

DR-6080/9080C

SERVICE MANUAL

FIRST EDITION

Canon

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disclosure of confidential
information

PREFACE

This Service Manual contains all the basic information required for field service and maintenance for maintaining the product quality and functions of the DR-6080/9080C.

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CHAPTER 1: GENERAL DESCRIPTION

Features, specifications, names of parts, and operation

CHAPTER 2: FUNCTIONS & OPERATION

Description of operation of mechanical and electrical systems by function

CHAPTER 3: DISASSEMBLY & REASSEMBLY

Description of disassembly and reassembly

CHAPTER 4: INSTALLATION & MAINTENANCE

Location and installation procedure, periodic replacement parts

CHAPTER 5: TROUBLESHOOTING

Service modes and troubleshooting procedures

APPENDIX: General circuit diagram, etc.

Information contained in this manual is subject to change without prior notice for improvement of the machine. Notification of changes will be given in the Service Information Bulletin.

Thoroughly read the information contained in this Service Manual and the Service Information Bulletins to gain a correct and deeper understanding of the machine. This is one way of fostering response for ensuring prolonged quality and function, and for investigating the cause of trouble during troubleshooting.

Quality Assurance Center
Canon Electronics Inc.

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CHAPTER 1

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I. FEATURES

1. High Speed Scanning

Various-sized papers, from name cards or checks up to A3, can be scanned at high speed.

DR-9080C (Color, Grayscale, Binary)	DR-6080 (Grayscale, Binary)
50ppm (A4, 200 dpi, Color)	60ppm (A4, 200 dpi, Grayscale)
90ppm (A4, 200 dpi, Grayscale)	60ppm (A4, 200 dpi, Binary)
90ppm (A4, 200 dpi, Binary)	

2. High Durability

The unit is designed for a lifetime of up to 6 million sheets.

3. Easy Maintenance

Replacing the rollers, including the pick-up roller, feed roller and retard roller, can be handled by the user.

4. New Functions

New functions such as staple detection and double feed detection by ultrasonic are available.

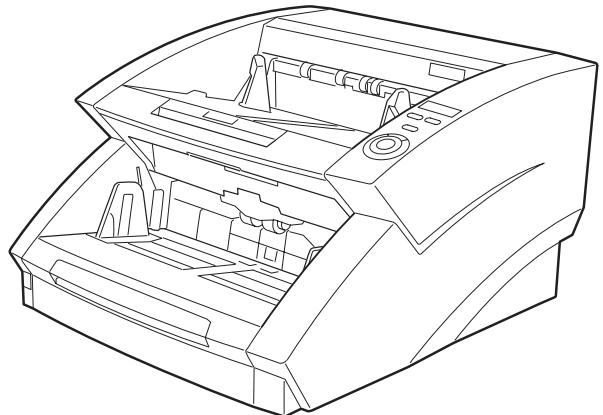


Fig. 1-101

Windows is a registered trademark of Microsoft Corporation in the U.S. and other countries.

Other company names and product names mentioned in this manual are registered trademarks or trademarks of the respective companies.

II. SPECIFICATIONS

1. Appearance / Installation

Item	Specifications	
	DR-9080C	DR-6080
1. Configuration	Desktop type	
2. Product model	1) 100 VAC, 50/60 Hz 2) 120 VAC, 60 Hz 3) 220-240 VAC, 50/60 Hz	
3. Rated power consumption or current	1) 100 VAC model: 120 W 2) 120 VAC model: 1 A 3) 220-240 VAC model: 0.5 A Note: Meets EnergyStar requirements. During sleep: 12 W or less.	
4. Performance-guaranteed ambience	15 to 27.5 °C 25 to 75%RH (Note: No condensation allowed.)	
5. Noise	1) Sound power level Standby: 40 dB or less Operation: 75 dB or less 2) Sound pressure level (By standers) Standby: 40 dB or less Operation: 60 dB or less	
6. Dimensions	Tray closed: 460 (W) x 525 (D) x 310 (H) mm	
7. Weight	Approx. 23 kg.	
8. Interface	1) SCSI-3 (ULTRA SCSI compatible) 2) USB 2.0 (High speed compatible)	
9. Bundled software	1) ISIS / TWAIN driver 2) CapturePerfect 2.0	
10. Expected product life	Whichever occurs first: 1) 5 years 2) Scans: 6,000,000 sheets (A4 size) Note: Some parts must be replaced during the product lifetime.	
11. Person in charge of installing	Service technician	
12. Options	1) Endorser: ED600 2) Imprinter 3) Hard counter (Mechanical counter) 4) Barcode module (CD-ROM)	
13. Consumable	1) Exchange roller kit 6080/9080C (pick-up/feed/retard rollers) 2) Ink cartridge (for imprinter) 3) Ink roller (for endorser) Note: These parts can be replaced by the users.	

Table 1-201

2. Document Scanning

Item	Specifications	
	DR-9080C	DR-6080
1. Sensor type	Contact Image Sensor (CIS)	
2. Sensor size	Density: 600 dpi. Effective elements: 7260 (305 mm)	
3. Output of sensor	10-bit digital output Note: Only 8 bits are available for image data.	
4. Light source	3 colors (RGB): 2 LEDs for each color	
5. Typical wave length	R: 620 nm, G: 530 nm, B: 467 nm	
6. Dropout color	Available: R/G/B	
7. Color emphasis	Available: R/G/B	
8. Scanning side	Simplex (Front/Back) / Duplex ^{*1} Note: Front/back reversing function is available.	
9. Scanning size (typical)	1) L series: LDR/LGL/LTR 2) A series: A3/A4/A5/A6 3) B series: B4/B5/B6	
10. Scanning size (atypical)	1) Main-scanning direction: Min. 64 pixels, Max. 305 mm 2) Sub-scanning direction: Min. 64 pixels, Max. 432 mm (1000 mm for long document mode)	
11. Output mode	1) Binary 2) Grayscale (8 bits: 256 gradations) 3) Color (24 bits) ^{*1}	1) Binary 2) Grayscale (8 bits: 256 gradations)
12. Binary mode	1) Black and White (Simple binary) 2) Error diffusion 3) Advanced Text Enhancement (ATE) Note: ATE processing is done within the personal computer.	
13. Output resolution	1) 100 x 100 dpi 2) 150 x 150 dpi 3) 200 x 200 dpi 4) 240 x 240 dpi 5) 300 x 300 dpi 6) 400 x 400 dpi 7) 600 x 600 dpi ^{*1}	

***1** When the document is large (A3 or LDR etc.), it is impossible to scan by duplex / color / 600 dpi due to the restriction of the memory capacity.

Table 1-202

3. Document Feeding

Item	Specifications		
	DR-9080C	DR-6080	
1. Document size	1) Width: 55 to 305 mm 2) Length: 70 to 432 mm (Up to 1000 mm for long document mode) 3) Thickness: Separation 0.06 to 0.15 mm, (48 to 120 g/m ²) Non-separation: 0.05 to 0.30 mm (40 to 240 g/m ²)		
2. Document requirements	1) Pressure-sensitive paper: Can be fed. (The orientation is restricted.) 2) Carbon-backed paper: Cannot be fed. 3) Perforated paper: Can be fed only if there are 2/3/4 holes that are φ8 mm or less in size. 4) Curled paper: Can be fed only if curl is 8 mm or less in height. (Total of the curled amount of max. pick-up storage) 5) Creased paper: Can be fed, but crease must be straightened before being fed. Note: When staple detection is used, paper curl must be 3 mm or less in height and creased paper cannot be fed.		
3. Pick-up mode	Normal/Panel/Auto/Manual Note: Manual here indicates manual feeding in non-separation mode.		
4. Pick-up storage	1) For A4 or smaller: 500 sheets (Must be 48 mm or less in height, including any curl.) 2) For larger than A4: The height must be less than 20 mm.		
5. Delivery storage	1) For A4 or smaller: 500 sheets (Must be 50 mm or less in height, including any curl.) 2) For larger than A4: The height must be less than 20 mm.		
6. Delivery direction	Face down		
7. Automatic size detection	Sensor/image processing		
8. Staple detection	1) Paper thickness: 0.06 to 0.12 mm 2) Paper size: A5 or Larger 3) Staple: Stapling must be in only one corner.		
9. Double feed detection	Overlapping (by ultrasonic)/Length		
10. Skew correction	Mechanical/image processing		
11. Feeding speed	Resolution	Binary/Grayscale	Color
	100 x 100 dpi	686 mm/sec	686 mm/sec
	150 x 150 dpi	686 mm/sec	457 mm/sec
	200 x 200 dpi	686 mm/sec	343 mm/sec
	240 x 240 dpi	686 mm/sec	286 mm/sec
	300 x 300 dpi	686 mm/sec	229 mm/sec
	400 x 400 dpi	286 mm/sec	96 mm/sec
	600 x 600 dpi	191 mm/sec	64 mm/sec

Table 1-203a (continued)

Item	Specifications				
	DR-9080C			DR-6080	
12. Scanning speed A4 size	Binary	Gray	Color	Binary	Gray
Simplex	100dpi	90 spm	90 spm	90 spm	90 spm
	150dpi	90 spm	90 spm	69 spm	90 spm
	200dpi	90 spm	90 spm	54 spm	63 spm
	240dpi	90 spm	90 spm	46 spm	63 spm
	300dpi	90 spm	87 spm	38 spm	63 spm
	400dpi	47 spm	46 spm	16 spm	30 spm
	600dpi	32 spm	25 spm	10 spm	20 spm
	100dpi	90 spm	90 spm	90 spm	90 spm
	150dpi	90 spm	90 spm	59 spm	90 spm
	200dpi	90 spm	85 spm	46 spm	63 spm
	240dpi	90 spm	65 spm	40 spm	63 spm
	300dpi	90 spm	43 spm	32 spm	63 spm
	400dpi	40 spm	26 spm	14 spm	30 spm
	600dpi	28 spm	12 spm	6 spm	18 spm
* spm = sheets per minute. The detailed conditions including JPEG value are omitted for grayscale and color, and may differ depending on function settings, the personal computer used, and other conditions. The color function is available only with the DR-9080C.					

Table 1-203b

4. Image Processing

Item	Specifications	
	DR-9080C	DR-6080
1. Brightness adjustment	255 levels	
2. Contrast adjustment	7 levels	
3. Gamma correction	Available (Standard/Custom)	
4. Smoothing	Available	
5. Dot erasing	Available	
6. Notch erasing	Available	
7. Border removal	Available	
8. Edge emphasis	Available (5 steps)	
9. Document orientation	Available (0° /90° /180° /270°)	
10. Reverse image	Available (only for binary mode)	
11. Text orientation recognition	Available	

Table 1-204

5. Other Functions

Item	Specifications	
	DR-9080C	DR-6080
1. Long document mode	Available	
2. Add-on	Available	
3. Scan-ahead mode	Available	
4. Count-only	Available	
5. Count verifying	Available	
6. Margin scan	Available	
7. Separate	Patch code/New file button	
8. Self-diagnostic function	Available	
9. Cumulative counter	Stored in the memory (The mechanical counter is option.)	
10. Operation panel	5 buttons; Display LED: 5 digits	

Table 1-205

These specifications are subject to change with improvements to the product.

III. PRECAUTIONS

This section describes items that require particular care regarding safety. These precautions must be observed. Explain to the user items that relate to safety, and instruct the user to take appropriate action.

1. Power OFF in Emergencies

When abnormal noise, smoke, heat or odor occur, turn the power OFF immediately and unplug the power cord.

As it may cause injury, be careful not to get clothing (ties, long hair, etc.) caught in the machine.

If this happens, turn the power OFF immediately.

Also, do not insert your fingers in the feed section while feeding documents.

2. Electromagnetic Interference Countermeasures

This machine complies with the electromagnetic interference standards (VCCI-A, FCC-A, etc.). However, the user might have to carry out separate countermeasures if the machine causes electromagnetic interference.

Do not change or modify this machine's specifications. If this has been carried out, its use may be forcibly discontinued on site. If the machine is disassembled and reassembled, follow the instructions described in this manual or in the Service Information Bulletins.

A "CAUTION LABEL" is affixed to the rear of the machine.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

CAUTION LABEL (120V machines)

3. User's Manual

Read the user's manual thoroughly before using this machine.

4. Ink Cartridge

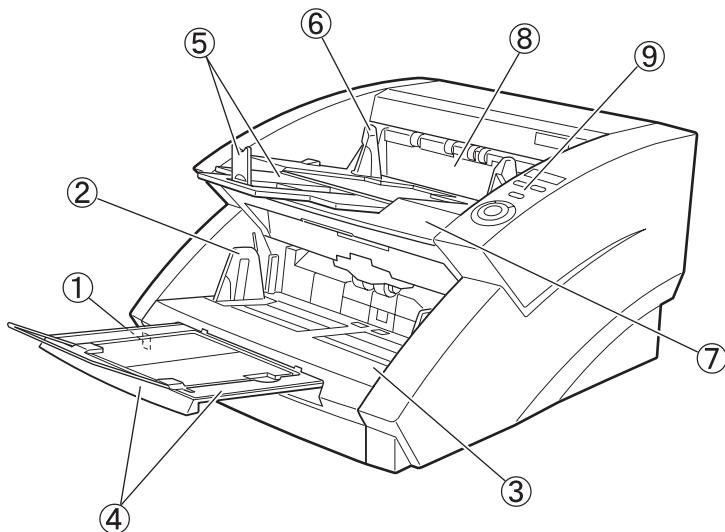
Obey the handling instruction written in the package of the ink cartridge.

5. Disposal

When disposing of the products and parts, obey local regulations.

IV. NAMES OF PARTS

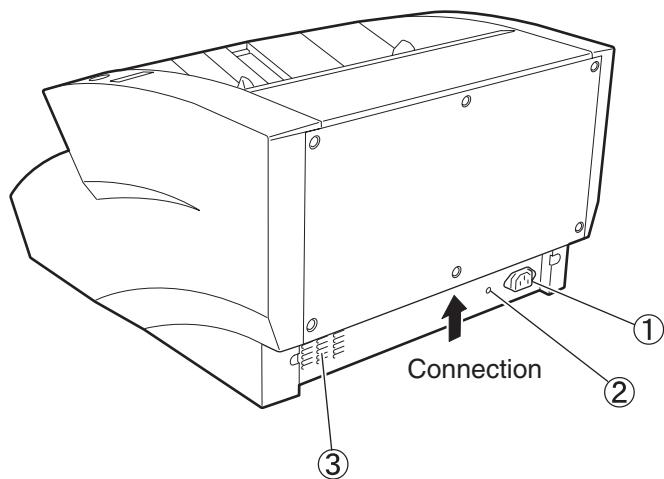
1. Front View



(1) Power switch	(6) Document eject tray guide
(2) Document guide	(7) Upper unit
(3) Document tray	(8) Imprinter cover
(4) Document tray extension / wire	(9) Operation panel
(5) Document eject tray extension / stopper	

Fig. 1-401

2. Rear View



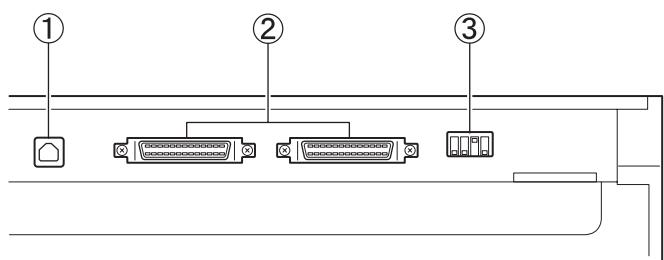
① Power cord connector
 ② Grounding terminal

③ Air vent

Fig. 1-402

Note: Do not block the air vent, otherwise the temperature will rise inside the machine and a fire might result.

3. Connection (Bottom view)

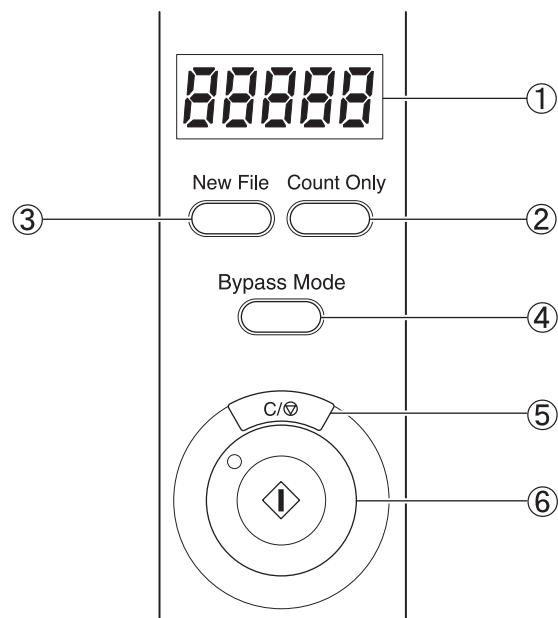


① USB connector
 ② SCSI connector

③ DIP switch

Fig. 1-403

4. Operation Panel



- ① Counter display
- ② Count Only key
- ③ New File key

- ④ Bypass Mode key
- ⑤ Stop key
- ⑥ Start key

Fig. 1-404

V. EXPLANATION OF OPERATION

For details, refer to the user's manual of this machine and the software used for its operation.

1. Basic Operation

The basic procedure for operating this machine is as follows:

- 1) Turn the machine ON.
- 2) Turn the personal computer ON.
- 3) Start up the software.
- 4) Set the documents.
- 5) Execute the operation.
- 6) Finish the operation.
- 7) Quit the application software.
- 8) Turn the personal computer OFF.
- 9) Turn the machine OFF.

2. Operation Window

The basic procedure for operating this machine is as follows. In the "CapturePerfect 2.0" bundled with the product, a "TWAIN" driver is used.

1) CapturePerfect 2.0

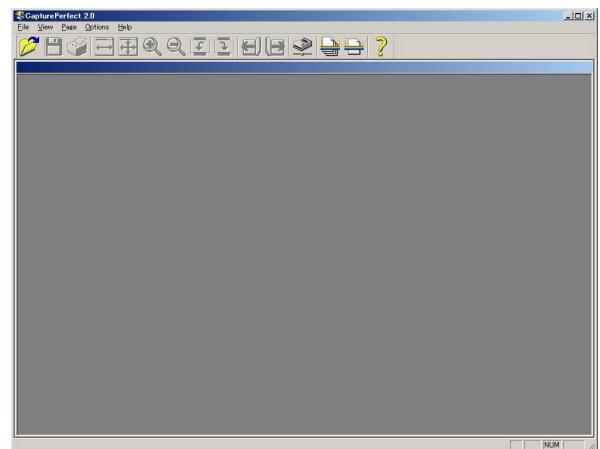


Fig. 1-501

2) Scanner Settings

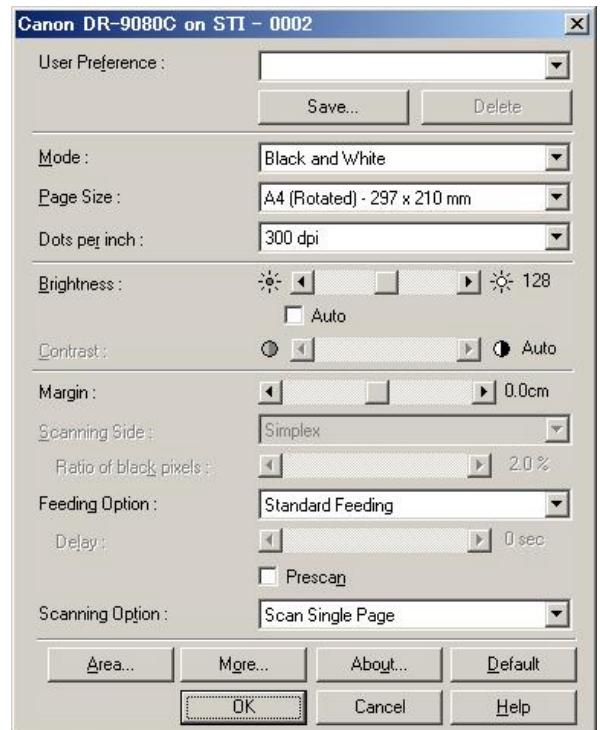


Fig. 1-502

3) Advanced Settings

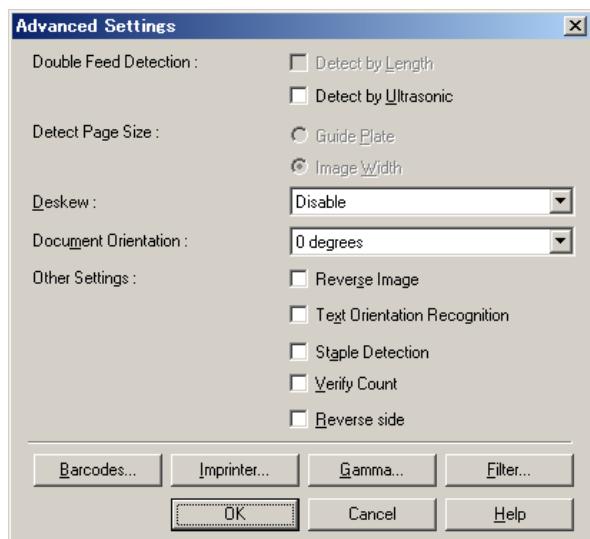


Fig. 1-503

5) Save As

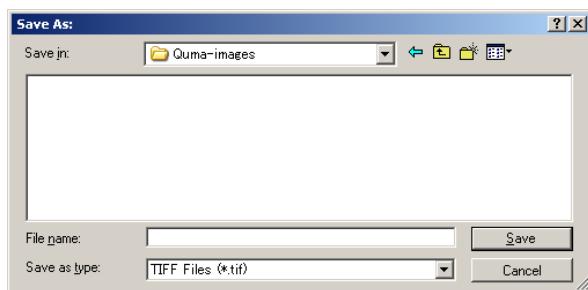


Fig. 1-505

4) Filter Settings



Fig. 1-504

VI. REGULAR INSPECTION BY THE USER

Instruct the user that the following locations must be cleaned about once a week.

For the details, refer to the user's manual.

1. Exterior

Wipe the covers with a cloth tightly wrung with water or neutral detergent soaked, and then wipe dry.

2. Document Sensor

Take off the dusts gathered on the document sensors with a blower or equivalent.

3. Reading glass

Wipe the reading glass (Upper, Lower) with a cloth tightly wrung with water and then wipe dry.

4. Feeder Assembly

Wipe the following rollers with a cloth tightly wrung with water and then wipe dry:

- 1) Pick-up roller
- 2) Feed roller
- 3) Retard roller
- 4) Platen roller
- 5) Feeder roller

5. Cleaning of Shading plates

Even when the reading glass and the rollers are cleaned, if the scanned image is streaked, the shading plate may be stained.

Wipe the shading plates (Upper, Lower) with a cloth tightly wrung with water and then wipe dry.

Note: Since the machine is being turned ON, be careful to proceed the work. And, take care so that the shading plates may not creased.

6. Power Cord

After the power cord is plugged in to the outlet for a long period of time, dust will collect on the connected part and could cause a fire or electric shocks. To prevent this, clean it regularly.

7. Imprinter (guide plate)

If ink adheres to the guide plate located in the inner part of the imprinter, it may contaminate the document during scanning operation. Wipe the guide plate with a cloth tightly wrung with water or neutral detergent soaked, and then wipe dry. To prevent this, clean it regularly.

8. Imprinter (ink cartridge)

Wipe softly the ink adhered to the ink nozzle of the ink cartridges with a lint-free cloth or paper (A cotton-tipped swab is also acceptable). Be careful not to wipe or touch the electrical contact part when wiping the ink.

CHAPTER 2

FUNCTIONS & OPERATION

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I. OUTLINE

1. System Configuration

The system configuration is shown in Fig. 2-101.

For the computer specifications and operating environment, refer to the user's manual.

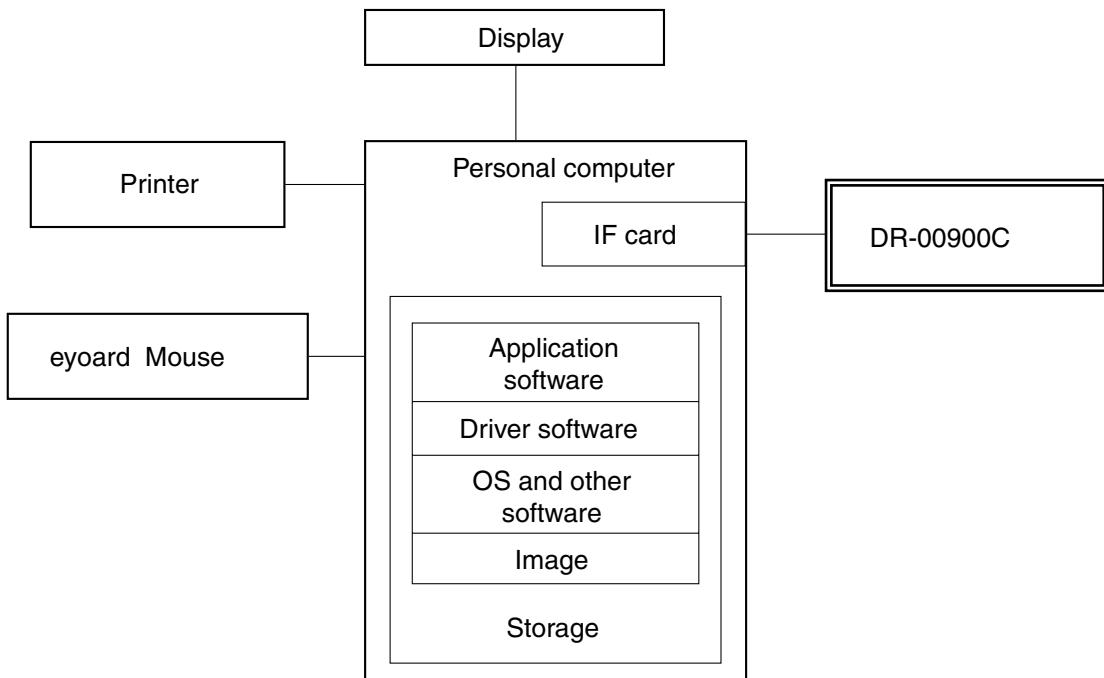


Fig. 2-101

2. Machine Internal Configuration

The machine internal configuration is shown in Fig. 2-102.

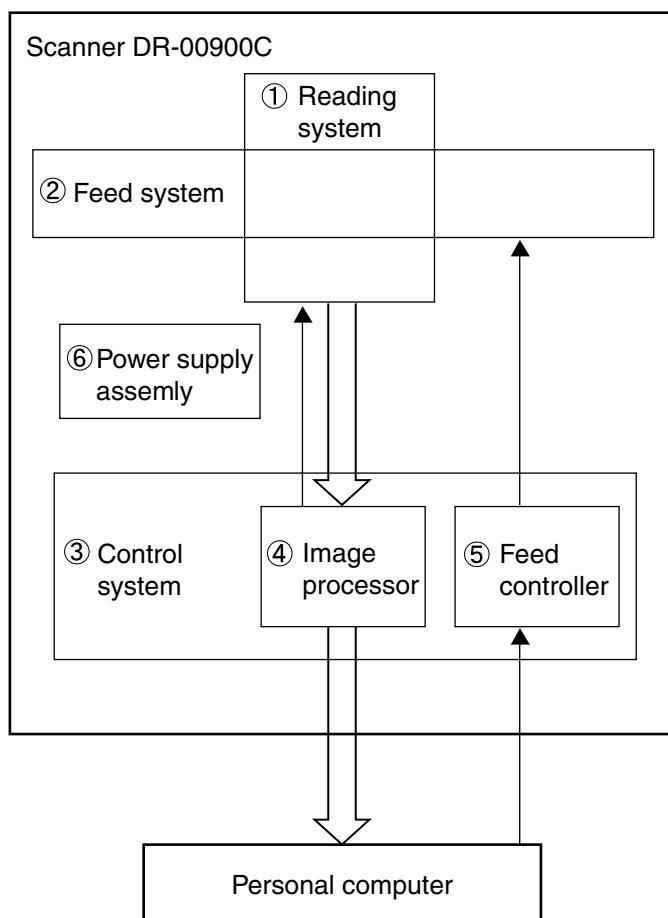


Fig. 2-102

Component	General Description
① Reading system	Scans image data from front and back sides of documents using the image sensors (CIS) of the reading units (front and back).
② Feed system	Picks up, feeds, and ejects documents placed on the document tray, using motors and rollers.
③ Control system	The control system consists of the image processor and the feed controller.
④ Image processor	Controls the reading system, processes the image data from the reading system, and outputs the data to the personal computer.
⑤ Feed controller	Controls the feed system and image processor.
⑥ Power supply assembly	Converts AC power to +24 VDC and supplies it to the various PCB assemblies.

Table 2-101

3. Motor Drive Configuration

The motor drive configuration for picking up and feeding documents is shown in Fig. 2-103.

This unit employs five motors consisting of the document tray motor (M6) for raising and

lowering documents, the pick-up motor (M2) for picking up documents, the retard motor (M5) for separating documents, the feed motor (M3) for feeding documents, and the main motor (M1) for feeding documents throughout the system.

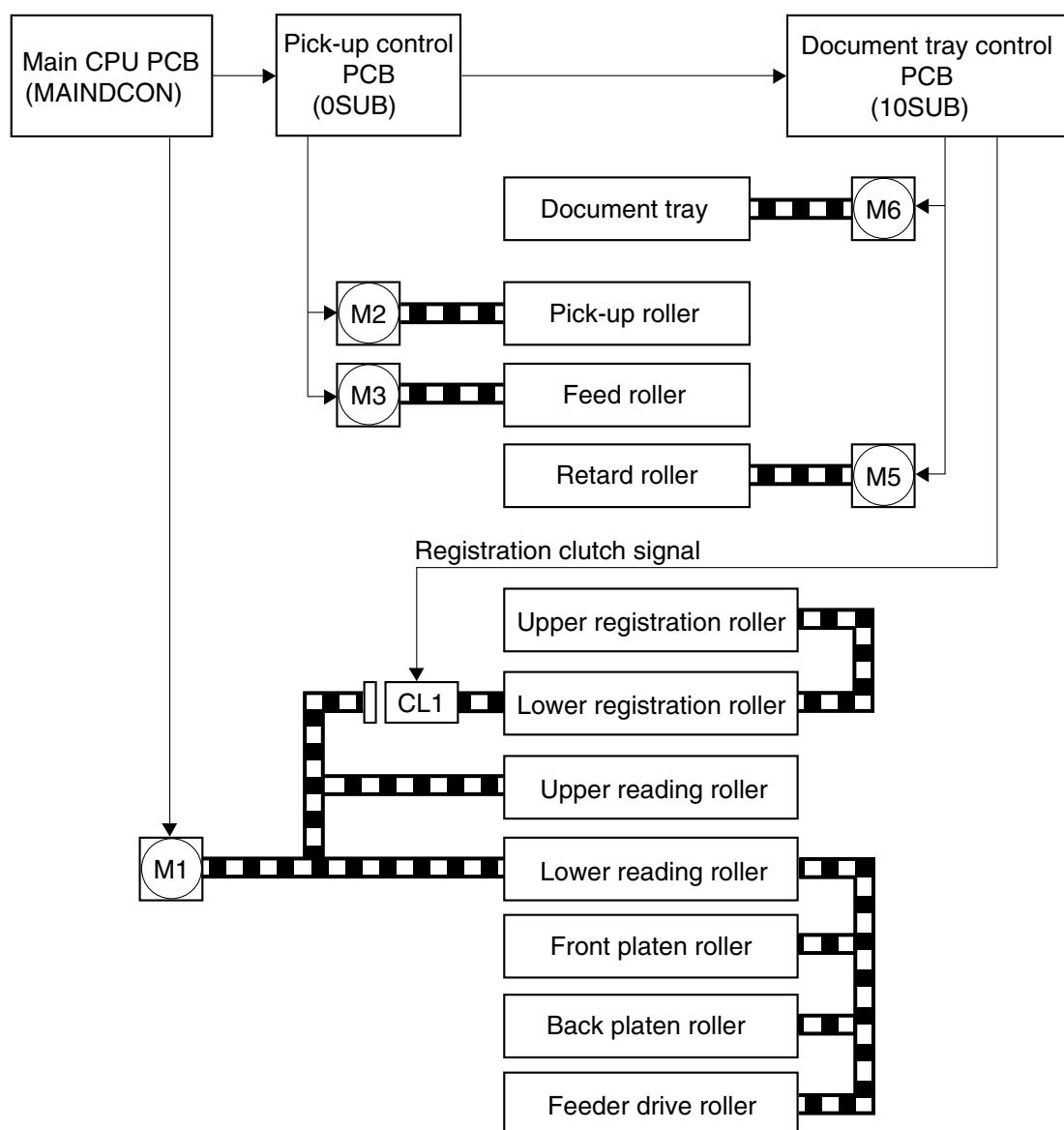


Fig. 2-103

4. Electrical Circuits

This machine uses three electrical circuits consisting of a main CPU PCB, a pick-up control PCB, and a document tray control PCB. A block diagram of these three circuits is shown in Fig. 2-104.

The pick-up control PCB controls pick-up of the document based on signals from the main CPU PCB. The document tray control PCB assembly controls the document tray based on signals from the main CPU PCB assembly and the pick-up control PCB.

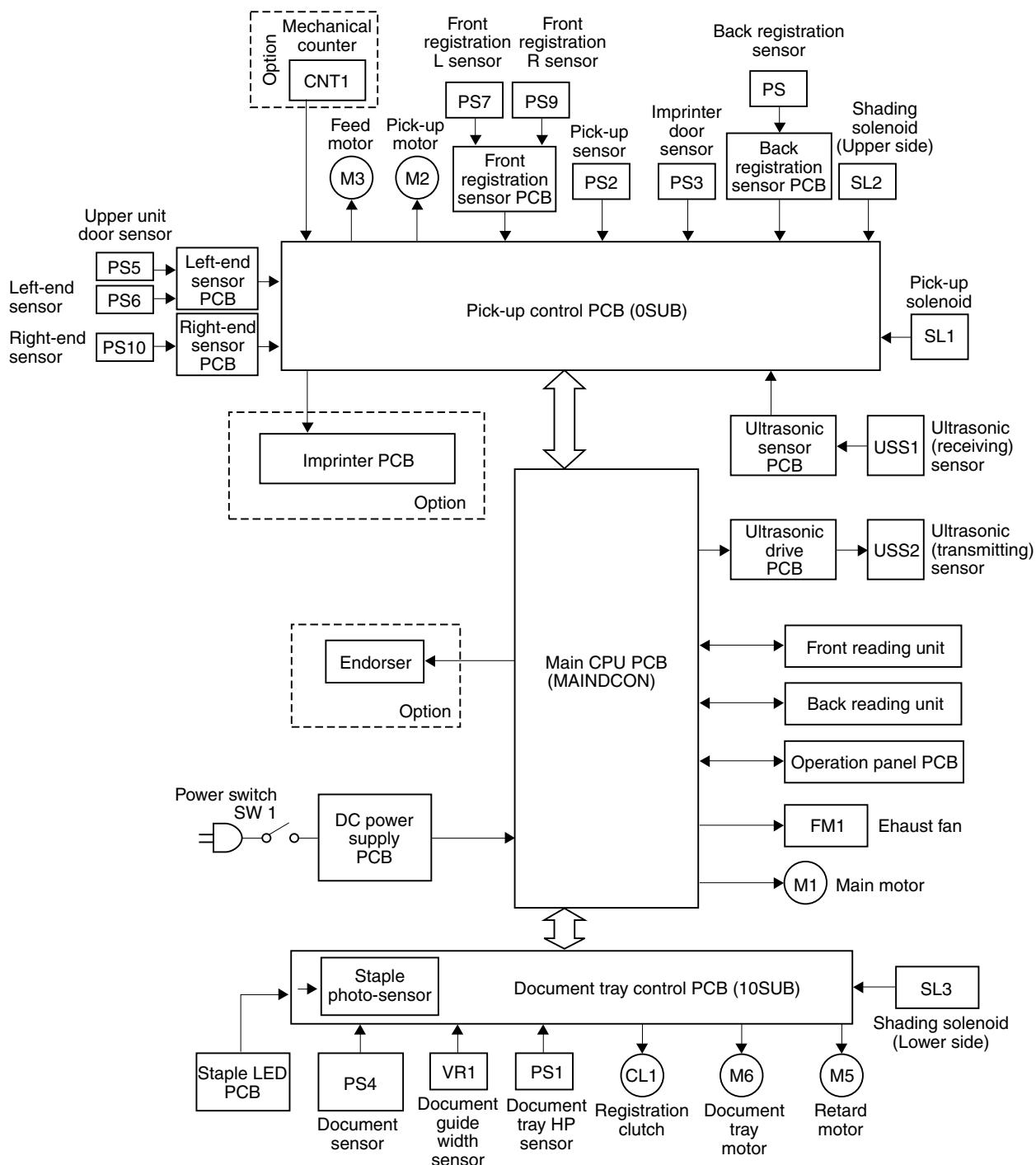
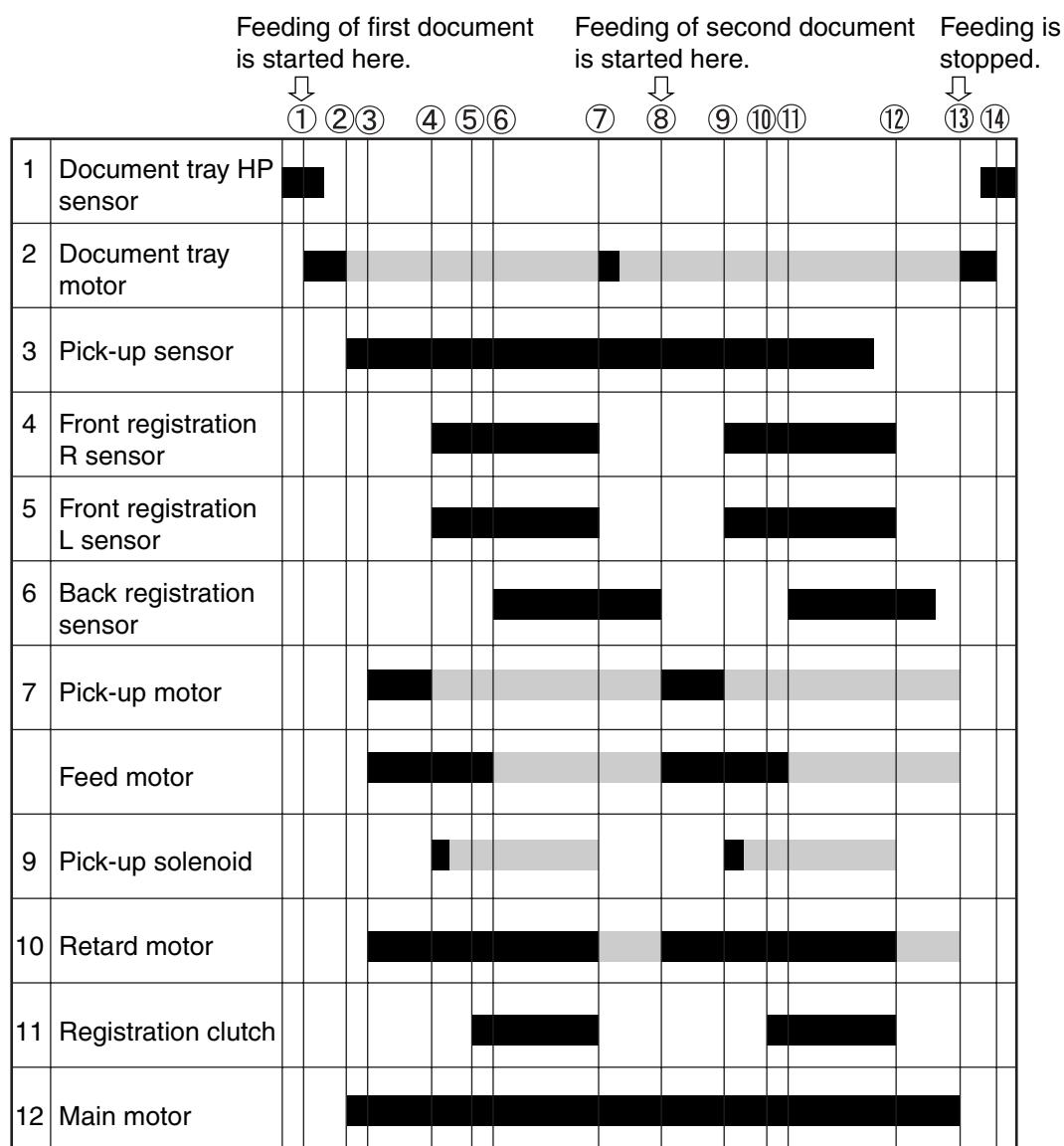


Fig. 2-104

5. Feed Timing Chart

Fig. 2-105 shows the feed timing chart. Table 2-102 explains points ① to ⑯ shown in the figure.

Feed condition: 1: Middle speed feeding, 2: Standard feeding, 3: Two documents,
4: No temporary stop



Note 1: Black area indicates the activating condition and gray area indicates the condition of staying at the present position with the torque dropped down.

Note 2: If there is a difference in the timing marked, it indicates the occurrence of skewing.

Fig. 2-105

No.	Explanation
①	When documents are placed on the document tray and pick-up is started, the document tray motor is started. The document tray is raised by a preset amount after the document tray HP sensor is switched from ON to OFF.
②	When the document tray is raised and the pick-up sensor detects the document, the document tray motor stops and the main motor is started.
③	The pick-up motor, feed motor, and retard motor are started at the same time.
④	When the two front registration sensors (R & L) detect the document, the pick-up motor stops and the pick-up solenoid turns ON. While the pick-up solenoid is ON, the pick-up roller retracts from the document. If there is a difference in detection timing between the front registration sensors (R & L), it indicates skewing. When roller deskew (skew correction) is selected, the document is pressed against the registration roller to perform skew correction.
⑤	The registration clutch is turned ON a specified time after the front registration sensors (R & L) detect the document together.
⑥	After the back registration sensor detects a document, the feed motor stops.
⑦	After the end of the document passes the front registration sensors (R/L), the document tray is raised by one sheet when both sensors detect no document.
⑧	After the end of the document passes the back registration sensor, feeding of the second document is started when the sensor detects no document.
⑨	Same as ④.
⑩	Same as ⑤.
⑪	Same as ⑥.
⑫	After the end of the document passes the front registration sensors (R & L), the registration clutch is turned OFF when both sensors detect no document. Since the pick-up sensor is turned off, no document is detected on the document tray.
⑬	After the end of the document passes the back registration sensor, the pick-up motor, feed motor, retard motor and main motor are turned OFF a given period of time after the sensor detects no document. The document tray motor turns in reverse to lower the document tray.
⑭	A given period of time after the document tray HP sensor switches from OFF to ON, the document tray motor is turned OFF.

Note: In high speed feeding, the second document is picked up immediately after the end of the first document passes the front registration sensors (R & L) and both sensors detect no document. In slow speed feeding, the second document is picked up a given time after both sensors detect no document, after the end of the first document passes the back registration sensor. Thus, the document feeding can maintain specific intervals for high speed, medium speed, and slow speed feeding.

Table 2-102

II. READING SYSTEM

1. Outline

Fig. 2-201 shows the reading system.

The reading system consists of the image reading units and platen rollers.

The front reading unit reads the front side of the documents and the back reading unit reads the back side. This configuration enables the unit

to read both the front and back sides of a document at one time using a single pass.

These reading units illuminate the document from different directions using two LEDs to prevent shadows, and the analog image data are internally converted to 10-bit digital signals and then sent to the image processor on the main CPU PCB.

The platen rollers hold the document tightly against the reading glass to keep it in focus.

