ENVELOPE FEEDER EF-9

SERVICE MANUAL

REVISION 0

Canon

JAN. 1999 **RY8-1391-000**

CANON ENVELOPE FEEDER EF-9 REV. 0 JAN. 1999 PRINTED IN JAPAN (IMPRIME AU JAPON)

Printed in Japan
Imprimé au Japon

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PREFACE

This Service Manual contains basic information required for after-sales service of Envelope feeder EF-9 (hereinafter referred to as the envelope feeder). This information is vital to the service technician in maintaining the high performance of the envelope feeder.

This manual consists of the following chapters:

Chapter 1: Product information
Specifications, parts of the deck, and installation

Chapter 2: Operation and Timing
A description of the operating principles and timing sequences of the electrical and mechanical systems.

Chapter 3: The Mechanical System
Explanation of mechanical operation, disassembly, reassembly, and adjustment procedures

Chapter 4: Troubleshooting
Maintenance and servicing, reference values and adjustments, troubleshooting procedures, lubricants, and solvents

Appendix: General circuit diagram, etc.

Information in this manual is subject to change as the product is improved or redesigned.
All relevant information in such cases will be supplied in Service Information Bulletins.
A thorough understanding of this paper deck, based on information in this Manual and Service Information Bulletins is required for maintaining its performance and for locating and repairing malfunctions.

DTP system

This manual was produced on an Apple PowerMacintosh 9500/233 personal computer and output by an Apple LaserWriter 16/600 PS laser beam printer; final pages were printed on DAINIPPON SCREEN MFG CO. LTD DT-R3100.

All graphics were produced with Macromedia FreeHand (J), and all documents and page layouts were created with QuarkXPress (E).

The video images were captured with SONY degital video camcorder and Radius PhotoDV capture board system, and modified with Adobe Photoshop™ (J).

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CHAPTER 1 PRODUCT INFORMATION

CHAPTER 2 OPERATION AND TIMING

CHAPTER 3 THE MECHANICAL SYSTEM

CHAPTER 4 TROUBLESHOOTING

APPENDIX

CHAPTER 1

PRODUCT INFORMATION

I. FEATURES

1. Common option
This envelope feeder can be installed in the LBP-2460 printer and LBP-3260 printer.

2. Continuous printing
The maximum of 100 envelopes can be set on the envelope feeder for large-volume continuous printing.

II. SPECIFICATIONS

1)	Type	Single-motion insertion type
2)	Pick-up speed	About 16 pages/min.
3)	Envelope size	From 98.4mm (width) x 190.5mm (length) (minimum) to 176mm (width) x 250mm (length) (maximum) sized envelopes.
4)	Envelope type	Commercial #10, C5, DL, MONARCH and B5-ISO.
5)	Capacity	73mm stack or 100 envelopes whichever the least.
6)	Dimensions	368mm (W) x 320mm (D) x 140mm (H)
7)	Weight	About 3kg
8)	Power supply	DC24V (supplied from the printer)

Specifications are subject to change with product improvement.

III. PARTS OF THE ENVELOPE FEEDER

A. External View

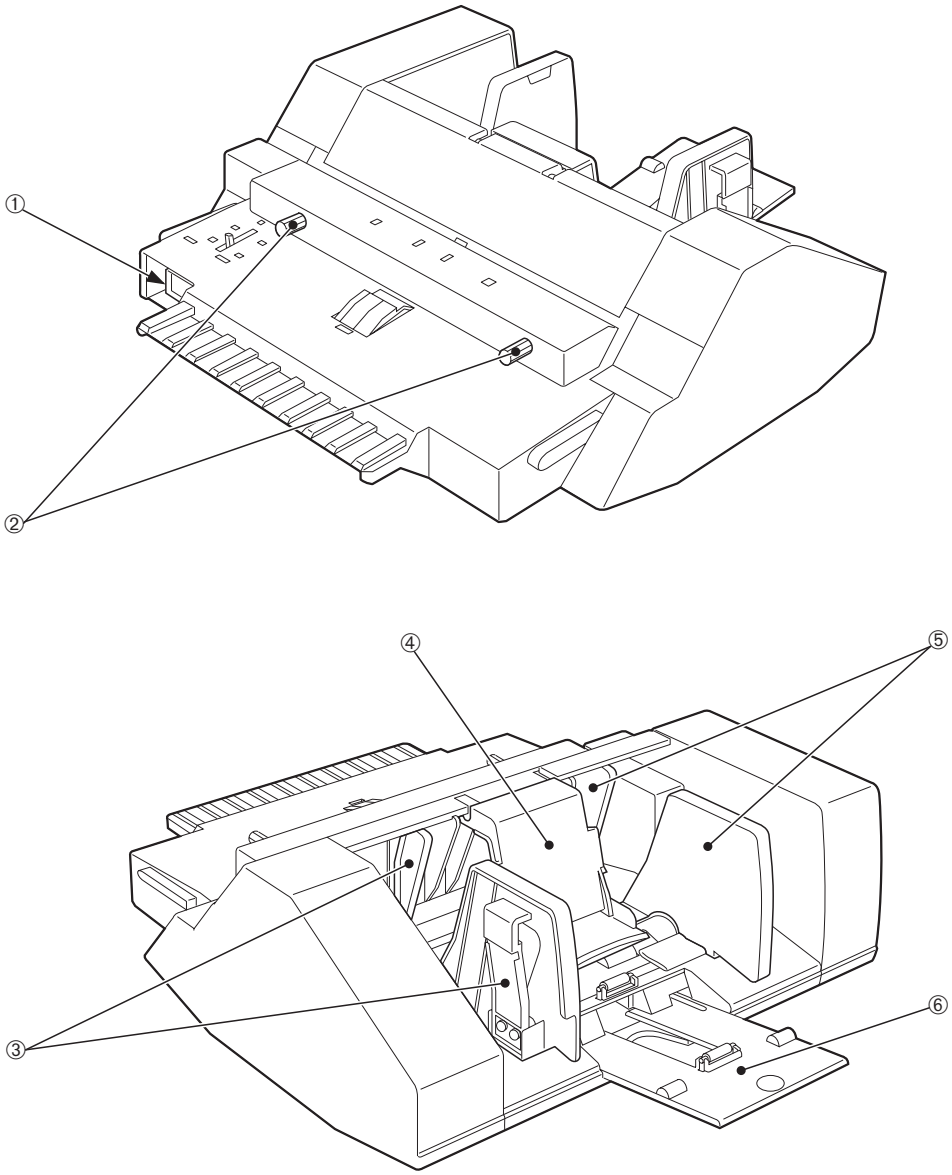


Figure 1-3-1

1: Connector
2: Positioning pins
3: Front guides
4: Weight
5: Rear guides
6: Expansion tray

B. Cross Sectional View

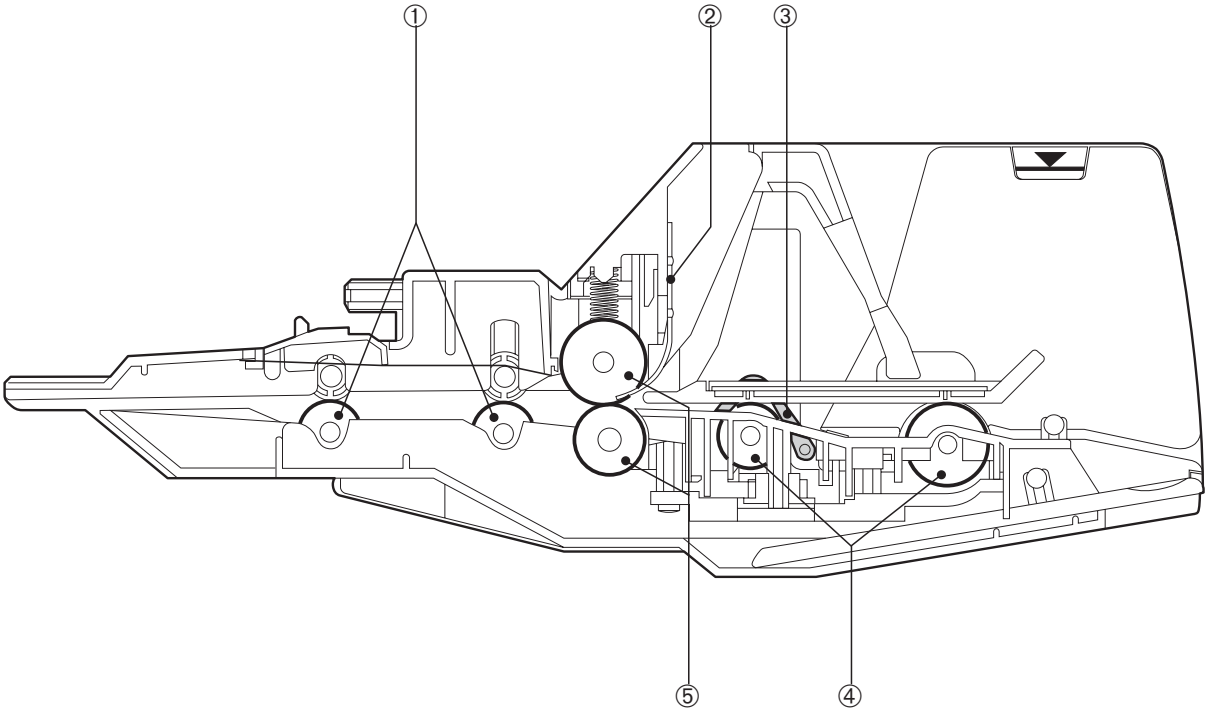


Figure 1-3-2

1: Feed rollers
2: Separation guide
3: Envelope feeder paper sensor lever
4: Pick-up rollers
5: Separation rollers

