

OKI

PACEMARK 4410 PRINTER

SERVICE HANDBOOK

PREFACE

This maintenance manual describes how to maintain the Pacemark 4410 printer in the field.

This manual is for customer engineers.

For further information, refer to the Users Manual for handling or operating the equipment.

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1. CONFIGURATION

1.1 Basic System Configuration

The basic system configuration of Pacemark 4410 is illustrated in Figure 1.1.

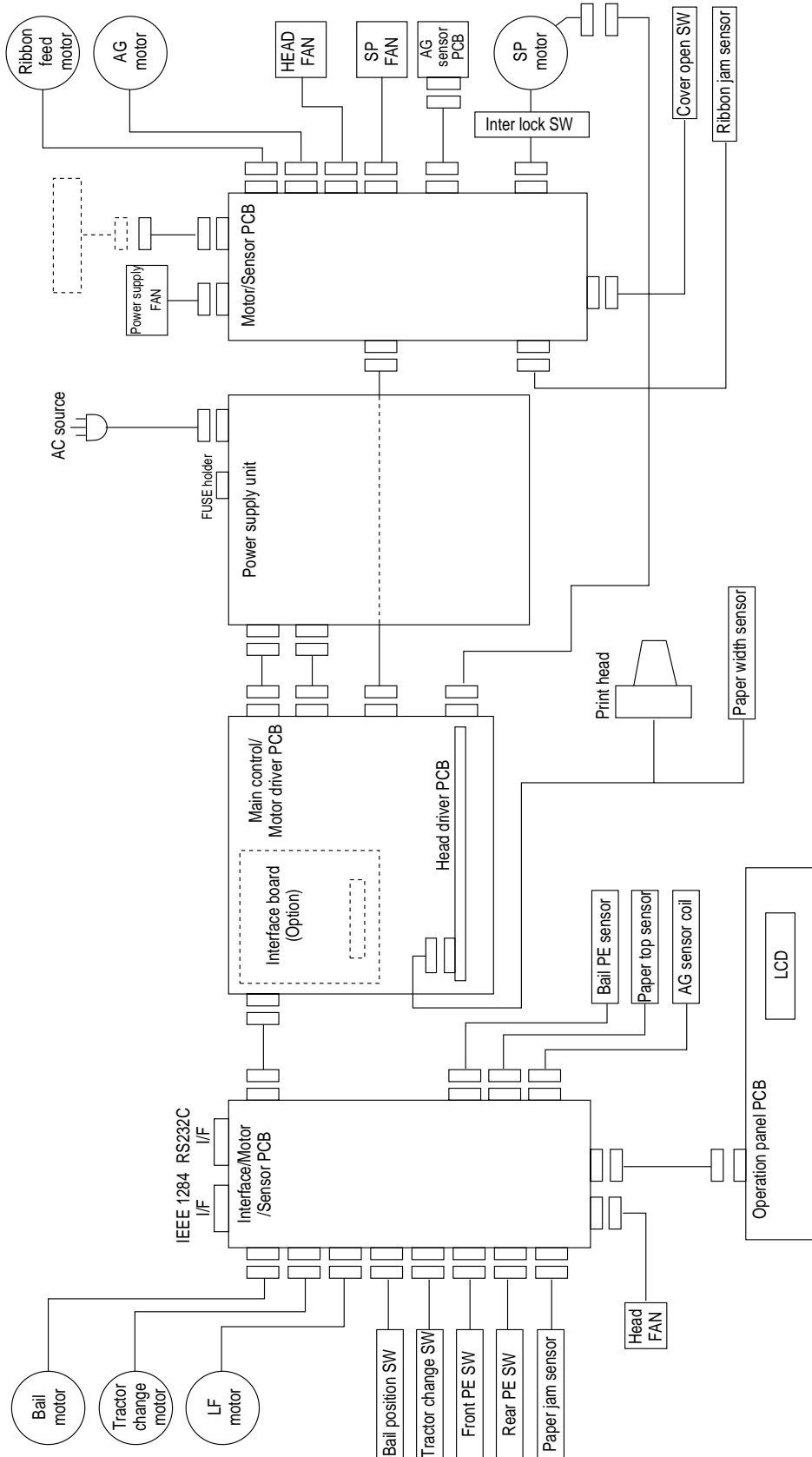


Figure 1.1

1.2 Printer Specifications

This printer unit is composed with the following hardware.

- Printer mechanism
- Main control/Motor driver board
- Head driver board
- Interface/Motor/Sensor board (including IEEE 1284 bidirectional parallel interface and RS-232C serial interface)
- Motor/Sensor and AG sensor boards
- Operation panel board
- Power supply unit
- Covers

Figure 1-2 show the printer unit configuration.

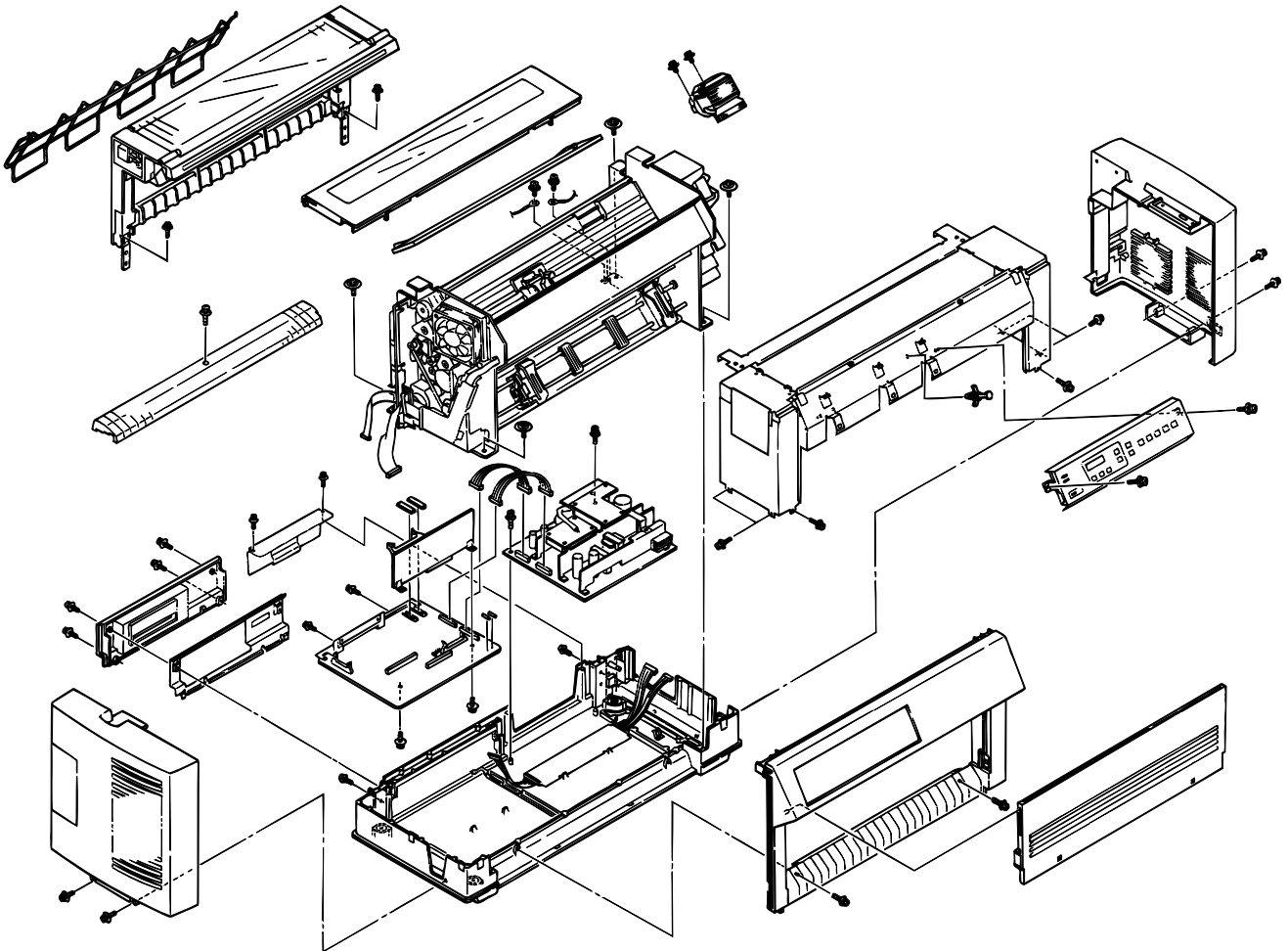
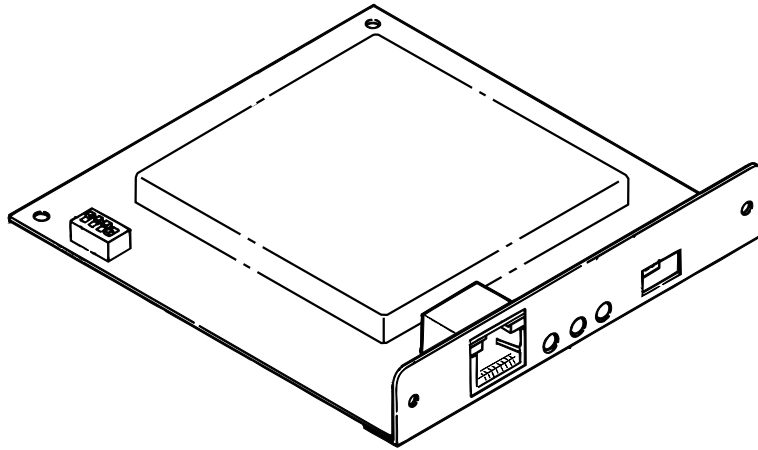


Figure 1.2

1.3 Option Specifications

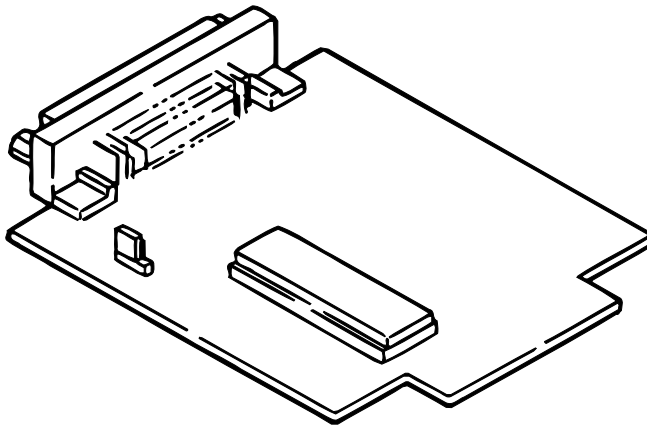
Options available for Pacemark 4410 are as follows.

- (1) Interface boards
 - (a) Oki-HSP (MUPIS) Network card



- (b) 300/500 Series Serial/ HSP Adapter

- RS232C
- RS422A
- Current Loop



1.4 Basic Specifications

- (1) Dimensions
Width: 768mm(30.24inches) Length: 385mm(15.16inches) Height: 358mm(14.09inches)
- (2) Weight
Approx. 42kg (92.6lbs)
- (3) Form
Continuous Paper
One-part paper
Ream weight: 45 to 90g/m² (12 to 24 lb)
Multiple-part paper Max.0.79mm(0.031inches)total thickness(with front feed)
Max.0.36mm(0.014inches)total thickness(with rear feed)

Paper type	Ream weight	Number of sheet
Carbon-lined paper	35 to 40 g/m ² (9 to 11 lbs)	Ten sheet maximum including original (with front feed)
Pressure-sensitive paper		Six sheet maximum including original (with rear feed)
Interleaf paper	Paper 35 to 52 g/m ² (9 to 14 lbs)	Seven sheet maximum including original (with front feed)
	Carbon paper 34 g/m ² (9 lbs)	Four sheet maximum including original (with rear feed)

When 7p or more papers are used for the front tractor, "High Impact Copy" should be selected in the menu mode to print these papers.

Continuous Envelope

Weight : Max. 90 g/m² (24lb)
Thickness : Max. 0.36mm (0.014 inch)
Width : 76.2 - 254mm (3 - 10 inches)
Media supply : Front paper feed only

Card

Weight : Max. 375 g/m² (100lb)
Thickness : Max. 0.20mm (0.008 inch)
Size : 5 x 8 inches (separated)
Media supply : Front paper feed only

Label

Thickness : Max 0.28mm (0.011 inch)
Size : Max. 381 x 83mm (15 x 3.25 inches)
Media supply : Front paper feed only

- (4) Print speed

Print Mode	Character Pitch				
	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
HSD	1066 CPS	1066 CPS	1066 CPS	1066 CPS	1066 CPS
NLQ	200 CPS	200 CPS	200 CPS	200 CPS	200 CPS
UTILITY	800 CPS	800 CPS	800 CPS	800 CPS	800 CPS

(5) Maximum Number of Dot Columns per Line

a) Graphics

Single Density	Double Density	Quadruple Density
816	1,632	3,264

b) Text

Print Mode	Character Pitch (CP)				
	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
ML, EPSON, IBM UTILITY	1,632	1,958	2,448	2,798	3,264
ML, EPSON, IBM NLQ	3,264	3,917	4,896	5,596	6,528
ML, EPSON, IBM HSD	1,224	1,468	1,836	2,098	2,448

(6) Maximum Number of Character per Line

Character Pitch (CPI)	5	6	7.5	8.5	10	12	15	17.1	20
ML EPSON IBM	68	81	102	116	136	163	204	233	272

(7) Printhead

Print method: Impact dot matrix
Number of dot wires: 9 wires x 2 rows
Dot wire diameter: 0.36mm(0.014inch)

(8) Line feed Speed

6 LPI spacing, one LF = 60 ms
8 LPI spacing, one LF = 52 ms
Continuous paper feed rate is 15 inches per second. (at head gap 1, 2)

(9) Line Feed Pitches

6 LPI 0.167 inch (4.23mm)
8 LPI 0.125 inch (3.175mm)
A variable line feed pitch of $n/216$ inch (integer n : $0 \leq n \leq 255$) can also be specified. Also, $7/72$ inch and $n/72$ inch can be specified.
PROPRINTER n : $1 \leq n \leq 255$
EPSON n : $1 \leq n \leq 255$ (Cannot specify MSB : $1 \leq n \leq 127$)

(10) Power Requirements

a) Input power

Single-phase AC
Voltage : 120VAC +5.5%, -15%
 230 VAC \pm 15%
Frequency : 50/60Hz \pm 2%

b) Power consumption

Local Test : Max. 295 W (Rolling ASCII, Utility)
Idle : Max. 15W (Energy Star compliant)

c) AC power cable

Length : Approximately 5.9 It (1.8 m)
Cable conforms to the UL, CSA, and European Standards.

Note : AC power cable is not supplied.

(11) Ambient temperature and relative humidity

	Operating	Non-operating	Storage	Transportation	Unit
Temperature	41 to 95 (5 to 35)	32 to 109.4 (0 to 43)	14 to 122 (-10 to 50)	-40 to 158 (-40 to 70)	°F (°C)
Relative Humidity	20 to 80	10 to 90	5 to 95	5 to 95	%RH

Avoid condensation at all times.

(12) Vibration

Operating : Max. 0.3G (5 to 150 Hz) (except at resonant frequency)
Non-operating : Max. 1G (5 to 150 Hz) (except at resonant frequency)

(13) Impact (Drop Test)

Packing : 12" Drop

(14) Noise

The 8-second average noise is Max. 55 dBA in quiet utility mode. (ISO 7779)

(15) Ribbon

Genuine OKI cartridge ribbon

Ink color : Black

Ribbon life : Approximately 15 million characters (Characters in Utility mode)

(16) Reliability

a) MTBF (mean time between failures)

12,000 hours of power-on time at 25% duty cycle and 35% page density.

b) Printhead life

400 million characters (average) in 10 CPI Utility print mode at 25% duty cycle and 35% page density.

c) Printer life

12,000 hours of power-on time at 25% duty cycle and 35% page density, or 5 years.

d) MTTR

15 minutes, major Sub-assembly level.

Definition of terms

- Duty cycle : Actual operation rate
- Page density : the proportion in area of characters and spaces within print head PPMovable area.
- Power on Time : 8H/day, 25days/month and 12 months/year.

2. THEORY OF OPERATION

2.1 Electrical Operation

The electrical operation of the printer circuit is described in this section.

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 (IC24: 80C186-16)

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

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

It is capable of accessing up to 4M bit program memory and 4M bit of data memory.

The following characteristics are also provided:

- High-Speed DMA Channel x 2
- Programmable Interrupt Controller
- Programmable 16-bit Timer x 3
- Programmable Memory and Peripheral Chip-Select Logic
- Programmable Wait State Generator
- Local Bus Controller

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.

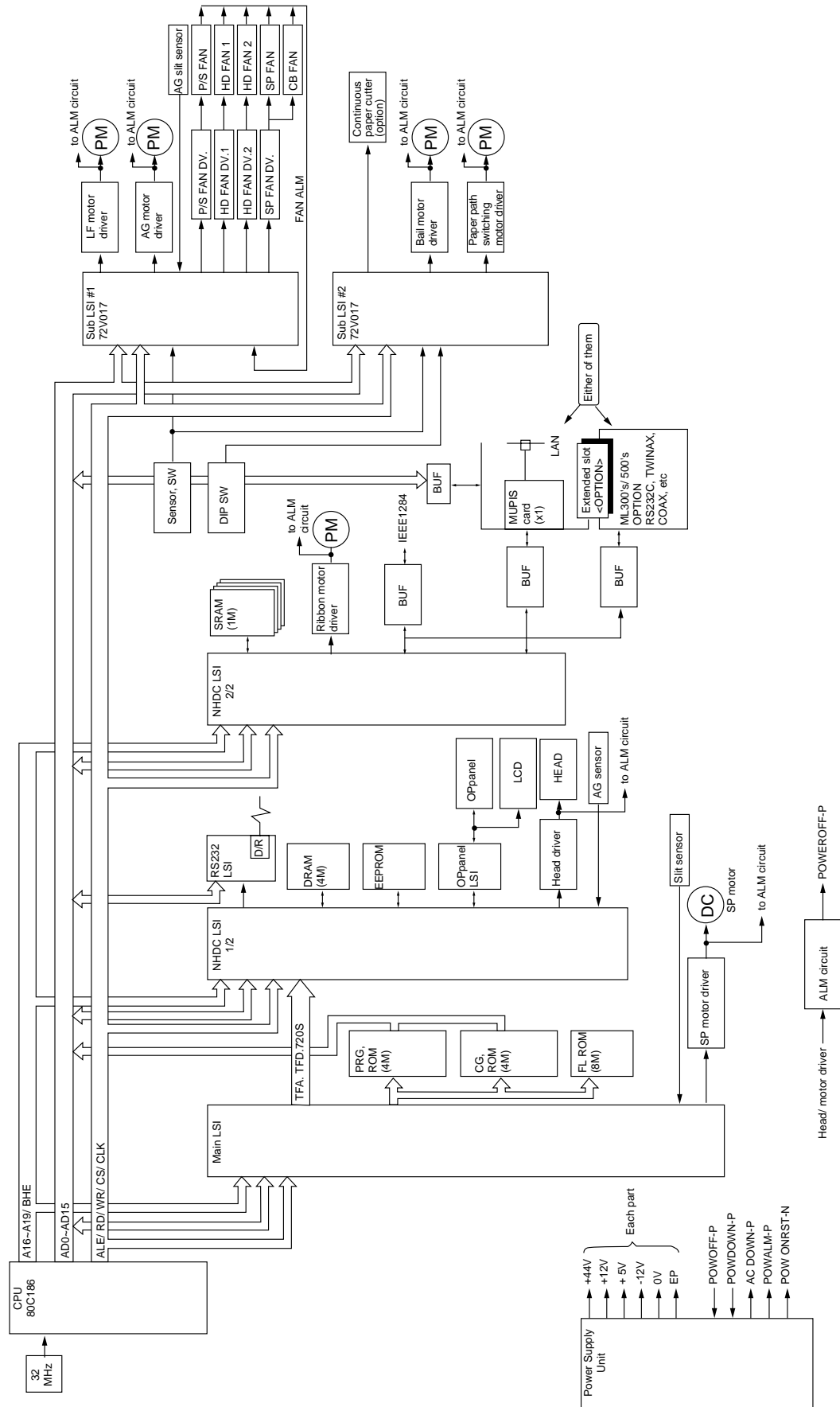


Figure 2.1

(2) PG ROM (IC46)

This is a 256 x 16 bits (4M bit) 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 RD signal of the MPU.

The following shows the operation of the memory access.

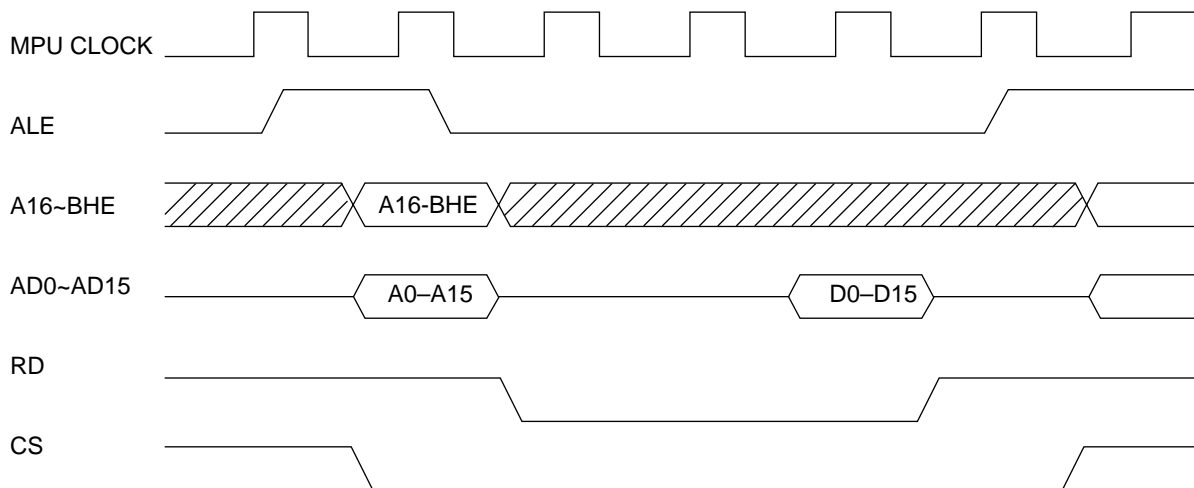
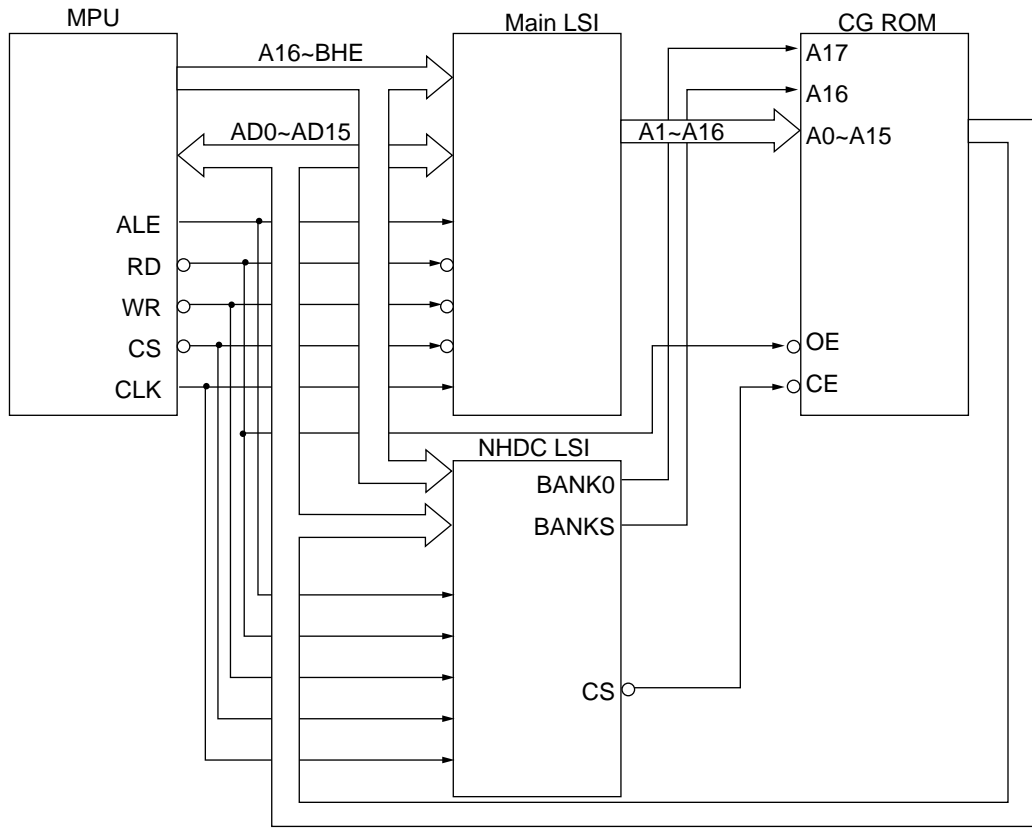


Figure 2.2

(3) DRAM(IC28)

The RAM is CMOS dynamic RAM with (256K x 16 bit) configuration, and used as buffers (such as receiving buffer, printing buffer, DLL buffer and working buffer).
The following shows the examples of the memory access operation.

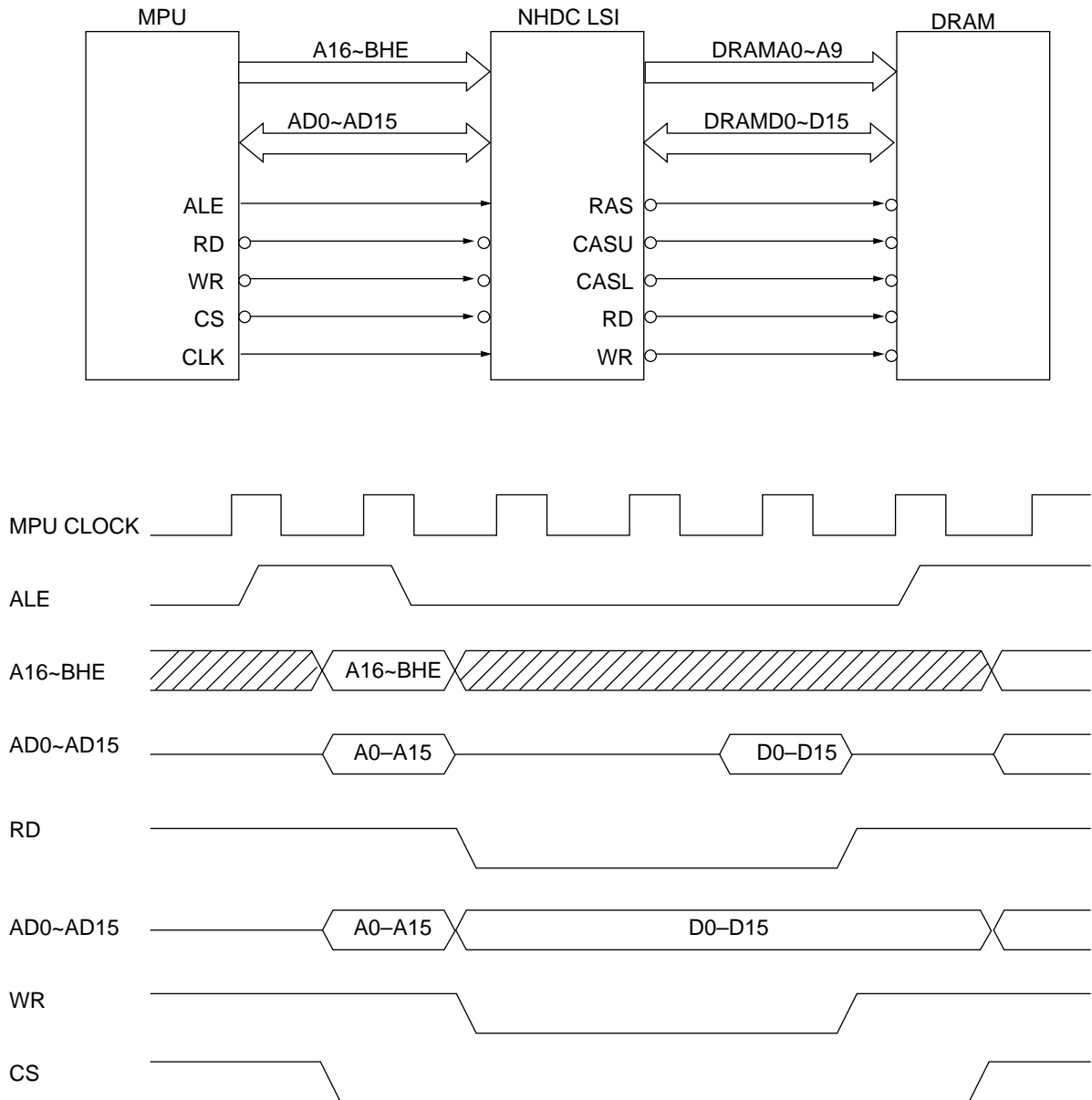


Figure 2.3

(4) CG ROM (IC48)

This is a 256K x 16 bits (4M bits) EPROM with the font data for the characters stored. CG ROM is assigned to the program memory area of the MPU and is fetched by the RD signal of the MPU. The following shows the memory access operation.

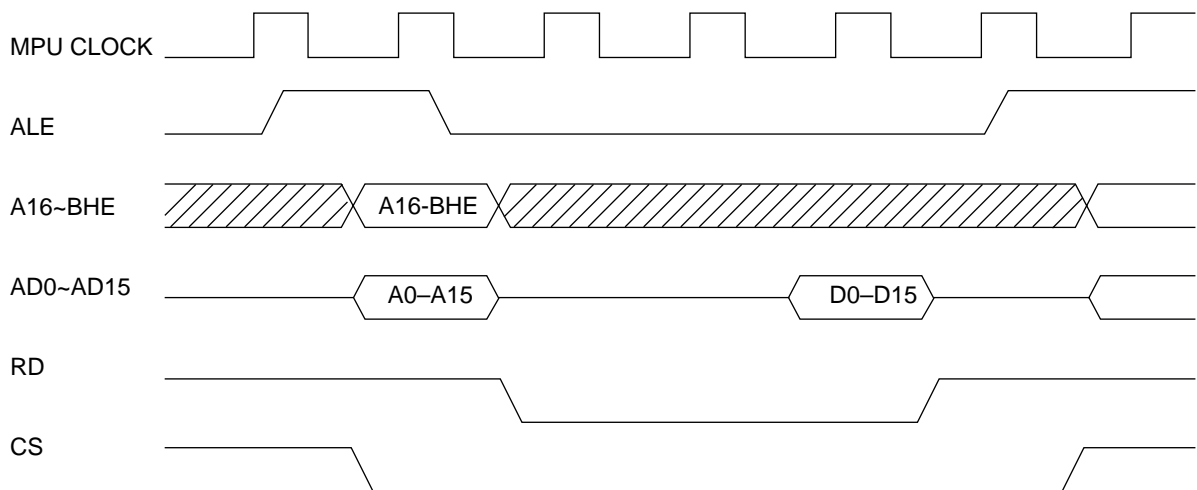
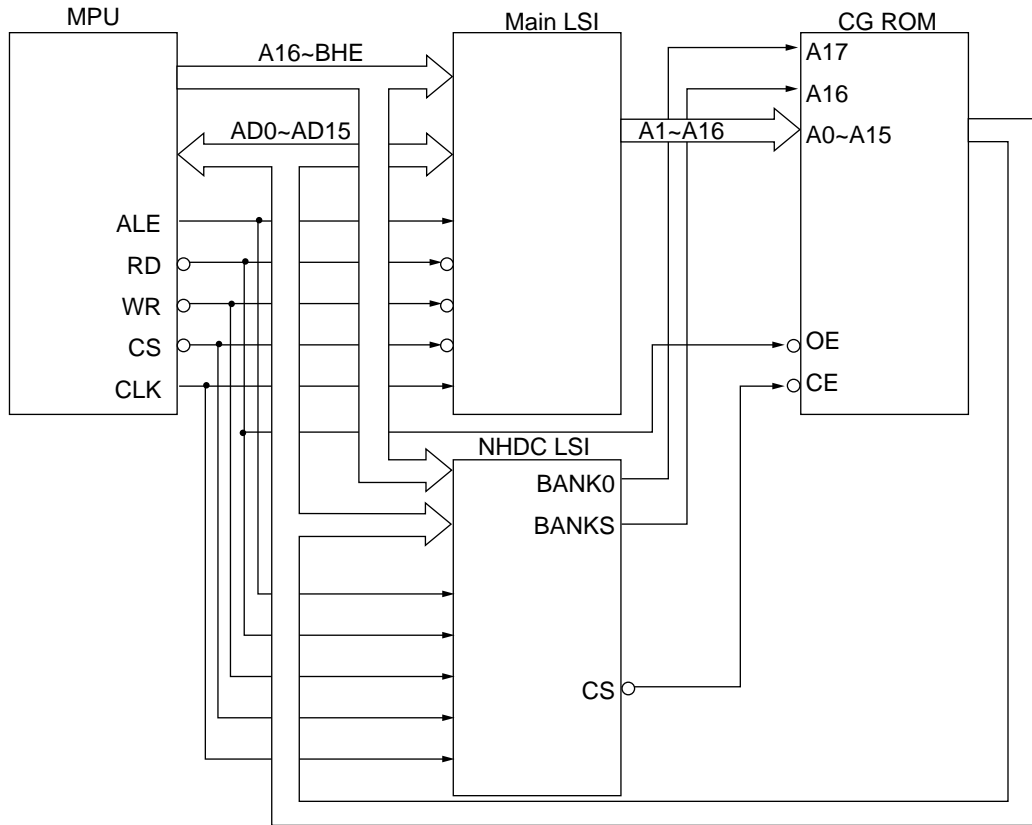


Figure 2.4

(5) EEPROM(IC40)

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.

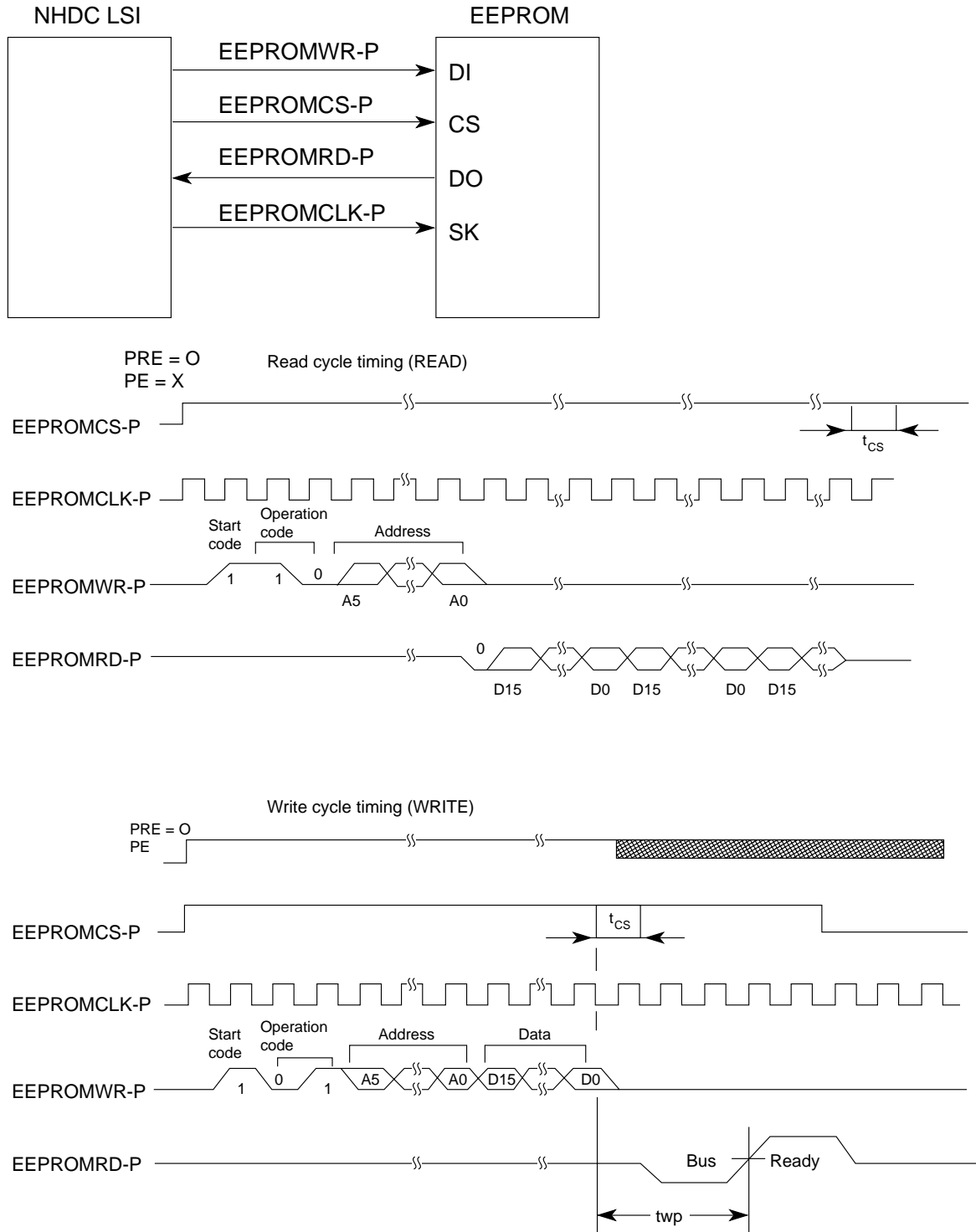


Figure 2.5

(6) Main LSI (IC38: MSM91U036)

MSM91U036 is control LSI for head data, DC motor and modification of print data, which has the following functions.

(a) Head data control

It distributes print data stored in the DRAM over wire arrangements of the print head and outputs it as dot data in synchronism with print timing. In this time, the distribution complies with each print mode which is specified by the MPU.

(b) Print timing control

It outputs the signals which control the print timing of ODD and EVEN pins on the print head.

(c) Space motor speed control function

It controls the space motor with micro-programs to accelerate/decelerate it. This LSI also controls the speed of the space motor in agreement with each print mode.

(d) I/O port

This printer has 8-bit output port which is used for controlling the SRAM.

(e) Head position count

It counts the outputs from slit sensors (SPPHASE A, B) located on the space motor to keep monitoring the current position of the print head.

(f) Print data modifying function

It modifies the print data stored in the DRAM with command inputs from the MPU.

(h) DMA control function

It outputs a DMA request to the MPU, simultaneously controlling the DMA.

This LSI is connected in multiplex to the MPU.

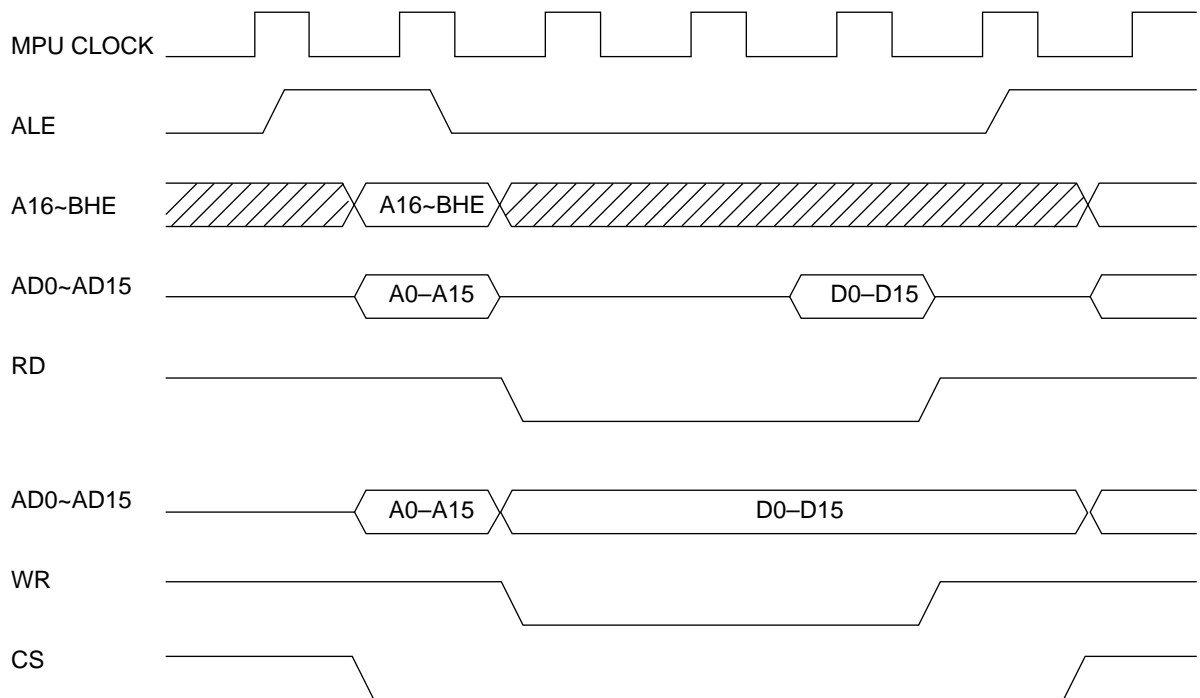
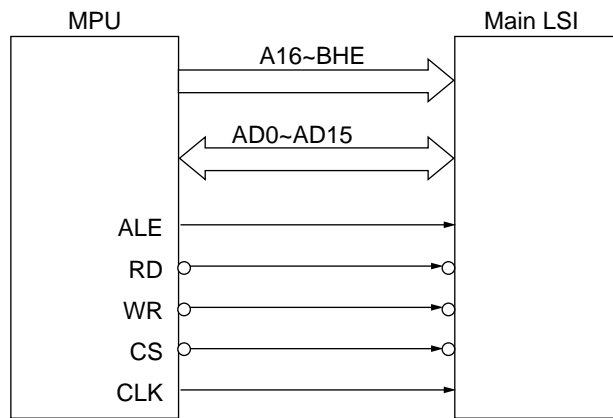


Figure 2.6

(7) NHDC LSI(IC27: TC190G08CF-7036)

This LSI controls timer, interruption, memories, printing, external interface, motor drive interface.

(a) Timer control

It controls the watchdog timer for detecting any out-of-control program, baud rate generator for setting the baud rate of the serial interface, and pulse generation timer for AG plus count.

(b) Interruption control

It controls LSI inside interruptions, external interruptions and interruptions from an external interface as outputs for the MPU.

(c) Memory control

DRAM and SRAM control, chip select output control of ROM, flash memory and MUPIS, and bank switch control for expanding their memory spaces.

(d) Print control

It creates a print timing corresponding to the print DPI to control the position and print correction for pins.

This also controls the print Mask and DMAC which reads print data from the memory and transmits it to the print output buffer.

(e) External interface

It controls various interfaces for main LSI, IEEE1284, serial, MUPIS, OpePanelSI, EEPROM.

(f) Motor drive interface

Each control of OVDV pulse generation for AG motor, generation of pulse for switching ribbon motor phase, and OVDV pulse generation for LF motor.

(8) Sub LSI (IC17, IC18: MSM72V017)

This LSI is the I/O port LSI which controls the input/output of various controlling signals with command inputs from the MPU.

(a) Sub LSI #1 (IC17: MSM72V017)

Input/output control for controlling signals to various sensors, FAN controlling signals, sensor slice level controlling signals, AG motor controlling signals, and LF motor controlling signals.

(b) Sub LSI #2 (IC18: MSM72V017)

Input/output control for controlling signals to various sensors, SP motor current controlling signals, external interface controlling signals, TR motor controlling signals, bail motor controlling signals, cutter motor (for optional connection) controlling signals.

(9) Serial I/F LSI (IC35: 85L30)

This LSI is the serial I/F LSI which controls the input/output of serial I/F controlling signals with command inputs from the MPU.

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 RESET-N signal is first output from the reset circuit to reset the MPU and LSIs. When resetting ends, the program starts and the LSIs are reset by NHDC LSI via LRESET-N. Reset operation by I-PRIME starts program to initialize, but does not reset the MPU. The program here 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 to inform the ready state for receiving to the host side and ends the initialize operation.

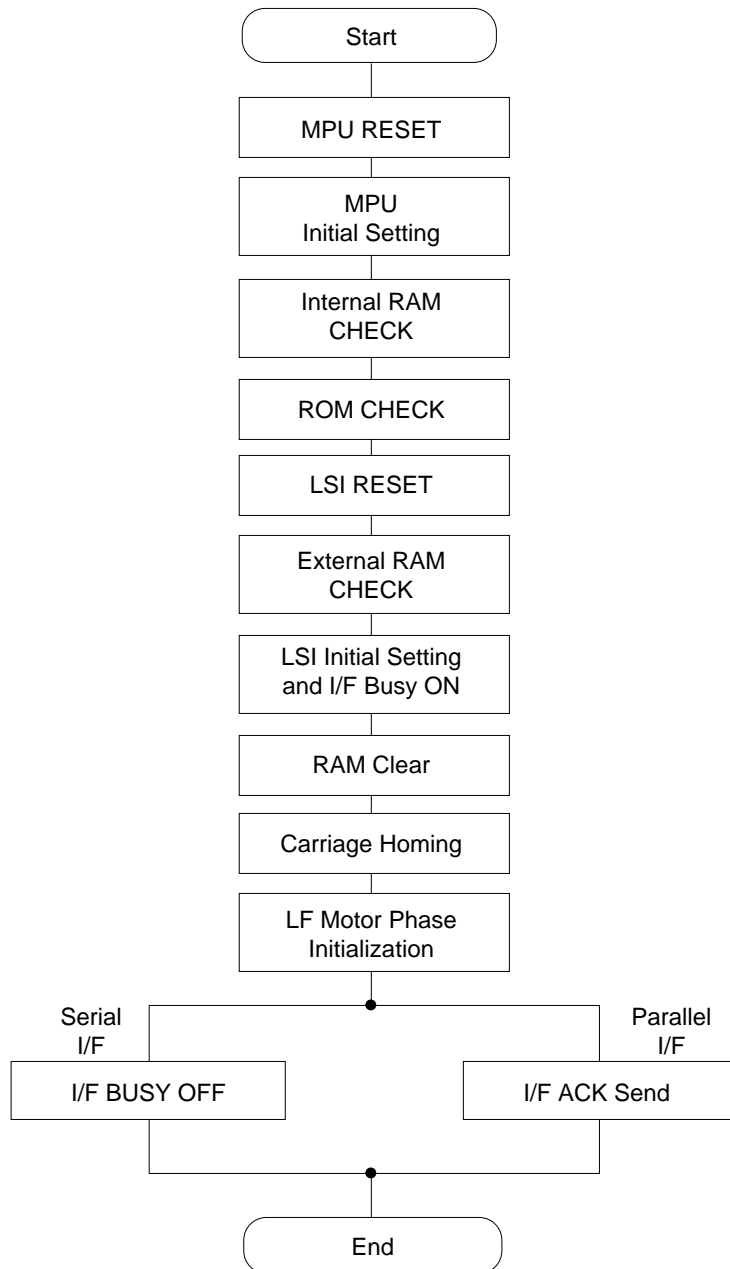


Figure 2.7

2.1.4 Interface control

The PM4410 is provided with the centronics parallel interface and RS-232C serial interface as standard features. Also, it can be connected to option OKI HSP or Opt. Card. The interface cable can be connected simultaneously with these interfaces.

These interfaces can be switched with the menu switch on the operation panel, in addition, you can designate auto-select for them. The MPU communicates with hosts through the NHDC according to the selected interface mode. The selected interface is stored to the EEPROM and can maintain even after powering the printer off.

2.1.5 Parallel Interface Control

The Parallel data input from the host to the NHDC LSI is latched to its internal register at the falling or rising 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 INT-P 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 request stopping of data transmission.

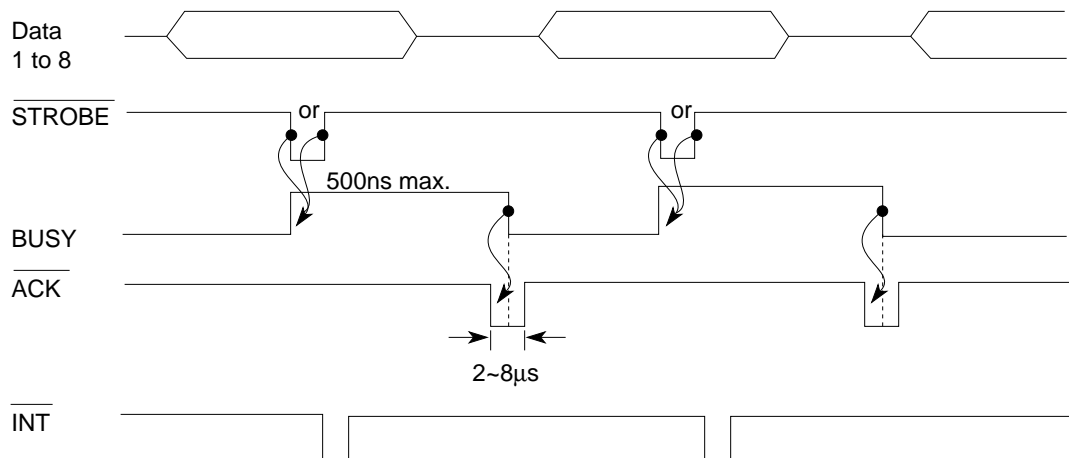
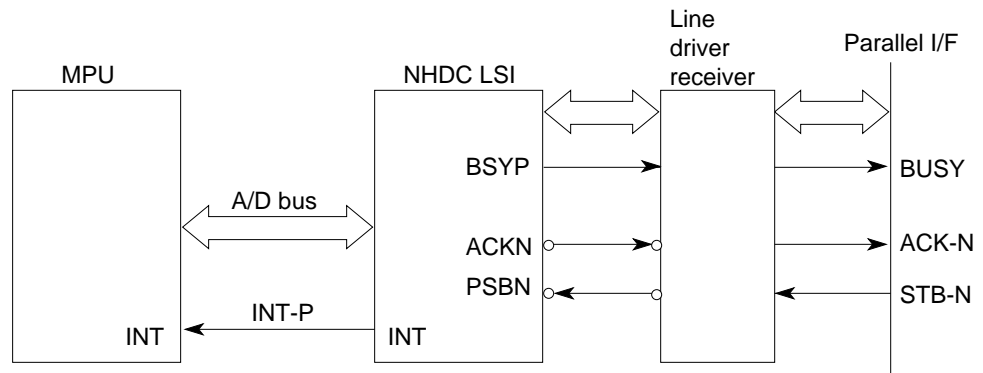


Figure 2.8

2.1.6 Serial Interface

The MPU sets the baud rate which is selected with the menu switch for the NHDC LSI and have the serial I/F LSI to output the clock frequency of the baud rate.

Input signals from the serial I/F (DSR, CTS, CD and RD) are converted into TTL level ones by the Line driver/receiver and input to the serial I/F LSI and NHDC LSI. The serial I/F LSI converts serial data into parallel data to output it to the MPU.

Output signals (DTR, RTS, SSD and TD) to the serial I/F are output from the MPU to the NHDC LSI and serial I/F LSI, and then converted through the Line driver/receiver into line voltage which is output to the serial I/F.

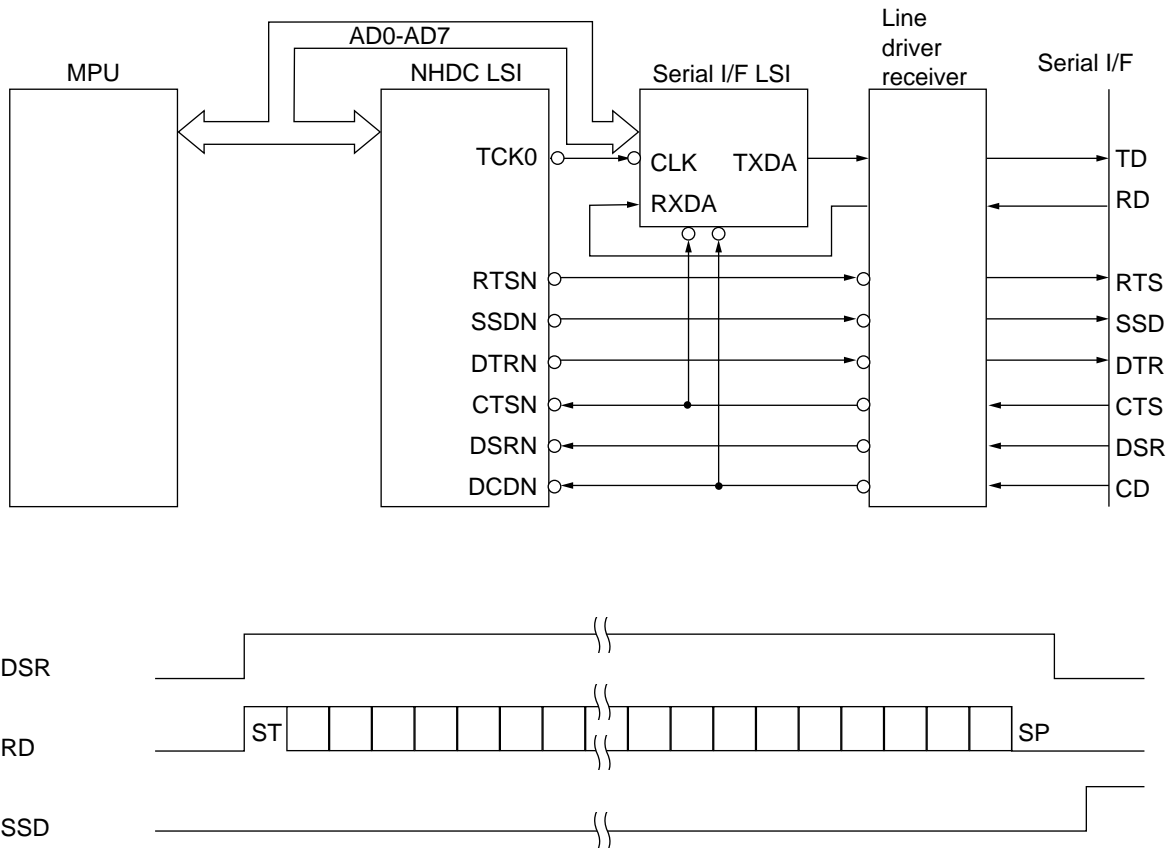


Figure 2.9

2.1.7 Printing operation

The time chart for the spacing and printing, line feed operations are as shown below.

The spacing, printing and line feed operations are controlled by the MPU. The MPU also controls the entire timing of these operations.

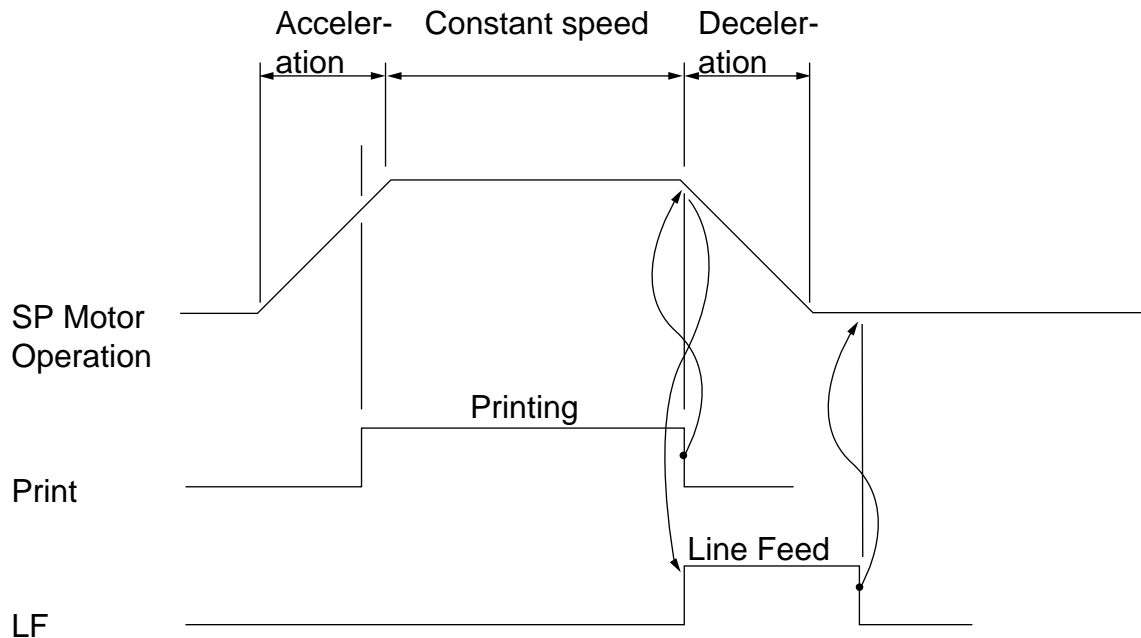


Figure 2.10

When starting the printing operation, the MPU specifies the distance moved, print start position, printing speed, etc. to the LSI, and activates the spacing motor. The MPU, when the carriage arrives at the print position specified, activates the printer to start printing, and when printing terminates, the MPU activates the line feed motor for line feed operation. During the line feed operation, the MPU causes the carriage to decelerate. Upon termination of line feed operation, the spacing operation is performed.

2.1.8 Printhead control

The printhead is controlled by the Main LSI and NHDC LSI.

Printing is synchronized with the ITOUT signal from the NHDC LSI.

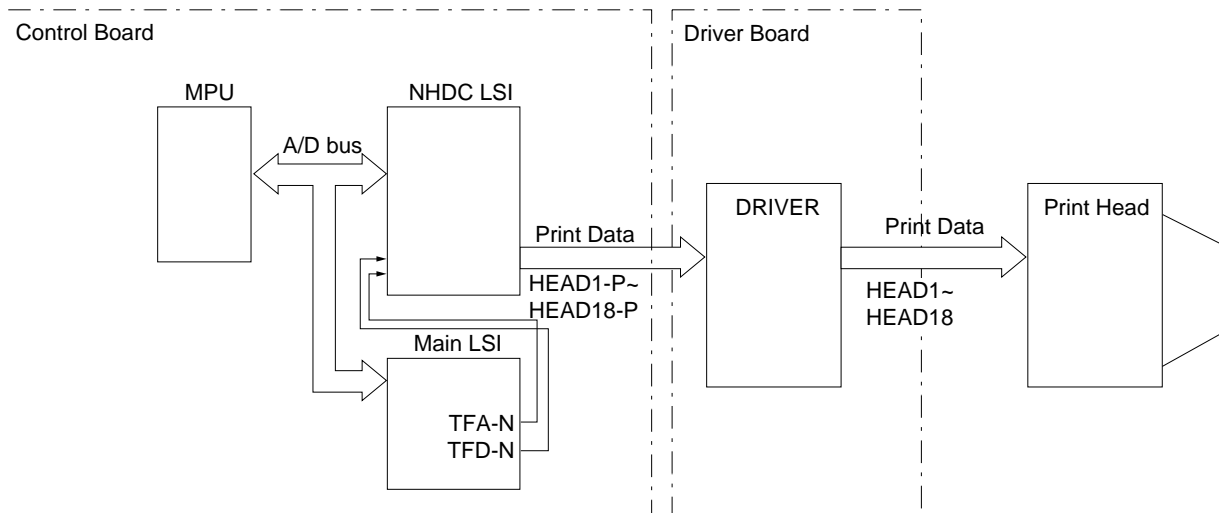


Figure 2.11

The NHDC LSI outputs the dot timing1 signals (DT1:1~18) and the dot timing2 signals (DT2:1~18), and the driver IC drives each dot magnet. These signals are output from the NHDC LSI after the following corrections for final driving time determination inside the LSI:

(1) Correction for the number of pins driven

The driving time is corrected according to the number of pins driven at the same time out of 18 pins.

(2) Correction according to adjacent pin drive timing

The driving time is adjusted by checking whether the pin adjacent to the pin to be driven is driven on the previous timing.

(3) Correction for head gap

The driving time is corrected according to the head gap.

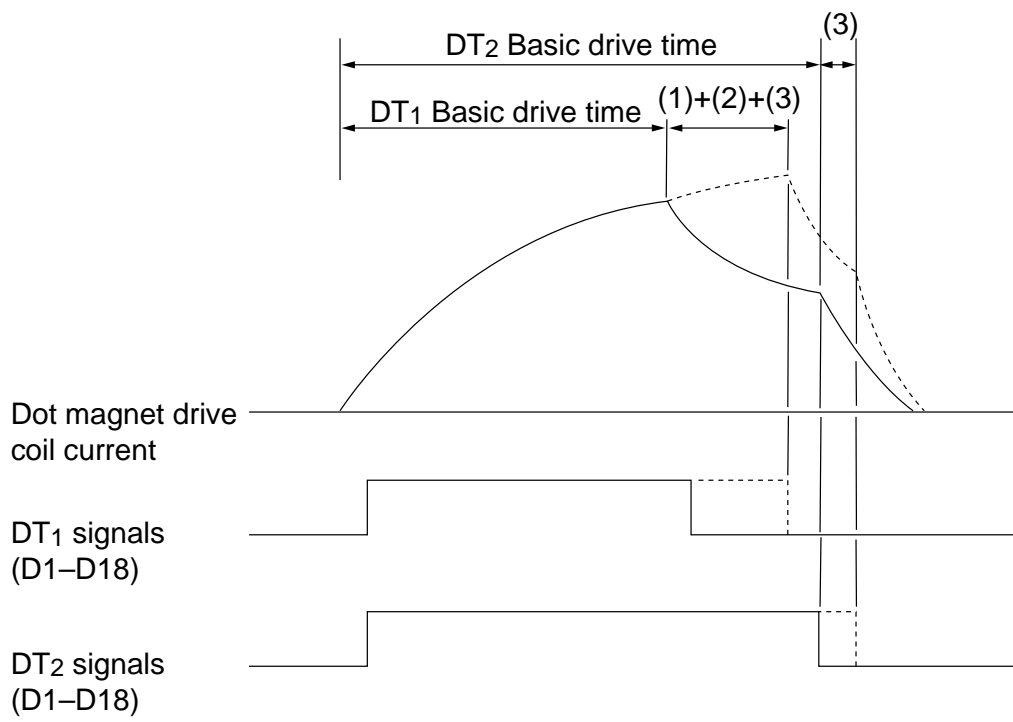


Figure 2.12

2.1.9 Print Compensation Control

The print compensation can be made as shown below:

- (a) Simultaneous Compensation of the number of impact pins
The NHDC LSI is provided with the compensation table for each pin to make necessary compensation.

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

- (b) Duty control
1. If the number of the lines which exceeds 60% printing duty is continuous 8 lines, the printer starts 2-path printing at the 8th line.
 2. If the printer can activate 12 pins simultaneously in a line, it 2-path prints the line.

- (c) Temperature compensation (See 2.1.14 "Alarm Circuit.")

- (d) 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%	97%	95%	90%	89%
Drive time	Short ←————→ Long				

(Drive time lengthens at each step.)

2.1.10 Space motor control

- (1) The Main LSI generates the SPDV-P signal upon receiving the spacing command from the MPU. This is a fixed cycle pulse signal.

The Main LSI varies the pulse duty according to the speed data from the MPU to control the motor speed.

The SPFOW-P or SPREV-P signal from the Main LSI changes the current direction in the DC motor to run the motor in the forward or reverse direction.

