

ULTIMA90/ULTIMA90 +/-Impact4550 Pro
DOT MATRIX PRINTER
MAINTENANCE MANUAL

CHAPTER 1

PRINTER SPECIFICATIONS, CONFIGURATION PERFORMANCE, AND

1.1 Overview

This manual is for maintenance engineers, and covers overall DL7600 printer maintenance, together with detailed information such as troubleshooting and component replacement.

The maintenance manual is described by the premise that understands the user's manual. Please also refer to the following manual if needed.

DL7600 Printer USER'S MANUAL	(C147-E052-01EN)
DL7600 Printer Product Description	(A1KA02039-B001/E)

DL 7600 printer has a reliable, simple mechanism requires little maintenance.

1.2 Equipment Structure

1.2.1 Overview

This section outlines printer structure and features.

1.2.2 Model configuration

The DL7600 printer is a 136-column printer.

Factory options are as follows

Power Supply type;	100-120VAC input(M33325A)
	220-240VAC input(M33325B)

Interface type;	Centronics parallel + USB interfaces
	Centronics parallel + RS232C serial interface

Add-on options are as follows.

Cut sheet feeder. (The SF940 single-bin feeder)
Tractor unit. (for a second tractor).
LAN card. (only for the Centronics parallel + USB interfaces Models.)
Large paper table. Small paper table Large stacker.

The DL7600 has three emulations as follows.

Fujitsu DPL24C PLUS
IBM Proprinter XL24E
Epson ESC/P2

1.2.3 Structure

Major printer components are organized as shown below. Items in boldface are recommended spare parts (see Chapter 6) that can be replaced in field by maintenance service engineers. Replacement and adjustment are detailed in Chapter 4.

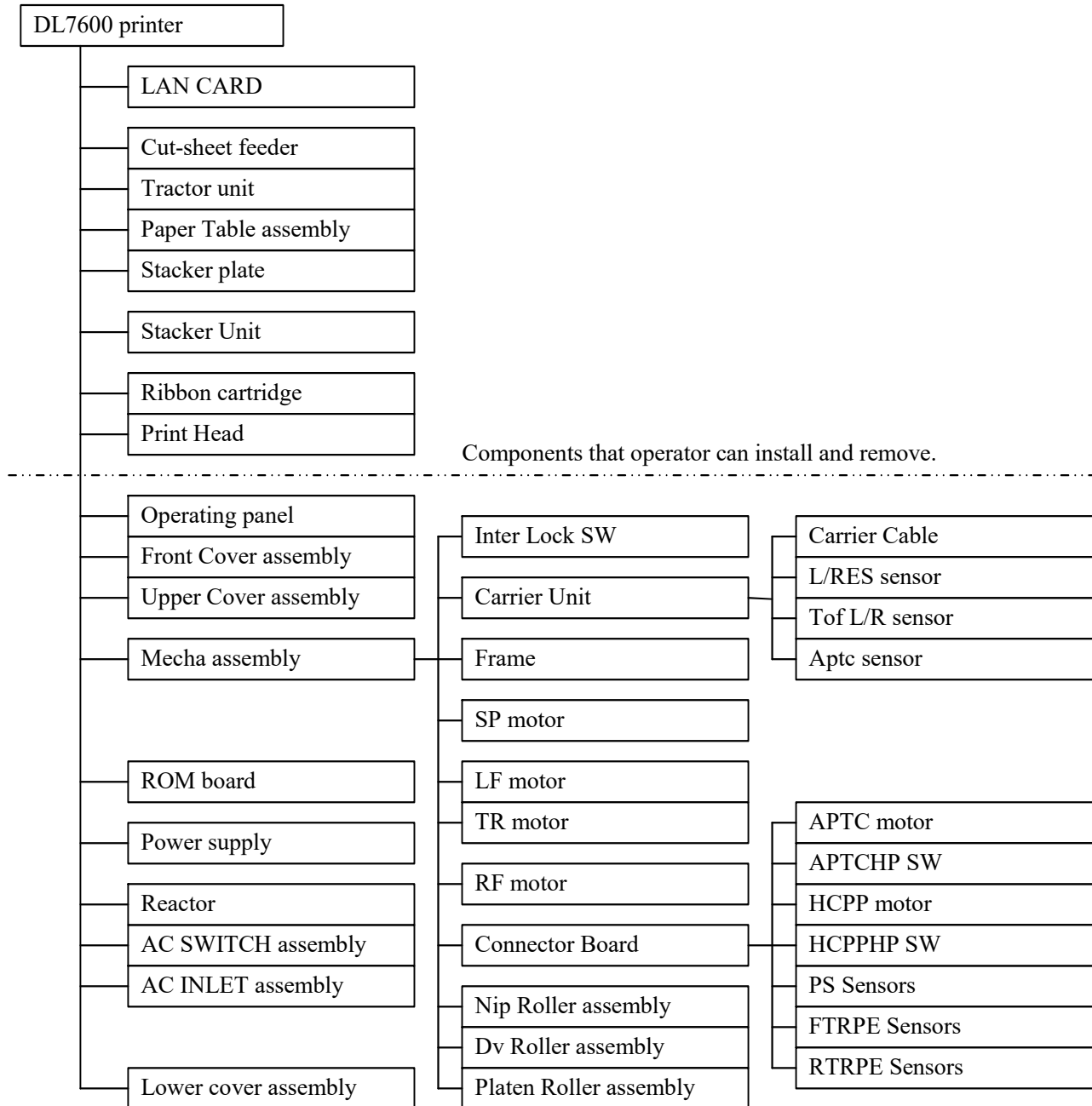


Figure 1.1 Structure of DL7600

Block diagrams

The following figure shows printer functional components and connecting cables.

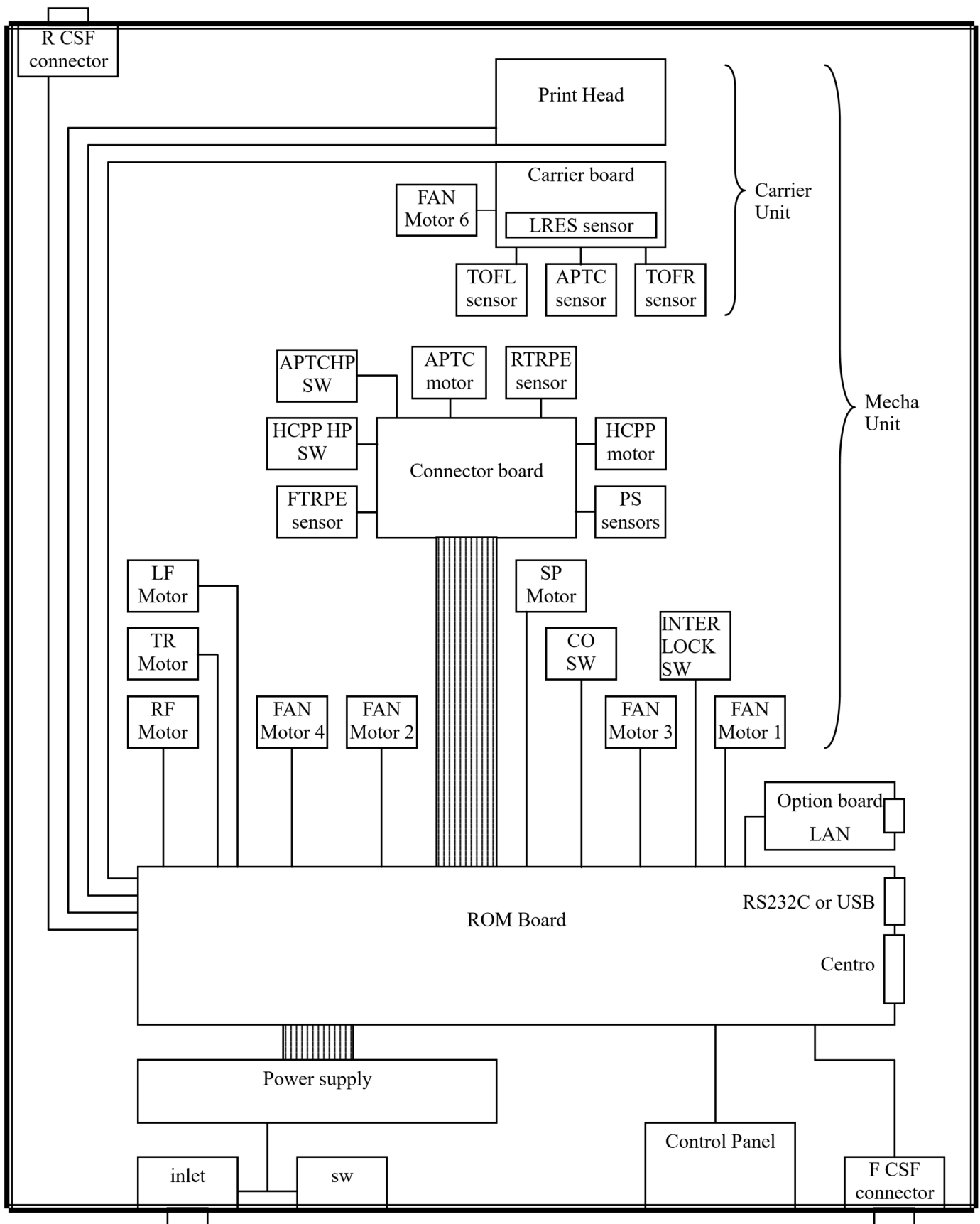


Figure 1.2 Block Diagram of DL7600

(1)Exterior components

This section gives information on exterior components of the printer: covers, removable mechanism units, etc.

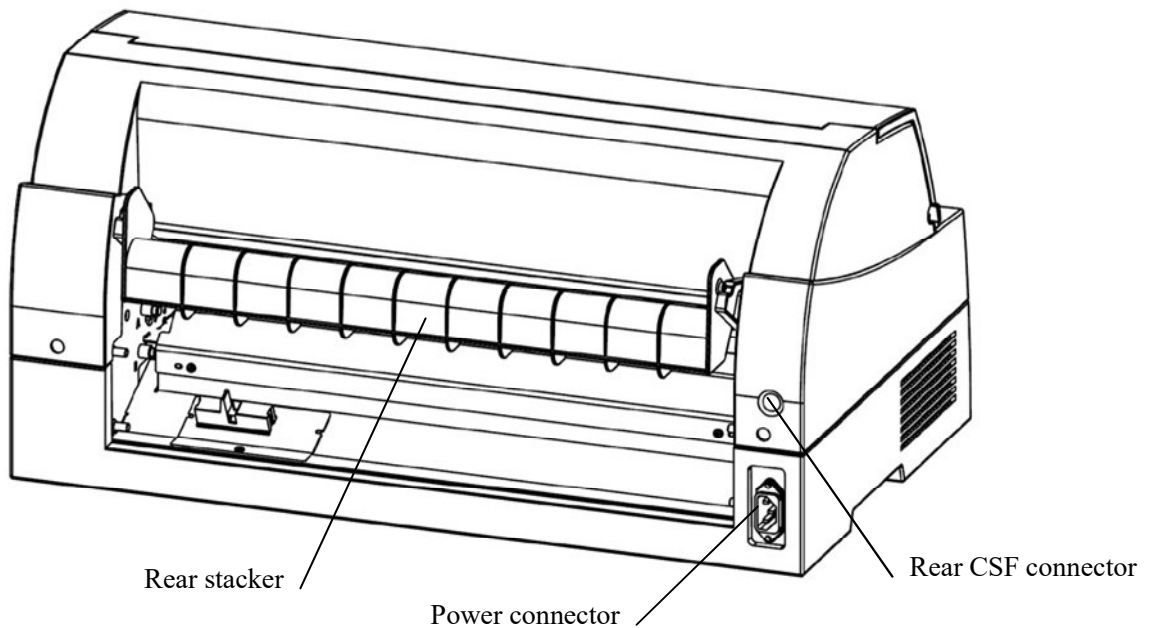
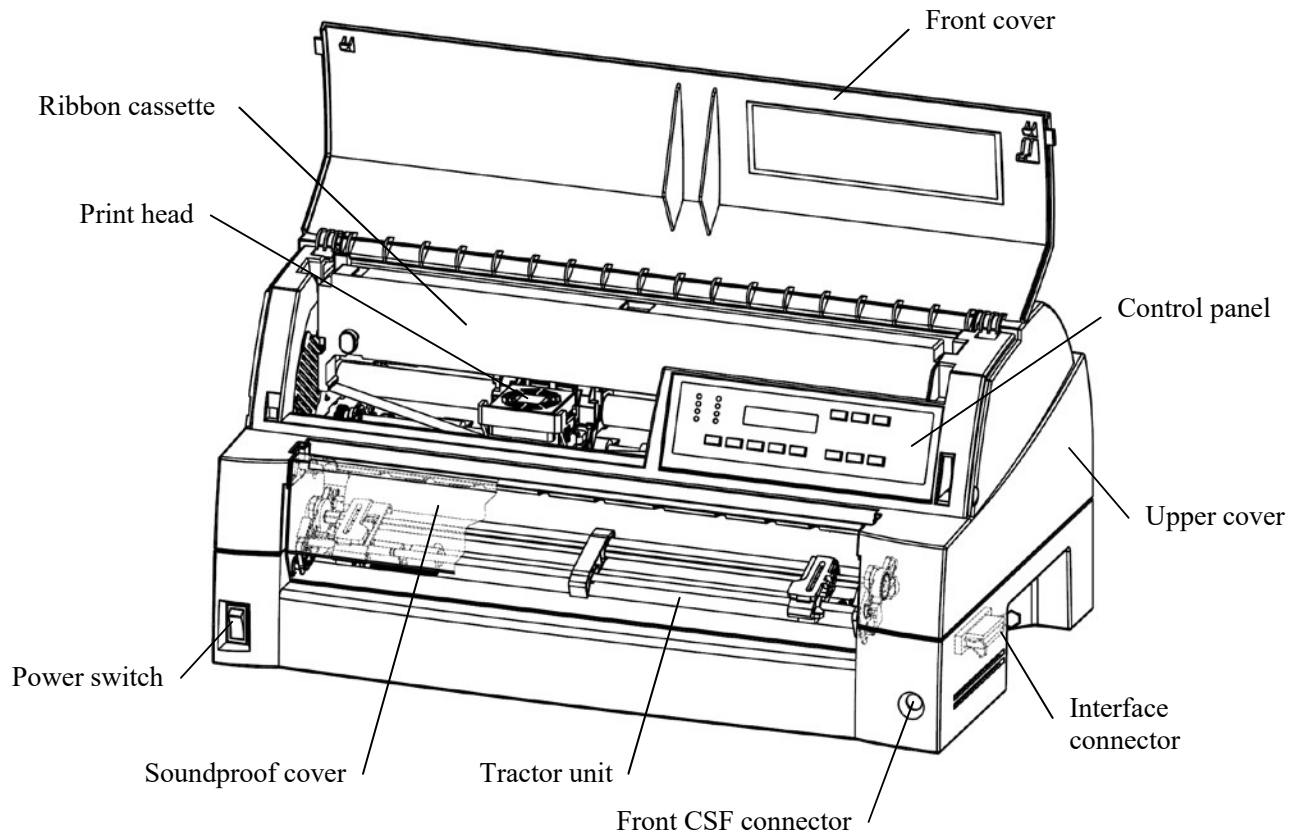


Figure 1.3 Exterior components of DL7600

a. Interface Connector

The interface cable connector is on the right side of the printer, as seen from the front of the upper cover, so the interface cable does not interfere with the paper feed path.

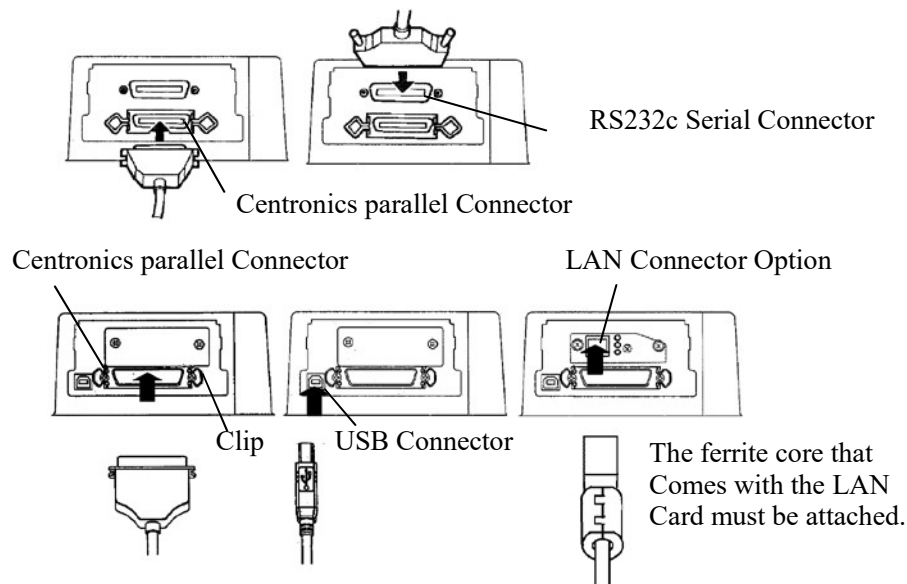


Figure 1.4 Interface type of DL7600

b. Upper cover

The bottom cover and the upper cover are fixed with a back screw.

b. Front cover

The front cover is opened to replace the ribbon cartridge. There is an Interlock SW for safety.

c. Soundproof cover

Soundproof cover is opened when the continuous form is set.
How to handle refer to the Quick Start Guide or User's Manual.

d. Rear stacker

The rear stacker holds printed cut sheets.
The optional Large Stacker is necessary to use cut sheets exceeding 297 mm in length

e. Control panel

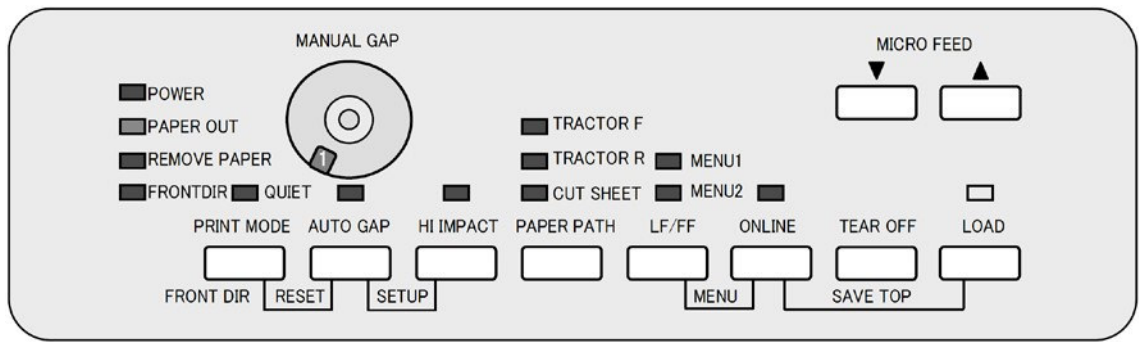
[LED type]

The control panel consists of an LSI, 10 push-button switches, 1 dial, 13 LEDs, and a buzzer.
The switches are used for operations such as loading and feeding paper and controlling printing pressure.
Some switches are also used in setup mode. The LEDs indicate printer basic statuses and paper feed path conditions. The buzzer sounds to indicate certain operating and printer statuses.

[LCD type]

The control panel consists of an LSI, 11 push-button switches, 1 LCD, 8 LEDs, and a buzzer.
The switches are used for operations such as loading and feeding paper and controlling printing pressure.
Some switches are also used in setup mode. The LEDs indicate printer basic statuses and paper feed path conditions. LCD displays the state of the printer. The buzzer sounds to indicate certain operating and printer statuses.

[LED type]



[LCD type]

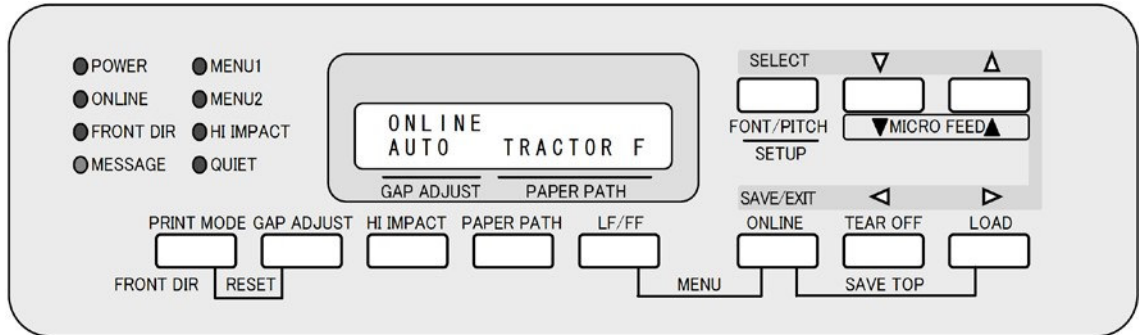
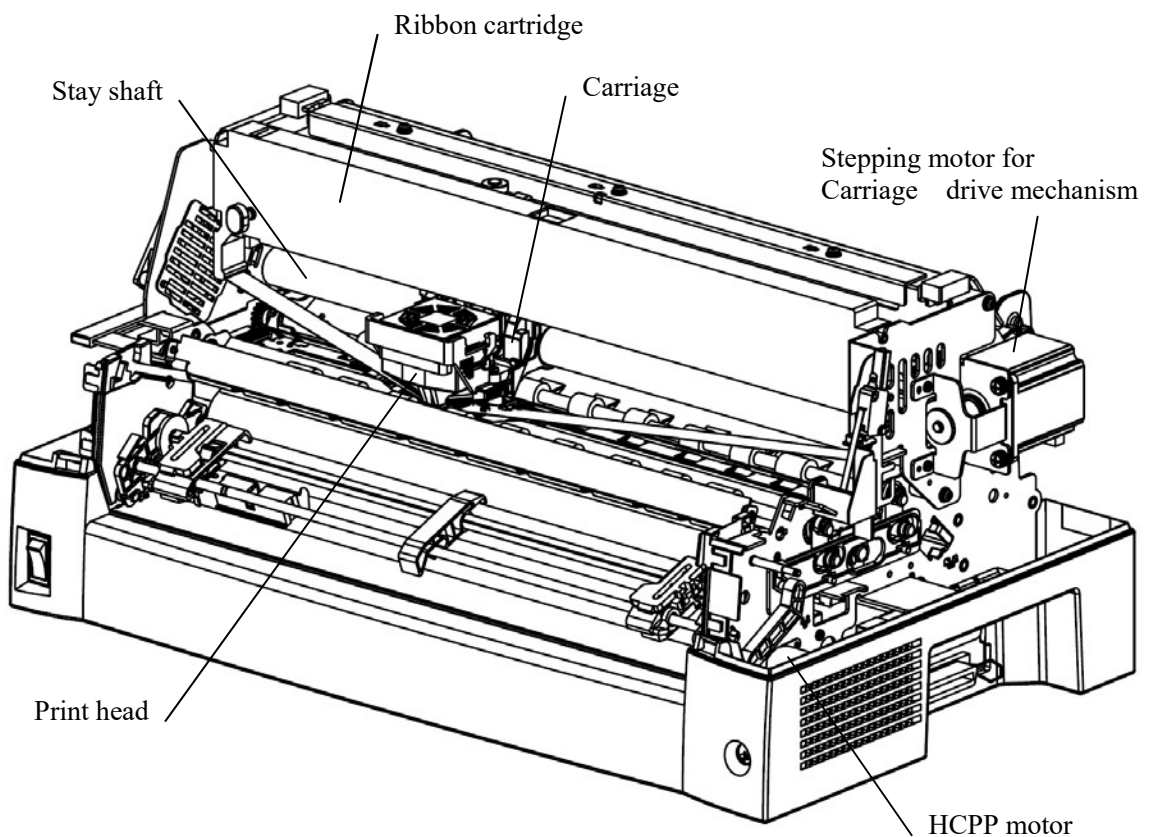


Figure 1.5 Control panel of DL7600

(2)Printing mechanism



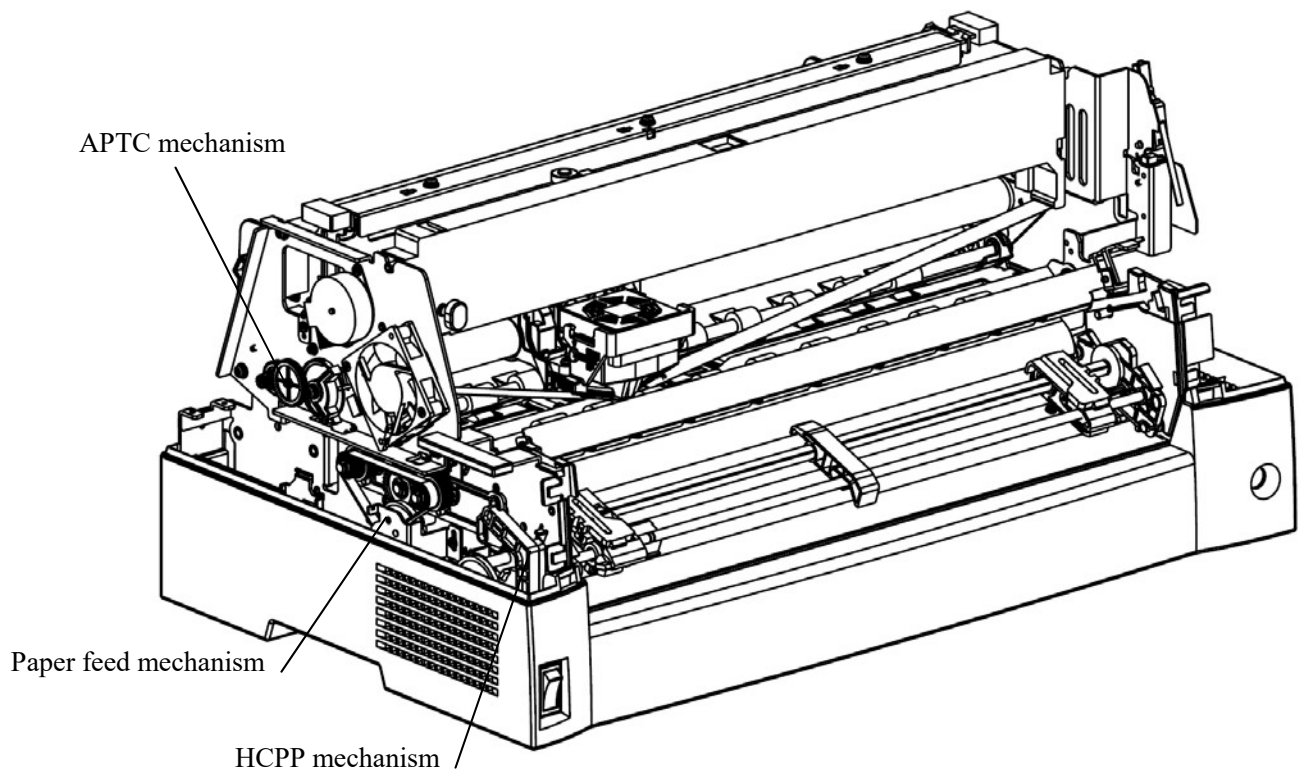


Figure 1.6 Mechanism of DL7600

The printing mechanism fit into the bottom cover. And Upper Cover holds it in position.

a. Carriage

The carriage supports the removable 24-wire print head, and slides left and right on the stay shaft. The ribbon feed gear system moves the ribbon in one direction regardless of carriage movement. It has four sensors: LRES, TOFL, TOFR and APTC sensor. The LRES detects both left and right ends of the carriage movement. The TOFL/R detects the edge (top, left, right, bottom) of paper. The APTC sensor detects the surface of paper for control the gap between the print head and the paper.

b. Carriage drive mechanism

The stay shaft and the stay guide (upper angle) support the carriage; the stepping motor and timing belt move the carriage horizontally.

c. Paper feed mechanism

There are two stepping motors. One of them drives the rollers and another one drives tractors.

d. Host-controlled paper path (HCPP) mechanism

The HCPP mechanism switches power transmission to the tractors. Three states are possible: front tractor is selected, rear tractor is selected, and cut sheet is selected. Switching is possible through software or by the control panel. The paper on the platen is unloaded to the park position or ejected, and then the paper feed path is switched. When switching from a cut sheet to continuous forms, the continuous forms are automatically loaded to the print position.

e. Automatic paper thickness control (APTC) mechanism

The APTC mechanism adjusts the gap between the print head and the paper surface. Before start printing, the print head is approach to the platen until APTC sensor is pressed against the paper surface. And then the print head is returned by a certain distance so that the gap (actually between the print head and the paper) is properly adjusted regardless of the paper thickness.

f. Paper sensors

There are six paper sensors for controlling paper feeding:

Name	Function	Sensor type
TOFL TOFR	Detect the top edge for paper loading -TOFL is for front loading -TOFR is for rear loading Detect left and right edge for area over control -TOFL is for left and right edge (small width paper) -TOFR is for right edge (large width paper) (Right and left are reversed for rear feed) Detect the bottom edge for detecting paper end. -TOFL is for front loading -TOFR is for rear loading	Photo reflectors
FTRPE RTRPE	Detect the continuous forms at the tractor for as follows. -Control the paper loading sequence. -Detect the paper parking position. -Detect the near paper end of continuous forms.	Photo interrupter
PSS	Detect the cut sheet on the paper table for auto loading. Detect the bottom of the cut sheet for control carriage position to detect the paper end . Detect the leaved paper on the paper table for display remove paper indicator.	Photo reflectors
APTC	Detect the surface of the paper for control the print head gap.	Panel Key Board

(3) Lower cover

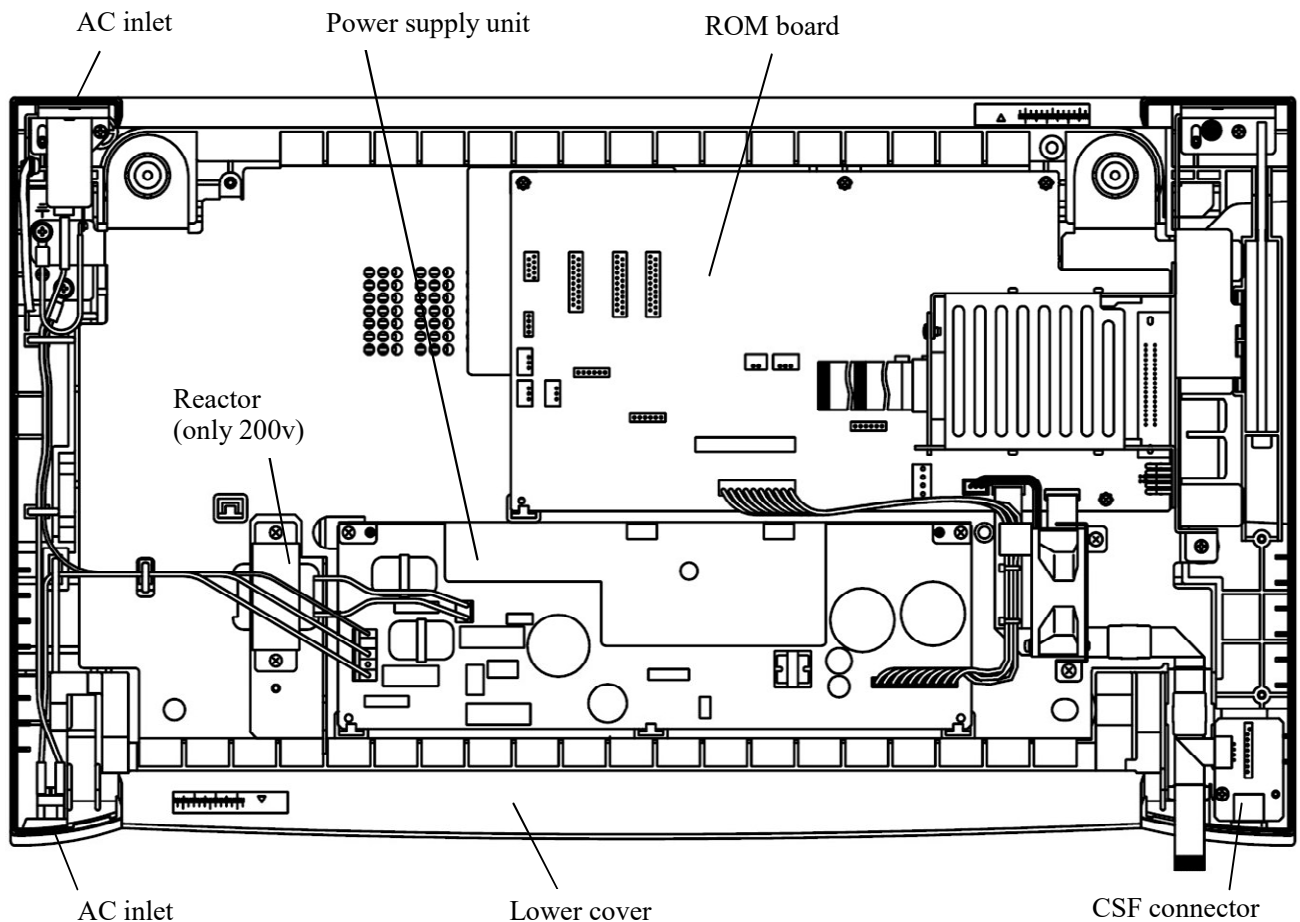


Figure 1.7 Electric components of DL7600

a. Lower cover

The Lower cover supports the printer mechanism and electric units as follows.

b. ROM board (control board with flash ROM)

The ROM board controls the host interface, control panel, and printing mechanism using an MPU and an LSI circuit. Memory holds the resident character patterns and firmware, including resident emulation programs. This board also has drivers and receivers for other components. The sensor receivers convert signals from the sensors. The drivers supply power to motors, print head wires, and other components. LAN relay board is connected to this board through the cable.

c. Power supply unit

The power supply unit supplies DC40V and DC5V by two transformers.

Two transformers realize that printer displays fatal alarms though printer shuts down DC40V. (Even if DC40V is shut down, DC5V still remains.)

d. AC inlet and AC switch.

The AC inlet has protective earth cable. In order to prevent an electric shock, it must be fixed to frame ground.

The AC switch has cables to connect the Power supply unit and AC inlet.

e. CSF connector (front CSF)

The connector board for the front CSF is mounted at the front right of the lower over.

(4) Option and consumables

a. Cut-sheet feeders

A cut-sheet feeder allows both single-part cut sheets and multi-part cut sheets to be fed automatically. The SF94 single-bin feeder is available for DL7600.

b. Tractor unit

An additional tractor unit can be installed in the printer. Because the standard tractor unit is installed at the front of the printer at shipment, the additional tractor is installed at the rear of the printer. However, both tractor units are the same, and installable at either position.

c. LAN card.

A LAN card is available as a printer add-on option. A user installable function, the LAN card can be installed only on printer models with the Centronics parallel + USB interfaces.

d. Large paper table

The large paper table helps to increase operability when large cut sheets are used. Also, sheets that are output from the front are easier to keep properly organized.

e. Small paper table

The Small paper table helps to increase operability when small cut sheets are used.

f. Large stacker.

The large stacker accommodates sheets output from the rear.
It is used in continuous printing with a cut sheet feeder.

g. Print head

The 24-wire print head is easily installed on and removed from the print head carriage.

CHAPTER 2 UNPACKING, PERFORMANCE CHECK, AND CONNECTION

2.1 Overview

The DL7600 printer comes packed for transportation.

After unpacking and before installation, the printer must undergo self-test printing. Installation requires minimum time and expense.

2.2 Notes on Installation

For best results, note the following points when installing the paper:

- Place the printer on a level, vibration-free surface.
- Keep the printer away from sunlight and heaters.
- Be sure printer ventilation ports are not blocked.
- Do not operate the printer in a humid or dusty environment.
- Use an outlet that is separated from noise-generating equipment such as motors. ▪ Use the correct AC voltage to avoid unexpected problems.

2.3 Unpacking

Unpacking the printer as follows(Figure 2.1)

1. Open the carton and remove Ribbon cartridge and Cushion L/R.
2. Lift up the printer using the grip at right and left of the printer.
3. Take out accessories (Power cord, Manual).

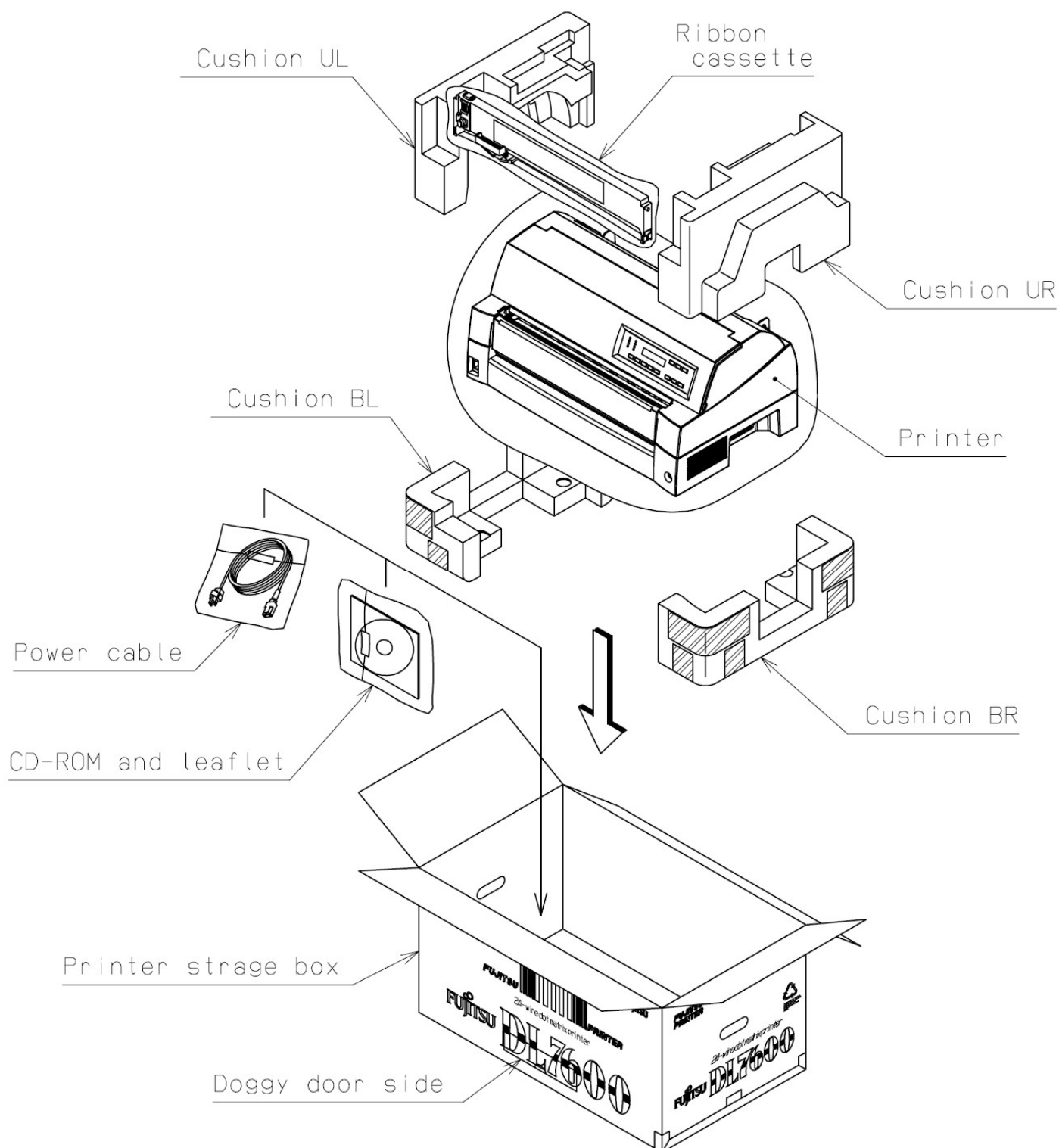


Figure 2.1 Unpacking the printer and accessories

4. Open the front cover and remove the cardboard shipping restraint holding the carriage in place

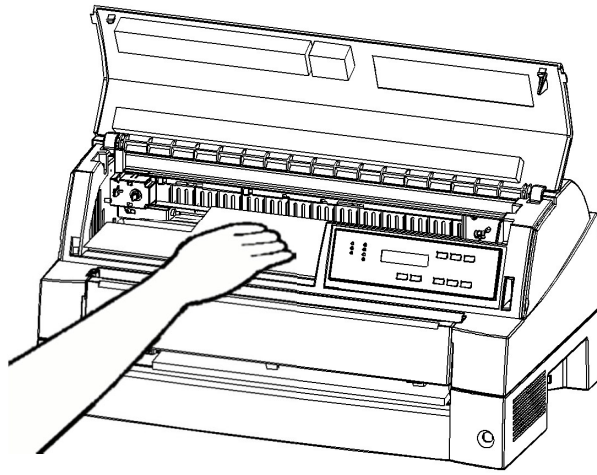


Figure 2.2 Removing the shipping materials

6. Store the original shipping carton and packing materials for future use in moving or shipping the printer.

2.4 Inspection after Unpacking

1. Carefully check assemblies and accessories for visible damage.
2. Install the ribbon cartridge. See the User's Manual for details.
3. Check the rated voltage of the printer and AC power outlet, then connect the AC power cord between the printer and AC power outlet.
5. Close the front cover.
6. Turn on the power switch.
7. Load continuous forms paper or cut sheet paper as explained in the User's Manual.
Check printing performance and quality using self-test printing, detailed in User's Manual.

CHAPTER 3 TROUBLESHOOTING

This chapter helps pinpoint the causes of problems with the printer.

Section 3.1 is a troubleshooting table. The table shows how to determine what is wrong with the printer and what to do to correct the problem.

Section 3.2 explains error displays on the control panel that help clarify the cause of a problem.

Section 3.3 explains the self-correction functions of the DL7600 printer. For replacement and adjustment after recovery, see Chapter 4.

3.1 Trouble shooting Table

3.1.1 Problems at power-on initialization (part 001/4)

	Symptom		Cause	Response
1	The POWER lamp does not go on.	—	The power cord is not connected to the outlet or the printer.	Connect the power cord properly
		The power cord is connected properly.	The power cord is defective.	Replace the power cord.
			The power supply is defective.	Replace the power supply.
			The control board is defective.	Replace and initialize the control board.
			The control panel board is defective.	Replace the control panel board.
			The cable connected to the control panel board is defective.	Check the connection. Check the cable.
2	The POWER lamp comes on momentarily, but goes off. Then, turn the power switch OFF, and turn on the power after 10 to 20 seconds. However, the POWER lamp does not go on.	+40 V over voltage alarm	The power supply is failing. (The power supply becomes a high voltage.)	Replace the power supply unit.

3.1.1 Problems at power-on initialization (part 002/4)

	Symptom	Cause	Response
3	The POWER lamp is on.	After the POWER lamp goes on, simultaneous blinking of all other lamps is not performed.	The control board is defective.
			Replace and initialize the control board.
		After the POWER lamp goes on, simultaneous blinking of all other lamps is performed but initialization is not performed normally.	The cover is open.
			Close the front cover.
			The cover open switch assembly is defective.
			Replace the cover open switch assembly.
		After the POWER lamp goes on, simultaneous blinking of all	The interface cable is defective.
			Replace the interface cable.

		other lamps is performed but the PAPER OUT lamp does not blink later. If the interface cable is disconnected, initialization is performed normally.	The host is defective.	Check the host.
		The case of as stated above. Initialization is not performed normally even if the interface cable is disconnected.	The control board is defective.	Replace and initialize the control board.
			The control panel board is defective.	Replace the control panel board.
			The cable connected to the control panel board is defective.	Check the connection. Replace the cable.
			The cover is open.	Close the front cover.

3.1.1 Problems at power-on initialization (part 003/4)

	Symptom	Cause	Response
4	[LED type] The PAPER OUT lamp blinks. [LCD type] Error message blinks.	ROM/RAM alarm [LED type] Also HI IMPACT and TRACTOR F lamps blink. [LCD type] LCD displays as follows FATAL! ROM/RAM ALARM	Mismatch of ROM is detected. <ul style="list-style-type: none"> Download correct program to the flash ROM. Replace the ROM board .
		Low-voltage alarm [LED type] Also QUIET and TRACTOR R lamps blink. [LCD type] LCD displays as follows FATAL! LOW VOLT ALARM	Low-voltage alarm is detected. <ul style="list-style-type: none"> Replace the power supply. Replace the control board, then initialize the EEPROM.
		APTC home position sensor alarm [LED type] Also AUTO GAP and TRACTOR R lamps blink. [LCD type] LCD displays as follows FATAL! APTC HPS ALARM	<ul style="list-style-type: none"> APTCHPSW ASY is defective. The APTC motor is defective. APTCHPSW ASY is not connected. The driver board is defective. <ul style="list-style-type: none"> Replace the APTCHPSW ASY. Replace the APTC motor. Connect the APTCHPSW ASY cable properly. Replace the driver board.
		LRES alarm [LED type] Also REMOVE PAPER and TRACTOR F lamps blink. [LCD type] LCD displays as follows FATAL! LRES ALARM	A LRES alarm is detected. <ul style="list-style-type: none"> LES detection is poor. The carriage cable is defective. The driver board is defective. The carriage cable is disconnected. <ul style="list-style-type: none"> Clean or replace the carriage PC board. Replace the carriage cable. Replace the driver board. Connect the carriage cable properly.

		Fire check alarm of ribbon feed motor [LED type] Also REMOVE PAPER and MENU2 lamps blink. [LCD type] LCD displays as follows FATAL! RBFM ALARM	Ribbon motor alarm is detected. A. The RF motor connector is disconnected. B. The RF motor is defective. C. The control board is defective.	A. Connect the Connector correctly. B. Replace the RF motor. C. Replace the control board, then initialize the EEPROM.
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3.1.1 Problems at power-on initialization (part 004/4)

	Symptom	Cause	Response	
4	[LED type] The PAPER OUT lamp blinks. [LCD type] Error message blinks.	FAN alarm [LED type] Also REMOVE PAPER and CUT SHEET lamps blink. [LCD type] LCD displays as follows FATAL! FAN ALARM	FAN motor alarm is detected. A. The FAN motor connector is disconnected. B. The FAN motor is defective. C. The control board is defective.	A. Connect the Connector correctly. B. Replace the FAN motor. C. Replace the control board, then initialize the EEPROM.
	SPACE alarm [LED type] Also REMOVE PAPER and TRACTOR R lamps blink. [LCD type] LCD displays as follows FATAL! SPACE ALARM	Space alarm is detected. A. The SP motor connector is disconnected. B. The SP motor is defective. C. The stay shaft is rough. D. The SP belt is loose. E. The control board is defective.	A. Connect the Connector correctly. B. Replace the space motor. C. Clean or lubricate the stay shaft. D. Check the tension pulley. E. Replace the control board, then initialize the EEPROM.	
	HCPP alarm [LED type] Also FRONT DIR and TRACTOR R lamps blink. [LCD type] LCD displays as follows FATAL! HCPP ALARM	• HCPPSW ASY is defective. • The HCPP motor is defective. • HCPPSW ASY is not connected. • The control board is defective.	• Replace the HCPPSW ASY. • Replace the HCPP motor. • Connect the HCPPSW ASY cable properly. • Replace and initialize the control board.	

3.1.2 Problems related to printing (part 001/2)

	Symptom	Cause	Response
1	The POWER lamp goes off during printing. Then, turn the power switch OFF, and turn on the power after 10 to 20 seconds. However, the POWER lamp does not go on.	+40 V over voltage alarm The power supply is faulty.(The power supply is a high voltage.)	Replace the power supply unit.

2	[LED type] The PAPER OUT lamp starts blinking. [LCD type] Error message blinks.	APTC Gap Alarm is detected [LED type] Also AUTO GAP and TRACTOR F lamps blink. [LCD type] LCD displays as follows FATAL! APTC GAP ALARM	The paper to be Printed on is too thick.	Replace the paper. (Use paper of a thickness specified in the paper specification.)
			Difference thickness of the paper.	Replace the paper or use manual mode properly.
			Card guide adjustment is incorrect	Adjust card guide correctly.
			APTC sensor is defective	
3	2pass printing is performed.		<ul style="list-style-type: none"> • Power overload is detected (if more than one character of the solid pattern is printed). • Print head overheat is detected (if print patterns of rather higher density of characters are printed continuously). • The control board is defective. • The power supply is defective. • The print head is defective. 	<ul style="list-style-type: none"> • The print head protection function works normally. Change the print pattern. • The print head protection function works normally. Change the print pattern or stop the printer for a while. • Replace the control board. • Replace the power supply. • Replace the print head.

3.1.2 Problems related to printing(part 002/2)

	Symptom	Cause	Response
4	Data sent from the host is not printed at all. Data cannot be received from the host.	The interface cable is not connected properly.	Connect the interface cable properly.
		The front cover is open.	Close the front cover.
	Self-test printing is performed normally.	The host interface setting of the printer does not match the host used.	Enter setup mode and change the setting for the host interface.
		The interface is defective.	<ul style="list-style-type: none"> • Replace and initialize the control board. • Replace the interface cable. • Check the host.
	Even self-test printing is not performed.	The carriage cable is improperly connected to the print head or control board.	Connect the carriage cable properly.
		The control board is defective.	Replace and initialize the control board.
	Paper out condition is detected.	Paper pass select isn't correct. Paper isn't load. CSF is empty.	

		[LED type] REMOVE PAPER indicator blinks. [LCD type] Error message lighting. Message : REMOVE PAPER	Cut sheet leaved on the paper table and printer waiting removing it.	Remove the paper from the paper table.
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3.1.3 Problems related to printing result

		Symptom	Cause	Response
1	The data sent from the host does not match the print results.	Self-test printing is performed normally.	The setup mode setting is invalid.	Enter setup mode and change the mode setting properly.
			The interface is defective.	<ul style="list-style-type: none"> • Replace and initialize the control board. • Replace the interface cable. • Check the host.
		Even self-test printing is abnormal.	The carriage cable is improperly connected to the print head or control board.	Connect the carriage cable properly.
			The control board is defective.	Replace and initialize the control board.
		Printer ignores data that out of print area.	Area over detection works.	
		Area over detection cut the data in the print area.	Printer misread the black printing into the paper edge.	

3.1.4 Problems related to print quality (part 001/2)

	Symptom		Cause	Response
1	A dot is missing or an excess dot is printed. (See other items about blurring of the top or bottom of a character.)		The print head is defective.	Replace the print head.
			The carriage cable is connected improperly.	Connect the carriage cable properly.
			The carriage cable is defective.	Replace the carriage cable.
			The control board is defective.	Replace and initialize the control board.
2	The printing position in the horizontal direction (character spacing direction) is misaligned. Check first that: - Paper thickness is adjusted properly. - The automatic paper thickness control mechanism works normally.		Bi-directional printing position adjustment is poor.	Properly adjust the bi-directional printing position.
			Stay shaft movement is not smooth.	Clean and grease the stay shaft.
			The space belt is defective.	Replace the space belt.
			The space belt tension is inadequate.	Check the tension pulley unit.
			The space motor is defective.	Replace the space motor.
			The control board is defective.	Replace and initialize the control board.
3	Printing smears paper.	Multipart paper or thick paper is used.	The manual paper thickness adjustment dial is set improperly.	Adjust the manual paper thickness adjustment dial.
			Automatic paper thickness control is defective.	Replace and readjust the card guide.
		Paper is smeared by the ribbon. (Haze)	The ribbon is fluffy.	Replace the ribbon cartridge.
		There is a blotch of ink.	Ribbon residue or ink adheres to the print head.	Remove ink or ribbon residue from the print head.
4	Printing is light or the top or bottom of characters is blurred.		<ul style="list-style-type: none"> • The manual paper thickness adjustment dial is set improperly. • The ink ribbon has reached the end of its life. • The gap between the print head and platen is inadequate. • The print head is defective. • The control board is defective. 	<ul style="list-style-type: none"> • Adjust the paper thickness adjustment dial according to paper thickness. • Replace the ink ribbon. • Adjust the gap between the print head and platen. • Replace the print head. • Replace the control board.

3.1.4 Problems related to print quality (part 002/2)

	Symptom	Cause	Response
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5	<p>Printing is partly blank or the ribbon is out of place.</p> <p>The ribbon is loose. The ribbon is vertically misaligned. The ribbon is twisted.</p>	<ul style="list-style-type: none"> • The manual paper thickness adjustment dial is set improperly. (Because the paper thickness setting is too narrow, the ribbon is loosened.) • The ribbon is loosened on a locally thick portion of paper. • The ribbon is partly twisted. • Poor card guide adjustment influenced ribbon movement. • The ribbon cartridge is defective. • The ribbon setting is inadequate. 	<ul style="list-style-type: none"> • Adjust the manual paper thickness adjustment dial properly according to paper thickness. • Check the paper specifications. • Check whether the ribbon is twisted. • Adjust the card guide. • Replace the ribbon cartridge. • Set the ribbon properly.
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3.1.5 Problems related to paper feed (part 001/2)

	Symptom	Cause	Response
1	Paper selection cannot be performed properly.	<ul style="list-style-type: none"> • The paper selection HCPP motor does not work • HCPPSW ASY is defective. • The paper selection mechanism is defective. • The control board is defective. 	<ul style="list-style-type: none"> • Replace the HCPP motor. • Replace the HCPPSW ASY. • Replace the printer mechanical unit. • Replace the control board.
2	<p>The paper loading position is inadequate.</p> <p>Or, the PAPER OUT lamp does not go off.</p>	<ul style="list-style-type: none"> • The setup is inadequate. • TOF adjustment in auto load mode is inadequate. • Paper is defective. • The sensor is defective. For cut sheet paper For front-fed continuous forms For rear-fed continuous forms 	<ul style="list-style-type: none"> • Correct the setup. • Adjust the TOF properly. • Replace paper. (with those conforming to the media specifications) • Replace the sensor. Replace the TOF 1 sensor. Replace the FTRPE sensor. Replace the RTRPE sensor.
3	Front-feed cut sheets are not loaded automatically.	<ul style="list-style-type: none"> • The setup is inadequate. • The TOF 1 or 2 sensor is defective. • The printer is detecting paper. • The paper detection mechanism is defective. 	<ul style="list-style-type: none"> • Correct the setup. • Replace TOF 1 or 2 sensor. • Eject the paper from the printer. • Replace the printing mechanism unit.
4	Front-fed continuous forms do not move back.	<ul style="list-style-type: none"> • The front tractor PE sensor is defective. 	<ul style="list-style-type: none"> • Replace the FTRPE sensor. • Replace the tractor unit.
5	Rear-fed continuous forms do not move back.	<ul style="list-style-type: none"> • The rear tractor PE sensor is defective. 	<ul style="list-style-type: none"> • Replace the RTRPE sensor. • Replace the tractor unit.
6	Paper loading and ejection are abnormal.	<ul style="list-style-type: none"> • Paper sensor output is abnormal. • Sensor cable connection is defective. • The control board is defective. 	<ul style="list-style-type: none"> • Replace the sensor. • Connect the cable sensor. • Replace the control board.
7	Line spacing is narrowed..	<ul style="list-style-type: none"> • Paper is defective. • The LF motor is defective. • The LF driver is defective. • Power output is insufficient. 	<ul style="list-style-type: none"> • Replace paper. (with that conforming to the media specifications) • Replace the LF motor. • Replace the control board. • Replace the power supply.
8	The CSF does not load paper automatically.	<ul style="list-style-type: none"> • The CSF cable is disconnected. • The CSF cable is defective. • The CSF is set improperly. 	<ul style="list-style-type: none"> • Connect the CSF cable properly. • Replace the CSF cable. • Set the CSF properly.

3.1.5 Problems related to paper feed (part 002/2)

	Symptom	Cause	Response
9	Paper skews or a paper jam occurs.	<ul style="list-style-type: none">• Paper is set improperly.• Paper is defective.• The manual paper thickness adjustment dial is set improperly.• The card guide is mounted out of place.• The print head gap is invalid.• Paper skews in the CSF.	<ul style="list-style-type: none">• Set paper properly.• Replace paper (with that conforming to the media specifications)• Adjust the manual paper thickness adjustment dial properly.• Adjust the card guide position.• Adjust the print head position.• Replace the CSF.

3.1.6 Problems related to the control panel

	Symptom	Cause	Response
1	Switches on the control panel are disabled.	<ul style="list-style-type: none"> • The printer is online. • The connection between the control panel board and control board is defective. • The printer is in alarm state. • The control board is defective. • The control panel board is defective. 	<ul style="list-style-type: none"> • Turn the printer offline. • Connect the cable properly, or replace the cable. • Check the fault and then turn on the power again. If the fault is an unusual order or smoke emission, eliminate the fault cause before turning on the power again. • Replace the control board. • Replace the control panel board.
2	Lamps on the control panel do not go on properly.	<ul style="list-style-type: none"> • The connection between the control panel board and control board is defective. • The control board is defective. • The control panel board is defective. 	<ul style="list-style-type: none"> • Connect the cable properly or replace the cable. • Replace the control board. • Replace the control panel board.

3.2 Error Display

This printer indicates errors on the control panel. There are three groups of errors as explained below.

(1) Warning errors

The buzzer sounds and the ONLINE indicator still lights.

For a data transmission error in the interface, only the buzzer indicates the error. The printer continues printing unless placed offline or other groups of errors occur. See Table 3.1.

Table 3.1 Warning errors

Error name	Cause of the error	Recovery
Parity error	An incorrect parity condition is detected in received data in the RS-232C interface. <ul style="list-style-type: none">• Besides parity, this error may also occur due to incorrect setting.• The printer prints question marks (?).	<ul style="list-style-type: none">• Check the baud rate and data format.• Check the interface cable.
Framing error	An incorrect stop bit condition is detected in received data in the RS-232C interface. <ul style="list-style-type: none">• The printer prints a question mark (?) for the first error byte then ignores the succeeding data.	
Overflow error	The host transmits data to the printer although the input buffer is full of data (i.e., while the printer is requesting the host to stop data transmission). <ul style="list-style-type: none">• The printer ignores the data (data is lost) and a question mark (?) is stored in the input buffer when the error is recovered.	Check all settings for the RS-232C interface.
Download error	The download buffer overflows. <ul style="list-style-type: none">• The printer ignores the data (data is lost).	<ul style="list-style-type: none">• Reduce downloaded data.• Reduce the print buffer capacity, i.e., increase the download buffer capacity.
Overrun error	The printer cannot accept data at the rate it is transmitted. That is, while the printer is reading out the input buffer, the host transmits the next data. <ul style="list-style-type: none">• The printer ignores the data (data is lost).	Check all settings for the RS-232C interface.
Transmission Time out error	While the printer attempts to transmit data to the host, ten seconds elapse with the output buffer full of data. <ul style="list-style-type: none">• The printer ignores the data (data is lost).	

Note:

Incorrect settings on the RS-232C do not always cause parity or framing errors. If the baud rates of the host computer and the printer are multiples of 4800, such as 19200, framing errors are not detectable, and meaningless data indicates a setting error. These errors do not affect the line from the host computer. An error remains if the printer is online and no other warning is displayed until pushbutton operation or an operational error or fatal error is detected.

(2) Operational errors

[LED type]

The PAPER OUT indicator is lighted.

The buzzer sounds, the PAPER OUT indicator lights up, and the printer is placed offline when operation is required.

[LCD type]

The error message is displayed with LCD.

The buzzer sounds, display the error name by the LCD display, and the printer is placed offline when operation is required.

Table 3.2 Operational errors

Error name	Cause of the error	Recovery
LOAD JAM	Jam occurred at the time of load.	Remove a paper from a printer.
EJECT JAM	Jam occurred at the time of eject.	Remove a paper from a printer.
LOAD ERROR	Skew when the cut sheet was load.	Load again straight.
HOPPER EMPTY	Paper of the CSF disappeared.	Supply forms and load them into the printer.
PAPER END	The printer has run out of continuous forms.	Supply forms and load them into the printer.
UNLOAD ERROR	The retreat operation of continuous forms was not able to be completed.	The "LOAD" switch is pushed and retreat operation is performed again.
PAPER SELECT ERR	The retreat operation of continuous forms was not able to be completed.	The "LOAD" switch is pushed and retreat operation is performed again.
REMOVE PAPER	The cut sheet remains being put on the paper table.	The cut sheet is extracted.
COVER OPEN	The front cover is open.	The front cover is close.

Notes:

1. The printer cannot be set online until these errors are cleared.
2. The paper end is ignored if setup item PPR-OUT: IGNORE is set.

(3) Fatal alarms

The power shut down by itself.

The printer cannot display the alarm if it detects the following alarms that turn off printer power. Disconnect components or connectors for related alarms, then check the cause of the alarm.

Table 3.3 Alarms that turn power off

Error name	Cause of the error
+40 V over voltage alarm	The power supply is faulty.(The power supply is a high voltage.)

[LED type]

The PAPER OUT lamp blinks with other lamps.

For a circuit malfunction detected in the printer:

- The printer stops printing immediately.
- The ONLINE indicator turns off.
- All buttons of the control panel are invalid.

Table 3.4 Fatal alarms displayed on control panel

Alarm name	Lamp	PAPER OUT	REMOVE PAPER	FRONT DIR	QUIET	AUTO GAP	HI IMPACT	TRACTOR F	TRACTOR R	CUT SHEET	MENU1	MENU2	ONLINE	Condition of occurrence
LRES alarm		◎	◎					◎						LRES could not be detected during the space initial operation.
Space problem alarm		◎	◎						◎					The shield board could not be detected normally by the LRES sensor.
Fan alarm	◎ ◎										◎			The cooling fan
could not rotate. Fire check alarm					◎ ◎									◎
Abnormally high current of motor														
SP motor														driver was detected.
Fire check alarm		◎	◎									◎		Abnormally high current of motor
Ribbon motor														driver was detected.
HCPP (cut sheet or continuous forms and continuous forms paper was not paper switching) alarm	◎			◎					◎					Switching between cut sheet paper possible.
Fire check alarm		◎		◎						◎				Abnormally high current of motor
LF motor														driver was detected.
Fire check alarm		◎		◎							◎			Abnormally high current of motor
CSF motor														driver was detected.
Overload alarm		◎			◎			◎						An overload occurred during printing, and second pass printing was performed. However, the power source voltage was not restored.
Low voltage alarm	◎				◎				◎					The power source voltage dropped below the specified level when no printing was in progress.
Fire check alarm		◎			◎					◎				Abnormally long driving of print head driver was detected.
Print Head														
Over voltage alarm	◎				◎						◎			Over voltage of power source was detected.
APTC gap alarm		◎				◎		◎						During the APTC operation, paper was detected immediately after the start of approach motion, or no paper was detected.
APTC home position	◎						◎				◎			During
the APTC operation, no sensor alarm														
reference position was detected.														
ROM/RAM alarm		◎					◎ ◎							A sum-check error or read/write error occurred, or no CG-ROM is mounted.

◎ : Blinking

Blank : Off

[LCD type]

The error message is displayed with LCD.

For a circuit malfunction detected in the printer:

- The printer stops printing immediately.
- The ONLINE indicator turns off.
- All buttons of the control panel are invalid.

Table 3.5 Fatal alarms displayed on control panel

Alarm name	Message Lamp	LCD	Condition of occurrence
LRES alarm	◎	FATAL! LRES ALARM	LRES could not be detected during the space initial operation.
Space problem alarm	◎	FATAL! SPACE ALARM	The shield board could not be detected normally by the LRES sensor.
Fan alarm	◎	FATAL! FAN ALARM	The cooling fan could not rotate.
Fire check alarm SP motor	◎	FATAL! SPM ALARM	Abnormally high current of motor driver was detected.
Fire check alarm Ribbon motor	◎	FATAL! RBFM ALARM	Abnormally high current of motor driver was detected.
HCPP (cut sheet or continuous forms paper switching) alarm	◎	FATAL! HCPP ALARM	Switching between cut sheet paper and continuous forms paper was not possible.
Fire check alarm LF motor	◎	FATAL! LFM ALARM	Abnormally high current of motor driver was detected.
Fire check alarm CSF motor	◎	FATAL! CSFM ALARM	Abnormally high current of motor driver was detected.
Overload alarm	◎	FATAL! OVERLOAD ALARM	An overload occurred during printing, and tripartite printing was performed. However, the power source voltage was not restored.
Low voltage alarm	◎	FATAL! LOW VOLT ALARM	The power source voltage dropped below the specified level when no printing was in progress.
Fire check alarm Print Head	◎	FATAL! HEAD ALARM	Abnormally long driving of print head driver was detected.
High voltage alarm	◎	FATAL! HIGH VOLT ALARM	Over voltage of power source was detected.
APTC gap alarm	◎	FATAL! APTC GAP ALARM	During the APTC operation, paper was detected immediately after the start of approach motion, or no paper was detected.
APTC home position sensor alarm	◎	FATAL! APTC HPS ALARM	During the APTC operation, no reference position was detected.
ROM/RAM alarm	◎	FATAL! ROM/RAM ALARM	A sum-check error or read/write error occurred, or no CG-ROM is mounted.

◎ : Blinking

CHAPTER 4 MAINTENANCE

This chapter explains the maintenance levels 1 and 2 for cleaning, lubrication, inspection, and adjustment of the DL7600 printer

4.1 Overview

Designed using the latest technology, the DL7600 printer offers high reliability and easy maintenance. Parts requiring lubrication and adjustment have been reduced and the replacement of defective parts made easier than previous models.

The printers has self-diagnostics and indicates the occurrence of errors on the control panel if the printer malfunctions.

The printer also has the self-test print and hex dump functions to indicate whether an error is due to printer or the host and to test operation after error recovery.

4.2 Notes on USE

Note the following:

Do not connect or disconnect connectors or printed circuit boards while power is on.

Use screwdrivers, wrenches, and other tools suited to the parts being replaced. Do not leave screws or parts inside the printer.

Use only the specified type of oil, grease, and cleaning solutions. Be sure power is turned off before starting to replace parts.

4.3 Maintenance Tools

Table 4.1 lists the tools required for maintenance.

Table 4.1 Maintenance tools

No	Tool	Model(part number)	Maintenance level
1	Screwdriver	M2-M2.5(Phillips)(*1)	
2	Screwdriver	M3-M5(Phillips) (*1)	
3	Screwdriver	M2-M2.5(standard)(*1)	
4	Tweezers	M3-M5(standard) (*1)	
5	Spring hook		
6	Long-nosed pliers		
7	Thickness gage		
8	Platen gap adjustment gage	0.03 to 1 mm	
	Foil	D98L-1020-0639	

*1 A magnetized screwdriver is convenient.

2 For fitting E-ring.

4.4 Maintenance levels

Maintenance for the DL7600 printer is done at two levels.

Level 1 maintenance includes cleaning and lubrication.

Level 2 maintenance includes level 1 items, plus replacement of PC boards, units, and mechanical subassemblies, and adjustment after replacement.

4.5 Preventive Maintenance

No periodic maintenance is required. However keeping the printer clean lengthens its service life and MTBF

4.6 Part Drawings

This section gives basic components and their location.