IV. INSTALLATION

Condensation will form on surfaces when brought into a warm room from the cold. Condensation on the surfaces of the envelope feeder can cause feeding failures. Therefore, when moving the envelope feeder to a warm environment, leave it packed in its box for at least an hour to acclimatize to room temperature.
Follows the procedures below to install the envelope feeder in the printer.

1) Open the envelope feeder packaging.
2) Take off the plastic bag and peel the tape off. Check that none of the covers have been scratched or deformed during shipment.
3) Remove the packing materials from the envelope feeder.
4) Open the multi-purpose tray and remove the envelope feeder slot cover.
5) Holding the envelope feeder in both hands, install it into the printer.

Note: Be sure to turn OFF the printer before installing the envelope feeder.

CHAPTER 2

OPERATION AND TIMING

1. This chapter describes the envelope feeder functions, the relationships between mechanisms and circuits, and the timing of operations. Mechanical linkages are indicated by black and white lines (▬▬), the flow of control signals by solid arrows (⟶), and the flow of groups of signals by outline arrows (⟹).
2. An active-high signal is indicated by "H" or by a signal name without a slash in front of it, such as "PSNS." An active-low signal is indicated by "L" or by a signal name with a slash in front of, such as "/SCNON."

   A signal that is "H" or has a name without a slash is active at the supply voltage level (indicating that the signal is being output), and inactive at ground level (indicating that the signal is not being output).

   A signal that is "L" or has a slash in front of its name is active at ground level, and inactive at the supply voltage level.

   There is a microcomputer in this printer. But as the internal operation of the microcomputer cannot be checked, an explanation of the operation of the microcomputer has been left out.

   As it is assumed that no repair will be made to customer circuit boards, the explanation of board circuits is limited to an outline using block diagrams. So there are two types of circuit explanations; (1) everything from the sensor to the input sections of the major circuit boards, (2) everything from the output sections of the major circuit boards to the loads. These are explained with block diagrams according to the function.

I. BASIC OPERATION

A. Outline

The envelope feeder feeds envelopes into the printer.

The envelope feeder is controlled by the pick-up commands (1st Start and 2nd Start) sent from the DC controller in the printer.

Operation sequences of the envelope feeder are controlled by the envelope feeder driver PCB. A 4 bit microcomputer (CPU, IC932) and a gate array (G.A., IC931) are installed on the PCB. The CPU serially communicates with the DC controller in the printer via the gate array.

The CPU drives the pick-up motor in response to the pick-up commands (1st Start and 2nd Start) sent from the DC controller.

+24VDC is supplied to the envelope feeder from the printer. +5VDC for the ICs and sensors is generated within the envelope feeder driver PCB from this +24VDC.

The flow of the signals between the envelope feeder and the printer is shown below.