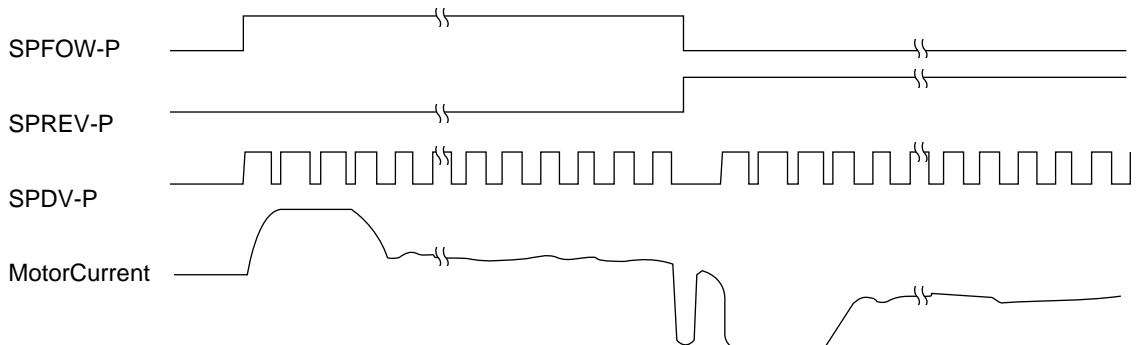


Figure 2.13

(2) Slit encoder

As the space motor rotates, it generates feedback pulse signals SPA-P and SPB-P. The Main LSI detects the edge pulses from these signals and multiplies the frequency to output the S720-P signals as the normalized timing to NHDC LSI to generate head drive timing.

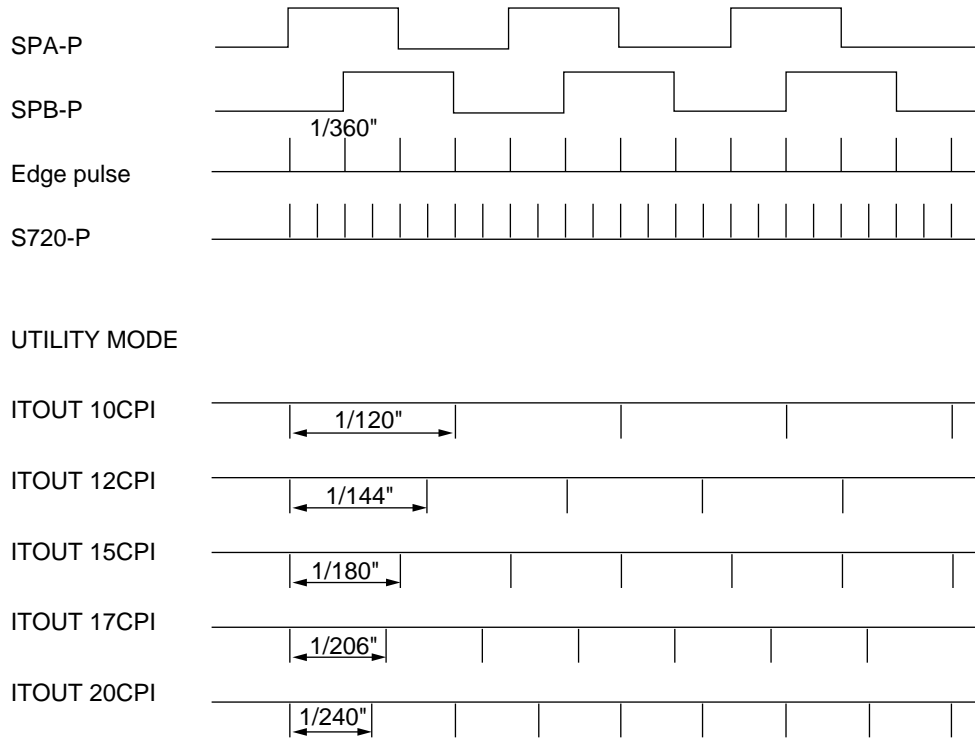


Figure 2.14

2.1.11 Line feed

The LF motor is locked by the current supplied from +12V according to the pulse duty of the LFCHOP-P signal during the stop period.

It is driven by +44V application by the LFOVDV-P signal for line feed operation.

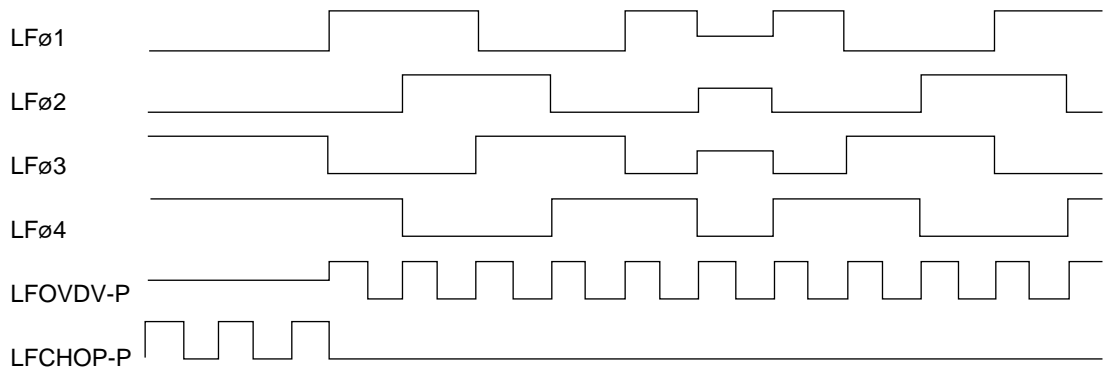


Figure 2.15

2.1.12 Bail, tractor switching, AG, ribbon motor control

Bail, tractor switching, AG and ribbon motor control is as shown below.
The AG motor is locked with AGHOLD-P.

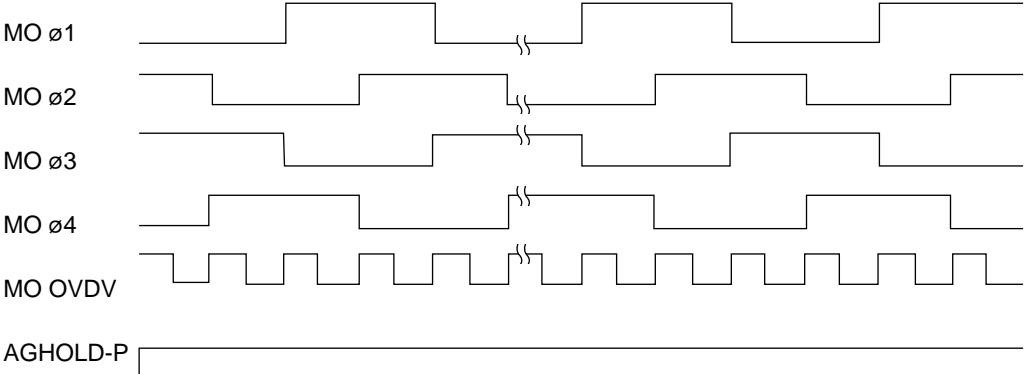


Figure 2.16

2.1.13 Operation Panel

The clock synchronization OPCLK of NHDC LSI is used to input the switch data and output the LED data and LCD data through the operation panel control LSI (IC1: BU6152S).

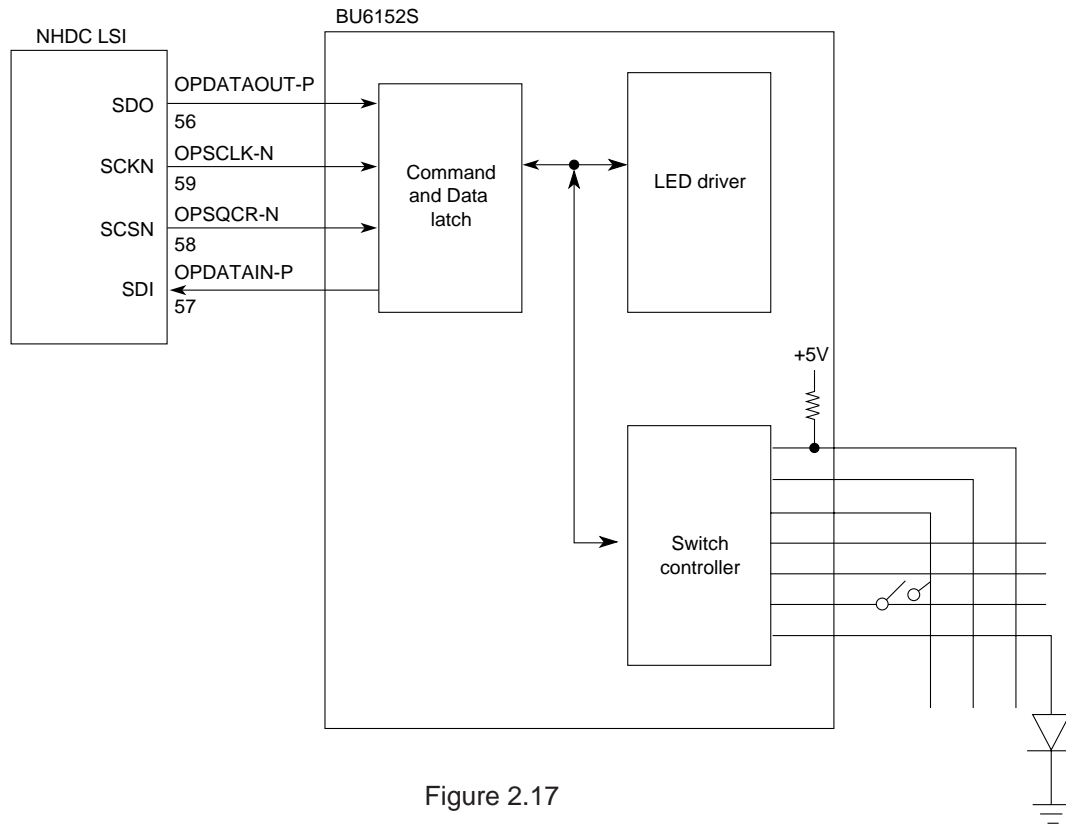


Figure 2.17

A 2-byte (15 bits + 1 even parity bit) command (OPDATAOUT-P) is transmitted to the LSI (BU6152S) in synchronization with the OPCLK-N signal. The LSI decodes this command and when it is found to be legal, returns a 2-byte command response back to the NHDC LSI which includes data on Switch information, LED status, LCD 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 OPSQCR-N signal.

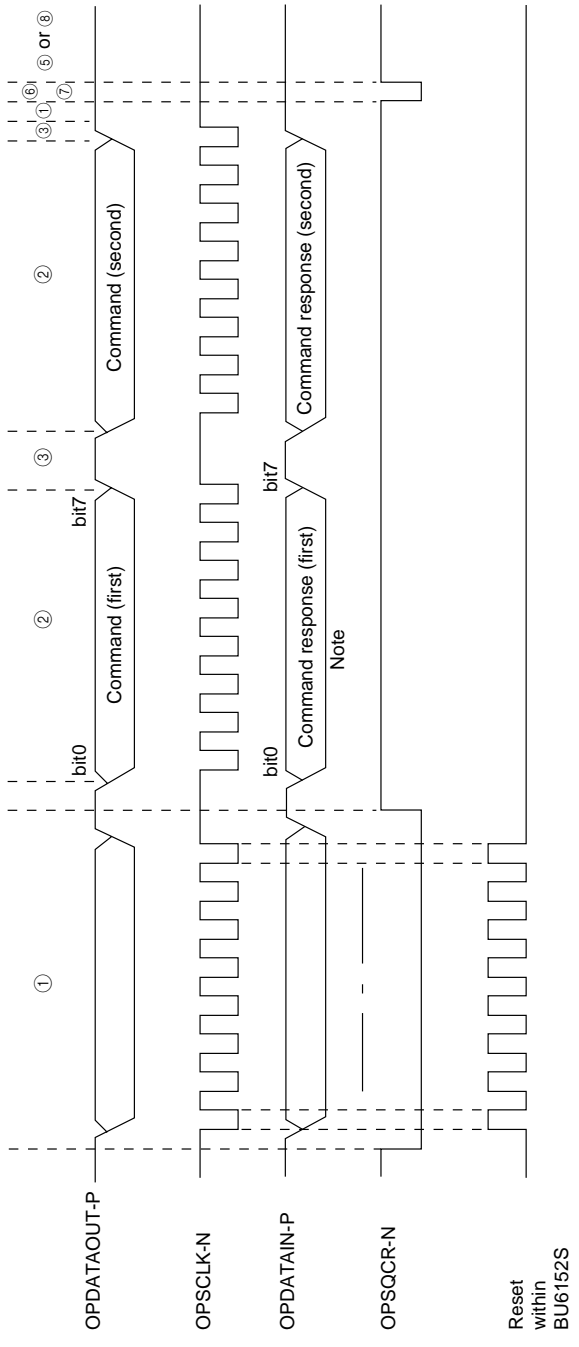
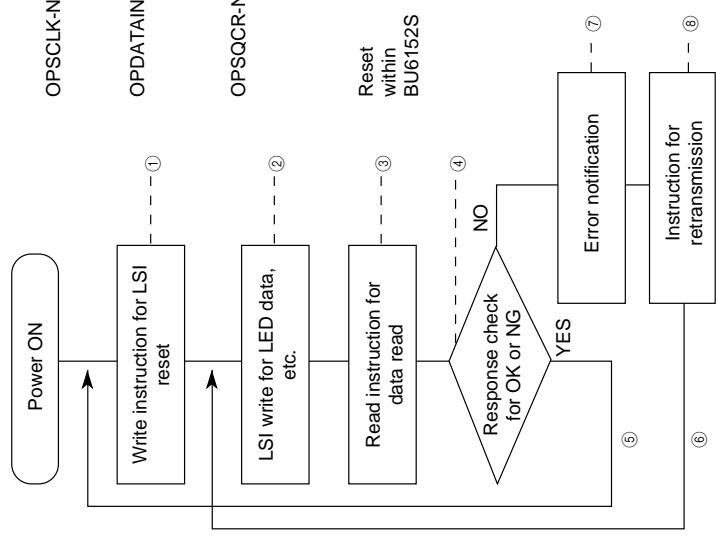


Figure 2.18

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 OPDATAIN-P are fixed so that the response can be returned before decoding the command.

2.1.14 Alarm circuits

(1) Driver circuit abnormality detection alarm.

This protective circuit prevents secondary troubles by stopping the power supply upon detection of an abnormality in the print head, SP motor driver circuit or other motor driver circuits.

This circuit monitors the driving time by means of the signals (DT1COM1, SPV, LF COM, AG-MCOM, RBN-MCOM, TR-MCOM, BEIL-MCOM and RENCOM) connected to the overdrive signals for each driver circuit. If any driver circuit driving time exceeds the specified time, the POWOFF-P signal is output to switch off the power supply to stop all DC voltage outputs.

(2) Head high temperature alarm circuit

The thermistor built in the head monitors the head temperature for head coil protection.

If high duty printing continues for a long time, the head temperature rises. If it reaches a certain level (approx. 148 °C and 158°C), head high temperature alarm 1 is detected to start one-way printing with a 40 ms interval after each line. When head temperature alarm 2 is detected to start one-way and two-pass printing with a 1.2 sec. interval after each line for the head temperature to fall. When the temperature falls to below the detection temperature, normal printing operation restarts.

As the head temperature rises, the resistance of the thermistor decreases and the potential of the input to the comparator in the head thermistor alarm circuit rises, when the potential goes above the alarm 1 specific level, MPU goes into alarm 1 procedure, simultaneously MPU continues to check if the potential goes above alarm 2 specific level. When going below alarm 2 level, MPU goes into alarm 2 procedure.

(3) Paper end detection circuit

Five sensors (front tractor paper end sensor, rear tractor paper end sensor, sheet jam sensor, sheet top sensor and sheet width sensor) are provided for different paper set routes to monitor paper end. When paper runs out, the corresponding sensor is turned off to input the FTRPESW-P, RTRPESW-P, SHEETJAM-P, SHEETTOP-P, SHEETWITH-N signal to the sub LSI (IC17), and is read by the MPU. The MPU stops the printing operation, informs the host of the paper end and jam, and lights the alarm lamp.

(4) Cover open alarm circuit

When the front access cover is PUSH opened, the COVEROPN1SW-P signal is input to the main LSI and the NHDC LSI from the cover open microswitch, and an invalid signal is input to MPU. The MPU stops the printing operation as soon as possible, informs the host that receiving is impossible, and lights the alarm lamp.

When the front access cover is opened and, the interlock switch cuts the SP motor drive current and makes the SP motor stop.

(5) Fan alarm circuit

For each of the five fans, the FANALM-P signal is provided to detect fan rotation/stop. The signal is at Low level when the fan rotates, while it becomes High when it stops. The MPU monitors this signal level. When the High level is kept for one minute or longer, the MPU stops the printing operation, informs the host of the fan alarm, and lights the alarm lamp.

(6) Head thermistor short/open alarm circuit

The head thermistor voltage is monitored physically. When short or open circuit occurs, the HDTHALM-N signal is input to the sub LSI (IC18) and read by the MPU. The MPU stops the printing operation, informs the host of the short/open alarm, and lights the alarm lamp. When the head is unloaded, the head thermistor becomes open, resulting in this alarm.

(7) SP motor thermal alarm circuit

The voltage at the thermistor, built in the SP motor encoder block, is monitored physically. When temperature higher than the specified level is detected, the SPTHACM-N signal is input to the sub LSI (IC18) and read by the MPU. The MPU starts printing with an approx. 0.2 sec. interval after each line to cool down the printer.

When the temperature becomes lower than the specified, normal printing will be resumed.

(8) Fuse alarm circuit

Fuses are mounted on each of the SP motor and the other pulse motors, including LF motor, where the voltage level is monitored physically. When one or both of the fuses on the main control board are blown, the FUSEALM-P signal is input to the sub LSI (IC18) and read by the MPU. The MPU stops the printing operation, informs the host of the fuse alarm, and lights the alarm lamp.

(9) Ribbon jam alarm circuit

The rotation detection knob mounted on the ribbon cassette synchronizes with ribbon rotation and detects the rotation using the sensor. The RBNSEN-P signal from this sensor is input to the sub LSI (IC17) for the MPU to monitor the rotation. With no rotation for 16 sec. or longer, the MPU stops the printing operation, informs the host of the ribbon jam, and lights the alarm lamp.

2.1.15 Power supply circuit

This switching type power supply circuit supplies the +5 VDC, ± 12 VDC and +44 VDC.

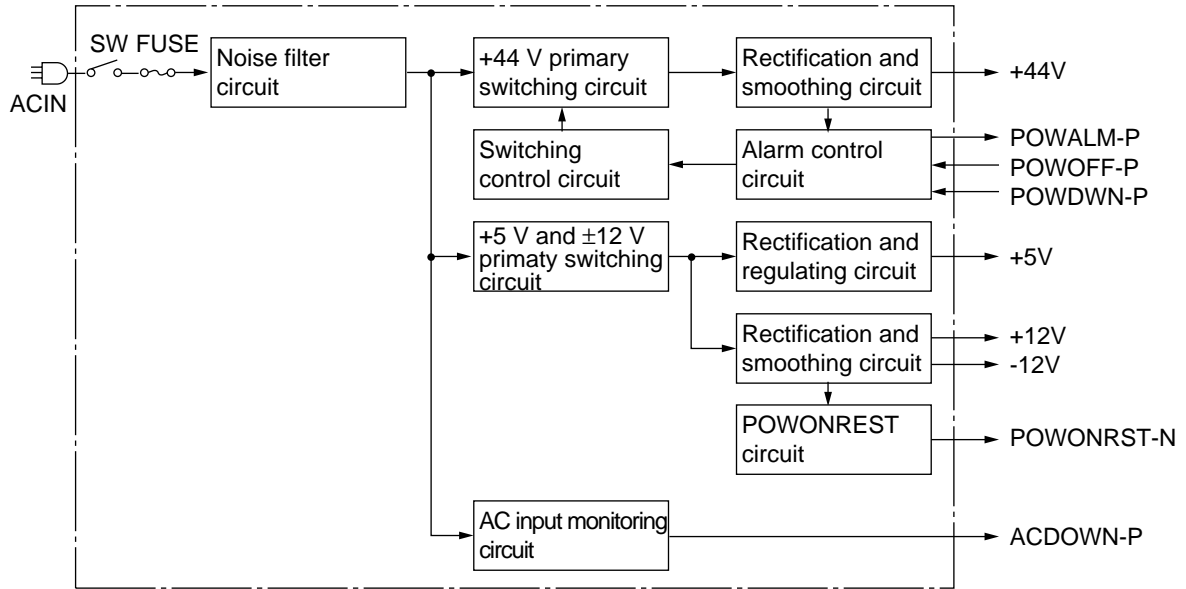


Figure 2.19

The uses of output voltages and signals are described below.

Voltage/ signal	Use
+5V	Logic IC/ LED drive voltage
+12V	Logic IC drive voltage, option interface line voltage and LF motor locking voltage
-12V	Option interface line voltage
+44V	Printhead, SP motor, LF motor, Other motors drive voltage
POW ALM-P	Out put from the power supply circuit upon detection of an abnormal temperature rise in the power supply circuit or an overcurrent of +44V. The control unit suppresses the overcurrent by two-pass printing. If the output does not change, the power supply circuit shuts off all DC output.
POW OFF-P	Output from the main PCB upon detection of an abnormality in the print head, SP motor, LF motor, Other motor driver circuit, and shut all DC output off.
AC DOWN-P	Output from the power supply circuit to the main PCB upon detection of no AC input with the AC switch turned off. Then the main PCB outputs the POWOFF-P signal to the power supply circuit to have the necessary information written into EEPROM.
POW DWN-P	Output from the main PCB to the power supply circuit upon detection of no host or operator access for approx. 10 min., to start the power-save mode. In this mode, the power supply circuit cuts off 44V output.
POW ONRST-N	Output form the power supply reset circuit to the main PCB. On receiving the POWONRST-N signal, the main PCB prepares the main PCB RESET-N signal and +5VD.

2.2 Mechanical Operation

2.2.1 Printhead mechanism and operation (See Figure 2-13)

The printhead is a spring charged 18-pin driving head using a permanent magnet. It is attached to the carriage, which moves in parallel with the platen. Electrically, this unit is connected to the control circuits through the control board.

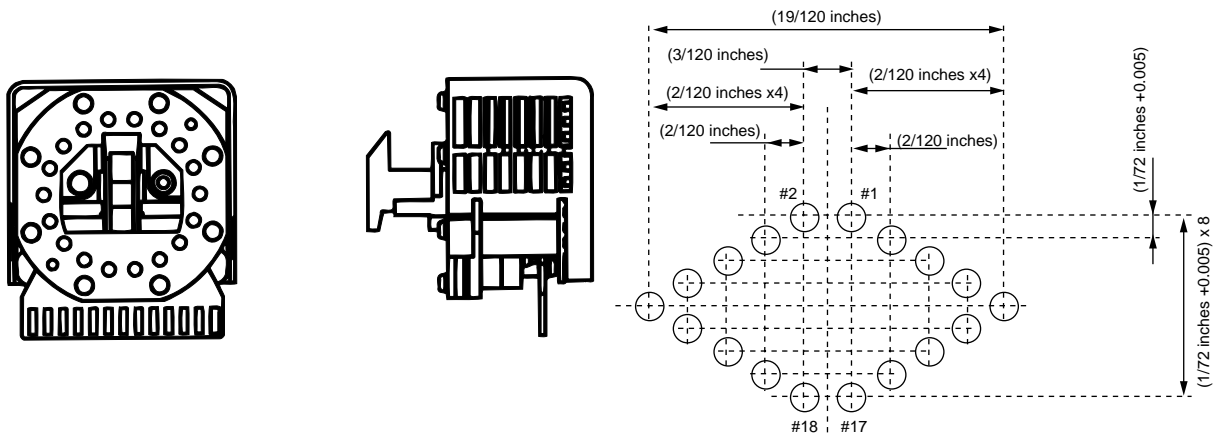


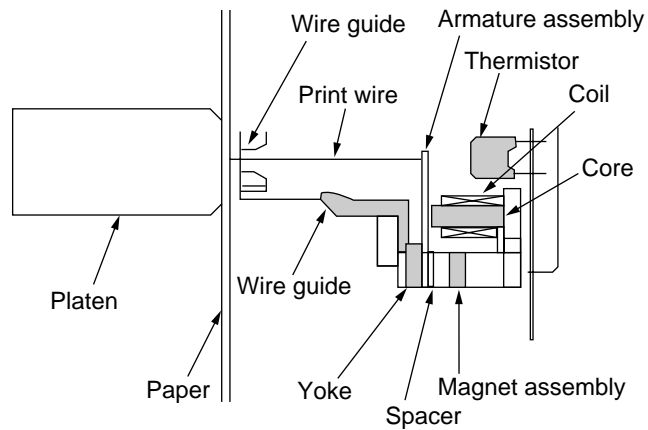
Figure 2-20 Arrangement of the head pins
View from the tip of the printhead

- (1) The printhead configuration:
The printhead is composed of the following parts:
 - (a) Wire guide
 - (b) Armature assembly (Wire, Armature, Spring, Yoke, Spacer)
 - (c) Magnet assembly (Magnet, core, coil, Yoke)
 - (d) Printed circuit board

(2) Motion of Printhead (Fig.2-14)

The armature usually loses the armature spring with a permanent magnet, making it to be attracted by the core. In this time, the print wire integrated with the armature is also in reset state, When the magnet coil is energized by a print command sent from the device controller, a magnetic flux will generate in the opposite direction against that of the permanent magnet and a restoring force of the armature in the opposite direction against the core, and then the print wire impinge on the platen. There is a paper and ink ribbon between the platen and print wire, so this impinging motion allows the ink of ink ribbon to be transferred (printed) to the paper.

(i) When printing



(ii) When not printing

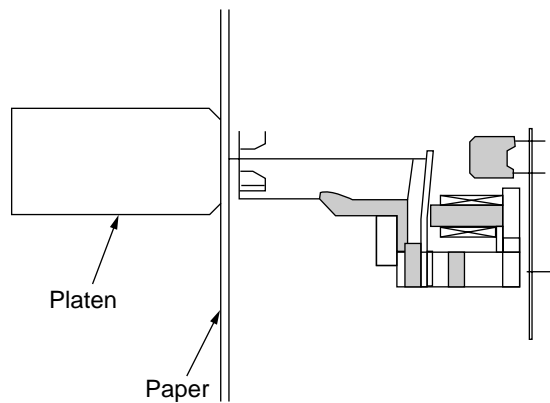


Figure 2.21

2.2.2 Spacing operation (See Figure.2-15)

Spacing is effected by driving the carriage assembly installed to the main shaft and slide beam set in parallel with the platen by the DC servo motor.

- (a) DC motor with motor
- (b) Carriage frame
- (c) Carriage shaft
- (d) Space belt
- (e) Sensor
- (f) Encoder disk

(1) Spacing operation

The carriage mounting the printhead moves in parallel with the platen along the main shaft and slide beam. The carriage is fixed to the mini pitch belt under the carriage frame.

When the DC servo motor runs clockwise as viewed from its front side, the driving force is transmitted to the mini pitch belt and the carriage moves from the left to the right. The DC servo motor rotating angle and speed are controlled by the count of θA and θB signals (with a phase difference of about 90°) from the encoder and the time intervals of the signals. The rotating direction is determined by the sign (positive or negative) of the phase difference between θA and θB .

The mechanism is designed so that the carriage moves 2.22 inches (56.44 mm) when the DC servo motor makes one revolution.

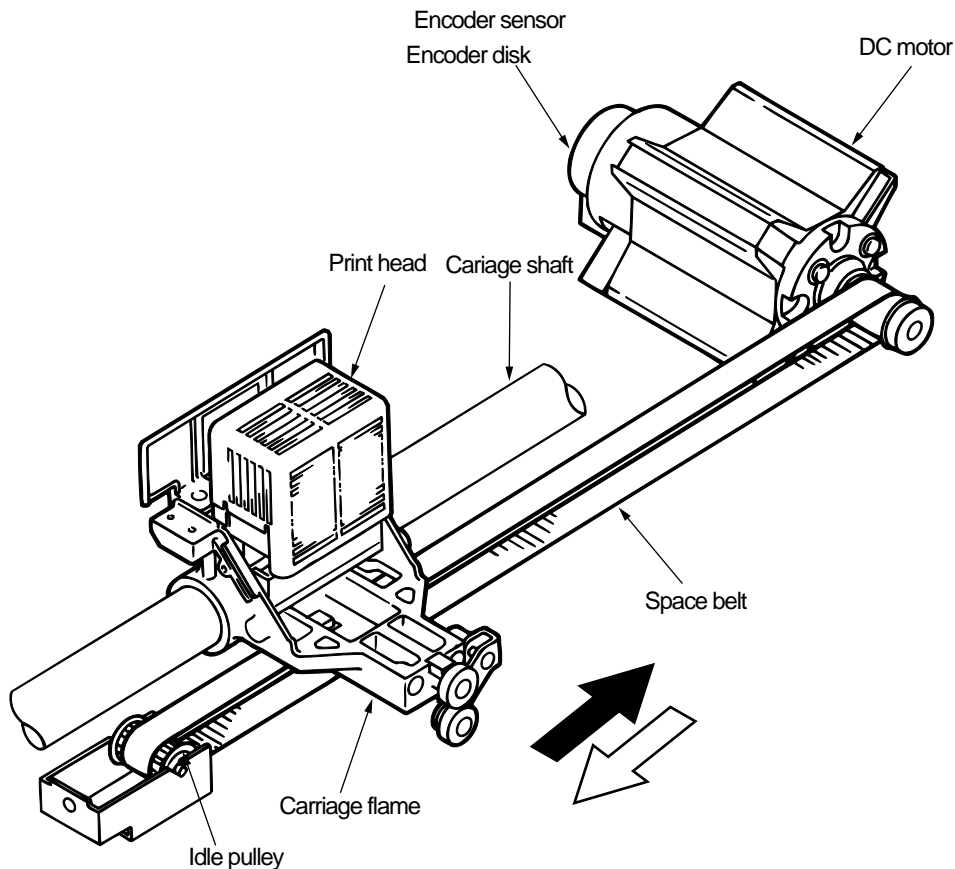


Figure 2.22

2.2.3 Head gap adjusting

The auto gap adjusting mechanism automatically adjusts the space between the platen and print head according to the thickness of papers. This mechanism does this driving the platen back and forth with the AG motor (pulse motor), and effects the auto gap motion after the reverse motion of the platen. The platen is reversed at power on or off line when cover open or paper end is detected, and the auto gap adjusting motion is performed when the printer returns to on line.

When the printer is shifted to off line at power on or detection of paper end, the platen reverses to the position that the space to the print head becomes wider than the thickness of paper (gap open position).

As the off line mode is released, shifted to on line after platen reverses, the AG motor drives the platen to the direction that the space between the print head and platen becomes narrower.

The rotational force of the AG motor moves the platen to the print head (in the direction that the space becomes narrower) through various idle gears and adjusting cam.

After that, the AG plate impinges on the paper, and the AG frame is deflected, changing the core gap of the auto gap sensor located on the AG frame. When the change of the core gap is detected, the AG motor stops rotating.

Next, the AG motor reverse-rotates only a fixed step and stops. This allows the platen move backward, obtaining an proper space with the print head.

The forward and backward motion of the platen is driven by the adjusting cam being rotated, and the platen is always pulled to the rear of the unit by the spring.

(1) AG detection mechanism

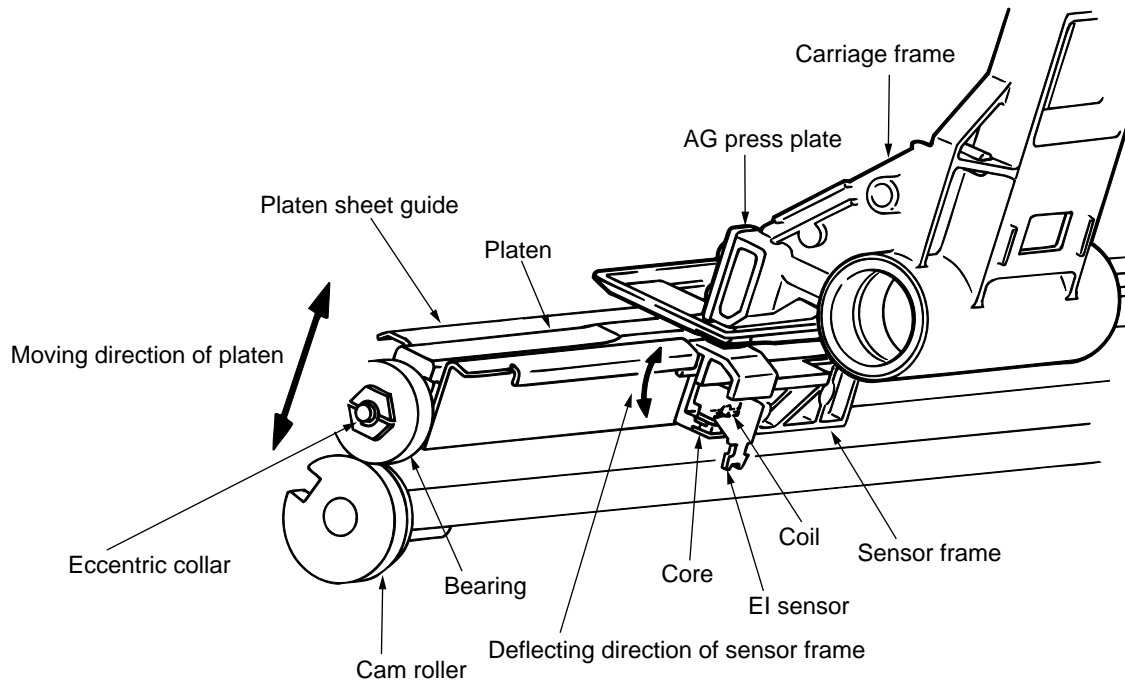


Figure 2.23

(2) AG sensor slit disk driving mechanism

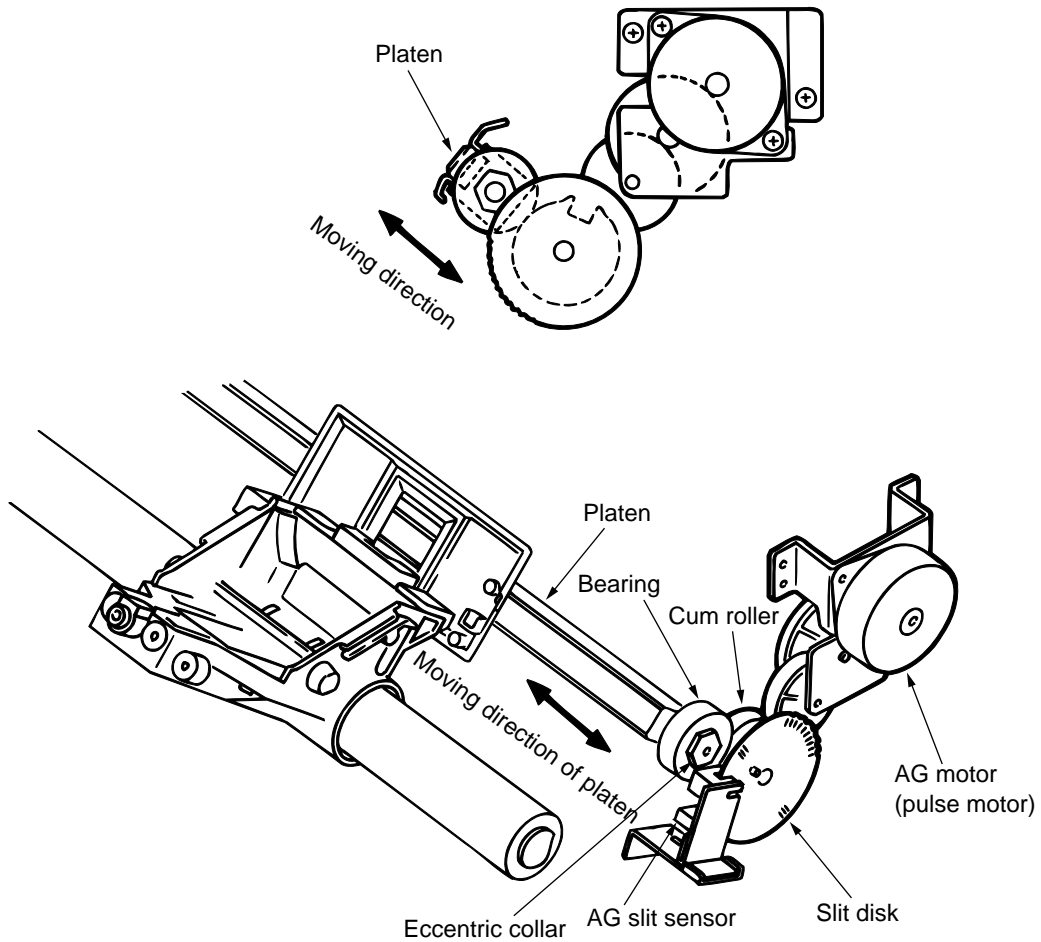


Figure 2.24

(3) AG detector detail drawing

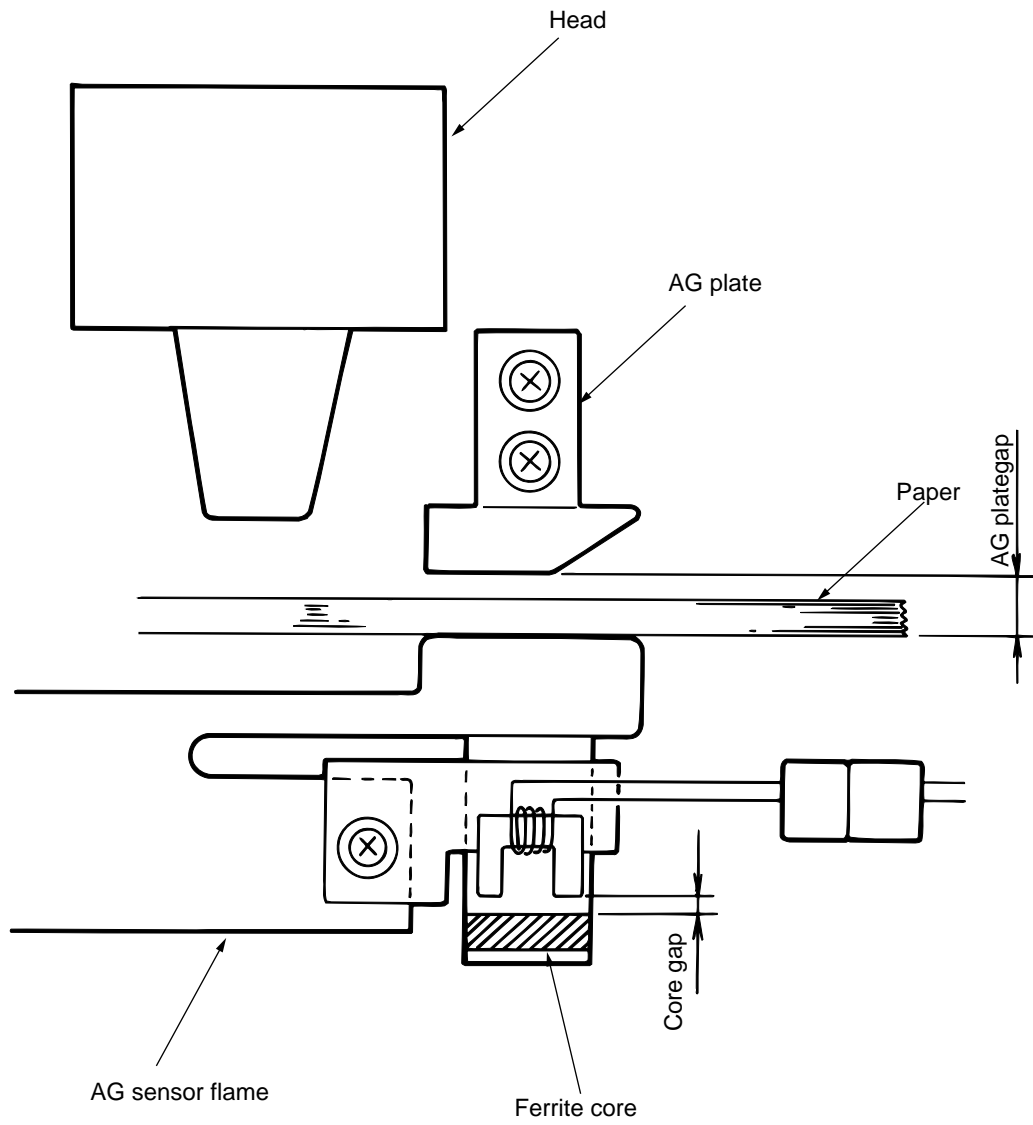
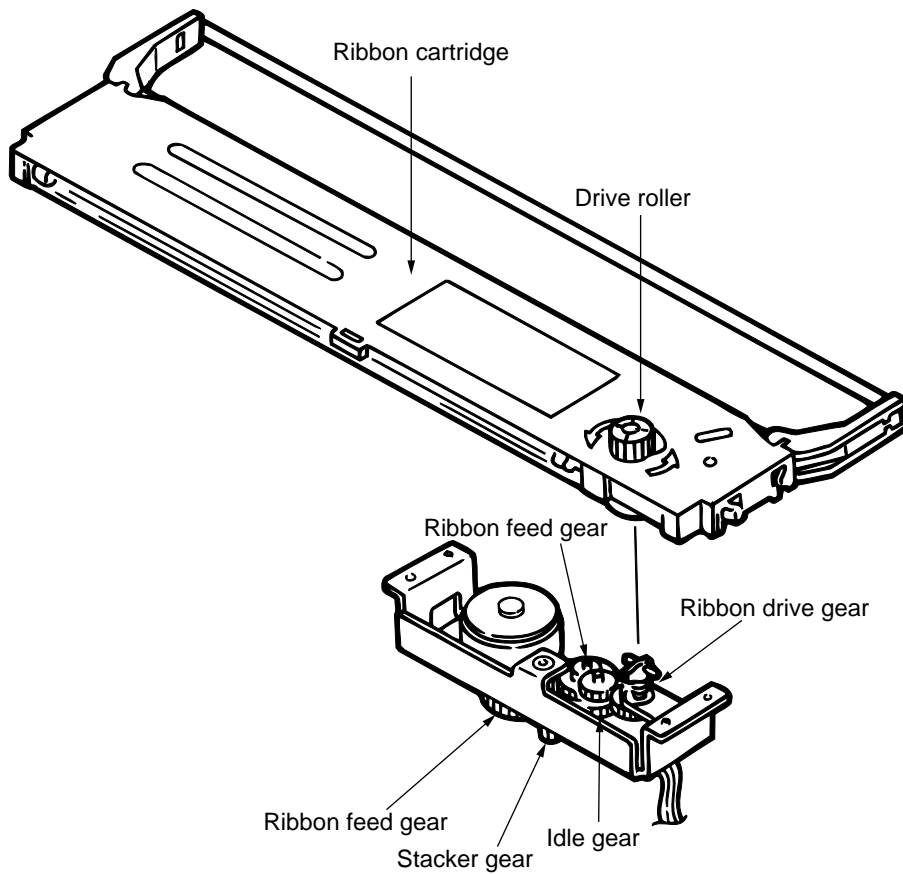


Figure 2.25

2.2.4 Ribbon drive (See Figure)

The ribbon feed mechanism feeds the ink ribbon and functions by driving the ribbon motor (pulse motor).

- (1) Ribbon cartridge
This has a mechanism of capable of printing clear characters at all times by using a one-way-feed endless ribbon.
- (2) Feeding
The ribbon feeding mechanism starts running regardless of whether the printer is printing or not, and stops at the same time when the spacing motion stops. When the ribbon motor is driven, the rotational force is transmitted to the drive roller in the ribbon cartridge through ribbon feed gears, and the ink ribbon fed.



Ribbon feed mechanism

Figure 2.26

2.2.5 Paper Feed Mechanism

The line feed on the print paper is driven by the LF motor (pulse motor) and done by rotating the sheet feeder and feed roller.

(1) Front tractor

The rotation of the LF motor rotates the drive shaft through the LF gear, change gear and front tractor drive gear, driving the pin belt of the front tractor Assy. This feeds a continuous paper set on the pin belt. Simultaneously, this drives the feed roller F/R through the mini-pitch belt following LF gear to carry in synchronization with the tractor.

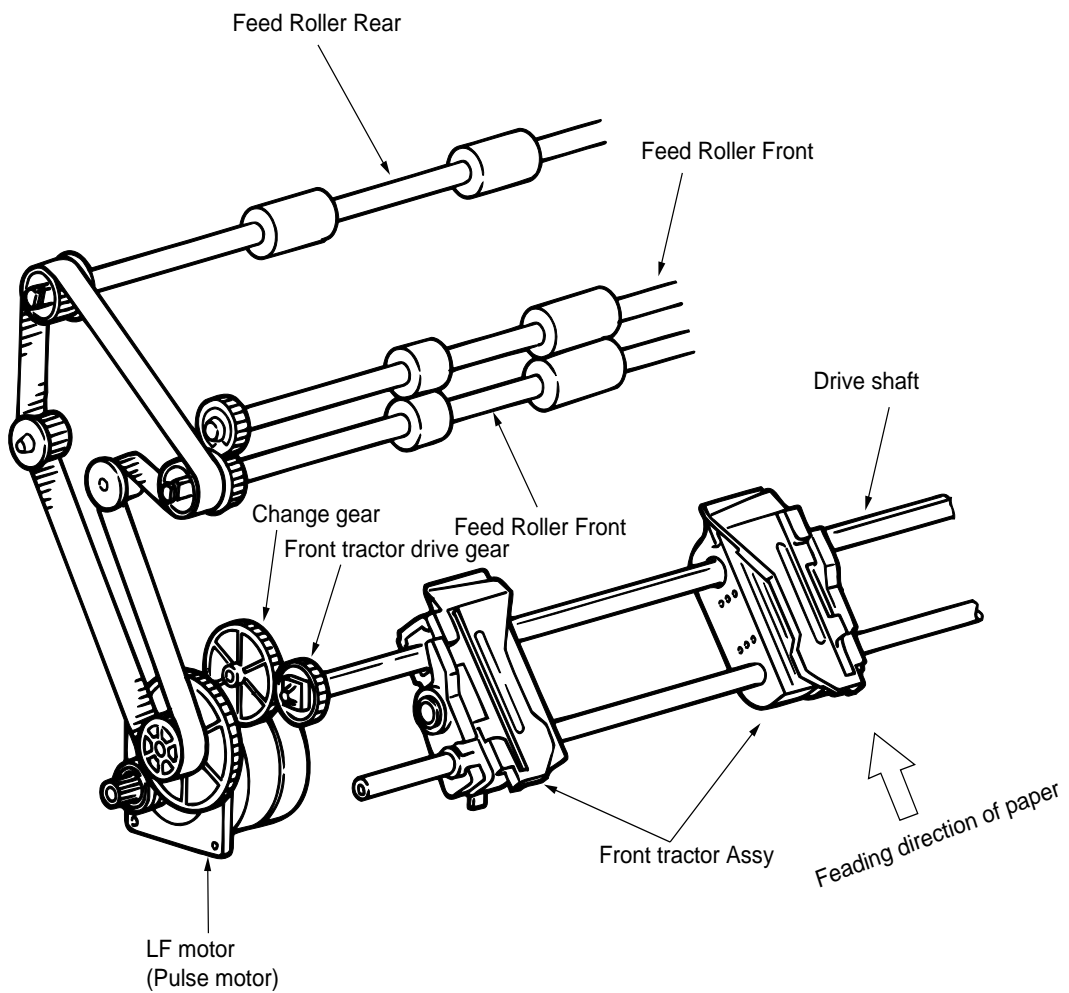


Figure 2.27

(2) Rear tractor

The rotation of the LF motor rotates 2 drive shafts through the LF gear, change gear and rear tractor drive gear A/B, driving the pin wheel and pin belt of the tractor Assy. This feeds a continuous paper set on the pin belt. Simultaneously, this drives the feed roller F/R through the mini-pitch belt following LF gear to carry the paper in synchronization with the tractor.

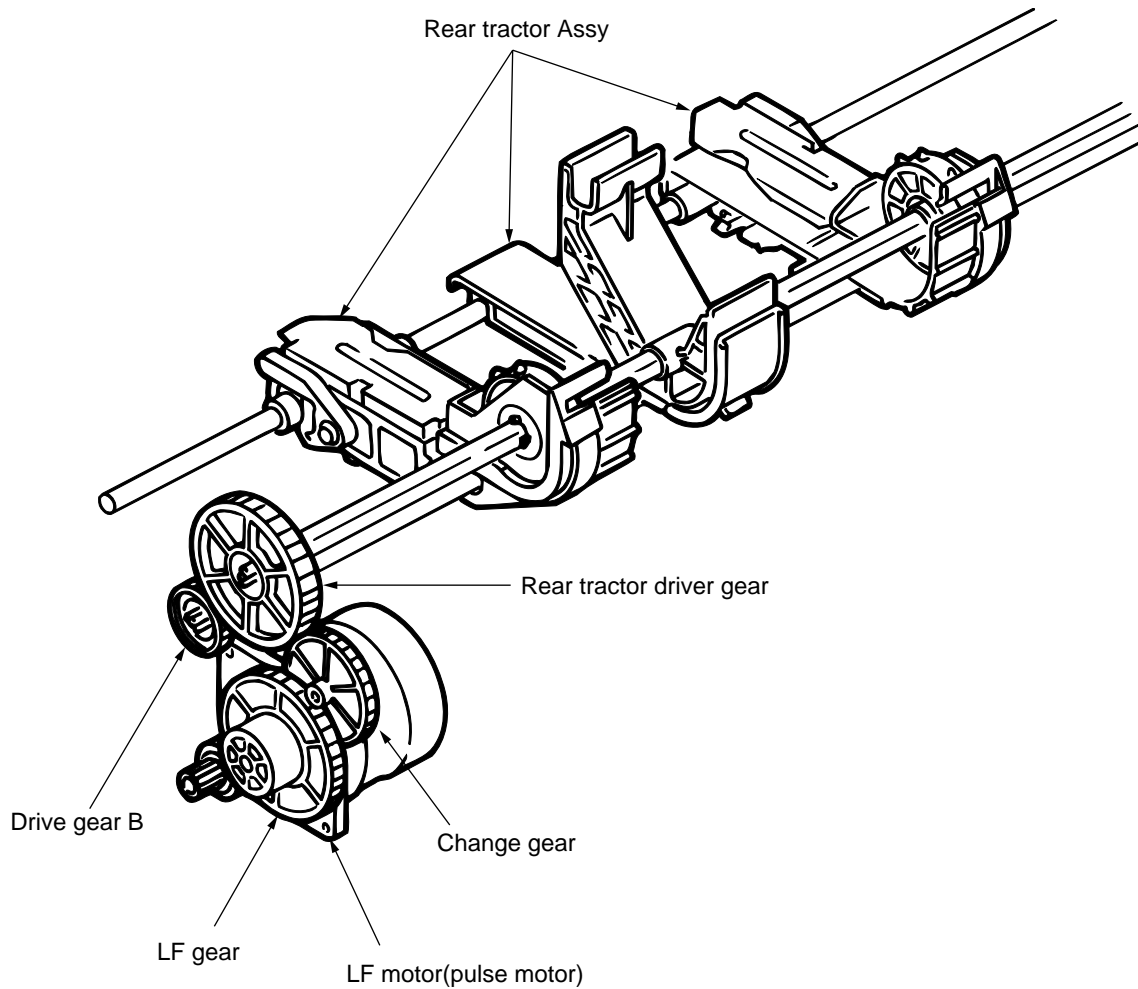
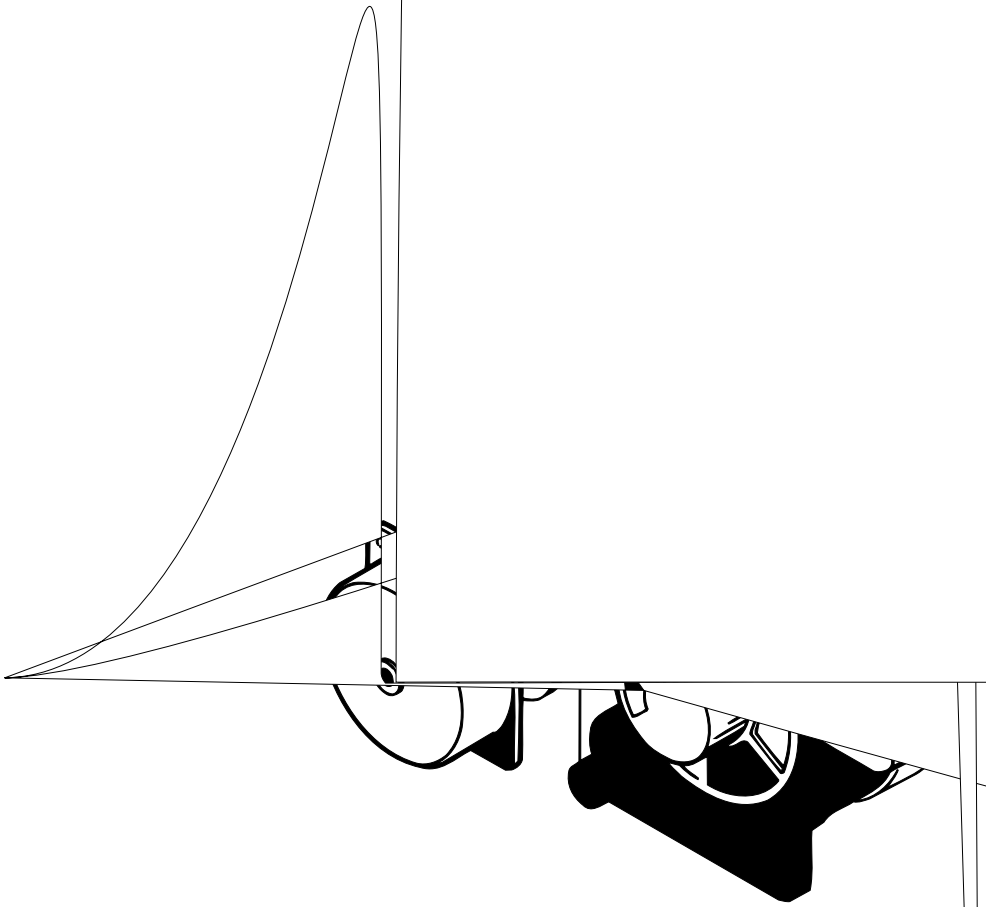
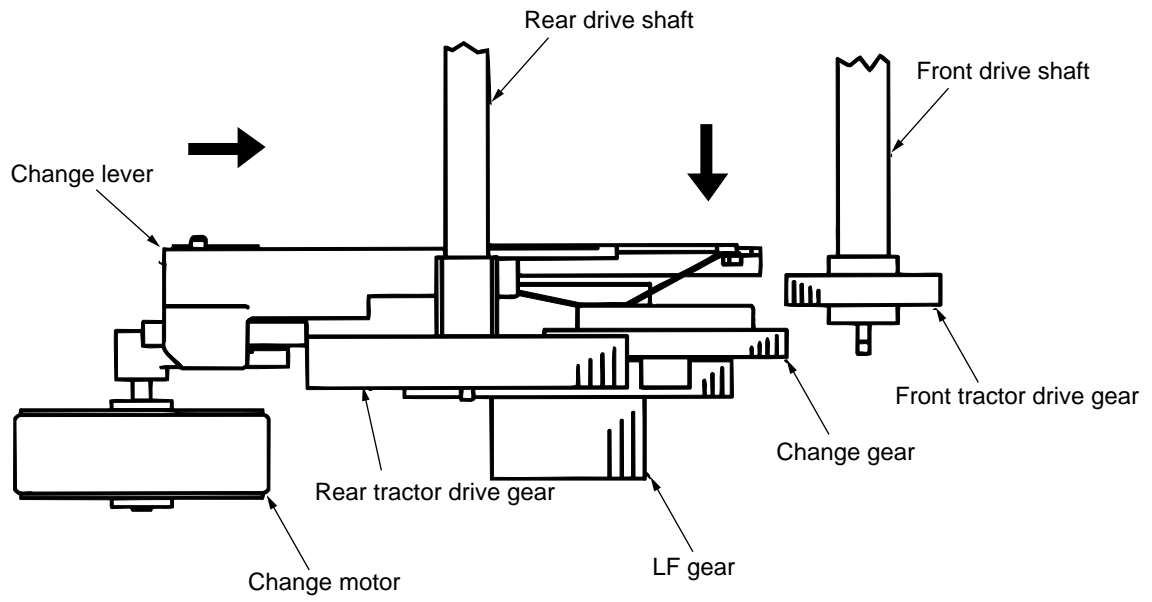


Figure 2.28

- (3) Tractor e
The fron
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rotation



- Rear tractor drive



- Front tractor drive

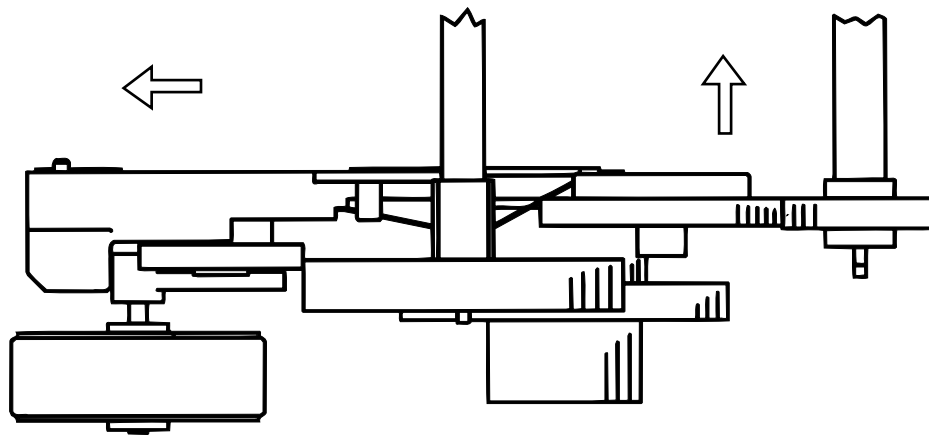


Figure 2.30

2.2.6 Bail Feed Mechanism (See Figure)

This mechanism automatically opens the bail for pulling a paper into, and closes it after the paper passes through the bail.

This function is operated by exclusive bail motor (pulse motor). The bail motor rotates depending on the position of a paper, moving the bail lift lever (L) back and forth through gears.

The moving force of the bail lift lever (L) is also transmitted to the bail lift lever (R) through the support shaft, so the right lever moves longitudinally in synchronization with the left lever. On the bail lever, a cam plate is formed and interlocked to a pin of the bail Assy so that the bail Assy is lifted and lowered by the longitudinal motion of the bail lever.

(1) Bail close position

This position is for the condition where a paper is being printed and carried with both bail Assy and feed roller front upper closed.

(2) Bail open position

This position is for the condition where a paper is being pulled into the bail unit with the bail Assy in open position and the feed roller front upper closed.

(3) Bail half open position

This position is for the condition where a paper is parked or jammed with both bail Assy and feed roller front upper half-opened (to make removal of jammed paper easy).

The rotational force transmitted to the feed roller through mini-pitch belt following the LF gear is, furthermore, transmitted to the bail roller, allowing both-side drive of paper at the bail unit.

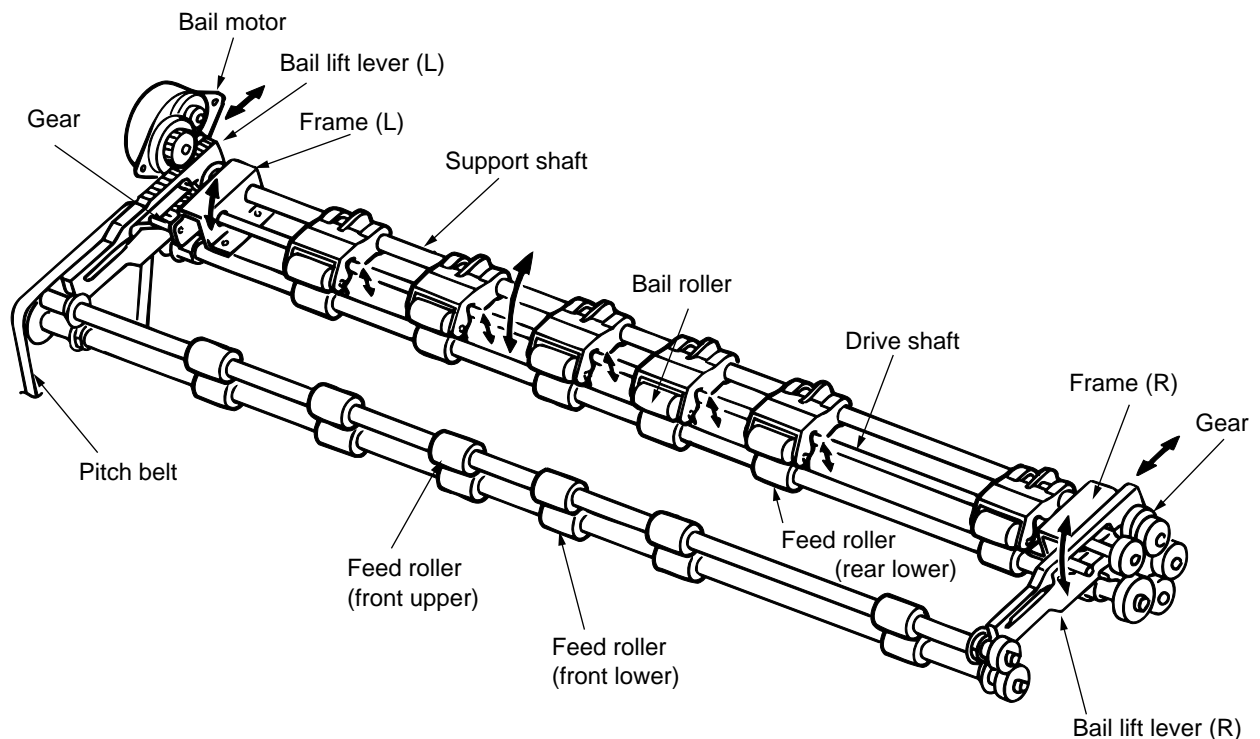
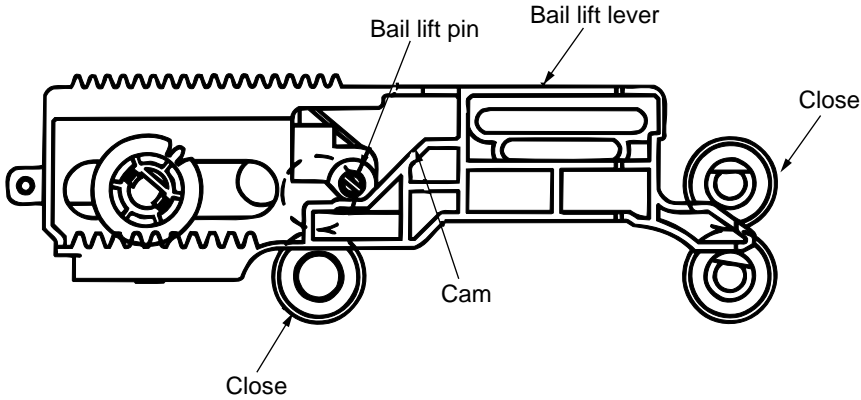
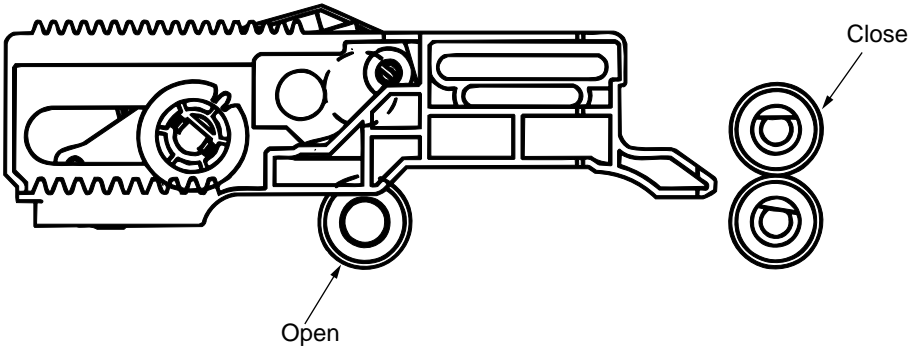


Figure 2.31

(i) Close position



(ii) Open position



(iii) Half open position

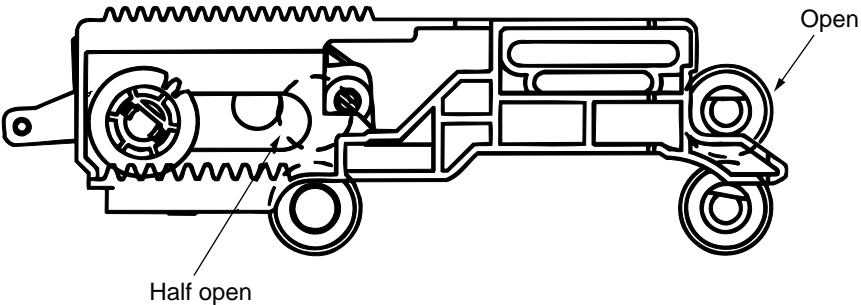


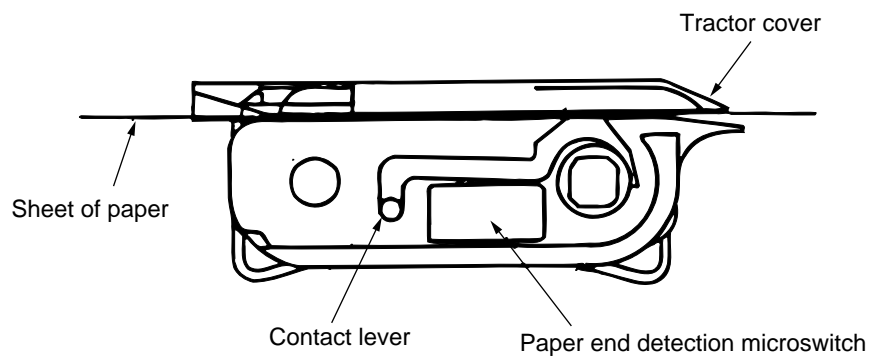
Figure 2.32

2.2.7 Paper End Detection Mechanism (See Figure)

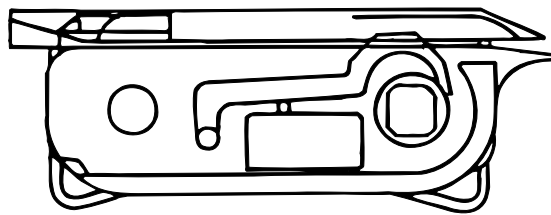
(1) Front/ Rear form end detection mechanism (when the form with sprocket holes is used)

The form prevents the paper end lever tip end from coming into the hole on the sheet feeder cover rib and the microswitch is set to the ON state. When the form runs out, the paper end lever comes into the hole on the sheet feeder cover rib and the bottom of the paper end lever leaves the microswitch to turn it off for form end detection. Both front and rear tractor detects the paper end at 12.7mm.

