(5) Pull tractor mechanism (option) (See Figure 2-12.)

Bottom feed of continuous sheets is possible only when the optional pull tractor unit is installed.

The rotation of the platen is transmitted to the idle gear of the pull tractor unit through the platen gear at the left end of the platen. The rotation of the idle gear is transmitted to the drive gear, and paper is fed when the sheet feeder shaft turns the pull tractor.

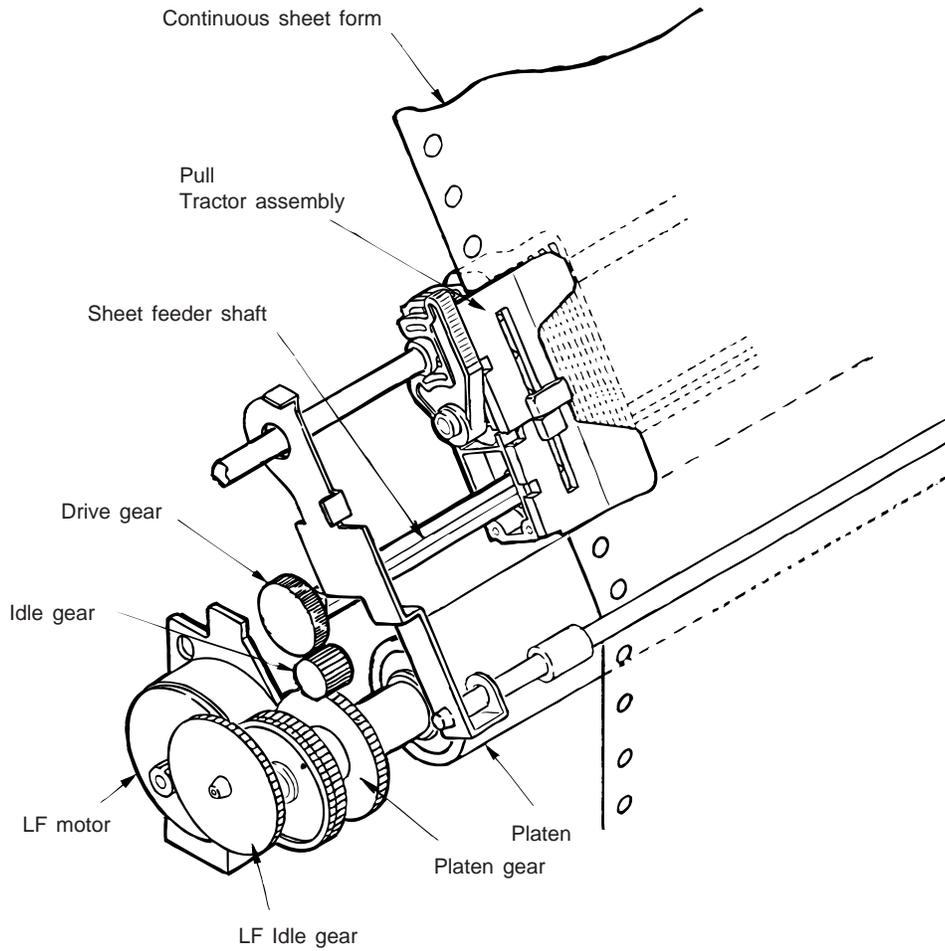


Figure 2-12

(6) Bottom push feed operation (Option) (See Figure 2-13.)

The bottom push feed of continuous sheet requires the bottom tractor feed unit

When the platen turns, its rotational force is transmitted through the tractor idle gear and the tractor change gear to the tractor drive gear of the bottom push tractor, and paper is fed to the print start position.

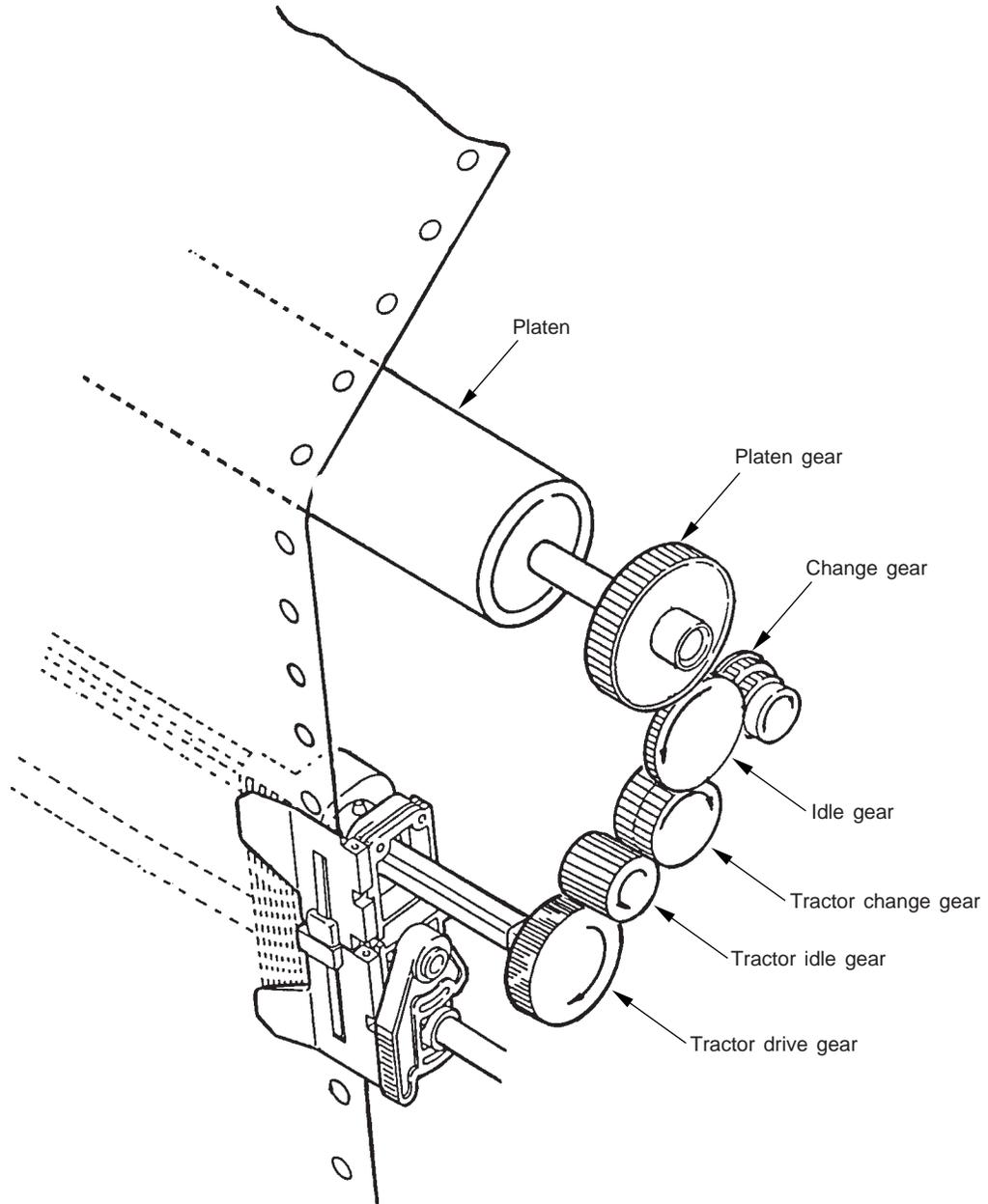


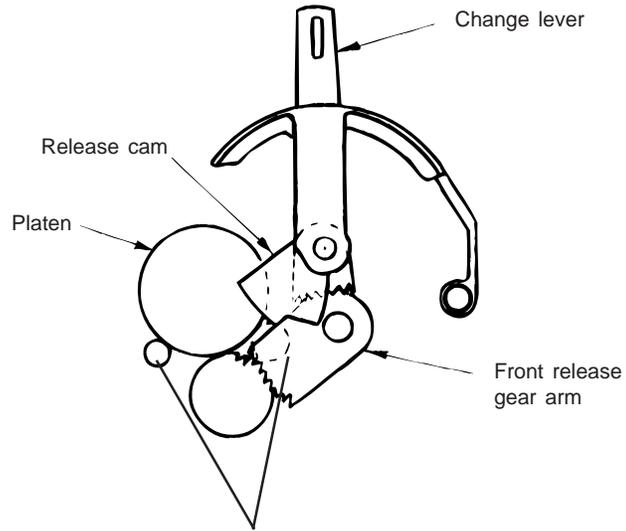
Figure 2-13

(7) Paper clamp mechanism (See Figure 2-14.)

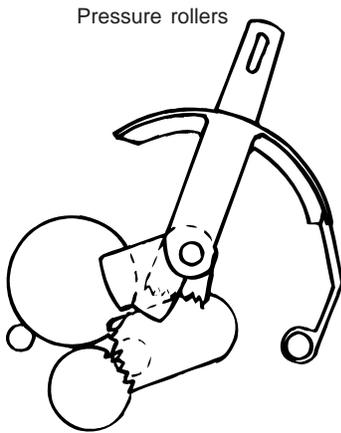
When setting the change lever to the **BOTTOM**, **TOP** or **REAR** position, the operation of the front release gear arm changes according to the position of the release cam. At the same time, the position of the cam relative to the front release gear arm changes, opening or closing the pressure roller.

Position of change lever	Front pressure roller	Rear pressure roller
BOTTOM	OPEN	OPEN
TOP	CLOSE	CLOSE
REAR	OPEN	OPEN

TOP



BOTTOM



REAR

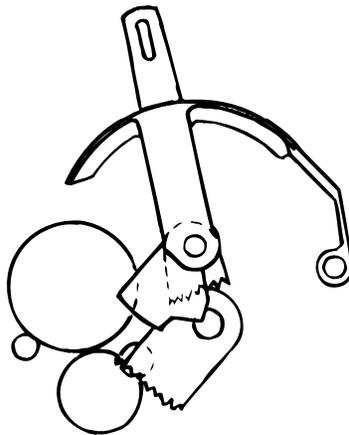


Figure 2-14

## 2.2.6 Paper Detection Mechanism (See Figure 2-15.)

### (1) Cut sheet detection

When the sheet is inserted, point A is pushed backward and the paper near end lever B rotates counterclockwise (CCW).

At this time, the rear sensor lever rotates counterclockwise (CCW) and pulls out of the rear and top paper end sensor to detect that the sheet is inserted.

The procedure for the paper end is the reverse, that is, detection occurs when the paper end sensor is blocked.

### (2) Rear feed detection

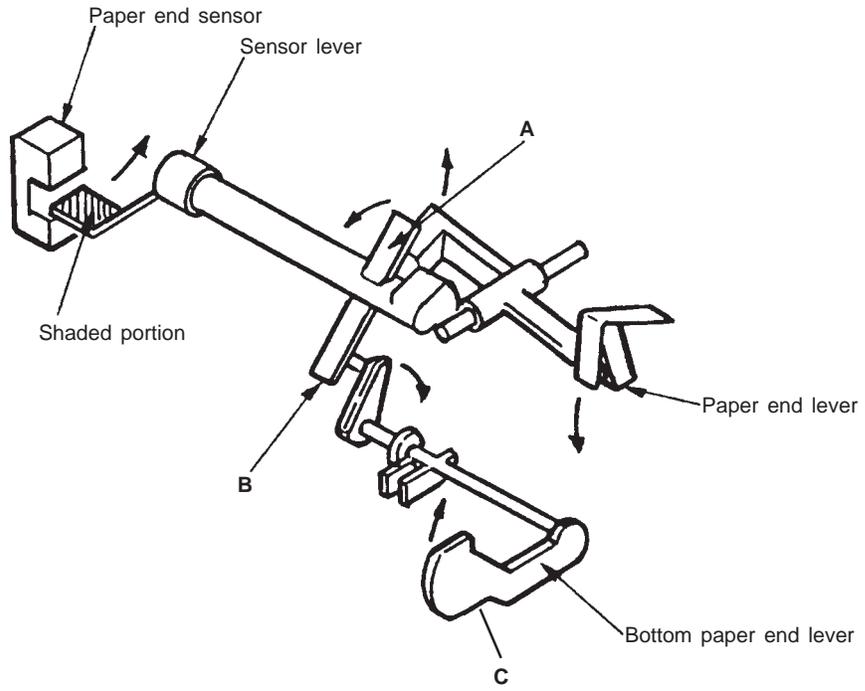
When the sheet is fed from the push tractor, the point B is pushed to the front side and the paper near end lever A rotates clockwise (CW). At this time, the rear sensor lever rotates counterclockwise (CCW), and pulls out of the rear and top paper end sensor to detect that the sheet is provided.

The procedure for the paper end is the reverse, that is, detection occurs when the rear sensor lever interrupts the sensor.

### (3) Bottom feed detection

When the sheet is fed from the bottom, the point C rotates clockwise (CW). When the bottom sensor lever rotates clockwise (CW), it pulls out of the bottom paper end sensor to detect that the sheet is inserted.

The procedure for the paper end is the reverse, that is, detection occurs when the bottom sensor lever interrupts the sensor.



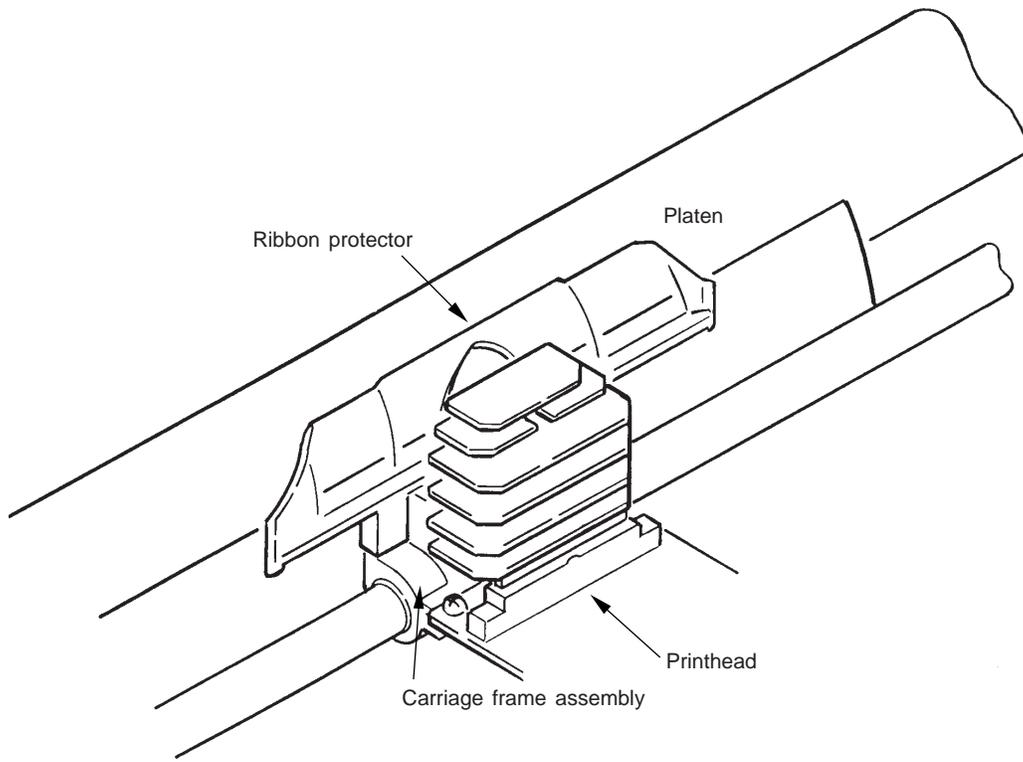
**Figure 2-15**

(4) Top line print mechanism (See Figure 2-16.)

The top edge of the sheet is protected by the ribbon protector so that it can stop at a position very close to the printhead (0 tear-off position) to start printing at the top of the sheet without causing it to crumple or curl up.

Printing starts at the top of the sheet, and continues uni-directionally until the top edge of the sheet gets to the inside of the pull-up roller cover.

After that, printing continues bi-directionally.



**Figure 2-16**

## 2.2.7 Automatic Sheet Feed

This function is used to feed in the sheet automatically up to the print start position when the cut sheet or the continuous sheet paper is used.

### Operational procedure

- (1) When using cut sheet paper:
  - 1) Set the change lever to the **TOP** position. (See Figure 2-17.)
  - 2) Insert a sheet of paper between the platen and the paper chute.
  - 3) After the lapse of time selected by the “wait time” item in the menu, the LF motor starts to feed the paper up to the print position.
  - 4) When the default is selected, the paper feeds up to the position 0.35 inches (first dot position) from the top edge of the sheet. However, the 0 tear-off mechanism allows printing at the top edge of the sheet by changing the TOF position.

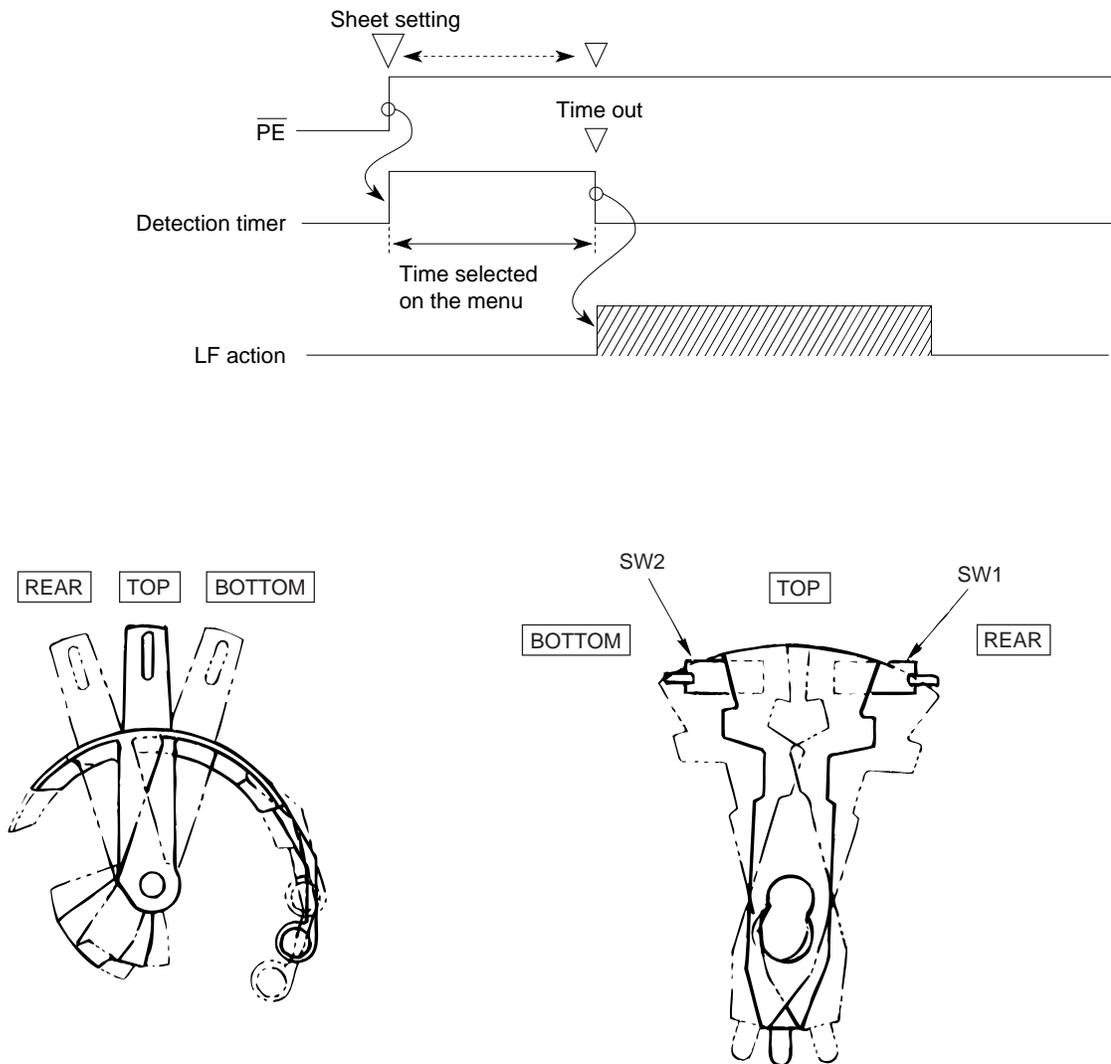
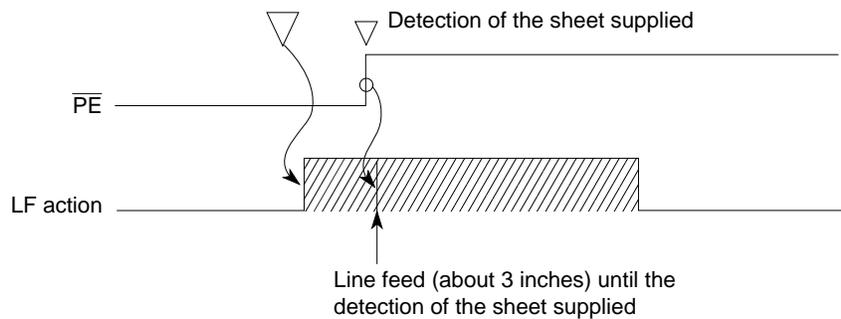


Figure 2-17

- (2) When using continuous sheet paper
  - 1) Set the change lever either to the rear or the bottom position. (See Figure 2-17.)
  - 2) Load paper either on the push tractor or on the bottom tractor.
  - 3) Press the "FF/LOAD" button.
  - 4) The LF motor starts to feed the paper up to the print start position.
  - 5) The paper feeds up to the TOF position (Factory default: 0.35 inches from the top).

Press the "FF/LOAD" button.

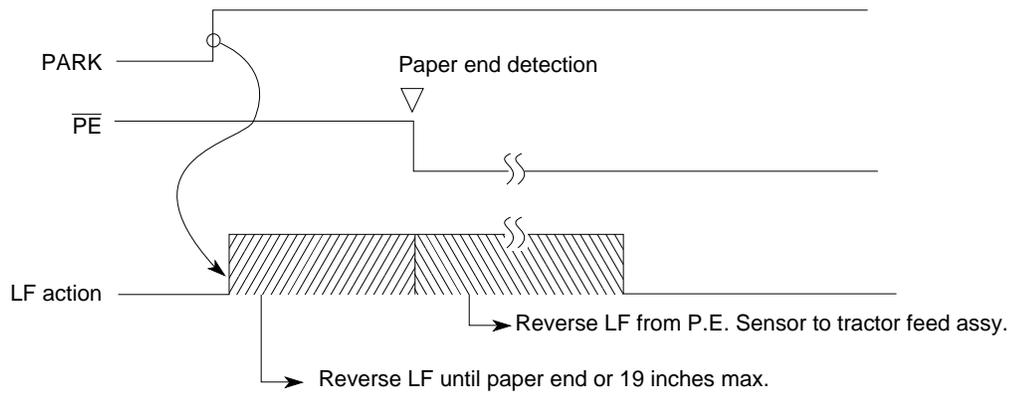


When the "FF/LOAD" button is pressed, the LF motor feeds in the sheet about 3 inches. When the LF motor completes its operation and the sheet has not been fed in, an alarm condition results.

### 2.2.8 Paper Park Function (Continuous sheet paper)

Continuous sheet paper can be backed out automatically by using the “PARK” button on the operation panel.

- 1) Press the “PARK” button.
- 2) Reverse LF starts and paper feeds in reverse until paper end occurs or a maximum of 19 inches have been fed.
- 3) The paper feeds in reverse to leave the paper on the tractor.



The alarm LED lights up when paper end is not detected after 19 inches of reverse feeding.

The operator can press the SEL button to turn off the alarm LED, then press the PARK button to continue the park function.

This operation is required when the paper to be parked is more than 19 inches long.

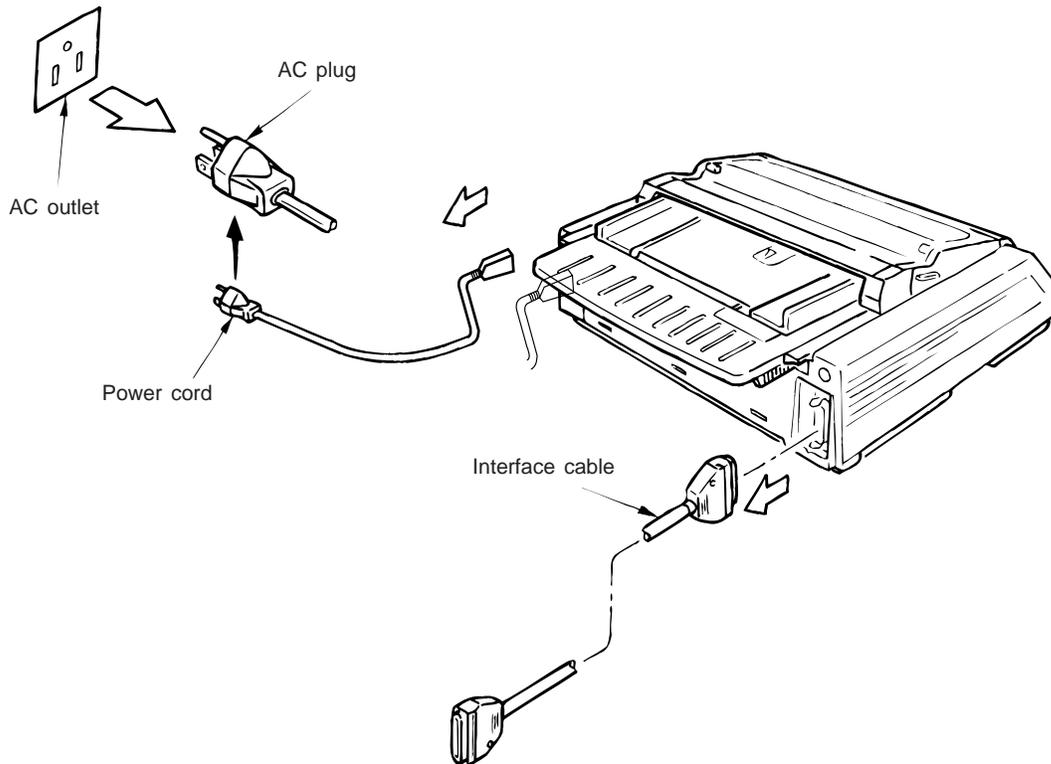
### 3. ASSEMBLY/DISASSEMBLY

This section explains the procedures for removing and installing various assemblies and units in the field.

Description is mainly limited to the removal procedure; installation should basically be performed in the reverse sequence of the removal procedure.

#### 3.1 Precautions for Parts Replacement

- (1) Remove the AC power cord and the interface cable before disassembling or assembling.
  - (a) Turn off the power switch. Remove the plug of the AC power cord from the outlet. Remove the power cord from the receptacle on the printer.
  - (b) To reconnect the power cord, connect it to the receptacle on the printer first, then plug it into the outlet.

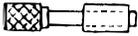
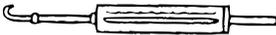


- (2) Do not disassemble the printer as long as it is operating normally.
- (3) Do not remove unnecessary parts, and limit the extent of disassembly as much as possible.
- (4) Use the designated service tools.
- (5) Carry out disassembly in the prescribed sequence; otherwise, damage to the parts may result.
- (6) It is advisable to temporarily install screws, snap rings and other small parts in their original positions to avoid losing them.
- (7) Whenever handling the microprocessors, ROM, RAM IC chips and boards, do not use gloves that may cause static electricity.
- (8) Do not place the printed circuit board directly on the equipment or on the floor.
- (9) If adjustment is specified in the middle of installation, follow the instructions.

### 3.2 Service Tools

Table 3.1 lists the tools necessary for replacing printed circuit boards and parts of units in the field.

**Table 3.1 Service tools**

No.	Service Tool	Q'ty	Use	Remarks
1	 No. 1-100 Phillips screwdriver	1	Screws 2.6 mm	
2	 No. 2-200 Phillips screwdriver	1	Screws 3-5 mm	
3	 No. 3-100 screwdriver	1		
4	 Spring hook	1		
5	 J-YX4025-83335-3	1	Head gap adjustment	
6	 Volt/ohmmeter	1		
7	 Feeler gauge	1	Head gap adjustment	
8	 Pliers	1		
9	 No. 5 nippers	1		
10	 1.1 lbs (500 g) bar pressure gauge	1		

### 3.3 Disassembly/Reassembly Procedure

This section explains the assembly replacement procedures according to the following disassembly system.