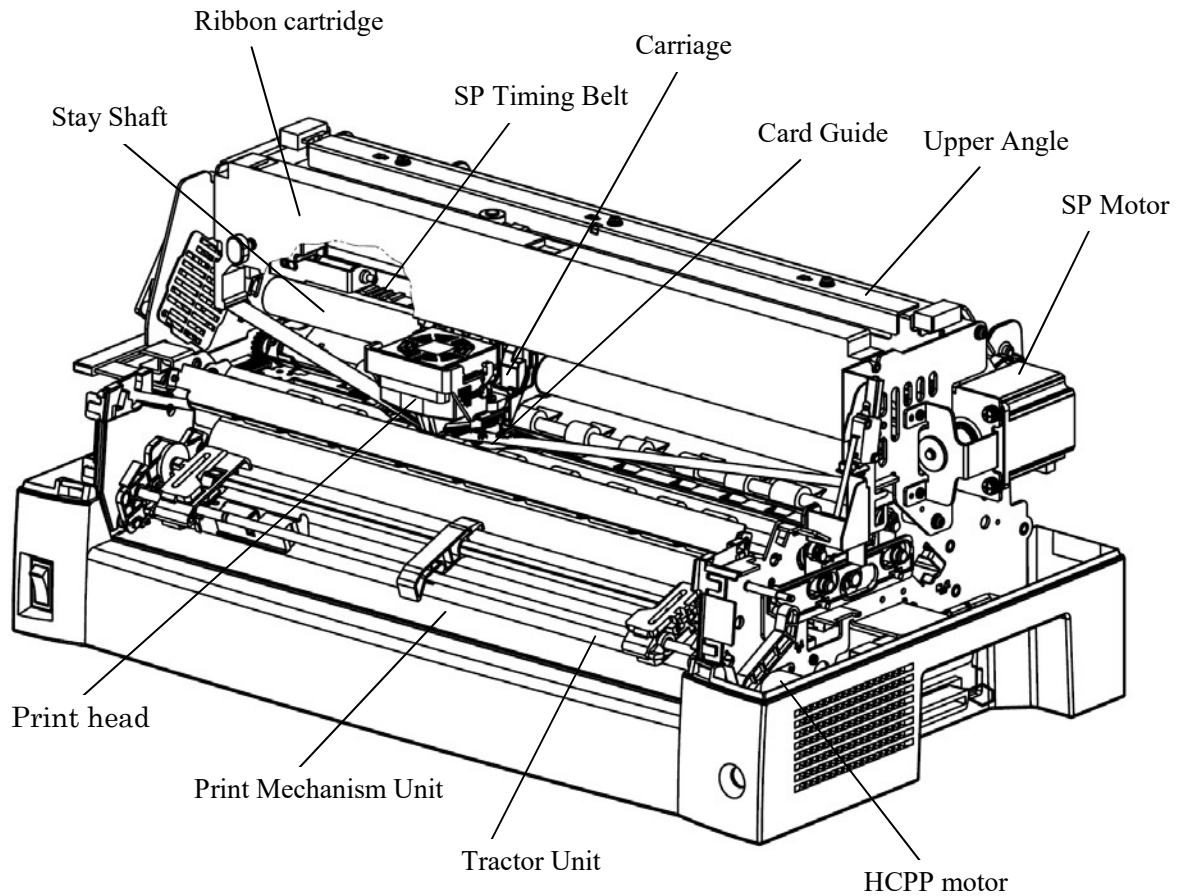


Figure 4.1 Part Drawings

4.7 Parts That must not be Disassembled

This section gives the locations of parts that must not be disassembled. Table 4.2 lists components not to be disassembled and whose mounting screws are not to be loosened or removed. Parts not to be Disassembled

No.	Components	Parts	Remark
1	Frames (L) and (R)	All screws	
2	Space motor	All screws and pulleys	
3	Print head		
4	Upper Angle	3 screws	Gage for Adjustment is necessary
5	Card Guide	2 screws	

Upper Angle

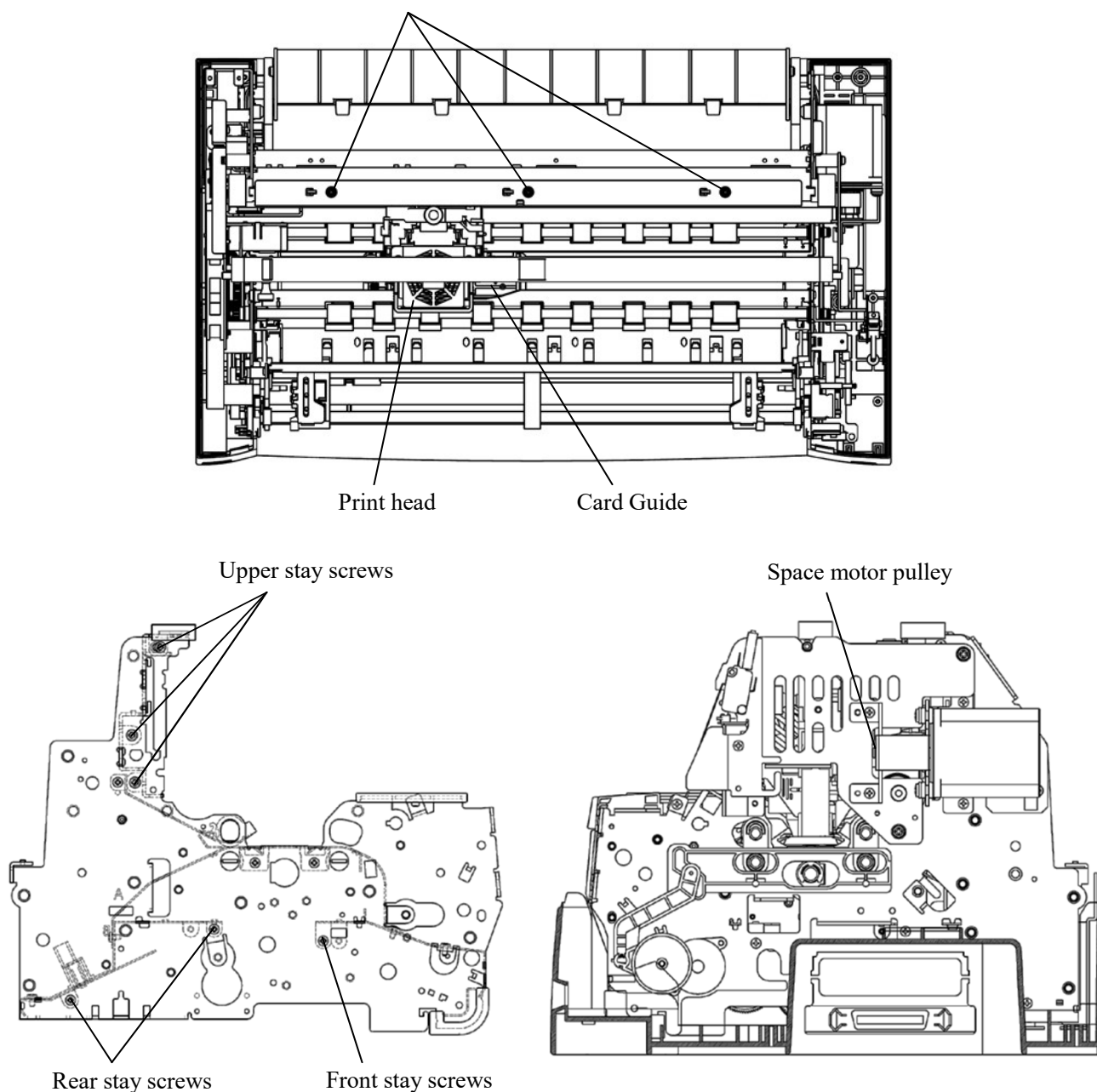


Figure 4.2 Parts That must not be disassembled

4.8 Level 1 Maintenance

Level 1 maintenance includes only cleaning and lubrication. These can be performed without removing covers although Figure 4.3 shows the printer with the covers removed.

Check the DL7600 printer inside for paper particles, dust, and dirt, and remove these as explained below. After cleaning, lubricate moving parts.

Location	Cleaning procedure	Remarks
Paper path	Remove paper particles and dirt	
Top of print head	Remove ribbon debris, paper scraps, and other contaminants.	
Card guide	Remove ribbon debris, paper scraps, and other contaminants.	
Platen surface	Clean the surface with soft cloth	*1
Stay shaft	Remove dust from the surface of the shaft and clean it with soft cloth.	Refer to the lubrication specifications.

*1 If paper becomes smeared or dirty, clean the platen. Use a very small amount of alcohol and wipe with clean cloth.

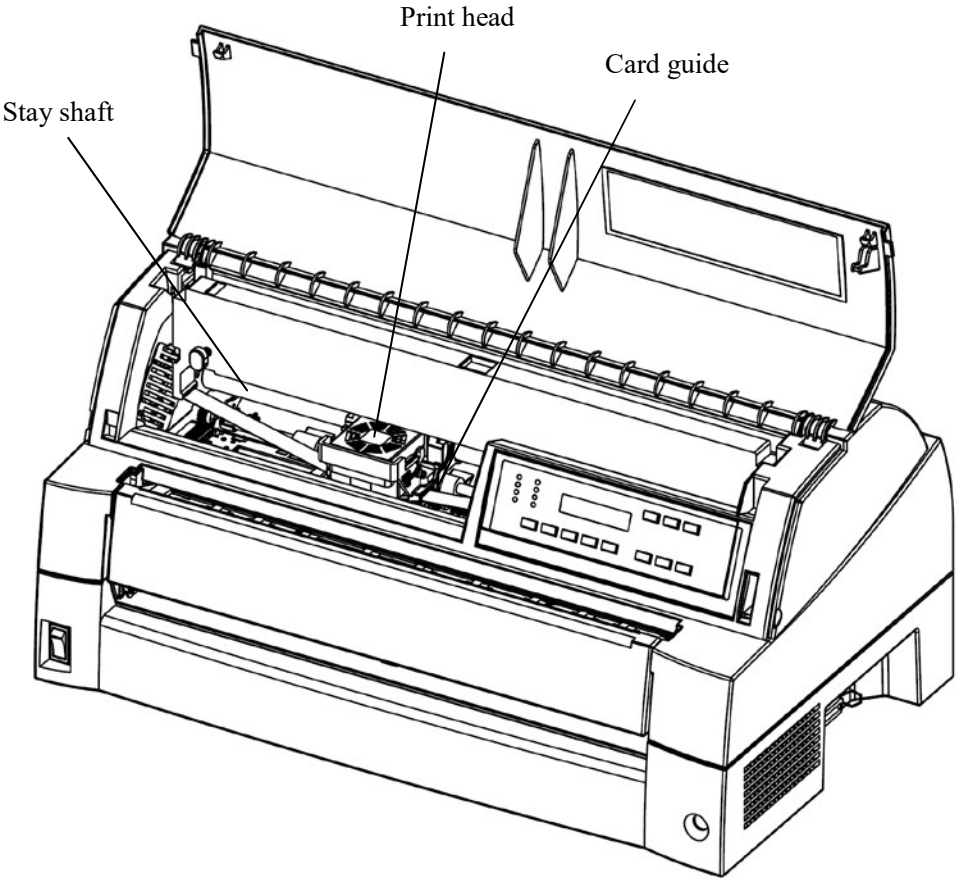


Figure 4.3 Cleaning and lubrication

4.9 Level 2 maintenance

Level 2 maintenance includes lubrication, adjustment, and parts replacement. Level 1 maintenance should be done at the same time.

4.9.1 Parts replacement

- Remember the following notes when replacing any component.
- Keep working area clean.
- Turn off power to equipment and unplug it before disassembled.
- Follow procedures carefully. Do not disassemble the parts that are not to be disassembled.
- Store disassembled parts in a clean place where they will not get lost.
- Check parts for number and shape after replacement, and adjust them if necessary.
- Reassemble the printer, following the steps in reverse order of disassembly.
- Confirm that all connectors are connected correctly.

RECOMMENDED SPARE PARTS

The following table lists parts and product numbers to be used when replacing spare parts, and the sections that explain the replacement:

				Area	FCI	FEL	FSBT	ASIA	FTL	FAL	FSE
--	--	--	--	------	-----	-----	------	------	-----	-----	-----

Item	Description	Parts number	Section to be referred to	Product number KA02039-	B103	B203	B110	B210	B117	B217	B219	B219	B228	B251	B115	B215
				Interface	P+USB	P+RS	P+USB	P+RS	P+USB	P+RS	P+USB	P+RS	P+RS	P+RS	P+USB	P+RS
				Revision												
1	PR. MECHA ASY	KA02039-D201	4. 9. 1 (13)		○	○	○	○	○	○	○	○	○	○	○	○
2	ROM BOARD KIT	KA02039-D202	4. 9. 1 (16)		○		○				○					
3	ROM BOARD KIT	KA02039-D203	4. 9. 1 (16)						○							
4	ROM BOARD KIT	KA02039-D204	4. 9. 1 (16)			○		○				○		○		
5	ROM BOARD KIT	KA02039-D205	4. 9. 1 (16)							○						
6	ROM BOARD KIT	KA02039-D206	4. 9. 1 (16)										○			
7	ROM BOARD KIT	KA02039-D244	4. 9. 1 (16)												○	
8	ROM BOARD KIT	KA02039-D247	4. 9. 1 (16)													○
9	POWER UNIT	KA02039-D207	4. 9. 1 (15)		○	○							○			
10	POWER UNIT	KA02039-D208	4. 9. 1 (15)				○	○	○	○	○	○		○	○	○
11	REACTOR	KA02039-D209	4. 9. 1 (20)				○	○	○	○	○	○		○	○	○
12	OP UNIT	KA02039-D210	4. 9. 1 (10)				○	○			○	○			○	○
13	OP UNIT	KA02039-D211	4. 9. 1 (10)		○	○								○		
14	OP UNIT	KA02039-D212	4. 9. 1 (10)										○			
15	OP UNIT	KA02039-D213	4. 9. 1 (10)						○	○						
16	FAN UNIT 2	KA02039-D214	4. 9. 1 (21)		○	○	○	○	○	○	○	○	○	○	○	○
17	CARRIER UNIT	KA02039-D215	4. 9. 1 (42)		○	○	○	○	○	○	○	○	○	○	○	○
18	STAY SHAFT	KA02039-D216	4. 9. 1 (42)		○	○	○	○	○	○	○	○	○	○	○	○
19	TRACTOR UNIT	KA02038-D217	4. 9. 1 (1)		○	○	○	○	○	○	○	○	○	○	○	○
20	CARD GUIDE UNIT	KA02039-D217	4. 9. 1 (40)		○	○	○	○	○	○	○	○	○	○	○	○
21	APTC SW ASY	KA02039-D218	4. 9. 1 (30)		○	○	○	○	○	○	○	○	○	○	○	○
22	SP MOTOR ASY	KA02039-D219	4. 9. 1 (27)		○	○	○	○	○	○	○	○	○	○	○	○
23	PLATEN ROLL ASY	KA02039-D220	4. 9. 1 (47)		○	○	○	○	○	○	○	○	○	○	○	○
24	APTC MOTOR	KA02039-D221	4. 9. 1 (32)		○	○	○	○	○	○	○	○	○	○	○	○
25	LF MOTOR	KA02039-D222	4. 9. 1 (28)		○	○	○	○	○	○	○	○	○	○	○	○
26	TR MOTOR	KA02039-D223	4. 9. 1 (29)		○	○	○	○	○	○	○	○	○	○	○	○
27	HCPP MOTOR	KA02038-D226	4. 9. 1 (34)		○	○	○	○	○	○	○	○	○	○	○	○
28	SP TIMING BELT	KA02039-D224	4. 9. 1 (44)		○	○	○	○	○	○	○	○	○	○	○	○
29	PS PCA	KA02038-D228	4. 9. 1 (37)		○	○	○	○	○	○	○	○	○	○	○	○
30	TRPES ASY	KA02038-D229	4. 9. 1 (39)		○	○	○	○	○	○	○	○	○	○	○	○

Item	Description	Parts number	Section to be referred to	Area	FCI		FEL		FSBT		ASIA		FTL	FAL	FSE	
				Product number KA02039-	B103	B203	B110	B210	B117	B217	B219	B219	B228	B251	B115	B215
				Interface	P+USB	P+RS	P+USB	P+RS	P+USB	P+RS	P+USB	P+RS	P+RS	P+RS	P+USB	P+RS
				Revision												
31	SENSOR PCA	KA02038-D230	4. 9. 1 (26)		○	○	○	○	○	○	○	○	○	○	○	○

32	RELAY CABLE 35P	KA02038-D231	4. 9. 1 (25)		○	○	○	○	○	○	○	○	○	○	○	○
33	CSF CONNECT PCA	KA02038-D232	4. 9. 1 (23, 24)		○	○	○	○	○	○	○	○	○	○	○	○
34	FRONT CSF CABLE	KA02039-D225	4. 9. 1 (23)		○	○	○	○	○	○	○	○	○	○	○	○
35	REAR CSF CABLE	KA02038-D234	4. 9. 1 (24)		○	○	○	○	○	○	○	○	○	○	○	○
36	HCPP SW ASY	KA02039-D226	4. 9. 1 (38)		○	○	○	○	○	○	○	○	○	○	○	○
37	S. COVER TR F	KA02038-D236	4. 9. 1 (39)		○	○	○	○	○	○	○	○	○	○	○	○
38	S. COVER TR R	KA02038-D237	4. 9. 1 (39)		○	○	○	○	○	○	○	○	○	○	○	○
39	LF TIMING BELT	KA02039-D227	4. 9. 1 (46)		○	○	○	○	○	○	○	○	○	○	○	○
40	DV ROLLER ASY2	KA02038-D239	4. 9. 1 (50)		○	○	○	○	○	○	○	○	○	○	○	○
41	NIP ROLLER ASY	KA02038-D240	4. 9. 1 (49)		○	○	○	○	○	○	○	○	○	○	○	○
42	NIP SPRING 1	KA02038-D241	4. 9. 1 (48)		○	○	○	○	○	○	○	○	○	○	○	○
43	NIP SPRING 2	KA02038-D242	4. 9. 1 (48)		○	○	○	○	○	○	○	○	○	○	○	○
44	PRINT HEAD	KA02033-E223	4. 9. 1 (9)		○	○	○	○	○	○	○	○		○	○	○
45	PRINT HEAD	KA02033-E229	4. 9. 1 (9)									○				
46	STACKER ASY	KA02038-D243	4. 9. 1 (4)		○	○	○	○	○	○	○	○	○	○	○	○
47	RF MOTOR ASY	KA02039-D228	4. 9. 1 (31)		○	○	○	○	○	○	○	○	○	○	○	○
48	SP FAN UNIT	KA02039-D229	4. 9. 1 (35)		○	○	○	○	○	○	○	○	○	○	○	○
49	FLAP	KA02038-D244	4. 9. 1 (7)		○	○	○	○	○	○	○	○	○	○	○	○
50	AC SWITCH ASY	KA02039-D230	4. 9. 1 (18)		○	○	○	○	○	○	○	○	○	○	○	○
51	INLET ASY	KA02039-D231	4. 9. 1 (19)		○	○	○	○	○	○	○	○	○	○	○	○
52	TILT BAR	KA02038-D248	4. 9. 1 (13)		○	○	○	○	○	○	○	○	○	○	○	○
53	STACKER PLATE	KA02038-D249	4. 9. 1 (3)		○	○	○	○	○	○	○	○	○	○	○	○
54	FT COVER ASY	KA02039-D232	4. 9. 1 (5)		○	○	○	○	○	○	○	○	○	○	○	○
55	FAN UNIT	KA02039-D233	4. 9. 1 (14)		○	○	○	○	○	○	○	○	○	○	○	○
56	FAN ASY	KA02039-D234	4. 9. 1 (33)		○	○	○	○	○	○	○	○	○	○	○	○
57	FRONT COVER ASY	KA02039-D235	4. 9. 1 (11)		○	○	○	○	○	○	○	○		○	○	○
58	FRONT COVER ASY	KA02038-D252	4. 9. 1 (11)									○				
59	LAN RELAY PCA	KA02038-D254	4. 9. 1 (17)		○		○		○		○				○	
60	LAN CABLE 17P	KA02038-D255	4. 9. 1 (17)		○		○		○		○				○	
61	INLK SW UNIT	KA02039-D236	4. 9. 1 (36)		○	○	○	○	○	○	○	○	○	○	○	○
62	TOF S. L ASY	KA02039-D237	4. 9. 1 (41)		○	○	○	○	○	○	○	○	○	○	○	○
63	TOF S. R ASY	KA02039-D238	4. 9. 1 (41)		○	○	○	○	○	○	○	○	○	○	○	○
64	C. CABLE ASY	KA02039-D239	4. 9. 1 (43)		○	○	○	○	○	○	○	○	○	○	○	○
65	CES SCALE	KA02039-D240	4. 9. 1 (45)		○	○	○	○	○	○	○	○	○	○	○	○
66	PACKING BOX	KA02039-D241	4. 9. 1 (-)		○	○	○	○	○	○	○			○	○	○
67	PACKING BOX	KA02038-D264	4. 9. 1 (-)									○				
68	CUSHION KIT	KA02039-D242	4. 9. 1 (-)		○	○	○	○	○	○	○	○	○	○	○	○
69	OP CABLE	KA02039-D243	4. 9. 1 (22)		○	○	○	○	○	○	○	○	○	○	○	○

(1) Tractor Unit replacement

Front feed tractor.

Removal

1. Raise the paper table.
2. During pressing the Rock lever, Lift the left and right sides of the tractor unit, and then remove the tractor unit.

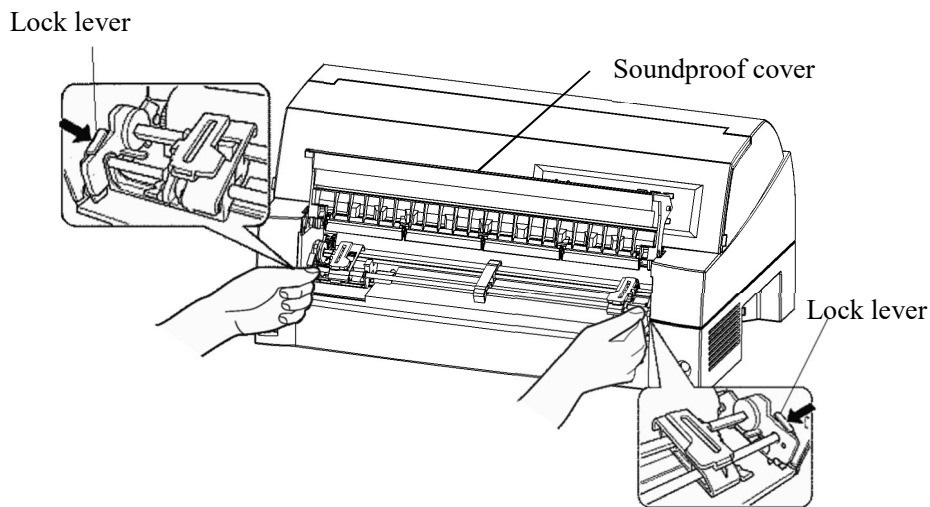


Figure 4.4 Front feed tractor Removal

Installation

1. Engage the U-grooves on the left and right sides of the tractor unit with the counterpart pins on the printer. (fit the ditch of left pin, there is any ditch of the right pin)
2. Press down the front shaft of the tractor unit to lock the unit.
3. Make sure that left and right mounting pins 2 have been hooked by lock levers.

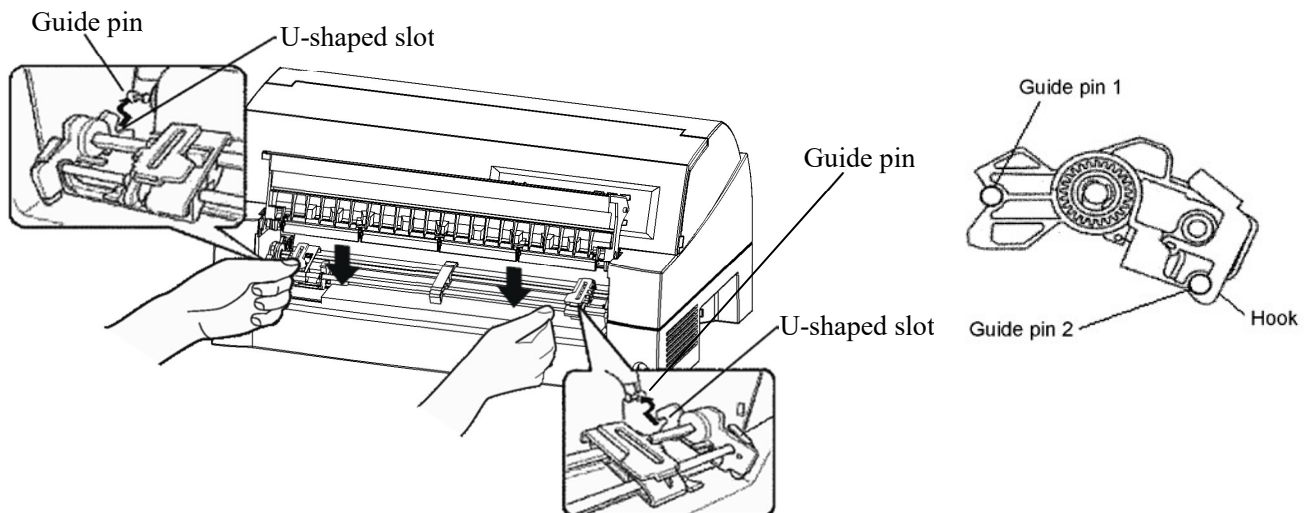


Figure 4.5 Front feed tractor Installation

Rear feed tractor.

Removal

1. During pressing the Rock lever, Lift the left and right sides of the tractor unit, and then remove the tractor unit.

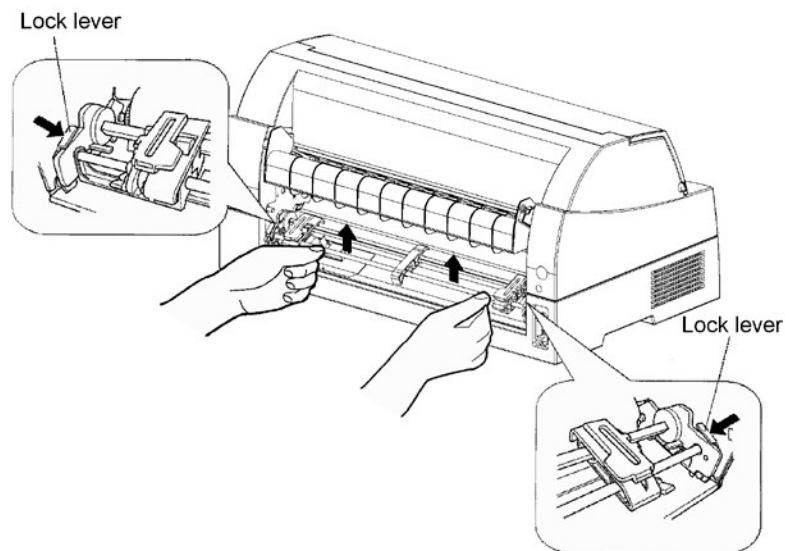


Figure 4.6 Rear feed tractor removal

Installation

1. Engage the U-grooves on the left and right sides of the tractor unit with the counterpart pins on the printer.
(fit the ditch of left pin, there is any ditch of the right pin)
2. Press down the front shaft of the tractor unit to lock the unit.

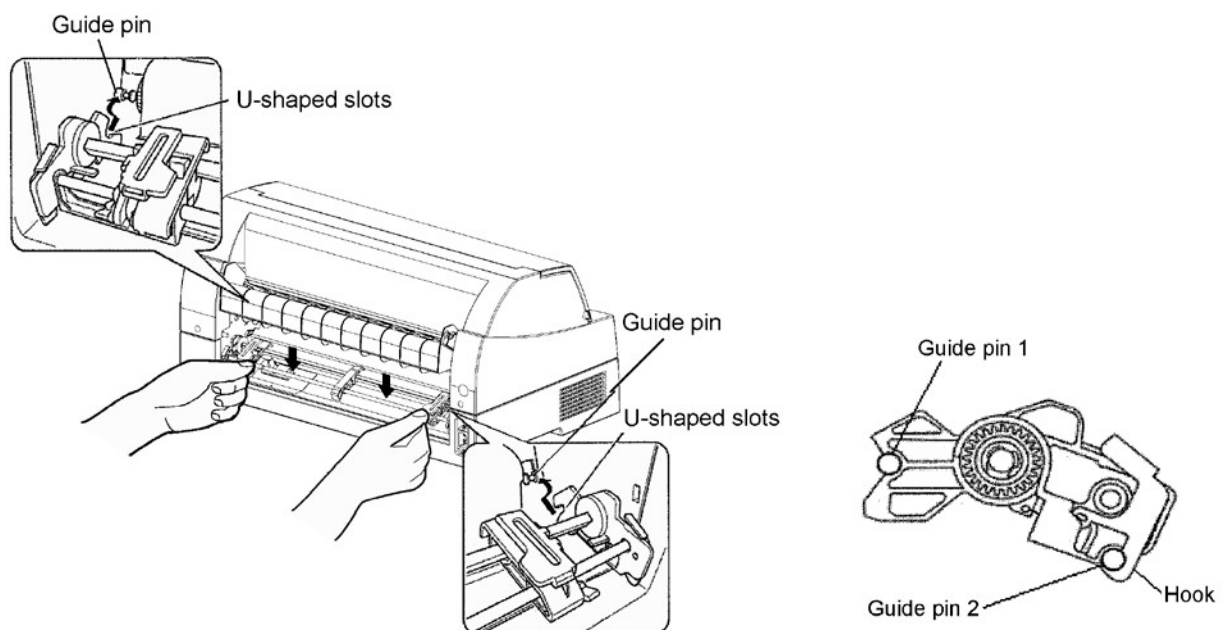


Figure 4.7 Rear feed tractor Installation

(2) Cut Sheet Feeder replacement

Front cut sheet feeder

Removal

1. Turn off the printer power.
2. Disconnect the cut sheet feeder cable.
3. Raise the paper table, then hold both ends of the cut sheet feeder and pull it off.

Installation

1. Install the cut sheet feeder by reversing the removal procedure.
2. Turn off the printer power.
3. Raise the paper table, then engage the U-grooves on both ends of the cut sheet feeder with the mounting pins on the printer and lower the cut sheet feeder carefully.
(Push in the cut sheet feeder while aligning label A on the feeder with label A on the right side of the printer.)
4. Connect the cut sheet feeder cable connector to the connector on the front right of the printer.
5. Insert the connector with the arrow side facing upward.

Note. When attaching the cut sheet feeder to the front of the printer, removing the tractor and replacing soundproof cover with large or small paper table are necessary.

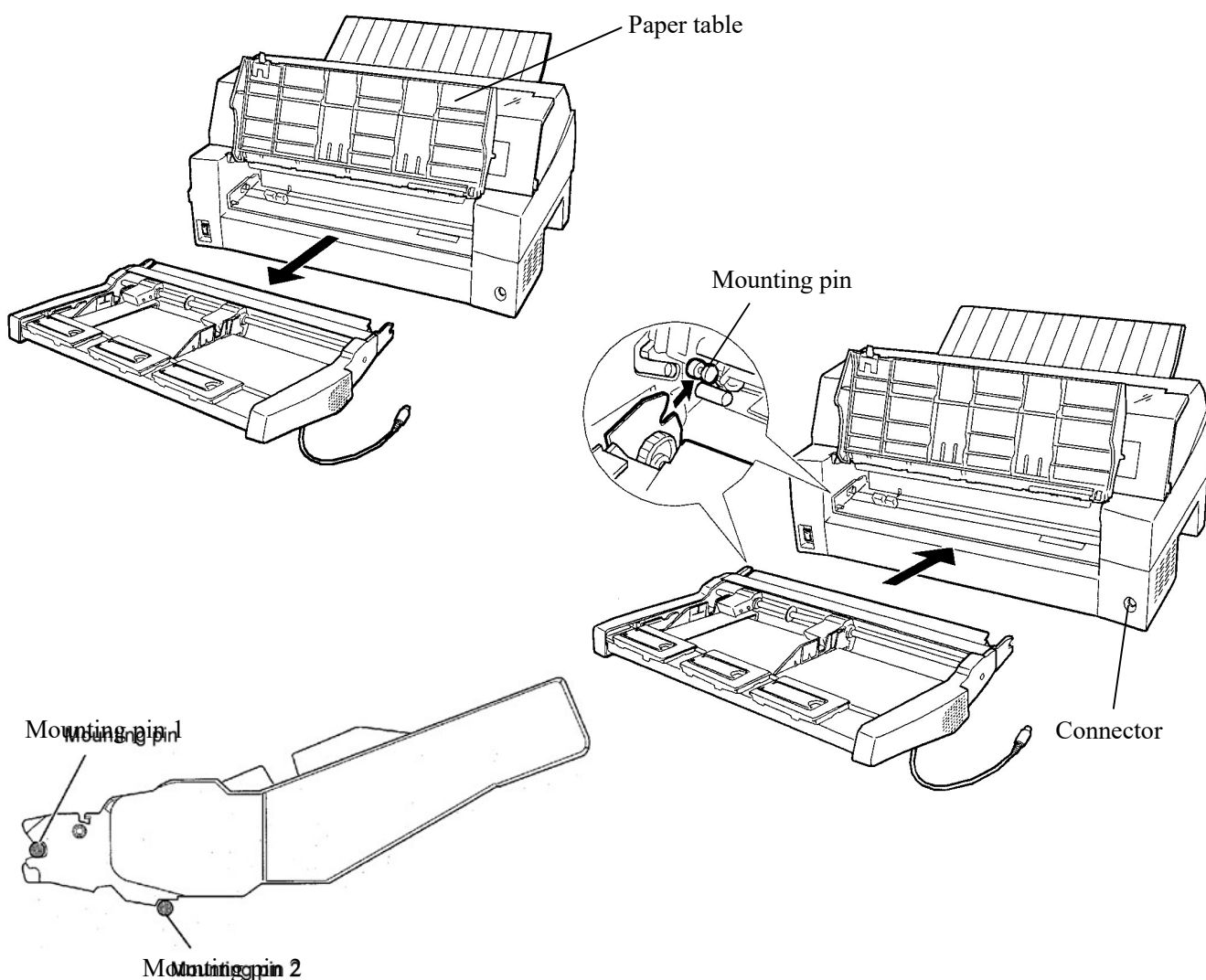


Figure 4.8 Front Cut Sheet Feeder replacement

Rear cut sheet feeder

Removal

1. Turn off the printer power.
2. Disconnect the cut sheet feeder connector.

3. Raise the stacker table, then hold both ends of the cut sheet feeder and pull it off.

Installation

1. Turn off the printer power.
2. Raise the stacker plate, then engage the U-grooves on both ends of the cut sheet feeder with the mounting pins on the printer and lower the cut sheet feeder carefully.
(Push in the cut sheet feeder while aligning label A on the feeder with label A on the right side of the printer.)
3. Lower the cut sheet feeder like turning it using the mounting pins as fulcrums.
4. Connect the cut sheet feeder cable connector to the connector on the rear left of the printer.
5. Insert the connector with the arrow side facing upward.

Note. When attaching the cut sheet feeder to the rear of the printer, replacing the stacker with large stacker is necessary.

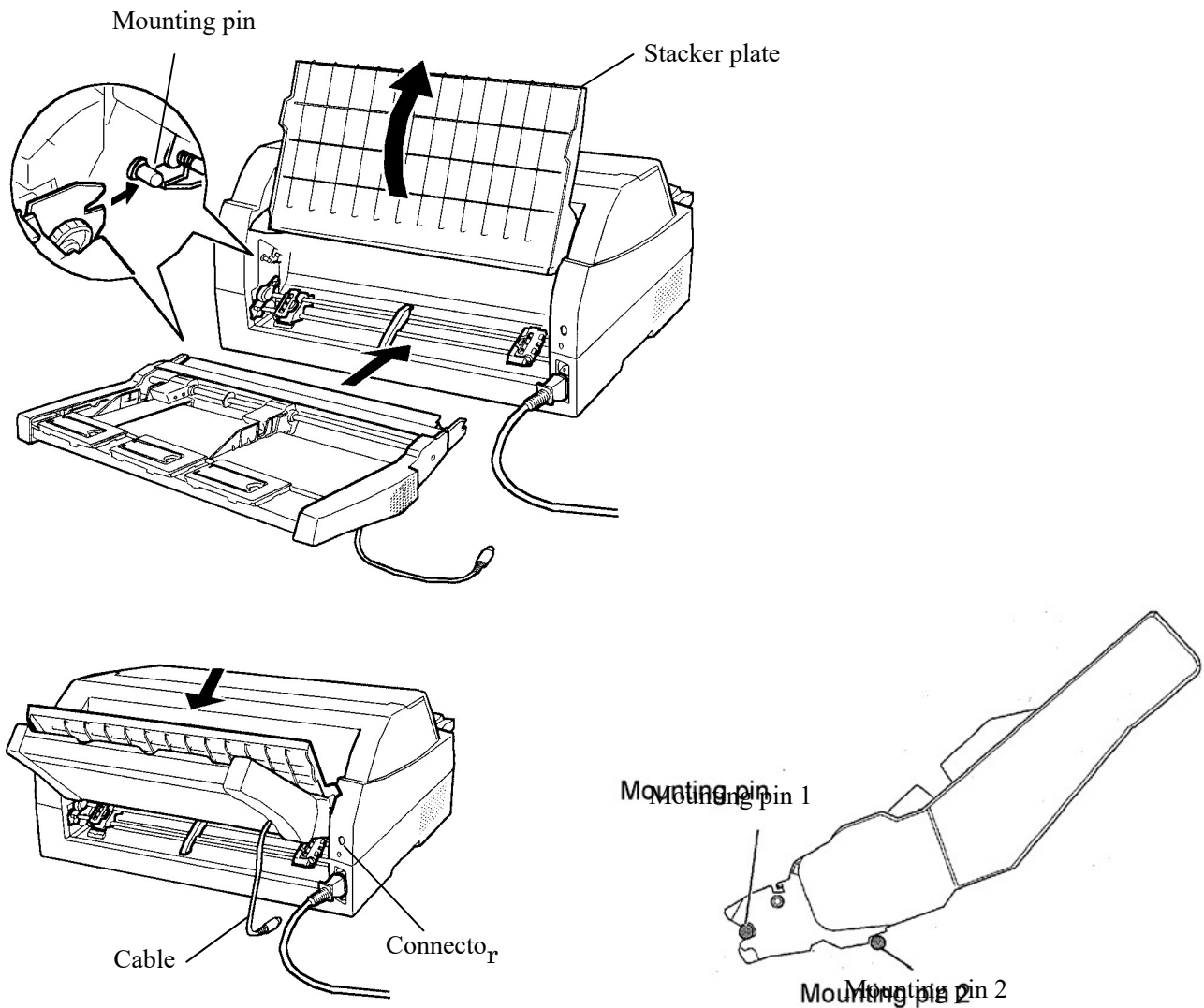


Figure 4.9 Rear Cut Sheet Feeder replacement

(3) Stacker Plate replacement

Removal

1. Raise the stacker plate in the direction indicated by an arrow.

2. Stretch the left and right sides of the stacker frame outward to disengage the stacker plate projections from the frame.

Installation

1. Install the stacker plate by reversing the removal procedure.

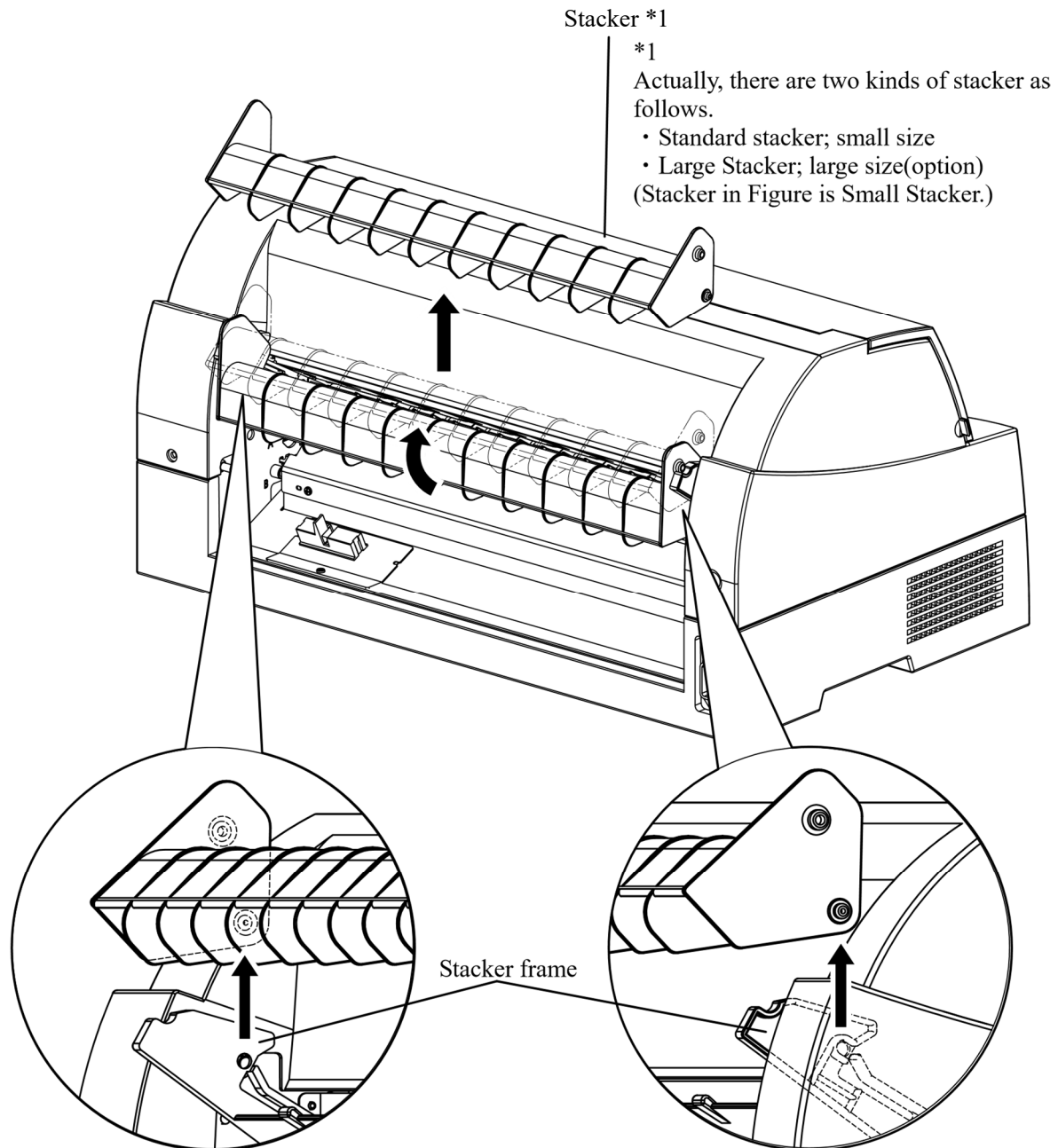


Figure 4.10 Stacker Plate replacement

(4) Stacker Unit replacement

Removal

1. While pressing down the lock levers on the left and right sides of the stacker unit, pull out the stacker unit to the back of the printer.

Installation

1. Install the stacker unit by reversing the removal procedure.

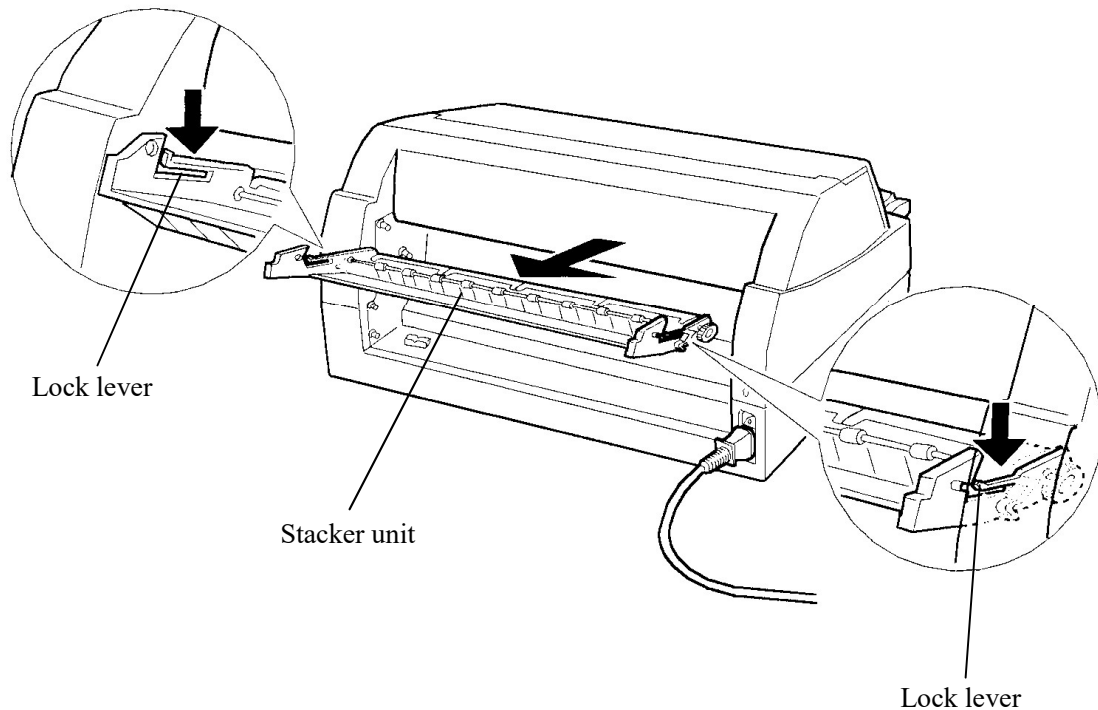


Figure 4.11 Stacker Frame replacement

(5) Soundproof cover replacement

Removal

1. After opening the soundproof cover and adjusting it to a tilted position, remove the soundproof cover lifting it to separate the left and right protrusions on the soundproof cover ends from the grooves on the cover.

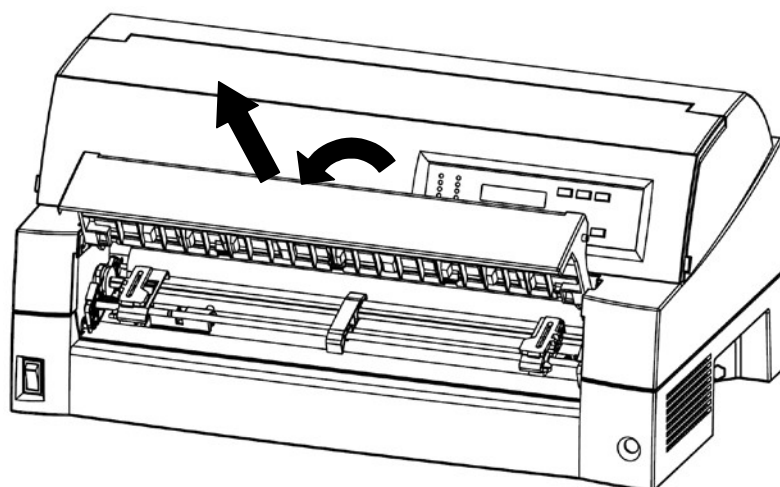


Figure 4.12 Soundproof cover removal

Installation

1. Insert the left and right protrusions on the paper table ends into the grooves on the cover as shown in the following figure.
2. Set the paper table in the normal position.

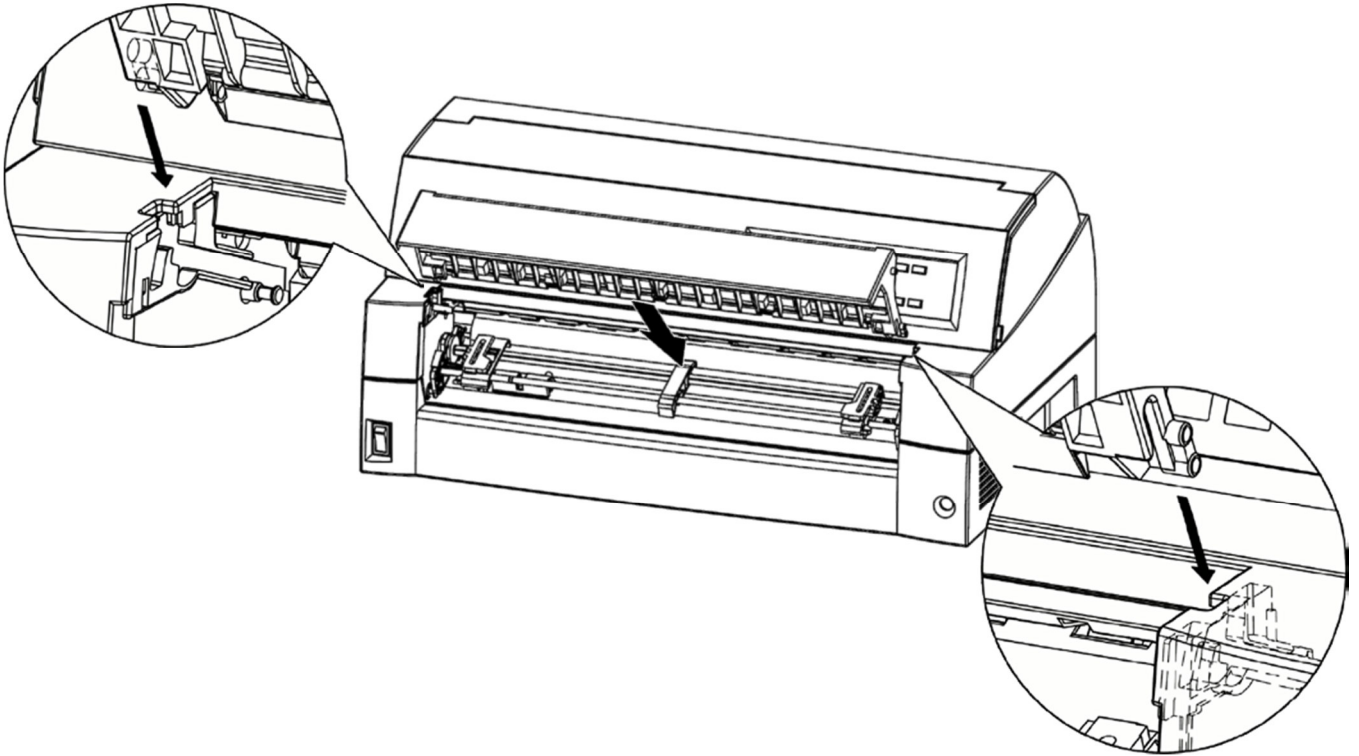


Figure 4.13 Soundproof cover Installation

(6) LAN card replacement

Removal

1. Remove the two screws.

2. Remove the LAN card.

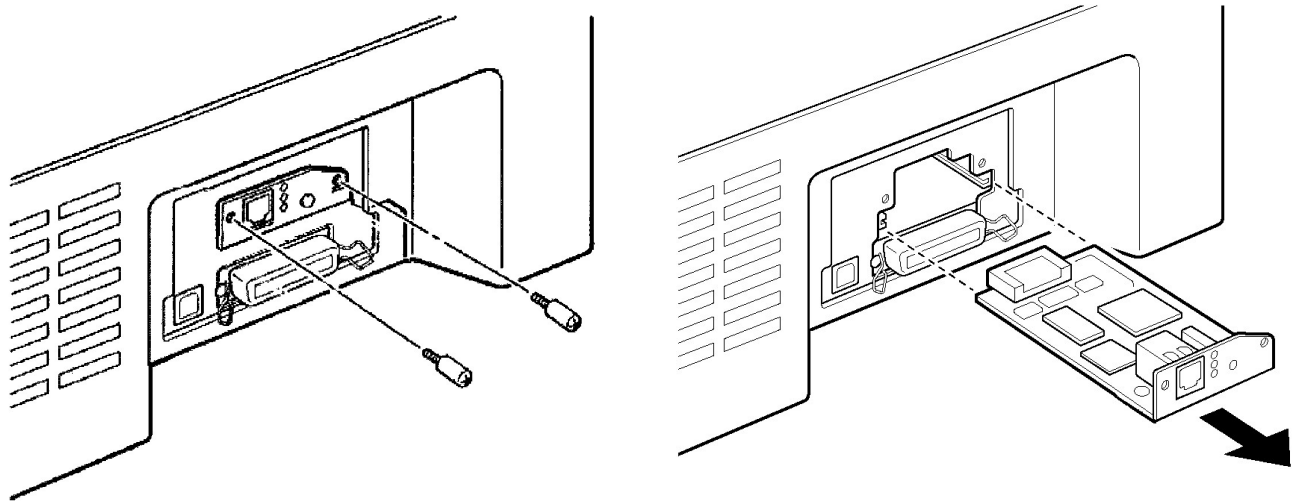


Figure 4.14 LAN card removal

Installation

1. Install the LAN card by reversing the removal procedure.

Note; Take care to insert the card into the guide rail correctly.

Setup of a LAN card is necessary. See the online manual in the CD of LAN card.

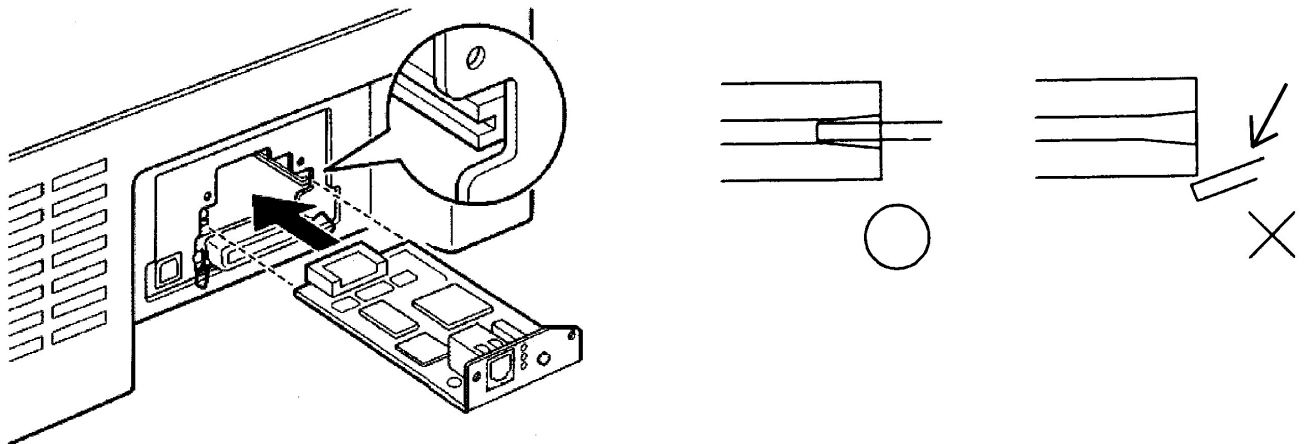


Figure 4.15 LAN card Installation

(7) Flap replacement

Removal

1. Remove the soundproof cover and stacker unit.
2. Remove the flap.

Installation

1. Install the flap by reversing the removal procedure.

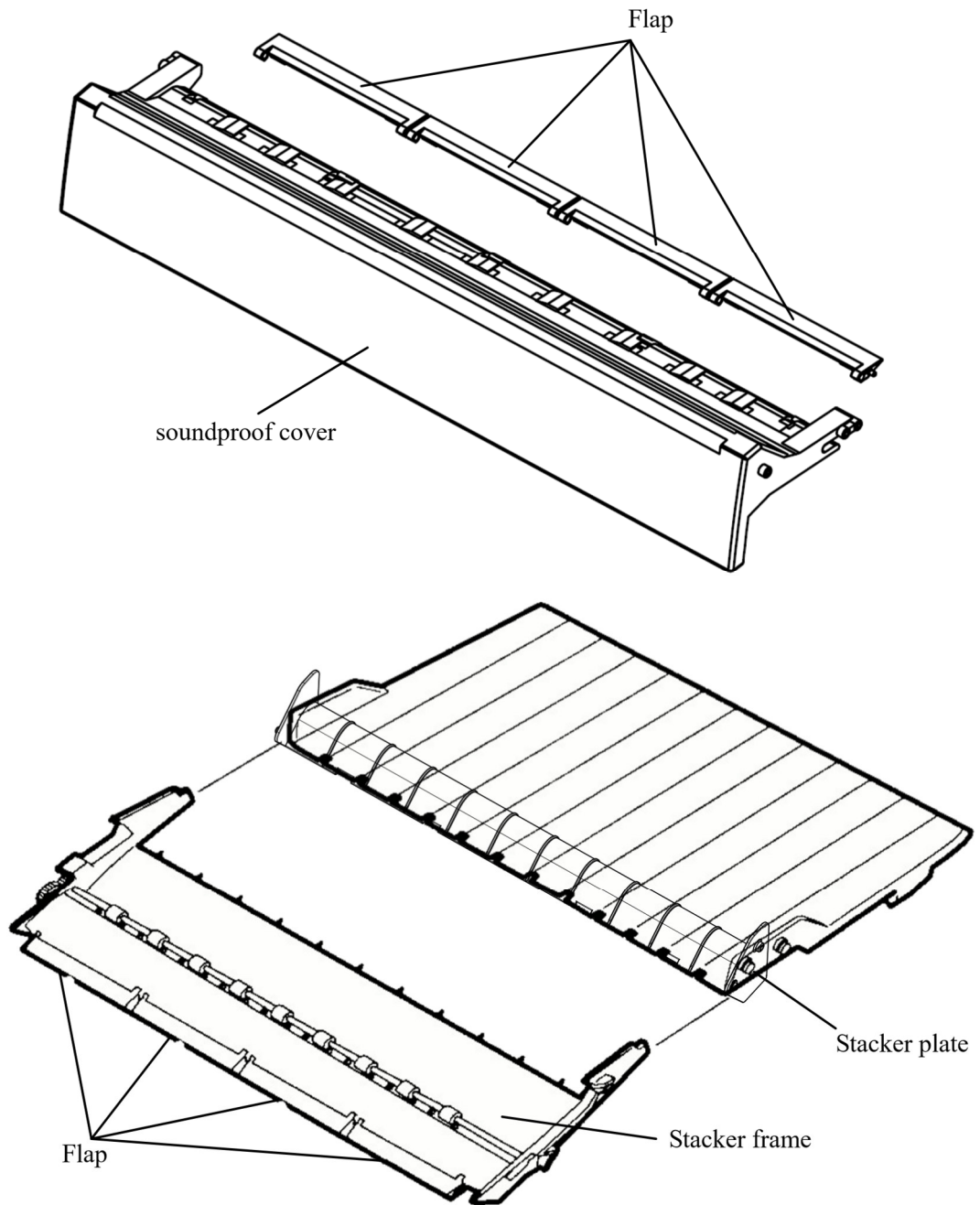


Figure 4.16 Flap replacement

(8) Ribbon Cassette replacement

Removal

1. Close the front cover, and turn the power on. Then the Print Head move to ribbon replace position.
2. Turn the power off. And open the front cover of the printer.
3. Open the control panel for easy installation of ribbon cassette., and a ribbon guide (green) is removed.
4. A ribbon cassette is raised to the front, Locke is removed, and it removes from a printer.

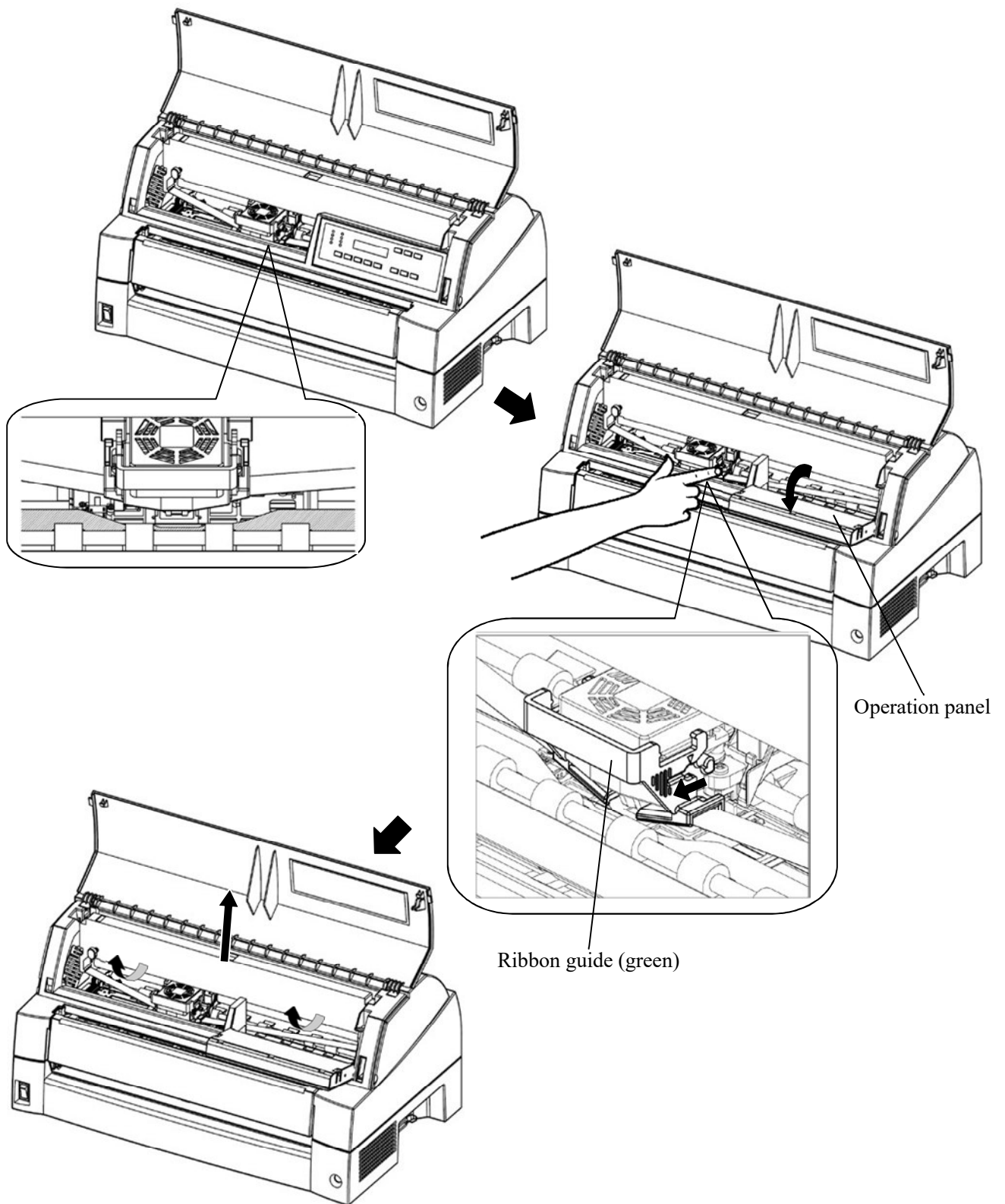


Figure 4.17 Ribbon cassette removal

Installation

1. Remove the new ribbon cassette from its package. Push in the two ribbon release tabs. The tabs snap into the cassette and the ribbon feed mechanism engages.
2. Remove the ribbon guide (green part) from the ribbon cassette. Don't turn the ribbon feed knob before installation.

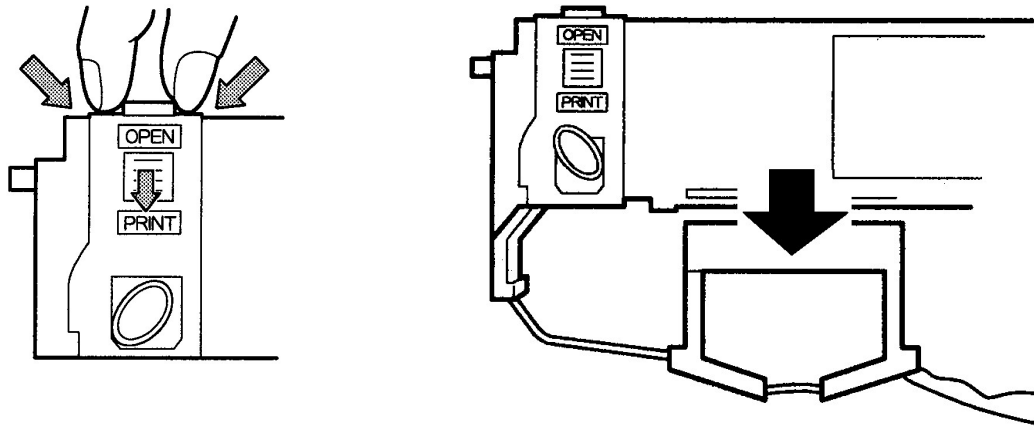


Figure 4.18 Ribbon cassette installation

3. Put the green ribbon guide into the space in front of print head. And then place the mounting pins (both side of ribbon cassette) on the slot of the printer cover. And then push the ribbon cassette so that the ribbon cassette is installed vertically.

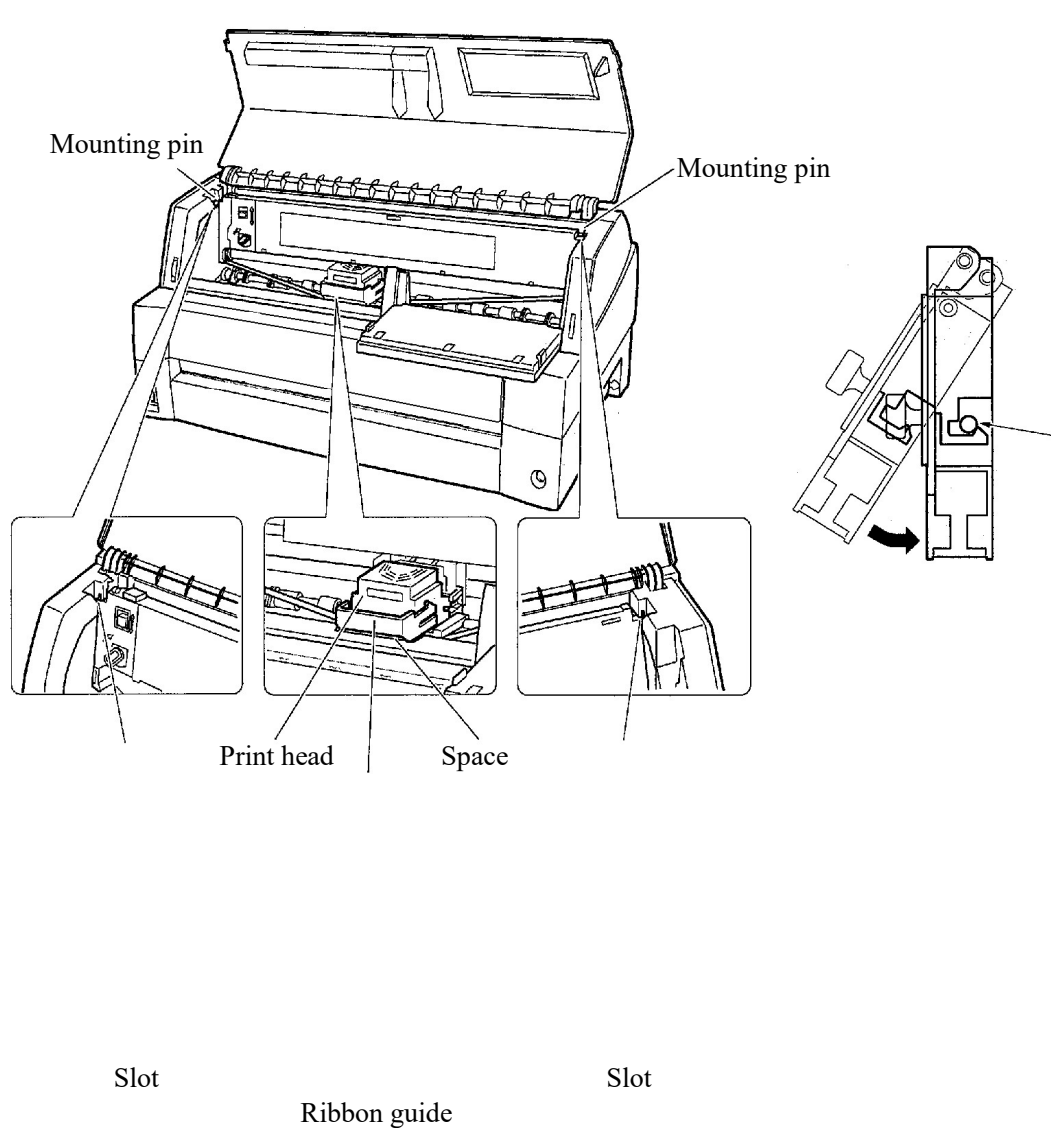


Figure 4.19 Ribbon cassette installation

4. Attach the green ribbon guide on the print head.

Please make sure that the ribbon slack lightly. (If the ribbon is strained, it will quirk when installation.) Push the green ribbon guide until the triangle mark "▼" meets the round projection of print head.