(2) Front tractor



Tractor with a paper



Tractor without paper

Figure 2.33 Paper end detection mechanism (front tractor)

(3) Rear tractor

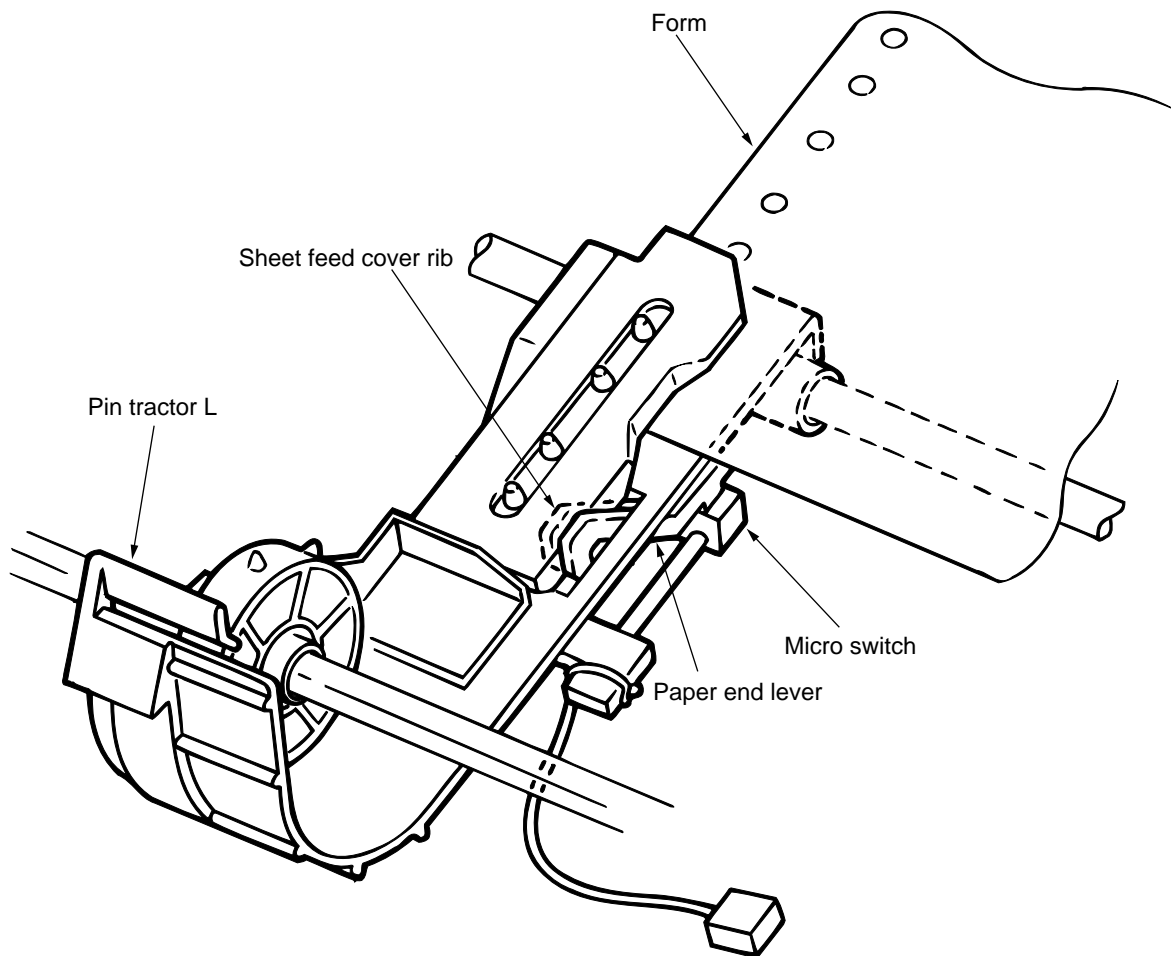


Figure 2.34 Rear form end detection mechanism

3. PARTS REPLACEMENT

The section explains the procedures for replacement of parts, assemblies, and units in the field. Only the removal procedures are explained here. Reverse the procedure for the installation.

3.1 Precautions for Parts Replacement

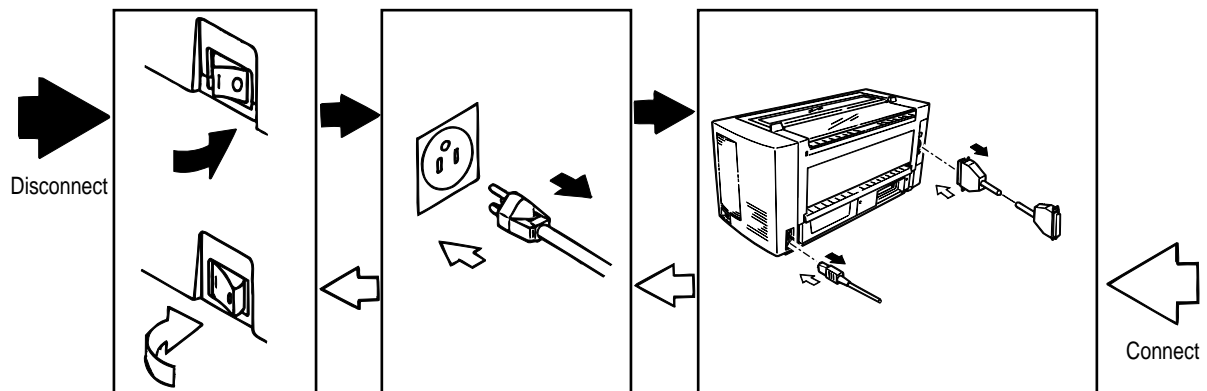
(1) Before starting parts replacement, remove the AC cable and interface cable.

(a) Remove the AC cable and the interface cable in the following procedure:

- i) Turn off ("o") the power switch of the printer
- ii) Disconnect the AC inlet plug of the AC cable from the AC receptacle.
- iii) Disconnect the AC cable and interface cable from the printer.

(b) Reconnect the printer in the following procedure.

- i) Connect the AC cable and interface cable to the printer.
- ii) Connect the AC inlet plug to the AC receptacle.
- iii) Turn on ("I") the power switch of the printer.



(2) Do not try disassembly as long as the printer is operating normally.

(3) Do not remove unnecessary parts: try to keep disassembly to a minimum.

(4) Use specified service tools.

(5) When disassembling, follow the determined sequence. Otherwise, parts may be damaged.

(6) Since screws, collars and other small parts are likely to be lost, they should temporarily be attached to the original positions.

(7) When handling ICs such as microprocessors, ROM and RAM, and circuit boards, do not wear gloves that are likely to generate static electricity.

(8) Do not place printed circuit boards directly on the equipment or floor.

(9) If adjustment is specified in the middle of installation, follow the instructions.

(10) Disassembly prohibited parts


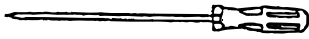








The following units and parts should not be disassembled because they cannot be reassembled if they are broken apart.)

Unit	Disassembly prohibited parts	Details
Print head	Print head	Print head unit
Printer Unit	Space motor Ribbon pulse motor Autogap motor Tractor change motor Bail motor	Motor unit
	Eccentric collar (L)/ (R) (within the bearing on the adjusting cam)	Eccentric collar fixing screw (white painted part)
	Gap sensor (AG sensor frame Assy)	Gap sensor fixing screw (white painted part)

[Service Tools]

Table 3-1 shows the tools required for field replacement of printed circuit boards and units.

Table 3-1 Service Tools

No.	Service Tools	Q' ty	Place of use	Remarks
1	 No. 1-100 Philips screwdriver	1	2~2.5 mm screws	
2	 No. 2-250 Philips screwdriver, Magnetized	1	3~5 mm screws	
3	 No. 3-100 screwdriver	1		
4	 No. 5-250 screwdriver	1		
5	 Digital multimeter	1		
6	 Pliers	1		
7	 Tweezers	1		
8	 Feeler gauge 150MZ	1		
9	 1.1 lbs (500g) bar pressure gauge	1		
10	 No.5 Nippers	1		

3.2 Parts Layout

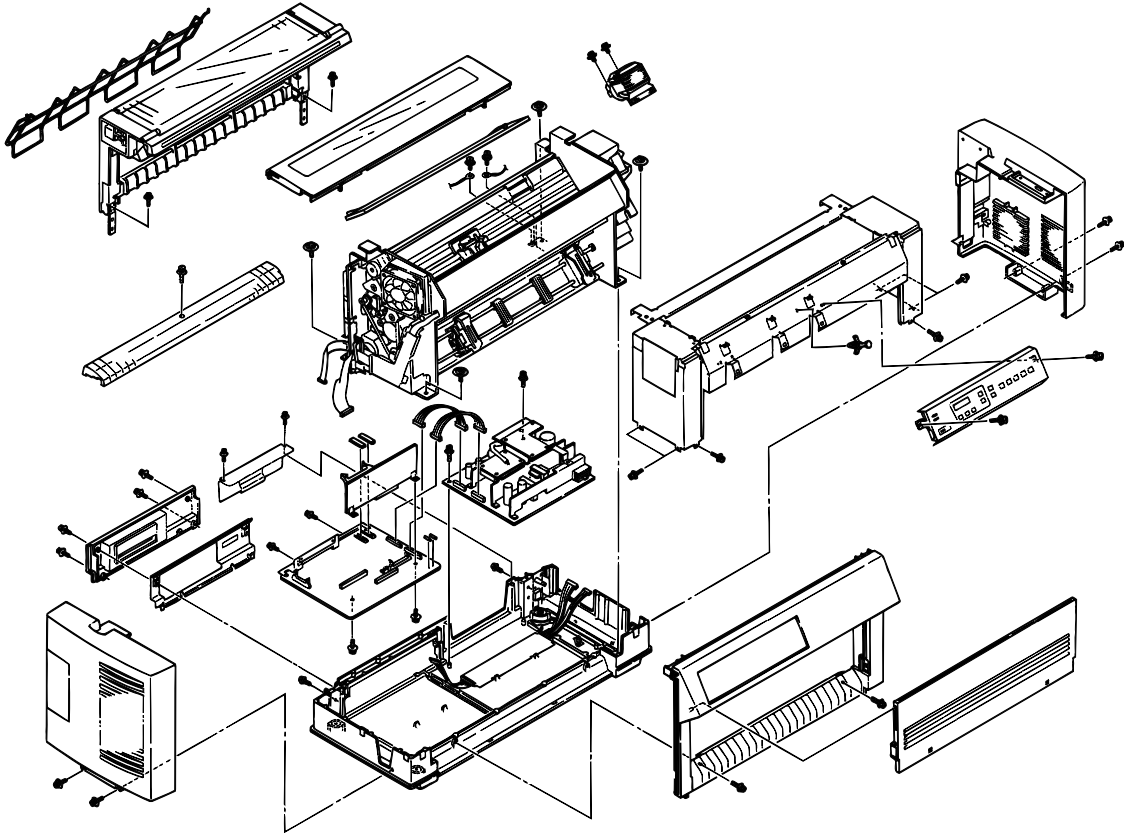


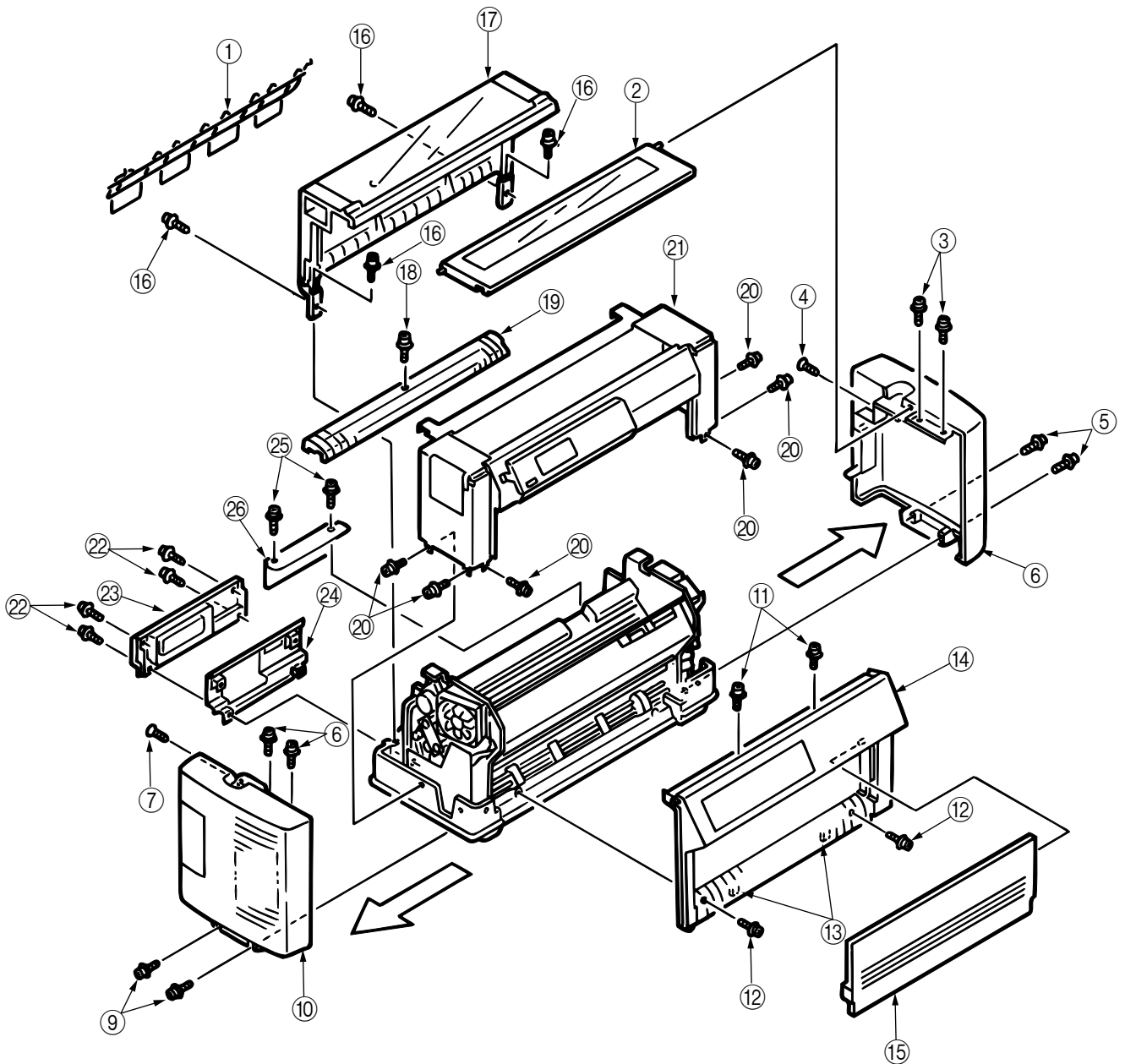
Figure 3-1

3.3 How to Change Parts

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

3.3.1 Cover-Assy-Access / Cover-Assy-Side (R) / Cover-Assy-Side (L) /Cover-Assy-Front / Frame-Assy-Rear / Plate-Front (stuck)

- (1) Remove Guide Sheet ① and Cover Assy Access ②.
- (2) Unscrew 2 screws ③ and the screw ④ and the screw ⑤, then remove Cover Assy Side (R) ⑥, sliding it to the arrow direction.
- (3) Unscrew 2 screws ⑦ and the screw ⑧ and the screw ⑨, then remove Cover Assy Side (L) ⑩, sliding it to the arrow direction.
- (4) Unscrew 4 screws ⑪ and the screw ⑫.
- (5) Release Hooks ⑬ then remove Cover Assy Front ⑭ and Door Assy Front ⑮.
- (6) Unscrew 4 screws ⑯ then lift and remove Frame Assy Rear ⑰.
- (7) Unscrew the screw ⑱ then remove Guide Paper (B) ⑲.
- (8) Unscrew 6 screws ⑳ then lift and remove Plate Front (stuck) ㉑.
- (9) Unscrew 4 screws ㉒ then remove Cover Rear B ㉓ and Plate Earth (Cover Rear) ㉔ together.
- (10) Unscrew 2 screws ㉕ then remove Cover Blank (lower) ㉖.
- (11) For installation, reverse the removal procedure.

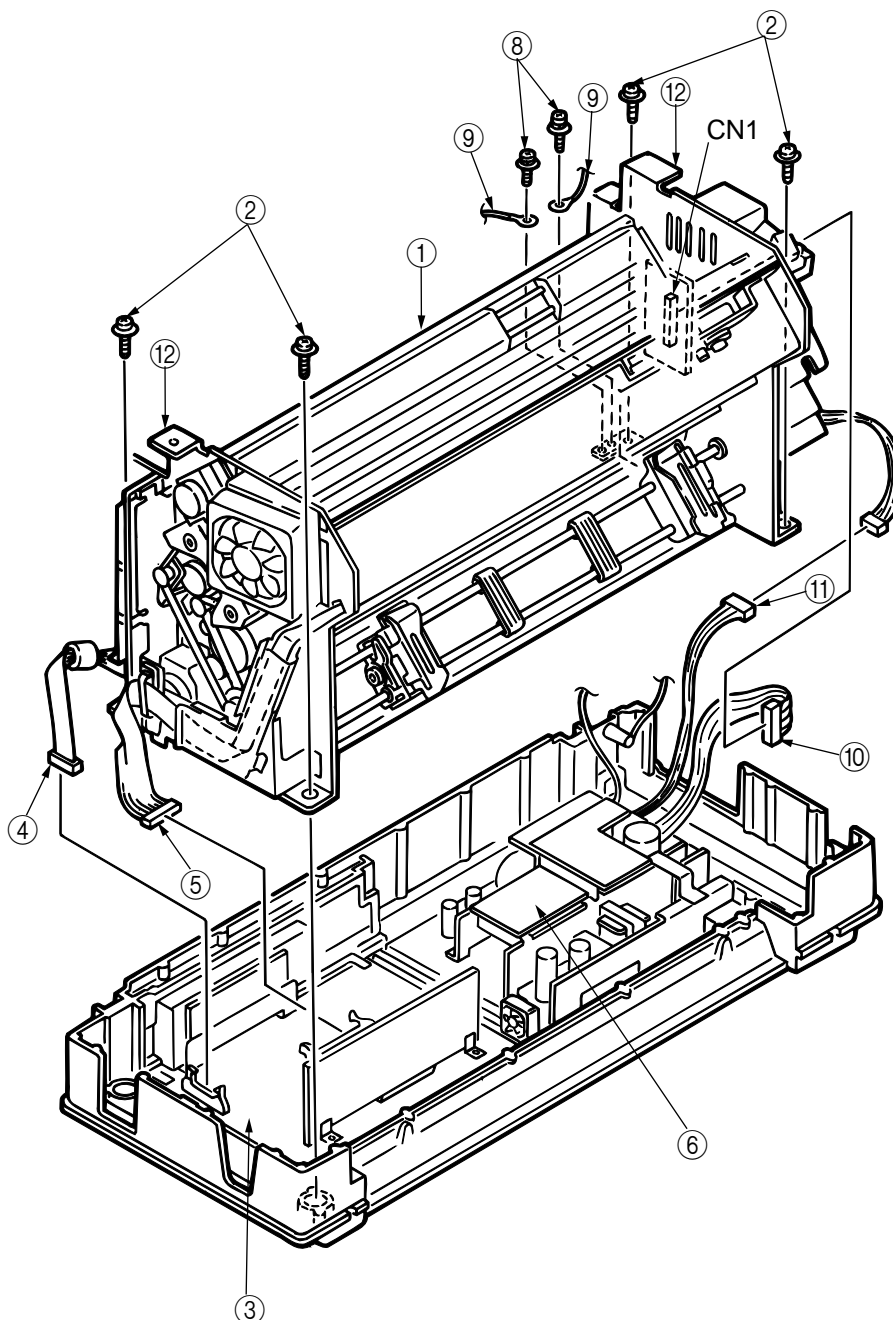


3.3.2 Printer Unit

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unscrew 4 screws ② which fix Printer Unit ①.
- (3) Unplug I/F Connecting Cable ④ and Head Cable ⑤ from Control Board ③.
- (4) Unplug the connector to Power Supply Assy ⑥ and unscrew 2 screws ⑧, then remove FG Wires ⑨.
- (5) Unplug Junction Board Cord ⑩ from Junction Board (PRA Printed Board)(CN1).
- (6) Unplug SP Slit Sensor Cord ⑪.
- (7) With the handle ⑫ held, lift and remove Printer Unit ①.

(Note on Installation)

1. When lowering Printer Unit, prevent connection cords/cables from being caught under the unit.
(Lifting and lowering Printer Unit require 2 or more maintenance personnel.)



3.3.3 Control Block [Control Board (PMA Printed Board), Driver Board (PDA Printed Board)]

- (1) Remove Cover Rear (B). (See 3.3.1)
- (2) Unscrew 2 screws ① and unplug all the connecting cords to Control Block ②.
- (3) Remove Control Block ②, sliding it into the arrow direction.

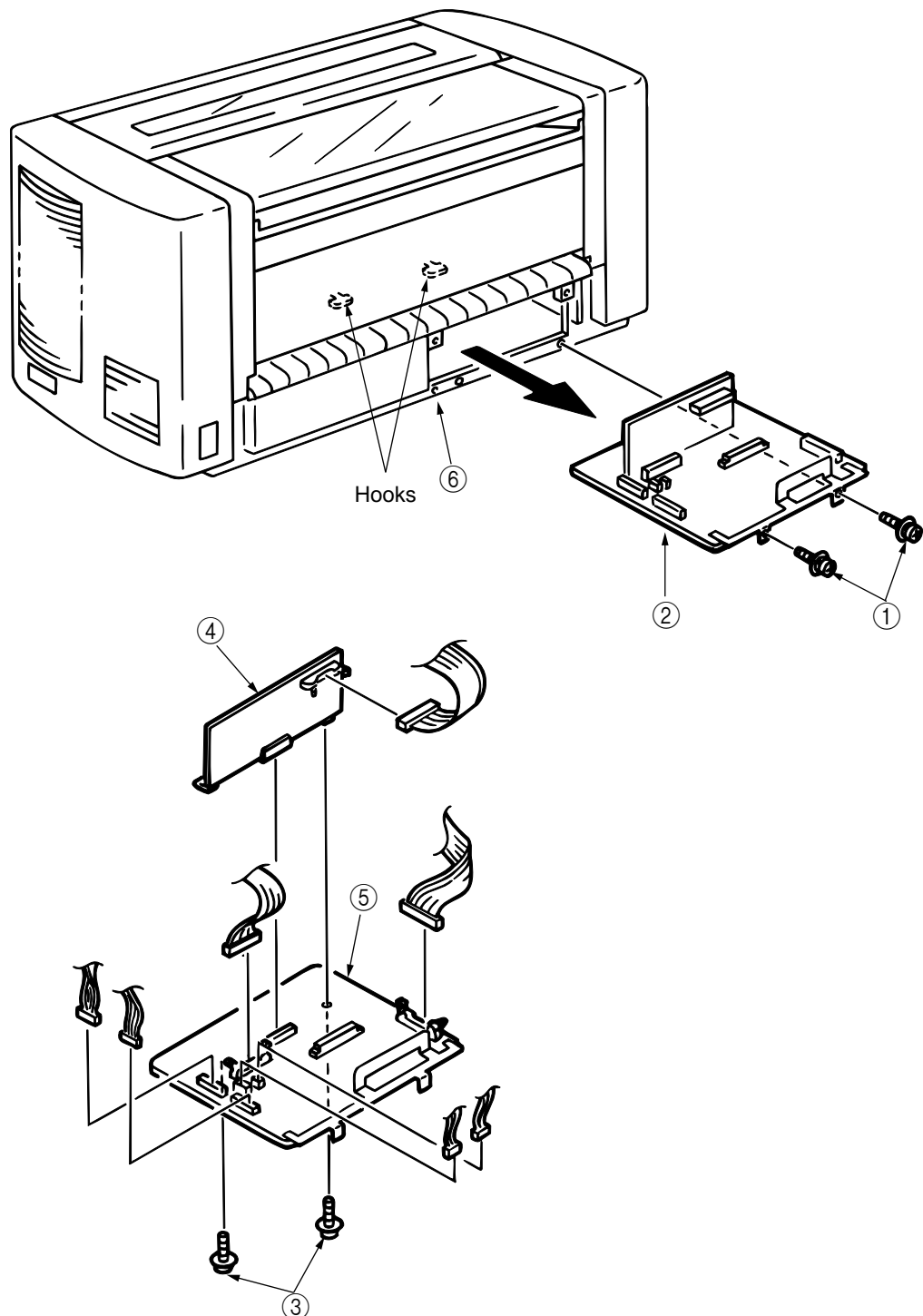
[Control Board (PMA Printed Board) and Driver Board (PDA Printed Board)]

Unscrew 2 screws ③ then pull Driver Board (PDA Printed Board) ④ upward and release it from the connecting position to Control Board (PMA Printed Board) ⑤.

- (4) For installation, reverse the removal procedure.

(Note on Installation)

1. Prevent the connecting cords from being caught under Control Block ②.
2. Make sure Control Block ② is fixed with 2 hooks on Lower Cover ⑥, when mounting the Unit.

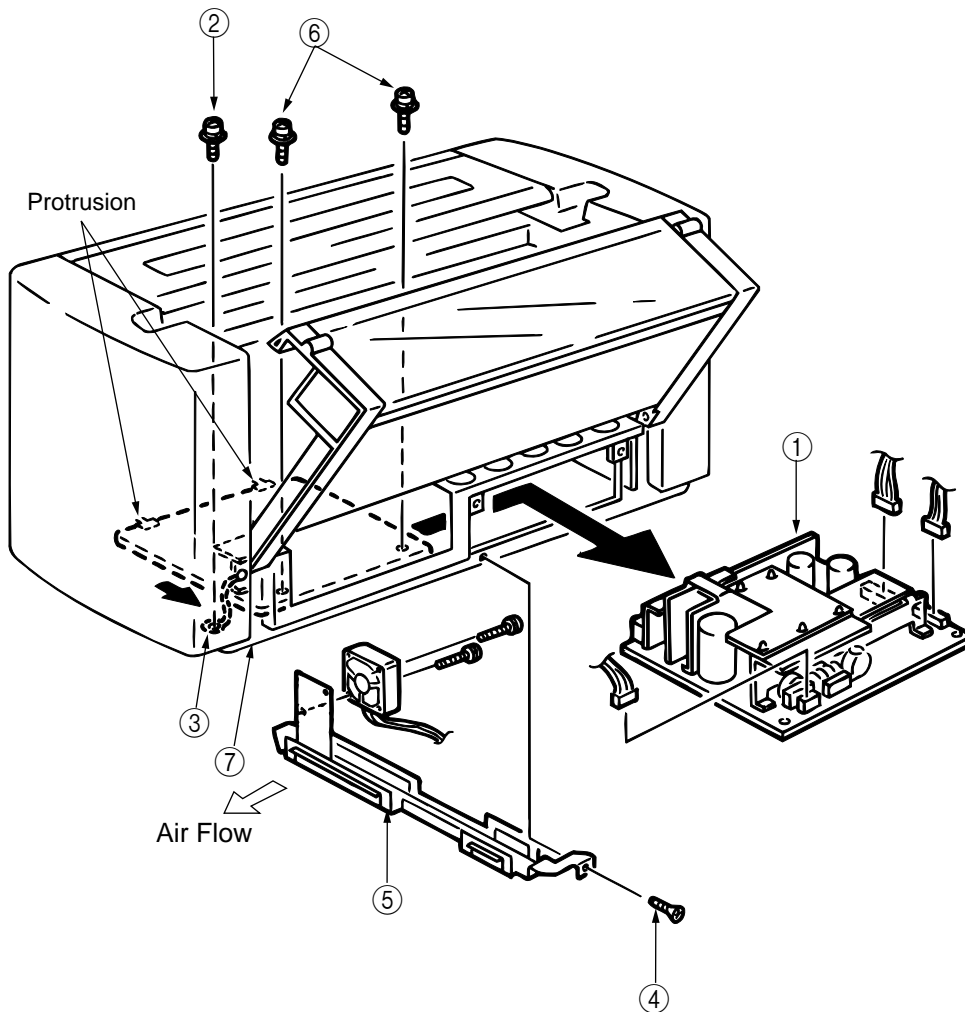


3.3.4 Power Supply Assy

- (1) Remove Guide Paper (B), Cover Blank Lower and Rear Cover (B). (See 3.3.1)
- (2) Unplug connectors to Power Supply Unit ①.
- (3) Unscrew the screw ② and release Earth Wire ③.
- (4) Unscrew the screw ④ and remove Bracket PG ⑤.
- (5) Unscrew 2 screws ⑥. Pulling forward the protrusion on Power Supply Unit ① and sliding it in the arrow direction through 2 inserting positions, remove Power Supply Unit.
- (6) For installation, reverse the removal procedure.

(Note on Installation)

1. Insert the protrusion on Power Supply Unit ① into the inserting positions on Lower Cover ⑦ and mount the Unit.
2. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.

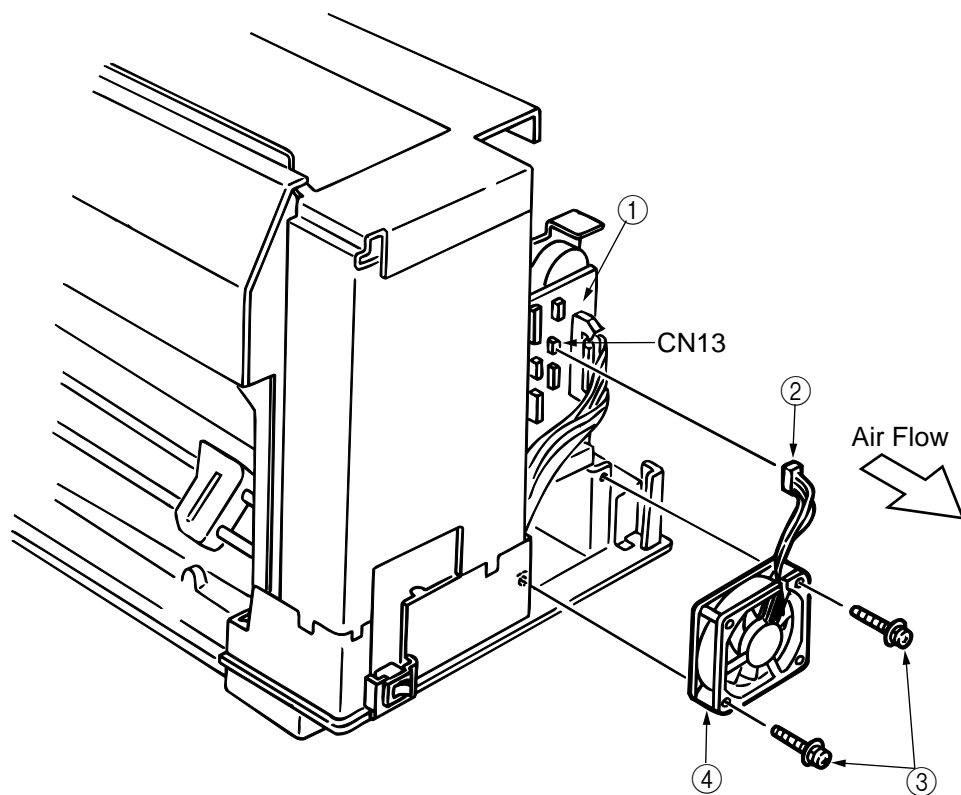


3.3.5 PG Cooling Fan

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear. (See 3.3.1)
- (2) Unplug the connectors ② to Junction Board (PRA Printed Board)(CN13)①.
- (3) Unscrew 2 screws ③ and remove PG Cooling Fan ④.
- (4) For installation, reverse the removal procedure.

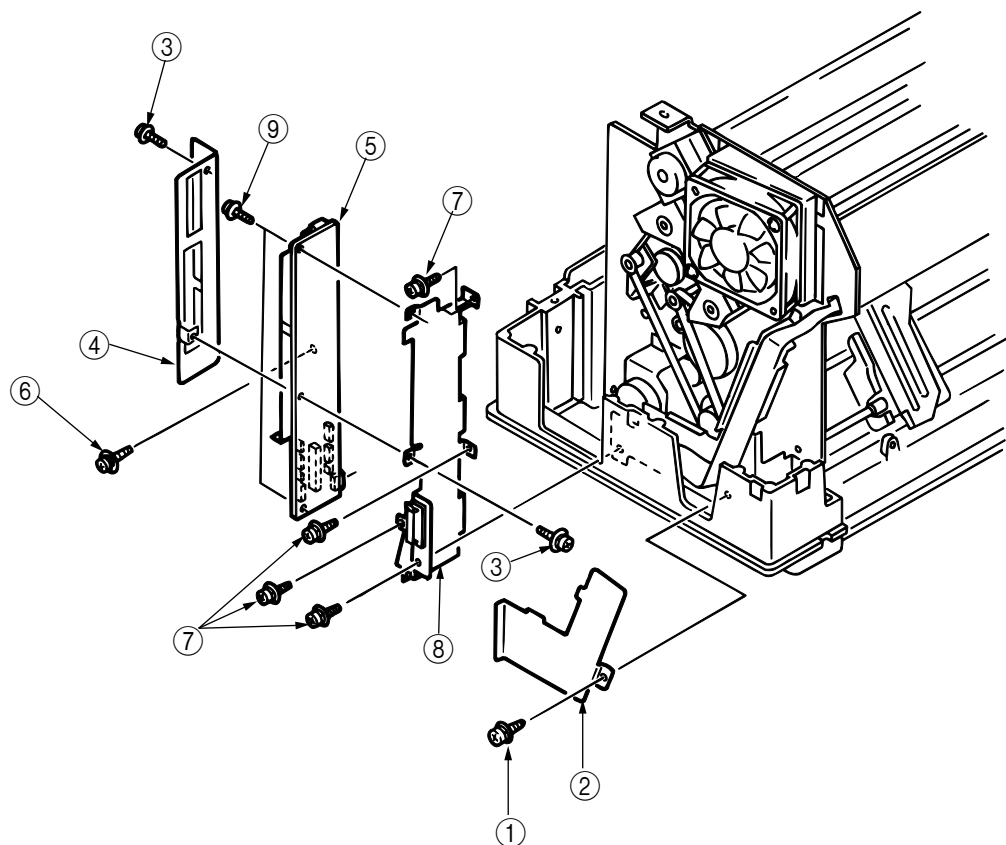
(Note on Installation)

1. Mount the fan to produce wind in the direction as indicated on PG Fan Bracket ⑤.
2. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.



3.3.6 I/F Board (PHA Printed Board)

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unscrew the screw ① and remove Cable Holder ②.
- (3) Unscrew 2 screws ③ and remove I/F Board Holder Cover ④.
- (4) Unplug all the connectors to I/F Board (PHA Printed Board) ⑤.
- (5) Unscrew the screw ⑥ and 4 screws ⑦, then remove I/F Board (PHA Printed Board) ⑤ and I/F Board Holder ⑧ together.
- (6) Unscrew 2 screws ⑨ and remove I/F Board (PHA Printed Board) ⑤.
- (7) For installation, reverse the removal procedure.

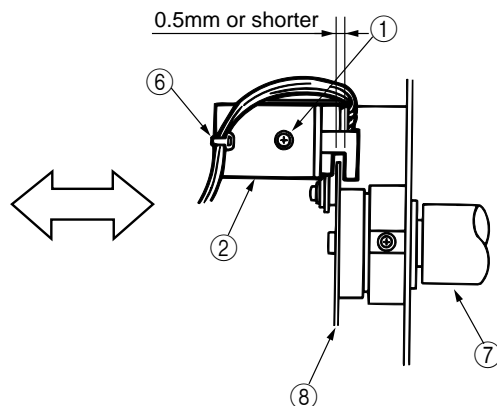
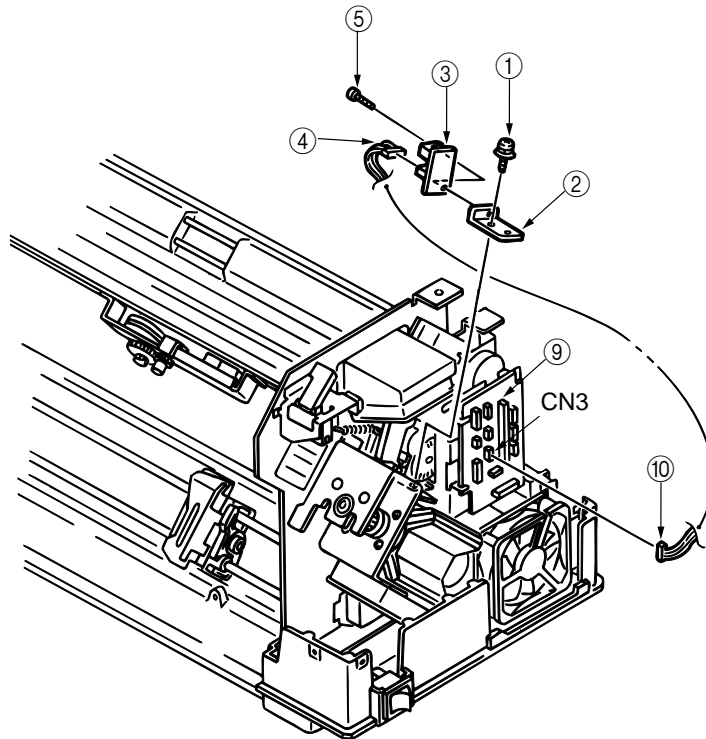


3.3.7 AG Board (PGA Printed Board) / Connector Cord

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unplug the connectors ⑩ to Junction Board (PRA Printed Board)(CN3) ⑨.
- (3) Unscrew the screw ①.
- (4) Remove AG Board Holder A ②, AG Board (PGA Printed Board) ③ and AG Slit Sensor Cord ④ together.
- (5) Unscrew the screw ⑤ and release the wrapping tie ⑥, then remove AG Board (PGA Printed Board) ③ and unplug AG Slit Sensor Cord ④.
- (6) For installation, reverse the removal procedure.

(Note on Installation)

1. The distance to Slit Disk should be 0.5 mm or shorter.
2. Screwing down the screw ①, move Sensor Bracket ② into the arrow direction to produce the following conditions:
Slit Disk ⑧ does not touch Sensor when Main Shaft ⑦ is shifted up to its right play end, and the gap should be 0.5 mm or shorter when Main Shaft ⑦ is shifted up to its left play end.
(Check the above conditions for all Slit Disk ⑧ surface.)



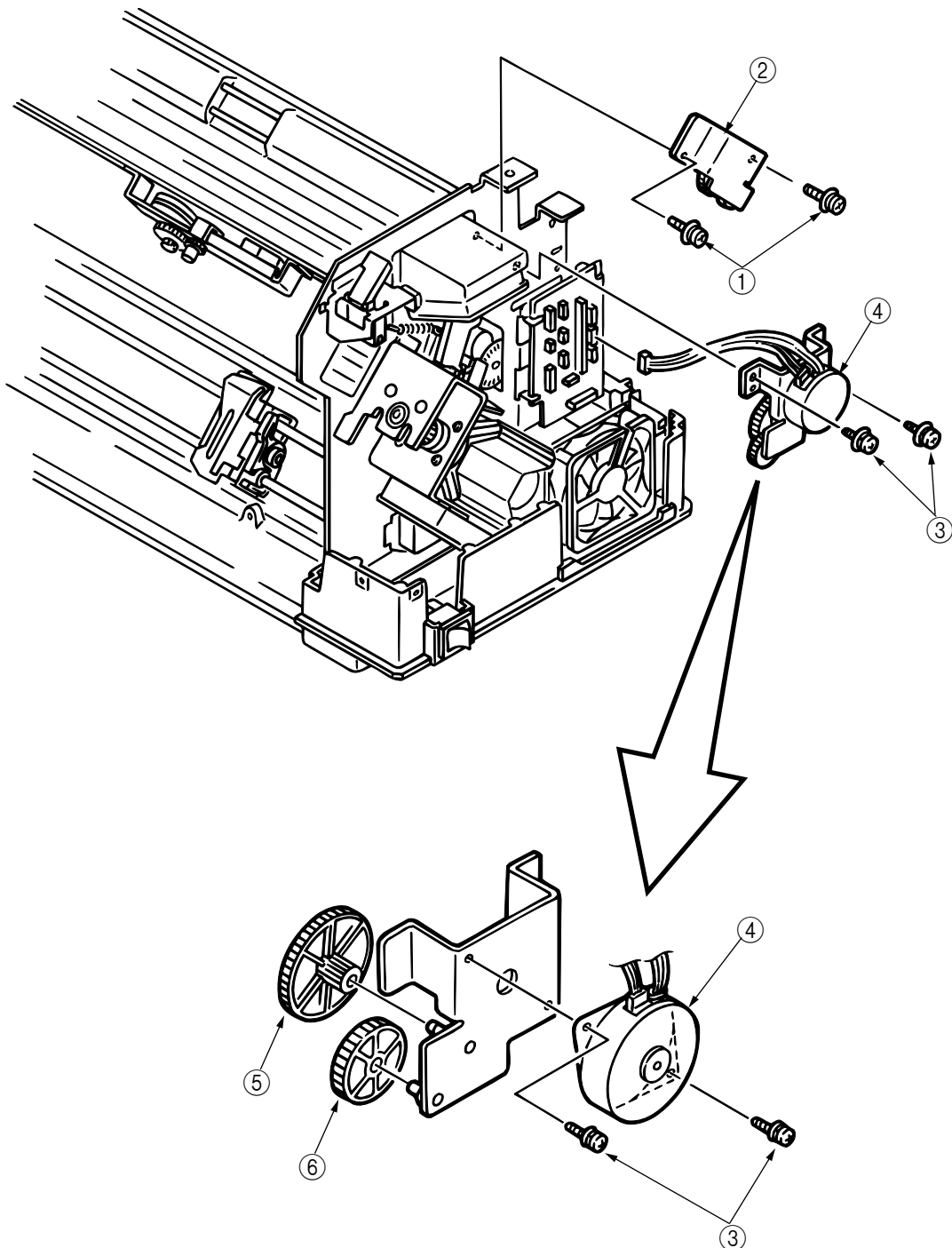
[Note on installation]

3.3.8 AG Motor Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unscrew 2 screws ① and remove Bail Gear Assy ②.
- (3) Unscrew 2 screws ③ and remove AG Motor Assy ④.
- (4) Unscrew 2 screws ⑤ and remove Motor ⑥.
- (5) Remove Idle Gear ⑦ and Tractor Idle Gear ⑧.
- (6) For installation, reverse the removal procedure.

(Note on Installation)

1. Making sure Idle Gear C ⑦ and Tractor Idle Gear ⑧ with AG Motor Assy ② rotate smoothly without play, mount the motor assy.

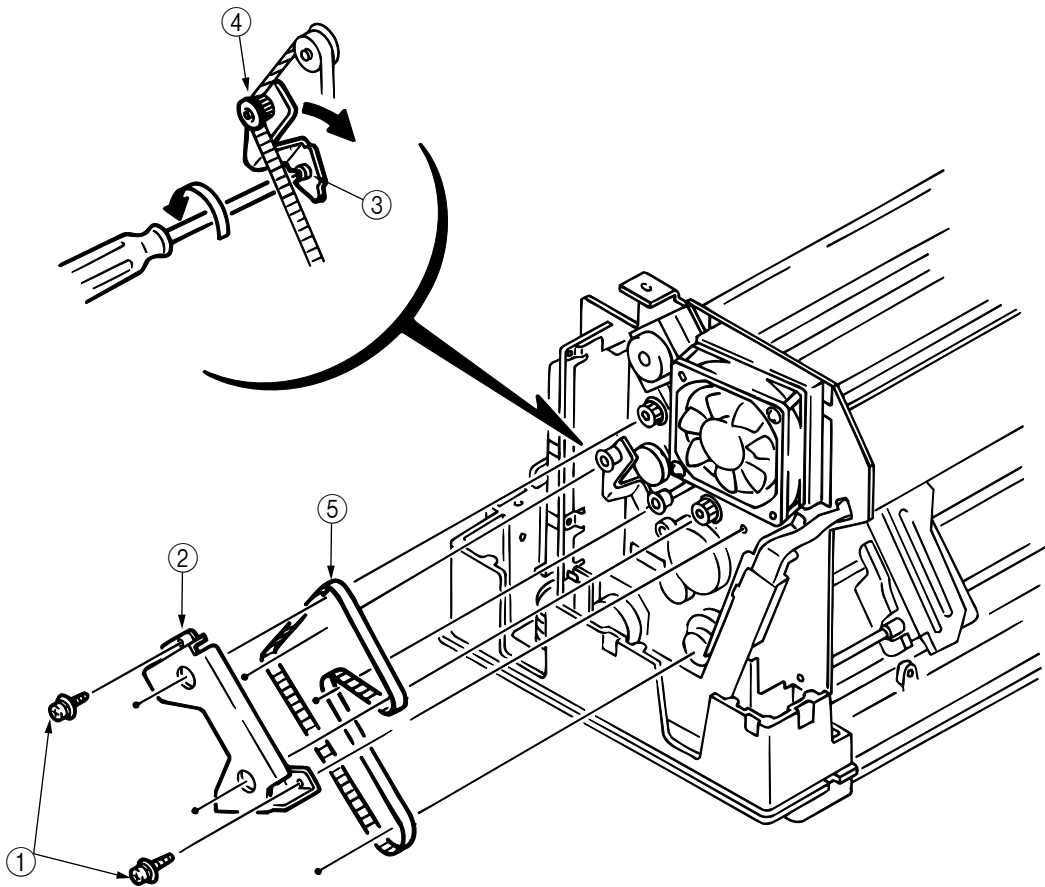


3.3.9 Mini Pitch Belt

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unscrew 2 screws ① and remove Shaft Support Plate (press fit) ②.
- (3) Screw down the screw ③ and turn Idle Pulley Assy ④ into the right direction.
- (4) Remove Mini Pitch Belt ⑤.
- (5) For installation, reverse the removal procedure.

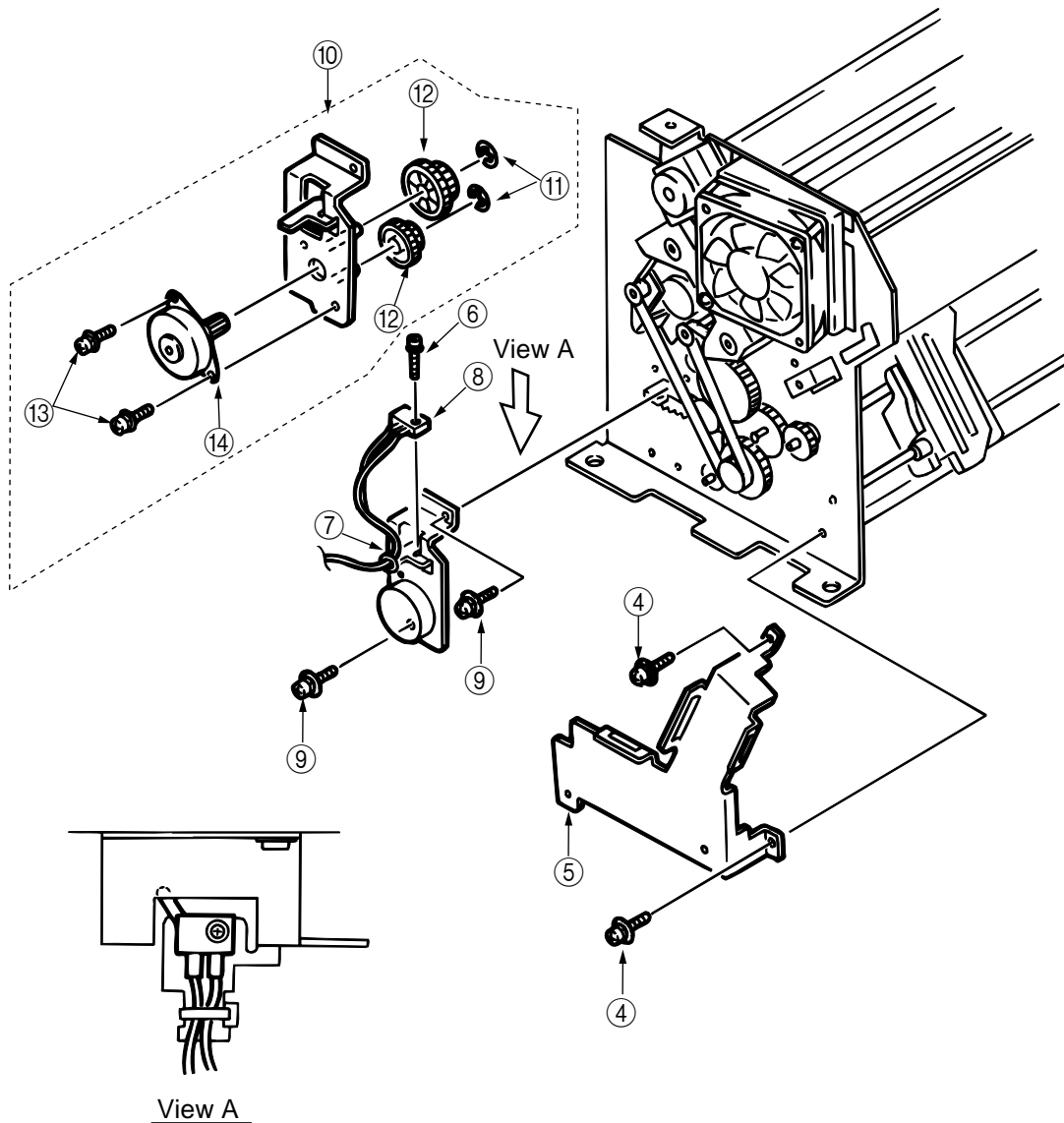
(Note on Installation)

1. Adjust the belt play after installing Mini Pitch Belt ⑤.



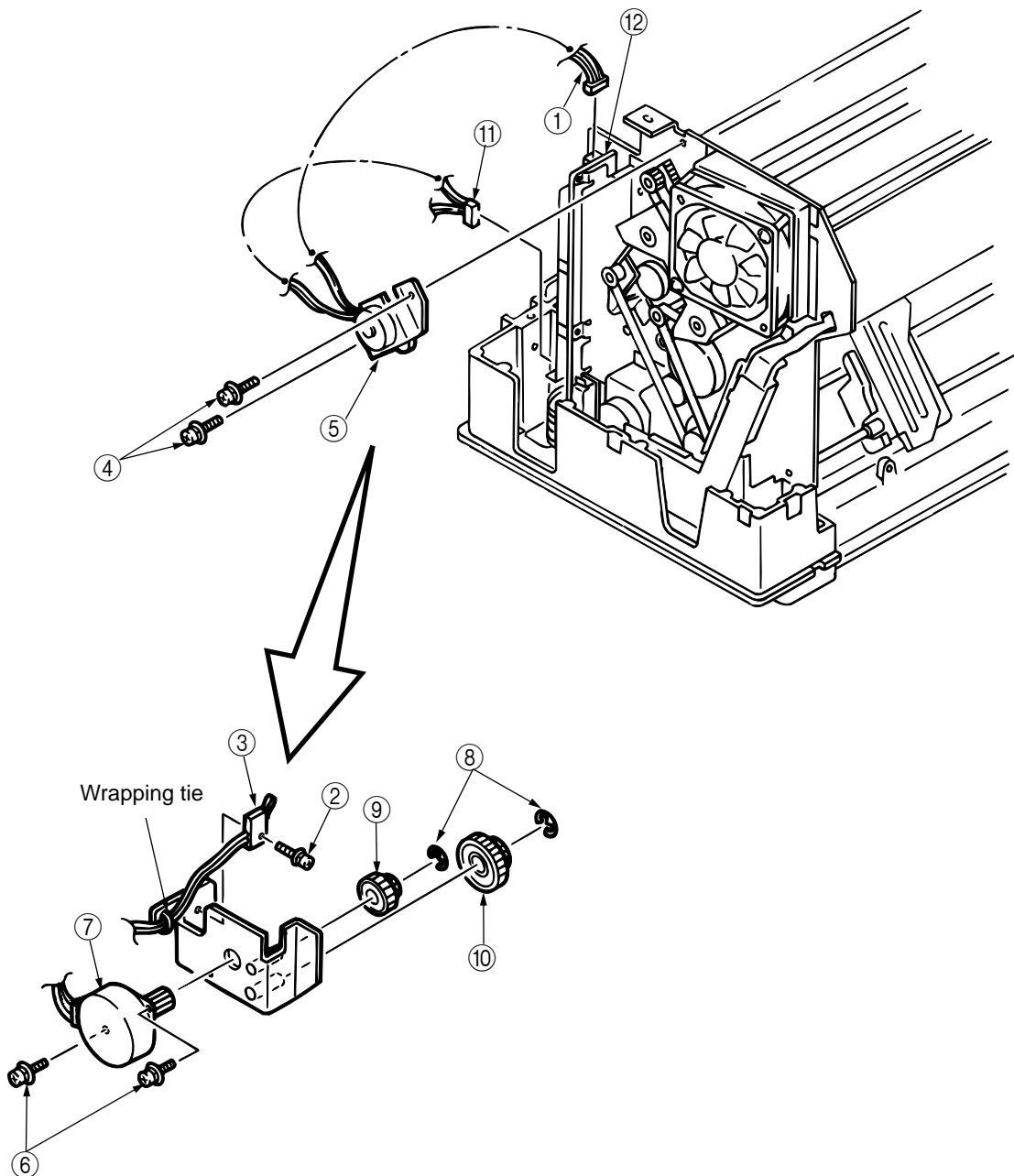
3.3.10 Tractor Change Motor Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Printer Unit. (See 3.3.2)
- (3) Remove I/F Board. (See 3.3.6)
- (4) Release the cords from Cord Clamp ③ on the cord route.
- (5) Unscrew 2 screws ④ and remove Cable Holder ⑤.
- (6) Unscrew the screw ⑥ and cut the wrapping tie ⑦.
- (7) Remove Micro Switch ⑧.
- (8) Unscrew 2 screws ⑨ and remove Tractor Change Motor Assy ⑩.
- (9) Remove E rings ⑪ and the gear ⑫.
- (10) Unscrew 2 screws ⑬ and remove Motor ⑭.
- (11) For installation, reverse the removal procedure.



3.3.11 Bail Motor Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unplug the connectors ① from I/F Board (PHA Printed Board)(CN2) ⑫.
- (3) Unplug the connectors ⑪ from I/F Board (PHA Printed Board)(CN11) ⑫.
- (4) Release the cords from the cord clamps on the cord route.
- (5) Unscrew the screw ② and cut the wrapping tie.
- (6) Remove Micro Switch ③.
- (7) Unscrew 2 screws ④ and remove Bail Motor Assy ⑤.
- (8) Unscrew 2 screws ⑥ and remove the motor ⑦.
- (9) Remove E rings ⑧ and 2 gears ⑨ and ⑩.
- (10) For installation, reverse the removal procedure.

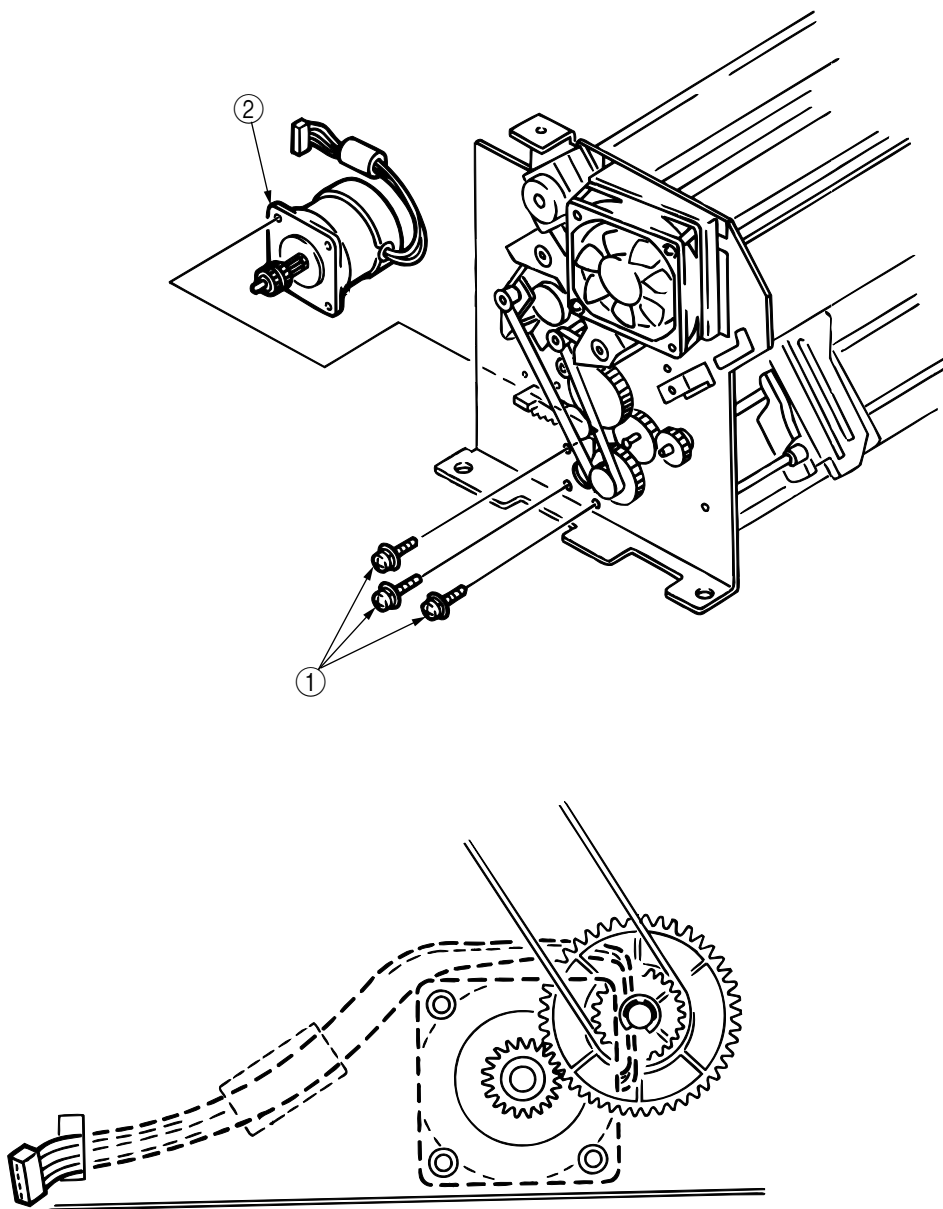


3.3.12 LF Motor Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove I/F Board. (See 3.3.6)
- (3) Remove Printer Unit. (See 3.3.2)
- (4) Remove Tractor Change Motor Assy. (See 3.3.10)
- (5) Unscrew 3 screws ① and remove LF Motor ②.
- (6) For installation, reverse the removal procedure.

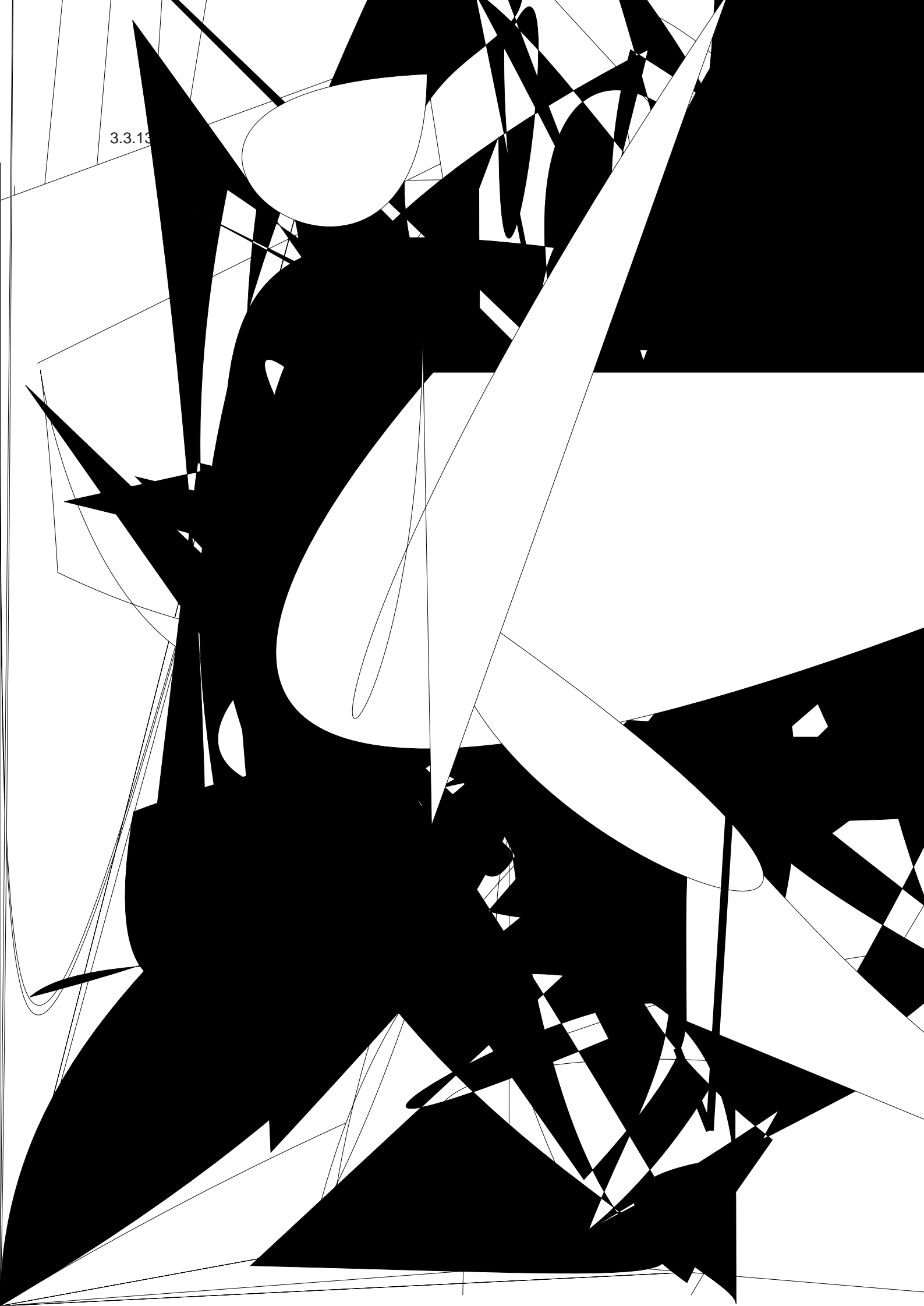
(Note on Installation)

1. LF Motor Assy ② should be mounted with the cord route as shown below.



[LF Motor Assy Cord Route Fig.]