#### Parts Layout

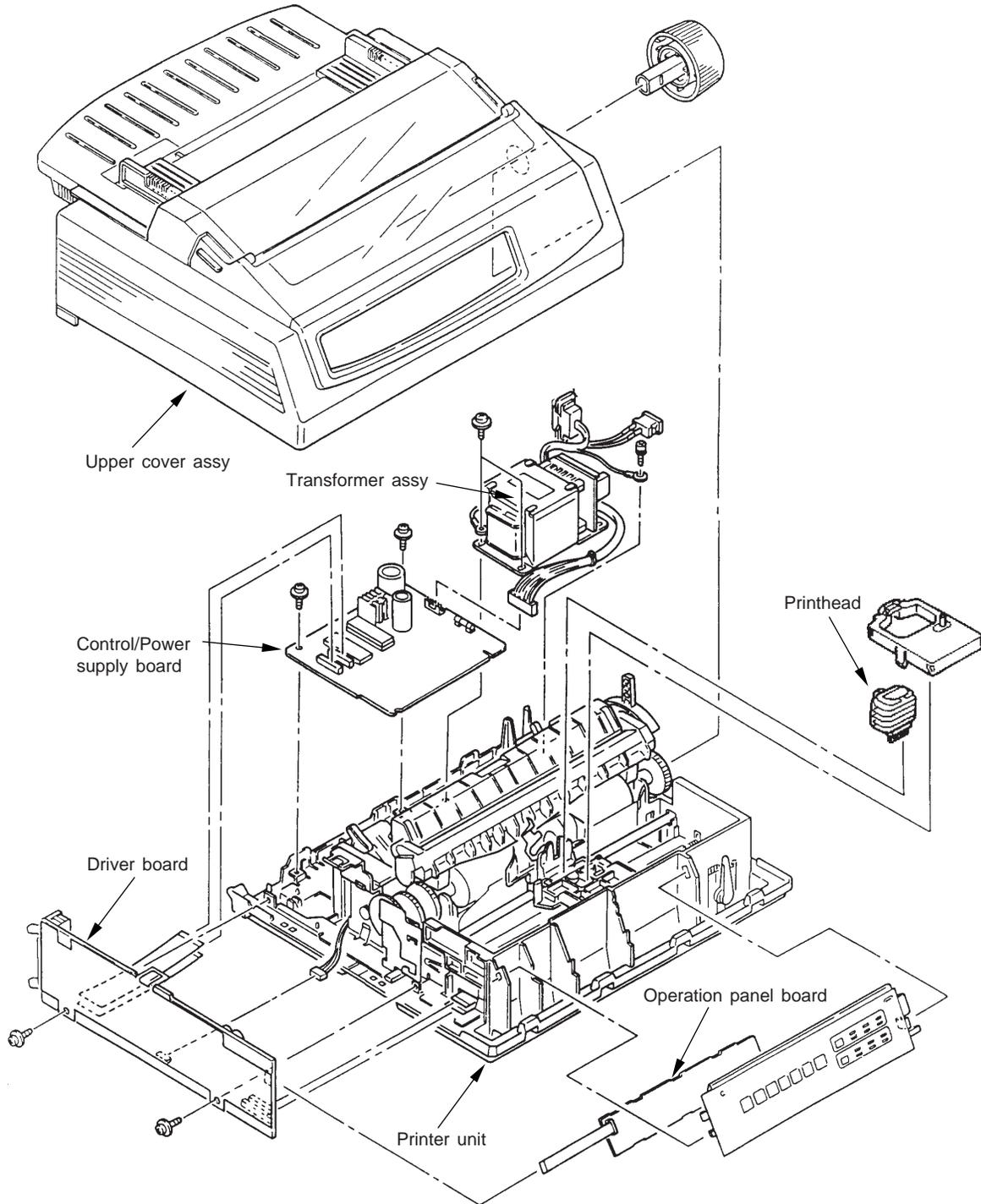
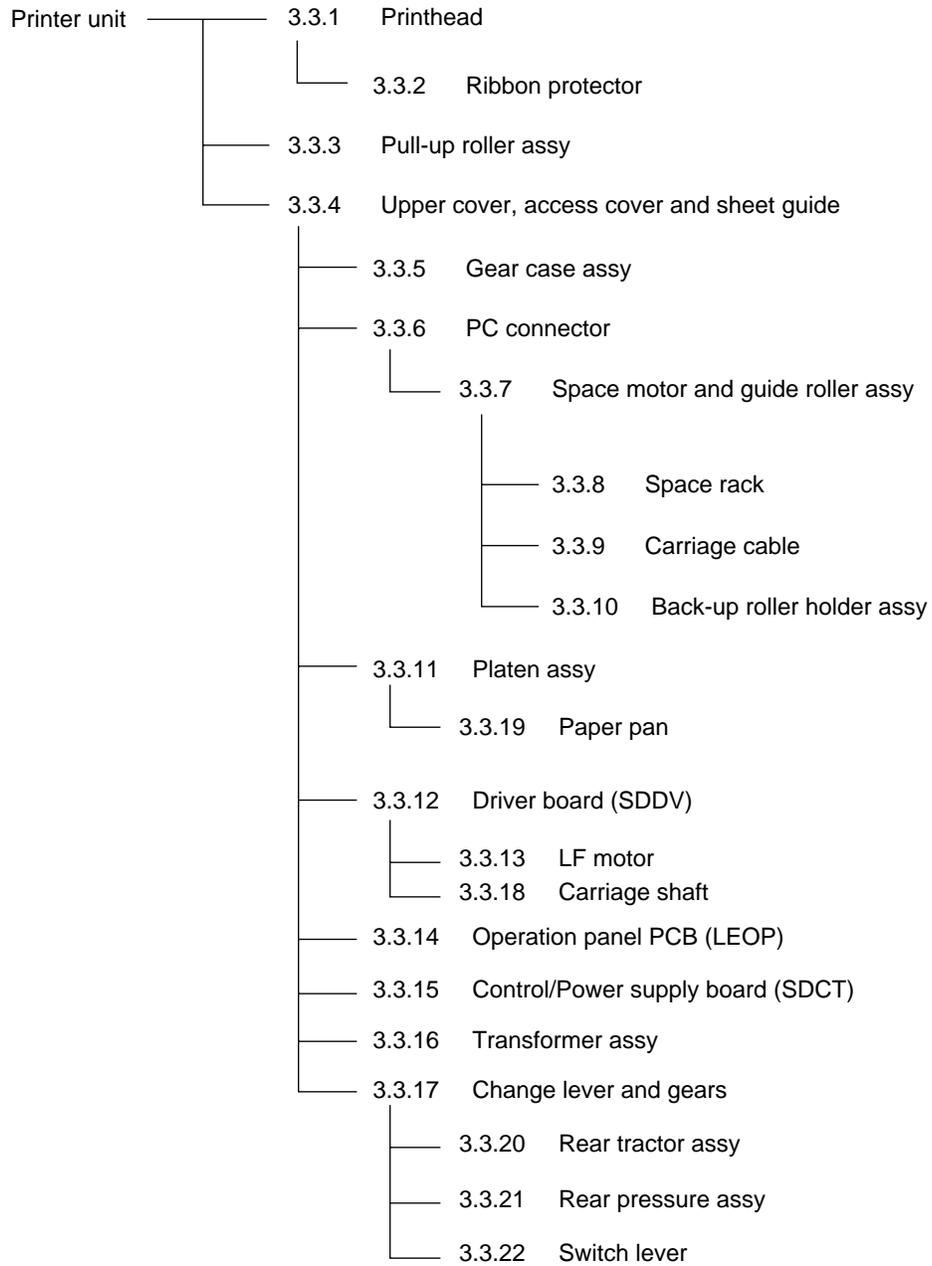


Figure 3-1 Printer unit

## How to Change Parts

This section explains how to change parts and assemblies appearing in the disassembly diagram below.



### 3.3.1 Printhead

- (1) Open the access cover.
- (2) Pull up and rotate the head clamp 1 to unclamp the printhead 2 as shown in fig. 3.3.1.
- (3) Disconnect the printhead 2 from PC connector 3 and remove.
- (4) To install, reverse the removal steps.

#### *Notes on installation:*

- (1) Insert the printhead 2 into the PC connector 3 while pushing it against the carriage frame 4.
- (2) The head clamp 1 must be securely sandwiched between printhead 2 and carriage frame 4 as shown in fig. 3.3.2.
- (3) Be sure to check the gap between platen and printhead (see 4).
- (4) Be careful not to touch the print head while it is hot.

**Important:** There is a shim on the carriage frame 4, which hangs over the platen side of the frame. Be sure to replace it correctly. Improper positioning of this shim will severely affect the printhead gap.

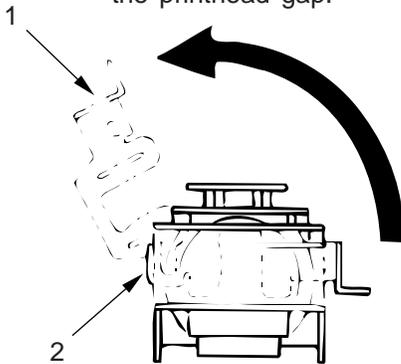


Figure 3.3.1

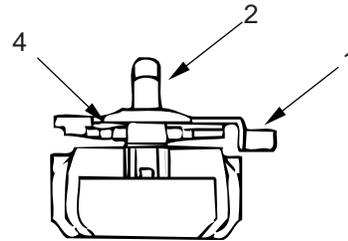
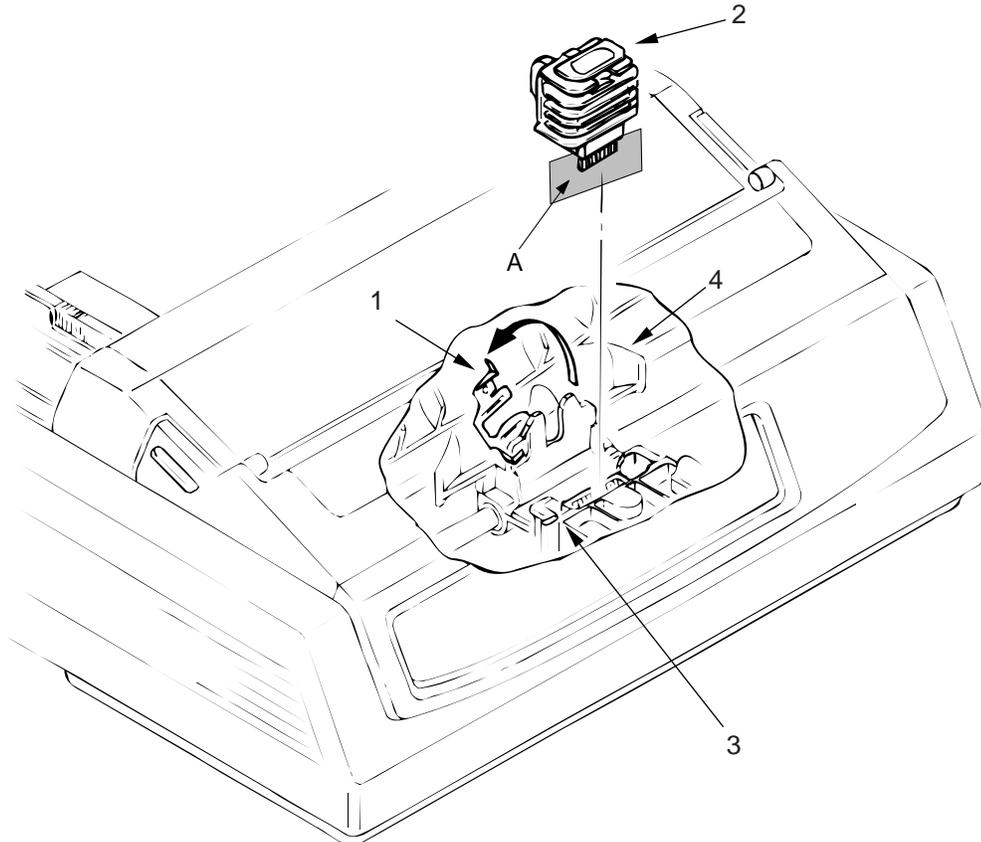
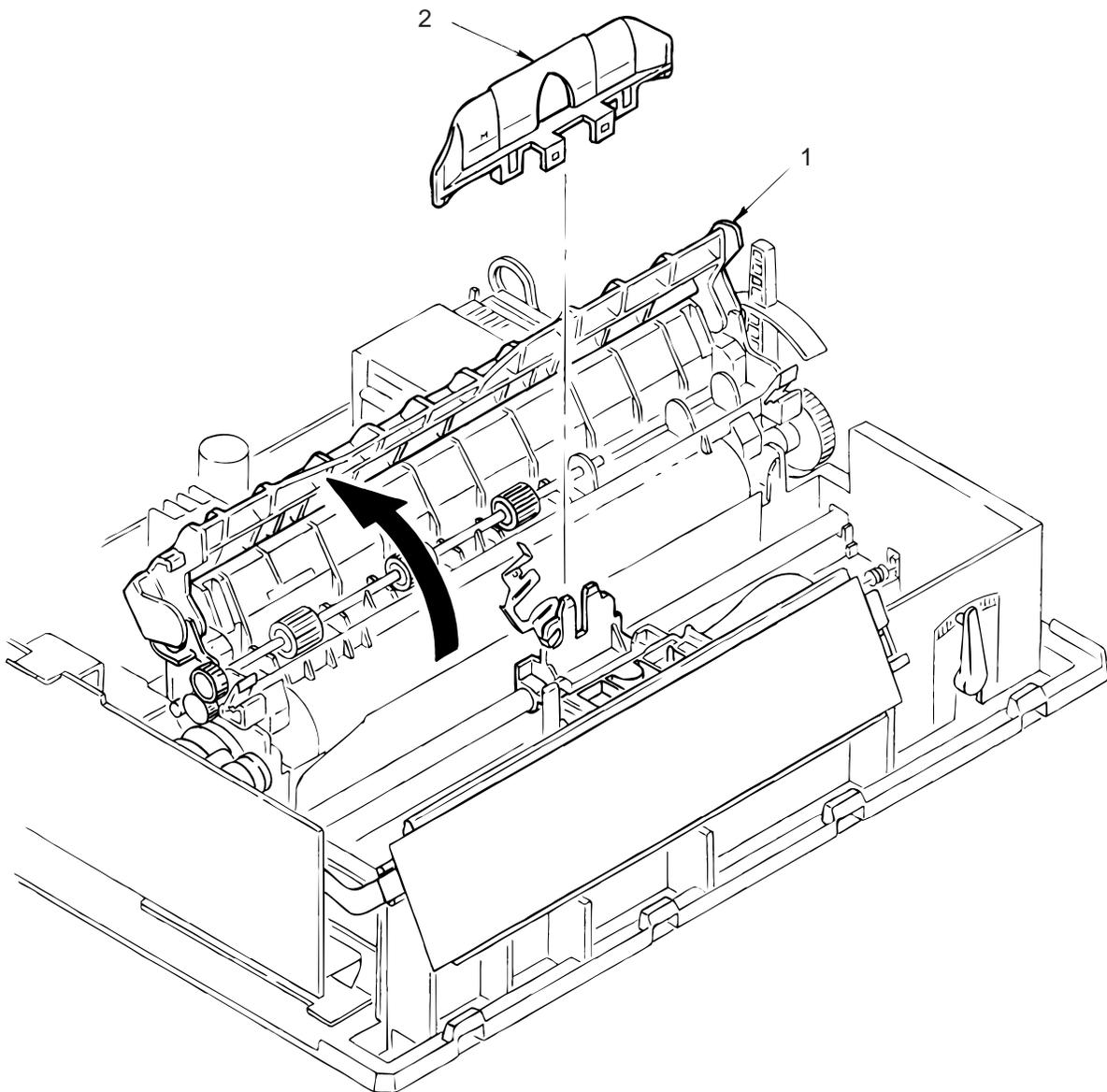


Figure 3.3.2



### 3.3.2 Ribbon Protector

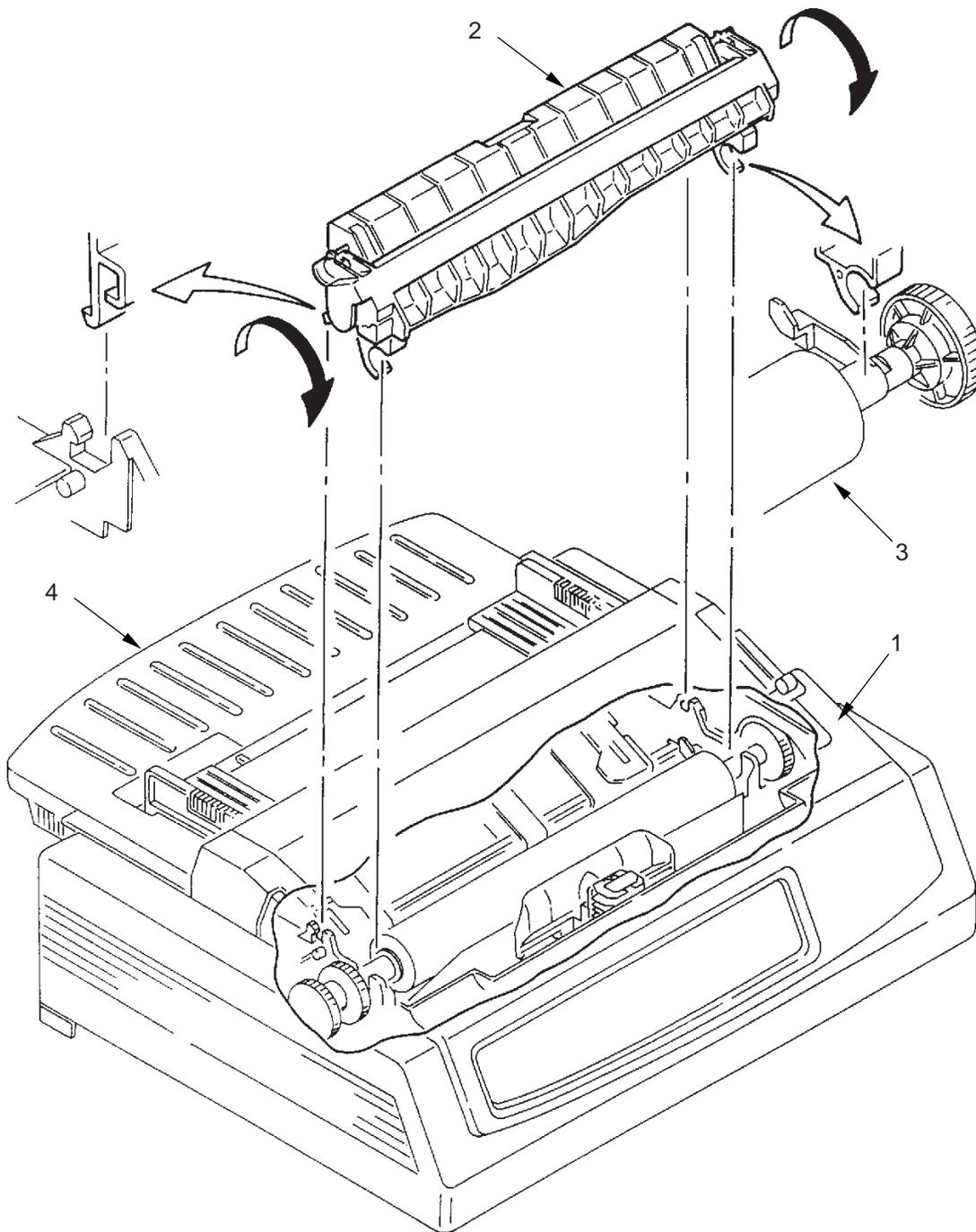
- (1) Remove the printhead (see 3.3.1).
- (2) Open the pull-up roller cover 1.
- (3) Remove the shim on the carriage frame.
- (4) Loosen the screws holding the carriage assembly to the carriage frame--this allows more play between the printhead and the platen.
- (5) Raise and remove the ribbon protector 2.
- (6) To install, follow the removal steps in reverse order. Be sure to replace the shim in exactly the same position as it was before disassembly.



### 3.3.3 Pull-up Roller Assy

- (1) Open the access cover 1.
- (2) Lift up the sheet guide Assy 4 to remove.
- (3) Tilting the pull-up roller Assy 2 toward the front, remove it from the shaft of platen Assy 3.
- (4) To install, follow the removal steps in reverse order.

**Note:** Remove the sheet guide Assy 4 before installing or removing the pull-up roller Assy 2.

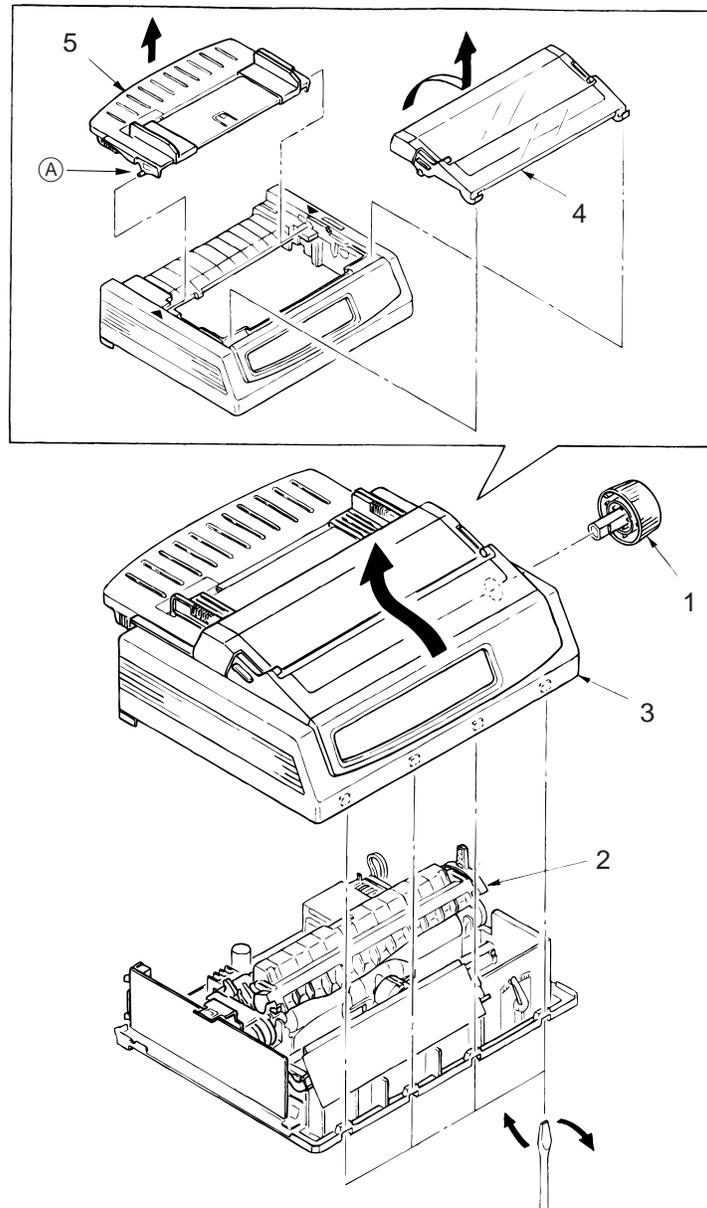


### 3.3.4 Upper Cover Assy, Access Cover Assy and Sheet Guide Assy

- (1) Pull off the platen knob 1.
- (2) Open the access cover Assy 4 toward the front to remove.
- (3) Lift up the sheet guide Assy 5 to remove.
- (4) Turn the change lever 2 toward the bottom position.
- (5) Insert a flat-blade screwdriver into grooves of frame (5 places for ML 321, 4 places for ML320) and twist to disengage claws of upper cover 3.
- (6) Raise the front side of upper cover Assy 3 and shift toward the rear to disengage claws of frame (6 places for ML321, 5 places for ML320).
- (7) Raise the upper cover Assy 3 to remove.
- (8) To install, follow the removal steps in reverse order.

*Note on installation:*

Match the posts (A) at both sides of the sheet guide 5 with the arrow marks on the upper cover. Push the guide into the cover.

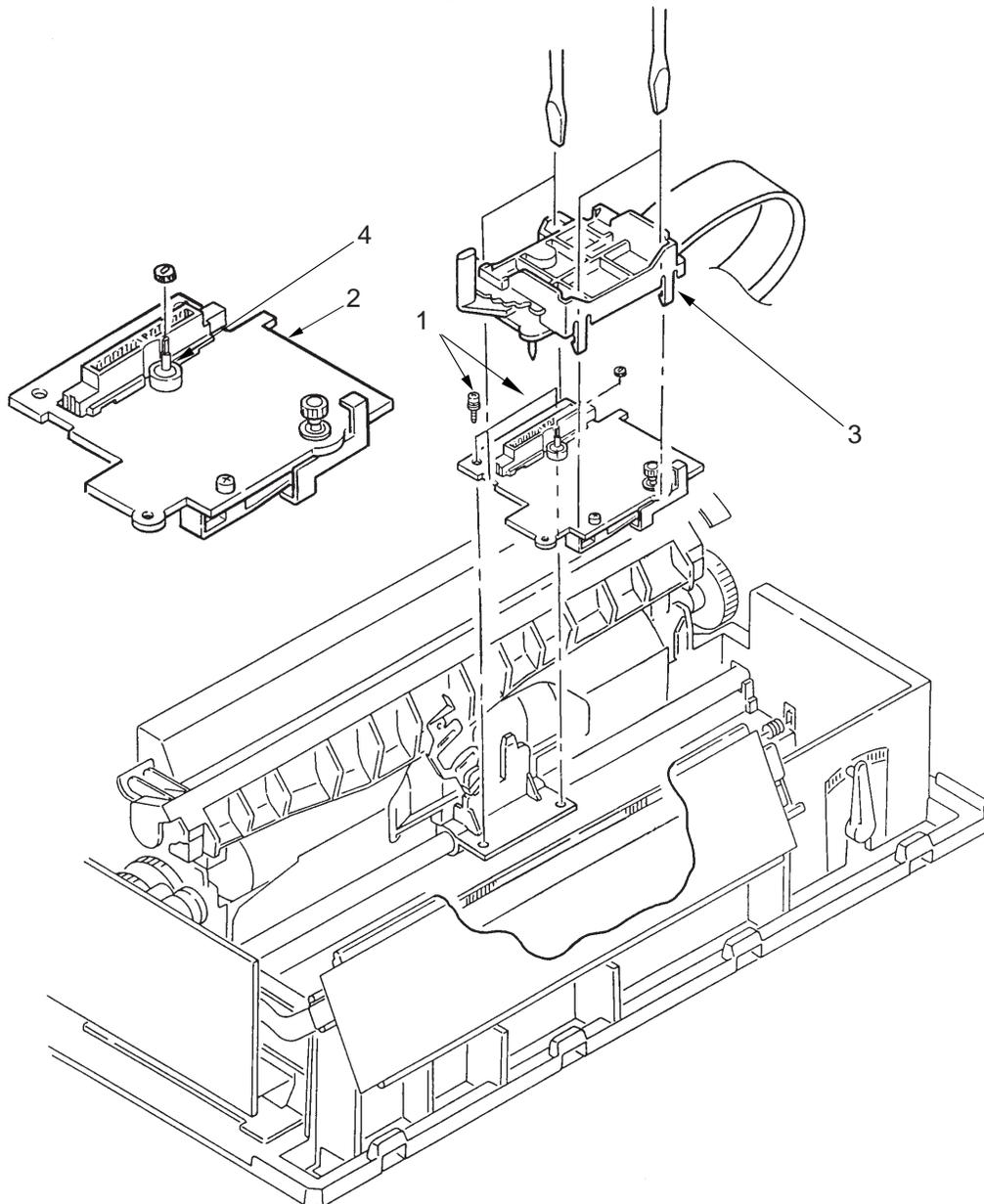


### 3.3.5 Gear Case Assy

- (1) Remove the printhead (see 3.31).
- (2) Remove the shim from the carriage frame.
- (3) Remove the upper cover (see 3.3.4).
- (4) Move the carriage Assy to right side, remove two screws 1, then remove the carriage Assy.
- (5) Disengage claws on the gear Assy (4 places).  
Using a flat-blade screwdriver, push to widen the claw for easy disengagement.
- (6) Lift up the gear case Assy 3 and release the carriage cable from the cable clamp of the gear case Assy.
- (7) To install, follow the removal steps in reverse order. Be sure to replace the shim on the carriage frame in exactly the same position as it was before disassembly

#### *Notes on installation:*

- (1) To assemble, align the direction of the SP motor axis 4 with the Gear Hole of the Gear Case Assy.
- (2) Be sure to check and adjust the gap between platen and printhead (see 4-1).

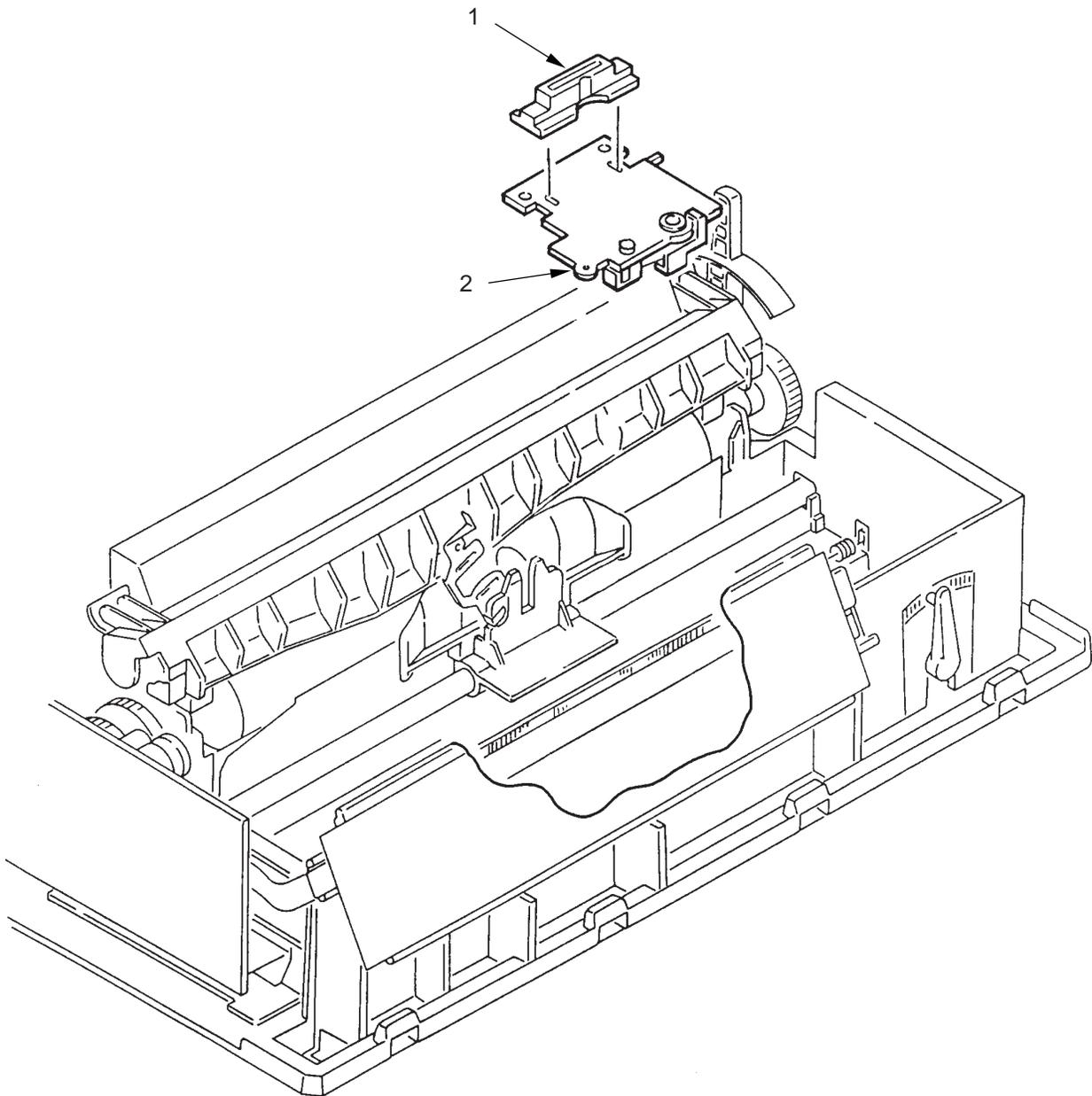


### 3.3.6 PC Connector

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the printhead (see 3.3.1).
- (3) Remove the shim from the carriage frame.
- (4) Remove the gear case Assy (see 3.3.5).
- (5) Remove the PC connector 1 from the space motor Assy 2.
- (5) To install, follow the removal steps in reverse order. Be sure to replace the shim on the carriage frame in exactly the same position as it was before disassembly

#### *Notes on installation:*

- (1) Do not touch the space motor 2 or terminals of PC connector 1. Also, take care to avoid dust or foreign matter.
- (2) After installation, check and adjust the gap between platen and printhead (see 4-1).

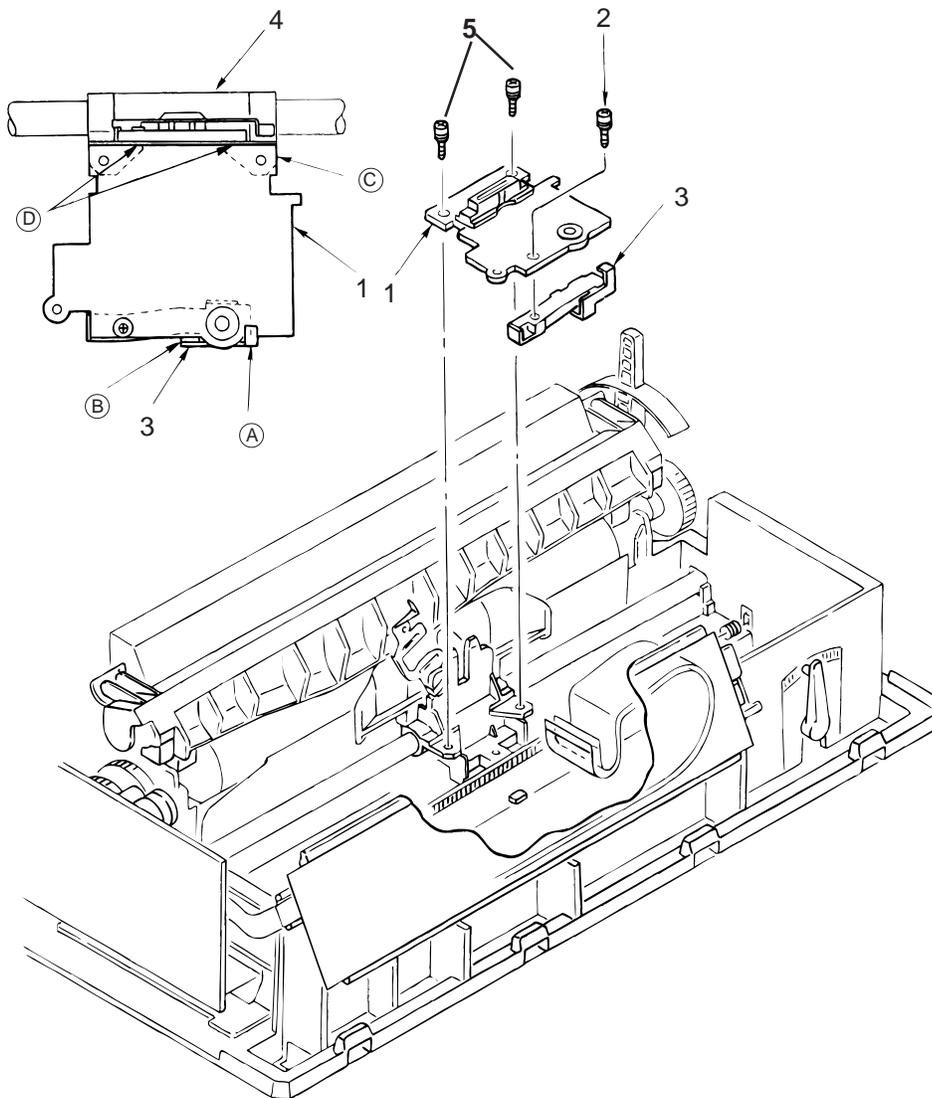


### 3.3.7 Space Motor, Guide Roller Assy

- (1) Remove the printhead (see 3.3.1).
- (2) Remove the upper cover (see 3.3.4).
- (3) Remove the gear case Assy (see 3.3.5).
- (4) Remove the PC connector (see 3.3.6).
- (5) Remove screw 2, then the guide roller Assy 3 from the space motor Assy 1.
- (6) Push down on the carriage cable and remove it.
- (7) Remove the two screws 5, from the space motor Assy.
- (8) Remove the space motor.
- (9) To install, follow the removal steps in reverse order.