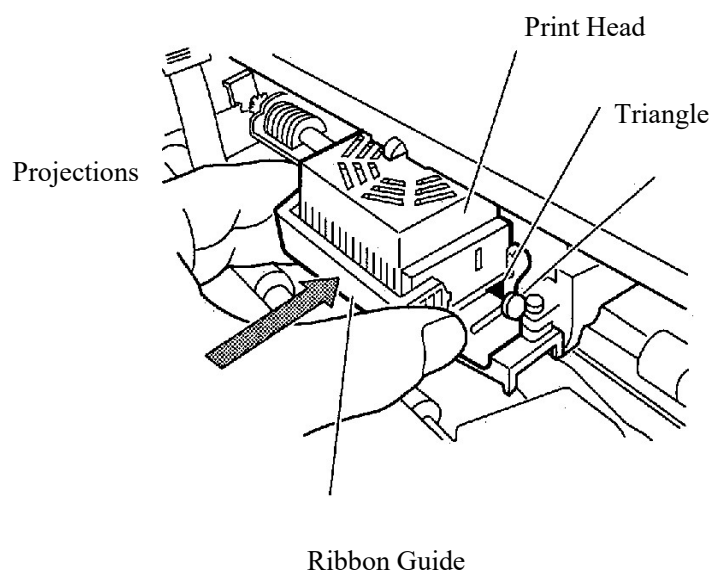


Figure 4.20 Ribbon cassette installation

5. Turn the ribbon feed knob clockwise to take up any slack in the ribbon.

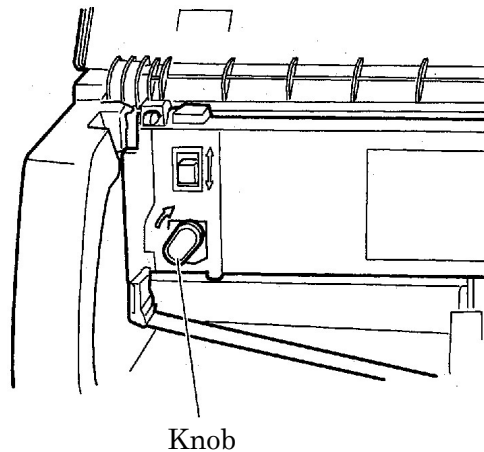


Figure 4.21 Ribbon cassette installation

6. Return the control panel..
7. Close the front cover of the printer.

NOTE

A Fujitsu ribbon cassette is recommended. Don't use other cassettes. If other cassettes are used, operating problems or a damage of the print head may be caused.

(9) Print head replacement



Caution Hot

At printing or after printing, print head is high temperature. Don't touch the print head still cool.

Removal

1. Turn off the printer.
2. Open the front cover of the printer and remove the ribbon cartridge.
3. Remove two screws.
4. The FAN connector is removed, the print head is lifted slowly up, and the print head is removed from

the print head connector.

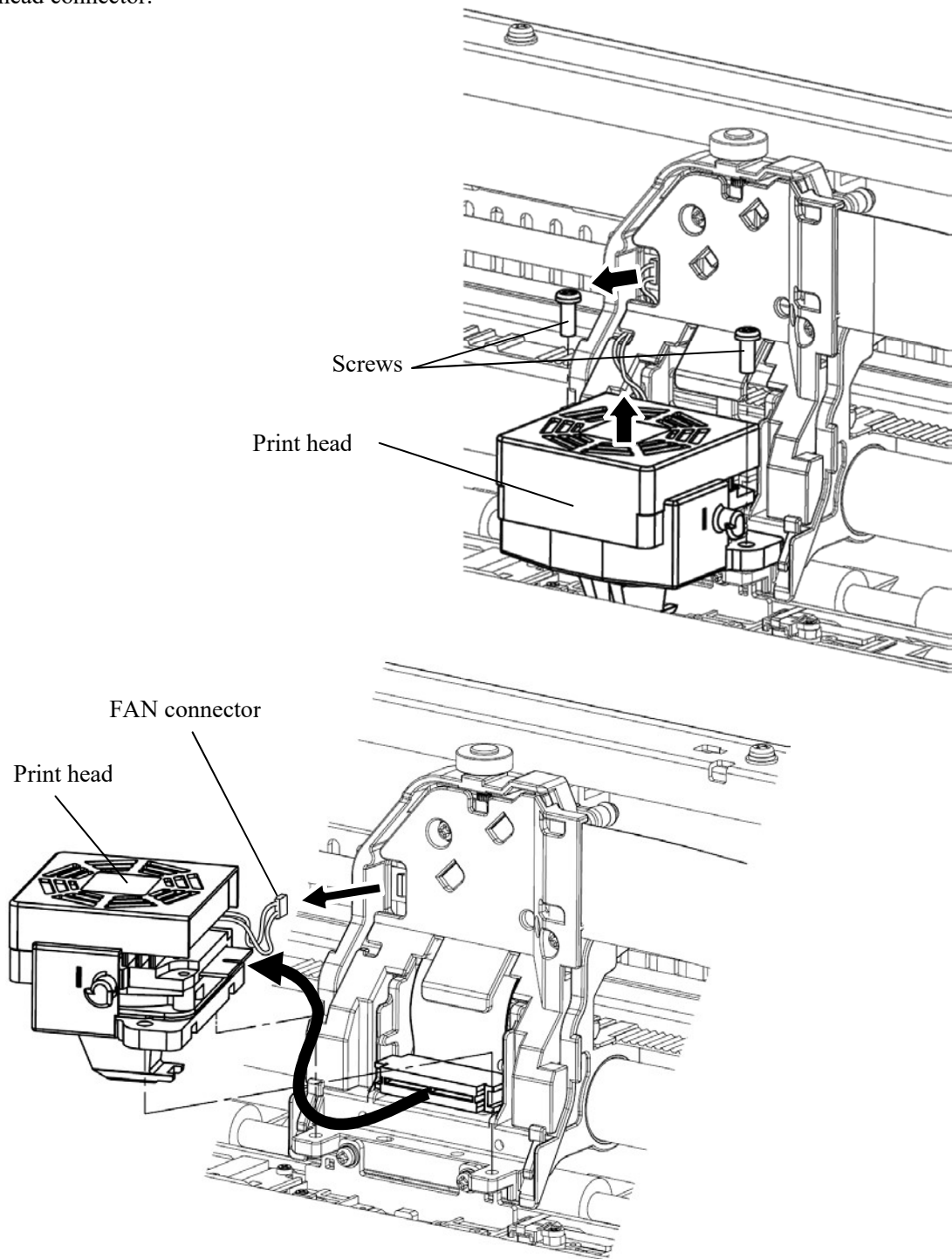
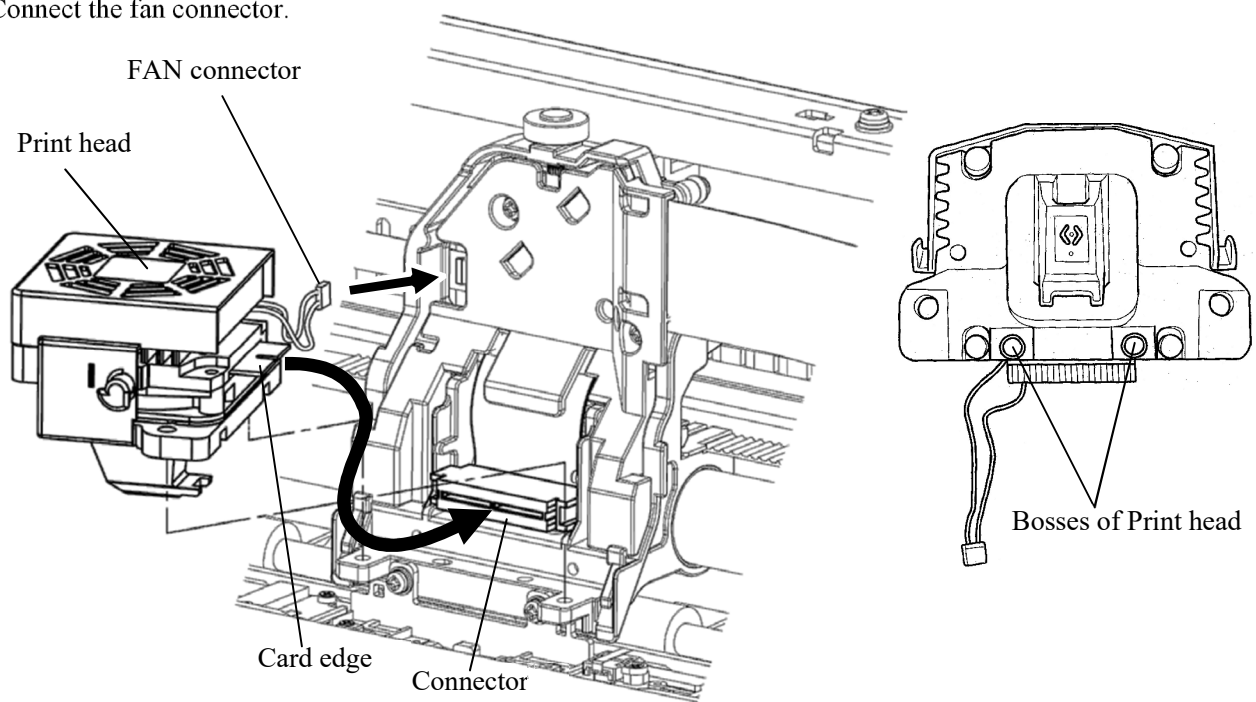


Figure 4.22 Print head removal

Installation

1. Connect the connector to the card edge of the print head.
2. Fit the mounting bosses of the print head into the holes on the carriage.

3. Connect the fan connector.



Note. Be carefully to insert the card edge straightly.

Figure 4.23 Print head Installation

4. Fix the print head by two screws..

5. Insert the fan cables under black plastic part.

Note. If the FAN cable protrude from black plastic part.

FAN cable may be damaged by ribbon feed mechanism on left side frame.

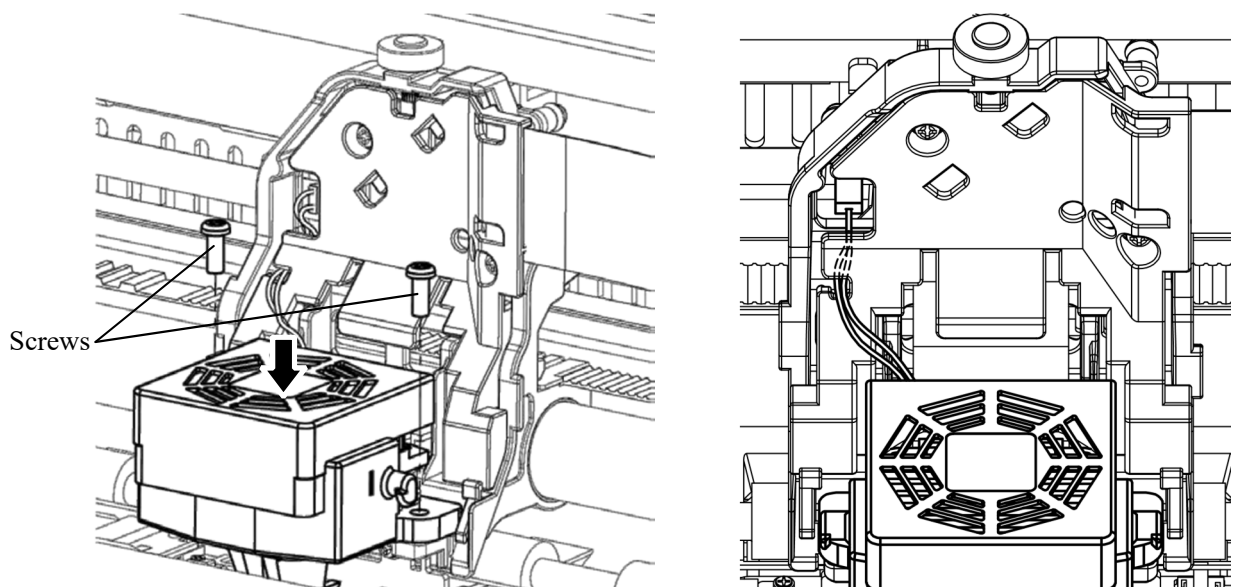


Figure 4.24 Print head Installation

Note: The following adjustments are required after installation:

- Bi-directional printing positions

(10) Control Panel Unit replacement

Removal

1. Open the front cover.
2. Unhook the control panel case at three positions, then pull out the control panel unit to the front.
3. Disconnect cable from the control panel board.

Installation

1. Install the control panel unit by reversing the removal procedure.

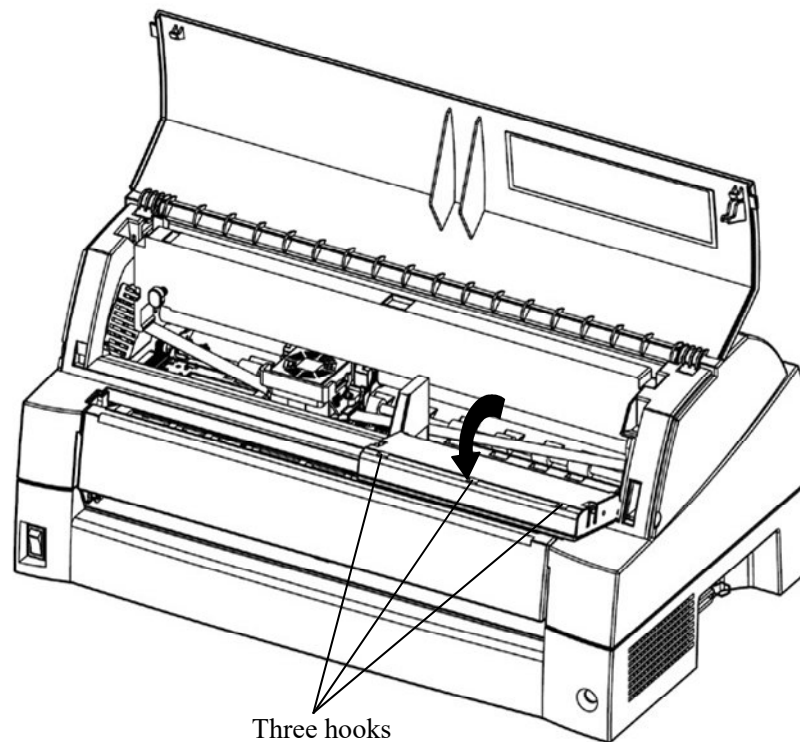


Figure 4.25 Control panel Unit replacement

(11) Front Cover replacement

Removal

1. Open the front cover .
2. Pull The hinge of the Front Cover slantwise then remove the front cover.

Installation

1. Install the front cover by reversing the removal procedure.

Front cover

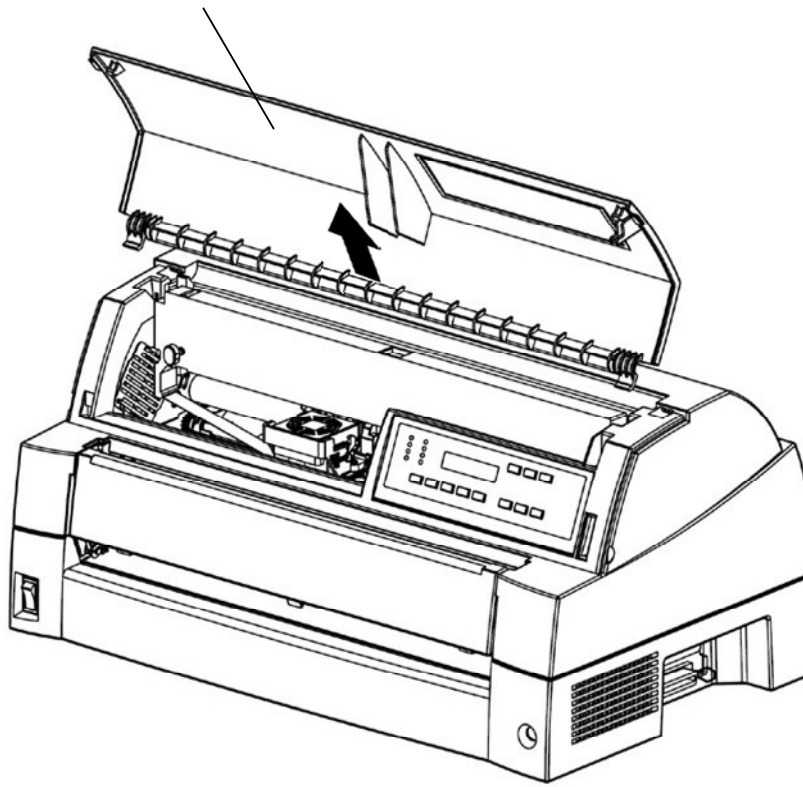


Figure 4.26 Front cover replacement

(12) Upper Cover replacement

Removal

1. Remove the control panel.
2. Remove the two screws securing the upper cover.
3. Raise the soundproof cover.
4. Disengage the hooks on the front left and right of the upper cover, then lift off the upper cover.
5. Remove the soundproof cover.

Installation

1. Install the soundproof cover.
2. When installing the upper cover, pass the control panel cable and cover open switch cable through the openings on the upper cover and control panel holder.
3. Hereafter, follow the removal procedure in reverse order.

Screw

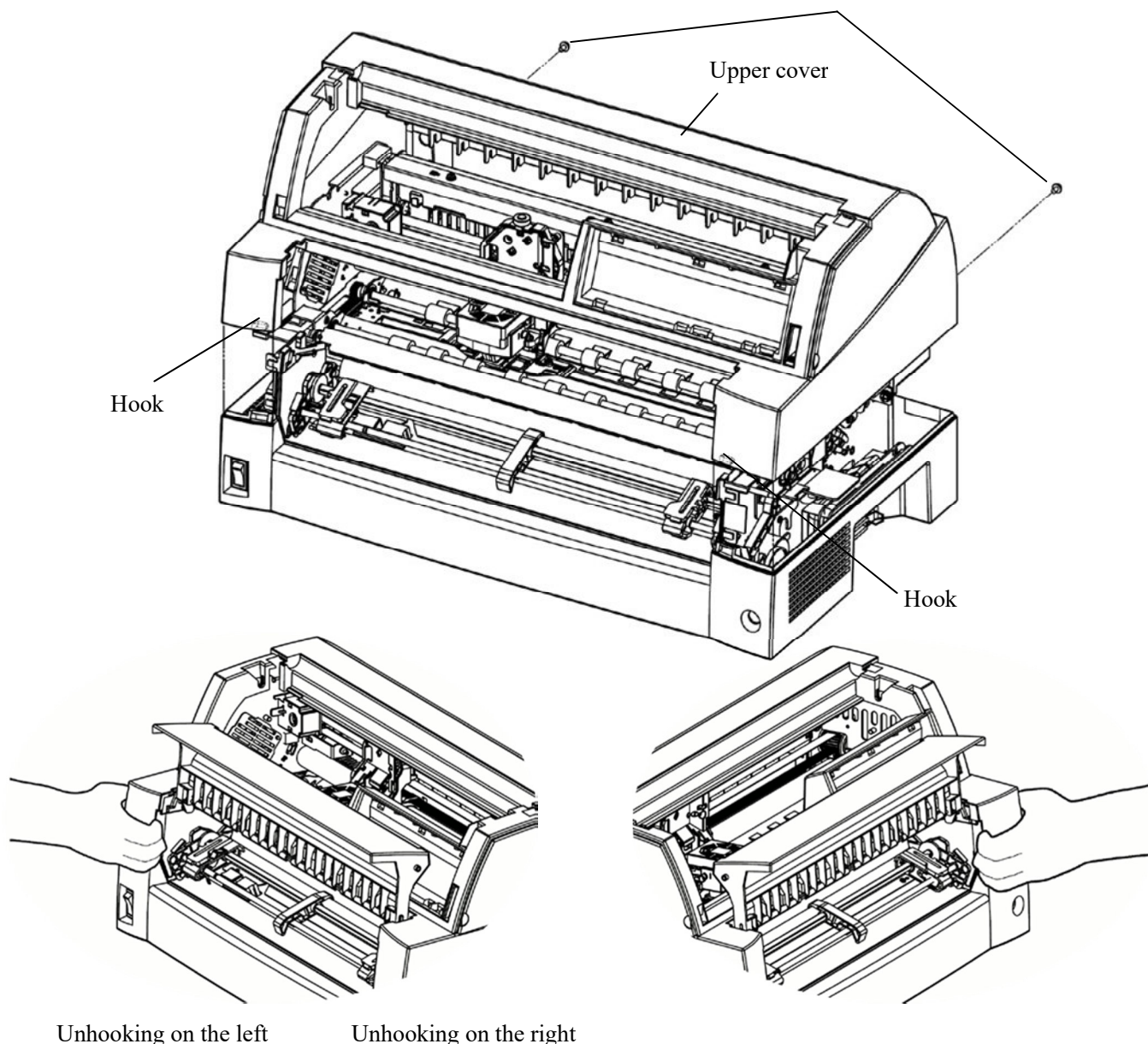


Figure 4.27 Upper cover replacement

(13) Print Mechanism Unit replacement

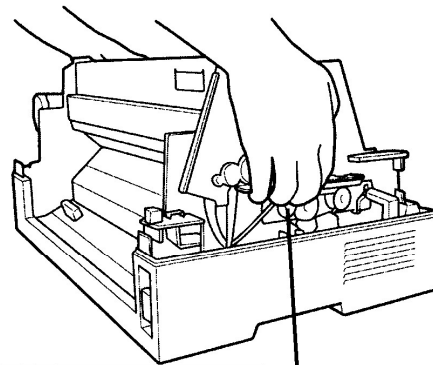
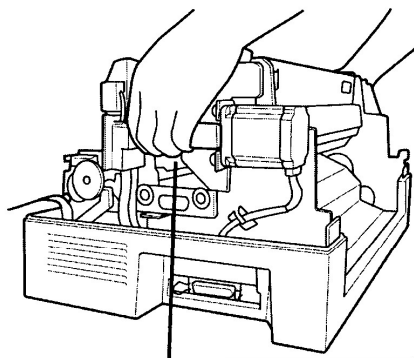
Removal

* Do this work on a no slippery level bench so that the mechanism can be tilted stably during replacement. On a slippery surface like paper, the printer may slide when the mechanism is tilted. It deteriorates the work efficiency.

1. Remove the upper cover.
2. Access the mechanism assembly from the back of the printer.
3. As shown in the following figure, a hand is hung on the side frame part of mecha unit.
4. Slowly hold up the mechanism unit on the upper side.

Note; Too high position cause unplug the connector. So be carefully.

The
hung on
portion of
frame to L



finger is
the
the side
Bend.

※サイドフレームの L 曲げ部に指をかけて下さい

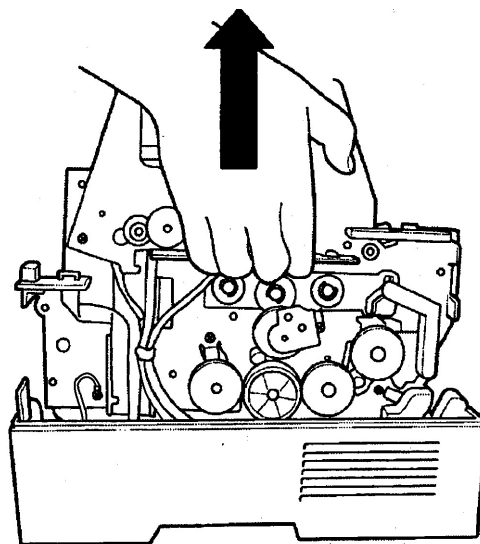
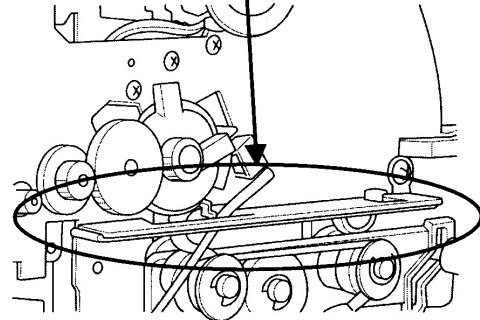
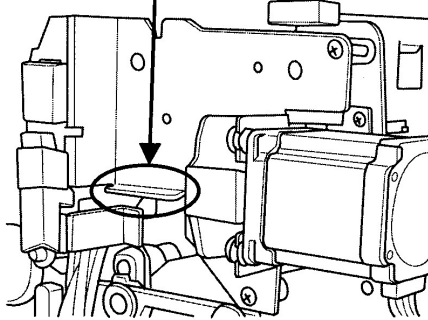


Figure 4.28 Print Mechanism Unit removal

5. Move the mechanism unit about 2cm to the right (when looking form back of the printer) and then put the rubber foots of the front of mechanism unit above the mounting projection of lower cover.

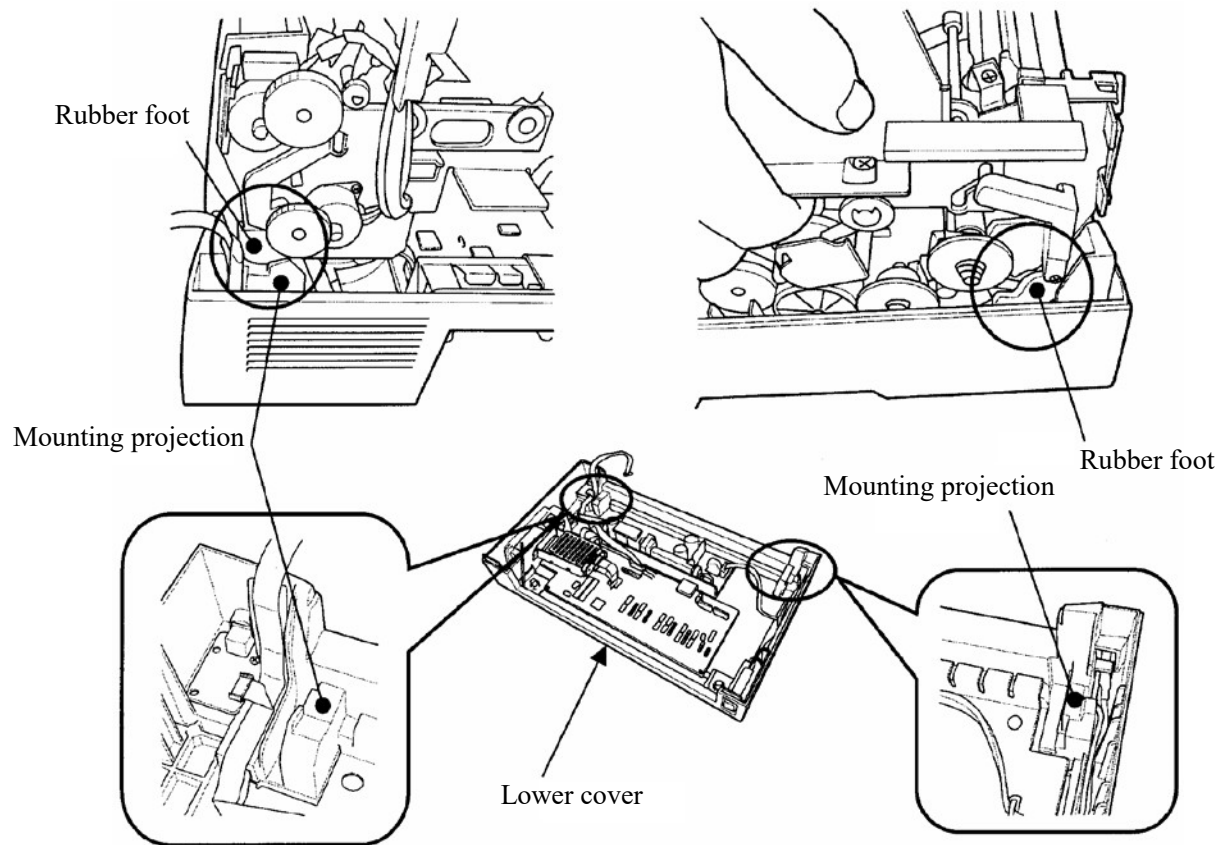


Figure 4.29 Print Mechanism Unit replacement

6. Keep the left hand holding side plate, and then move the right hand to the rear of the mechanism unit.

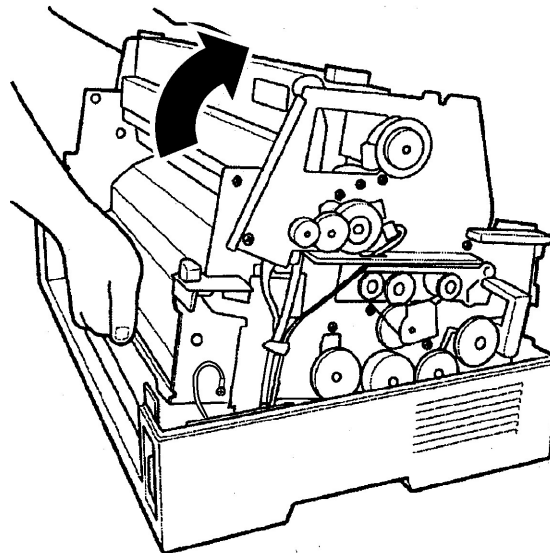


Figure 4.30 Print Mechanism Unit replacement

7. Lift up the rear of the mechanism unit and then place the tilt
8. Lift up the rear of the mechanism unit and then place the tilt bar hole of the rubber foot(5) and hole of the lower cover to support mechanism unit.

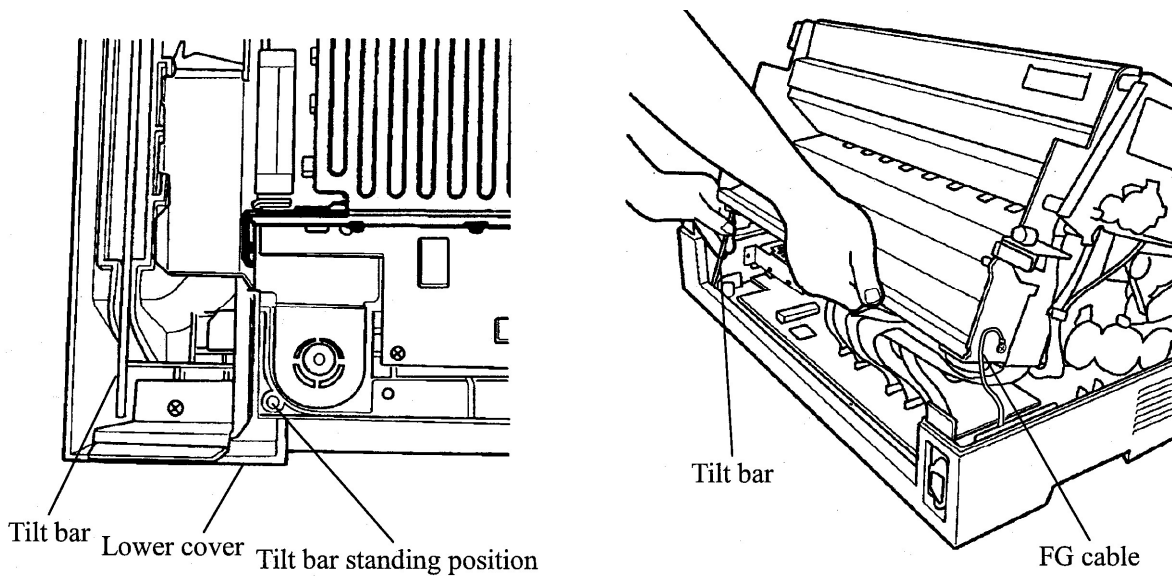


Figure 4.31 Print Mechanism Unit replacement

9. Unplug cables from mechanism unit.
(SP motor cable, LF motor cable, TR motor cable, RF motor cable, Carrier cable (3 flat cables), RCSF cable, Relay cable, INLK sw cable, CO sw cable, FAN2 cable, FAN3 cable, FAN4 cable. Total 14 cables)
10. Remove the screws securing the FG cable 11. Lift the mechanism unit higher and remove it.

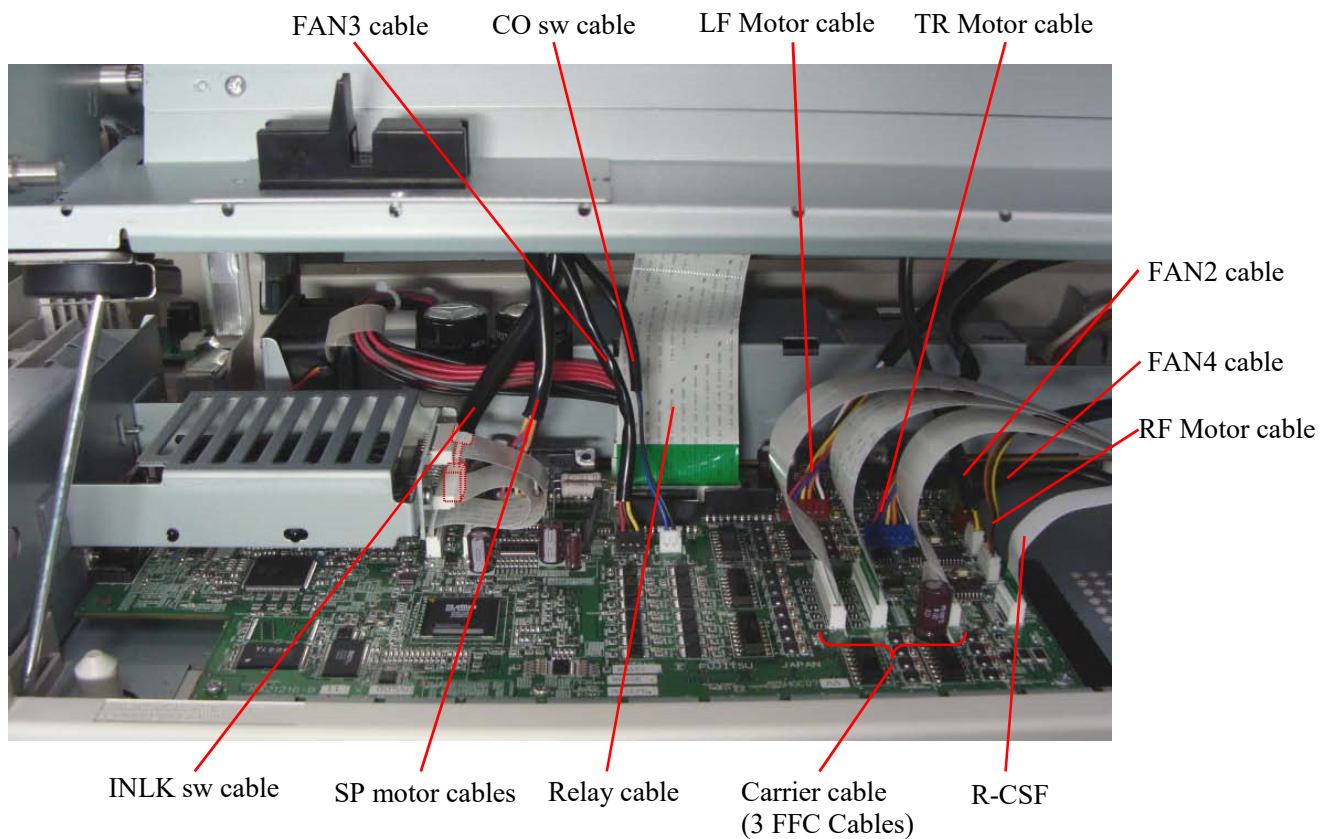


Figure 4.32 Print Mechanism Unit replacement

Installation

1. Install the mechanism assembly by reversing the removal procedure.

Note: To prevent that FG cable is trapped between mechanism unit and lower unit.

The direction of FG cable is changed (from October 2009) to upper direction.

Note: The following adjustments are required after installation:

- Bi-directional printing positions
- Auto loading position
- Printing positions at paper end
- Left printing start position
- Skew detection

(14) FAN UNIT replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the two screws securing the FAN UNIT

Installation

1. Install the power supply unit by reversing the removal procedure.

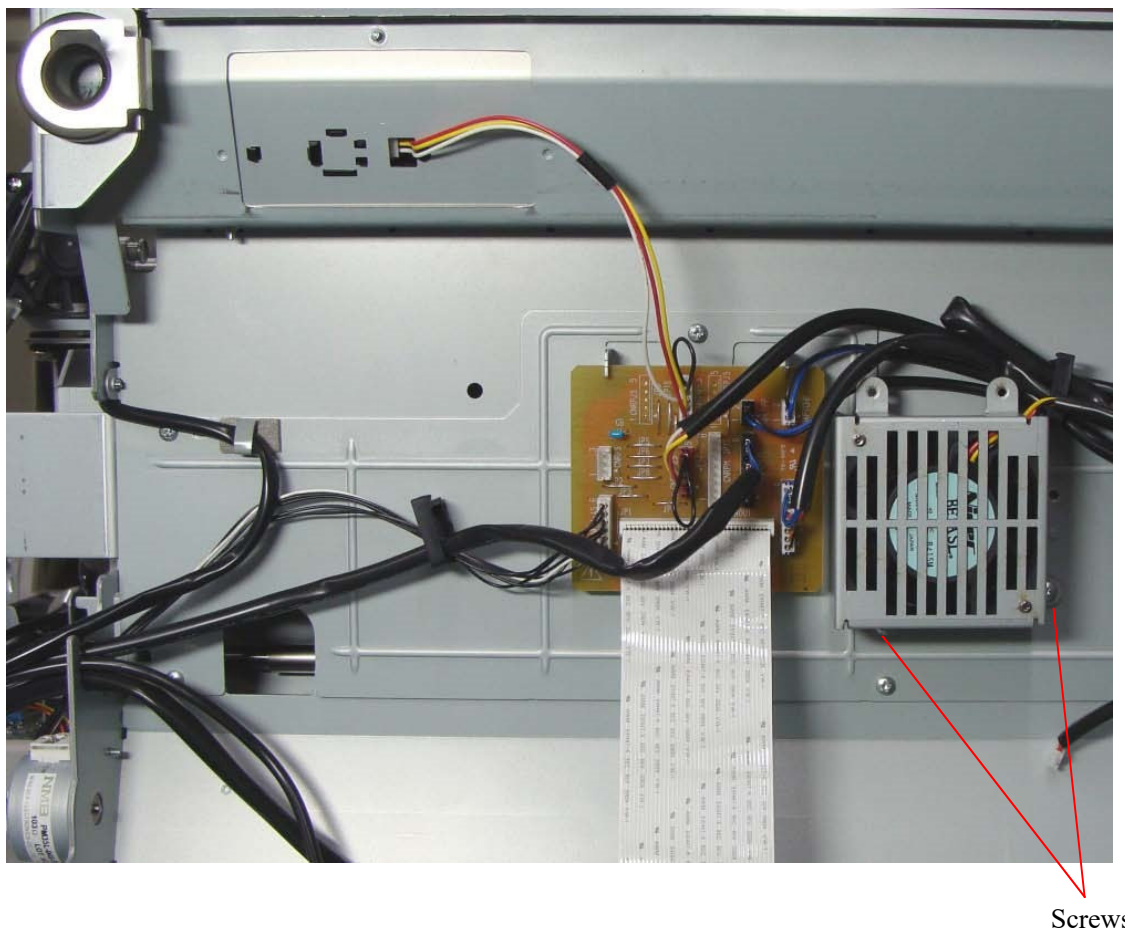


Figure 4.33 FNA UNIT replacement

(15) Power Supply Unit replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the 3 screws securing the power supply unit.
4. Disconnect the AC switch assembly connector, reactor connector, and power supply unit connector, then remove the power supply unit.

Installation

1. Install the power supply unit by reversing the removal procedure.

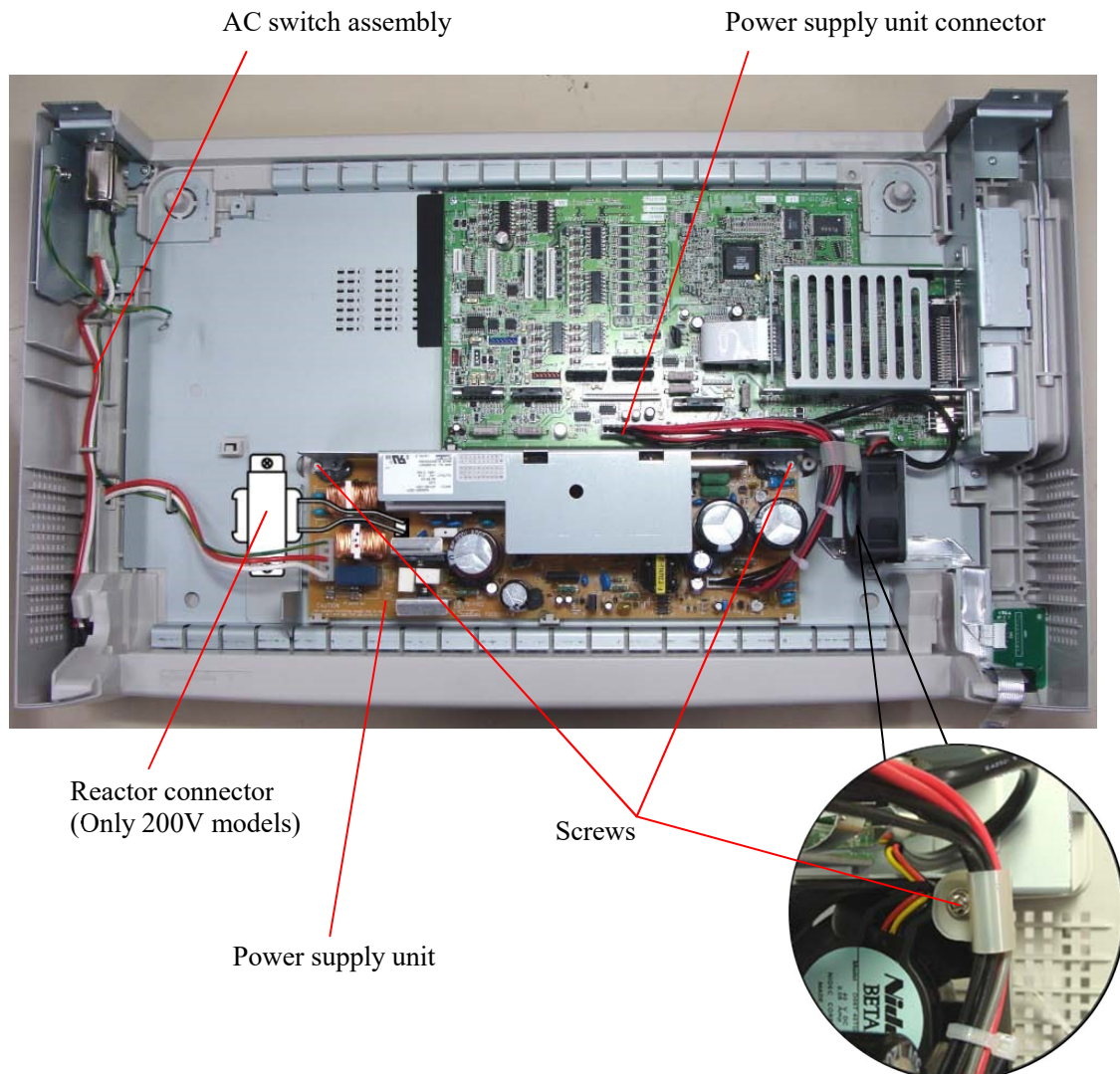


Figure 4.34 Power Supply Unit replacement

(16) ROM Board (Main Board) replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the LAN cables. Remove the bracket (2 screws).
4. Remove the 6 screws securing the ROM board (4 on the top and 2 on the side), and remove the ROM board.
5. The memory chip on the ROM board contains printer information (setup and counter data). Remove it from the old ROM board and mount it on the ROM board to be installed.

Installation

1. Replace the NVRAM (memory chip) to put adjustment and set up information from old board into the new board.
2. Install the ROM board by reversing the removal procedure.

Mount the memory chip on the IC socket with the dent facing the printer cable connector.

To reset the NVRAM see the procedure as follows.

(Note, Resetting NVRAM requires adjustment and setting up. If you don't know set up value don't reset NVRAM)

To all clear NVRAM ;

To reset SET-UP ;

Don't mount the memory chip
in the wrong direction

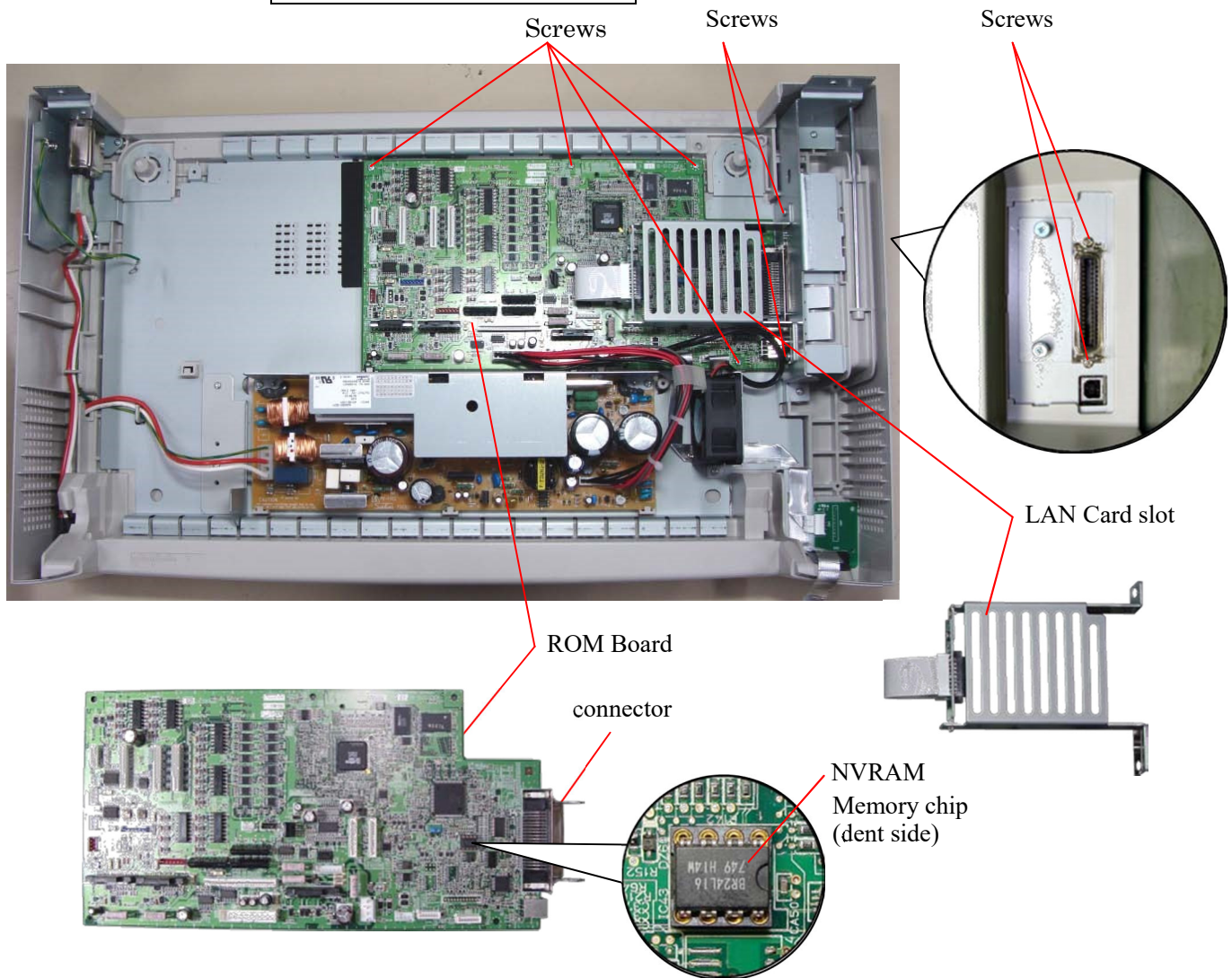


Figure 4.35 Rom board replacement

(17) LAN RELAY PCA / LAN cable 17P replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the two LAN cables. Remove the bracket (2 screws).
4. Remove the screws securing the LAN RELAY PCA.
5. Remove the LAN cable 17P.

Installation

1. Install the LAN RELAY PCA / LAN cable 17P by reversing the removal procedure.

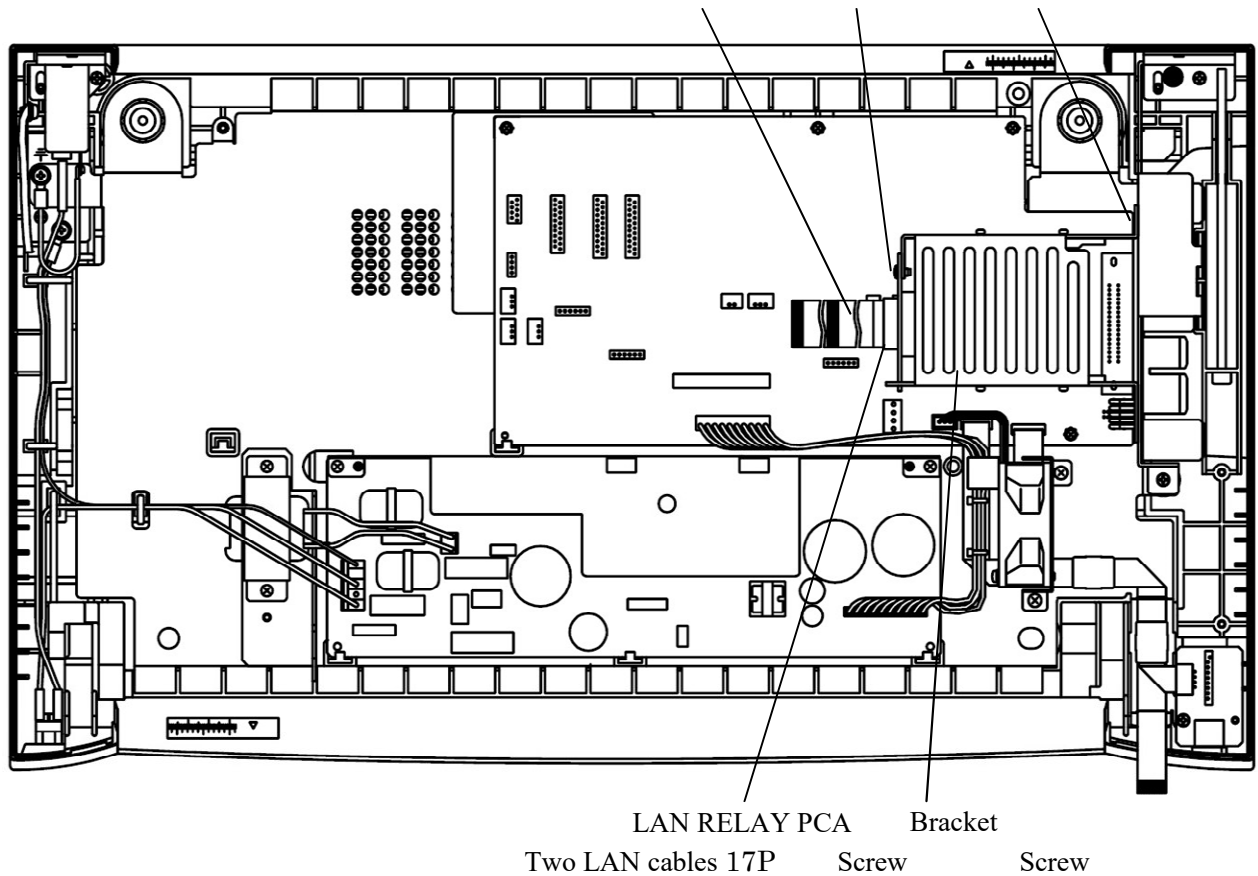


Figure 4.36 LAN RELAY PCA / LAN CABLE 17P replacement

(18) AC Switch ASY replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the AC switch assembly from the lower cover.

Installation

1. Install the AC switch assembly by reversing the removal procedure.

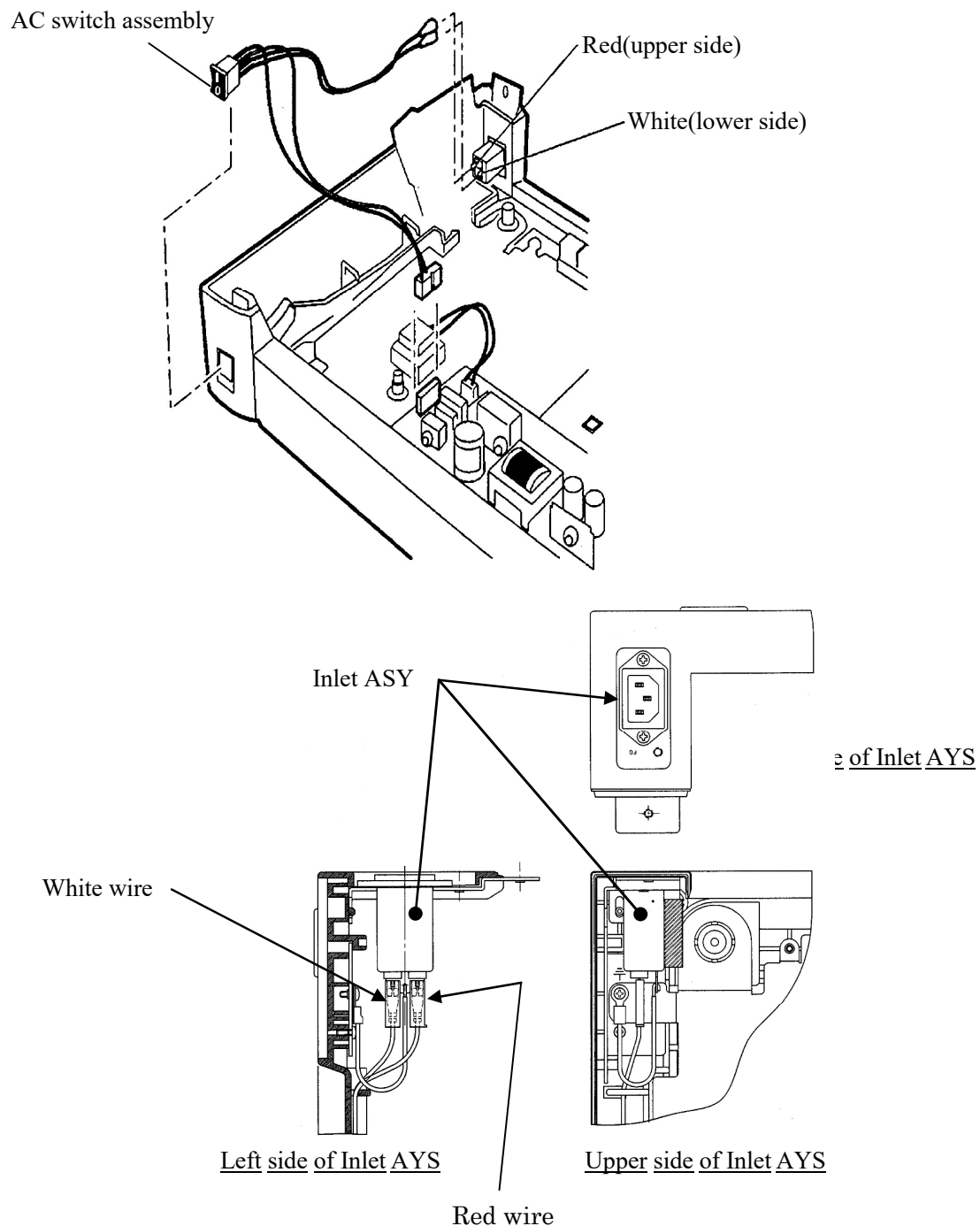


Figure 4.37 AC Switch ASY replacement

(19) Inlet ASY replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the two screws securing the inlet and one screw securing the frame ground wire, and 4. remove the inlet assembly.

Installation

1. Install the inlet assembly by reversing the removal procedure.
2. Regarding the connecting cables, refer to the front page.

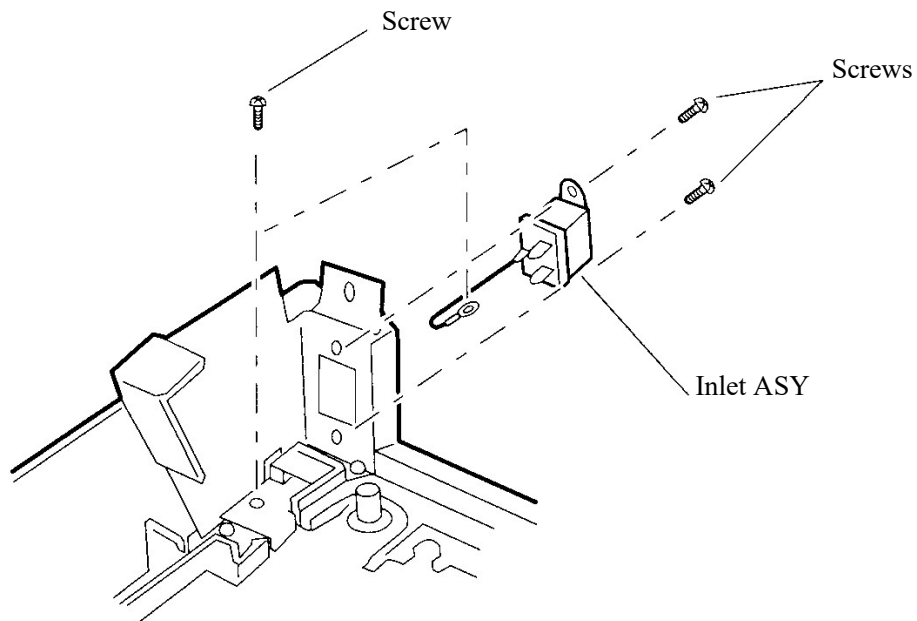


Figure 4.38 Inlet ASY replacement

(20) Reactor replacement

Note Reactor used only 100-120V models.

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the two screws securing the reactor.
4. Disconnect the cable from the power supply and remove the reactor.

Installation

1. Install the reactor by reversing the removal procedure.

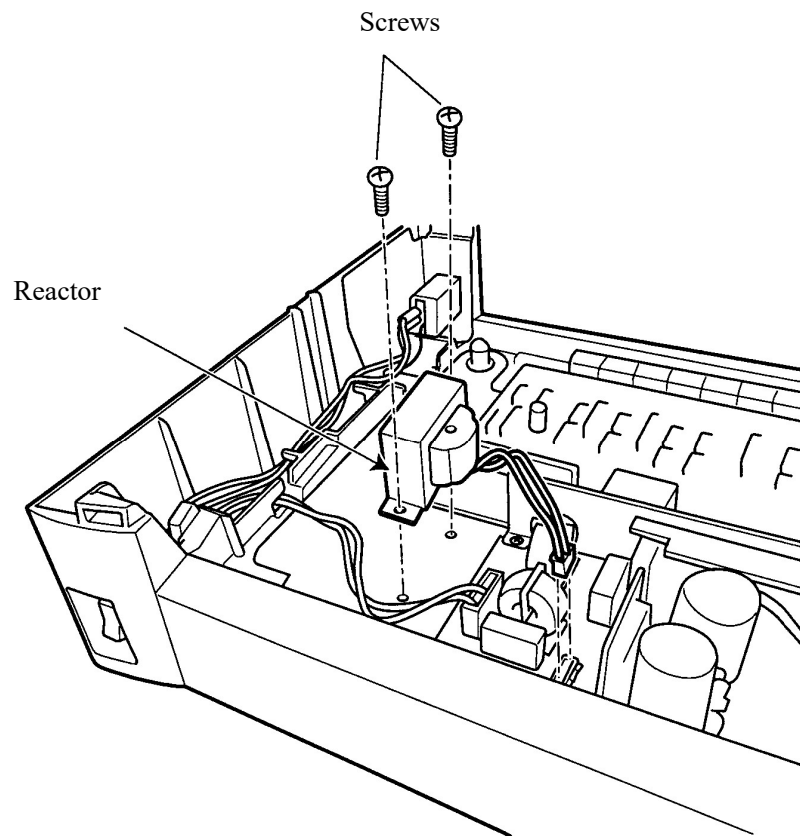


Figure 4.39 Reactor replacement

(21) FAN UNIT 2 replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the screws securing the FAN.
4. Remove the power cable from the cable clamp.
5. Remove the FAN UNIT 2 cable from ROM BOARD.
6. Remove the two screws securing the FAN UNIT 2.

Installation

1. Install the FAN UNIT 2 by reversing the removal procedure.

FAN fixation screw

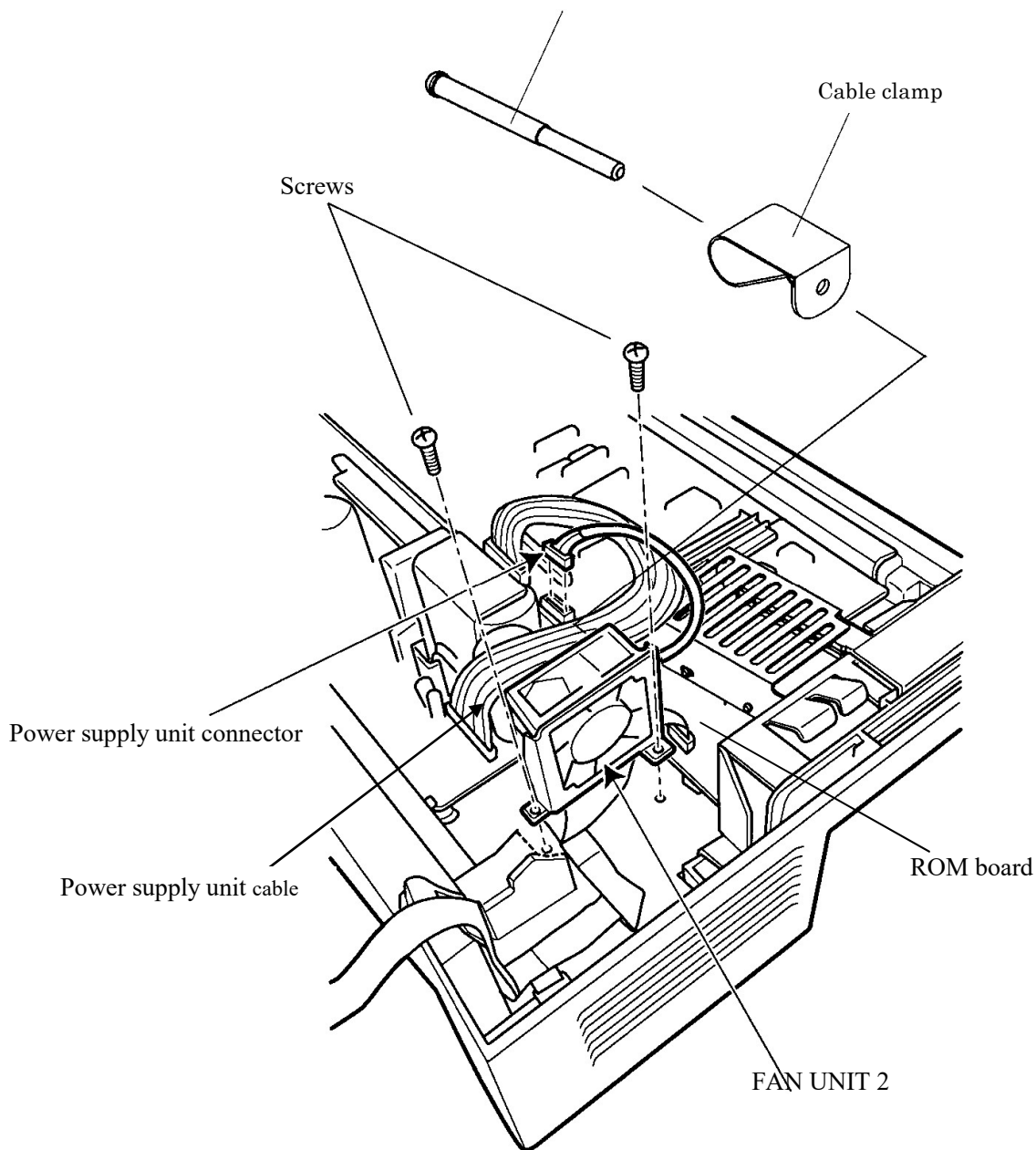


Figure 4.40 FAN UNIT 2 replacement

(22) Control Panel Cable replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the FAN UNIT 2.
4. Remove the 4 operator cable covers and then disconnect the operator cable from the ROM board.