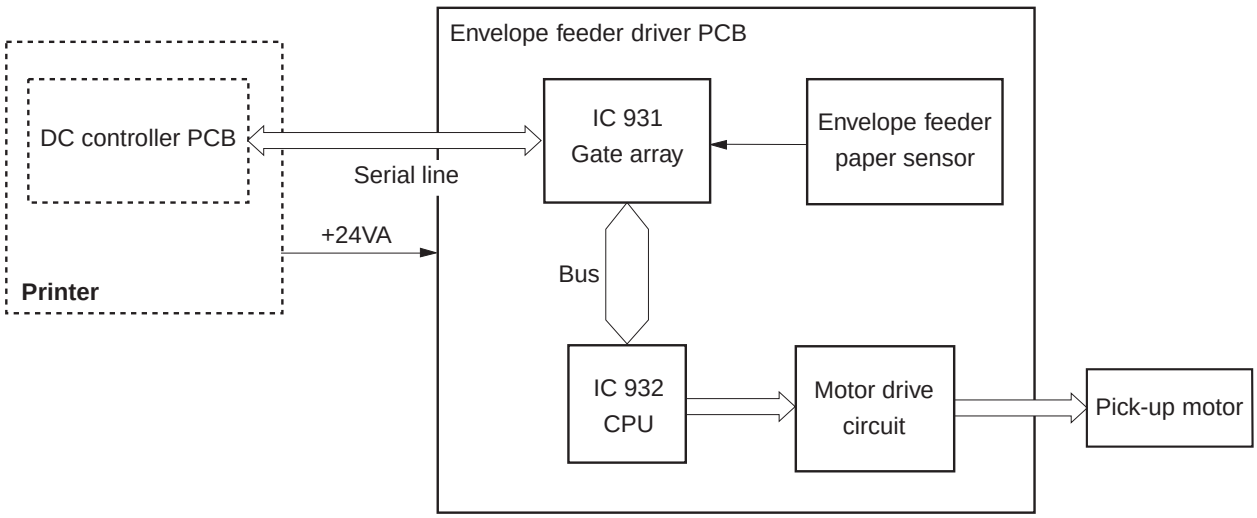


Figure 2-1-1

B. Envelope Feeder Input/Output Signals

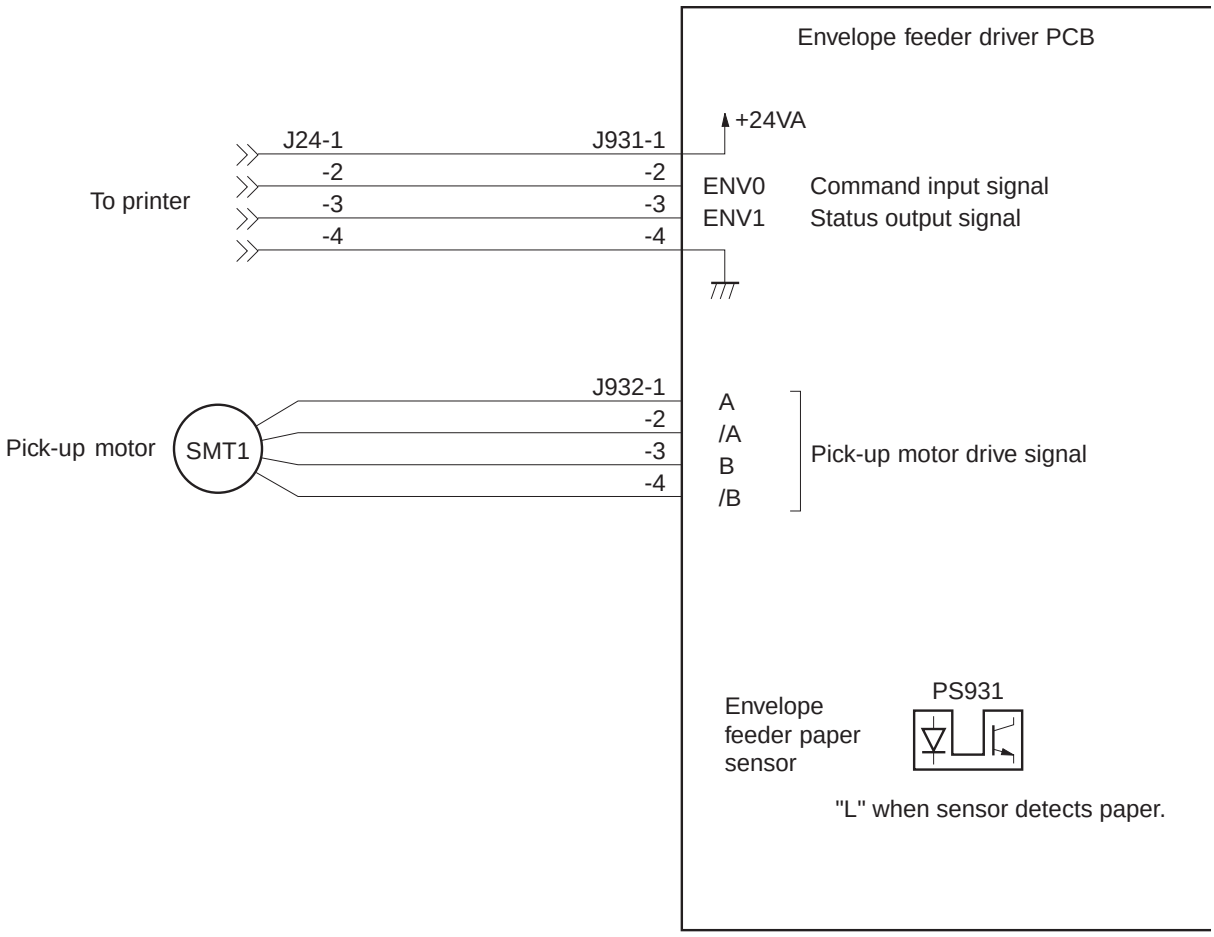


Figure 2-1-2

II. PICK-UP/FEED SYSTEM

A. Pick-up/Feed System

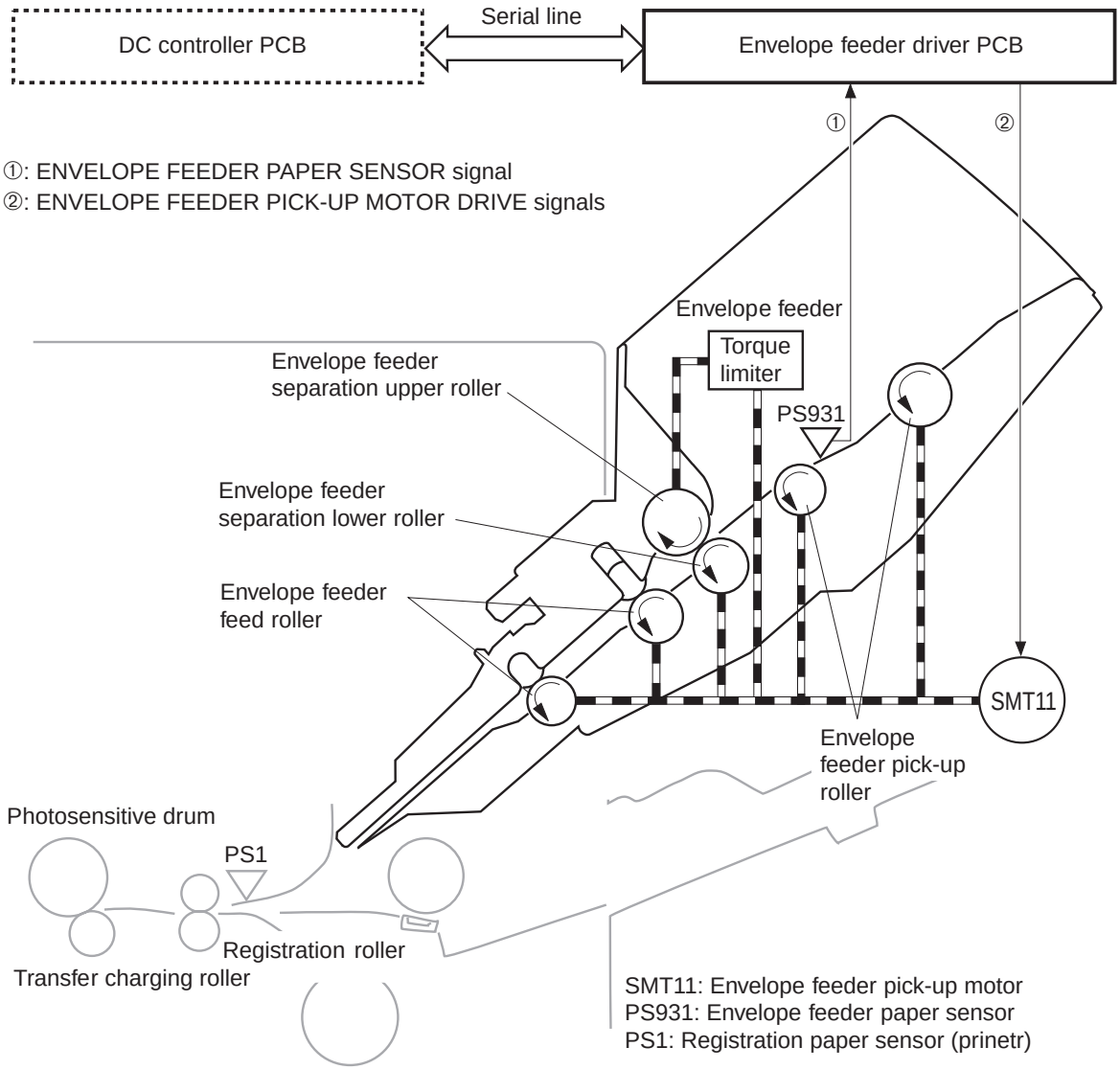


Figure 2-2-1

The envelope feeder pick-up motor (SMT11) is a stepping motor that is rotated clockwise and counterclockwise by the envelope feeder driver PCB.

When the motor rotates clockwise, all rollers in the envelope feeder are rotated. When it rotates counterclockwise, only the upper separation roller and feed rollers are rotated.

The envelope feeder driver PCB rotates the pick-up motor clockwise for about 1.0 second when it receives the 1st Start command from the DC controller. After 0.1 seconds, the motor is rotated counterclockwise for about 1.9 seconds. This process picks up and feeds the envelope into the printer.

The envelope is stopped when it is 16mm past the registration paper sensor (PS1). Following this, the envelope feeder driver PCB rotates the pick-up motor counterclockwise for about 1 second in response to the 2nd Start command sent from the DC controller to feed the envelope

again.

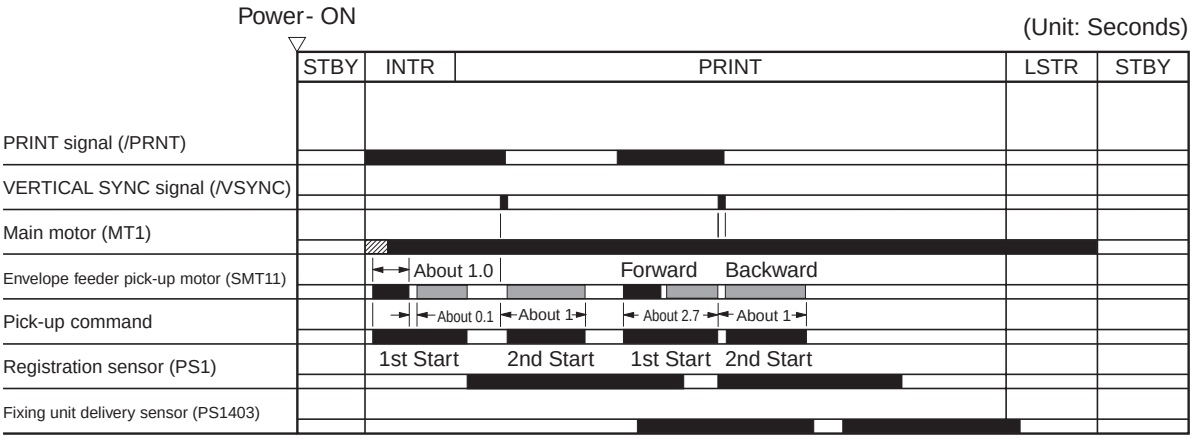


Figure 2-2-2

B. Multi-feed Prevention Mechanism

This envelope feeder utilizes the separation roller method to prevent feeding multiple envelopes.

The upper separation roller is driven by the motor via a torque limiter. The upper separation roller is imparted with rotational force in the direction of the outlined arrow. However, as the upper separation roller, envelope and lower separation roller are in contact with each other, the rotational force of the lower separation roller is transmitted to the upper separation roller via the envelope and the upper separation roller rotates in the direction of the solid arrow (as shown in the middle figure of Figure 2-2-3).

When two or more envelopes are fed simultaneously, low friction between the envelopes results in weak rotational force being transmitted to the upper separation roller. The upper separation roller, therefore, rotates with its own rotational force, which is in the opposite direction to the pick-up direction (shown by the outlined arrows in Figure 2-2-3).

Any extra envelopes are returned to the feeder while only one is sent into the printer.