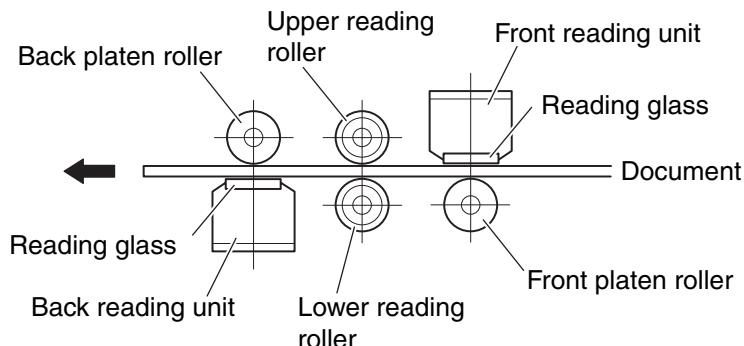


Fig. 2-201

The platen rollers hold the document against the reading glass. Two springs are attached to the back side of the reading units, to feed both thick and thin documents under the same conditions. (Refer to Fig. 2-202)

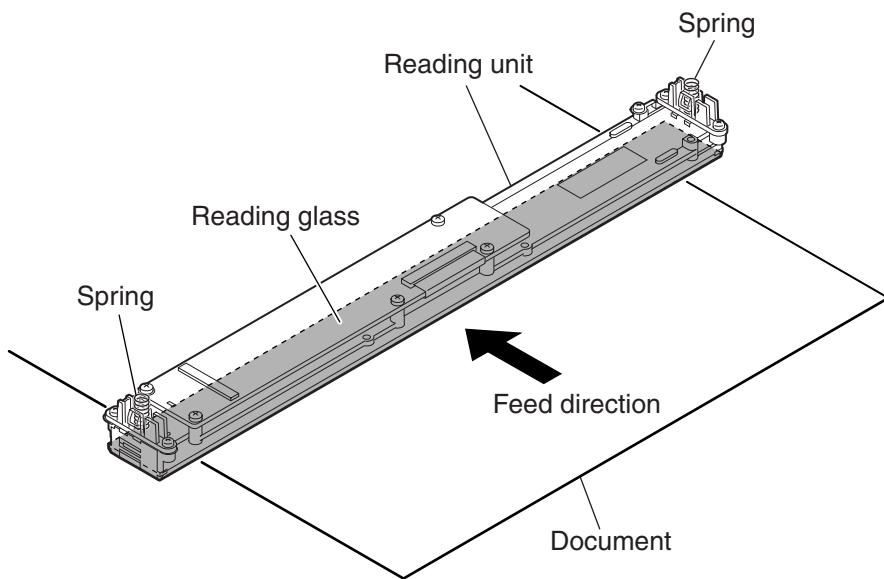


Fig. 2-202

However, if the platen rollers were to touch the reading glass when rotating, it might leave marks. Therefore, two spacers are attached to the platen rollers outside the image reading area, and the outer diameter of the spacers is a little bit larger than that of the platen rollers. This provides a small gap between the platen rollers and the reading glass when the platen rollers hold the document against the reading glass. (Refer to Fig. 2-203)

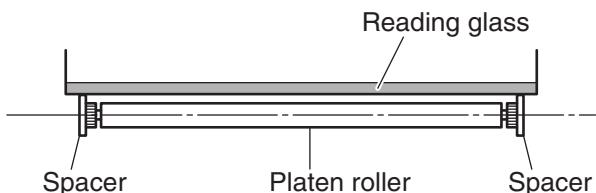


Fig. 2-203

2. Reading Unit Configuration

Fig. 2-204 is a sectional diagram of the reading unit. The reading unit consists of the sensor drive PCB, image sensor PCB, lens array, LEDs (R/G/B), light guide, and reading glass.

The contact image sensors (CIS) are mounted on the image sensor PCB in a single row, with a density of 600 dpi. The valid reading width is 305 mm, and the number of valid pixels is 7260. The optical resolution can be switched between 600 dpi and 300 dpi by an external signal.

The main feature of this reading unit is that it provides lighting for the image sensors using two LEDs, lighting the document from both the right and left sides as shown in the figure. The light guides are arranged on the right and left side, and a red (R), green (G), and blue (B) LED is arranged for each light guide on the image sensor PCB.

LEDs light illuminate the document through the light guides, and the light reflected from the document enters the image sensors through the lens array. The image sensors convert the light to an analog signal. The analog signal is sent to the sensor drive PCB, and then to the main CPU PCB as a digital signal after A/D conversion and shading correction.

In the binary or grayscale mode, the image is read with composite light generated by lighting all the RGB LEDs simultaneously. In the color mode, the RGB LEDs are sequentially lit, and the image data is read separately for each color. In the drop-out color mode, only the LEDs of the designated color are lit.

In the previous models (DR-5020/5080C), A/D conversion and shading correction were handled by the image processor on the main CPU PCB, but in this model they are processed internally by the reading unit.

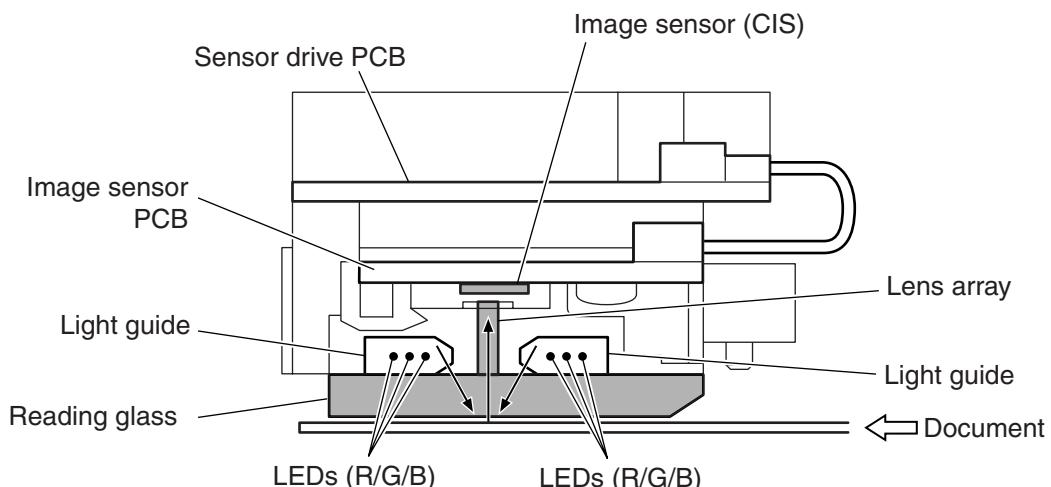


Fig. 2-204

3. Shading

In the previous models (DR-5020/5080C), a shading sheet had to be prepared separately, and the shading correction value was determined using the service mode, but this model incorporates a shading plate and a shading correction value determined by the reading unit can be used.

Two shading plates are mounted near the front and back platen rollers.

1) Shading plate mechanism

Fig. 2-205 shows the arrangement of the shading plate for the back platen roller.

The shading plate is a white sheet, 0.1 mm thick, housed near the platen roller, and is normally not visible. When shading is performed, the shading solenoid pulls in, so that the shading plate coupled to the gear pops out over the platen roller.

The lower shading plate carries out the shading for the front reading unit, and the upper shading plate does the same for the back reading unit. When the shading is completed, the shading plates move back to their original positions.

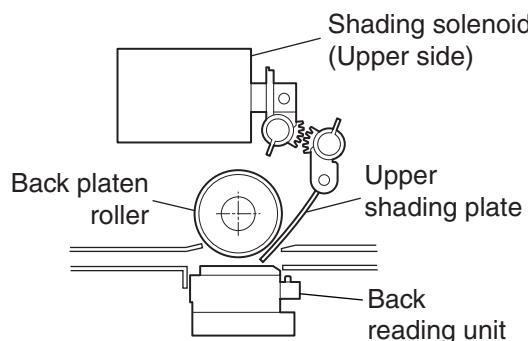


Fig. 2-205

2) Shading plate timing

The operation of the shading plates is carried out using the timing shown below.

- a. when the power is on
- b. after the upper unit is open or closed
- c. after recovering from power-saving mode
- d. at the beginning of batch processing
- e. when feeding is started, after no feeding for 10 minutes, during batch-to-batch processing

At the points a, b, and c, LED intensity is adjusted. At d and e, white level adjustment (gain adjustment) and black level adjustment (offset adjustment) are performed according to the LED intensity set at a, b, and c.

The LED intensity adjustment is carried out by changing the lighting time of the LED. When the shading plate pops out at points a, b, and c, the LED lighting time under the black-and-white (same for grayscale) and color conditions are determined by the reading unit and saved.

In this model, the white and black level adjustments are performed by the reading unit for each picture element, and the adjustment value is saved on the sensor drive PCB of the reading unit.

III. FEED SYSTEM

1. Outline

Fig. 2-301 shows a cross section of the document feed system.

The various drive rollers are rotated by motors via gears and timing belts.

For controlling the document feed, various sensors are arranged in necessary positions of the system. The arrangement of the sensors is shown in Fig. 2-301, 2-302 and 2-303.

The document feed system is equipped with the following functions.

- Document tray driving mechanism

During pick-up, this mechanism raises the document tray, and when pick-up is finished, lowers it.

- Separating mechanism

Overlapped documents can be separated by the retard roller and the feed roller, to feed the documents one by one.

- Staple detection

Detects the jumping up of documents bundled by staples when they are picked up, and stops the feeding.

- Skew correction mechanism

Detects skewed documents, enabling correction by the rollers, as well as in the scanned image. This selection is performed by the computer.

- Ultrasonic double feed detection

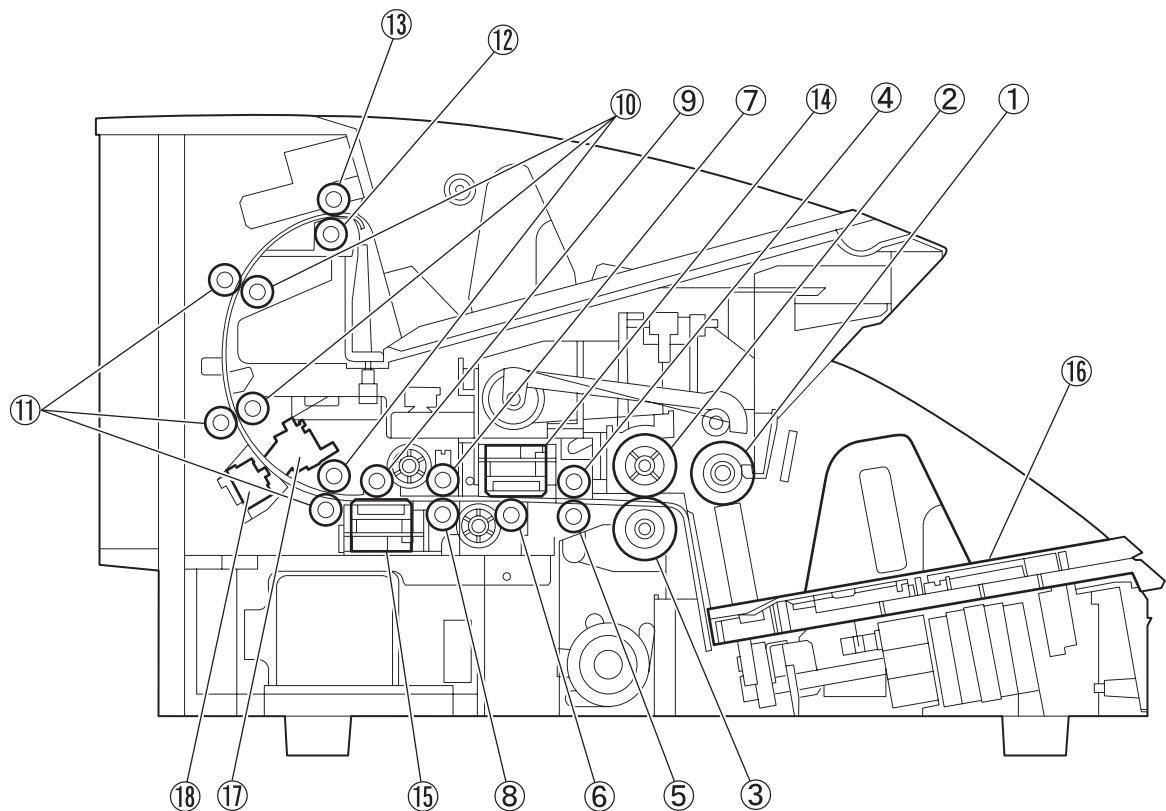
Overlapping documents (indicating double feeding) can be detected by the ultrasonic sensor.

- Feed error detection

Feed errors (jams) can be detected by the registration sensors (front & back).

- Special feed mode

Checks the feed condition of the machine without using the personal computer.



- ① Pick-up roller
- ② Feed roller
- ③ Retard roller
- ④ Upper registration roller
- ⑤ Lower registration roller
- ⑥ Front platen roller
- ⑦ Upper reading roller
- ⑧ Lower reading roller
- ⑨ Back platen roller

- ⑩ Feeder follower roller
- ⑪ Feeder drive roller
- ⑫ Delivery follower roller
- ⑬ Delivery drive roller
- ⑭ Front reading unit
- ⑮ Back reading unit
- ⑯ Document tray
- ⑰ Ultrasonic (receiving) sensor
- ⑱ Ultrasonic (transmitting) sensor

Fig. 2-301

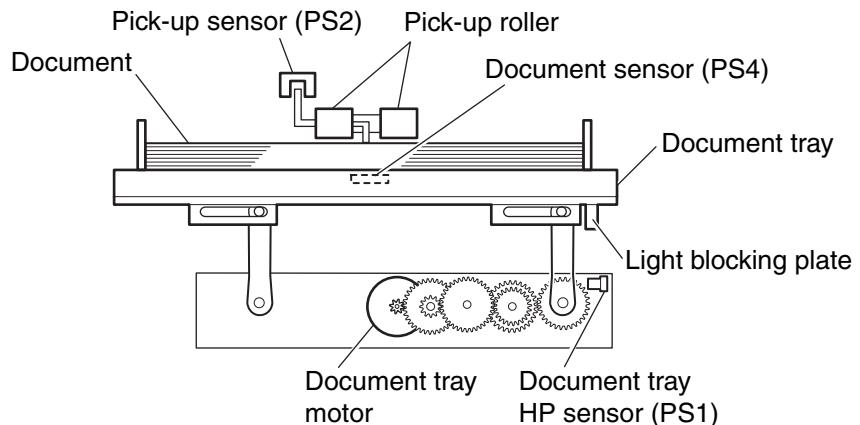


Fig. 2-302

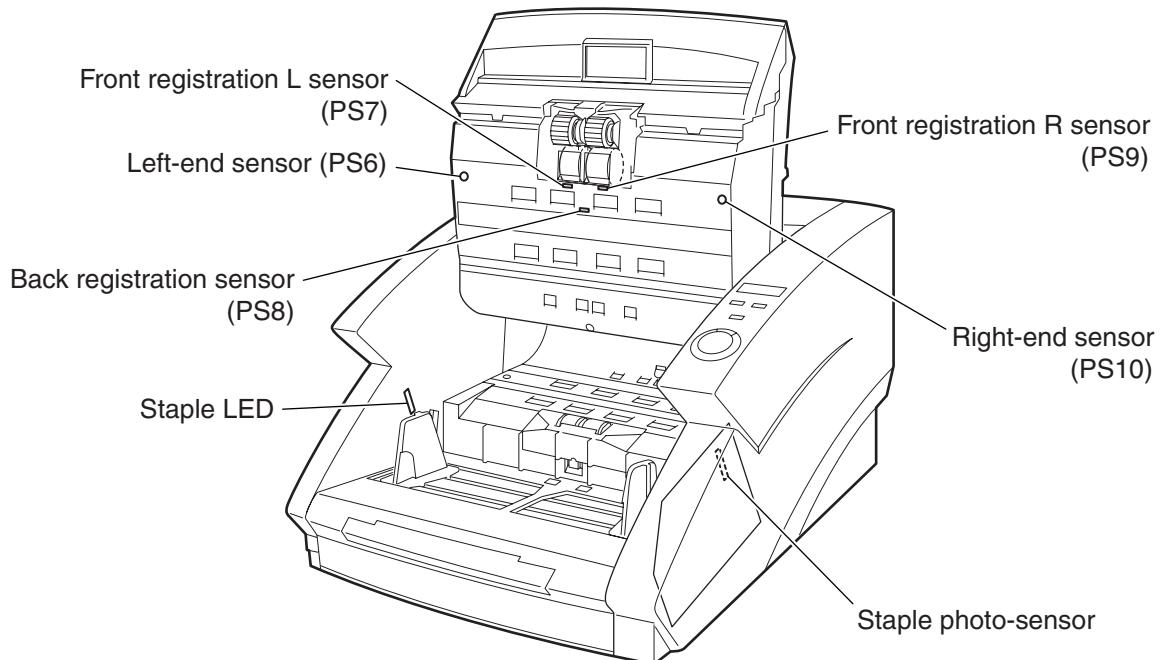


Fig. 2-303

2. Document Tray Driving Mechanism

Fig. 2-304 shows the document tray being lowered and Fig. 2-305 shows the document tray being raised.

The document tray for holding documents and a box unit designed to raise and lower the document tray work together. The arms for supporting the document tray are attached to the four corners of the box unit.

The rollers attached at the front ends of the arms are fitted to the document tray. When the arms rotate in a clockwise direction as they are laid down (Refer to Fig. 2-304), the document tray is raised up.

When the arms rotate in a counterclockwise direction as they stand vertically (Refer to Fig. 2-305), the document tray is lowered. Thus, moving the arms of the box unit enables the raising and lowering of the document tray.

Of the four arms, only the two arms fixed to the right-end gear shaft are coupled to the gear.

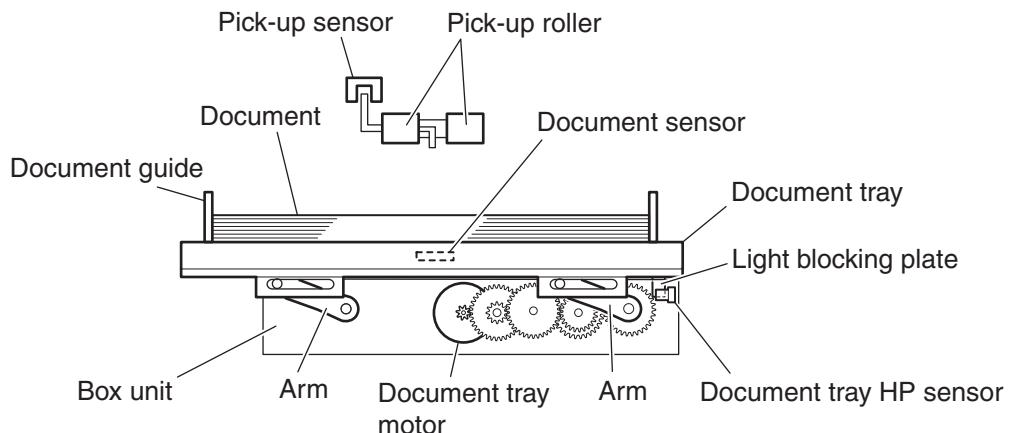


Fig. 2-304

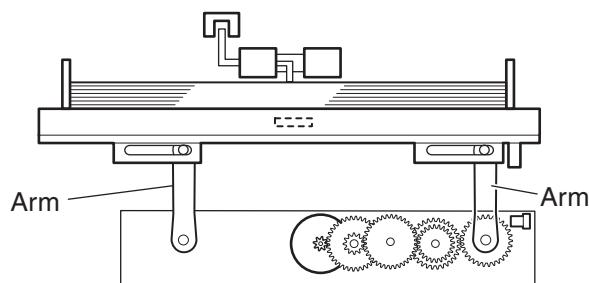


Fig. 2-305

First, the raising of the document tray will be explained.

- 1) When a document getting picked up is detected by the document sensor of the document tray, the document tray motor is started.
- 2) When the motor force is transmitted to the gear and the gear is rotating, the front and back arms fixed to the right-end gear shaft begin to rotate in a clockwise direction as they are laid down. At the same time, the document tray begins to rise.
- 3) After the document tray is slightly raised and the light blocking plate installed on the document tray switches the document tray HP sensor OFF, the document tray is raised until the motor has rotated a preset amount.
- 4) When the lever located between the pick-up rollers is pushed up by the document to turn ON the pick-up sensor, while the document tray is being raised, the document tray motor stops. At the same time, the raising of the document tray is stopped.
- 5) After that, the pick-up motor and feed motor are started simultaneously to feed the document.

Next, the lowering of the document tray will be explained.

- 1) When the documents on the document tray run out, the pick-up sensor detects no document.
- 2) After a given time, the document tray motor begins to rotate in reverse.
- 3) The front and back arms fixed to the right-end gear shaft begin to rotate in a counterclockwise direction as they stand vertically. At the same time, the document tray begins to drop down.
- 4) The light blocking plate moves, switching the document tray HP sensor from OFF to ON, and the document tray is stopped.

3. Separation Mechanism

Fig. 2-306 shows the configuration of the separation mechanism.

The retard roller is configured in elastic body and is transmitted the feed driving force in reverse to the feed roller. Since the torque limiter is mounted on the drive transmission assembly of the retard roller, when the friction of the feed roller and the document exceeds the specified value, the retard roller begins to rotate in the same feeding direction as the feed roller.

As shown in Fig. 2-306-a, when overlapped documents enter into the space between the feed roller and the retard roller, the document in contact with the feed roller is fed in the feeding direction, and the retard roller rotates in the reverse direction so that the document in contact with the retard roller is pushed backwards.

As shown in Fig. 2-306-b, once a single document remains, the retard roller rotates in conjunction with the feed roller to feed the document.

When the Bypass Mode key on the operation panel is pressed, or Manual Feed is selected on the computer, the driving of the feed roller is turned OFF and the retard roller begins to rotate in the forward direction, invalidating the separation function.

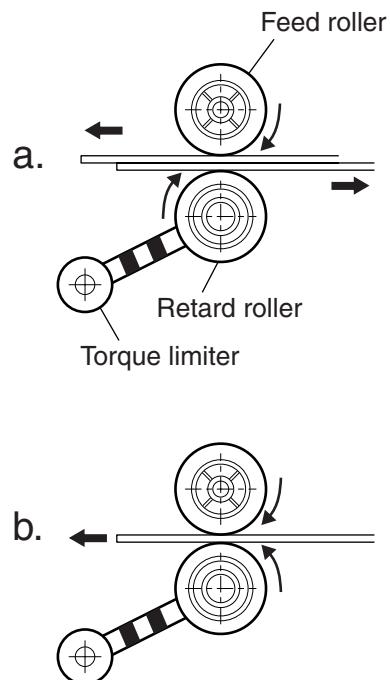


Fig. 2-306

4. Staple Detection

In this unit, a staple detection mechanism is employed which detects the jumping up of stapled documents. This mechanism is designed not to detect the staple itself, but to detect the jumping up of the stapled documents, and to stop the feeding. As such, it prevents stapled documents from being torn apart.

Fig. 2-307 shows a stapled document jumping up due to the pick-up roller.

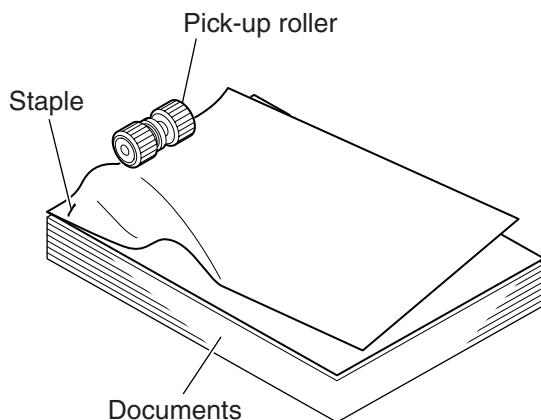


Fig. 2-307

Fig. 2-308 shows the configuration of the staple detection.

The staple detection consists of staple LEDs and a staple photo-sensor, arranged on both sides of the document pick-up opening. If there is no staple in the documents, the light emitted from the LEDs is received by the photo-sensor. If the stapled documents jump up, the light gets blocked and the documents are found to be stapled, resulting in stopping the feeding.

The five staple LEDs are mounted on the staple LED PCB. The staple photo-sensor has five sensors that correspond to the five LEDs on the staple LED PCB, and is directly mounted on the document tray control PCB (10_SUB).

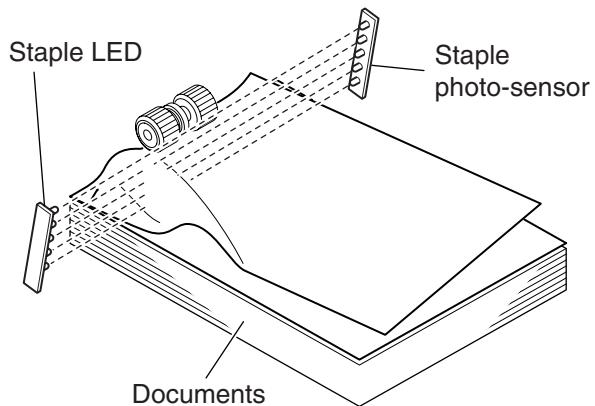


Fig. 2-308

Note: Because the documents do not jump up under the following conditions, the staple detection sensor will not work:

- When there are two or more stapled places.
- When the staple is not positioned at a corner.
- When the documents are smaller than A5.

Document curl must be 3 mm or less in height and the documents cannot be creased.

It is possible to change the level of detection accuracy with the user mode.

5 Skew Correction Mechanism

The skew correction (deskew) uses the front registration sensors and the registration rollers. Skew is detected by the front registration sensor and then is corrected by the registration rollers. Fig. 2-309 shows the arrangement of the front registration sensors and Fig. 2-310 shows the skew correction mechanism.

As shown in Fig. 2-309, the front registration sensors consist of the left sensor (L) and the right sensor (R), and are mounted in front of the registration roller. If no skewing occurs, there is no difference in the timing for both sensors detecting the document. However, if the document is skewed, one of the sensors detects the document earlier and there is a difference in the timing of detecting the document. As the skew amount is increased, the difference is also increased. The difference affects the time of the skew correction performed by the registration roller, and an increased difference will prolong the skew correction time.

The time taken from the time both sensors detect the document together until the registration roller begins to rotate is the time required for the skew correction.

As shown in Fig. 2-310, the skew correction is performed at the registration roller area. When the feed roller feeds the document in the feeding direction, either the right or left front end of the document runs into the registration roller. Since the registration roller remains stopped, the document is turned on the fore-end of the document run into the registration roller so that the skew is corrected. (Refer to Fig. 2-310-a)

When the skew correction is performed after both sensors detect the document together, the registration roller begins to rotate and the document is fed without being skewed. (Refer to 2-310-b)

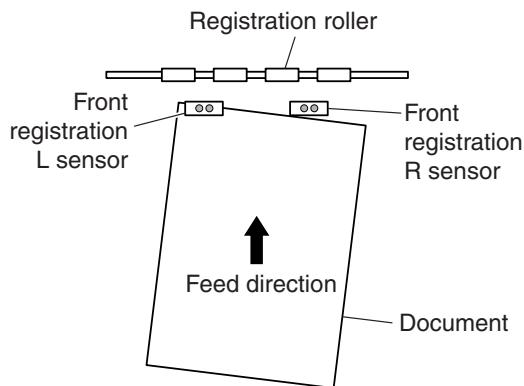


Fig. 2-309

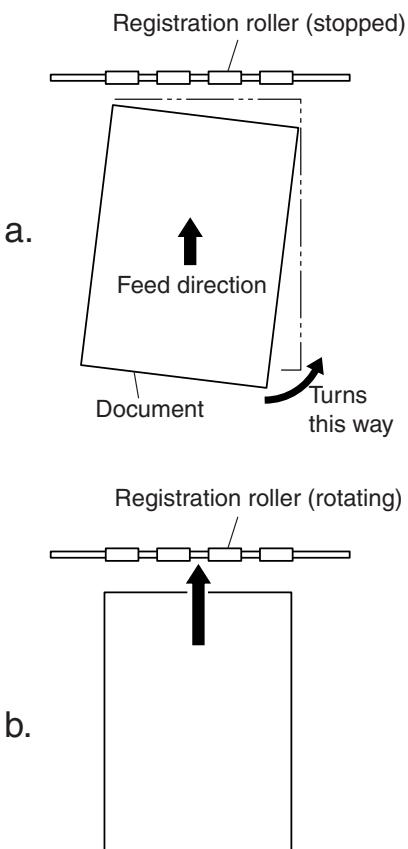


Fig. 2-310

When a larger-sized document is skewed so as to exceed the specified value, the ends of the document may be torn. Therefore, the skew detection sensors are mounted on both sides inside the machine. The left-end sensor is mounted on the left-end sensor PCB and the right-end sensor is mounted on the right-end sensor PCB. When skewing is detected by both sensors, the document feeding is stopped.

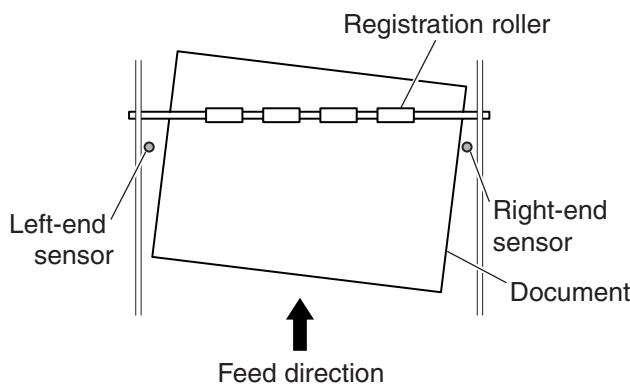


Fig. 2-311

6 Ultrasonic Double Feed Detection

Fig. 2-312 shows the double feed detection mechanism by ultrasonic.

The double feed detection by ultrasonic uses the ultrasonic (transmitting) sensor and the ultrasonic (receiving) sensor.

The ultrasonic transmitting sensor is connected to the ultrasonic drive PCB, while the ultrasonic receiving sensor is connected to the ultrasonic sensor PCB. The receiving sensor receives the ultrasonic signal transmitted by the transmitting sensor to gain a specific signal level. When overlapping documents are fed, the signal level is different from when properly feeding a single document. The unit interprets this difference as a double feed and displays an error.

Note: When the length of the overlapping portion of the documents is less than 50 mm, the double feed may not be detected.

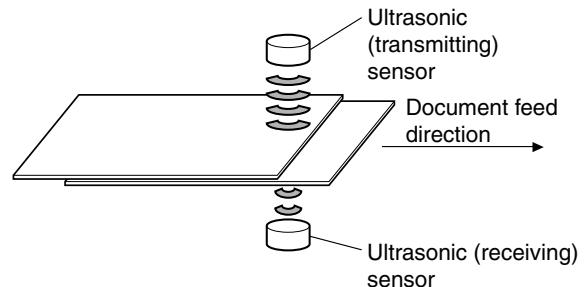


Fig. 2-312

7 Feed Error Detection

This explanation is about feed errors due to document jams. Document jams are detected by the front and the back registration sensors.

The front registration sensor and the back registration sensor are located at the front and back of the registration roller, respectively. The front registration sensors are divided into the left sensor (L) and the right sensor (R), and are mounted on the front registration sensor PCB. The back registration sensor is mounted on the back registration sensor PCB.

1) Early reach jam (P01)

The front edge of the following document was detected after the end of the proceeding document is detected before the motor finishes driving the specified length.

2) Residual jam (P02)

The end of the document is not detected even though the document has been fed for a specific length after the front edge was detected.

3) Fast feed jam (P03)

The end of the document is detected before the document has been fed for a specific length after the front edge was detected.

When the machine is powered on or the upper unit is opened/closed with a document left in the machine, a removal jam (P00) occurs.

8. Special Feed Mode

This unit also supports a mechanical feed mode to check the feed condition without using a personal computer.

This mode should not be available to the users.

The mechanical feed mode can be activated by pressing the keys on the operation panel, as follows:

- a. Turn on the power switch with the start key pressed.
- b. Continue pressing the start key for about one second.
- c. Press the stop key.

If the start key is pressed while in the mechanical feed mode, with documents in the document tray, the machine will feed the documents at a feed speed determined by the SCSI ID set on the DIP switch located at the computer connection. Images are not scanned at this time.

When specifying the feed speed is not required, it is possible to check the feeding state using the "Count Only mode".

	Feed speed	1	2	3
ID0	Black/white 200DPI	OFF	OFF	OFF
ID1	Black/white 300DPI	ON	OFF	OFF
ID2	Black/white 400DPI	OFF	ON	OFF
ID3	Black/white 600DPI	ON	ON	OFF
ID4	Color 200DPI	OFF	OFF	ON
ID5	Color 300DPI	ON	OFF	ON
ID6	Color 400DPI	OFF	ON	ON
ID7	Color 600DPI	ON	ON	ON

* The figures 1-3 above indicate the numbers of the DIP switch used to set the SCSI ID.

Table 2-301

IV. DESCRIPTION OF ELECTRICAL CIRCUITS

1. Main CPU PCB (MAIN_DCON)

The main CPU PCB mainly handles image processing.

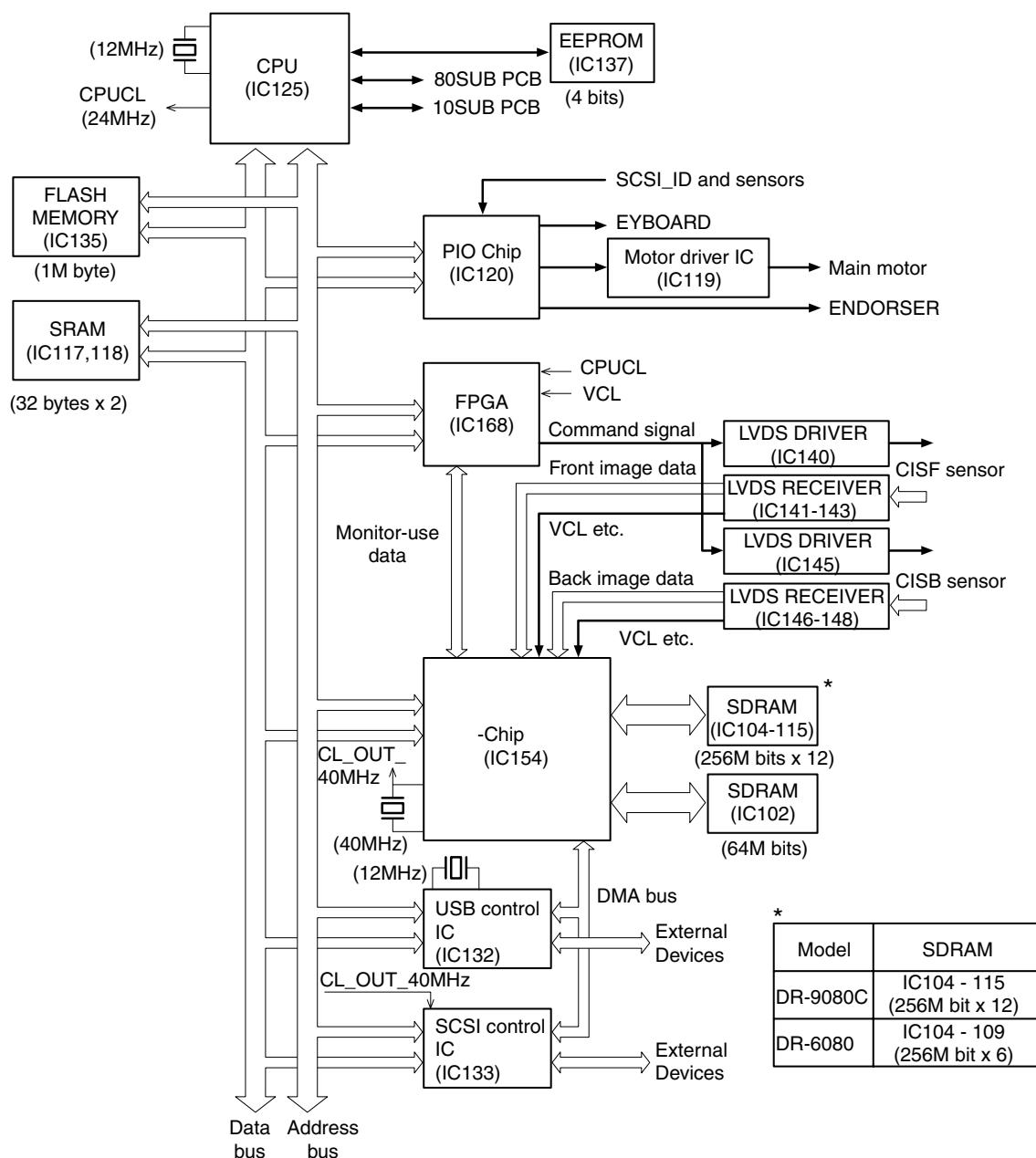


Fig. 2-401

IC No.	Name	Function
IC125	CPU	Overall control
IC137	EEPROM	Storing various settings
IC117,118	SRAM	Work memory for CPU
IC135	FLASH MEMORY	Memory for firmware and various parameters
IC120	PIO Chip	Port input and output
IC119	MOTOR DRIVER	Main motor control
IC168	FPGA	QQ-Chip correction
IC140,145	LVDS DRIVER	LVDS signal driving
IC141-143,146-148	LVDS RECEIVER	LVDS signal receiving
IC154	QQ-Chip	Total image processing
IC104-115	SDRAM	Memory for image data
IC102	SDRAM	Memory for JPEG
IC132	USB controller	USB control
IC133	SCSI controller	SCSI control
IC155	Switching regulator	18V generation
IC131	Switching regulator	3.3V generation
IC116	Switching regulator	5.0V generation
IC156	Switching regulator	12.0V generation
Q150,151	FET	Energy save mode switch

Note: The DR-9080C has 12 memory chips for image data (SDRAM) numbered from IC104 to IC115, while the DR-6080 has 6 of them numbered from IC104 to IC109.

Table 2-401

2. Pick-up Control PCB (80_SUB)

Fig. 2-402 shows a block diagram of the pick-up control PCB (80_SUB). The CPU mounted on the pick-up control PCB performs the following functions.

- 1) Obeys instruction from the main CPU PCB to pick up documents
- 2) Controls the pick-up motor, feed motor, and each solenoid

- 3) Sends instructions to the document tray control PCB
- 4) Processes signals from the sensors and mechanical counter (option)

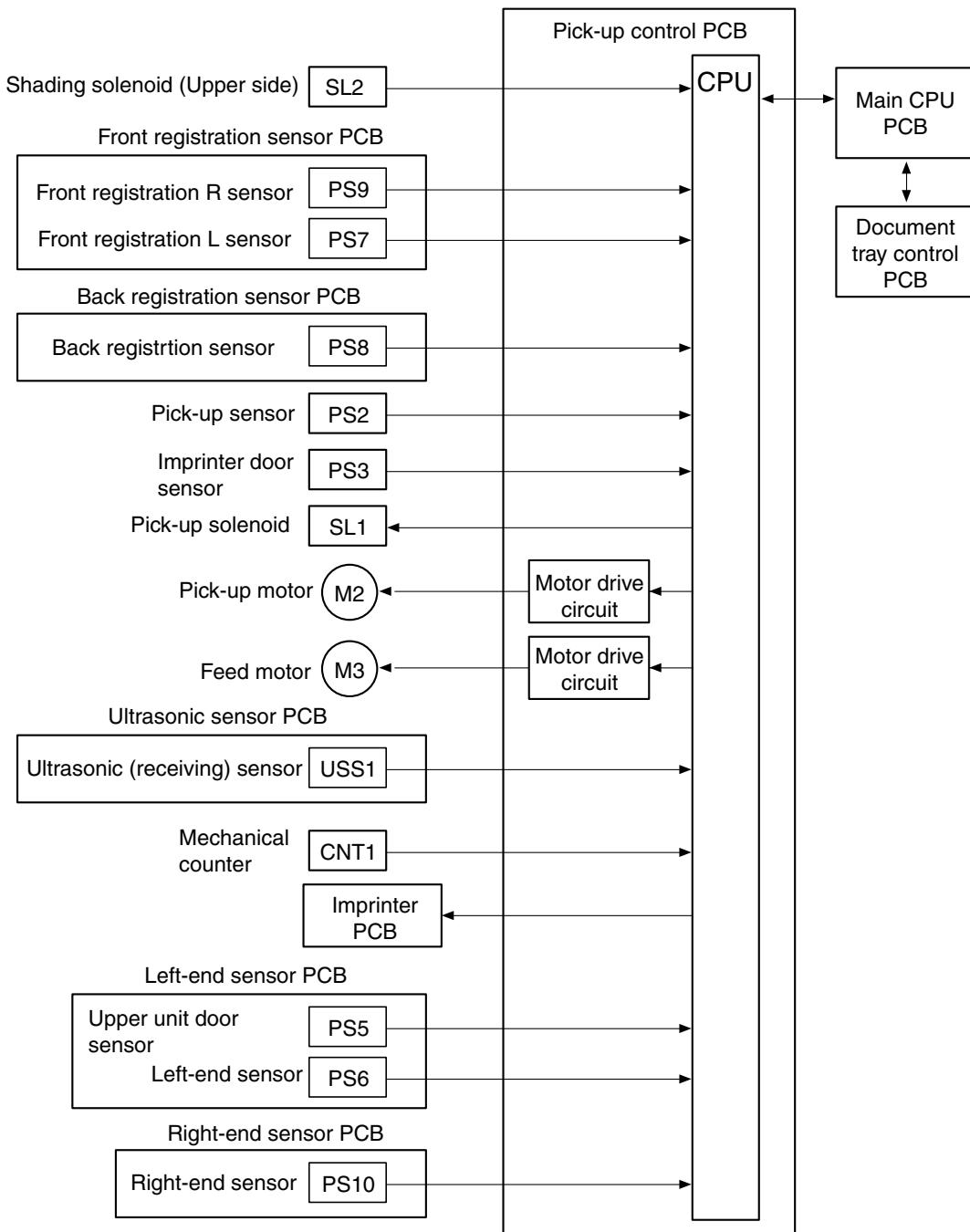


Fig. 2-402

3. Document Tray Control PCB (10_SUB)

Fig. 2-403 shows a block diagram of the document tray control PCB (10_SUB). The CPU mounted on the document tray control PCB performs the following functions.

- 2) Receives instructions from the main CPU PCB assembly to control the registration clutch
- 3) Processes signals from the sensors
- 4) Controls the staple LED PCB

- 1) Receives instruction from the pick-up control PCB to control the retard roller and document tray motor

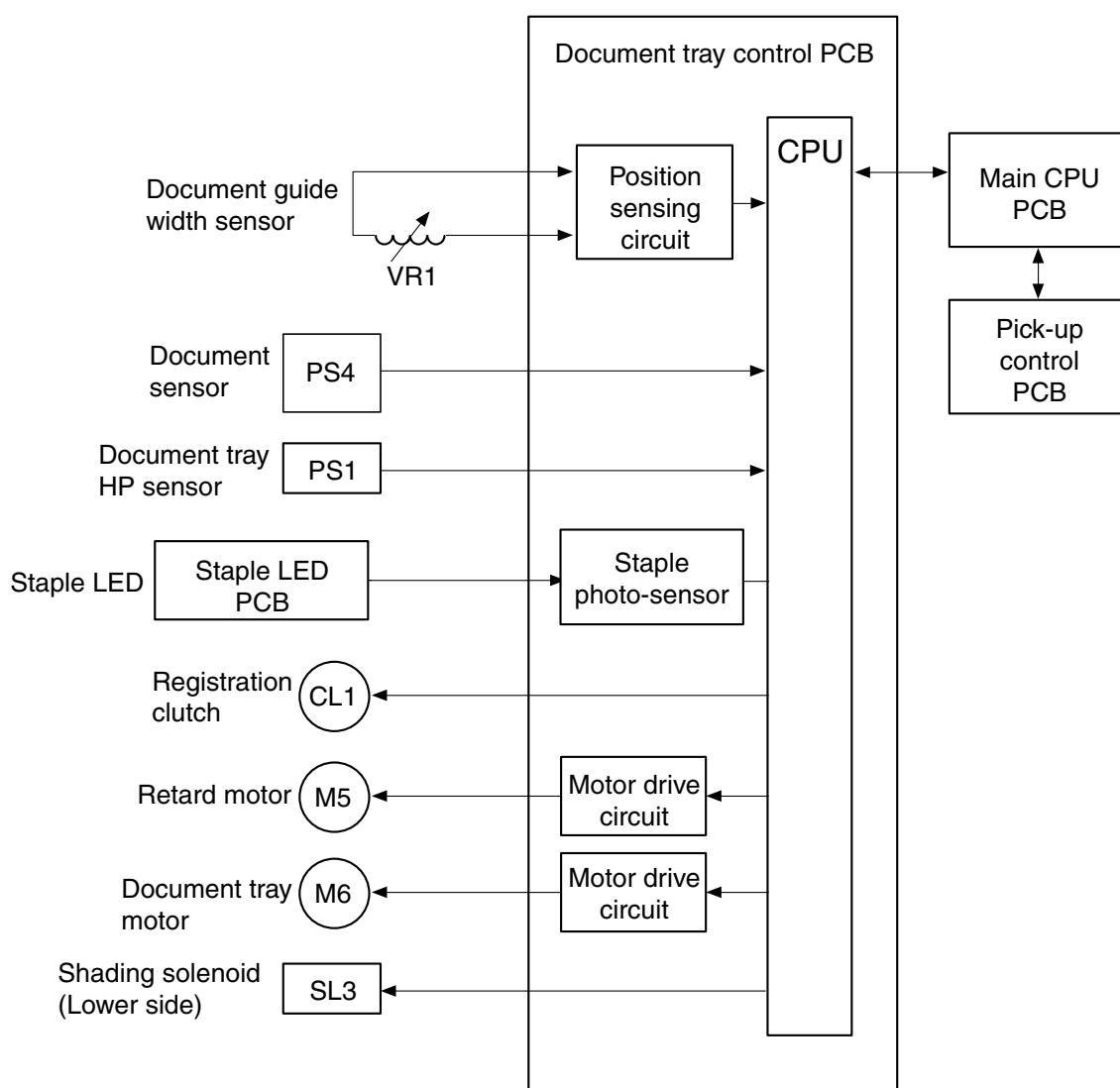


Fig. 2-403

V. IMAGE PROCESSING

1. Image Processing Within the Unit

Fig. 2-501 shows a block diagram of the image processor.