Installation

1. Install the control panel cable by reversing the removal procedure.

ROM board

Control Panel cable

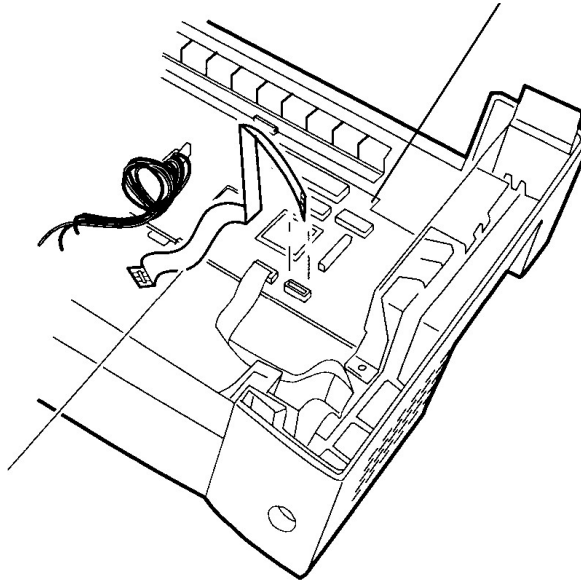


Figure 4.41 Control Panel Cable replacement

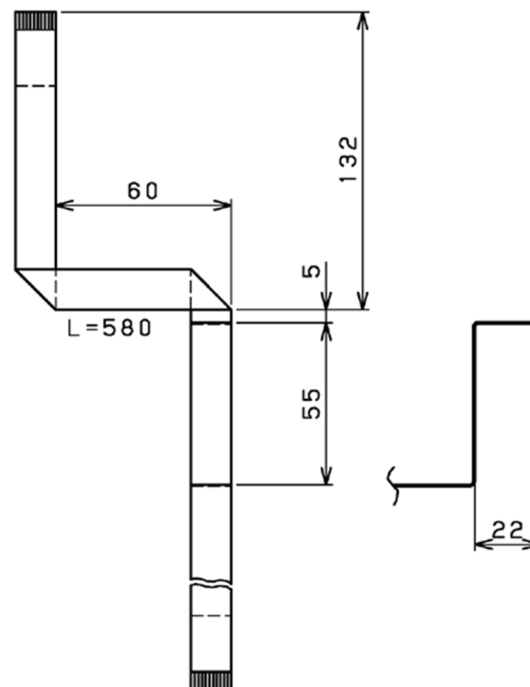


Figure 4.42 bending size of control panel cable
(23) F-CSF Cable/CSF Connector PCA replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the FAN UNIT 2.
4. Disconnect the cable from the front CSF PCA connector.
5. Remove the two screws securing the front CSF PCA to remove the PCA.

Installation

1. Install the front CSF PCA by reversing the removal procedure.

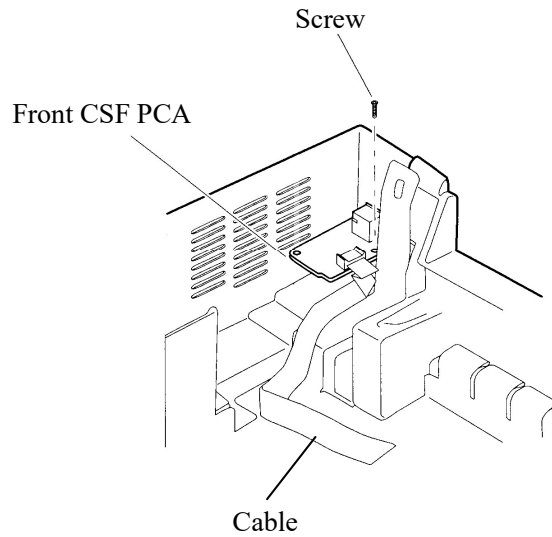


Figure 4.43 F-CSF Cable/Connector PCA replacement

Bending the front CSF cable (KA02027-Y192)

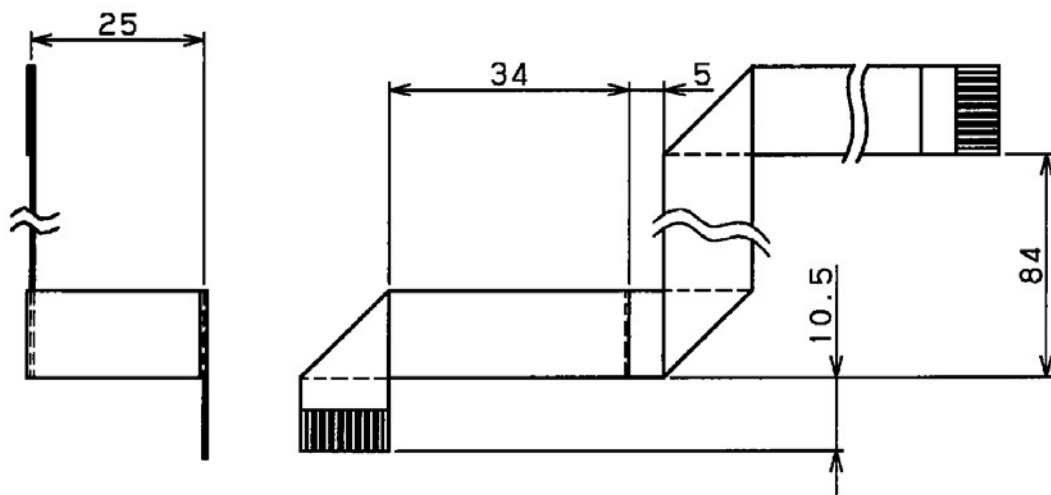


Figure 4.44 bending size of Front csf cable

(24) R-CSF Cable/CSF Connector replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the screw securing the rear CSF PCA and remove the PCA.

Installation

1. Install the rear CSF by reversing the removal procedure.

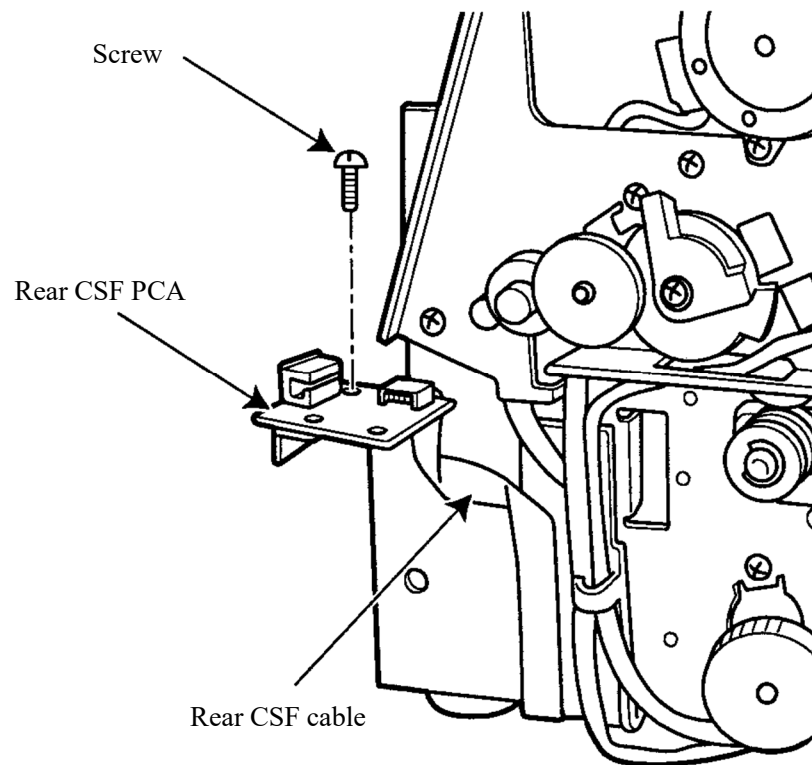


Figure 4.45 R-CSF Cable/CSF Connector replacement

Bending the rear CSF cable (KA02022-Y191)

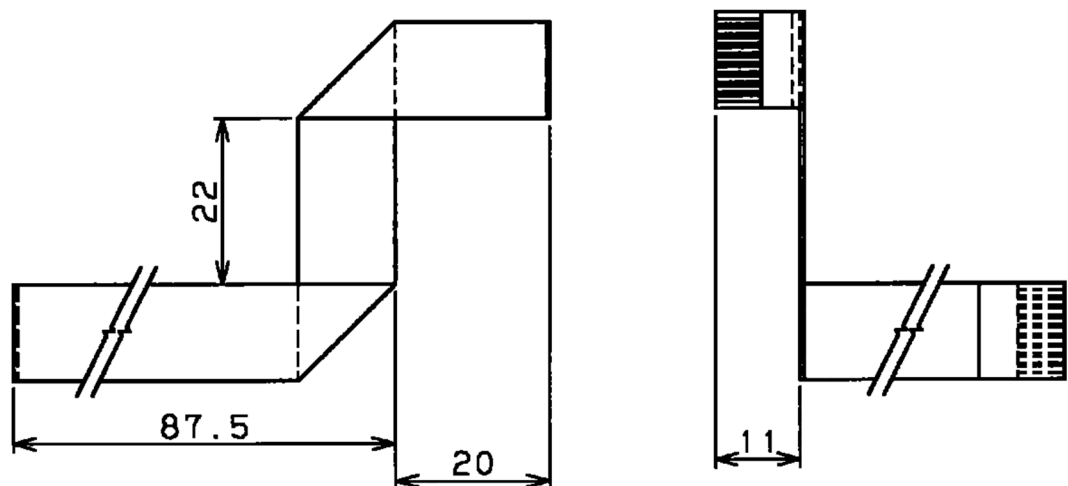


Figure 4.46 bending size of Rear csf cable

(25) Relay Cable replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Disconnect the relay cable from the sensor PCA connector.

Installation

1. Install the relay cable by reversing the removal procedure.

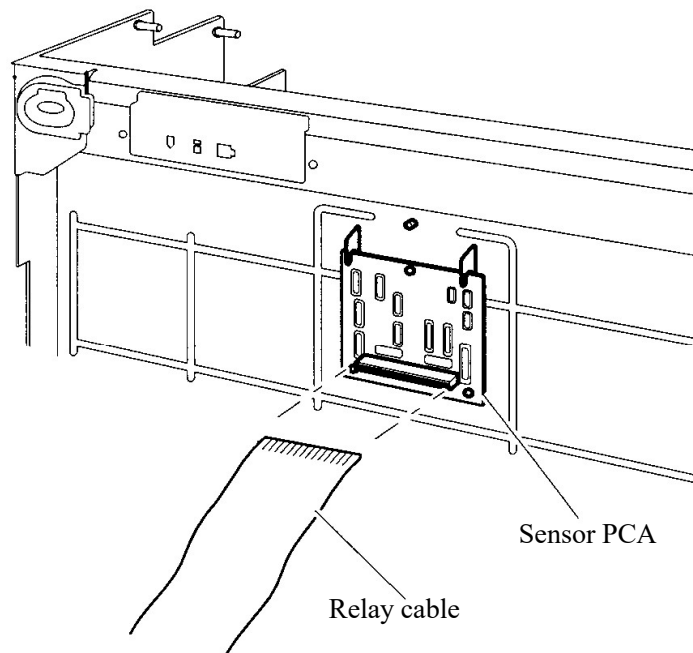


Figure 4.47 Relay cable replacement

(26) Sensor PCA replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Disconnect the mechanism cable and flat cable from the sensor PCA connectors.
4. Separate and remove the sensor PCA from the two saddles by using long-nosed pliers.

Installation

1. Install the sensor PCA by reversing the removal procedure.

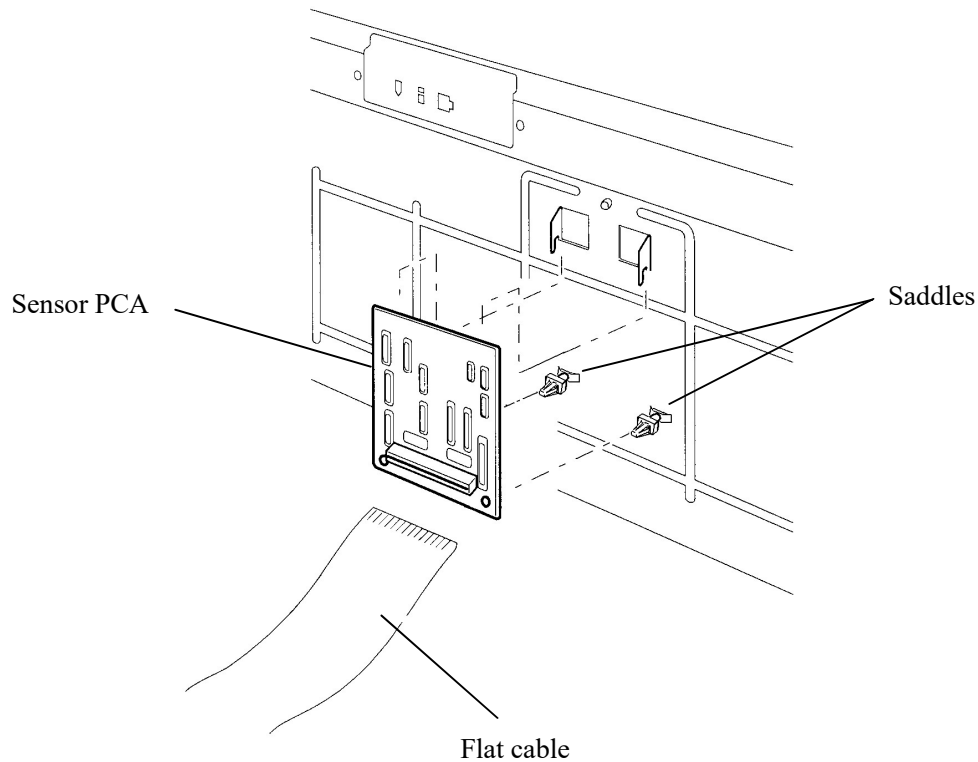


Figure 4.48 Sensor PCA replacement

(27) SP Motor ASY replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the screws securing SP motor ASY.
4. While loosening the SP belt tension, remove the SP motor ASY.

For details

1. Insert the (-) Screw Driver between SP belt and side frame (refer to the below fig).
(Then use the (-) Screw Driver as lever)
2. Prize the SP belt tension pulley so that SP belt loosens. 3.
While SP belt loosens, the SP motor can be removed.

Installation

1. While loosening the SP belt tension, install the SP motor.
2. Fix the screws securing SP motor.

Note: After installation, the following adjustment is required:

-Bi-directional printing position

(-)Screw Driver

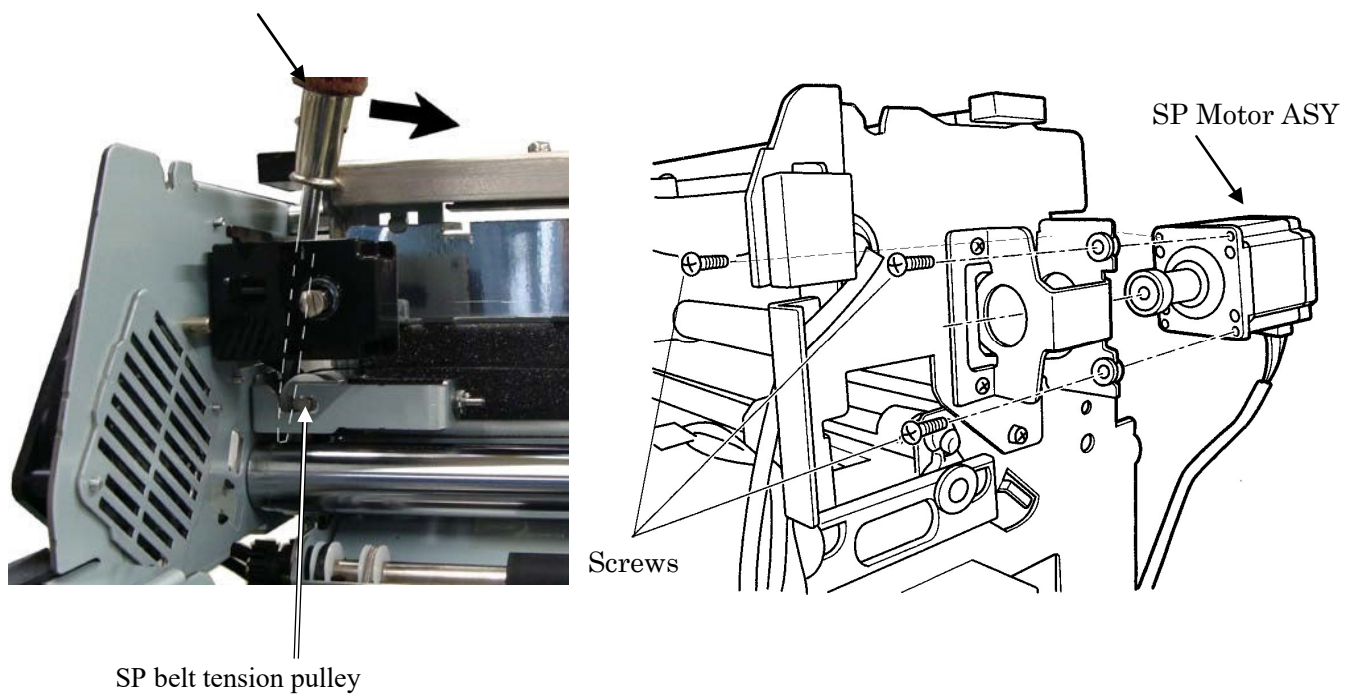


Figure 4.49 Sp Motor ASY replacement

(28) LF Motor replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the idle gear
4. Remove the screws securing LF motor 5. Remove the LF motor from inside of side frame.

Installation

1. Install the LF motor by reversing the removal procedure.

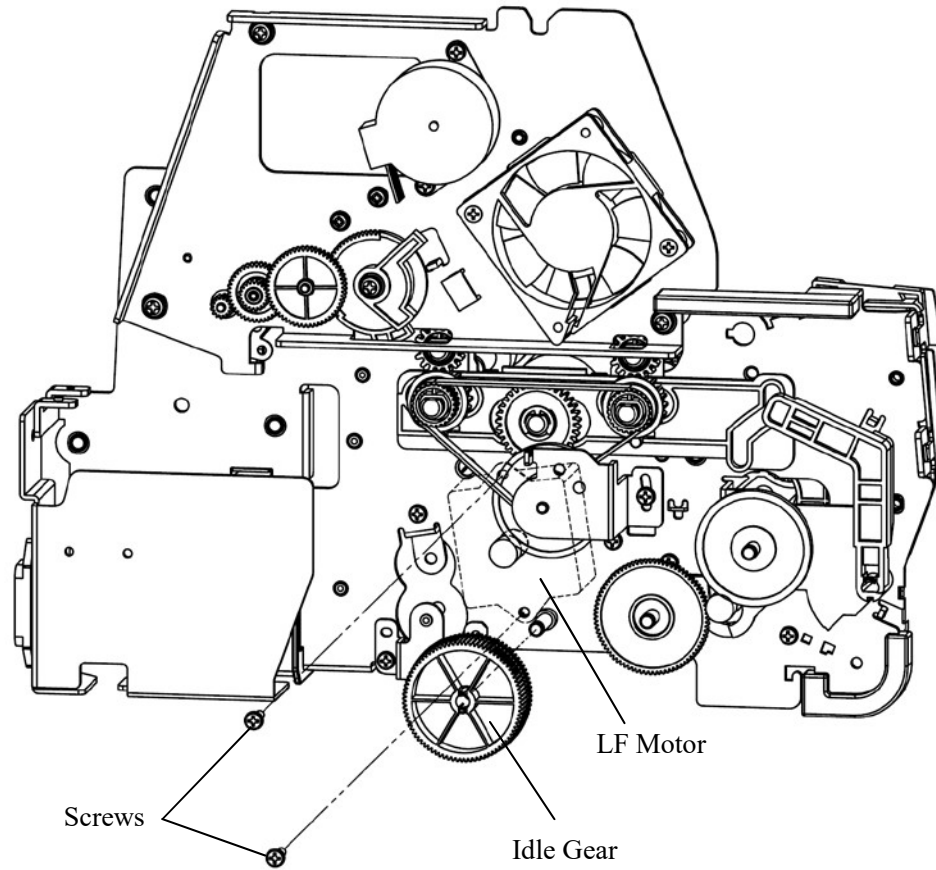


Figure 4.50 LF motor replacement

(29) TR Motor replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the shift gear and shift spring.
4. Remove the two screws securing the TR motor.
5. Remove the TR motor from the side frame.

Installation

1. Install the TR motor by reversing the removal procedure.

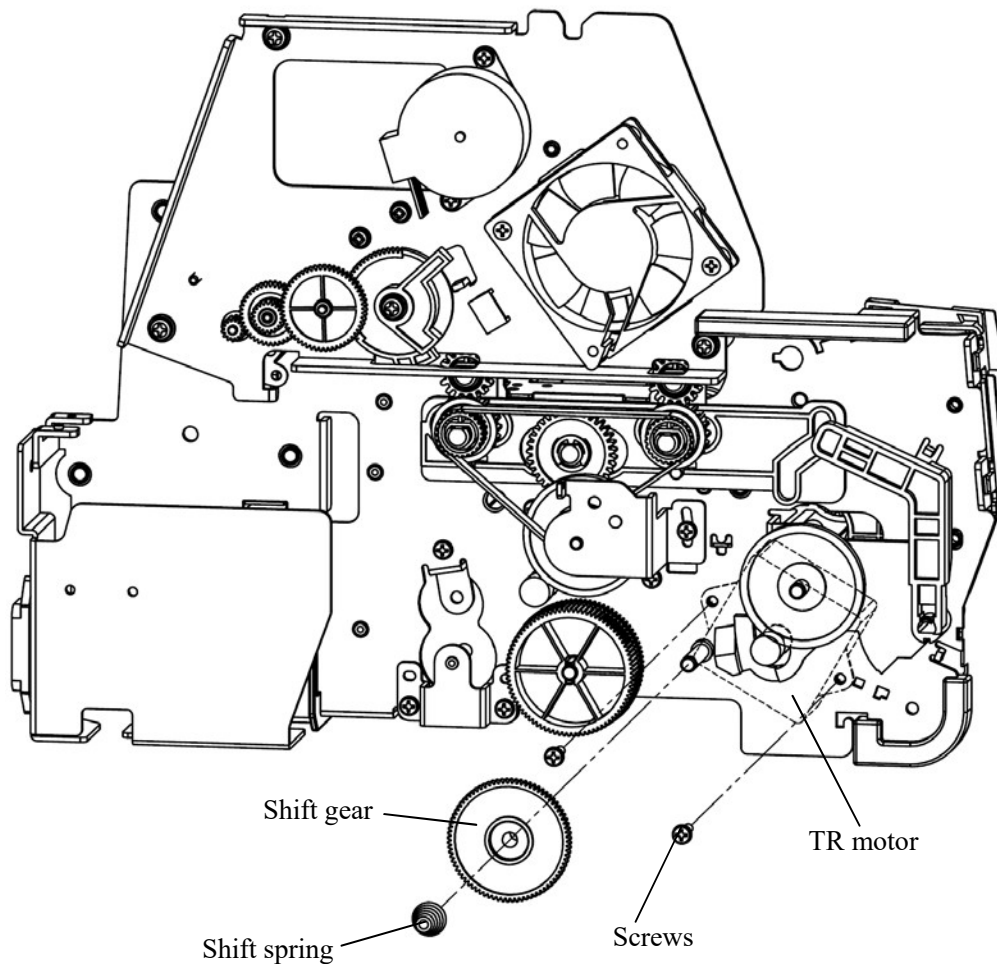


Figure 4.51 TR motor replacement

(30) APTC SW ASY replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Peel off the Stopper plate.
4. Remove the SW holder.
5. Disconnect the cable from the sensor PCA connector, and remove the APTC SW ASY.

Installation

1. Install the APTC motor by reversing the removal procedure.

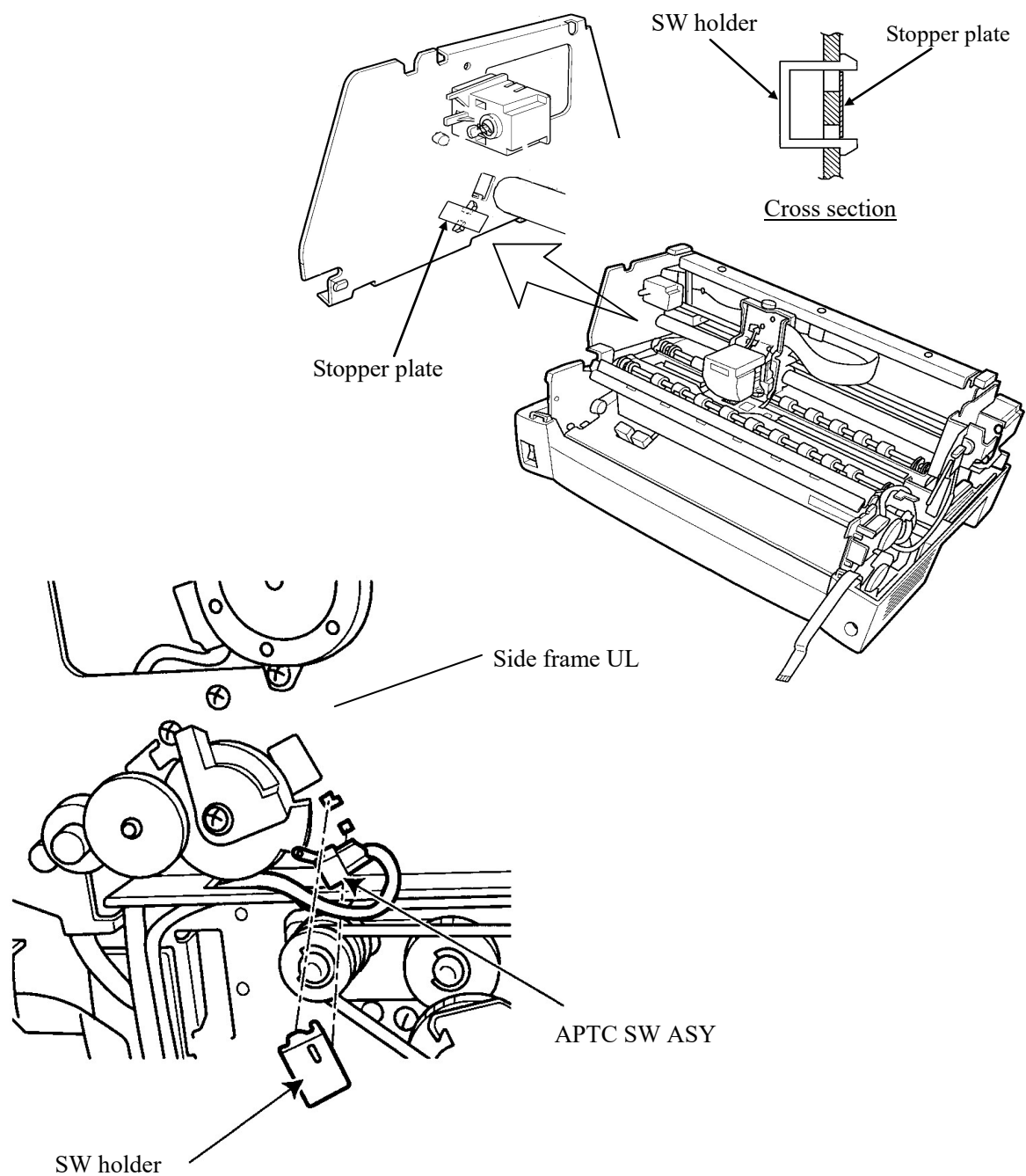


Figure 4.52 APTC SW ASY replacement

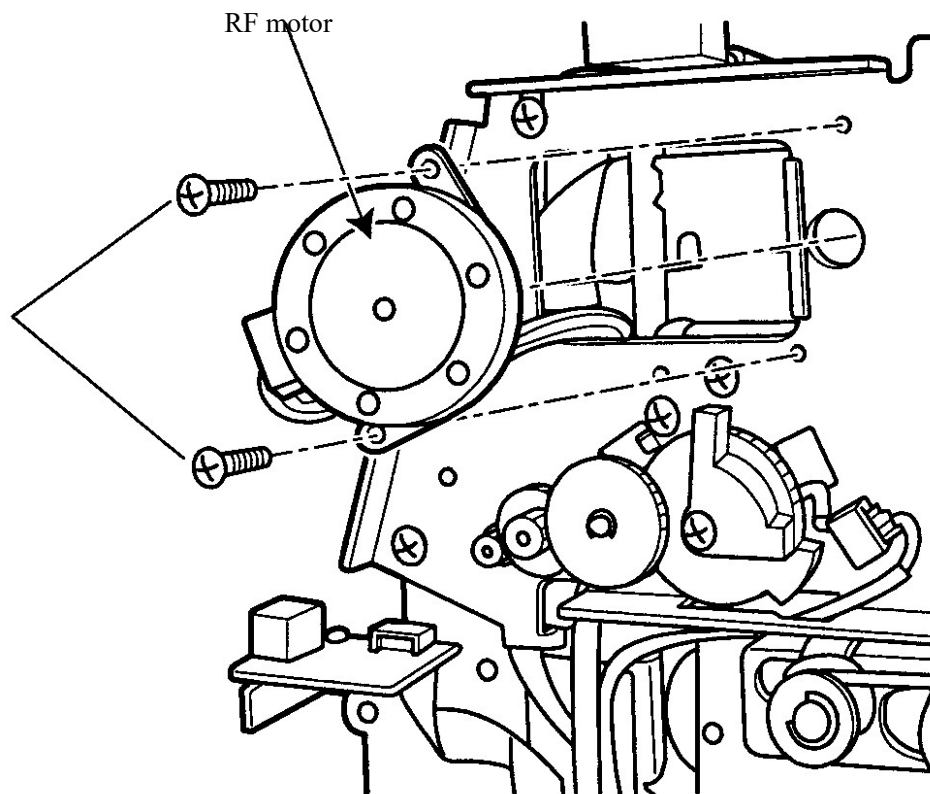
(31) RF Motor replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
8. Remove the screw securing the RF motor, and remove the RF motor.

Installation

1. Install the RF motor by reversing the removal procedure.



Screws

Figure 4.53 RF motor replacement

(32) APTC Motor replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the E ring securing the gear B, and remove the gear B.
4. Remove the screw securing the SS gear , and remove the SS gear .
5. Remove the screw securing the tension unit , and remove the tension unit.
6. Remove the SP motor ASY.
7. Remove the screw securing the side frame UL, and remove the side frame UL.
8. Remove the screw securing the APTC motor, and remove the APTC motor.

Installation

1. Install the APTC motor by reversing the removal procedure.

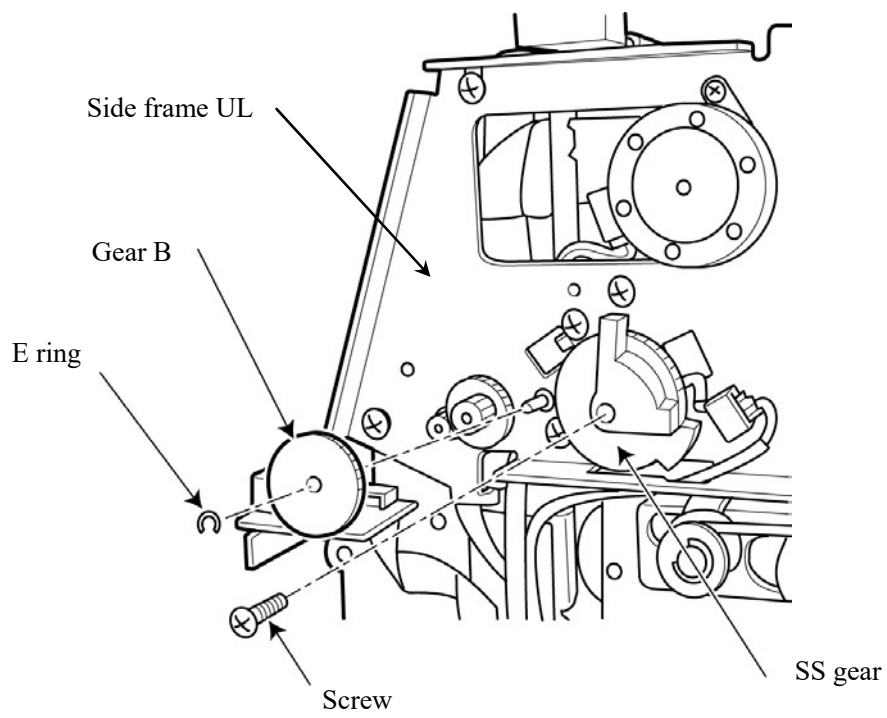
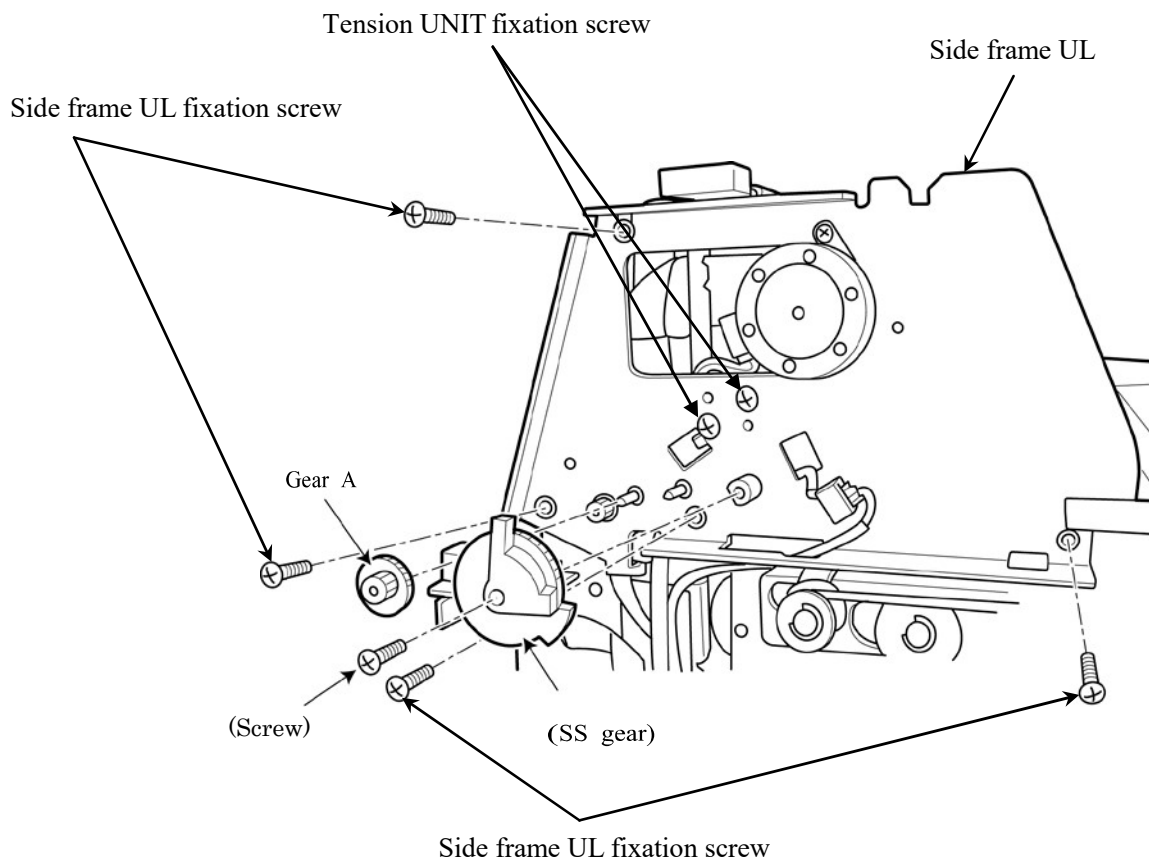


Figure 4.54 APTC Motor replacement



The back side of side frame UL

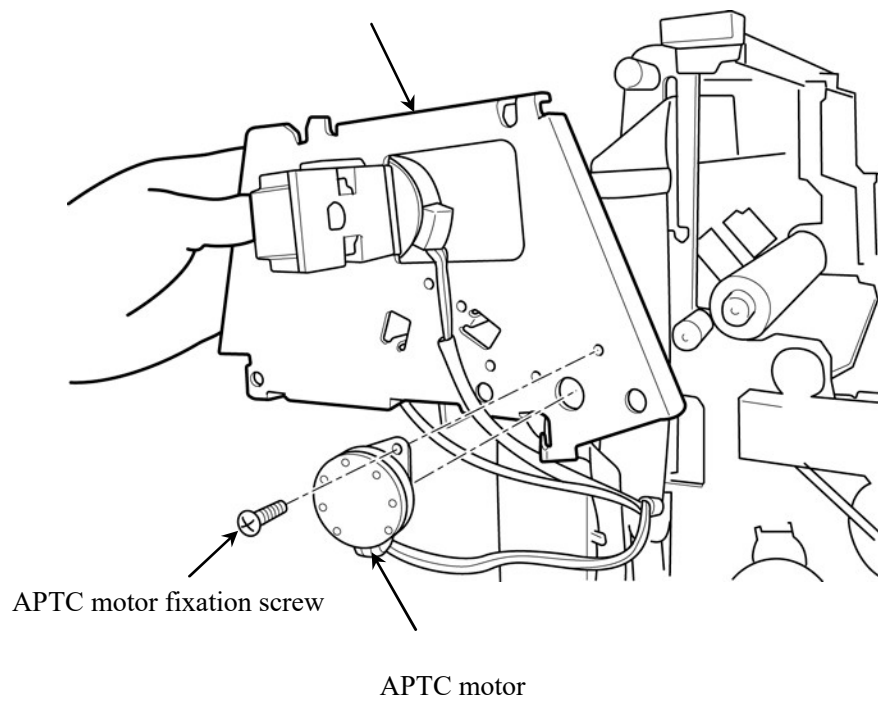


Figure 4.55 APTC Motor replacement

(33) FAN ASY replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the two screws securing the FAN ASY , and remove the FAN ASY and FAN guard.

Installation

1. Install the FAN ASY by reversing the removal procedure.

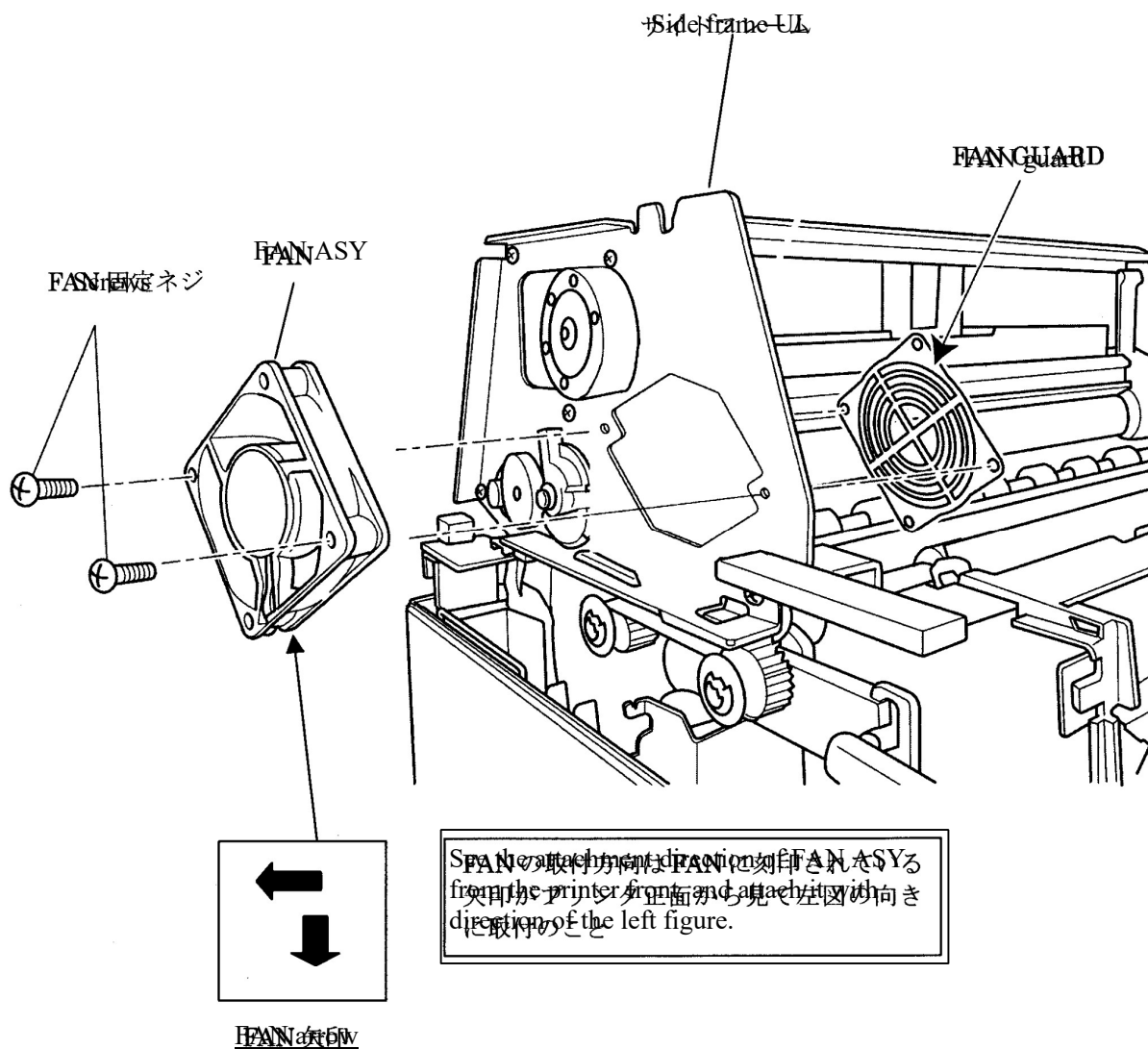


Figure 4.56 FAN ASY replacement

(34) HCPP Motor replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the E ring securing the HCPP gear , and remove the HCPP gear.
4. Remove the two screws securing the HCPP motor.
5. Disconnect cable from the sensor PCA connector, then remove the HCPP motor from the side frame.

Installation

1. Install the HCPP motor assembly by reversing the removal procedure.

HCPP Motor

Gear

HCPP

Screws

□-ring

replacement

(35) SP FAN UNIT replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the two screws securing the SP FAN UNIT , and remove the SP FAN UNIT.

Installation

1. Install the SP FAN UNIT by reversing the removal procedure.

Figure 4.57
HCPP
Motor

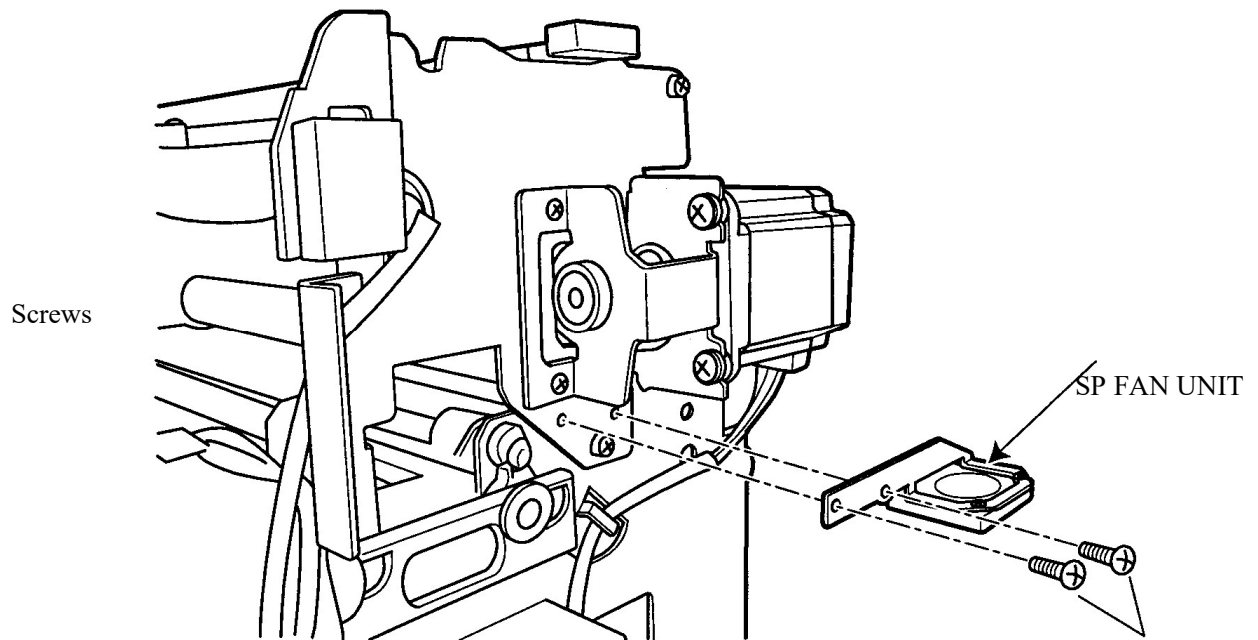


Figure 4.58 SP FAN UNIT replacement

(36) INLK SW UNIT replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the two screws securing the INLK SW UNIT , and remove the INLK SW UNIT.

Installation

1. Install the INLK SW UNIT by reversing the removal procedure.

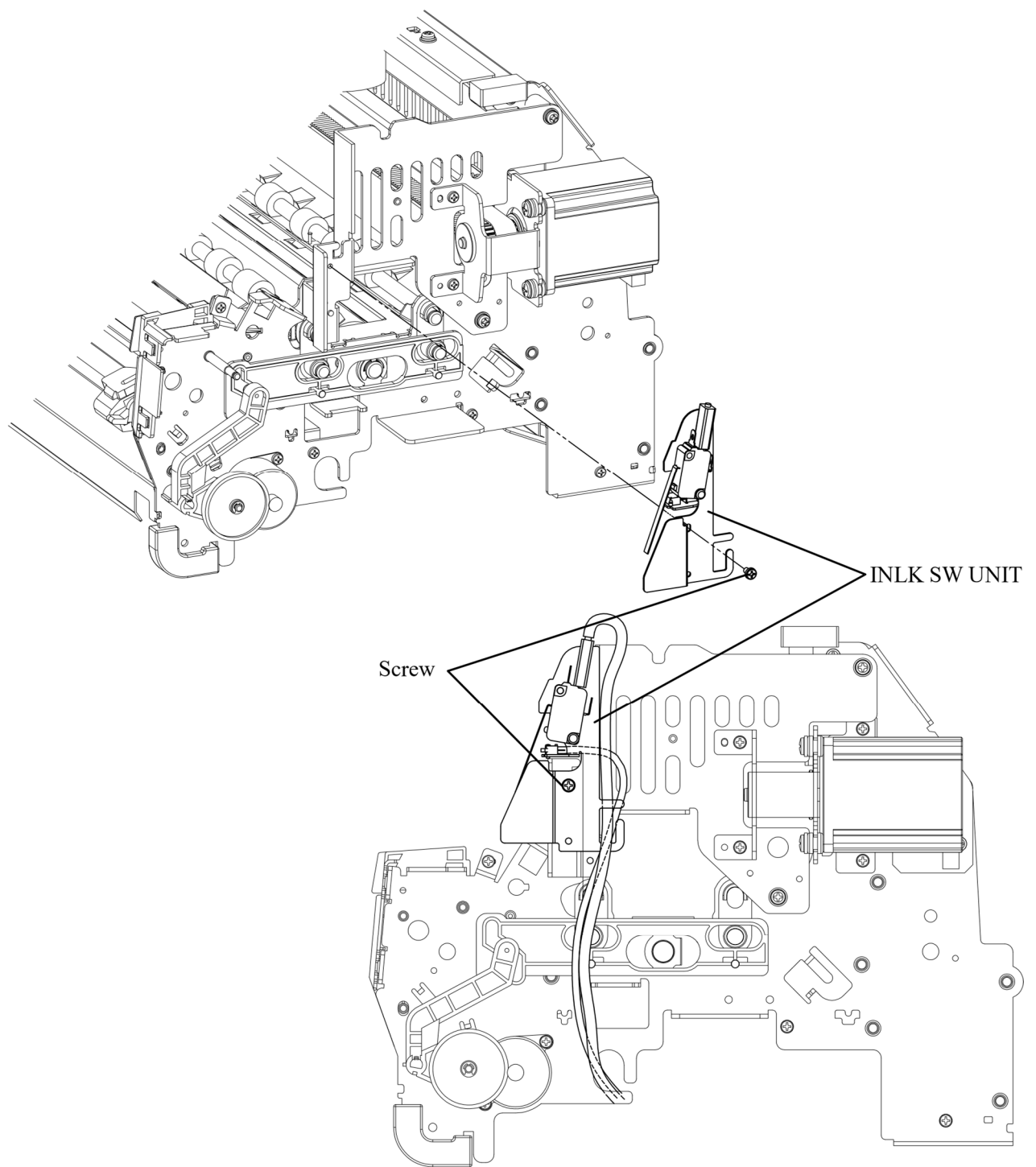


Figure 4.59 INLK SW UNIT replacement

(37) PS PCA replacement

Removal

1. Remove the upper cover.
2. Release the PS PCA from the three hooks on the PS holder.
3. Disconnect the cable from the connector and remove the PS PCA.

Installation

1. Install the reactor by reversing the removal procedure.

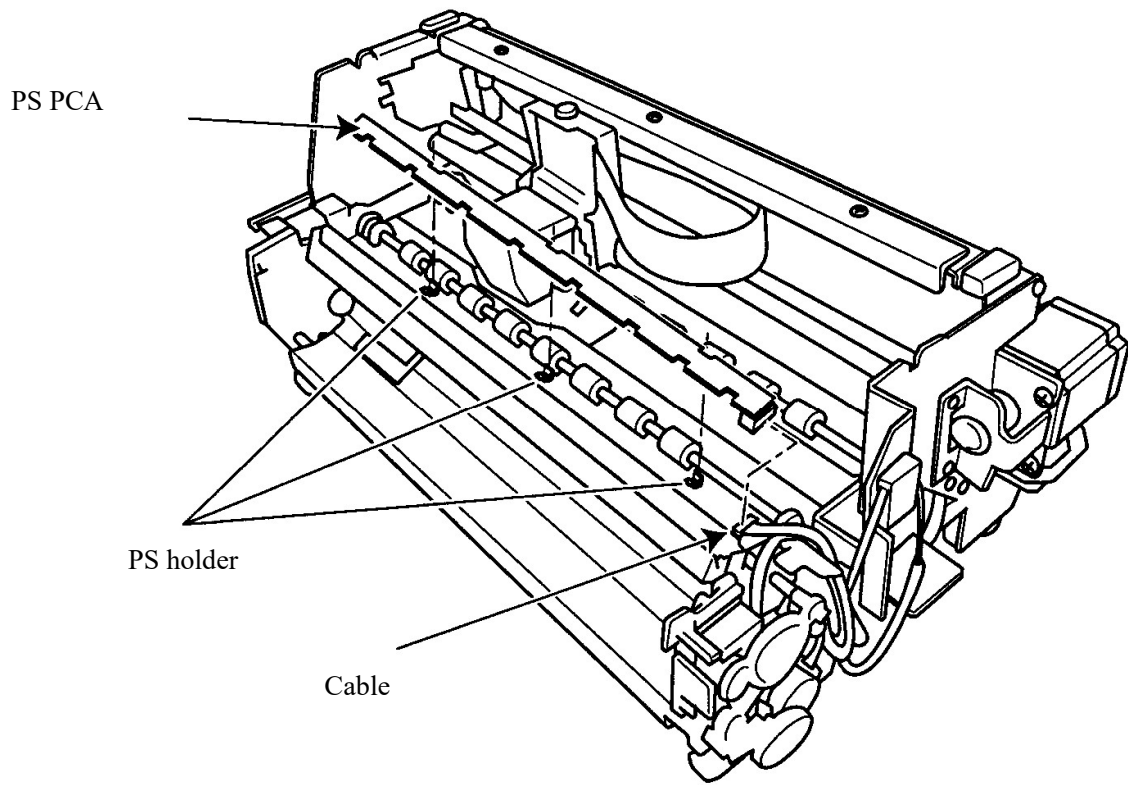


Figure 4.60 PS PCA replacement

(38) HCPP switch ASY replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the rubber foot from side frame L, then unhook the holder at two locations.
4. Disconnect the cable from the sensor PCA connector, and remove the HCPP switch assembly.

Installation

1. Install the HCPP switch assembly by reversing the removal procedure.

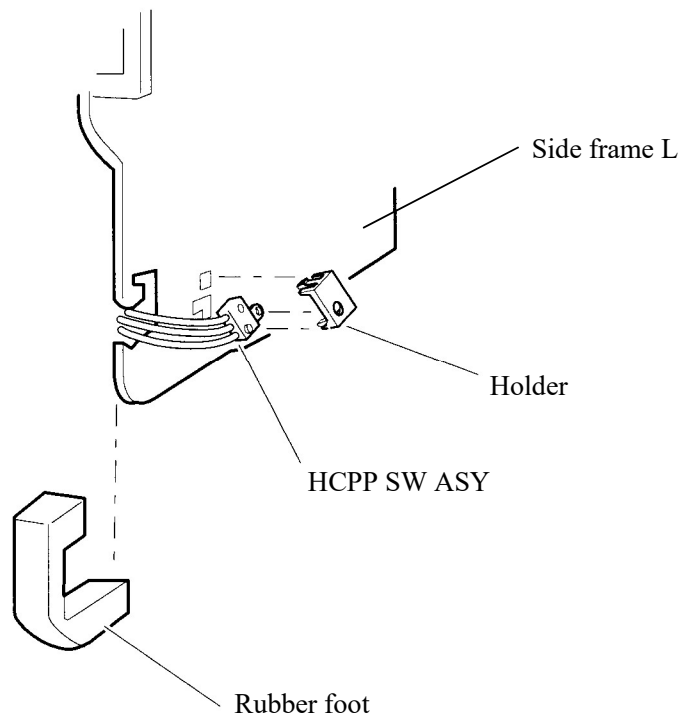


Figure 4.61 HCPP switch ASY replacement

(39) Sensor cover TR/TR PES ASY replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Unhook the sensor cover TR and remove the sensor cover TR.
4. Unhook the TRPES ASY and remove the TRPES ASY.
5. Disconnect the TRPES ASY connector.

Installation

1. Install the TRPES assembly and sensor cover TR by reversing the removal procedure.

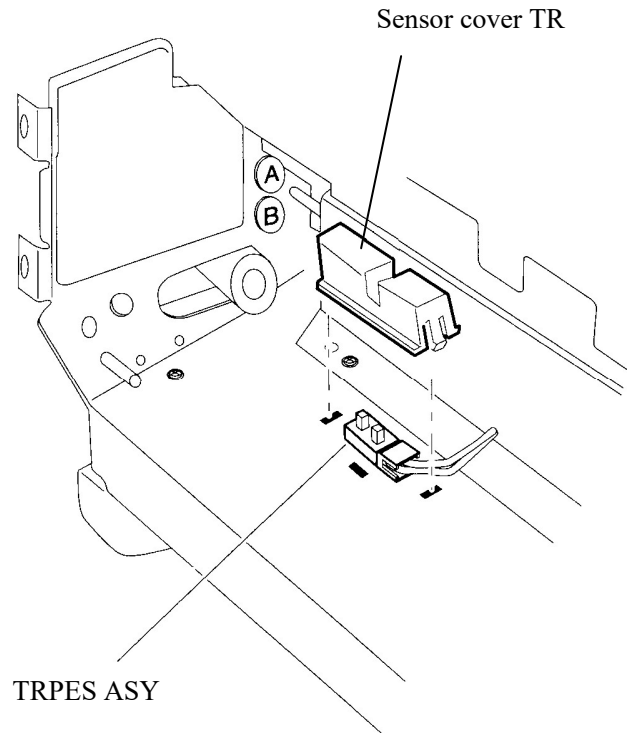


Figure 4.62 Sensor cover TR/TR PES ASY replacement

(40) Card Guide ASY replacement

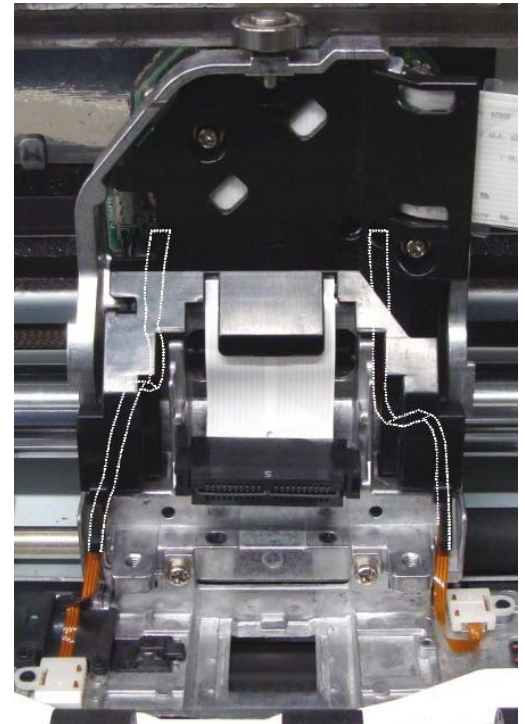
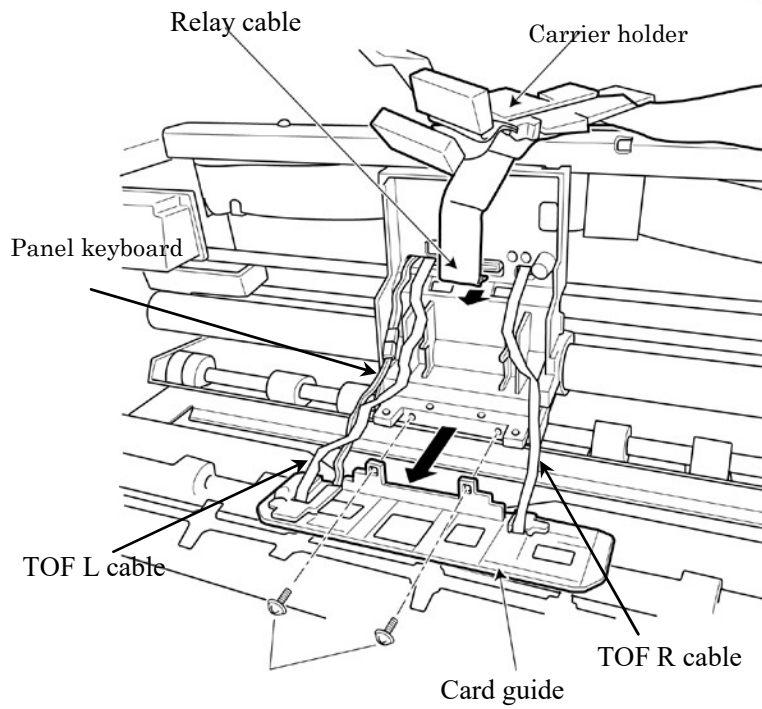
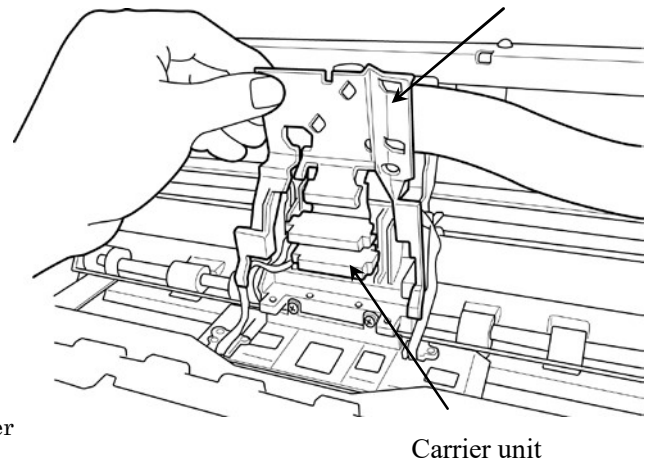
Removal

1. Remove the upper cover.
2. Remove the screws securing the upper guide F on its left and right, and release it to the front.
3. Remove the print head.
4. Remove the two screws securing the carrier holder , and remove the carrier holder.
5. Disconnect the TOF L cable, TOF R cable, and panel keyboard cable from the carriage PC board.
6. Remove the two screws securing the card guide ASY , and remove while rotating card guide ASY.

Installation

1. Install the card guide assembly by reversing the removal procedure.
2. Improper cable forming may cause the breaking of wire. See next page to form the wire appropriately. (Do the homing surely about the homing of TOF L cable, TOF R cable, and panel keyboard cable between the carrier holder and the carrier.)
3. After installation, the following adjustments are required: Carrier holder

- Card guide attaching position
- TOF sensor output
- Auto loading position
- Printing positions at paper end
- Left printing start position
- Skew detection



cable

Figure 4.63 Card Guide ASY replacement
(41) TOF S. L/R ASY replacement

Removal

1. Remove the upper cover.
2. Remove the screws securing the upper guide F on its left and right, and release it to the front.
3. Remove the print head.
4. Disconnect the TOFL/R cable from the carriage PC board.
5. Remove the small screws by precision driver, and remove the TOFL/R sensor.

Installation

1. Install the TOFL/R sensor assembly by reversing the removal procedure.
2. After installation, the following adjustments are required:
 - TOF sensor's voltage adjustment
 - Top-of-forms adjustment (factory use)
 - Skew detection value adjustment

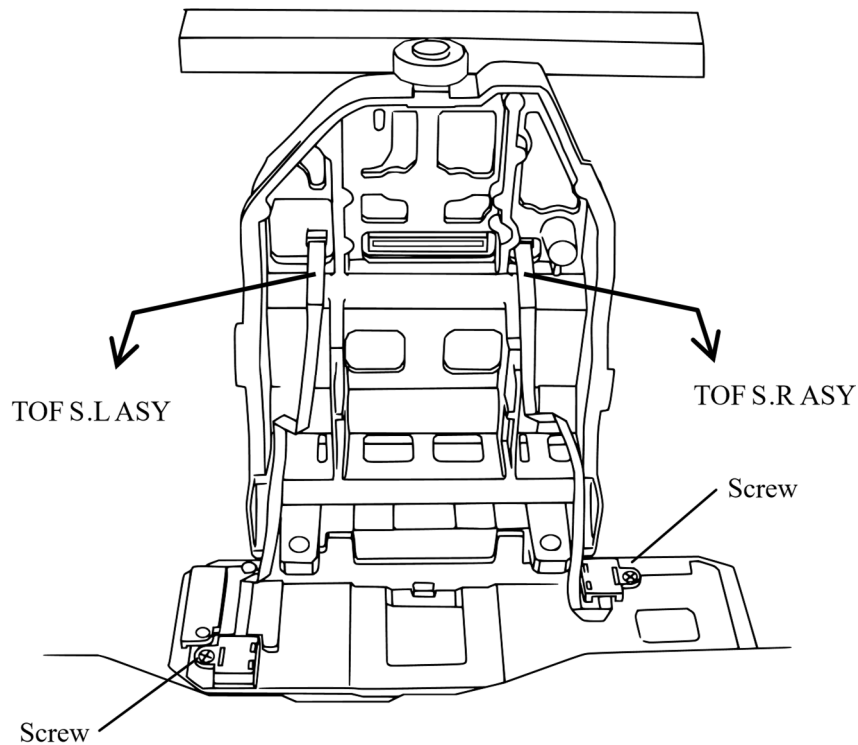


Figure 4.64 TOF S. L/R ASY replacement

(42) Carrier UNIT and Stay shaft replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Release the SS gear, Gear B and Gear A.
4. Remove the screw securing the tension unit , and remove the tension unit.
5. Remove the SP motor.
6. Remove the screws securing the upper guide F on its left and right, and release it to the front.
7. Remove the card guide from carrier unit.
(If you don't have head gap jig don't remove upper angle.)
8. Remove the side frame UL.
9. Remove the stay shaft.
10. Remove the carrier unit

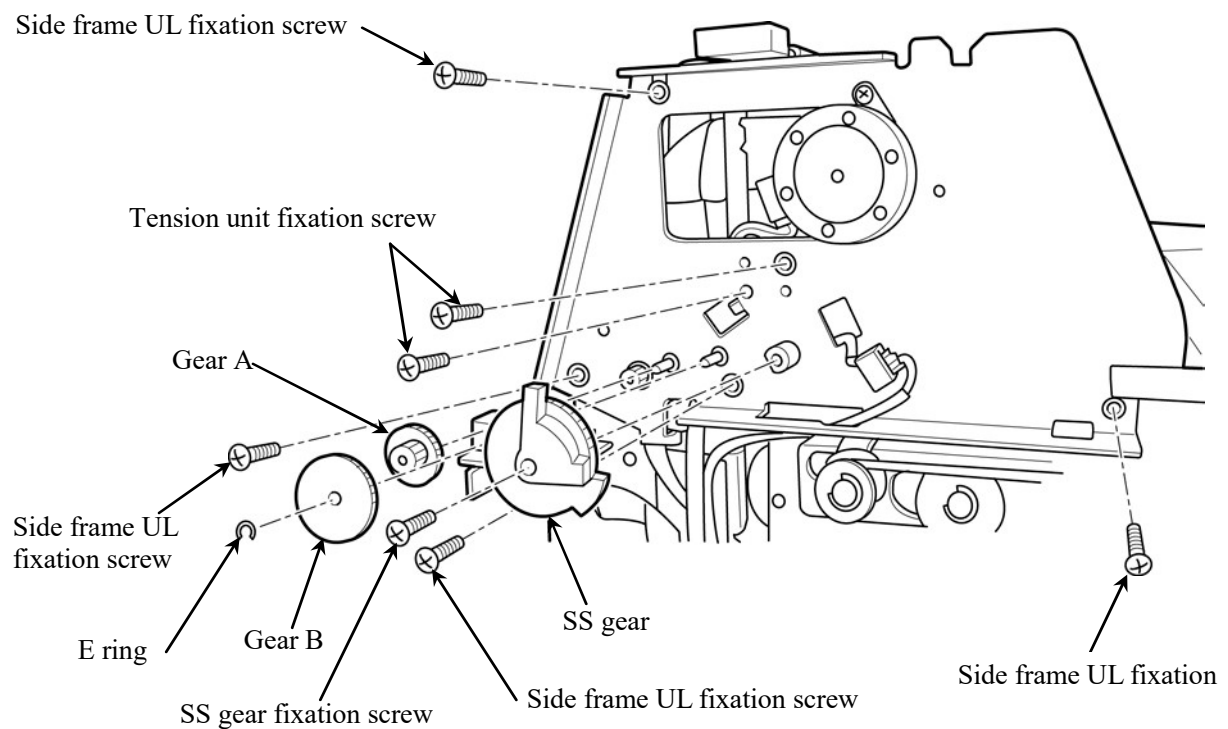


Figure 4.65 Carrier UNIT and Stay shaft replacement

Note.
Don't remove the screws for upper

to angle. Head gap jig is necessary to fasten them.

Removing print head and card guide is necessary to remove carrier unit without removing upper angle.

Carrier cable holder is behind the carriage.
Slide it to remove it.

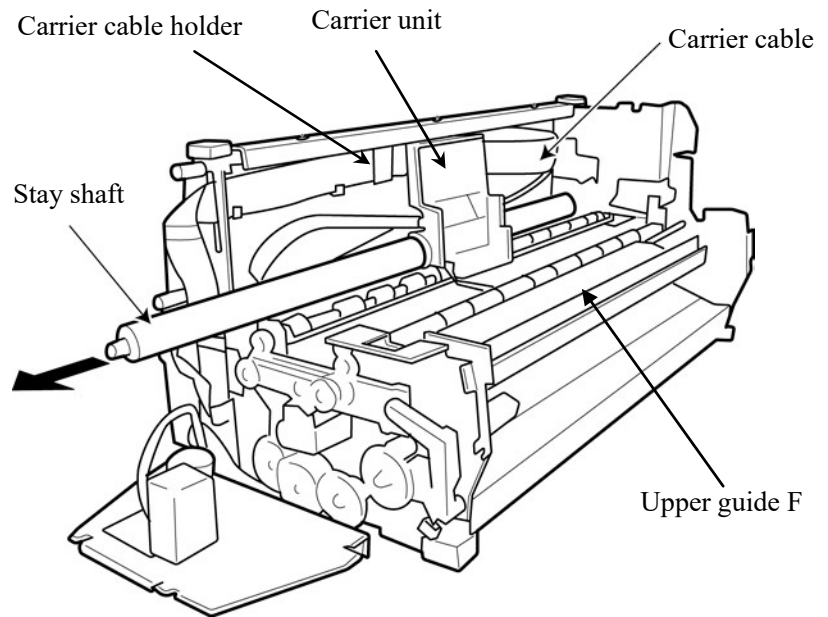


Figure 4.66 Carrier UNIT and Stay shaft replacement

Installation

1. Install the Carriage Unit and Stay Shaft by reversing the removal procedure.
2. When insert the stay shaft, take care of the oil felt inside the carrier hole.