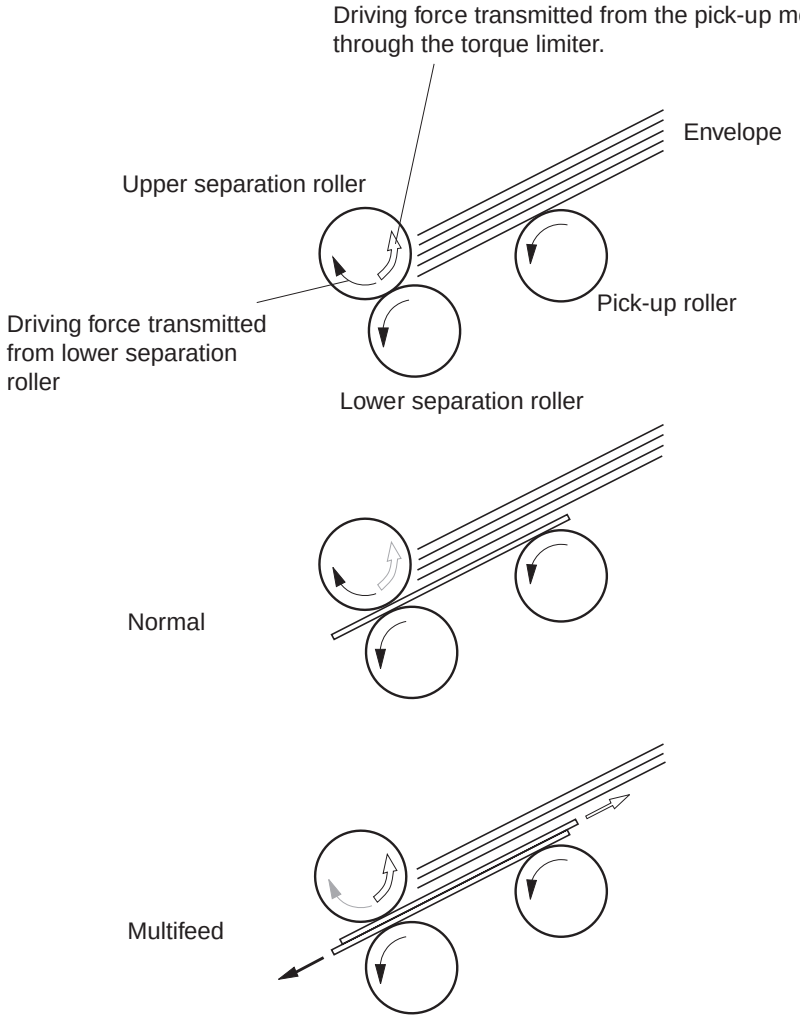


Figure 2-2-3

C. Paper Jam Detection

The paper jam detection at the time of paper pick-up/feed from the envelope feeder is performed by the printer. Refer to the Service Manual for the printer for details.

CHAPTER 3

THE MECHANICAL SYSTEM

I. PREFACE

This chapter describes disassembly and reassembly procedures of the envelope feeder.

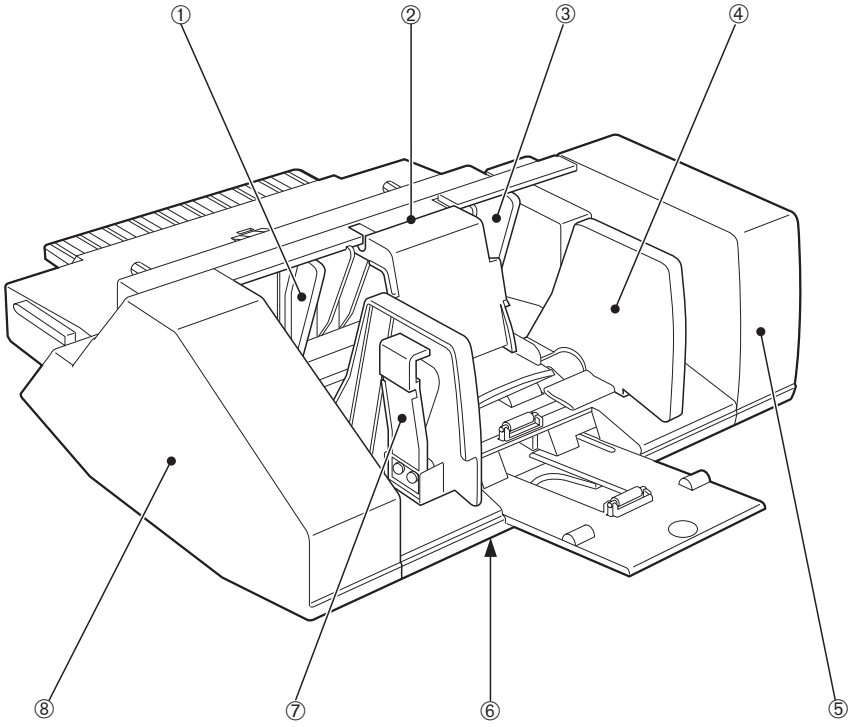
The service technician is to find the cause of malfunction according to Chapter 4 Troubleshooting and to replace the defective parts following the procedures described in this chapter.

Note the following precautions during disassembly or reassembly.

1. **CAUTION:** Disconnect the power cord of the printer from the electrical outlet and remove the envelope feeder from the printer before servicing the envelope feeder.
2. Assembly is the reverse of disassembly unless otherwise specified.
3. Note the lengths, diameters, and locations of screws as you remove them. When reassembling the envelope feeder, be sure to use them in their original locations.
4. Do not operate the envelope feeder with any parts removed.
5. Discharge electrical static from your body by touching the metal frame of the printer prior to handling the PCB in order to avoid causing damage by the difference in static charge at that time.

II. EXTERNALS

A. Locations



① Left front guide
② Upper cover unit
③ Left rear guide
④ Right rear guide
⑤ Rear cover
⑥ Lower cover
⑦ Right front guide
⑧ Front cover

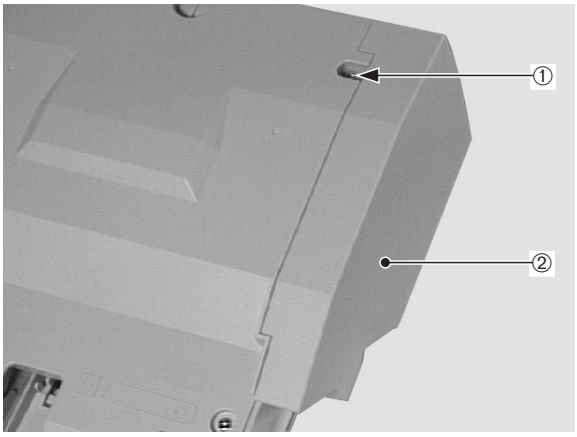
Figure 3-2-1

Follow the procedures below to remove the cover(s) as required when cleaning, inspecting, or repairing inside the printer.

The procedures for the covers, which can be removed simply by removing screws without removing other parts, are omitted.

1. Rear Cover

1) Remove the screw and take off the rear cover.



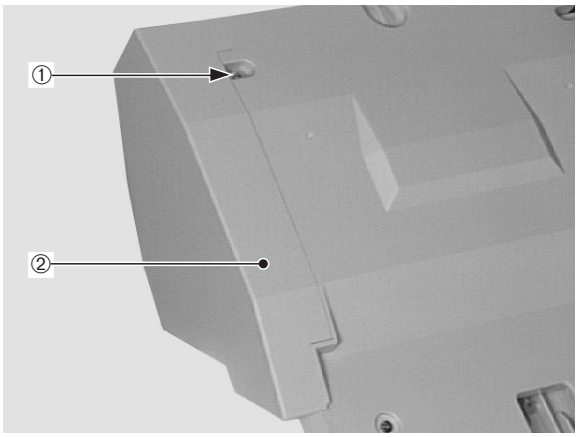
① Screw ② Rear cover

Figure 3-2-2

Note: Before performing an operation check on the envelope feeder with the rear cover removed, be sure to either hold the bottom of the PCB with your hand or tape it to the frame.

2. Front Cover

1) Remove the screw and take off the front cover.

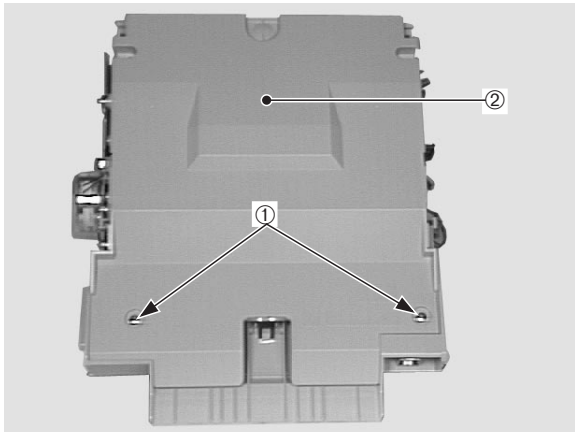


① Screw ② Front cover

Figure 3-2-3

3. Lower Cover

1) Remove the rear and front covers.
2) Remove the 2 screws and take off the lower cover.