3.3.13

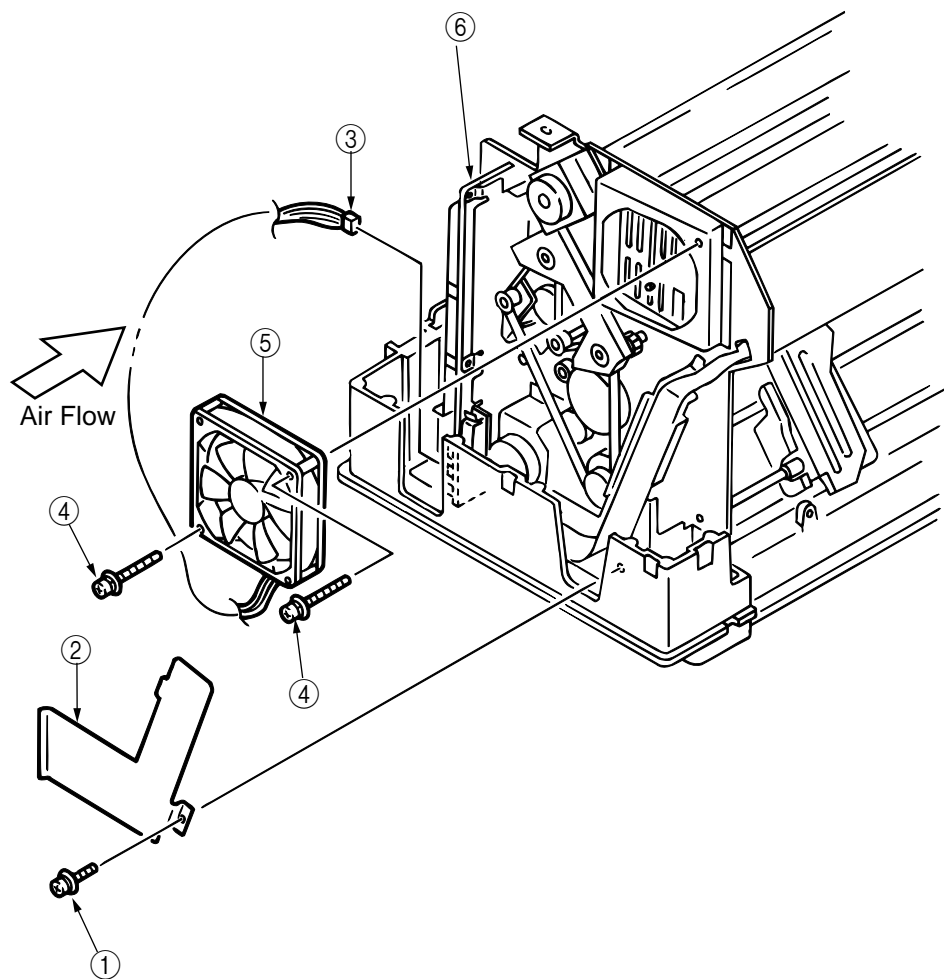


3.3.14 Head Cooling Fan 2

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unscrew the screw ① and remove Cable Holder Cover ②.
- (3) Unplug the connector ③ from I/F Board (PHA Printed Board)(CN6) ⑥.
- (4) Release the cords from the cord clamps on the cord route.
- (5) Unscrew 2 screws ④ and remove Head Cleaning Fan 2 ⑤.
- (6) For installation, reverse the removal procedure.

(Note on Installation)

1. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.

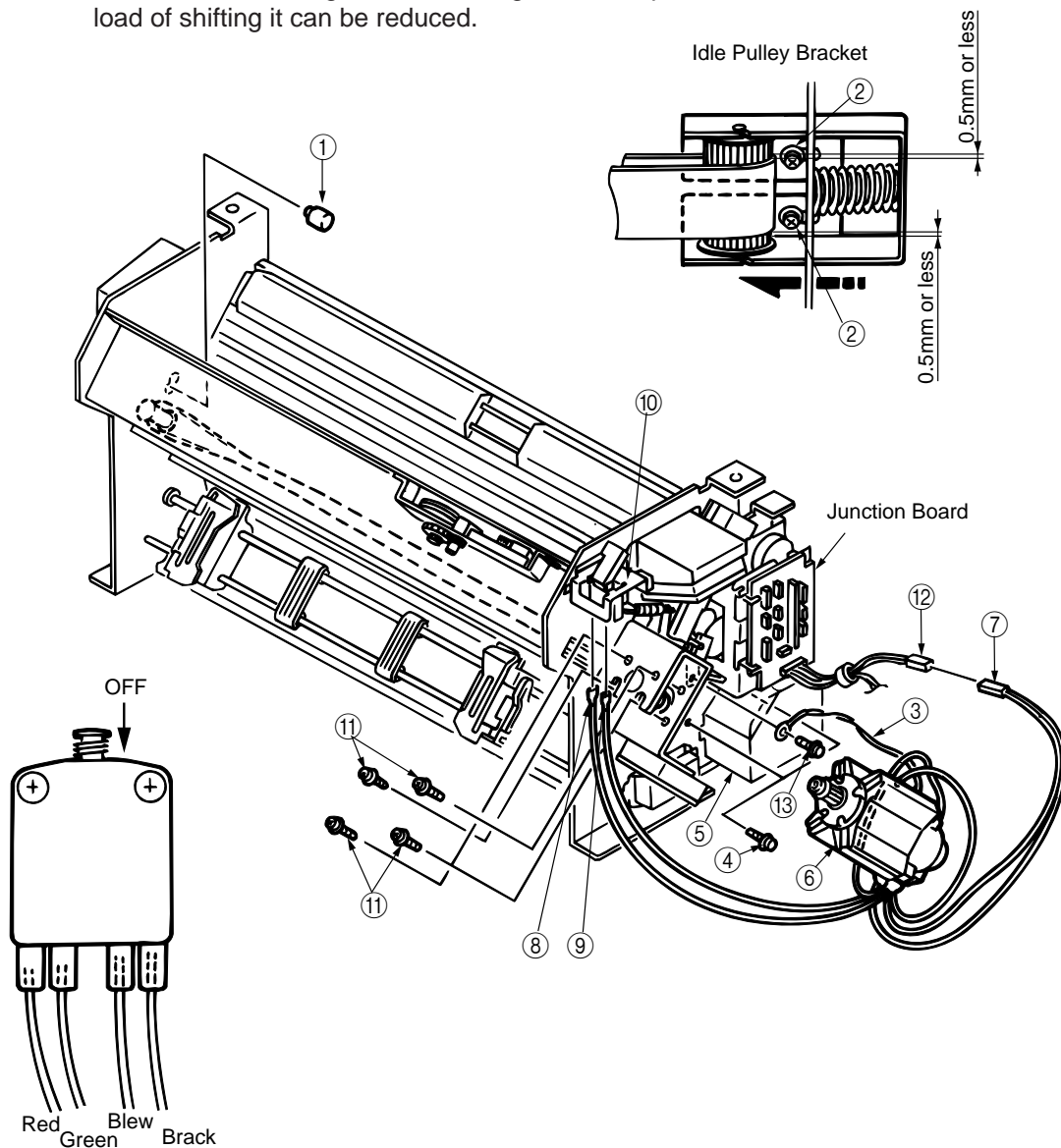


3.3.15 Space Motor

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Printer Unit. (See 3.3.2)
- (3) Remove the stopper ①.
- (4) Screw down 2 fixing screws ② on Idle Pulley Bracket. Move the pulley into the arrow direction to loose the belt, then fasten the screws.
- (5) Remove PG Cooling Fan. (See 3.3.5)
- (6) Unscrew 2 screws ④ and remove PG Fan Bracket ⑤.
- (7) Unplug connectors ⑦ to Interlock Switch Cord Assy ⑫.
- (8) Unplug connectors ⑧, ⑨ to Interlock Switch ⑩, and release the cords from the cordclamps on the cord route.
- (9) Unscrew 1 screws ⑬ and remove FG Mesh ③.
- (10) Unscrew 4 screws ⑪ and remove Space Motor ⑥.
- (11) For installation, reverse the removal procedure.

(Note on Installation)

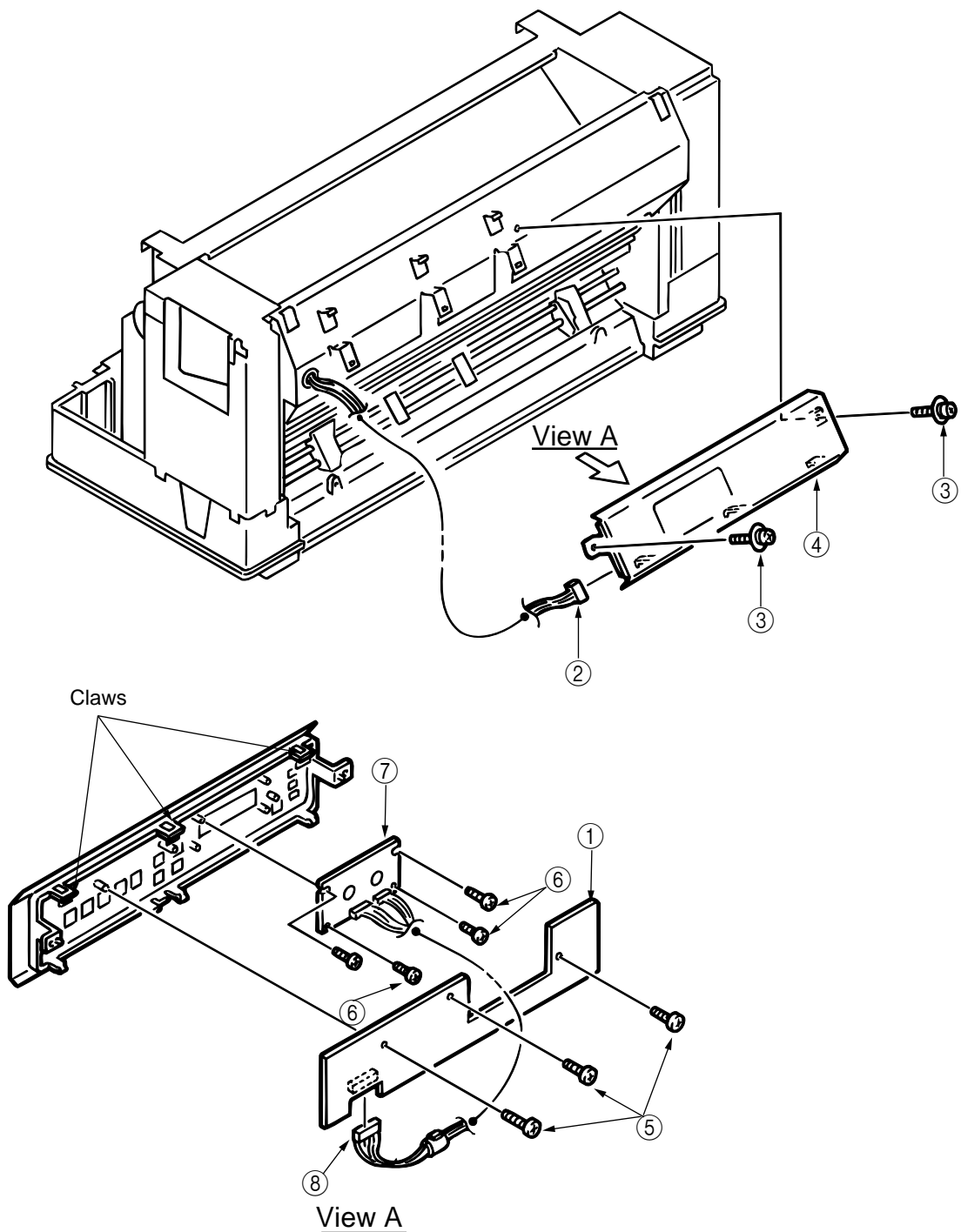
1. After assembling the motor, adjust the position of the idle pulley bracket with screw ② so that the space belt should be positioned at the center between the idle pulley and motor pulley, and the vertical fluctuation of belt be 0.5mm or less when the carriage is shifted to right and left. When the carriage is shifted to right and left, press the interlock switch ⑩ off so that the load of shifting it can be reduced.



Wiring of interlock switch

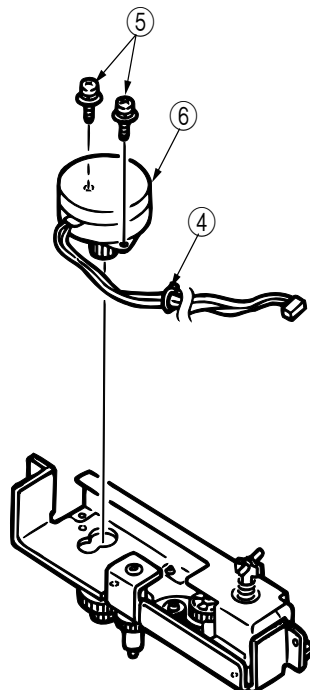
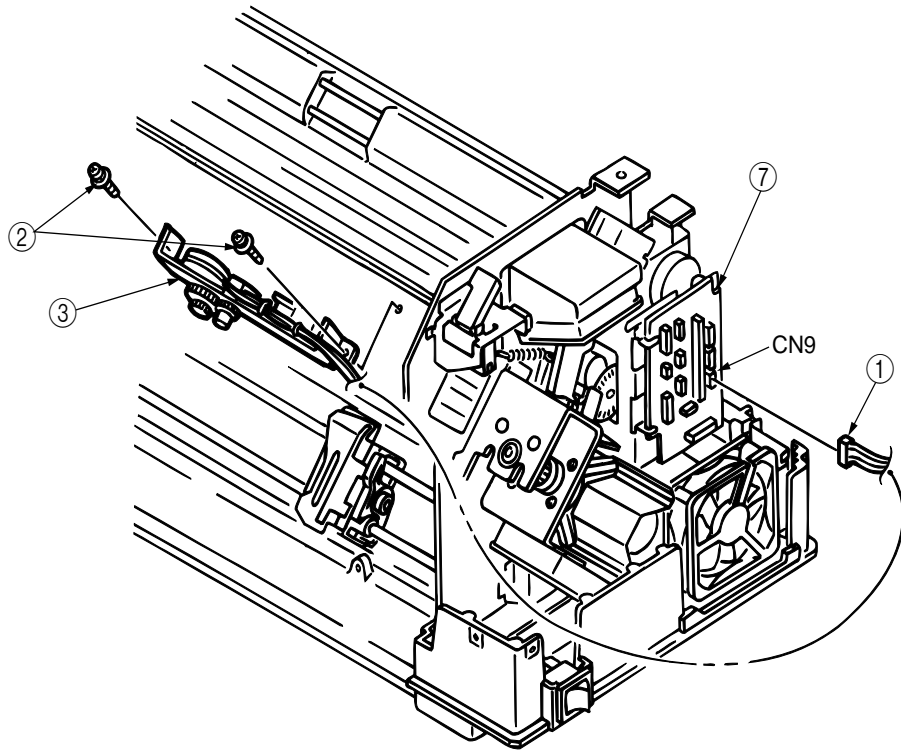
3.3.16 Operator Board (POA Printed Board)

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unplug the connector ② from Operator Board (POA Printed Board)(CN1) ①.
- (3) Unscrew 2 screws ③ and Remove Operator Block Assy ④.
- (4) Unplug the connector ⑧ from Operator Board (POA Printed Board)(CN2) ①.
- (5) Unscrew 3 screws ⑤ and release 3 claws, then remove Operator Board (POA Printed Board) ① from Operator Block Assy ④.
- (6) Unscrew 4 screws ⑥ and remove LCD Unit ⑦.
- (7) For installation, reverse the removal procedure.



3.3.17 Ribbon Feed Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unplug the connector ① from Junction Board (PRA Printed Board)(CN9) ⑦.
- (3) Unscrew 2 screws ② and remove Ribbon Feed Assy ③.
- (4) Release the cord wrapping tie ④ and unscrew 2 screws ⑤, then remove the motor ⑥.
- (5) For installation, reverse the removal procedure.

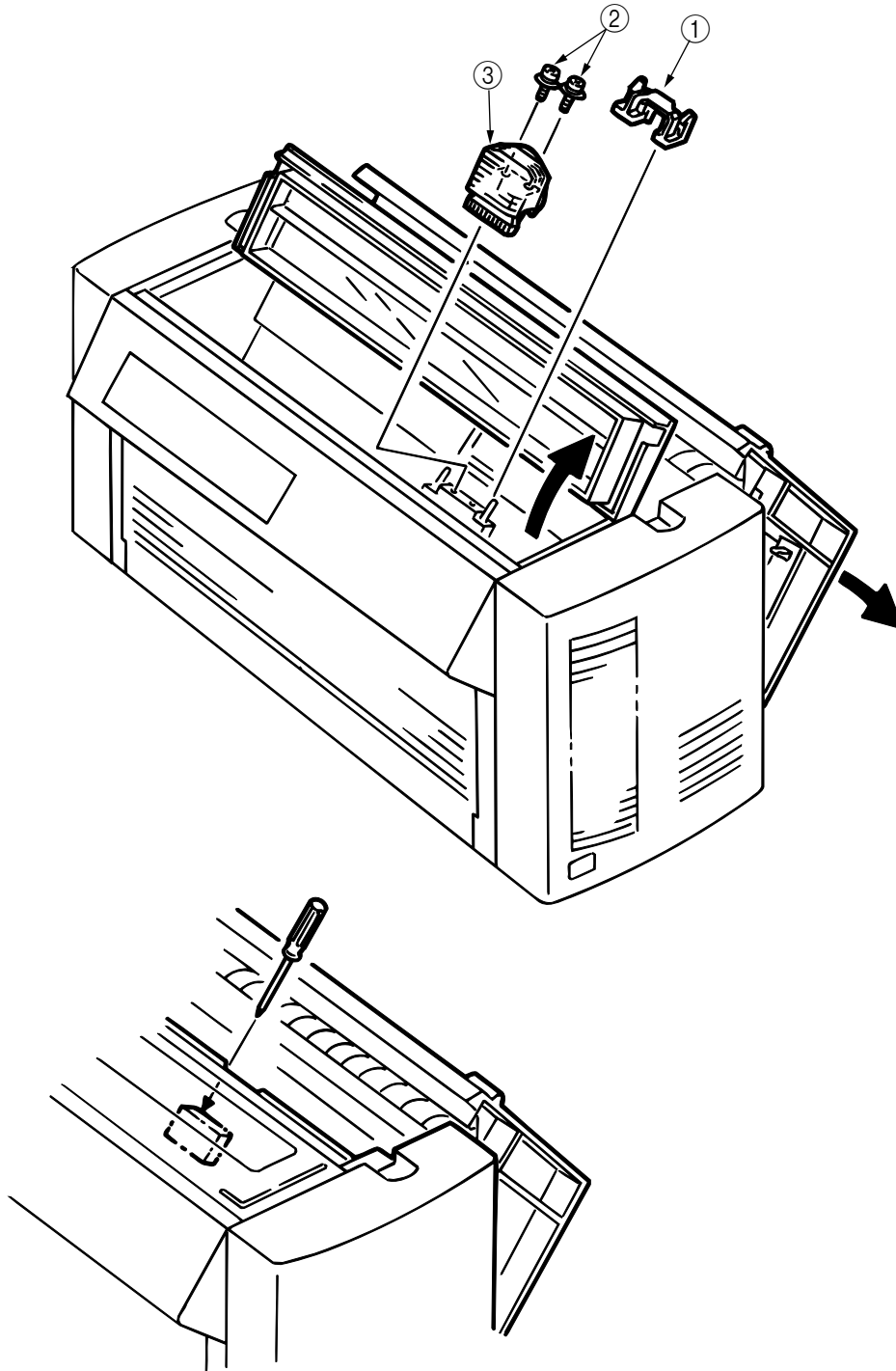


3.3.18 Printing Head

- (1) Lean Frame Assy Rear backward and open Access Cover.
- (2) Move the printing head to the recess on the right seen from the front.
- (3) Pull out Ribbon Guide ① upward.
- (4) Unscrew 2 screws ② and remove Printing Head ③ from the connector.
- (5) For installation, reverse the removal procedure.

(Note on Installation)

1. The head should be installed according to Section 9, Procedure for Installing Print Head in 4 ADJUSTMENTS.

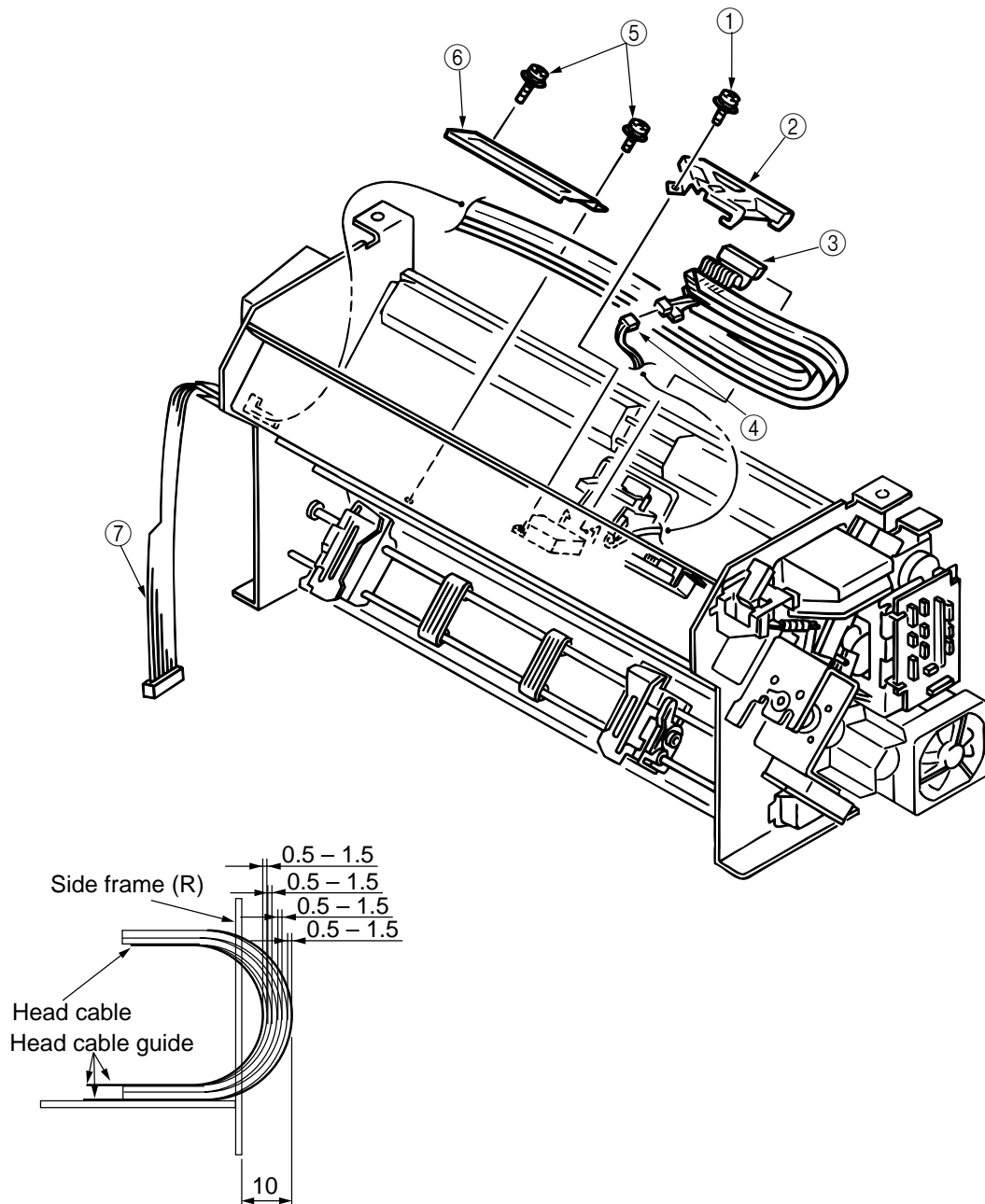


3.3.19 Head Cable

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Printing Head. (See 3.3.18)
- (3) Remove Printer Unit. (See 3.3.2)
- (4) Remove Cable Holder Cover. (See 3.3.6)
- (5) Unscrew the screw ① and remove Carriage Cable Holder ②.
- (6) Unplug Head Connector ③ and then the connector (green) ④.
- (7) Unscrew 2 screws ⑤ and remove Head Cable Cover ⑥.
- (8) Unplug Head Cable ⑦, pulling it to the left.
- (9) For installation, reverse the removal procedure.

(Note on Installation)

1. When the head cable is assembled, make sure that 0.5 - 1.5mm clearance between cables should be secured and the amount of protrusion from the side frame (R) should be approx. 10mm on condition that the carriage is shifted to the left end.



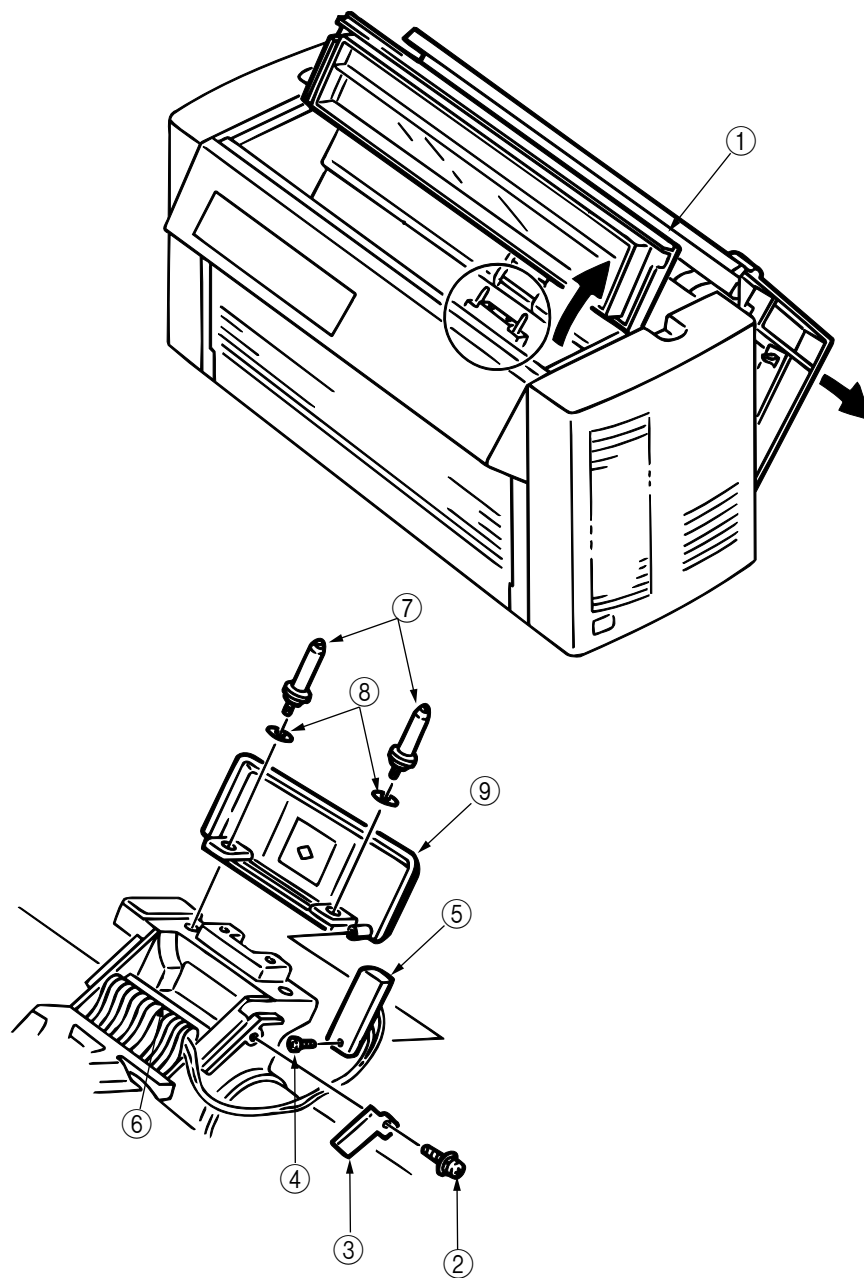
The condition of cables when the carriage is shifted to the left end

3.3.20 Ribbon Protector

- (1) Remove Printing Head. (See 3.3.18)
- (2) Open Access Cover ①.
- (3) Unscrew the screw ② and remove the cord clamp ③.
- (4) Unscrew the screw ④ and remove Paper Width Sensor ⑤.
- (5) Unplug the connector ⑥.
- (6) Remove 2 Ribbon Guide Posts ⑦ and 2 washers ⑧.
- (7) Remove Ribbon Protector ⑨.
- (8) For installation, reverse the removal procedure.

(Note on Installation)

1. In assembling the ribbon protector, make an adjustment according to the Section 1 (2) Protector Gap of 4. ADJUSTMENTS.

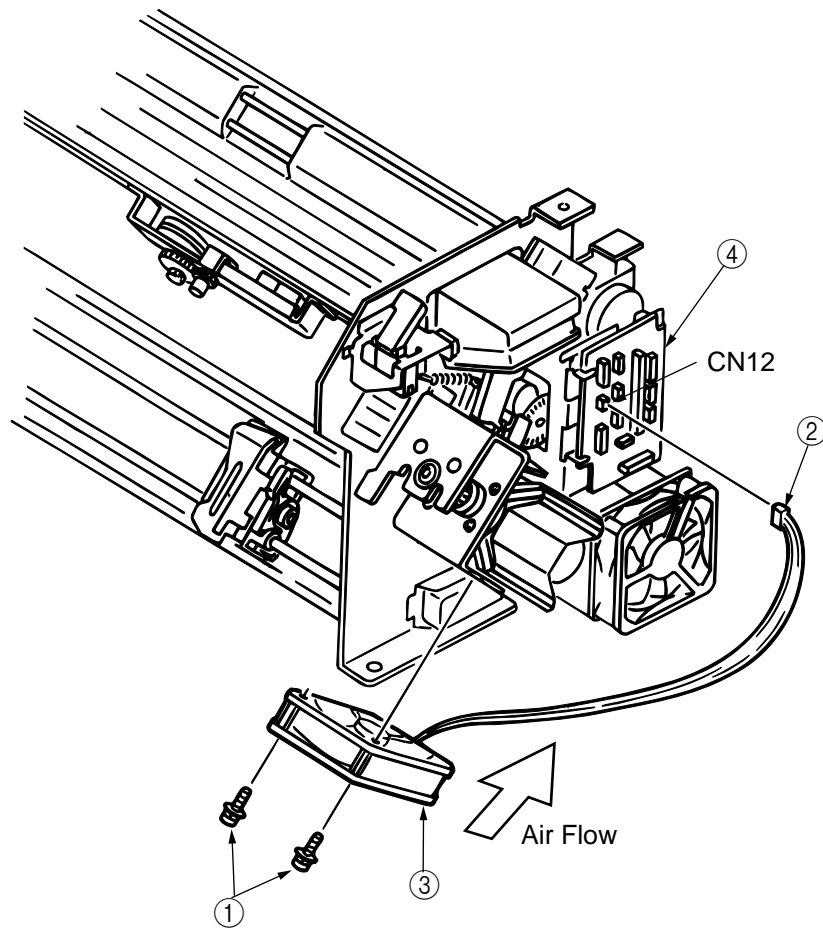


3.3.21 Space Motor Fan

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Printer Unit. (See 3.3.2)
- (3) Unscrew 2 screws ① and unplug the connector ② from Junction Board (PRA Printed Board) (CN12) ④, then remove Space Motor Fan ③.
- (4) For installation, reverse the removal procedure.

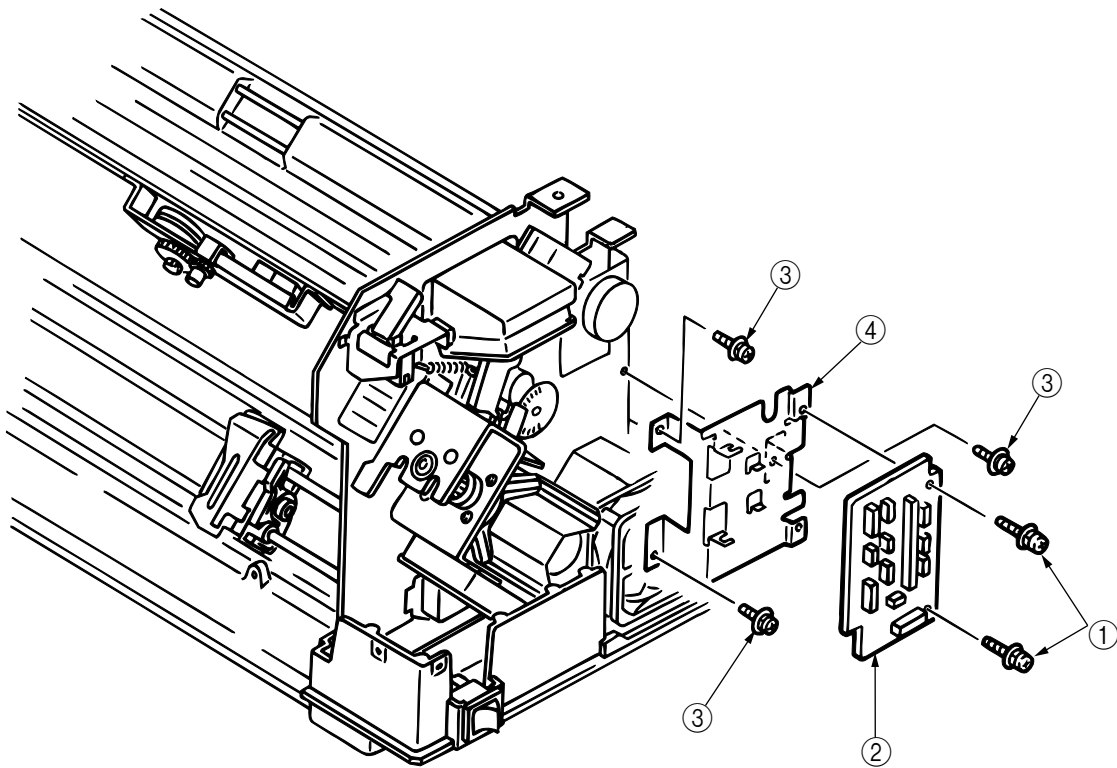
(Note on Installation)

1. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.



3.3.22 Junction Board

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unplug all the connectors from the above.
- (3) Unscrew 2 screws ① and remove Junction Board (PRA Printed Board) ②.
- (4) Unscrew 3 screws ③ and remove Junction Board Bracket ④.
- (5) For installation, reverse the removal procedure.

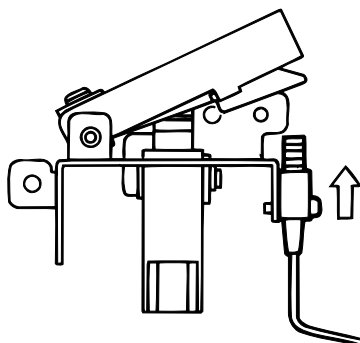
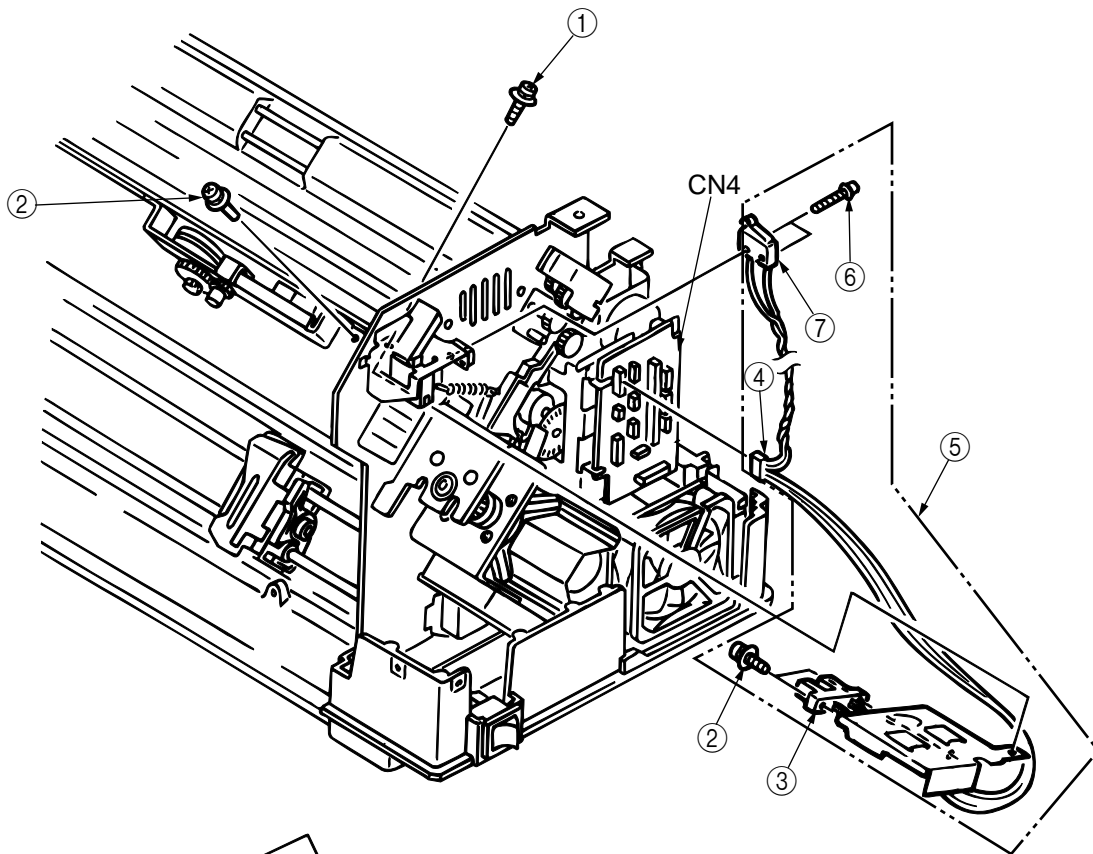


3.3.23 Cover Open Switch Assy / Ribbon Rotation Sensor

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Head Cooling Fan 1. (See 3.3.13)
- (3) Unscrew the screw ① and 2 screws ②, and remove Ribbon Bracket ③.
- (4) Unplug the connector ④ from Junction Board (PRA Printed Board) (CN4) ⑧, then remove Cover Open Switch Assy / Ribbon Rotation Sensor ⑤.
- (5) Unscrew 2 screws ⑥ and remove Cover Open Switch Assy ⑦.
- (6) For installation, reverse the removal procedure.

(Note on Installation)

1. In assembling the microswitch, position it until backlash is removed.

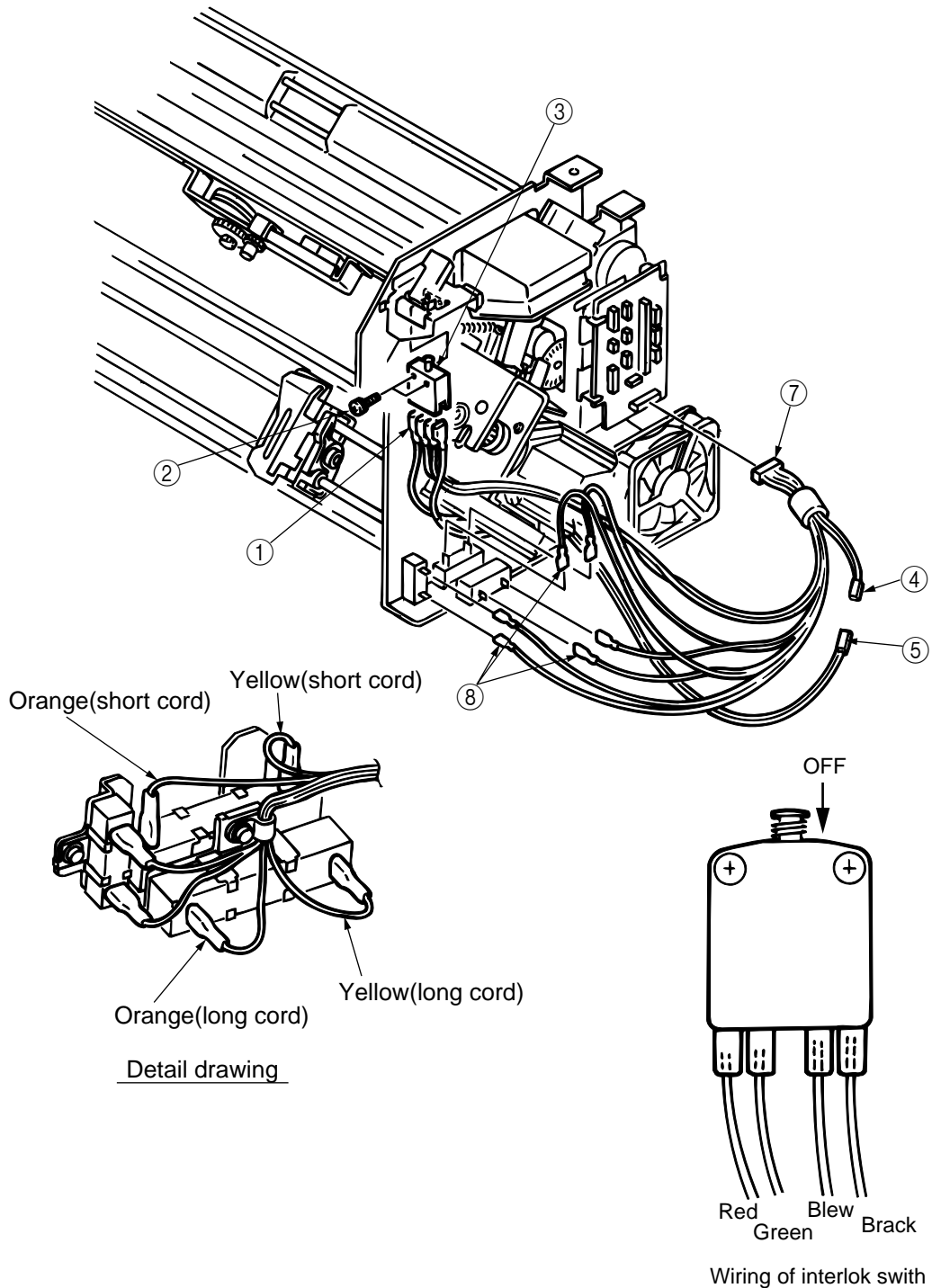


Note1
In installing the microswitch, raise it in the direction of arrow until backlash is removed.

MicroSW assembly detail

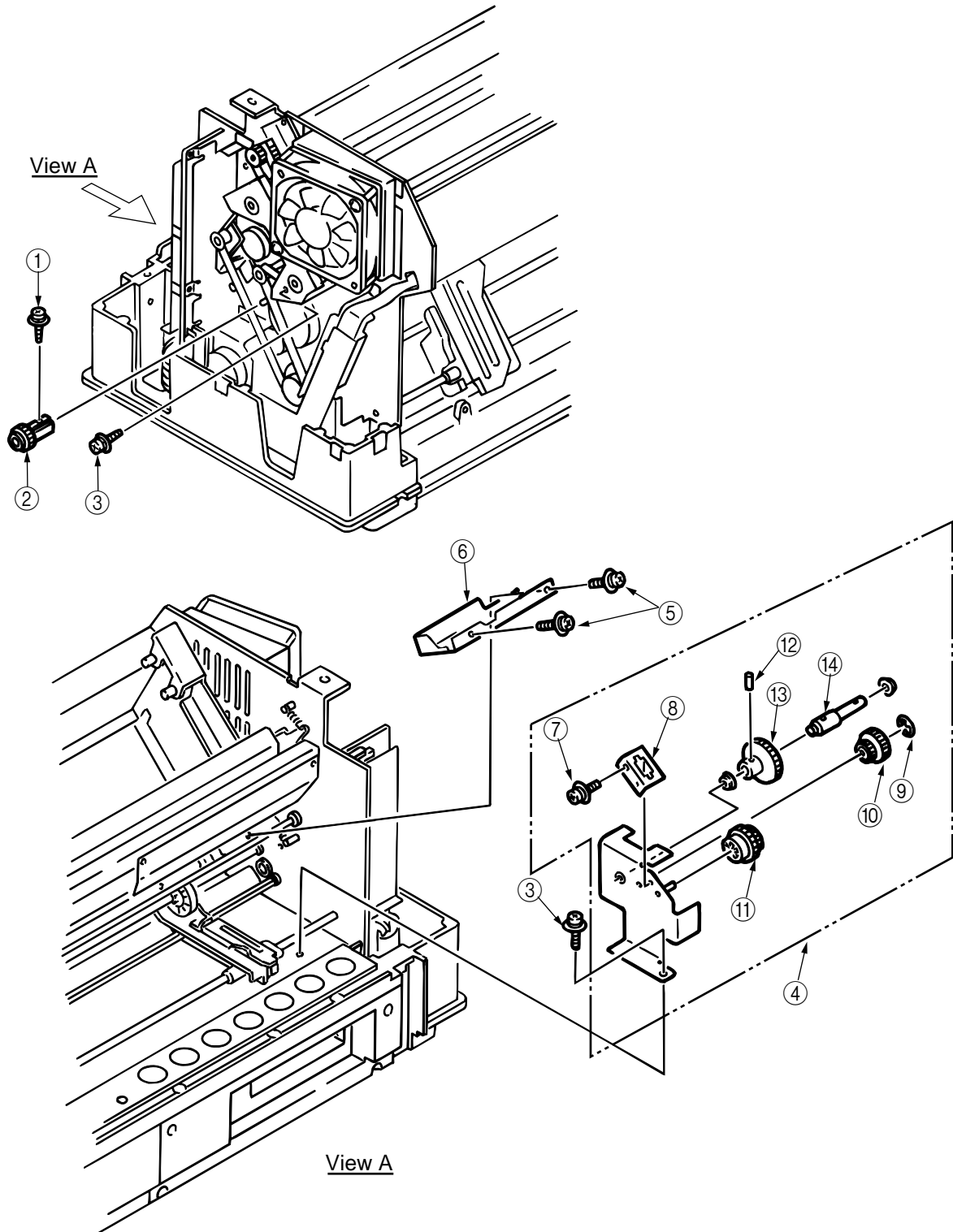
3.3.24 Interlock Switch / Interlock Switch Cord Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unplug 4 cables ①.
- (3) Unscrew 2 screws ② and remove Interlock Switch ③.
- (4) Unplug 6 connectors ④.
- (5) Unplug connectors ④ to Spacing motor code ⑤.
- (6) Unplug Interlock Switch Cord Assy ⑦ from the cable clamp.
- (7) For installation, reverse the removal procedure.



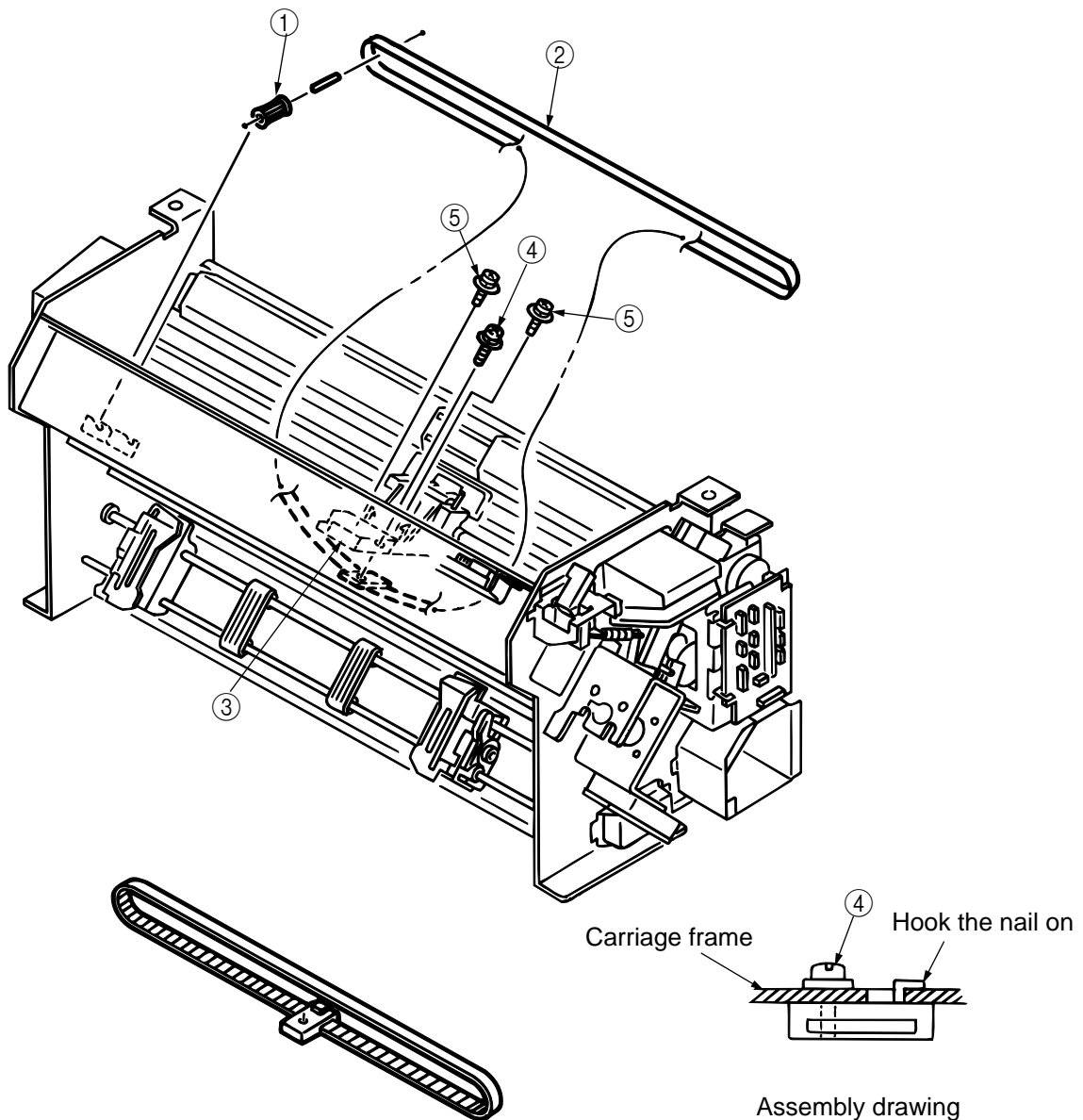
3.3.25 Knob Bracket Assy

- (1) Remove Bail Motor. (See 3.3.11)
- (2) Unscrew the screw ① and remove the gear ②.
- (3) Unscrew 2 screws ③ and remove Knob Bracket Assy ④.
- (4) Unscrew 2 screws ⑤ and remove AG Sensor Cover ⑥.
- (5) Unscrew the screw ⑦ and remove Knob Cover ⑧.
- (6) Remove the E-ring ⑨, Gear ⑩ and Adjusting Knob ⑪.
- (7) Remove Spring Pin ⑫, then remove Idle Gear Shaft ⑬ and CSF Drive Shaft ⑭.
- (8) For installation, reverse the removal procedure.



3.3.26 Space Belt

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Space Motor. (See 3.3.15)
- (3) Remove Printing Head. (See 3.3.18)
- (4) Remove Idle Pulley ① from Idle Pulley Bracket, then remove Space Belt ②.
- (5) Unscrew ⑤ screw and pull out Connector Guide ③, unscrew the screw ④ and remove Space Belt ②.
- (6) For installation, reverse the removal procedure.

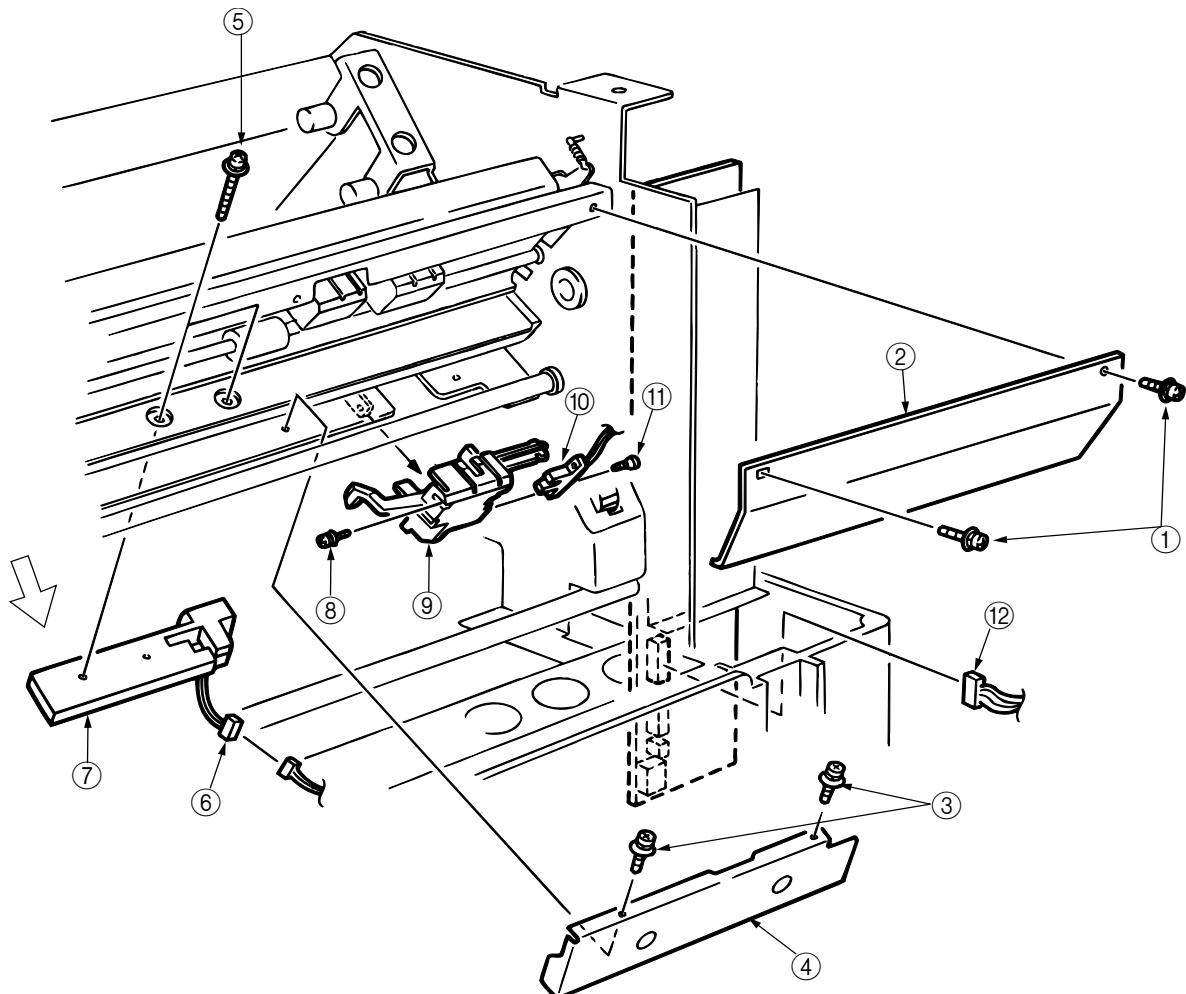


3.3.27 AG Sensor Frame / Start Searching Sensor

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unscrew 2 screws ① and remove Rear Plate ②.
- (3) Unscrew 2 screws ③ and remove AG Sensor Cover ④.
- (4) Unscrew 2 screws ⑤, unplug the connector ⑥ and remove AG Sensor Frame ⑦.
- (5) Unscrew the screw ⑧ and release the latch, then remove Start Searching Sensor Lever Assy ⑨ and Start Searching Sensor Cord ⑩ together.
- (6) Unscrew the screw ⑪ and unplug the connector ⑫ from I/F Board (CN9), then unplug Start Searching Sensor Cord ⑩.
- (7) For installation, reverse the removal procedure.

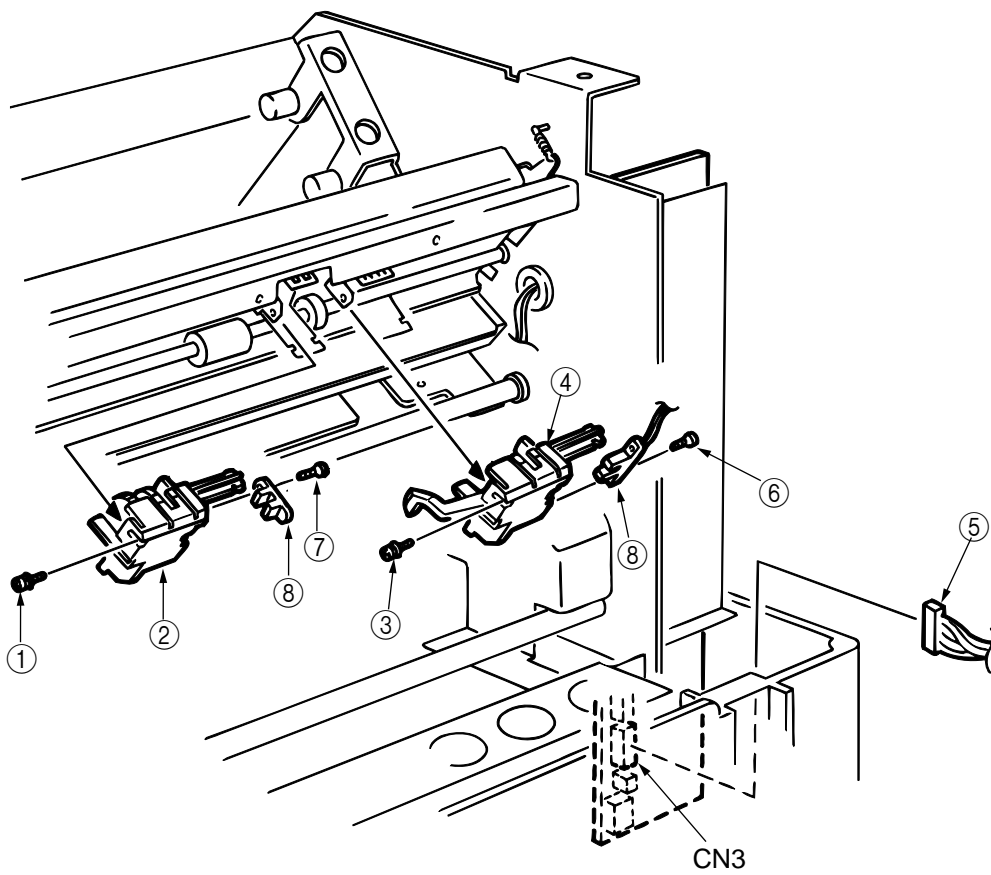
(Note on Installation)

1. In assembling AG sensor frame ⑦, it should be pulled in the direction of arrow shown in the figure.
2. After assembling the AG sensor frame ⑦, check the AG plate gap as stated in Section 2 of 4 ADJUSTMENTS and execute the auto gap correction as stated in Section 3.



3.3.28 Paper Jam Sensor Assy / Bail PE Sensor Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Unscrew the screw ① and release the latch, then remove Paper Jam Sensor Assy ②.
- (3) Unscrew the screw ③ and release the latch, then remove Bail PE Sensor Assy ④.
- (4) Unplug the connector ⑤ from I/F Board (CN3).
- (5) Unscrew 2 screws ⑥, ⑦ and remove Paper Jam Sensor ⑧.
- (6) For installation, reverse the removal procedure.

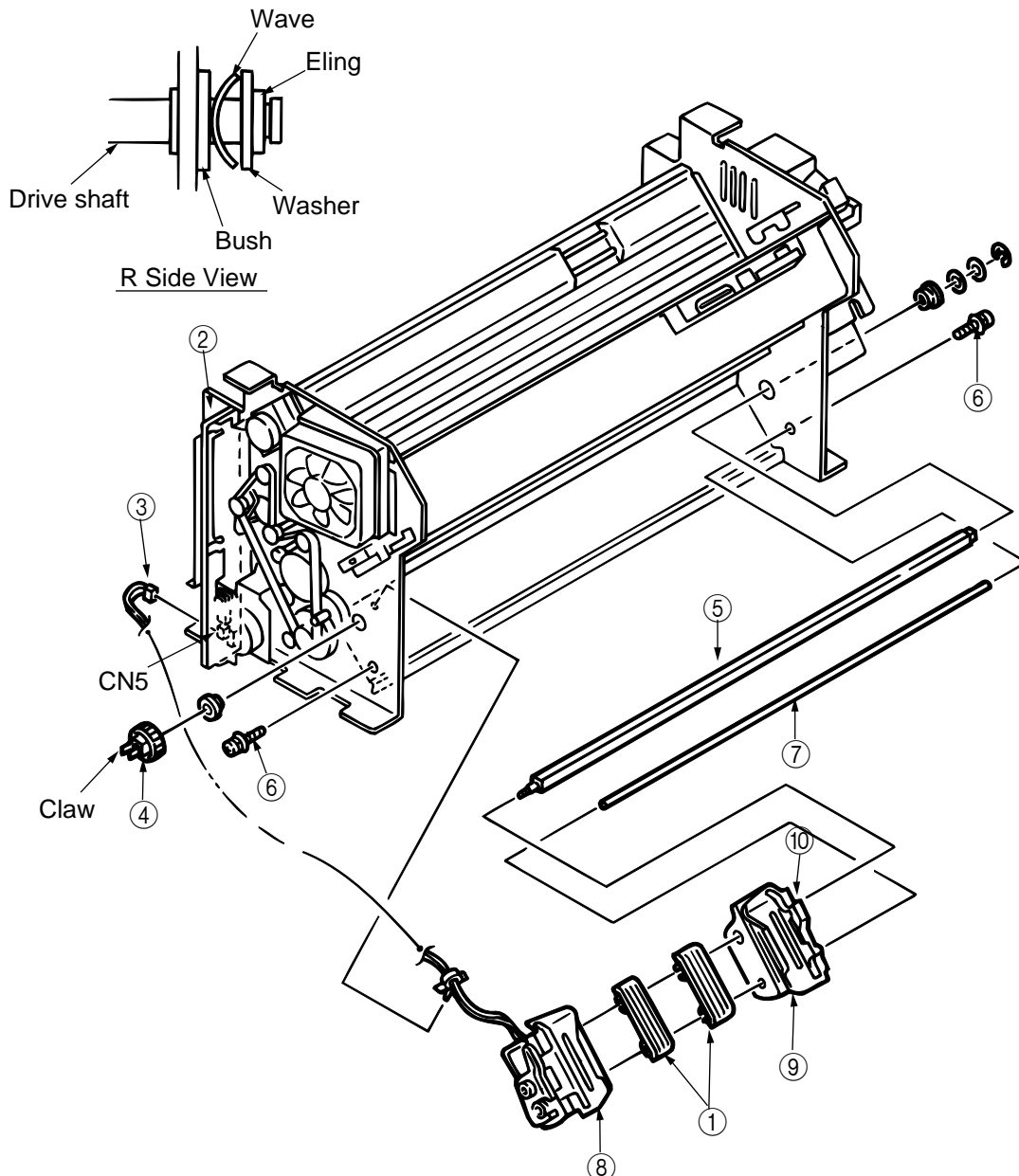


3.3.29 Sprocket Assy (L) (R) (Front Tractor)

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Printer Unit. (See 3.3.2)
- (3) Remove Space Motor Fans. (See 3.3.21)
- (4) Remove 2 Sheet Guides ①.
- (5) Unplug the connector ③ from I/F Board (PHA Printed Board) (CN5) ②.
- (6) Release cords at cord clamps and remove the Snap Band.
- (7) Release the claw to remove Front Tractor Drive Gear ④.
- (8) Pull out Front Tractor Drive Shaft ⑤ to the right.
- (9) Unscrew 2 screws ⑥ and remove Front Lock Shaft ⑦, Sprocket Assys (L) ⑧ and (R) ⑨ together.
- (10) Release Lock Lever ⑩ and pull out Sprocket Assys (L) ⑧ and (R) ⑨ from Front Lock Shaft ⑦.
- (11) For installation, reverse the removal procedure.