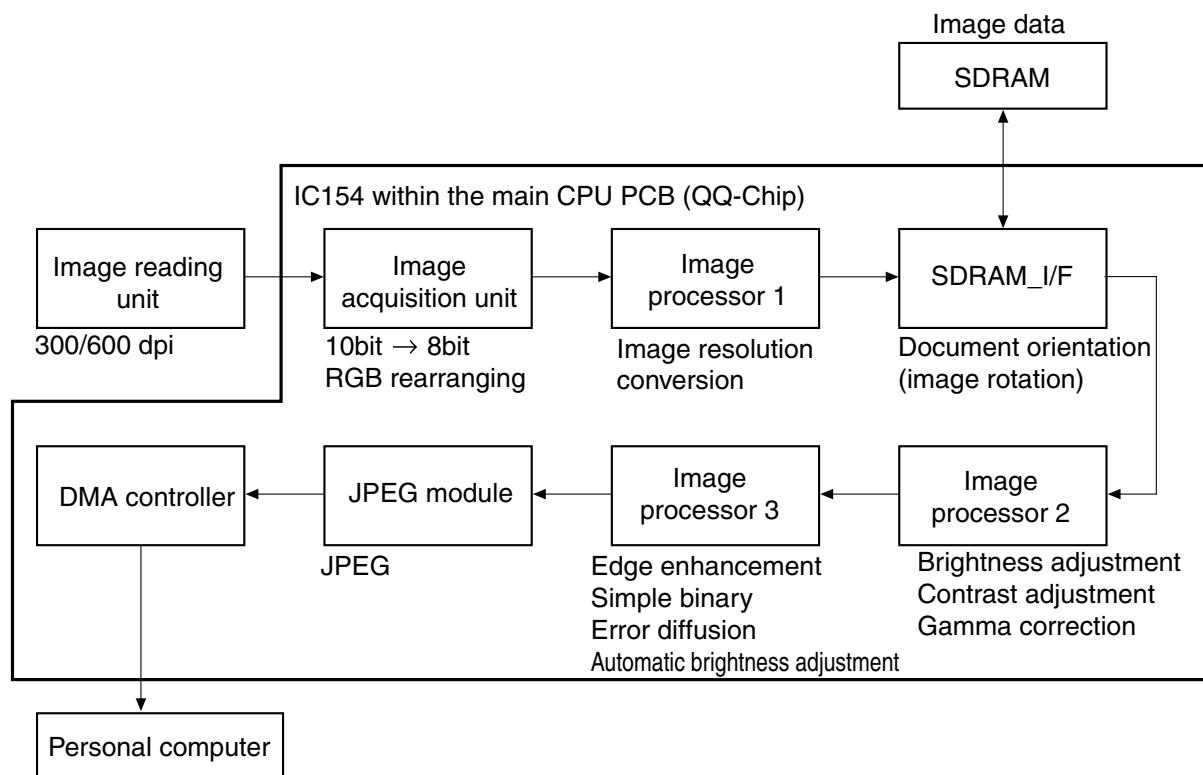


Fig. 2-501

The image processing within the machine is performed in IC154 (QQ-Chip) within the main CPU PCB.

With the reading unit, the optical resolution can be switched between 600 dpi and 300 dpi from the personal computer. For example, when the resolution set in the personal computer is 300 dpi or less (300, 240, 200, 150, 100), the optical resolution of the unit is set to 300

dpi. And, when 400 dpi or 600 dpi is set on the computer side, 600 dpi is set on the reading unit side. The image data scanned by the unit are processed (A/D conversion and shading correction) within the unit, and then are output as 10-bit digital signals to the main CPU PCB.

Since the data are processed as 8 bits within the machine, they are converted from 10 bits to 8 bits at the Image acquisition unit. And, for colored image data, RGB rearranging is executed.

- 10 bits to 8 bits
- RGB rearranging

The QQ-Chip used in this machine is designed to handle future multi-stream processing. Image processors 1 and 2 for conducting equivalent processing are provided within the QQ-Chip. However, since the software is not available for the earlier model, both processors serve to conduct the processing of image data. A multi-stream function can output different modes of data from a single scan. The description below describes the image processing in the earlier model where the multi-stream function is not available.

Image resolution conversion is carried out by image processor 1. For converting resolution, one of two methods, thinning-out and smoothing, is used according to the image mode. The smoothing process also helps to reduce moire patterns.

The image data are stored in the SDRAM, and accessed via the SDRAM_I/F (Interface).

Image processor 2 handles brightness adjustment, contrast adjustment, and gamma correction.

Image processor 3 handles edge emphasis, simple binarizing, error diffusion, and automatic brightness adjustment. The automatic brightness adjustment is valid for simple binary mode.

In the JPEG module, the grayscale and color data can be compressed. When JPEG is selected, the image data size is reduced by compression within this machine so that it can be transferred to the personal computer in less time. As a result, more documents can be scanned in a given time.

Finally, processed image data are sent from the DMA controller to the computer either through the SCSI or USB interface.

Other image processing is carried out on the personal computer.

2. RGB rearranging

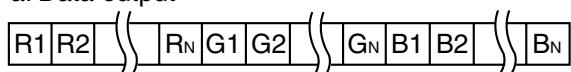
An RGB rearranging diagram is shown in Fig. 2-502.

For colored images, the data is output from the reading unit in the order R, G, B for each line. (Refer to 2-502-a)

The Image acquisition unit rearranges the data in the order of RGB for each pixel.

For instance, if there were 5 pixels in a line, the data output from the reading unit would be "R1, R2, R3, R4, R5, G1, G2, G3, G4, G5, B1, B2, B3, B4, B5". After the rearrangement, the data would be "R1, G1, B1, R2, G2, B2, R3, G3, B3, R4, G4, B4, R5, G5, B5".

a. Data output



b. RGB rearrangement

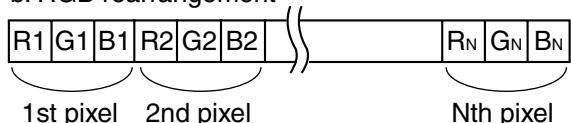


Fig. 2-502

3. Image Resolution Conversion

In this mode, the image resolution conversion differs according to the image mode. Thinning-out is available for binary mode, smoothing is available for grayscale mode, and either one is selectable for color mode.

The resolution in the main-scanning direction is the same as in the sub-scanning direction.

The optical resolution (main-scanning direction) of the reading unit can be switched between 600 and 300 dpi. Therefore, when 400 dpi is selected, the resolution is converted from 600 dpi, and when 240 dpi or less is selected, it is converted from 300 dpi.

a) Thinning-out method

For the main-scanning direction, the image resolution conversion is executed by thinning out the standard clocks for image processing. (Refer to Fig. 2-503)

When converting to 200 dpi, the standard 300 dpi clock is used, with 1 clock pulse removed from every 3 pulses. When converting to 240 dpi, 1 clock pulse is removed from every 5 pulses. And, when converting to 400 dpi, the standard 600 dpi clock is used with 1 clock removed from every 3 clock pulses.

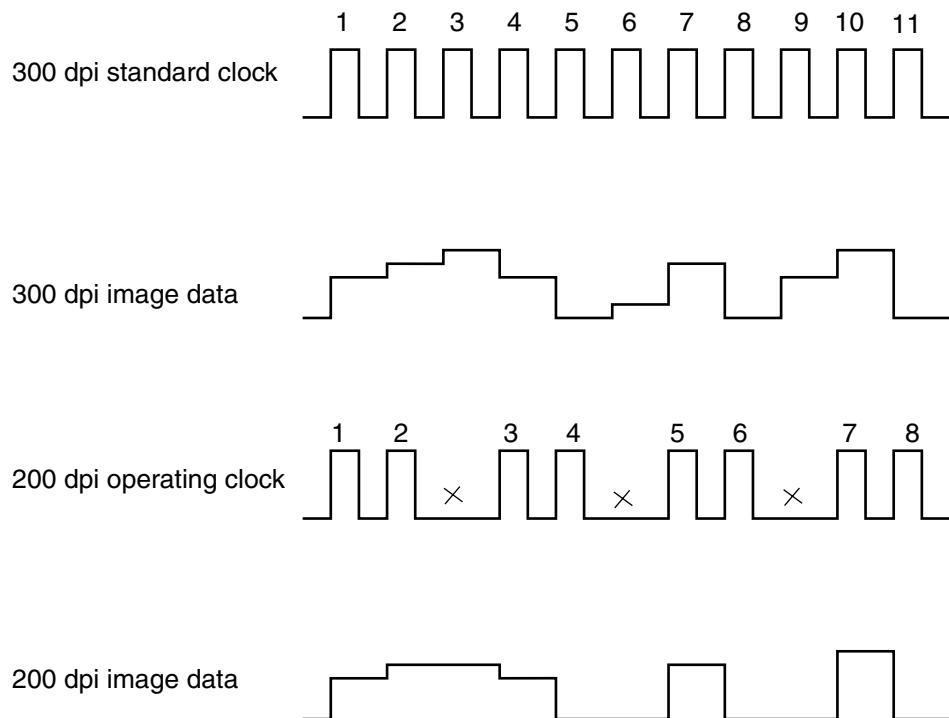


Fig. 2-503

The document is scanned in the sub-scanning direction basically by changing the feed speed.

In the case of 200 dpi, feed speed is 1.5 times that for 300 dpi. In the case of 150 dpi, it is twice the speed, and in the case of 100 dpi, three times the speed used for 300 dpi.

Since the timing for reading the data from the image sensor (CIS) is the same, the resolution in the sub-scanning direction can be converted by changing the feed speed. (Refer to Fig. 2-504a)

For low resolution binary and grayscale modes (the original data for both is grayscale), the feed speed must be raised excessively high. The feed speed can be increased by raising the motor speed. However, since the motor speed is limited, the feed speed is also limited, and therefore the thinning-out processing is executed by image processor 1. (Refer to Fig. 2-504b)

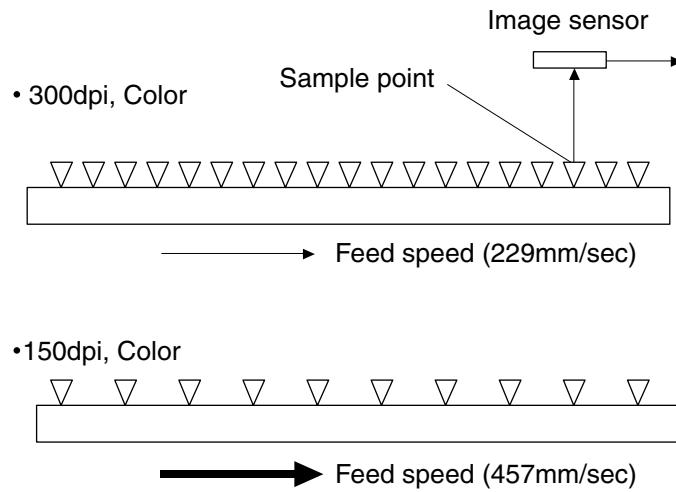


Fig. 2-504a

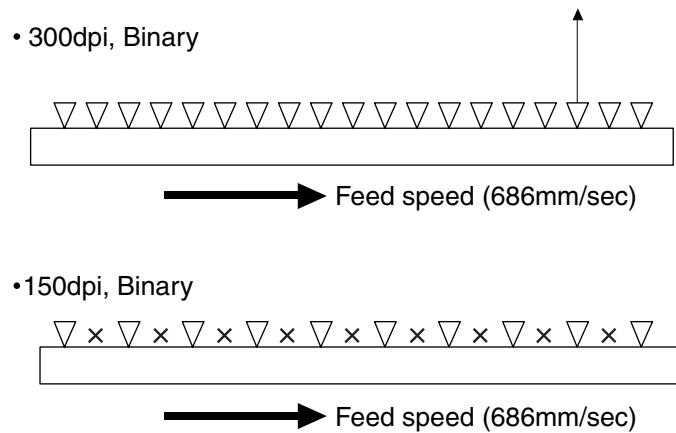


Fig. 2-504b

b. Smoothing method

The image resolution conversion by averaging is called "smoothing."

Smoothing method conversion enables the data to be smoothly transformed much better than that by thinning-out method, resulting in reducing the occurrence of Moire patterns. Smoothing is especially useful for low-resolution photographs, but the time required for the processing is longer than that for thinning-out.

Smoothing is not performed in binary mode since Moire patterns are not usually a problem.

For grayscale mode, smoothing is always performed because the number of scanned documents is not decreased even by smoothing.

For color mode, Smoothing can be selected by the user. When the optical resolution of the reading unit is 600 dpi (or 300 dpi), smoothing to 600 dpi (or 300 dpi) is not carried out.

When the resolution is set to 600 or 400 dpi on the personal computer, the reading unit reads the documents at 600 dpi. When 300 dpi or less is selected, the unit reads the documents at 300 dpi. Subsequently, the data of 600 dpi (or 300 dpi) resolution are calculated according to the selected resolution. The calculation is as follows.

- The reading unit reads the document at 600 or 300 dpi.

A	B	C	D	E	F	...
---	---	---	---	---	---	-----

- The data are calculated according to the selected resolution. An example of conversion from 300 dpi to 150 dpi is as follows:

(A+B)/2	(C+D)/2	(E+F)/2	...
---------	---------	---------	-----

The resolution of the sub-scan is converted by changing the feed speed, the same principle as the resolution conversion by thinning-out method.

Fig. 2-505 shows the aspects of 300 x 300 dpi image data and the image data smoothed to 150 x 150 dpi.

- 300 x 300 dpi

1st line	A	B	C	D	E	F	G	H	→	→
2nd line	A	B	C	D	E	F	G	H	→	→
3rd line	A	B	C	D	E	F	G	H	→	→
4th line	A	B	C	D	E	F	G	H	→	→
5th line	A	B	C	D	E	F	G	H	→	→
6th line	A	B	C	D	E	F	G	H	→	→

- 150 x 150 dpi

1st line	(A+B)/2	(C+D)/2	(E+F)/2	(G+H)/2	→
2nd line	(A+B)/2	(C+D)/2	(E+F)/2	(G+H)/2	→
3rd line	(A+B)/2	(C+D)/2	(E+F)/2	(G+H)/2	→

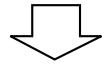


Fig. 2-505

4. Data Conversion

To improve the reproducibility of original documents and modify the acquired image as required by the user, it is possible to convert the original image data using conversion tables. This machine provides various conversion tables adjusted for image mode and setting value. However, there are several adjustment items not available for image mode and other conditions. For details, refer to the driver software "Help" function.

The conversion tables below are for fundamental items and may be different from actual items.

1) Brightness adjustment

This adjusts the overall brightness of the scanned image. The image brightness increases as the setting value becomes larger, and decreases as the value becomes smaller. For automatic brightness adjustment in Black & White mode, refer to the "Binarizing" section.

2) Contrast adjustment

This adjusts the contrast of the scanned image. The image contrast increases as the setting value becomes larger, and decreases as the value becomes smaller.

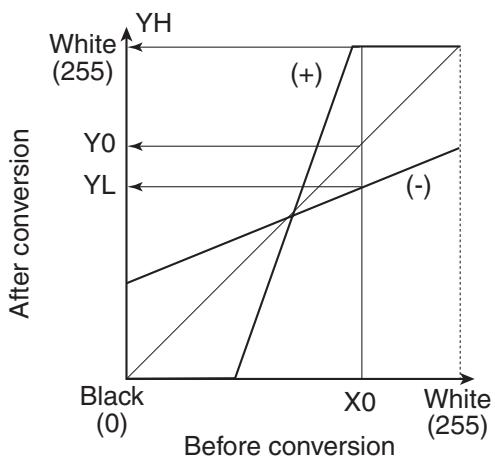


Fig. 2-507

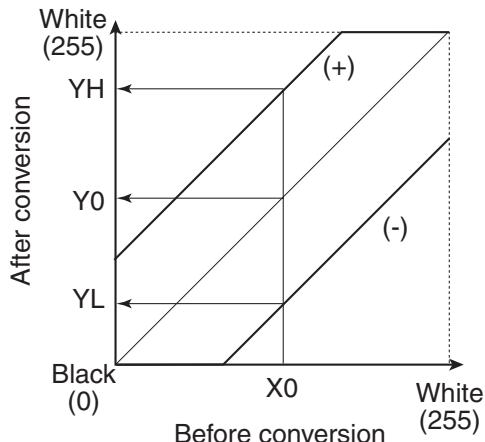


Fig. 2-506

3) Gamma correction

This is used when data conversion other than brightness and contrast adjustments is required.

It is possible for the user to use a custom conversion table for converting the gamma of the original image data. In this case, the brightness and contrast adjustments become invalid.

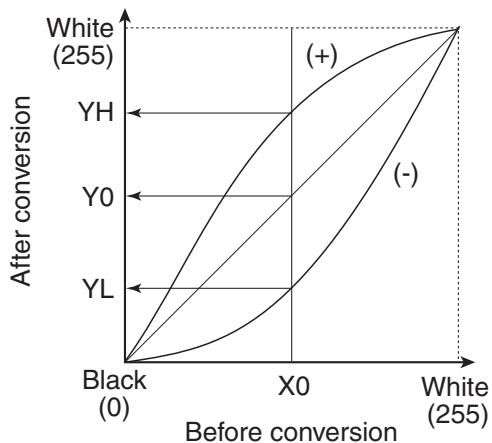


Fig. 2-508

5. Edge Emphasis

Edge emphasis is a kind of processing which emphasizes light and shade in order to make the image appear sharp. (Fig. 2-509)

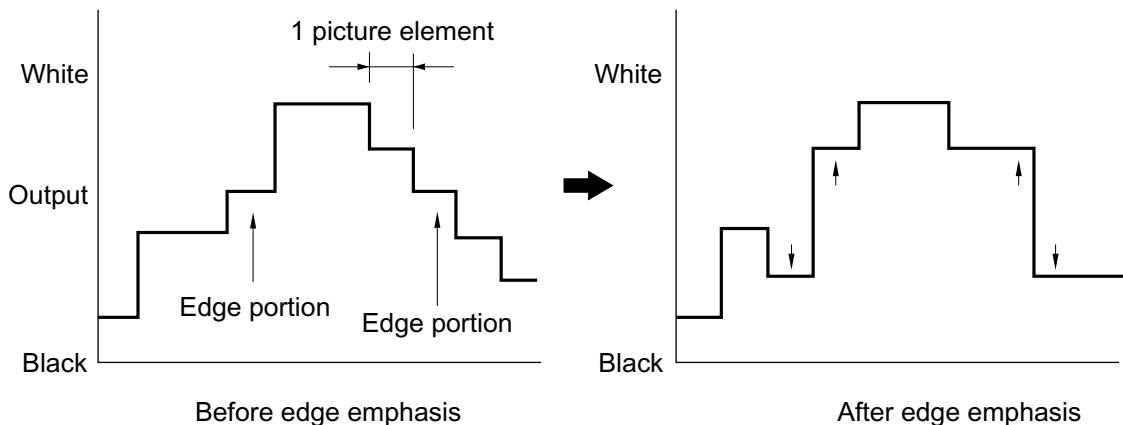


Fig. 2-509

Density processing is performed by comparing the data in the conversion table provided for performing edge emphasis, with the target picture element. (Refer to Fig. 2-510.)

The stages in edge emphasis can be changed by changing the conversion table and reproduction ratio (B) of the conversion table.

If the density of the target picture element is increased fourfold and the density of the other four points multiplied by -1, the overall density will remain unchanged.

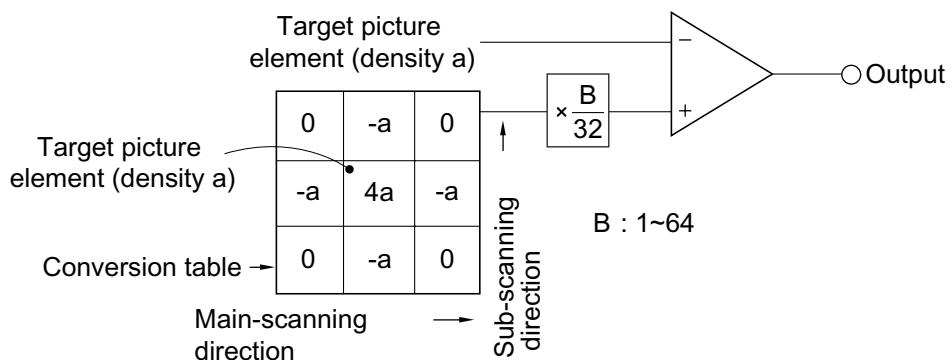


Fig. 2-510

6. Binarizing

Image binarizing is described below. For the "Advanced text enhancement," refer to the section entitled "IMAGE PROCESSING IN THE COMPUTER."

1) Simple Binarizing

Binary image data can only express picture elements as either "black" or "white."

In order to separate the picture elements into black and white, signals corresponding to the image density of the document must be cut off at a certain level, so that anything above that level is judged as "white" and anything below as "black." This is called simple binarizing. This is useful for text documents. Simple binarizing for this machine is called "Black and White" mode.

The level at which picture elements are to be divided into white or black is called the "slice level" (or threshold value).

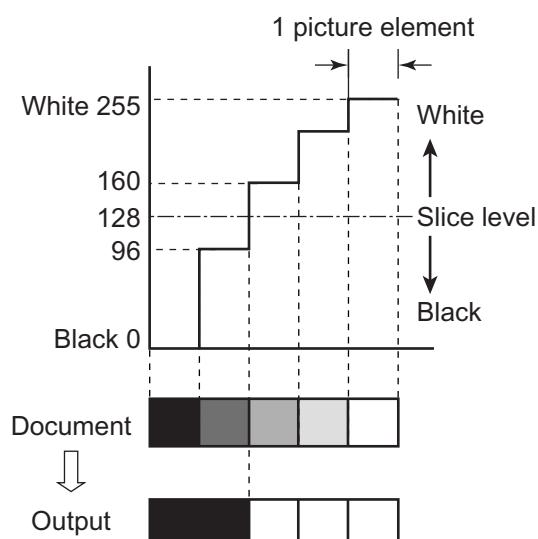


Fig. 2-511

2) Error Diffusion

Error diffusion processing is used to binarize documents containing gray levels, such as pictures and photos.

A sample case is shown below, where the output is set to 4 bits and the slice level is set to 8.

The value of 1 picture element of input image data is compared with the slice level. When it is smaller than the slice level, it is output as "0" and

when it is bigger than the slice level, it is output as “15”.

The difference between the values of the input and output picture elements is then added to the next picture element to be processed.

First, when processing the first low of Line 1, since the data “12” is larger than the slice level “8”, the output data becomes “15”, and the resultant error becomes $-3(=12-15)$. (Refer to Fig. 2-512.)

First row of line 1

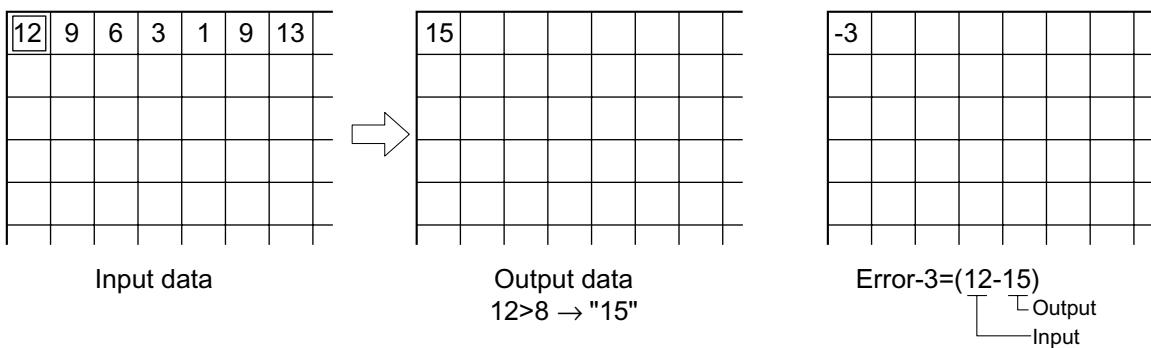


Fig. 2-512

Next, when processing the second row of Line 1, since the error is diffused to the right, the data of the picture element of the second row of Line 1 becomes “6”($=9-3$).

As this value is smaller than the slice level, the output data is “0” and the error becomes “+6” $=[(9-3)-0]$. (Refer to Fig. 2-513.)

The third row of Line 1 and later are processed similarly.

Second row of line 1

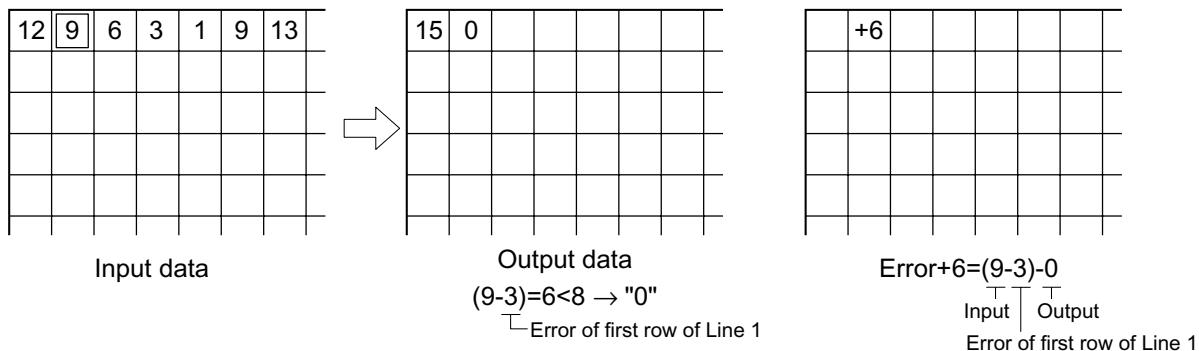


Fig. 2-513

Line 2 is processed using the first row of Line 2 as a reference. If the rest is processed similarly, the data becomes as shown in Fig. 2-514.



12	9	6	3	1	9	13	
10	13	5	4	2	7	13	
9	12	6	3	1	10	9	
11	8	5	0	3	5	10	
12	9	2	7	6	9	11	

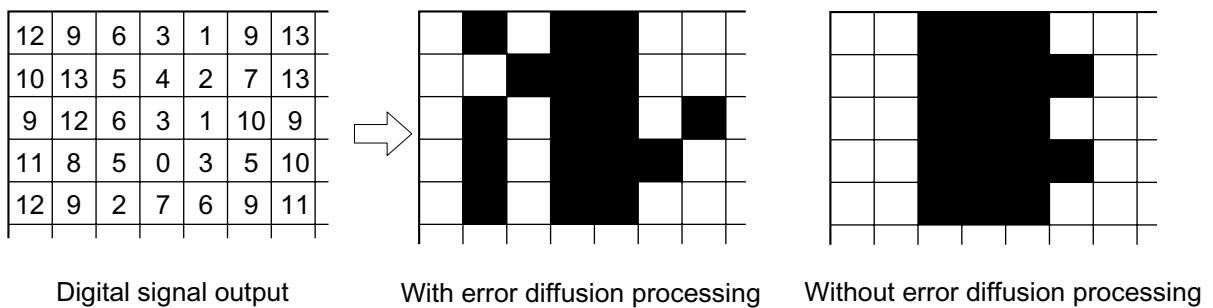
15	0	15	0	0	0	15	15
15	15	0	0	0	0	15	15
15	0	15	0	0	0	15	0
15	0	15	0	0	0	0	15
15	0	15	0	0	0	15	15

Input data

Output data

Fig. 2-514

Fig. 2-515 shows a comparison of binarizing with error diffusion processing, and binarizing without error diffusion processing (simple binarizing).



Digital signal output

With error diffusion processing

Without error diffusion processing

Fig. 2-515

3) Automatic Brightness Adjustment

This adjustment automatically controls the brightness of the scanned image according to the density of the document's background in the simple binary mode.

The brightness is adjusted by assessing the brightness line by line, and adjusting the level for the next line to be scanned.

This process is known as ABC (Auto Back-ground Control).

When the number of pixels of specified brightness in a line exceeds the predetermined value for the document size, the brightest output is transformed gradually, line by line.

Fig. 2-516 shows the difference in output when reading a text document with a colored background.

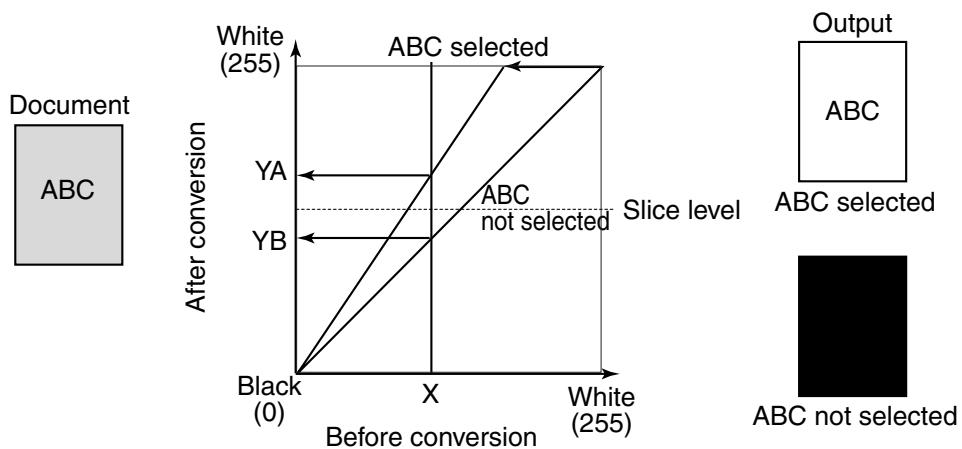


Fig. 2-516

7. Image Processing in the Computer

Various types of image processing can be executed in the personal computer, in addition to the processing executed in this machine.

- Advanced text enhancement
- Skew correction (deskew)
- Reverse image (invert image)
- Text orientation recognition
- Erase dots
- Erase notches
- Border removal
- Size detection, etc.

The main types of image processing are described below. For others, refer to the driver software "Help".

1) Advanced text enhancement

In this mode, a histogram of brightness level for each block within the scanned data is calculated, and an optimum slice level is determined to binarize the pixels.

Binarizing in this way removes the background, for example, from behind text printed on a background.

For example, as shown in the image in Fig. 2-517, a histogram for each block is calculated, and the optimum slice level is determined to binarize the pixels.

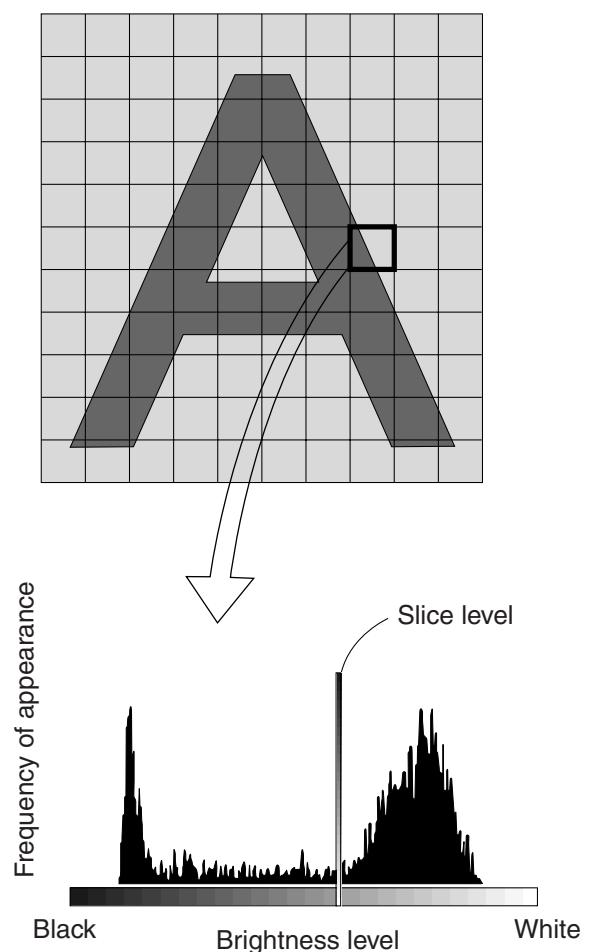


Fig. 2-517

2) Skew correction (Deskew)

When image skew correction (deskew) is enabled, the driver detects the angle of skew from the black frame that is formed. Then image data is loaded at a size slightly larger than the user-specified paper size. The skew angle is corrected for, so that the image data is restored to the set image size.

However, skew correction may not work properly if the document has dark areas on its left and right edges or if the brightness setting is incorrect.

"Skew correction (deskew)" and "margin scan" cannot be used simultaneously.

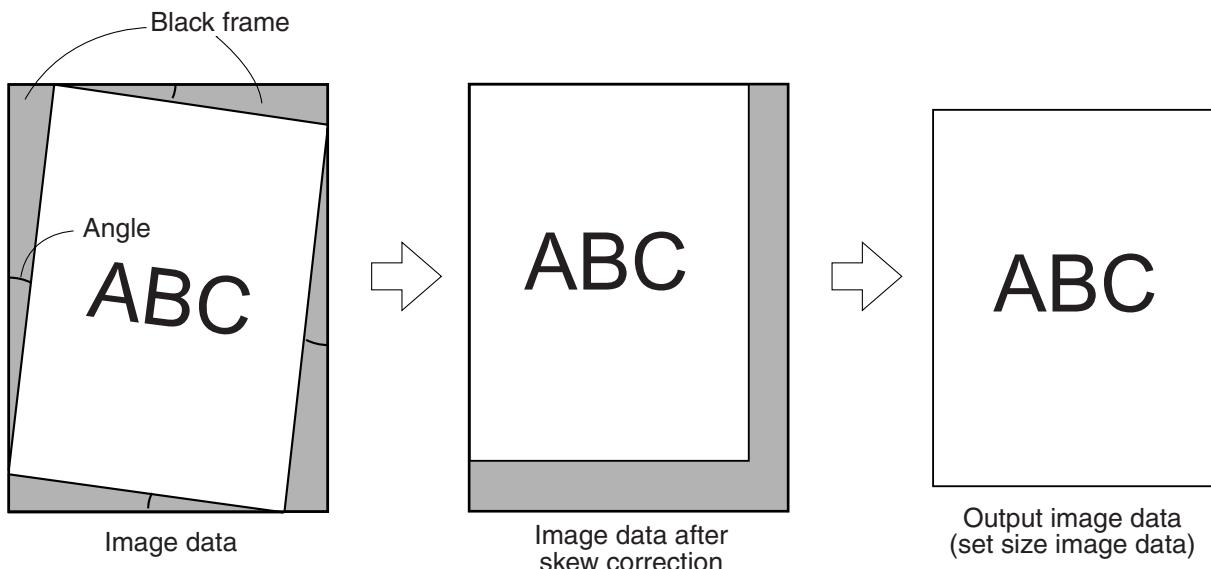


Fig. 2-518

VI. POWER SUPPLY

1. Outline

The DC power supply PCB of this machine is capable of handling power input of 100 to 240 VAC.

Fig. 2-601 shows a block diagram of the DC power supply PCB.

AC power is supplied to the DC power supply PCB by turning on the power switch.

The 100 to 240 VAC power is converted by a rectifying bridge to unsmoothed 100 to 240 VUN and sent to the booster assembly. At the booster

assembly, the power is temporarily raised to 380 VDC and then converted to DC.

A fuse is used in the DC power supply PCB to protect against over-current situations. + 24 VDC is output from the DC power supply PCB to the main CPU PCB (MAIN_DCON). The necessary voltage is generated by the switching regulator IC and FET on the main CPU PCB. (Refer to Fig. 2-602)

The DC voltages necessary for the pick-up control PCB (80_SUB) and document tray control PCB (10_SUB) are supplied from the main CPU PCB.

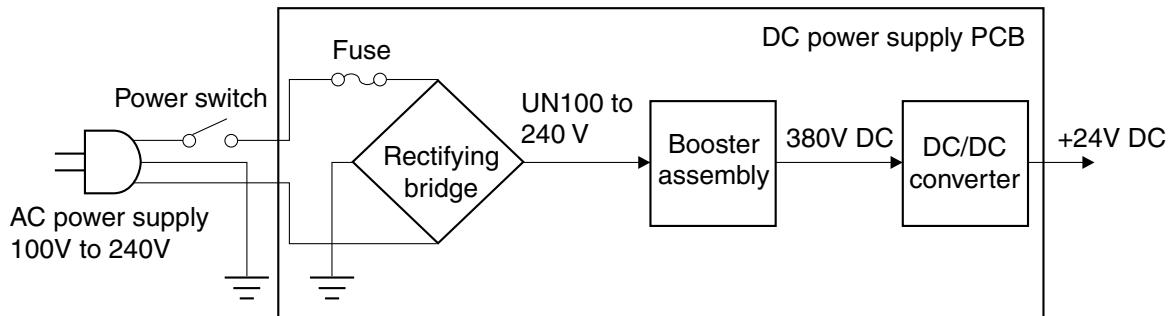


Fig. 2-601

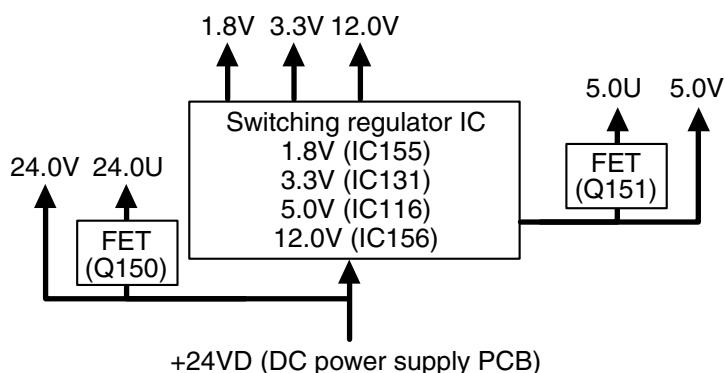


Fig. 2-602

2. Protection Function

The DC power supply PCB is a switching regulator type.

If the load is shorted and there is an over-current situation, the protection function is activated and the output is stopped.

Once the output stops, it can be automatically restored by turning the power switch off, eliminating the cause of the short circuit, discharging the capacitor (for about 10 minutes) and then turning on the power switch.

A fuse is used for protection on each PCB. If an excessive current flows into the DC/DC converter, the fuse blows and stops the power supply to the PCB.

A fuse is also used for protection of the main motor. If an excessive current flows in the + 24 VDC supplied to the main motor, the fuse blows and stops the power supply to the main motor.

3. Power Saving Mode

This machine will shift into the power saving mode if no key or pick-up operation takes place for 10 minutes or more, when the power is on. In the power saving mode, power consumption is minimized and the electrical circuits enter the "sleep" state. The CPUs, however, do not shift into power saving mode.

The machine shifts back to the standby mode when any communication is carried out on the computer side or when any key on the operation panel is pressed.

Setting the power saving mode is carried out in the user mode.

VII. INTERFACE

When sending data from this unit to a personal computer, the data is transmitted over an interface. This unit provides both SCSI-3 and USB 2.0 interfaces.

1. SCSI-3

SCSI-3 (Small Computer System Interface-3) is a Parallel Interface standard. This unit supports Ultra SCSI and the data transfer rate between the machine and the personal computer is up to 20 MB/sec.

Fig. 2-701 shows the data input/output between the machine and the computer, when connected with SCSI-3. Table 2-701 gives the signal descriptions for the SCSI connector. The connector numbers on the main CPU PCB are J105 and J121.

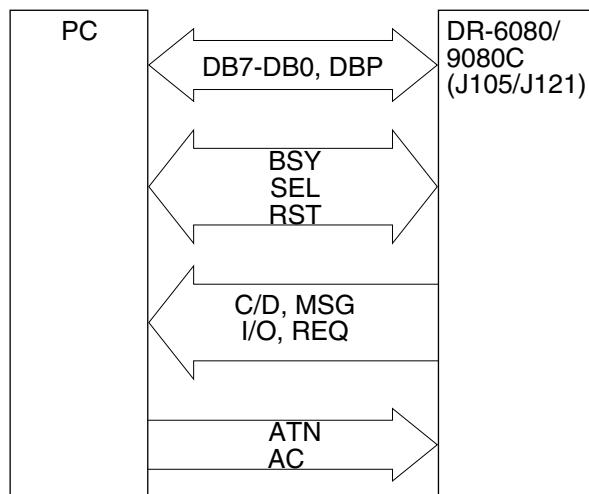


Fig. 2-701

Pin No.	Signal	Remarks
1-12	GND	(Ground)
13	OPEN	(No-connection)
14-25	GND	(Ground)
26	DB0*	(Data Bit 0)
27	DB1*	(Data Bit 1)
28	DB2*	(Data Bit 2)
29	DB3*	(Data Bit 3)
30	DB4*	(Data Bit 4)
31	DB5*	(Data Bit 5)
32	DB6*	(Data Bit 6)
33	DB7*	(Data Bit 7)
34	DBP*	(Odd Parity Data Bit)
35-37	GND	(Ground)
38	TERMPWR	(Termination Power)
39-40	GND	(Ground)
41	ATN*	(Attention)
42	GND	(Ground)
43	BSY*	(Busy)
44	ACK*	(Acknowledge)
45	RST*	(Reset)
46	MSG*	(Message)
47	SEL*	(Select)
48	C/D*	(Control/Data)
49	REQ*	(Request)
50	I/O*	(Input/Output)

The asterisk "*" at the end of the signal name denotes the signal is low-active.

Table. 2-701

The SCSI bus is made up of data signals (1 byte + parity bit = 9 signals) and control signals (9 signals) for a total of 18 lines.

2. USB 2.0

USB 2.0 (Universal Serial Bus 2.0) is a serial interface standard, and provides fast data transmission.

This machine supports High-Speed USB 2.0, and the data transfer rate between the unit and the personal computer is up to 480 Mbits/sec.

Fig. 2-702 shows the data input/output between the machine and the computer when connected with USB. Table 2-702 gives the signal descriptions for the USB connector. The connector number on the main CPU PCB is J124.

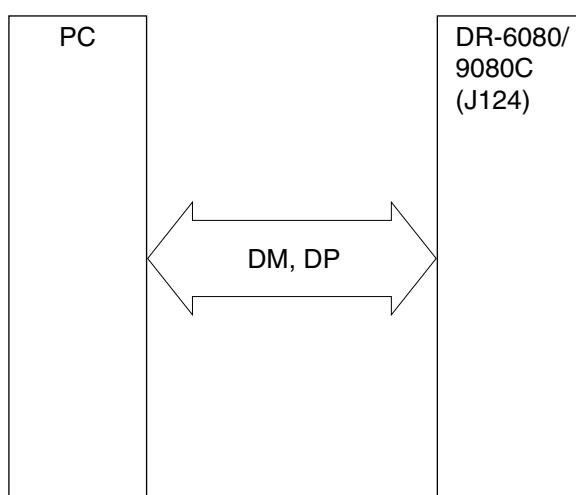


Fig. 2-702

Pin No.	Signal	Remarks
1	VBUS	Vcc (+5V)
2	DM	Differential signal(-)
3	DP	Differential signal(+)
4	GND	Ground

Table 2-702

USB is also referred to as a differential interface, and uses 2 signal lines for a single signal.

VIII. OPTION

1. IMPRINTER

An optional imprinter can be installed on the DR-6080/9080C to print specified text on the scanned documents. This imprinter is to be used with the ink cartridges made by Hewlett-Packard Company, with part numbers as follows: C6602R(Red), C6602G(Green), C6602B(Blue).

The imprinter should be installed by a service technician. For the procedure, refer to "CHAPTER 4: INSTALLATION & MAINTENANCE".

The specifications of the imprinter are shown in Table 2-801.

No	Item	Specification
1	Printing side	Front
2	Maximum number of characters	32
3	Contents to be printed 1) Text 2) Arrows 3) Date 4) Time 5) Counter 6) Counter-up 7) Counter increment 8) Reset 9) Value after reset	ASCII code (20H•7FH) ↑/↓/←/→ MDY/DMY/YMD hh:mm:ss Up to 9 digits, 2 levels New File/Per page/None Up to 9 digits New File/Per page/None Up to 9 digits
4	Font size	12 x 12 dots (Regular)/ 12 x 8 dots (small)
5	Orientation	0° / 90° / 180° / 270°
6	Power supply	Supplied from DR-6080/9080C
7	Consumables	Ink cartridge

Table. 2-801

2. Endorser

An optional endorser can be installed at the eject tray of the DR-6080/9080C to print an 8-digit number and a stamp on scanned documents, such as for checks. The ED600 for the DR-5020/5080C is used.

However, when the ED600 is used on the DR-6080/9080C, the feed and reading speeds are slowed. The maximum feed speed becomes the maximum feed speed of the ED600, 588 mm/sec. In the case of color at 400/600 dpi, the noise from the ED600 becomes high.

The endorser should be installed by a service technician. For the procedure, refer to "CHAPTER 4: INSTALLATION & MAINTENANCE". The specifications of the endorser are shown in Fig. 2-802.

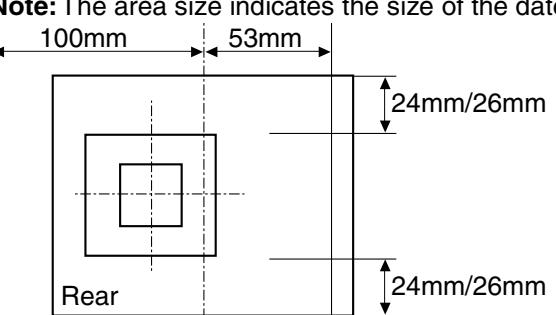
No.	Item	Specification
1	Printing method	Stamping
2	Supported Document Size 1) Width 2) Length 3) Thickness	130-257mm a) 70-93mm (Check mode) b) 70-297mm (A4 mode) a) 0.08-0.15mm (Auto feed) b) 0.08-0.20mm (Manual feed) Note: A4/Letter landscape feed is not supported
3	Stamping position 1) Width direction 2) Feeding direction	Slide the print unit manually from side to side. The range is 53mm to the left and 100mm to the right based on the center of the feed path. Make sure the stamping area does not deviate from the document. Control with the adjusting dial at the document feeder. Stamping is not executed if the travel distance exceeds the length of the document. a) Stamping area for the check mode In the center, within 24mm of either side b) Stamping area for the A4 mode In the center, within 26mm of either side Note: The area size indicates the size of the date area. 