#### *Notes on installation:*

- (1) Do not touch the terminals of space motor 1. Also, take care to avoid dust or foreign matter.
- (2) When installing the guide roller Assy 3, push portions A and B against the space motor 1.
- (3) When installing the space motor 1, align the face C with carriage frame 4 and push portion D against the frame.
- (4) After installation, check and adjust the gap between platen and printhead (see 4-1).

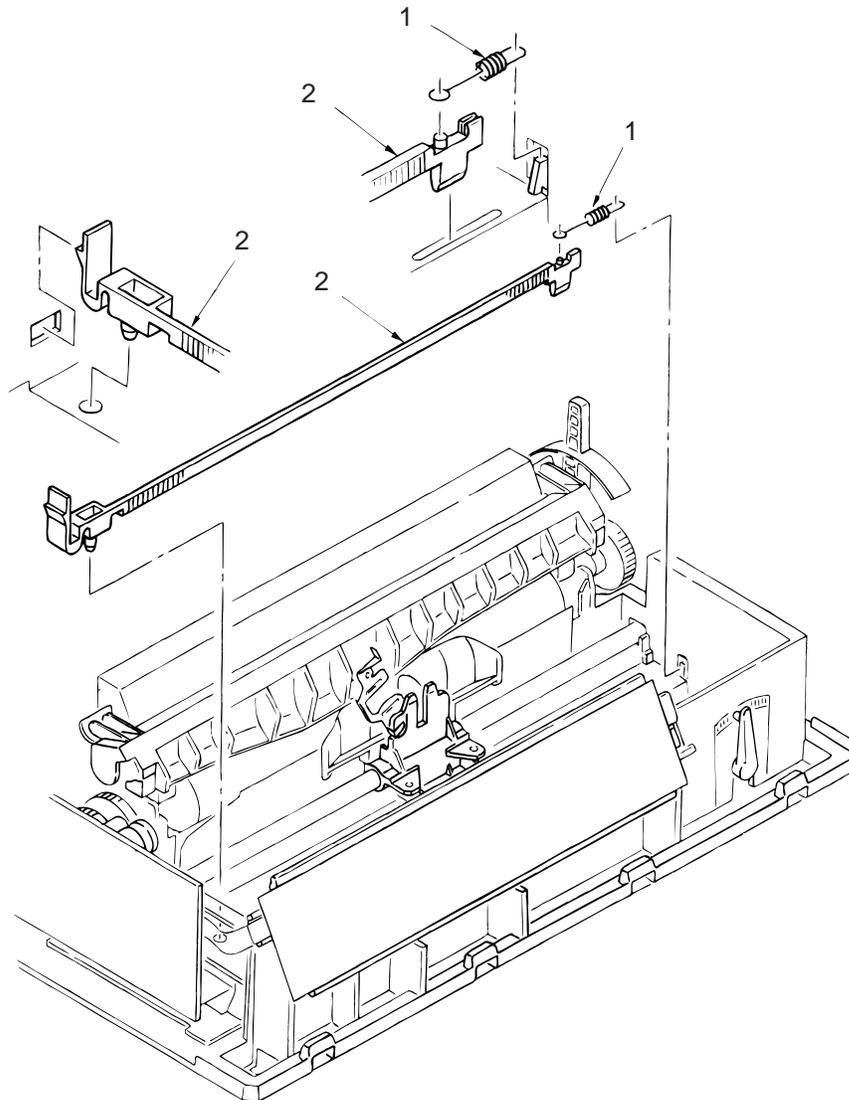


### 3.3.8 Space Rack

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the printhead (see 3.3.1).
- (3) Remove the shim from the carriage frame.
- (4) Remove the gear case Assy (see 3.3.5).
- (5) Remove the space motor Assy (see 3.3.7).
- (6) Remove the spring 1.
- (7) Disengage the claw on left side of space rack 2 from the frame, and remove the space rack 2 in upper direction.
- (8) To install, follow the removal steps in reverse order. Be sure to replace the shim on the carriage frame in exactly the same position as it was before disassembly

*Note on installation:*

After installation, check and adjust the gap between platen and printhead (see 4-1).

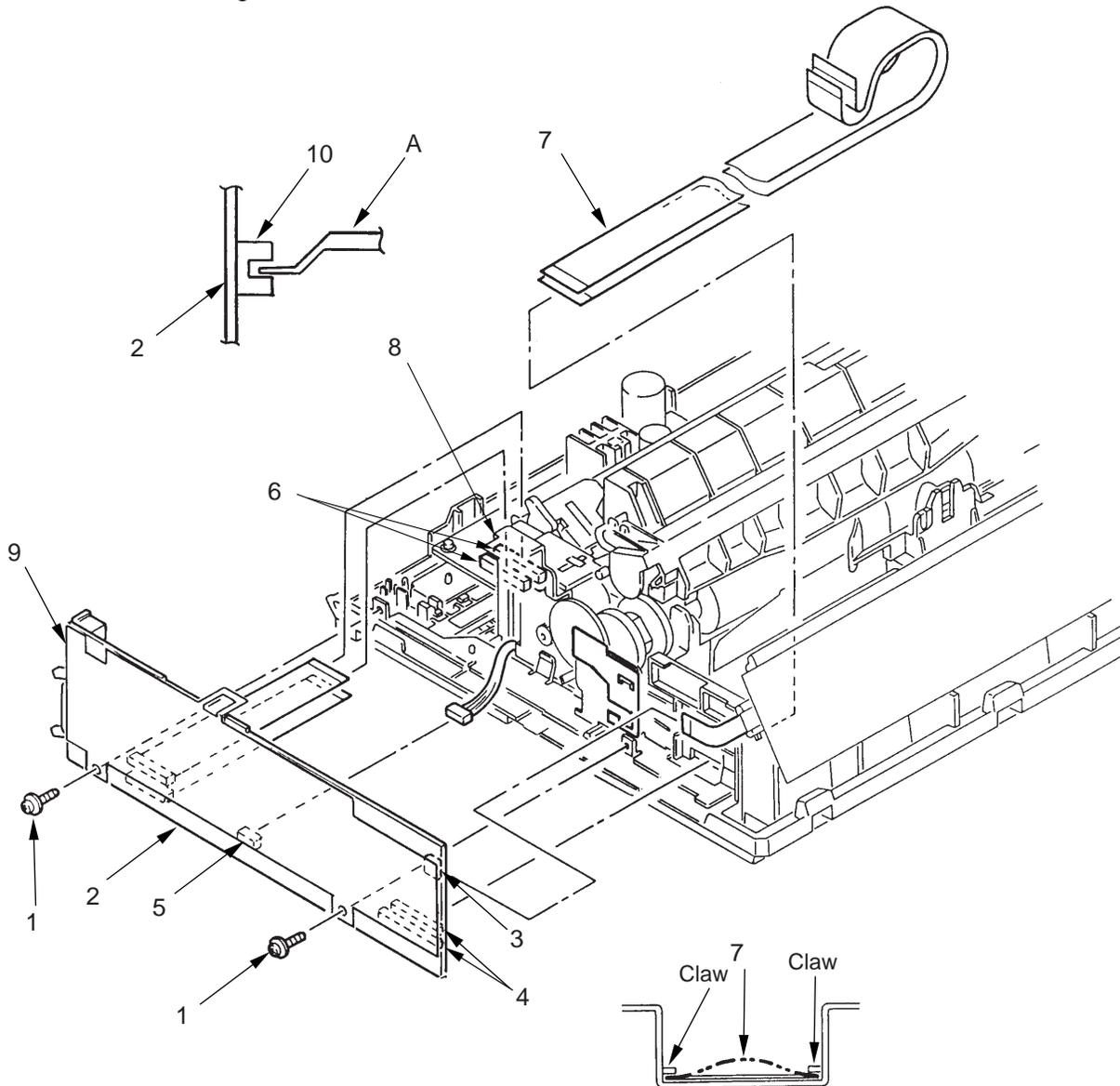


### 3.3.9 Carriage Cable

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the printhead (see 3.3.1).
- (3) Remove the shim from the carriage frame.
- (4) Remove the gear case Assy (see 3.3.5).
- (4) Remove the space motor Assy (see 3.3.7).
- (5) Remove the two screws 1, release the driver board 2 and PCB board 9 by lifting clamp 8, and disconnect cable from connector 3, 4, 5, 6.
- (7) Remove the carriage cable 7 from fasteners on frame.
- (8) To install, follow the removal steps in reverse order. Be sure to replace the shim on the carriage frame in exactly the same position as it was before disassembly

#### *Notes on installation:*

- (1) Take care not to fold the carriage cable 7 during installation. Curve the carriage cable 7 slightly when assembling into the fasteners.
- (2) Make sure that the paper end lever A will not contact the paper end sensor 10 when installing the driver board.

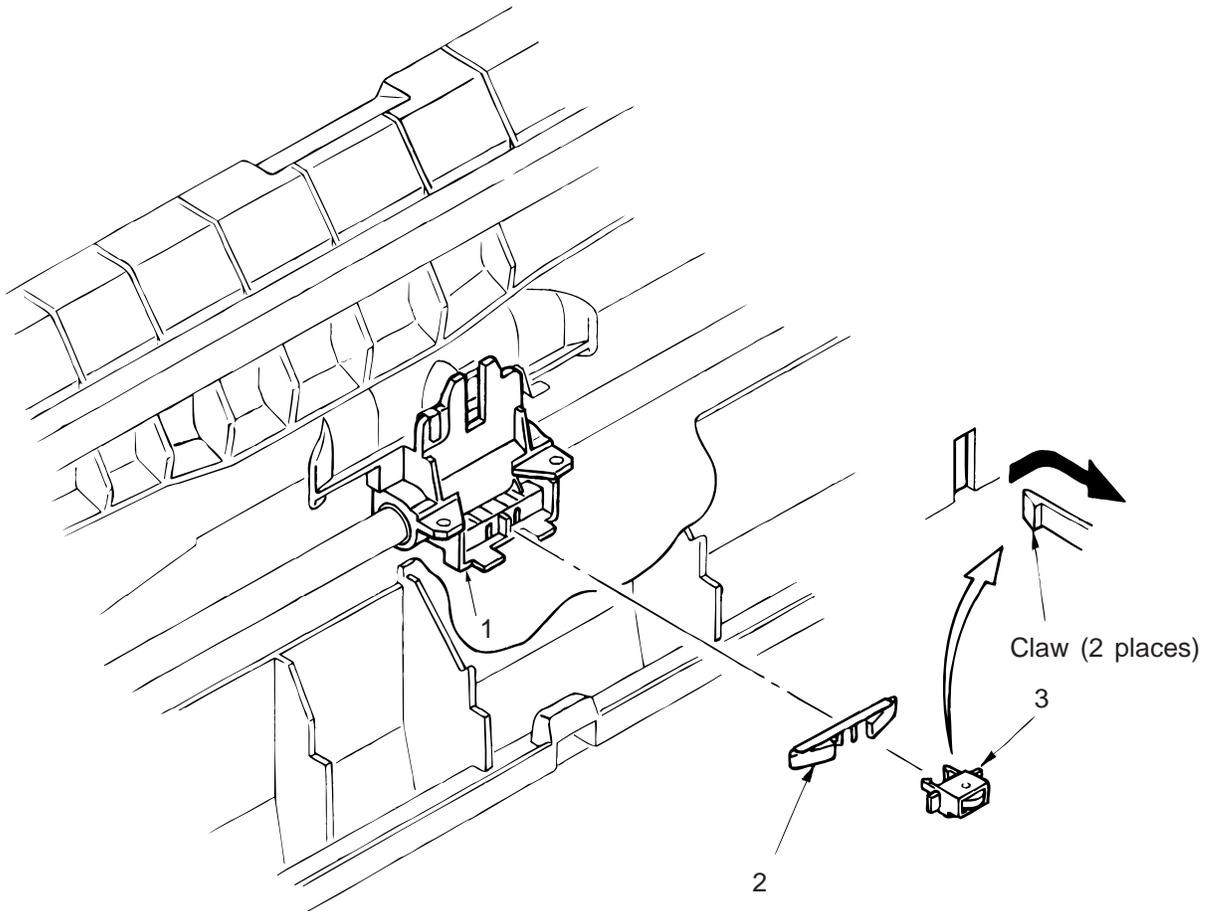


### 3.3.10 Backup Roller Holder Assy

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the printhead (see 3.3.1).
- (3) Remove the carriage Assy (see 3.3.5 (3)).
- (4) Remove the backup roller spring 2.

Disengage claws of roller holder from the carriage frame 1 (2 places), and remove the backup roller holder assy 3.

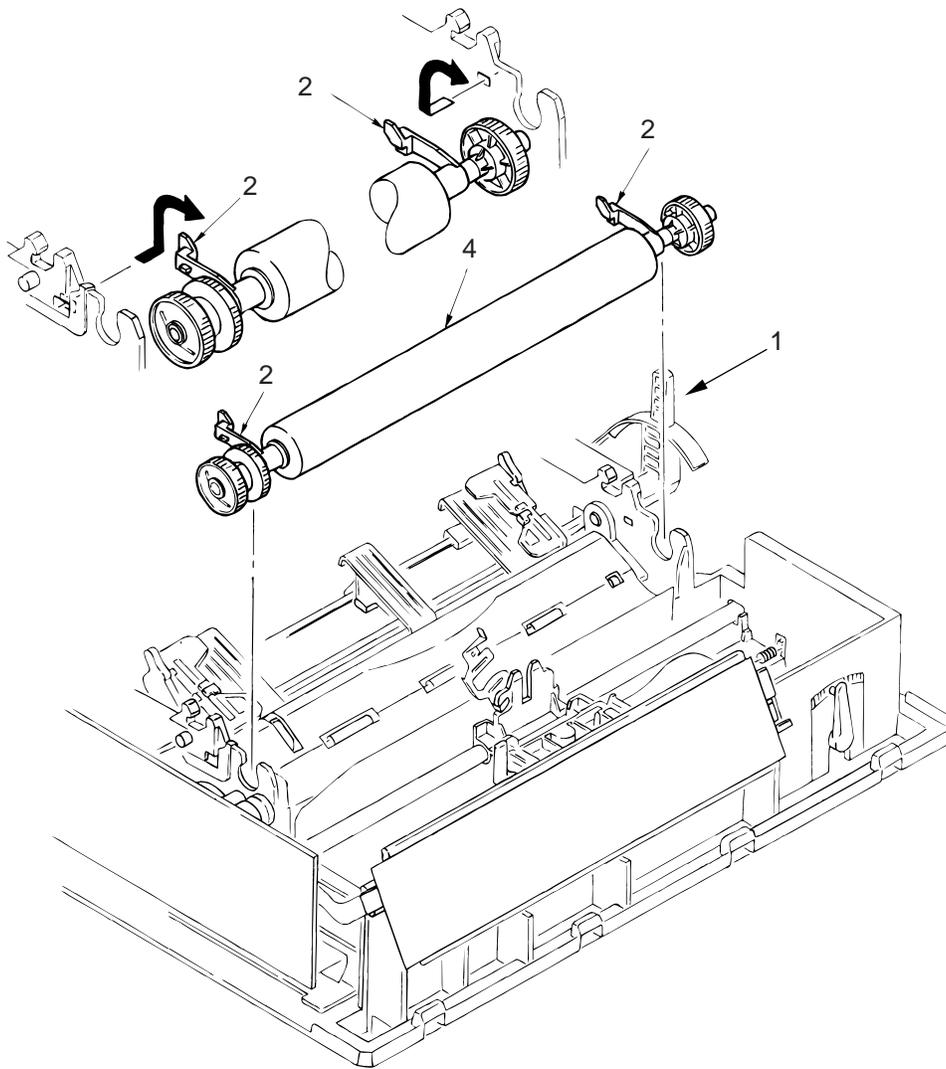
- (6) To install, follow the removal steps in reverse order.



**Note:** Small round hole with metal tip on back of roller holder assy 3 should be facing up when installing.

### 3.3.11 Platen Assy

- (1) Remove the printhead (see 3.3.1).
- (2) Remove the upper cover (see 3.3.1).
- (3) Remove the pull-up roller Assy (see 3.3.3).
- (4) Remove the ribbon protector (see 3.3.2).
- (5) Turn the change lever 1 to the bottom position.
- (6) Push in the lock levers 2 on both sides to unlock the Assy from the frame, then rotate them upward 90°.
- (7) Remove the platen Assy 4 from the base frame.
- (8) To install, follow the removal steps in reverse order.

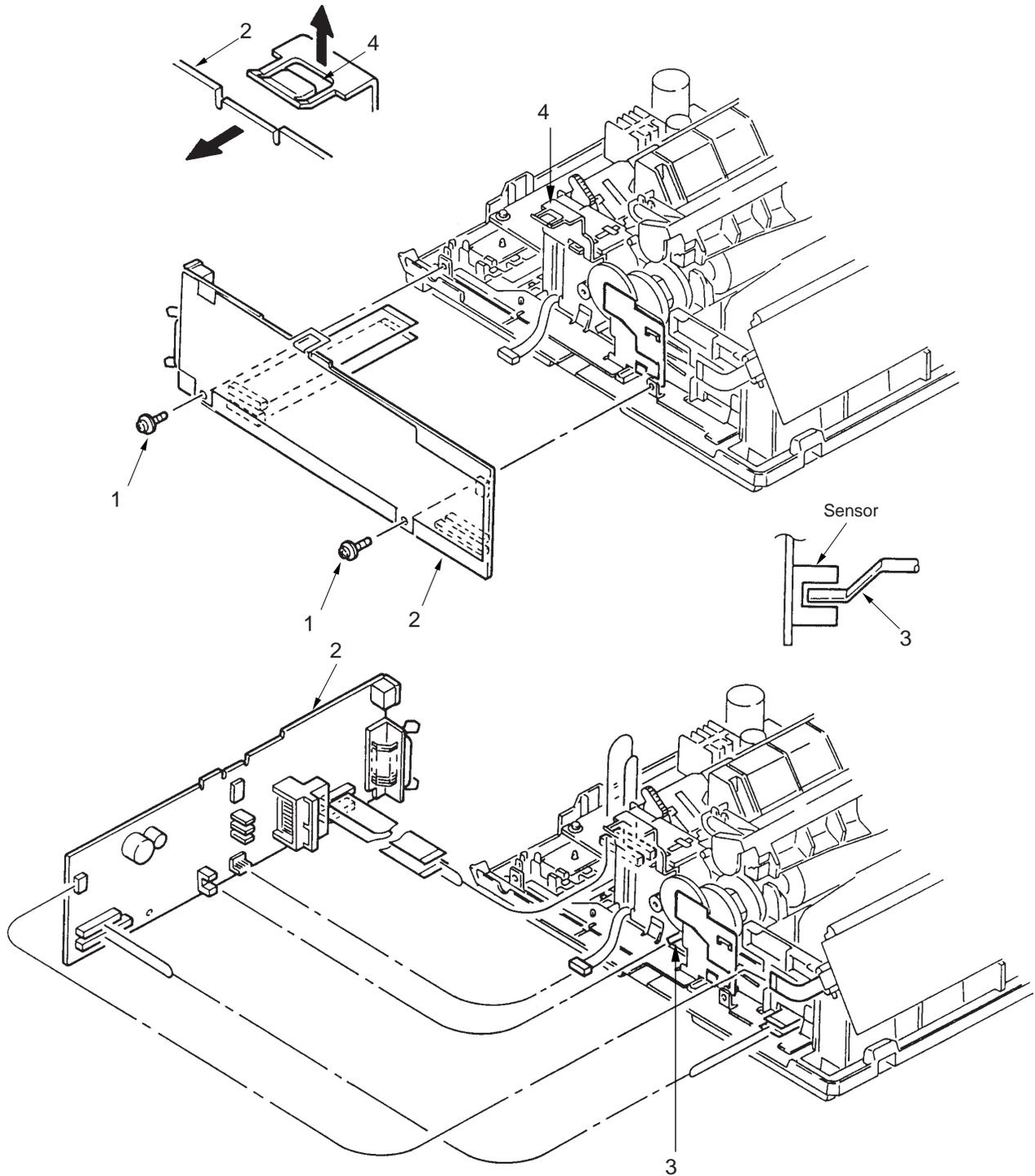


### 3.3.12 Driver Board (SDDV)

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the two screws 1, and release the driver board 2 by lifting clamp 4.
- (3) Disconnect all cables from driver board 2.
- (4) To install, follow the removal steps in reverse order.

*Note on installation:*

Insert sensor lever 3 in the sensor as shown when installing the driver board 2.

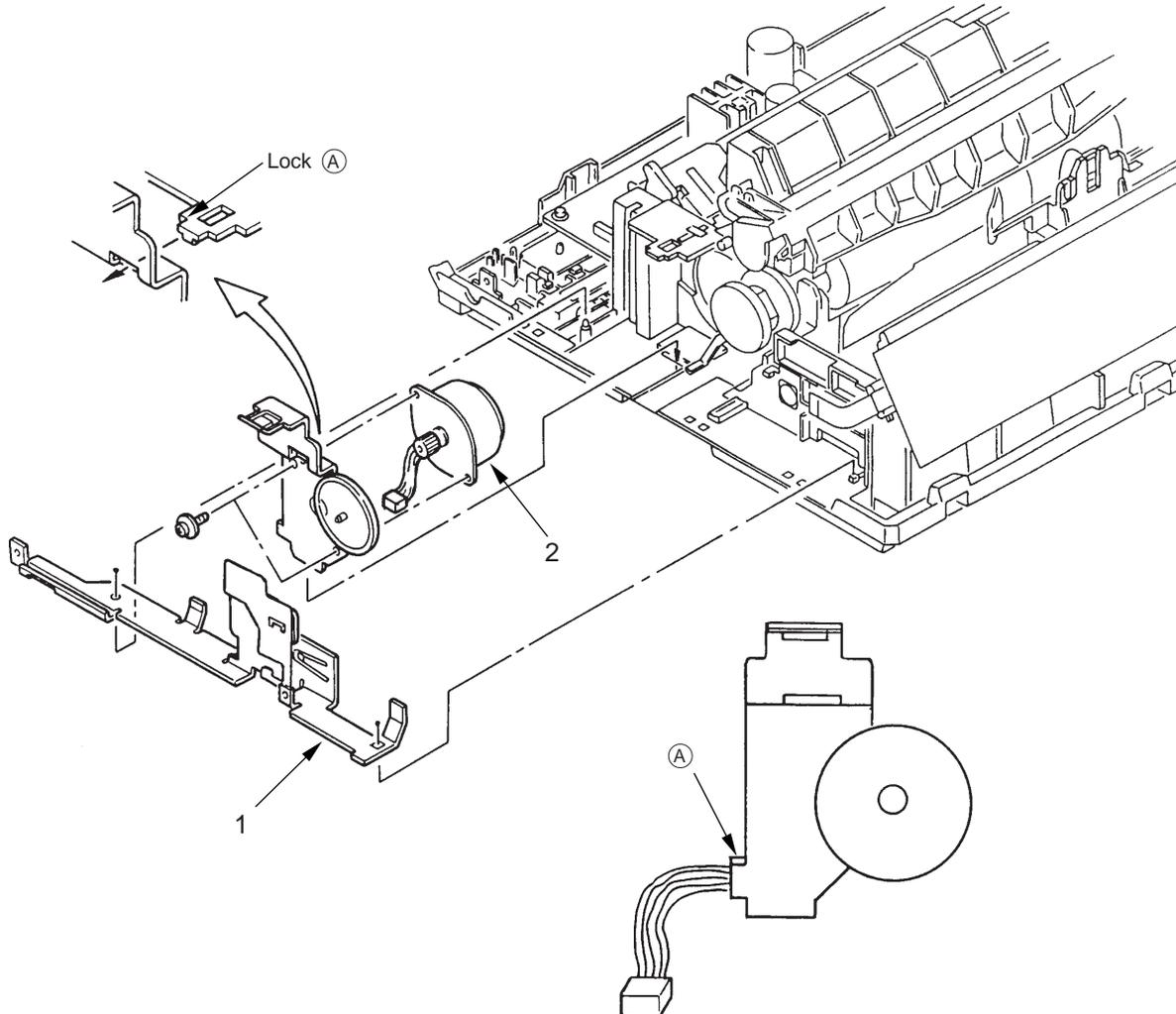


### 3.3.13 LF Motor

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the printhead (see 3.3.1).
- (3) Remove the ribbon protector (see 3.3.2).
- (4) Remove the pull-up roller Assy (see 3.3.3).
- (5) Remove the platen Assy (see 3.3.11).
- (6) Remove the driver board (see 3.3.12).
- (7) Remove the left FG plate 1: lift base at three points to release tabs.
- (8) Release the lock A to remove the LF motor 2.
- (9) To install, follow the removal steps in reverse order.

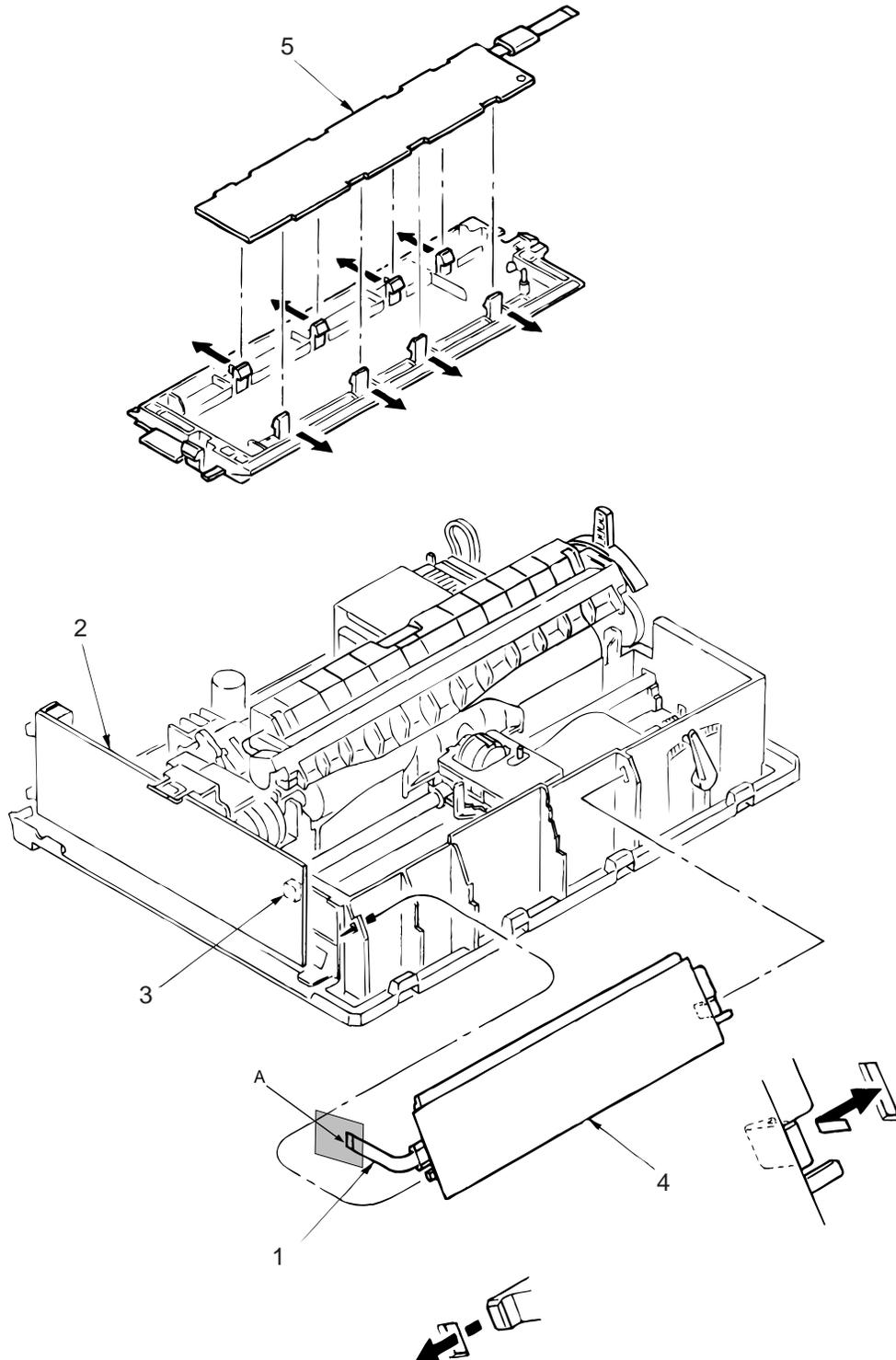
*Note on installation:*

Press the LF motor cable with a portion (A) of the motor plate.



### 3.3.14 Operation Panel PCB (LEOP)

- (1) Remove the upper cover (see 3.3.4).
- (2) Disconnect cable 1 from connector 3 of driver board 2.
- (3) Disengage claws on both sides from the frame, and remove the operation panel 4.
- (4) Open claws (8 places) and remove the operation panel PCB 5 from the operation panel 4.
- (5) To install, follow the removal steps in reverse order.