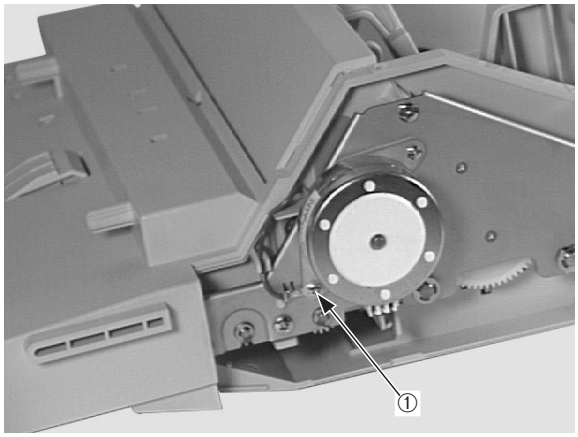


① Screws ② Lower cover

Figure 3-2-4

4. Upper Cover

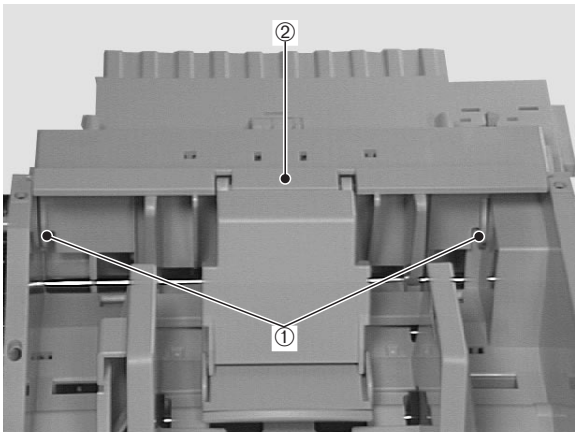
1) Remove the rear and front covers.
2) Remove the screw.



① Screw

Figure 3-2-5

3) With a flat nosed screwdriver, unfasten the snaps on both sides. Remove the upper cover and spring.

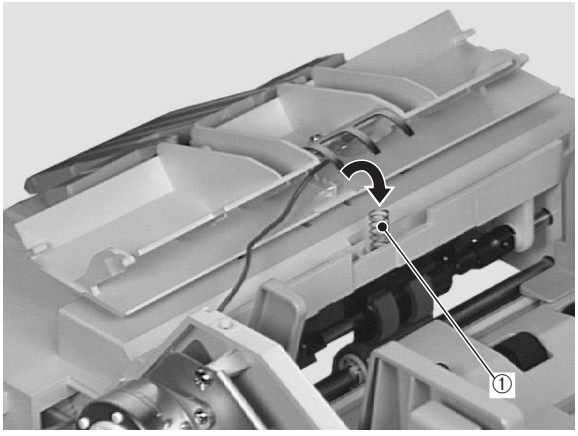


① Snaps ② Upper cover

Figure 3-2-6

Notes: **1.** Ensure that the separation guide and upper cover are removed as one unit. However, in the event that the separation guide has already been removed, be sure to follow the position adjustment directions (refer to Page 4-8) when re-installing.

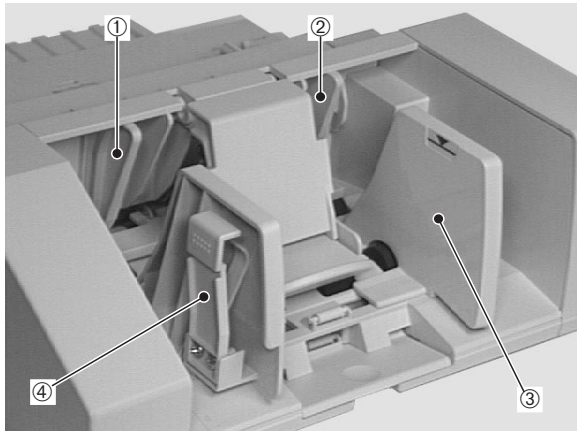
2. Check that the separation roller pressure spring is correctly installed when reassembling.



① Separation roller pressure spring

Figure 3-2-7

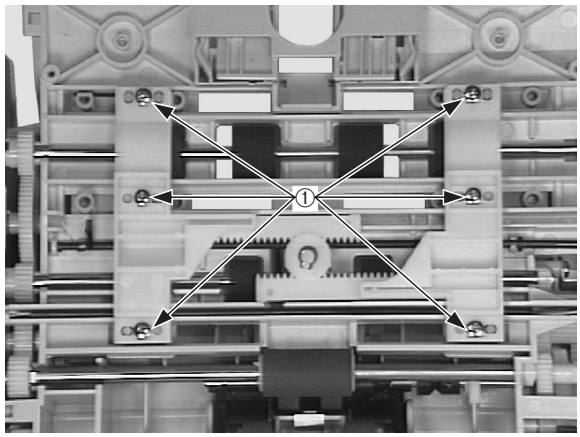
5. Removal of the Envelope Side Guides



① Left front guide ② Left rear guide
③ Right rear guide ④ Right front guide

Figure 3-2-8

1) Remove the rear, front, lower and upper covers.
2) Remove the 6 screws and take out the guides from underneath.



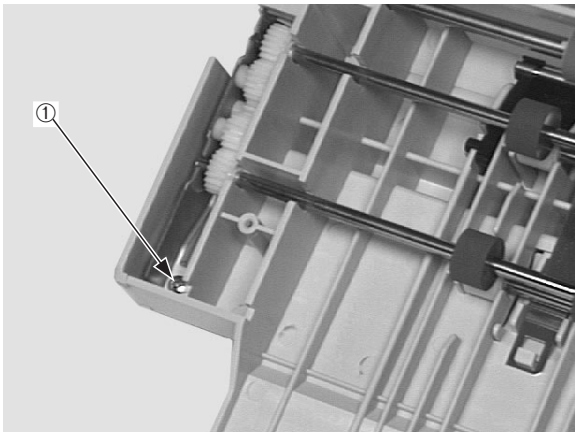
① Screws

Figure 3-2-9

III. MAIN UNITS

A. Drive Unit

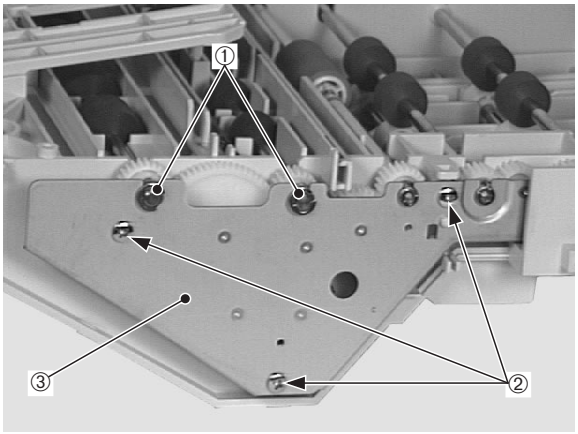
1) Remove the pick-up motor following steps 1 to 5 on Page 3-8.
2) Remove the screw.



① Screw

Figure 3-3-1

3) Remove the drive unit by taking off the 2 E-rings and 3 screws.



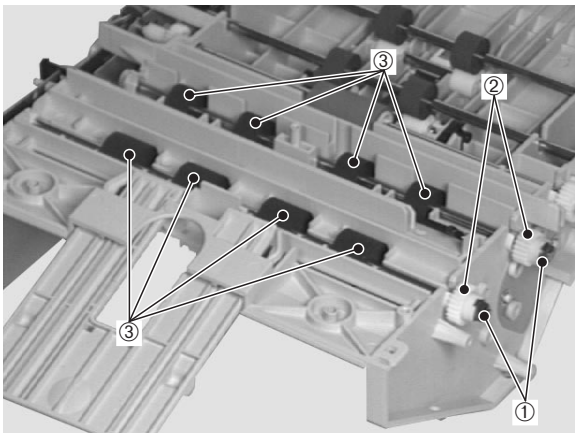
① E-rings ② Screws
③ Drive unit

Figure 3-3-2

IV. MAIN PARTS

A. Pick-up Roller

1) Remove the pick-up motor following steps 1 to 5 on Page 3-8.
2) Remove the drive unit.
3) Remove the 2 bushings and 2 gears, and then take out the pick-up roller shaft.



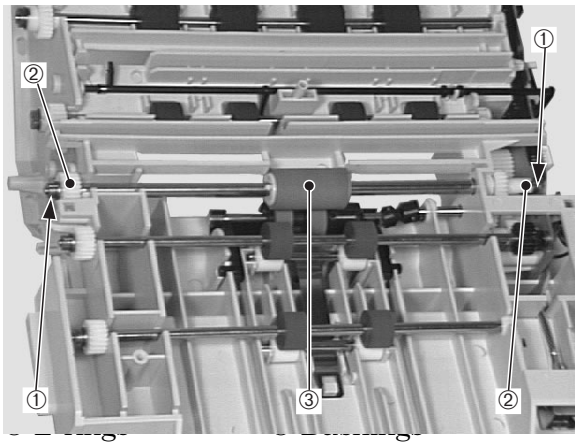
① Bushings ② Gears
③ Pick-up roller

Figure 3-4-1

4) Remove the 2 E-rings and 2 bushings, and then take out the pick-up roller shaft.