(Note on Installation)

1. Adjust sprocket pin phases of Sprocket Assys (L) ⑧ and (R) ⑨, before inserting Front Tractor Drive Shaft ⑤ into them.

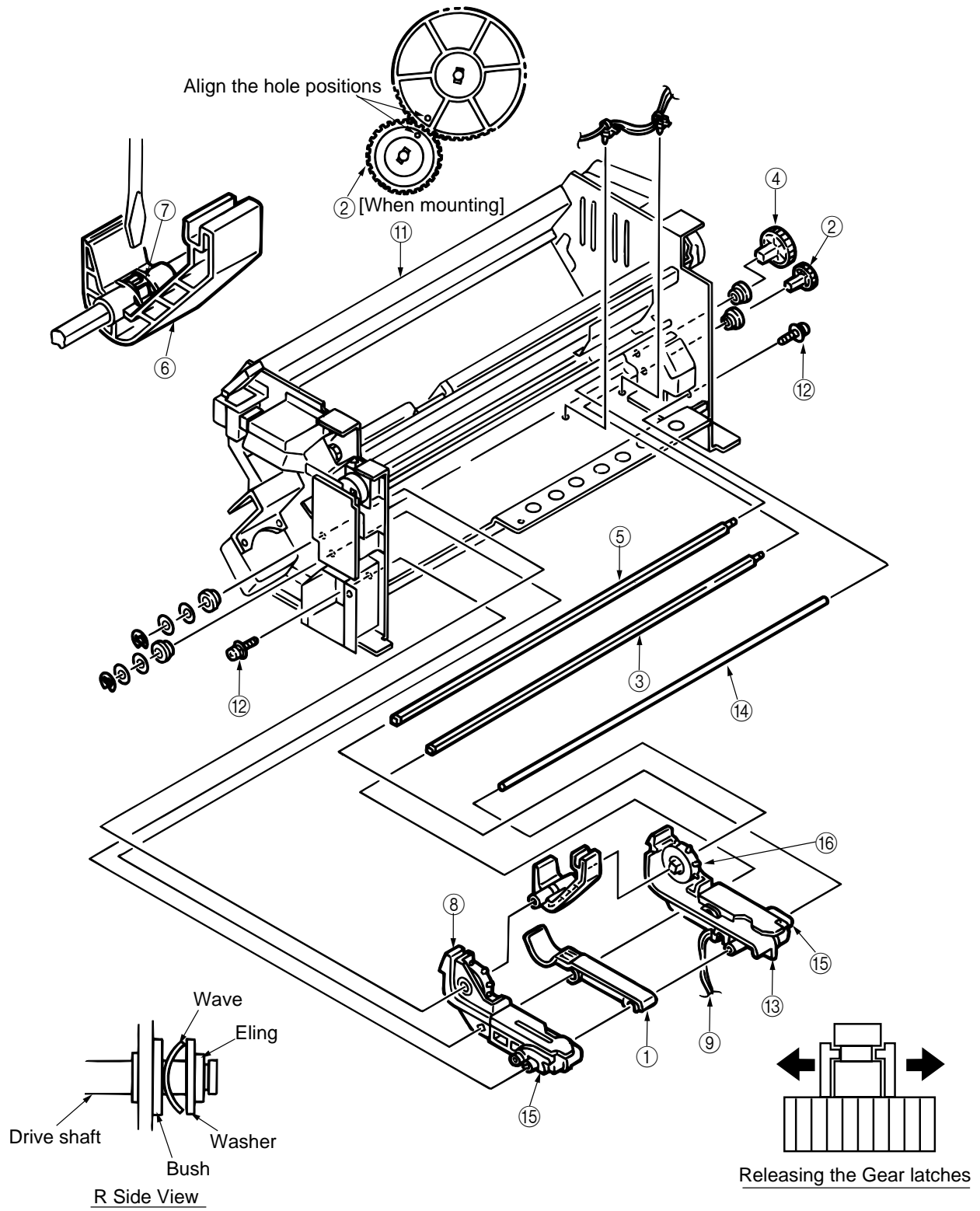


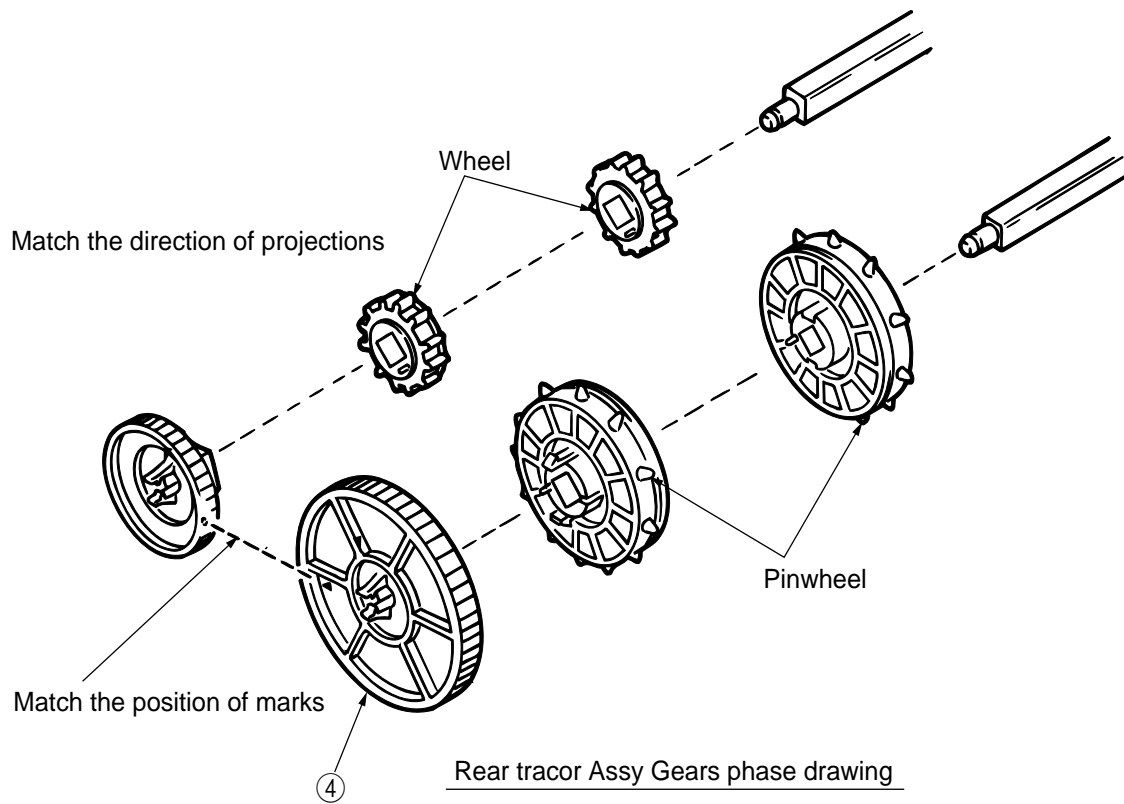
3.3.30 Sheet Feeder Assy (L) Rear / Sheet Feeder Assy (R) Rear

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) / Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Printer Unit. (See 3.3.2)
- (3) Remove PG Cooling Fan. (See 3.3.5)
- (4) Remove Mini Pitch Belt. (See 3.3.9)
- (5) Remove I/F Board (PHA Printed Board). (See 3.3.6)
- (6) Remove Center Guide Lower ①.
- (7) Open the clamp of Drive Gear ② to the arrow direction and remove the gear, then pull out Rear Tractor Drive Shaft ③.
- (8) Open the clamp of Rear Tractor Drive Gear ④ to the arrow direction and remove the gear, then pull out Rear Tractor Drive Shaft ⑤. At this time, Center Guide Upper ⑥ and Friction Piece ⑦ come off together.
- (9) Remove 2 Snap Bands ⑩ fastening Micro Switch Connecting Cord ⑨ on Sheet Feeder Assy (L) Rear ⑧, from Main Frame Assy ⑪. Then release the cords from the clamps on the cord route.
- (10) Unscrew 2 screws ⑫ on the right and left then remove Lock Shaft ⑭ with Sheet Feeder Assy (L) Rear ⑧ and Sheet Feeder Assy Rear (R) ⑬ on.
- (11) Release Lock Lever ⑮ and remove Sheet Feeder Assy (L) Rear ⑧ and Sheet Feeder Assy Rear (R) ⑬ from Lock Shaft ⑭.
- (12) For installation, reverse the removal procedure.

(Note on Installation)

1. Mount Sheet Feeder Assy (L) Rear ⑧ between 2 protrusions B on Main Frame Assy ⑪.
2. Mount Rear Tractor Drive Shafts ③ and ⑤ as follows:
 - (a) Adjust the position of Sprocket Wheel ⑭ protrusion at right and left pin tractors to that of Rear Tractor Drive Gear ④ hole, then insert Rear Tractor Drive Shaft ⑤.
 - (b) Adjust the position of Pin Wheel ⑯ protrusion at right and left pin tractors then insert Rear Tractor Drive Shaft ③.
 - (c) Adjust the position of Pin Wheel ⑯ protrusion to that of Drive Gear B ② hole, align the holes at Rear Tractor Drive Gear ④ and at Drive Gear B ② then mount Drive Gear B ② on Rear Tractor Drive Shaft ③.
3. Give friction to Friction Piece ⑦ with a screwdriver turned 45 degrees, after inserting it into Rear Tractor Drive Shaft ⑤.
Slow moving of Center Guide Upper ⑥ to the right/left means the right installation, and smooth one means the false installation.

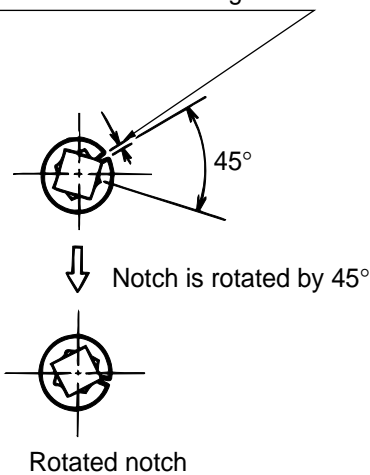




1. Matching the phase of pin tractors

- a. Match the direction of pin wheel projections on right/left pin tractor to that of mark on the ② (rear tractor drive gear)
- b. Match the direction of wheel projections on right/left pin tractor to that of mark on ④ (drive gearB), and install ② (drive gear B) to ⑤ ③ (rear drive shaft of the rear tractor Assy) at a position where the directions of marks on ④ (drive gear B) and ② (rear tractor drive gear) match.

Open up the notch to 1mm and assemble it, positioning the notch as shown in figure.



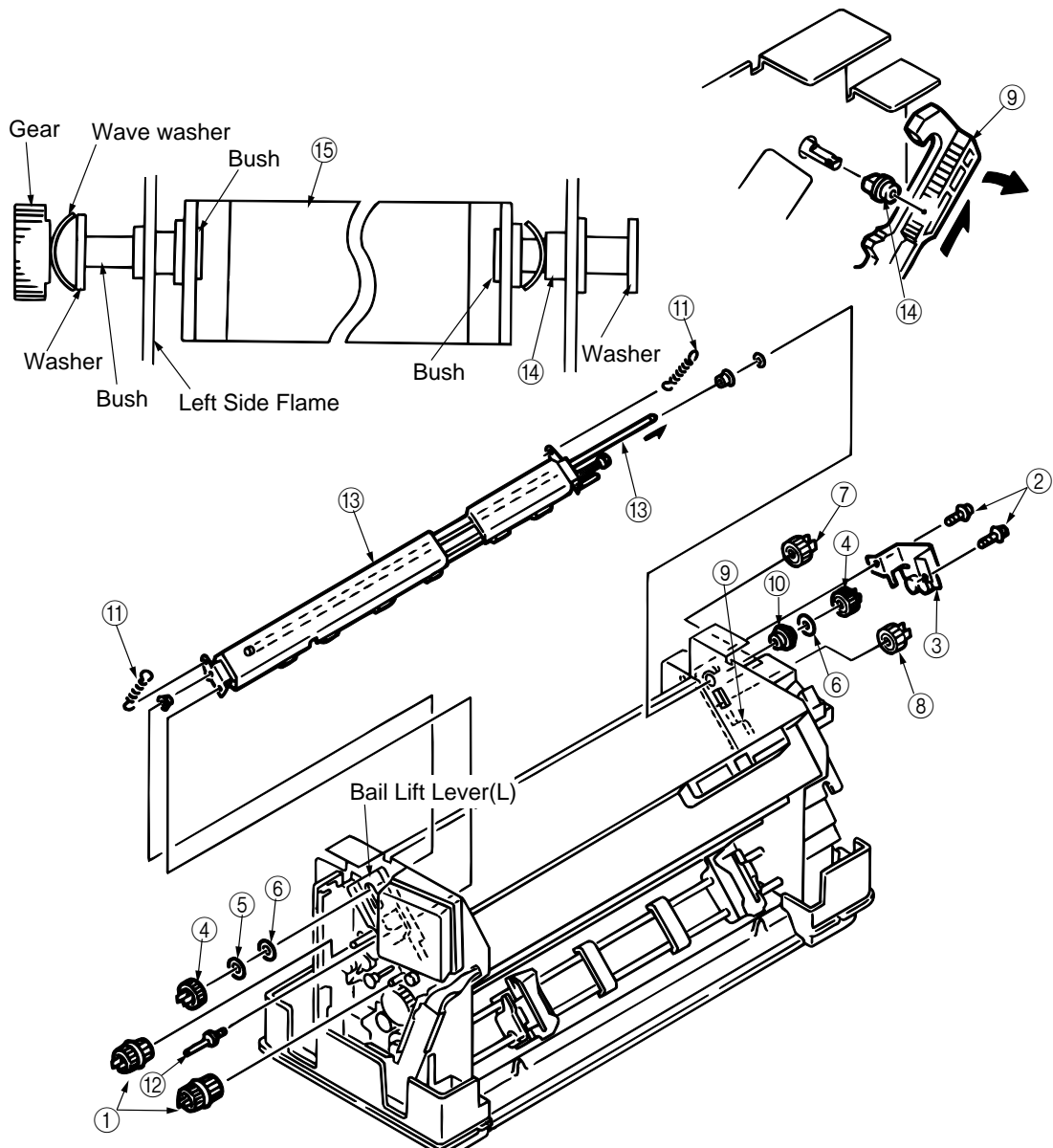
⑧ Assembling friction piece

3.3.31 Bail Assy

- (1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
- (2) Remove Mini Pitch Belt. (See 3.3.9)
- (3) Remove Bail Motor Assy (See 3.3.11)
- (4) Remove 2 Drive Pulleys ①.
- (5) Unscrew 2 screws ② and remove Bail Gear Assy ③.
- (6) Release the claws at right/left Drive Gears B ④ then remove Drive Gears B ④, Wave Washers ⑤ and Flat Washers ⑥.
- (7) Slide Bail Lift Lever (R) ⑨, Drive Gear B ⑦ and Drive Gear C ⑧ to the oblique upper direction and remove Bearing (Bail) ⑩.
- (8) Remove 2 Bail Springs ⑪.
- (9) Remove Screw Stud ⑫.
- (10) Slide Bail Support Shaft ⑬ to the right then remove it from left Bearing (Bail) ⑭.
- (11) Lift Bail Assy ⑮ to the oblique upper direction and pull it out to the left.
- (12) For installation, reverse the removal procedure.

(Note on Installation)

1. The wave washers should be attached, paying attention to the direction of them.
2. The phase of bail lift lever (L), (R) should be matched in assembling them.



4. ADJUSTMENTS

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

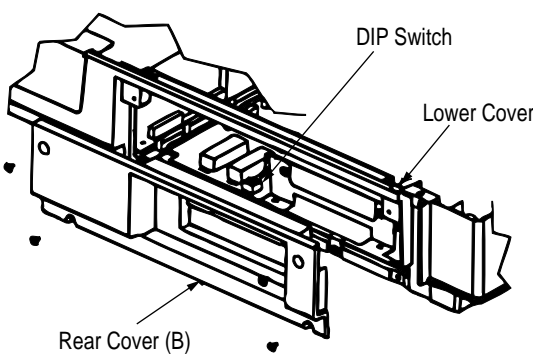
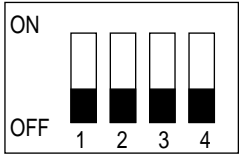
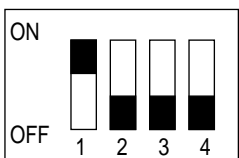
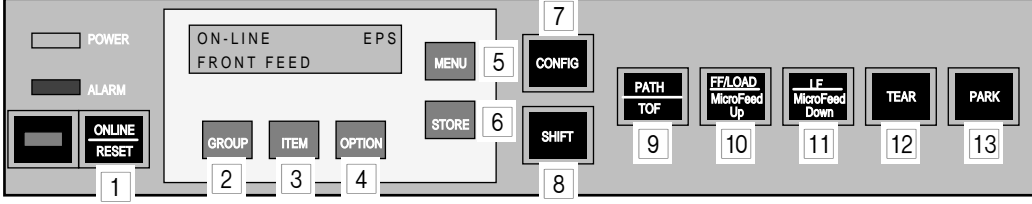
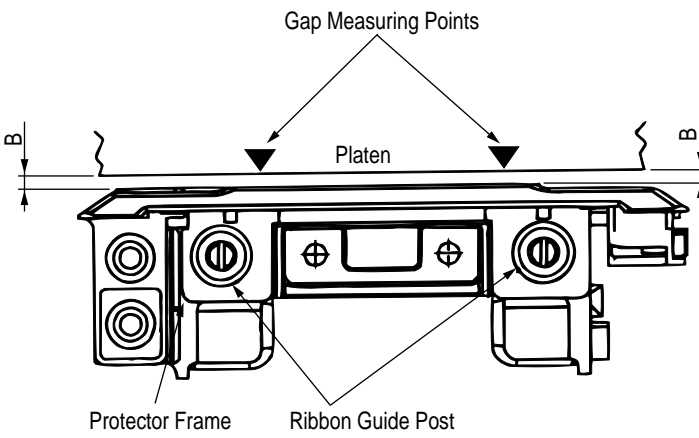
[Service Tool]

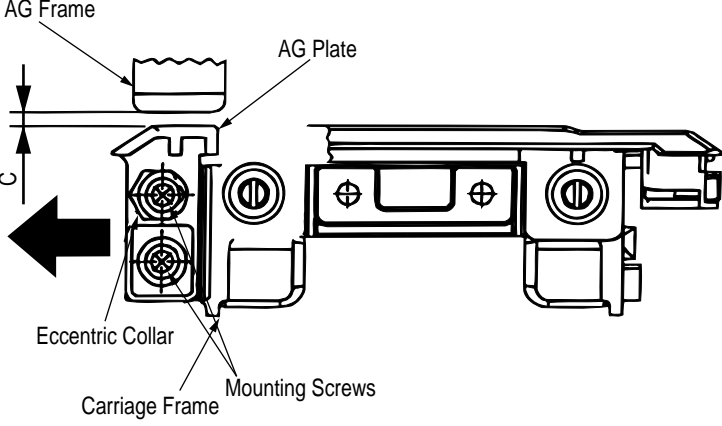
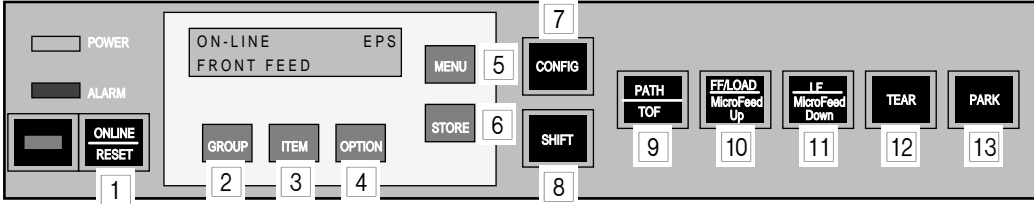
- No. 2-200 Philips screwdriver
- No. 2-200 screwdriver
- Feeler gauge
- 500 g rod tension gauge
- Calipers

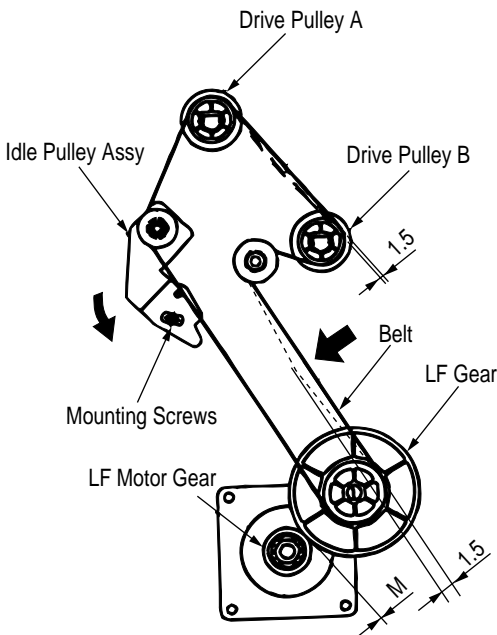
Adjustment should be conducted after removing the Rear Cover (B) and setting the Dip Switch 1 on the board to "ON"(maintenance mode). (See Note 1 and 2)

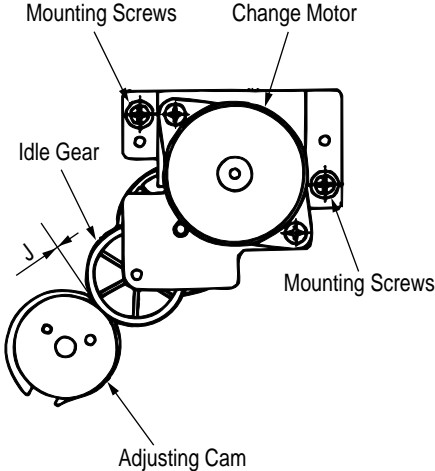
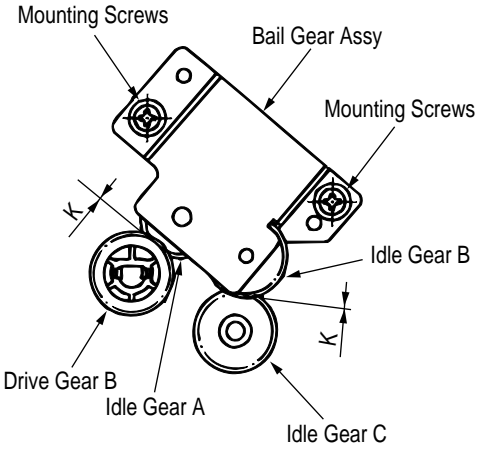
Note 1: After the adjustment and lubrication have completed, set the all the dip switches to "OFF"(normal operation mode), and fix the Rear Cover (B) with the mounting screws.

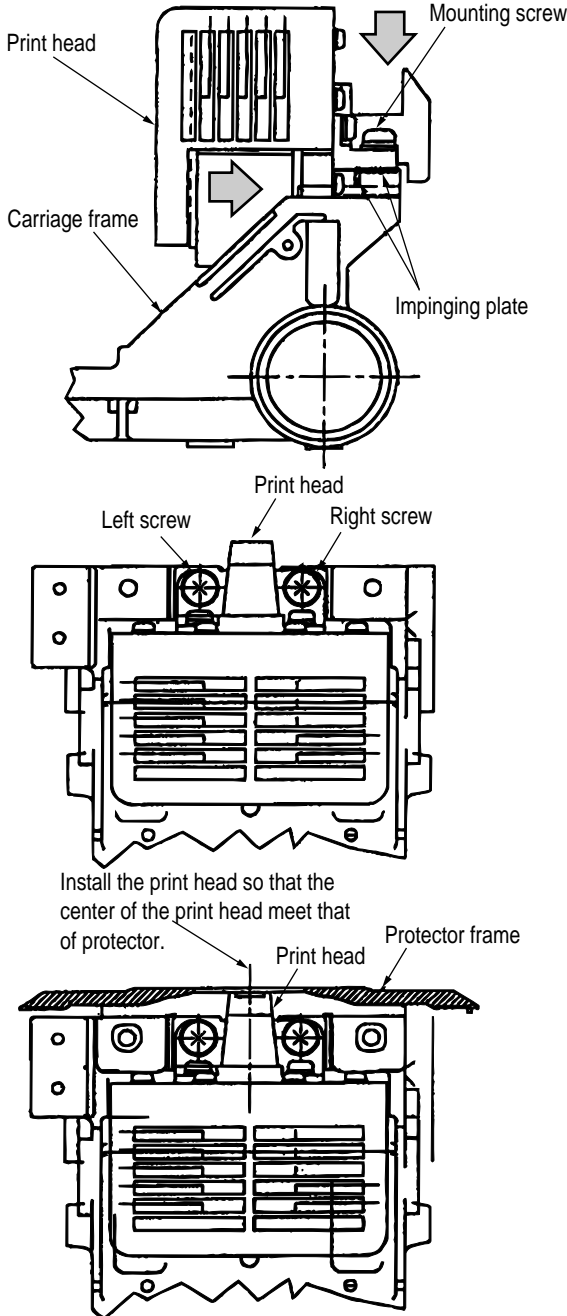
Note 2: The local test printing except for the menu printing should be implemented with all the dip switches set to "OFF"(normal operation mode).

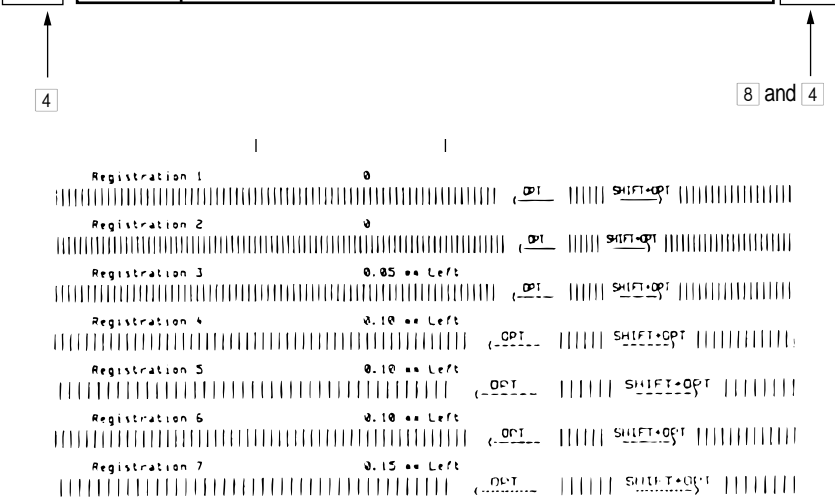
Item No.	Items	Standard Value	Illustration	Adjustment Method
1	Protector Gap Adjustment (1)Range Adjustment			<p>① Remove the Rear Cover (B), and set Dip Switch 1 on the board to "ON" (maintenance mode).</p> <div style="text-align: center;"> <p>Temporary</p>  <p>ON OFF</p> <p>1 2 3 4</p> </div> <div style="text-align: center;"> <p>Maintenance</p>  <p>ON OFF</p> <p>1 2 3 4</p> <p>DIP SW</p> </div>
	(2)Protector Gap			<p>② Close the access cover, and turn on the printer while pressing Switches 7 and 10 on the operation panel. (This starts the auto gap adjusting mode.) The platen moves forward/ backward up to the adjusted position.</p> <p>③ When the platen stops, turn off the printer.</p> <p>① Insert the thickness gauge between the platen and the protector frame to verify the protector gap value B is between 0.12 and 0.16 mm.</p> <p>Notes:</p> <p>Although the adjustment should use a range from 0.12 to 0.16mm, the configuration should use a range from 0.09 to 0.2mm</p> <p>② If adjustment is required, screw down the ribbon guide post with the Philips screwdriver and adjust the protector frame to make the protector gap value B between 0.12 and 0.16 mm, then fix the protector frame.</p> <p>Notes:</p> <p>a) The protector frame should be mounted parallel with the platen, when measured at the right/left gap measuring points.</p>
				

Item No.	Items	Standard Value	Illustration	Adjustment Method
2	AG Plate Gap	C=0.14±0.02mm		<p>① Insert the thickness gauge between the AG frame and the AG plate to verify the gap value C is between 0.12 and 0.16 mm.</p> <p>② If adjustment is required, screw down the mounting screws and adjust the eccentric collar to make the protector gap value C between 0.12 and 0.16 mm, then fix the AG plate.</p> <p>Notes: After this Adjustment, the Auto Gap Correction should be conducted (See item 3)</p>
3	Auto Gap Correction		<p>③ Turn on the printer while pressing Switches 12 and 13.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>○ 1st = 0EH ○</p> <p>○ 2nd = 0DH ○</p> <p>○ 3rd = 0EH ○</p> <p>○ AVE = 0EH ○</p> </div> <p>④ The auto gap correction has completed if "Av" is printed.</p>	<p>① Set the continuous form (1P, 15 in. wide and 55 Kg) at the printing valid position and also the ribbon cassette.</p> <p>② Turn off the printer, then power on again while pressing Switches 12 and 13 to conduct the auto correction. If the auto gap operation has been repeated 3 times and "Av=" printed, it is the end of the auto gap correction.</p> <p>③ The auto correction value from 09 H to 18 H is desirable. If any value other than this is indicated, the AG plate gap should be adjusted again. (See Item 2)</p> <p>Notes:</p> <p>a) In the following cases, this adjustment should be implemented.</p> <p>i) After the gap adjustment between the AG frame and the AG plate;</p> <p>ii) After replacing the control board. (not required after CG/PROGRAM, EEPROM replacement)</p> <p>b) When the correction value "Av=" is not between 09 and 18, "Warning" will be indicated on the LCD panel. Press Switch 1 to reset this warning.</p> <p>c) The correction value "Av=" from 09 to 18 is desirable. If any value other than this is indicated, the gap between the AG frame and the AG plate should be adjusted again to the proper range as described in Item 2. Then, conduct this correction.</p>

Item No.	Items	Standard Value	Illustration	Adjustment Method
4	LF Motor Belt Tension	200 ~ 250gf		<p>① Adjust the LF motor belt tension, with the idle pulley assy, to produce the standard value when the belt is deflected 1.5 mm at the middle of the LF gear and the drive pulley B.</p>
5	Slice Level Setting-Paper Width Sensor			<p>① Install the ribbon cassette only. ② Turn on the printer while pressing Switches 9 and 11 at the operation panel. (This starts the slice level correction mode - paper width sensor.) Confirm "COMPLETE" is indicated on the LCD. The cover should be closed during this process.</p> <p>Notes: In the following cases, this adjustment should be implemented. 1) After replacing the Control board. (not required after ROM replacement)</p>
6	Position Correction - Paper Front Edge Sensor			<p>① Set the continuous form (1P, 15 in. wide and 55 Kg) at the front tractor and also the ribbon cassette. ② Turn on the printer while pressing Switches 10 and 13. (This starts the paper front edge sensor position correction mode.) Confirm paper feeding/parking has been repeated 3 times and then "COMPLETE" is indicated on the LCD.</p> <p>Notes: In the following cases, this adjustment should be implemented. 1) After replacing the Control board. (not required after ROM replacement)</p>

Item No.	Items	Standard Value	Illustration	Adjustment Method
7	Auto Gap Motor Assy Backlash	J=0.1mm		<p>① Verify the backlash is 0.1 mm between the idle gear and the adjusting cam.</p> <p>② If adjustment is required, screw down the 2 screws fixing the auto gap assy, and ensure the backlash between the idle gear and the adjusting cam.</p>
8	Bail Gear Assy Backlash	K=0.2mm		<p>① Verify the backlash is 0.2 mm between the idle gear A and the drive gear B, and between the idle gear B and the idle gear C.</p> <p>② If adjustment is required, screw down the 2 screws fixing the bail gear assy, and ensure the back lash between the idle gear A and the drive gear B, and between the idle gear B and the idle gear C.</p>

Item No.	Items	Standard Value	Illustration	Adjustment Method
9	Installing print head			<p>① In installing the print head, accurately bump it to the impinging plate on the carriage frame.</p> <p>Notes: The print head should be installed/ removed at 1-range position. (prevent protector deformation)</p> <p>② How to tighten screws in installing the print head. a. Lightly tighten the right and left screw while pushing the print head against the carriage. b. In tightening the screws first, (note) make sure to tighten the left screw after tightening the right screw while pushing the head against the carriage.</p> <p>Notes 1: To prevent the float of head when tightening the screws.</p> <p>Notes 2: Tightening the screws while pressing the head in the direction of " ← ↑".</p> <p>③ Adjust the backlash of screws so that the print head can meet the center of the protector.</p>
10	Alignment of horizontal printing			<p>① Set a continuous paper (1P, 15 inch width, 55kg sheet) onto the printable position.</p> <p>② Press [5] switch to go to the menu mode. Press [2] to display "Set-Up". Next, press [3] to display "Registration1". (The printer starts Registration1 printing.)</p> <p>Open the access cover to confirm that the printing is in progress and close it, and then execute the correction after pressing the ON-LINE switch.</p>

Item No.	Items	Standard Value	Illustration	Adjustment Method																								
				<p>Correct the printing alignment in each "Registration17". (Note2)(Note3)</p> <p>Note2)After printing, change items with [4] switch</p> <p>Note3)The reverse printing position is shifted by 0.05mm to the reference position by pressing [4] switch or [8] and [4] switch.</p> <p>④After completing the correction, press [6] switch to store the corrected values to the inside of printer. (Note4)</p> <p>Note4)If the [6] switch is not pressed, the corrected values cannot be stored and the settings are returned to the previous set values.</p> <p>Press [5] while holding [8] to print a menu page to check the registration. (See the left drawing)</p>																								
			<table border="1" data-bbox="236 327 1075 748"> <thead> <tr> <th>Number</th> <th>Correction dot position of reverse printing</th> </tr> </thead> <tbody> <tr> <td>+5</td> <td>Printing position is shifted by 0.25mm to right of the reference position.</td> </tr> <tr> <td>+4</td> <td>Printing position is shifted by 0.20mm to right of the reference position.</td> </tr> <tr> <td>+3</td> <td>Printing position is shifted by 0.15mm to right of the reference position.</td> </tr> <tr> <td>+2</td> <td>Printing position is shifted by 0.10mm to right of the reference position.</td> </tr> <tr> <td>+1</td> <td>Printing position is shifted by 0.05mm to right of the reference position.</td> </tr> <tr> <td>0</td> <td>Reference position</td> </tr> <tr> <td>-1</td> <td>Printing position is shifted by 0.05mm to left of the reference position.</td> </tr> <tr> <td>-2</td> <td>Printing position is shifted by 0.10mm to left of the reference position.</td> </tr> <tr> <td>-3</td> <td>Printing position is shifted by 0.15mm to left of the reference position.</td> </tr> <tr> <td>-4</td> <td>Printing position is shifted by 0.20mm to left of the reference position.</td> </tr> <tr> <td>-5</td> <td>Printing position is shifted by 0.25mm to left of the reference position.</td> </tr> </tbody> </table> 	Number	Correction dot position of reverse printing	+5	Printing position is shifted by 0.25mm to right of the reference position.	+4	Printing position is shifted by 0.20mm to right of the reference position.	+3	Printing position is shifted by 0.15mm to right of the reference position.	+2	Printing position is shifted by 0.10mm to right of the reference position.	+1	Printing position is shifted by 0.05mm to right of the reference position.	0	Reference position	-1	Printing position is shifted by 0.05mm to left of the reference position.	-2	Printing position is shifted by 0.10mm to left of the reference position.	-3	Printing position is shifted by 0.15mm to left of the reference position.	-4	Printing position is shifted by 0.20mm to left of the reference position.	-5	Printing position is shifted by 0.25mm to left of the reference position.	
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5. CLEANING AND LUBRICATION

5.1 Cleaning

[Caution]

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 portion after cleaning.

(1) Cleaning time

When the equipment time has reached six months or 300 hours, whichever comes first.

(2) Cleaning tools

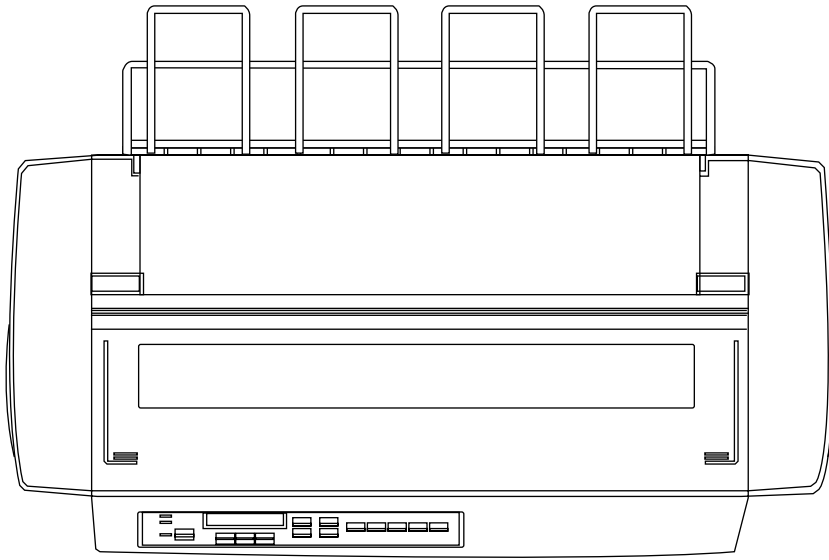
Dry cloth (soft cloth such as gauze), vacuum cleaner.

(3) Places to be cleaned

Table 5.1 lists the places to be cleaned:

Table 5.1

Place to be cleaned	Cleaning procedure
Main shaft and the vicinity	Remove paper waste and wipe off stain, dust, waste. etc.
Paper travel surface	
Ribbon guide and the vicinity	



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 in case the printer is disassembled, reassembled, cleaned or parts have been changed.

(1) Cleaning time

Remarks:

- 1) Turn off the power before cleaning.
- 2) Make sure that paper dust will not fall inside of the machine.

- Cleaning period:

6 months of operation or 300 hours of operation, whichever the 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.

Paper Width Sensor —————> Remove the dust on the Sensor.

Ribbon Jam Sensor —————> Remove the dust on the Sensor.

Paper Out Sensor —————> Remove the dust on the Sensor.

Paper Jam Sensor —————> Remove the dust on the Sensor.

(2) Lubricant

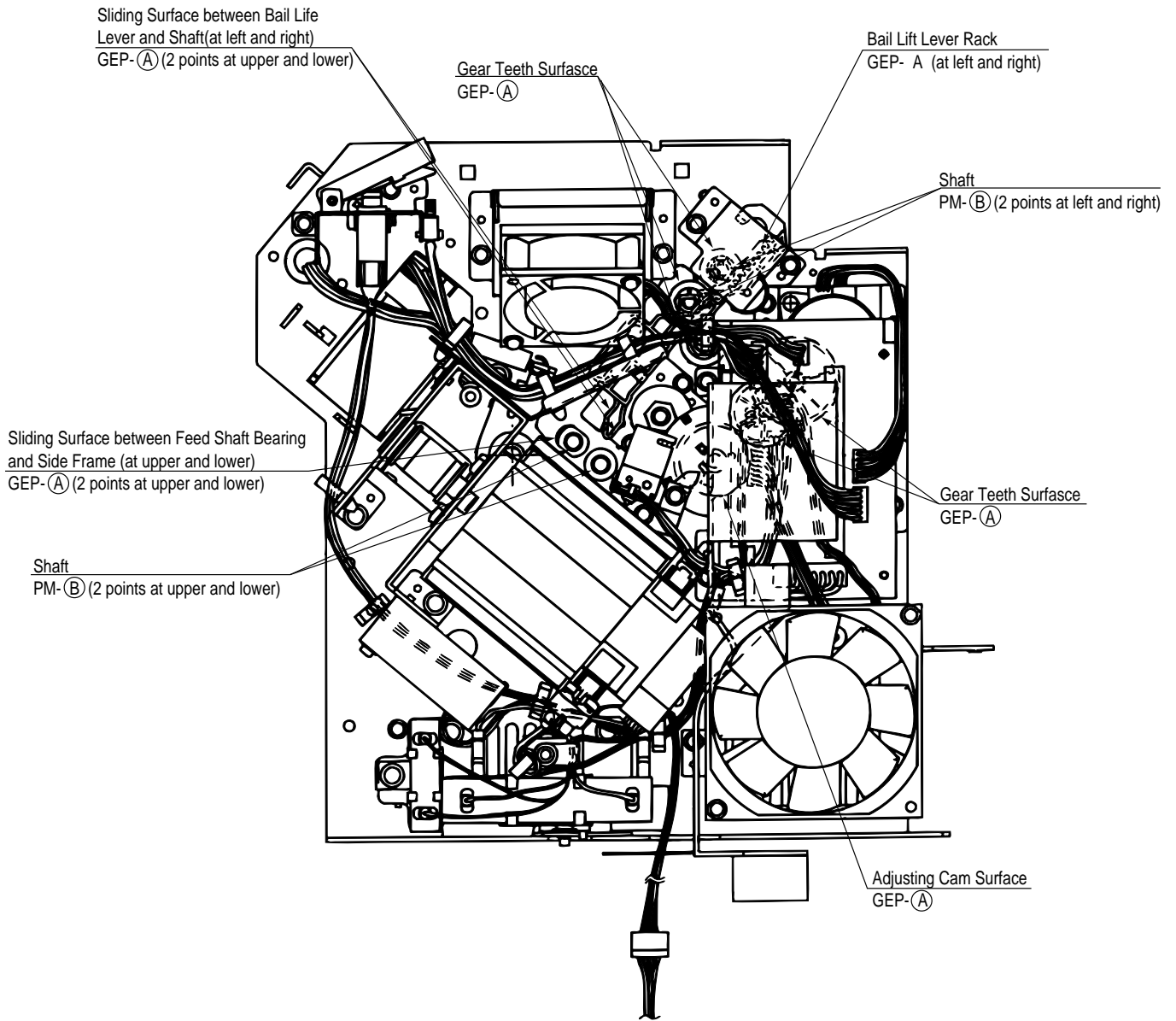
- Pan motor oil (or equivalent): PM
- Albania grease (or equivalent): GEP

(3) Amount of lubricant

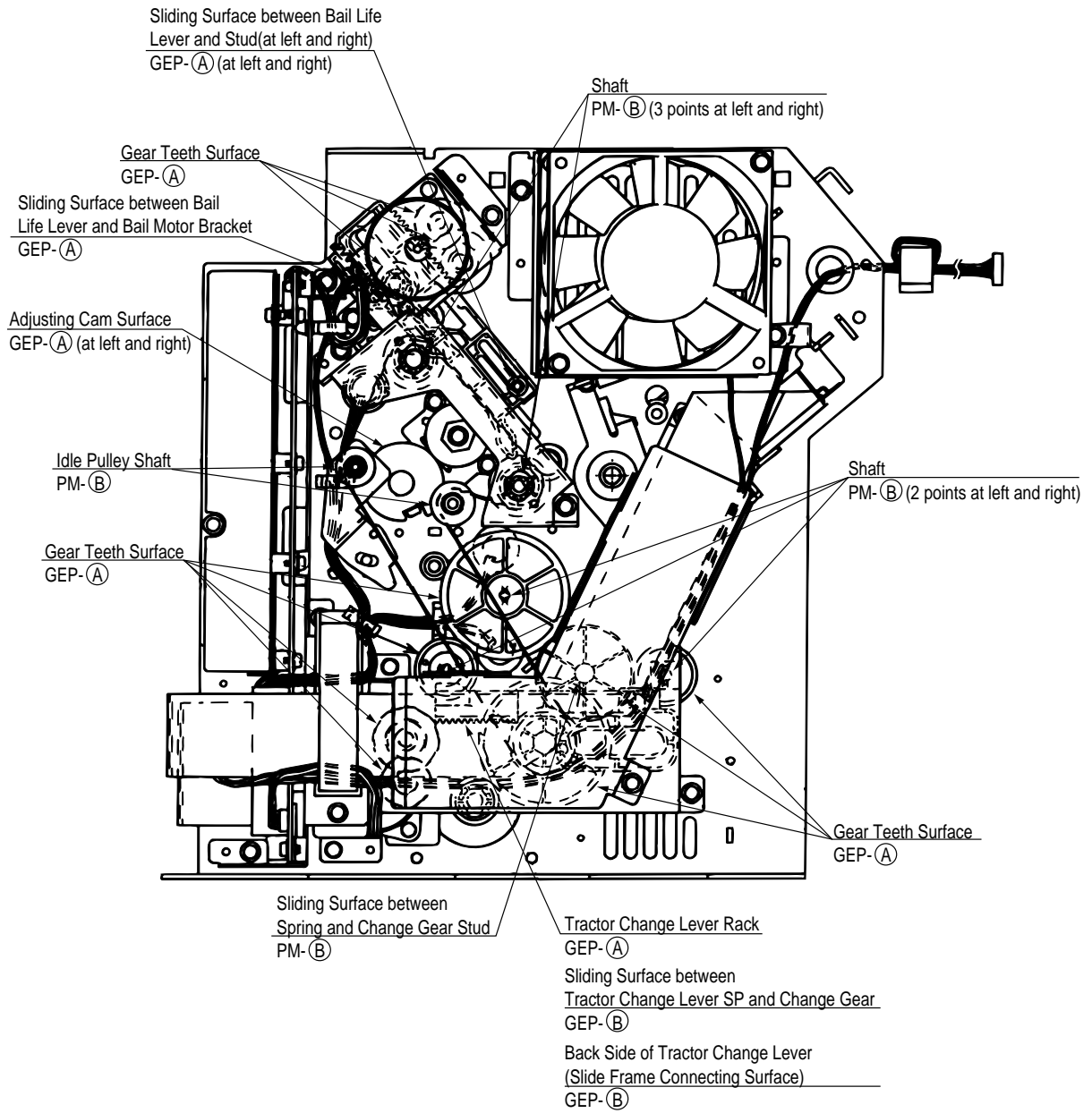
- Medium amount A : Apply three to four drops of oil, or 0.008 inch(0.2mm)thick grease.
- Small amount B : Apply one drop of oil(0.006±0.002 g)

(4) Areas to Avoid

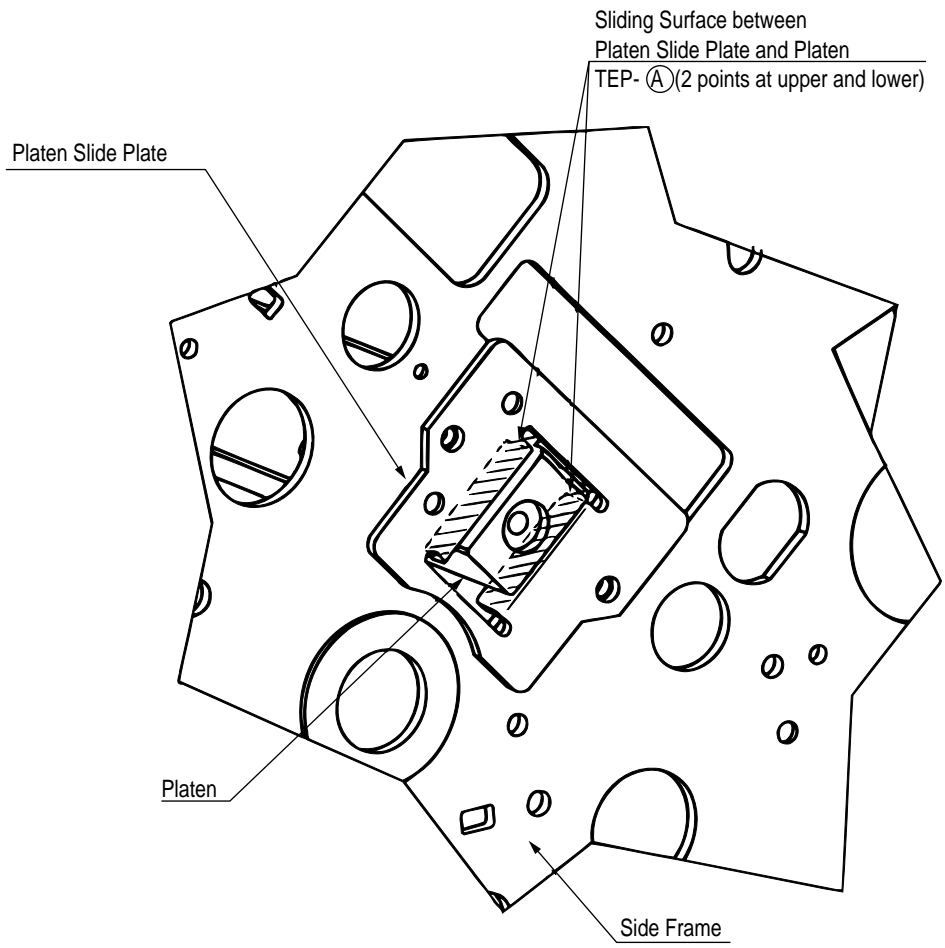
No	Do not lubricate	Reason
1	Ink ribbon	To prevent blurring of print
2	Sensor	To prevent dust adhering
3	Platen (printing face)	To prevent stained paper
4	Feed roller (rubber face and resin face)	To prevent stained paper
5	Pitch belt	To prevent rubber degradation
6	Head cable	To prevent deterioration
7	Micro switch	To prevent stained paper
8	Pin tractor surface	To prevent contacts
9	Auto gap disc	To prevent dust adhering

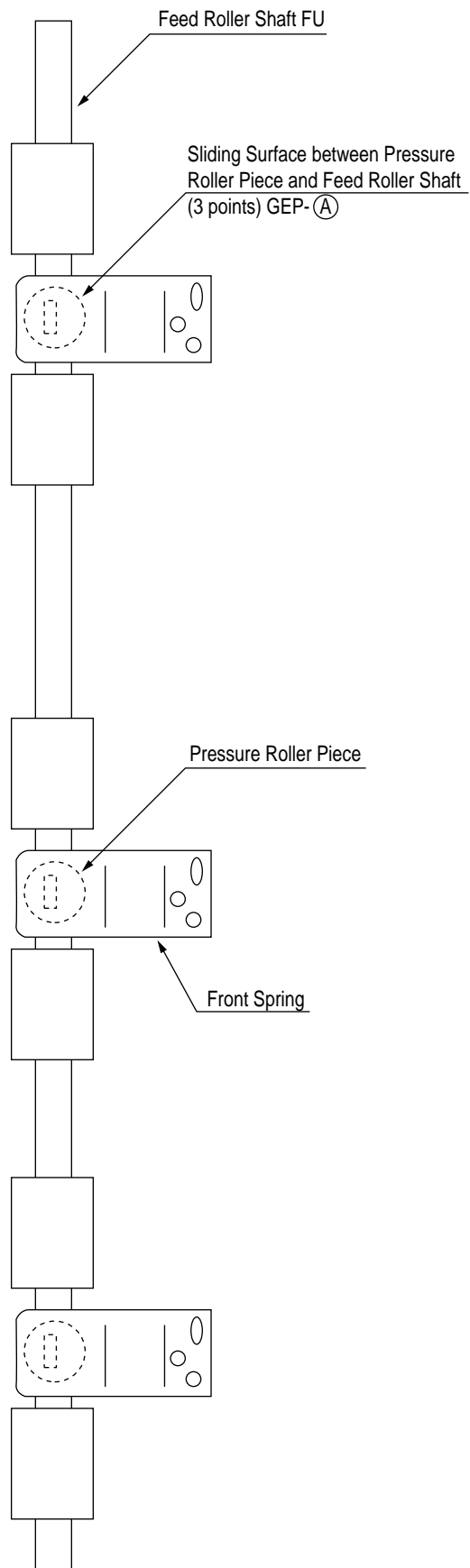


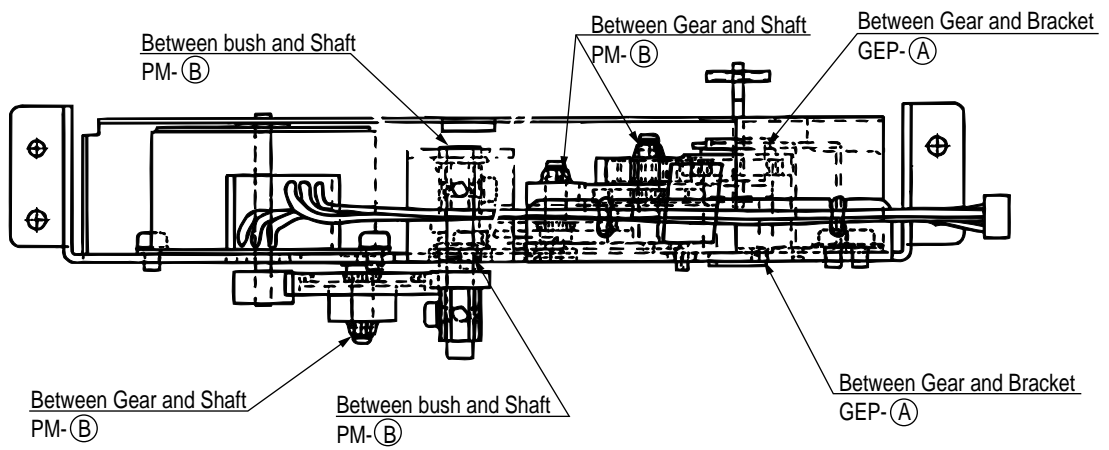
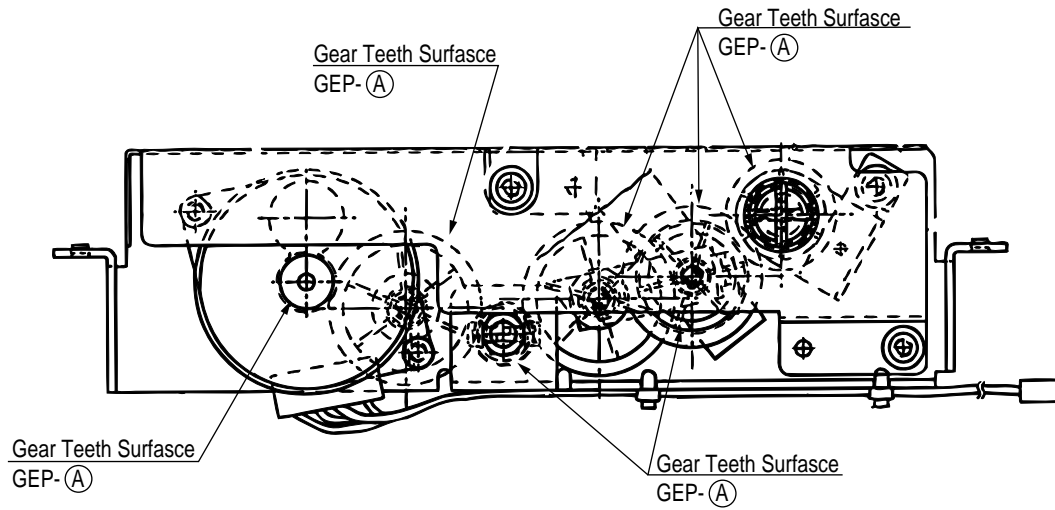
Right Side View

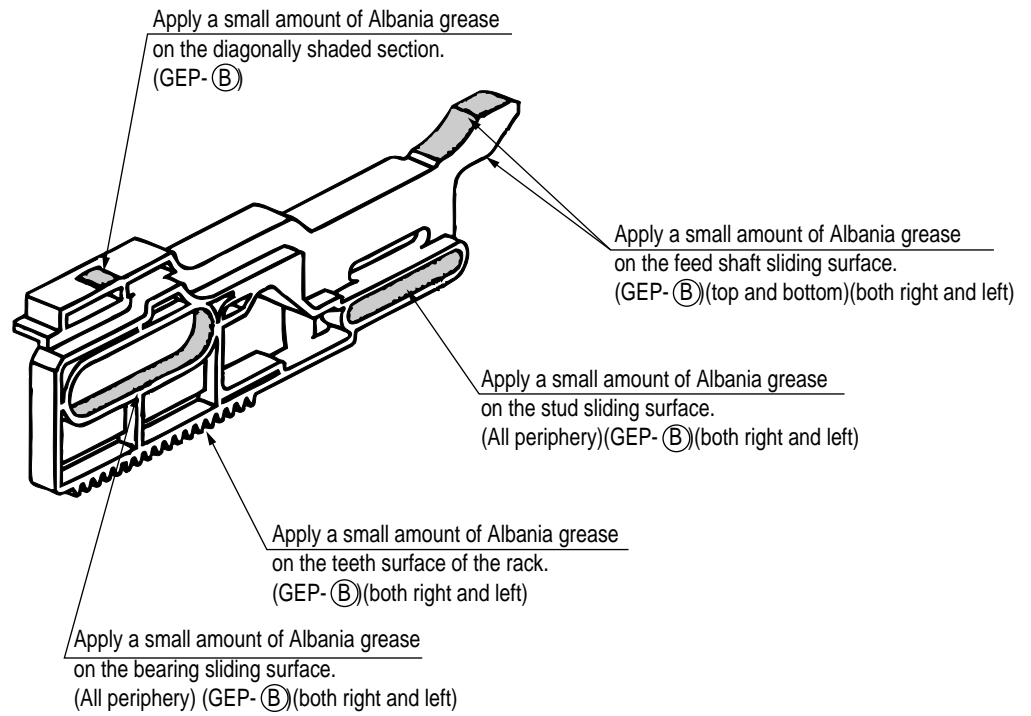


Left Side View

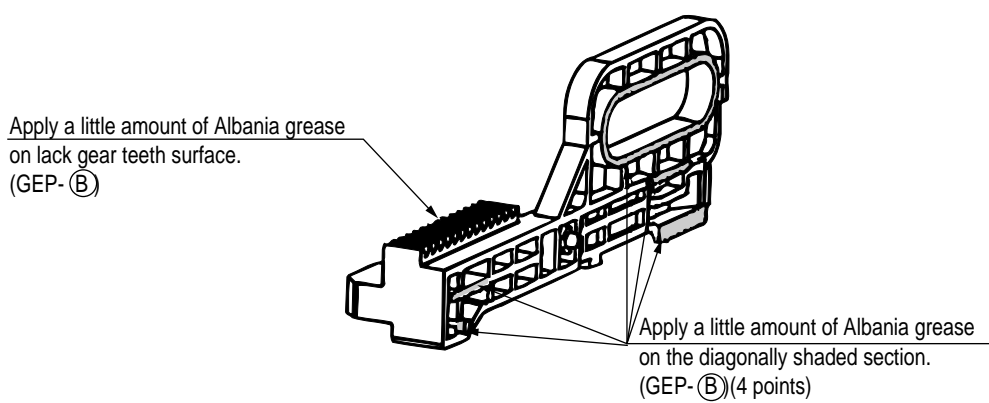




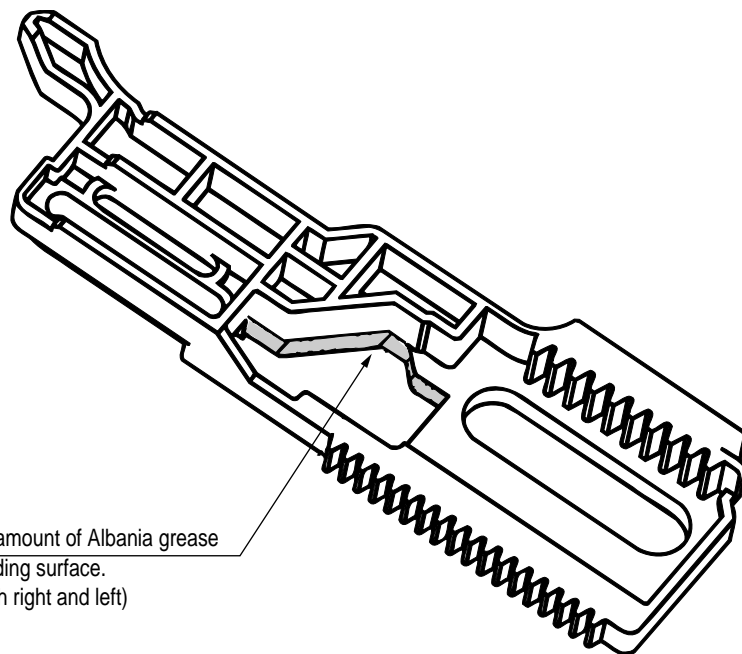




Bail lift lever oblique view



Tractor change lever Assy oblique view



Apply a small amount of Albania grease
on the stud sliding surface.
(GEP-Ⓟ)(both right and left)

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 trouble as possible from the customer.
- (3) Inspect in the 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, locate the trouble position 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	Details	Flowchart item No.
Trouble upon power on	• Power is not supplied.	①
	• No spacing operation.	②
	• Homing does not end normally.	③
Trouble during printing	• Wrong character, character omission or dot omission.	④
	• Ribbon feed trouble.	⑤
	• Line feed trouble.	⑥
	• Malfunction of switch on operation panel.	⑦
	• Data receiving failure.	⑧
	• Data is entered, but the paper does not feed.	⑨
	• The ALARM indicator on the printer is lit.	⑩
	• The SELECT indicator on the printer is off.	⑪
	• Paper jam while paper inset.	⑫
	• Smearing/ Missing dots.	⑬
	• Faint or dark print.	⑭

6.3 Lamp and LCD Display

(1) Printer mode display

Table 6.2

Printer mode	ALARM	SELECT	LCD	Contents	Remedy																																											
Operation mode	ON LINE	OFF	ON	<table border="1"> <tr><td>O</td><td>N</td><td>-</td><td>L</td><td>I</td><td>N</td><td>E</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	O	N	-	L	I	N	E																																		Indicates that the printer is ready for receiving.			
	O	N	-	L	I	N	E																																									
	HEX DUMP	OFF	ON	<table border="1"> <tr><td>H</td><td>E</td><td>X</td><td>D</td><td>U</td><td>M</td><td>P</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	H	E	X	D	U	M	P																																			Indicates that the printer is in the hex dump mode.		
H	E	X	D	U	M	P																																										
SELF TEST	OFF	OFF	<table border="1"> <tr><td>S</td><td>E</td><td>L</td><td>F</td><td>T</td><td>E</td><td>S</td><td>T</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	S	E	L	F	T	E	S	T																																		Indicates that the printer is in the self test mode.			
S	E	L	F	T	E	S	T																																									
MENU	OFF	OFF	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																																											Indicates that the printer is in the menu mode.	As for LCD messages, refer to Menu List.	
Operator alarm	FRONT PAPER END	ON	OFF	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>F</td><td>R</td><td>O</td><td>N</td><td>T</td><td>P</td><td>A</td><td>P</td><td>E</td><td>R</td><td>E</td><td>N</td><td>D</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						F	R	O	N	T	P	A	P	E	R	E	N	D									Front form end.	
	F			R	O	N	T	P	A	P	E	R	E	N	D																																	
	REAR PAPER END			<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R</td><td>E</td><td>A</td><td>R</td><td>P</td><td>A</td><td>P</td><td>E</td><td>R</td><td>E</td><td>N</td><td>D</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						R	E	A	R	P	A	P	E	R	E	N	D										Rear form end.	
	R			E	A	R	P	A	P	E	R	E	N	D																																		
	EJECT JAM			<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>E</td><td>J</td><td>E</td><td>C</td><td>T</td><td>J</td><td>A</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						E	J	E	C	T	J	A	M														Paper Eject Jam.	
	E			J	E	C	T	J	A	M																																						
LODE JAM	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>L</td><td>O</td><td>A</td><td>D</td><td>J</td><td>A</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						L	O	A	D	J	A	M															Paper Load Jam.				
L	O	A	D	J	A	M																																										
PARK JAM	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>P</td><td>A</td><td>R</td><td>K</td><td>J</td><td>A</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						P	A	R	K	J	A	M															Paper Park Jam.				
P	A	R	K	J	A	M																																										
FEED JAM	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>F</td><td>E</td><td>E</td><td>D</td><td>J</td><td>A</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						F	E	E	D	J	A	M															Paper Feed Jam.				
F	E	E	D	J	A	M																																										
PAPER JAM	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>P</td><td>A</td><td>P</td><td>E</td><td>R</td><td>J</td><td>A</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						P	A	P	E	R	J	A	M														Paper Jam.				
P	A	P	E	R	J	A	M																																									
RIBBON JAM	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R</td><td>I</td><td>B</td><td>B</td><td>O</td><td>N</td><td>J</td><td>A</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						R	I	B	B	O	N	J	A	M													RIBBON FEED JAM.				
R	I	B	B	O	N	J	A	M																																								

Table 6.3

Printer mode	ALARM	SELECT	LCD	Contents	Remedy																																										
Operator alarm PATH CHANGE JAM	ON	OFF	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>P</td><td>A</td><td>T</td><td>H</td><td></td><td>C</td><td>H</td><td>A</td><td>N</td><td>G</td><td>E</td><td></td><td>J</td><td>A</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						P	A	T	H		C	H	A	N	G	E		J	A	M							Paper jam due to path change.	
P	A	T	H		C	H	A	N	G	E		J	A	M																																	
PAPER RELEASE	OFF	OFF	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>P</td><td>A</td><td>P</td><td>E</td><td>R</td><td></td><td>R</td><td>E</td><td>L</td><td>E</td><td>A</td><td>S</td><td>E</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						P	A	P	E	R		R	E	L	E	A	S	E									Indicates that paper is released.	
P	A	P	E	R		R	E	L	E	A	S	E																																			
COVER OPEN	ON	OFF	<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>C</td><td>O</td><td>V</td><td>E</td><td>R</td><td></td><td>O</td><td>P</td><td>E</td><td>N</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						C	O	V	E	R		O	P	E	N												Indicates that Access Cover is opened.	
C	O	V	E	R		O	P	E	N																																						
DATA REMAIN			<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>D</td><td>A</td><td>T</td><td>A</td><td></td><td>R</td><td>E</td><td>M</td><td>A</td><td>I</td><td>N</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																						D	A	T	A		R	E	M	A	I	N											Indicates that Cover Open Alarm occurred when data remained inside (Cover Open during space-system operation), then Cover was closed.	
D	A	T	A		R	E	M	A	I	N																																					
Fault alarm			<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																																											For details see paragraph (2) fault alarm display.	