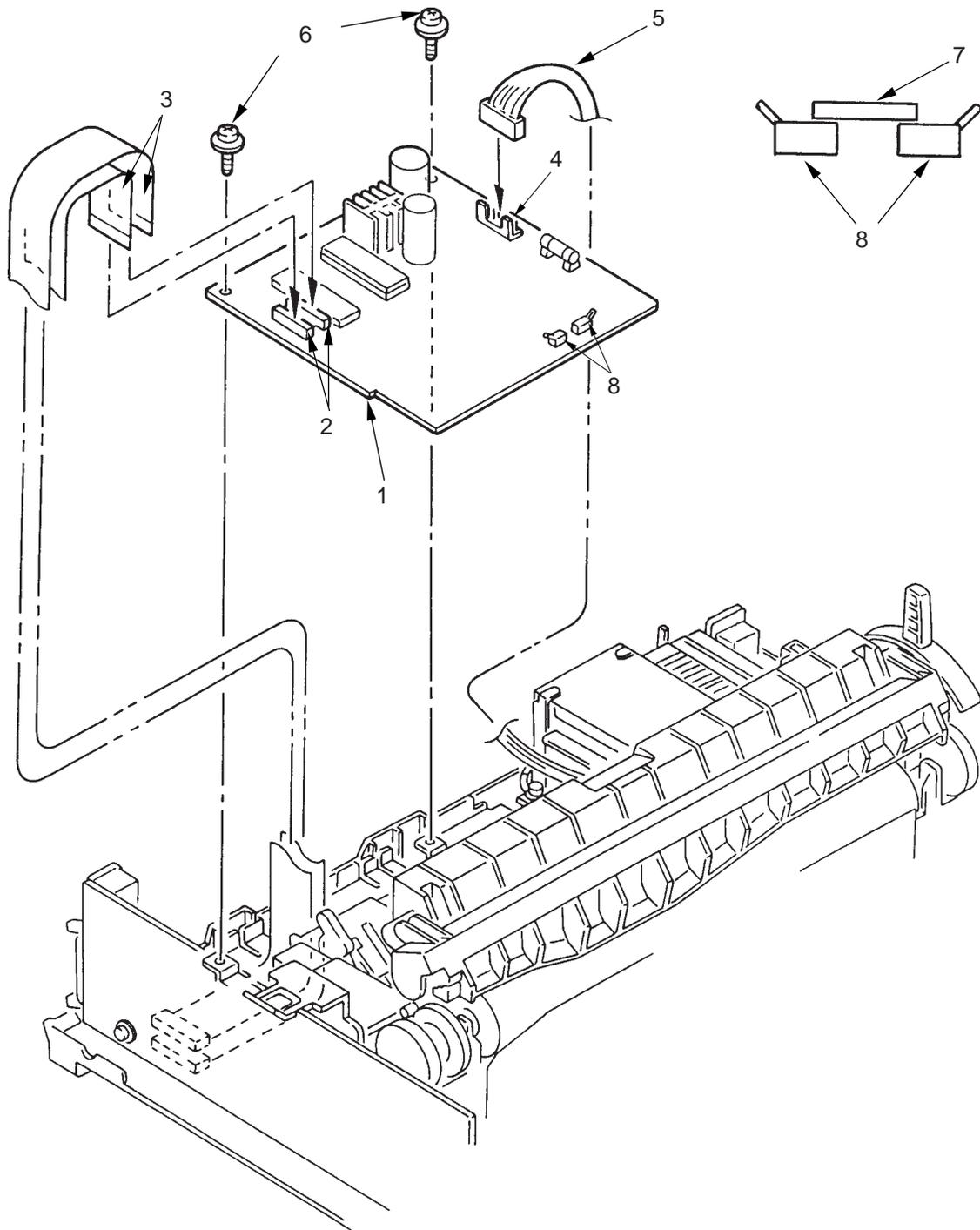


### 3.3.15 Control/Power Supply Board (SDCT)

- (1) Remove the upper cover (see 3.3.4).
- (2) Disconnect the two flexible cables 3 from connector 2 on the Control/Power Supply Board 1.
- (3) Remove cable 5 from connector 4 on the control/power supply board 1.
- (4) Remove the two screws 6, and remove the controlpower supply board 1.
- (5) To install, follow the removal steps in reverse order.

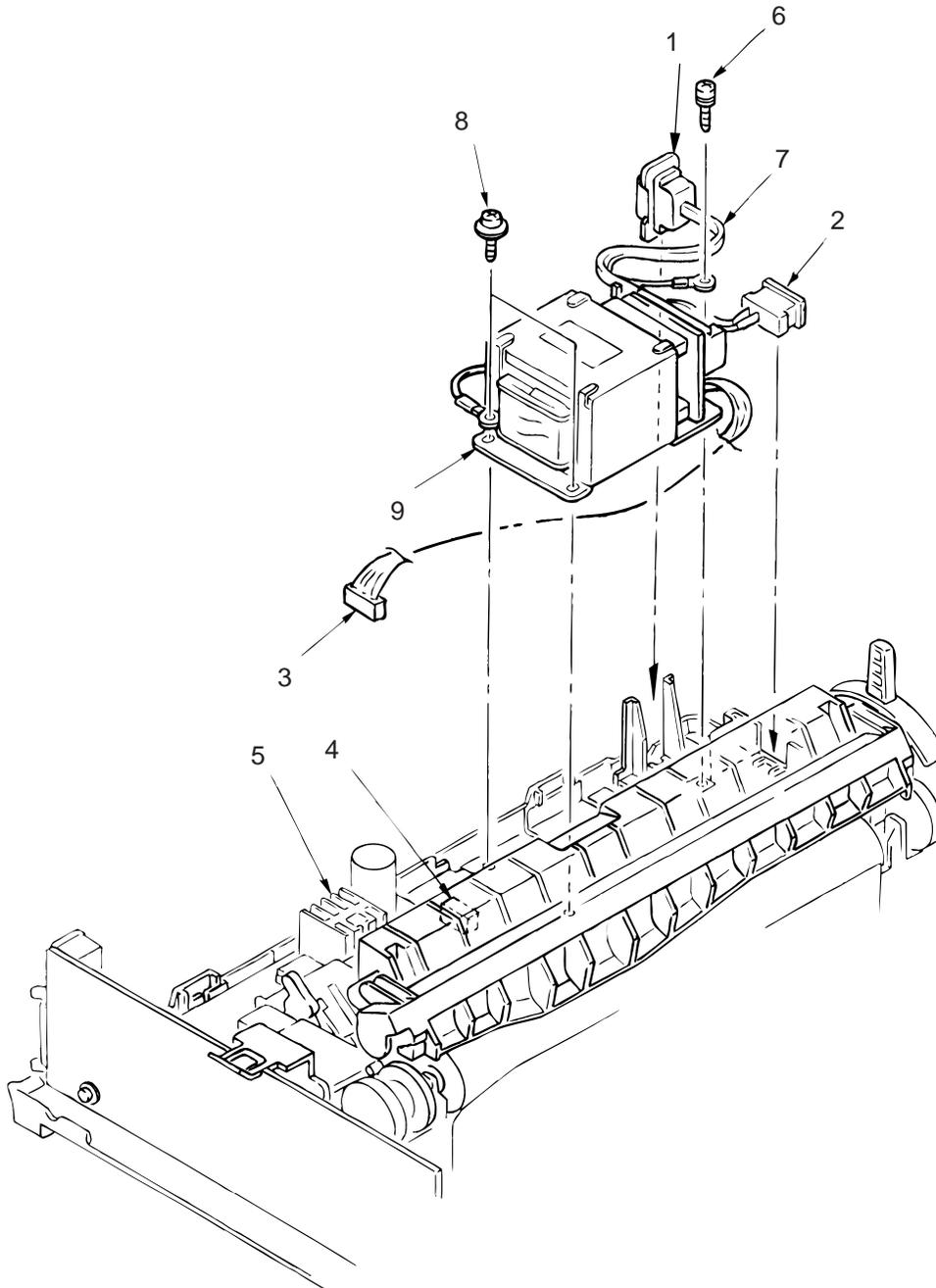
*Note on installation:*

To install the control/power supply board, set the change lever to the top position so that the switch lever 7 will not catch on the microswitches 8.



### 3.3.16 Transformer Assy

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove AC inlet 1 and AC switch 2 from the frame guide.
- (3) Disconnect the cable 3 from the connector 4 on the Control/Power Supply Board 5.
- (4) Remove a screw 6 and disconnect ground cable 7.
- (5) Remove two screws 8 and shift the transformer Assy 9 to the left and remove it.

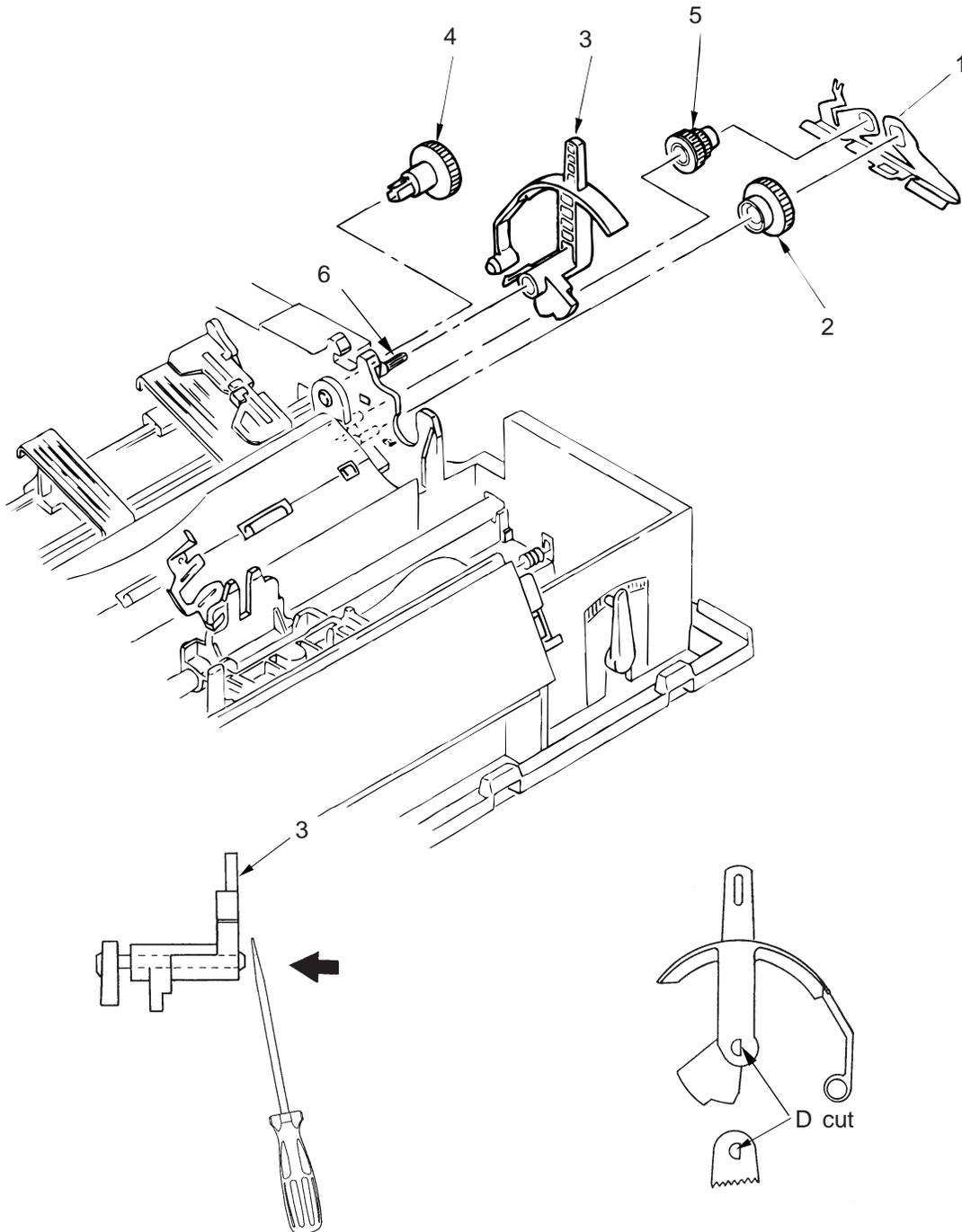


### 3.3.17 Change Lever and Gears

- (1) Remove the upper cover (see 3.3.4).
- (2) Release the reset spring 1 from the tab, remove it, then remove the idle gear 2, the tractor gear 4 and the change gear 5.
- (3) Push back the protrusion of the change gear shaft 6 *gently* with a flatblade screw driver to remove the change lever 3. *Note: The change lever can be difficult to remove; be careful not to exert too much force with the screwdriver. Make sure the springs do not fly off when you release the change lever from the shaft.*
- (4) To install, reverse the removal procedure.

*Note on installation:*

To insert the change lever into the change gear shaft 6, match the flat surface (D cut).

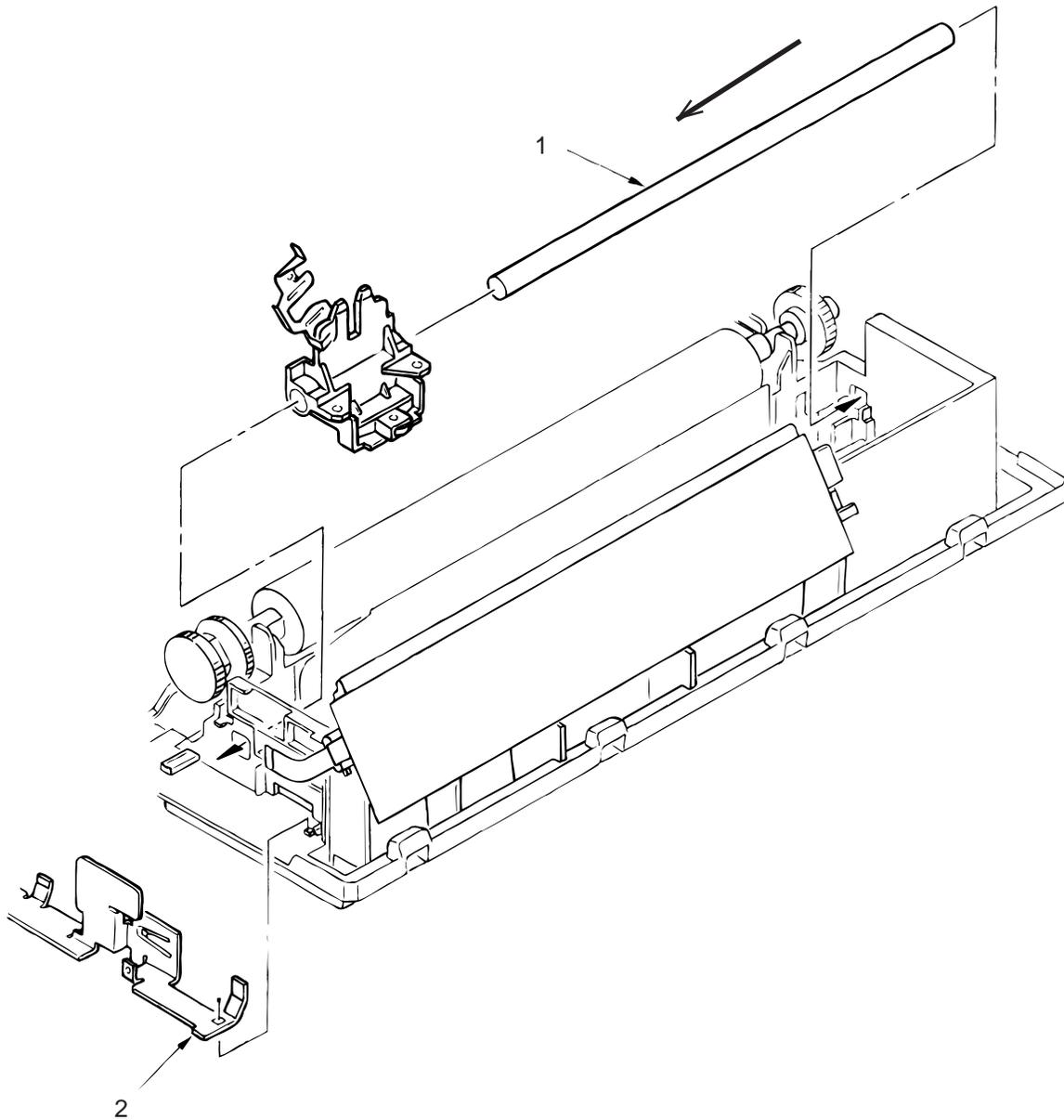


### 3.3.18 Carriage Shaft

- (1) Remove the printhead (see 3.3.1).
- (2) Remove the upper cover (see 3.3.4).
- (3) Remove the driver board (see 3.3.12).  
Remove the FG plate (L) 2.
- (4) Slide the carriage shaft 1 to the left side (in the direction of the arrow) to remove.
- (5) To install, reverse the removal procedure.

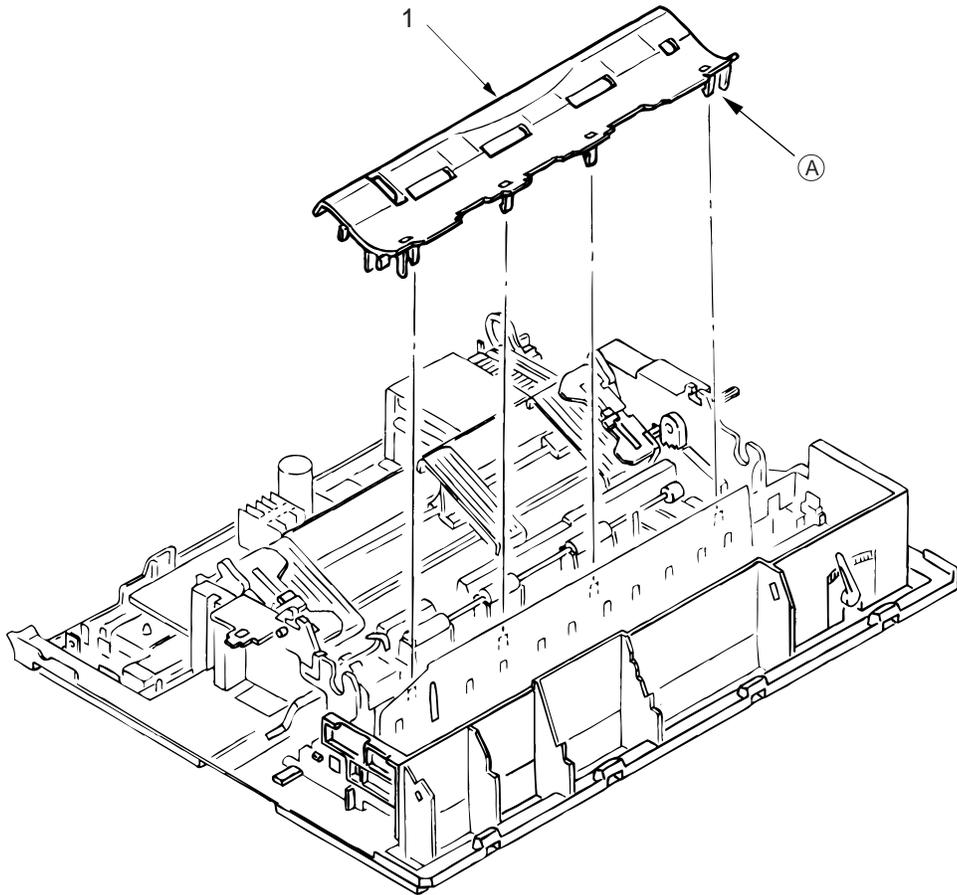
*Note on installation:*

After installation, check and adjust the gap between platen and printhead (see 4-1).



### 3.3.19 Paper Pan

- (1) Remove the printhead (see 3.3.1).
- (2) Remove the ribbon protector (see 3.3.2).
- (3) Remove the pull-up roller assy (see 3.3.2).
- (4) Remove the upper cover assy (see 3.3.4).
- (5) Remove the platen assy (see 3.3.11).
- (6) Release claws (A).
- (7) Lift up the paper chute assy 1 and remove.
- (8) To install, reverse the removal procedure.

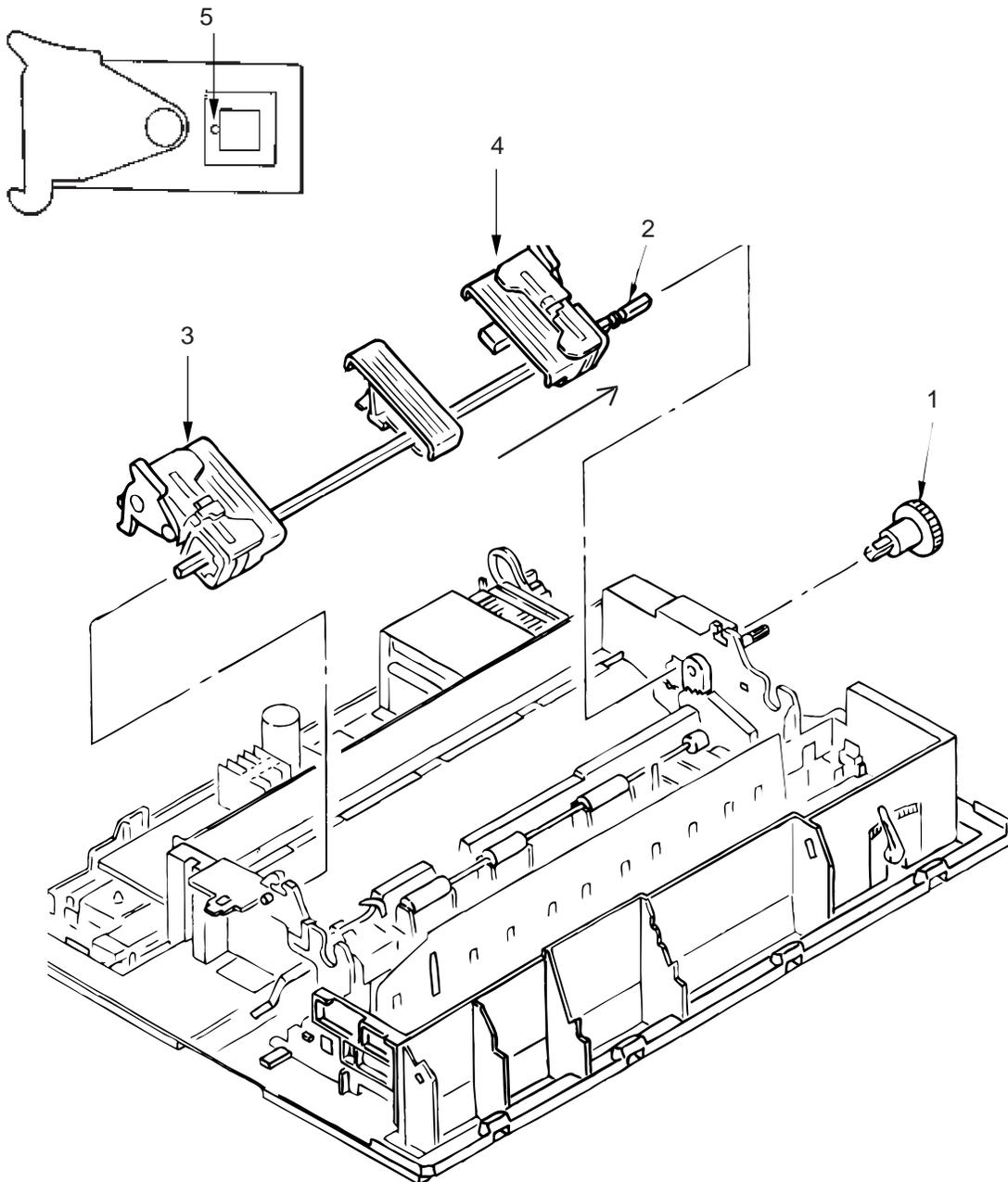


### 3.3.20 Rear Tractor Assy

- (1) Remove the printhead (see 3.3.1).
- (2) Remove the ribbon protector (see 3.3.2).
- (3) Remove the pull-up roller assy (see 3.3.3)
- (4) Remove the upper cover (see 3.3.4).
- (5) Remove the reset spring (see 3.3.17 (3))
- (6) Remove the tractor gear 1.
- (7) Shift the drive shaft 2 to the right side to remove (in the direction of the arrow).
- (8) To install, reverse the removal procedure.

*Note on installation:*

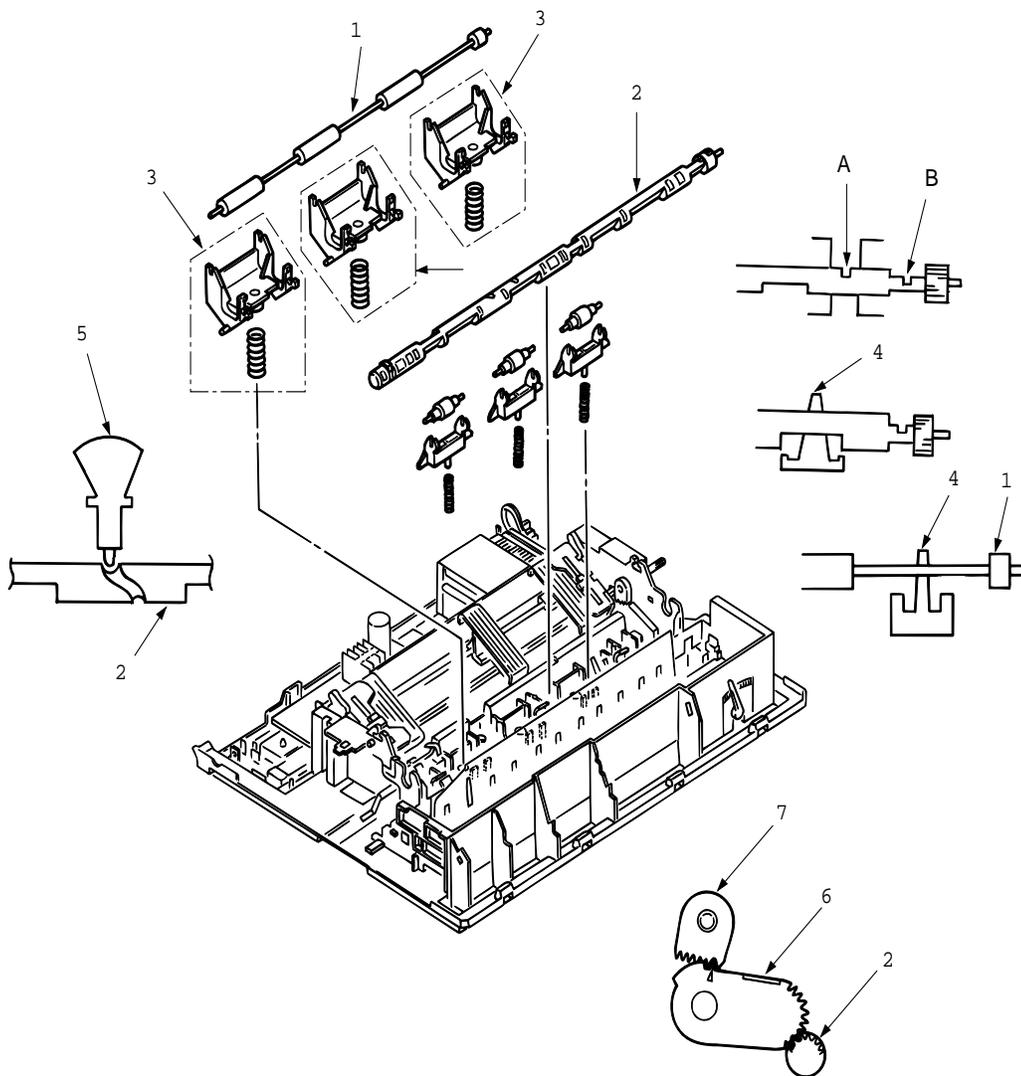
When the tractor assemblies (L) 3 (R) 4 have been detached from the drive shaft, align the protrusions 5 of the pin tractor wheels in the same direction as before assembly.



### 3.3.21 Rear Pressure Assy

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the change lever and gears (see 3.3.17).
- (3) Remove the paper pan (see 3.3.19).
- (4) Remove the rear pressure roller 1.
- (5) Rotate the release shaft 2 and move it to the left to detach the release shaft 2.  
Match the main frame rib A with the protrusion B of the release shaft.
- (6) Remove rear pressure SP assy 3.
- (7) To install, follow the removal steps in reverse order.

- Note:**
- (1) When installing the release shaft 2, pay attention to the gear engagement of release shaft 2, change arm lever 6, and change gear shaft 7.
  - (2) On the ML321 Turbo there are 5 rear pressure spring assemblies. Use the two pieces which have larger spring diameter on the right side. Use the three remaining pieces on the left side.
  - (3) Make sure that the release shaft 2 will be on top of the support spring 4.
  - (4) To assemble the release shaft 2, make sure that the protrusion of the switch lever 5 is in the U groove of the release shaft 2.

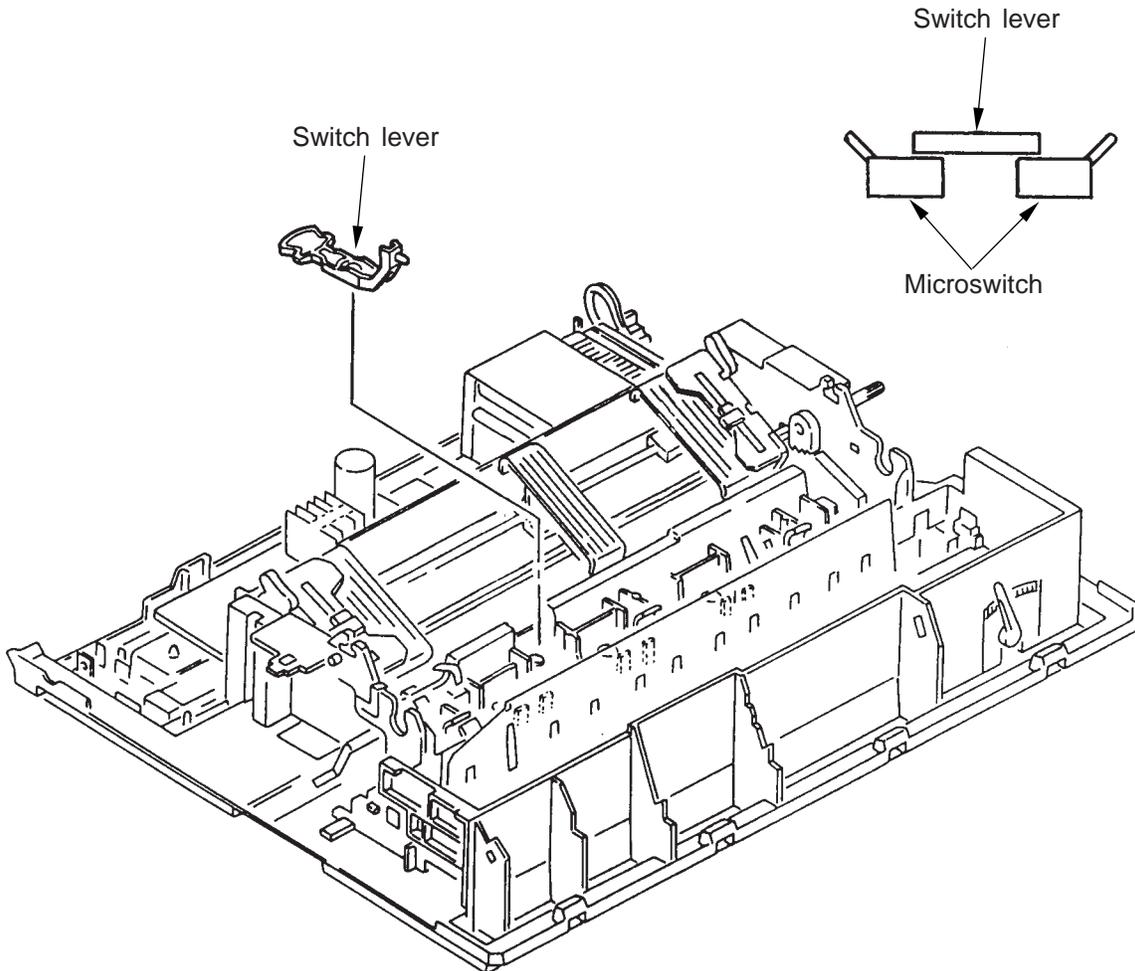


### 3.3.22 Switch Lever

- (1) Remove the upper cover (see 3.3.4).
- (2) Remove the change lever and gears (see 3.3.17).
- (3) Remove the paper pan (see 3.3.19).
- (4) Remove the rear pressure assy (see 3.3.21).
- (5) Pull the switch lever toward you and remove it upward.
- (6) To install, follow the removal steps in reverse order.