Refer to lubrication inspection.

The following adjustments are required:

- Print head gap adjustment (for upper angle).
(You may omit, when having not loosened the screw.)
- Card guide position adjustment
- TOF sensor's voltage adjustment
- Vertical Alignment (V-ALMNT) adjustment
- Top-of-forms adjustment (factory use)
- Skew detection value adjustment

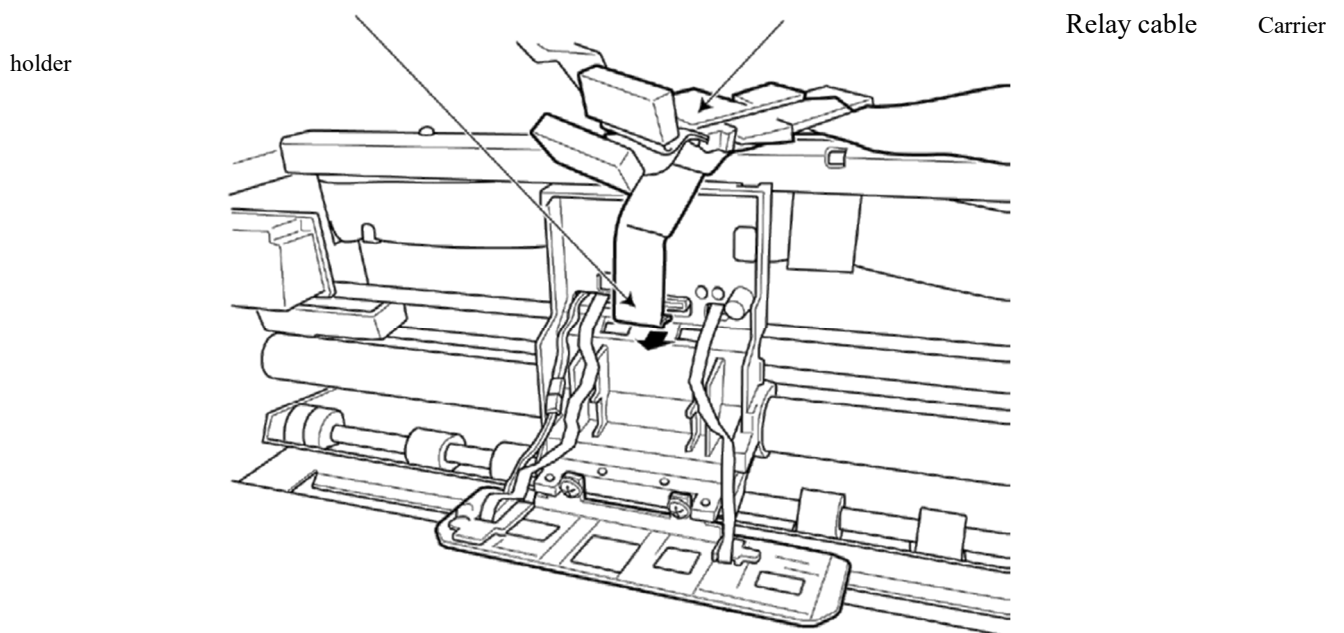
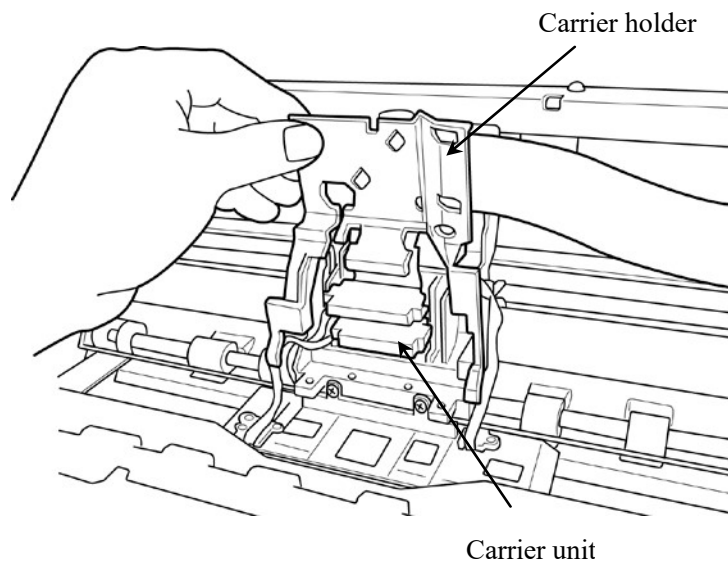
(43) Carrier Cable ASY replacement

Removal

1. Remove the upper cover.
2. Remove the print head.
3. Remove the two screws securing the carrier holder , and remove the carrier holder.
4. Disconnect the relay cable from the carriage PC board.
6. Remove the carrier cable ASY from the card holder.
(Carrier cable holder is behind the carriage. Slide it to remove it.)

Installation

1. Install the card guide assembly by reversing the removal procedure.



**Figure 4.67 Carrier Cable ASY replacement
(44) SP Timing Belt replacement**

Removal

1. Remove the upper cover.
2. Remove the print head.
3. Remove the Carrier UNIT.
4. Remove the two screws securing the belt cramp , and remove the SP timing belt.
4. Disconnect the relay cable from the carriage PC board.

6. Remove the carrier cable ASY from the card holder.
(Carrier cable holder is behind the carriage. Slide it to remove it.)

Installation

1. Install the SP timing belt by reversing the removal procedure.
The following adjustments are required:

- Print head gap adjustment (for upper angle).
(You may omit, when having not loosened the screw.)
- Card guide position adjustment
- TOF sensor's voltage adjustment
- Vertical Alignment (V-ALMNT) adjustment
- Top-of-forms adjustment (factory use)
- Skew detection value adjustment
- APTC detection sensor adjustment

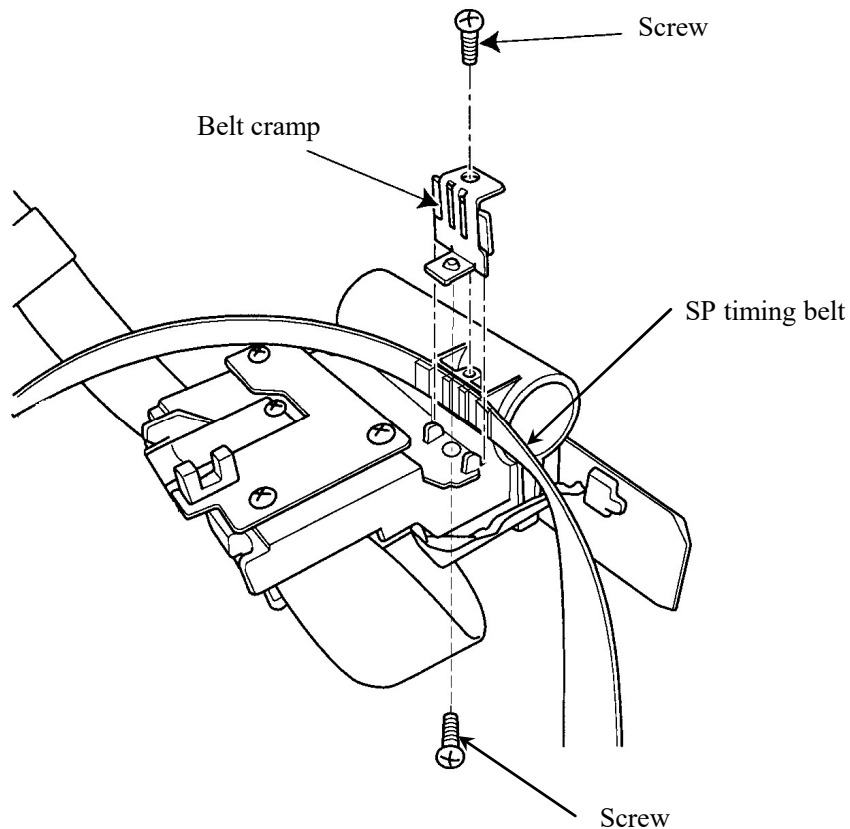


Figure 4.68 SP Timing Belt replacement

(45) CES Scale replacement

Removal

1. Remove the upper cover.
2. Remove the CES spring.
3. Remove the screw securing the CES scale, and remove the CES scale.

Installation

1. Install the CES scale by reversing the removal procedure.

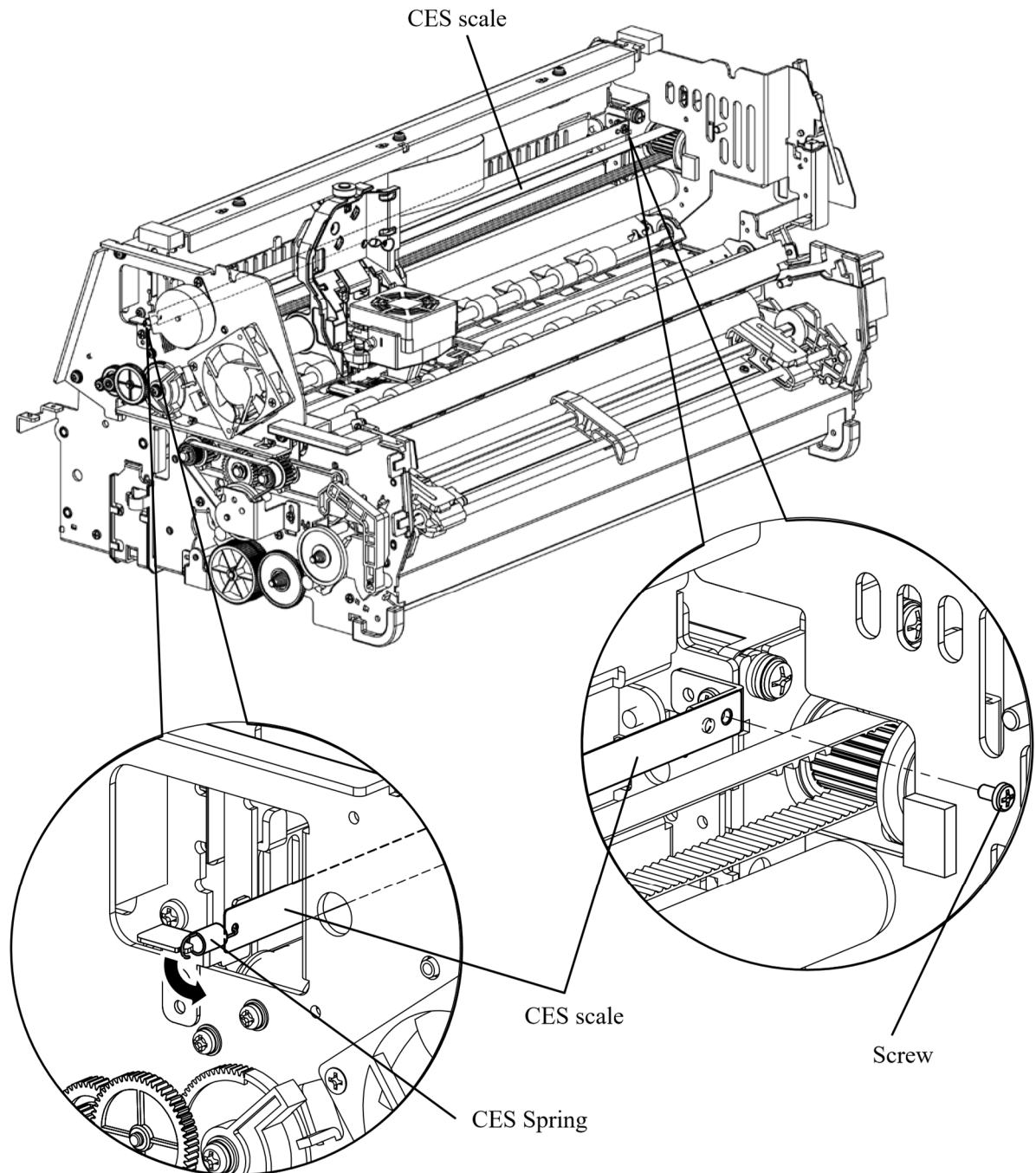


Figure 4.69 CES Scale replacement

(46) LF Timing belt replacement

Removal

4. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Put the mark to memory the LF tension bracket position. .
4. Remove the LF tension bracket and remove the LF belt.

Installation

4. Install the LF timing belt by reversing the removal procedure.
2. Install the LF tension bracket while aligning it with the marking and secure it with a screw.

Note:

After installation is finished, the following adjustment is required: LF belt tension

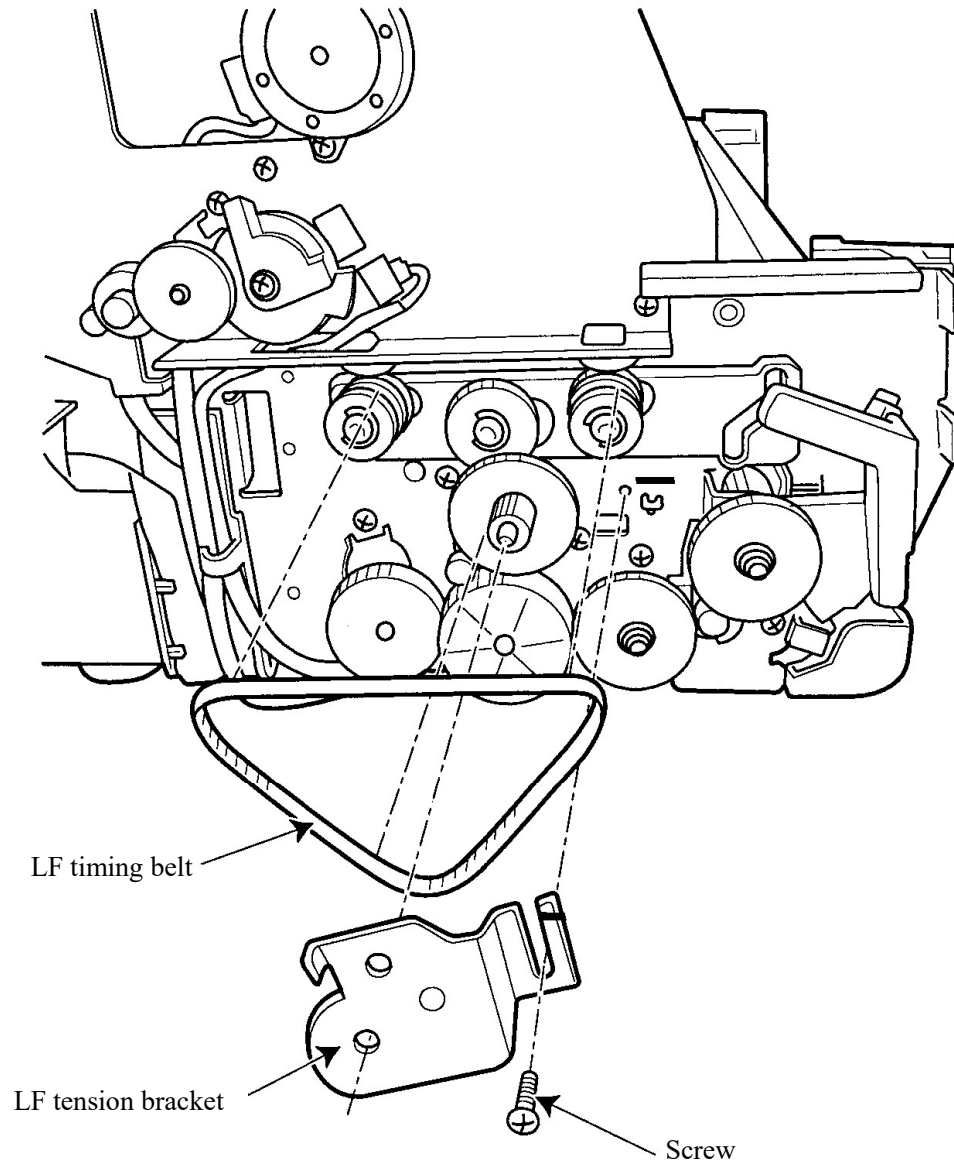


Figure 4.70 LF Timing Belt replacement

(47) Platen Roll replacement

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Before remove the LF tension pulley ASY put the mark to memory its adjusted position.
4. Remove the LF tension bracket, LF belt and Pulley gear.
5. Remove the Platen gear, Flanges, DV gears.

6. Remove the slide cam.

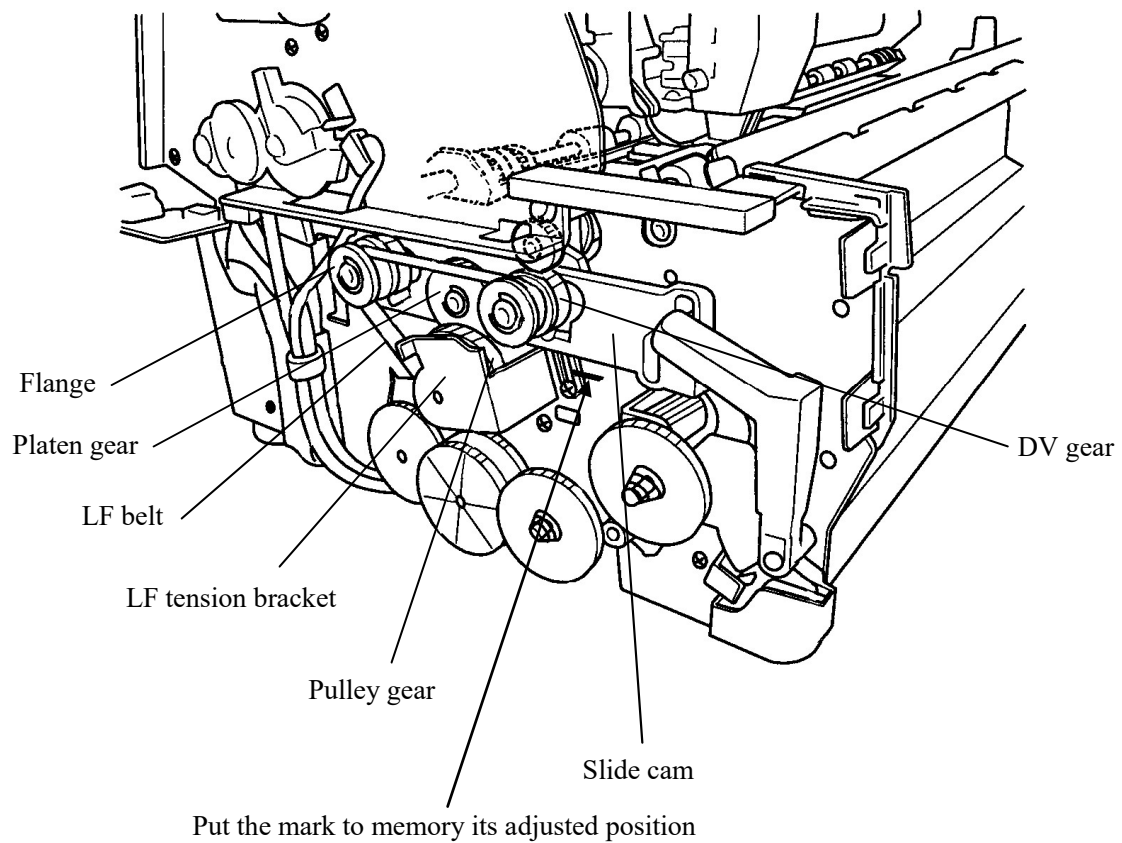
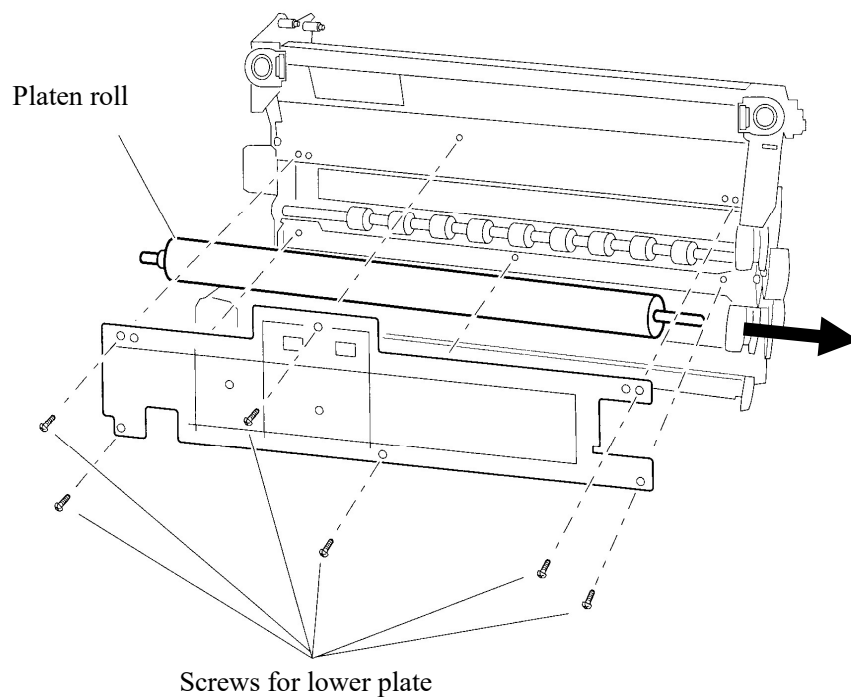


Figure 4.71 Platen Roll replacement

7. Turn down the mechanism assembly.
8. Disconnect cables backside of printer mechanism unit, remove 6 screws of lower plate.
9. Remove the bearings and slide in the direction of allow then remove it.



Note:

Take care of jamming cables together when install platen cover.

Figure 4.72 Platen Roll replacement

Installation

1. Assembly by reverse order the removal.

Note Lubrication is necessary to right and left shaft of Platen roll.
(Refer to lubrication tables)

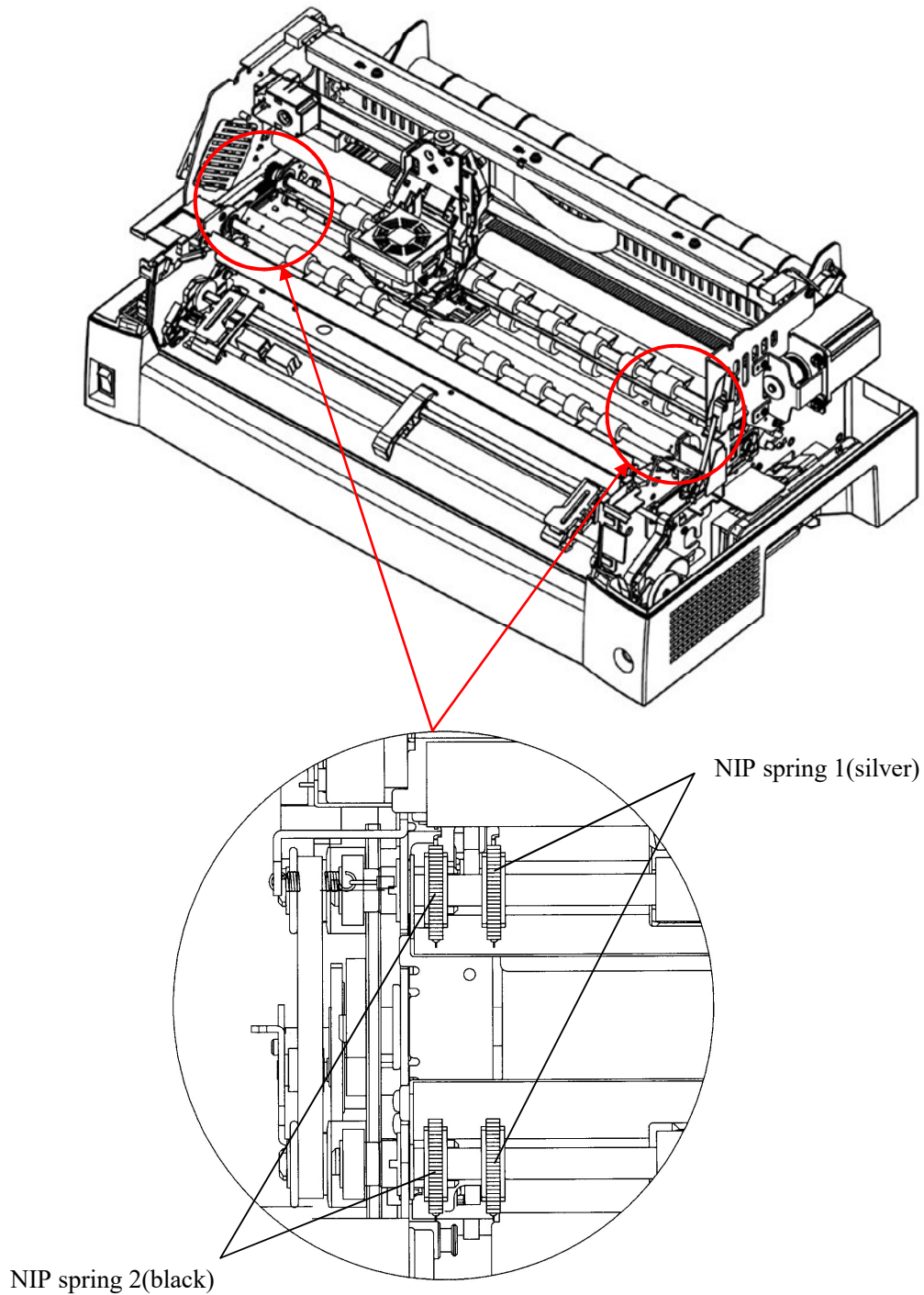
(48) NIP Spring 1/2 replacement

Removal

1. Remove the upper cover.
2. Unhook four nip springs 1 (two on each end) and four nip springs 2 (two on each end), and remove the springs.

Installation

1. Install nip springs 1 and 2 by reversing the removal procedure.



**Figure 4.73 NIP Spring 1/2 replacement
(49) NIP Roller ASY replacement**

[For the front side]

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Unhook one sides of 4 nip springs and remove 4 spring holders.
4. Remove the E ring of both side and Nip gear on the left side.

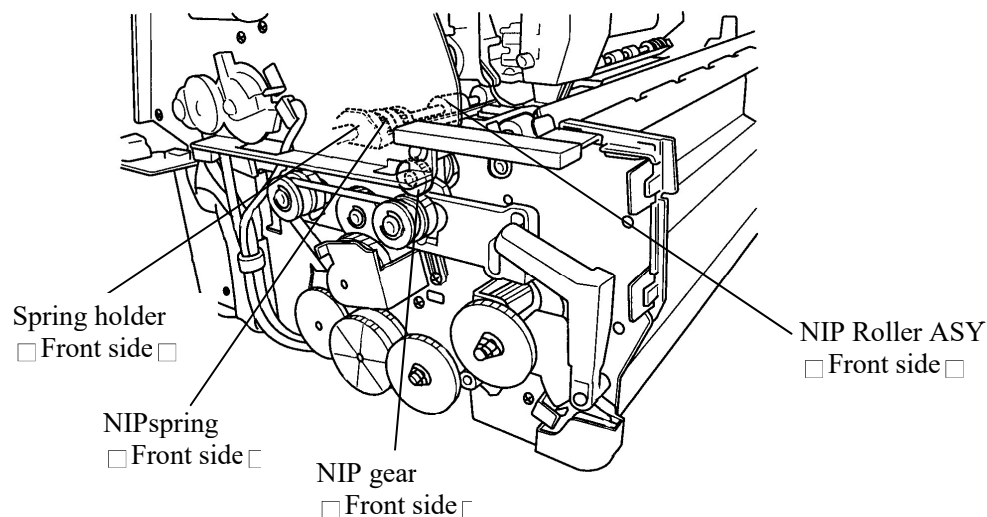


Figure 4.74 Nip Roller ASY replacement

5. Remove the SP FAN UNIT and plate.
6. Remove the flanges, slide cam, OC cam and bearings..
7. Lift and slide the Nip roller to the right. And remove it from its left end.

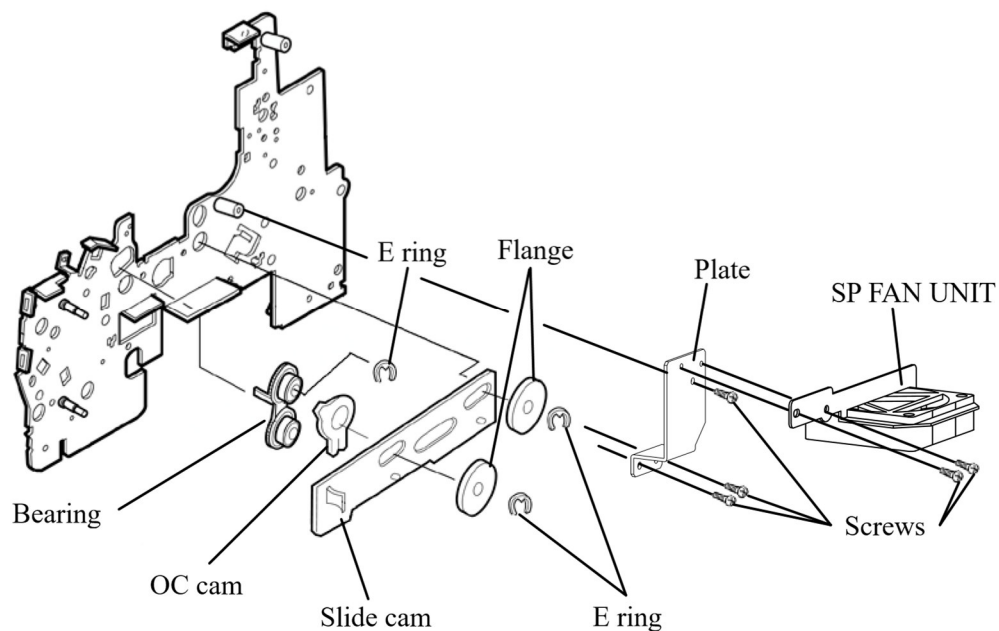


Figure 4.75 Nip Roller ASY replacement

Installation

1. Assembly by reverses order.
(Lubrication is necessary refer to lubrication table)

[For the rear side]

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Unhook one sides of 4 nip springs and remove 4 spring holders.
4. Remove the E ring of both side and Nip gear on the left side.

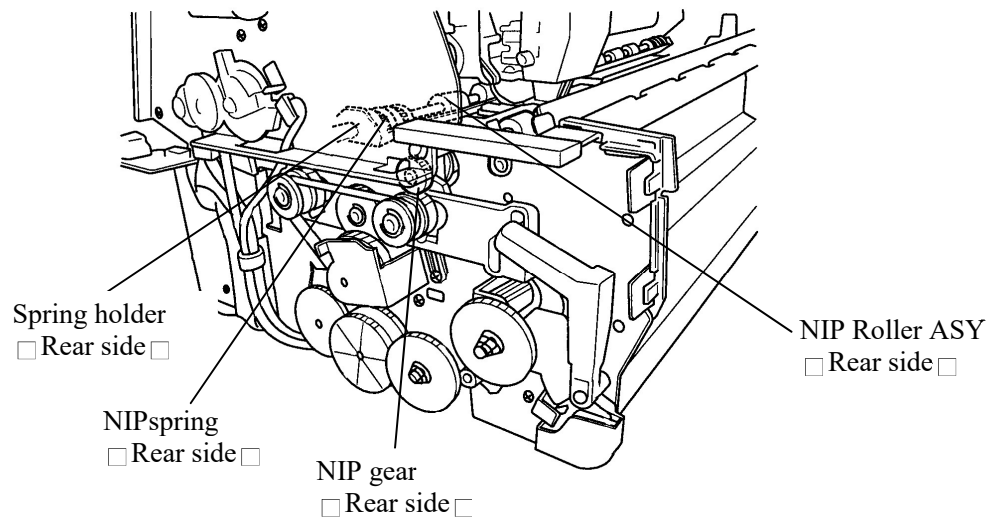


Figure 4.76 Nip Roller ASY replacement

5. Remove the SP FAN UNIT and plate.
6. Remove the flanges, slide cam, OC cam and bearings..
7. Lift and slide the Nip roller to the right. And remove it from its left end.

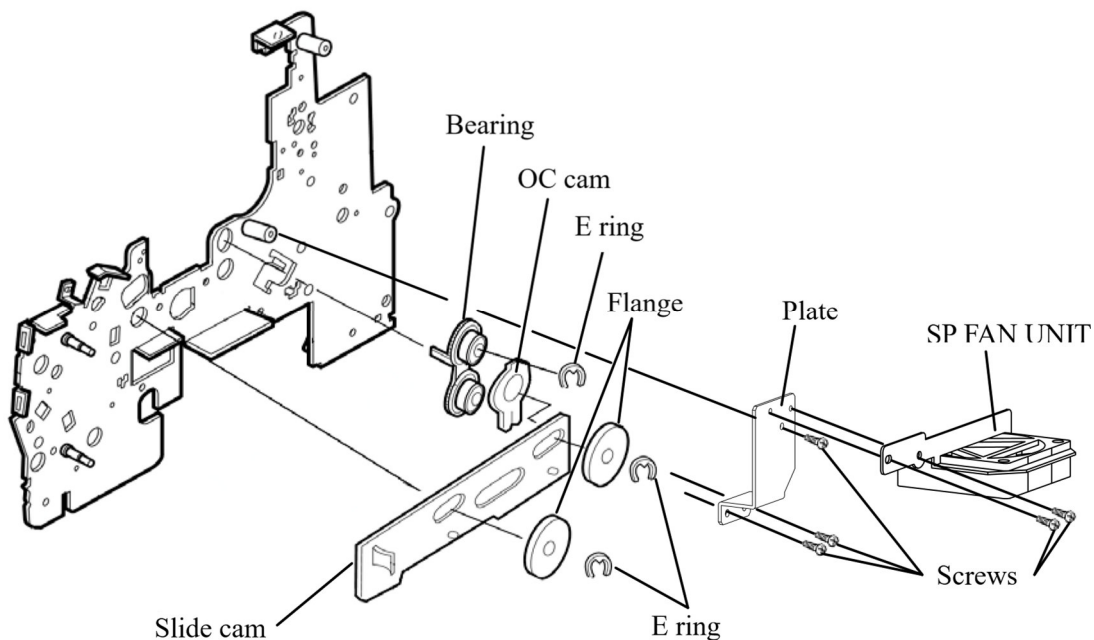


Figure 4.77 NIP Roller ASY replacement

Installation

1. Assembly by reverses order.
(Lubrication is necessary refer to lubrication table)

(50) DV Roller ASY replacement

[For the front side]

Removal

1. Remove the upper cover.

2. Remove the printer mechanism assembly.
3. Remove the LF bracket (one screw) and LF belt.
4. Remove the two flanges (two E-rings), two DV gears, two NIP gears (two E-rings), and one platen gear (one E-ring) from the left side of the mechanism assembly.
5. Remove the slide cam and OC cam from the left side of the mechanism assembly.
6. Remove the bearings from the left side of the mechanism assembly.

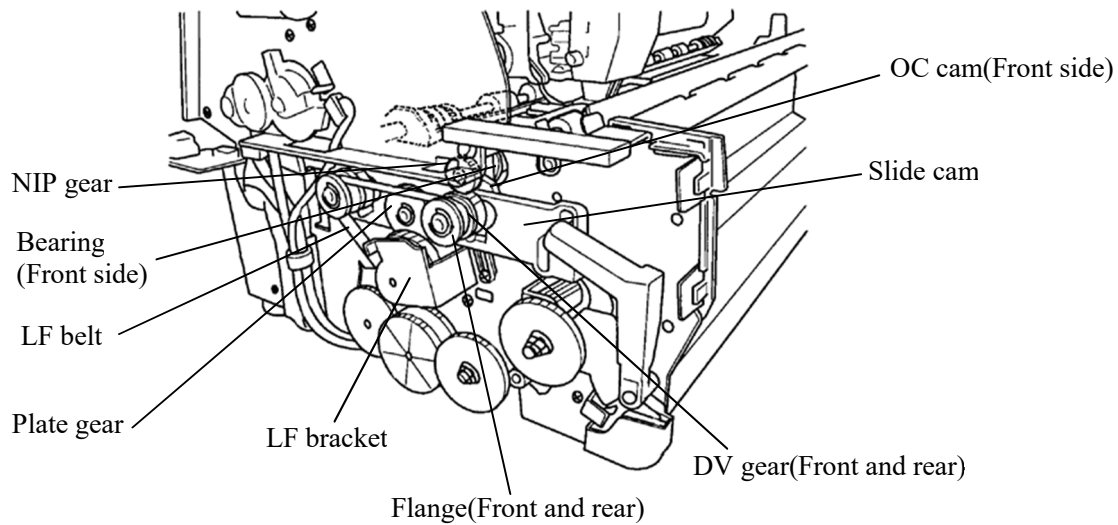


Figure 4.78 DV Roller ASY replacement

7. Remove the SP FAN UNIT and plate.
8. Remove 3 e-rings, 2 flanges and slide cam at right side of printer mechanism.
9. Remove the OC cam and bearing at right side of printer mechanism.
10. Remove 4 screws fixing lower guide at left and right side.

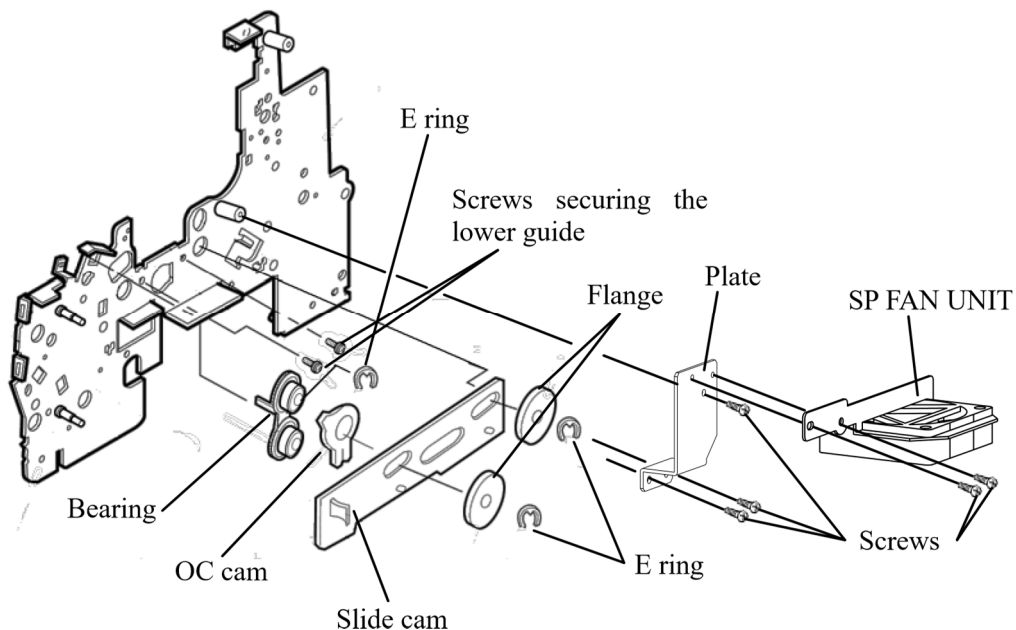


Figure 4.79 DV Roller ASY replacement

10. Remove 4 screws fixing lower guide at front and rear side.
11. Shift the lower guide a little upward.

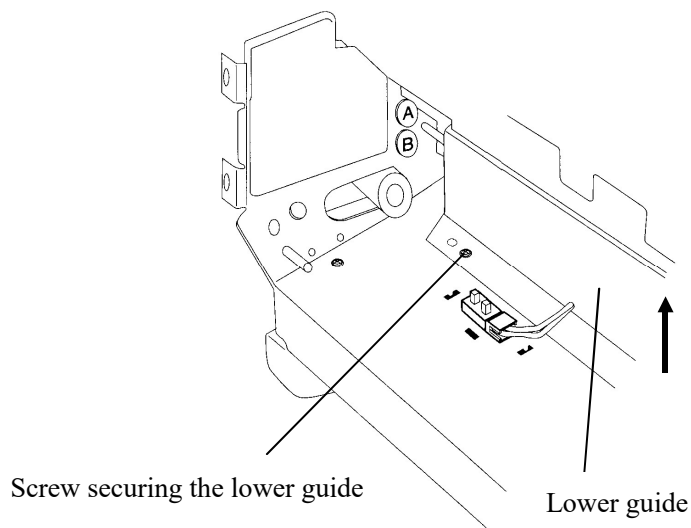


Figure 4.80 DV Roller ASY replacement

12. Remove the lower plate.

Disconnect cables backside of printer mechanism unit, remove 6 screws of lower plate.

13. Slide the DV roller assembly direction of arrow, then remove it.

14. Replace assembled parts on the DV roller.

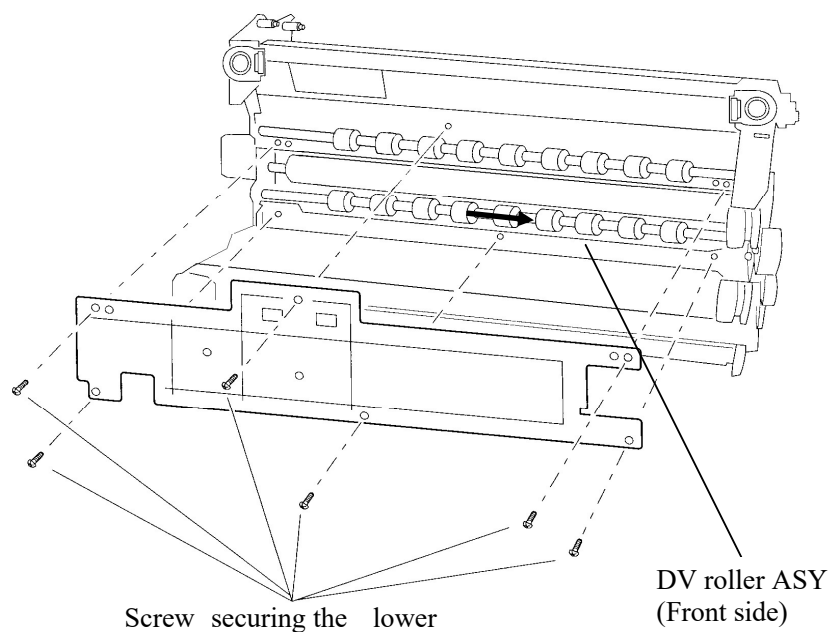


Figure 4.81 DV Roller ASY replacement

Installation

1. Assembly by reverse order the removal.

Note Lubrication is necessary to right and left shaft of Platen roll.
(Refer to lubrication tables)

NOTE) after installation, the following adjustment are required.

(1) LF belt tension Note Lubrication is necessary to right and left shaft of Platen roll.
(Refer to lubrication tables)

[For the rear side]

Removal

1. Remove the upper cover.
2. Remove the printer mechanism assembly.
3. Remove the LF bracket (one screw) and LF belt.
4. Remove the two flanges (two E-rings), two DV gears, two NIP gears (two E-rings), and one platen gear (one E-ring) from the left side of the mechanism assembly.
5. Remove the slide cam and OC cam from the left side of the mechanism assembly.
6. Remove the bearings from the left side of the mechanism assembly.

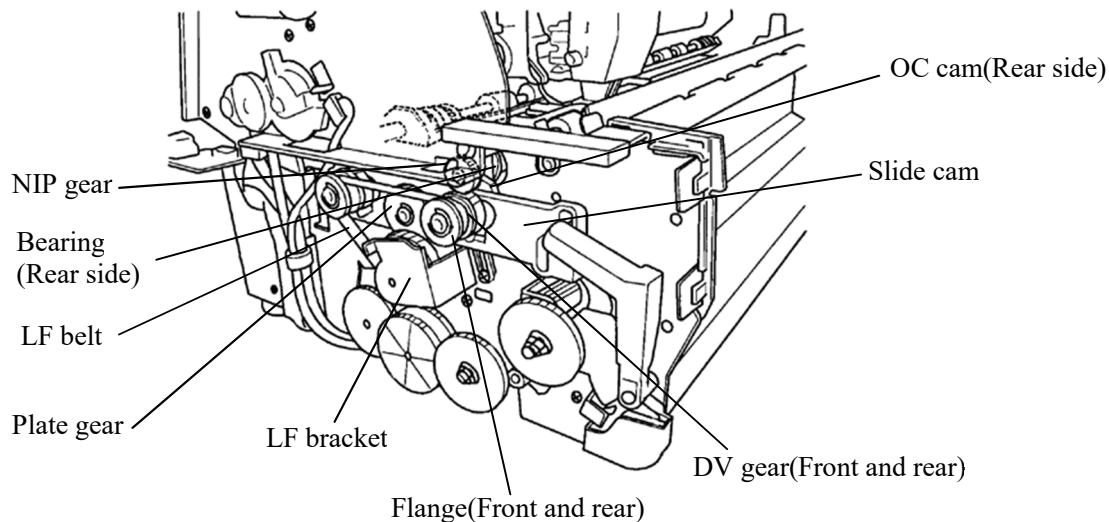


Figure 4.82 DV Roller ASY replacement

7. Remove the SP FAN UNIT and plate.
8. Remove 3 e-rings, 2 flanges and slide cam at right side of printer mechanism.
9. Remove the OC cam and bearing at right side of printer mechanism.
10. Remove 4 screws fixing lower guide at left and right side.

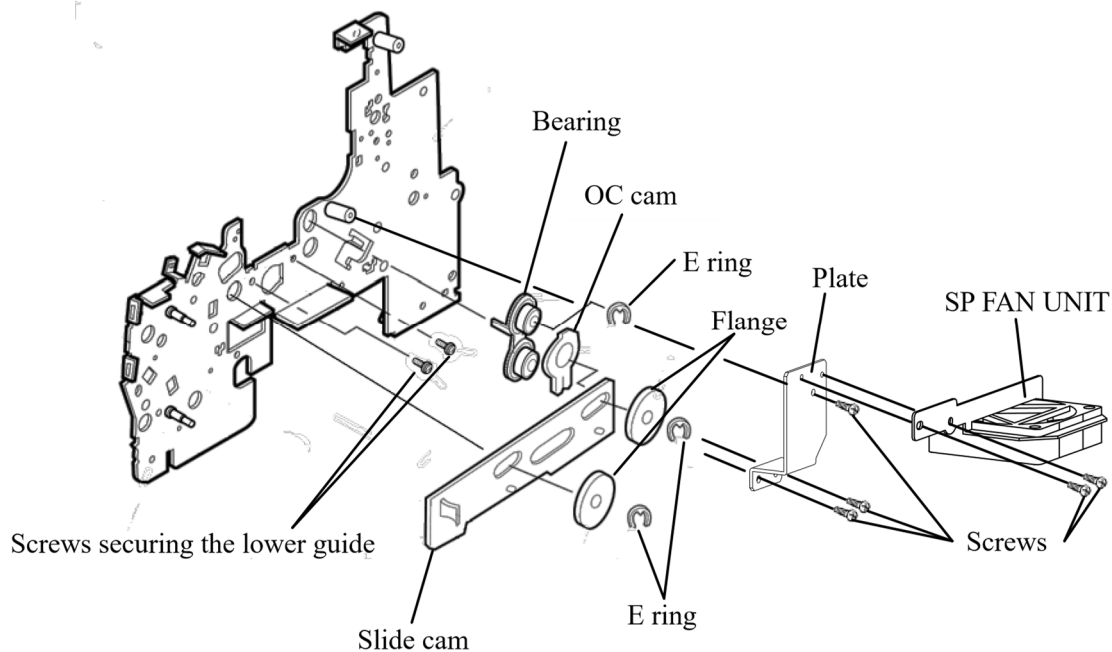


Figure 4.83 DV Roller ASY replacement

10. Remove 4 screws fixing lower guide at front and rear side.
11. Shift the lower guide a little upward.

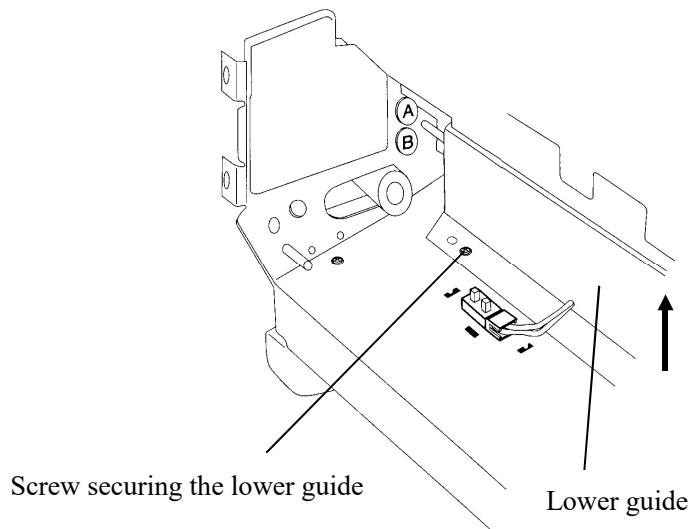


Figure 4.84 DV Roller ASY replacement

12. Remove the lower plate.

Disconnect cables backside of printer mechanism unit, remove 6 screws of lower plate.

13. Slide the DV roller assembly direction of arrow, then remove it.

14. Replace assembled parts on the DV roller.

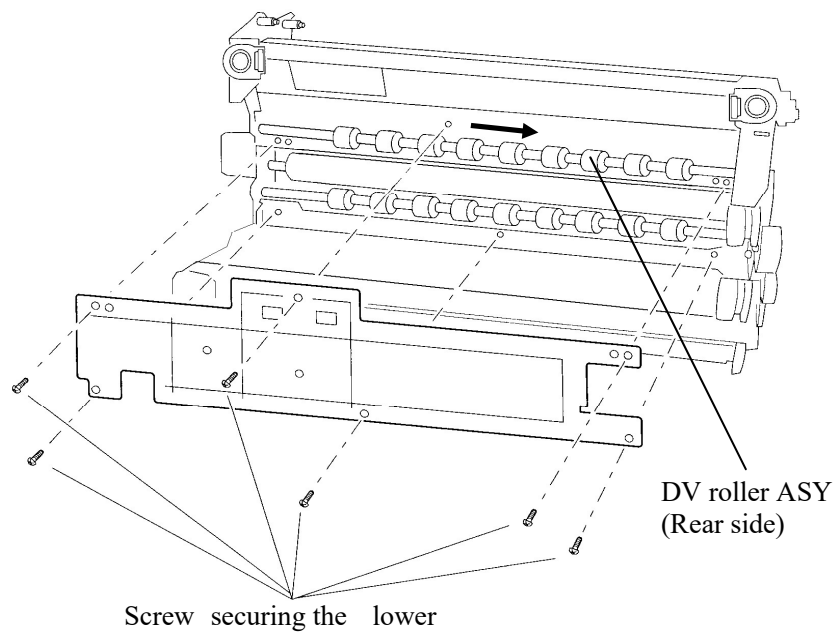


Figure 4.85 DV Roller ASY replacement

Installation

1. Assembly by reverse order the removal.

Note Lubrication is necessary to right and left shaft of Platen roll.
(Refer to lubrication tables)

NOTE) after installation, the following adjustment are required.

(1) LF belt tension Note Lubrication is necessary to right and left shaft of Platen roll.
(Refer to lubrication tables)

4.9.2 Adjustment

(1) Print head gap adjustment

Note:

This adjustment needs the head gap adjustment jig (special dial gage), so this part is parts that must not be disassembled. If you don't have head gap adjustment jig, don't adjust this portion as much as possible.

Procedure

1. Attach the head gap adjustment jig on the carriage.
2. If necessary open the upper guide F open.
3. Move the card guide upper side.

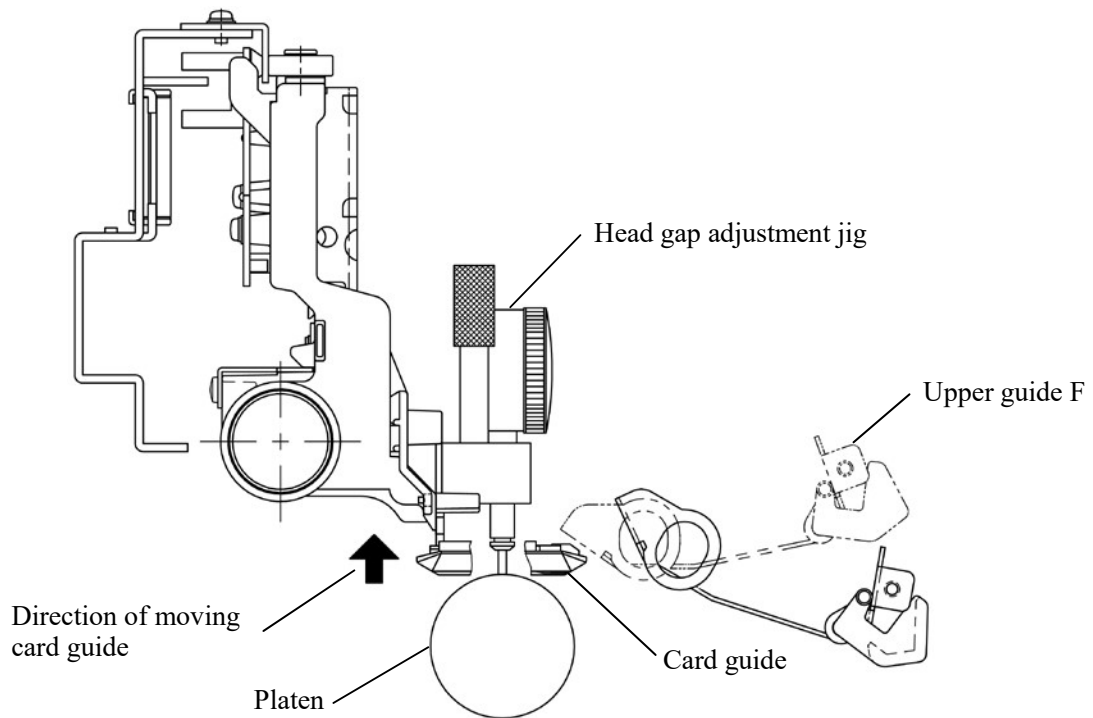


Figure 4.86 Attach the print head gap jig

4. Rotate the SS gear (located at the left side of the stay shaft) clockwise (this direction makes the head gap narrow) until its stopper touches the stopper of the side frame.

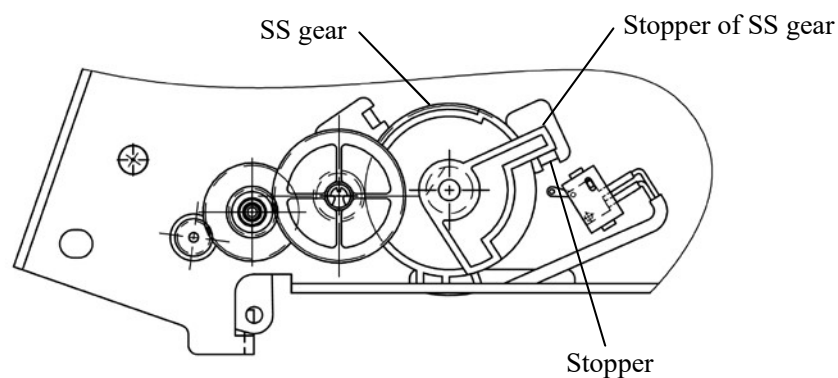


Figure 4.87 Rotate SS gear

5. Slightly loosen the three screws(a),(b) and (c) on the upper angle.

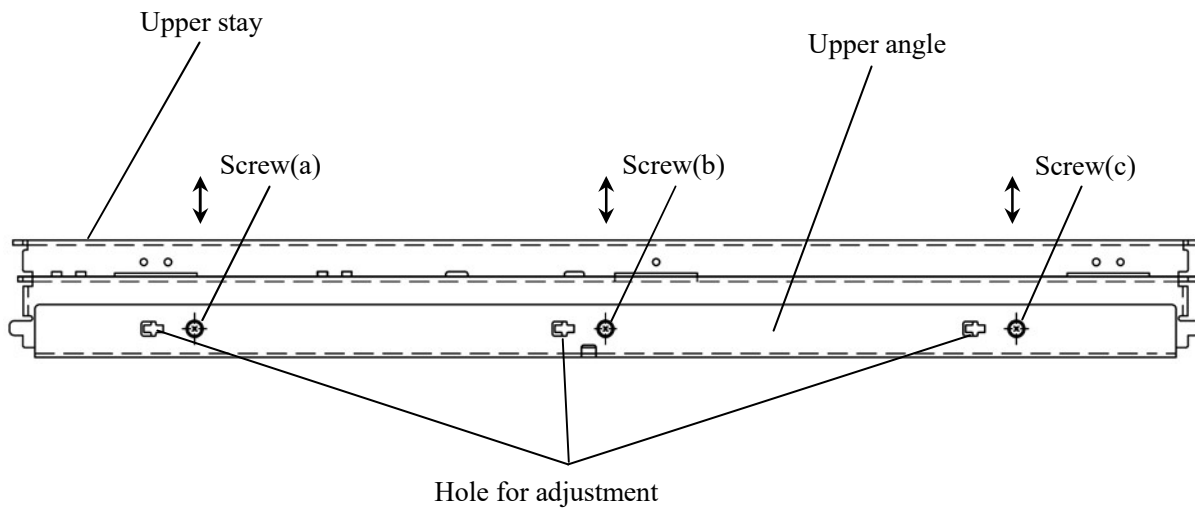


Figure 4.88 Adjustment head gap

$$A=0.00\text{mm}\pm0.01\text{mm}$$

6. Slide the carriage unit to the left end (1st column side)
7. Move the upper angle back and forth so that the head gap may have value A, then fasten the screw(a).
8. Slide the carriage to the right end (136 column side) and move the upper angle back and forth so that the head gap may have value A, then fasten the screw(c).
9. Center the carriage unit and move the upper angle back and forth so that the head gap may have value A, then fasten the screw(b).
10. Slide the carriage unit to the left, center and right, and check the value A at each position.
11. If the head gap doesn't have value A, loosen the screw at that position and move the upper angle back and forth again so that the head gap may have value A, and then fasten the screw.
12. If the head gap has value A at the left, center, and right positions, that's all for this adjustment.

(2) Card guide position adjustment

Note:

For improve the precision using the head gap adjustment jig is better.

If you don't have the head gap adjustment jig refer to the another procedure which comes out behind

[Using the head gap adjustment jig]

This adjustment should be done after print head gap adjustment is finished.

1. Attach the head gap adjustment jig on the carriage.
2. Open the upper guide F open.
3. Place the carriage to the ribbon replace position.
4. Loosen the card guide mounting screws slightly (to an extent where the card guide doesn't drop towards the platen).

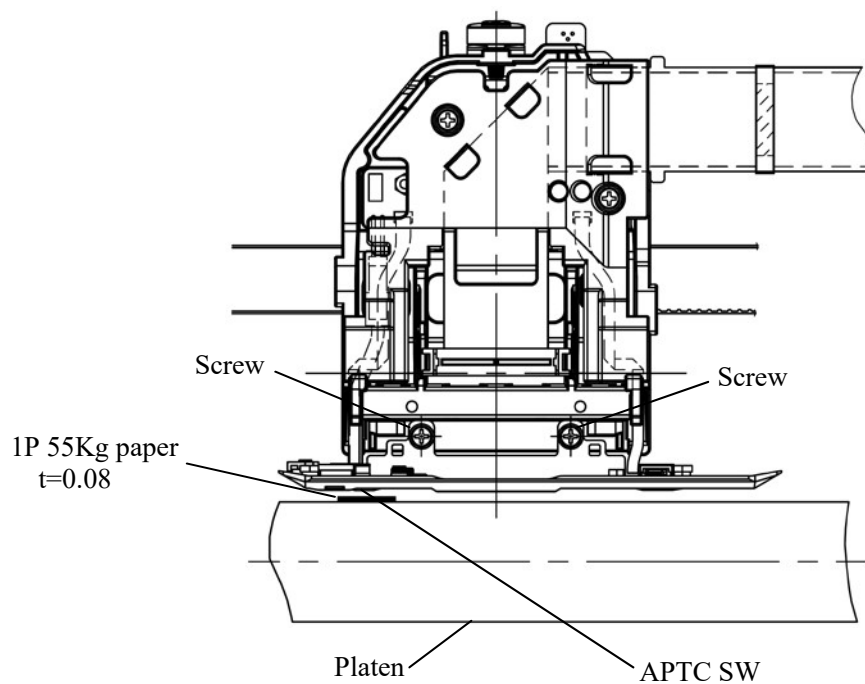
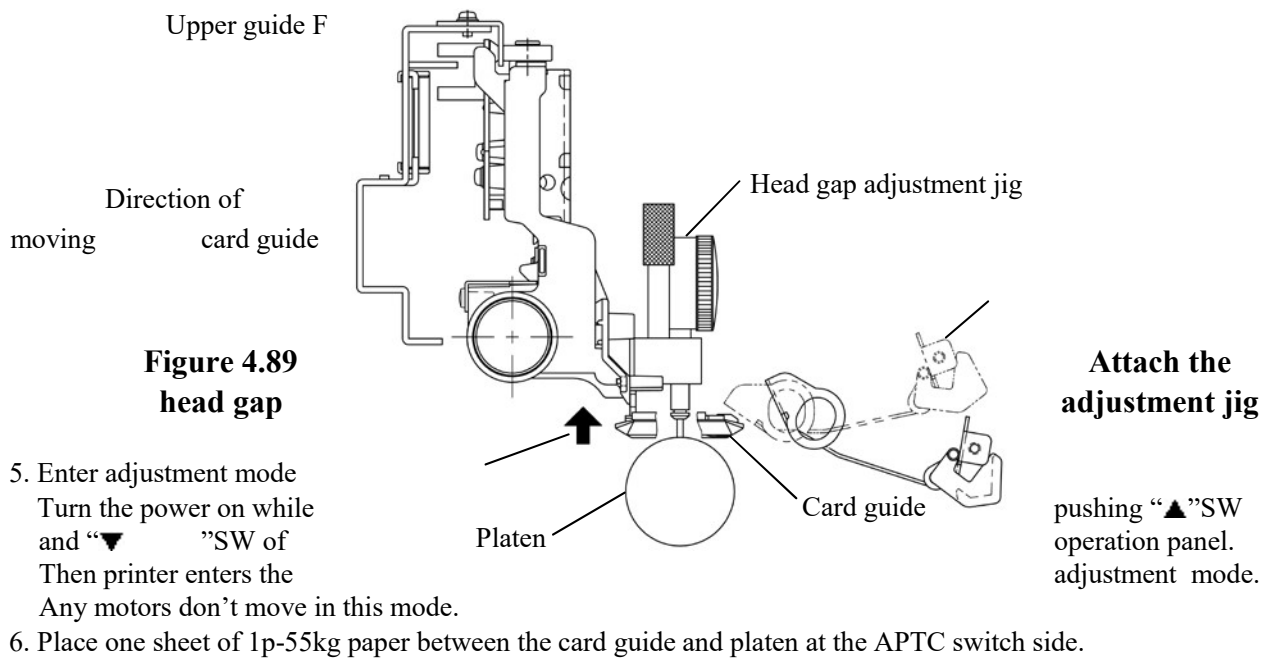


Figure 4.90 Insert paper for adjustment

7. Adjust the head gap to value A, by turning the SS gear.

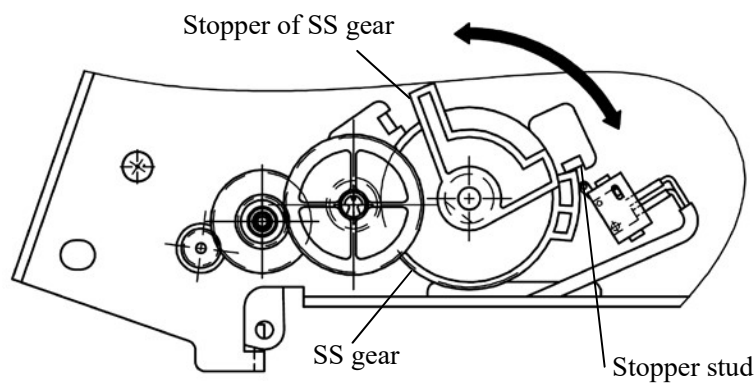


Figure 4.91 Rotate SS gear

$A=0.27\text{mm}\pm0.01\text{mm}$

8. Move the card guide up and down so that APTC SW should be switched into conducting state at the head gap is value A. (The value A should be checked during the SS gear is rotating in the direction of clockwise.)
9. Slope of card guide should be as follows.

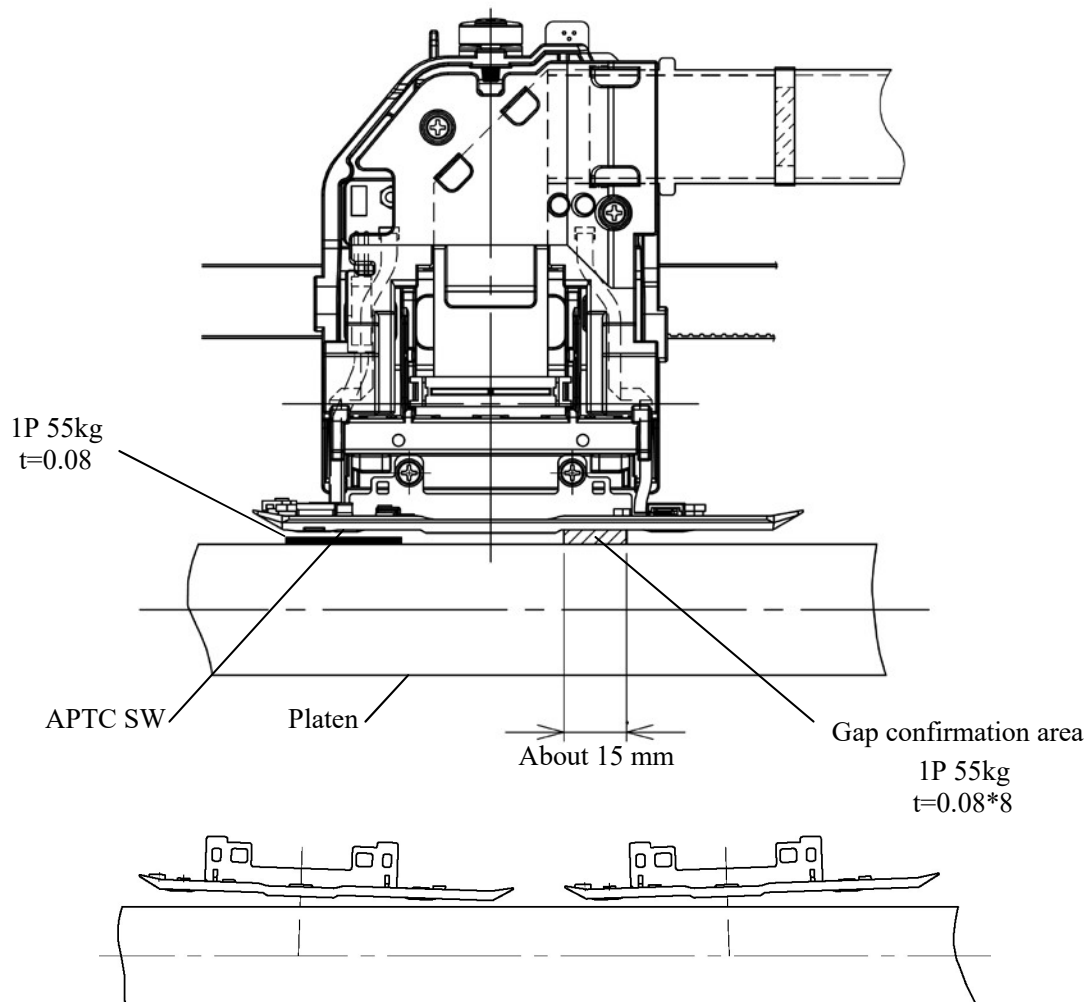


Figure 4.92 Adjustment and check inclination of card guide

10. Check the gap between the print head and paper after APTC function is operated.
Turn the printer off immediately after printing is started. Check the value B by head gap adjustment jig. If the Value B is as follows adjustment is finished.