Table. 2-802-a

No.	Item	Specification
4	Stamping area size	36mm (width) x 42mm (length) Note: The stamping size is 36mm x 40mm
5	Feed speed	shifts automatically according to the signal from the DR-6080/9080C. However, the maximum speed is 588 mm/sec.
6	Storage height of documents for stamping 1) Check mode 2) A4 mode	Up to 45mm (500 sheets or less) Up to 27mm (300 sheets or less)
7	Support for functions 1) Pre-paint 2) Jam detection 3) Stamp counter 4) Function sheet	Supported Supported Supported (displayed in the operation panel) Not supported
8	Outside dimensions	360 (W) x 156 (D) x 215 (H) mm
9	Weight	4.8kg (Including the die drum and the ink roller)
10	Power supply	Supplied from the DR-6080/9080C
11	Expected lifetime of the product	5 years of use or 6 million sheets scanned, whichever comes first. Note: Guide for the time to replace the ink roller is 0.2 million sheets.

Table. 2-802-b

3. Mechanical counter

A 7-digit mechanical counter can be installed on this machine to count the total number of documents fed. If the data of the software counter is lost, the mechanical counter can show the total number of documents fed.

After the mechanical counter is installed, the installation is recognized by the DR-6080/9080C. If the counter fails or is uninstalled, an error occurs and the DR-6080/9080C cannot be operated (error code: E31). Therefore, special attention should be paid.

The mechanical counter should be installed by a service technician. For this procedure, refer to "CHAPTER 4: INSTALLATION & MAINTENANCE".

4. Barcode module

The barcode module is an add-on that adds a barcode function to the ISIS/TWAIN driver. Installing the barcode module on the personal computer enables barcode symbols to be interpreted. The barcodes supported by this module are EAN/JAN, CODABAR, CODE39, ITF, CODE128, UPC-A, and UPC-E.

The barcode module can be installed by the user.

IX. LAYOUT OF ELECTRICAL COMPONENTS

1. Switches and Sensors

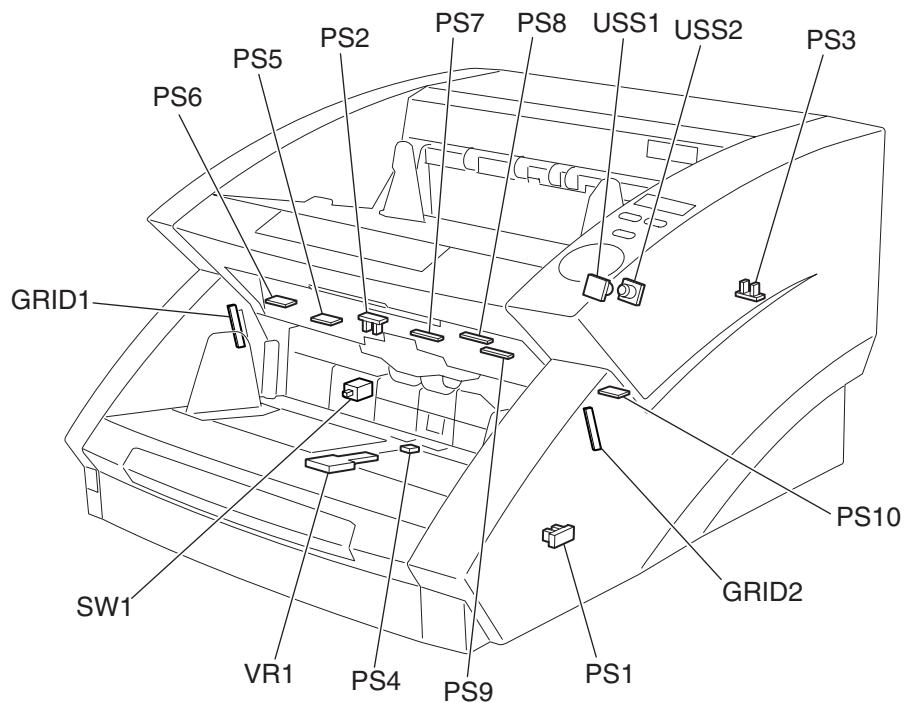


Fig. 2-901

Category	Name	Code	Function
Switch	Power switch	SW1	Turning the power ON/OFF.
Sensor	Document tray HP sensor	PS1	Detecting the HP (home position) of the document tray.
	Pick-up sensor	PS2	Detecting documents at pick-up.
	Imprinter door sensor	PS3	Detecting if the imprinter door is open or closed.
	Document sensor	PS4	Detecting if there are documents on the document tray.
	Upper unit door sensor	PS5	Detecting if the upper unit is open or closed.
	Left-end Sensor	PS6	Detecting document skew. (Left end)
	Front registration L sensor	PS7	Detecting documents at the front registration roller. (Left side)
	Back registration sensor	PS8	Detecting documents at the back registration roller.
	Front registration R sensor	PS9	Detecting documents at the front registration roller. (Right side)
	Right-end sensor	PS10	Detecting document skew. (Right end)
	Ultrasonic (receiving) sensor	USS1	Detecting double feeds.
	Ultrasonic (transmitting) sensor	USS2	
	Staple LED	GRID1	Detecting the jumping up of stapled documents.
	Staple photo-sensor	GRID2	
	Document guide width sensor	VR1	Detecting the width of documents.

Table 2-901

2. Motors, Clutches and Solenoids

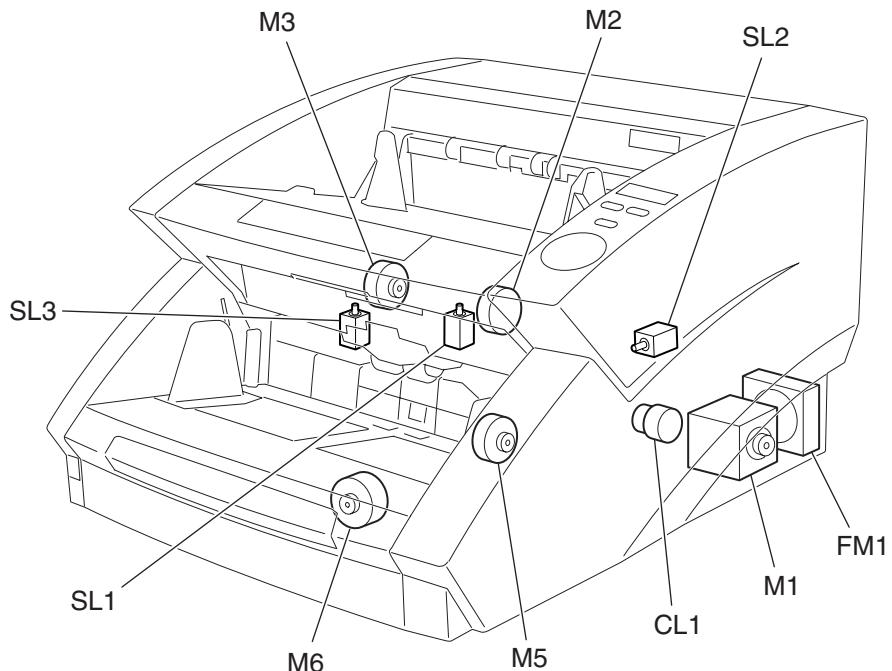


Fig. 2-902

Category	Name	Code	Function
Motor	Main motor	M1	Feeding documents.
	Pick-up motor	M2	Starting/Stopping the pick-up roller.
	Feed motor	M3	Starting/Stopping the feed roller.
	Retard motor	M5	Starting/Stopping the retard roller.
	Document tray motor	M6	Raising and lowering the document tray.
Fan	Exhaust fan	FM1	Cooling the inside of the unit.
Clutch	Registration clutch	CL1	Starting/Stopping the registration roller.
Solenoid	Pick-up solenoid	SL1	Raising the pick-up roller.
	Shading solenoid (Upper side)	SL2	Activating the shading plate of the back reading unit.
	Shading solenoid (Lower side)	SL3	Activating the shading plate of the front reading unit.

Table 2-902

3. PCB and Units

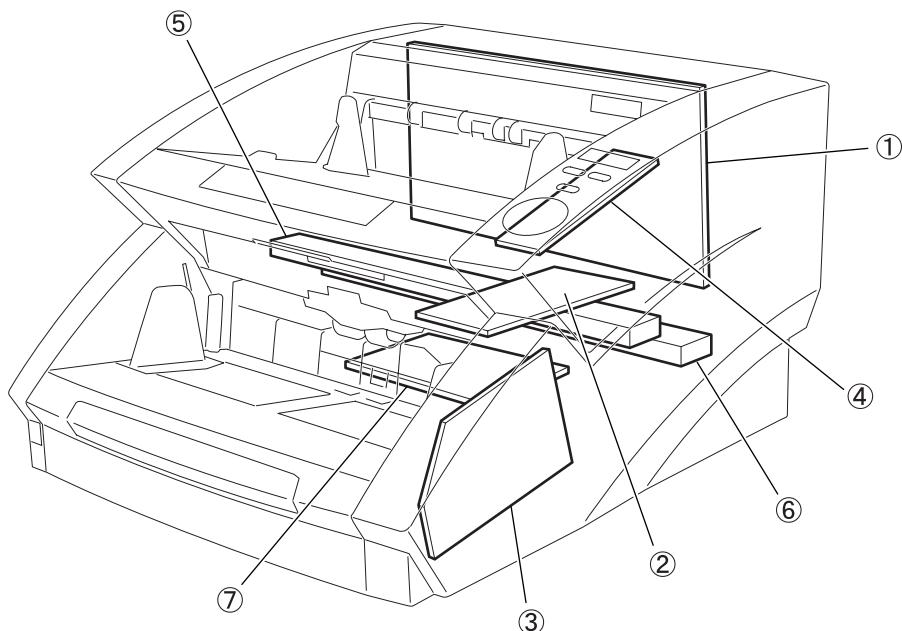


Fig. 2-903

No	Name	Function
①	Main CPU PCB (MAIN_DCON)	Processing images and overall control.
②	Pick-up control PCB (80_SUB)	Controlling document pick-up.
③	Document tray control PCB (10_SUB)	Controlling the document tray and the retard roller.
④	Operation panel PCB	Displaying the counter and errors.
⑤	Front reading unit	Reading the front side of documents.
⑥	Back reading unit	Reading the back side of documents.
⑦	DC power supply PCB	Supplying DC power.

Table 2-903

Note: For information on the PCBs related to sensors, refer to “1. Switches and Sensors”.

X. LIST OF CONNECTORS, SWITCHES & LEDS FOR EACH PCB

Shown below are the connectors, setting switches and LEDs for the main CPU PCB, pick-up control PCB, and the document tray control PCB.

The electrical parts not included in the list are set by the factory, and the adjustment or checking of these parts requires special tools and

measuring instruments as well as special skill. Therefore, take care not to touch these parts. Do not use the parts labeled "DO NOT USE."

Note: This machine does not include any potentiometers that requires adjustment in the market.

1. Main CPU PCB (MAIN_DCON)

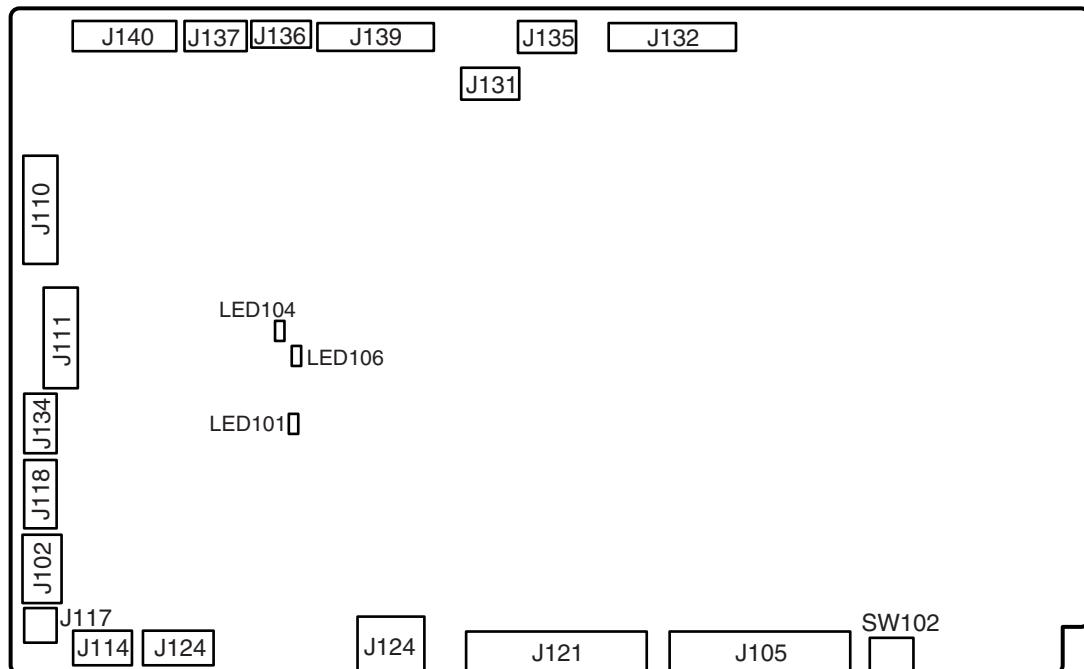
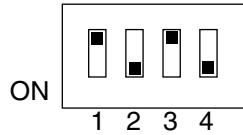


Fig. 2-1001

LED No.	Indication
LED101	Flashing when working normally (Checking the CPU operation.)
LED104	Lit when +24V is normal
LED106	Lit when +5V is normal

Table 2-1001

SW No.	Setting	Setting			
		1	2	3	4
SW102	Switches related to the SCSI interface 1 to 3: For setting the SCSI ID. 4: Turns the termination ON/OFF. Default setting Terminator: ON SCSI ID: 2 	OFF	OFF	OFF	OFF
		ON	OFF	OFF	OFF
		OFF	ON	OFF	OFF
		ON	ON	OFF	OFF
		OFF	OFF	ON	ON
		ON	OFF	ON	ON
		OFF	ON	ON	ON
		ON	ON	ON	ON

Note: The switch settings should only be changed when the power is OFF.

Table 2-1002

2. Pick-up Control PCB (80_SUB)

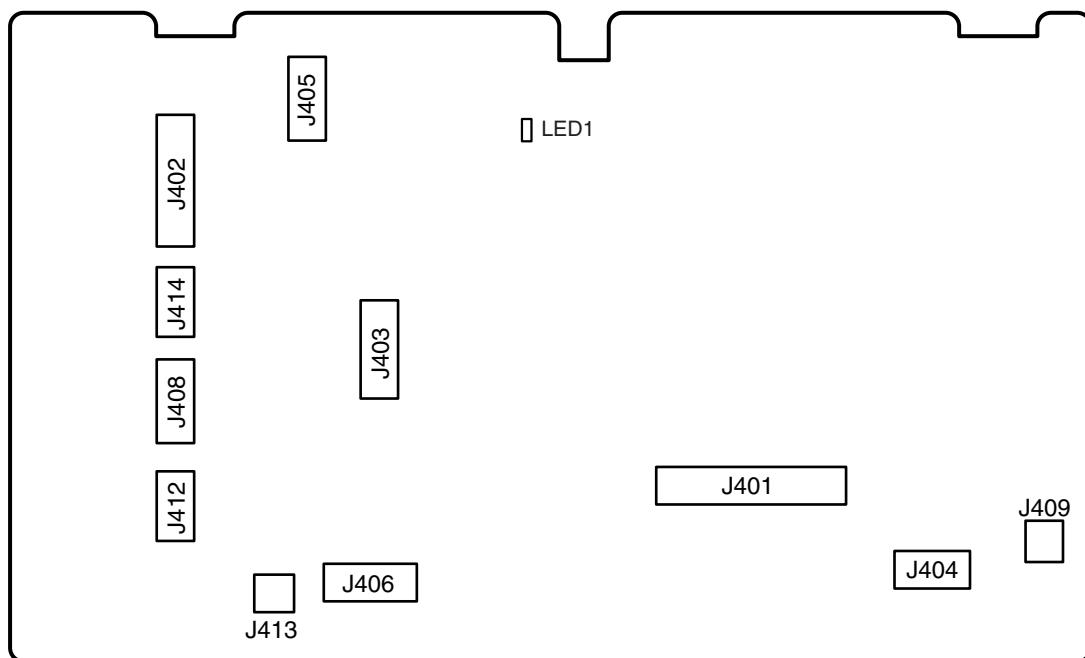


Fig. 2-1002

LED No.	Indication
LED1	Flashing when working normally

Table 2-1003

3. Document Tray PCB (10_SUB)

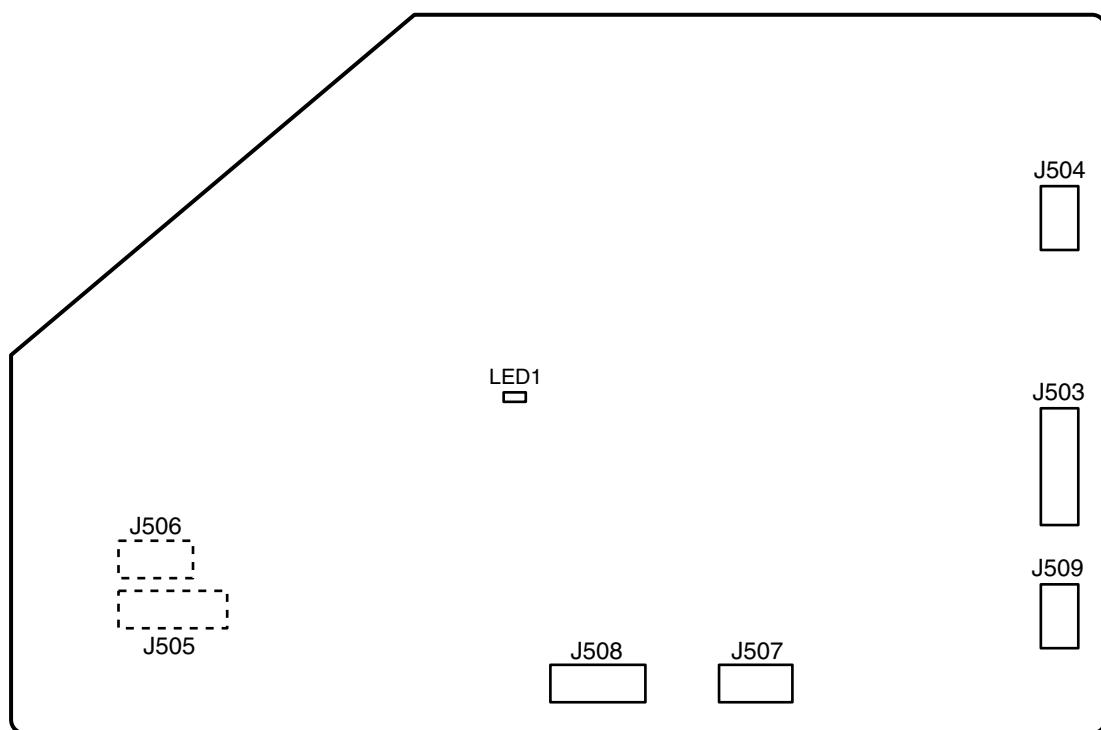


Fig. 2-1003

LED No.	Indication
LED1	Flashing when working normally

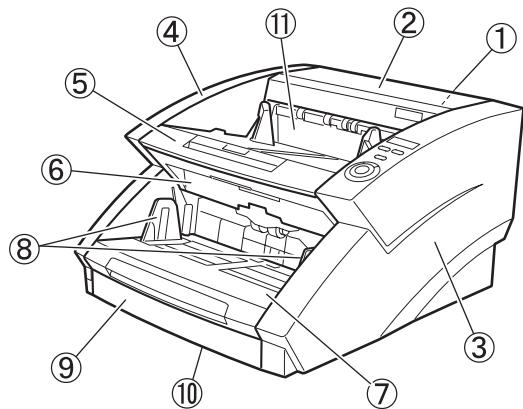
Table 2-1004

CHAPTER 3

DISASSEMBLY & REASSEMBLY

I. EXTERNAL ASSEMBLY	3-1	IV. READING SECTION.....	3-35
II. DRIVE SYSTEM (MOTORS).....	3-12	V. ELECTRICAL PARTS	3-38
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I. EXTERNAL ASSEMBLY

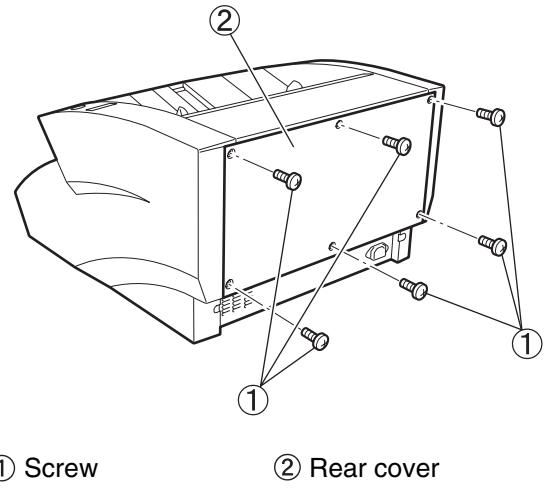


- ① Rear cover
- ② Top cover
- ③ Right cover
- ④ Left cover
- ⑤ Upper delivery cover
- ⑥ Front delivery cover
- ⑦ Document tray
- ⑧ Document guide
- ⑨ Document tray front cover
- ⑩ Lower front cover
- ⑪ Upper unit

Fig. 3-101

1. Rear cover

- 1) Remove six screws ①, then remove the rear cover ②.



① Screw

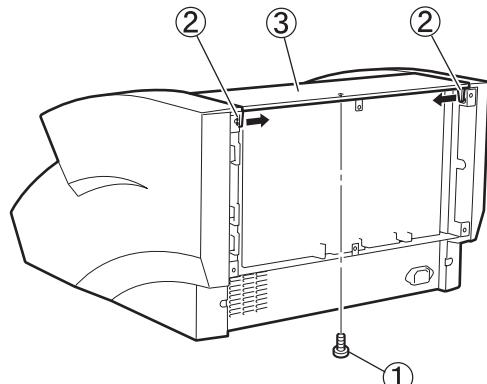
② Rear cover

Fig. 3-102

Note: When all the screws are removed, hold the rear cover, since it can fall off.

2. Top cover

- 1) Remove the rear cover.
- 2) Remove one screw (self-tapping) ①, release two hooks ②, and take off the top cover ③.



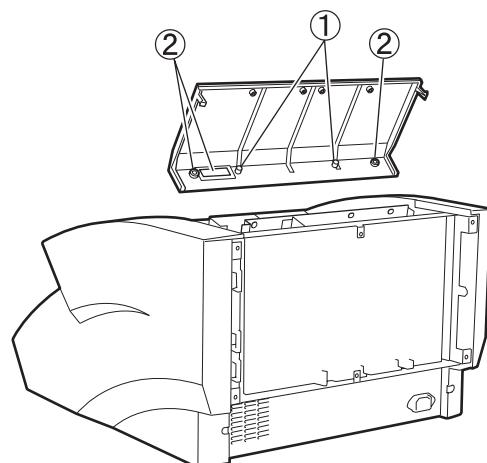
① Screw
③ Top cover

Fig. 3-103

Note: Note that the blind plates A/B may fall off (see Fig. 3-104).

Precautions during assembly

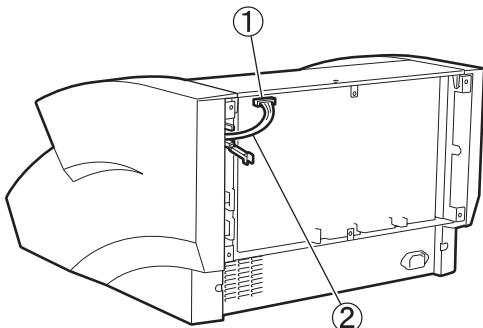
- Insert the positioning boss ① of the top cover into the hole in the main body.



① Boss
② Blind plate A/B

Fig. 3-104**3. Right cover (assembly)**

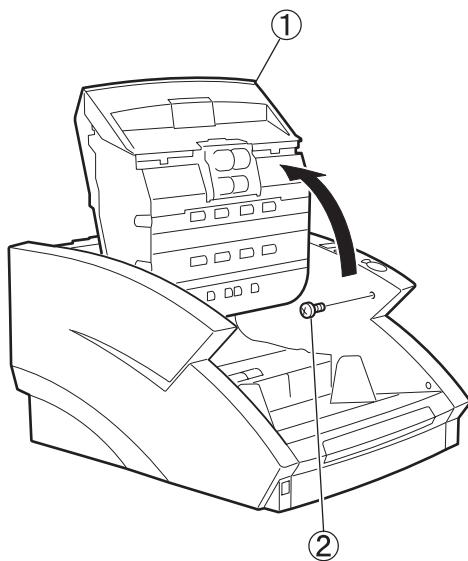
- 1) Remove the rear cover.
- 2) Unhook the connector ① and pull out the cable assembly ②.



① Connector
② Cable assembly

Fig. 3-105

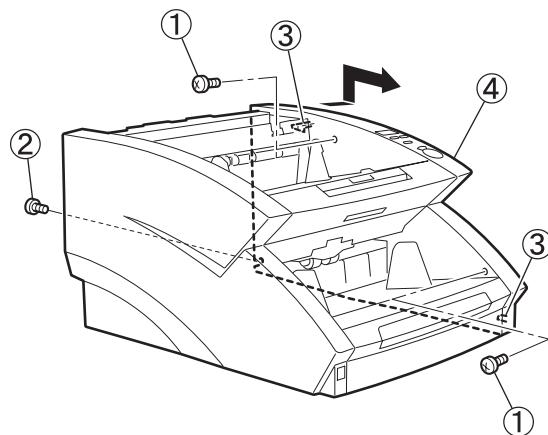
- 3) Open the upper unit ① to remove one screw ②.



① Upper unit
② Screw

Fig. 3-106

4) Close the upper unit and remove two screws A (self-tapping) ① and one screw B ② on the back side. Take off the lower part on the back of the right cover assembly ④ to release two hooks ③, and then detach the front side while lifting it upward.

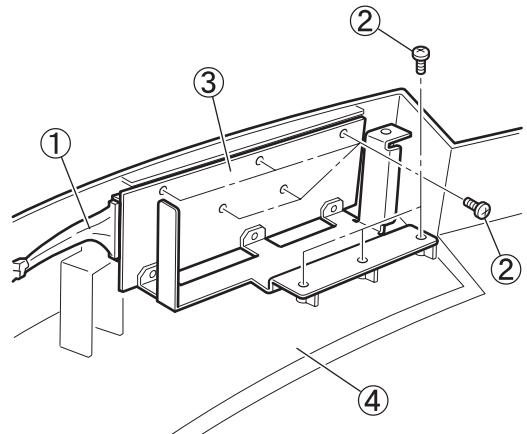


① Screw A
③ Hook

② Screw B
④ Right cover assembly

Fig. 3-107

5) Unhook one connector ①, remove eight screws (self-tapping) ②, and then separate the operation panel PCB (with the mounting metal bracket) ③ from the right cover ④.



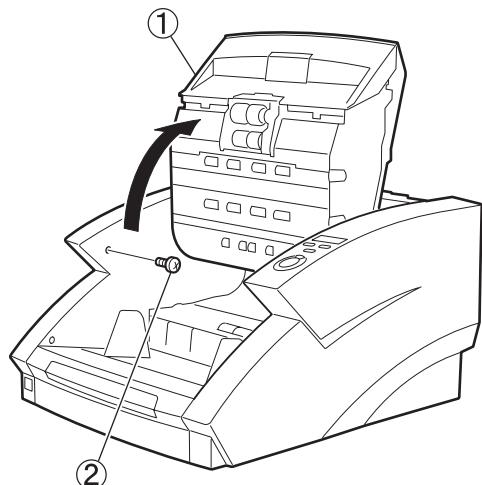
① Connector
③ Operation panel PCB
④ Right cover

② Screw

Fig. 3-108

4. Left cover

- 1) Take off the rear cover.
- 2) Open the upper unit ① and remove one screw (self-tapping) ②.

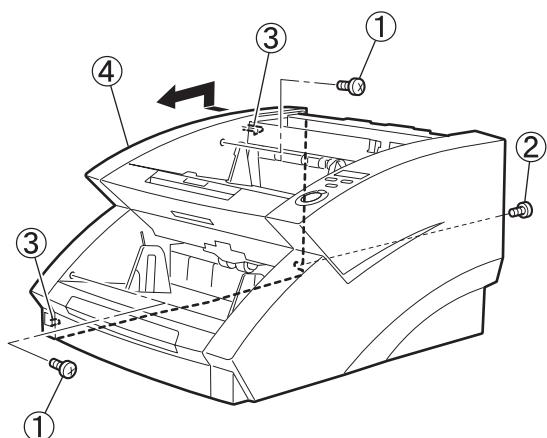


① Upper unit

② Screw

Fig. 3-109

- 3) Close the upper unit and remove two screws A (self-tapping) ① and one screw B ② on the back side. Take off the lower part on the back of the left cover ④ to release two hooks ③, and then detach the front side while lifting it upward.



① Screw A

③ Hook

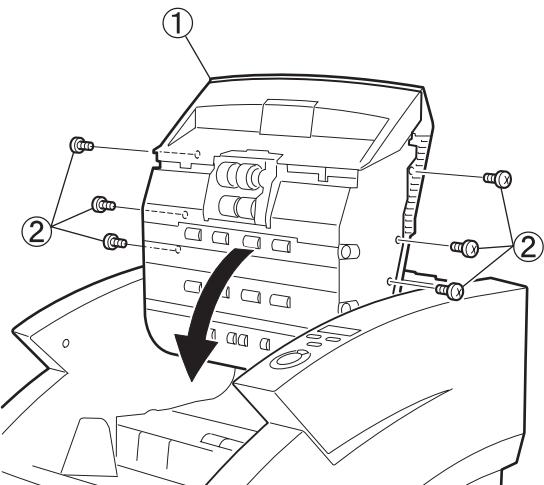
② Screw B

④ Left cover

Fig. 3-110

5. Upper delivery cover (assembly)

- 1) Open the upper unit ①, remove six screws ② (three for each side), and then close the upper unit.

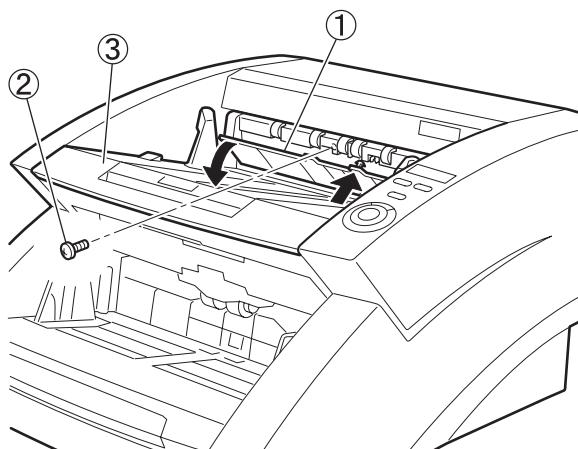


① Upper unit

② Screw

Fig. 3-111

- 2) Push and tilt the IP cover ① toward the front, remove the screw ②, and then detach the upper delivery cover assembly ③ forward.



① IP cover

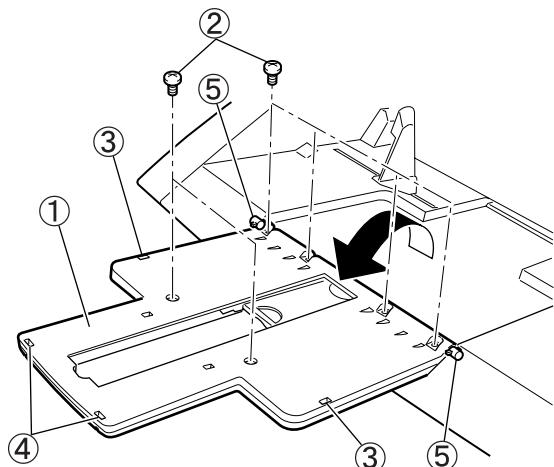
② Screw

③ Upper delivery cover assembly

Fig. 3-112

3) Rotate the delivery tray assembly ①. Remove six screws ②, unhook two claws ③, and release the front claw ④ by sliding it forward. Release two collars ⑤ and detach both the upper and lower eject tray assemblies.

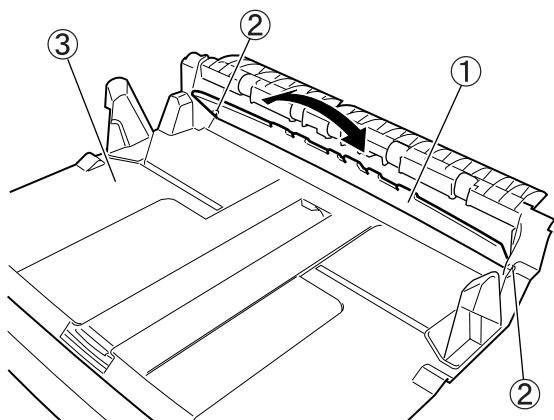
Note: Be careful not to damage the claw since it is breakable.



① Delivery tray assembly
 ② Screw
 ③ Claw
 ④ Front claw
 ⑤ Collar

Fig. 3-113

4) Release the boss ② on each side by bending the IP cover ① to separate it from the upper delivery cover ③.

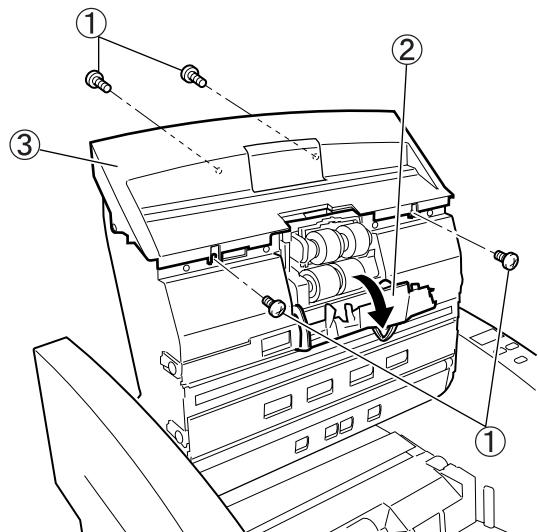


① IP cover
 ② Boss
 ③ Upper delivery cover

Fig. 3-114

6. Front delivery cover

1) Detach the upper delivery cover assembly.
 2) Remove four screws ①, pull down the roller ②, and take off the front delivery cover ③ by lifting it upward.



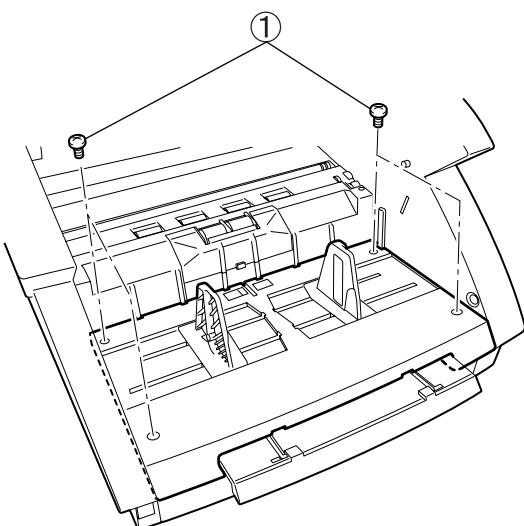
① Screw
 ② Roller cover
 ③ Front delivery cover

Fig. 3-115

7. Document tray assembly

- 1) Remove four screws ①.

Note: For the early produced products, a spacer is placed at the left-side two screws.



① Screw

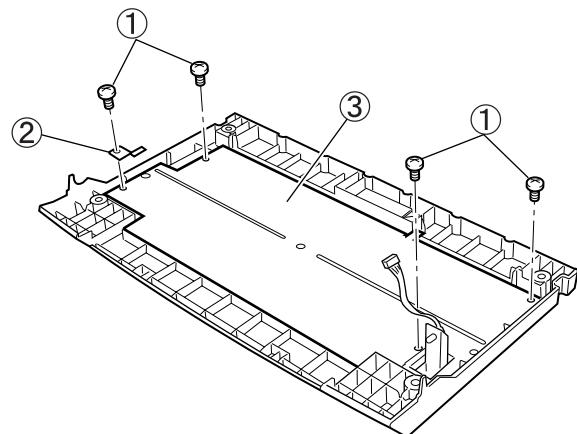
Fig. 3-116

8. Document guide

- 1) Detach the document tray assembly.

- 2) Remove five screws (self-tapping) ①, release the leaf spring ②, and dismount the reinforcing plate ③.

Note: Be careful not to lose the leaf spring after removing the screws.



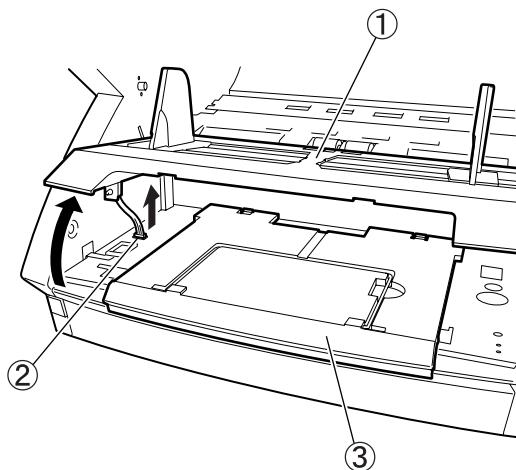
① Screw

② Leaf spring

③ Reinforcing plate

Fig. 3-118

- 2) Lift the document tray assembly ①, release the connector ②, and detach the document tray assembly and document tray extension ③.



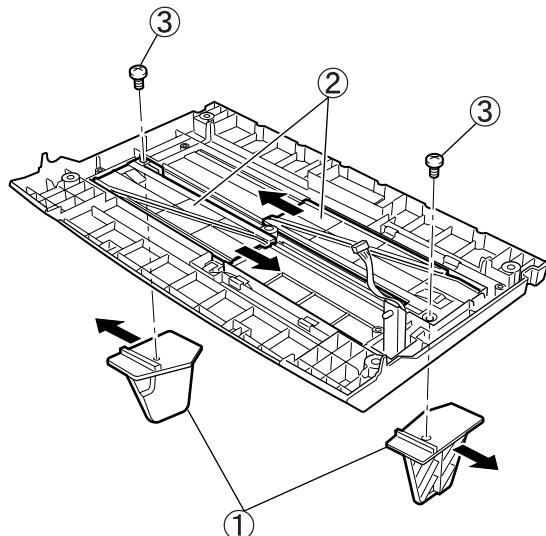
① Document tray assembly

② Connector

③ Document tray extension

Fig. 3-117

3) Remove two screws ③ (one on each side) fixing the document guide ① and rack ② and detach the document guide.

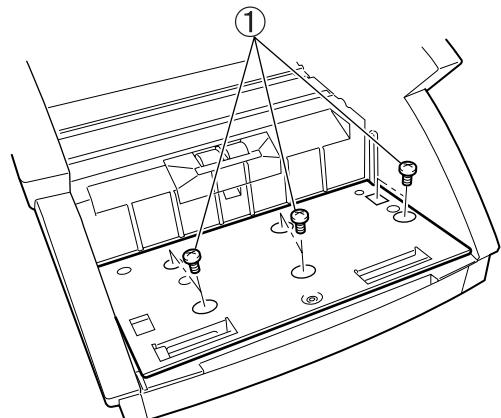


① Document guide ② Rack
③ Screw

Fig. 3-119

9. Document tray front cover

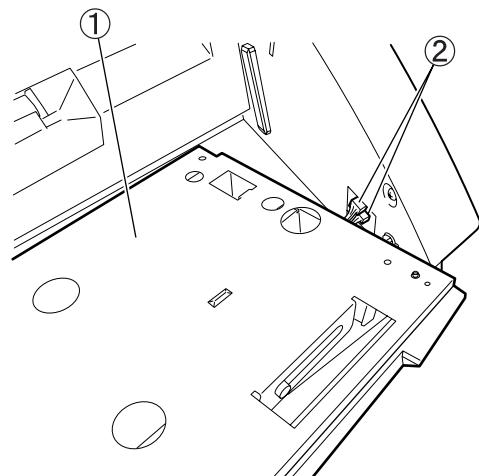
1) Detach the document tray assembly.
2) Remove six screws (with round-shaped tips) ①.



① Screw

Fig. 3-121

3) Lift the document tray driving unit ① a little, unhook two connectors ②, and then detach the document tray driving unit.



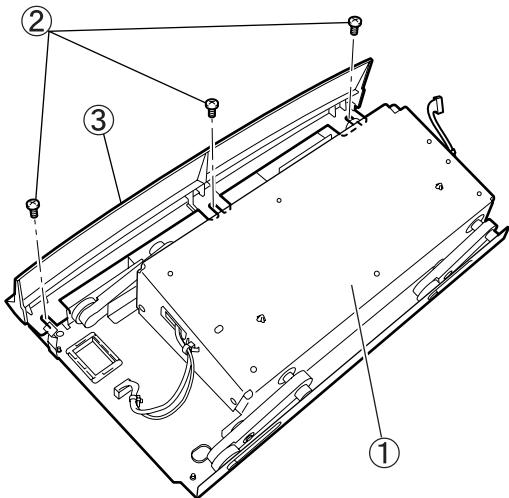
① Document tray driving unit ② Connector

① Document guide

Fig. 3-120

Fig. 3-122

4) Remove three screws ② on the reverse side of the document tray driving unit ① and detach the document tray front cover ③.

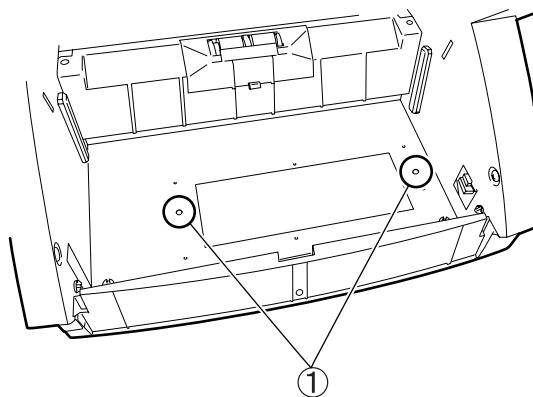


① Document tray driving unit
 ② Screw ③ Document tray front cover

Fig. 3-123

Precautions during assembly

- When installing the document tray driving unit, fit it to the two positioning marks ① located at the bottom. If the positioning is improper, the screw holes may be displaced, or the unit may be loose.



① Positioning mark

Fig. 3-124

- Since the tips of the screws that mount the document tray driving unit will protrude, use the screws with round-shaped tips to prevent injuries.

10. Lower front cover

- 1) Detach the right/left cover assembly.
- 2) Remove the document tray driving unit. Refer to the section entitled "Document tray front cover".
- 3) Take off the lower front cover ② by removing three screws ①.

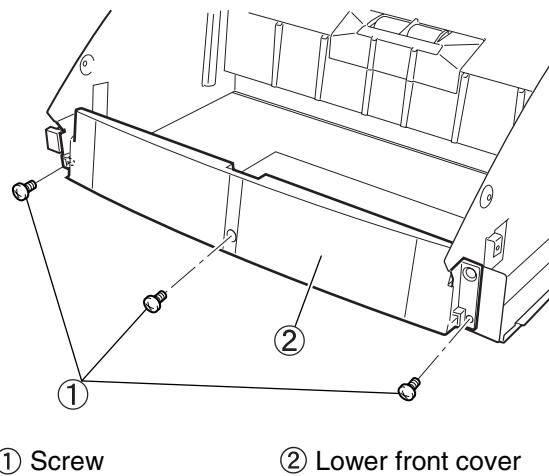
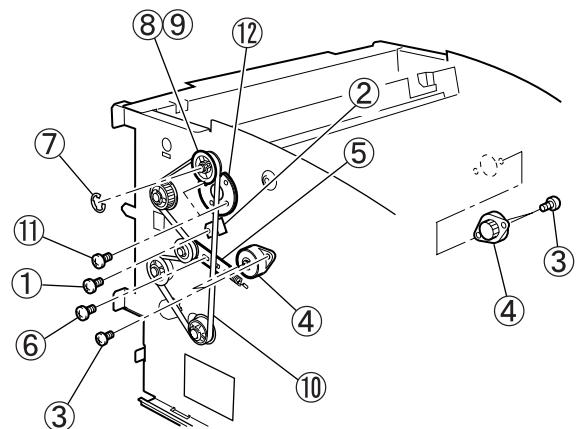


Fig. 3-125

11. Upper unit

- 1) Detach the right/left cover assembly. The upper unit should be closed.
- 2) First, remove one screw ① to release the leaf spring ②. Remove two screws (with round-shaped tips) ③ and dismount the damper (white) ④. Loosen one screw ⑥ of the tensioner ⑤ and remove the E-ring ⑦, pulley ⑧, and pin ⑨ and belt ⑩ in sequence. Remove the additional two screws ⑪ and detach the pivot ⑫.