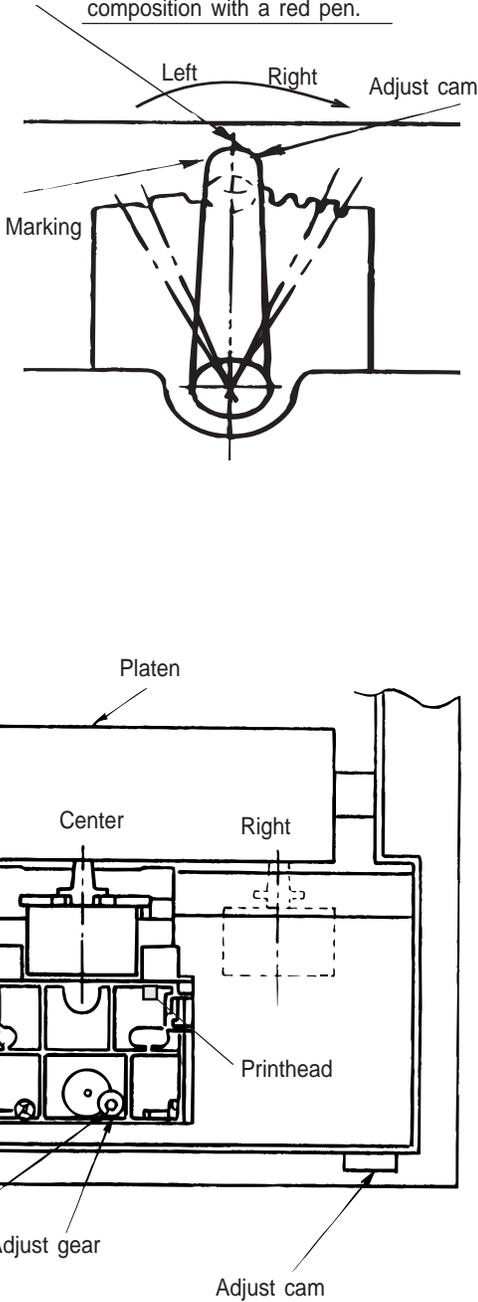
*Note on installation:*

When installing the switch lever, make sure that the microswitch on the driver board works properly.

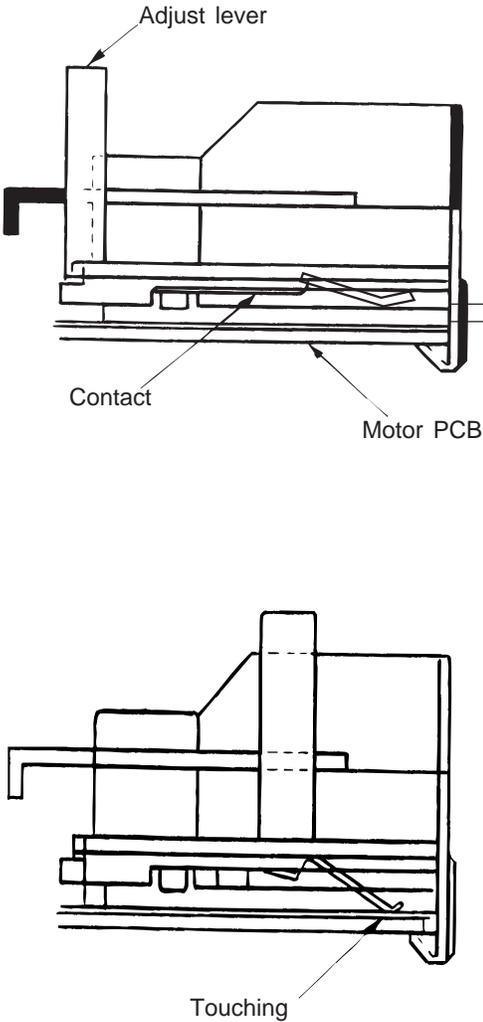


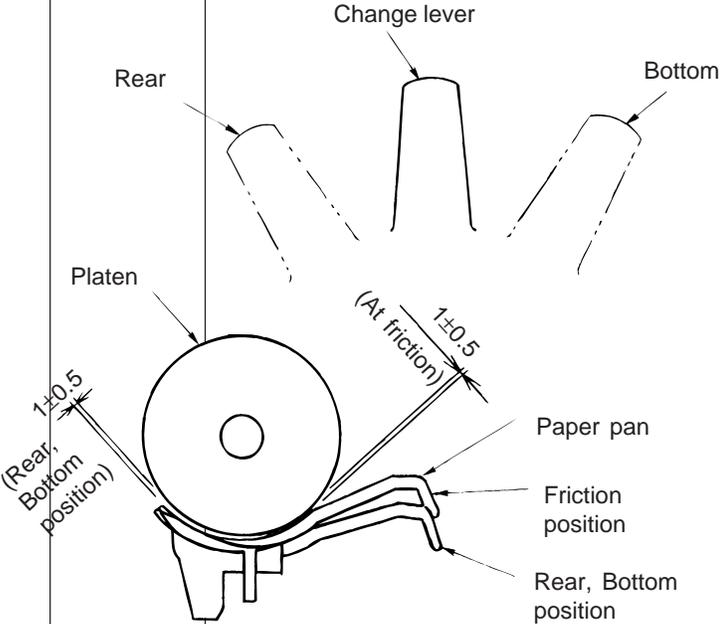
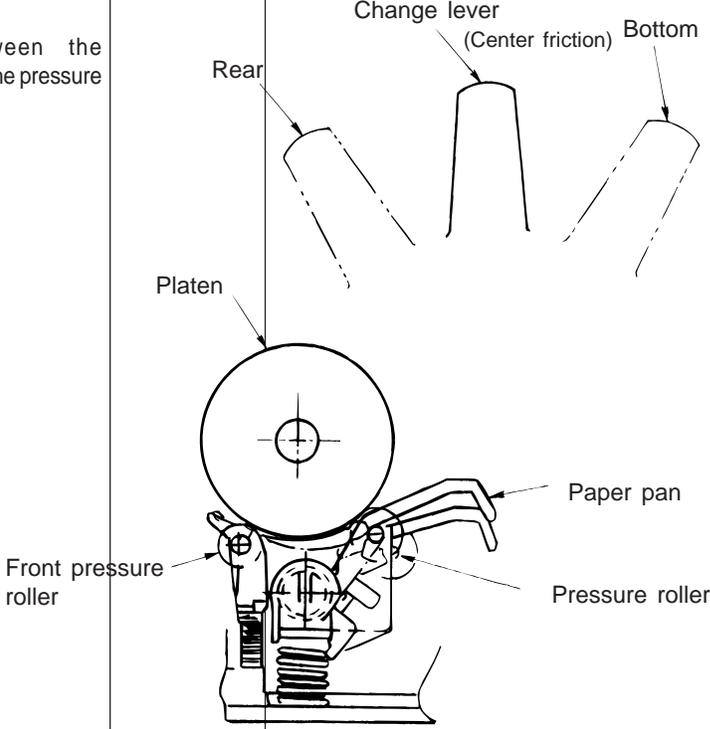
## **4. ADJUSTMENT**

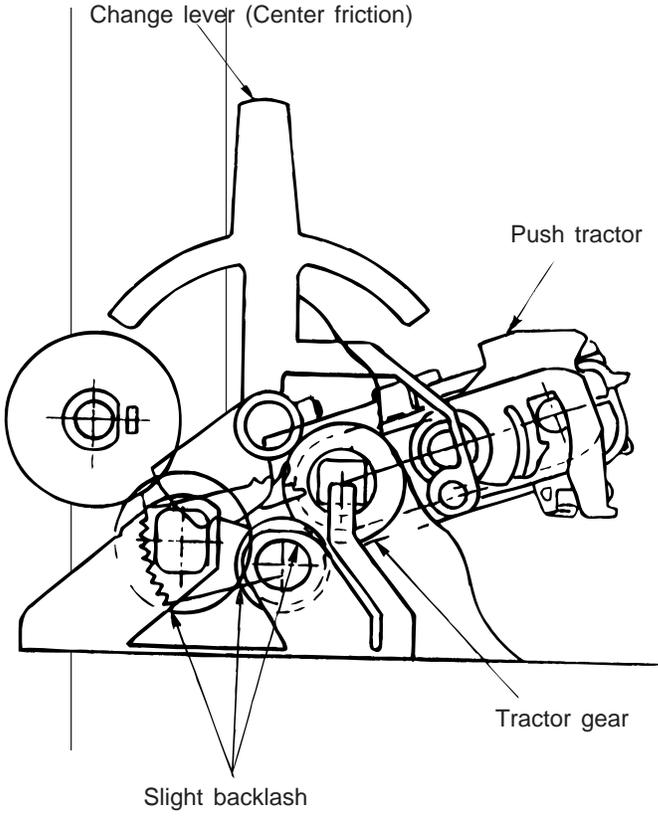
- (1) Be sure to carry out these adjustments with the printer mechanism installed on the lower cover.
- (2) Be sure to carry out these adjustment operations on a level and highly rigid work table (flatness: less than 0.039 inch or 1 mm) so as to minimize adjustment error.

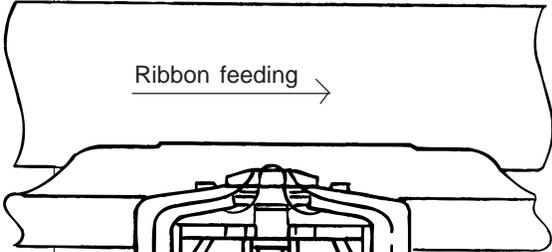
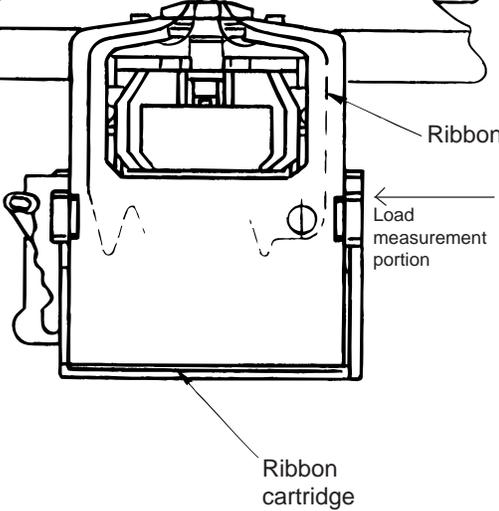
No.	Item	Specification	Drawing	Adjustment method
4-1-1	<p data-bbox="289 184 509 239">Gap between the platen and the printhead</p> <p data-bbox="289 268 509 323">1) Parallelism adjustment</p> <p data-bbox="289 1024 509 1058">2) Initial adjustment</p>	<p data-bbox="522 302 665 470">Variation of value at the left, the center and the right shall be less than 0.02 mm</p> <p data-bbox="522 1024 665 1058">0.41±0.03 mm</p>	<p data-bbox="769 483 1104 537">After adjustment, mark the adjust composition with a red pen.</p> 	<p data-bbox="1198 184 1404 323">It shall be measured at 3 points: the left end, the center and the right end of the platen.</p> <p data-bbox="1198 357 1404 390">Adjustment method</p> <ol data-bbox="1198 415 1404 1348" style="list-style-type: none"> <li data-bbox="1198 415 1404 646">(1) Gap between the platen and the printhead at the left end and the right end shall be adjusted by rotating the adjust cam.</li> <li data-bbox="1198 680 1404 970">(2) Set the adjust lever at the Range: 1. Press the adjust gear downward (in direction A) to push the adjust gear and the adjust gear out of mesh.</li> <li data-bbox="1198 1003 1404 1201">(3) Adjust the gap by rotating the adjust screw in direction B or C while the adjust lever and the adjust gear are disengaged.</li> <li data-bbox="1198 1234 1404 1348">(4) After adjustment, mark the adjust cam position with a red pen.</li> </ol>

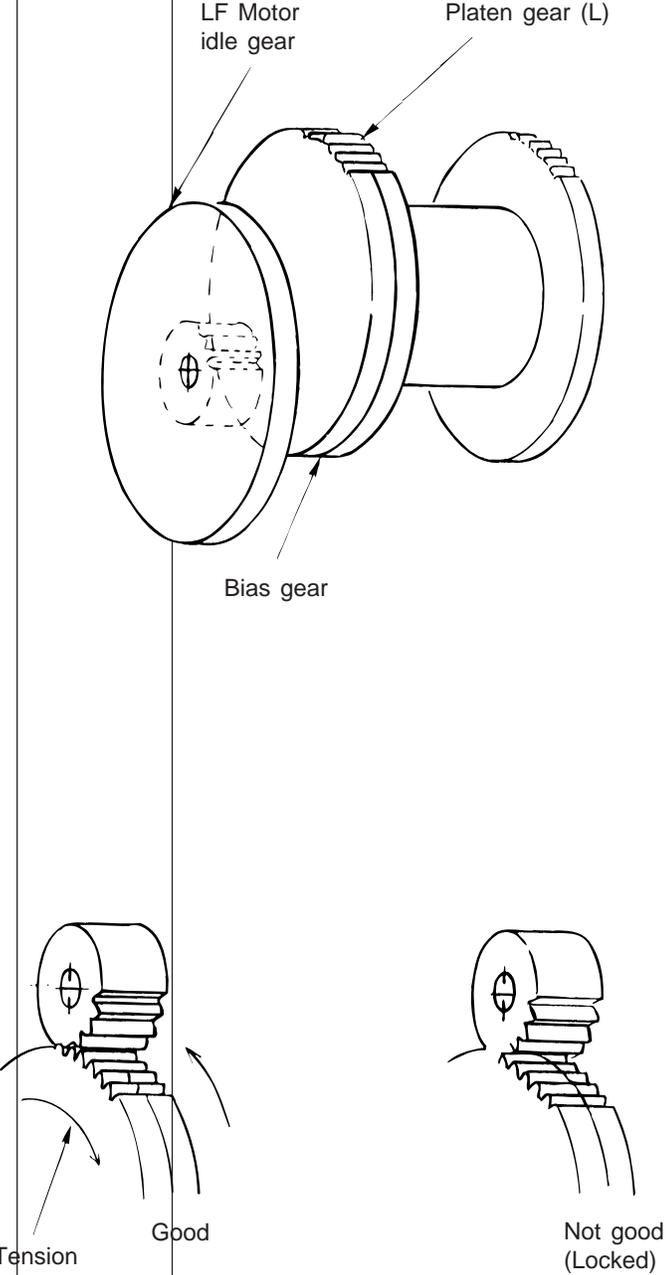
No.	Item	Specification	Drawing	Adjustment method
				<p>Note 1) The head gap shall be measured with the change lever set to rear position.</p> <p>Note 2) The head gap shall be measured positioning the platen gear (R) crawl on the top.</p> <p>Note 3) Move the adjust screw in clockwise direction (in direction B) to measure.</p>
4-1-2	Measure variation of gap when range is changed.	Gap = 0.69 ± 0.05 at the range 5.		

No.	Item	Specification	Drawing	Adjustment method
	Gap between the contact and the monitor	0.3mm or more		<p>Verify the following.</p> <p>Make sure that the gap between the contact and the motor PCB is 0.3 mm or more.</p> <p>At the time of printing test, make sure that the contact touches the motor PCB and it enters reduced speed mode when the adjust lever is set to range 2 and 4.</p>

No.	Item	Specification	Drawing	Adjustment method
4-2	Gap between the platen and the paper pan	$1\pm 0.5$		<p>Verify the following.</p> <ol style="list-style-type: none"> <li>(1) When the change lever is set at Friction position, the gap between the platen and the paper pan at the rear side shall be <math>1\pm 0.5</math>mm.</li> <li>(2) When the change lever is set at Rear or Bottom position, the gap between the platen and the paper pan at the front side shall be <math>1\pm 0.5</math> mm.</li> </ol>
4-3	Gap between the platen and the pressure roller			<p>Verify the following.</p> <ol style="list-style-type: none"> <li>(1) When the change lever is set at Friction position, all the pressure rollers shall be pressed to the platen.</li> <li>(2) When the change lever is set at Rear or Bottom position, the gap between the platen and the pressure roller at the rear side shall be 3mm. The front pressure rollers shall be pressed to the platen.</li> </ol>

No.	Item	Specification	Drawing	Adjustment method
4-4-1	Rotation of the push tractor			<p>Verify:</p> <p>The tractor gear shall rotate smoothly when the change lever is set at Friction position.</p>
4-4-2	Backlash between gears	Approx. 0.05 to 0.11 mm		<p>Verify:</p> <p>There shall be slight backlash between gears to allow smooth rotation of gears. (Backlash 0.05 to 0.11 mm)</p>

No.	Item	Specification	Drawing	Adjustment method
4-5-1	Ribbon feed			<p>Verify:</p> <p>Ribbon shall be fed smoothly when the carriage is moved from side to side.</p>
4-5-2	Running load to spacing mechanism	250g or less without a ribbon cartridge		<p>Verify:</p> <p>Make sure that the power is turned off at the time of measurement.</p>

No.	Item	Specification	Drawing	Adjustment method
4-6	Engagement of the double gear and the LF motor idle gear of the Platen Assy.		 <p>LF Motor idle gear</p> <p>Platen gear (L)</p> <p>Bias gear</p> <p>Tension</p> <p>Good</p> <p>Not good (Locked)</p>	<p>Verify:</p> <p>The idle gear of the LF motor and the platen gear (L) and the bias gear of the platen shall be in mesh in such way that the platen gear (L) and the bias gear rotate against each other to pinch the teeth of idle gear.</p> <p>The idle gear stays in mesh with the platen gear (L) and the bias gear and not locked. The bias gear and the platen gear shall be staggered by one tooth as shown in the drawing.</p>

## 5. CLEANING AND LUBRICATION

### 5.1 Cleaning

#### Cautions

1. Be sure to turn OFF the AC POWER switch before cleaning. Remove the AC power cord from the printer.
2. Avoid dust inside the printer mechanism when cleaning.
3. If a lubricated part has been cleaned, be sure to apply lubricating oil to that part after cleaning.

(1) Cleaning time

After six months or 300 hours of operation, whichever comes first.

(2) Cleaning tools

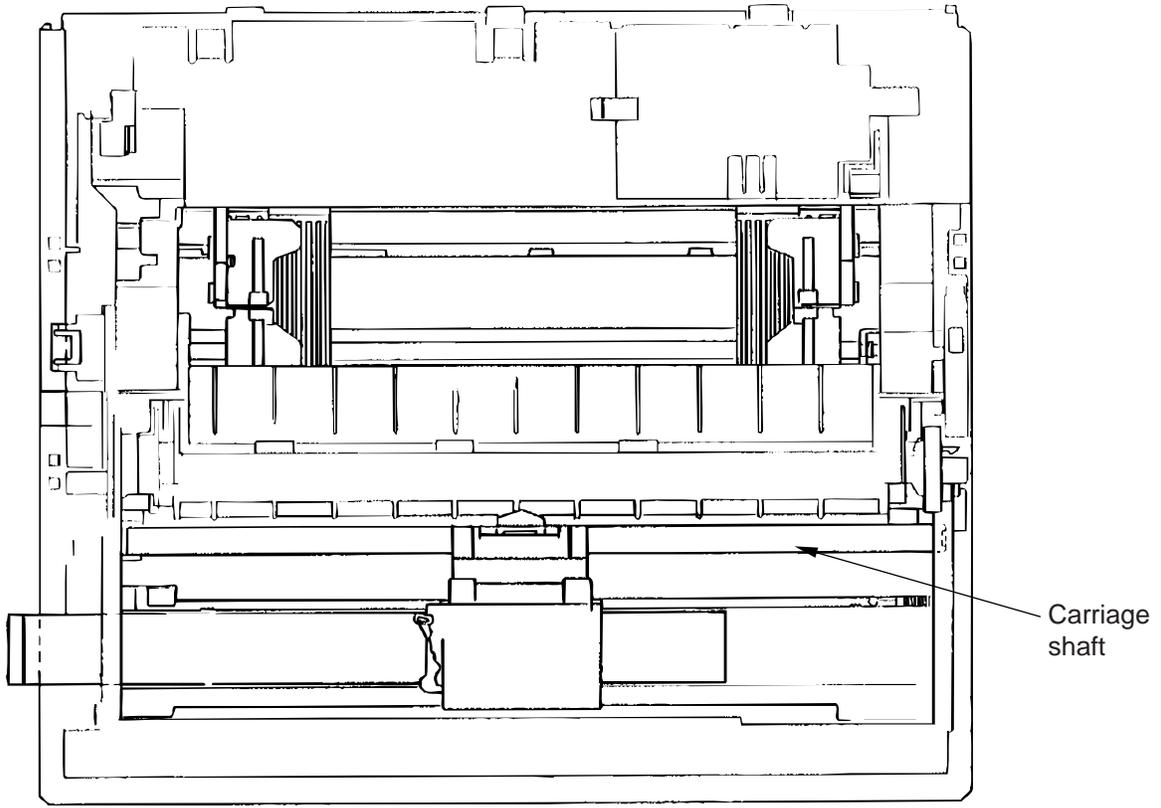
Dry cloth (soft cloth such as gauze), vacuum cleaner

(3) Places to be cleaned

Table 5.1 lists the places to be cleaned.

**Table 5.1**

Place to be cleaned	Cleaning procedure
Carriage shaft and vicinity Paper travel surface	Remove paper waste and wipe off stain, dust, ribbon waste. etc.



## 5.2 Lubrication

This printer is designed to be maintenance free and requires no lubrication during normal operation. However it is necessary to apply lubricant if the printer is disassembled, reassembled, cleaned, or if parts have been changed.

### (1) Cleaning time

Remarks:

- 1) Turn off the power before cleaning.
- 2) Make sure that paper dust does not fall inside of the machine.
  - Cleaning period:  
6 months of operation or 300 hours of operation, whichever is earlier.

- Cleaning points:

Carriage shaft and surroundings:  Remove paper and ribbon dust.

Paper path:  Clean stains and dusts.

Paper End sensor  Remove the dust on the sensor.

### (2) Lubricant

- Pan motor oil (or equivalent): PM
- Molicort (or equivalent): EM-30L

### (3) Amount of lubricant

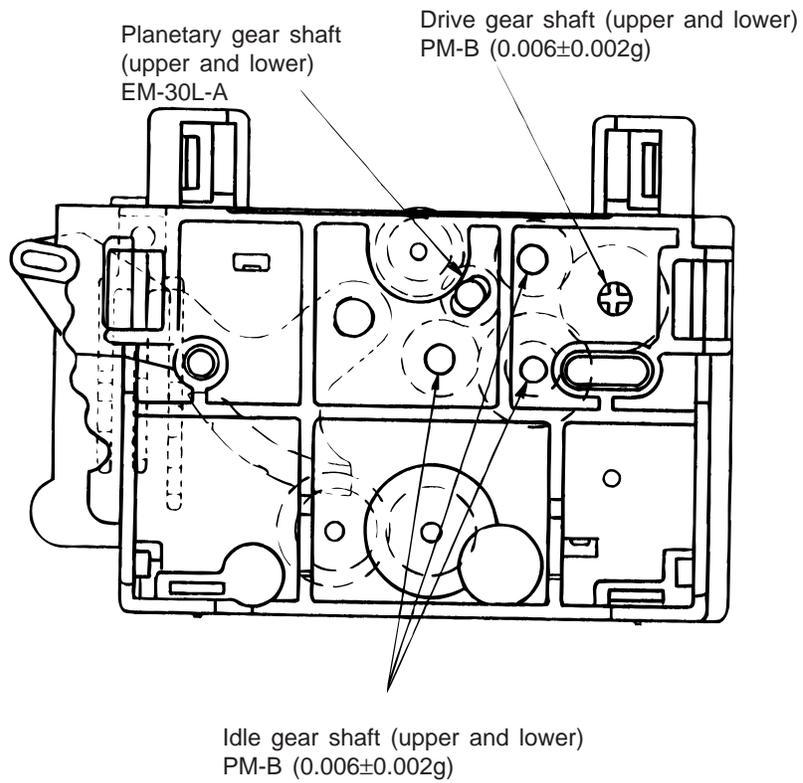
- Medium amount A : Apply three to four drops of oil, or 0.008 inch (0.2 mm) thick grease.
- Small amount B : Apply one drop of oil (0.006±0.002 g)

### (4) Areas to Avoid

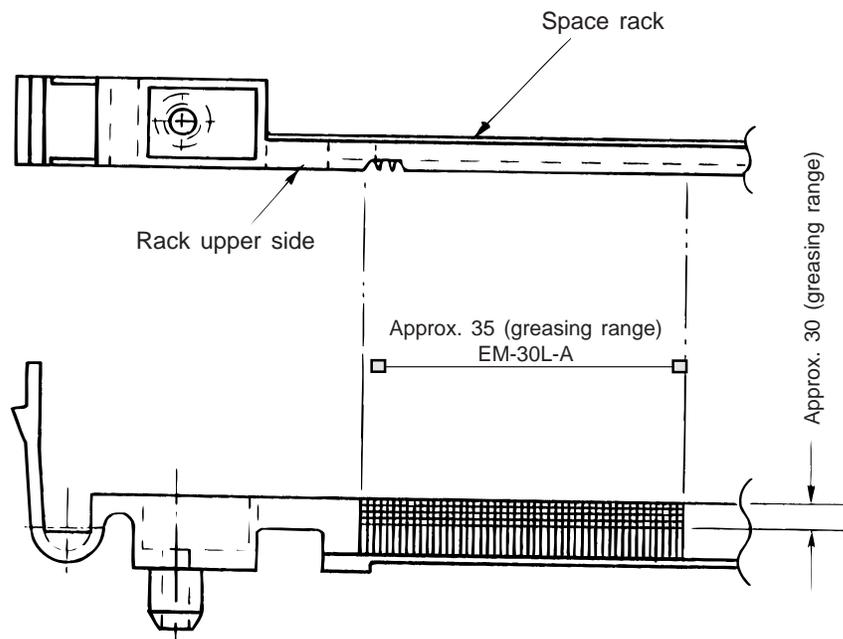
No.	Do not lubricate	Reason	Remarks
1	Platen assembly (rubber face)	To prevent stained paper and illegal paper feed.	Be careful not to put grease on the rubber face of the pressure roller.
2	Pressure roller (rubber face)	To prevent stained paper	
3	Carriage shaft	To stabilize carriage traveling load	
4	Ink ribbon image	To prevent blurring of print	
5	Pin tractor	To prevent stained paper	
6	Flexible cable and crack	To prevent loose connection	
7	Motor PCB	To prevent loose connection	
8	Connector terminals	To prevent loose connection	

(5) Lubrication point

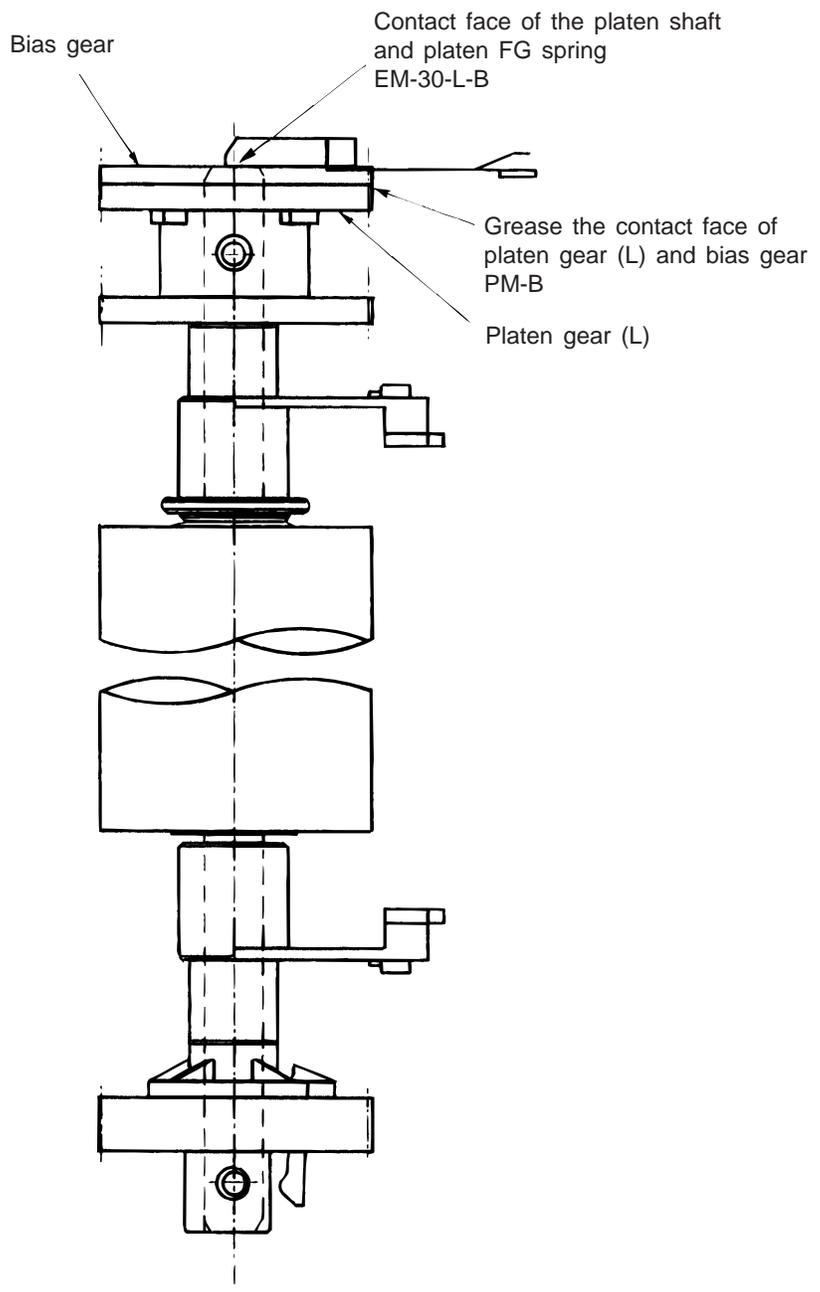
1. Ribbon feed gear Assy.