B. Lower Separation Roller, Upper Separation Roller and Torque Limiter

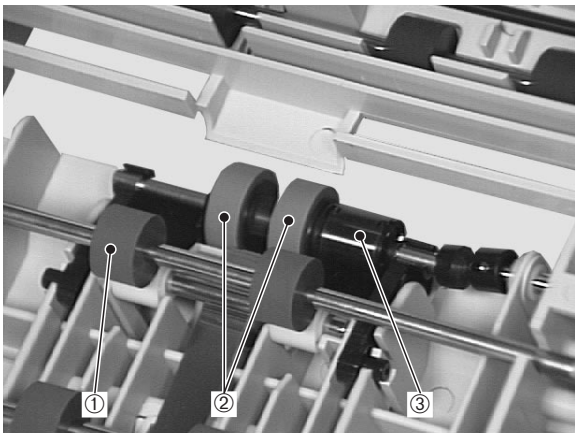
1) Remove the pick-up motor following steps 1 to 5 on Page 3-8.
2) Remove the drive unit.
3) Remove the 2 E-rings and 2 bushings, then take out the separation lower roller shaft. Remove the lower separation roller from the shaft.



③ Lower separation roller

Figure 3-4-2

4) Remove the separation roller shaft from the guide. Then take out the upper separation roller and torque limiter off the shaft.

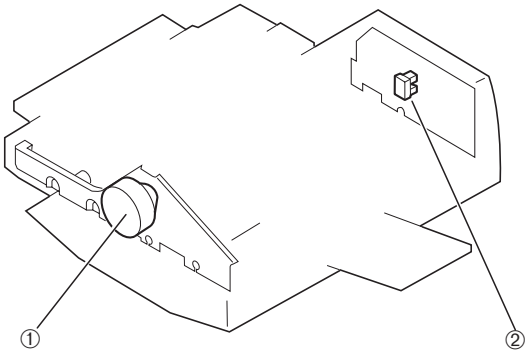


① Guide
② Upper separation roller
③ Torque limiter

Figure 3-4-3

V. MOTOR/SENSOR

A. Locations

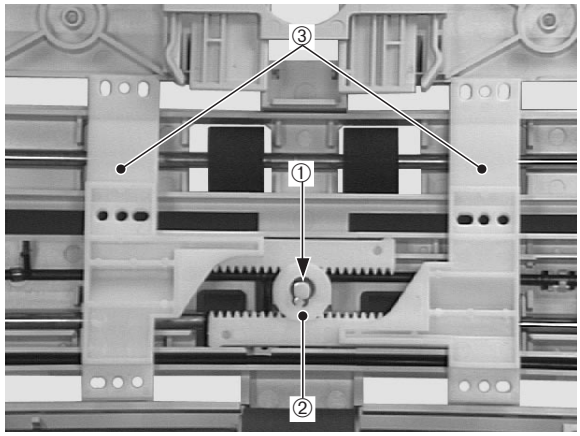


① Pick-up motor
② Envelope feeder paper sensor

Figure 3-5-1

B. Pick-up Motor

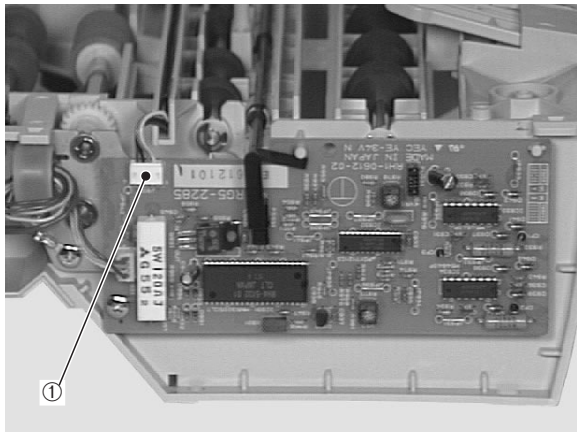
1) Remove the rear, front, lower and upper covers.
2) Remove the envelope side guides following steps 1 and 2 on Page 3-4.
3) Remove the C-ring, the gear, and then the rack.



① C-ring ② Gear
③ Rack

Figure 3-5-2

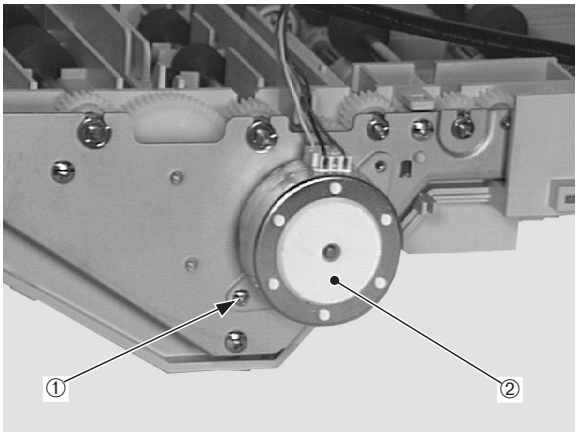
4) Disconnect the connector.



① Connector

Figure 3-5-3

5) Remove the screw and take out the pick-up motor.



① Screw ② Pick-up motor

Figure 3-5-4

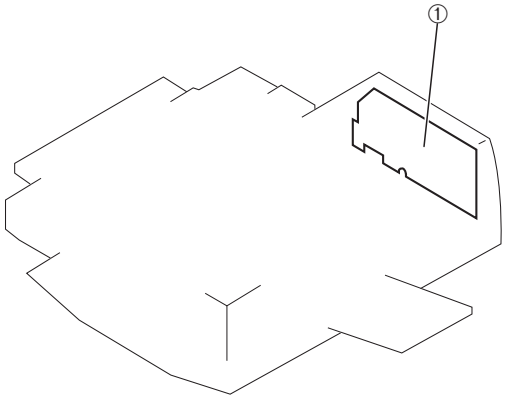
Note: After fastening the guides to the rack, attach the gear by spreading the guides apart.

C. Envelope Feeder Paper Sensor

1) Remove the envelope feeder driver PCB following steps 1 to 4 on Page 3-10.

VI. PCB

A. Location

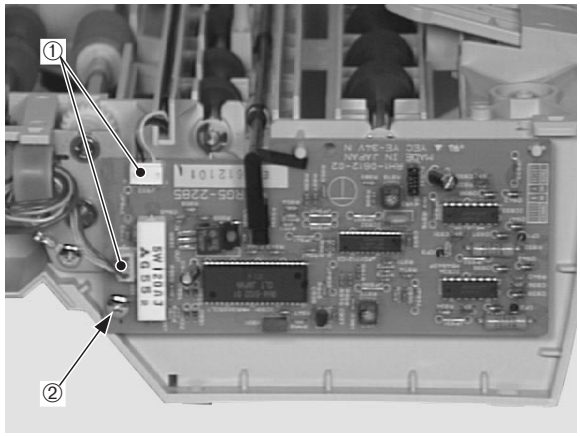


① Envelope feeder driver PCB

Figure 3-6-1

B. Envelope Feeder Driver PCB

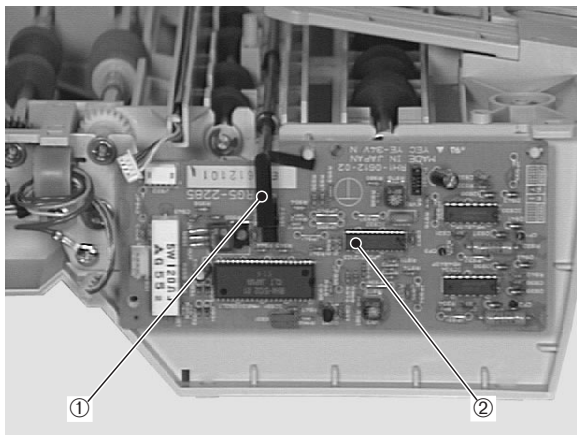
1) Remove the rear, front, lower and upper covers.
2) Remove the envelope guides.
3) Remove the 2 connectors and the screw.



① Connectors ② Screw

Figure 3-6-2

4) After removing the sensor lever, take out the envelope feeder driver PCB.