Table 6.4

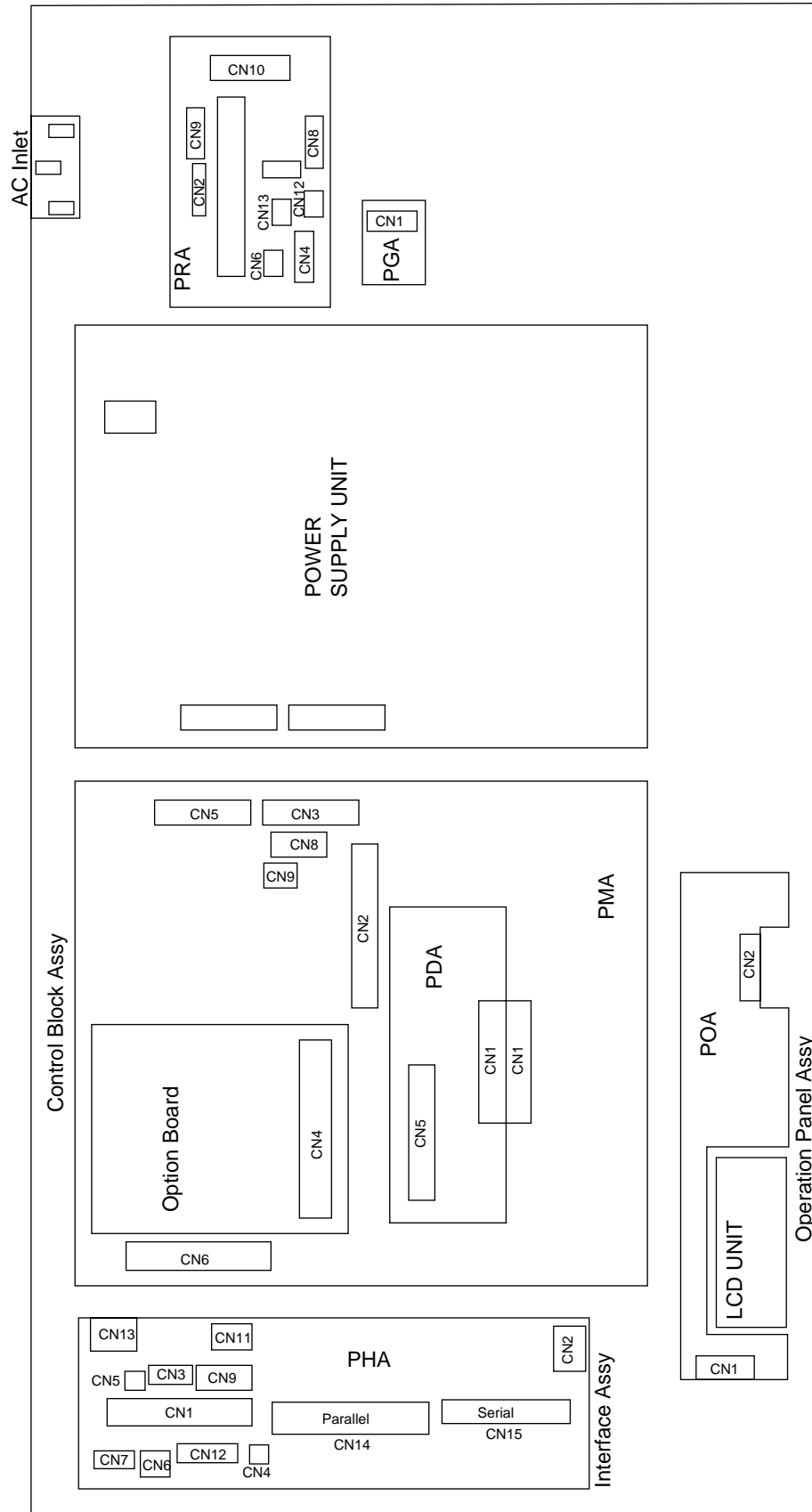
Error Category	LCD	Comments	Remedies
RAM ALARM	D - R A M	D-RAM Error	
	S - R A M	S-RAM Error	
ROM ALARM	P R O G R A M - R O M	Program-ROM Error	
	C G - R O M	CG-ROM Error	
	E E P R O M	EEPROM Error	
PROGRAM ALARM	W D T	Watch Dog Time Error	
	I N V A L I D I P T	Invalid Input Error	
ENGINE ALARM	S P A C I N G	Spacing Error	Refer to flow chart ②
	H O M I N G	Homing Error	Refer to flow chart ③
	F U S E	Fuse Breakdown	Refer to flow chart ①
	H E A D T H E R M I S T E R	Head Thermister Failure	
	A U T O G A P	Auto-Gap Error	
	P A T H C H A N G E	Path-Change Error	
	C E N T E R I N G	Centering Error	
	P O W E R F A N	Power Fan Failure	
	H E A D 1 F A N	Head Fan 1 Failure	
	H E A D 2 F A N	Head Fan 2 Failure	
	S P A C E F A N	Space Motor Fan Failure	
	N H D C L S I	NHDC LSI Error	
	M A I N L S I	Main LSI Error	
B A I L	Bail Motor Error		

Error Category	LCD	Comments	Remedies
ENGINE ALARM	R I B B O N	Ribbon Motor Error	Refer to flow chart ⑤
	O P T I C A L S E N S O R	Paper Width Sensor Error	
OPERATION PANEL ALARM	L C D T I M E O U T	LCD Time-out Error	
	F L A S H C H I P	Flash Memory Chip Error (Except for Fujitsu-and AMD-made chips)	
FLASH MEMORY ALARM	F L A S H U N L O A D	Flash Memory Unloading Error	
	F L A S H H A S H	Flash Memory HASH Error	
	F L A S H M E M O R Y	Flash Memory Polling Error	
	F L A S H C O M M A N D	Flash Memory Command Received	
MUPIS ALARM	O K I H S P C O N N E C T	HSP Connection Error	
OPTION ALARM	O P T C A R D R O M	ML300's IF Card ROM Error	
	O P T C A R D R A M	ML300's IF Card RAM Error	
	O P T C A R D C O N N E C T	ML300's IF Card Connection Error	

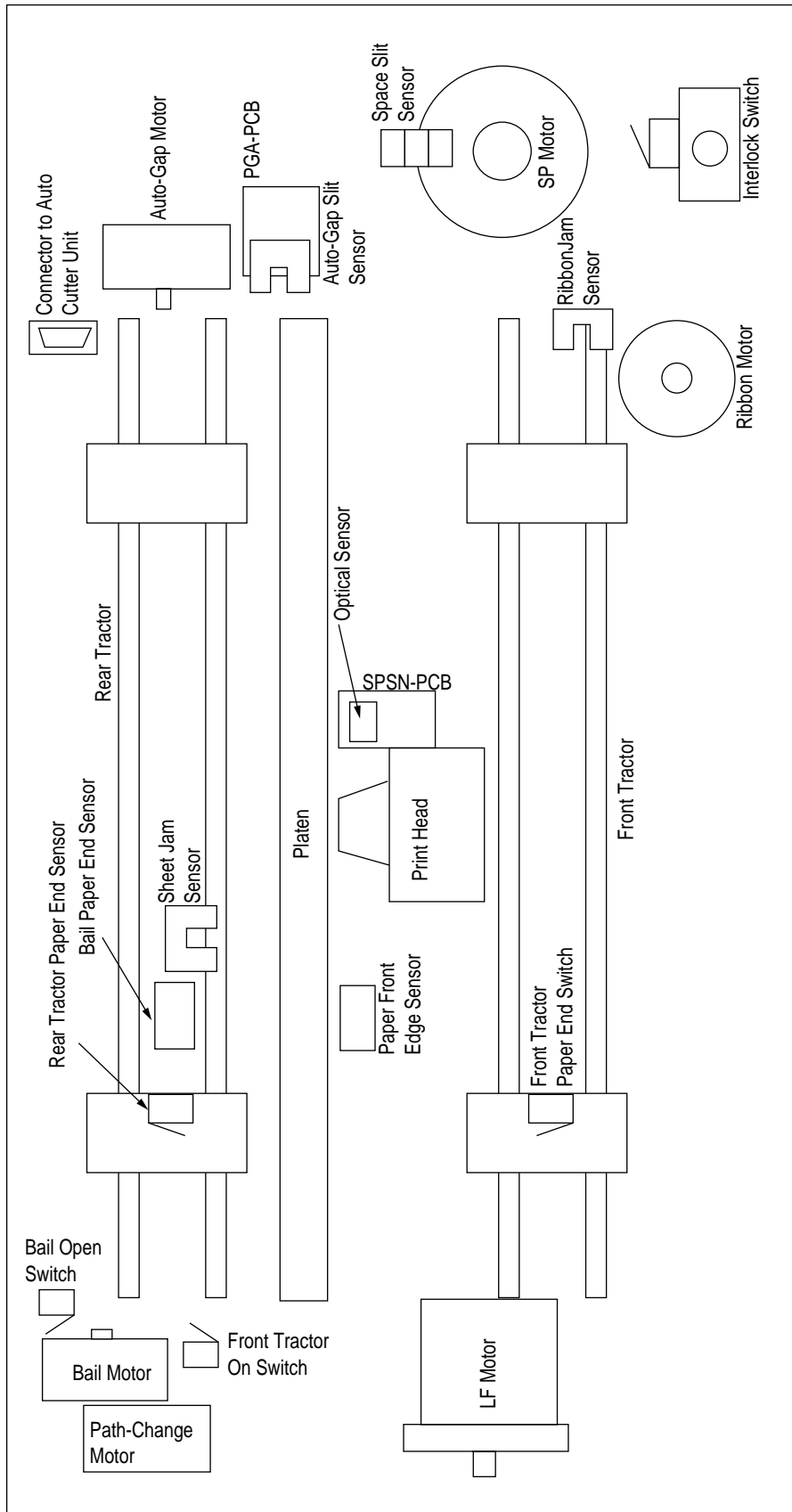
6.4 Part Layout

(1) Board

* SPSN-Board is illustrated on the next page (2) to define the detail positions.



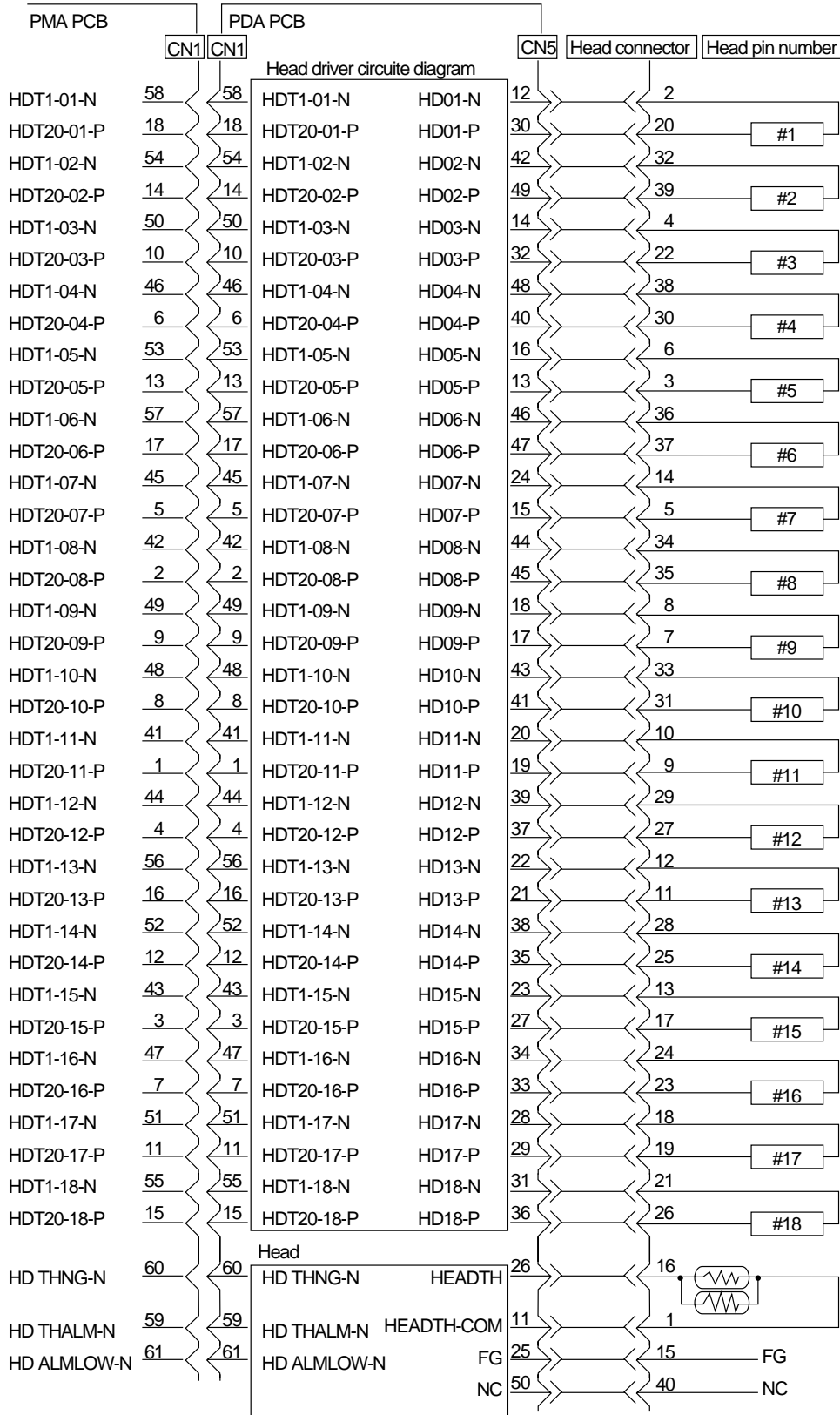
(2) Other



6.5 Connection

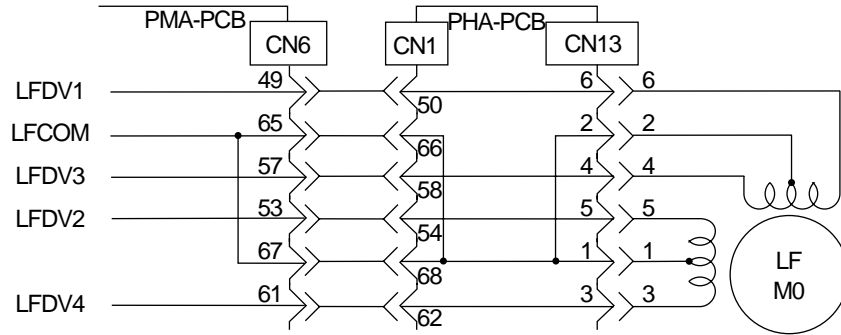
(1) Printhead

Resistance of each coil should be about 5.8Ω



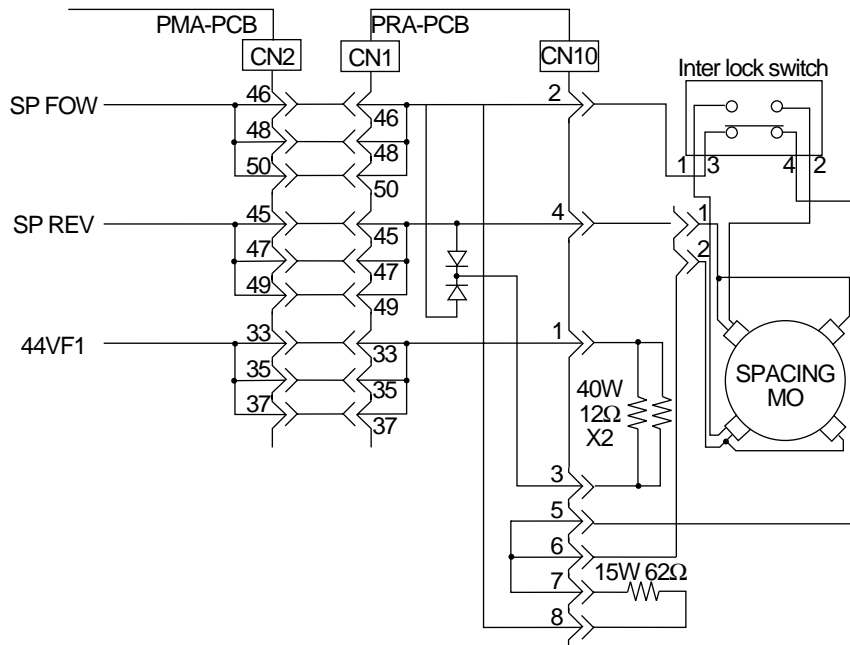
(2) Line feed motor

Resistance of each coil should be about 4.2Ω



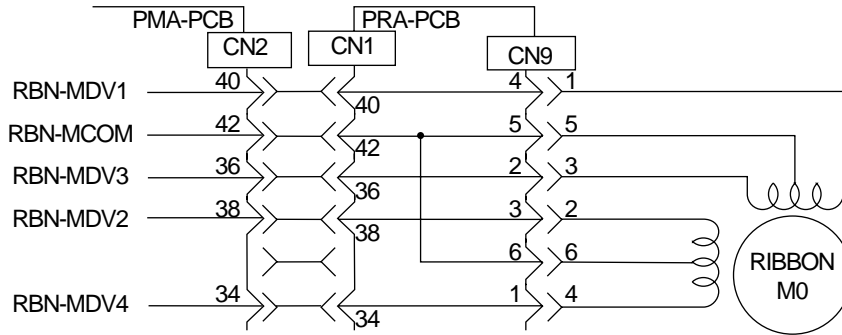
(3) Space motor

Resistance of motor should be about 1.08Ω



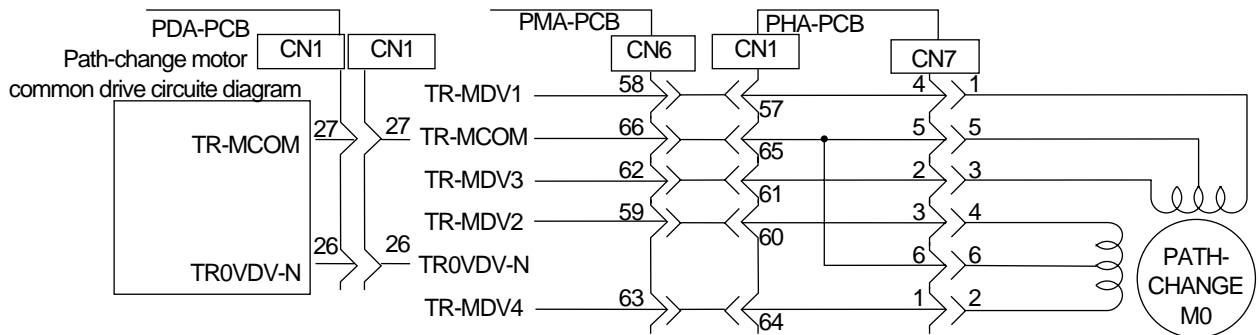
(4) Ribbon motor

Resistance of each coil should be about 155Ω



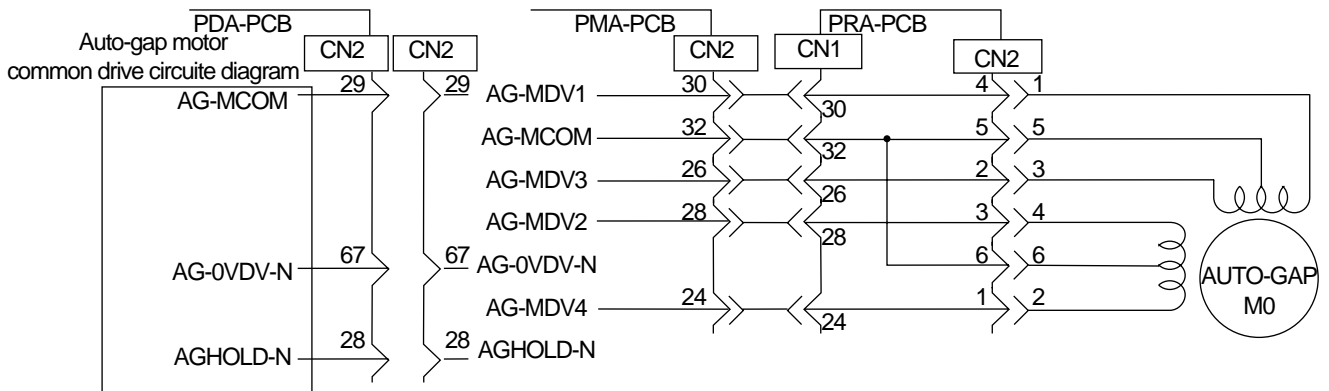
(5) Path-change motor

Resistance of each coil should be about 90Ω



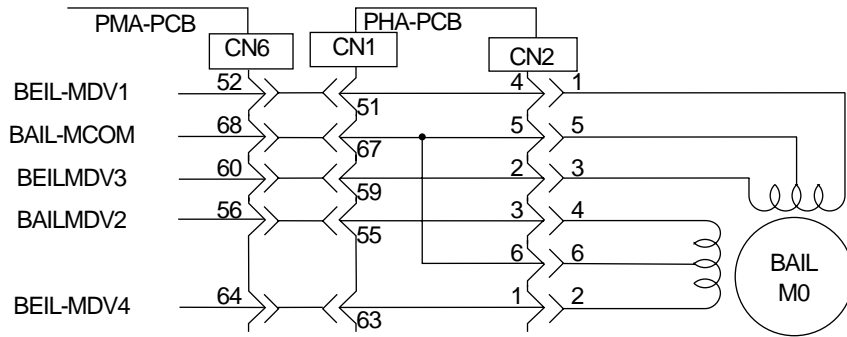
(6) Auto-gap motor

Resistance of each coil should be about 90Ω

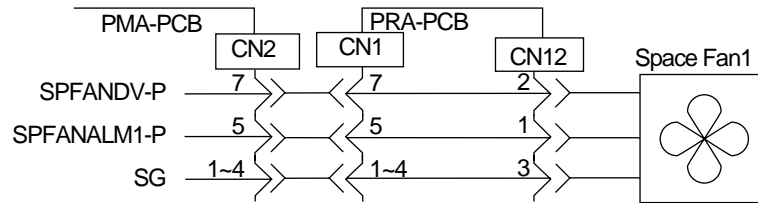


(7) Bail motor

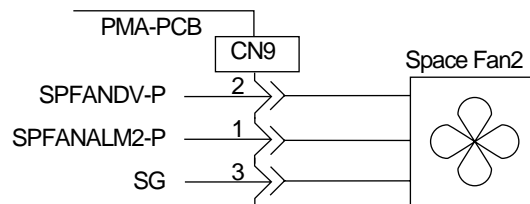
Resistance of each coil should be about 90Ω



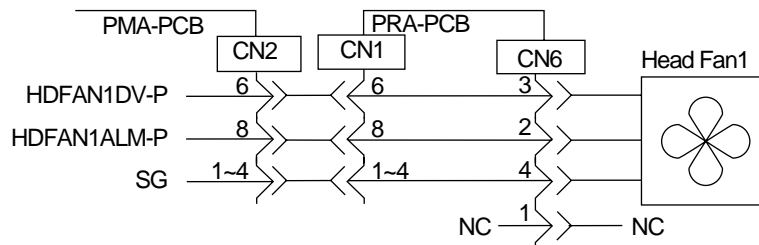
(8) Space Fan1



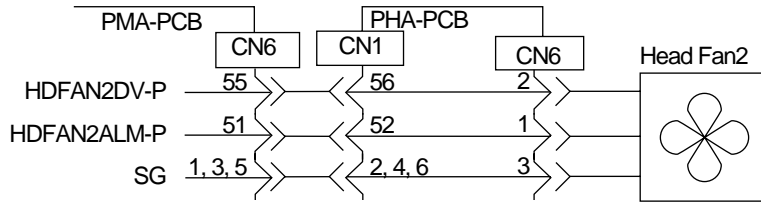
(9) Space Fan2



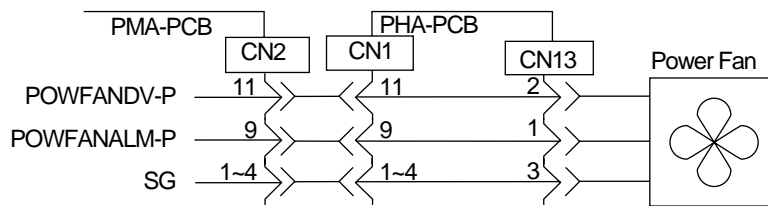
(10) Head Fan1



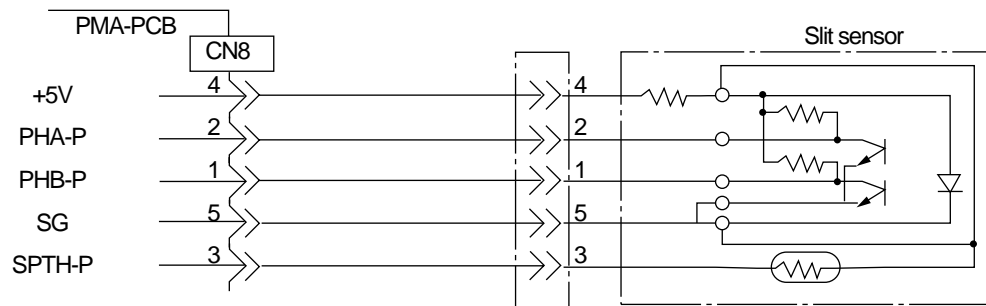
(11) Head Fan2



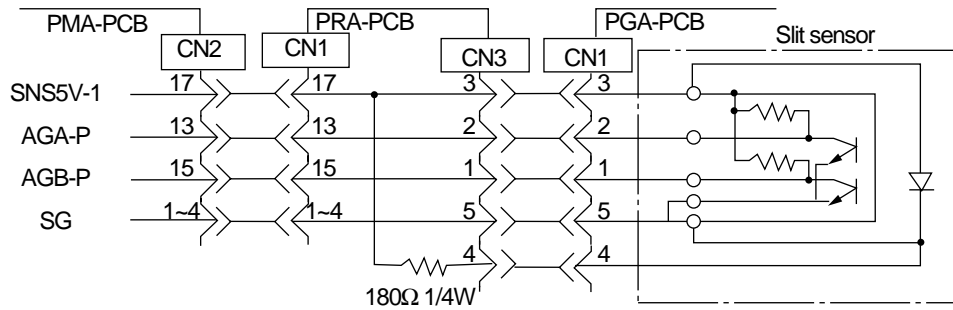
(12) Power Fan



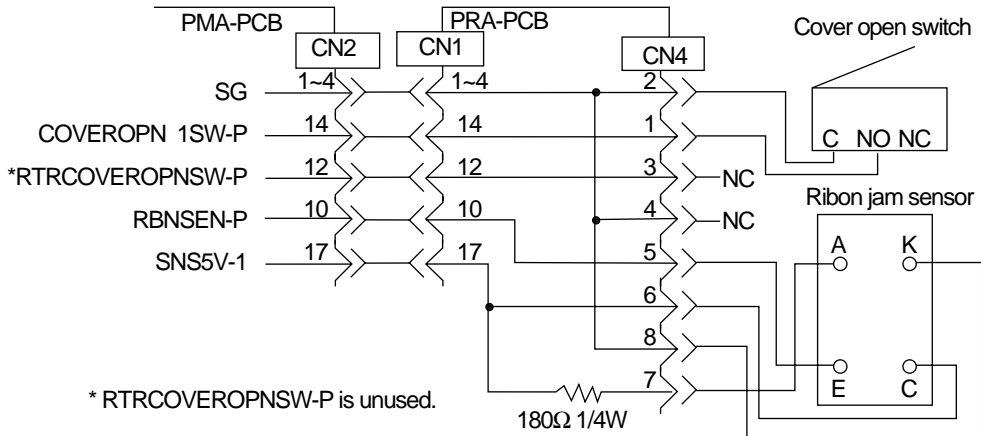
(13) space slit sensor



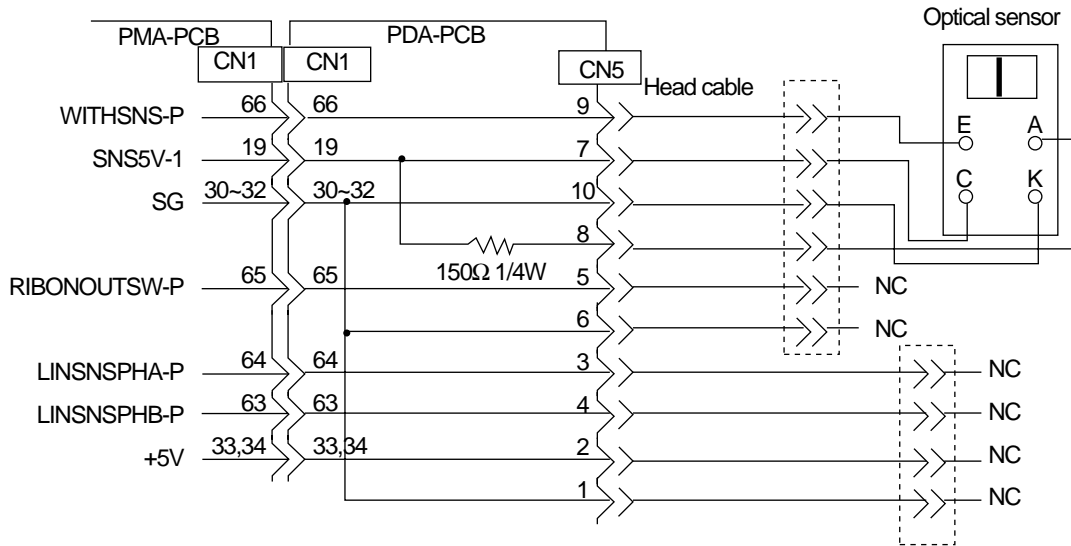
(14) Auto-gap slit sensor



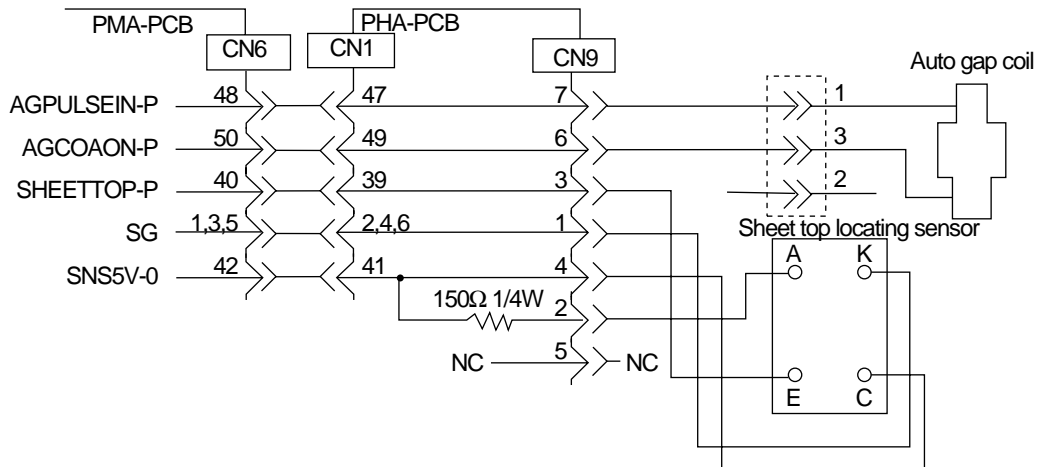
(15) Cover Open Switch/ Ribbon Jam Sensor



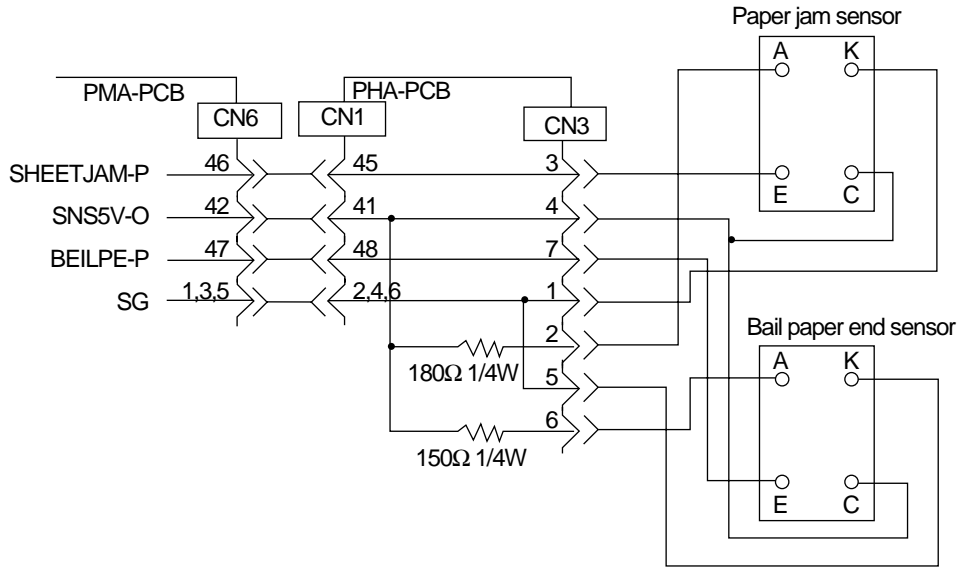
(16) Optical Sensor



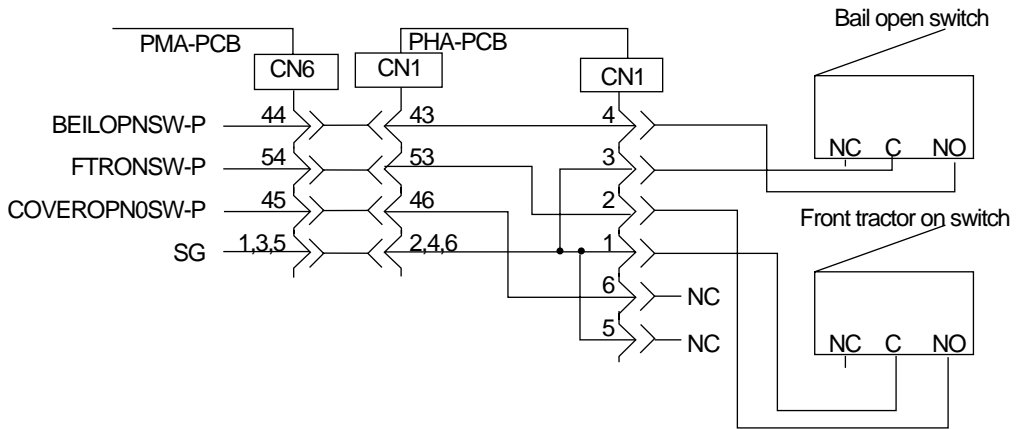
(17) Sheet Top Locating Sensor/ Auto Gap Core



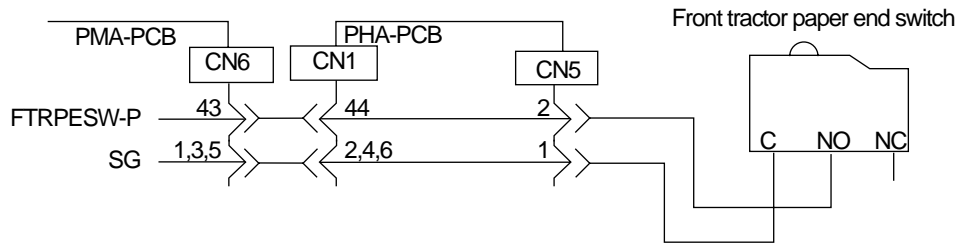
(18) Paper Jam Sensor/ Bail Paper End Sensor



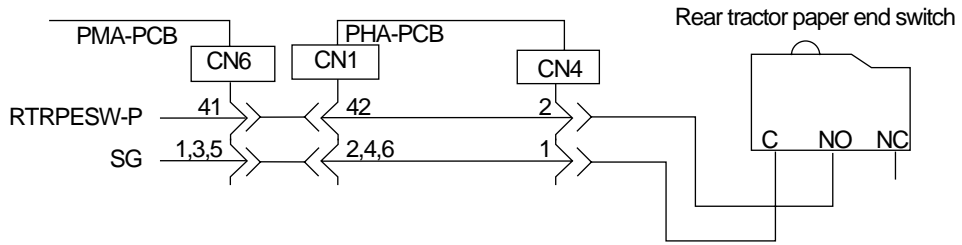
(19) Bail Open Switch/ Front Tractor On Switch



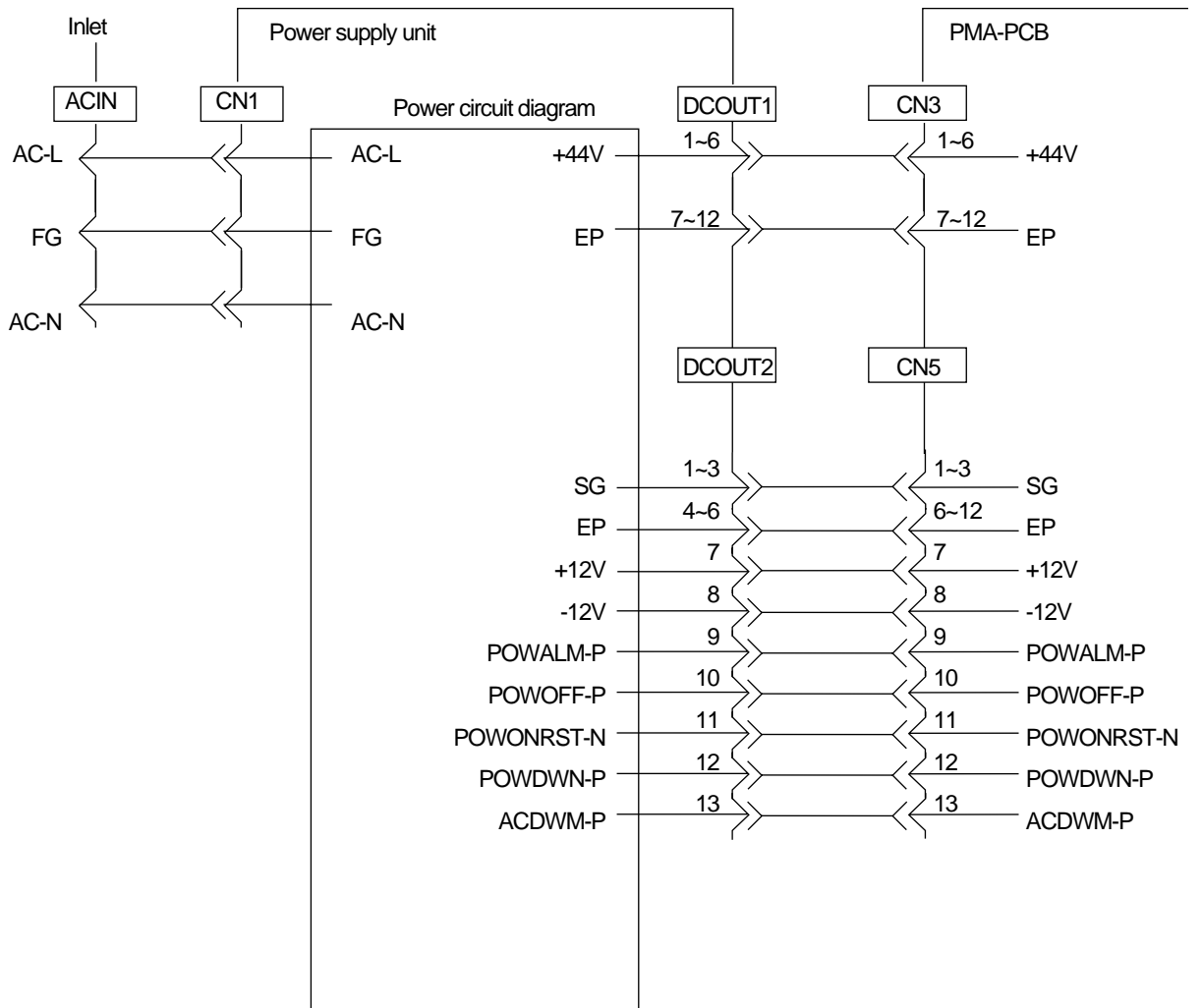
(20) Front Tractor Paper End Switch



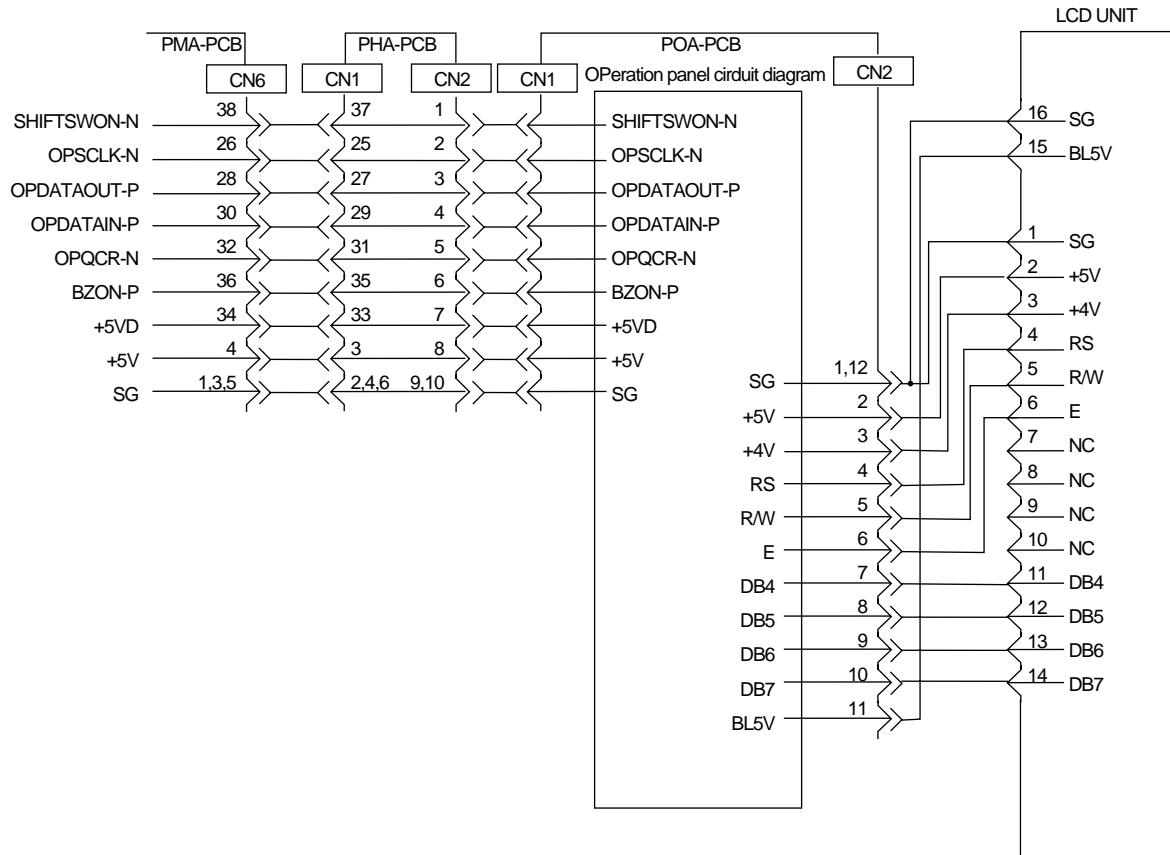
(21) Rear Tractor Paper End Switch



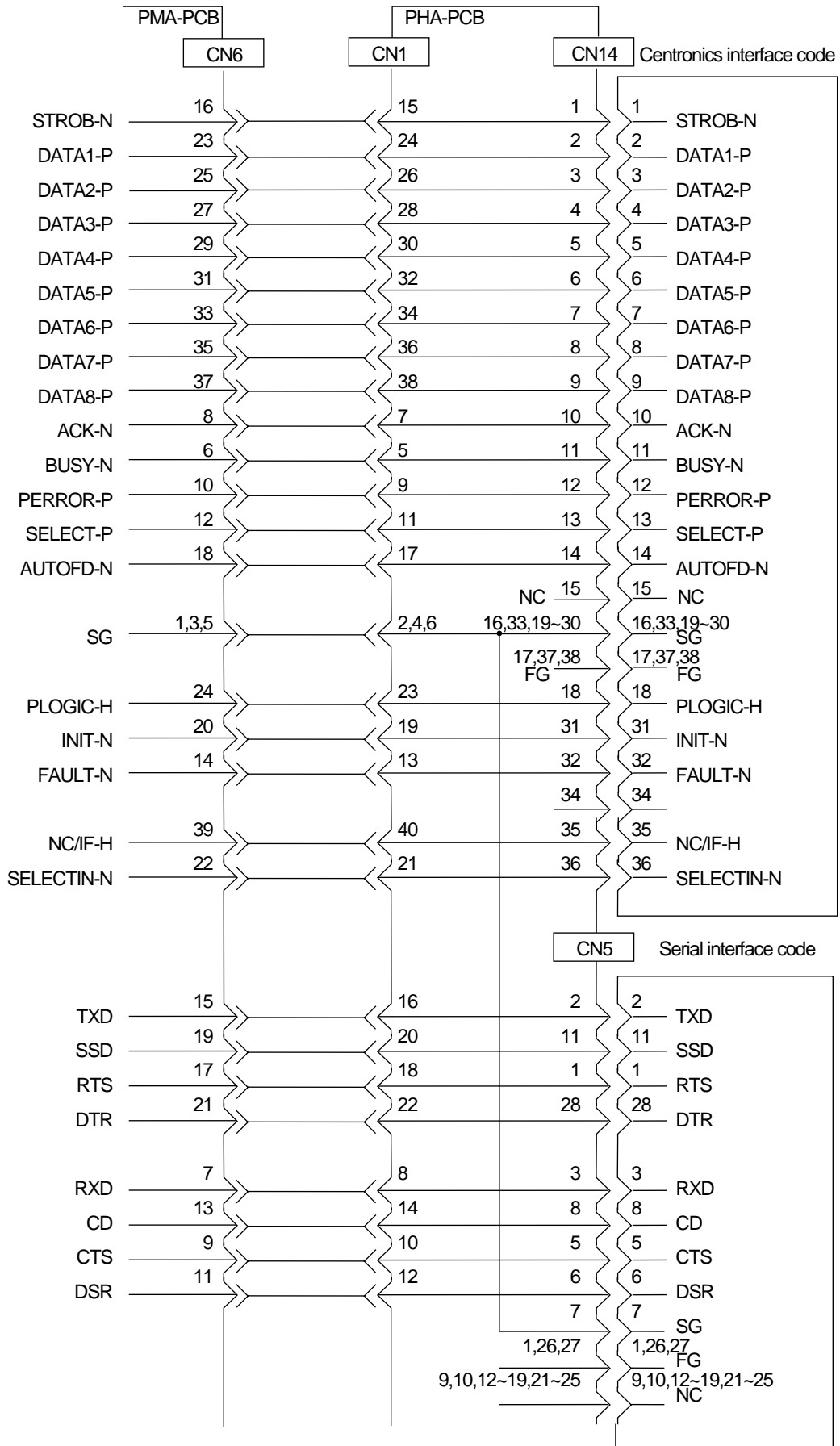
(22) Power Supply Unit



(23) Operation Panel

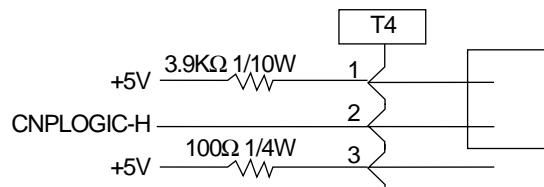
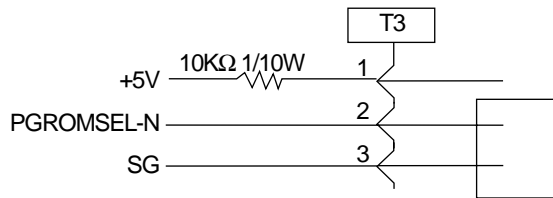
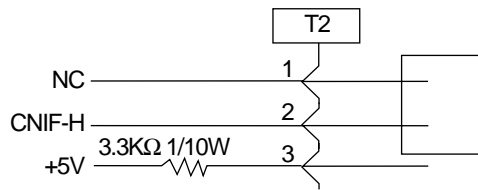
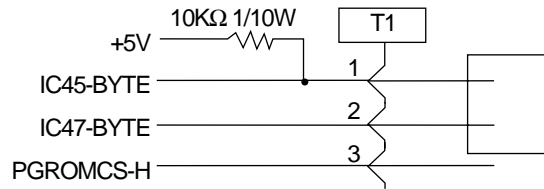


(24) Standard Interface

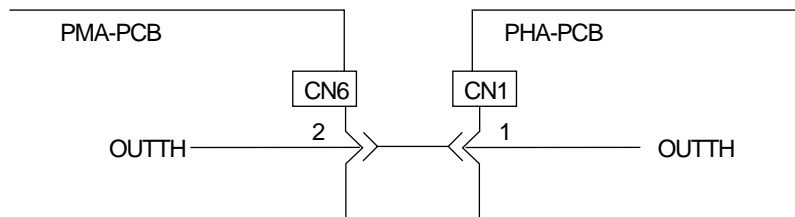
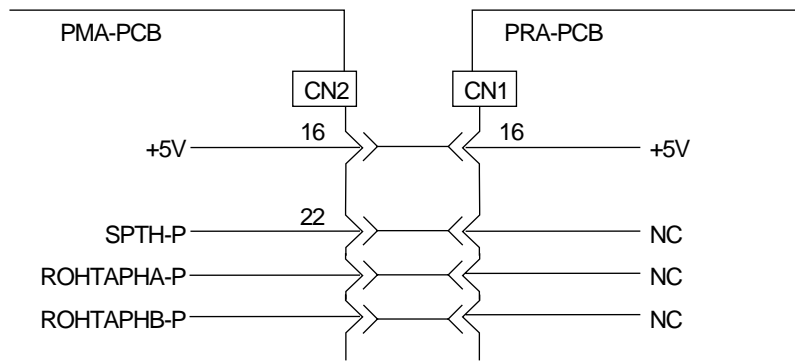
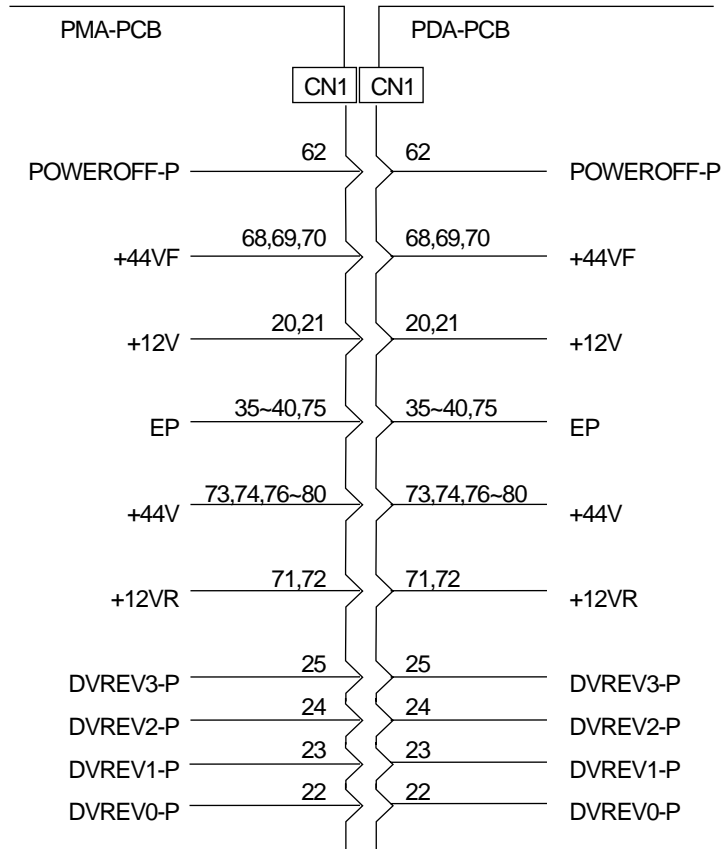


(25) Short Plug

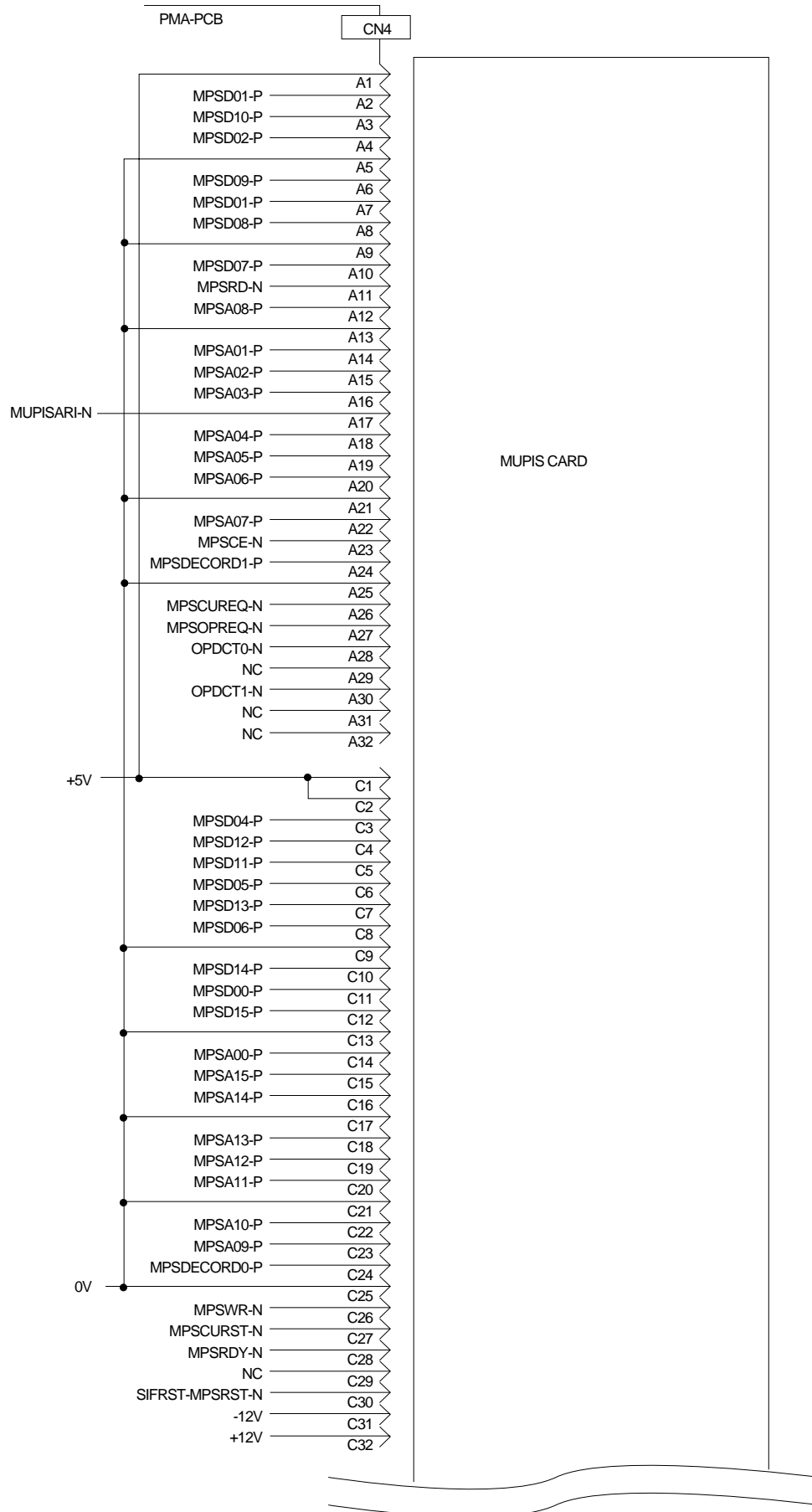
* For setting details see the maintenance manual



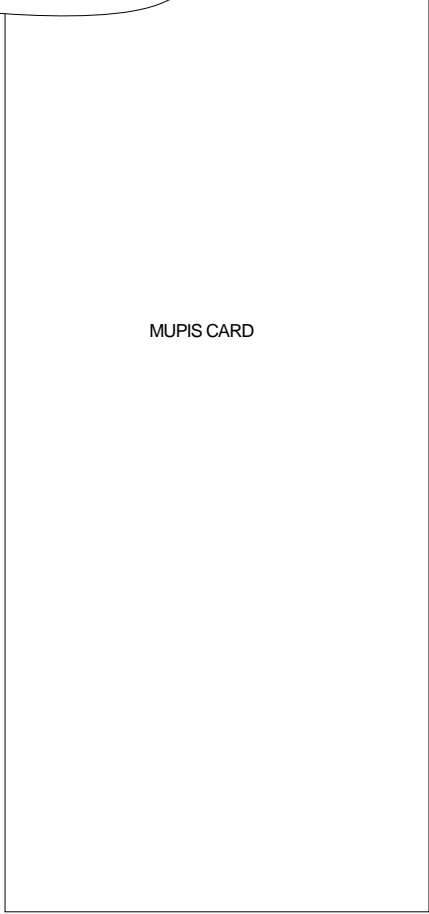
(26) Others



(27) MUPIS Interface (Option)

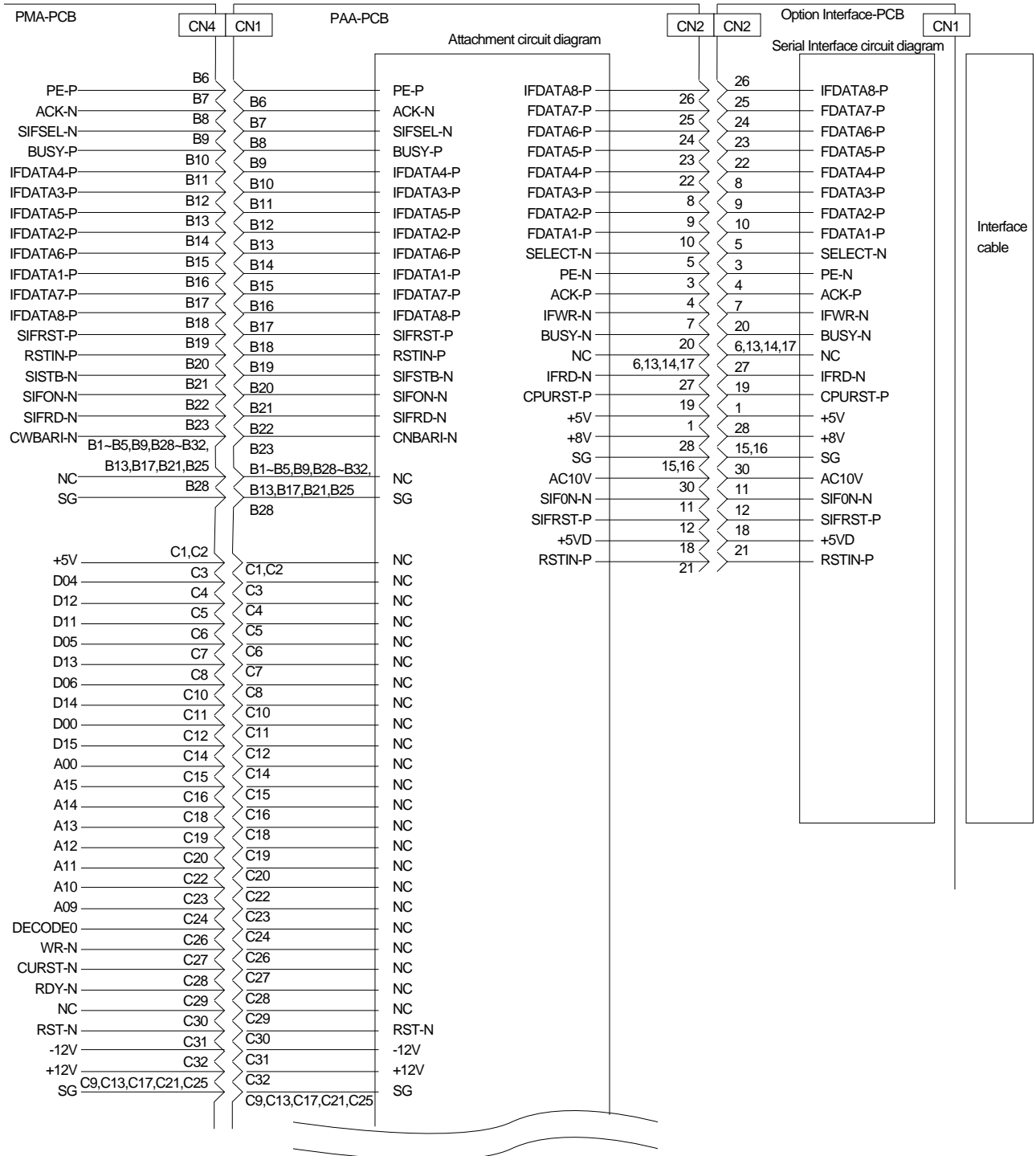


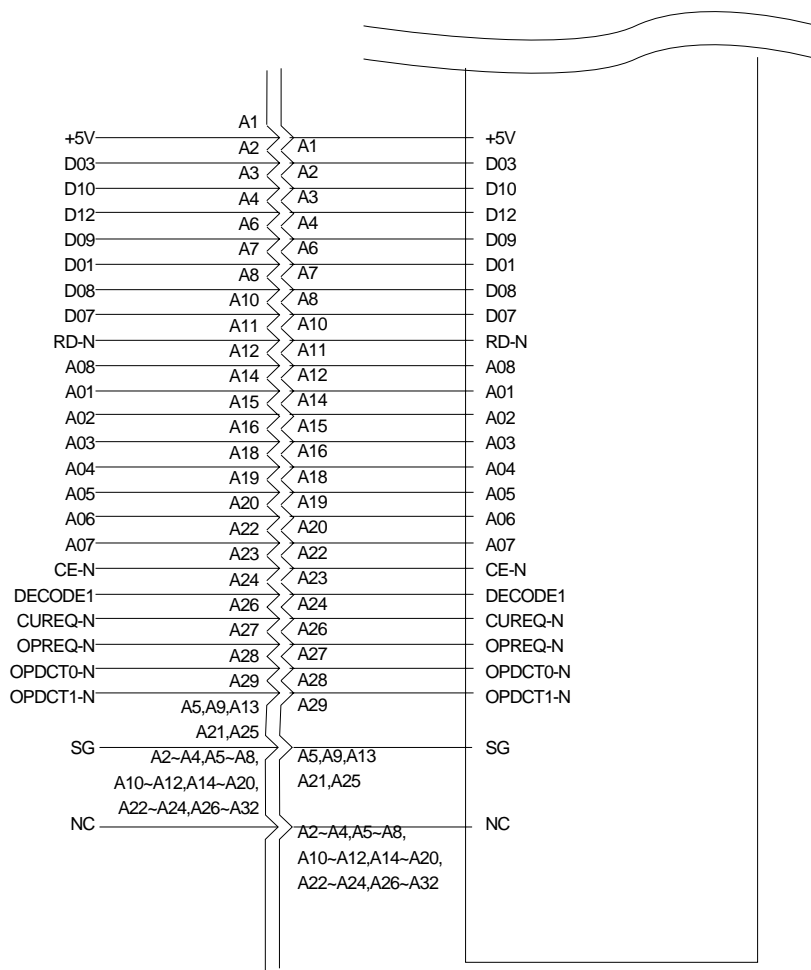
NC —————> B1
 NC —————> B2
 NC —————> B3
 NC —————> B4
 NC —————> B5
 PE-N —————> B6
 ACK-N —————> B7
 SIFSEL-N —————> B8
 NC —————> B9
 BUSY-P —————> B10
 IFDATA4-P —————> B11
 IFDATA3-P —————> B12
 NC —————> B13
 IFDATA5-P —————> B14
 IFDATA2-P —————> B15
 IFDATA6-P —————> B16
 NC —————> B17
 IFDATA1-P —————> B18
 IFDATA7-P —————> B19
 IFDATA8-P —————> B20
 NC —————> B21
 SIFRST-P —————> B22
 RSTIN-N —————> B23
 SIFSTB-N —————> B24
 NC —————> B25
 SIFON-N —————> B26
 SIFRD-N —————> B27
 CNBARI-N —————> B28
 NC —————> B29
 NC —————> B30
 NC —————> B31
 NC —————> B32



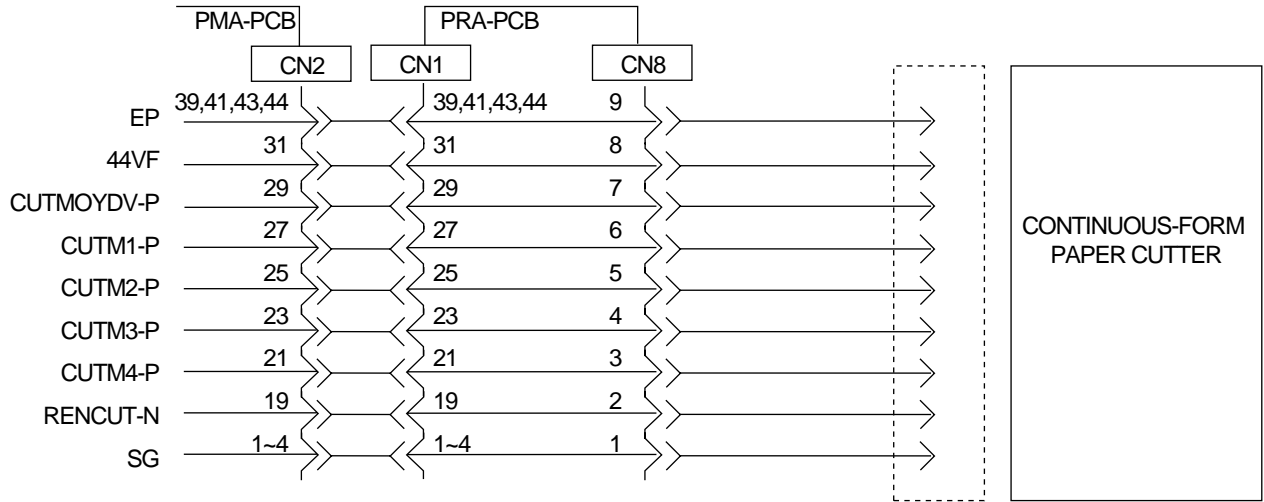
MUPIS CARD

(28) Option Interface





(29) Continuous-Form Paper Cutter (Option)



① Printer is not powered on at all.