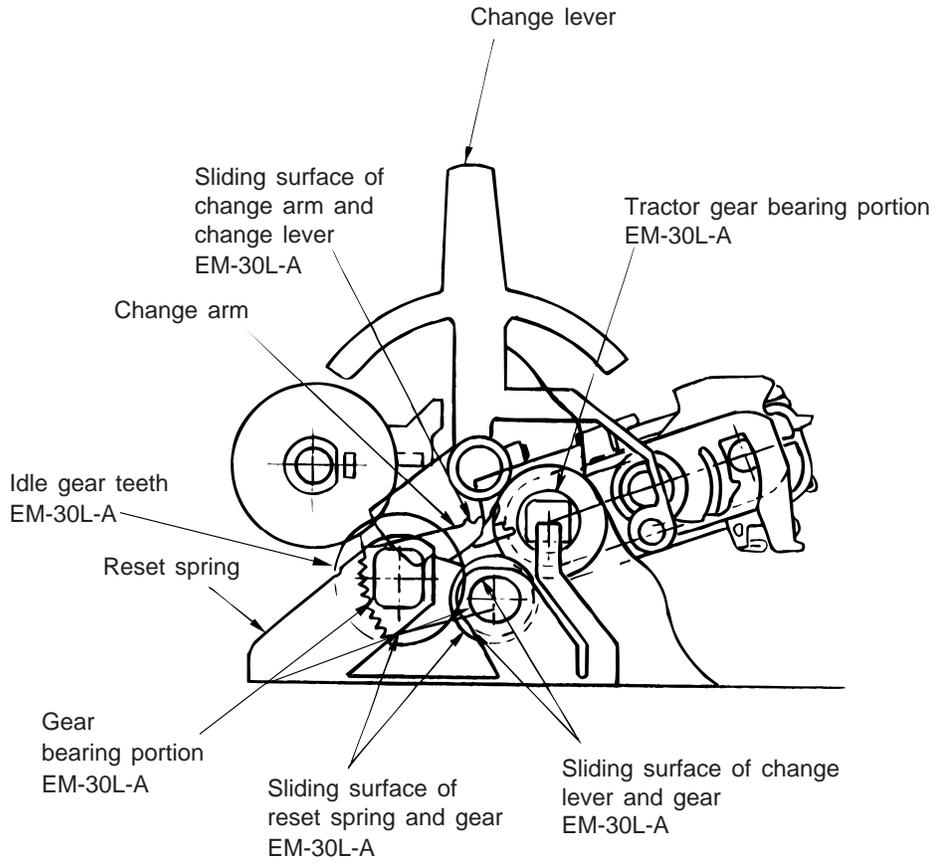
2. Space rack



3. Platen Assy.

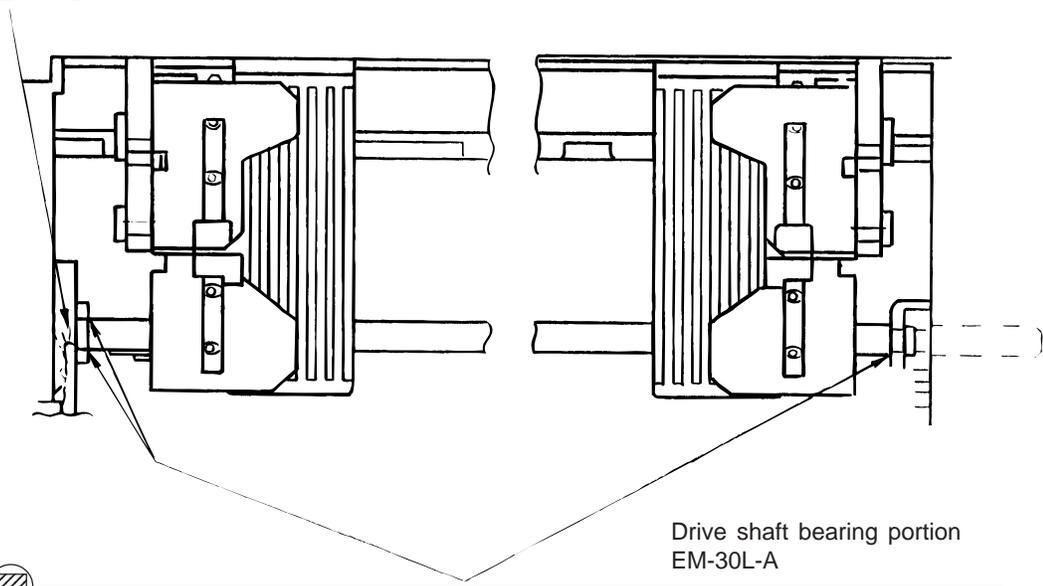


4. Tractor driving mechanism



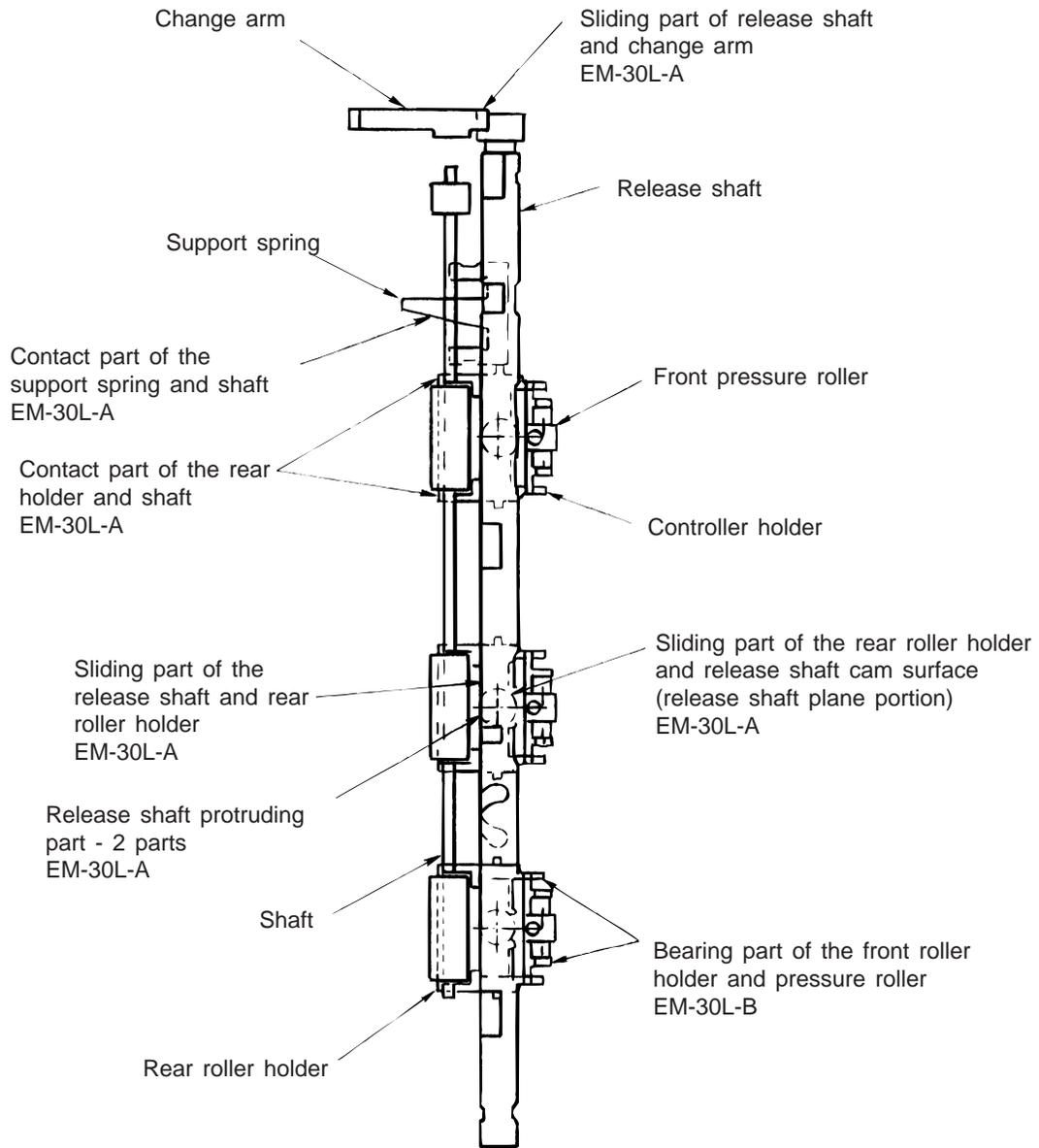
5. Tractor drive shaft

Sliding surface of FG spring and drive shaft end EM-30L-A

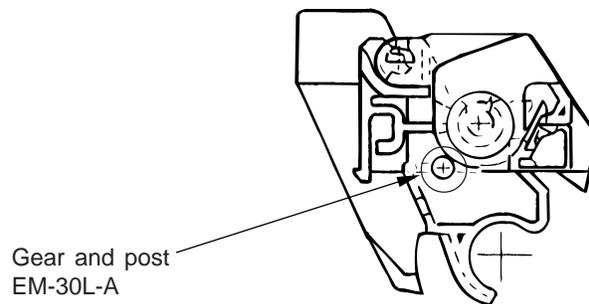
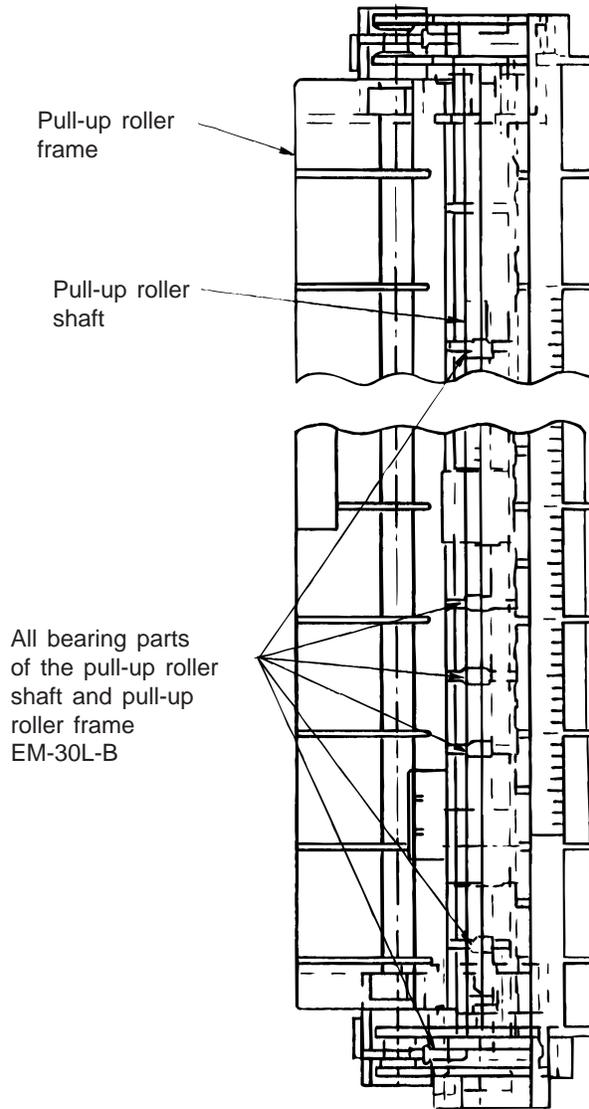


A-A Arrow view

6. Pressure roller



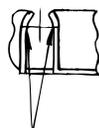
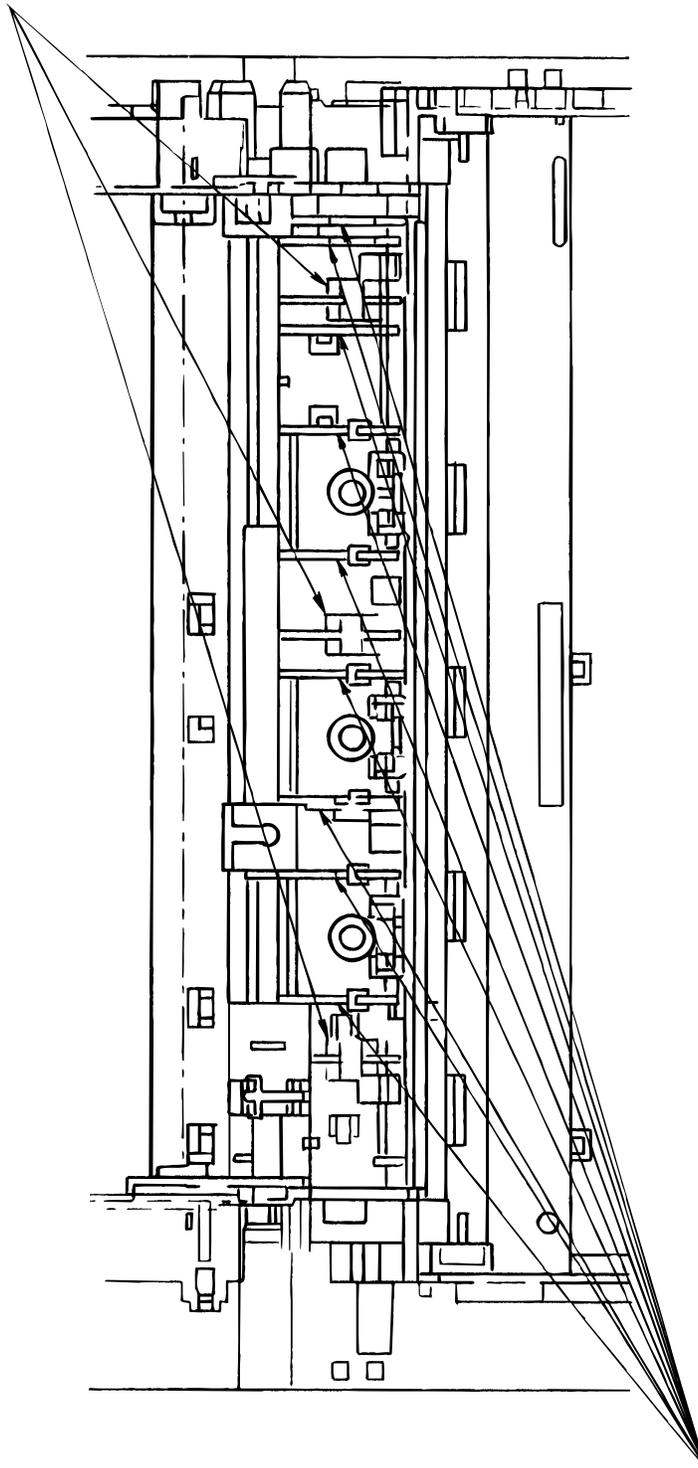
7. Pull up roller Assy.



8. Main chassis Assy.

Grease part (N: 3 parts, W: 5 parts) rear side  
EM-30L-A

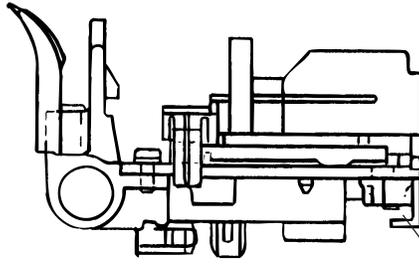
Models	
N	ML320 Turbo
W	ML321 Turbo



Grease part

Grease part at rib  
(N: 9 portions W: 13 portions)  
EM-30L-A

9. Carriage Assy.



NK2-10-SUS Bearing part  
of the guide roller  
EM-30L-B

## 6. TROUBLESHOOTING AND REPAIR

### 6.1 Items to Check Before Repair

- (1) Check the inspection items specified in the instruction manual.
- (2) Find out as many details of the problem as possible from the customer.
- (3) IN the shop, inspect under conditions as close as possible to those at the time the trouble occurred.
- (4) Proceed with the repair as follows:  
 Check the trouble status according to Table 6.1 for the details of the trouble. Then isolate the problem according to the detailed flowchart.
- (5) Carry out a thorough test after the repair to check for correct functioning.

### 6.2 Troubleshooting Table

**Table 6.1**

Status	Symptom	Troubleshooting Flowchart No.	Probable Cause
Trouble upon power on	• Power is not supplied.	1	Control/Power Supply Board, Driver Board, Transformer Assy. Space Motor, Carriage Cable, Printhead.
	• No spacing operation	2	
	• Homing does not end normally.	3	
Trouble during printing	• Paper jam while paper insertion	4	Pressure Roller Mechanism, Pull Up Roller Cover.
	• Smearing/Missing dots	5	Printhead, Driver Board, Space Motor, Carriage Cable
	• Faint or dark print	6	Printhead, Ribbon Feed Assembly, Driver Board
	• Ribbon feed trouble	7	Ribbon Feed Assembly, Space Motor, Driver Board
	• Line feed trouble	8	LF Motor, Platen Assy, LF Mechanism, Driver Board
	• Malfunction of switch on operation panel	9	Operation Panel, Driver Board
	• Data receiving failure	⑩	Driver Board, (I/F Board), I/F Cable, Menu Setting

## 6.3 Lamp Display

### (1) Printer mode display

**Table 6.2**

ALARM CATEGORY	ALARM	LED CONDITION					EXPLANATION	TROUBLE SHOOTING
		ALARM	SEL	MENU	10CPI	15CPI		
OPERATOR ALARM	Paper end alarm	ON	OFF	—	—	—	From, cut sheet or bottom paper end	Set New paper.
	Paper change lever alarm	ON	OFF	—	BLINK 1	OFF	Change lever is set to TOP position while paper is already inserted from rear or bottom.	<ul style="list-style-type: none"> <li>Set the lever to specified position.</li> <li>Check rear sensor lever.</li> <li>Replace Control Board</li> </ul>
	Paper jam alarm	ON	OFF	—	OFF	BLINK 1	<ul style="list-style-type: none"> <li>Cut sheet could not be ejected.</li> <li>Cut sheet could not be fed properly</li> </ul>	<ul style="list-style-type: none"> <li>Remove the paper or check feed Mechanism</li> <li>Press SEL key.</li> </ul>
	Print Head thermal alarm	OFF	—	BLINK 1	—	—	Print head temperature exceeds 119°C	<ul style="list-style-type: none"> <li>Wait until it is cooled.</li> <li>Replace P.H. or Driver Board</li> </ul>
	Space motor thermal alarm	OFF	—	BLINK 1	—	—	Temperature of space motor exceeds specified value.	<ul style="list-style-type: none"> <li>It is recovered automatically</li> <li>Replace SP motor or Driver Board</li> </ul>
FATAL ALARM		BLINK 2	OFF	OFF	See Table 6.3		Hardware Alarm has occurred.	See Table 6.3.

**Note:**

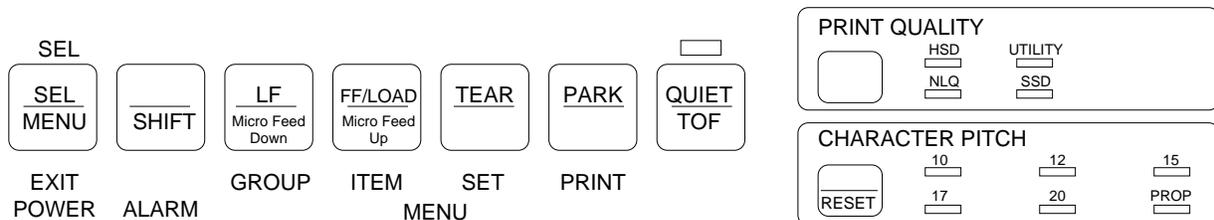
BLINK1 : 400ms ON, 400ms OFF

BLINK2 : 200ms ON, 200ms OFF

— : LED is kept in Current Condition (no change)

### (2) Fault alarm display

When the printer detects any of the various alarm states, the information is displayed as shown below on the operation panel. The alarm is specified by lamp combination of PRINT QUALITY and CHARACTER PITCH. (See Table 6.3 for details.)



**Figure 6-1**

(3) Fatal Alarm

Table 6.3 (1/2)

ALARM CATEGORY	ALARM	LED DISPLAY										REMARKS	TROUBLESHOOTING	
		ALARM	10	12	15	17	20	PROP	HSD	UTL	NIQ			
MAIN CONTROL ALARM	MPU internal RAM alarm	◎	○										Read/write error	Replace Control/Power Supply Board
	Program ROM alarm	◎			○								Check sum error	Replace ROM or Control/Power Supply Board
	RAM on Control Board alarm	◎					○						Read/write error	Replace Control/Power Supply Board
	EEPROM alarm	◎			○						○		No reaction when MPU reads data	Replace Control/Power Supply Board
FIRMWARE DETECTION ALARM	WDT (Watch Dog Timeout) alarm	◎				○							MPU is locked up and it is reset after 65ms.	Turn the power OFF and ON or replace Control/Power Supply Board
	NMI signal alarm	◎				○					○		NMI port of MPU is kept low level.	Turn the power OFF and ON or replace Control/Power Supply Board
	BRK instruction alarm	◎				○					○		FFFF data is detected due to MPU locked up.	Replace ROM or Control/Power Supply Board
SERIAL INTERFACE ALARM	MPU internal RAM alarm	◎	○										Read/write error	Replace I/F Board
	ROM alarm	◎			○						○		Check sum error	Replace ROM on I/F board or I/F Board
	RAM on I/F board alarm	◎								○			Read/write error	Replace I/F Board
	I/F not mounted	◎											No reaction from serial I/F board	Replace I/F Board or Control Board.

◎ : LED Blink (200ms ON, 200ms OFF)

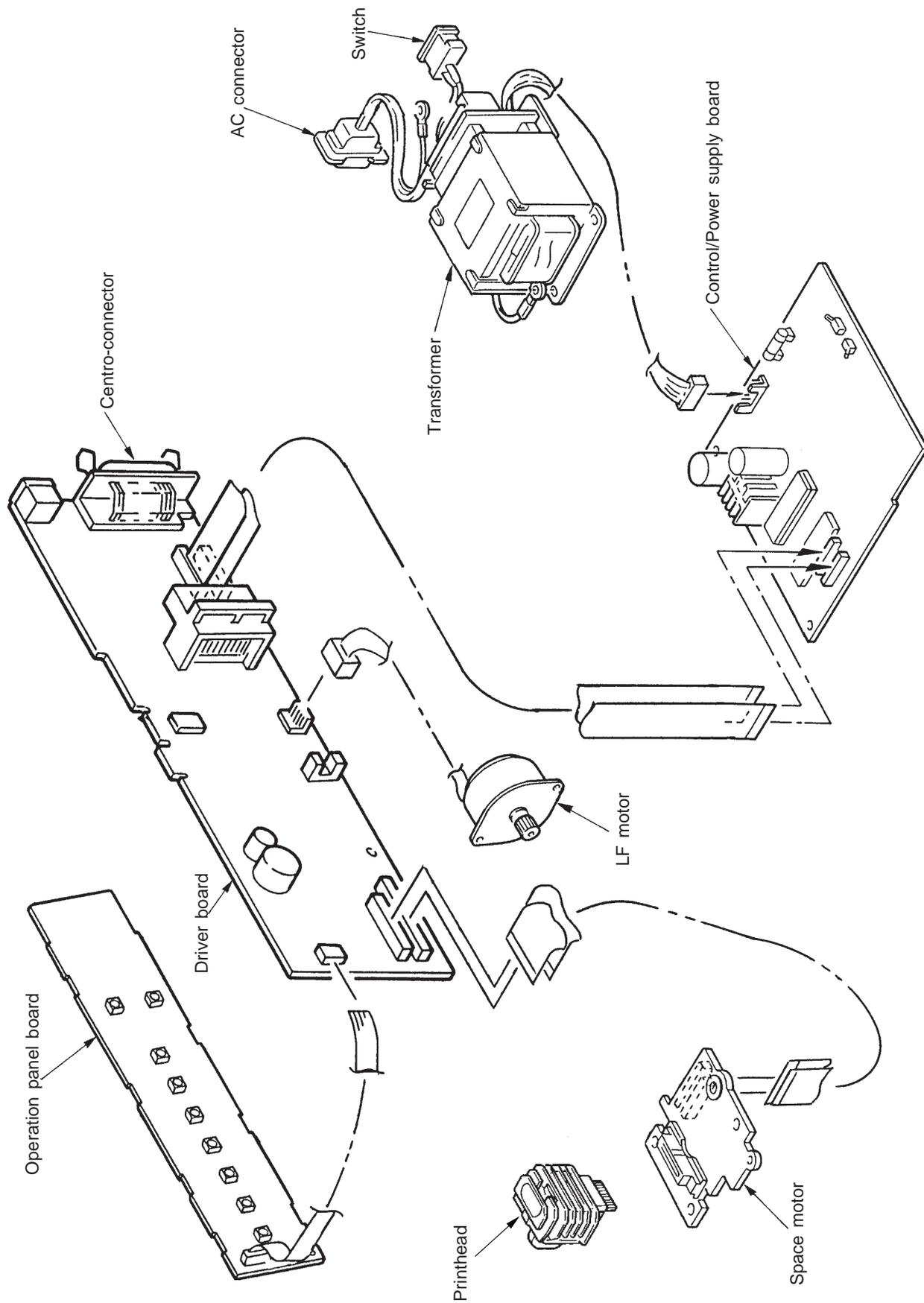
○ : LED Lights up

Table 6.3 (2/2)

ALARM CATEGORY	ALARM	LED DISPLAY										REMARKS	TROUBLESHOOTING			
		ALARM	10	12	15	17	20	PROP	HSD	UTL	NLQ					
SPACING ALARM	Spacing alarm	☉										○				<ul style="list-style-type: none"> <li>• Replace space motor.</li> <li>• Replace P.H. cable.</li> <li>• Replace Control/Power Supply Board</li> <li>• Check the mechanisms if load is too much.</li> </ul>
	Print Head homing alarm	☉											○			<ul style="list-style-type: none"> <li>• Print head does not reach to the home position.</li> </ul>
PRINT HEAD ALARM	Print Head A/D alarm	☉								○						<ul style="list-style-type: none"> <li>• Check the P.H. connection.</li> <li>• Replace Print Head.</li> <li>• Replace P.H. cable.</li> <li>• Replace Control/Power Supply Board</li> </ul>
	Print Head Gap A/D alarm	☉											○			<ul style="list-style-type: none"> <li>• Replace P.H. cable.</li> <li>• Replace Space Motor Assy.</li> <li>• Replace Control/Power Supply Board</li> </ul>

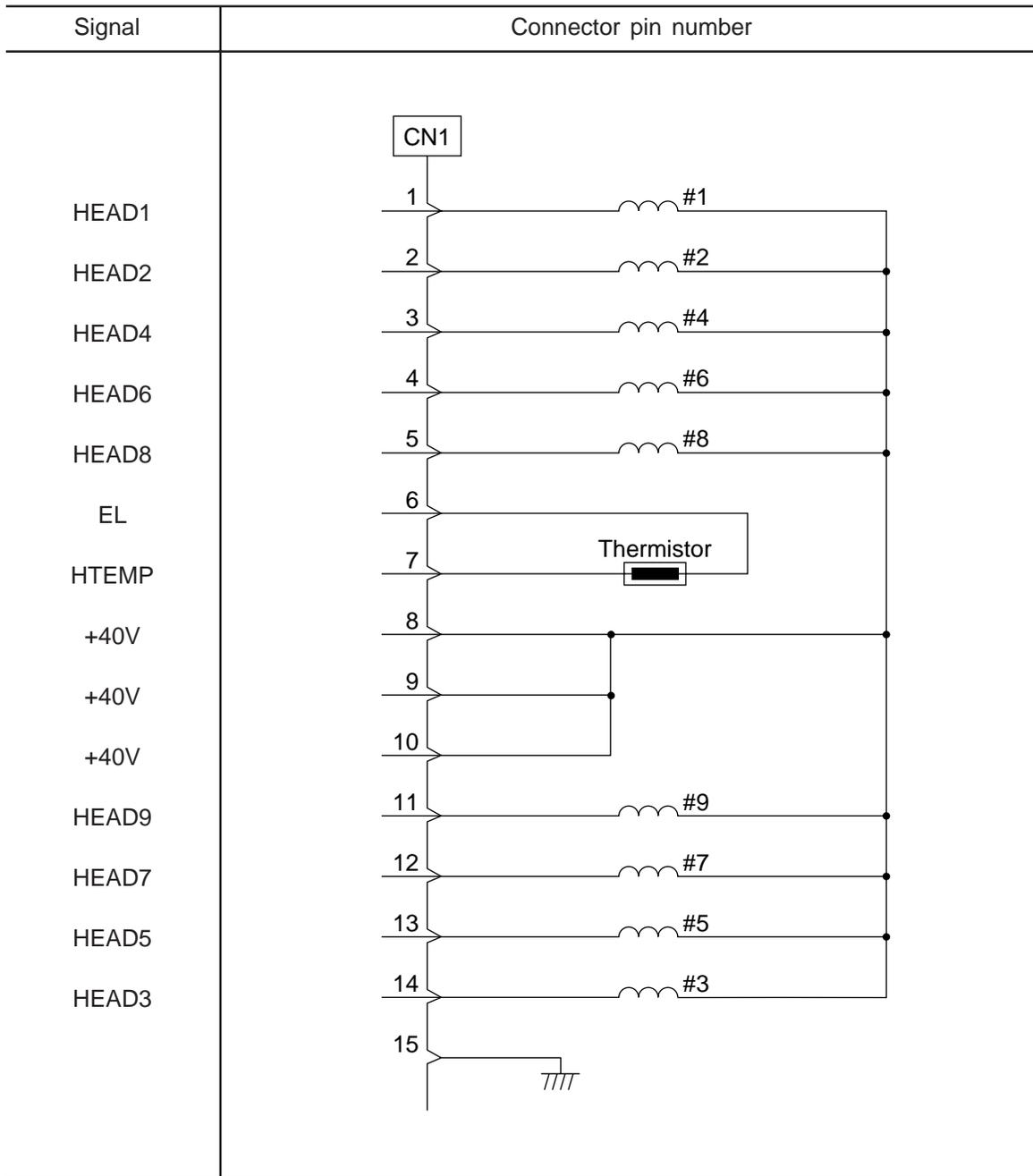
☉ : LED Blink (200ms ON, 200ms OFF)

○ : LED Lights up



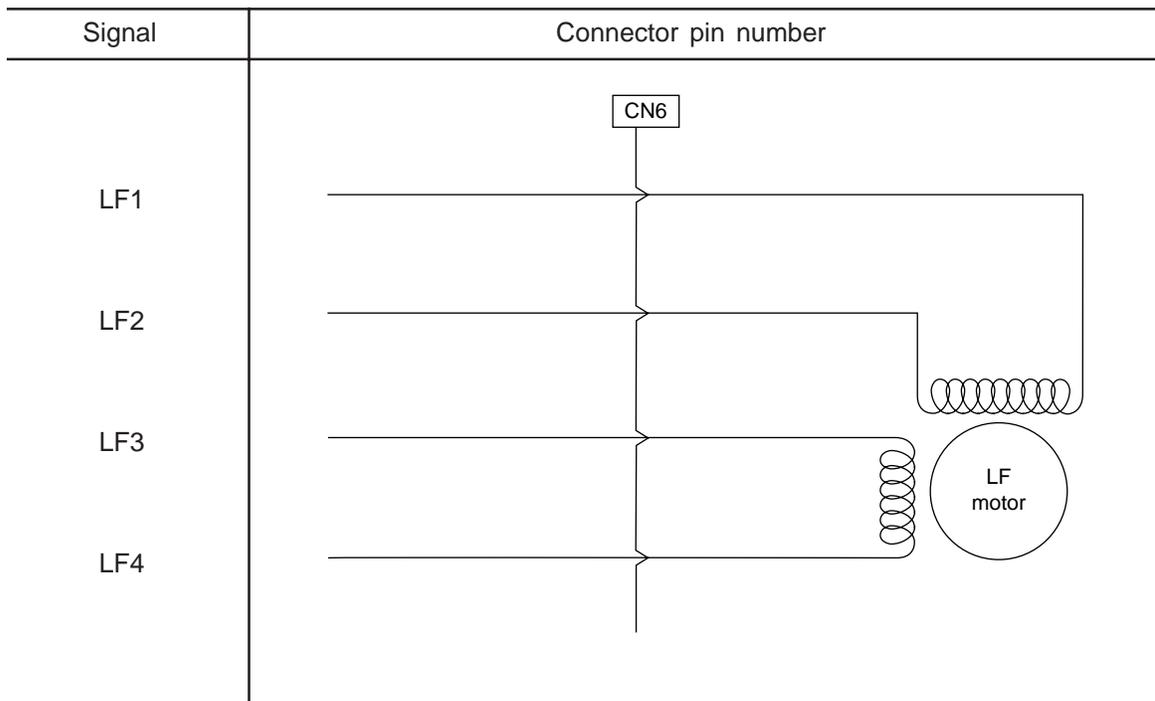
## 6.4 Connection Circuit Check for Printhead and SP/LF Motor

### (1) Printhead



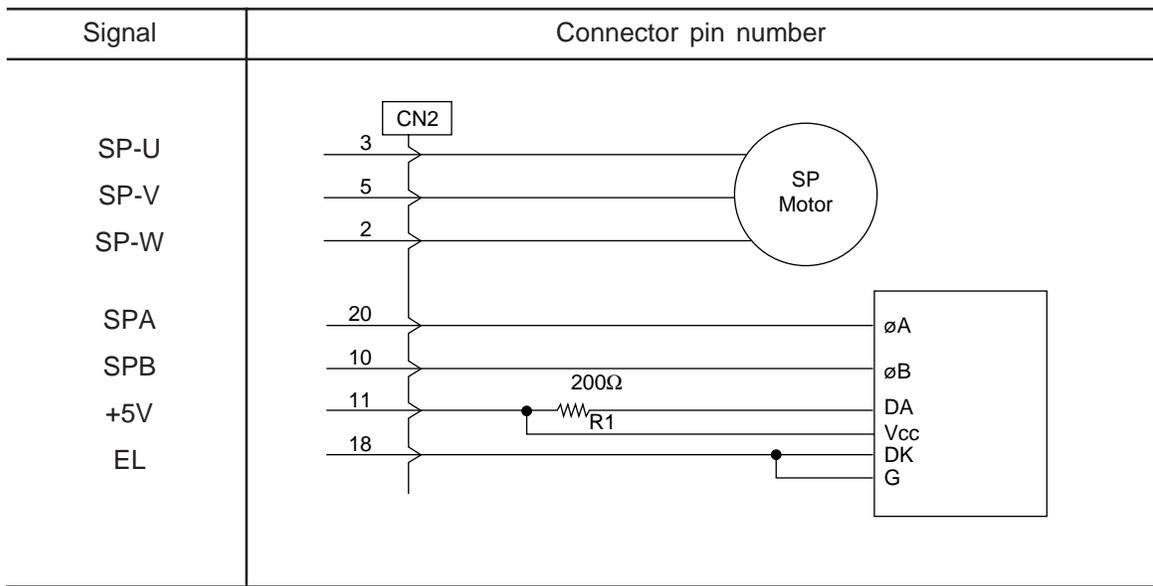
(2) Line Feed Motor

Resistance of each coil should be about  $7.6\Omega$ .