$B=0.31\text{mm}\pm0.03\text{mm}$

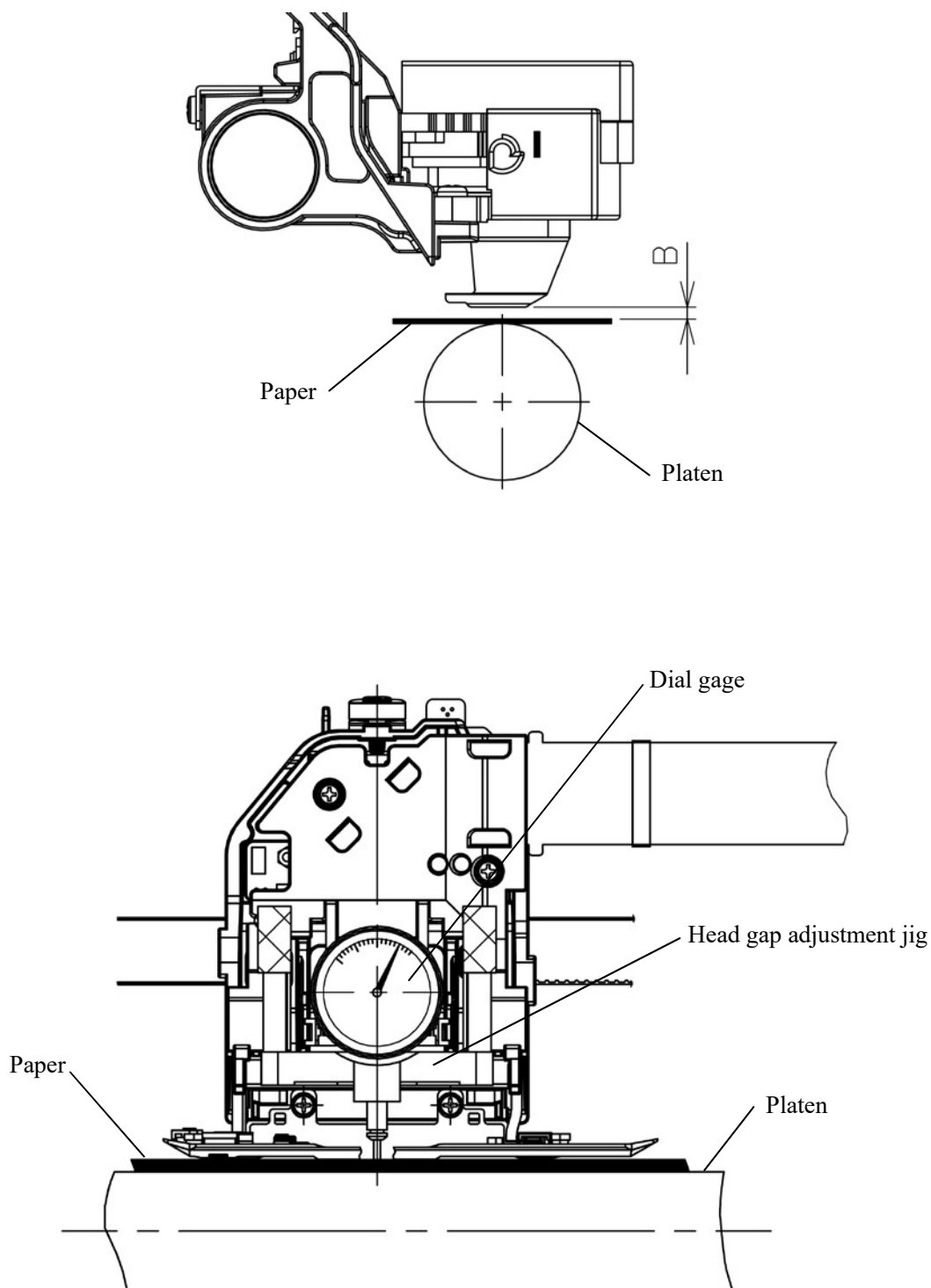


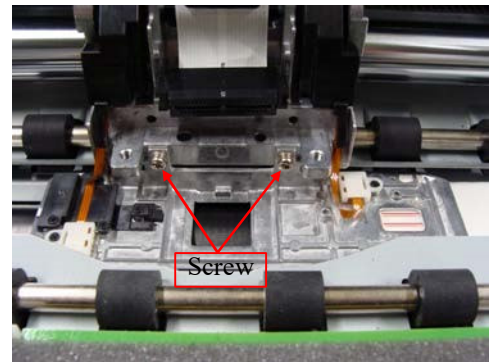
Figure 4.93 Check the gap after APTC operate

(3) Card guide position adjustment (another way)

[Without the head gap adjustment jig]

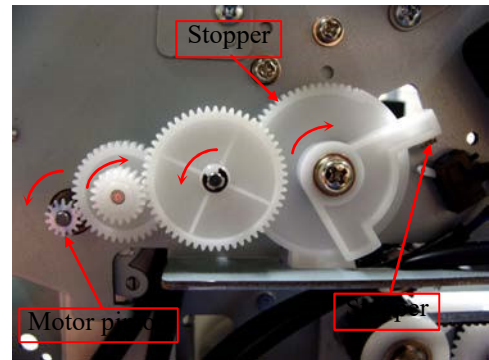
This method uses the gear that is next to the motor pinion instead of head gap adjustment jig. This adjustment should be done after print head gap adjustment is finished.

1. Remove the print head.
2. Open the upper guide F open.
3. Loosen the fixed screw of the card guide.

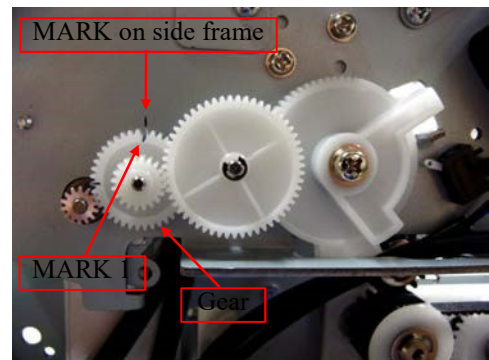


4. Rotate the motor pinion counterclockwise until stopper of SS gear touch against the stopper stud.

Note Please make sure to rotate gears by motor pinion.



5. Put the "MARK 1" as the base position.
Put the "MARK 1" on the tooth of the gear, and put the mark side frame at same position.



6. Put the "MARK 2" as the aim for adjustment.
Rotate the motor pinion clockwise to rotate drive gear by 11 teeth. Then put the "MARK 2" to the tooth, which becomes ten pieces from the "MARK 1".
And then rotate the motor pinion clockwise to rotate drive gear by 2 teeth.

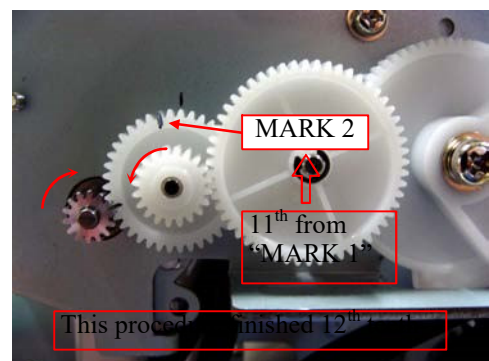
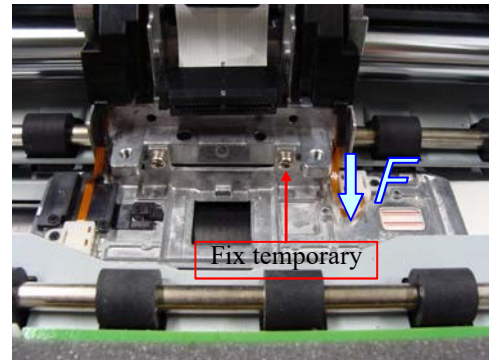
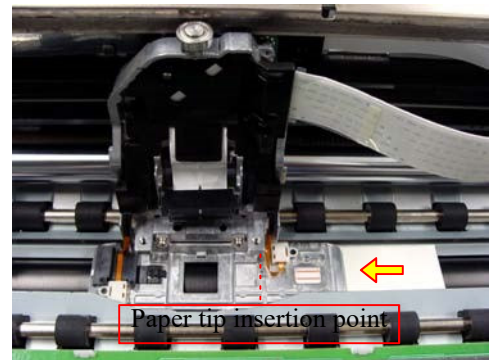


Figure 4.94 other way to adjust the card guide

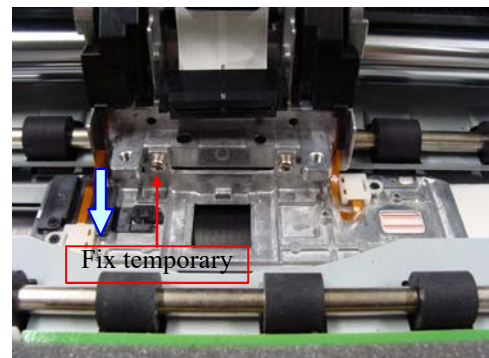
7. Insert the 8 parts of paper into the right of card guide and platen.
This spacer should be made as follows.
Fold the A5 size paper 3 times. Total thickness of papers should be $0.65 \pm 0.1 \text{ mm}$



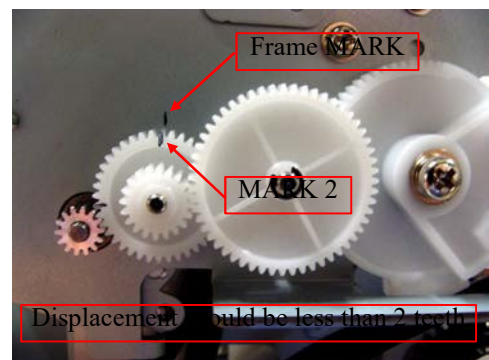
8. Fasten the right side screw temporary
Fasten the right side screw during pushing right portion of card guide by light force.



9. Remove the inserted paper.
10. Enter the adjustment mode.
During pushing the "▲", "▼" SW, turn the power on.
11. Adjust the position of the card guide
Lower the left side of a card guide little by little until the buzzer sounds, and then fasten the screw temporarily.
The buzzer sounds during the APTC detect SW is pushed. To stop the buzzer rotate motor pinion clockwise.



12. Check the drive gear position when the buzzer sound. Once turn clockwise until buzzer is stop, and then turn the motor pinion gear counterclockwise until buzzer sounds.
On an ideal target "MARK 2" agree the mark on the bracket.
 ± 2 tooth is a permission level.
When the buzzer start sounding, "MARK 2" is on the right of the mark on the bracket, upper the card guide.
When the buzzer start sounding, "MARK 2" is on the left of the mark on the bracket, lower the card guide.



13. Fasten the screws.
Check result is ± 2 teeth, and then fasten the screws. After fasten the screws. Check again and check result is less than two teeth it can finish adjustment.

Figure 4.95 other way to adjust the card guide

(4) TOF sensor's voltage adjustment

Note This adjustment should be done after card guide adjustment is finished. Please make sure any dust has cleaned under the TOF sensors.

1. Turn the printer power on, then the carriage escape to the maximum gap and move and stop the ribbon replacing position.
2. Enter adjustment mode.
Turn the power on while pushing “▲”SW and “▼”SW of operation panel. Then printer enters the adjustment mode. Any motors don't move in this mode.
3. Adjust the volume resistance shown below, so that states on the table is satisfied

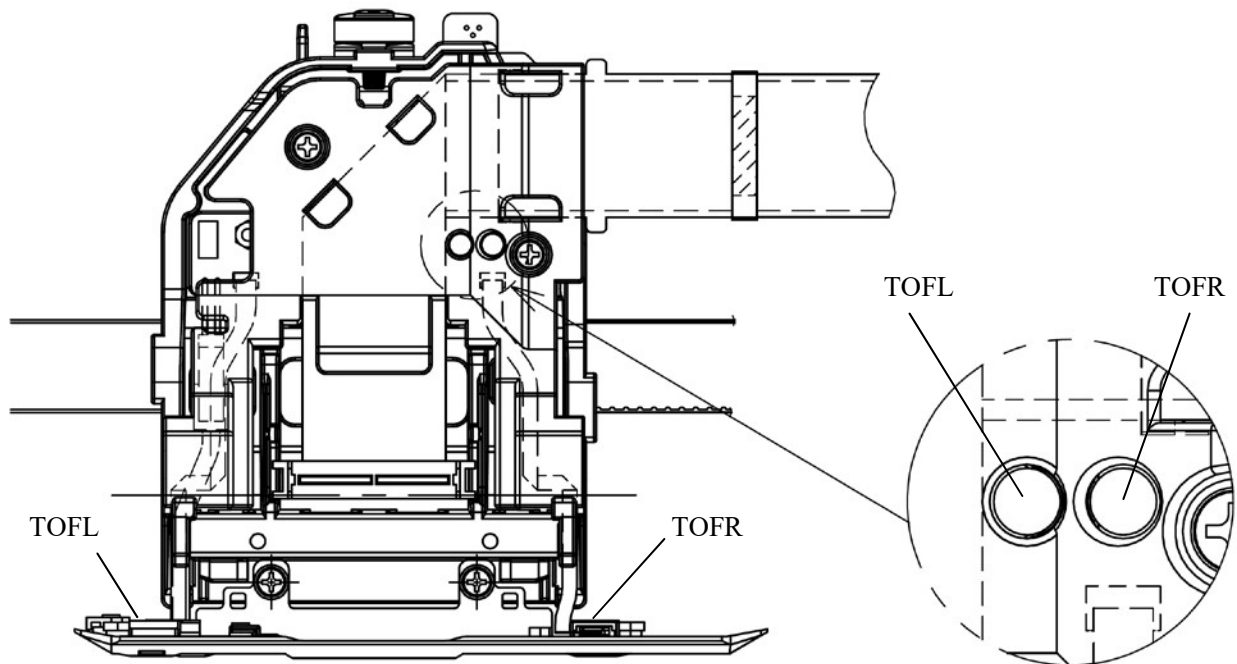


Figure 4.96 adjusting TOFL/R output level

Name of sensor	Name of LED	Remark
TOFL	HI IMPACT	When paper is out of the printer, LED should light steadily.
TOFR	ONLINE	

4. Adjustment has finished. Then turn the power off.

For reference

Output voltage when LED lights steadily is 0.65~0.75V. If the paper exists, LED is blinking.

(5) LF belt's tension adjustment

1. Adjust the tension using tension bracket position, so that reaction force is value A when LF belt is lowered 2mm.

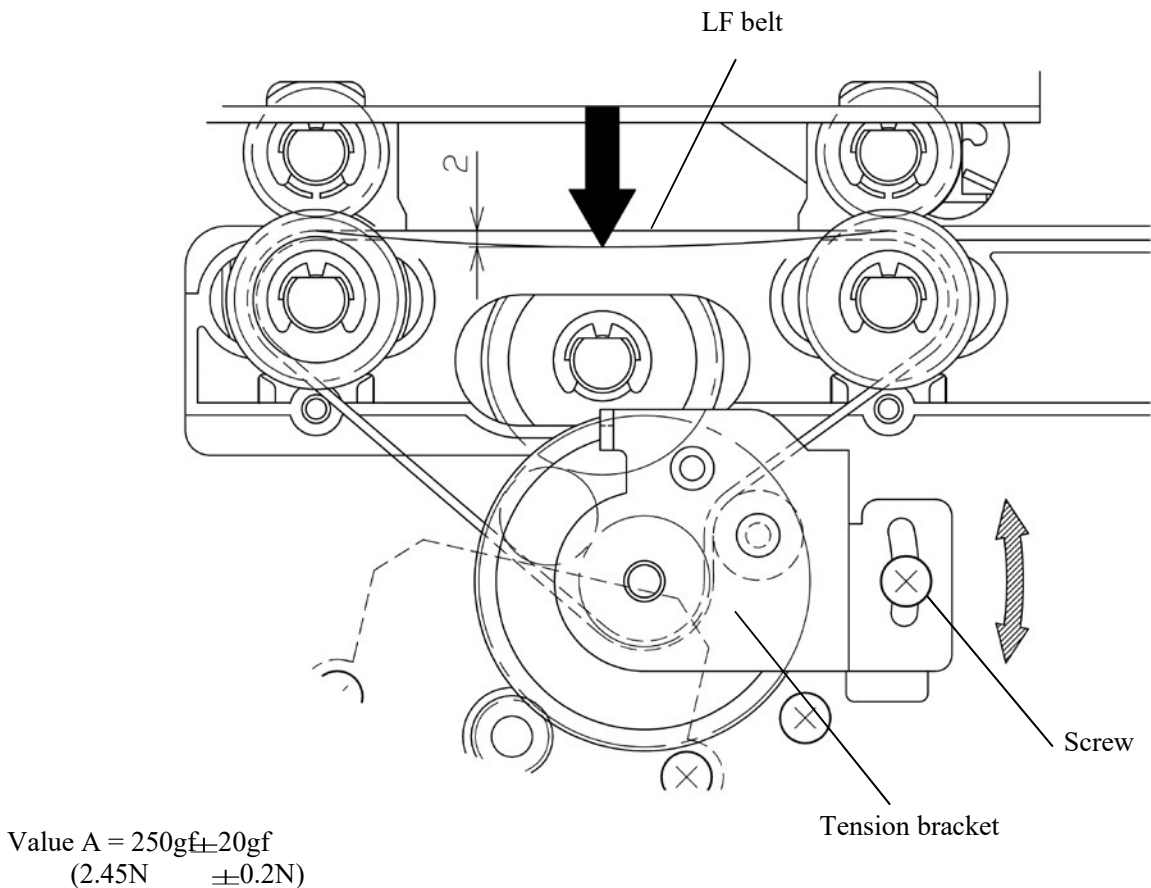


Figure 4.97 adjusting LF belt tension

(6) Vertical Alignment (V-ALMNT) adjustment

1. Load the continuous forms paper wider than 356mm (14 inches) from front tractor.
2. Enter adjustment mode.
 “ONLINE”SW + POW ON ,then printing start at “LQ”speed.
3. Check the direction of displacement and adjust the alignment using ▲▼ SW as follows.

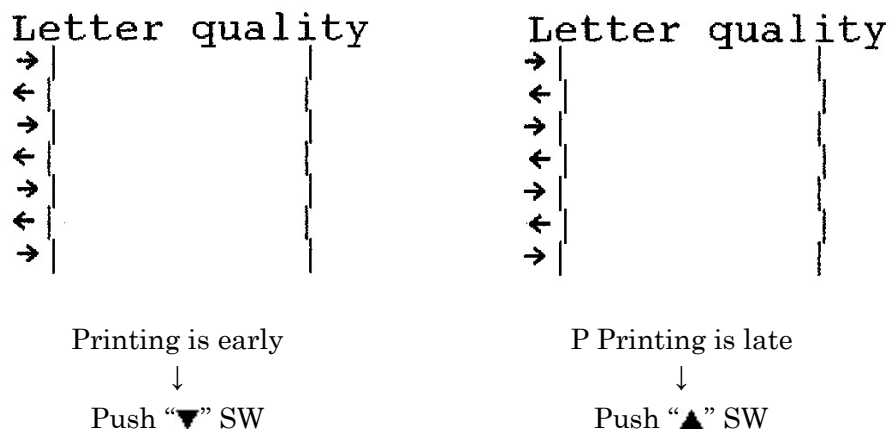


Figure 4.98 adjusting Vertical Alignment

Note

SW is detected when the cartridge turns each side of printing.

So you must start pushing the SW before carriage turning and release the SW after carriage turning.

If the carriage turns two times while pushing SW, adjustment value is added two steps.
Check all lines (left, center, right) and correct adjustment if necessary.

4. Change the printing mode and adjust individually.

All printing mode is as follows.

For change the printing speed press “TEAR OFF” button. To enter Hi-impact mode press “Hi-impact” button.

	Speed mode				
	LQ	LQ2	CQ	DQ	HDQ
Normal	180cps	125csp	360cps	540cps	720cps
Hi-impact	150cps	-	300cps	450cps	600cps

5. Save and exit the adjustment mode.

Press “ONLINE” button to exit adjustment mode and save new values.

(7) Top of forms adjustment

Note . Other adjustment methods are in setup mode.

Each adjustment value exists independently in each adjustment mode.

Anyway vertical printing position effected by both adjustment value.

If vertical printing position is adjusted by set up mode. Don't adjust this value.

Ideally set up mode should be done after this adjustment is satisfied.

1. Enter set up mode

Turn the power on while pressing the “▲” SW.

2. Select the paper pass


Push the “PAPER PATH” SW to select the paper pass

3. Load the paper.

Push the “LOAD” SW to load the paper.

- Paper thickness should be 1P 55kg (about 0.08mm)

- Paper width should be wider than A4 size(210mm)

4. Print the marks “ at the load position. Push the “TEAR OFF” SW to print marks.

5. Unload the paper to measure the value of top margin. Push the “LOAD” SW to unload the paper.

Then measure the top margin. And calculate the adjust values.

Paper top

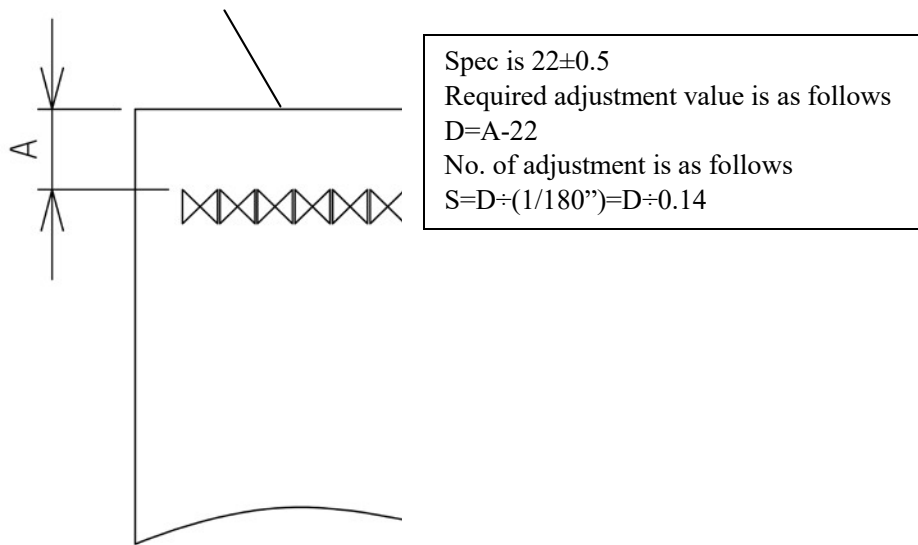


Figure 4.99 adjusting top of form position

6. Load the paper again to adjustment.
 Push the "LOAD" SW to load the paper.
7. Adjust the load position
 Paper moves in the direction of the ▲, ▼ SW shape. (push the ▲ to advance front pass paper
 Amount of move is 1/180 inch for one push.)

(8) End of forms adjustment

Note . Other adjustment methods are in setup mode.

Each adjustment value exists independently in each adjustment mode.

Anyway vertical printing position effected by both adjustment value.

If vertical printing position is adjusted by set up mode. Don't adjust this value.

Ideally set up mode should be done after this adjustment is satisfied.

1. Enter set up mode
 Turn the power on while pressing the "▼" SW.
2. Select the paper pass
 Push the "PAPER PATH" SW to select the paper pass
3. Load the paper.
 Push the "LOAD" SW to load the paper.
 - Paper thickness should be 1P 55kg (about 0.08mm)
 - Paper width should be wider than A4 size(210mm)
4. Print the marks "X" at the load position. Push the "TEAR OFF" SW to print marks.
5. Unload the paper to measure the value of top margin. Push the "LOAD" SW to unload the paper.
 Then measure the top margin. And calculate the adjust values.

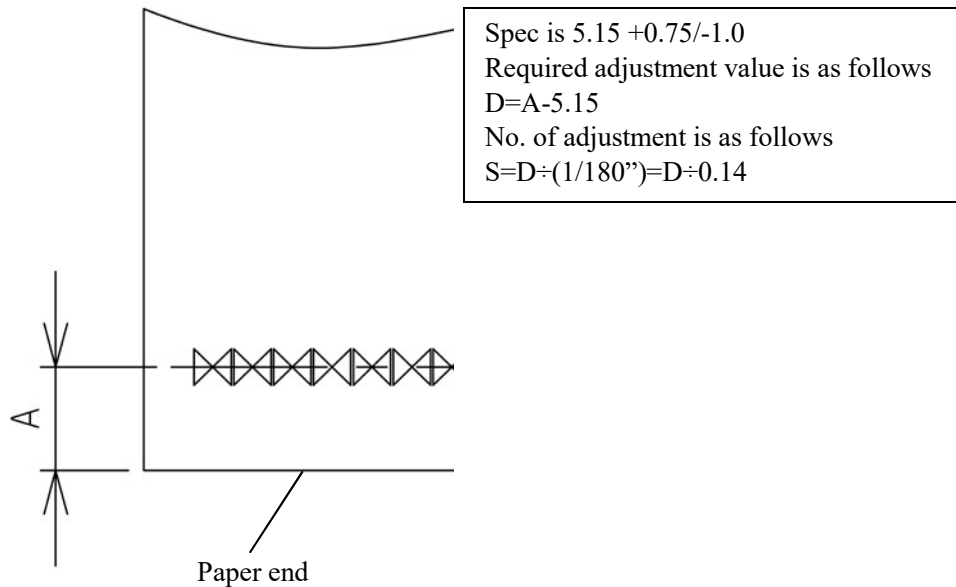


Figure 4.100 adjusting end of form position

6. Load the paper again to adjustment.

Push the “LOAD” SW to load the paper.

7. Adjust the load position

Paper moves in the direction of the ▲, ▼ SW shape(push the ▲ to advance front pass paper
 Amount of move is 1/180 inch for one push.

(9) Print starting positioning adjustment

Note . Other adjustment methods are in setup mode.

Each adjustment value exists independently in each adjustment mode.

Anyway vertical printing position effected by both adjustment value.

If vertical printing position is adjusted by set up mode. Don't adjust this value.

Ideally set up mode should be done after this adjustment is satisfied.

1. Enter set up mode

Turn the power on while pressing the the “LOAD” SW and “▼” SW.

2. Select the paper pass

Push the “PAPER PATH” SW to select the paper pass

3. Load the paper.

Push the “LOAD” SW to load the paper.

- Paper thickness should be 1P 55kg (about 0.08mm)

- Paper width should be wider than A4 size(210mm)

4. Print the marks “✕” at the load position. Push the “TEAR OFF” SW to print marks.

5. Unload the paper to measure the value of top margin. Push the “LOAD” SW to unload the paper.

Then measure the top margin. And calculate the adjust values.

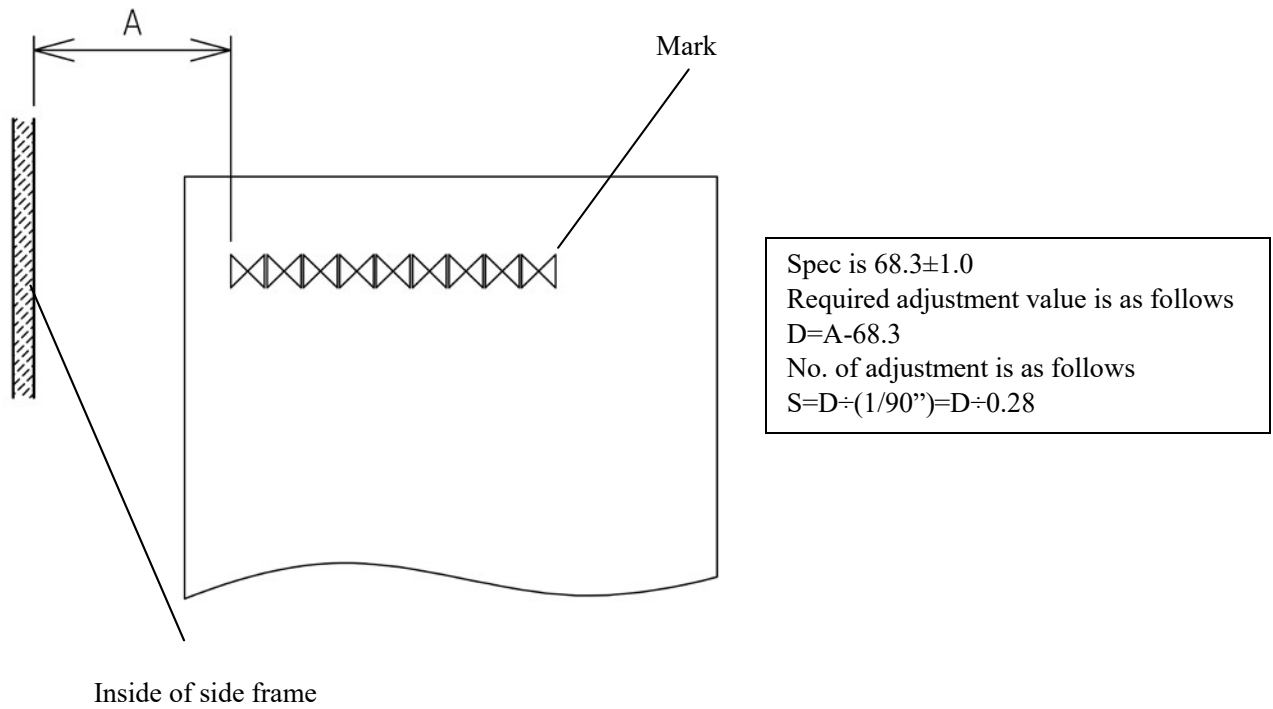


Figure 4.101 adjusting print starting position

6. Load the paper again to adjustment.

Push the "LOAD" SW to load the paper.

7. Adjust the load position

Paper moves in the direction of the ▲, ▼ SW shape(push the ▲ to advance front pass paper
 Amount of move is 1/90 inch for one push.

(10) Skew detection value adjustment

Note. To correct the vertical span between TOFL and TOFR for correct skew detection.

1. Enter adjustment mode.

Turn the power on while pressing the "LOAD" and "▲" SW .

2. Select the cut sheet position.

Press the "PAPER PASS" SW to select the paper pass.

3. Perform the sequence of adjustment.

- 1) Advance the paper until TOFL sensor detects the paper top end.
- 2) Move the carriage, so that TOFR sensor detects the paper top end at the same position.
- 3) Advance the paper until TOFR sensor detects the paper top end.
- 4) Write the distance between the TOFL and TOFR to the NVRAM. 5) Eject the paper. And perform the initialization.

(11) APTC detection sensor adjustment

Note. The error margin of the APTC sensor detection is automatically adjusted.

[For LED type]

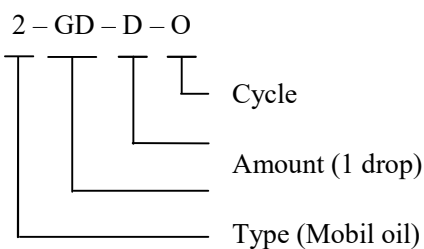
1. Enter adjustment mode.
Turn the power on while pressing the “PRINT MODE/FRONT DIR”, “AUTO GAP” and “HI IMPACT”SW .
2. "7" is selected with the MANUAL GAP dial and the “online” SW is pushed.
3. The “AUTO GAP” SW is pushed.
APTC approach/APTC escape operation is done twice, and the adjustment value is written in NVRAM.
4. “ONLINE” SW is pushed and it ends.

[For LCD type]

1. Enter adjustment mode.
Turn the power on while pressing the “PRINT MODE/FRONT DIR”, “GAP ADJUST” and “HI IMPACT”SW .
2. “LOAD” SW is pushed six times. LCD display
ADJ-MODE SELECT
APTC SENSOR
3. The “AUTO ADJUST” SW is pushed.
APTC approach/APTC escape operation is done twice, and the adjustment value is written in NVRAM.
4. “ONLINE” SW is pushed and it ends.

4.9.3 Lubrication

Lubrication is required only when the printer is overhauled or mechanical components are replaced. Lubrication codes are as follows:



No.

1. No.

Sequential number for the location to be lubricated

2. Type

A: Alvania EP grease 2

A· GD: Mixture of Alvania EP grease 2 and oil (Mobile)

FL: Floil

KF: Silicone (KF96SP manufactured by Shinetsu)) SG:

Silicone grease

RP41: Ribarson Paste 41

3. Amount

C: Thin uniform film D: 1

drop

F: Fill the case or oil wick.

S: Several drops

4. Cycle

O: At overhaul

(1) Upper angle

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	PR41	C	O	Front and rear surface of the upper angle	Area of phantom line

Upper ungle

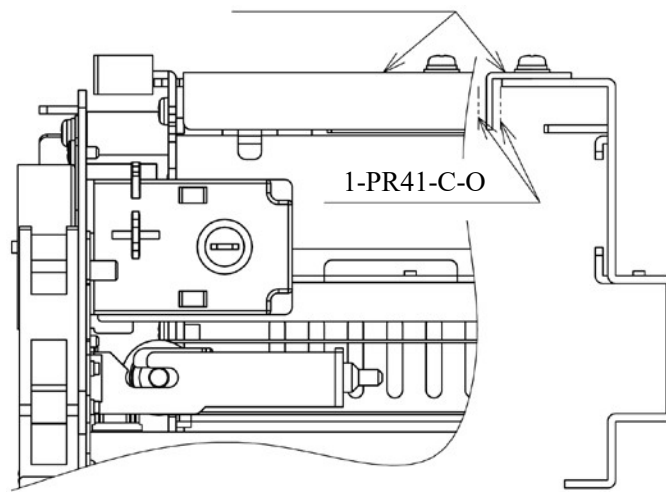


Figure 4.102 upper angle lubrication

(2) HCPP mechanism, Stud for gear

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	PR41	C	O	Hole of slide cam	
2	PR41	C	O	Cam surface	
3	PR41	C	O	OC lever L sliding section	
4	PR41	C	O	Axis of OC lever L/R	
5	PR41	C	O	Studs for shift gears	2 points (stud)
6	PR41	C	O	Studs for LF gears	

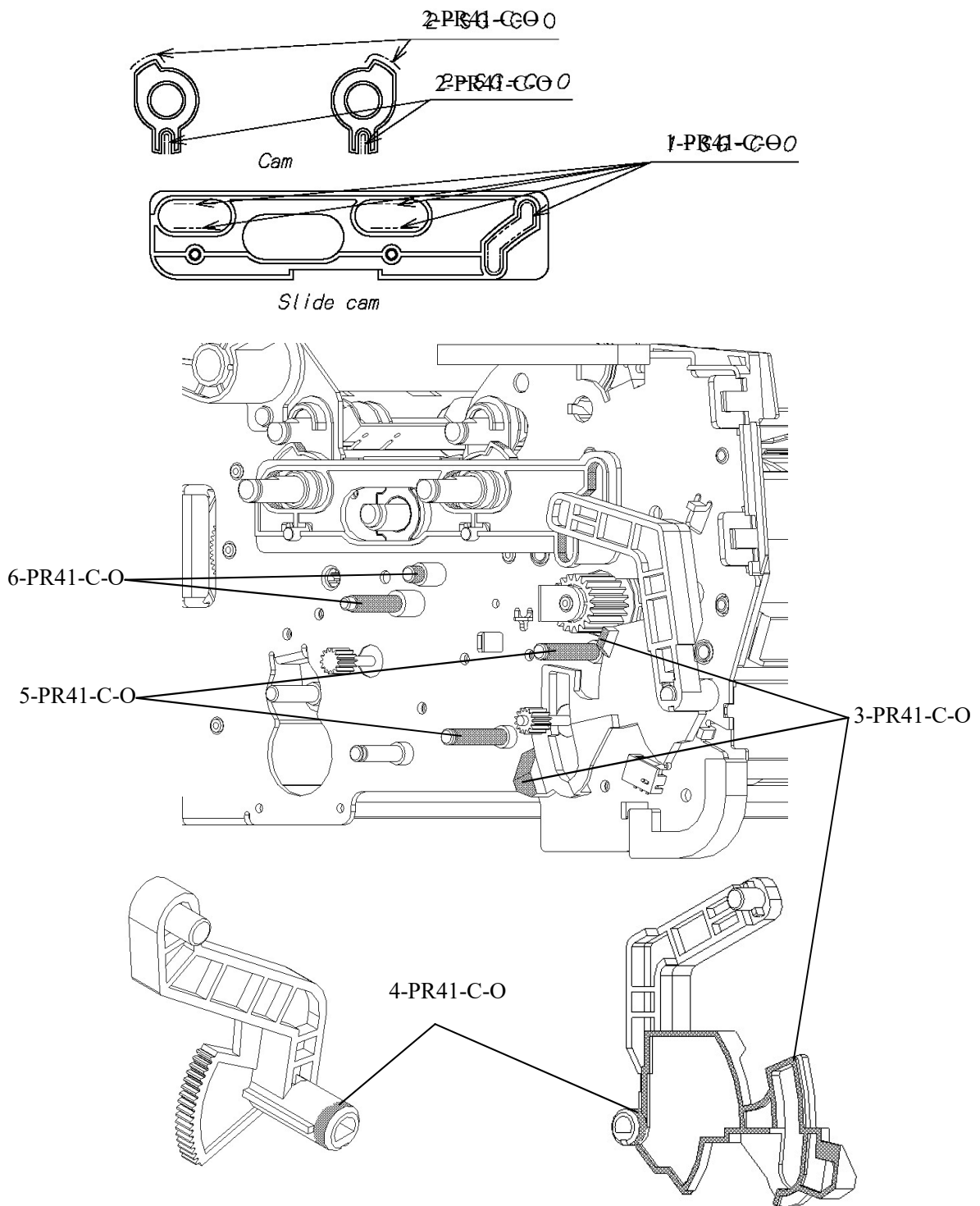


Figure 4.103 HCPP mechanism lubrication

(3) Detent for DV roller

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	PR41	C	O	Spacer	
2	PR41	C	O	Collar	

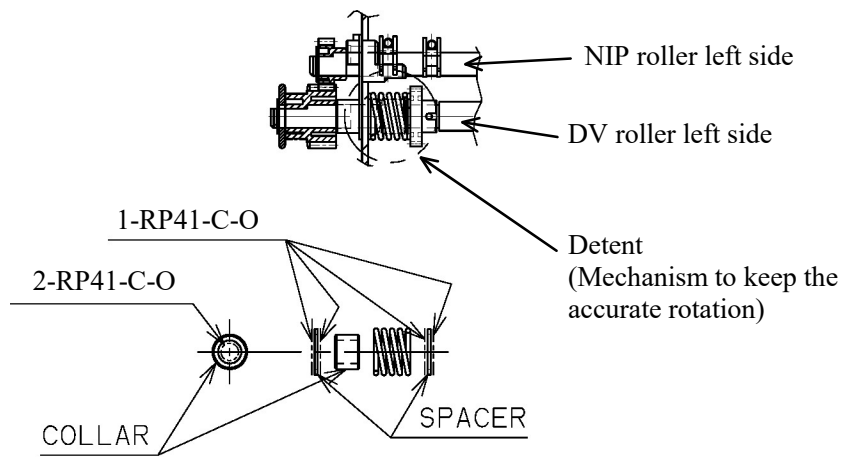


Figure 4.104 Detent lubrication

(4) Bearings

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	PR41	C	O	Bearings Nip and DV roller shaft	Same as side frame R
2	PR41	C	O	Bearings platen roller shaft	Same as side frame R
3	PR41	C	O	Side of bearing	Gear is sliding on the surface

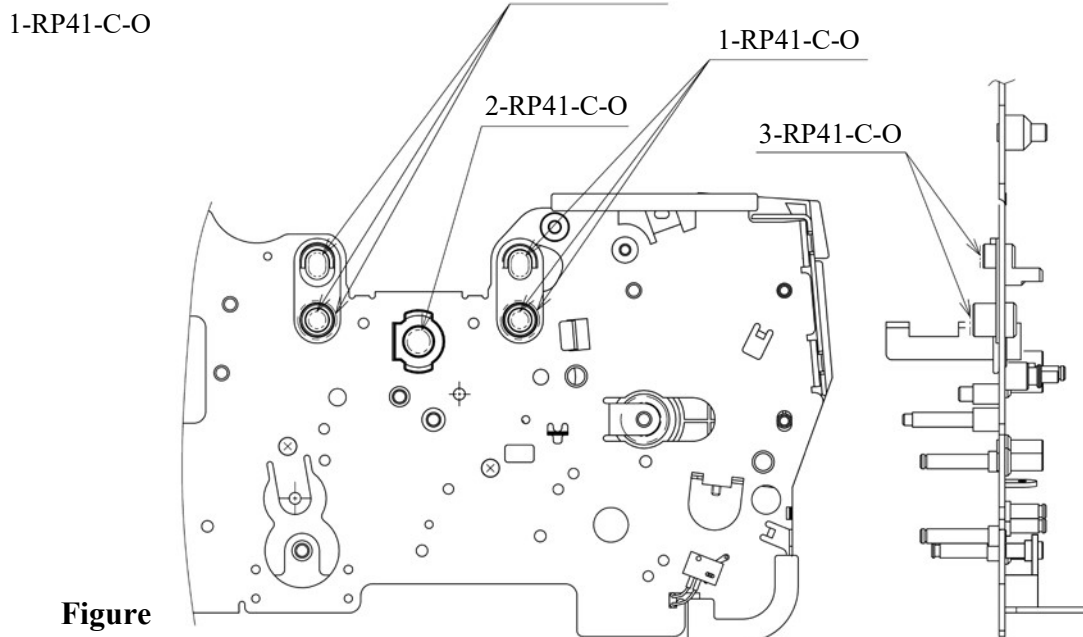


Figure 4.105

Bearing lubrication

(5) Bearing of stay shaft, SS gear

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	RP41	C	O	Bearing of stay shaft	Same as Side frame R
2	RP41	C	O	SS gear and side frame UL sliding area	

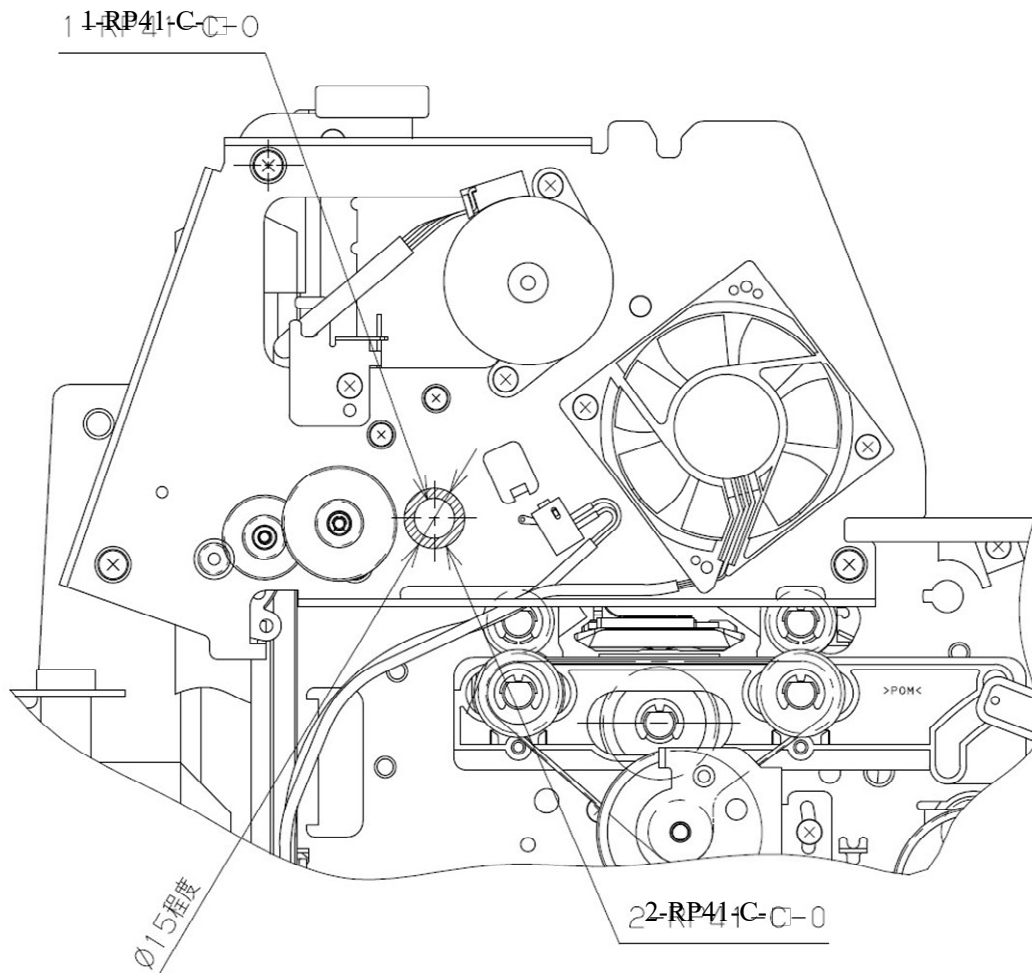


Figure 4.106 Bearing of stay shaft, SS gear lubrication

(6) Guide to slide the paper table

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	KF	C	O	Guide rails of paper table.	
2	RP41	C	O	Studs for gears	

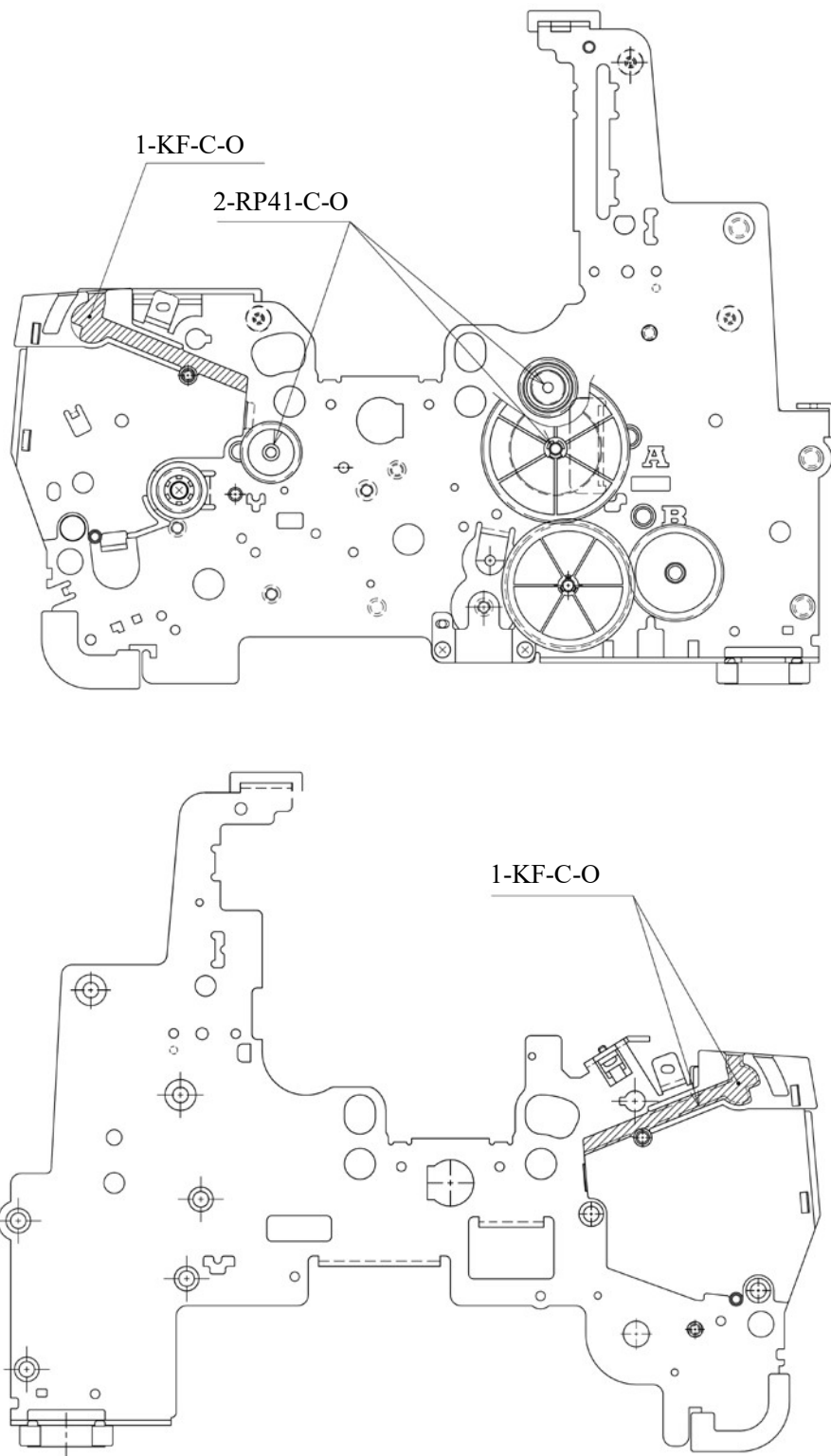


Figure 4.107 paper table slide guide lubrication

(7) Ribbon drive

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	RP41	C	O	Gear bearing	2 points
2	RP41	C	O	Gear bearing	1 points(Stud)
3	RP41	C	O	Gear teeth	4 points

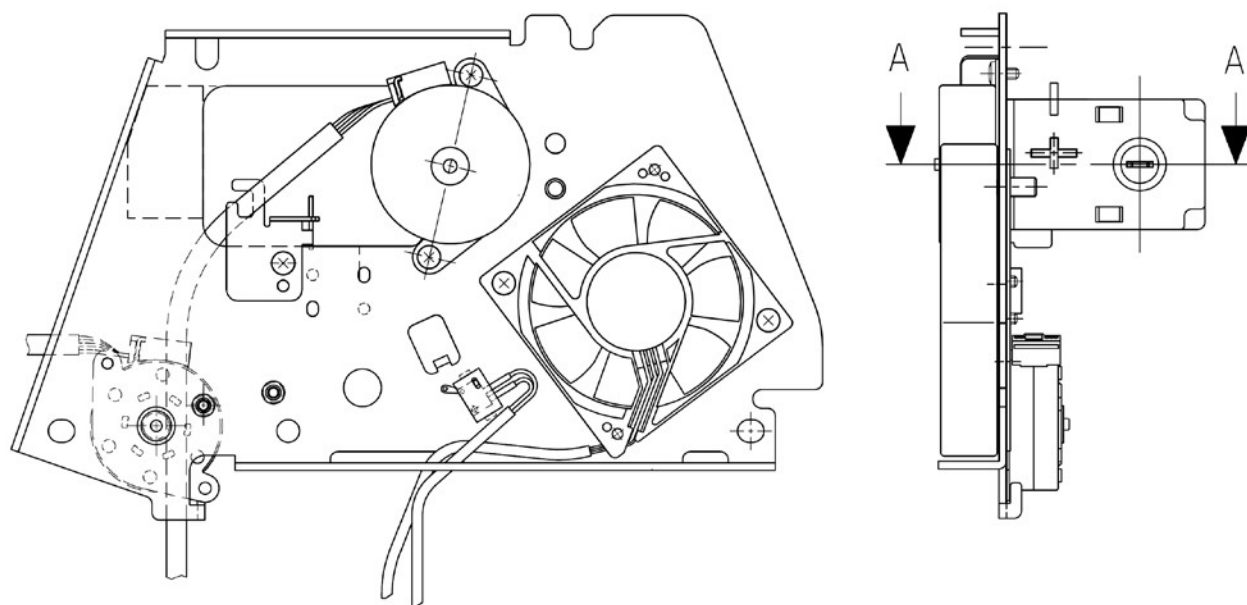
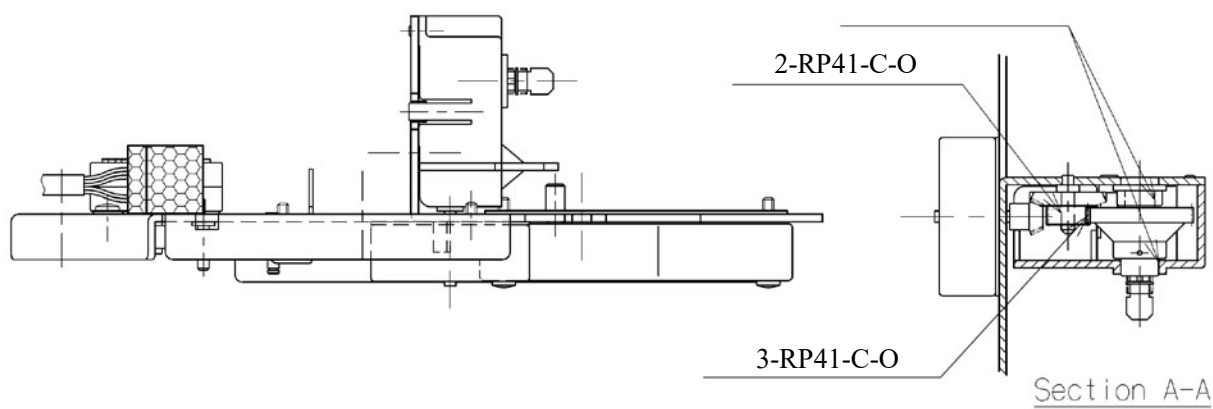
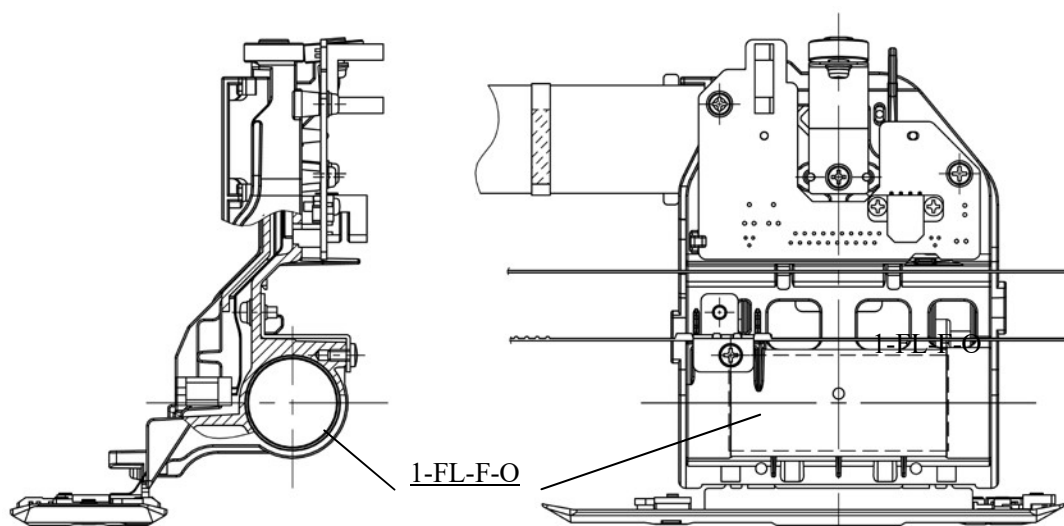


Figure 4.108 Ribbon drive lubrication

(8) Carrier unit

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	FL	F	O	Oil felt section	1.2~1.3CC



Note

Don't apply grease too much to the teeth.

If excessive grease disperses, the slide of the stay shaft will occur and It will be breaking down early.

Figure 4.109 Carrier unit lubrication

(9) Tension unit

No.	Oil	Amount	Lubrication cycle	Location	Remarks
1	RP41	C	O	Stud sliding section	
2	RP41	C	O	Sliding section	
3	RP41	C	O	Sliding section	

1-RP41-C-O

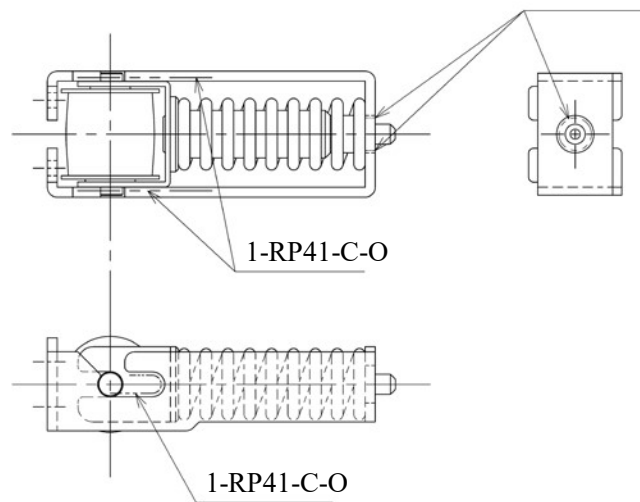


Figure 4.110 Tension unit lubrication

4.10 Diagnostics

This section describes how to use the following diagnostic functions:

- SELF-TST
- HEX-DUMP

These functions are used for checking print quality and diagnosing printer problems. HEX-DUMP also provides useful information for programmers.

4.10.1 Printing the Self-Test

The SELF-TST function prints test pages to check how the printer operates independently of your computer.

The self-test does not check the interface between the computer and the printer.

The self-test prints the printer's firmware version, its resident emulations, and all of the characters available in the currently selected character set.

If the DPL24C PLUS emulation is selected for MENU1, the self-test is printed using the settings currently assigned to MENU1.

Procedure

This procedure assumes that you are in setup mode. To print the self-test, make sure that continuous forms paper is loaded into the printer.

Then proceed as follows:

1-1. Print the <<FUNCTION>> menu.(LED)

The <<FUNCTION>> menu should be the last printed line on the page. If the menu is not printed, press the ONLINE button to print the menu. If you are using the HEX-DUMP function, press the "TEAR OFF" or "LOAD" button instead of the ONLINE button to print the menu. The following <<FUNCTION>> menu is printed:

<< FUNCTION >>									
SAVE&END	MENU1	MENU2	HARDWRE	ADJUST	CONFIG	GAP-ADJ	DEFAULT	LIST	SELF-TST
HEX-DUMP	V-ALMNT	INITIAL							

2-1. Select the SELF-TST function.(LED)

Repeatedly press the "TEAR OFF" or "LOAD" button to position the cursor on the left edge of the aluminum print guide on SELF-TST, and then press the "▲" button or the "▼" button. The printer selects SELF-TST and starts printing. A short help menu is printed at the top of the page, followed by the self test. Note that the printer is not online during self-test printing.

1-2. Move to TOP MENU of SETUP MODE.(LCD)

Press the "▲" button until "SETUPMODE" is displayed on LCD panel.

4.10.2 Hex dump

The HEX-DUMP function prints data and commands in hexadecimal characters and abbreviated control codes. The IBM character set 2 is used for printing (see Appendix E).

The HEX-DUMP function is useful for checking whether your computer is sending the correct commands to the printer and whether the printer is executing the commands correctly. It is also useful for debugging software programs.

Procedure

To print hex dumps, make sure that continuous forms paper is loaded into the printer. Then proceed as follows:

1-1. Enter setup mode.(LED)

Press the “AUTO GAP” button and the “HI IMPACT” button simultaneously until the printer beeps. Wait for the printer to stop printing and check that the following <<FUNCTION>> menu is printed:

2-1. Select the HEX-DUMP function.(LCD)

<< FUNCTION >>										
SAVE&END	MENU1	MENU2	HARDWRE	ADJUST	CONFIG	GAP-ADJ	DEFAULT	LIST	SELF-TST	HEX-
DUMP	V-ALMNT	INITIAL								

Repeatedly press the “TEAR OFF” or “LOAD” button to position the cursor on the left edge of the aluminum print guide on HEX-DUMP, then press the ▲ button or the ▼ button to select the HEX-DUMP function. The printer goes online and prints a header and a short help menu

1-2. Enter setup mode(LCD).

Press the SETUP button at offline state. Check that the “SETUP MODE” is displayed on LCD panel.

2-2. Select the HEX-DUMP function(LCD).

Repeatedly press the “◀” or “▶” button to display “SELFDIAGNOSTIC”. And then press the “▼” button to move lower layer. And then repeatedly press the “◀” or “▶” button to display “HEX-DUMP”. And then press the “SELECT” button. The printer goes online and prints a header and a short help menu.

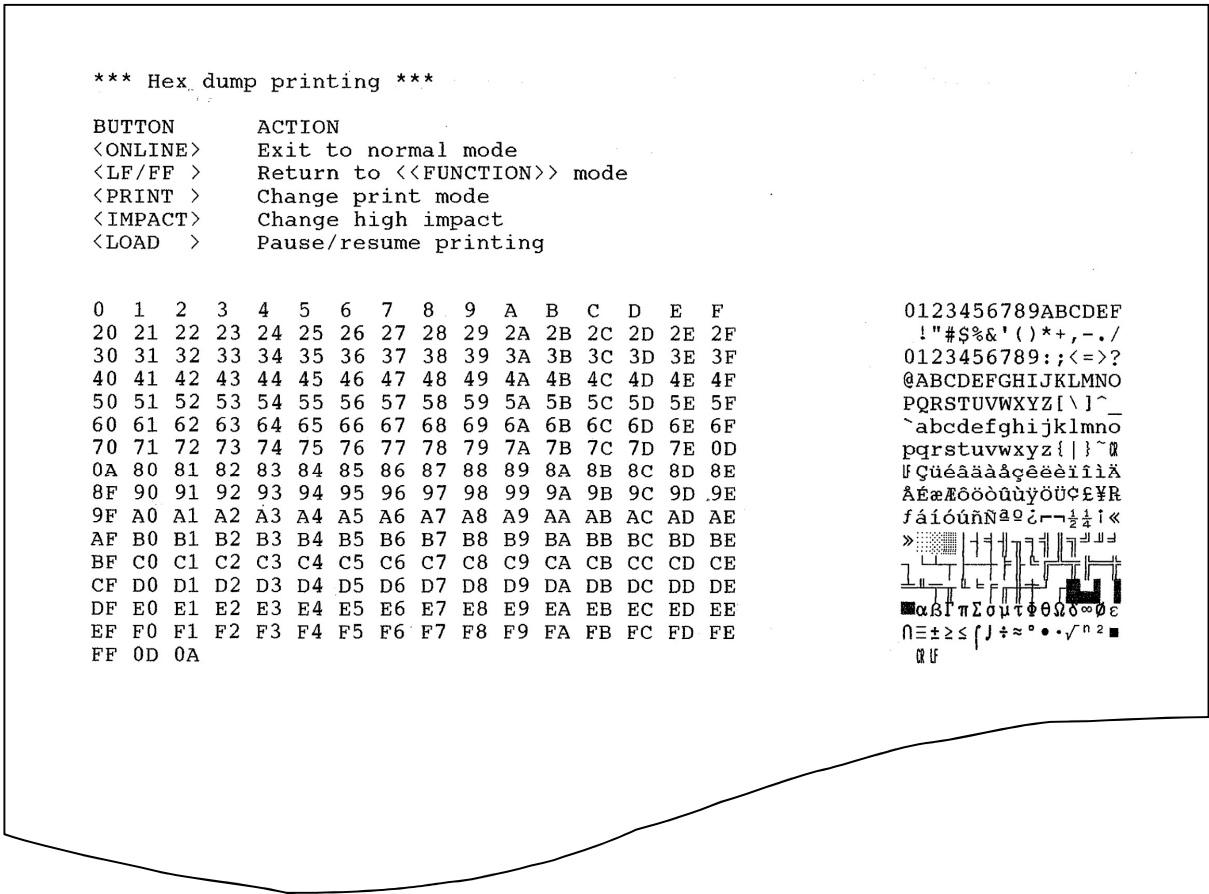
3. Print the hex dump.

To start hex dump printing, send your file or program to the printer. The printer goes online and prints the hex dump. Press the “LOAD” button to pause during hex dump printing. To resume hex dump printing, press the button again.

NOTE

When hex dump printing stops, the printer remains online in setup mode (the ONLINE indicator is green).

To print another hex dump, send another file to the printer.



Sample HEX-DUMP

4. Exit the HEX-DUMP function.

Exit the HEX-DUMP function in either of the following ways:

- To remain in setup mode, press the LF/FF button. The <<FUNCTION>> menu is then reprinted. For details on other functions, see other sections in this chapter.
- To return to online normal mode, press the ONLINE button. If you press the ONLINE button while the hex dump is printing, The printer immediately switches to normal online mode. Any data that was sent to the printer but not printed is discarded (cleared).

You can also enter hex dump mode, by turning off the printer, and then turning the printer back on while simultaneously pressing the ONLINE button and the LF/FF button until the printer beeps.

4.10.3 Power-on Features for DL7600

There are several special tests and setup modes built into the DL7600 printers. Holding down certain control panel buttons, while turning on the printer, activates these special printer modes.

After the printer beeps, the buttons are released.

Please do not open these features to end-users, just use for CE check.

The chart below shows the relationship between the control panel buttons and the various power on modes.

[LED type]

Special Power-on Features	
Button Name	Function Description

▼	▲	PRINT MODE	AUTO GAP	HI IMPACT	PAPER PATH	LF/FF	ONLINE	TEAR OFF	LOAD	
			●	●						Offline Setup Mode
								●		Online Setup Mode
						●				Self Test Print Mode
							●		●	EEPROM DATA Print Mode
						●	●			HEX Dump Mode
							●			Vertical Alignment Mode
	●									TOF adjustment Mode
●										PE adjustment Mode
●									●	Left start position adjustment mode.
	●								●	Skew detect adjustment mode.
		●	●	●						Factory adjustment mode
●	●									Sensor adjustment Mode
							●	●	●	All EEPROM Reset (Note 1, a)
						●	●		●	EEPROM All Settings Reset (Note 1, b)
								●	●	Reset set up value. (Note 1, c)
					●	●	●			Error Log Clear
●	●							●	●	Flash ROM Update Mode
				●		●				No Print Mode
				●						List Setup Parameters
		●								Demonstration Print Mode

Denotes a button that is pressed down to activate a test mode.