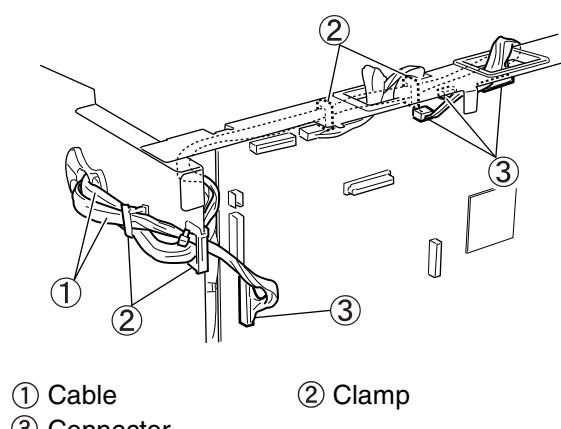
Note: Be careful not to drop the parallel pin.



① Screw	② Leaf spring
③ Screw	④ Damper
⑤ Tensioner	⑥ Screw
⑦ E-ring	⑧ Pulley
⑨ Pin	⑩ Belt
⑪ Screw	⑫ Pivot

Fig. 3-126

3) Unfasten the clamp ② fixing a cable ① that are pulled out from the right-side of the upper unit, and unhook four connectors ③ on the main CPU PCB.

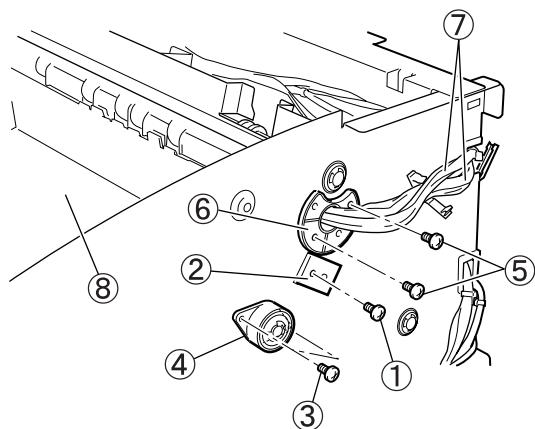


① Cable
③ Connector

Fig. 3-127

4) First, remove one screw ① and then the stopper ②. Remove two screws (with round-shaped tips) ③ and dismount the damper (black) ④. Remove the additional two screws ⑤, detach the pivot ⑥, and then finally detach the upper unit ⑧ so as not to damage the cable ⑦.

Note: Detach the upper unit while holding it to prevent it from falling.



① Screw
③ Screw
⑤ Screw
⑦ Cable
② Stopper
④ Damper
⑥ Pivot
⑧ Upper unit

Fig. 3-128

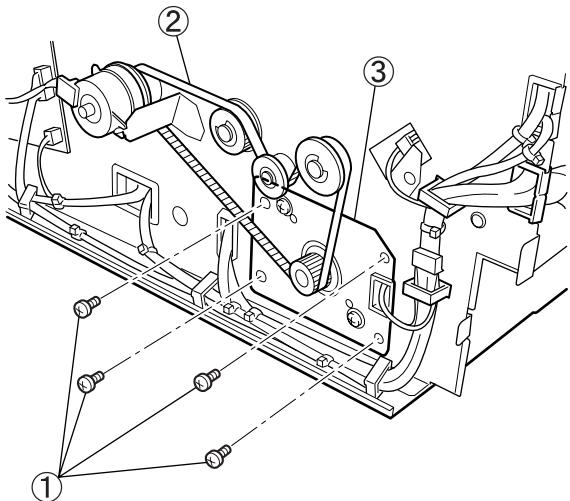
Precautions during assembly

- Pass the cable through the hole of the cable for the right-side plate in advance.
- There are two types of dampers: the one whose outside color is white is for the left-side plate, and the one whose outside color is black is for the right-side plate.
If you make a mistake in this assembly, the upper unit will not open or close properly.
- Since the tips of the screws that mount the damper will protrude inward, use the screws with round-shaped tips to prevent injuries.
- With the upper unit closed and locked, install the damper and check that it engages the rack correctly.
- Install the leaf spring and the stopper at the end of the assembly, with the upper unit closed.

II. DRIVE SYSTEM (MOTORS)

1. Main motor

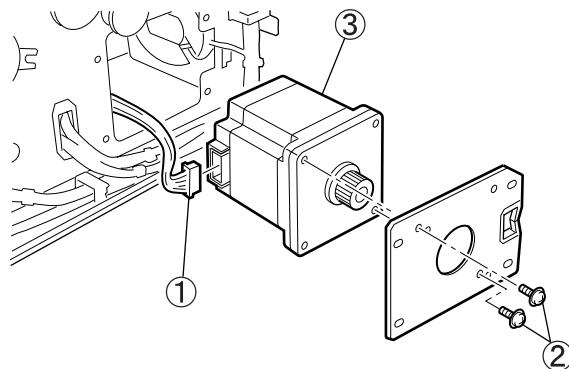
- 1) Detach the right cover assembly.
- 2) After removing four screws ①, detach the belt ② and pull out the main motor assembly ③.



① Screw ② Belt
③ Main motor assembly

Fig. 3-201

- 3) Remove two screws ①, unhook the connector ②, and detach the main motor ③.



① Connector
② Screw
③ Main motor

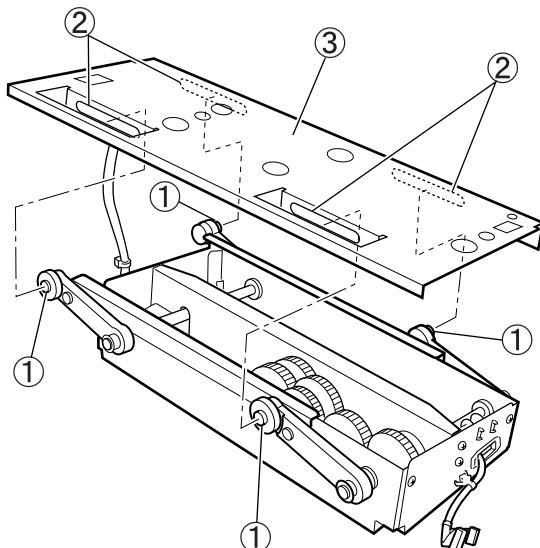
Fig. 3-202

Precautions during assembly

- Fix the main motor assembly position so that the belt does not miss the sprockets. However, the fixing should not be tightened too much.

2. Document tray motor

- 1) Detach the document tray driving unit. Refer to the section entitled "Document tray front cover".
- 2) Remove four bosses ① of the document tray driving unit and dismount the reinforcing plate ③ through four slotted holes ②.



- ① Boss
- ② Slotted hole
- ③ Reinforcing plate

Fig. 3-203

3) After removing four screws ①, remove the additional two screws ② that fix the gear shaft, and detach the gear unit ③.

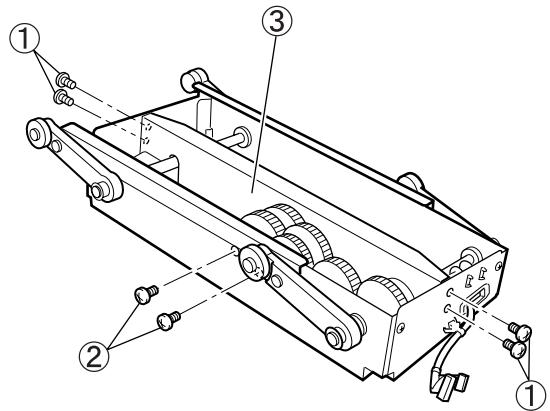
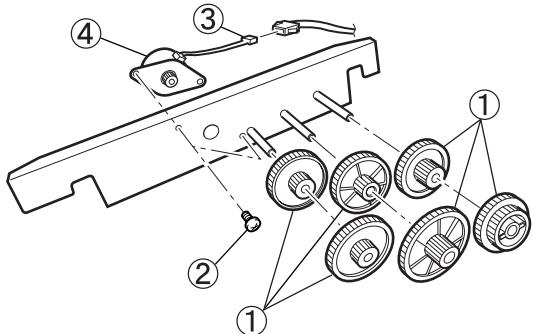


Fig. 3-204

4) After removing six gears ①, remove two screws ② and the connector ③, and dismount the document tray motor ④.



① Gear
② Screw
③ Connector
④ Document tray motor

Fig. 3-205

Precautions during assembly

- When installing the document tray driving unit into the main body, be careful with the positioning. Refer to the section entitled "Document tray front cover".
- Make sure that the reinforcing plate is lowered to the bottom before the installation.

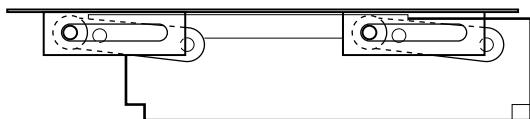
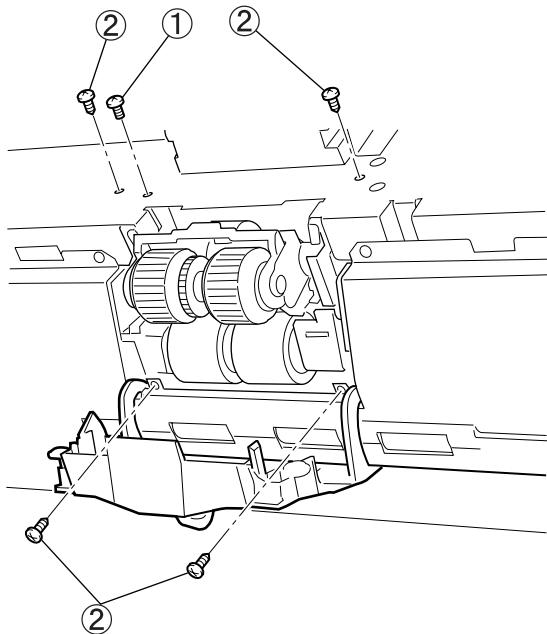


Fig. 3-206

3. Pick-up motor

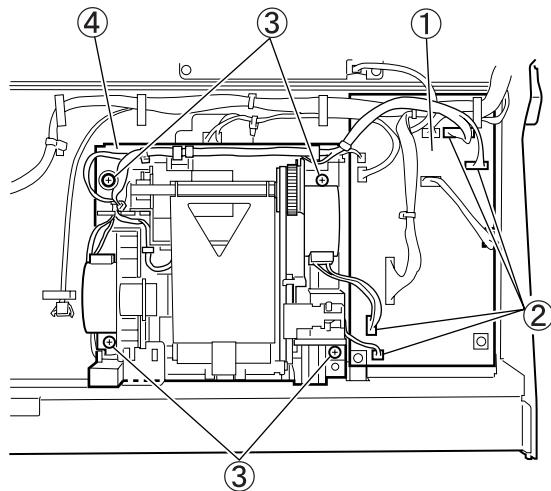
- 1) Detach the front delivery cover.
- 2) Remove one screw A ① and four screws B (self-tapping) ②.



① Screw A
② Screw B

Fig. 3-207

3) Unhook four connectors ② of the pick-up control PCB ①, remove four screws ③, and then detach the pick-up assembly ④.

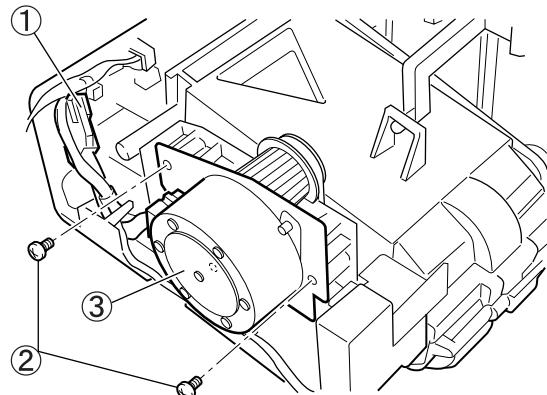


① Pick-up control PCB ② Connector
③ Screw ④ Pick-up assembly

Fig. 3-208

4. Feed motor

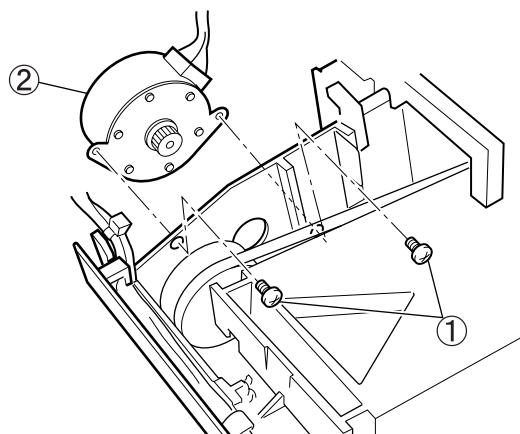
1) Detach the pick-up assembly. Refer to the section entitled "Pick-up motor".
2) Unhook the connector ①, remove two screws ②, and detach the feed motor assembly ③.



① Connector ② Screw
③ Feed motor assembly

Fig. 3-210

4) Remove two screws ① and dismount the pick-up motor ②.



① Screw ② Pick-up motor

Fig. 3-209

3) Remove two screws ① and dismount the feed motor ②.

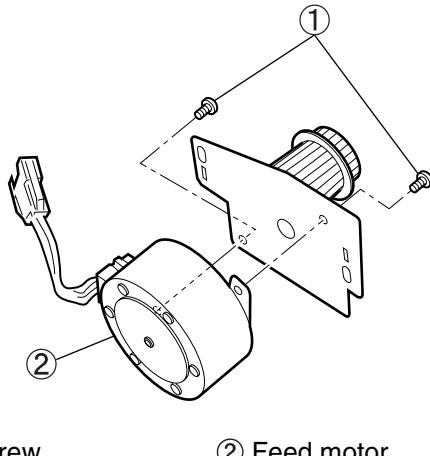


Fig. 3-211

Note: Be aware that documents cannot be picked up if the one-way pulley is installed backwards when replacing the feed motor belt.

5. Retard motor

- 1) Open the upper unit.
- 2) Push the lever in the direction of the arrow and take off the lower entry guide plate cover ①. Remove three screws (stepped) ② and detach the lower entry guide plate ③.

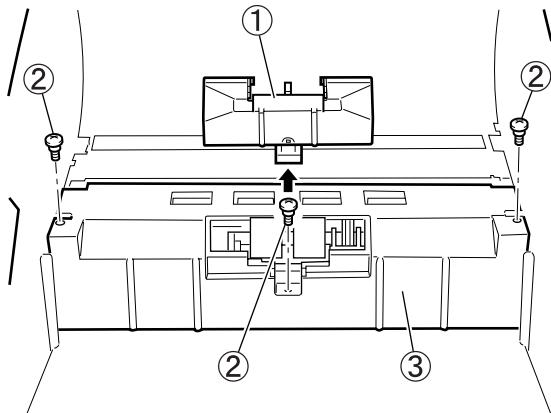


Fig. 3-212

3) Remove four screws (with round-shaped tips) ① and detach the retard roller unit ②. Unhook the connector ③.

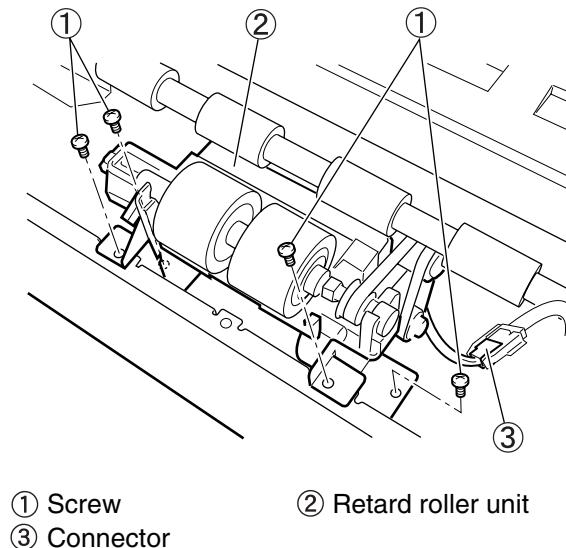


Fig. 3-213

4) Remove two screws ① and dismount the retard motor ②.

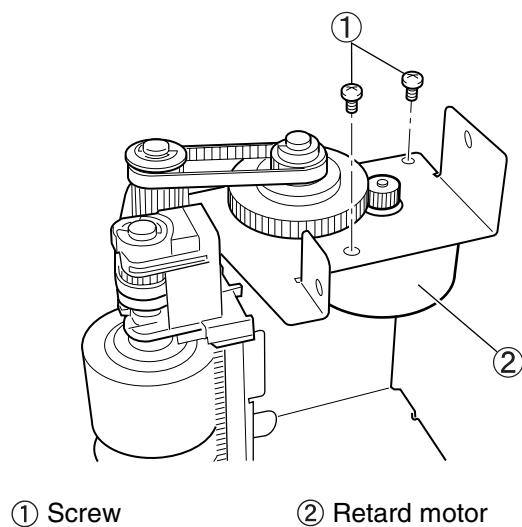


Fig. 3-214

Reference: Light guide

The following describes the disassembly/reassembly of the light guide, which is installed at the lower entry guide plate shown in the previous section, "Retard motor".

- Unhook the arm ① of the light guide by bending it to the direction of the arrow and detach the light guide ②. Be careful not to damage the arm. You can remove the light guide.

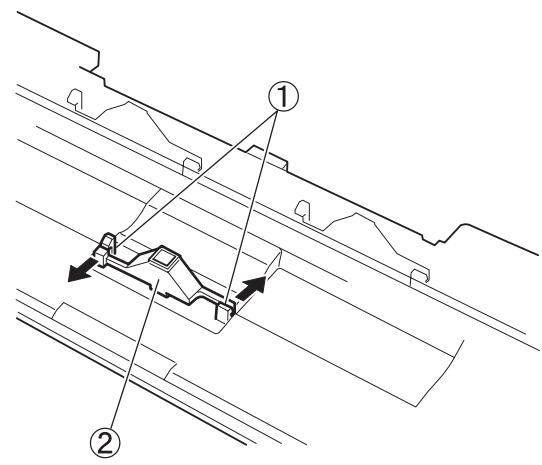


Fig. 3-215

- There are two types of projections on the light guide: round ① and oval ②. Install the projections in the matching holes and insert the arm into the hooks until it clicks.

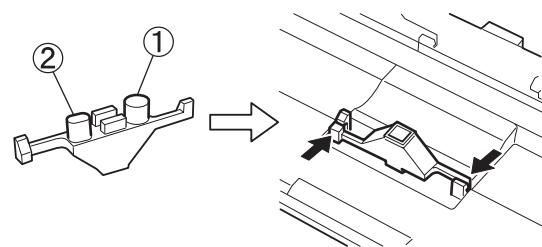
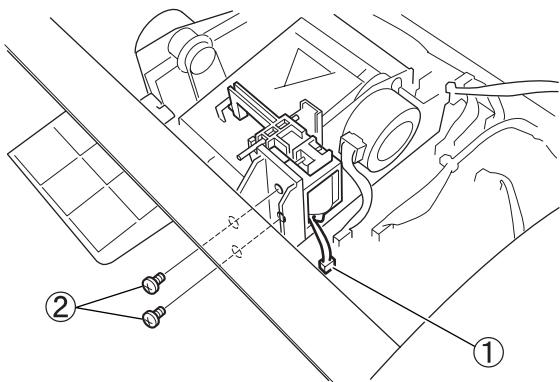


Fig. 3-216

6. Pick-up solenoid

- 1) Take off the Front delivery cover.
- 2) Unhook the connector ① and remove two screws ②.

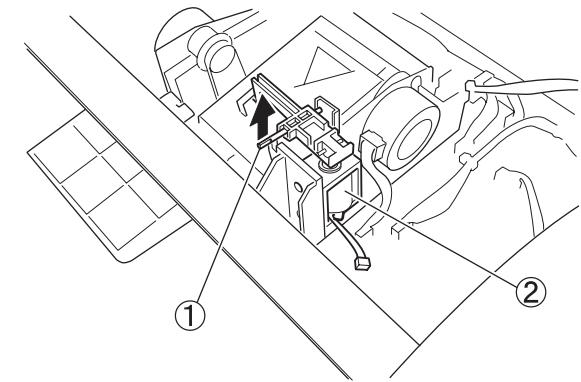


(①) Connector

(②) Screw

Fig. 3-217

- 3) Lift the end of the shaft ① to pull it off and detach the solenoid ②.



(①) Shaft

(②) Solenoid

Fig. 3-218

Precautions during assembly

- Push in the shaft by fitting the D-cut of the shaft into the groove.
- With the plunger of the solenoid pushed downward, fix the solenoid at the position where the pick-up roller raises upward.

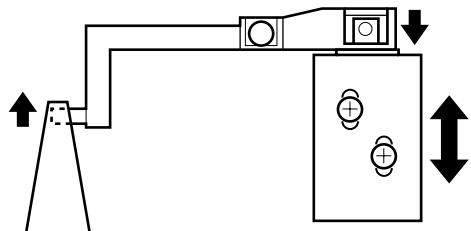
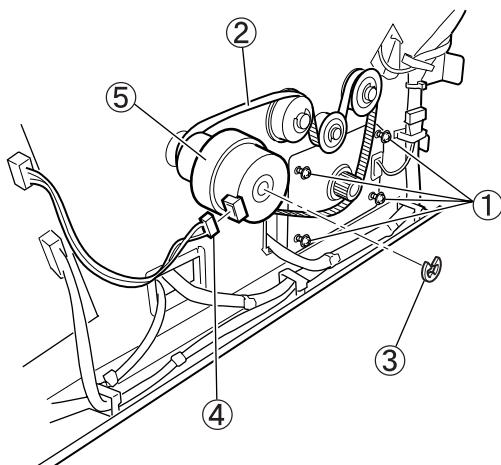


Fig. 3-219

7. Registration clutch

- 1) Detach the right cover assembly.
- 2) Loosen four screws ① of the main motor mount plate and detach the belt ②. And then, remove the E-ring ③ and unhook the connector ④ in order to pull the clutch ⑤ out of the shaft.

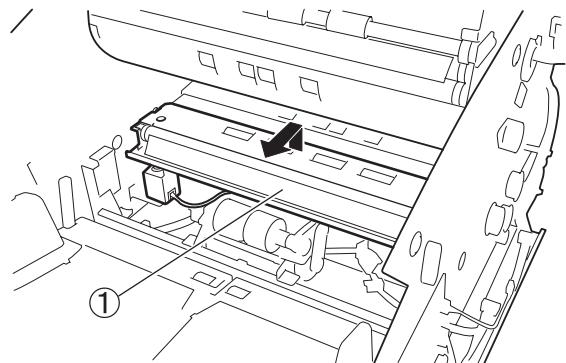


① Screw	② Belt
③ E-ring	④ Connector
⑤ Clutch	

Fig. 3-220

8. Shading solenoid (lower side)

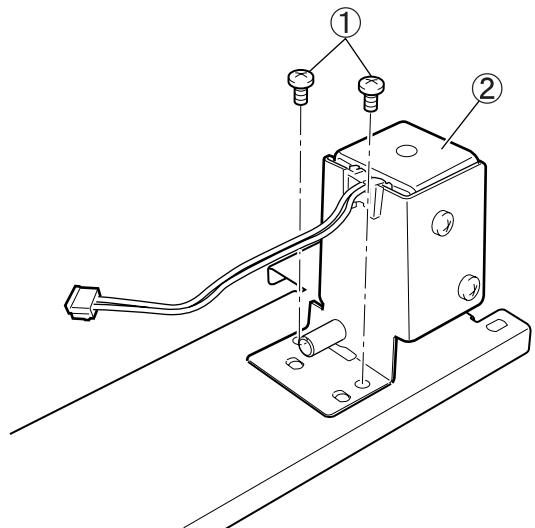
- 1) Take off the right/left cover assembly.
- 2) Detach the lower registration roller and platen unit ①. Refer to the section entitled "III. FEED SYSTEM".



① Platen unit

Fig. 3-221

- 3) Turn over the platen unit, remove two screws ①, and detach the solenoid assembly ②.



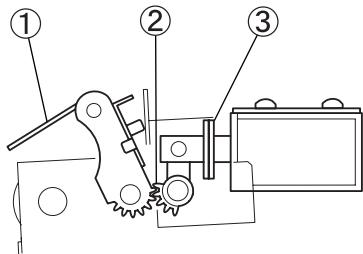
① Screw

② Solenoid assembly

Fig. 3-222

Precautions during assembly

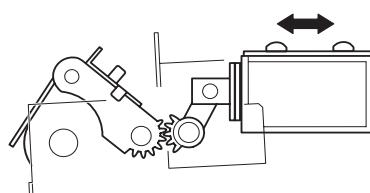
- With the shading plate ① located all the way inside, install the gears of the solenoid side and the shading plate side so that the gear teeth (outer one) of the solenoid side ② is positioned at the top. Remember to install the spacer ③ into the plunger.



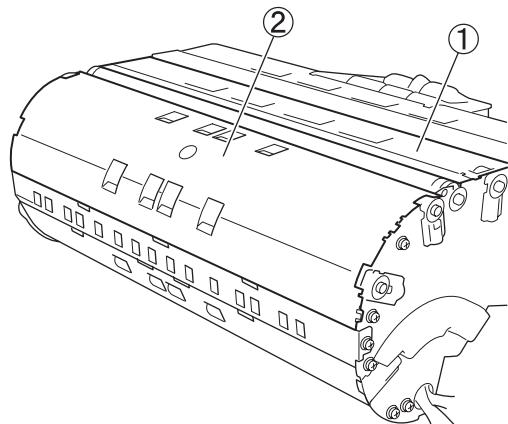
① Shading plate
 ② Gear teeth (outer one) of the solenoid side
 ⑤ Spacer

Fig. 3-223

- With the plunger of the solenoid pushed inward, fix the solenoid at the position where the shading plate is farthest outward.

**Fig. 3-224****9. Shading solenoid (upper side)**

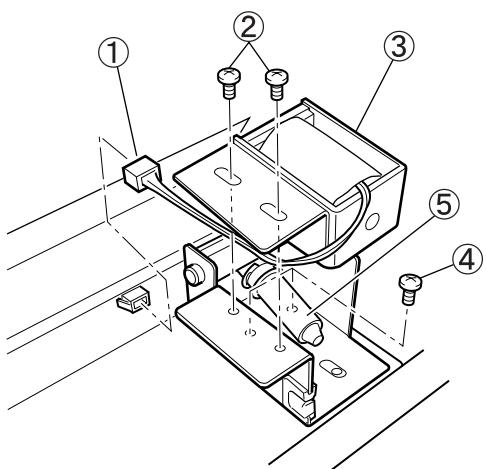
- Remove the upper unit.
- Dismount the reading roller guide plate ① and feed guide plate 1 ② to detach the Feeder follower roller. Refer to the section entitled "III. FEED SYSTEM".



① Reading roller guide plate
 ② Feed guide plate 1

Fig. 3-225

- Unhook the connector ①, remove two screws A ②, and detach the solenoid body ⑤. Remove two screws B (with round-shaped tips) ④ and detach the plunger assembly ⑤.



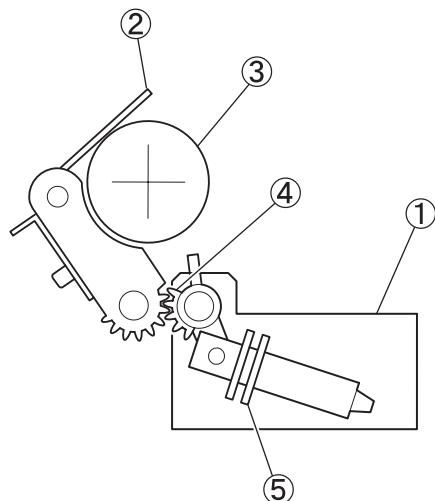
① Connector
 ② Screw A
 ③ Solenoid body
 ④ Screw B
 ⑤ Plunger assembly

Fig. 3-226

Precautions during assembly

- For the mount plate ① of the plunger side, with the shading plate ② fitting the platen roller ③ and positioning itself all the way outside, fix the gears so that the gear teeth ④ (outer one) of the plunger side are at the top.

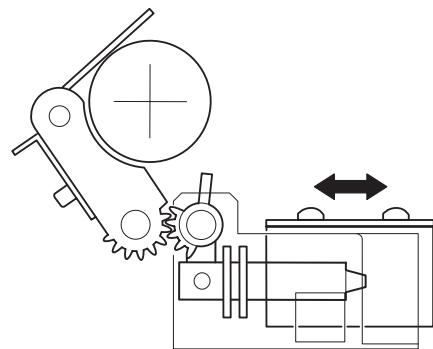
Remember to install the spacer ⑤ into the plunger.



① Mount plate	② Shading plate
③ Platen roller	
④ Gear teeth	
⑤ Spacer	

Fig. 3-227

- Likewise, the solenoid body should be fixed so that the gear teeth (outer one) of the plunger side are at the top, with the shading plate fitting the platen roller and positioned all the way outside.

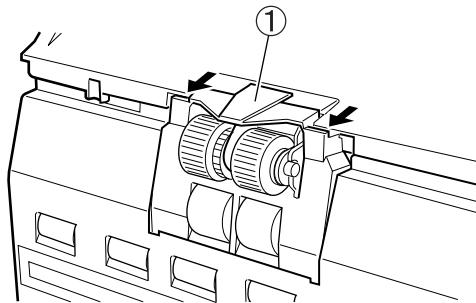
**Fig. 3-228**

- Before fixing the feed guide plate 1, match three fits between plate 1 and the feed guide plate 2. Refer to the section entitled "Feeder follower roller".

III. FEED SYSTEM (ROLLERS)

1. Pick-up roller

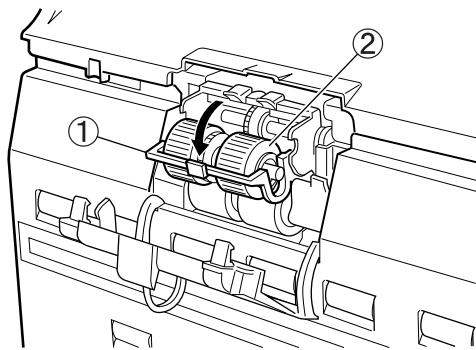
- 1) Open the upper unit.
- 2) Press the portion indicated by the arrow to open the roller cover ①.



① Roller cover

Fig. 3-301

- 3) Open the roller holder ① and detach the pick-up roller ②.



① Roller holder
② Pick-up roller

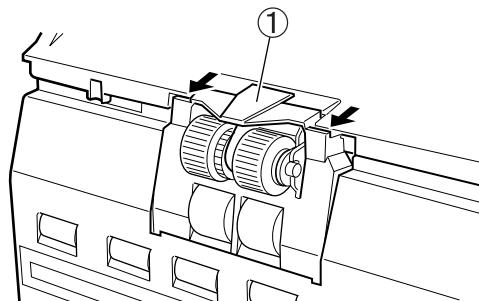
Fig. 3-302

Precautions during assembly

- Close the roller holder or the roller cover completely until it is hooked.

2. Feed roller

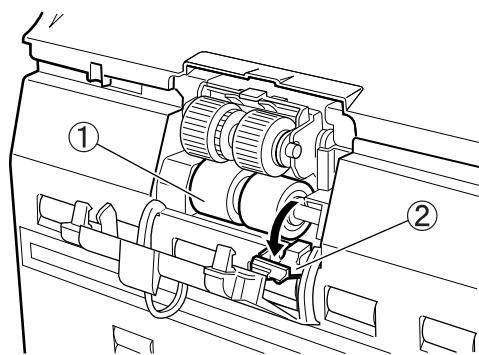
- 1) Open the upper unit.
- 2) Press the portion indicated by the arrow and open the roller cover ①.



① Roller cover

Fig. 3-303

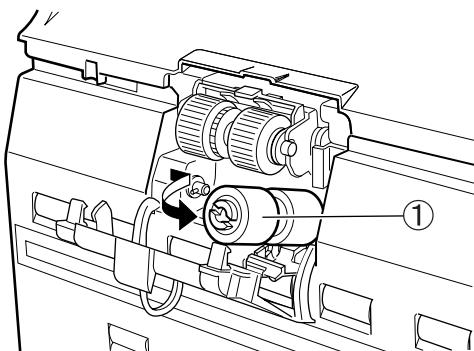
- 3) Pull the lever ② forward so that it locks the feed roller ①.



① Feed roller ② Lever

Fig. 3-304

4) Slide the feed roller ① to the right and raise it toward the front in order to detach it.



① Feed roller

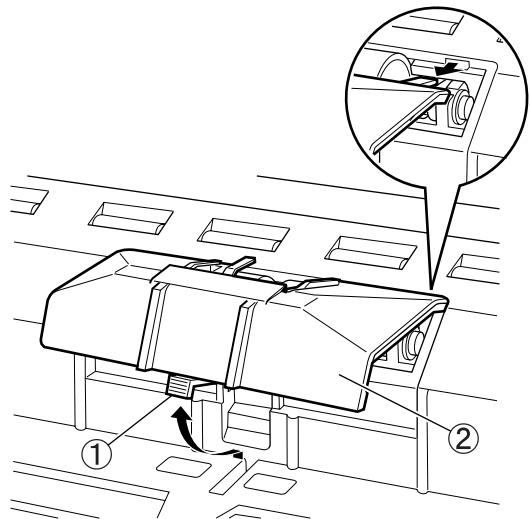
Fig. 3-305

Precautions during assembly

- Fit the notch on the left side of the roller to the pin on the main body side.
- Do not push or move the right-side guide shaft to the left.

3. Retard roller

- 1) Open the upper unit.
- 2) Push the hook upward ① and take off the roller cover ②.

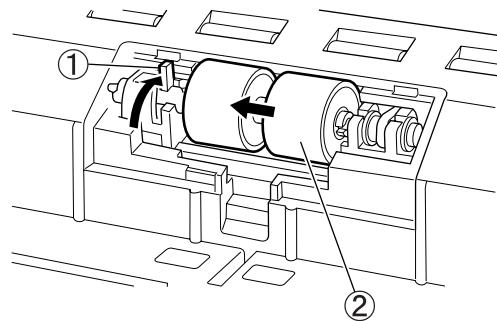


① Hook

② Roller cover

Fig. 3-306

- 3) Raise the roller fixing lever ①, slide the retard roller ② to the left, and detach the retard roller.



① Roller fixing lever ② Retard roller

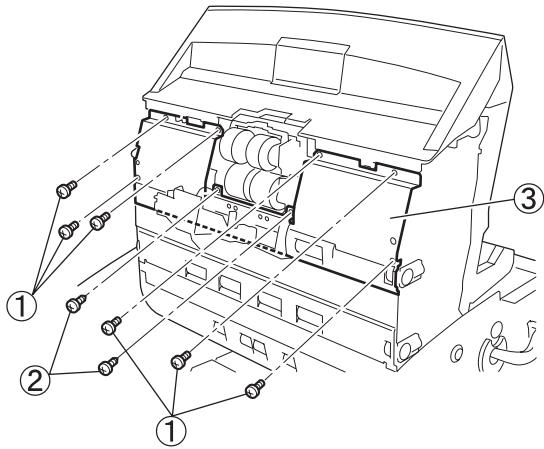
Fig. 3-307

Precautions during assembly

- Fit the notch on the right side of the roller to the pin on the main body side.

4. Upper registration roller

- 1) Detach the right/left cover assembly.
- 2) Open the roller cover.
- 3) Remove six screws A ① and two screws B (self-tapping) ② and detach the upper registration roller guide ③.



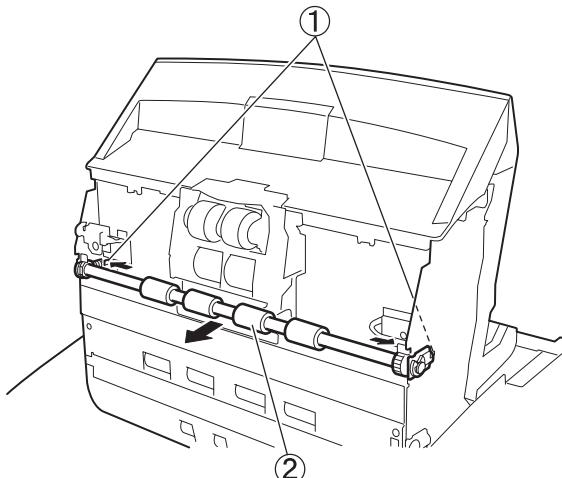
① Screw A

② Screw B

③ Upper registration roller guide

Fig. 3-308

- 4) Press the claw of the stopper ① from within, and detach the registration roller assembly ②.

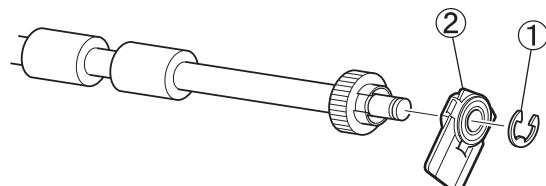


① Claw of the stopper

② Registration roller assembly

Fig. 3-309

- 5) Remove two E-rings ① (one on each side) and detach the stopper assembly ②.



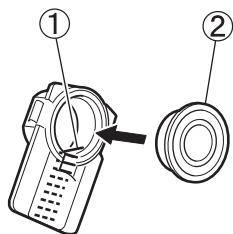
① E-ring

② Stopper assembly

Fig. 3-310

Precautions during assembly

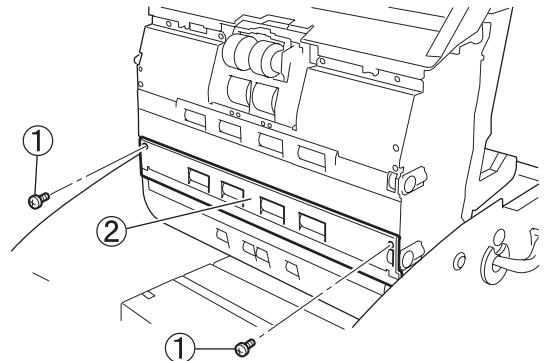
- The stopper assemblies on both sides are the same parts. All stopper assemblies for the roller installed into the upper unit are the same. When installing the coil spring of the stopper assembly, the side where the tip of the spring is bent should contact the ball bearing ②. This dissipates static charge from the roller unit onto the side plate.



① Side where the tip is bent
② Ball bearing

Fig. 3-311**5. Upper reading roller**

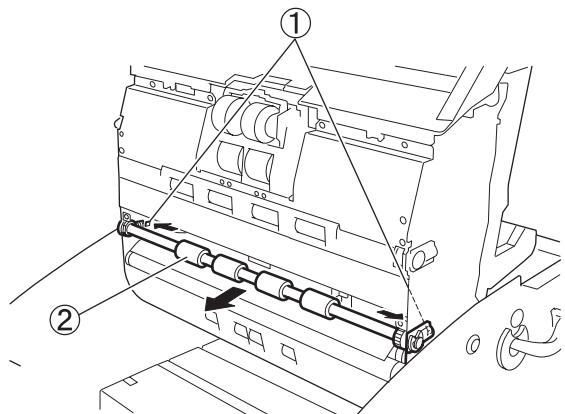
- Detach the right/left cover assembly.
- Open the upper unit.
- Remove two screws ① and detach the upper reading roller guide ②.



① Screws
② Upper reading roller guide

Fig. 3-312

- Press the claw of the stopper ① from within and detach the upper reading roller assembly ②.



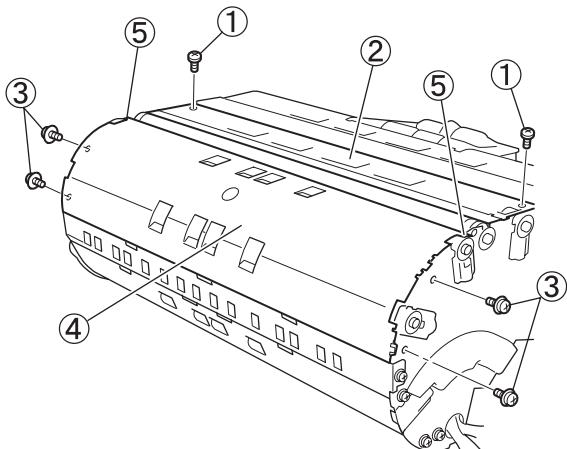
① Claw of the stopper
② Upper reading roller assembly

Fig. 3-313

- Detach the stopper assembly. Refer to the section entitled "Upper registration roller".

6. Back platen roller

- 1) Dismount the upper unit.
- 2) Remove two screws A ① and detach the upper reading roller guide ②. After removing four screws B ③ (two on each side) and the back side of feed guide plate 1 ④, slide feed guide plate 1 to the right to detach it by unhooking the fit ⑤ on the front side.

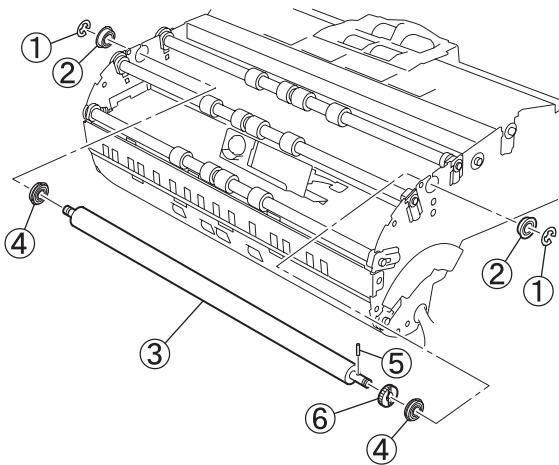


① Screw A	② Upper reading roller guide
③ Screw B	④ Feed guide plate 1
⑤ Fit	

Fig. 3-314

- 3) Remove two E-rings ① and two bearings ② and detach the back platen roller ③. Additionally, remove two spacers ④, the pin ⑤, and the gear ⑥.

Note: The spacer comes with the bearing.



① E-ring	② Bearing
③ Back platen roller	④ Spacer
⑤ Pin	⑥ Gear

Fig. 3-315

Precautions during assembly

- Fix feed guide plate 1 by matching three fits on the back.

7. Feeder follower rollers 1, 2, and 3

- 1) Dismount the upper unit.
- 2) Remove twelve screws ① (six on each side) and detach feed guide plates 1 ②, 2 ③, and 3 ④.

Note: When detaching feed guide plate 1, remove the back side of feed guide plate 1 and slide it to the right to unhook the fit on each side of the front side.

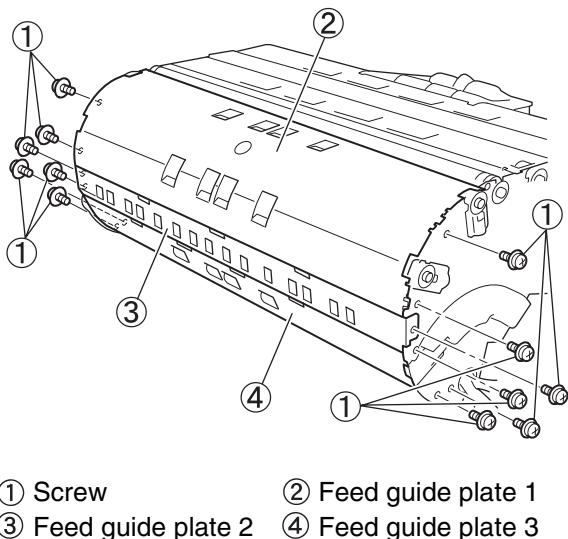
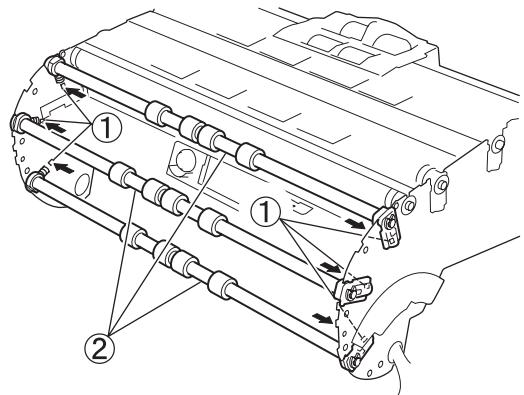


Fig. 3-316

- 3) Press the claw of the stopper ① from within and detach the feeder follower roller assemblies 1, 2, and 3 ②.



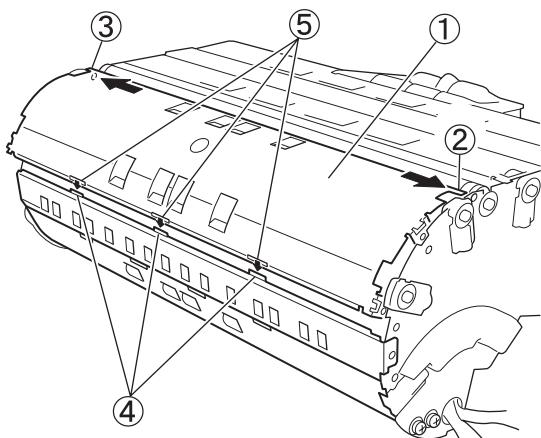
① Claw of the stopper
② Feeder follower roller assemblies

Fig. 3-317

- 4) Detach the stopper assembly. Refer to the section entitled "Upper registration roller".

Precautions during assembly

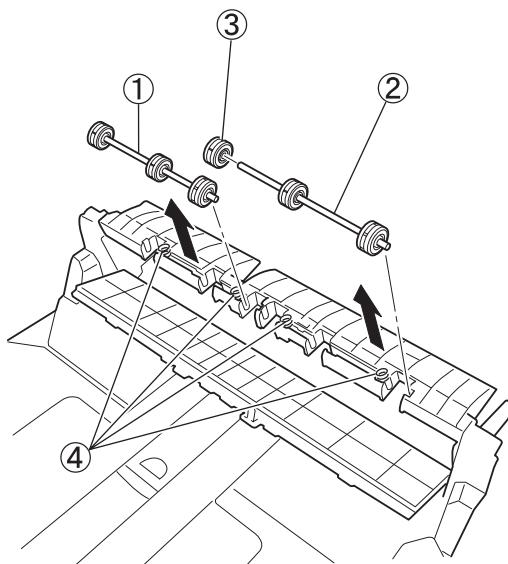
- Feeder follower rollers 1, 2 and 3 are the same parts.
- When installing the feed guide plates from the bottom side, start from plate 3, and then install 2 and 1.
- As for feed guide plate 1 ①, its upper-right projection ② is longer than the upper-left projection ③. Therefore, install it by inserting the right side first. Also, feed guide plate 2 should be fixed by its three convex parts ④ into the groove ⑤.