(3) Space Motor

Resistance of each coil should be about 5Ω.



## 6.5 Troubleshooting Flow Chart

1 Power is not supplied.

- Is the AC cable connected correctly?

Yes No

- Connect the AC cable correctly.

- Is fuse F1 on the transformer assy/or F1 on the control/power supply board blown?

No Yes

- Replace fuse (with same type and rating).
- Remedied?

No Yes

- End

- Does DC + 8V out?

No Yes

- Turn power off, remove printhead, then turn on.
- Remedied?

No Yes

- Replace printhead.
- End

- Replace carriage cable or ribbon feed mechanism.

- Remedied?

No Yes

- End

- Replace control/Power supply board.

- Remove CN3 on driver board.

- Measure for any short circuits between + 5V, + 40V, + 8V, 0V (EL or EP).

- Any short circuit?

No Yes

•

No Yes



- Replace driver board.



- Replace transformer assy.



- Remedied?

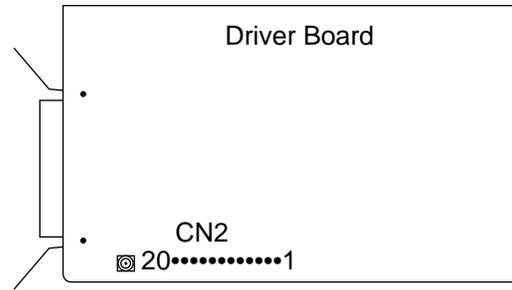
No Yes



- End



- Replace control/power supply board.



Pin No.	20	19	18	17	16	15	14	13	10	9	8	7	6	5
Signal	+8V	EP (F.G)			+40V			AC 10V		EL (0V)		+5V		

2 **No spacing operation** (The alarm LED Blinks)

- Is carriage assembly binding or jammed?

No      Yes



- Check for dust build-up around space motor, between the teeth of the space rack, back up roller, ribbon feed mechanism, and carriage frame etc.
- Replace space motor assy.

- Remedied?

No      Yes



- End
- Replace driver board.

- Remedied?

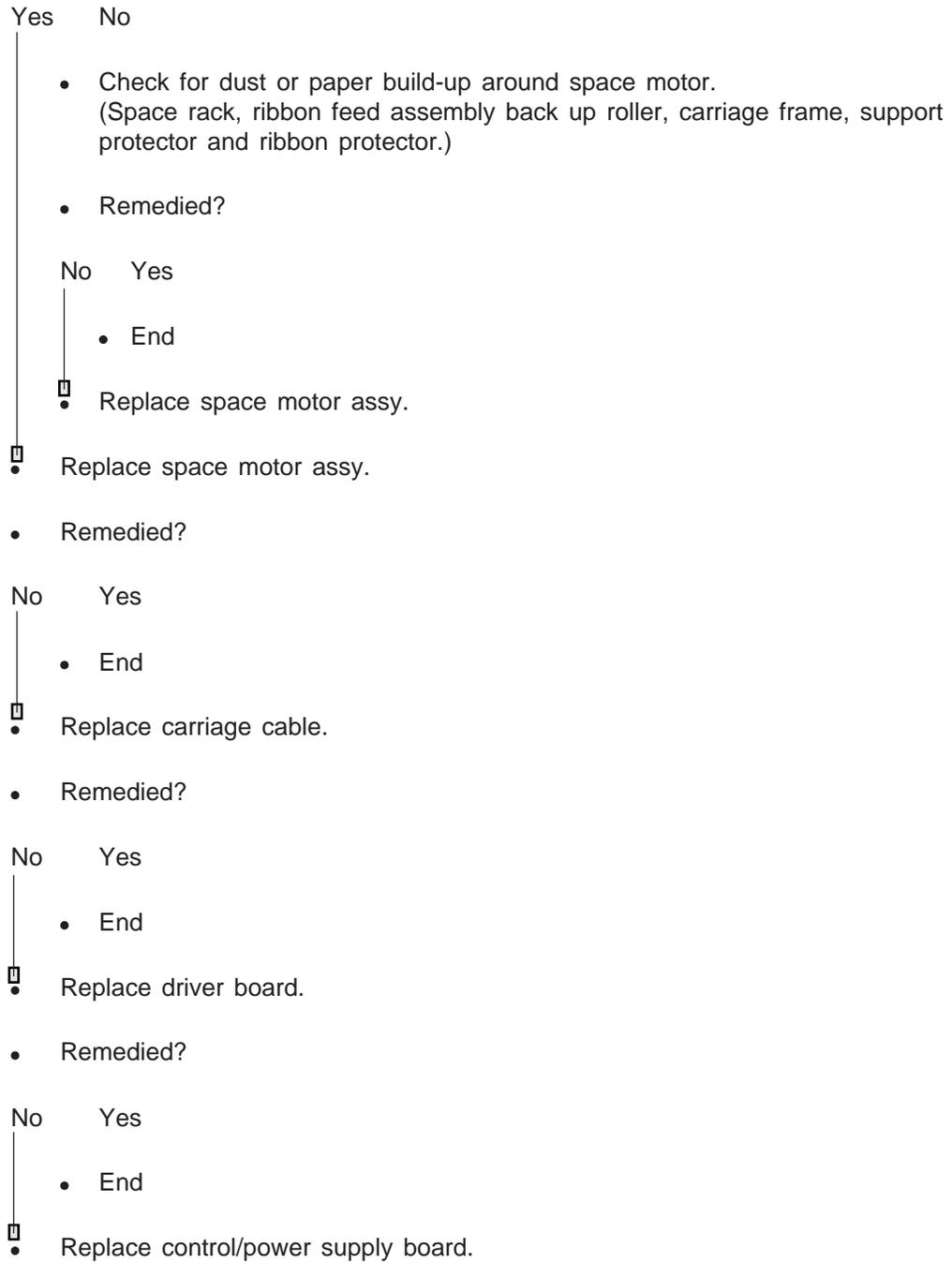
No      Yes



- End
- Replace carriage cable.

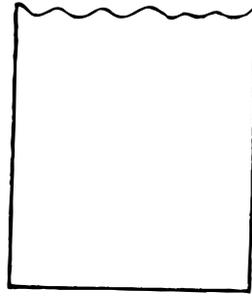
3

Homing does not end normally

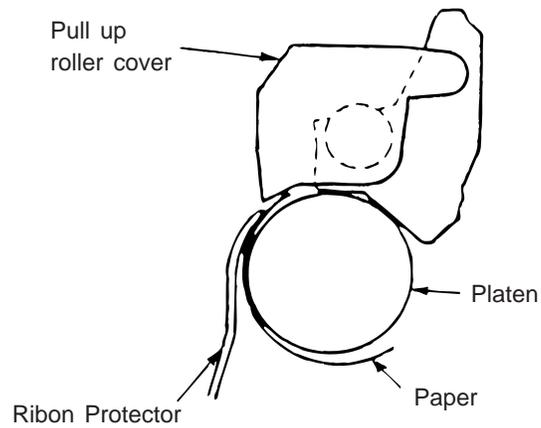


4 Paper jam while paper insertion

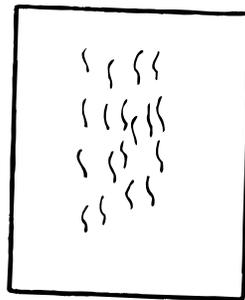
Jam 1



- Check the ribbon protector.
- Make sure the pull up roller cover is closed properly.



Jam 2 (wrinkled paper)



- Check around pressure roller mechanism for the following:
  - Front pressure springs are properly installed (narrow: 3 pcs; wide: 5 pcs).
  - Tension of all of the front pressure rollers is properly set.
  - Make sure the position and fit of the change gear shaft, change arm shaft and release shaft are correct.

- Does ALARM LED blink and display alarm?

No      Yes



- See Tables 6.2 and 6.3 for troubleshooting information.

- Replace printhead.

- Remedied?

No      Yes



- End

- Replace driver board.

- Remedied?

No      Yes



- End

- Replace carriage cable or space motor assy.

6

Faint or dark print

- Is the printhead gap set properly?

Yes    No



- Adjust the printhead gap (see section 5).
- Remedied?

No    Yes



- End



- Replace printhead.

- Remedied?

No    Yes



- End



- Replace driver board.

- Remedied?

No    Yes



- End



- Replace ribbon feed mechanism.

7

Ribbon feed trouble

- Remove the ribbon cartridge.
- Move carriage to left and right.
- Does the ribbon drive shaft rotate?

No      Yes

- Change ribbon cartridge.
- Remove ribbon feed mechanism.
- Move carriage to left and right.
- Does the ribbon drive shaft rotate?

No      Yes

- Replace Ribbon feed mechanism.
- Replace space motor assy.

- Turn the power off, and rotate the platen manually.
- Does the platen rotate smoothly?

Yes    No

- Is the platen gear (L) broken?

No    Yes

- Replace platen assembly.

- Is the LF motor idle gear broken?

No    Yes

- Replace the LF motor assembly or LF idle gear.

- Is the platen gear (R), idle gear or change gear broken?

No    Yes

- Replace the gear.

- Set change lever to the rear position.

- Does the platen rotate smoothly?

No    Yes

- Replace tractor feed assembly.

- Replace LF motor assembly.

- Replace LF motor assembly.

- Remedied?

No    Yes

- End

- Replace driver board.

9 Malfunction of switch on operation panel

- Is the CN1 of Operation panel connected to the CN3 on the driver board?

Yes    No



- Connect the cable properly.
- Replace operation panel board.
- Remedied?

No    Yes



- End
- Replace driver board.

10 Data receiving failure

- Is the SEL LED blinking?

No Yes

- Printer went into the print suppress mode.  
Wait until printer receives DC1 code, or change the menu item "Print suppress" to "Ineffective" when the function is not required.

- Is the I/F RS232C?

No Yes

- Go to step 10-2

- Does the SEL LED light up?

Yes No

- Press the SEL key.
- Remedied?

No Yes

- Does the printer receive data properly?

No

Yes

- Go to step 10-1
- End

10-1

- Disconnect I/F cable.

- Does the SEL LED light up?

No Yes

- Change menu item "I-prime" to "Invalid," or check for defective cable.

- Replace driver board.

- Remedied?

No Yes

- End

- Replace I/F cable.

10-2 (RS232C I/F)

Printer I/F pin assignment.

Is the correct cable used?

TXD	2 pin,
RXD	3 pin,
SSD	11 pin,
DTR	20 pin,
DSR	6 pin.

Yes      No

- Change I/F cable.

Is the ALARM LED blinking?

No      Yes

- See tables 6.2 and 6.3 for troubleshooting.

Make sure the parameters for RS232C in the menu are correct.

- Baud rate
- Bit length
- Parity
- Protocol
- Busy signal and its polarity

Remedied?

No      Yes

- End

Is + 8V supplied on driver board?

Yes      No

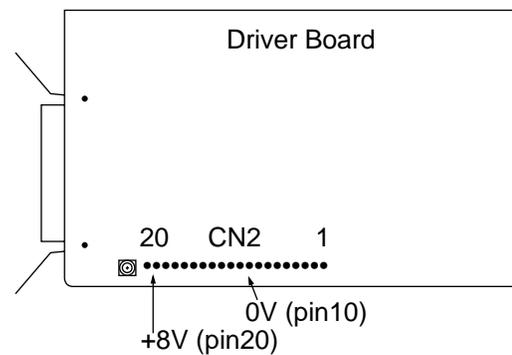
Remove RS232C I/F board.

Is the + 8V supplied on the Driver board?

No      Yes

Replace RS232C I/F board.

Replace driver board.



• Replace RS232C board.

• Remedied?

No      Yes

• End

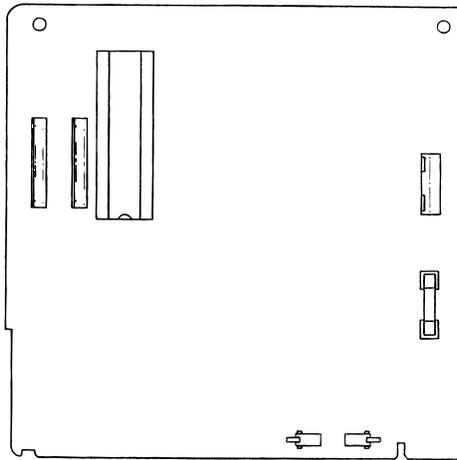
• Replace driver board.

# A. PCB LAYOUT

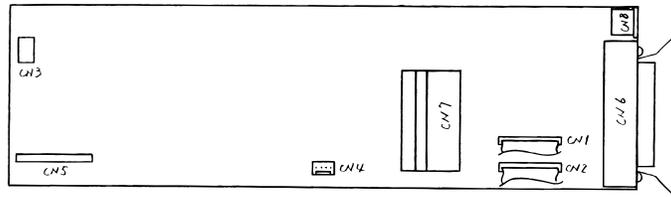
## PCB list

- (1) Circuit board SDCT (Control/Power Supply)
- (2) Circuit board SDDV (Driver)
- (3) Circuit board LEOP-3 (Operation Panel)

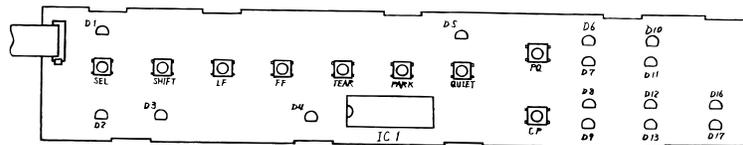
(1)



(2)



(3)



## **B. SPARE PARTS LIST**

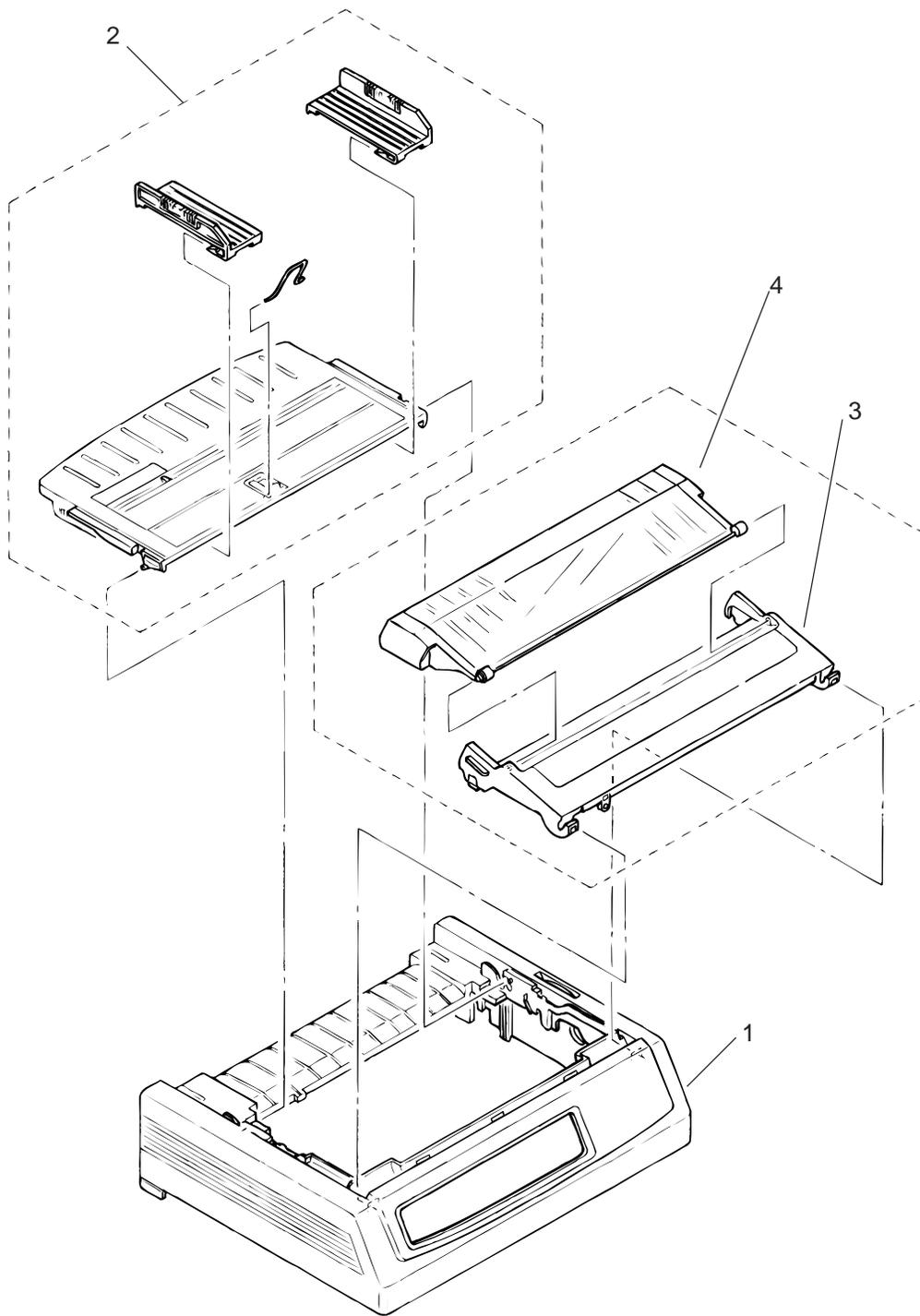


Figure 11-1 Upper Cover Assy

**Figure 11-1 Upper Cover Assy**

No.	Part No.	Description	Q'ty	Q'ty Required	Remarks	ODA P/N
1	1PP4128-1186P6	Upper cover (N)	1	2	For ML320 Turbo	For INT
	1PP4128-1186P4	Upper cover (N)	1	2	For ML320 Turbo	For OEL
	1PP4128-1186P2	Upper cover (N)	1	2	For ML320 Turbo	53076502
	1PP4128-1231P6	Upper cover (W)	1	2	For ML321 Turbo	For INT
	1PP4128-1231P4	Upper cover (W)	1	2	For ML321 Turbo	For OEL
	1PP4128-1231P2	Upper cover (W)	1	2	For ML321 Turbo	53076602
2	1PA4094-7305G10	Sheet guide assy (N)	1	2	For ML320 Turbo	51009409
	1PA4094-7308G11	Sheet guide assy (W)	1	2	For ML321 Turbo	51009510
3	2PA4128-1237G1	Access cover assy (N)	1	2	For ML320 Turbo	53076701
	2PA4128-1241G1	Access cover assy (W)	1	2	For ML321 Turbo	53076801
4	1PP4128-1188P1	Acoustic cover (N)	1	2	For ML320 Turbo	53076901
	1PP4128-1233P1	Acoustic cover (W)	1	2	For ML321 Turbo	53077001

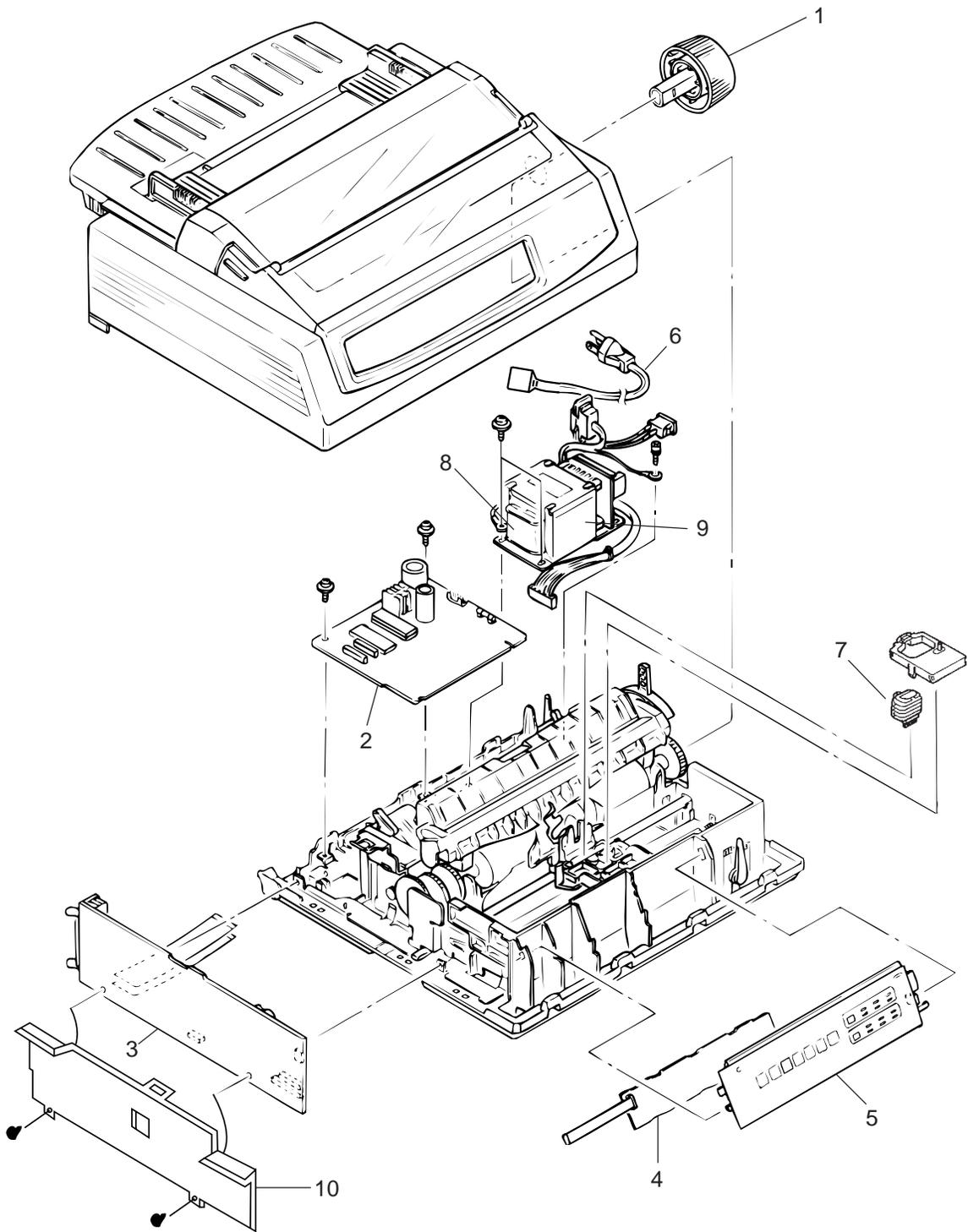


Figure 11-2 Printer General Assy

**Figure 11-2 Printer General Assy**

No.	Part No.	Description	Q'ty	Q'ty Required	Remarks	ODA P/N
1	2PP4025-2871P20	Platen Knob	1	1		51902220
2	4YA4042-1543G301	Control/power supply board (SDCT)	1	9	For ODA/no ROM	55080801
	4YA4042-1543G302	Control/power supply board (SDCT)	1	9	For OEL	
	4YA4042-1543G303	Control/power supply board (SDCT)	1	9	For INT	
3	4YA4042-1549G1	Driver board (SDDV)	1	9	ROM	55080701
4	4YA4042-1516G3	Operator panel board (LEOP-3)	1	3		55081103
5	3PP4044-5360G1	Operation panel w/frame assy	1	2		50221901
6	3YS4011-1315P1	AC cord	1	1	For ODA	56609701
	3YS4011-1266P1	AC cord	1	1	For OEL	
	3YS4011-1329P2	AC cord A	1	1	For INT	
	3YS4011-1269P1	AC cord for 230V	1	1		
7	4YA4023-3301G1	Printhead (9)	1	10		50114601
8	4YB4042-1553P1	Fuse 237002 (125V 2A)	1	10	For 120V	50923102
	4YB4042-1552P1	Fuse 217001 (250V 1A)	1	10	For 230/240V	56307301
9	4YB4049-7103P1	Transformer assy (ML320 Turbo 120V)	1	2		56415301
	4YB4049-7104P1	Transformer assy (ML320 Turbo 230/240V)	1	2		
	4YB4049-7103P2	Transformer assy (ML321 Turbo 120V)	1	2		56415302
	4YB4049-7104P2	Transformer assy (ML321 Turbo 230/240V)	1	2		
10	3PB4050-3429P2	PCB plate	1	2	For 230V	ODA, OEL

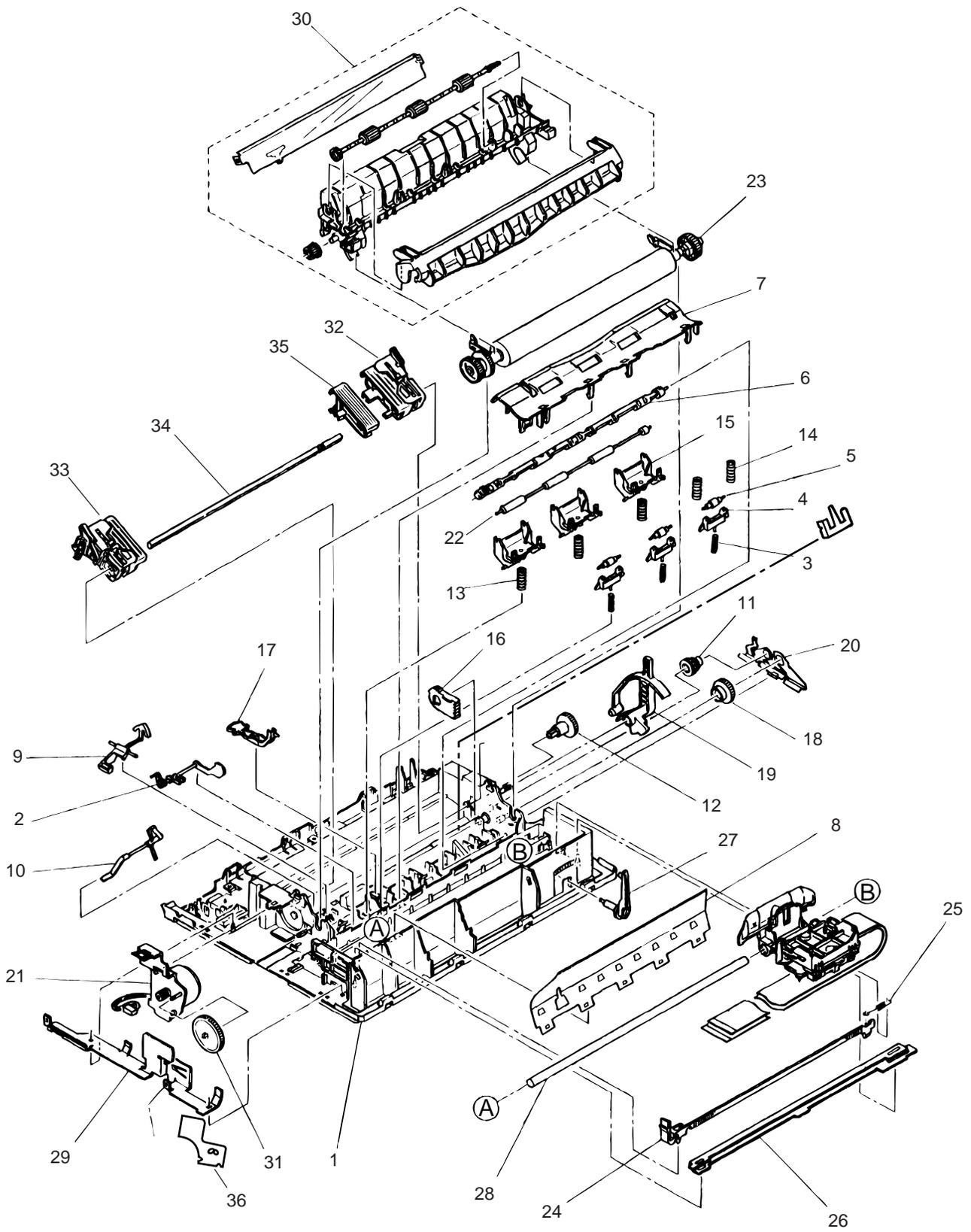


Figure 11-3 Printer Unit

**Figure 11-3 Printer Unit**

No.	Part No.	Description	Q'ty	Q'ty Required	Remarks	ODA P/N
1	3PA4044-5002G2	Main chassis assy (N)	1	2	For ML320 Turbo	53348801
	3PA4044-5152G2	Main chassis assy (W)	1	2	For ML321 Turbo	53348901
2	3PP4044-5012P1	Bottom paper end lever	1	1		50809201
3	4PP4044-5019P1	Pressure spring (F)	3	2	For ML320 Turbo	50931301
	4PP4044-5019P2	Pressure spring (F)	5	4	For ML321 Turbo	50931302
4	4PP4044-5031P1	Roller holder (F)	3	6	For ML320 Turbo	53349001
			5	8	For ML321 Turbo	53349001
5	4PA4025-3327G2	Front pressure roller assy	3	6	For ML320 Turbo	50410901
			5	8	For ML321 Turbo	50410901
6	3PP4044-5015P1	Front release gear shaft (N)	1	2	For ML320 Turbo	51114001
	3PP4044-5157P1	Front release gear shaft (W)	1	2	For ML321 Turbo	51114101
7	1PP4044-5021P1	Paper pan plate (N)	1	2	For ML320 Turbo	53399201
	1PP4044-5158P1	Paper pan plate (W)	1	2	For ML321 Turbo	53349301
8	3PP4025-3320P2	Leaf spring (N)	1	2	For ML320 Turbo	50923002
	3PP4025-3507P2	Leaf spring (W)	1	2	For ML321 Turbo	50923102
9	3PP4044-5011P1	Paper end lever	1	1		50809301
10	3PP4044-5013P1	Sensor lever	1	1		50809401
11	4PP4025-3340P1	Change gear	1	2		51228001
12	3PP4025-3341P1	Tractor gear	1	2		51228101
13	4PP4044-5020P1	Pressure spring (R)	3	2	For ML320 Turbo	50931401
			3	2	For ML321 Turbo	50931401
14	4PP4044-5163P1	Pressure spring (W)	2	1	For ML321 Turbo	50931501
15	3PP4044-5033P1	Roller holder (R)	3	6	For ML320 Turbo	53349101
			5	10	For ML321 Turbo	53349101
16	4PP4044-5017P1	Change arm lever	1	2		50809501
17	3PP4044-5014P1	Switch lever	1	1		50809601
18	4PP4044-5024P1	Idle gear (PLT)	1	2		
19	2PP4044-5016P1	Change lever	1	2		51238501
20	3PP4044-5023P1	Reset spring D	1	2		50931601
21	3PA4044-5110G1	LF motor assy	1	4		56513601
22	3PP4044-5034P1	Rear pressure roller (N)	1	2	For ML320 Turbo	53349401
	3PP4044-5162P1	Rear pressure roller (W)	1	2	For ML321 Turbo	53349501