① Sensor lever
② Envelope feeder driver PCB

Figure 3-6-3

CHAPTER 4

TROUBLESHOOTING

I. PREFACE

A. Malfunction Diagnostic Flowchart

The malfunctions that occur in this envelope feeder are broadly classified in to 4 factors: "Paper jams", "paper transport troubleshooting", "malfunction troubleshooting" and " malfunction status troubleshooting."

If malfunction occurred in the envelope feeder, the service technician is to find the factor of the malfunction according to the flowchart and to redress the problem following the action procedures described in this chapter.

Make sure the following points at the execution of troubleshooting.

Be sure that the connector has no poor contact when measuring the voltage at the specified terminal of the connector.

Before handling PCBs, be sure to touch metal part of the printer to discharge static electricity, as it can cause damage to the PCBs.

In some cases, the cause of malfunction cannot be distinguished between the printer and the video controller. Therefore, in this chapter, it is assumed that the video controller installed in the printer is normal.

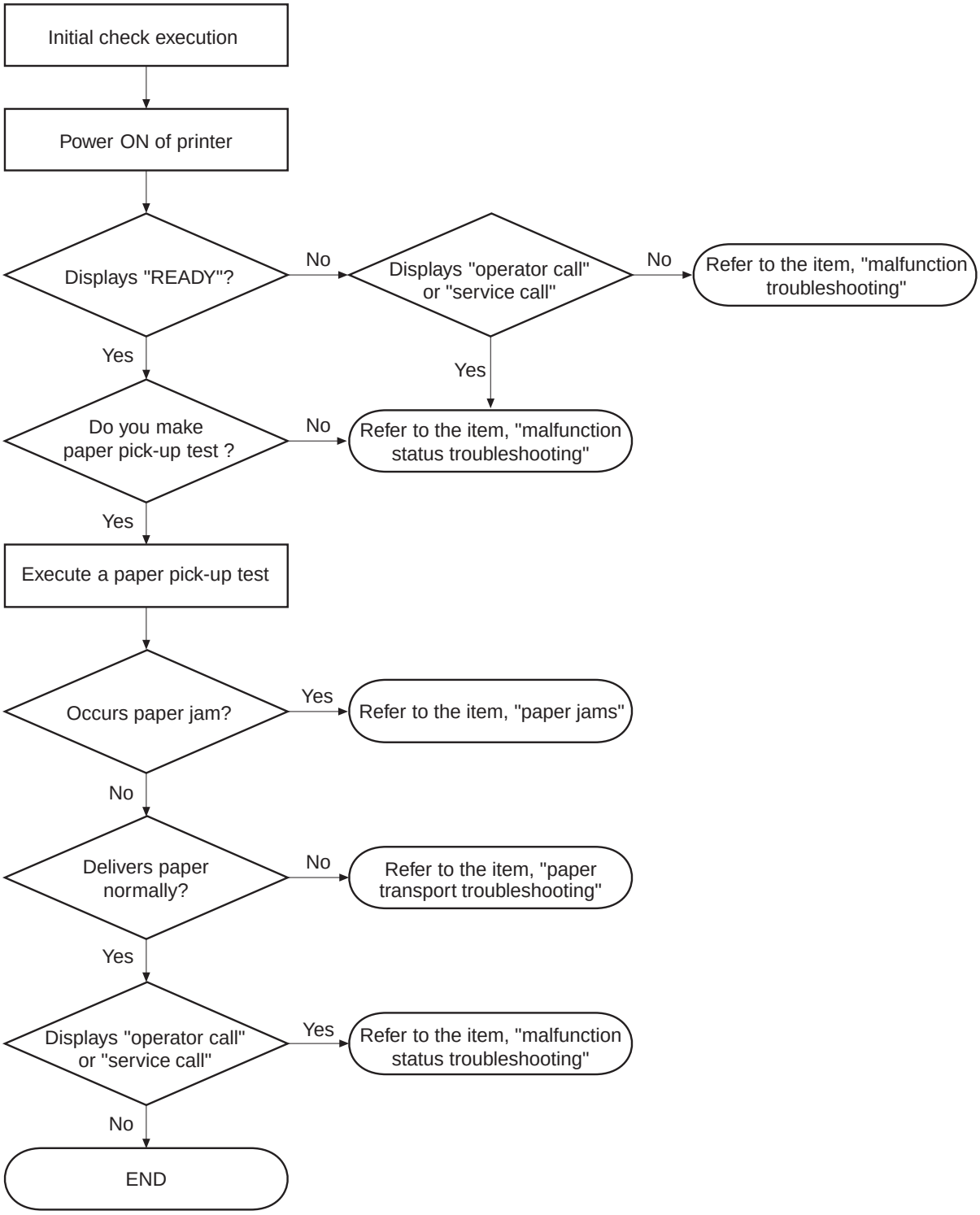

Initial check execution
Power ON of printer
Displays "READY"?
No
Displays "operator call" or "service call"
No
Refer to the item, "malfunction troubleshooting"
Yes
Yes
Do you make paper pick-up test ?
No
Refer to the item, "malfunction status troubleshooting"
Yes
Execute a paper pick-up test
Occurs paper jam?
Yes
Refer to the item, "paper jams"
No
Delivers paper normally?
No
Refer to the item, "paper transport troubleshooting"
Yes
Displays "operator call" or "service call"
Yes
Refer to the item, "malfunction status troubleshooting"
No
END

Figure 4-1-1

B. Initial Checks

1. Installation environment

Refer to the printer's installation environment.

2. Envelope checks

a. The recommended envelopes for the envelope feeder are used.
b. The envelopes are not damp.

3. Condensation

During winter, particularly when moving the envelope feeder into a warm room from a cold location such as a warehouse, various problems can occur due to condensation in the envelope feeder.

If condensation appears, either wipe the parts with dry cloth, or leave the envelope feeder ON for 10 to 20 minutes.

II. PAPER JAMS

If a paper jam occurred in the envelope feeder, perform the following actions.

<Possible causes>

1. The envelope guides are applying too much pressure to the envelopes.
   Action: Advise the user not to press the envelope guides to the envelopes too strongly.

2. Worn or deformed envelope feeder rollers
   Action: Replace any worn or deformed rollers.

3. Damaged gears
   Action: Check the gears and replace any damaged gears.

4. Defective pick-up motor
   Action: Using the printer driver tester, rotate the envelope feeder pick-up motor. Replace the motor if it does not rotate.

5. Defective envelope feeder driver PCB
   Action: Replace the envelope feeder driver PCB.

III. PAPER TRANSPORT TROUBLESHOOTING

III-1 Multi-feed

<Possible causes>

1. Worn or deformed separation roller
   Action: Replace the separation roller.

2. Worn or deformed separation guide
   Action: Replace the separation guide.

3. Improper position of the separation guide.
   Action: Adjust the space between the separation guide and lower separation roller correctly.

4. Spring pulling the separation roller is defective.
   Action: If the spring is out of place, set it in the proper position. Replace it if deformed.

5. Defective torque limiter of the separation roller.
   Action: Replace the torque limiter.

III-2 Wrinkles

<Possible causes>

1. Worn or deformed rollers
   Action: Check the rollers in the pick-up and feed areas. Replace any worn or deformed rollers.

III-3 Bent leading edge

<Possible causes>

1. Scarred or deformed feed guide.
   Action: Check the paper path and replace the feed guide if scarred or deformed.

3-4 Skew

<Possible causes>

1. Paper dust and dirt are accumulated on the paper path.
   Action: Clean the dirty areas.

2) Scarred or deformed rollers
   Action: Replace any scarred or deformed rollers in the pick-up and feed areas.

IV. MALFUNCTION TROUBLESHOOTING

IV-1 No power supply

<Possible causes>

1. The envelope feeder is not installed in the printer properly.
   Action: Re-install the envelope feeder into the printer properly.

2. Poor contact in the +24V supply line connector
   Action: Reconnect the connector J931 on the envelope feeder driver PCB correctly.

3. Defective envelope feeder driver PCB
   Action: Replace the envelope feeder driver PCB.

IV-2 Pick-up motor failure

<Possible causes>

1. Poor contact in the pick-up motor drive signal line connector
   Action: Reconnect the connector J932 on the envelope feeder driver PCB correctly.

2. Defective pick-up motor
   Action: Replace the pick-up motor.

3. Defective envelope feeder driver PCB.
   Action: Replace the envelope feeder driver PCB.

V. MALFUNCTION STATUS TROUBLESHOOTING

V-1 "No paper" status appears when envelopes are set on the envelope feeder.

<Possible causes>

1. Broken paper sensor lever
   Action: Replace the lever.

2. Defective paper sensor
   Action: Replace the paper sensor.

3. Defective envelope feeder driver PCB.
   Action: Replace the envelope feeder driver PCB.

VI. MEASUREMENT AND ADJUSTMENT

A. Mechanical Adjustment

1. Installing the separation guide of the envelope feeder (Adjusting the gap between the separation guide and the lower separation roller)

Under normal conditions, the separation guide and the upper cover are to be removed as one unit. Adjust the gap as follows when you removed the separation guide only for unavoidable reason or if you need to replace it due to deformation, etc..