- The AC cable connected properly?

Yes No



- Connect the cable properly.

▼
• AC Input Fuse blown?

No Yes



- Replace it with a new AC Input Fuse of the same type and rating.
- Remedied?

No Yes



- End

▼
• Replace the power supply unit or connection cable.(See section X.X.X)

▼
• Are the +5V outputs in the control board provided?
Are the (5V outputs in Control Board provided? Slide Control Block toward outside without unplugging the cables. (Stop sliding when the cables becomes straight. Do not extend the cables by force.) Check the voltage between Control Block C75 (side and GND1 or GND2.

Yes No



- The cables to Control Block CN5 and to Power Supply Unit DCOUT2 connected properly?

Yes No



- Connect the cables properly.

▼
• The cable to Power Supply Unit CN1 connected properly?

Yes No



- Connect the cable properly.

▼
• Replace Power Supply Unit.

▼
• The cable to PMA-Board CN6 connected properly?

Yes No



- Connect the cable properly.

▼
• The cables to PHA-Board CN1 and CN12 connected properly?

Yes No



- Connect the cables properly.

▼
1-1

1-1



The cable to POA-Board CN1 connected properly?

Yes No

- Connect the cable properly.
- Replace POA-Board or PMA-Board.



② Printer does not operate at all, while Power Lamp is on, Alarm Lamp blinks and nothing is displayed on LCD.

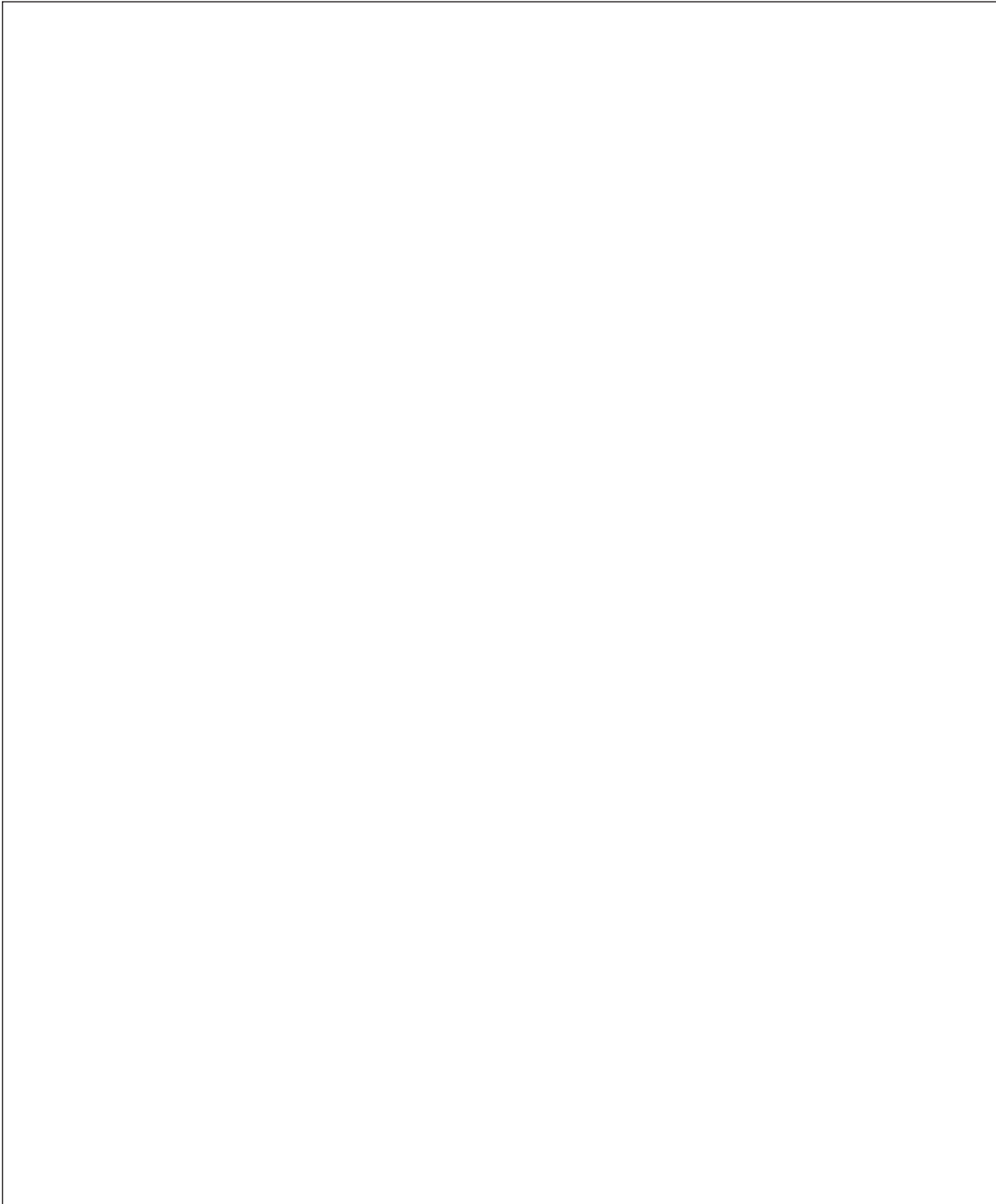
- The cable to POA-Board CN2 connected properly?

Yes No



- Connect the cable properly.

- Replace LCD Unit.



③ Printer does not operate at all, while Power Lamp is on, Alarm Lamp is on/off and nothing is displayed on LCD.

- Replace POA-Board. Recovered?

No

Yes



- End



Replace Program-ROM. Recovered?

No

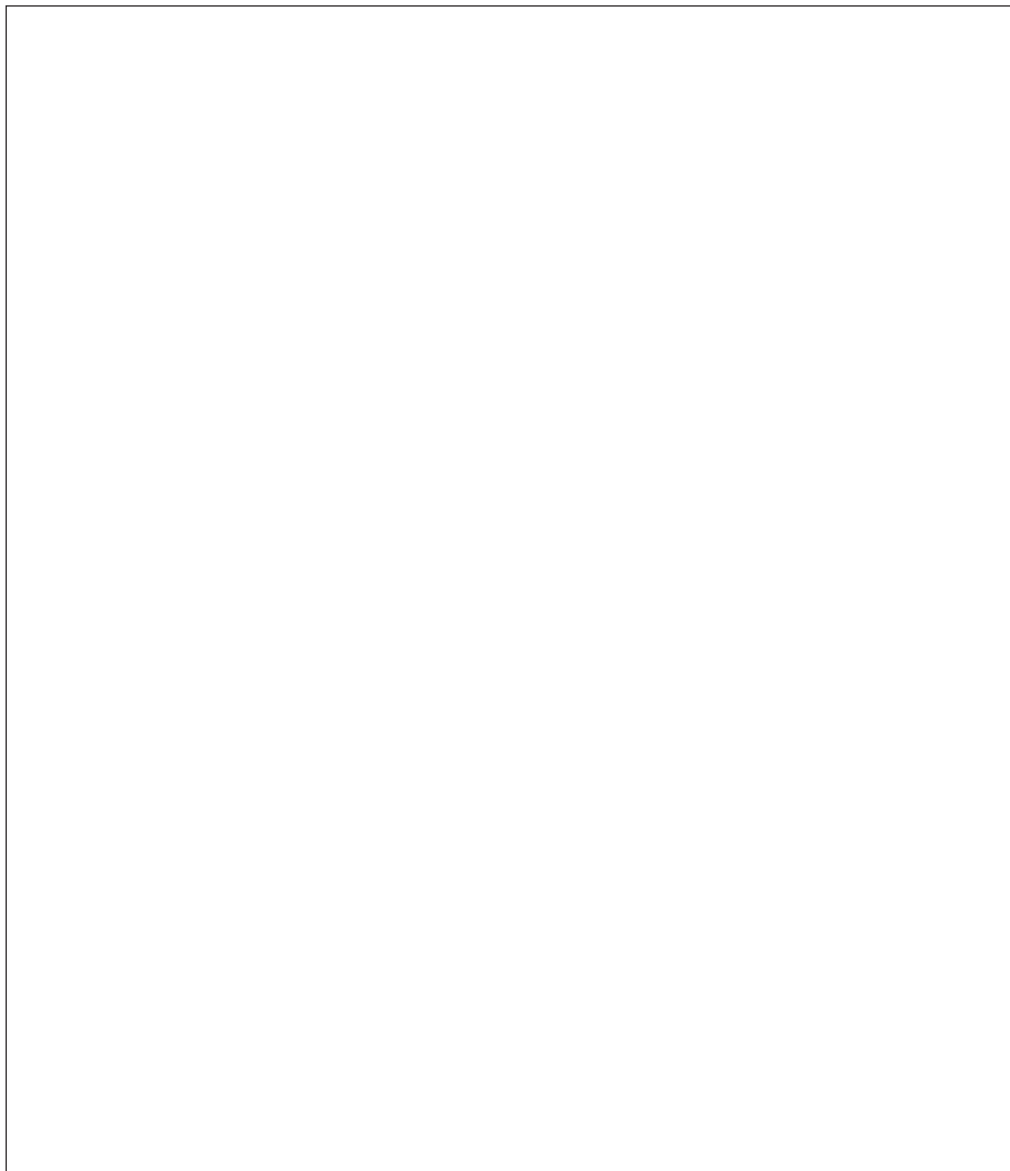
Yes



- End



Replace PMA-Board



④ Spacing is abnormal, while Alarm Lamp is on and “ERROR HOMING” or “ERROR SPACING” is displayed on LCD.

- Paper rolled into Carriage?

No Yes



- Remove the printing paper.

• Carriage moves if Printer is restarted?

No Yes



- Go to C.

• The cable to DC Motor connected properly?

Yes No



- Connect the cable properly.

• The cables to PRA-Board CN1 and CN10 connected properly?

Yes No



- Connect the cables properly.

• The cable to PMA-Board CN2 connected properly?

Yes No



- Connect the cable properly.

• Check the DC Motor wave form at PRA-Board. No problem?
FOW side: Measure between CN10-2 pin and SH13.
REV side: Measure between CN10-4 pin and SH13.

No Yes



- Replace PMA-Board. Recovered?

No Yes

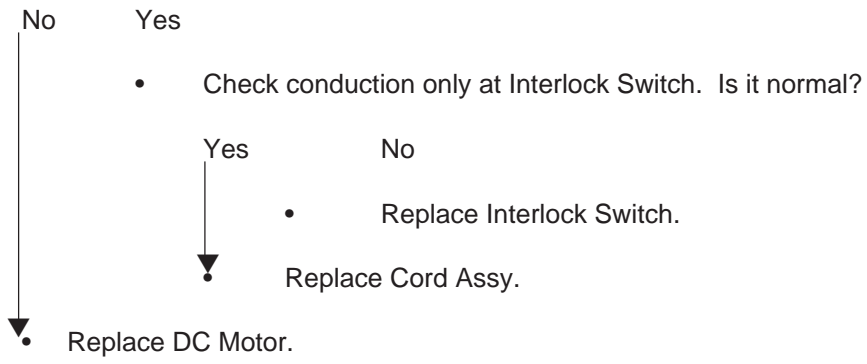


- End

Replace the junction cable.

• Check conduction at Cord Assy connecting to DC Motor. No problem?

FOW side: Examine between CN10-2 pin and DC Motor Red Terminal, with Interlock Switch on.
REV side: Examine between CN10-4 pin and DC Motor Black Terminal, with Interlock Switch on.



C • Loose Carriage Belt?

No Yes



- Adjust Carriage Belt tension properly.

• The cable to PMA-Board CN8 connected properly?

Yes No



- Connect the cable properly.

• The Slit Sensor cable under Space Motor connected properly with the Printer-side cable?

Yes No



- Connect the cable properly.

• The cables to Space Motor terminals connected properly?

Black cable: Should be connected to the terminal with no marking.
Red cable: Should be connected to the terminal with red marking.

Yes No



- Connect the cables properly.

• Check the wave form of DC Motor Slit Sensor. Proper wave form output?

(A: Examine between Slit Sensor Cord Connector 2 pin under Space Motor and PRA-Board SH4.

(B: Examine between Slit Sensor Cord Connector 1 pin under Space Motor and PRA-Board SH4.

Yes No



- Replace Space Motor.

• Check conduction of (A(Pin 1) and (B(Pin 2), at the both ends of the junction sensor cable (black shielded cable).

- Normal conduction?

Yes No

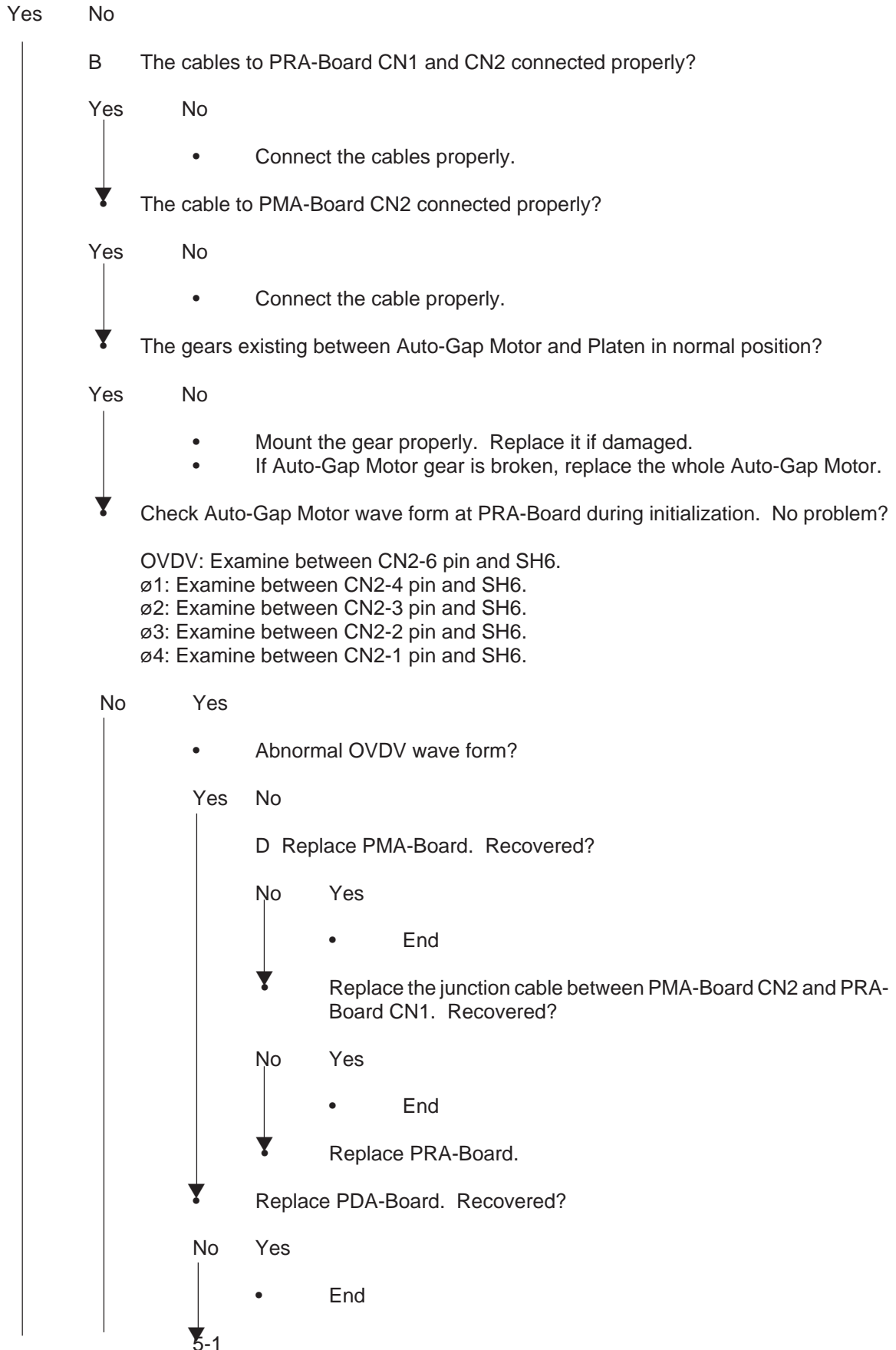


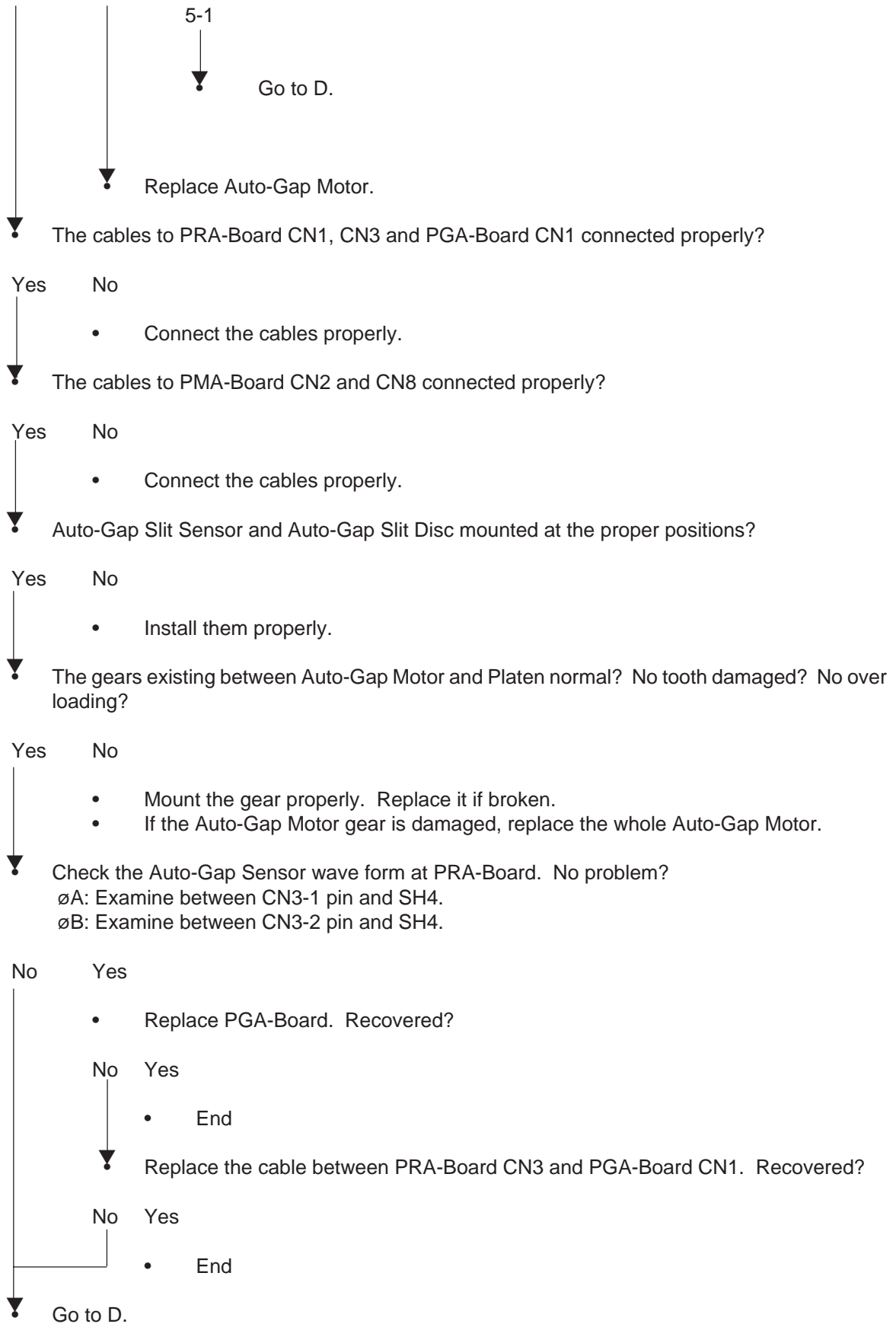
- Replace the junction sensor cable.

• Replace PMA-Board.

⑤ Carriage does not operate at all, while the Alarm Lamp is on and "ERROR AUTOGAP" is displayed on LCD.

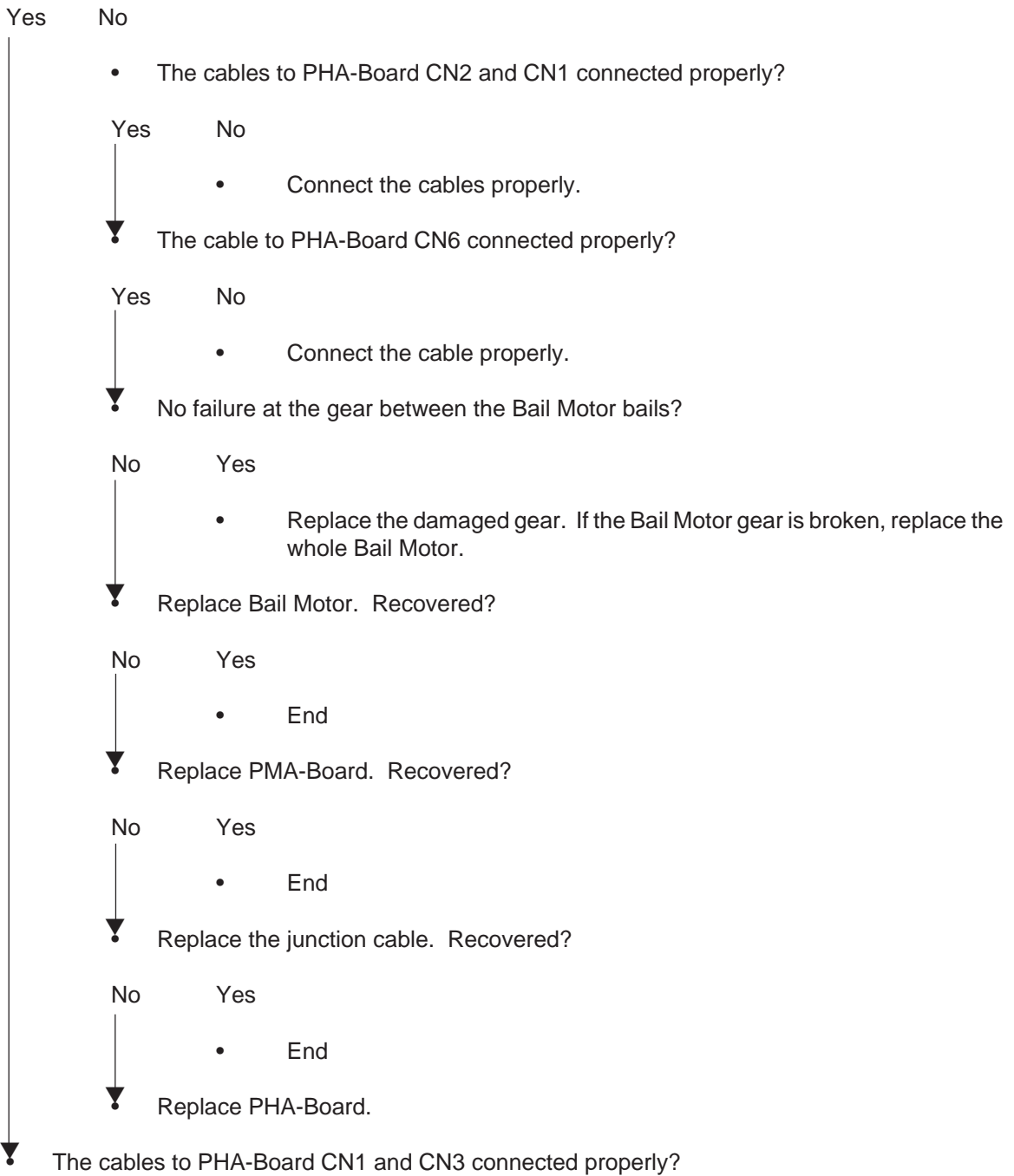
- Platen works normally during initialization?

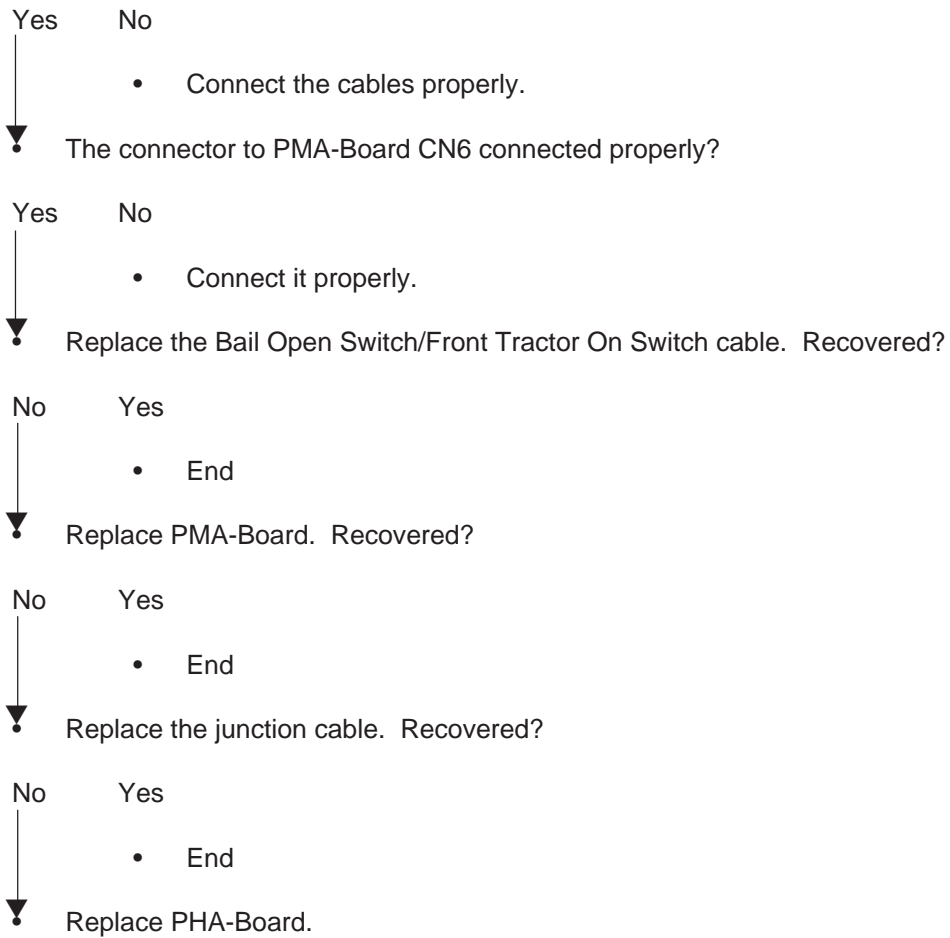




⑥ After Carriage works, Alarm Lamp goes on and “ERROR (in the upper row), BAIL (in the lower)” is displayed on LCD.

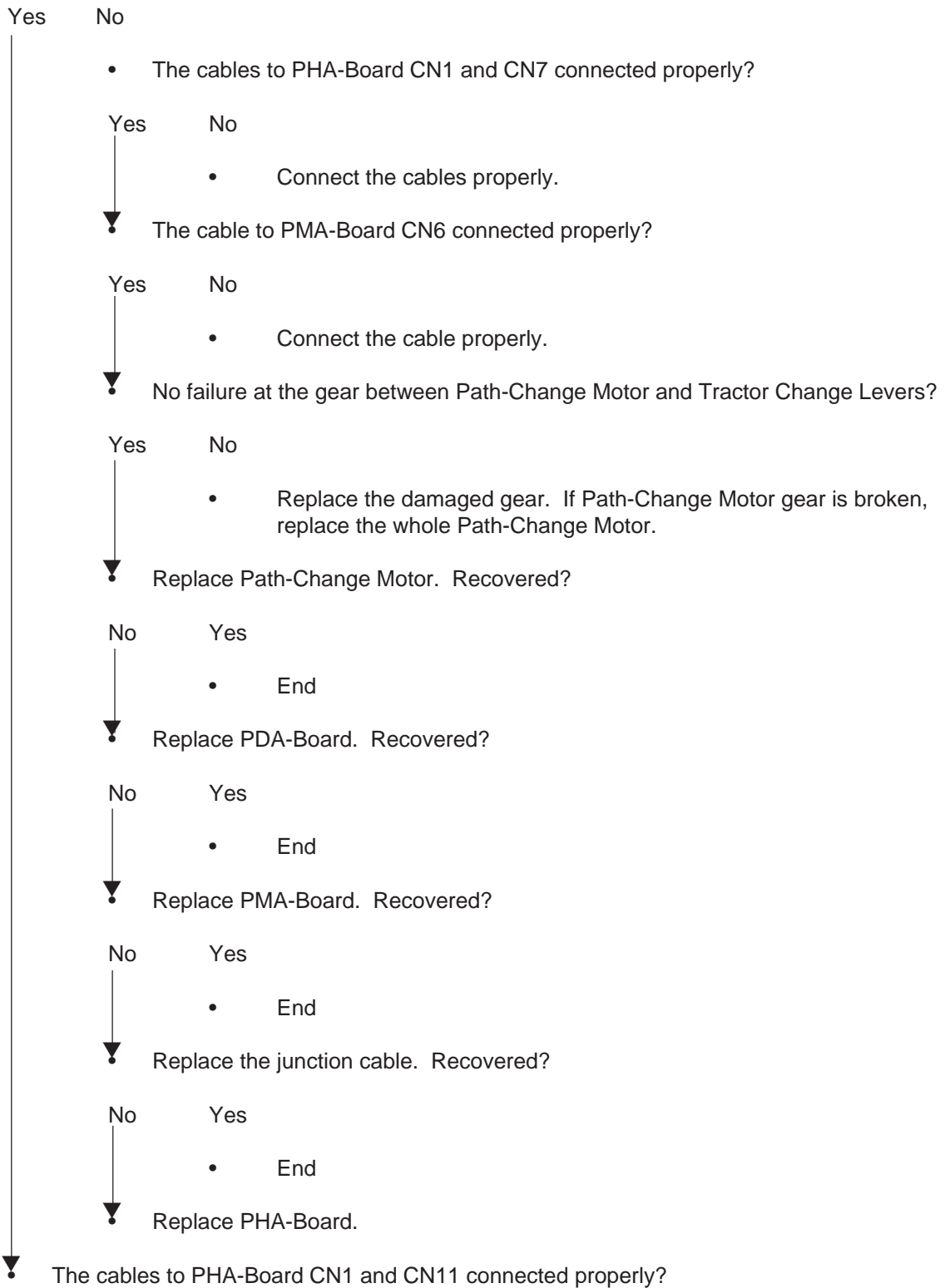
- Bail operates during initialization?





⑦ After Carriage operates, Alarm Lamp goes on and “ERROR (in the upper row), PATH CHANGE (in the lower)” is displayed on LCD.

- Tractor Change Lever operates during initialization?



Yes No
↓
• • Connect the cables properly.
• The cable to PMA-Board CN6 connected properly?

Yes No
↓
• • Connect the cable properly.
• Replace the Bail Open Switch/Front Tractor On Switch cable. Recovered?

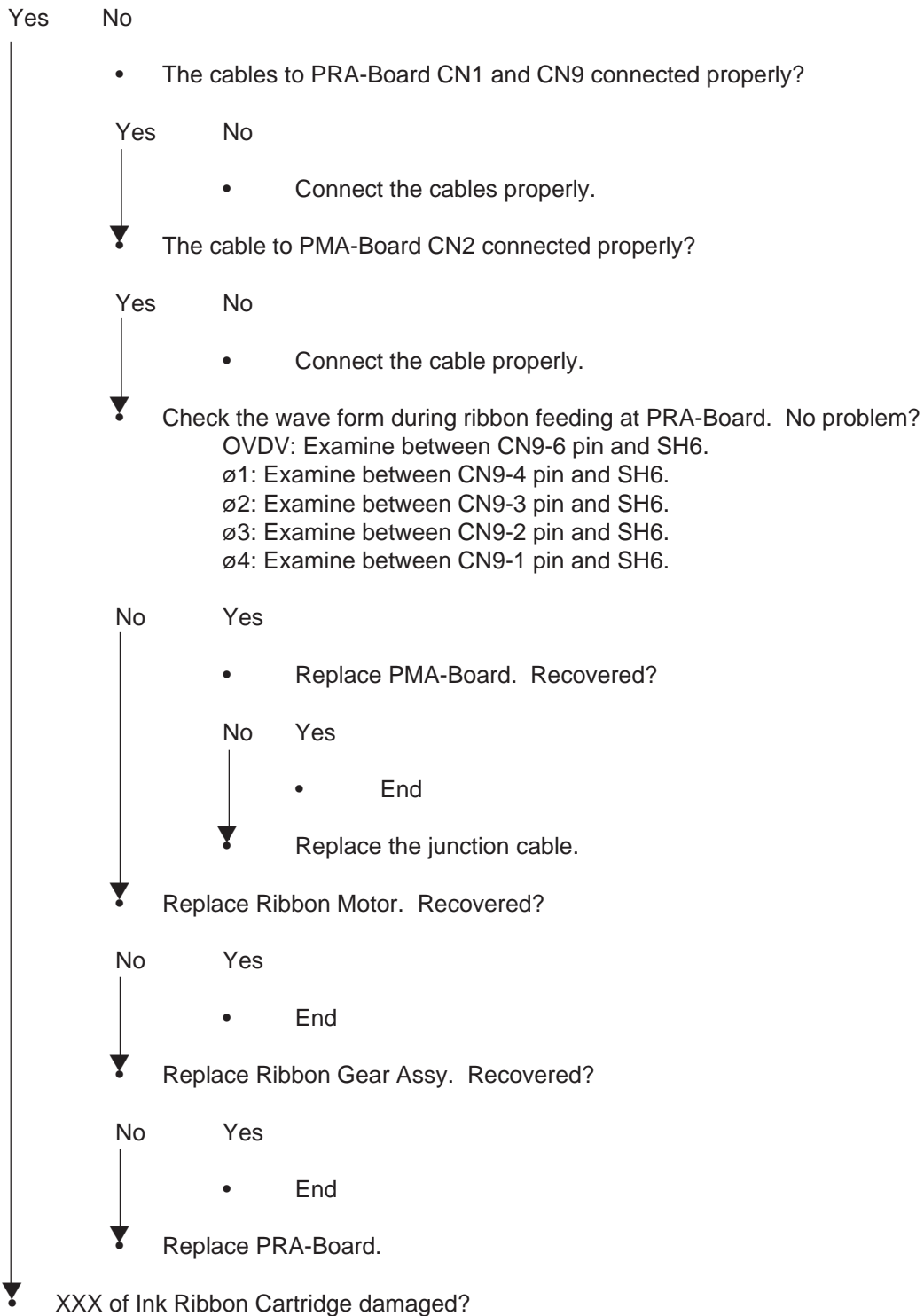
No Yes
↓
• • End
• Replace PMA-Board. Recovered?

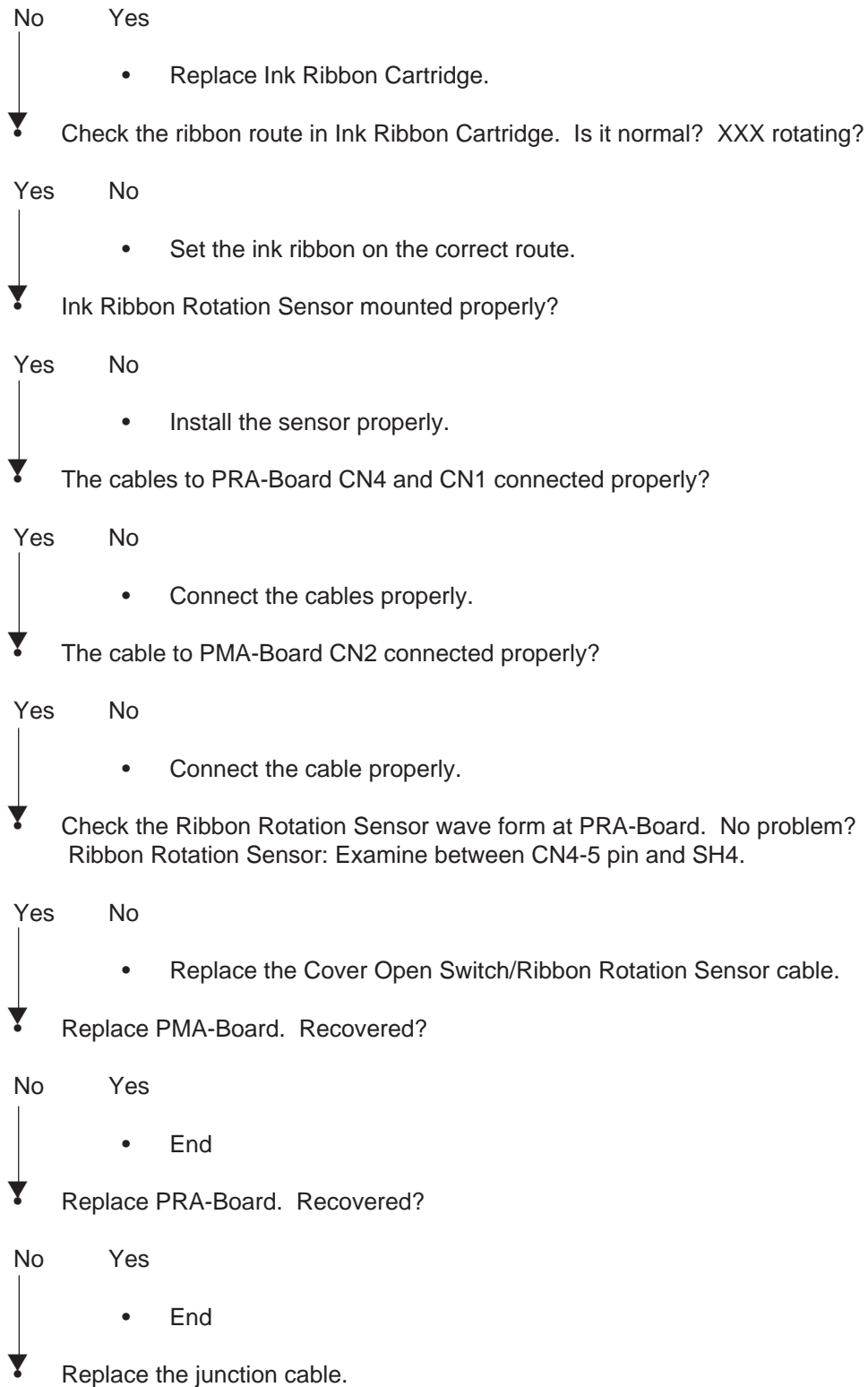
No Yes
↓
• • End
• Replace the junction cable. Recovered?

No Yes
↓
• • End
• Replace PHA-Board.

⑧ After initialization, Alarm Lamp goes on and “ERROR (in the upper row), RIBBON JAM (in the lower)” is displayed on LCD.

- Ribbon fed during initialization?





⑨ Paper is not line fed, while the Alarm Lamp is on and “ERROR (in the upper row), FEED JAM (in the lower)” is displayed on LCD.

- The printing paper stuck on the paper feed route?

No Yes



- Remove the paper.

• The cables to PHA-Board CN1 and CN13 connected properly?

Yes No



- Connect the cables properly.

• The cable to PMA-Board CN6 connected properly?

Yes No



- Connect the cable properly.

• No failure at the gear between LF Motor and Tractor Unit?

Yes No



- Replace the broken gear. If the LF Motor gear is damaged, replace the whole LF Motor.

• Replace PMA-Board. Recovered?

No Yes



- End

• Replace LF Motor. Recovered?

No Yes



- End

• Replace the junction cable. Recovered?

No Yes



- End

• Replace PHA-Board.

⑩ Paper is line fed, but “FEED JAM” is displayed on LCD.

- The cables to PHA-Board CN1 and CN3 connected properly?

Yes No



- Connect the cables properly.



- The cable to PMA-Board CN6 Connector connected properly?

Yes No



- Connect the cable properly.



- Feed Jam Sensor mounted properly?

Yes No



- Install it properly.



- Replace the FEED JAM/Bail Paper End Sensor cable. Recovered?

No Yes



- End



- Replace PMA-Board. Recovered?

No Yes



- End



- Replace the junction cable. Recovered?

No Yes



- End



- Replace PHA-Board.

⑪ Printer does not operate at all, while the Alarm Lamp is on and "ERROR FUSE" is displayed on LCD.

- The cable to PMA-Board CN3 connected properly?

Yes No



- Connect the cable properly.

▼ The cable to Printer Unit Connector DCOUT2 connected properly?

Yes No



- Connect the cable properly.

▼ PMA-Board F1 and F2 mounted?

Yes No



- Install them.

▼ PMA-Board F1 and F2 blown?

No Yes



- Replace the blown-out fuse. Recovered?

No Yes



- End

▼ Turn Printer on, with PMA-Board CN2 and CN6 unplugged. Are the fuses blown?

No Yes



- Which fuse is blown, F1 or F2?

F1 F2



- Short circuit occurs at PDA-Board, between HTA1-5 pin and 4 pin and between HTA1-1 pin and 2 pin?

No Yes



- Replace PDA-Board.

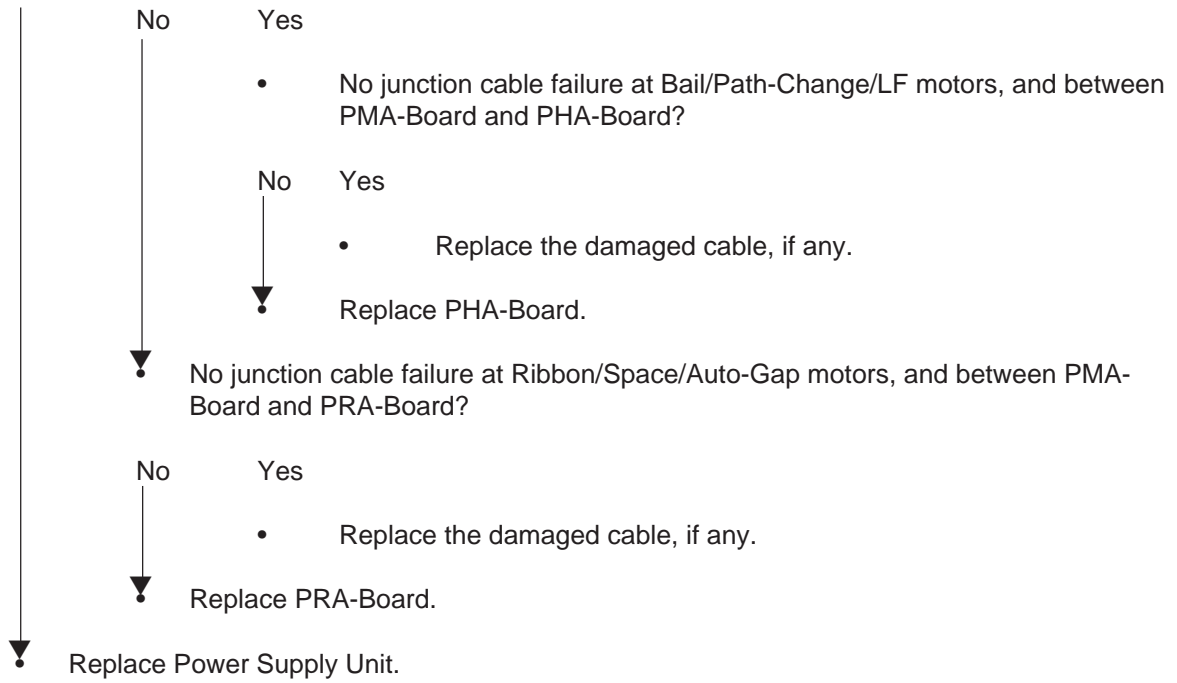


- Replace PMA-Board.



- Replace PMA-Board.

▼ Turn Printer on, with PMA-Board CN2 unplugged. Are the fuses blown?



⑫ Printer goes off during operation.

- Turn Printer on, with PMA-Board CN3 cable unplugged. Printer goes off during operation?

No Yes



- Replace Power Supply Unit.

- Turn Printer on, with PMA-Board CN2, CN6 and PDA-Board CN5 unplugged. Printer goes off during operation?

No Yes



- Short circuit occurs at PDA-Board, between THA1-5 pin and 4 pin and between HTA1-1 pin and 2 pin?

No Yes



- Replace PDA-Board.

- Replace PMA-Board.

- Turn Printer on, with PMA-Board CN2 and CN6 unplugged. Printer goes off during operation?

No Yes



- Replace Print Head. Recovered?

No Yes



- End

- Replace Head Cable.

- Turn Printer on, with PMA-Board CN2 and PDA-Board CN5 unplugged. Printer goes off during operation?

No Yes



- No junction cable failure at Bail/Path-Change/LF motors, and between PMA-Board and PHA Board?

No Yes



- Replace the damaged cable, if any.

- Replace PHA-Board.

- No junction cable failure at Ribbon/Space/Auto-Gap motors, and between PMA-Board and PRA Board?

No Yes



- Replace the damaged cable, if any.

- Replace PRA-Board.

⑬ Printer does not operate after being turned on, while "INITIALIZING" is displayed on LCD.

- The interface cable connected properly?

Yes

No



- Connect the cable properly.



• Replace the interface cable. Recovered?

No

Yes



- End



• Replace PMA-Board.

⑭ Wrong characters are printed or characters are omitted.

- Self Diagnosis Printing conducted normally?

Yes No



- Replace PMA-Board.

• The interface cable and the network cable connected properly?

Yes No



- Connect the cables properly.

• The cables to PMA-Board CN6 and PHA-Board CN1 connected properly?

Yes No



- Connect the cables properly.

• Replace the interface cable. Recovered?

No Yes



- End

• Replace the junction cables to PMA-Board and to PHA-Board. Recovered?

No Yes



- End

• Replace PHA-Board.

⑮ Printer operates normally but characters are not printed.

- Self Diagnosis Printing conducted normally?

Yes No



- Replace PMA-Board.

• The interface cable connected properly?

Yes No



- Connect the cable properly.

• Replace the interface cable. Recovered?

No Yes



- End

• The interface is parallel or serial?

Parallel Serial



- The serial interface setting adjusted for the system?

Yes No



- Set it properly.



• Check -12V output at PMA-Board.

Slide Control Block toward outside without unplugging the cables. (Stop sliding when the cables becomes straight. Do not extend the cables by force.)

Check the voltage between CN5-1 pin and CN5-8 pin. Is -12V output?

Yes No



- Check conduction at the 8 pin on the junction cable between PMA-Board CN5 and Power Supply Unit Connector DCOU2.
- Normal conduction?

Yes No



- Replace the cable.



• Replace Power Supply Unit.

• The cable between PMA-Board CN6 and PHA-Board CN1 connected properly?

Yes No



- Connect the cable properly.

• Replace the junction cable between PMA-Board CN6 and PHA-Board CN1. Recovered?

No Yes
↓
• End
• Replace PHA-Board. Recovered?

No Yes
↓
• End
• Replace PMA-Board.

⑩ Printer operates normally but characters are not printed. (With Option Serial Board used)

- Self Diagnosis Printing conducted normally?

Yes No



- Replace PMA-Board.

- The interface cable connected properly?

Yes No



- Connect the cable properly.

- The serial interface setting adjusted for the system?

Yes No



- Set it properly.

- Replace the interface cable. Recovered?

No Yes



- End

- With Menu, check Printer's recognition of PAA-Board, the Option Serial Board attachment. At Menu Setting, select "Set-up" as Group and "Host Interface" as Item. If "Opt. Card" is displayed in Set Window, Printer recognizes PAA-Board.

- PAA-Board recognized by Printer?

Yes No



- PAA-Board and PMA-Board connected properly.

Yes No



- Connect them properly.

- Replace PAA-Board.

- With Menu, check Printer's recognition of Option Serial Board. At Menu Setting, if "Serial I/F (OP)" is displayed as Group, Printer recognizes Option Serial Board.

- Option Serial Board recognized by Printer?

Yes

No

- Option Serial Board connected to PAA-Board properly?

Yes

No

- Connect it properly.

▼
• Replace Option Serial Board.

▼

• Check -12V output at PMA-Board.

Slide Control Block toward outside without unplugging the cables. (Stop sliding when the cables becomes straight. Do not extend the cables by force.)

- Check the voltage between CN5-1 pin and CN5-8 pin. Is -12V output?

Yes

No

- Check conduction at the 8 pin on the junction cable between PMA-Board CN5 and Power Supply Unit Connector DCOUT2.

Yes

No

- Replace the cable.

▼
• Replace Power Supply Unit.

▼

• Replace PMA-Board.

⑰ Printer operates normally but characters are not printed. (With MUPIS Card used)

- Self Diagnosis Printing conducted normally?

Yes No



- Replace PMA-Board.

- ▼ The network cable to MUPIS Card (LAN Cable) connected properly?

Yes No



- Connect the cable properly.

- ▼ Replace the network cable to MUPIS Card (LAN Cable). Recovered?

No Yes



- End

- ▼ With Menu, check Printer's recognition of MUPIS Card.
At Menu Setting, select "Set-up" as Group and "Host Interface" as Item. If "OKI HSP" is displayed in Set Window, Printer recognizes the card.

- MUPIS Card recognized by Printer?

Yes No



- MUPIS Card connected to PMA-Board properly?

Yes No



- Connect it properly.

- ▼ Replace MUPIS-Board.

- ▼ Check -12V output at PMA-Board.
Slide Control Block toward outside without unplugging the cables. (Stop sliding when the cables becomes straight. Do not extend the cables by force.)

- Check the voltage between CN5-1 pin and CN5-8 pin. Is -12V output?

Yes No



- Check conduction at the 8 pin on the junction cable between PMA-Board CN5 and Power Supply Unit Connector DCOUT2.

Yes No



- Replace the cable.

- ▼ Replace Power Supply Unit.



- Replace PMA-Board.

⑱ Dots are omitted.

- Head Gap adjusted properly?

Yes No

- Adjust Head Gap according to Maintenance Manual.

▼ Implement Head Pin Test according to Maintenance Manual.

- Is any pin missing?

Yes No

- Go to 14.

▼ Replace Print Head. Recovered?

No Yes

- End

▼ Replace PDA-Board. Recovered?

No Yes

- End

▼ Replace PMA-Board. Recovered?

No Yes

- End

▼ Replace Head Cable.

⑲ Images are faint.

- End of Ink Ribbon life?

No Yes



- Replace Ink Ribbon.

- ▼ Head Gap adjusted properly?

Yes No



- Adjust it properly.

- ▼ Check +44V output at PMA-Board.

Slide Control Block toward outside without unplugging the cables. (Stop sliding when the cables becomes straight. Do not extend the cables by force.)

- In this state, turn Printer on and check the voltage between CN3 -1 pin and CN3 Pin 12.
- More than +38V output?

Yes No



- Replace Power Supply Unit.

- ▼ Replace Print Head. Recovered?

No Yes



- End



- Replace PDA-Board.

⑳ After Carriage works, the Alarm Lamp goes on and “ERROR AUTOGAP” is displayed on LCD.

- Platen operates normally during initialization?

Yes No

- Go to B.

▼ Adjust Head Gap. Recovered?

No Yes

- End

▼ Adjust Core Gap. Recovered?

No Yes

- End

▼ The cables to PRA-Board CN1, CN3 and PGA-Board CN1 connected properly?

Yes No

- Connect the cables properly.

▼ The cables to PMA-Board CN2, CN6 and CN8 connected properly?

Yes No

- Connect the cables properly.

▼ The cables to PHA-Board CN1 and CN9 connected properly?

Yes No

- Connect the cables properly.

▼ Auto-Gap Slit Sensor and Auto-Gap Slit Disc mounted at the proper positions?

Yes No

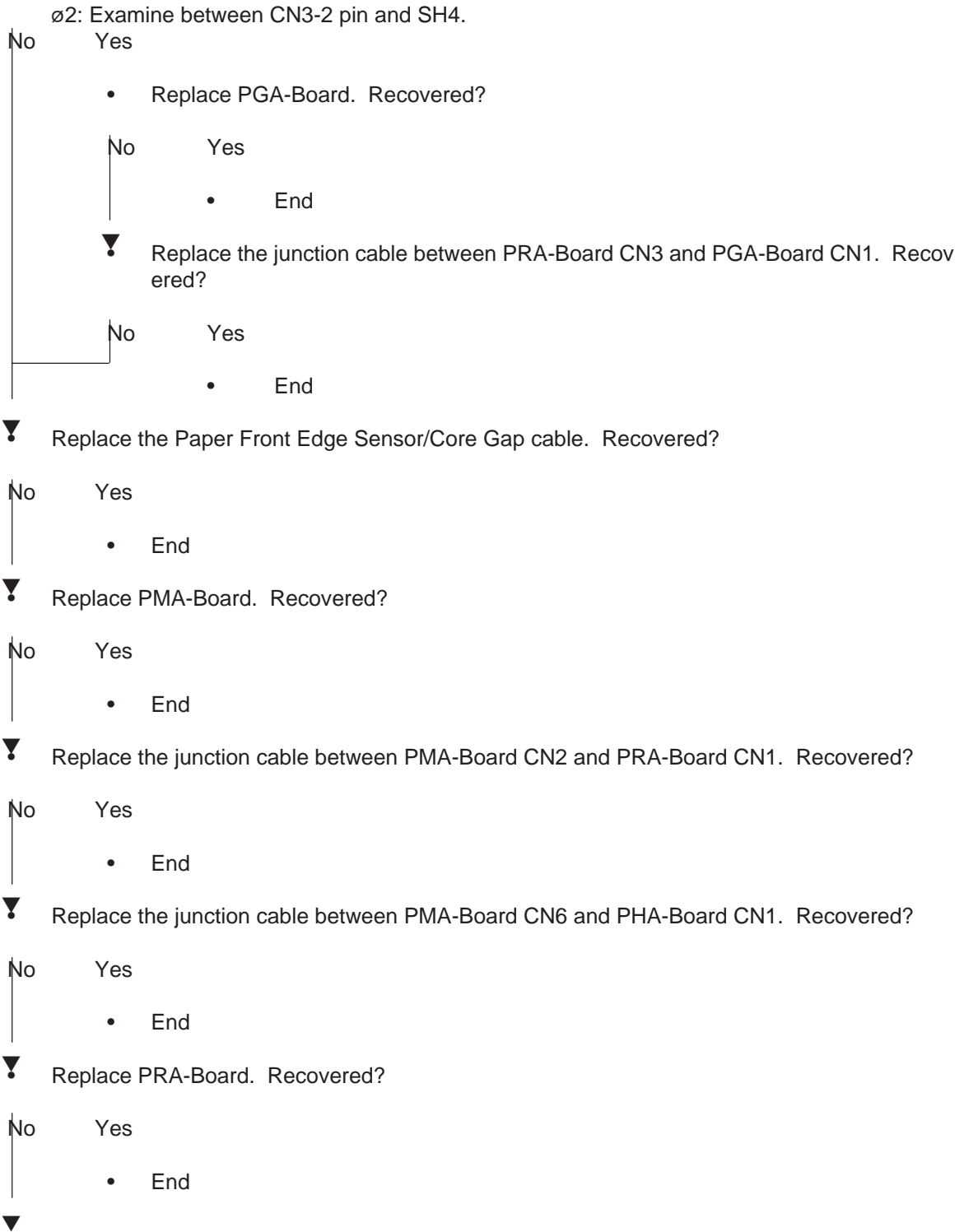
- Install them properly.

▼ The gear existing between Auto-Gap Motor and Platen normal? No tooth broken? No overloading?

Yes No

- Install the gear properly. Replace it if damaged.
- If the Auto-Gap Motor gear is broken, replace the whole Auto-Gap Motor.

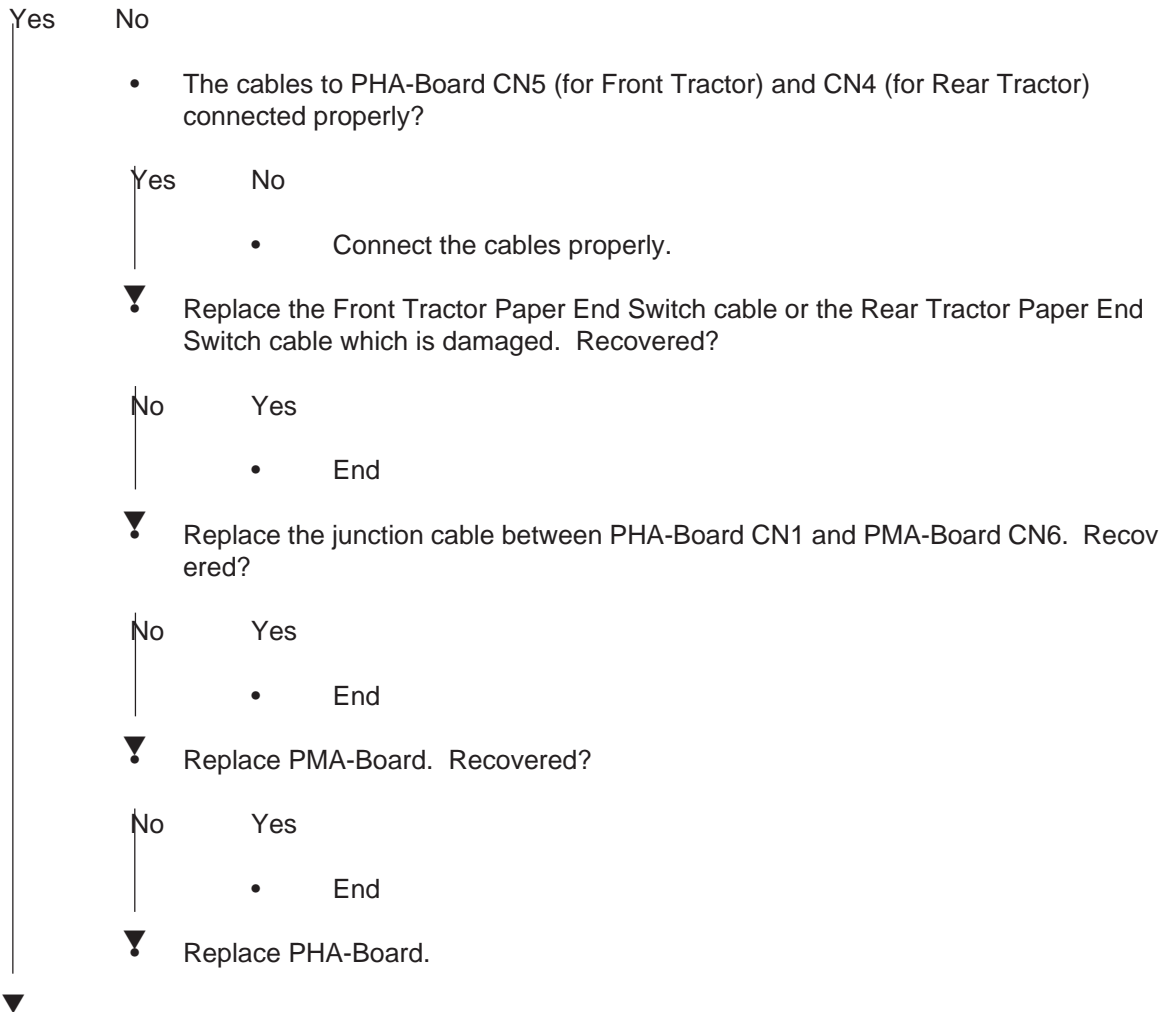
▼ Check Auto-Gap Slit Sensor wave form at PRA-Board. No problem?
 ○1: Examine between CN3-1 pin and SH4.