No.	Part No.	Description	Q'ty	Q'ty Required	Remarks	ODA P/N
23	3PA4044-5025G2	Platen assy (N)	1	3	For ML320 Turbo	50114801
	3PA4044-5159G2	Platen assy (W)	1	3	For ML321 Turbo	50114901
24	3PP4044-5010P1	Space rack gear (N)	1	3	For ML320 Turbo	53349601
	3PP4044-5156P1	Space rack gear (W)	1	3	For ML321 Turbo	53349701
25	4PB4025-3377P2	Tension spring for space rack	1	1		50923502
26	3PP4044-5008P1	Guide rail plate (N)	1	1	For ML320 Turbo	51022201
	3PP4044-5155P1	Guide rail plate (W)	1	1	For ML321 Turbo	51022301
27	3PP4025-2810P2	Adjust cam	1	1		51238601
28	4PP4044-5009P1	Carriage shaft	1	1	For ML320 Turbo	51114201
	4PP4044-5009P2	Carriage shaft	1	1	For ML321 Turbo	51114202
29	3PP4044-5005P1	FG plate (L)	1	1		
30	3PA4044-5050G1	Pull-up roller assy (N)	1	2	For ML320 Turbo	50411001
	3PA4044-5165G1	Pull-up roller assy (W)	1	2	For ML321 Turbo	50411101
31	4PP4044-5115P1	Idle gear, LF (9)	1	4		51238701
32	4PA4044-5041G2	Tractor frame assy (R)	1	2		53350302
33	4PA4044-5043G2	Tractor frame assy (L)	1	2		53350202
34	4PP4025-3335P3	Drive shaft, tractor (N)	1	2	For ML320 Turbo	51114403
	4PP4025-3335P4	Drive shaft, tractor (W)	1	2	For ML321 Turbo	51114404
35	3PP4044-5046P1	Tractor sheet guide	1	2	For ML321 Turbo	51022901
36	4PB4044-5095P1	FG plate (A)				51022401

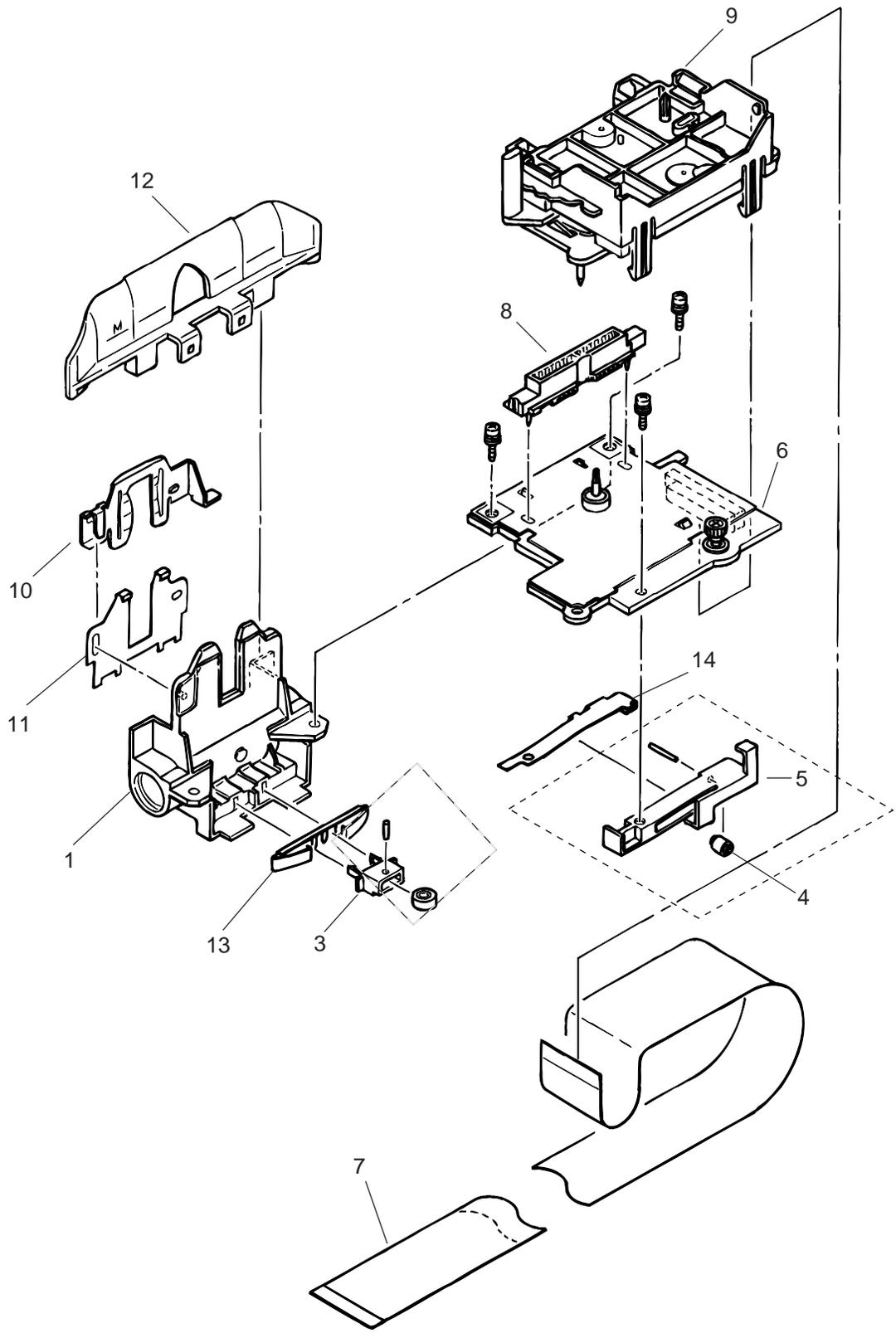
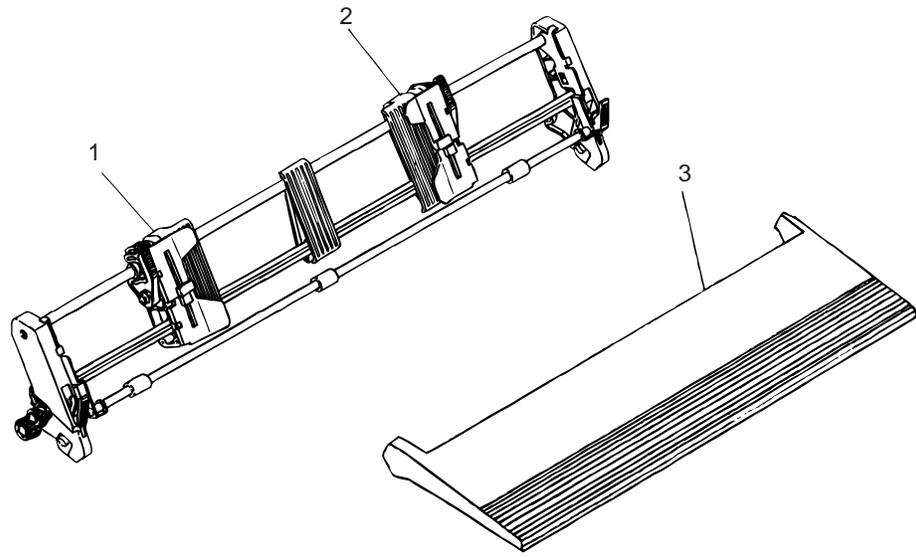


Figure 11-4 Carriage Assy

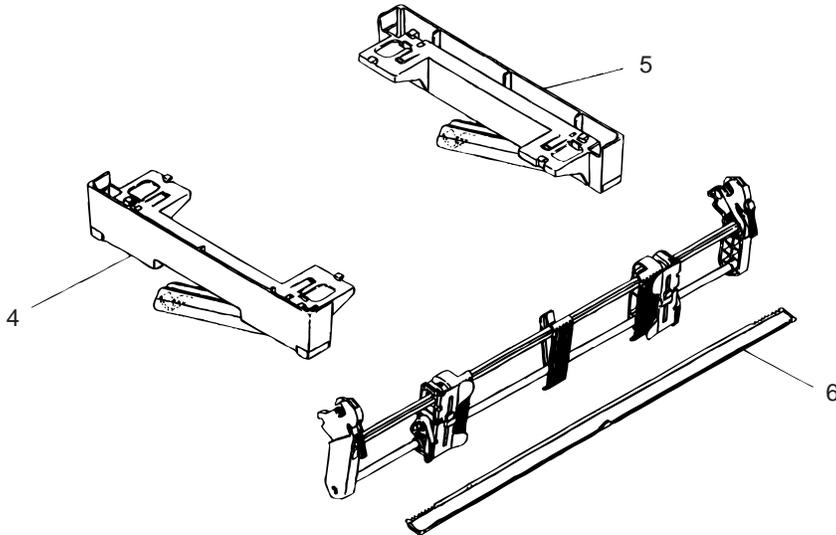
**Figure 11-4 Carriage Option Assy**

No.	Part No.	Description	Q'ty	Q'ty Required	Remarks	ODA#
1	4PP4044-5061G1	Carriage frame set	1	2		53349801
2	_____	_____	_____	_____	_____	_____
3	4PA4025-3718G1	Back up roller holder assy	1	2		53343201
4	4PP4025-3398P1	Guide roller	1	2		53341901
5	3PP4044-5065P1	Guide roller holder	1	2		53350101
6	4YA4044-5100G1	Space motor assy	1	4		56513701
7	3PB4044-5506P1	Head cable (9N)	1	5	For ML320 Turbo	56633801
	3PB4044-5507P1	Head cable (9W)	1	5	For ML321 Turbo	56633802
8	3PB4044-5125P1	15-pin connector	1	2		56731301
9	3PA4044-5070G1	Gear cace assy	1	3		51238801
10	3PP4044-5068P1	Head clamp	1	1		50709001
11	4PP4044-5067P1	Head plate	1	1		51022501
12	3PP4044-5064P1	Ribbon protector	1	2		53077101
13	4PP4025-3397P1	Back up roller holder spring	1	1		50925001
14	4PP4044-5066P1	Guide roller spring	1	1		50931801

[Pull-Tractor]



[Bottom-Tractor]



[I/F Board]

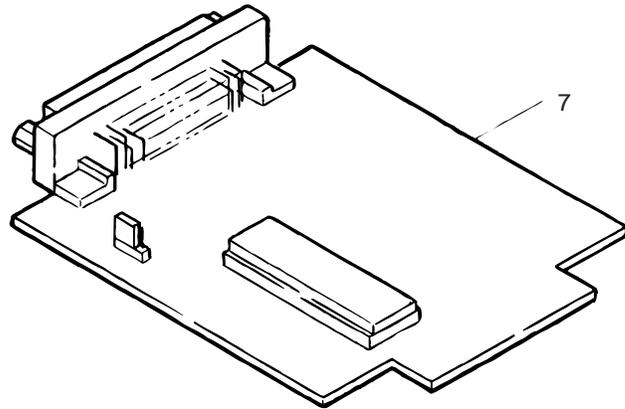


Figure 11-5 Option Spare Parts

**Figure 11-5 Option Spare Parts**

No.	Part No.	Description	Q'ty	Q'ty Required	Remarks	ODA P/N
1	4PA4025-3608G1	Pull and bottom tractor assy (L)	1	2		50098001
2	4PA4025-3603G1	Pull and bottom tractor assy (R)	1	2		50097901
3	2PP4128-1239G1	Tractor cover assy (N)	1	3	For ML320 Turbo	53077201
	2PP4128-1243G1	Tractor cover assy (W)	1	3	For ML321 Turbo	53077301
4	1PA4128-1277G1	Bottom push stand (L)	1	2		51902301
5	1PA4128-1277G2	Bottom push stand (R)	1	2		51902302
6	4PP4094-7385G1	Paper knife (N)	1	1	For ML320 Turbo	50098701
	4PP4094-7386G1	Paper knife (W)	1	1	For ML321 Turbo	50098801
7	4YA4021-1050G1	LXHI-PCB (RS232 I/F)	1	3		

## **APPENDIX C RS-232C SERIAL INTERFACE BOARD**

### **1. GENERAL**

This section describes the operation of the RS-232C Serial Interface board installed in the Printer as an option using a start-stop synchronization and serial communications circuit. This serial interface board is capable of transmitting and receiving simultaneously at speeds up to 19,200 bits per second. Two protocols are available: printer Ready/Busy and X-ON/X-OFF modes.

## 2. OPERATION DESCRIPTION

### 2.1 Element Description

(1) 80C51 with MASK ROM

An eight-bit microprocessor controller that controls the following:

- (a.) Serial interface protocol and data transfer through a serial port.
- (b.) Message buffer.
- (c.) Transmission of parallel data to the printer.

(2) SN75189

An RS-232C standard line receiver

(3) SN75188

An RS-232C standard line driver.

(4) 2764

An 8 kbyte ROM that contains the serial interface control program.

(5) HM6264

An 8192-byte static RAM used as a message buffer.

### 2.2 Circuit Description

A block diagram is shown in Figure C-2-1.

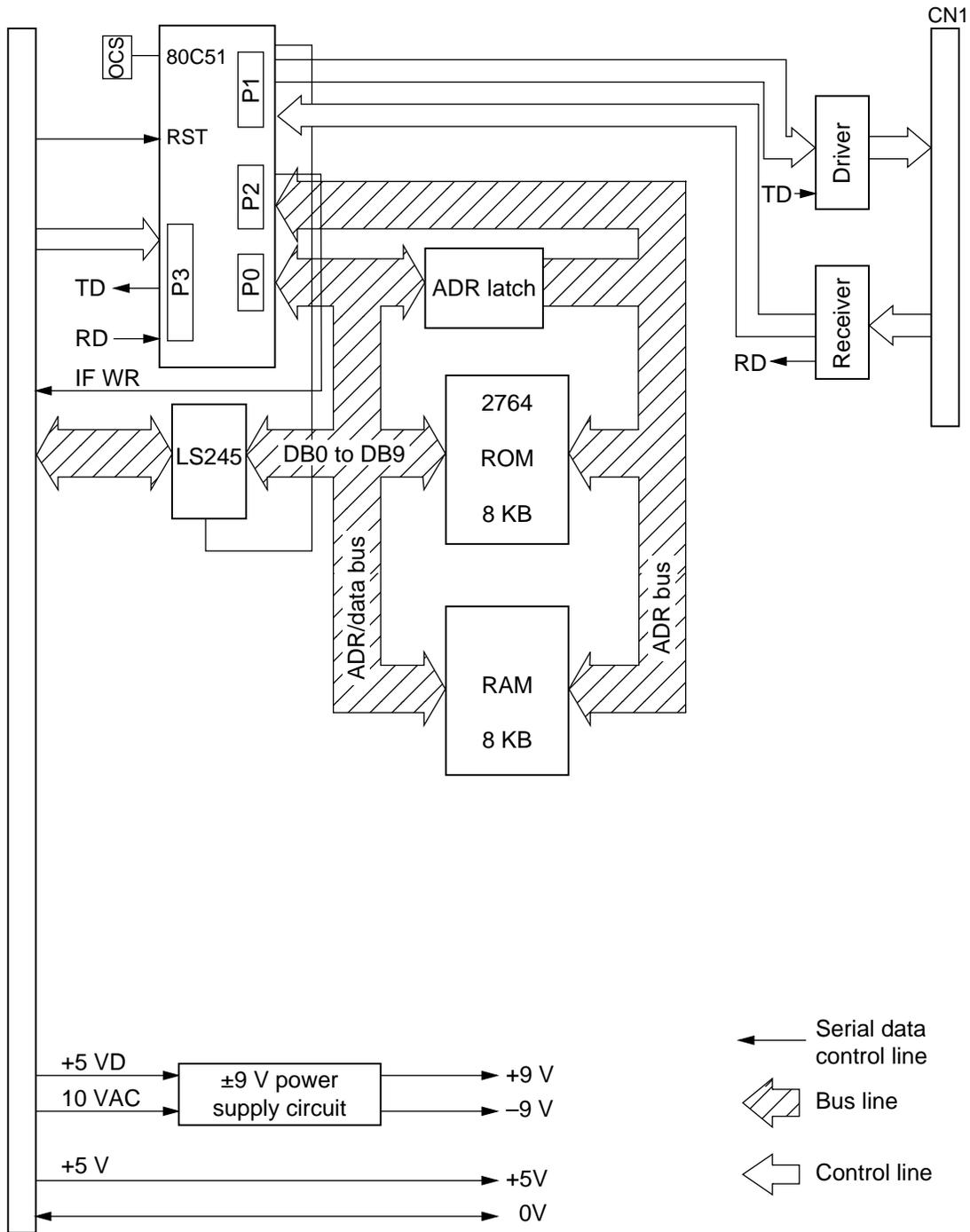


Figure C-2-1 Block Diagram

### 2.2.1 Operation at power on

After power is turned on, an RST OUT signal is sent from the printer control board to reset the printer. When the reset is canceled, the 80C51 CPU performs initialization. Initialization consists of setting the 80C51 timer and setting the serial mode.

### 2.2.2. RS-232C interface

The DTR, SSD, TD and RTS signals output by the 80C51 are converted to RS-232C signals by line driver SN75188 (Q1) and sent to the interface.

In addition, signals DSR, CTS, CD, and RD on the RS232C interface are converted to TTL level by line receiver SN75189 (Q2) and input to the 80C51.

## 2.3 Communication Procedure Flowchart

### 2.3.1 Mode (a)

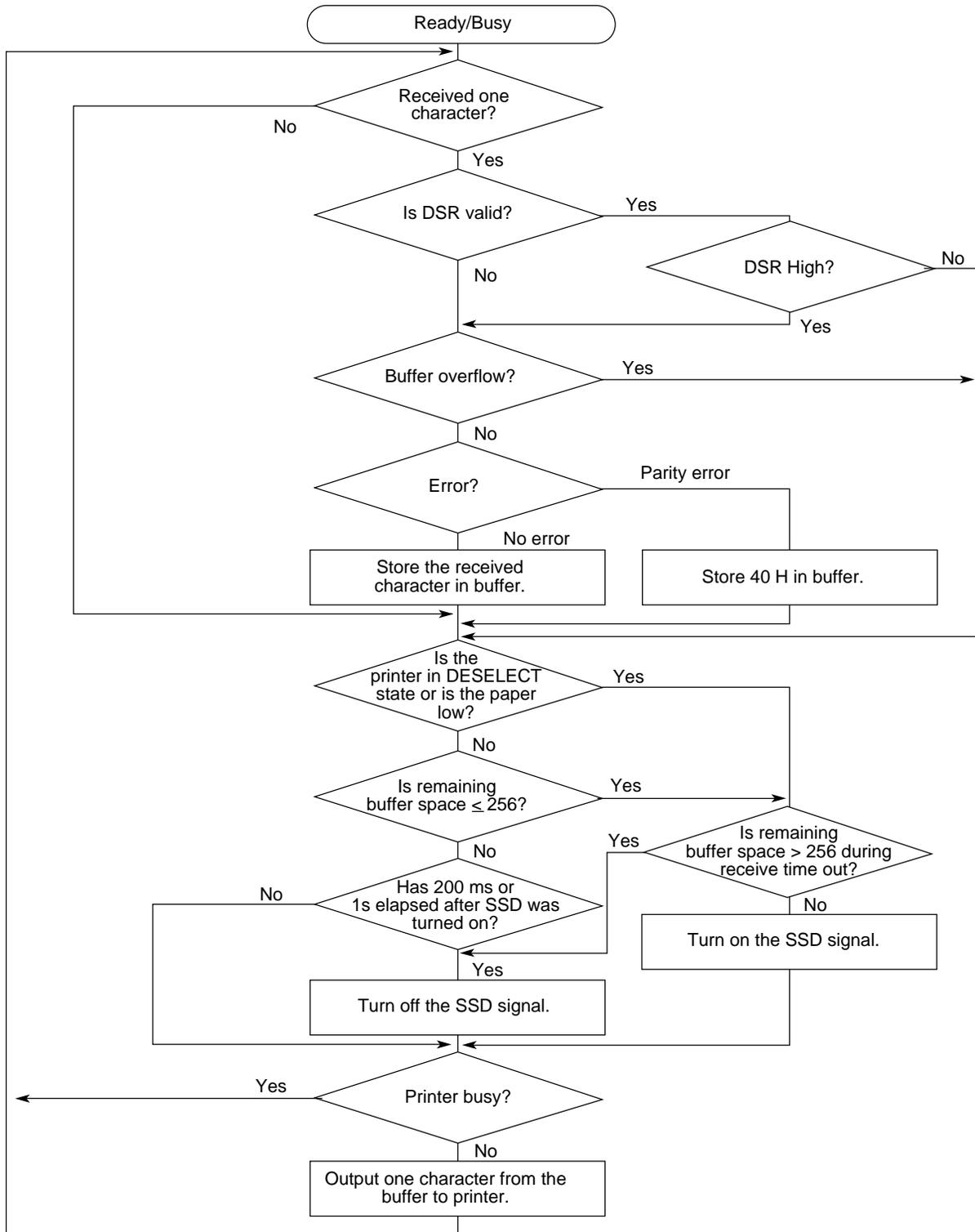


Figure C-2-2

2.3.2 Mode (b)

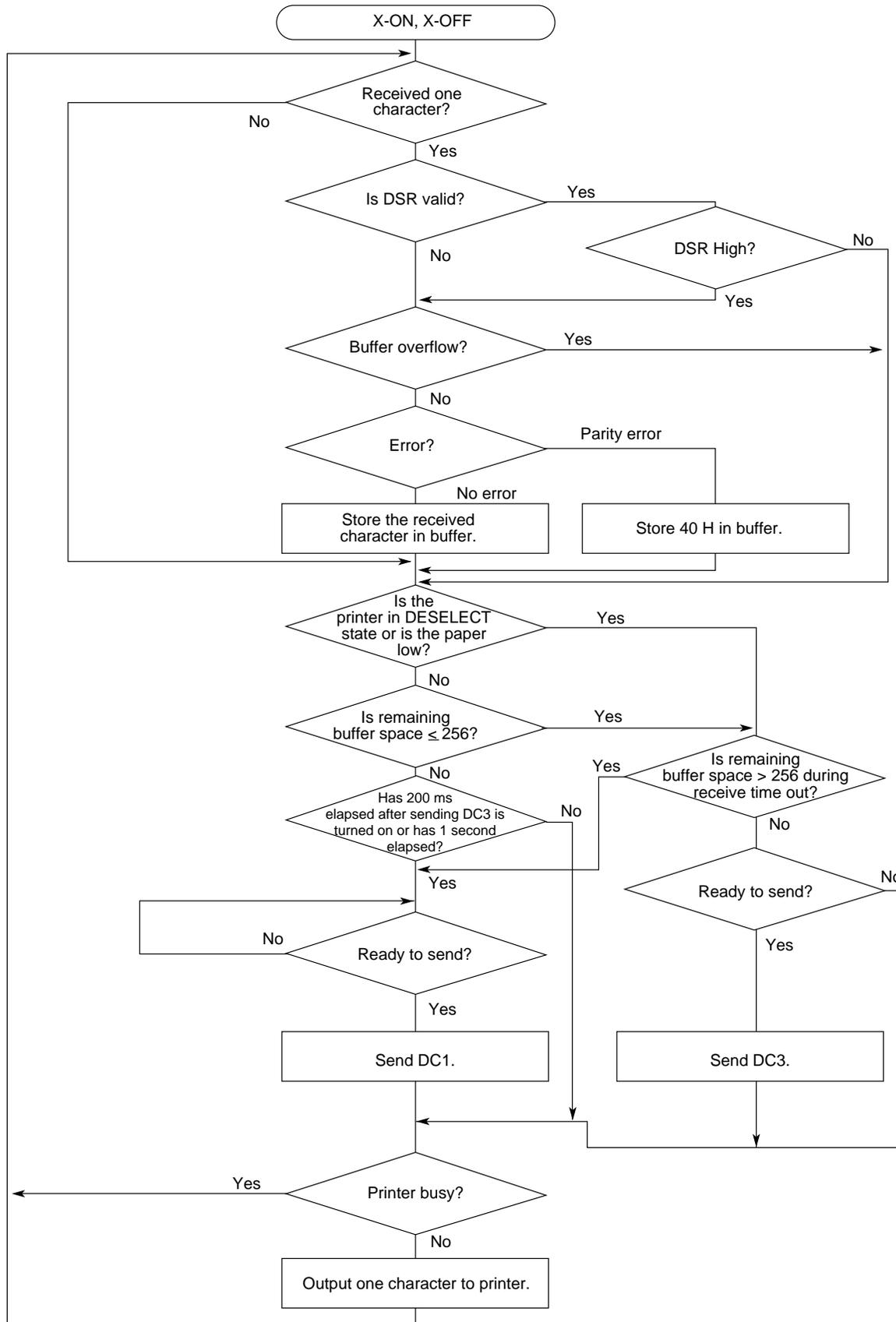


Figure C-2-3

### 3. TROUBLESHOOTING FLOWCHART

#### 3.1 Before Repairing a Fault

Before servicing the printer, ask the customer under what circumstances the trouble occurred and record the response.

Before you start troubleshooting, operate the printer under the same conditions as that at the time of the problem to see if the same trouble occurs again. If not, perform the printer's self test and thoroughly test the printer's functionality. If the trouble is reproducible, proceed to the troubleshooting section.

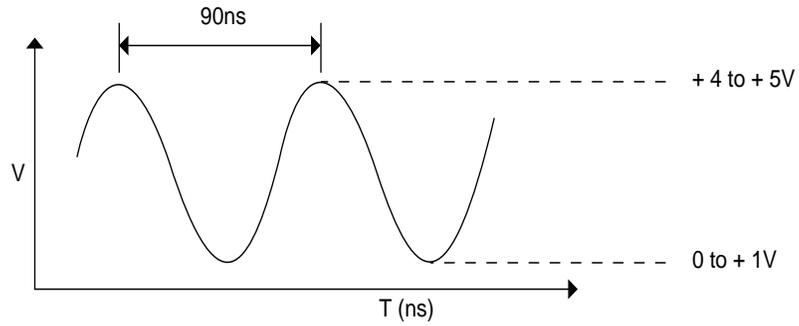
#### 3.2 Troubleshooting

- (1) The data is not received using a serial interface.
- (2) Using a serial interface, the print data is omitted or the print operation is not performed.

1 The data is not received using a serial interface.

(A protocol is set to READY/BUSY state, and BUSY LINE is in SSD + state.)

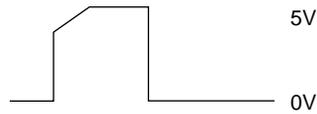
• Is the OSC oscillation waveform as specified in Figure C-3-1?



**Figure C-3-1**

• No Replace the OSC.

□ Yes Is a RST signal in Q3 is as specified in Figure C-3-2?



**Figure C-3-2**

• No Check the RST circuit on the SDCT board.

□  
Ⓐ

A

Yes Are ALE,  $\overline{\text{PSEN}}$ ,  $\overline{\text{RD}}$ ,  $\overline{\text{WR}}$ , signals as specified in Figure C-3-3?

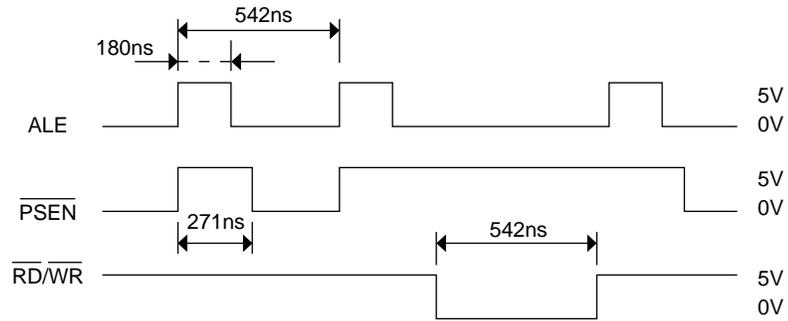


Figure C-3-3

- No Replace the Q3.

Yes Are (T1)  $\overline{\text{SELECT}}$  and (INT0)  $\overline{\text{BUSY}}$  signals low level?

- No Check Q501 on the SDDV board.

Yes Are +9V and -9V input to Q1?

- No Replace defective component in +9/-9 volt control circuit.

Yes Is pin 1 SSD signal of Q3 High level?

- No Replace the Q3.

Yes Is pin 11 SSD of Q1 low level?

- No Replace the Q1 or the CN1 connector.

Yes Is the RxD of Q3 as specified in Figure C-3-4?

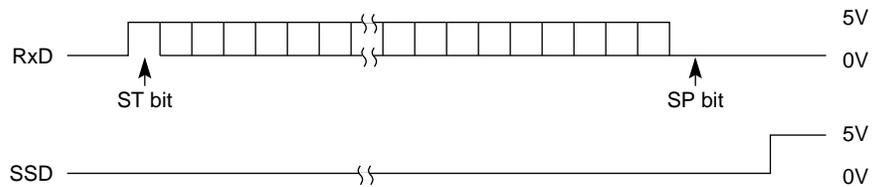


Figure C-3-4

- No Replace the Q2.

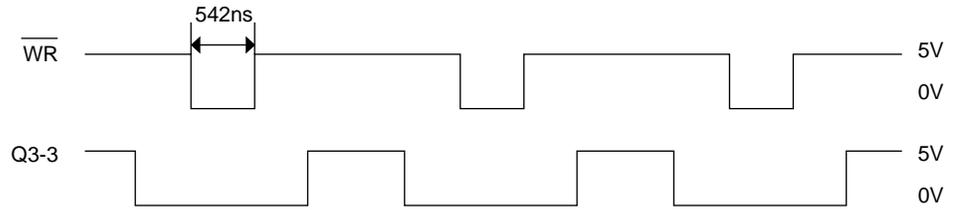
Yes Replace the Q3.

2 In receiving by serial interface, printing data is omitted or printing operation is not performed.

• Are RxD and SSD of Q3 as specified in Figure C-3-4?

• No Replace the Q2.

□ Yes Are,  $\overline{WR}$ , and BUS signals of Q3 pin 3 as specified in Figure C-3-5?



**Figure C-3-5**

• No Replace the Q3.

□ Yes Is the level of BUS signals at Q7 pins 2-9 the same as that of DB0-7 when  $\overline{WR}$  signal is started?

• No Replace the Q7.

□ Yes Is 4 pin of Q6 identical to  $\overline{WR}$  signal in Figure C-3-5?

• No Replace the Q6.

□ Yes Check Q501 in the SDDV PCB.

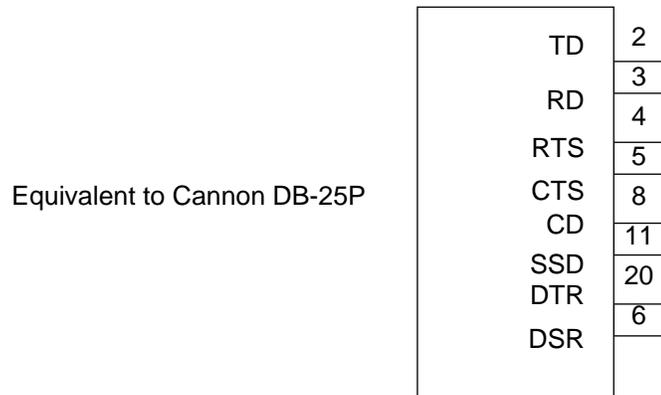
### 3.3 Local Test

#### 3.3.1 Circuit test mode

##### 3.3.1.1 Setting

- (1) Diagnostic test (set by menu)
- (2) Test connector

Connect the test connector shown in Figure C-3-6 to the interface connector CN1 on the LXH1 board



**Figure C-3-6 Test Connector Connection Diagram**

##### 3.3.1.2 Function

After the settings outlined in Section 3.3.1.1 are completed and power is turned on, the serial interface checks the message buffer memory and interface driver/receiver circuit. It then prints characters.

To start and stop this test, push the SEL button on the front of the printer.

Details of this test are explained on the next page.

- (1) The program revision using two numerical characters is printed.
- (2) "LOOP TEST" is printed.
- (3) Memory is checked for the message buffer.
- (4) Prints "OK" is printed if the memory check is OK and "BAD" is printed if the memory check fails.
- (5) Output level to DTR, RTS, and SSD signals is dropped low. If DSR, CTS, or CD signals is High, "IF BAD" is printed. If DSR, CTS, and CD signals are all Low, "IF OK" is printed.
- (6) Output level to DTR, RTS, and SSD signals is raised high. If DSR, CTS, or CD signals is Low, "IF BAD" is printed. If DSR, CTS, and CD signals are all High, "IF OK" is printed.
- (7) Transmits characters codes from 20H to 7FH is transmitted by SD signal. At the same time, characters are received by the RD signal and stored in the message buffer.
- (8) The characters that were stored in the message buffer as indicated in (7) are printed.
- (9) Steps (1) through (8) are repeated until test is interrupted.

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Service Manual**

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