Install the separation guide 1.5mm from the lower separation roller. Adjust its position by inserting the thickness gauges (1mm and 0.5mm) into the gap between the separation guide and the lower separation roller.

<Cross sectional view of the envelope feeder>

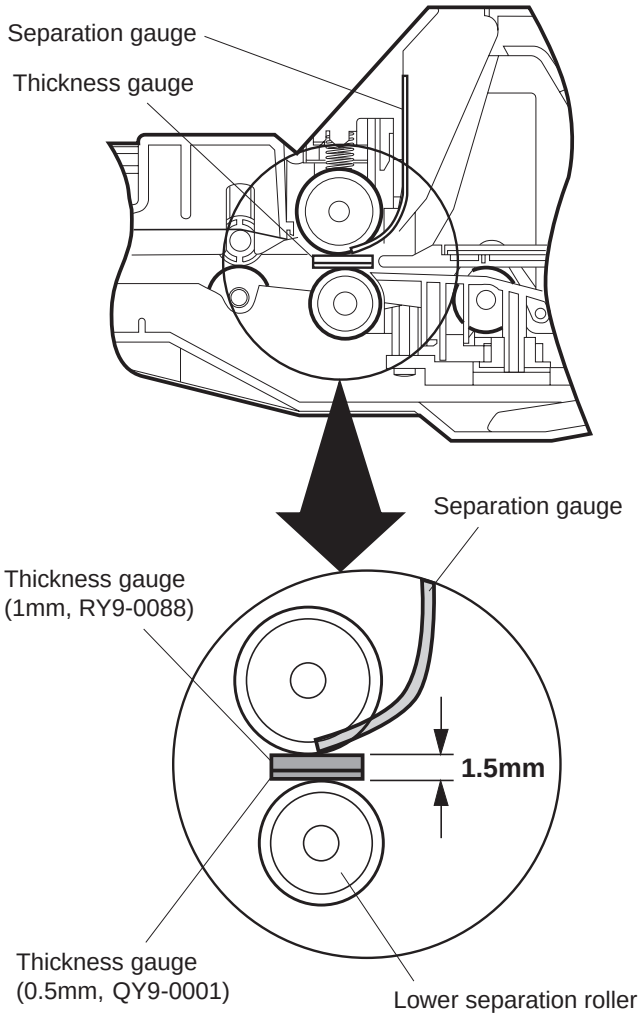


Figure 4-6-1

B. Electrical Adjustment
The envelope feeder does not require electrical adjustment in the field.

C. Variable resistors, LEDs, test pins, jumpers and switches on PCBs
No variable resistors, LEDs, test pins, jumpers or switches are required for after-sales-service of this envelope feeder.

VII. MAINTENANCE AND SERVICING

A. Periodic Replacement Parts

There are no parts which require periodic replacement in this envelope feeder.

Note: Periodic replacement parts are the parts that must be replaced at regular intervals, even if they are functioning properly and show no signs of wear. (Failure of these parts can seriously affect the performance.) These parts should be replaced during a regular service visit closest to the end of the parts expected life.

B. Expected Service Life of Consumable Parts

There are no consumable parts in this envelope feeder.

Note: Consumable parts are the parts that are expected to require replacement one or more times during the warranty period of the envelope feeder due to deterioration or damage. They need to be replaced when the parts are proven faulty.

C. Periodic Service

There are no parts which require periodic service in the envelope feeder.

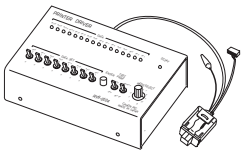
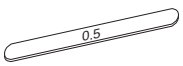
D. Standard Tools

The standard tools required to service the envelope feeder is the same as for the printer.

E. Special Tools

In addition to the standard tools, the following special tools are required for servicing the envelope feeder.

Table 4-7-1

No.	Tool name	Tool No.	Shape	RANK	Application/remarks
1	Printer driver tester	RY9-0104		B	Used for checking printer operations.
2	Thickness gauge	RY9-0088		A	Used for installing the separation guide of the optional envelope feeder.
3	Thickness gauge	QY9-0001		A	

Note: Ranks

A: Tools used for part replacements or adjustment on-site.

B: Tools used on-site and in regions.
This category includes tools useful for failure analysis, and those are difficult to carry around.

C: Tools used in the workshop
This category mainly includes tools for PCB and unit repairs.

F. Solvents and Oil List

Table 4-7-2

No.	Material name	Components	Use	Remarks
1	Alcohol: ethyl (pure or denatured) or isopropyl (pure or denatured)	C_2H_5OH, $(CH_3)_2CHOH$	Cleaning: plastic, rubber, external parts	• Purchase locally • Flammable: keep away from flame
2	Lubricating oil	Petroleum mineral oil	Apply between gear and shaft	• Tool No. CK-8003 (100 ml bottle)
3	Lubricating agent	Special oil Special solid lubricating material Lithium soap	Apply to gears	• Tool No. HY9-0007 (20 g tube)

VIII. LOCATION OF CONNECTORS

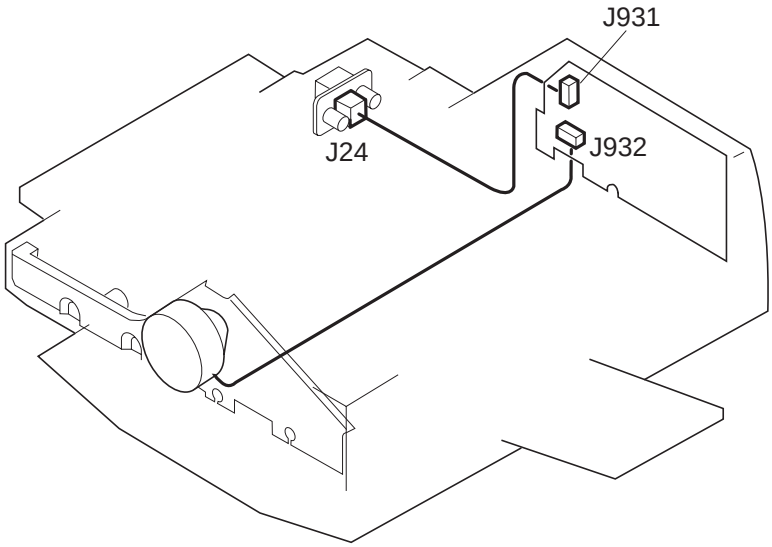
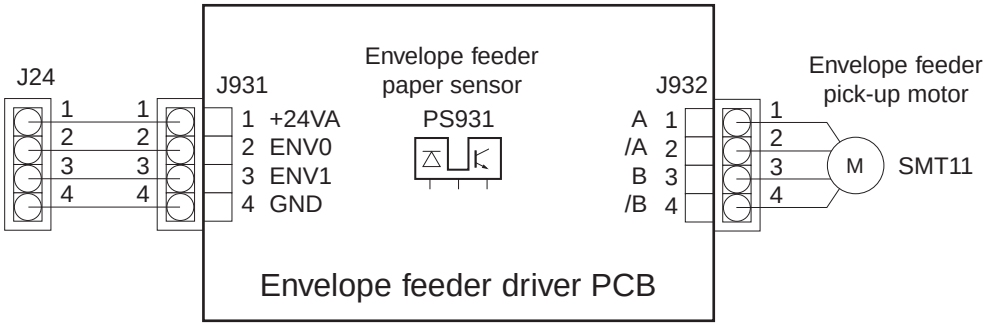


Figure 4-8-1

APPENDIX

I. GENERAL CIRCUIT DIAGRAM/LIST OF SIGNALS

A. Genaral Circuit Diagram



B. Input/output signals to/from Envelope Feeder Driver PCB

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J931	1	+24VA	I		
	2	ENV0	I		Command input signal
	3	ENV1	O		Status output signal
	4	GND			
J932	1	A	O		Pick-up motor drive signal
	2	/A	O		Pick-up motor drive signal
	3	B	O		Pick-up motor drive signal
	4	/B	O		Pick-up motor drive signal

Prepared by
PERIPHERAL PRODUCTS QUALITY PLANNING DIV.
PERIPHERAL PRODUCTS TECHNICAL DOCUMENTATION DEPT.
CANON INC
Printed in Japan

REVISION 0 (JAN. 1999)

5–1, Hakusan 7-chome, Toride-City, Ibaraki-Pref., 302-8501, Japan

The printing paper contains
70% waste paper.

Canon

PRINTED IN JAPAN (IMPRIME AU JAPON) 0199AT0.70 CANON INC.