Note 1: Print a listing of the printer setup before resetting the EEPROM. Then reprogram the printer to the required

settings. Reset items are as follows:

(1)Settings of Setup

(2)Mechanical settings

(3)Error Log

a) All EEPROM Reset: ONLINE + TEAR OFF + LOAD: Reset (1), (2), (3)

b) EEPROM All Settings Reset : LF/FF + ONLINE + LOAD: Reset (1) and (2)

c) EEPROM Reset : TEAR OFF + LOAD: Reset (1) only

[LCD type]

Special Power-on Features										
Button Name										Function Description
▼	▲	PRINT MODE	GAP ADJUST	HI IMPACT	PAPER PATH	LF/FF	ONLINE	TEAR OFF	LOAD	
								●		Online Setup Mode
						●				Self Test Print Mode
							●		●	EEPROM DATA Print Mode
						●	●			HEX Dump Mode
							●			Vertical Alignment Mode

	•									TOF adjustment Mode
•										PE adjustment Mode
•									•	Left start position adjustment mode.
	•								•	Skew detect adjustment mode.
		•	•	•						Factory adjustment mode
•	•									Sensor adjustment Mode
							•	•	•	All EEPROM Reset (Note 1, a)
						•	•		•	EEPROM All Settings Reset (Note 1, b)
								•	•	Reset set up value. (Note 1, c)
					•	•	•			Error Log Clear
•	•							•	•	Flash ROM Update Mode
				•		•				No Print Mode
				•						List Setup Parameters
		•								Demonstration Print Mode

Denotes a button that is pressed down to activate a test mode.

Note 1: Print a listing of the printer setup before resetting the EEPROM. Then reprogram the printer to the required

settings. Reset items are as follows: (1)Settings
of Setup

(2)Mechanical settings

(3)Error Log

a) All EEPROM Reset: ONLINE + TEAR OFF + LOAD: Reset (1), (2), (3)

b) EEPROM All Settings Reset : LF/FF + ONLINE + LOAD: Reset (1) and (2)

c) EEPROM Reset : TEAR OFF + LOAD: Reset (1) only

CHAPTER 5 PRINCIPLES OF OPERATION

5.1 Overview

This section explains the principles of DL7600 operation. A microprocessor controls the following basic functions:

Carriage drive
Print head drive
Paper feed

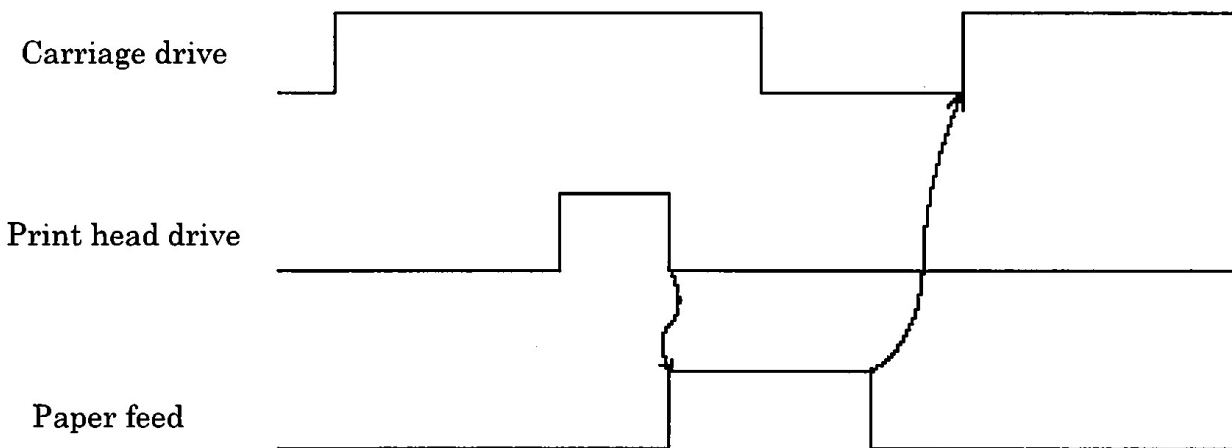


Figure 5.1 Function sequence

5.2 Mechanical Operation

5.2.1 Printing Operation

5.2.1.1 Print head

The print head consists of 24 wires in 12 rows.

The print head has 24 electromagnets that drive armatures with wires.

The print head is fixed to the carriage by the two screws.

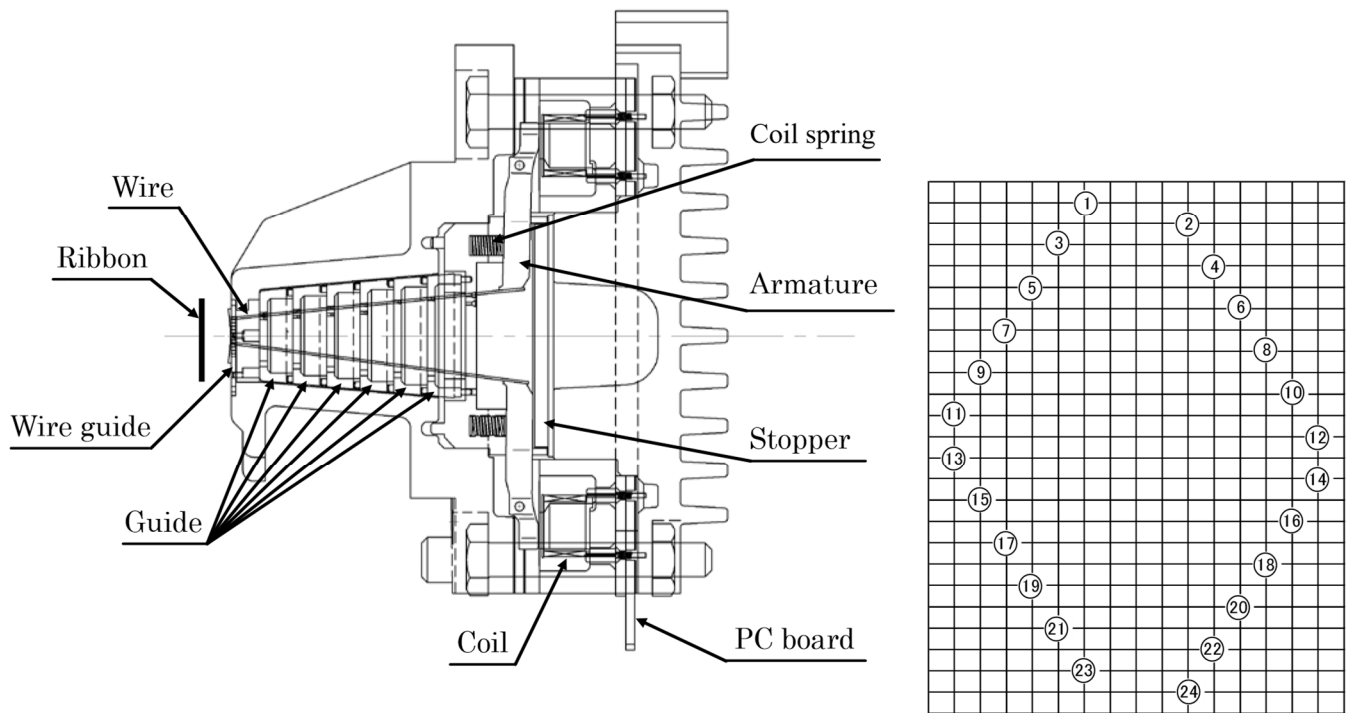
When not printing, the armature is parked against the stopper by the elasticity of the coil spring.

During printing, the coil is excited to generate a driving force, which attracts the armature and accordingly moves the wire in the direction indicated by an arrow.

The wire is guided by the ceramic wire guide and other six plastic guides.

When attracted by the magnet, the armature pushes the wire against the ribbon to print a dot.

When coil excitation is interrupted, the armature returns to the stopper again by the elasticity of the coil spring.



Positions of wire dots viewed from the printing side

Figure 5.2 Print head structure

5.2.1.2 Spacing operation

Figure 5.3 shows spacing mechanism.

Spacing operation is performed by the space motor (4-phase pulse motor) mounted on the right side of the side frame.

The drive pulley used to move the carriage is mounted on the top of the space motor, and the timing belt is put on the drive pulley.

The carriage with the print head is guided by the stay shaft parallel to the platen and the upper angle secured to the frame so that the carriage can move parallel to the platen.

The timing belt is connected to the carriage by the belt clamber, and the carriage moves in parallel to the platen to the left and right in accordance with the space motor rotation.

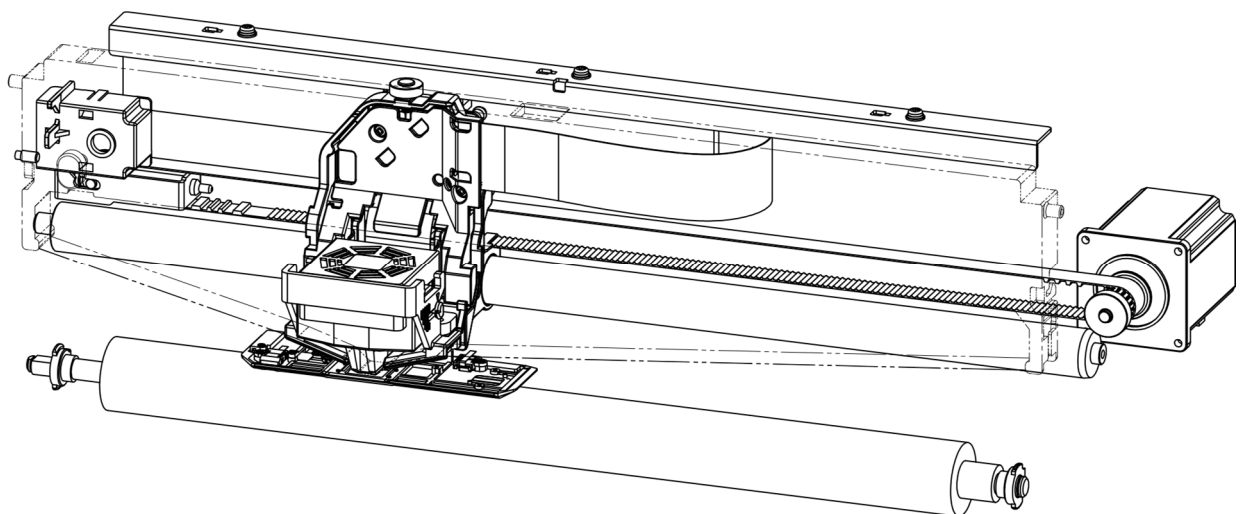


Figure 5.3 Spacing mechanisms

5.2.1.3 LRES (Carriage position) detection

The left and right carriage positions are detected using one LRES sensor provided on the back of the carriage and the left and right shield plates provided on the upper stay. The shield plates are different in length in the direction in which the carriage moves.

The LRES uses a photo interloper (packaged device include LED and photo transistor) and detects the presence of the shield plate, i.e., the interrupted state and the transparent state.

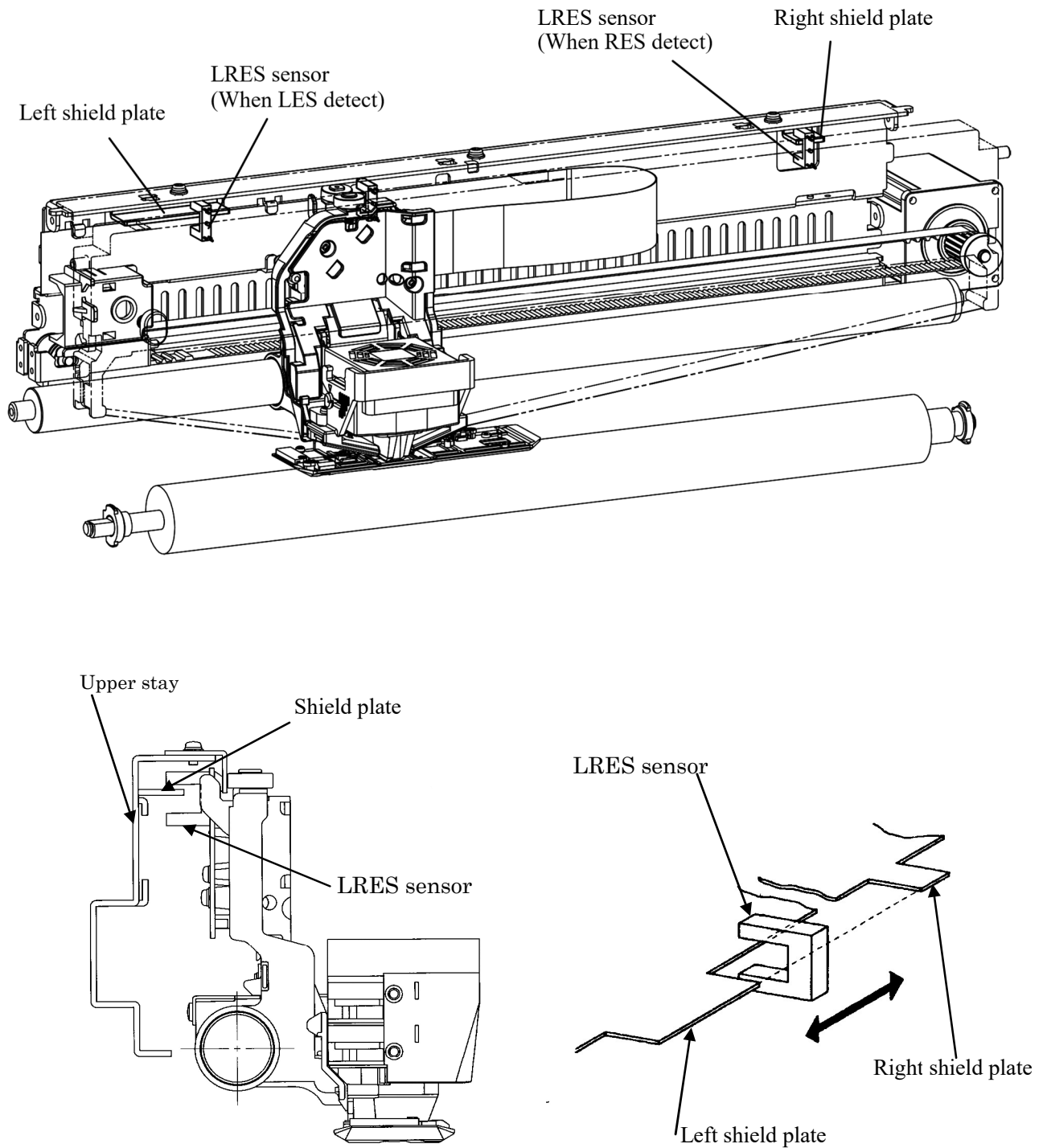


Figure 5.4 LRES detection

5.2.1.4 Ribbon feed mechanism

Figure 5.5 shows the ribbon feed mechanism.

The ribbon is fed by the rotation of the ribbon feed shaft.

The ribbon feed mechanism is mounted at the left of the side frame.

Ribbon feed motion turns the ribbon feed roller in a ribbon cassette to one way.

The ribbon feed mechanism is transmitted to the ribbon feed-shaft with the idle gear and the drive gear by the bevel gear fixed by the RF motor.

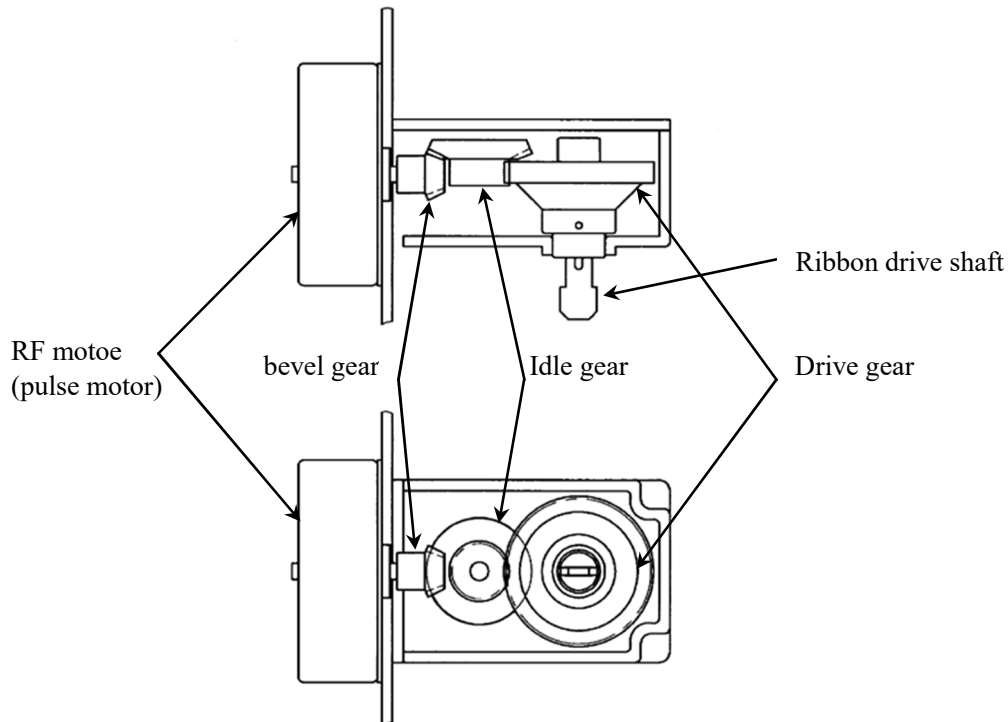


Figure 5.5 Ribbon feed mechanism

5.2.1.5 Automatic paper thickness control mechanism

The automatic paper thickness control mechanism consists of and the paper surface detection switch on the left side of the card guide.

< The head approach mechanism>

The mechanism consists of the pulse motor, stay shaft, and gear transmission mechanism.

Because stay shaft is designed to work as eccentric cam, the print head is moved up and down by the angle of the stay shaft.

Idle gear

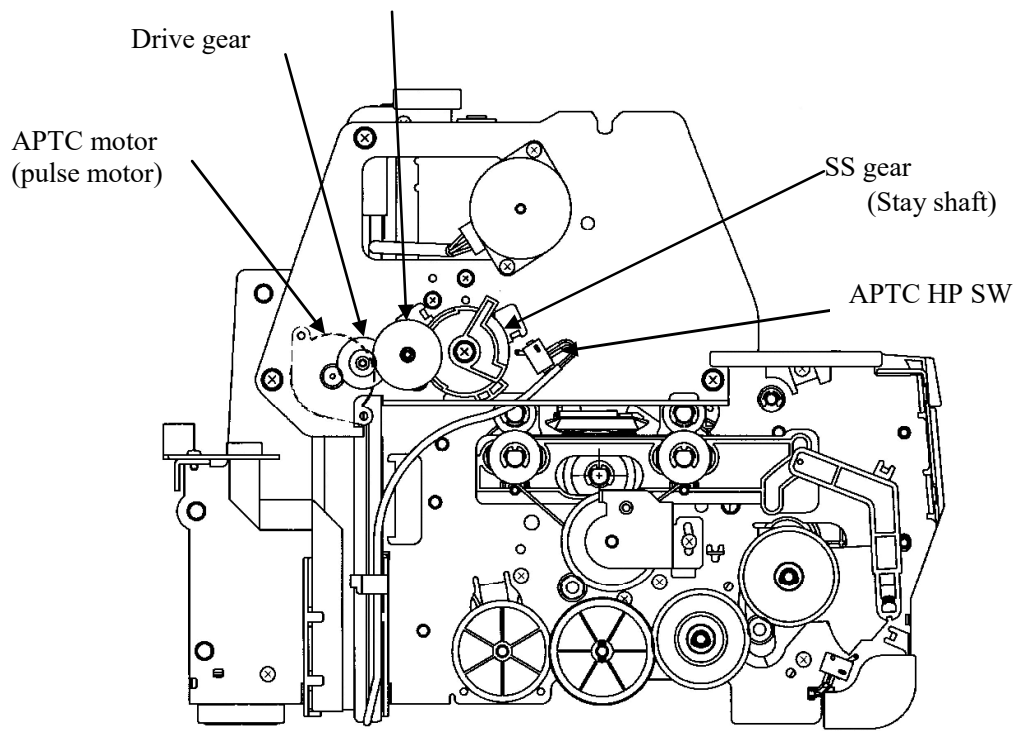


Figure 5.7 APTC approach and escape mechanism

<The paper surface detection switch on the left side of the card guide>

The ceramic chip is pressed by the paper surface during print head approaches. And then panel keyboard SW is pressed by lever. The spring is mounted in order to acquire the proper load to detect the paper surface.

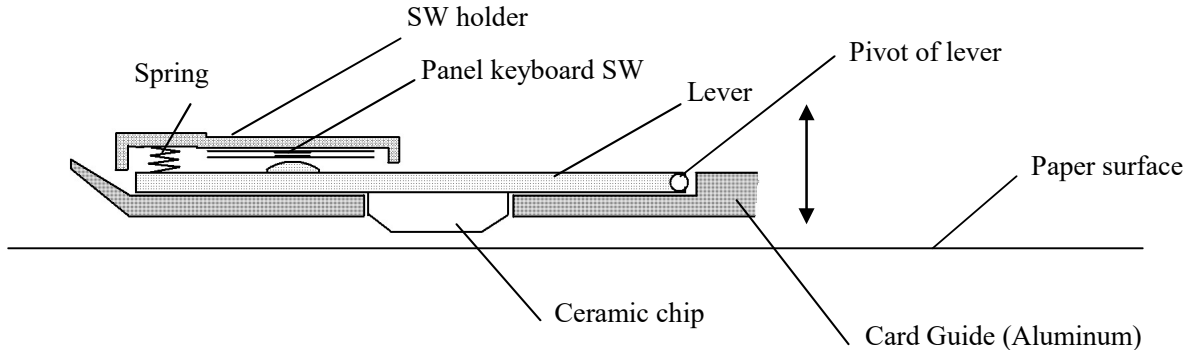


Figure 5.8 APTC sensor structure

5.2.1.6 Skew detection

Skew is detected by two sensors provided on the card guide in the carriage unit when a cut sheet is loaded.

The card guide has two sensors: TOFL and TOFR. If a detection difference between the two sensors when the top end of paper passes them is too large, paper is ejected to the front.

Skew detection is valid only when a cut sheet is fed manually. It is invalid when a cut sheet is fed from the CSF (front or rear) or continuous forms are fed.

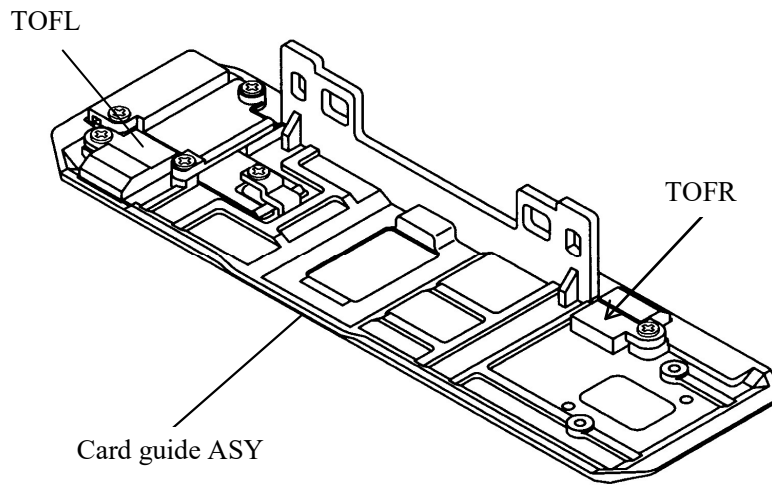
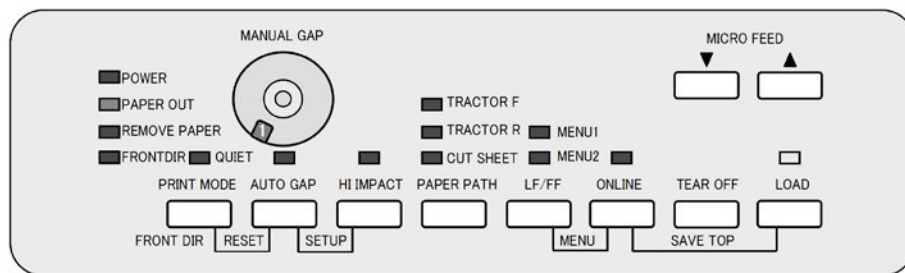


Figure 5.9 APTC sensor structure

5.2.2 Paper Feed Operation

5.2.2.1 Paper path selection mechanism (HCPP)

[LED type]



[LCD type]

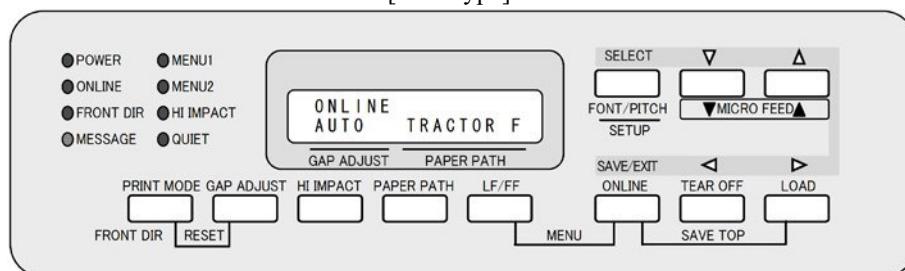


Figure 5.10 Control panel

The “PAPER PATH” button on the control panel is used to select cut sheet paper, front-fed continuous forms, and rear-fed continuous forms. The button lights a lamp indicating the type of paper to be used. When the PAPER PATH button is pressed to select the type of paper, the printer automatically operates the applicable components by using power of HCPP motor rotation.

The opening and closing of a roller and the state of a motor connection place in each paper path are as follows.

Table Condition of Each PAPER PATH

	PAPER PATH	“TRACTOR F”		“CUT SHEET”	“TRACTOR R”	
	STATE OF ROLLER	1	2 *		2 *	1
1	Nip ROLLER F	OPEN	CLOSE	CLOSE	CLOSE	CLOSE
2	Nip ROLLER R	CLOSE	CLOSE	CLOSE	CLOSE	OPEN
3	What TR motor drives	FRONT TRACTOR		Nothing	REAR TRACTOR	
4	What LF motor drives	ROLLERS		ROLLERS	ROLLERS	

Note * ; In each tractor mode, both of nip rollers are closed when loading and ejecting the paper.

< Opening and closing the Nip Roller>

HCPP motor moves OC lever L and R through the gear. And OC lever L and R move the OC slide cams. And OC slide cams moved the OC calms. and OC came lift up the Nip roller.

When OC slide cam move to the front side, then front Nip Roller is opened. When OC slide cam move to the rear side, then rear Nip Roller is opened.

< Switching the TR motor transmission>

HCPP motor rotates the OC lever L. And OC lever L's rib (cam) shifts shift gears F and R to switch power to the TR motor.

< How to determine the home position of a HCPP mechanism>

When the PAPER PATH button is pressed to change the paper path, the OC lever operates to detect the ON/OFF state of the HCPP switch under the OC lever L. OC lever L has a cam to operate the switch, which is closed in REAR TRACTOR side and open in FRONT TRACTOR side.

Detecting the home position done from off state to on state.

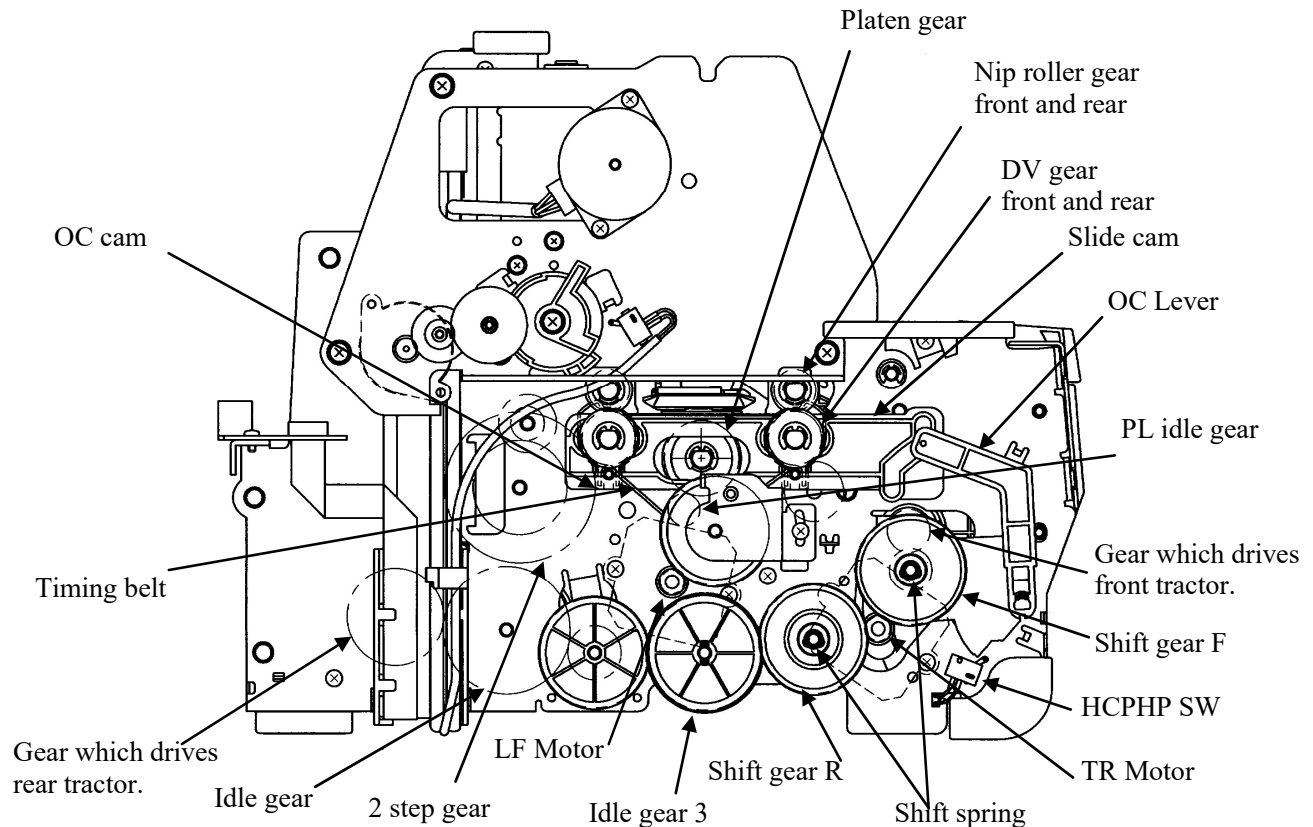


Figure 5.11 HCPP mechanism

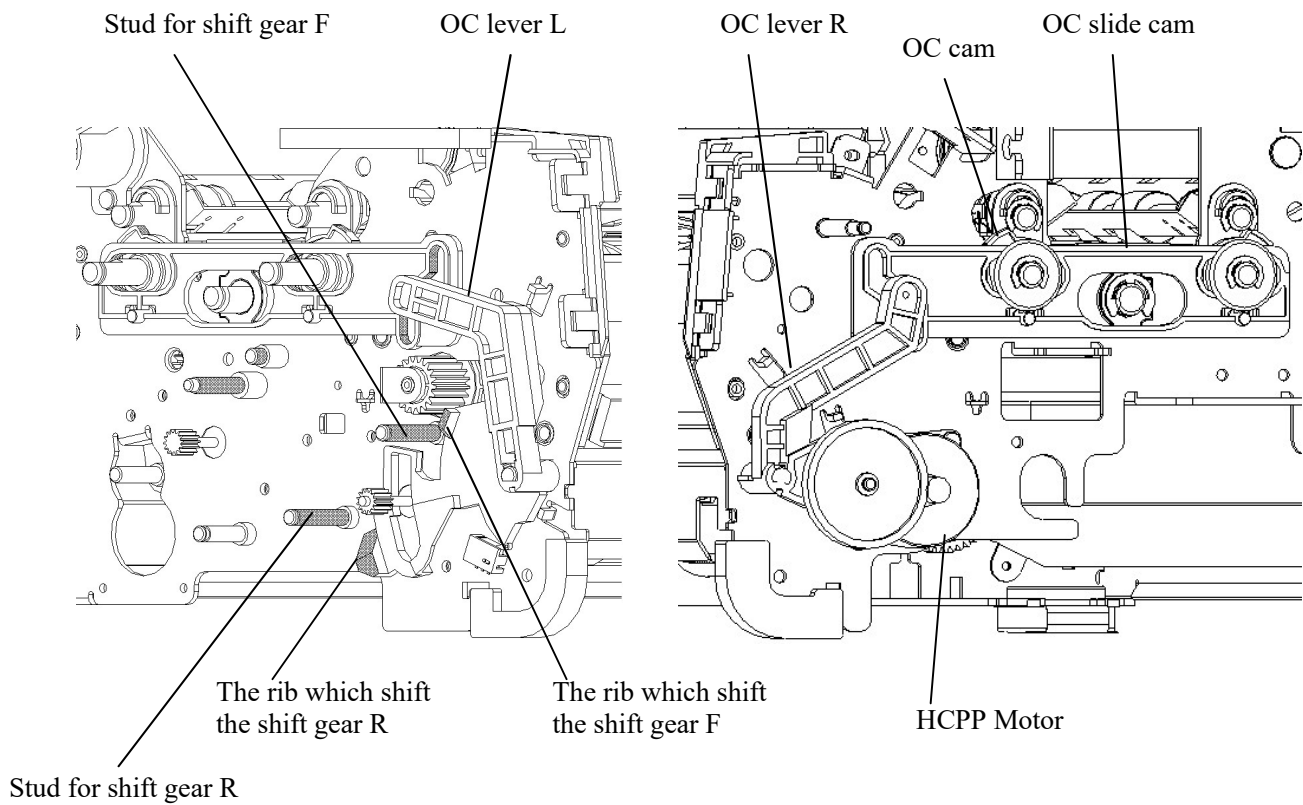


Figure 5.12 HCPP mechanism

5.2.2.2 Paper feed operation

Figure 5.13 shows the driving system of the paper feed mechanism.

The LF and TR motors mounted on the frame via gears feed paper. The LF motor operates for both cut sheet paper and continuous forms to rotate the first and second transport rollers and platen roll. The TR motor operates only for continuous forms to rotate the front or rear tractor to feed paper.

(1) Power transmission

Driving the transport roller

The transport roller is driven by the LF motor, which rotates the first and second transport roller gears (pulleys) via the pulley gear and timing belt.

Driving the front tractor

The front tractor is driven by the TR motor, which transmits power to the tractor driving gear via shaft gear F

Driving the rear tractor

The rear tractor is driven by the TR motor, which transmits power to the tractor driving gear via shaft gear R, idle gear, 2-step gear, and TR idle gear.

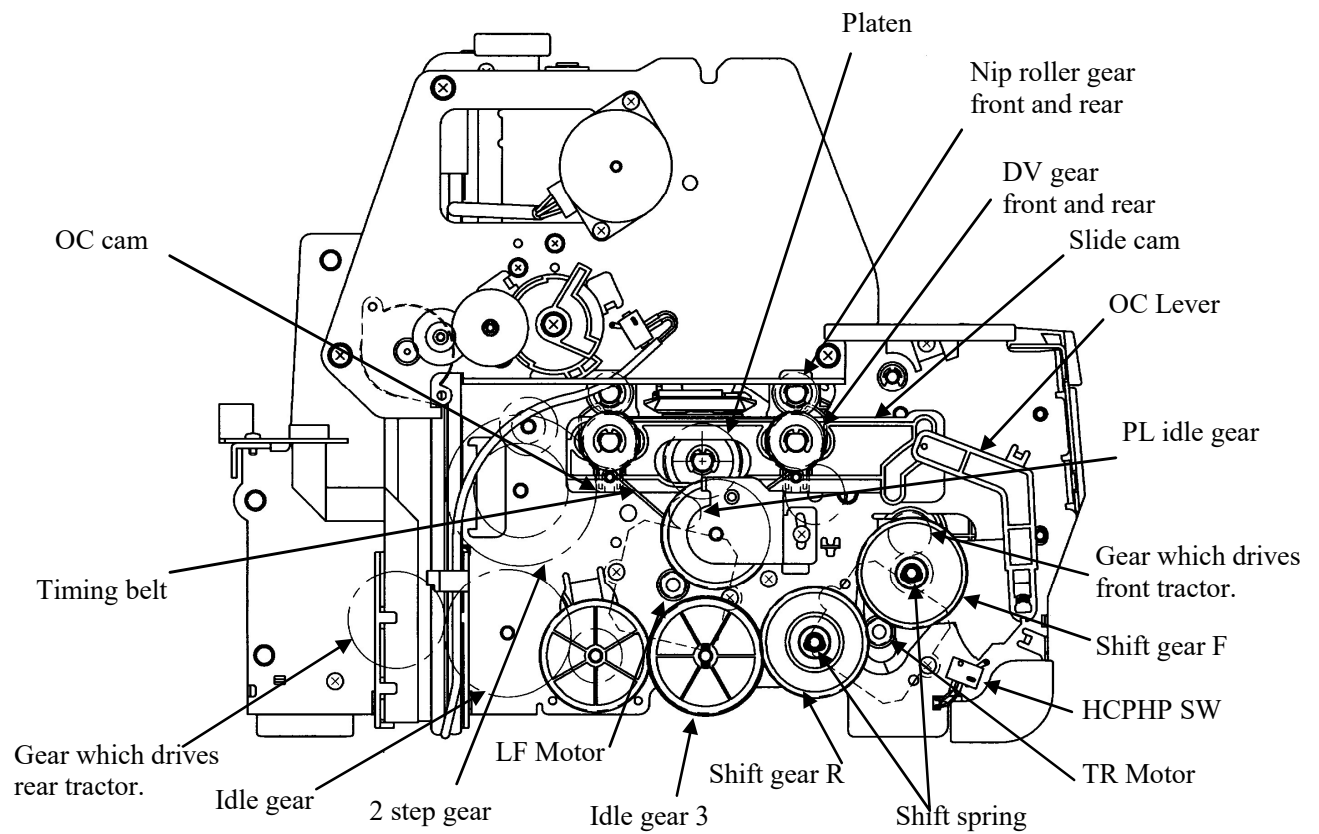


Figure 5.13 Power transmission mechanism

(2) Continuous forms paper feed operation

Figure 5.13 shows the paper feed mechanism for continuous forms. Continuous forms paper is loaded with its sprocket holes fitted to the pins on the paper feed tractor belt and is fed by transmitting TR motor power to the transmission mechanism to rotate the tractor belt. The paper fed by the front paper feed tractor is pulled by the first and second rollers driven by the LF motor. Paper fed by the rear paper feed tractor is also fed in the same way as with the front paper feed tractor and is pulled by the second and first rollers driven by the LF motor.

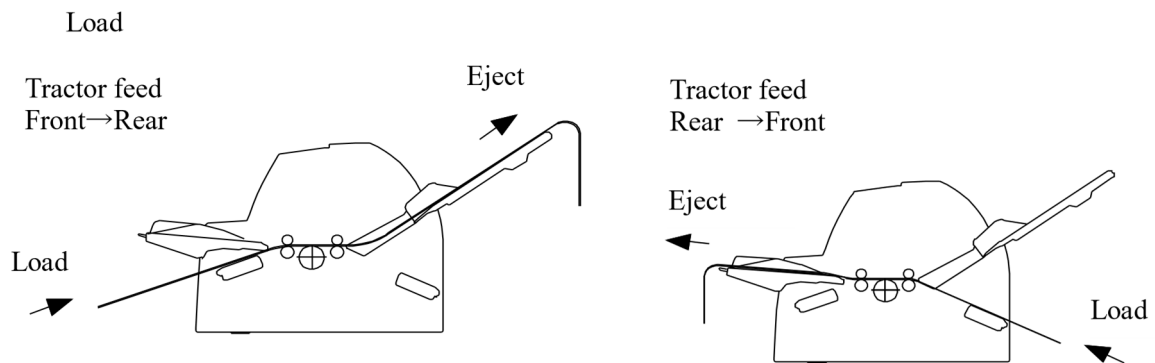
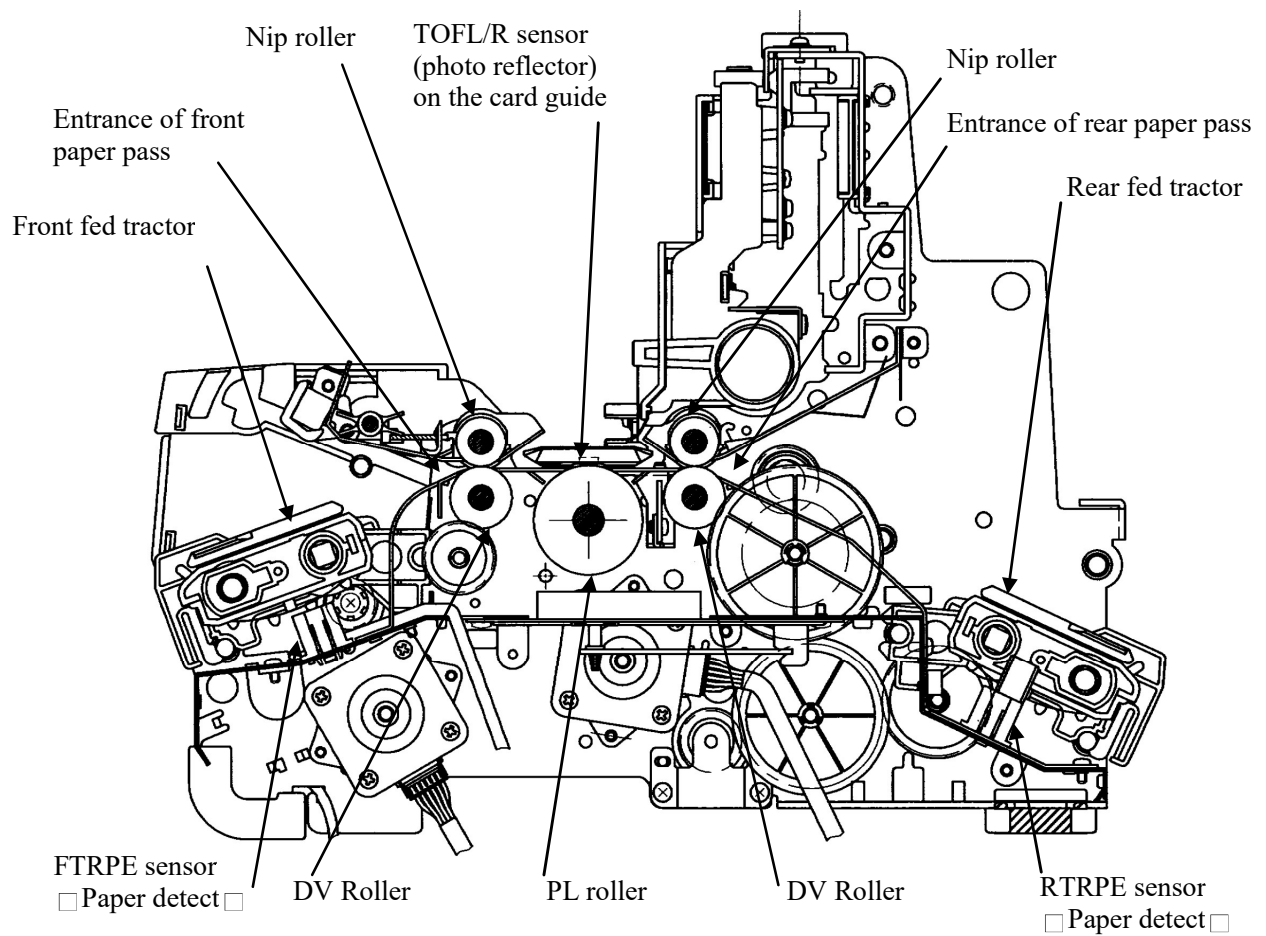


Figure 5.14 Tractor feed mechanism

(3) Cut sheet paper feed operation

Figure 5.14 shows the paper feed mechanism for cut sheet paper.

The cut sheet paper placed on the paper table, which is not shown in the figure below, against the first roller in the cut sheet feeding slot is fed between the first transport roller and first nip roller, which are driven by the LF motor, and pulled by the second transport roller and second nip roller.

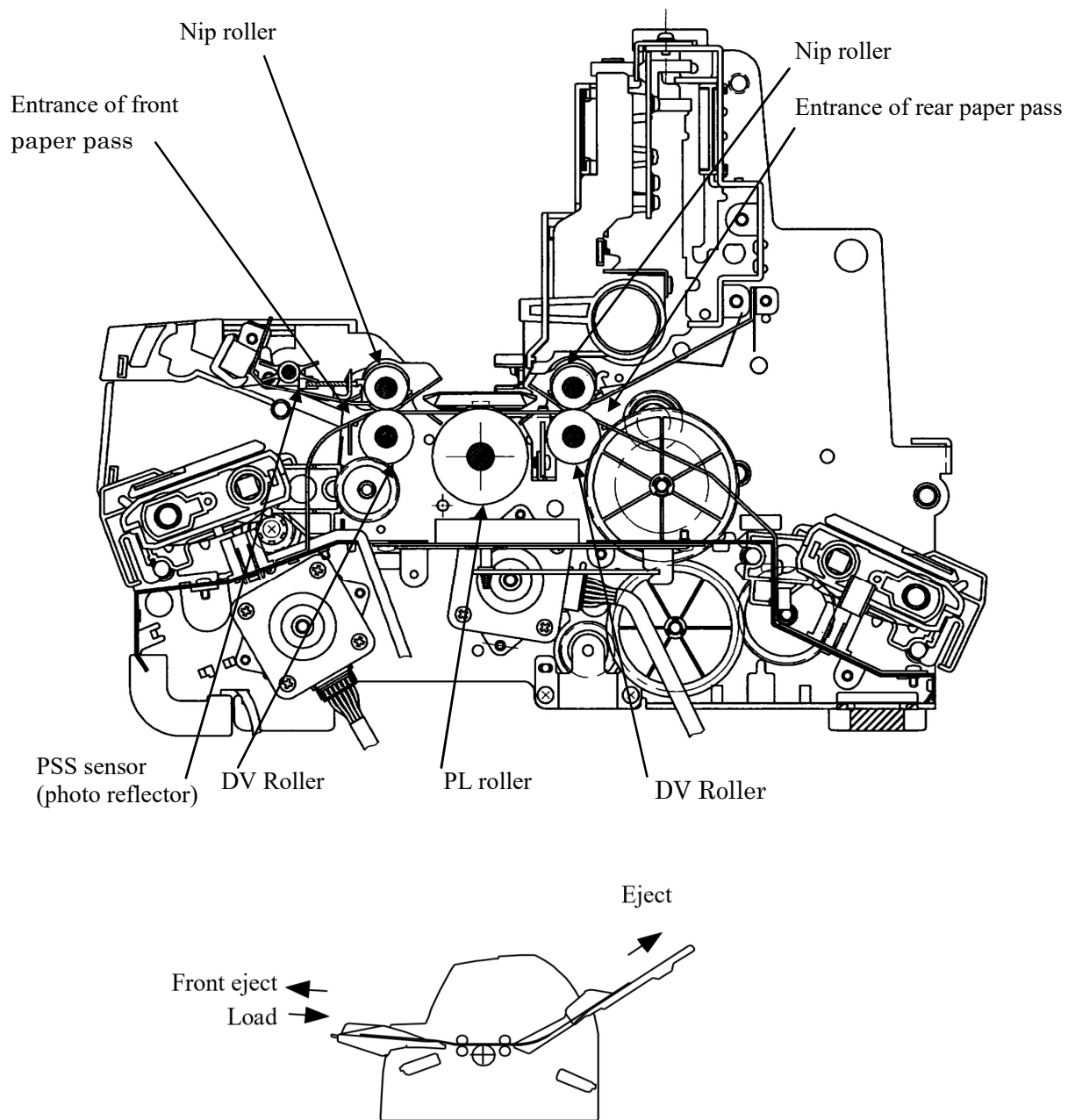


Figure 5.15 Cut sheet feed mechanism

5.2.2.3 Paper loading and ejection operation (auto loading)

Loading the paper is done automatically.

< Continuous forms loading operation >

After setting continuous forms on the front or rear tractor, press the LOAD button to start loading operation. When the top of paper reaches the paper sensor (mounted on the card guide) shown in Figure 5.15, the paper sensor changes from the “no-paper” state to the “paper present” state. Based on this position, the amount of paper sending is determined so that continuous forms are loaded to top of form position.

< Continuous forms unload operation >

Pressing the LOAD button on the control panel while paper is loaded unloads the continuous forms to the position where the tractor detection switch changed from the “paper present” state to the “no paper” state or. If 2 pages have unloaded then stop.

< Continuous forms ejection operation >

Holding the pressing the LF/FF button on the control panel while paper is loaded sends the continuous forms forward. If 1 page has fed then stop.

< Cut sheet loading operation (automatic cut sheet setting operation)>

Operator push against the cut sheet to the feed roller, loading operation begins after 1.5 seconds since the PSS(Paper set sensor)changes from the “no paper” state to the “paper present” state. Default setting of CUTLOAD(in set up mode) is AUTO. If its changed to BUTTON pushing button is necessary to load the cut sheet.

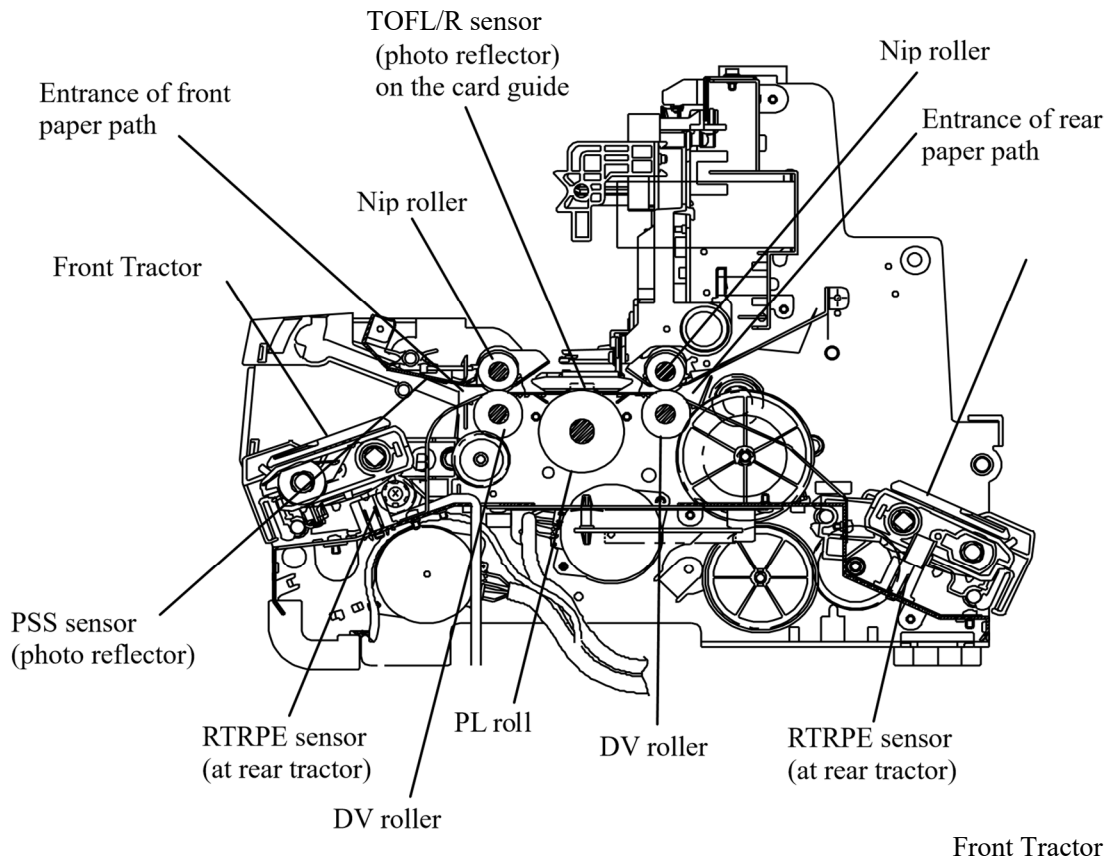


Figure 5.16 Auto loading mechanism

5.3 Electrical Operation

The main control unit uses the MB91110controller dedicated to the printer. The controller contains Centronics control and stepping motor control circuits while using 32-bit RISC FR30 as its core element. It thus implements high-speed, compact, and low-cost control circuits.

The printer contains a full two-line buffer and performs normal/reverse automatic checking and printing to implement high throughputs.

Firmware is put in modules to improve reliability.

Note

EEPROM (part symbol IC43) mounted on the main board contains information on adjusted values and consumables specific to the mechanism.

If the main board (HGC07**) of this printer is replaced, remove the EEPROM package in advance from the main board and mount it on the new main board.

5.3.1 Printed Circuit Boards and Basic Configuration

Table 5.3.1 lists the printed circuit boards used in this printer.

Alias of PC board	Drawing number	Major functions
Main board HGC07**	KA21206-B**X	Main control circuit, drive circuit, interface driver/receiver circuit
Control panel board GAO99BA	CA21264-B91X	Serial/parallel converter LSI, display lamps, control switches
Control panel board LCD02BA	CA21323-B61X	Serial/parallel converter LSI, display LCD/lamps, control switches
Power supply board KA0071(100V)	KA02951-0071	+40 V and +5 V power supply
Power supply board KA0076(200V)	KA02951-0076	+40V and +5 V power supply

(X: PC board EC level) **Table 5.3.1 Printed circuit boards**

Figure 5.3.1 shows the basic configuration of this printer.

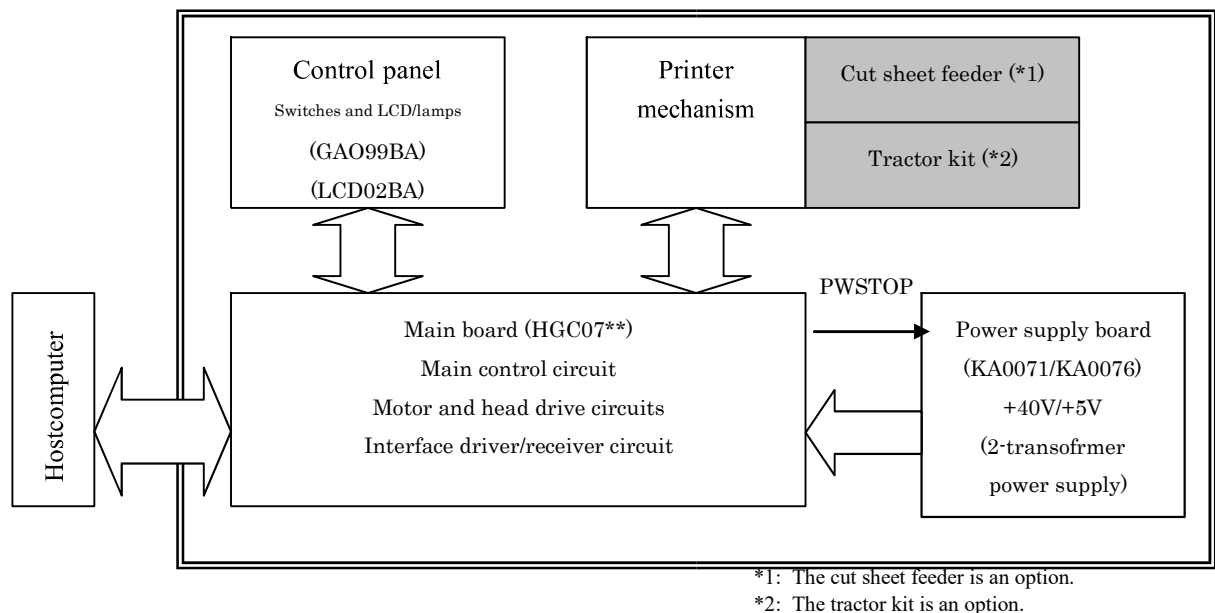


Figure 5.3.1 Basic configuration

5.3.1.1 Outline of Printed Circuit Boards

Main board (HGC07**)

This printed circuit board consists of three basic blocks: the main control circuit, interface circuit, and drive circuit blocks.

The main board has the following ten connectors:

No.	Name	Abbreviation	Connection destination
1	Centronics connector	IFCEN	Host computer
2	Control panel connector	CNOP	Control panel board
3	Power supply connector	CNPW	Power supply board
4	Carriage board connector	CNHD3	Multi-sensor for detection of left and right ends

5	Head cable connector	FCNHD1 FCNHD2	Print head
6	Space motor cable	CNSP	Space motor
7	Line feed motor cable	CNMLF	Line feed motor
8	Tractor motor cable	CNTLF	Tractor motor
9	Sheet feeder cable	Front:CNFCSF Rear:CNRCSF	Sheet feeder connector board
10	Sensor board connection cable	CNSEN	Mechanism board (sensor board)
11	USB connector	CNUSB	Host computer
12	RS232C connector	CNFRS	Host computer
13	Ribbon feed motor cable	CNRF	Ribbon feed motor
14	Power supply FAN connector	CNFAN1	Power supply FAN
15	Space motor driver FAN connector	CNFAN2	Space motor driver FAN
16	Space motor FAN connector	CNFAN3	Space motor FAN
17	Head FAN connector	CNFAN4	HEAD FAN
18	Inter rock connector	INLK	Inter rock switch

Power supply board (KA0071/KA0076)

This printed circuit board supplies logic power (+5 V) and driving power (+40V) to the main board.

The driving power can be turned on and off by the control signal (PWSTOP) from the main board.

This printed circuit board has an AC inlet for AC cable connection, the AC switch, and main board connection harness.

Control panel board (GA099BA/LCD02BA)

This printed circuit board has printer status display LCD/LEDs and mode setting switches. It also has the main board connector (CNOP).

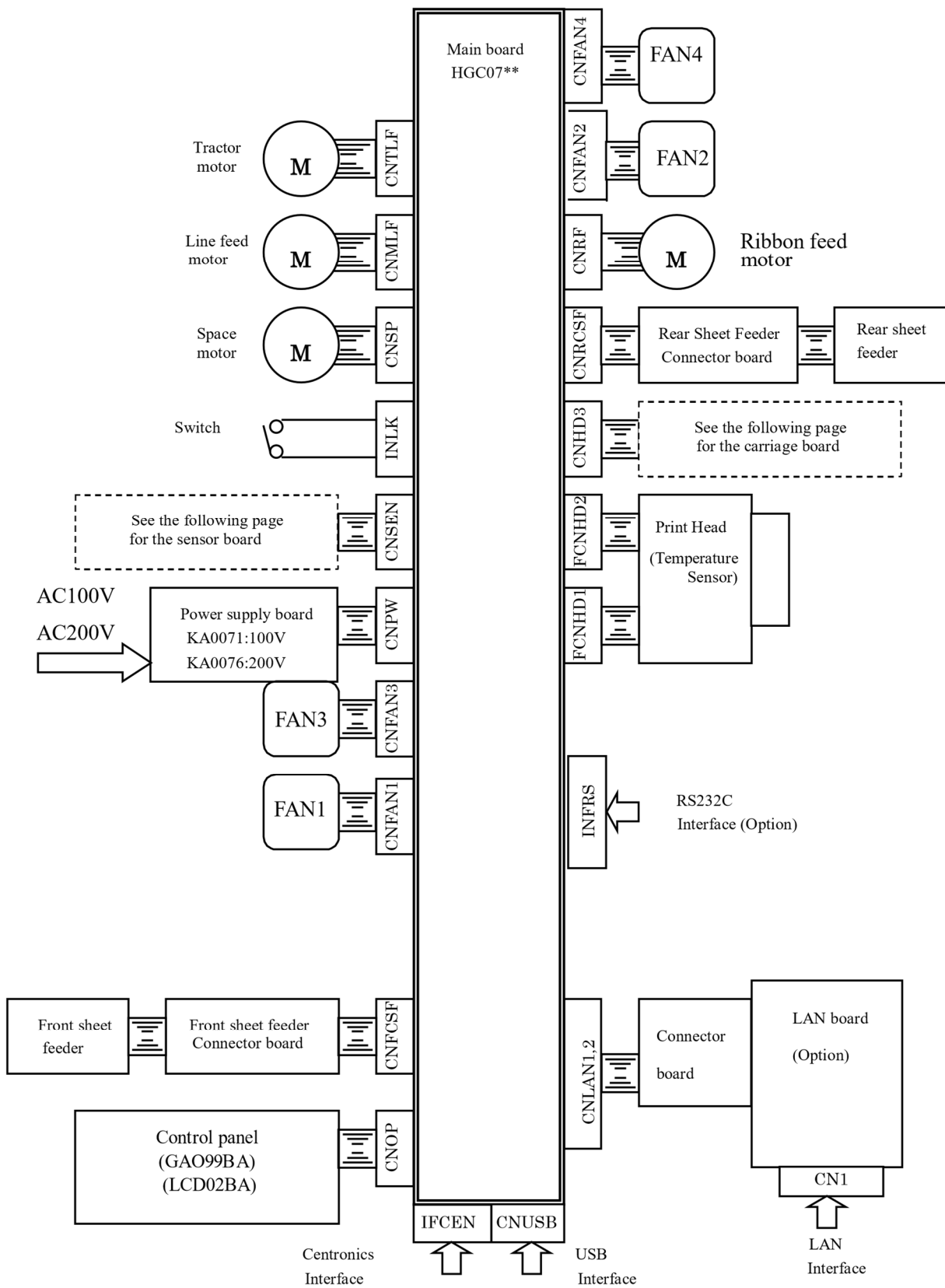


Figure 5.3.2 Main board peripheral configurations

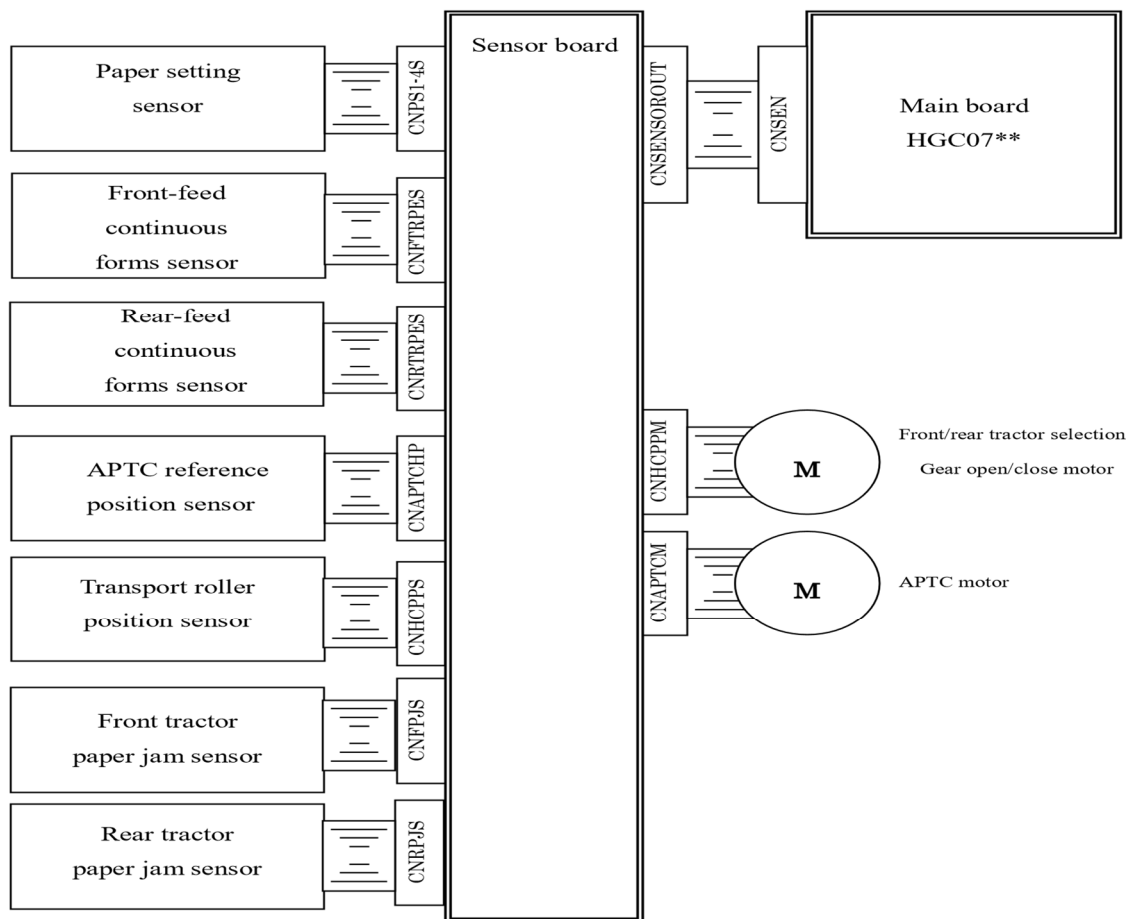


Figure 5.3.3 Sensor board peripheral configuration

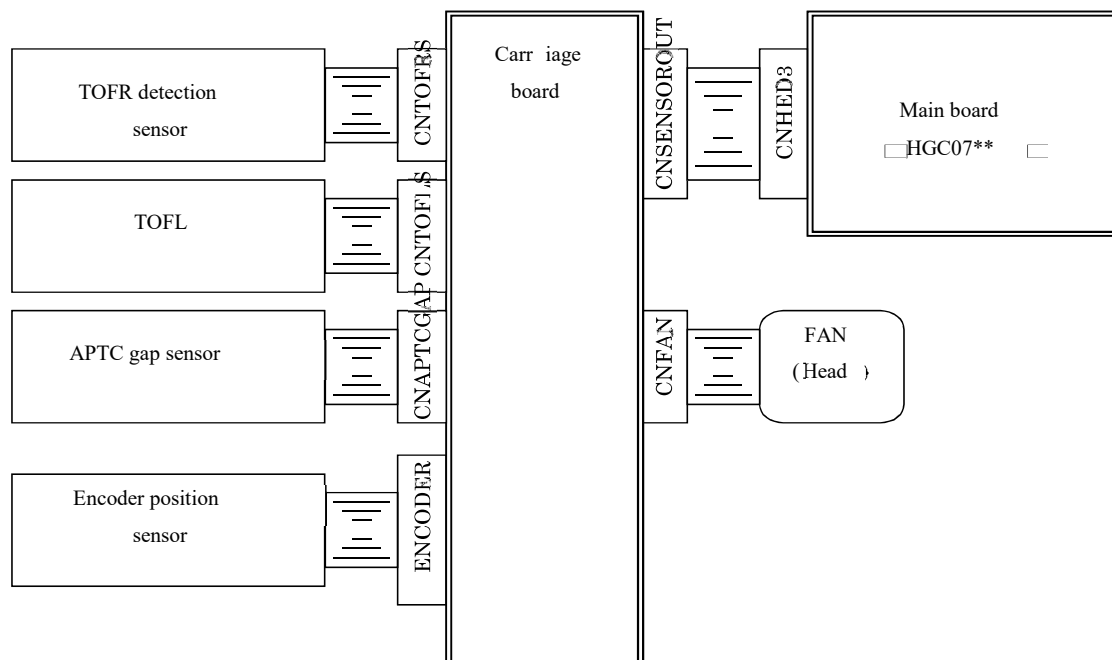


Figure 5.3.4 Carriage board peripheral configurations

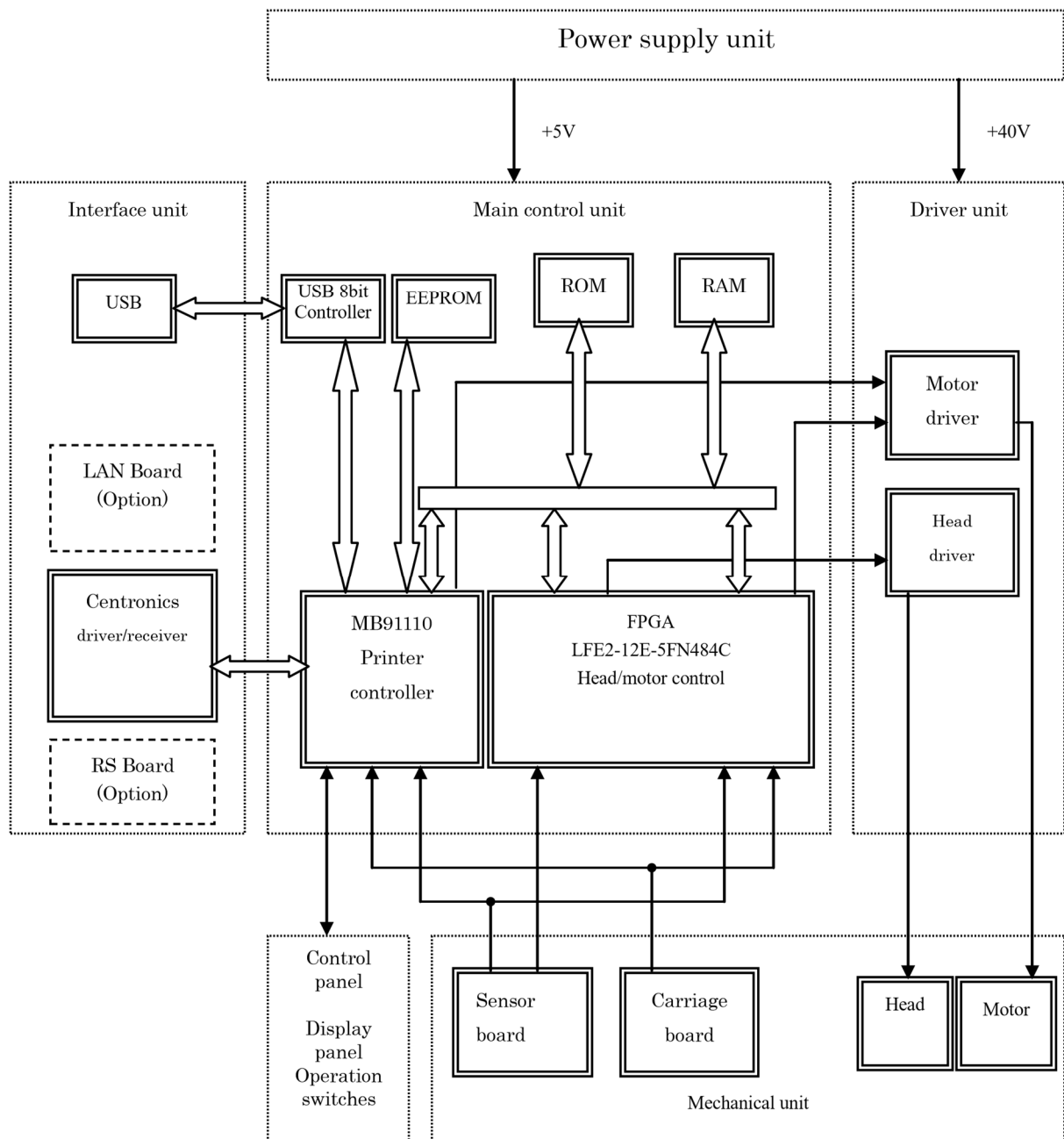


Figure 5.3.5 Internal circuit block diagrams

5.3.2 Control Circuit Operation

5.3.2.1 Printer Special Controller (MB91110)

Figure 5.3.6 is an MB91110 internal block diagram.