① Feed guide plate 1 ② Upper-right projection
 ③ Upper-left projection ④ Convex part
 ⑤ Groove

Fig. 3-318**8. Delivery follower roller**

- 1) Detach the upper delivery cover assembly.
- 2) Press the delivery follower roller assembly ① in the direction of the arrow to detach it. Be aware that the shaft ②, roller ③, and coil spring ④ will come off when detaching the roller.

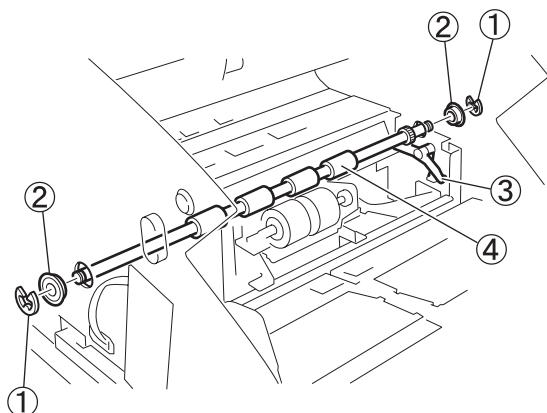


① Delivery follower roller assembly ② Shaft
 ③ Roller ④ Coil spring

Fig. 3-319

9. Lower registration roller

- 1) Detach the right/left cover assembly.
- 2) Detach the lower entry guide plate cover and the lower entry guide plate. Refer to the section entitled "Retard motor".
- 3) Detach the registration clutch.
- 4) Remove two E-rings ① (one on each side) and two bearings ② (one on each side), and lower the lever ③ to detach the lower registration roller ④.



- ① E-ring
- ② Bearing
- ③ Lever
- ④ Lower registration roller

Fig. 3-320

Precautions during assembly

- Lower the lever ① and install the lower registration roller ② into the hole in the right-side plate so that it is positioned at the top.

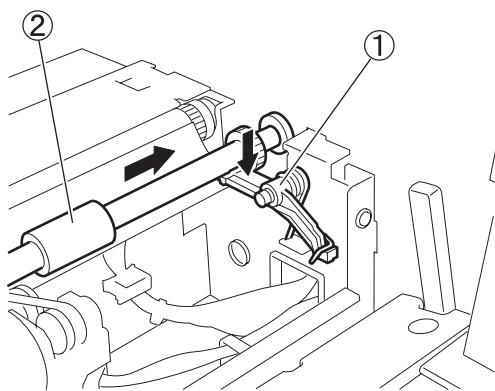
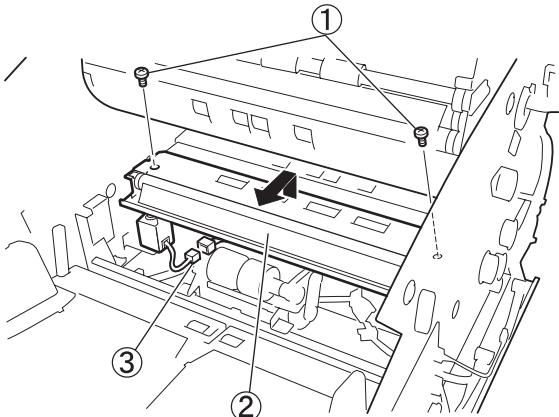


Fig. 3-321

10. Front platen roller

- 1) Detach the right/left cover assembly.
- 2) Detach the lower registration roller.
- 3) Open or dismount the upper unit.
- 4) Remove two screws ① located inside and detach the platen unit ② in the direction of the arrow. Unhook the connector ③.

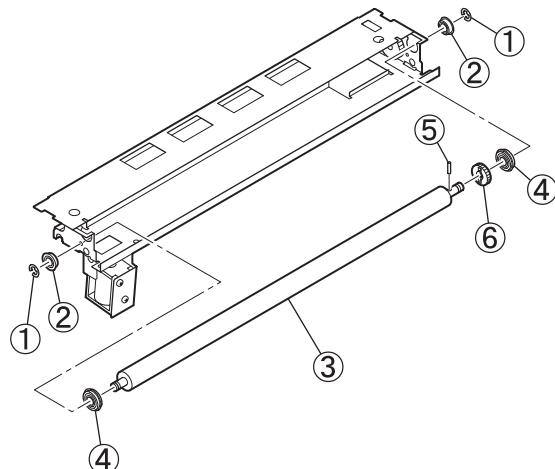


① Screw
② Platen unit
③ Connector

Fig. 3-322

- 5) Remove two E-rings ① (one on each side) and two bearings ② (one on each side) to detach the front platen roller. And then, remove two spacers ④ (one on each side), the pin ⑤, and the gear ⑥.

Note: The spacer comes with the bearing.

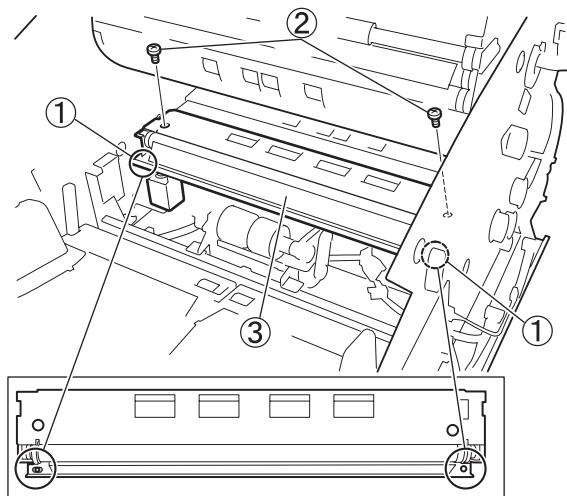


① E-ring ② Bearing
③ Back platen roller ④ Spacer
⑤ Pin ⑥ Gear

Fig. 3-323

Precautions during assembly

- Align the holes to the positioning bosses ① (one on each side) and install the platen unit ③ using two screws ②. Be careful not to drop the screws into the machine.

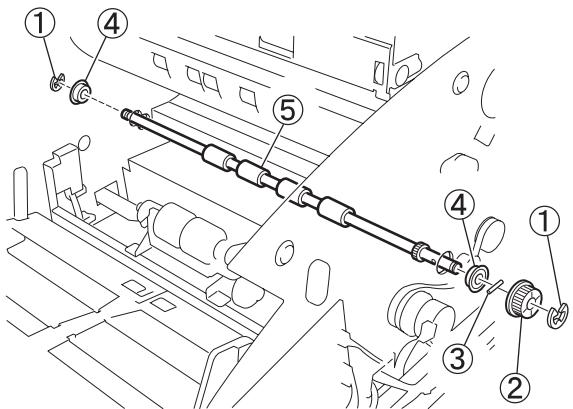


① Positioning boss ② Screw
③ Platen unit

Fig. 3-324

11. Lower reading roller

- Detach the platen unit. For details, refer to the section entitled "Front platen roller".
- Unfasten two E-rings ① (one on each side), the pulley ②, pin ③, and two bearings ④ (one on each side) in sequence, and then detach the lower reading roller ⑤.



① E-ring ② Pulley
③ Pin ④ Bearing
⑤ Lower reading roller

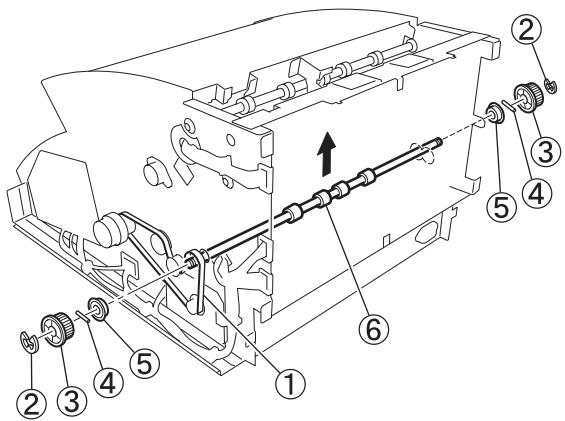
Fig. 3-325

Precautions during assembly

- Be sure to install the pulley with the flange correctly oriented. The pulley for the lower reading roller is flanged on the inside.

12. Feeder drive roller A

- 1) Detach the upper unit.
- 2) Loosen the belt on each side. Refer to the "Right belt" and "Left belt" sections.
- 3) Detach the belt ① and remove two E-rings ② (one on each side), two pulleys ③ (one on each side), and two pins ④ (one on each side) in sequence. Additionally, remove two bearings ⑤ (one on each side) and detach feeder drive roller A ⑥.



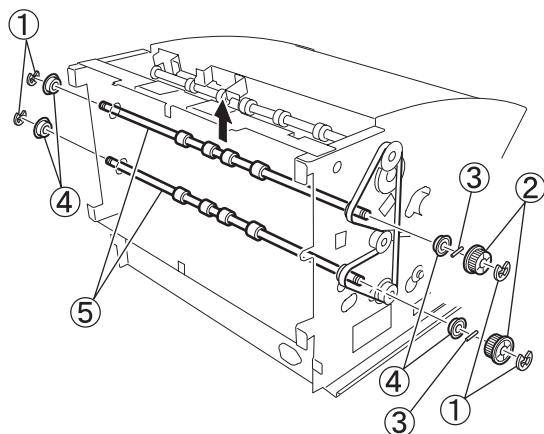
① Belt	② E-ring
③ Pulley	④ Pin
⑤ Bearing	⑥ Feeder drive roller A

Fig. 3-326

13. Feeder drive rollers B/C

- 1) Dismount the upper unit.
- 2) Let the left belt loosen. Refer to the "Left belt" section.
- 3) Unfasten four E-rings (two on each side) ①, detach two pulleys ② and two pins ③. Additionally, remove four bearings ④ (two on each side) and feeder drive rollers (B and C) ⑤.

Note: Feeder drive rollers B and C are the same parts.

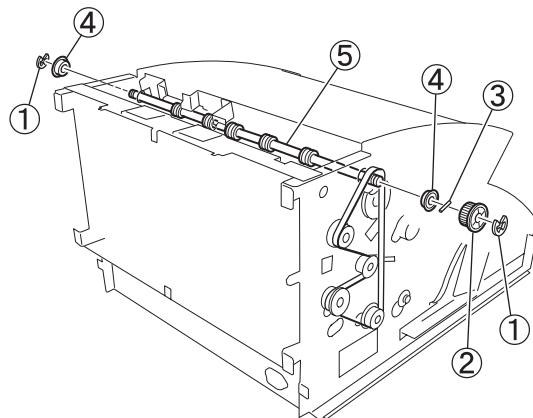


① E-ring	② Pulley
③ Pin	④ Bearing
⑤ Feeder drive rollers B/C	

Fig. 3-327

14. Delivery drive roller

- 1) Detach the right/left cover assembly and top cover.
- 2) Let the left belt loosen. Refer to the "Left belt" section.
- 3) Unfasten two E-rings (one on each side) ①, detach the pulley ② and the pin ③. Additionally, remove two bearings ④ (one on each side) and detach the delivery drive roller ⑤.

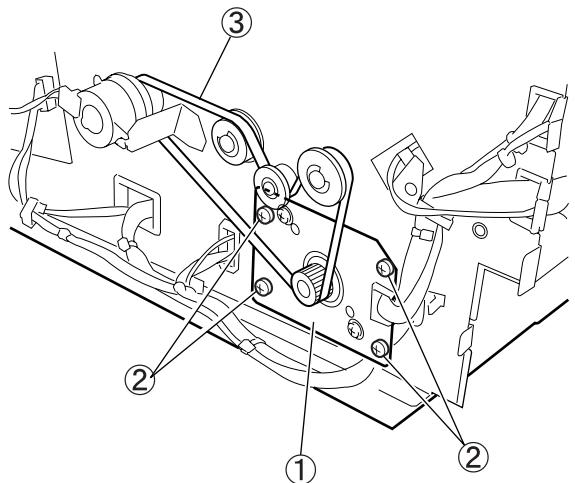


① E-ring	② Pulley
③ Pin	④ Bearing
⑤ Delivery drive roller	

Fig. 3-328

15. Right belt

- 1) Remove the right cover assembly.
- 2) Loosen four screws ② of the main motor mount plate ① and detach the belt ③.



① Main motor mount plate
② Screw
③ Belt

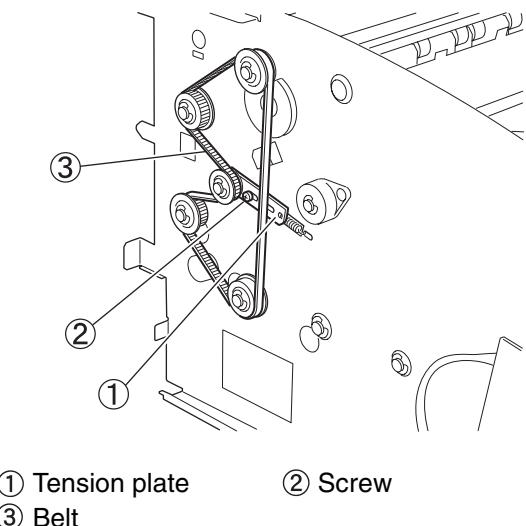
Fig. 3-329

Precautions during assembly

- Do not allow any slack in the belt. Adjust the tension so that the belt does not miss the sprockets and the tension is not tightened too much.

16. Left belt

- 1) Remove the left cover.
- 2) Loosen one screw ② of the tension plate ① and detach the belt ③.



① Tension plate ② Screw
 ③ Belt

Fig. 3-330

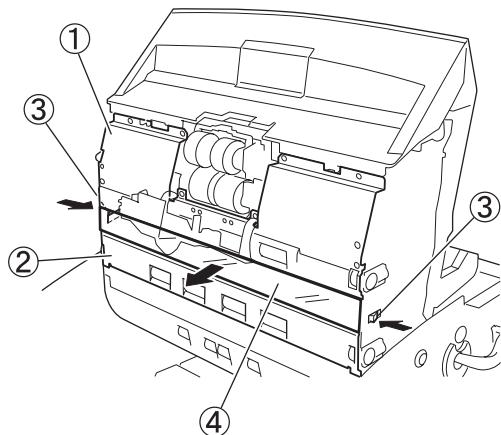
Precautions during assembly

- Be sure to correctly orient the flange attached to the pulley (see Fig.3-330).
- After hanging the belt on the pulley, fix the screw of the tension plate. The tension of the belt can be adjusted with the coil spring attached to the tension plate.

IV. READING SECTION

1. Front reading unit

- 1) Detach the right/left cover assembly.
- 2) Open the upper unit.
- 3) Detach the upper registration roller guide ① and the upper reading roller guide ②. And then, push the stopper ③ on each side, and pull the front reading unit ④ out toward the front.

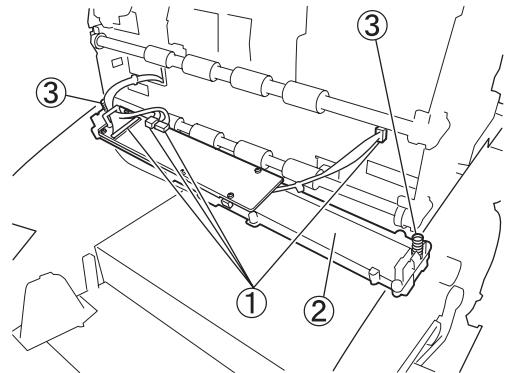


① Upper registration roller guide
 ② Upper reading roller guide
 ③ Stopper
 ④ Front reading unit

Fig. 3-401

- 4) Unhook four connectors ① and detach the front reading unit ②.

Note: Be careful not to lose the spring ③ attached to the stopper.



① Connector
 ③ Spring

② Front reading unit

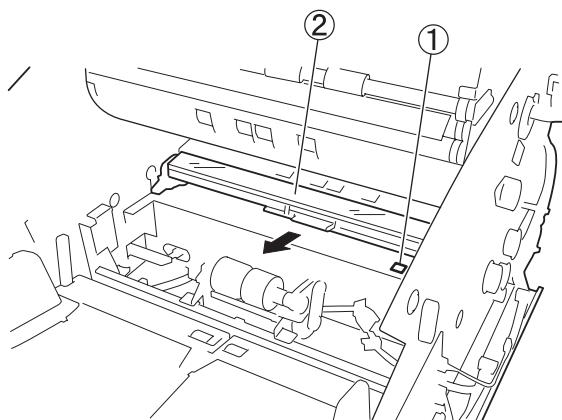
Fig. 3-402

Precautions during assembly

- Be careful not to pull in the connected cable assembly.
- Remember to attach the spring on the back side.
- Clean the reading glass.
- The back registration sensor PCB is mounted in the front reading unit. Detach the PCB as necessary.

2. Back reading unit

- 1) Detach the platen unit and the lower reading roller. Refer to the "Lower reading roller" section.
- 2) Unhook the cable clamp ① and pull the back reading unit ② out toward the front.



① Cable clamp ② Back reading unit

Fig. 3-403

- 3) Unhook three connectors ① and detach the back reading unit ②.

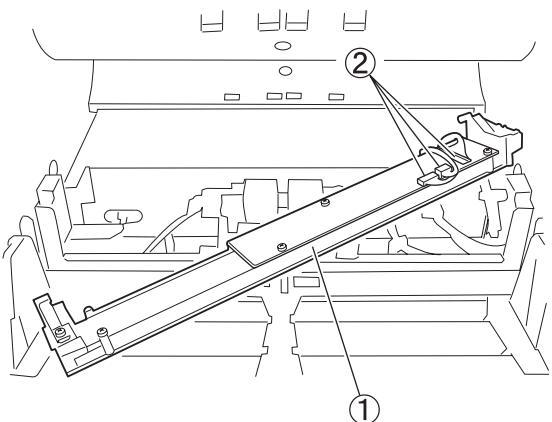


Fig. 3-404

① Connector ② Back reading unit

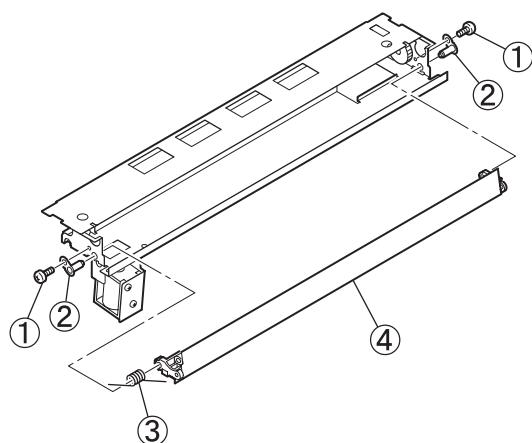
Precautions during assembly

- Be careful not to pull in the connected cable assembly.
- Since the leaf spring is attached to the rear side of the back reading unit, push it as far as it will go while pressing it against the bottom.
- Clean the reading glass.

3. Shading plate assembly (lower side)

- 1) Detach the platen unit and the front platen roller. Refer to the "Front platen roller" section.
- 2) Remove two screws ① (one on each side), two shafts ② (one on each side), and the spring ③ in sequence and detach the shading plate assembly (lower side) ④.

Note: Do not crease or scratch the shading plate.



① Screw	② Shaft
③ Spring	④ Shading plate assembly (lower side)

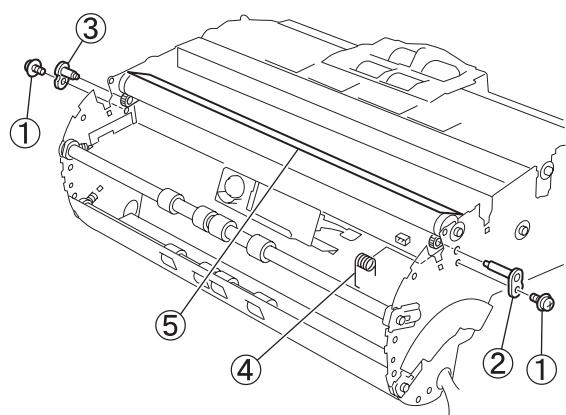
Fig. 3-405

Precautions during assembly

- Hang either side of the left-side spring on the shading plate assembly, and fix the left-side shaft.
- After referring to the "Shading solenoid (lower side)" section, adjust the positioning of the gears on the shading plate side and the solenoid side, and also adjust the position of the solenoid.
- Clean the shading plate.

4. Shading plate assembly (upper side)

- 1) Detach the upper unit.
- 2) Detach the back platen roller. Refer to the "Back platen roller" section.
- 3) Remove two screws ① (one on each side), shaft A ②, shaft B ③, and the spring ④ in sequence, and then detach the shading plate assembly (upper side) ⑤.



① Screw	② Shaft A
③ Shaft B	④ Spring
⑤ Shading plate assembly (upper side)	

Fig. 3-406

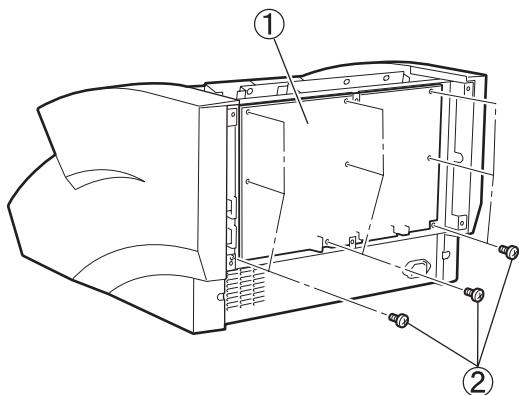
Precautions during assembly

- Insert the spring onto shaft A (longer one) and hang the either side of the spring on the shading plate assembly.
- After referring to the "Shading solenoid (upper side)" section, adjust the positioning of the gears on the shading plate side and the solenoid side, and also adjust the position of the solenoid.
- Clean the shading plate.

V. ELECTRICAL PARTS

1. Main CPU PCB (MAIN-DCON)

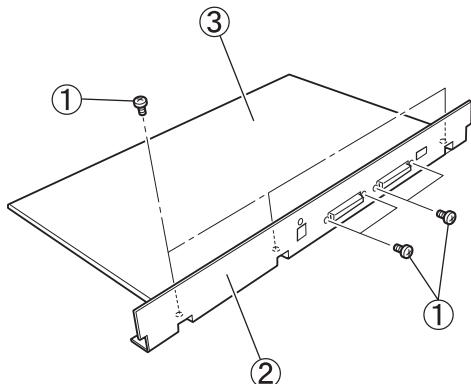
- 1) Remove the rear cover and the top cover.
- 2) Unhook all connectors connected to the main CPU PCB ①, remove nine screws ②, and then detach the main CPU PCB.



① Main CPU PCB
② Screw

Fig. 3-501

- 3) Remove seven screws ①, take off the connector cover ②, and detach the main CPU PCB ③.



① Screw
② Connector cover
③ Main CPU PCB

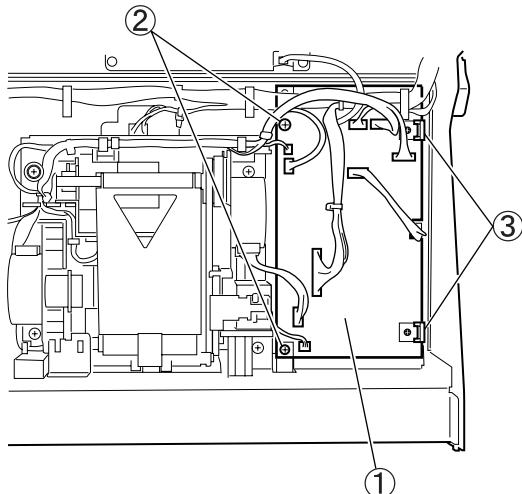
Fig. 3-502

Precautions during assembly

- Make sure that every cable is connected and securely inserted.
- Do not pull in the cables. Fix them using cable clamps.

2. Pick-up control PCB (80-SUB)

- 1) Detach the upper delivery cover assembly.
- 2) Unhook all connectors connected to the pick-up control PCB, remove two screws ②, and then detach the pick-up control PCB while removing two stoppers ③.

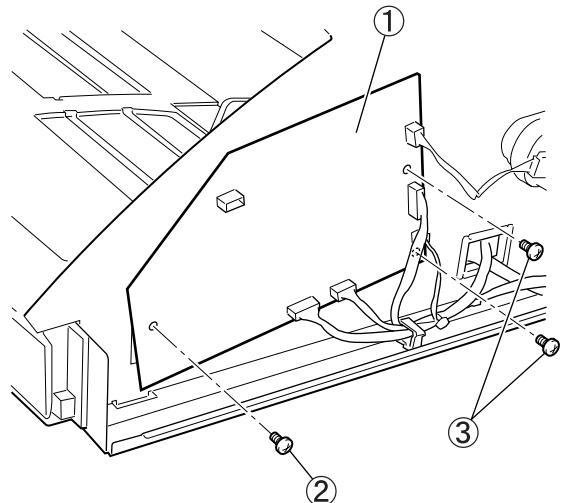


① Pick-up control PCB ② Screw
③ Stopper

Fig. 3-503

3. Document tray control PCB (10-SUB)

- 1) Detach the right cover assembly.
- 2) Unhook all connectors connected to the document tray control PCB ① and remove one screw A ② and two screws B (self-tapping) ③.



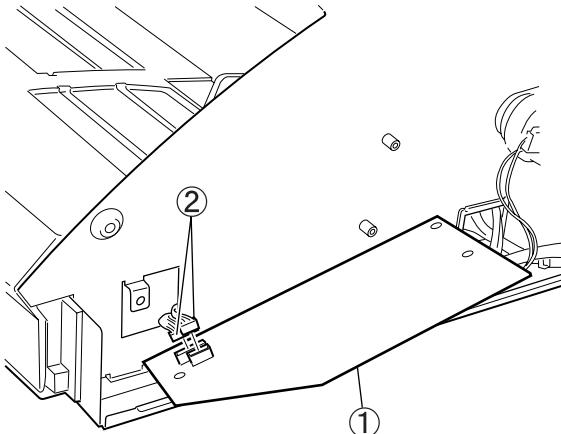
① Document tray control PCB
② Screw A
③ Screw B

Fig. 3-504

Precautions during assembly

- Make sure that every cable is connected and securely inserted.
- Do not pull in the cables. Fix them using cable clamps.

- 3) Disconnect two connectors ② attached to the back side of the document tray control PCB ①.

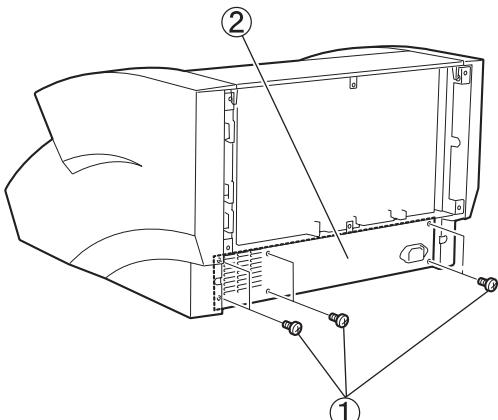


① Document tray control PCB
② Connector

Fig. 3-505

4. DC power supply PCB

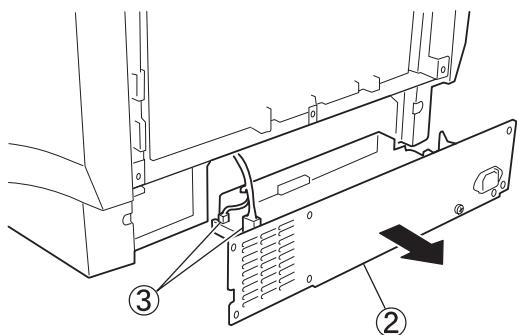
- 1) Remove the rear cover.
- 2) Remove six screws ① and pull out the DC power supply PCB ②.



① Screw
② DC power supply PCB

Fig. 3-506

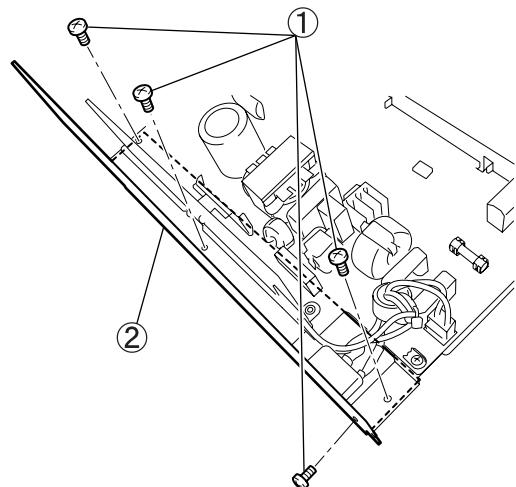
- 3) Unhook two connectors ③ and detach the DC power supply PCB ②.



② DC power supply PCB
③ Connector

Fig. 3-507

- 4) Remove four screws (with round-shaped tips) ① and detach the panel ②



① Screw
② Panel

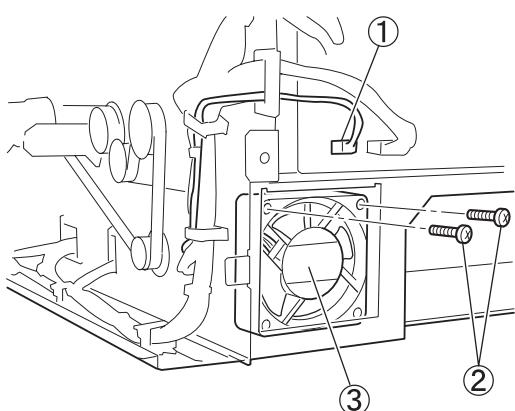
Fig. 3-508

Precautions during the assembly

- The power switch should be in the OFF position (in which the tip of the switch sticks out). Connect connector 4P to CN1.
- Since the tips of the three screws that fix the panel will protrude, use the screws with round-shaped tips to prevent injuries.

5. Exhaust fan

- 1) Detach the right cover assembly.
- 2) Detach the DC power supply PCB.
- 3) Unhook the connector ① of the exhaust fan on the main CPU PCB, remove two screws (M4x25) ②, and then detach the exhaust fan ③.



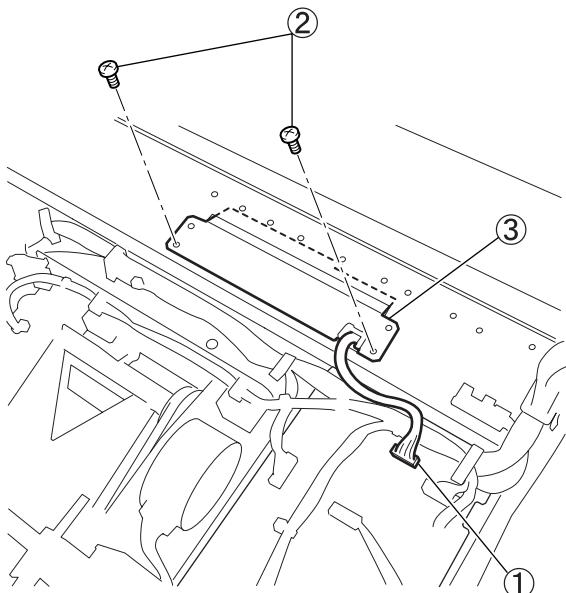
① Connector
③ Exhaust fan

② Screw

Fig. 3-509

6. Ultrasonic sensor PCB (upper side)

- 1) Detach the upper delivery cover assembly.
- 2) Unhook one connector ① and remove two screws ②, and detach the ultrasonic sensor PCB (with metal plates) ③.

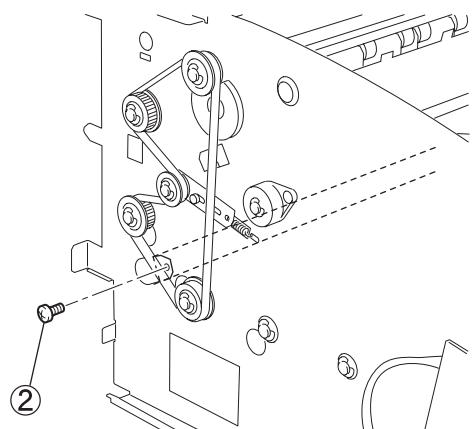
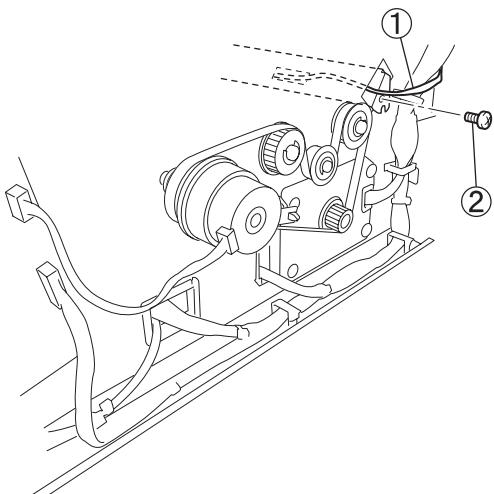


① Connector ② Screw
③ Ultrasonic sensor PCB (with metal plates)

Fig. 3-510

7. Ultrasonic sensor PCB (lower side)

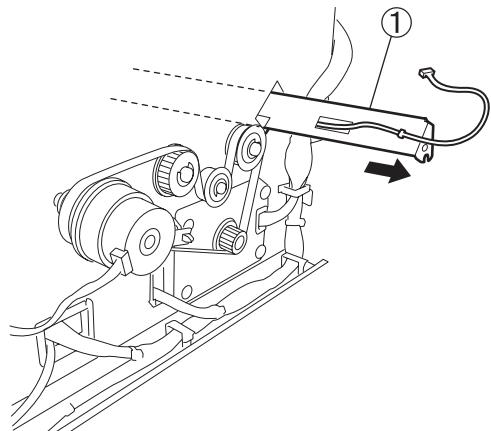
- 1) Detach the right/left cover assembly.
- 2) Unhook the connector on the main CPU PCB, which is connected to the cable ①. Remove two screws ② (one on each side).



① Cable
② Screw

Fig. 3-511

- 3) Pull off the ultrasonic sensor PCB (with metal plates) ① from the right.

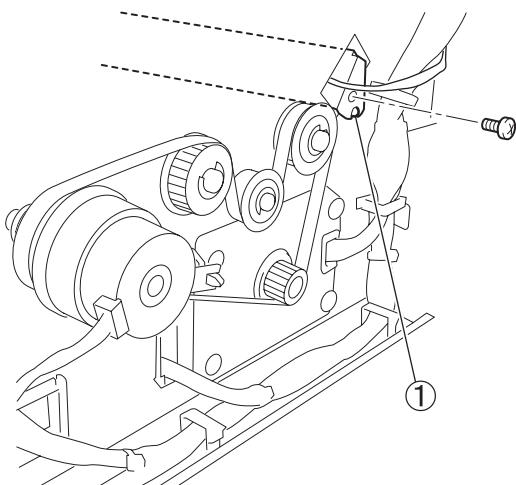


① Ultrasonic sensor PCB (with metal plates)

Fig. 3-512

Precautions during the assembly

- Match the positioning marks ① on the right side, tighten the right-side screw while holding the left side, and then tighten the screw on the left side.

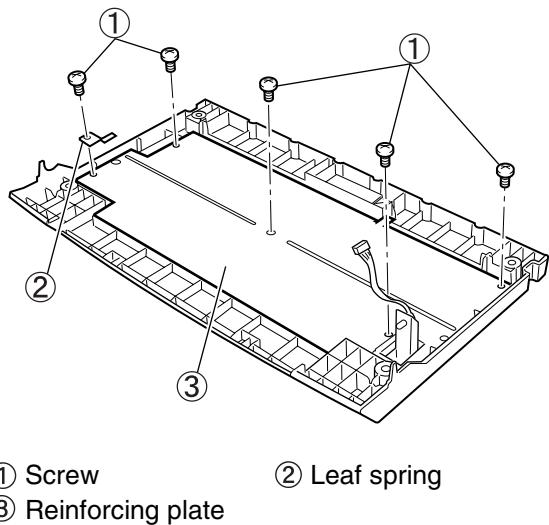


① Positioning mark

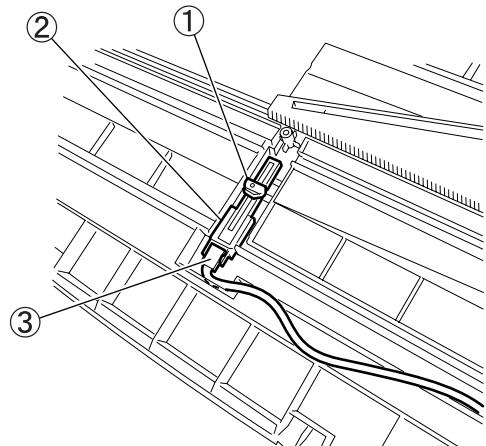
Fig. 3-513

8. Document guide width sensor

- 1) Detach the document tray assembly.
- 2) Remove five screws (self-tapping) ① and detach the leaf spring ② and reinforcing plate ③.



- 4) Remove the spacer ①, detach the document guide width sensor ②, and unhook the connector ③.



① Spacer
 ② Document guide width sensor
 ③ Connector

Fig. 3-516

Fig. 3-514

- 3) Remove the gear ①. Additionally, remove one screw ② and detach the document guide ③ and the rack ④ by sliding them out.

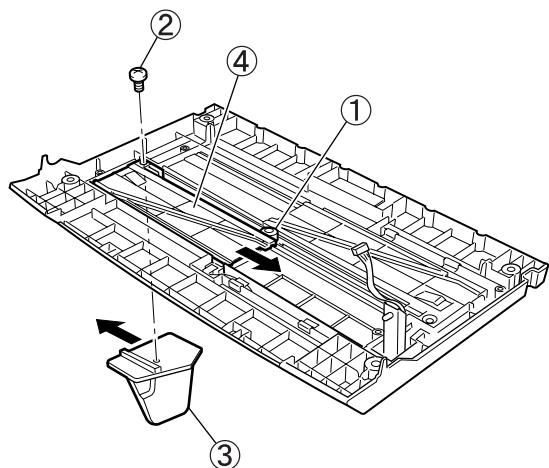
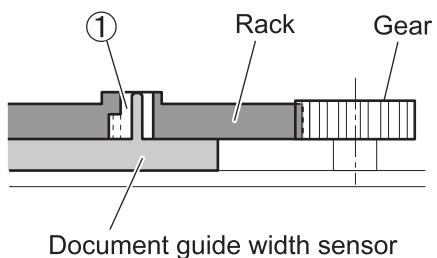


Fig. 3-515

Precautions during the assembly

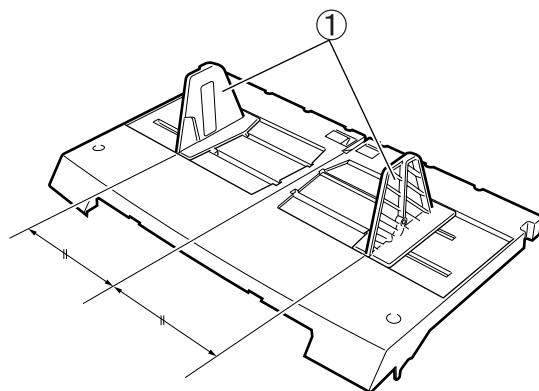
- Be sure to install the spacer ① in the correct direction.



① Spacer

Fig. 3-517

- Position the document guide ① symmetrically during assembly. After reassembly, check that the document guide moves smoothly.



① Document guide

Fig. 3-518

CHAPTER 4

INSTALLATION & MAINTENANCE

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I. SELECTION OF LOCATION

It is recommended that the customer engineer personally inspect the customer's premises before installing this machine. The location should meet the following requirements:

- The power supply should be connected to an outlet capable of supplying the voltage shown on the rating plate plus or minus 10%. A grounded plug must be used.

Grounding Items

- 1) Power outlet grounding terminal
- 2) Earth lead that has been grounded for office equipment

- The machine should not be installed on unstable places such as a fragile table or inclined surface. The weight of the machine is approx. 23 Kg.
- Ambient temperature and humidity should be 10 to 32.5°C and 20 to 80% RH. However, since the performance-guaranteed ambient conditions are 15 to 27.5°C and 25 to 75% RH, it is desirable for the machine to be operated under such conditions. In particular, do not install the machine near water faucets, humidifiers, hot water heaters, and refrigerators.

■ The machine should not be exposed to open flame, dust, ammonia or other corrosive gases, direct sunlight, intense vibration, or near unity that generates electromagnetic waves.

* Prevent cigarette smoke from coming into contact with the machine.

* In applications where installation in areas receiving direct sunlight is unavoidable, a heavy curtain should be installed on the windows to protect the machine.

■ Maintain sufficient space around the machine during operation and maintenance, and to allow proper ventilation.

* The exhaust fan and power cord are located at the rear of the machine. Do not push the machine against the wall.

* Allow sufficient space on both sides of the machine so that you can insert your hands to lift it when the machine is to be moved.

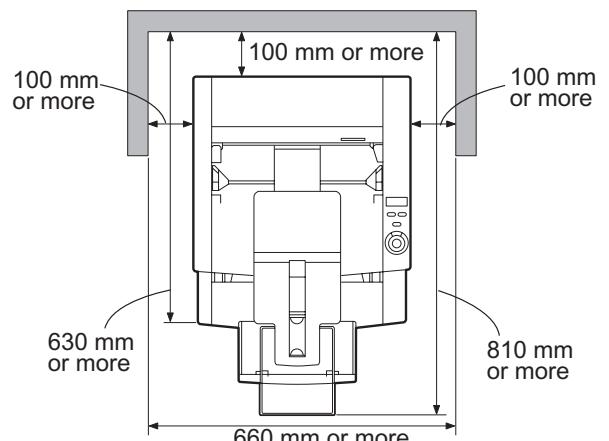


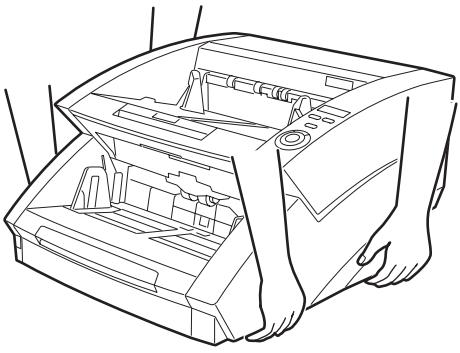
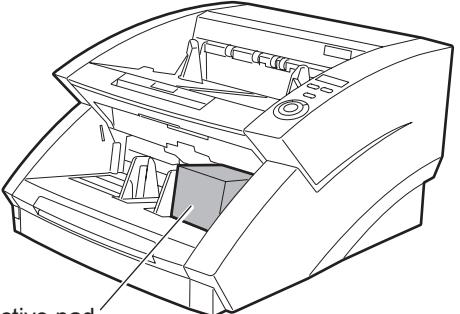
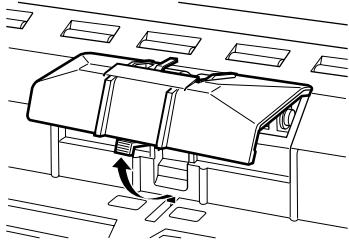
Fig. 4-101

II. UNPACKING & INSTALLATION

If the machine (in its shipping container) has been stored in a cold location, it should not be

unpacked in a warm room until it has had time to warm up. Otherwise, moisture may condense on the metal and glass parts, which can cause trouble. At least one hour should be allowed for the machine to warm up to room temperature before the shipping container is opened.