- Replace PHA-Board.

⑳ Paper is set at Tractor, but printing is not conducted in the state of "PAPER END".

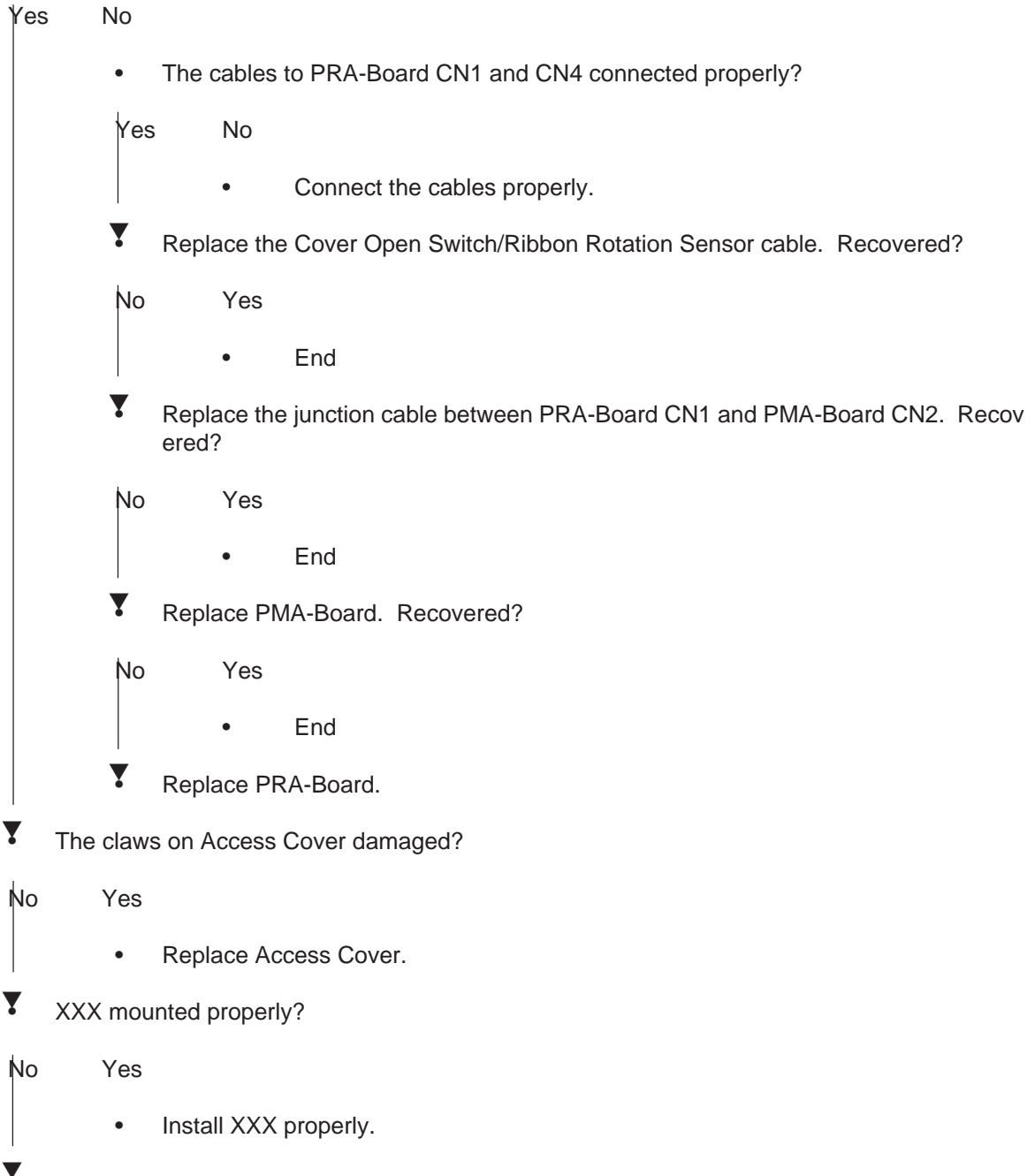
- Intervals between lines occur during printing.
- Check ON/OFF operation of the Tractor used (Front or Rear), according to Maintenance Manual.
- Normal N/OFF operation?



- Check the mounting of Tractor Paper End Switch.

② "COVER OPEN" is displayed on LCD even though Access Cover is closed.

- Check ON/OFF operation of Cover Open Switch, according to Maintenance Manual.
- Normal ON/OFF operation?



- Check the mounting of Cover Open Switch.

②③ Pressing Operation Panel Switches does not make Printer operate. (after normal initialization)

- The cable between POA-Board CN1 and PHA-Board CN12 connected properly?

Yes No



- Connect the cable properly.

- ▼ Check conduction at the junction cable between POA-Board CN1 and PHA-Board CN12.
- Normal conduction?

Yes No



- Replace the junction cable.

- ▼ Replace POA-Board. Recovered?

No Yes



- End

- ▼ Replace the junction cable between PMA-Board CN6 and PHA-Board CN1. Recovered?

No Yes



- End

- ▼ Replace PHA-Board. Recovered?

No Yes



- End



- Replace PMA-Board.

②4 "ERROR, D-RAM" is displayed on LCD, while Alarm Lamp blinks.

- Replace PMA-Board.

②5 "ERROR, PROGRAM-ROM" is displayed on LCD, while Alarm Lamp blinks.

- Program-ROM mounted properly on PMA-Board?

Yes No

|

- Install it properly.

▼ Replace Program-ROM. Recovered?

No Yes

|

- End

▼ Replace PMA-Board.

②6 "ERROR, EEPROM" is displayed on LCD, while Alarm Lamp blinks.

- EEPROM mounted properly on PMA-Board?

Yes No

|

- Install it properly.

▼ Replace EEPROM. Recovered?

No Yes

|

- End

▼ Replace PMA-Board.

②7 "ERROR, S-RAM" is displayed on LCD, while Alarm Lamp blinks.

- Replace PMA-Board.

⑳ "ERROR, CG-ROM" is displayed on LCD, while Alarm Lamp blinks.

- CG-ROM mounted properly on PMA-Board?

Yes No



- Install it properly.

▼ Replace CG-ROM. Recovered?

No Yes



- End

▼ Replace PMA-Board.

㉑ "ERROR, CENTERING" is displayed on LCD, while Alarm Lamp blinks.

- Go to 4.

8. Parts List

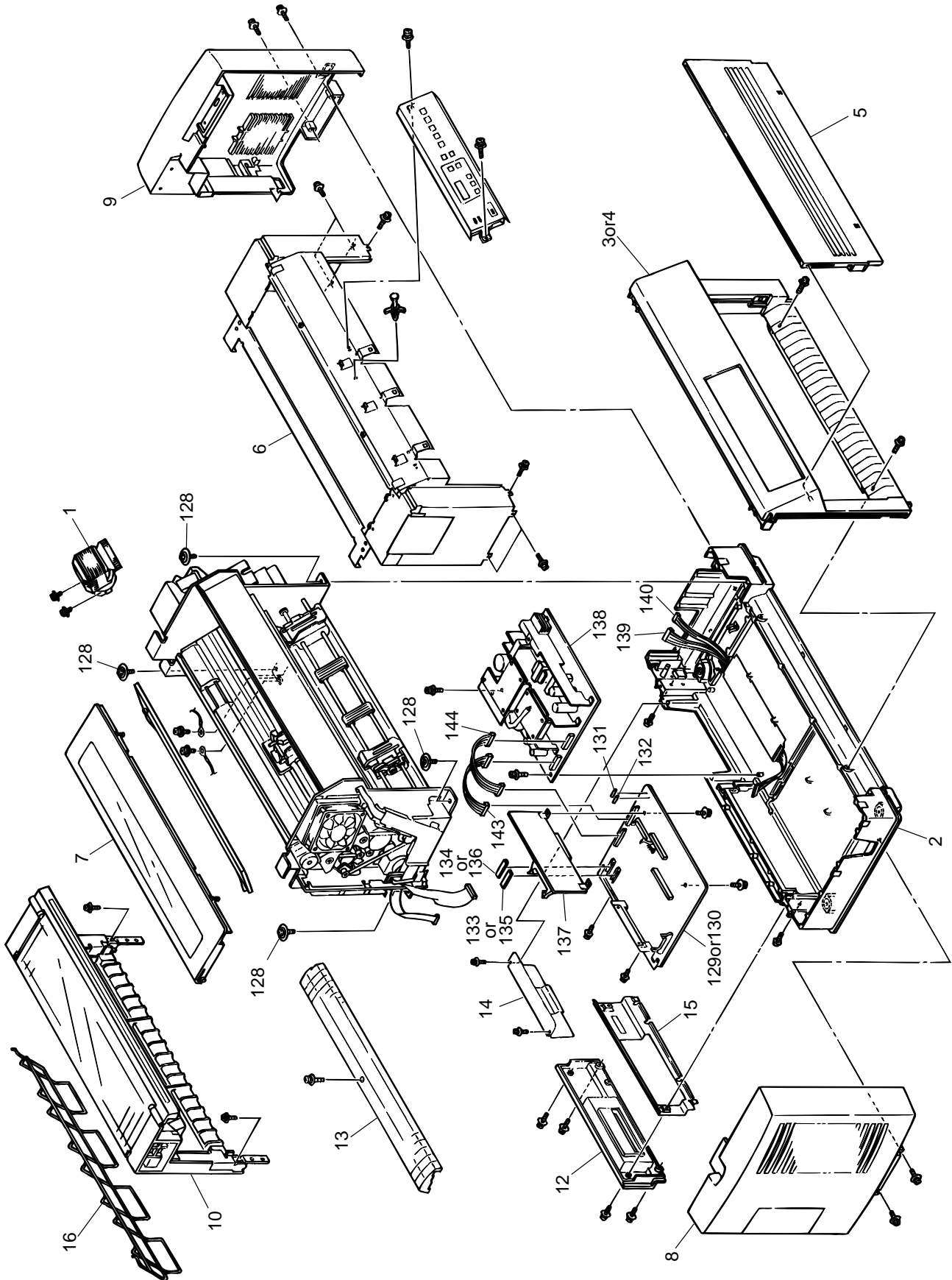


Fig.8-1

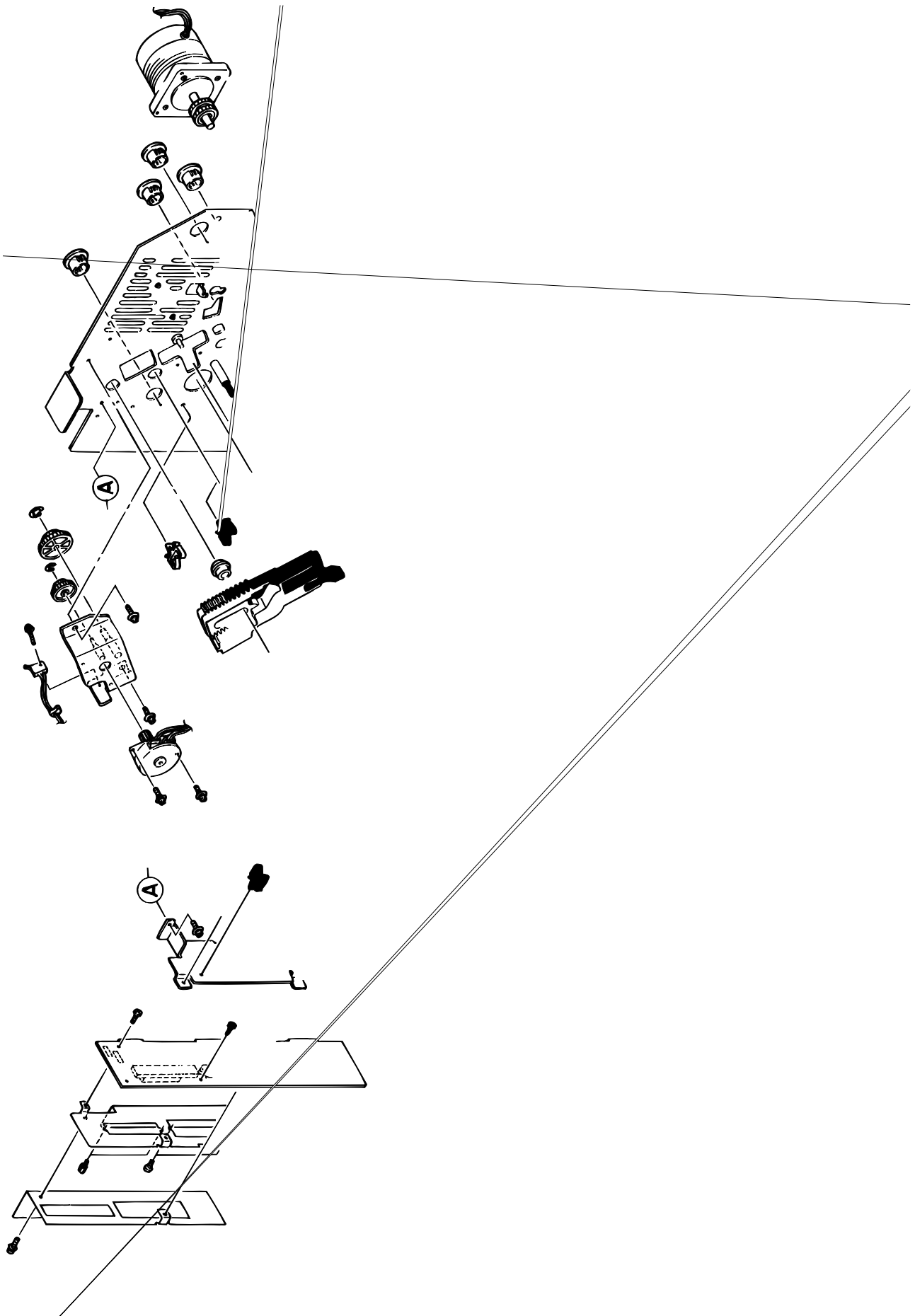


Fig.8-2

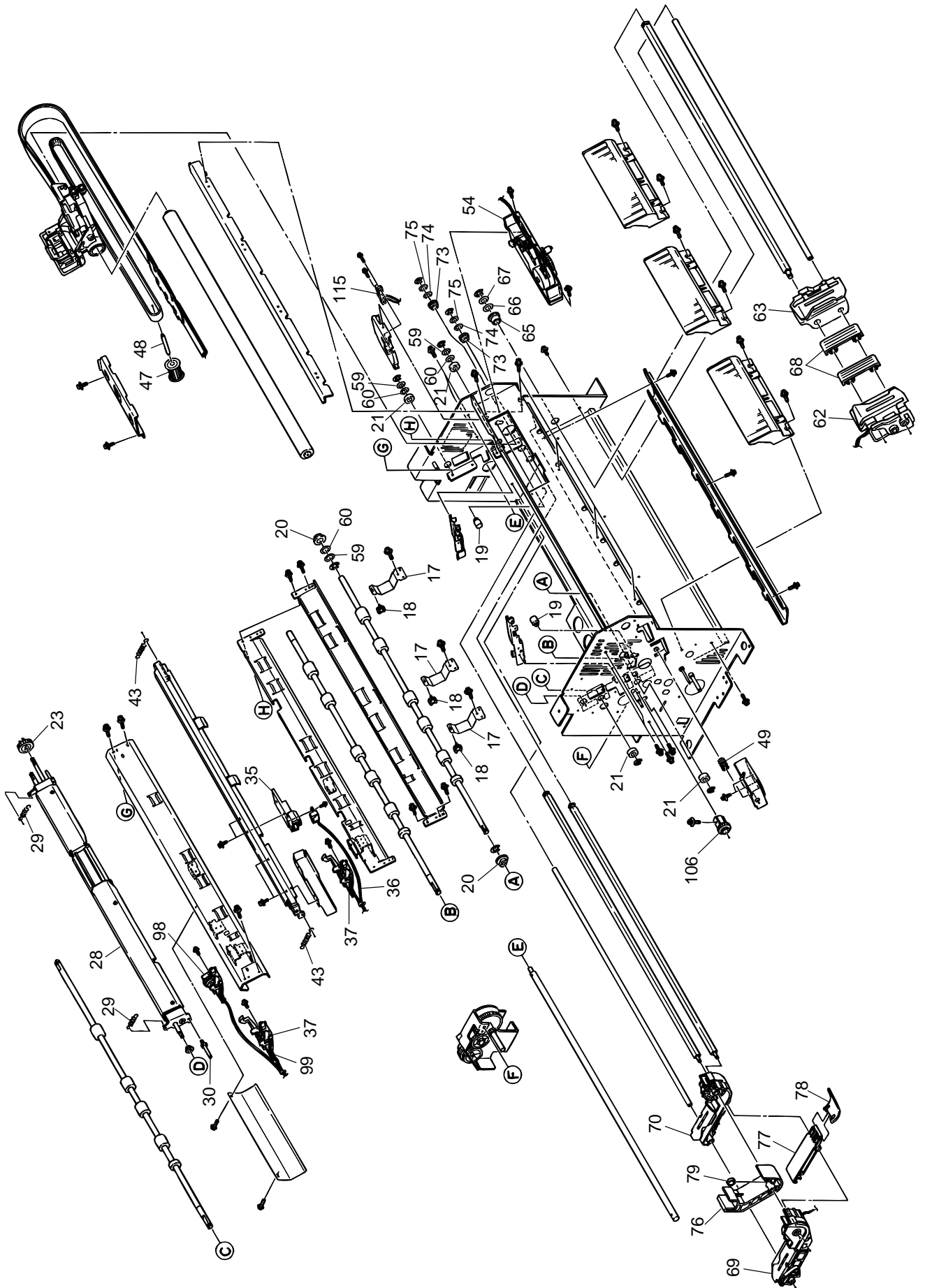


Fig.8-3

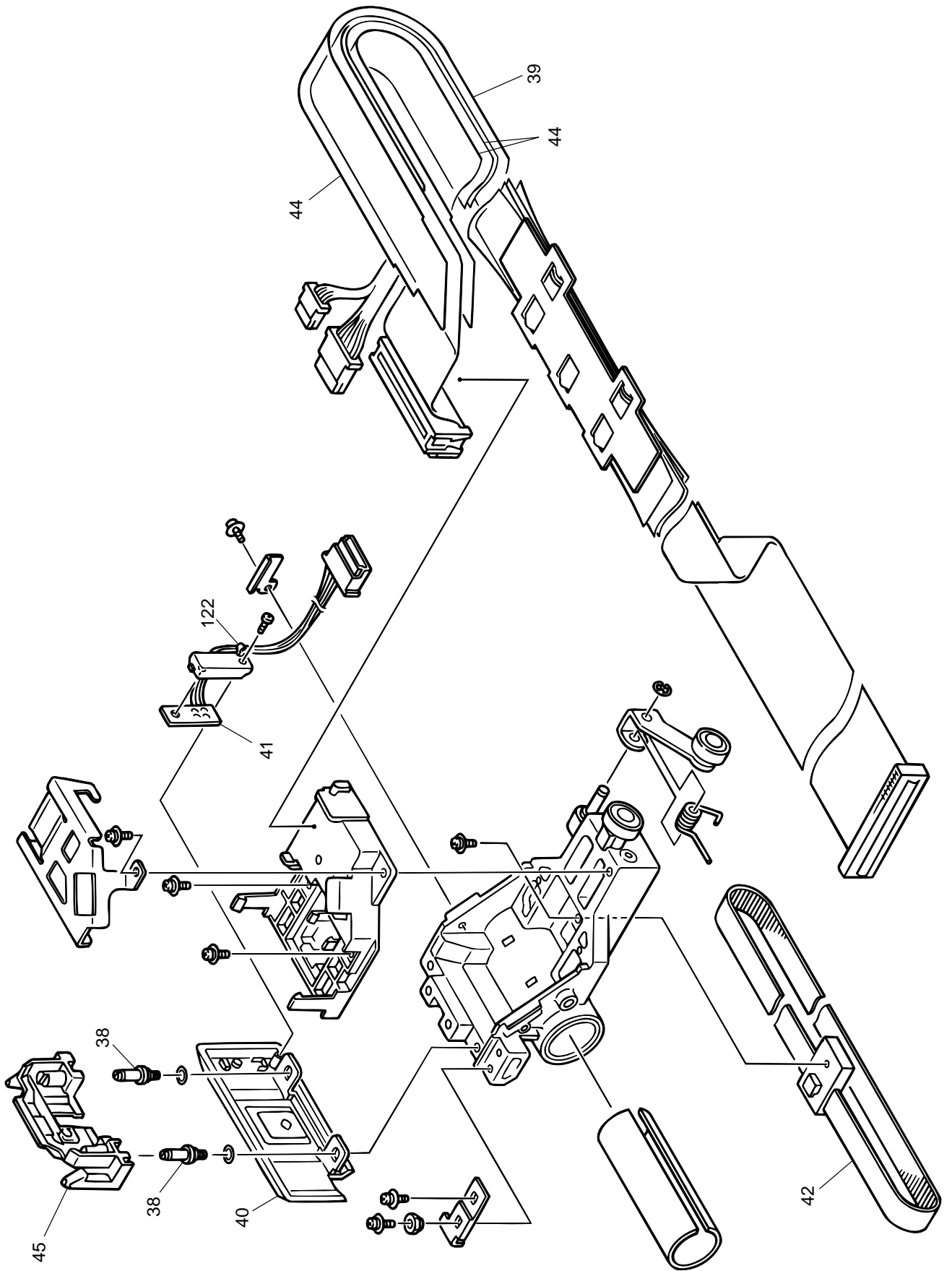


Fig.8-5

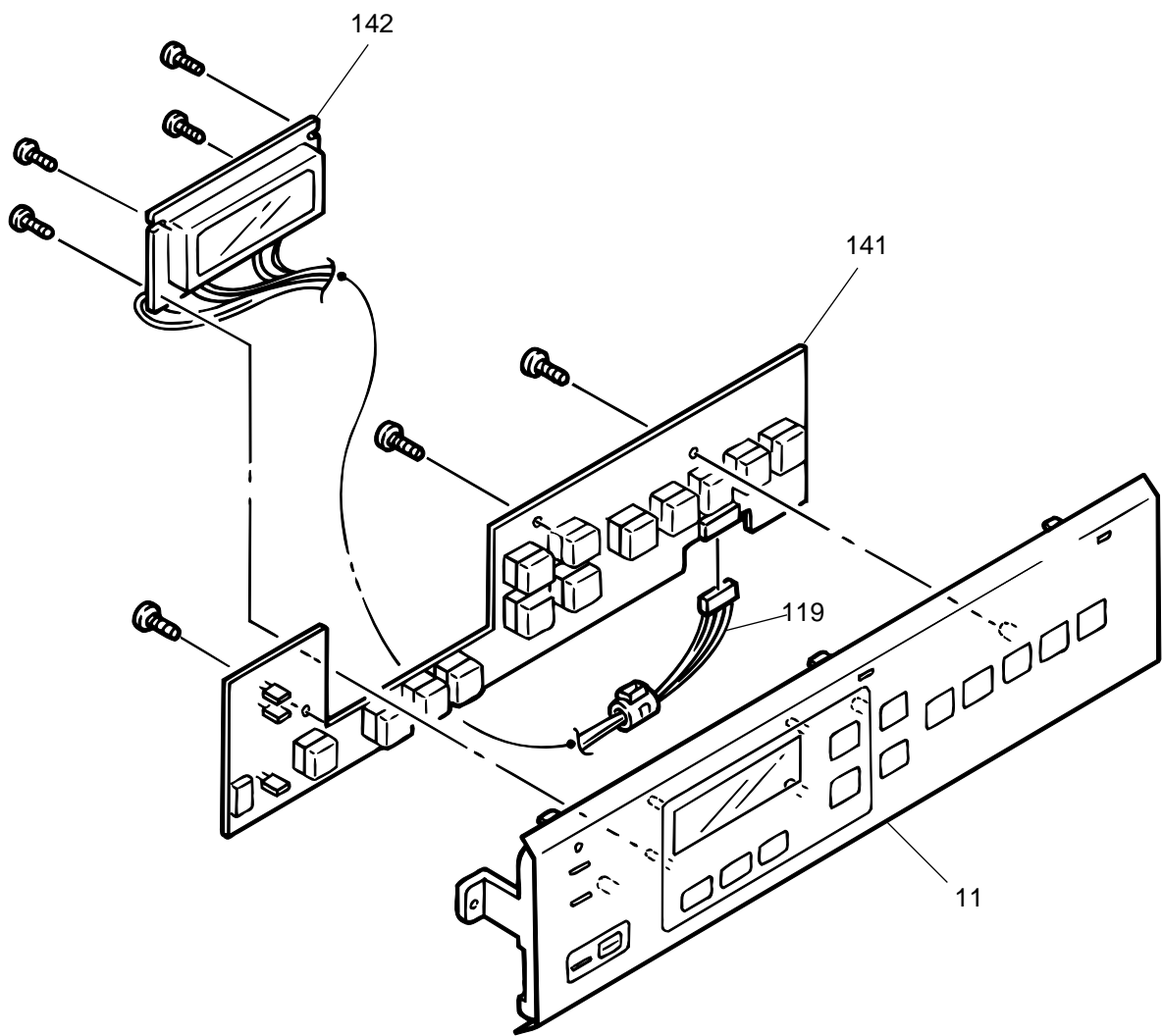


Fig.8-6

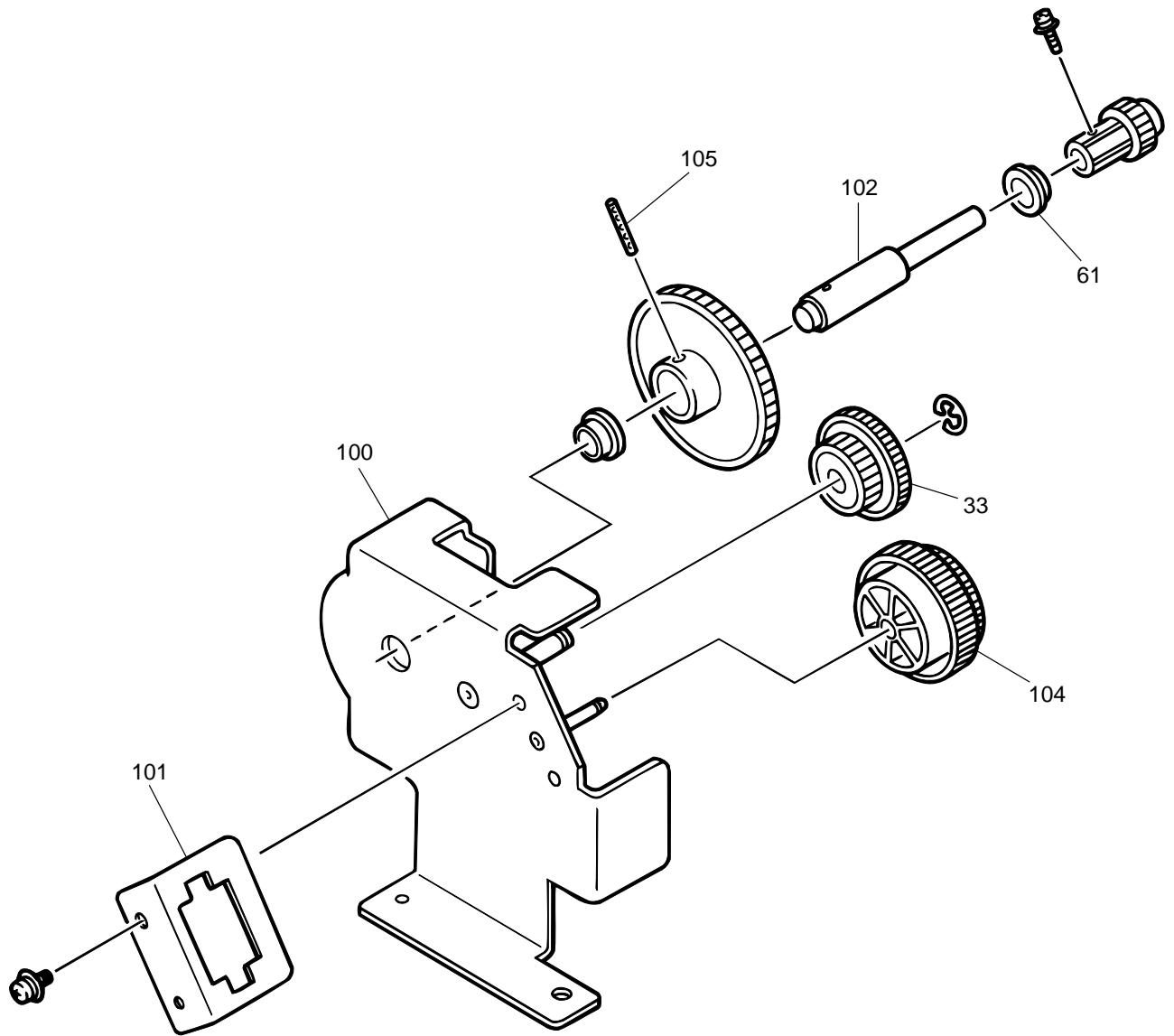


Fig.8-7

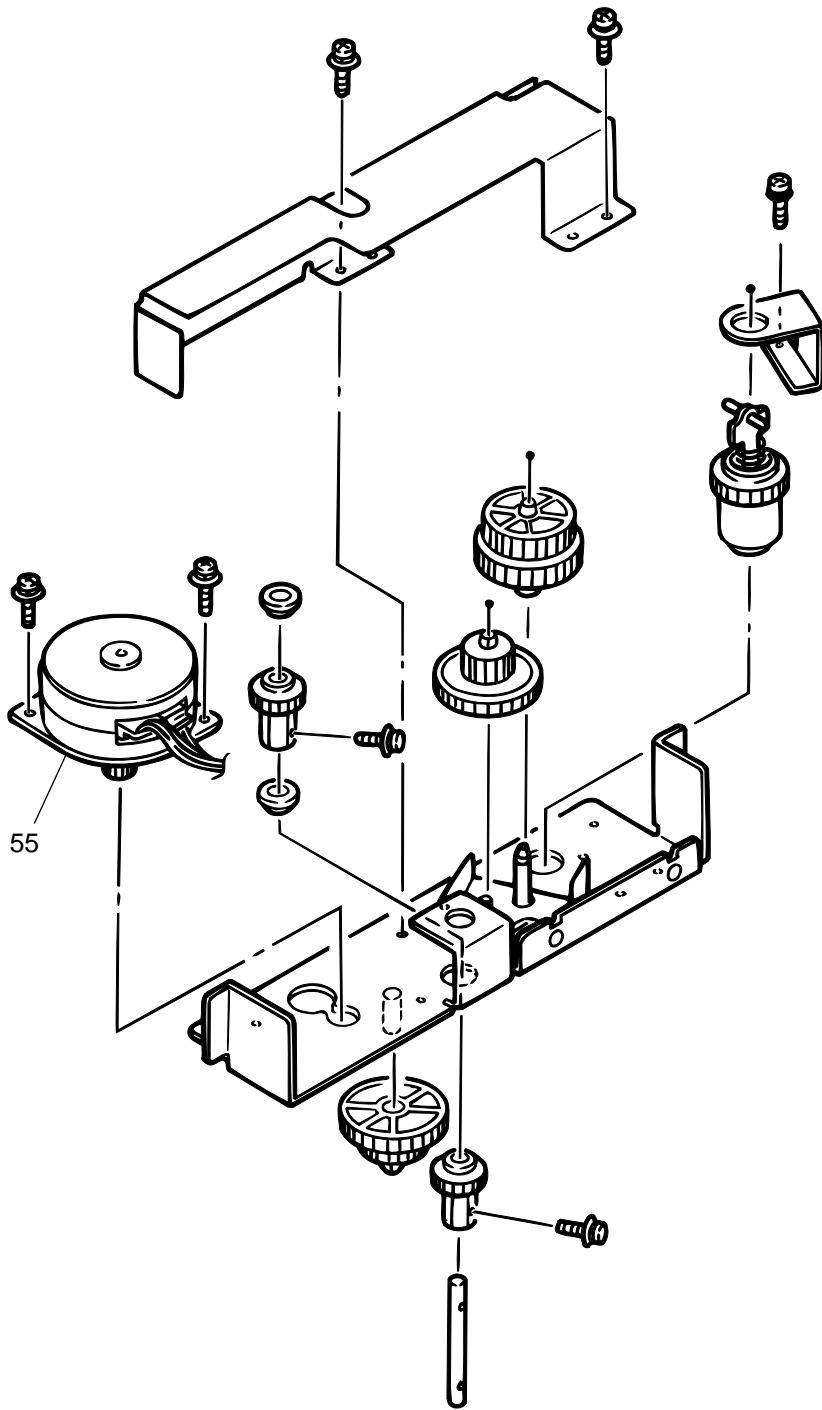


Fig.8-8

Table.8-1

No.	Parts No.	Name	Q'ty/U	Recomended Q'ty			Remarks
				500	1000	2000	
1	40538101	Serial Dot Head-4410	1	20	40	80	
2	40677101	Cover Assy-Lower	1	3	6	12	
3	40677201	Cover Assy-Front	1	3	6	12	ODA
4	40677202	Cover Assy-Front	1	3	6	12	OEL
5	40677401	Door Assy-Front	1	3	6	12	
6	40768901	Plate-Front (Sticking)	1	3	6	12	
7	40520201	Cover Assy-Access	1	3	6	12	
8	40677601	Cover Assy-Side (L)	1	3	6	12	
9	40677901	Cover Assy-Side (R)	1	3	6	12	
10	40678301	Frame Assy-Rear	1	3	6	12	
11	40678901	Frame-Opepane (Sticking)	1	5	10	20	
12	40520501	Cover-Rear (B)	1	3	6	12	
13	40627701	Guide-Paper (B)	1	3	6	12	
14	40738901	Cover-Brank (Lower)	1	3	6	12	
15	40777901	Plate-earth (Cover-Rear)	1	3	6	12	
16	40658201	Guide-Sheet	1	3	6	12	
17	40498801	Spring-Pressure	3	3	6	12	
18	3PP4053-3795P001	Pressure Roller Piece	3	3	6	12	
19	4PB4044-1358P002	Stopper	2	3	6	12	
20	4PB4035-4456P001	beaing	2	3	6	12	
21	4LP-6418-13	Ball Beaing RSF (12*8 W = 3.5)	4	3	6	12	
22	40608401	Drive Gear C	1	3	6	12	
23	40608301	Drive Gear B	3	3	6	12	
24	4PP3520-1306P001	Idle Gear	3	3	6	12	
25	40555001	Bearing – Metal (Bail)	2	3	6	12	
26	40511801	Lever – Bail Lift (L)	1	3	6	12	
27	40511901	Lever – Bail Lift (R)	1	3	6	12	
28	40499601	Bail Assy	1	3	6	12	
29	40791701	Spring (Bail)	2	3	6	12	
30	40745501	Screw Stud	1	3	6	12	
31	40609201	Bail Gear Bracket Assy	1	3	6	12	
32	40608501	Bail Motor Bracket Assy	1	3	6	12	
33	4PP4122-1285P001	Gear (Z19-Z52)	3	3	6	12	
34	4LR-200494	Brake Gear	2	3	6	12	
35	40500801	AG Sensor Lever Assy	1	3	6	12	
36	40501201	AG Sensor Coil Assy	1	3	6	12	
37	40513401	sensor lever assy	2	3	6	12	

Table.8-2

No.	Parts No.	Name	Q'ty/U	Recomended Q'ty			Remarks
				500	1000	2000	
38	40596601	Ribbon Guide Post	2	3	6	12	
39	40533501	Head Cable Assy (FM50P)	1	5	10	20	
40	40502901	Protector Ribbon Assy	1	10	20	40	
41	40887501	Paper Width Sensor/Ribbon SW cord (with Sensor Cover and Tie Wrap)	1	3	6	12	
42	40474701	Space Belt	1	5	10	20	
43	40099101	Spring (Lift Arm)	2	3	6	12	
44	40622101	Head Cable Guide	3	10	20	40	
45	40503401	Guide Assy – Ribbon	1	5	10	20	
46	40627101	SP Motor	1	5	10	20	
47	4PB4044-4138P001	Idle Pulley	1	3	6	12	
48	4PP4044-4155P001	Pulley Shaft	1	3	6	12	
49	4PB4044-4357P001	Tension Spring	1	3	6	12	
50	40507901	Space Motor Fan	1	3	6	12	
51	40719201	Head Cooling Fan 2	1	3	6	12	
52	40505501	Head Cooling Fan 1	1	3	6	12	
53	40505801	PG Cooling Fan	1	3	6	12	
54	40887401	Ribbon Assy – Feed	1	5	10	20	
55	40458201	Motor – Ribbon	1	5	10	20	
56	4PP4044-4232P001	Waved Washer	1	3	6	12	
57	40630001	Drive Pulley	2	3	6	12	
58	4PP4053-1321P001	LF Knob Gear	1	3	6	12	
59	40588401	Pan Washer Feed	3	3	6	12	
60	40507401	Washer	3	3	6	12	
61	4PP4043-2590P001	Bush	2	3	6	12	
62	40507601	Sprocket Assy (L)	1	3	6	12	
63	40508101	Sprocket Assy (R)	1	3	6	12	
64	40508301	Front Tractor Drive Gear	1	3	6	12	
65	4PP4044-3489P001	Tractor Bush	4	3	6	12	
66	40508401	Washer	1	3	6	12	
67	40588501	Pan Washer Tractor Feed	1	3	6	12	
68	5LR-123467	Sheet Guide	2	3	6	12	
69	40508701	Sheet Feeder Assy (L) Rear	1	3	6	12	
70	40509101	Sheet Feeder Assy (R) Rear	1	3	6	12	
71	40778401	Rear Tractor Drive Gear	1	3	6	12	
72	4PP4044-4268P001	Drive Gear B	1	3	6	12	
73	40555501	Rear Tractor Bush	4	3	6	12	

Table.8-3

No.	Parts No.	Name	Q'ty/U	Recomended Q'ty			Remarks
				500	1000	2000	
74	40509501	Washer	2	3	6	12	
75	40588601	Pan Washer Tractor Rear	2	3	6	12	
76	40509601	Center Guide (U)	1	3	6	12	
77	3PP4043-2453P001	Center Guide Lower A	1	3	6	12	
78	40509701	Guide Lower B - Center	1	3	6	12	
79	4PP4043-2451P001	Friction Piece	1	3	6	12	
80	40510501	Change Motor Bracket Assy	1	3	6	12	
81	40511101	Tractor Change Lever	1	3	6	12	
82	40794401	Tractor Change Lever SP	1	3	6	12	
83	40615101	LF Motor	1	5	10	20	
84	4LP-1313-33	Mini-pitch Belt	1	5	10	20	
85	40511201	LF Gear	1	3	6	12	
86	40511301	Tractor Change Gear	1	3	6	12	
87	4LB-190700-A	Coil Spring	1	3	6	12	
88	4PP4044-2800P001	Idle Roller	1	3	6	12	
89	40511401	Pulley Assy - Idle	1	3	6	12	
90	40534201	Bail Open SW/Front Tractor ONSW Cord	1	3	6	12	
91	40141301	Slit Disk	1	3	6	12	
92	40472401	Change Motor	3	5	10	20	
93	4PP4044-3594P001	Idle Gear C	1	3	6	12	
94	5LR-191324	Tractor Idle Gear	1	3	6	12	
95	40512501	AG Motor Bracket Assy	1	3	6	12	
96	40751101	PGA Printed Circuit Board Specifications (only PGA BCB)	1	5	10	20	
97	40534601	AG Slit Sensor Cord	1	3	6	12	
98	40513901	JAM Sensor Assy	1	3	6	12	
99	40533901	Paper JAM/Bail PE Sensor Cord	1	3	6	12	
100	40646401	Knob bracket Assy	1	3	6	12	
101	40794501	Knob Cover	1	3	6	12	
102	40646101	Idle Gear Shaft	1	3	6	12	
103	4PP4043-2502P001	CSF Drive Gear	1	3	6	12	
104	4PP4044-4193P001	Adjust Knob	1	3	6	12	
105	SPP3-14SUS	Spring Pin	1	3	6	12	
106	4PP4043-1895P001	Stacker Gear	1	3	6	12	
107	40750801	PHA Printed Circuit Board Specifications (with I/F Board and Bracket)	1	5	10	20	
108	40533801	I/F Connection Cable HIROSEFC68	1	3	6	12	

Table.8-4

No.	Parts No.	Name	Q'ty/U	Recomended Q'ty			Remarks
				500	1000	2000	
109	40750901	PRA Printed Circuit Board Specifications (only Trunk Board)	1	5	10	20	
110	2051001P1000	Interlock SW (AV14053)	1	5	10	20	
111	40785101	Interlock SW Connection Cord	1	3	6	12	
112	40514401	Cover Open Lever	1	3	6	12	
113	40514501	Interlock Switch Lever	1	3	6	12	
114	40552901	Interlock Switch Lever SP	1	3	6	12	
115	43536301	Cover Open SW/Ribbon Sensor Rotation Cord	1	3	6	12	
116	40798701	Locking Wire Saddle	10	5	10	20	
117	40798702	Locking Wire Saddle	10	5	10	20	
118	40652901	Continuous Form Cutter Code	1	3	6	12	
119	40820601	Operation Panel Code (with Core)	1	3	6	12	
120	40795002	One-Touched Bush	5	3	6	12	
121	4LP-6693-3	Flat Cable Clip (FCC-225 19.1*76.2)	1	3	6	12	
122	4LP-6401-B1	Tie Wrap (SHT18R-HS/TY-23M)	1	10	20	40	
123	4LP-6342-2	Wire Bundle Clamp	2	5	10	20	
124	3200561J0620	Brake Resistor (62Ω, 15W)	1	3	6	12	
125	3200560J0120	Oscillation Resistor (12Ω, 40W)	2	3	6	12	
126	4PB3529-5116P001	Tapping Screw		10	20	40	
127	4PB4013-3100P006	Cup Screw (S Tight M3)		10	20	40	
128	4PB4053-1883P002	Cup Screw with Washer	6	10	20	40	
129	40750403	PMA Printed Circuit Board Specifications (no ROM, with Bracket, Sheet and Fuse)	1	5	10	20	ODA
130	40750404	PMA Printed Circuit Board Specifications (no ROM, with Bracket, Sheet and Fuse)	1	5	10	20	OEL
131	540A2067T1632	Fuse (237-06.3)	1	10	20	40	
132	540A2036M1502	Fuse (GGS5)	1	10	20	40	
133	40751201	Control ROM Writing Specifications	1	5	10	20	ODA
134	40751301	Font ROM Writing Specifications	1	5	10	20	ODA
135	40756201	Control ROM Writing Specifications	1	5	10	20	OEL
136	40784201	Font ROM Writing Specifications	1	5	10	20	OEL
137	40750701	PDA Printed Circuit Board Specifications (with Driver Board and Bracket)	1	5	10	20	
138	40414001	Power Supply	1	10	20	40	
139	40534401	Trunk Board Cord	1	3	6	12	
140	40785001	SP Slit Sensor Cord	1	3	6	12	

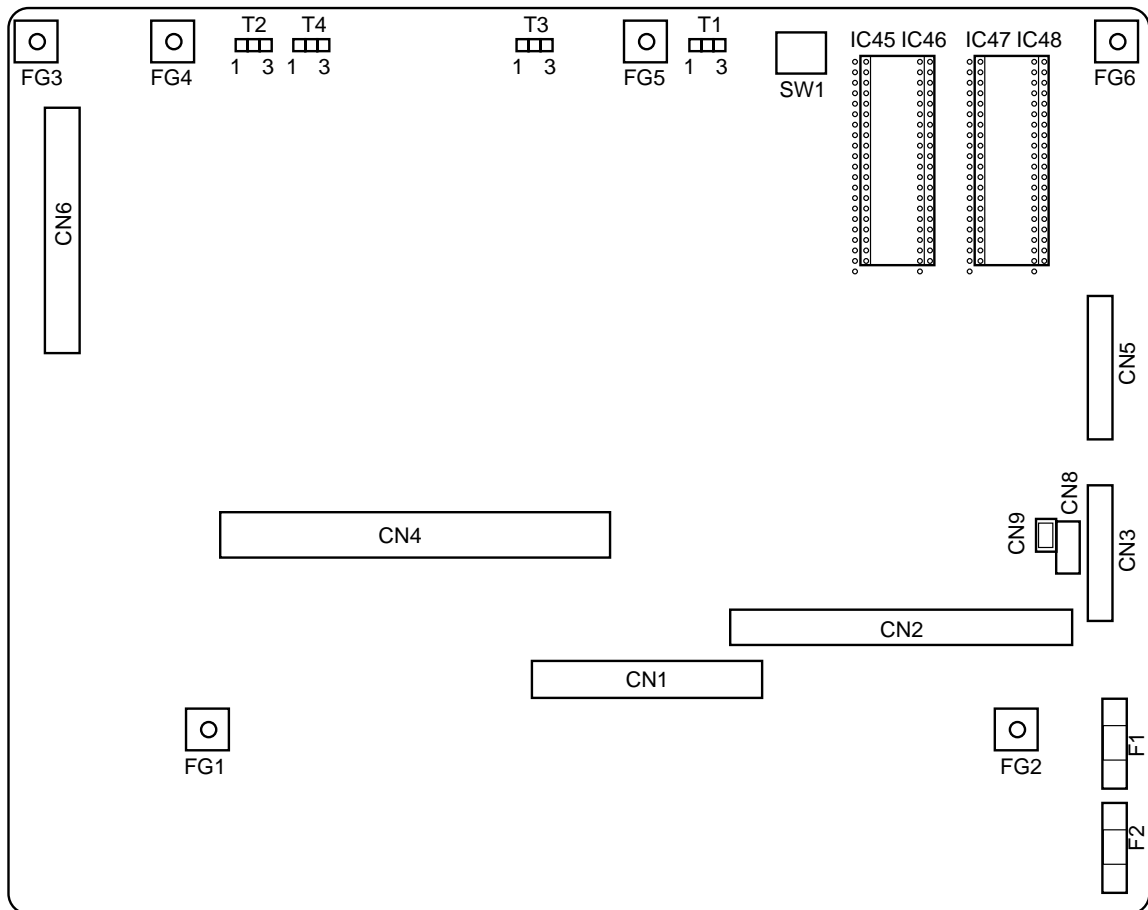
Table.8-5

No.	Parts No.	Name	Q'ty/U	Recomended Q'ty			Remarks
				500	1000	2000	
141	40751001	POA Printed Circuit Board Specifications (only Operation Panel Board)	1	5	10	20	
142	40742901	LDC Assy (with Cord and Core)	1	5	10	20	
143	40533301	Nylon Connector Cord (13P)	1	3	6	12	
144	4YS4011-4311P006	Nylon Connector Cord (12P)	1	3	6	12	
145							
146							
147							
148							

Appendix A PCB LAYOUT

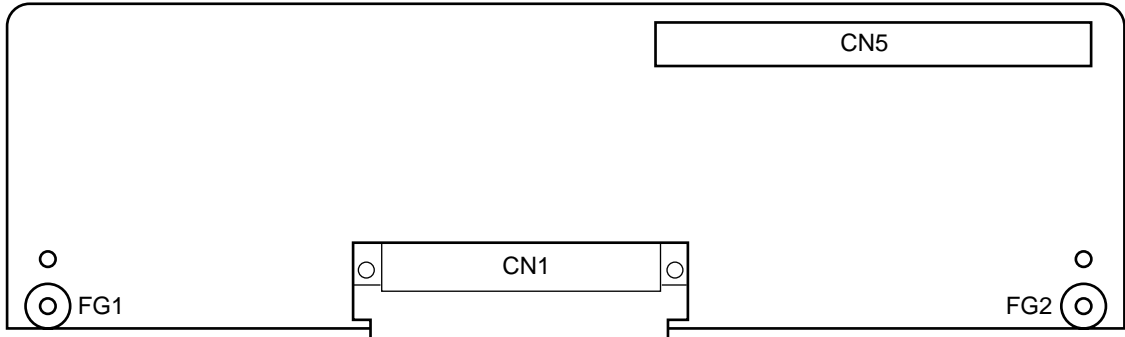
- (1) Circuit board PMA (Control)
- (2) Circuit board PDA (Driver)
- (3) Circuit board POA (Operation Panel)
- (4) Circuit board PHA (Interface)
- (5) Circuit board PRA (Connection)
- (6) Circuit board PGA (Sensor)

- (1) Circuit board PMA (Control)

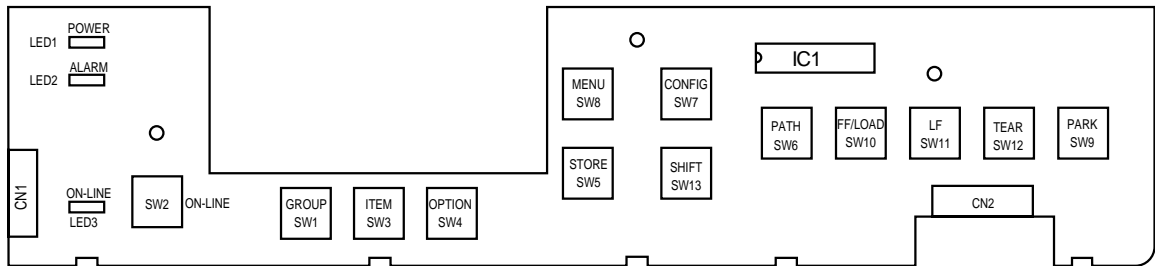


Short plug		Setting	Default
T1 1 3	1-2	When either PGROM or CGROM is 8 or 16Mbit mask ROM.	1-2
	2-3	When either PGROM or CGROM is 32Mbit mask ROM.	
T2 1 3	Centronics I/F (Pin No.35)		2-3
	1-2	In IEEE1284 mode.	
T3 1 3	1-2	When the PGROM is EPROM (IC46).	1-2
	2-3	When the PGROM is mask ROM (IC45).	
T4 1 3	Centronics I/F (Pin No.18)		2-3
	1-2	In IEEE1284 mode.	
	2-3	Compatible with PM3410.	

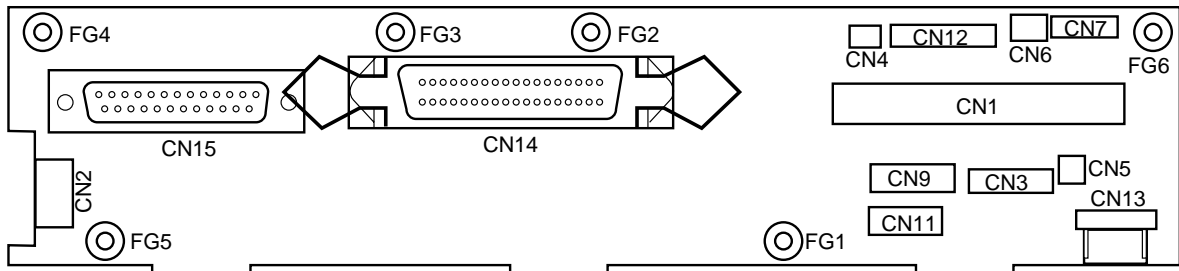
(2) Circuit board PDA (Driver)



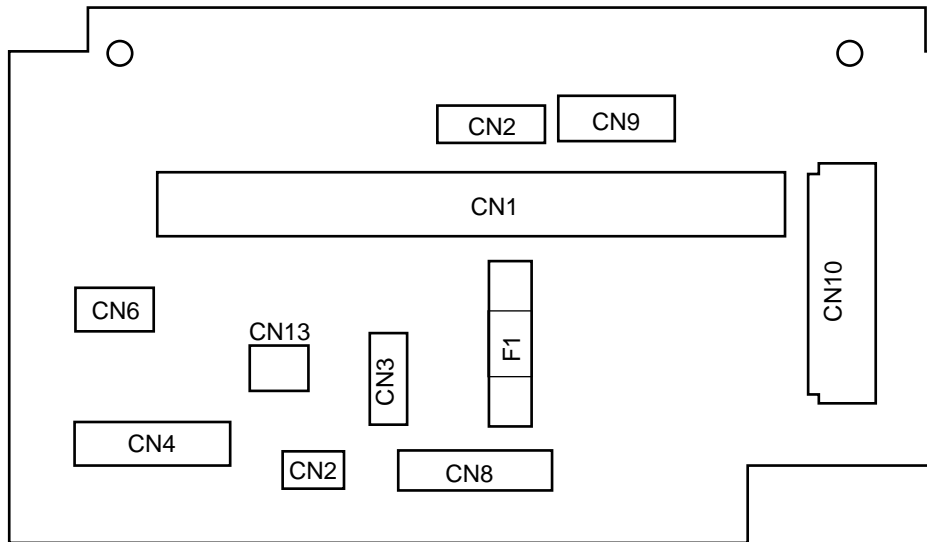
(3) Circuit board POA (Operation Panel)



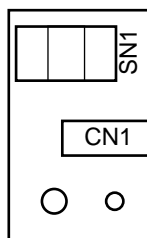
(4) Circuit board PHA (Interface)



(5) Circuit board PRA (Connection)



(6) Circuit board PGA (Sensor)



APPENDIX B RS-232C SERIAL INTERFACE BOARD (Option)

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.

For this serial interface to be installed in a Pacemark 4410, you need to have an adapter board (PAA PCB).

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 B-2-1.

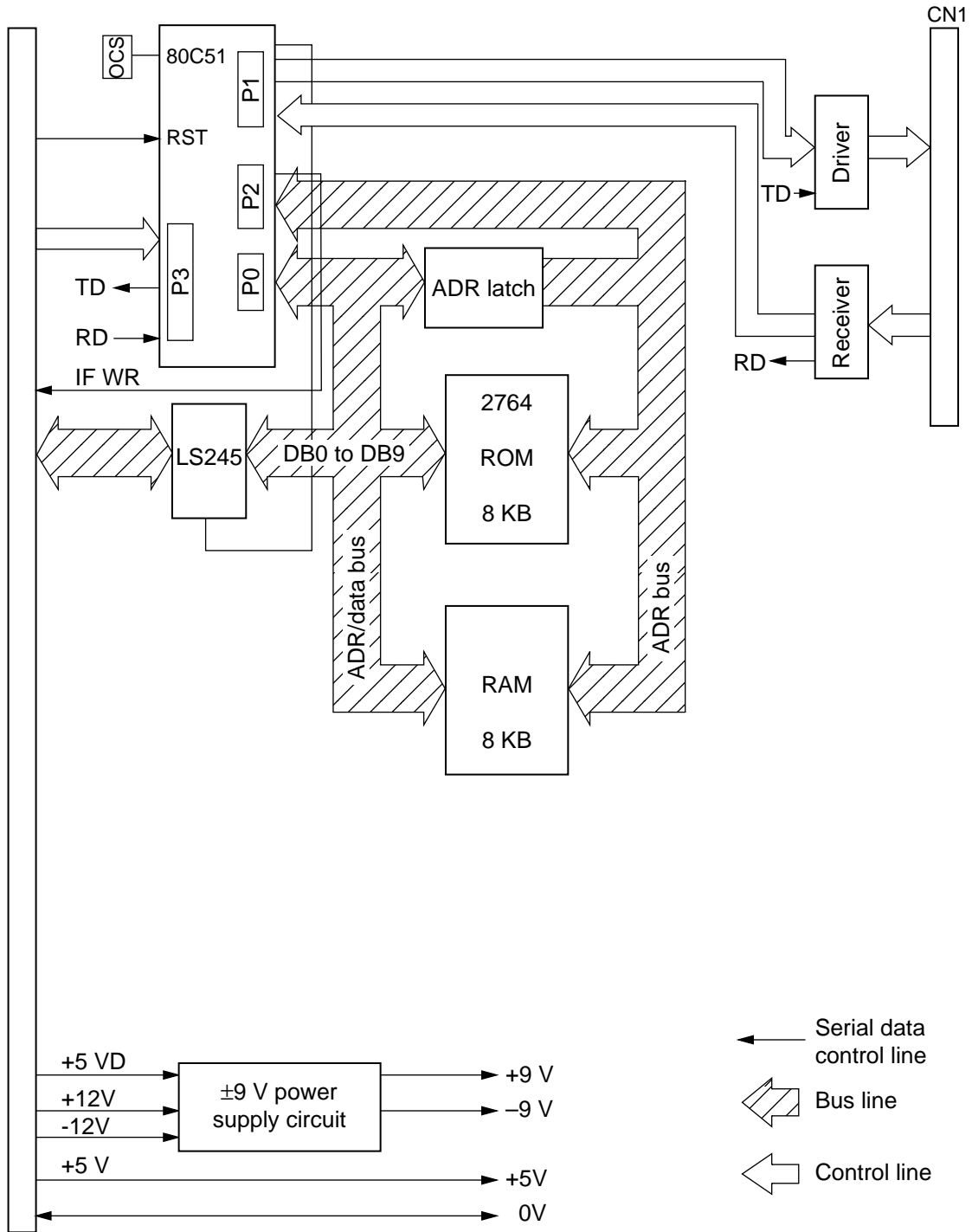


Figure B-2-1 Block Diagram

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 Local Test

2.3.1 Circuit test mode

2.3.1.1 Setting

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

Connect the test connector shown in Figure B-3-6 to the interface connector

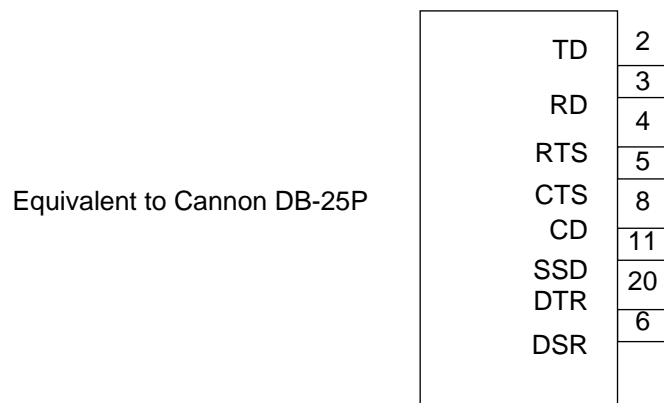


Figure B-3-6 Test Connector Connection Diagram

2.3.1.2 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 switch 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.

Appendix.C Maintenance-Support Function

1. Normal mode

(1) DIP Switch Settings

DIP Switch (O: ON, X: OFF, -: ignored)				Function
4	3	2	1	
-	-	-	-	Normal mode

(2) Power ON Switch Function

Switch								Function
SEL/ RESET	MENU	CON- FIG	PATH/ TOF	FF/ LOAD	LF	TEAR	PARK	
	○							Starts menu mode
	○	○						Starts menu maintenance mode
					○			Starts demo-pattern self test
			○					Starts rolling ASCII self test
				○		○		Starts head pin test
				○				Starts HEX DUMP mode

Switch					Function
GROUP	ITEM	Option	STORE	MENU	
○	○				Sets MENU setting CFG 1 to factory default. Note ⁽¹⁾
	○	○			Sets MENU setting CFG 2 to factory default. Note ⁽¹⁾
○		○			Sets paper input location to factory default.
		○	○		Sets MENU setting (CFG 1 and 2)/paper input location to factory default. Note ⁽¹⁾
			○	○	Sets header/MENU settings (CFG 1 and 2) to ROM fixed values. Sets paper input location to factory default.

Note ⁽¹⁾ Registration/flash ROM USED setting holds the values of current setting.

2. Maintenance mode 1

(1) DIP Switch Settings

DIP Switch (O: ON, X: OFF, -: ignored)				Function
4	3	2	1	
-	-	-	○	Maintenance function enabled mode

(2) Power ON Switch Function

Switch								Function (Valid when DIP switch-1 is ON)
ON-LINE	SHIFT	CON-FIG	PATH/TOF	FF/LOAD	LF	TEAR	PARK	
			○		○			Starts learning function for slice level of paper width sensor.
					○		○	Starts auto-gap test.
				○	○			Gap open/close test.
		○		○				Starts gap close.
			○			○		Starts ON/OFF test for all sensors.
				○			○	Starts the alignment of print start position sensor.
	○	○						Resets the counter of print character number
						○	○	Starts AG correction mode.
					○	○		Starts AG adjustment aid mode.
			○				○	Flash Loading Mode
○		○						Starts aging mode (10 min.)
○	○							Starts aging mode (5 min.)

The above switches are also valid during Limited Operation.
 The empty boxes indicate not-pressed switches.
 ○: indicates that the switch is pressed.

3. Maintenance mode 2

(1) DIP Switch Settings

DIP Switch (O: ON, X: OFF, -: ignored)				Function
4	3	2	1	
-	-	○	-	Maintenance information indication enabled mode

(2) Operator panel switch Function

Switch								Function (Valid when DIP switch-2 is ON)
STORE	SHIFT	CON-FIG	PATH/TOF	FF/LOAD	LF	TEAR	PARK	
○	○							The LCD displays the maintenance information (total page number, number of print characters) for 2 seconds.

(3) Maintenance Information Display Condition

LCD	Condition	Flash ROM Function	
		Function	Display Data
Top line	1~8	Displays the value of line feed counter.	Current counter value
	9~16	Displays the value of print counter.	Current counter value
Bottom Line	1~8	Displays a correction value for AG centering.	Current counter value
	9~16	Reserved	

(4) Stored historical page number data

This function counts a page each 11 inch and stores it to EEPROM.

The storage capacity for the counter is 3byte, which equals to pages for 70 years at 20000 pages/ month.

As the printer has no function which is capable of resetting this counter, line feed frequency can be known since the printer's shipment.

(5)

a) Stored historical printed character number data

This function counts the number of actually printed characters and stores it to EEPROM.

It reads and analyses the characters from receiving buffer and identifies the characters which has been actually printed and counts them.

The count of image data for any DPI should be increases by one character each 12 columns, The storage capacity for the counter is 3byte, which equals to 430 million characters with 256 characters counted as 1 count.

As the printer has the function which is capable of resetting this counter to zero, The usage frequency of print head ribbon can be known as an index by resetting this counter when replacing a print head and ribbon set.

b)Printed character number counter resetting function

Activating	Power on, holding SHIFT + CONFIG switches.
Releasing	
Condition	When DIP switch 1 has been turned on.
Subject	Printed character number counter (EEPROM data)

This function resets the counter for the number of printed characters to zero, which is stored in the EEPROM.

This function is advanced in the following steps.

1) This function starts, showing the following indications on the LCD.

Top line : INITIALIZING
Bottom Line : COUNTER RESET

2) It resets the printed character number counter to "0" and rewrites the EEPROM.

3) The printer returns to the normal Power On condition.