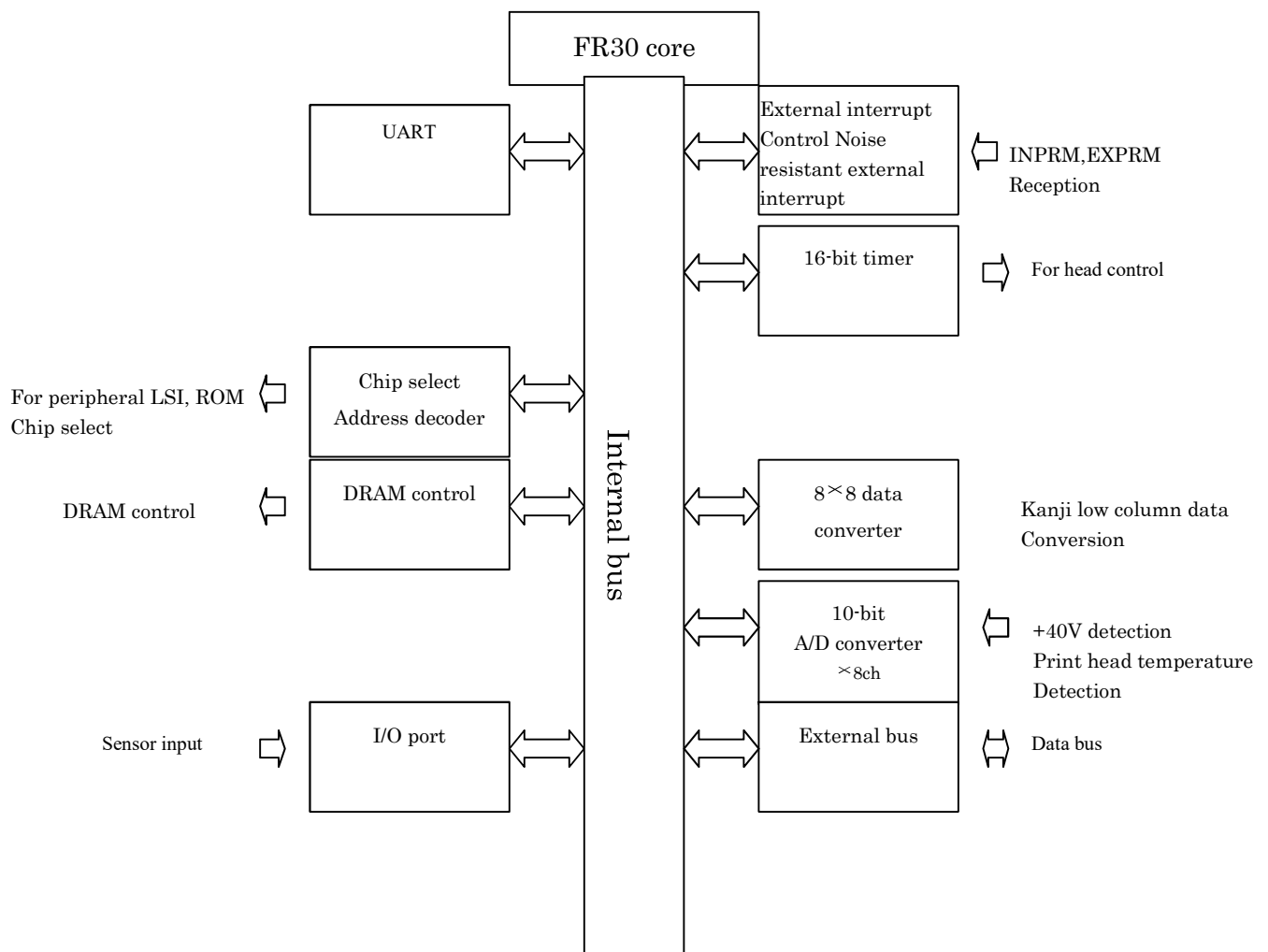


Figure 5.3.6 MB91110 internal block diagram

The MB91110 is a printer controller that has 32-bit RISC FR30 as the core element and the peripheral circuits required for printer control as shown in Figure 5.3.6.

The controller features the following:

Minimum instruction execution time -> 20ns (at 50 MHz machine cycle)

Using a high-level language (C) to support multitasking

Enhanced interrupt function (eight priority levels)

Automatic data transfer function independent of the CPU

Device using 144-pin flat package CMOS technology

5.3.2.2 Memory Circuit Control

Figure 5.3.7 is a memory circuit control block diagram.

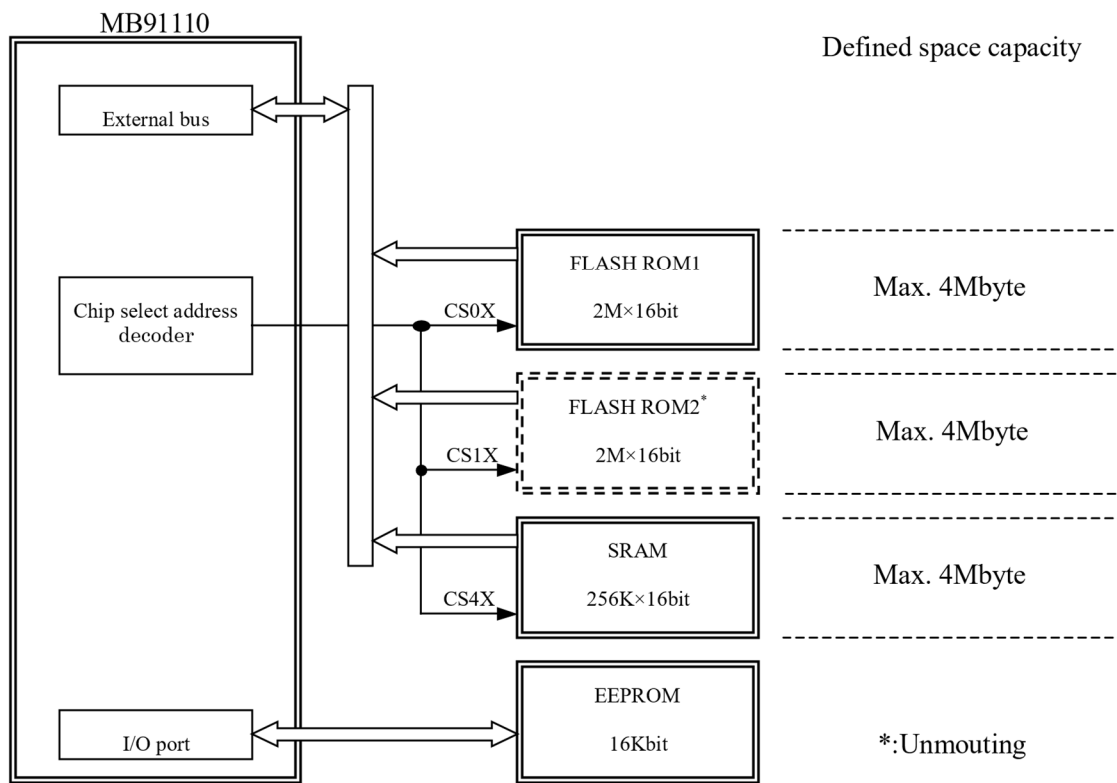


Figure 5.3.7 Memory control block diagram

The MB91110 has the chip select address decoder circuits for memory control as shown in Figure 5.3.7

[Chip select address decoder]

The chip select address decoder decodes addresses and outputs a chip enable signal to ROM.

The memory circuit consists of four types of elements, SRAM, PROGRAM ROM, and EEPROM as shown in Figure 5.3.7.

[SRAM]

The MB91110 has a “256K x 16 bits” DRAM for control program work areas, line buffers, and external character storage areas. [EEPROM]

The MB91110 has a 16K-bit serial transmission EEPROM (equivalent to the BR24LFV-W) that contains setup information, mechanism information, and consumables information.

If the board is replaced, remove the EEPROM from the board to be replaced and mount it on the replacing board.

[ROM]

The MB91110 uses a “2M x 16 bits” flash ROM for programs.

It also permits another flash ROM to be mounted when needed to support various types of emulation.

A 4-megabyte memory space is defined for each ROM.

Address	Capacity	Explanation
00000000 to 000007FF	2K bytes	CPU internal I/O area
00100000 to 003FFFFFFF	3M bytes	External I/O area (for FPGA)
00400000 to 007FFFFFFF	4M bytes	Program ROM 1
00800000 to 00BFFFFFFF	4M bytes	CG ROM area

00C00000 to 00FFFFFF	4M bytes	Program ROM 2
01000000 to 01DFFFFFF	14M bytes	Reserved
01E00000 to 01FFFFFF	2K bytes	External RAM

Table 5.3.2 Memory map

5.3.2.3 Centronics Controller

Figure 5.3.8 is an interface control block diagram.

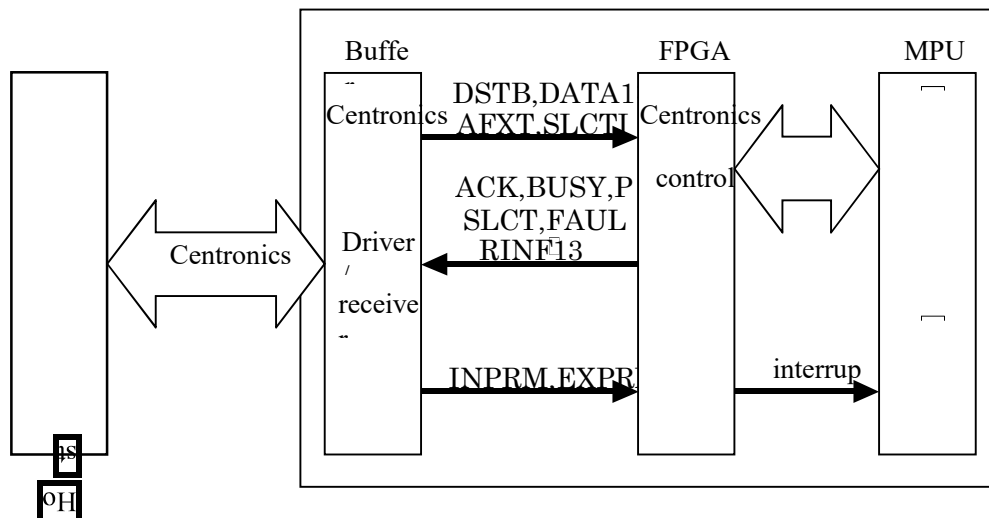


Figure 5.3.8 Interface control block diagram

[Centronics interface control]

The Centronics interface controller uses the Centronics controller built in the FPGA as shown in Figure 5.3.8

The INPRM and EXPRM signals, which are forcible reset signals from the host, are used as interrupt signals after noise is removed from them by sampling in the anti-noise interrupt control circuit.

This printer supports nibble mode conforming to IEEE Std 1284-1994.

The following shows the circuits used for two-way Centronics control.

[Centronics control circuit]

Figure 5.3.9 shows a general timing chart for the Centronics control circuit.

The Centronics control circuit latches received data DATA1 to DATA8 to the internal register at the falling edge of data strobe signal *DSTB, and simultaneously sends an interrupt signal to the external interrupt control circuit to inform the MPU of the receipt of data.

The MPU checks that external data has been input, reads the data, and then stores it in SRAM.

After the interrupt is released from the MPU, BUSY is reset and *ACK is sent.

DATA1-8

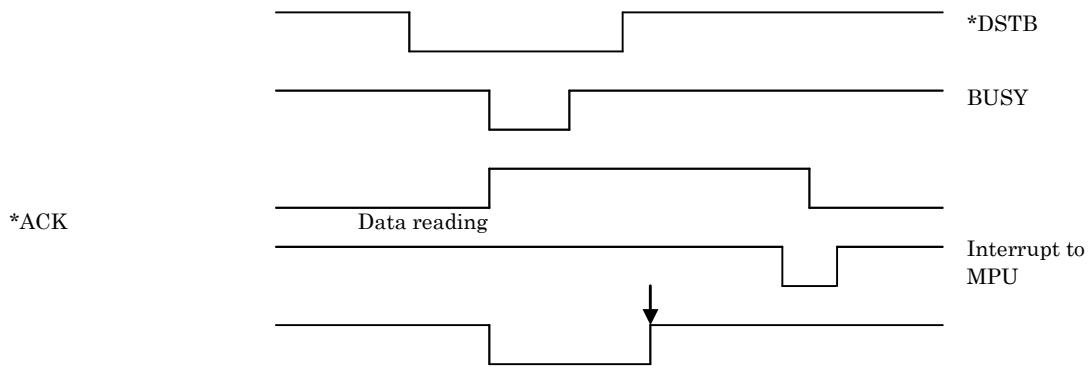


Figure 5.3.9 Interface timing chart

5.3.2.4 The MPU(MB89585) has the following main functions

USB 8bit controller

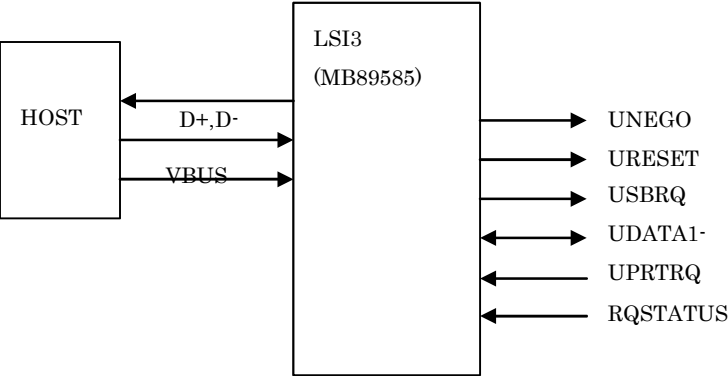


Figure 5.3.10
MB89585 block diagram

(3) USB interface

USB interface signal

	Signal name	Function
1	VBUS	Power
2	D-	Data transfer
3	D+	Data transfer
4	GND	GND
Shell	Shield	

Specification

- Basic specification: USB interface conform
- Electric power control: Self power device

5.3.2.5 LAN interface

LAN interface signal

	Signal name	Dir	Function
1	TXO+	output	Data transfer+
2	TXO-	output	Data transfer-
3	RXI+	input	Data transfer+
4	-	-	-

5	-	-	-
6	RXI+	input	Data transfer-
7	-	-	-
8	-	-	-

Specifications

- A transfer mode: 10/100BASE

5.3.3 Head Control LSI (LFE2-12E-5FN484C)

Figure 5.3.11 and 5.3.12 is a head/motor control FPGA block diagram.

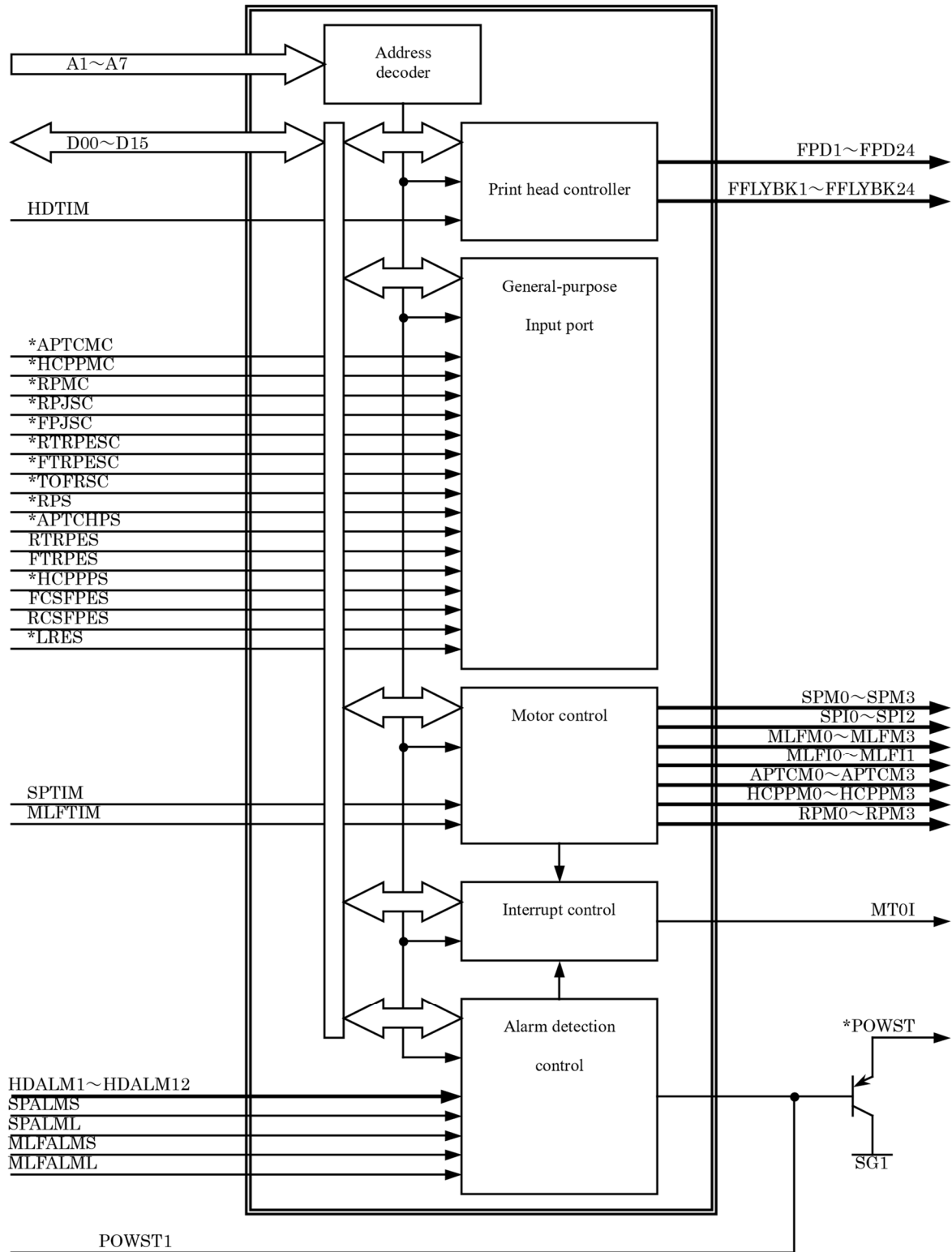


Figure 5.3.11 Head/motor control FPGA block diagram

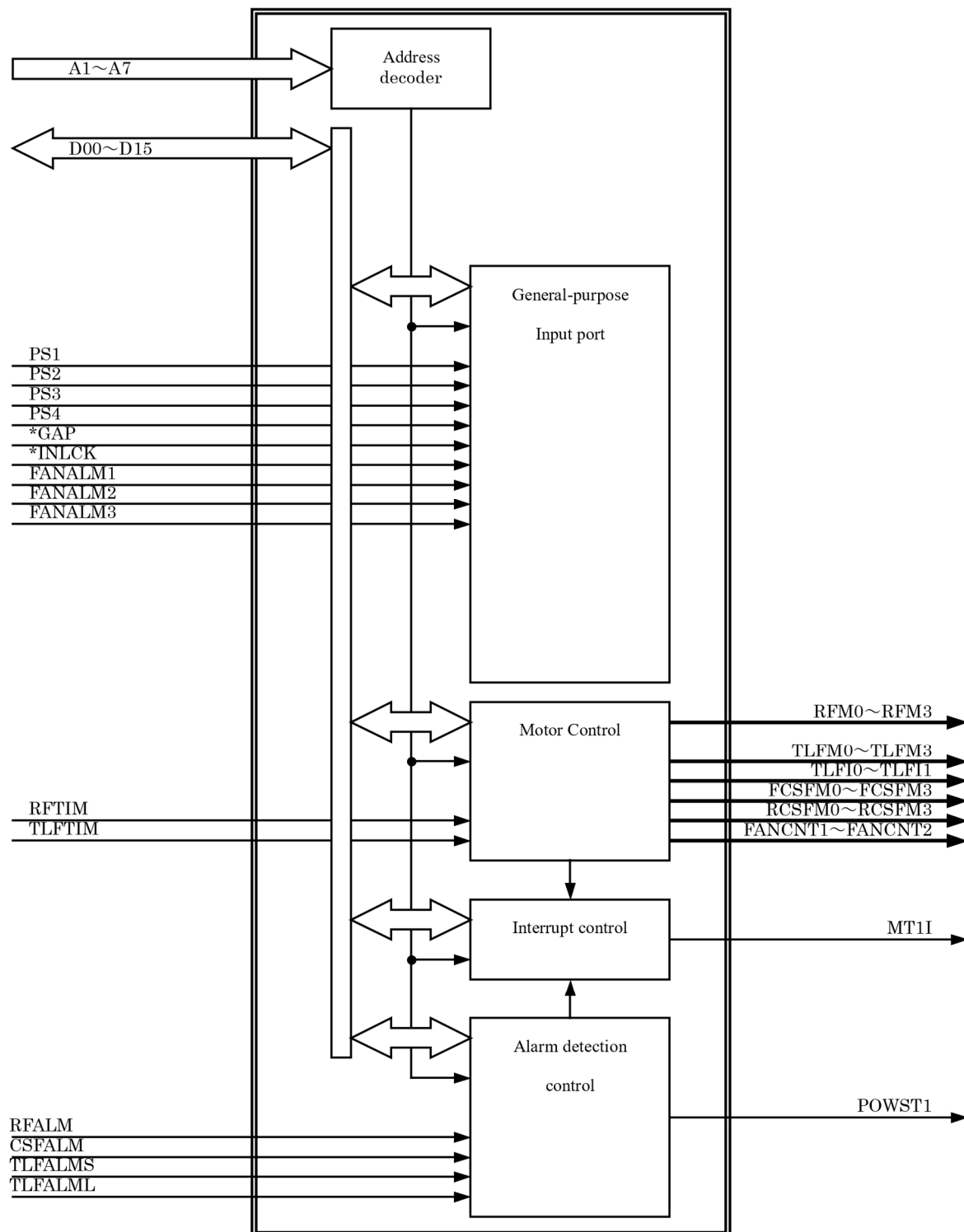


Figure 5.3.12 Head/motor control LSI block diagram

5.3.4 Control Panel Control

Figure 5.3.13 is a control panel controller block diagram.

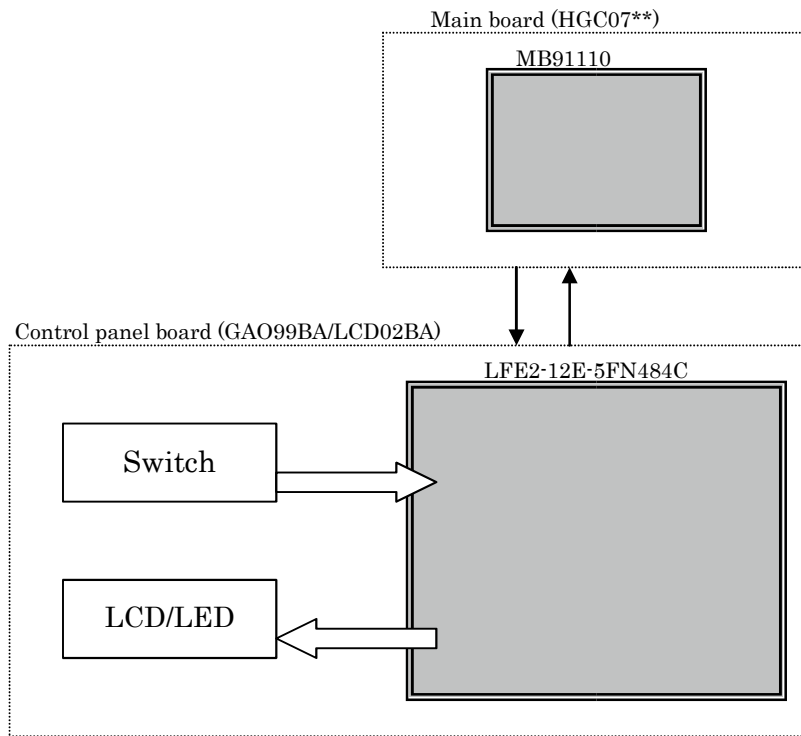


Figure 5.3.13 Control panel control block diagram

Switches and LCD/LEDs are provided on the control panel board.

These switches and LEDs are controlled by serial-parallel conversion by the MPLSI (MBCG47492-502PF-G) mounted on the control panel.

5.3.5 Motor Control and Drivers

This printer has six motors (space motor, line feed motor, tractor motor, front and rear tractor selection gear open/close motor, APTC motor, and ribbon motor) in a standard configuration. It also enables two optional motors for the front and rear cut sheet feeders (the driving circuits are built in the sheet feeders) to be mounted.

The motor controller (MB91110) controls eight motors using the motor control FPGA.

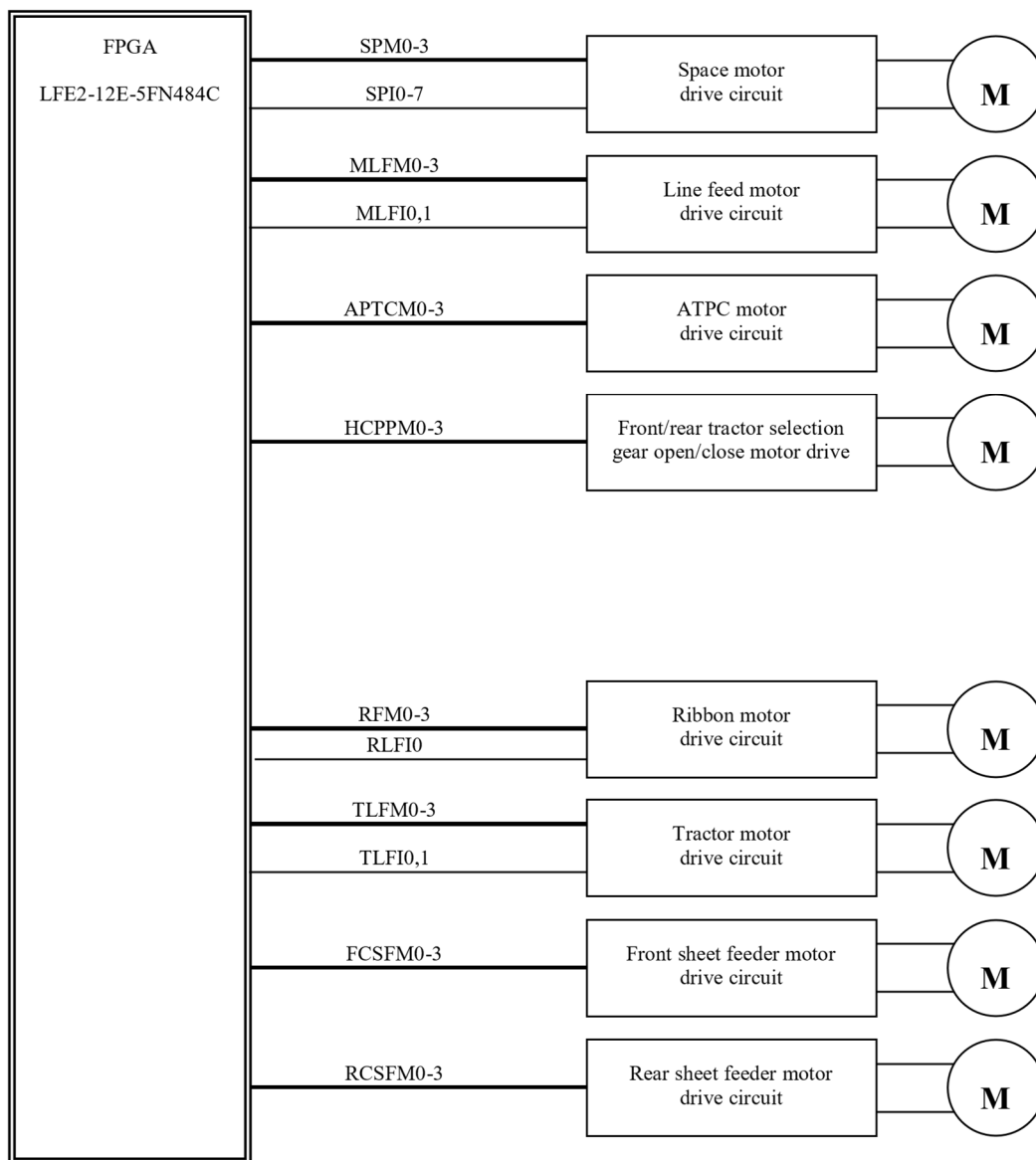


Figure 5.3.14 Motor controller block diagram

[Space, line feed, tractor, CSF, ATPC, and ribbon motor drive circuits]

Figure 5.3.15 shows a block diagram of the control and drive circuits for the standard motors in the printer.

+40V

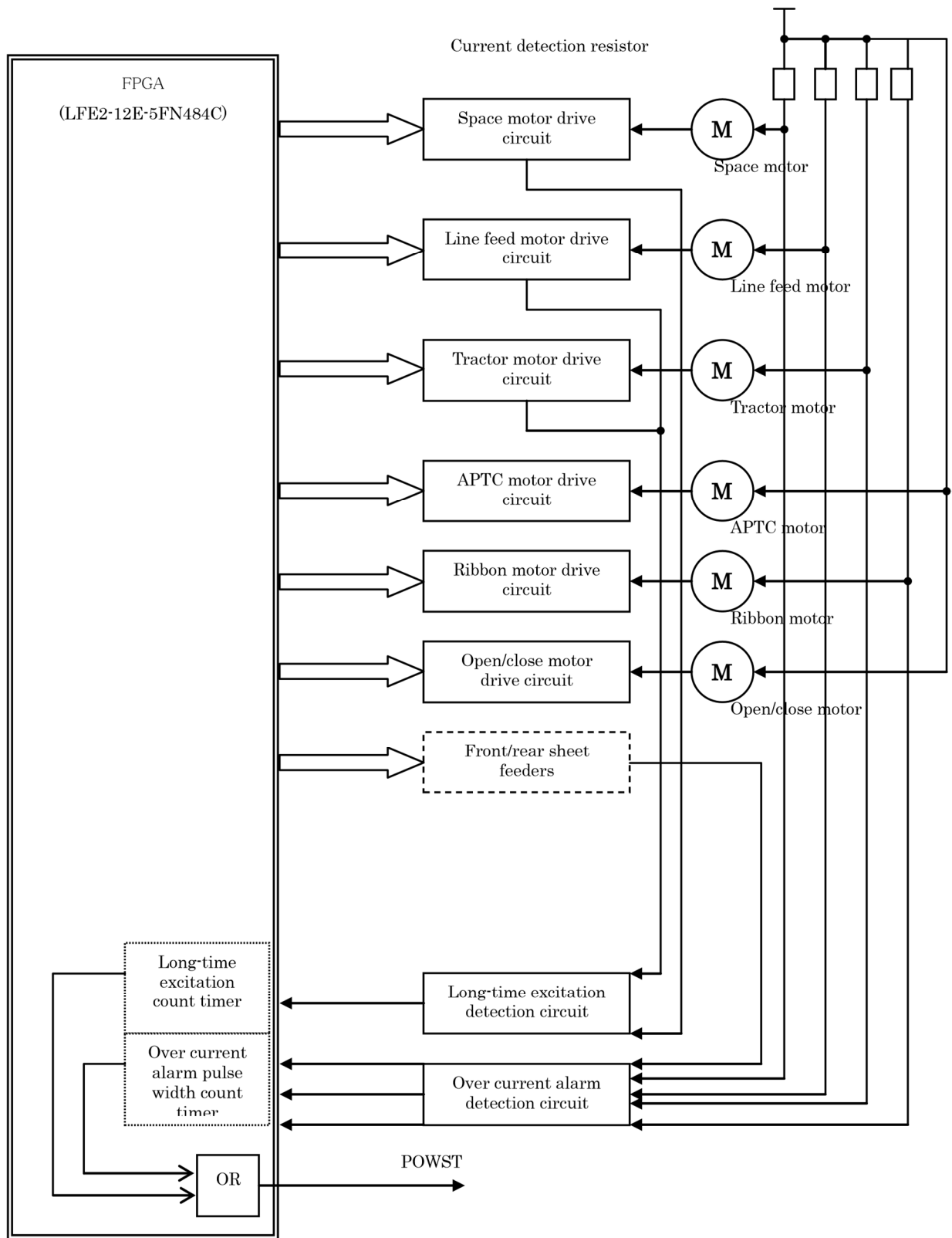


Figure 5.3.15 Block diagram for various motor control and drive circuits

The space motor is rotated as follows:

The MPU reads phase excitation data from ROM.

The rotation direction and initial excitation phase are set in the FPGA control register of the stepping motor control circuit and simultaneously current specification data is written to the current specification register as needed.

An internal interrupt is caused to the MPU every step and, when needed, the excitation time and current specification data are changed to FPGA control the stepping motor.

Figure 5.3.16 shows the space motor drive circuit.

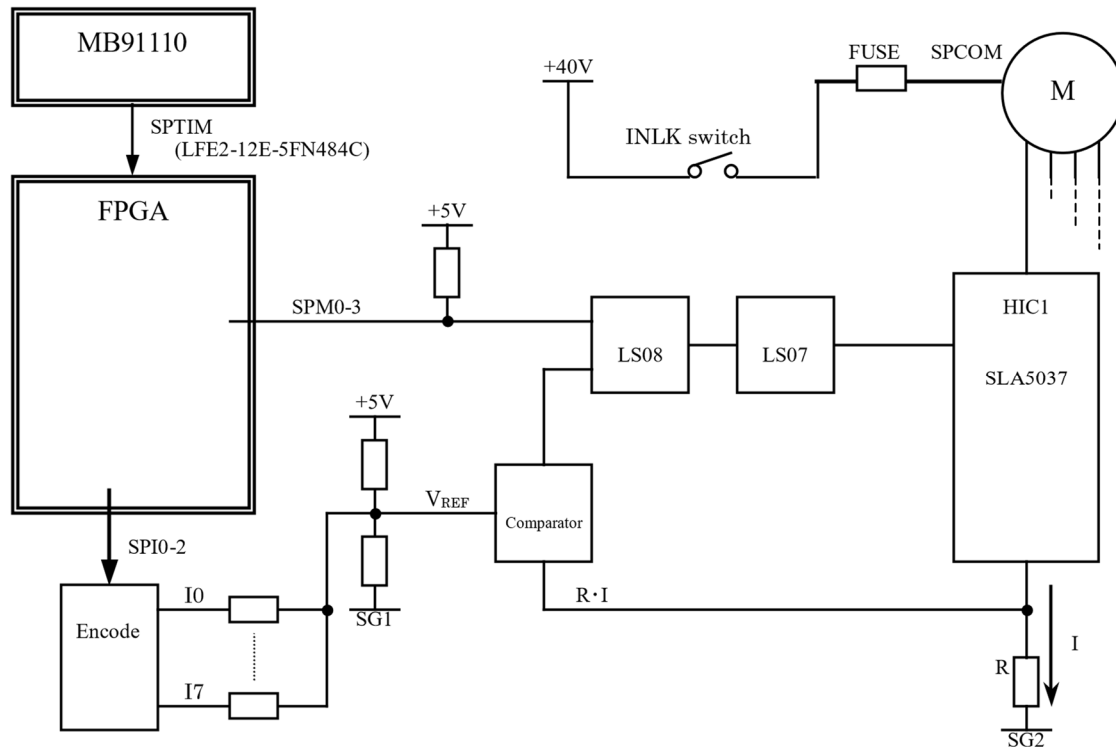
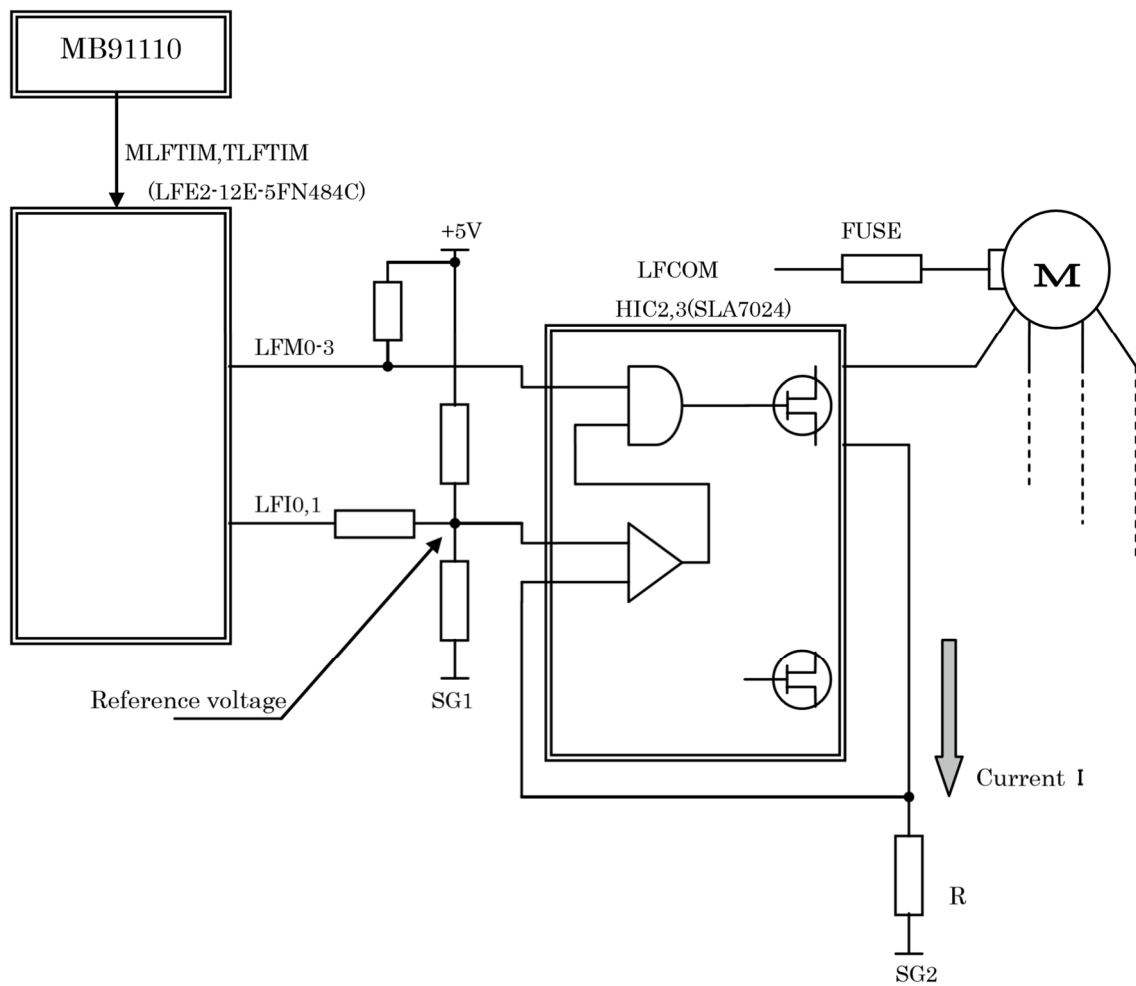


Figure 5.3.16 Space motor drive circuit

The space motor uses a constant current drive circuit as shown in Figure 5.3.16. The constant current drive circuit and drive FET used exclusively for motor driving. The FPGA stepping motor control circuit outputs SPM0 to SPM3 as phase data. When the output signal is Hi-Z(H), the FET in the HIC goes on to supply current to the motor phase. Current I flows to SG2 through resistor R . Voltage level IR for the SG2 when current I flows into resistor R is compared with the reference voltage in the comparator. When IR exceeds the reference voltage, the comparator output and phase signal are ANDed in the HIC to turn off the FET and thereby control flowing current constant. The reference voltage is generated by pressure division of the resistor as shown in Figure 5.3.16. The reference voltage is changed at the pressure division resistor by current control signals SPI0-2 from the motor control circuit, and thus output current is controlled.

[Line feed motor and tractor motor drive circuits]

The 4-phase line feed motor and tractor motor (Uni-polar stepping motor) are controlled by the constant current drive circuit shown below.



[Ribbon motor drive circuits]

+40V

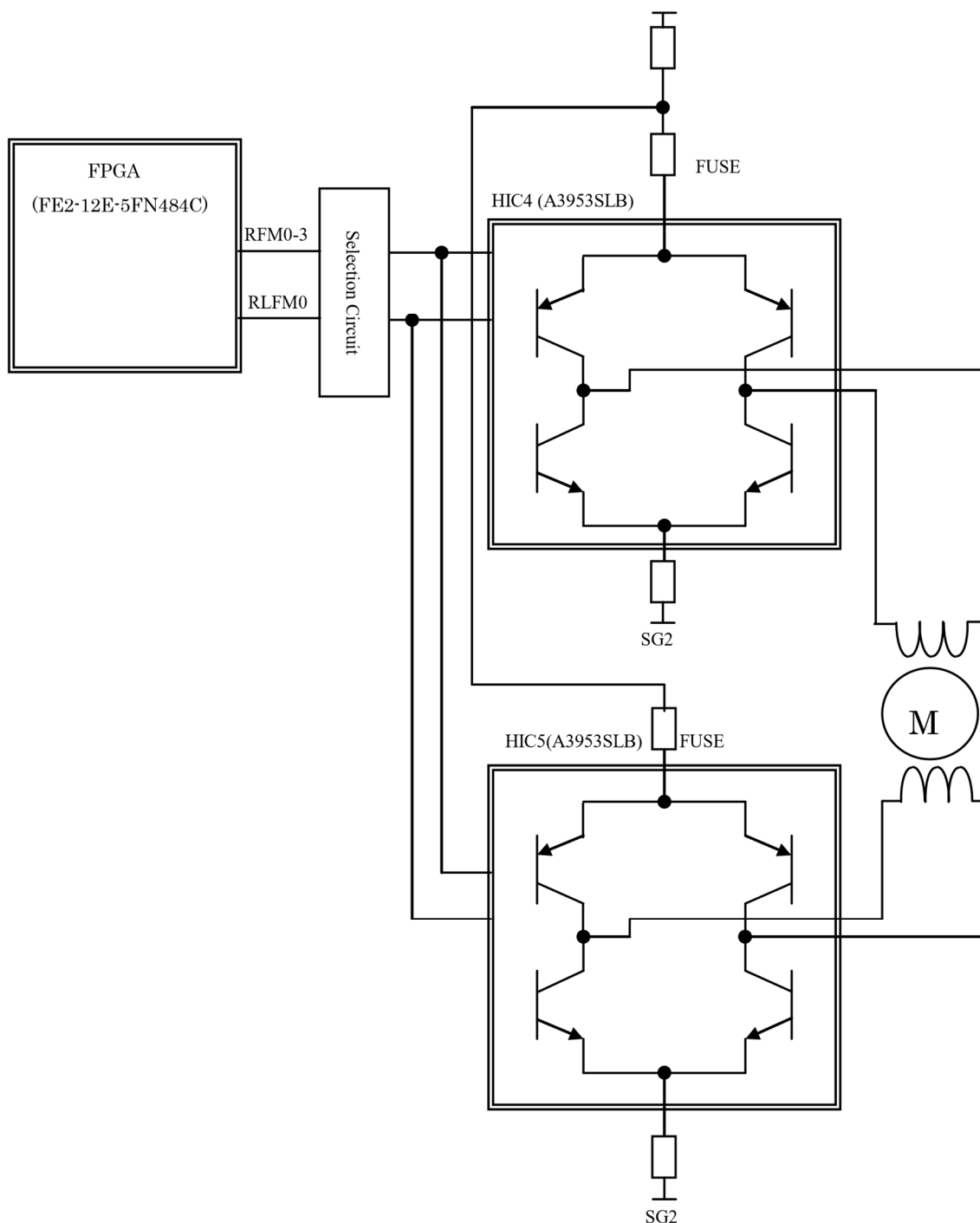


Figure 5.3.18 Bi-polar motor drive circuit

[Error detection circuit]

□ Over current detection

If the space motor, line feed motor, or tractor motor current exceeds the respective absolute rated value, an over current detection signal is sent to the FPGA.

After a given period of the receipt of the detection signal, the FPGA controls the POWST signal to turn off +40 V. It also notifies the MPU of the occurrence of a driver error.

[Open/close, APTC, and CSF motor control and drive circuits]

The phase data and switchover timing for the open/close, APTC, and CSF motors are controlled by FPGA motor control, but current control is not performed.

[CSF short-circuit protection circuit]

If abnormal current flows to +40V for some reason, the fuse is blown to prevent +40 V from being supplied from the main board (HGC07**).

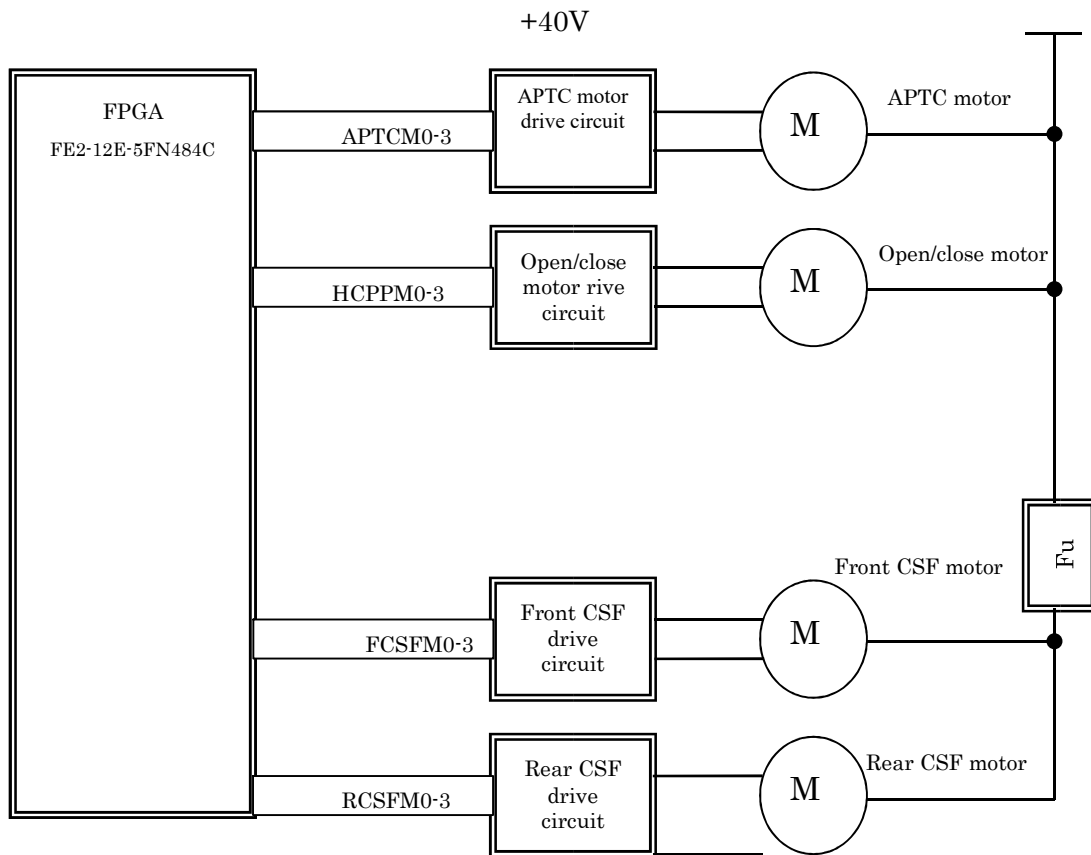


Figure 5.3.19 Open/close, APTC and CSF motor drive circuit block diagram

5.3.6 Print Head Driver

Figure 5.3.20 is a print head drive circuit block diagram.

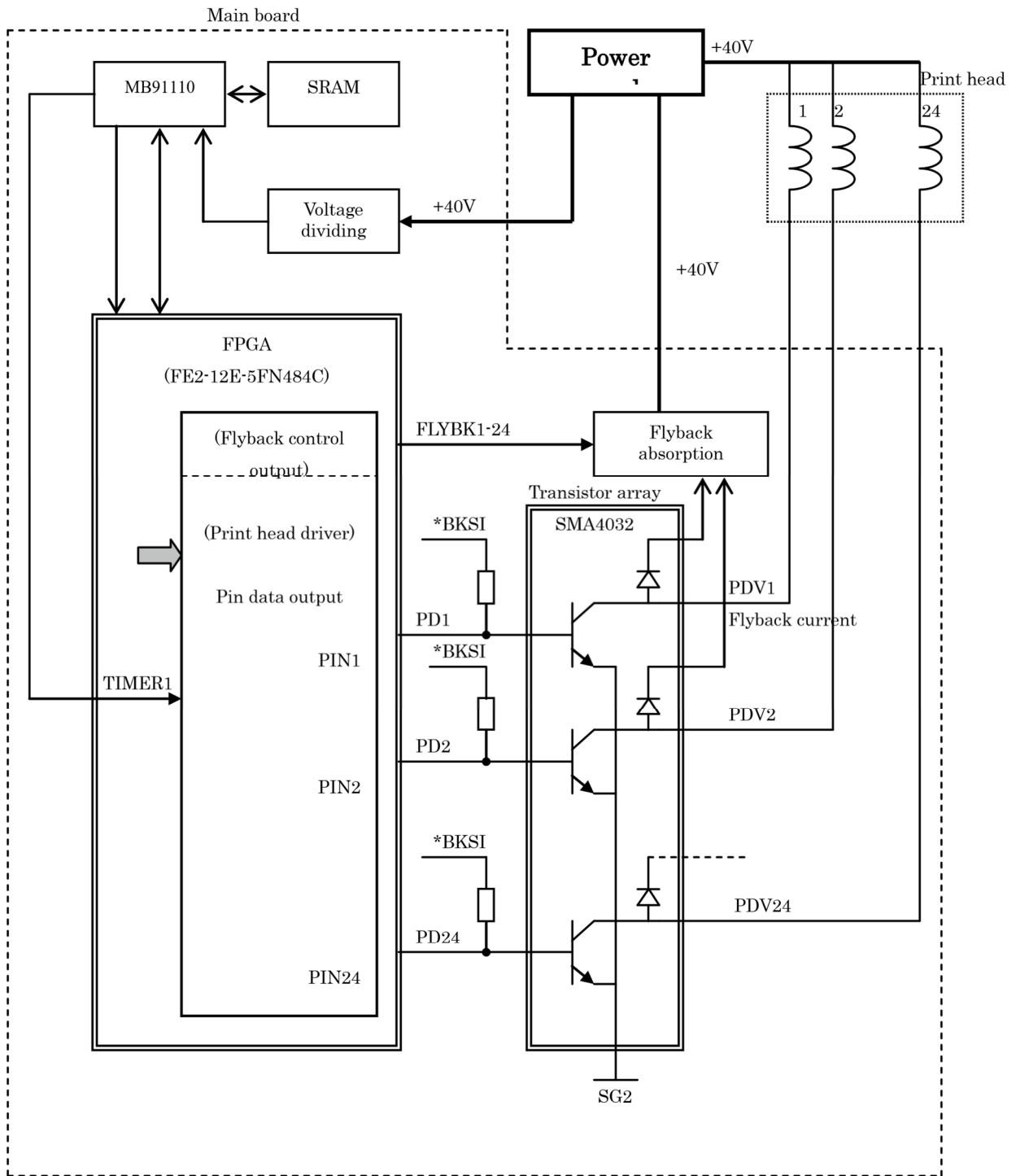


Figure 5.3.20 Print head drive circuit

[Print head drive circuit control]

The controller (MB91110) reads print data from SRAM.

The data is set on the FPGA print control circuit.

At this point, printing does not begin yet.

The MPU sets the excitation time (T1) and flyback absorption time (T2) in the FPGA.

The MPU outputs print timing signal TIMER1.

In synchronization with print timing signal TIMER1, excitation signal PDV1-24 is output from the print head driver to turn on the print head drive transistor (SDH02).

After the specified excitation time has elapsed, the print head drive transistor is turned off and a flyback absorption signal (FLYBK1-24) is output to activate the absorption circuit.

- After the specified flyback absorption time has elapsed, the absorption circuit is turned off.

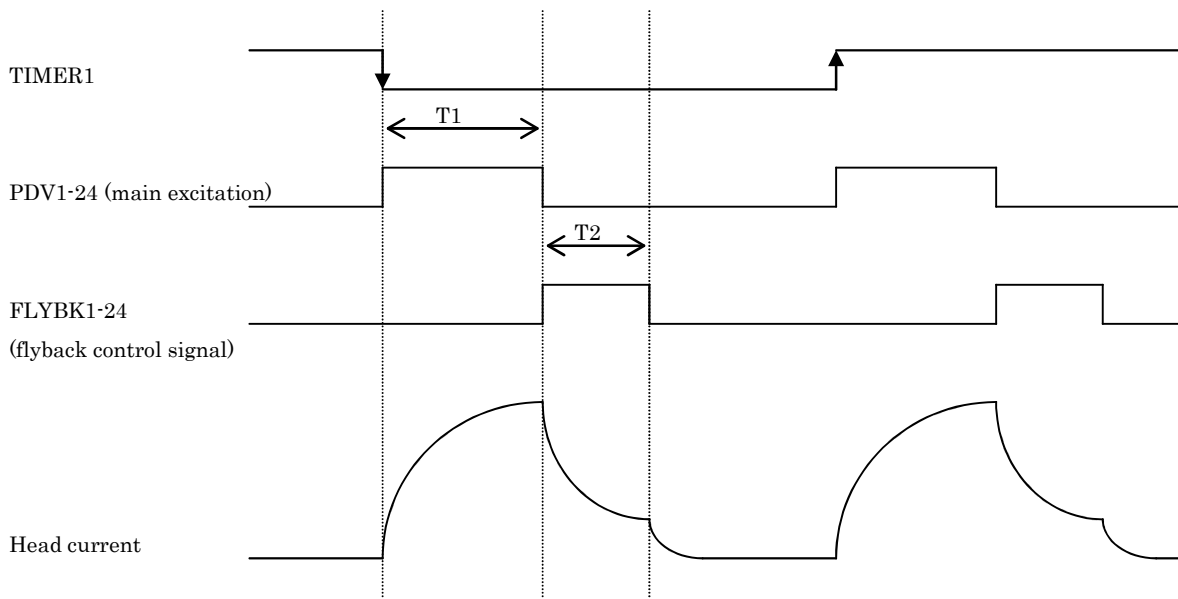


Figure 5.3.21 Print head drive circuit

[Error detection circuit]

- Detection of abnormal excitation

When the print head is excited, the head fire check circuit sends an excitation detection signal to the FPGA. If an unreasonable period elapses after the receipt of the detection signal, the FPGA drives the POWST signal to stop +40 V.

It also notifies the MPU of the occurrence of the driver error.

5.3.7 Alarms

5.3.7.1 Fire Check

A fire check alarm occurs if:

Abnormal current flows because of damage to the space, line feed, or tractor motor, or a motor driver.

The space motor has been excited for a long time.

Current flows to the head drive transistor for a period longer than specified.

5.3.7.2 ROM or RAM Error

A ROM or RAM error occurs if an error is detected during the following checks when power is turned on. □

ROM check

Check data is set for each ROM, and an add-up check is performed.

- RAM check

A RAM check is performed while writing 0 and 1 to every RAM address and reading them. EEPROM

(nonvolatile memory) check

Check data is set for each EEPROM, and an add-up check is performed.

5.3.7.3 Spacing Error

A space alarm occurs if a space error is detected during spacing operation.

A predetermined pulse signal is applied to the space motor but the left-end sensor shows no change. (The sensor freezes in detection state or detects nothing.)

Printer column management is abnormal; the left-end sensor is detected at a place other than the left end or vice versa.

5.3.7.4 APTC Gap Alarm

When the optional automatic paper thickness control mechanism is used, a gap alarm occurs if:

Paper is thicker than the specified value.

The APTC motor drive circuit is damaged and the motor does not rotate.

APTC retract operation does not work normally.

Paper thickness cannot be detected.

The mechanism keeps staying at the retract position when paper thickness detection is performed.

5.3.7.5 HCPP Alarm

An HCPP alarm occurs if:

An attempt to change the paper path failed.

The reference position cannot be detected during initial operation (at power-on).

The reference position cannot be detected during initial operation performed for continuous loading.

5.3.7.6 FAN Alarm

A FAN unit error occurs if:

When the FAN breaks down.

5.3.7.7 Jam Alarm

A Jam alarm occurs if:

When load/unload operation, the paper on DV roller doesn't move.

5.3.7.8 Overload Alarm

An Overload alarm occurs if: When the power-supply voltage +40V doesn't return though it is a division by voltage descent print.

5.3.7.9 Overload Alarm

A Low voltage alarm occurs if:

When the power-supply voltage decreases besides the print.

5.3.8. Power Supply

The power supply circuit consists of the components shown in the block diagram in Figure 5.3.21 AC input filter

Direct rectifying and smoothing circuit (including surge current preventive circuit)

+5V/+34V switching regulator

This section explains the +5V/+34V switching regulator and surge current preventive circuit according to the block diagram in Figure 5.3.21.

5.3.8.1 +5 V Switching Regulator

This circuit consists of a one-stone ringing choke converter (RCC) using a hybrid regulator. Two types of power, +5 and +40 V, are output from one transformer.

The circuit has the following functions:

Self-excitation switching control

When AC power is input, the circuit automatically starts oscillation.

It thus cannot be controlled from the outside.

□ Over current control (automatic drooping characteristics)

If a short circuit occurs at the +5 V circuit load, the output voltage automatically droops to prevent damage to the power supply.

□ Over voltage control

If the 3-terminal switching regulator malfunctions in short mode, over voltage may occur at the +5V output. The detection section on the secondary side of this circuit detects the over voltage to prevent abnormal voltage from being output to the +5 V output.

5.3.8.2 +40V Switching Regulator

This circuit consists of a one-stone forward choke converter using a switching control IC. It has the following functions:

+40V ON/OFF control

The *POWST signal can be used to turn off the +40 V and +5 V circuits.

(When *POWST is low, the +40 V outputs are turned on. When *POWST is high, the +40 V outputs are turned off.)

- Over current control (automatic drooping characteristics)

If a short circuit occurs at the +40 circuit load, the +40 V switching circuit is stopped intermittently to prevent damage to the power supply.

- Over voltage control

If the voltage detection circuit malfunctions and over voltage occurs at the +40 V output, the over voltage detection circuit detects the over voltage and stops the +40 V switching circuit under +40 V OFF control.

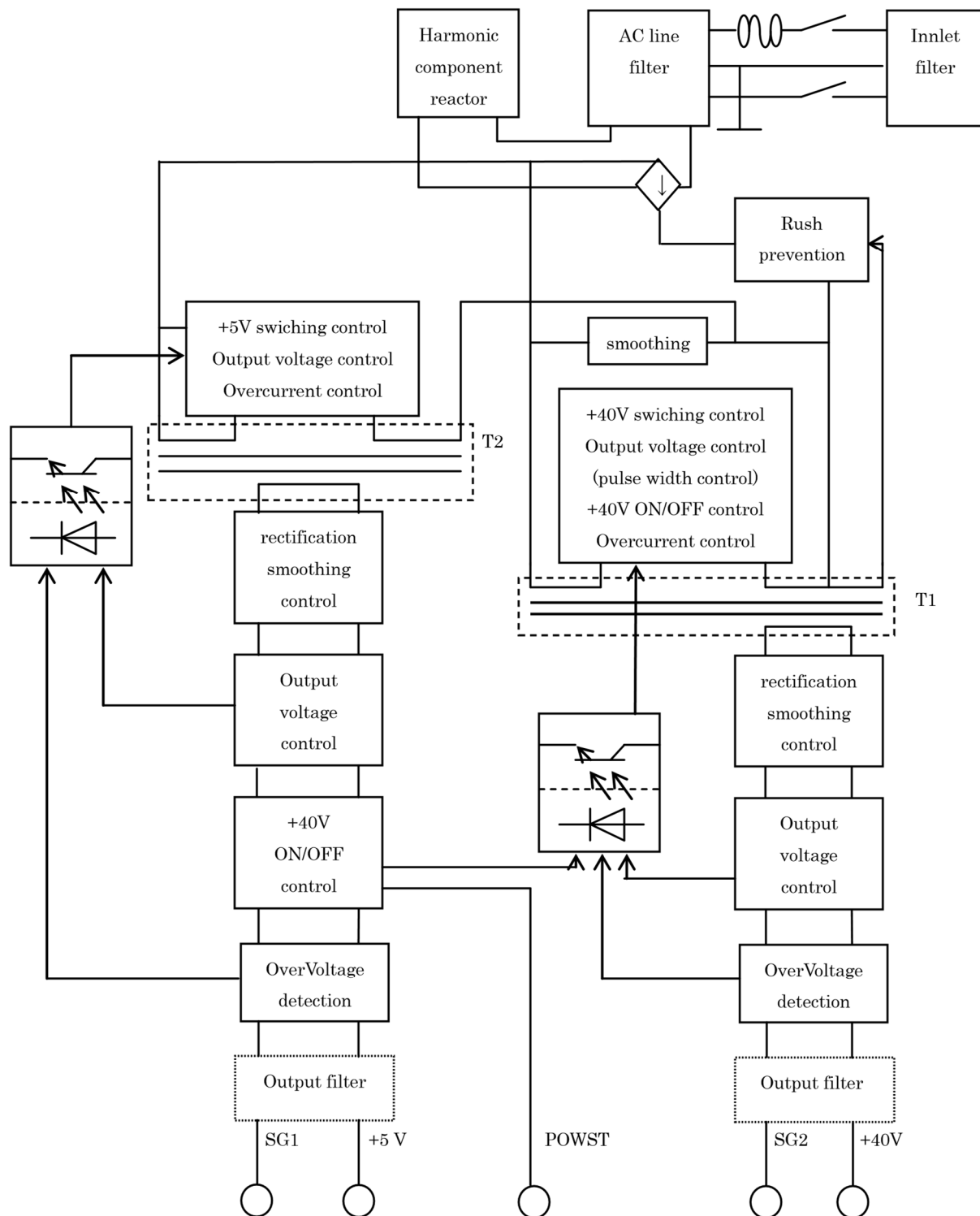


Figure 5.3.22 Power supply circuit block diagram

5.3.9. Surge Current Controller

Surge current caused at power-on is controlled by the power thermistor (NTC thermistor) on the power supply board. This section explains the surge current controller.

At power-on

The power thermistor is directly connected to the power supply input line and normally has several ohms of resistance when power is turned on.

This resistance suppresses surge current at power-on.

During printer operation

Because the power thermistor heats by itself by input current during printer operation, resistance is lowered down to about one-tenth of its initial value to reduce loss.

When power is turned on again

If the power is turned on again immediately after it is turned off, the power thermistor is still warm and may have less suppression effects, and surge current exceeding the specified level may flow.

5.3.10. Fuse

Basically, PCB should be replaced. But just in case of replacing fuse, choose the following fuse.

1.FU1

1-1.Ampere Rating: 1A

1-2.Voltage : 125V

1-3.Model name : 0451001.MRL-LITTELFUSE

1- 4.Fusing feature : Super fast-blow type

2.FU3,FU4

2- 1.Ampere Rating : 5A

2-2.Voltage : 125V

2-3.Model name : 0451005.MRL-LITTELFUSE

2- 4.Fusing feature : Super fast-blow type

3.FU2

3- 1.Ampere Rating : 5A

3-2.Voltage : 125V

3- 3.Fusing feature : Super fast-blow type

4.FU5,FU6,FU7,FU8

4- 1.Ampere Rating : 3.5A

4- 2.Voltage : 125V

4-3. Fusing feature : Super fast-blow type

5.FU10,FU12,FU13

5- 1.Ampere Rating : 2A

5- 2.Voltage : 125V

5-3. Fusing feature : Super fast-blow type