No.	Procedure	Inspection/Remarks
1	<p>Remove the exterior container and take out the parts and other materials packed inside. Check if anything is missing. The container weighs approx. 30 kg. and its external dimensions are approx. 600 (W) x 700 (D) x 450 (H) mm.</p> <p>① Main body ② Power cord ③ Grounding wire (100V model only) ④ Quick reference guide ⑤ Setup disk (CR-ROM) ⑥ User's manual ⑦ Warranty card (100V and 120V models only)</p>	

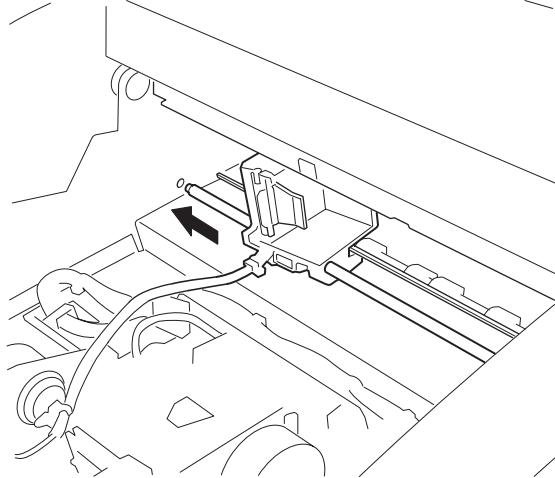
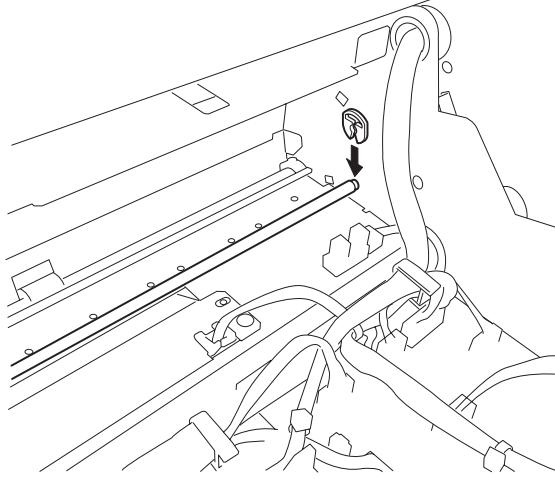
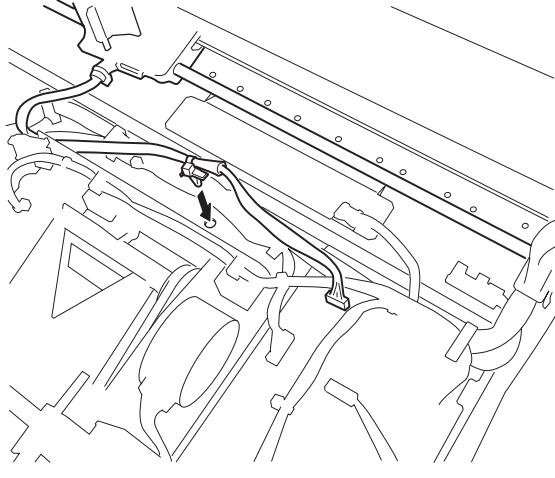
No.	Procedure	Inspection/Remarks
2	<p>Move the main body to where it is to be installed.</p> <p>Note: When moving it, two persons should hold both sides at the bottom. It is recommended to use a cart. The main body weighs approx. 23 kg.</p>	
3	<p>Peel off all the tape securing each part. The tape for the pick-up roller should be peeled off after opening the roller cover.</p>	<p>Check if the covers show any signs of damage caused during transportation.</p>
4	<p>Open the upper unit and remove the protective pad from the document guide area. Open the retard roller cover and remove the protective pad.</p>	 
5	<p>Connect the power cord.</p> <p>In the case of the 100V model, connect the grounding wire too.</p>	

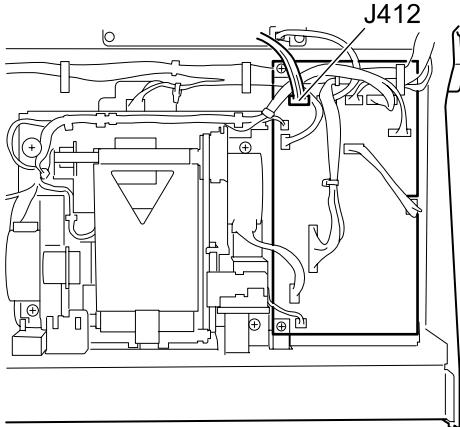
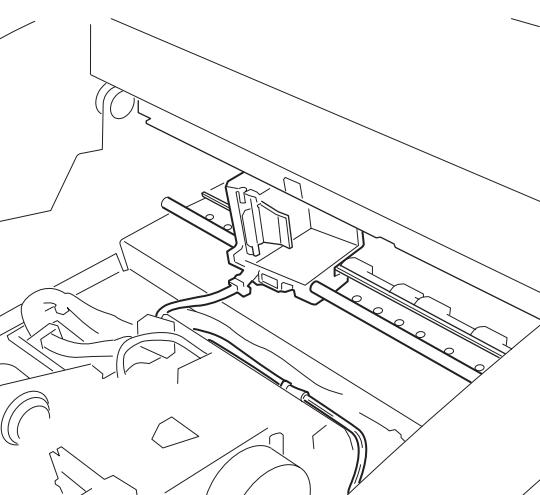
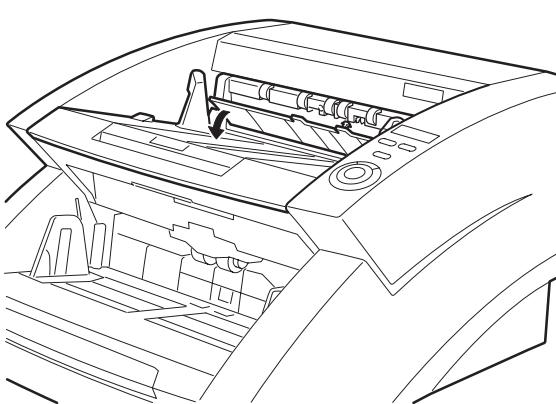
No.	Procedure	Inspection/Remarks
6	<p>Connect a personal computer to this machine using a SCSI or USB cable.</p> <p>When connecting a SCSI cable, change the SCSI ID and terminator settings if necessary.</p> <p>If this machine is connected at the end of the daisy chain, be sure to switch on the terminator.</p>	
7	<p>After turning on power to the machine, turn on power to the personal computer.</p> <p>Note: Before turning on power to the personal computer, make sure that "00000" appears on the counter display of the operation panel.</p>	
8	Install the driver and application software on the personal computer. For details, refer to the user's manual.	
9	Check if the machine operates normally. For details, refer to the user's manual.	

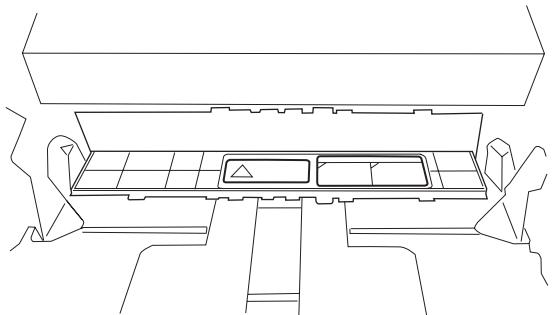
III. IMPRINTER MOUNTING PROCEDURE

No.	Procedure	Inspection/Remarks
1	<p>Make sure that all parts are ready.</p> <ul style="list-style-type: none"> ① IP drain unit ② IP carriage ③ IP shaft ④ Resin clip (white) ⑤ Screw (BH, M3x6) ⑥ IP label ⑦ User's manual <p>Note: Since the electrical contacts of the IP carriage are exposed, handle it carefully to avoid damage due to static electricity.</p>	
2	<p>Remove the rear cover.</p> <p>Note: Refer to "CHAPTER 3: DISASSEMBLY & REASSEMBLY".</p>	
3	<p>Remove the left and right covers.</p> <p>Note: Refer to "CHAPTER 3: DISASSEMBLY & REASSEMBLY".</p>	
4	<p>Insert the IP drain unit into the hole on the left side of the machine, in the direction of the arrow, as far as it will go. Be careful to orient the unit correctly. Place the inserted tip into the hole on the right side of the machine.</p> <p>Note: Insert the unit vertically at the left side of the machine.</p>	

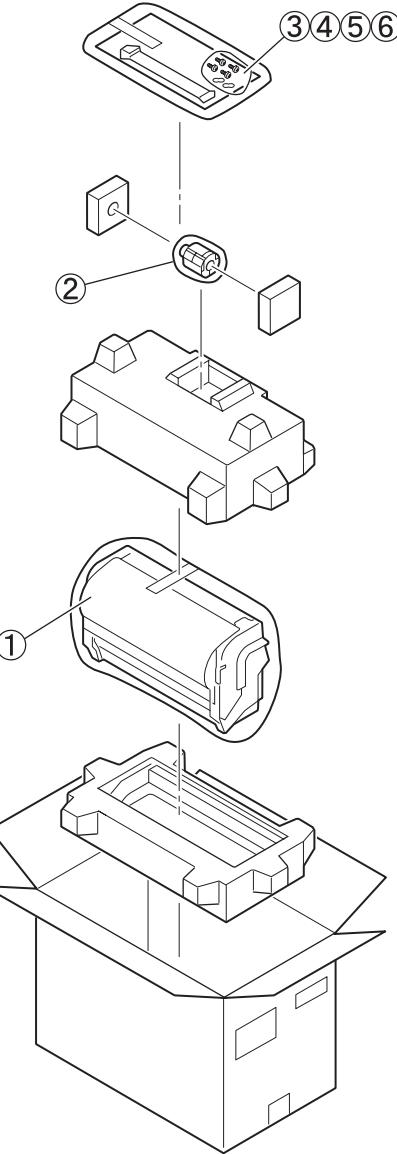
No.	Procedure	Inspection/Remarks
5	Secure the IP drain unit using screws (BH, M3x6).	
6	Dismount the upper delivery cover assembly. Note: Refer to "CHAPTER 3: DISASSEMBLY & REASSEMBLY."	
7	Insert the IP shaft into the IP carriage. Note: Be careful to insert the IP shaft in the correct direction. As illustrated in the right figure, insert the IP shaft into the IP carriage so that the short convex tip of the shaft is to the left and the longer tip is to the right.	
8	Insert the longer convex tip of the IP shaft into the hole inside the right side of the main body.	

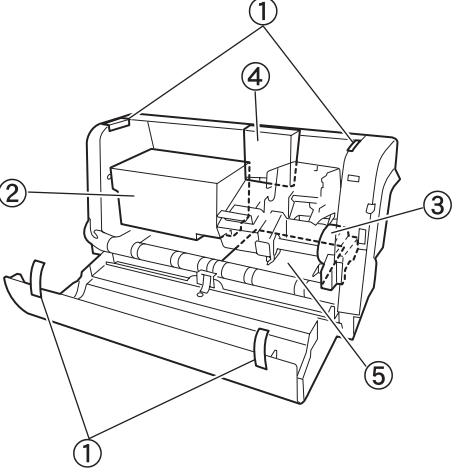
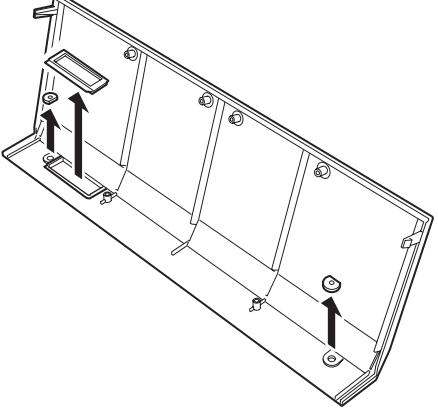
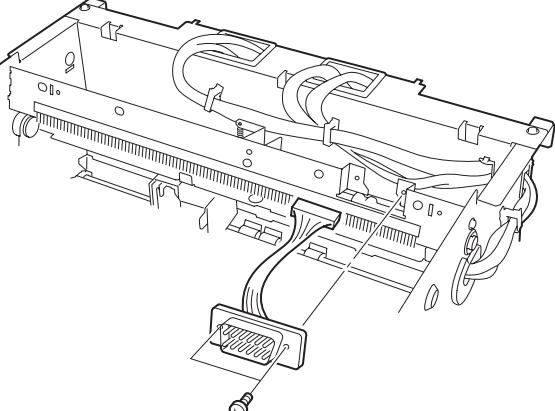
No.	Procedure	Inspection/Remarks
9	Rotate the other tip of the IP shaft in the direction of the arrow and then insert it into the hole inside the left side of the main body.	
10	Attach the resin clip to the right end of the IP shaft to secure it.	
11	Insert the snap band attached to the cable assembly of the IP carriage into the hole located at the center of the main body upper frame.	

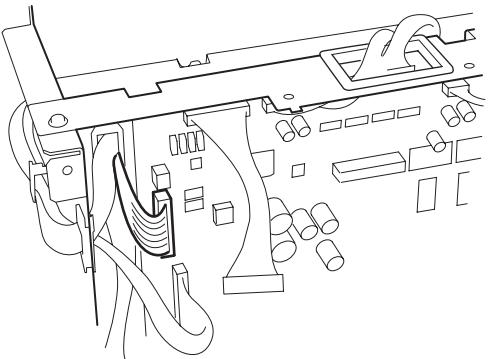
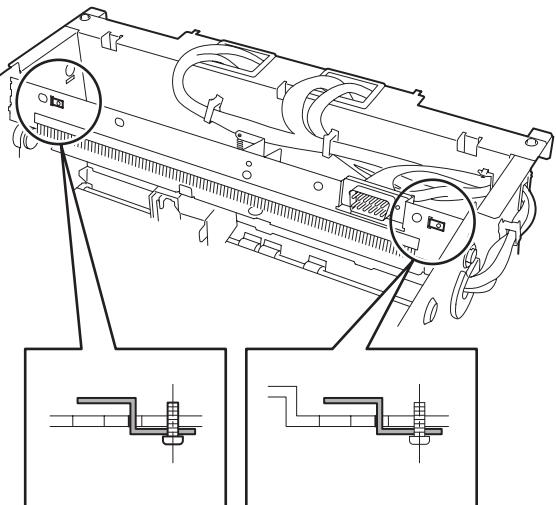
No.	Procedure	Inspection/Remarks
12	Connect the connector located at the tip of the IP carriage cable assembly to J412 of the pick-up control PCB (80_SUB) on the main body.	
13	<p>Check that the IP carriage can move from side to side. In the lower frame of the IP carriage there are small round grooves, and the IP carriage moves back and forth while stopping at each groove.</p> <p>Note: The IP carriage should stop at each of the grooves.</p>	
14	<p>Install the upper delivery cover assembly.</p> <p>Note: The upper delivery cover assembly should be installed with the imprinter cover opened.</p>	
15	Attach the right and left covers, and the rear cover.	

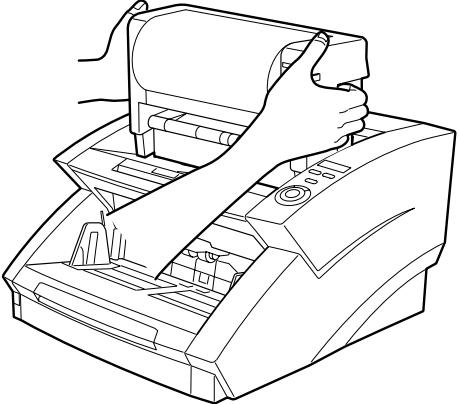
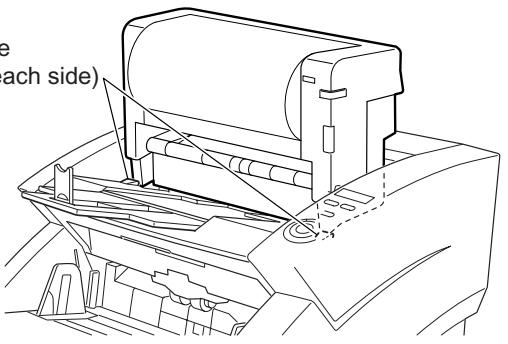
No.	Procedure	Inspection/Remarks
16	Peel off the IP label and stick it inside the IP cover. The label should be positioned correctly as viewed from the front of the main body.	
17	Install an ink cartridge.	The ink cartridges are sold separately. Use the products made by Hewlett-Packard Company, with part numbers as follows: C6602R (Red), C6602G (Green) C6602B (Blue)
18	Check that the imprinter operates normally.	

IV. ENDORSER ED600 MOUNTING PROCEDURE

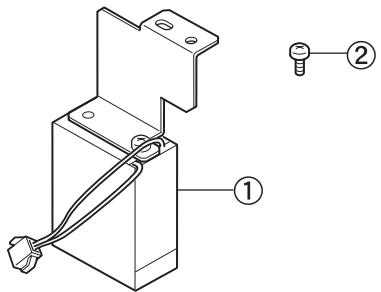
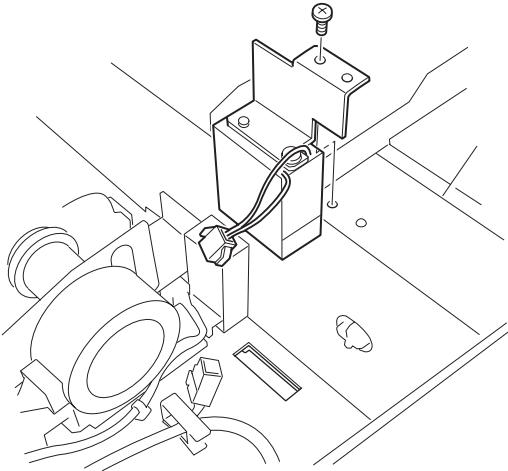
No.	Procedure	Inspection/Remarks
1	<p>Open the container and take out the endorser main body and the parts packed inside.</p> <p>① Endorser main body ② Die drum 300 (with a fixing screw) ③ Endorser cable assembly ④ Leaf springs: 2 pieces ⑤ Screws (stepped type): 2 pieces ⑥ Screw (BH, M3x4): 1 piece ⑦ User's manual</p> <p>Note: The ink roller and stamping plate are sold separately.</p>	

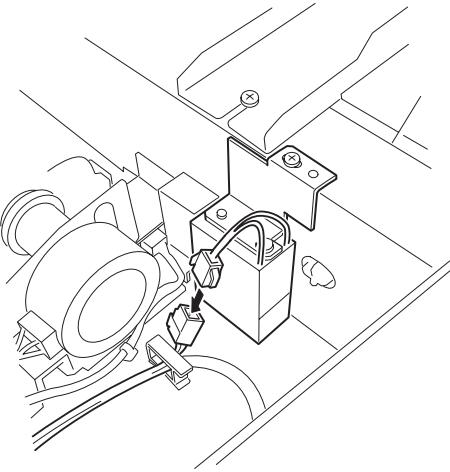
No.	Procedure	Inspection/Remarks
2	<p>Peel off all the fixing tape. Open the cover and remove the protective pads and protective sheets.</p> <p>① Fixing tape ②③④ Protective pad ⑤ Protective sheet</p>	
3	Remove the rear cover of the DR-6080/9080C. Note: Refer to "CHAPTER 3: DISASSEMBLY & REASSEMBLY."	
4	Remove the top cover of the DR-6080/9080C. Note: Refer to "CHAPTER 3: DISASSEMBLY & REASSEMBLY."	
5	Take the blind plate (attached at three places) off of the top cover.	
6	Install the endorser cable assembly (with two stepped screws).	

No.	Procedure	Inspection/Remarks
7	Pass the connector of the endorser cable assembly through the upper hole and connect it to J110 of the main CPU PCB (MAIN_DCON).	
8	Install a leaf spring at each side (with a screw).	
9	Attach the top and rear covers.	

No.	Procedure	Inspection/Remarks
10	<p>Open the document eject tray guide of the DR-6080/9080C outwards. Install the endorser main unit onto the delivery area of the DR-6080/9080C. Make sure to hold the handles of the right/left cover of the endorser. Also make sure that the rear connector and the positioning pin are inserted into the DR-6080/9080C, and the lower front part of the right/left cover is fit into the upper unit guide.</p> <p>Note: Before installing the endorser, open the document eject tray extension, if needed.</p>	  <p>Guide (for each side)</p> <p>View of opened document eject tray extension</p>
11	<p>Install the die drum 300.</p> <p>Note: Attach the stamping plate properly.</p>	
12	<p>Set the ink roller.</p> <p>Note: If the height of the ink roller has to be adjusted, use the adjusting screw, which was adjusted in accordance with the standard ink roller before shipping.</p>	
13	<p>Check that the unit operates normally. For details on how to operate it, refer to the user's manuals for the DR-6080/9080C and ED600.</p>	

V. MECHANICAL COUNTER INSTALLATION PROCEDURE

No.	Procedure	Inspection/Remarks
1	<p>Make sure that all the mounting parts are ready.</p> <p>① Mechanical counter unit ② Screw (M3x6)</p>	
2	<p>Remove the upper delivery assembly.</p> <p>Note: Refer to "CHAPTER 3: DISASSEMBLY & REASSEMBLY."</p>	
3	<p>Install the mechanical counter unit.</p>	

No.	Procedure	Inspection/Remarks
4	Connect the connector.	
5	Attach the upper delivery cover assembly	
6	Check that the unit operates normally. Note: Feed documents to check that the number on the counter is increased by the number of fed documents.	

VI. PERIODICALLY REPLACED PARTS

Parts must be replaced periodically to maintain the machine's functions to a constant standard. The following table shows parts that must be replaced periodically (parts that greatly influence machine operation when they are no longer functional but are not externally deformed or damaged).

Preferably these parts should be replaced when periodic servicing is carried out closest to the recommended replacement cycle. However, the rollers (3 types) can be replaced by the user and a "Replacement message" is displayed on the personal computer.

No.	Part Name	Part No.	Q'ty	Replacement Cycle (number of sheets)	Remarks
1	Pick-up roller	8927A004AA	1	250,000	The three types of rollers are sold as a set.
2	Feed roller		1		
3	Retard roller		1		
4	Pick-up solenoid	MF1-4251	1	1,500,000	

Table 4-601

Note 1: The above figures are for reference only, and may vary according to conditions of use.

Note 2: The rollers (3 types) can be replaced by the user and are sold as the "Exchange Roller Kit." For the "Replacement message", refer to the next page.

Reference: The difference between consumables, consumable parts, and periodically replaced parts

1. Consumables are parts that will be replaced when they become faulty, and are defined as products for sale. They are replaced by the user.
2. Consumable parts are the parts that will be replaced when they become faulty, and are defined as products for service. They are replaced by the user or service technician.
3. Periodically replaced parts are usually defined as products for service and replaced by the service technician.

Reference: Replacement Message

- For details on the replacement message, refer to the user's manual.
- The general outline is shown below.
- If the number of fed sheets exceeds 250,000, the following message appears when the personal computer is booted up again.

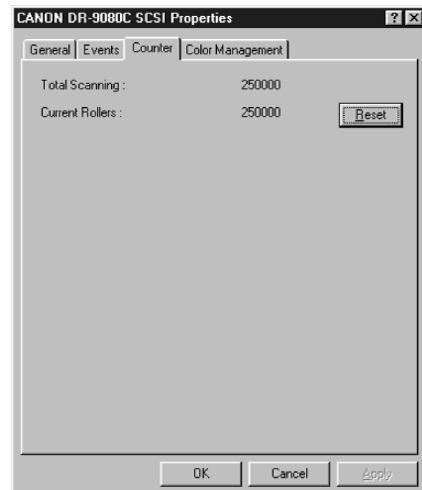
**Fig 4-601**

- After replacing the rollers, be sure to reset the counter. the method is shown below.

- Open the "Scanners and Cameras" in control panel.

**Fig 4-602**

- Display the "Properties" for the current scanner.
- Click the "Counter" tab.
- Press the "Reset" button to reset the counter to "0".

**Fig 4-603**

- This replacement message is not available for WindowsNT.

VII. CONSUMABLE PARTS AND CONSUMABLES

This machine has no consumable parts.

The following table shows consumables (products for sale). These items are to be replaced by the user.

No.	Part Name	Application	Guide for Replacement	Remarks
1	Ink cartridge	Imprinter	1.75 million characters	Replace it when running out of the ink. The guide-for-replacement value is based on the following conditions: smaller fonts (44 dots/character), 24 characters/sheet, 100 sheets/batch, and extra ink discharging.
2	Ink roller	Endorser	200 thousand sheets	Replace it when running out of the ink.

Table 4-701

Note 1: Used consumable parts must be collected and disposed of according to local laws.

Note 2: For the ink cartridges, use the products made by Hewlett-Packard Company, with part numbers as follows: C6602R (Red), C6602G (Green) C6602B (Blue)

VIII. PERIODIC MAINTENANCE SERVICE LIST

Note: Use only the specified solvents and oils.

[\triangle : Cleaning \bullet : Replacement \star : Oiling \square : Adjustment \circledcirc : Inspection]

Unit name	Location	Maintenance cycle				Remarks
		Every 250,000 sheets	Every 500,000 sheets	Every 1.5 million Sheets	Every 3 million Sheets	
Document feed system	Pick-up roller / Feed roller / Retard roller	(\bullet)				Replaceable by the user.
	Other rollers		\triangle			Wipe with a cloth moistened with water, and then wipe dry.
	Document sensor		\triangle			Clean with a cotton-tipped swab or air blower.
Reading system	Reading glass		\triangle			Wipe dry.
	Shading plate		\triangle	\square		Wipe with a cloth moistened with water, and then wipe dry. Clean the inside of the machine if necessary.
Drive system	Pick-up solenoid			\bullet		

Table 5-801

Note 1: If the parts above are very dirty, instruct the user to perform the "Daily User Inspection."

Note 2: For cleaning the shading plate, refer to the next page.

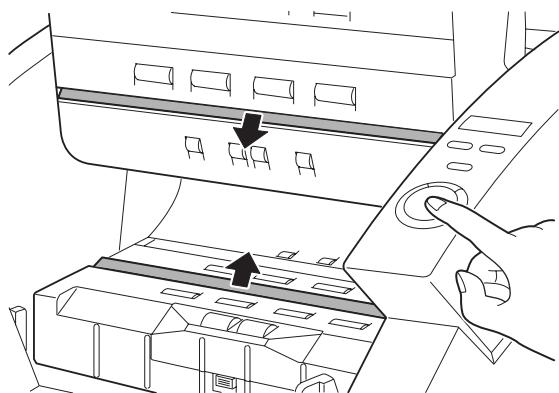
Note 3: Clean ink from inside the unit with a cotton-tipped swab, if the imprinter is being used. Refer to the user's manual packaged with the imprinter.

Note 4: Because dust on the power cord connectors may cause electrical leakage, clean them as necessary.

Reference: Cleaning the shading plate

- For details on cleaning the shading plate, refer to the user's manual.
- A general outline is shown below. The internal cleaning of the machine by the service technician is also shown here.
- Activation of the shading plate is shown below.

- 1) Fully open the upper unit. If the unit is not fully opened, the shading plate does not activate.
- 2) When the start key is pressed, the shading plate appears.

**Fig. 4-801**

- 3) When the stop key is pressed, the shading plate is retracted.

Closing the upper unit halfway enables the shading plate to be automatically retracted.

- Wipe with a cloth moistened with water, and then wipe dry. Be careful not to crease or scratch the shading plate.
- Even after the shading plate is cleaned, paper dust from the inside of the machine may get on the plate. Clean the inside of the machine as necessary. This cleaning must be performed by a service technician, not the user.

CHAPTER 5

TROUBLESHOOTING

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I. ERROR INDICATION AND SOLUTIONS

1. Error codes

1) List of error codes that can be handled by the user

Category	Code	Details	Solutions
Document jam	A01	In the event of a pick-up error, the document was fed to the front registration sensors.	Remove the document jam.
	P00	When powering on, or after opening/closing the upper unit, a document remains inside.	
	P01	Front or back registration sensor has detected a length between papers that is shorter than specified.	
	P02	Front or back registration sensor has detected a document length that is longer than specified.	
	P03	Front or back registration sensor has detected a document length that is shorter than specified.	
	P30	Document jam has occurred at the endorser.	
Door open	C01	Upper unit is open.	Close the covers completely.
	C02	Imprinter cover is open.	
	C03	Upper unit and imprinter cover are open.	
	C04	Endorser cover is open.	
	C05	Endorser cover and upper unit are open.	
	C06	Endorser cover and imprinter cover are open.	
	C07	Endorser cover, imprinter cover, and upper unit are open.	

Table 5-101a

Category	Code	Details	Solutions
Double feed	d02	Page length double feed detection.	Remove the document jam.
	d04	Ultrasonic double feed detection.	
	d06	Page length and ultrasonic double feed detection.	
Checks	H01	Ink cartridge is not installed.	Install the ink cartridge.
	J01	Staple detected (Feeding has stopped).	Remove the stapled document.
	J02	Staple detected (Pick-up has stopped).	
	J18	Skew detected.	Remove the document.
	U01	Verify error (counter<number of fed sheets) has occurred.	Check the number of documents.
	U02	Verify error (counter>number of fed sheets) has occurred.	Check if all the documents have been scanned.

Table 5-101b

2) List of error codes requiring a service technician

Category	Code	Details	Solutions
Hardware connection	E15	Voltage abnormalities in the imprinter	Check the connection and load, and replace any required parts.
	E20	Abnormalities in the main motor	
	E21	Abnormalities in the document tray motor	
	E22	Abnormalities in the retard motor	
	E24	Abnormalities in the feed motor	
	E25	Abnormalities in the pick-up motor	
	E26	Abnormalities in the pick-up solenoid	
	E27	Abnormalities in the endorser feed motor	
	E28	Abnormalities in the endorser printing motor	
	E29	Abnormalities in the registration clutch	
	E30	Abnormalities in the exhaust fan	
	E31	Abnormalities in the mechanical counter	
	E32	Wrong installation of main CPU PCB (The CPU PCB for a DR-9080C has been installed in a DR-6080 or vice versa.)	
	E33	Abnormalities in the shading solenoid (upper side) connection	
	E34	Abnormalities in the shading solenoid (lower side) connection	
Communication between CPUs	E40	Can't communicate with CPU on pick-up control PCB (80_SUB).	Check the connection and replace the PCB.
	E41	Can't communicate with CPU on document tray control PCB (10_SUB).	
	E42	Can't communicate with CPU for imprinter.	
	E44	Can't communicate with CPU for ultrasonic double feed detection.	

Table 5-102

2. Error messages

In addition to error code indications, error messages will appear on the display. The error messages vary with the software.

Error messages are often due to operation mistakes or document jams, which the user can take care of in accordance with the messages.

For detailed solutions, refer to the Help menu in the software or the user's manual. If an

error is not corrected by the user, the service technician will take care of it.

Fig.5-101 and Fig. 5-102 shows an example error message. Table 5-103 shows the main error messages possible when the driver and application software CapturePerfect 2.0 bundled with this machine are used.



Fig. 5-101

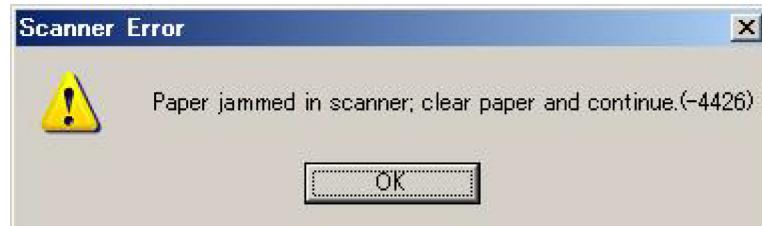


Fig. 5-102

Category	Error message	Cause → Remedy
Scanner search	Can't locate SCSI device; check cable and power.	Scanner (this machine) was not recognized. → Check the power supply. → Check the SCSI cable connection. → Check the SCSI card.
Document feed	Scanner cover is open.	Upper unit is open. → Close the upper unit securely.
	No page in the scanner, add page to the scanner?	Document sensor has not detected a document. → Load a document.
	Paper jam in scanner; clear paper and continue.	Registration sensor has detected a document jam. → Check if a document remains inside. → Check the thickness and type of the document.
	No page was found in the feeder.	Registration sensor has detected no document. Document cannot be fed. → Check the thickness and type of the document. → Check the rollers for correct installation, and for dust. → Check the operation of the pick-up sensor. → Check the connection of the motors and gears.

Table 5-103

II. REMOVING DOCUMENT JAMS

1. At pick-up

- 1) Remove any documents left in the document tray or eject tray.
- 2) If the stopper or eject tray extension is open, close it.
- 3) Press the open/close button and open the upper unit until it is stopped.

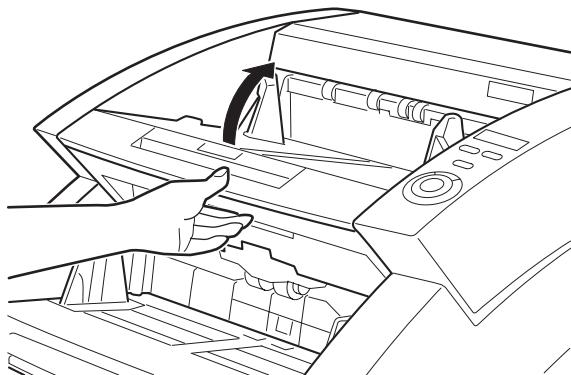


Fig. 5-201

- 4) Remove any documents remaining inside the main body.

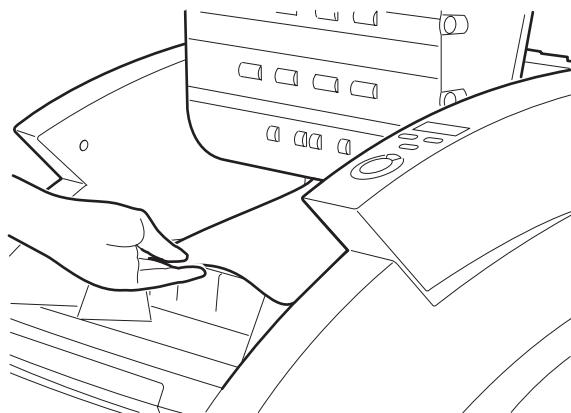


Fig. 5-202

- 5) Hold the upper unit at both sides and close it securely until it clicks.

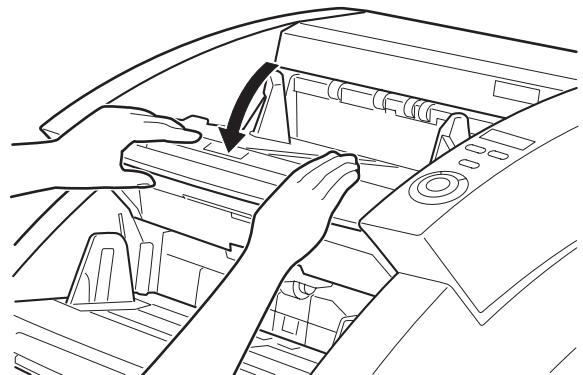


Fig. 5-203

Note: When removing the documents, be careful not to tear them.
When opening/closing the upper unit, be careful not to get your fingers caught.
Check if the last page of the ejected document was properly scanned.

2. At ejection

- 1) Remove any documents remaining in the document tray or eject tray.
- 2) If the stopper or eject tray extension is open, close it.
- 3) Press the open/close button and open the upper unit slightly.

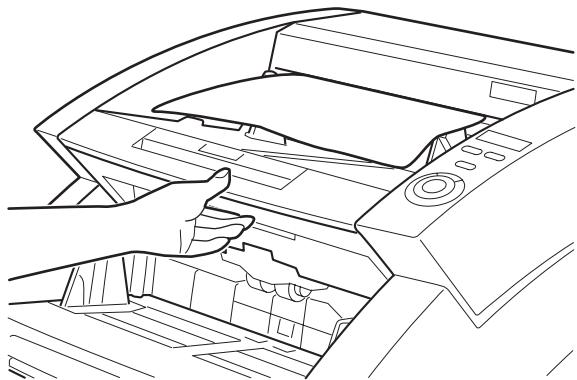


Fig. 5-204

- 4) Remove the document left in the eject tray.

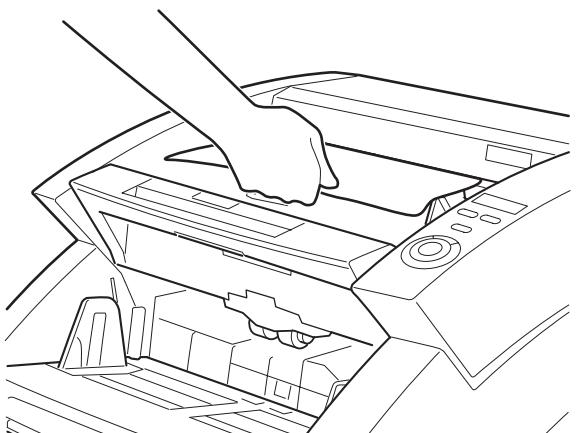


Fig. 5-205

- 5) Hold the upper unit at both sides and close it securely until it clicks.

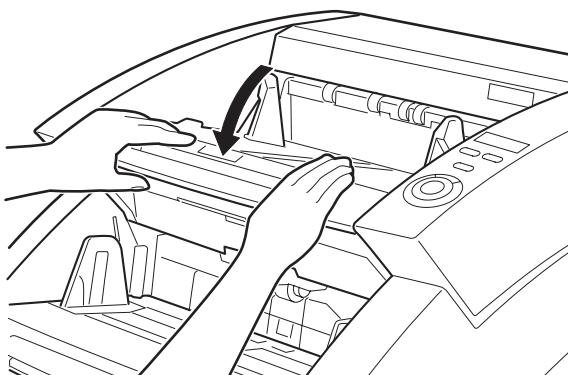


Fig. 5-206

Note: When removing the document, be careful not to tear it.

When opening/closing the upper unit, be

careful not to get your fingers caught.

Check if the last page of the ejected

document was properly scanned.

III. SERVICE MODES

1. Overview

The service modes of this machine can be enabled by installing the service mode software (found on the bundled setup disk) on a personal computer to be used for servicing.

The system requirements of the personal computer to be used should be equivalent to those described in the User's Manual. In the case of a slower CPU or less memory, the processing time may become longer, though the service modes will still be available.

Fig. 5-301 shows the Service window.

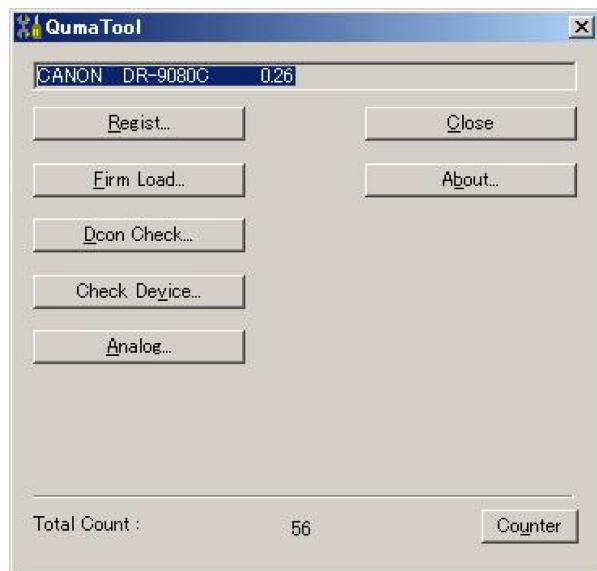


Fig.5-301

In the Service window, buttons for executing each mode are displayed. Each Service mode starts from this window. In the Service window of this machine, English is basically used, except for the OS-related displays.

- 1) Regist
Registration adjustment for image scanning
- 2) Firm Load
Firmware update.
- 3) Dcon Check
The operation of various kinds of hardware such as operation keys, sensors, operation panel LEDs, motors, solenoids, and shading plates is checked.
- 4) Check Device
Versions of devices located inside the machine are displayed and the imprinter is checked.
- 5) Analog
Displays analog values of sensors.
- 6) About
Displays the version of the service mode software.
- 7) Counter
The total number of fed sheets and the number of document jams can be displayed and changed.

2. Installation procedure

The following procedure is for installing the service mode software. Do not install it onto the user's personal computer.

- 1) Power on the personal computer for service and start the Windows OS.
- 2) Insert the Setup disk bundled with this machine.
- 3) Copy the folder "\Driver\Tools" in the Setup disk to any drive.

Note: To verify operation of this machine using the personal computer for service, install any necessary hardware. For details on how to install the software bundled with this machine, refer to the user's manual. When checking specifications such as the number of scanned documents, be sure the personal computer for service satisfies the personal computer system requirements described in the User's manual.

3. How to start and exit

The procedure for starting and exiting from the service mode is as follows:

- 1) Connect the personal computer for service to the machine using a SCSI or USB cable.
- 2) After powering on the machine, turn on the personal computer.
- 3) Open the installed "Tools" folder and launch the file "QumaTool.exe" inside that folder.

Note: Application software, including CapturePerfect, must be closed.

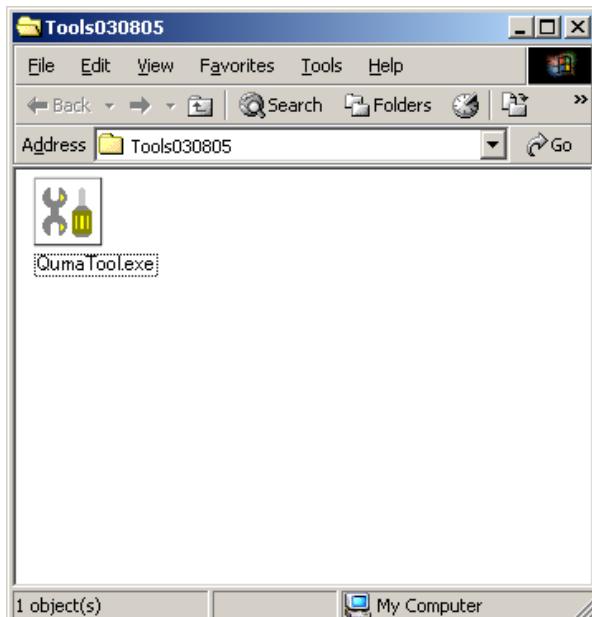


Fig. 5-302

- 4) When the Password window appears, type "quma" and click OK.

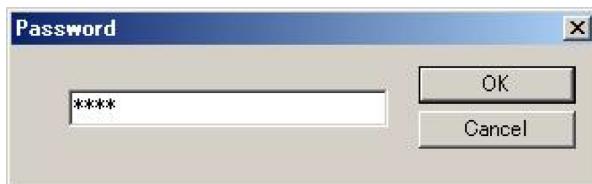


Fig. 5-303

- 5) The Service window appears.
- 6) To exit from the service mode, select "Close" in the Service window.

When turning on the personal computer for service after this machine has been connected, a window appears to ask for the installation of 'new hardware' or a 'device driver.' In this case, take the following action:

- a) When only the service mode software has been installed, click 'Cancel'.
- b) When the driver bundled with the machine has been installed, follow the user's manual.

Note: When performing service modes using the user's personal computer, make sure that the program "\Driver\Tools\QumaTool.exe" is launched from the bundled Setup disk. Do not copy the QumaTool.exe file onto the user's personal computer. When starting any service mode, pay attention not to reveal the folder name or password to the user.

4. Regist

This mode is used to adjust registration for image scanning.

- 1) Set some plain white copy paper (A4/LTR) on the document tray.

Note: Do not use dirty or creased paper. Place the sheets along the document guide so that they are not skewed.

- 2) Select "Regist" from the Service window. The state-displaying window appears (Refer to Fig.5-304).

When the registration adjustment is completed the state-displaying window disappears and the service window appears.

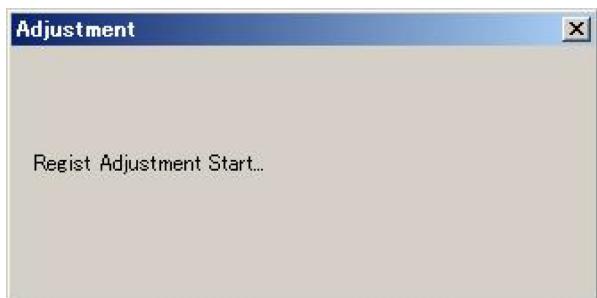


Fig. 5-304

Note: If this mode is executed with no document loaded, an error window (See Fig. 5-305) appears. Load a document and click OK to continue the registration adjustment.



Fig. 5-305

5. Firm Load

This mode is used to update the firmware in the machine. For details, refer to the service information issued with the new firmware. Avoid executing this mode by mistake.

- Brief operational procedure

- 1) Select 'Firm Load' from the Service window.
- 2) A window appears in which the firmware file is selected.
- 3) Specify the file to open it.
- 4) The firmware is loaded into the machine.

Note: When the firmware has been changed, write down the version number on the "ROM Version" label affixed on the rear side of the main body.

6. Dcon Check

This mode is used to check the operation of various kinds of hardware, such as the operation keys, sensors, operation panel LEDs, motors, solenoids, and shading plates.

- Operation window

After selecting 'Dcon Check' in the Service window, the Operation window (See Fig. 5-306) appears. To close the Operation window, press the 'Close' button.

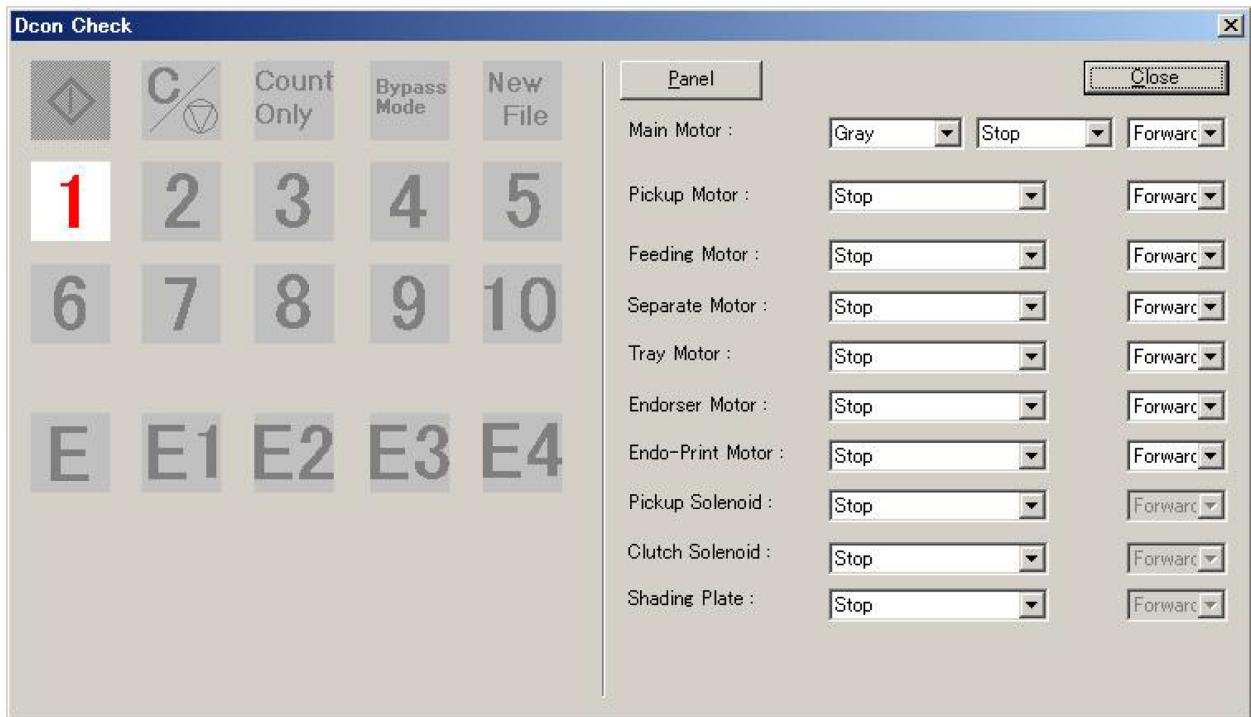


Fig. 5-306

a) Operation keys

Pressing an operation key will illuminate the corresponding mark. Fig. 5-307 shows the case in which the 'Count Only' key is pressed.

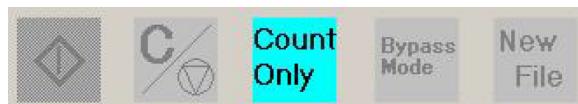


Fig. 5-307

b) Sensors of the main body

When a sensor on the main body is in a state of detection, the mark corresponding to the sensor will illuminate. Fig. 5-308 shows the case in which the document tray HP sensor and the document sensor are in a state of detection. The mark '1', which corresponds to the document tray HP sensor, will illuminate if the document tray is lowered, and will turn off when it starts to rise.

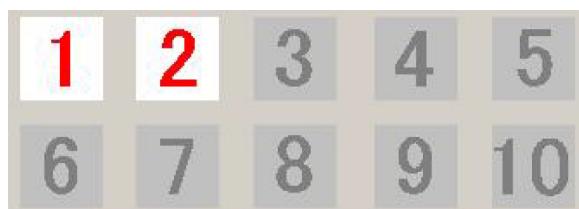


Fig. 5-308

1	Document tray HP sensor
2	Document sensor
3	Upper unit opening/closing sensor
4	Pick-up sensor (Refer to Note)
5	Imprinter door sensor
6	Left-end sensor
7	Front registration L sensor
8	Back registration sensor
9	Front registration R sensor
10	Right-end sensor

Note: When something is wrong with the operation of the pick-up sensor, the sensor position is thought to be incorrect. This problem occurs quite often, especially when disassembling or reassembling the pick-up sensor. For the adjustment, refer to the "VIII. AFTER REPLACING PARTS".

c) Endorser

As with the sensors on the main body, when the endorser button LED is pressed, or the sensor of the endorser is in a state of detection, the mark corresponding to the sensor will illuminate.

E Endorser button LED

E1 Die drum HP sensor

E2 Document sensor

E3 Cover open sensor

E4 Die drum open sensor

d) Operation panel LEDs

The 'Panel' button is shown in Fig. 5-309. If this button is selected, the operation panel LEDs alternate illuminating normally, illuminating all, and turning off all.



Fig. 5-309

e) Motors

Fig. 5-310 shows the part of the Operation window corresponding to various kinds of motors.

When a resolution is selected (100, 150, 200, 240, 300, 400, or 600), the main motor will rotate at the feeding speed corresponding to the resolution (See Fig. 5-311). When STOP is selected, the main motor will stop. The direction of rotation can be selected from 'Forward' or 'Reverse' (See Fig. 5-312). 'Forward' means the feeding direction, and 'Reverse' means reverse rotation. In addition, you can choose 'Gray' or 'Color' for the image mode.

The pick-up motor, feed motor ("feeding motor" on screen), retard motor("separate motor" on screen), tray motor, endorser feed motor (Endorser Motor), and endorser stamping motor (Endo-Print Motor) will rotate at the selected torque level (Weak, Middle, or Strong; See Fig. 5-313). When STOP is selected, each motor will stop. For these motors, you can choose the direction of rotation as 'Forward' or 'Reverse', just as for the main motor.

Note: For the motor torque level, select Weak or Middle, and stop the motor as soon as you have checked its operation.

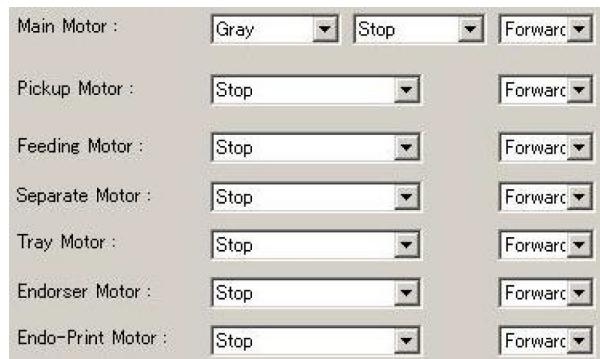


Fig. 5-310

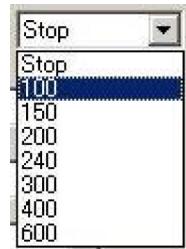


Fig. 5-311



Fig. 5-312

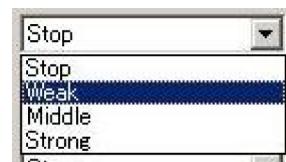


Fig. 5-313

f) Solenoids

Fig. 5-314 shows the part of the Operation window corresponding to the solenoids. The Pick-up Solenoid and Clutch Solenoid (registration clutch) will pull in with the selected force (Weak, Middle, or Strong) when it is selected (See Fig. 5-315). When STOP is selected, each solenoid will stop pulling in.

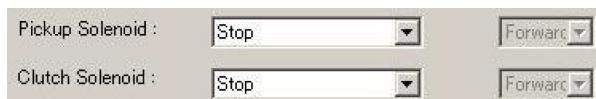


Fig. 5-314

g) Shading plate

Fig. 5-316 shows the part of the Operation window corresponding to the shading plates. Shading plates on the upper or lower side will pop up via a gear to overhang the platen roller, as soon as any force (Weak, Middle, and Strong) is selected (See Fig. 5-317), because the upper or lower shading solenoids are pulled in.

When STOP is selected, both shading plates will return to their original positions.



Fig. 5-316

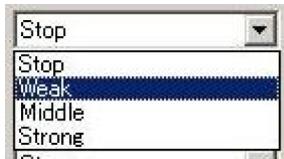


Fig. 5-315



Fig. 5-317

Note: For the solenoid force level, select Weak or Middle, and stop the solenoid as soon as you have checked its operation.

Note 1: When operating the shading plates, select Weak or Middle, and stop the operation as soon as you have checked it.

Note 2: Confirming the operation of the shading plates is enabled even when cleaning the shading plates.

7. Check Device

This mode is used to display the versions of the devices located inside this machine.

After selecting 'Check Device' in the Service window, a window displaying the version of each device appears (See Fig. 5-318).

Clicking the 'Imprinter Flushing' button enables the ink of the imprinter to be discharged. Setting a sheet of paper for the imprinter in the feed path and pressing this button allows you to check the ink discharge.

To close the window, press the 'Close' button.

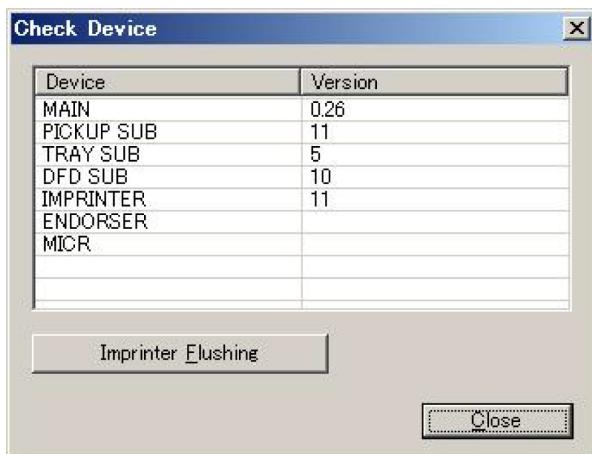


Fig. 5-318

8. Analog

This mode is used to display the analog values of sensors. It allows you to check the operation of sensors, such as the ultrasonic sensor, document guide width sensor, and staple sensor, which are not included in the main body sensors of Dcon Check operation window.

a) USS

After selecting 'Analog' in the Service window, a window displaying the analog value of each sensor appears (See Fig. 5-319). The box menu of Fig. 5-319 shows 'USS', which means the window displays the analog values related to the ultrasonic sensor.

Setting papers on the ultrasonic sensor portion in the feed path, while avoiding the registration sensors, allows you to check the operation of the ultrasonic sensor.

When one sheet is set, the "Document judgement" lamp will illuminate. When two or more sheets are set, the "Document judgement" lamp and "Amplitude judgement" lamp will illuminate, and the "Phase judgement" lamp will illuminate or flash.

To close the window, press the 'Close' button.

Opening the box menu will allow you to choose 'Feeder 1' or 'Feeder 2', in addition to 'USS' (See Fig. 5-320).

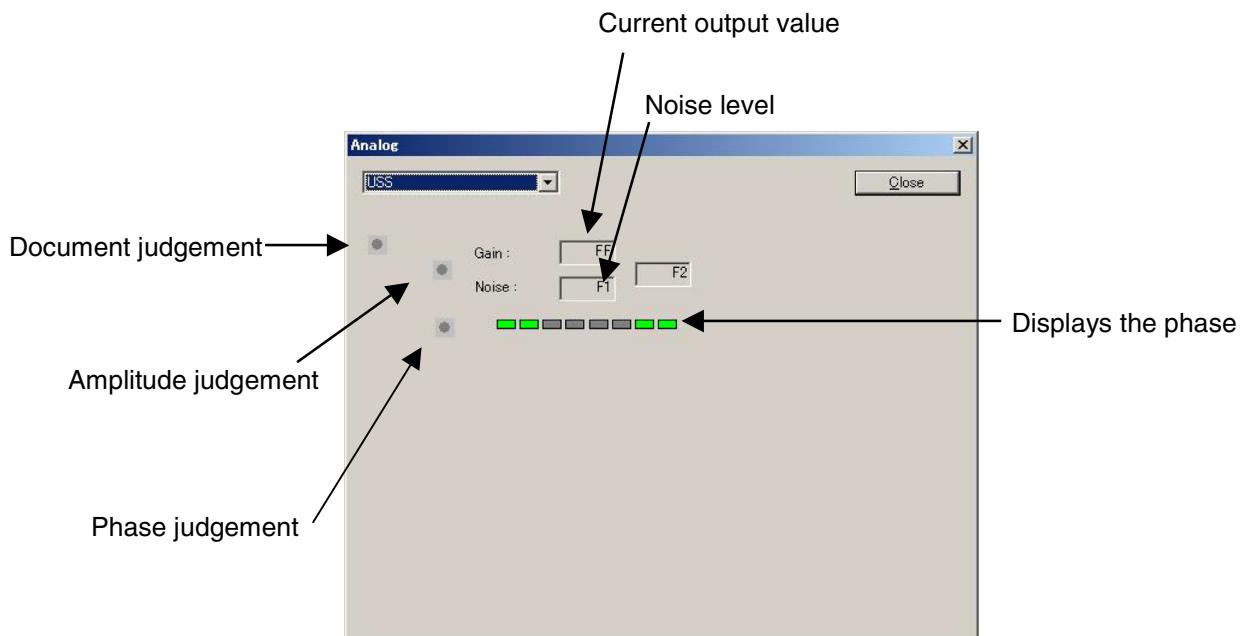


Fig. 5-319



Fig. 5-320

b) Feeder 1

Fig. 5-321 shows the window displayed after selecting 'Feeder 1' from the box menu.

In this figure, the analog values for the upper unit door sensor, left-end sensor, front registration L sensor, pick-up sensor, front registration R sensor, back registration sensor,

and right-end sensor are displayed. The mark of the sensor that has detected a document will illuminate.

The operation of these sensors must be checked using the "Dcon Check".

To close the window, press the 'Close' button.

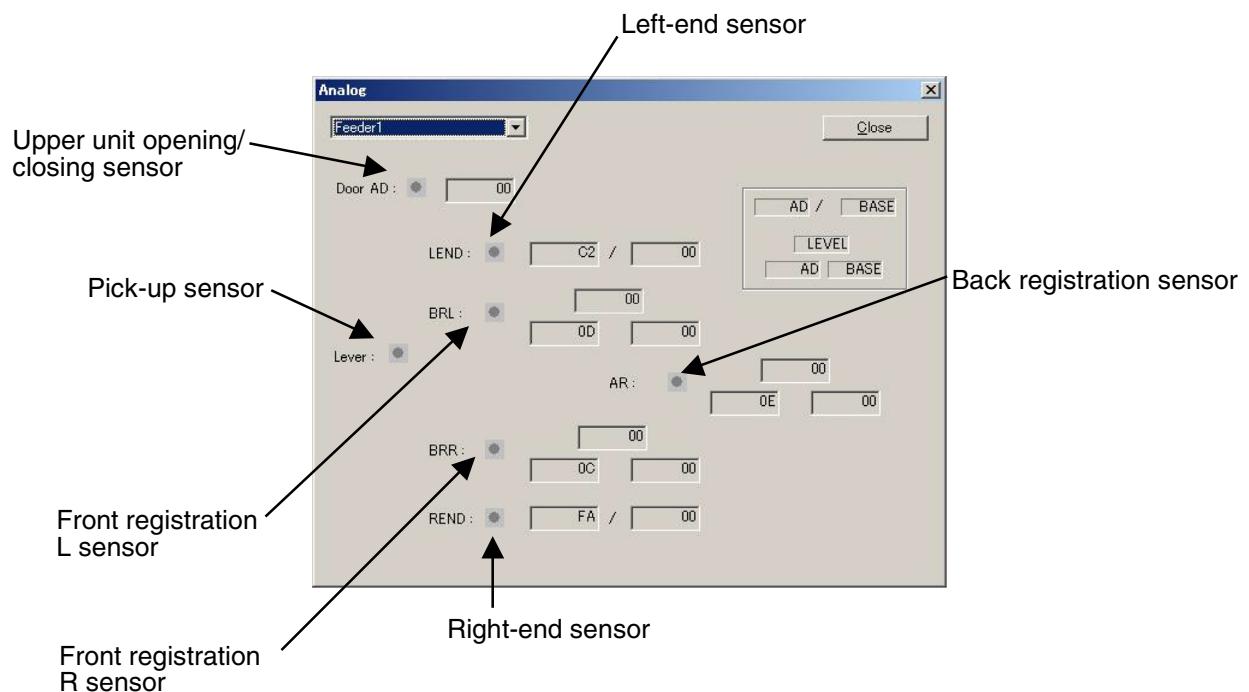


Fig. 5-321

c) Feeder 2

Fig. 5-322 shows the window displayed after selecting 'Feeder 2' from the box menu.

In this figure, the analog values for the document guide width sensor, document sensor, document tray HP sensor and staple sensor (on a one-by-one basis) are displayed. The mark for the sensor that has detected a document will illuminate.

However, the operation of the document guide width sensor and staple sensor are checked here, and the operation of the document sensor and document tray HP sensor are checked with the "Dcon Check".

- Document guide width sensor

Slide the document guide and check that the output value varies accordingly.

- Staple sensor

Block the light path of the staple sensor and check that the lamp illuminates.

To close the window, press the 'Close' button.

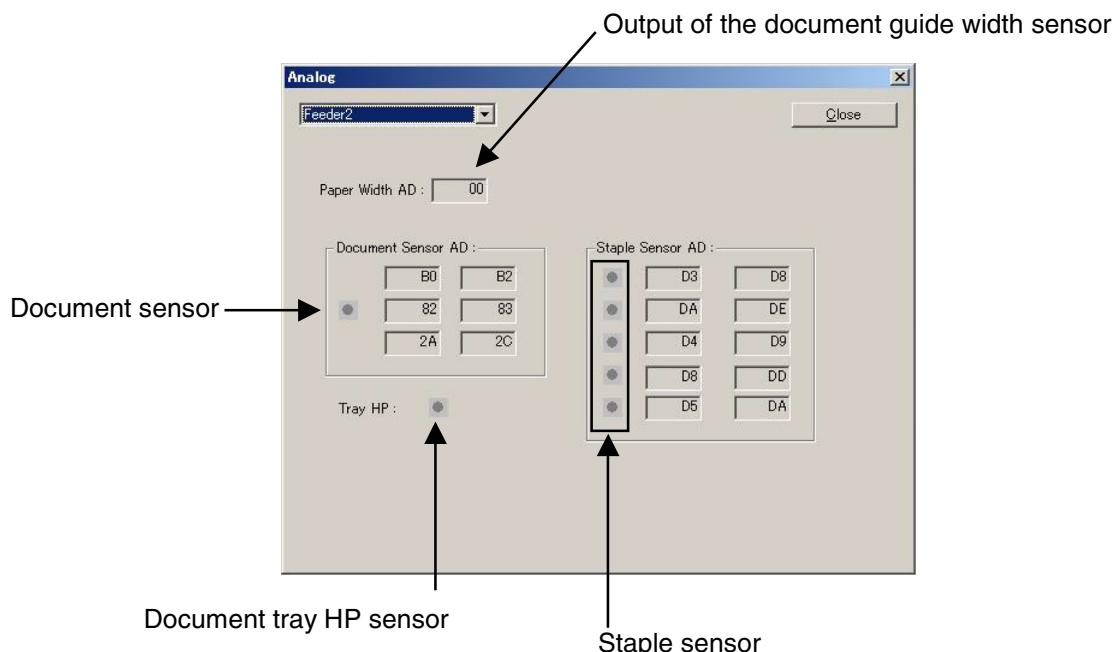


Fig. 5-322

9. About

This mode is used to display the version of the service mode software.

When 'About' is selected from the Service window, the version of the service mode software is displayed.

To close the window, press the 'Close' button.



Fig. 5-323

10. Counter

This mode is used to display or change the total number of fed sheets and the number of document jams. After 'Counter' is selected from the Service window, the Change Counter window appears (See Fig. 5-324). This window includes the following information:

- Total Count
Displays total number of fed sheets.
- P01_Jam Count
Displays the number of occurrences of error code P01.
- P02_Jam Count
Displays the number of occurrences of error code P02.
- P03_Jam Count
Displays the number of occurrences of error code P03.

After changing the numeric value and clicking the 'Set' button to the right, the new value is entered.

To close the window, press the 'Close' button.

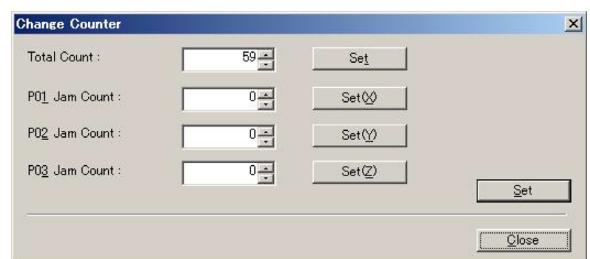


Fig. 5-324

IV. USER MODES

Table 5-401 shows a list of the user modes. To set the user modes, use the following procedure:

- 1) When the machine is in the standby state, press the NEW FILE key and Count Only key simultaneously. During the user mode, the LEDs of the NEW FILE key and Count Only key illuminate and the address (U01-U10) and data (the last digit) appear on the counter display.
- 2) When changing the address, use the NEW FILE key. Each time NEW FILE is pressed, the address changes, cycling from U01 to U10.
- 3) When changing the data, use the Count Only key. Each time Count Only is pressed, the data changes.
- 4) Pressing the Stop key exits the user mode.

Item	Address	Data	Description
Buzzer	U01	0	Does not use the buzzer.
		1	Uses the buzzer. (*)
Endorsement on Count Only	U02	0	Does not make the endorsement. (*)
		1	Makes the endorsement.
Endorser imprinting mode	U03	0	American check size (*)
		1	A4/Letter size
Double feed detection on Count Only	U04	0	Does not detect double feed. (*)
		1	Detects double feed using the ultrasonic sensor.
Staple detection on Count Only	U05	0	Does not detect staples. (*)
		1	Detects staples.
Strength for staple detection	U06	0	Staple detection strength: Weak
		1	Staple detection strength: Middle (*)
		2	Staple detection strength: Strong
Imprinter printing on Count Only	U07	0	Does not perform imprinter printing. (*)
		1	Performs imprinter printing.
Skew correction on Count Only	U08	0	Does not correct skew.
		1	Corrects skew. (*)
Power saving mode	U09	0	Does not shift to power saving mode.
		1	Shifts to power saving mode after ten minutes idle. (*)
Long document mode	U10	0	Normal mode: Document length is 432mm or less. (*)
		1	Long document mode: Document length is 1,000mm or less.

(*): Factory default settings

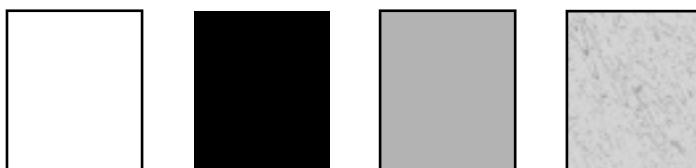
Table 5-401

V. IMAGE TROUBLESHOOTING

Note 1: There are times when image trouble is due to the display device or printer. In such cases, the problem cannot be corrected with the machine.

Note 2: There are times when, depending on the type of image and settings, document reproducibility becomes poor. In such case, the image may be improved by changing the settings.

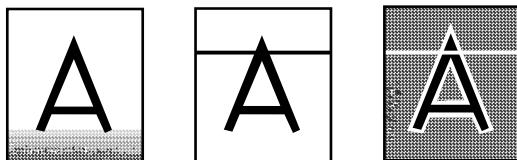
1 No image is output (completely white, completely black, completely grey, mottled)



Cause	Step	Check Item	Result	Action
'Brightness' setting	1	Is the 'Brightness' setting appropriate?	NO	Change the setting. Also change 'Contrast' if necessary.
Reading glass	2	Is the reading glass clean?	NO	Clean it. Also clean the roller if necessary.
Shading plate	3	Is the shading plate clean?	NO	Clean it.
	4	Does the shading plate jumps up to the platen roller?	NO	Check the assembly of the shading plate and the operation of the shading solenoid.
Connection of reading unit	5	Are J131/J132/J135 (front side) and J136/J137/J139 (back side) of MAIN_DCON connected properly? Are J2/J3/J4 (front side) and J2B/J3B/J4B (back side) of reading unit connected properly?	NO	Check all connections.
Reading unit	6	Is the problem solved when the reading unit is replaced?	YES	End.
MAIN_DCON	7	Is the problem solved when MAIN_DCON is replaced?	YES	End.

Table 5-501

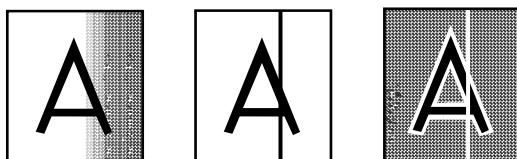
2 Uneven density, streaks (main-scanning direction)



Cause	Step	Check Item	Result	Action
Rollers	1	Are the pick-up roller, feed roller and retard roller properly installed?	NO	Install them properly.
	2	Are they dirty or deformed?	NO	Clean or replace them.
Gear/belt	3	Does it turn smoothly?	NO	Adjust or replace parts.
Main motor (M1)	4	Is the problem solved when the main motor is replaced?	YES	End.
Reading unit	5	Is the problem solved when the reading unit is replaced?	YES	End.
MAIN_DCON	6	Is the problem solved when MAIN_DCON is replaced?	YES	End.

Table 5-502

3 Uneven density, streaks (sub-scanning direction)



Cause	Step	Check Item	Result	Action
Reading glass	1	Is the reading glass clean?	NO	Clean it. If necessary, clean the roller too.
Shading plate	2	Is the shading plate clean?	NO	Clean it.
	3	Does the shading plate jumps up to the platen roller?	NO	Check the assembly of the shading plate and the operation of the shading solenoid.
Reading unit	4	Is the problem solved when the reading unit is replaced?	YES	End.
MAIN_DCON	5	Is the problem solved when MAIN_DCON is replaced?	YES	End.

Table 5-503

VI. OPERATION TROUBLESHOOTING

When an operation problem occurs, first check for an Error Code on the counter display. In addition, check the operation of the various sensors, motors and solenoids using the 'Service Modes'. For details on the 'Error Codes' and 'Service Modes', refer to the corresponding sections.

1	No power																																																
Note: Immediately after the AC power supply is turned off, the capacitor on the DC power supply PCB is still charged, so wait 10 seconds or more after the AC power supply is turned off before you connect/disconnect any connectors.																																																	
<table border="1"> <thead> <tr> <th>Cause/Faulty location</th><th>Step</th><th>Check item</th><th>Result</th><th>Action</th></tr> </thead> <tbody> <tr> <td>Connection of power cord</td><td>1</td><td>Is the power cord connected?</td><td>NO</td><td>Connect it.</td></tr> <tr> <td>AC power supply voltage</td><td>2</td><td>Is the specified voltage being supplied at the outlet?</td><td>NO</td><td>Explain to the customer that the trouble is not with the machine.</td></tr> <tr> <td>Power switch</td><td>3</td><td>Does the power switch work normally?</td><td>NO</td><td>Check the movement of the power switch shaft assembly.</td></tr> <tr> <td rowspan="2">Connectors related to the DC power supply</td><td>4</td><td>Are J102 and J117 of MAIN_DCON securely connected?</td><td>NO</td><td>Check that they are securely connected.</td></tr> <tr> <td>5</td><td>Are CN1 and CN6 of DC power supply PCB securely connected?</td><td>NO</td><td>Check that they are securely connected.</td></tr> <tr> <td>Connectors related to the operation panel</td><td>6</td><td>Are J140 of MAIN_DCON and J1201 of the operation panel PCB securely connected?</td><td>NO</td><td>Connect them securely. If the LED of the operation panel does not illuminate, replace the operation panel.</td></tr> <tr> <td rowspan="2">DC power supply PCB</td><td>7</td><td>Does LED104 (+24V) of MAIN_DCON illuminate?</td><td>NO</td><td>Replace the DC power supply PCB.</td></tr> <tr> <td>8</td><td>Is the problem solved when the DC power supply PCB is replaced?</td><td>YES</td><td>End.</td></tr> <tr> <td>MAIN_DCON</td><td>9</td><td>Power Does LED101 (for CPU operation check) flash, and does LED106 (+5V) illuminate?</td><td>NO</td><td>Replace the MAIN_DCON.</td></tr> </tbody> </table>		Cause/Faulty location	Step	Check item	Result	Action	Connection of power cord	1	Is the power cord connected?	NO	Connect it.	AC power supply voltage	2	Is the specified voltage being supplied at the outlet?	NO	Explain to the customer that the trouble is not with the machine.	Power switch	3	Does the power switch work normally?	NO	Check the movement of the power switch shaft assembly.	Connectors related to the DC power supply	4	Are J102 and J117 of MAIN_DCON securely connected?	NO	Check that they are securely connected.	5	Are CN1 and CN6 of DC power supply PCB securely connected?	NO	Check that they are securely connected.	Connectors related to the operation panel	6	Are J140 of MAIN_DCON and J1201 of the operation panel PCB securely connected?	NO	Connect them securely. If the LED of the operation panel does not illuminate, replace the operation panel.	DC power supply PCB	7	Does LED104 (+24V) of MAIN_DCON illuminate?	NO	Replace the DC power supply PCB.	8	Is the problem solved when the DC power supply PCB is replaced?	YES	End.	MAIN_DCON	9	Power Does LED101 (for CPU operation check) flash, and does LED106 (+5V) illuminate?	NO	Replace the MAIN_DCON.
Cause/Faulty location	Step	Check item	Result	Action																																													
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MAIN_DCON	9	Power Does LED101 (for CPU operation check) flash, and does LED106 (+5V) illuminate?	NO	Replace the MAIN_DCON.																																													

Table 5-601

2	PC does not recognize the machine
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This problem is caused by the SCSI or USB interface between this machine and the personal computer.

Cause/Faulty location	Step	Check item	Result	Action
Connection of SCSI/USB cable	1	Is the SCSI/USB cable properly connected?	NO	Connect it properly.
Power-on Sequence	2	Was power to the machine turned on before the personal computer was turned on?	NO	Follow the proper power-on sequence.
SCSI ID and terminator settings	3	Are the SCSI ID and terminator set properly?	NO	Set them properly.
Personal computer/SCSI PC and SCSI card settings	4	Are the personal computer and SCSI card set properly?	NO	Set them properly.

Table 5-602

3	Motors and solenoids do not operate
----------	--

Cause/Faulty location	Step	Check item	Result	Action
DC power supply	1	Is the unit receiving power?	NO	Perform the actions in section 1: 'No power.'
Counter display	2	Was the error code checked?	NO	Check the error code and identify the cause.
Connectors	3	Are the connectors for the faulty motor or sensor connected properly?	NO	Connect them properly.
Transmission system load	4	Is the transmission system driven by the motor normal? Are such parts as gears and belts normal?	NO	Remove the abnormal load. Replace needed parts.
Sensor	5	Is the operation normal when checking the sensor detection display in the service mode?	NO	Replace the sensor. Adjust the pick-up sensor position.
Motor	6	Is the operation normal when checking the operation in the service mode?	NO	Replace the motor.
Solenoid	7	Is the operation normal when checked in the service mode?	NO	Replace the solenoid.
MAIN_DCON	8	Is the problem solved when MAIN_DCON is replaced?	YES	End.

Table 5-603

VII. FEED TROUBLESHOOTING

1 Faulty document feeding (jam/double feed/wrinkles)

Note: When feeding extremely thick, thin, or pliant documents, faulty feeding can be improved by having the user change the feed condition settings.

Cause/Faulty location	Step	Check item	Result	Action
Document	1	Is the document within the specifications (thickness, dimensions, fold, curl, etc.)?	NO	Ask the customer to use documents within the specifications.
	2	Does the document have no staples?	NO	Ask the customer to remove the staples and reload the document.
	3	Do the documents slide smoothly?	NO	Ask the customer to manually feed the documents one at a time.
Improper detection of double feed	4	Is the size of batch code sheet the same as that of document?	NO	Ask the customer to use the same size sheet.
Rollers	5	Are the rollers clean?	NO	Clean them. If necessary, clean the reading glass too.
Parts in feed path	6	Are all parts that the documents contact properly installed (not loose or tilted)?	NO	Install them properly.
	7	Is the surface in contact with the document smooth (not scratched, no burrs)?	NO	Replace defective parts.
Drive transmission system	8	Is any abnormal noise emitted when feeding documents? Are any gears broken or is the belt loose?	YES	Replace defective parts. Tighten the belt properly.

Table 5-701

VIII. AFTER REPLACING PARTS

Some of the parts used in this machine require adjustments and settings after being replaced or disassembled/reassembled.

Check document feed and images after the replacement or disassembly/reassembly of the parts.

1. Main CPU PCB

- 1) When the SCSI is used, the SCSI ID and terminator must be set.
- 2) Perform the following items using the service mode.
 - Registration adjustment
 - Setting of total counter
- 3) When custom gamma data is to be used, enter the data.

2. Pick-up sensor

When the pick-up sensor is not properly installed, the document tray motion and feeding are not performed correctly.

Therefore, the adjustment of the pick-up sensor position is required not only after replacing parts, but also when a malfunction occurs after changing the position of the pick-up sensor.

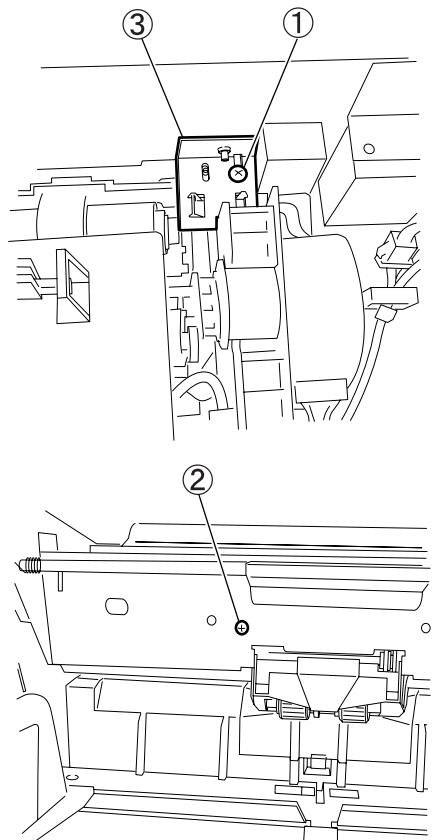
The position is correct if the pick-up sensor turns ON when the document tray reaches the top with plain copy paper set on the document tray.

- Checking the operation

- 1) Select "Dcon Check" in the service mode and keep the operating condition of the pick-up sensor visible.
If the pick-up sensor is illuminating when the document tray is not raised up, position adjustment is required.
- 2) Press the "Count Only" key on the operation panel of the main body to activate the Count Only mode.
- 3) Set plain copy paper on the document tray.
- 4) Press the "Start" key to feed the document.
- 5) If the pick-up sensor turns ON and the paper is correctly fed when the document tray reaches the top, everything is OK. Otherwise, position adjustment is required.

- How to adjust the position

- 1) Remove the upper delivery cover and front delivery cover.
- 2) Loosen the fixing screw ① and rotate the adjusting screw ② to move the sensor mounting plate ③ on which the pick-up sensor is mounted back and forth.



- ① Fixing screw
- ② Adjusting screw
- ③ Sensor mounting plate

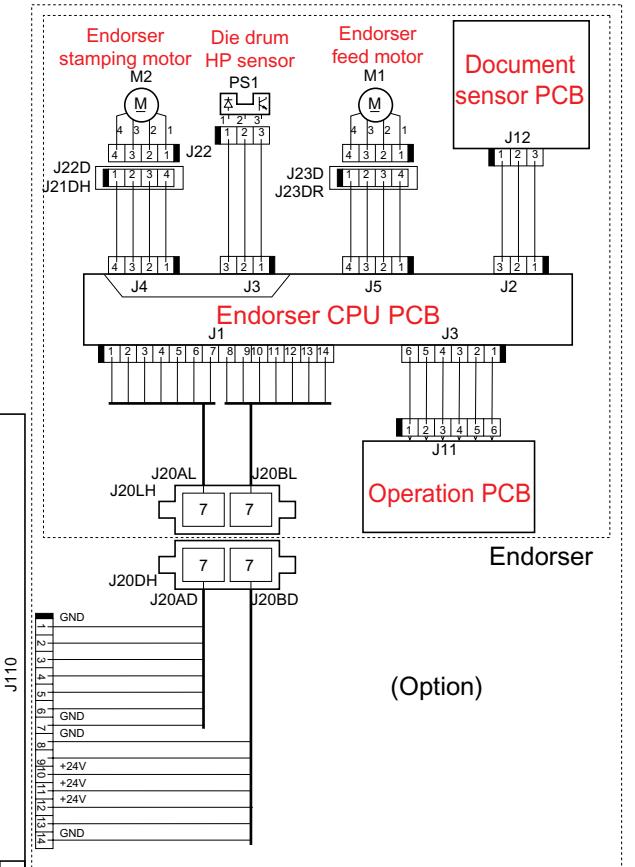
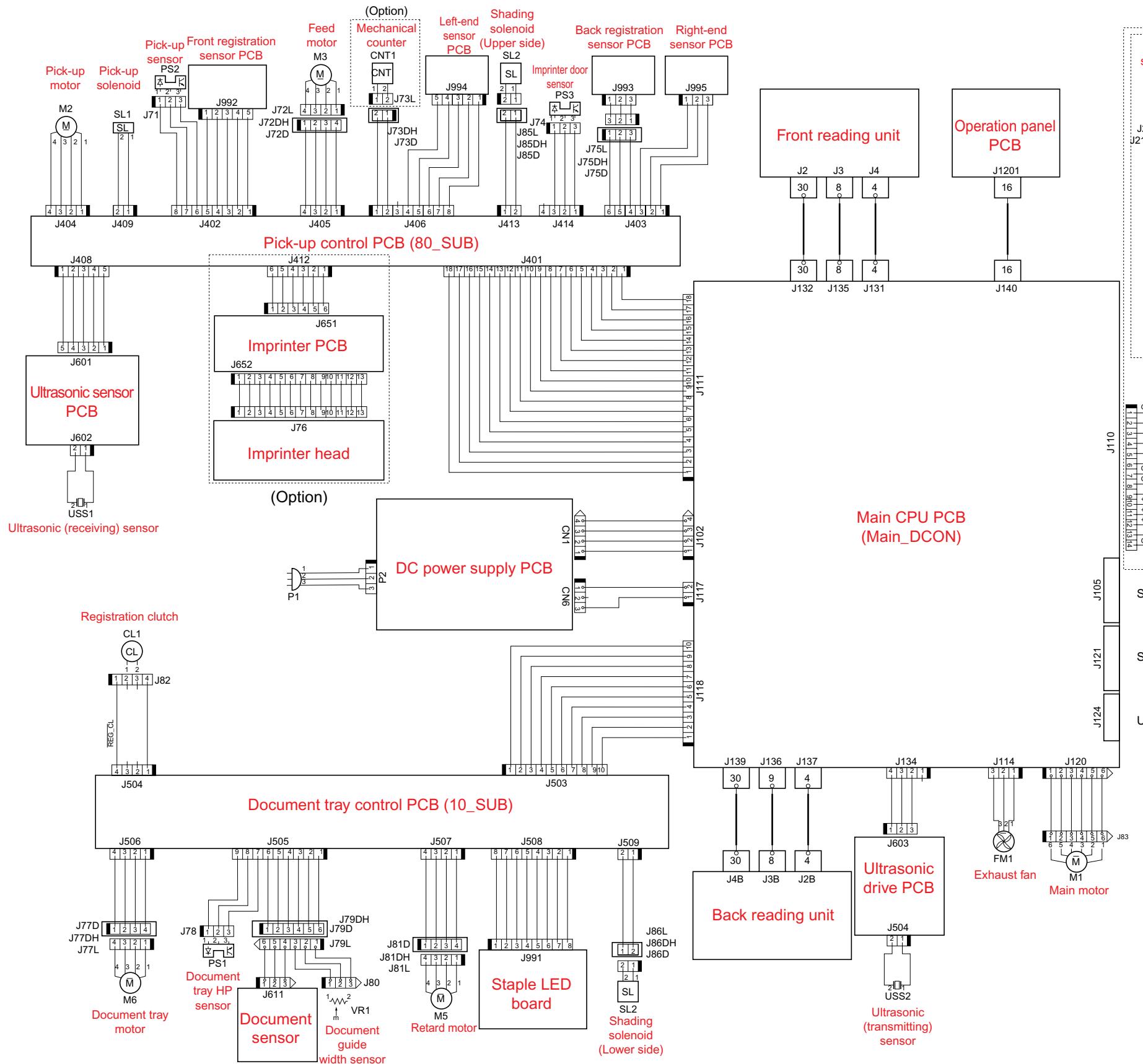
Fig. 5-801

- 3) Check the sensor operation while feeding the paper. Adjust the pick-up sensor to the correct position, and then fix it with the screw.
- 4) Replace the covers and check the operation again.

APPENDIX

I. GENERAL CIRCUIT DIAGRAM	A-1		II. LIST OF SIGNALS	A-3
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I. GENERAL CIRCUIT DIAGRAM



II. LIST OF SIGNALS

1. Main CPU PCB (MAIN_DCON)

The list of signals connected to the main CPU PCB is shown below.

Terminal No.	Name of Signal	Terminal No.	Name of Signal	Terminal No..	Name of Signal
J102	1 PWR_OFF	J111	13 80_TXD	J124	1 VBUS
	2 24V		14 80_RXD		2 DM
	3 GND		15 IP_RXD		3 DP
	4 GND		16 IP_TXD		4 GND
J105	1	J114	17 80IN0*	J131	1 FG
	1		18 DFS_PLS		2 GND
	50	J117	1 FAN_P		3 5V
J110	1 GND	J118	2 FAN_RDY		4 12V
	2 EN_RXD*		3 GND		1 CISF_RESET*+
	3 EN_TXD*		1 STB-		2 CISF_RESET*-
	4 EX_PORT0		2 STB+		3 CISF_SYNC•
	5 EX_PORT1	J120	1 24V	J132	4 CISF_SYNC+
	6 EX_RXD*		2 24V		5 CISF_MCLK+
	7 ENDORSER*		3 GND		6 CISF_MCLK-
	8 GND		4 GND		7 CISF_INT*-
	9 EX_PORT2		5 GND		8 CISF_INT*+
	10 24V		6 5V		9 CISF_DCLK+
	11 24V		7 10_IN*		10 CISF_DCLK-
	12 24V		8 10_TXD		11 CISF_DAT9-
	13 EX_PORT3		9 10_RXD		12 CISF_DAT9+
	14 GND		10 10_IN_X*		13 CISF_DAT8+
J111	1 24V	J121	1 B*		14 CISF_DAT8-
	2 24V		2 24V		15 CISF_DAT7-
	3 24V		3 B		16 CISF_DAT7+
	4 GND		4 A*		17 CISF_DAT6+
	5 GND		5 24V		18 CISF_DAT6-
	6 GND		6 A		19 CISF_DAT5-
	7 10_OUT		1		20 CISF_DAT5+
	8 10_TXD		1		21 CISF_DAT4+
	9 10_RXD		1		22 CISF_DAT4-
	10 REG_GO		50		23 CISF_DAT3-
	11 REG_MAE				
	12 EXTRA_IN				

Terminal No	Name of Signal
J132	24 CISF_DAT3+
	25 CISF_DAT2+
	26 CISF_DAT2-
	27 CISF_DAT1-
	28 CISF_DAT1+
	29 CISF_DAT0+
	30 CISF_DAT0-
J135	1 GND
	2 CISF_SDD
	3 GND
	4 CISF_SDI
	5 GND
	6 CISF_SCLK
	7 GND
	8 CISF_SEN*
J136	1 (OPEN)
	2 GND
	3 CISB_SDD
	4 GND
	5 CISB_SDI
	6 GND
	7 CISB_SCLK
	8 GND
	9 CISB_SEN*
	10 (OPEN)
J137	1 FG
	2 GND
	3 5V
	4 12V
	5 CISB_RESET*+
J139	6 CISB_RESET*-
	7 CISB_SYNC-
	8 CISB_SYNC+
	9 CISB_MCLK+
	10 CISB_MCLK-
	11 CISB_INT*-
	12 CISB_INT*+
	13 CISB_DCLK+
	14 CISB_DCLK-
	15 CISB_DAT9-

Terminal No	Name of Signal
J139	12 CISF_DAT9+
	13 CISF_DAT8+
	14 CISF_DAT8-
	15 CISF_DAT7-
	16 CISF_DAT7+
	17 CISF_DAT6+
	18 CISF_DAT6-
	19 CISF_DAT5-
	20 CISF_DAT5+
	21 CISF_DAT4+
	22 CISF_DAT4-
	23 CISF_DAT3-
	24 CISB_DAT3+
	25 CISB_DAT2+
	26 CISB_DAT2-
	27 CISB_DAT1-
	28 CISB_DAT1+
	29 CISB_DAT0+
	30 CISB_DAT0-
J140	1 KEY_IN0
	2 LED_SEL4
	3 LED_SEL3
	4 LED_SEL2
	5 LED_SEL1
	6 LED_SEL0
	7 LED SEG8
	8 LED SEG7
	9 LED SEG6
	10 LED SEG5
	11 LED SEG4
	12 LED SEG3
	13 LED SEG2
	14 LED SEG1
	15 LED SEG0

2. Pick up Control PCB (80_SUB)

The list of signals connected to the pick-up control PCB is shown below.

Terminal No	Name of Signal	Terminal No	Name of Signal
J401	1	1	TAK_MA
	2	2	TAK_MA*
	3	3	TAK_MB
	4	4	TAK_MB*
	5	1	24V
	6	2	COUNT*
	7	3	(OPEN)
	8	4	L_SEN*
	9	5	L_SEN_P
	10	6	GND
	11	7	DOOR_S
	12	8	DOOR_S_P
	13	1	5V
	14	2	DFS_PLS
	15	3	DFS_RXD*
	16	4	DFS_TXD*
	17	5	GND
	18	1	24V
J402	1	2	B_SHD_SL*
	2	1	GND
	3	2	IP_TXD
	4	3	IP_RXD
	5	4	(OPEN)
	6	5	5V
	7	6	24V
	8	1	24V
J403	1	2	PK_SL*
	2	1	GND
	3	2	IP_DR_DT
	4	3	5V
	5	4	(OPEN)
	6		
J404	1		
	2		
	3		
	4		

3. Document Tray Control PCB (10_SUB)

The list of signals connected to the document tray control PCB is shown below.

Terminal No	Name of Signal
J503	1 10_IN_X*
	2 10_RXD
	3 10_TXD
	4 10_IN*
	5 5V
	6 GND
	7 GND
	8 GND
	9 24V
	10 24V
J504	1 24V
	2 (OPEN)
	3 (OPEN)
	4 REG_CL*
J505	1 SIZE_DT
	2 GND
	3 5V
	4 GND
	5 AUTO_DT
	6 AUTO_P
	7 GND
	8 TRY_HP
	9 5V
J506	1 TYR_MA
	2 TRY_MA*
	3 TRY_MB
	4 TRY_MB*
J507	1 SEP_MA
	2 SEP_MA*
	3 SEP_MB
	4 SEP_MB*

Terminal No	Name of Signal
J508	1 GND
	2 GL_0*
	3 GL_1*
	4 GL_2*
	5 GL_3*
	6 GL_4*
	7 (OPEN)
	8 5V
J509	1 F_SHD_SL*
	2 24V

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