DR-3060/3080C

SERVICE MANUAL

REVISION 1

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PREFACE

This Service Manual describes necessary basic information for after-sales service and maintenance for maintaining the product quality and functions of the DR-3060/3080C.

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Features, specifications, names of parts, description of operation

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Description of disassembly, reassembly, and adjustment

Chapter 5: Installation
Location and installation procedure

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Parts to be replaced periodically, consumable parts

Chapter 7: Troubleshooting
Troubleshooting and service modes

Appendix: General circuit diagrams, etc.

Information in this manual is subject to change. Notification of such changes will be given in Service Information Bulletins.

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

GENERAL DESCRIPTION

I. FEATURES

1. Gray scale, simplex supported

Output is possible in 8-bit gray scale and 24-bit simplex color (DR-3080C only).

2. High speed scanning

Binary	300 × 300 dpi (high speed)	Simplex	40 sheets/minute or more
		Duplex	40 sheets/minute or more
Gray scale	300 × 300 dpi (high speed)	Simplex	40 sheets/minute or more
		Duplex	32 sheets/minute or more
Color	100 × 100 dpi	Simplex	20 sheets/minute or more
		Duplex	10 sheets/minute or more

* Only DR-3080C produces color output.
* When feeding A4 size documents.
* The front side of color, duplex documents is output in color and the back side as a gray scale image.
* The above scanning speeds are for when image data is read and discarded afterwards.

3. High durability

The expected life is three million sheets when feeding LTR size documents.
(Replacement of consumables and periodically replaced parts is required.)

4. Improved operability

Operation has been made easier by using the “Scan Panel”, the operational panel for the DR-3060/3080C.

5. Prescan function

Brightness, contrast and other image quality settings can be adjusted while viewing the first scanned page on the personal computer’s screen.

6. Automatic blank skip functions

This machine can be set not to automatically scan white pages when fed in with other document pages.

II. SPECIFICATIONS

Category	Item	Specifications		
Appearance/Installation	1. Configuration	Desktop type, sheet thru method scanner		
	2. Power supply	100 V AC 50/60 Hz 120 V AC 60 Hz 220 to 240 V AC 50/60 Hz		
	3. Weight	Approx. 8.1 kg		
	4. Effective temperature range	15 to 27.5 °C (59 to 81.5 °F)		
	5. Effective humidity range	25 to 75% RH		
	6. Max. power consumption/ current	100 V model: 42 W or less 120 V model: 0.6 A or less 220 - 240 V model: 0.4 A or less		
	7. Noise (sound power level)	Operation: 7.2 B or less Standby: 4.0 B or less		
	8. Dimensions	Tray opened: 344(W) × 240(H) × 555(D) mm Tray closed: 344(W) × 191(H) × 278(D) mm		
	9. External interface	SCSI-2 (Fast SCSI supported)		
Document scan	1. Photosensitive element	Contact image sensor (CIS CMOS)		
	2. Scanning method	Movement of document		
	3. Photosensitive element pixels	Density of pixels 300 dpi, 3024 effective pixels (approx. 256 mm)		
	4. Light source	Front side: RGB 3-color 1-line LED array (DR-3080C) • R : 640 nm • G : 525 nm • B : 470 nm Yellow-green 1-line LED array (DR-3060) • Yellow-green : 570 nm		
		Back side: Yellow-green 1-line LED array • Yellow-green : 570 nm		
	5. Scanning side	Simplex (front side)/duplex		
	6. Image output mode (main-scanning × sub-scanning)	Mode		Output format
		Simple binary / error diffusion/ text enhanced	Simplex Duplex	300 × 300 dpi (high speed) 200 × 200 dpi 240 × 240 dpi 300 × 300 dpi
		Gray scale		
		Color	Simplex Duplex	100 × 100 dpi 200 × 200 dpi
		* Only DR-3080C produces color output. * Color duplex mode: Front side 24-bit color, back side 8-bit gray scale		

Table 1-1 (cont.)

Category	Item	Specifications
Document feed	1. Pickup method	Automatic/Manual
	2. Document size	Min.: 55 mm (W), 70 mm (L) (70 mm is the min. size when Automatic is selected) Max.: 257 mm (W), 364 mm (L) Thickness: 0.06 to 0.15 mm (Automatic) 0.05 to 0.20 mm (Manual)
	3. Document requirements	1) Carbon-backed paper: Cannot be used 2) Press sensitive paper: Can be used 3) Perforated paper for binders: Only round holed paper can be used 4) Curled paper: 5 mm or less
	4. Expected life of product	Whichever of the 2 following items occurs soonest. 1) 3,000,000 sheets (A4/LTR size) 2) 5 years
	5. Max. pickup storage	Document stacking height: 10 mm or less (including curl) Number of sheets: Approx. 100 (80 g/m^2)
	6. Max. delivery storage	Document stacking height: 10 mm or less (including curl) Number of sheets: Approx. 100 (80 g/m^2)
	7. Pickup start mode	1) Auto: Automatic pickup when document is placed 2) Standard: Pickup when start of reading is instructed in the application 3) Panel: Pickup when start of reading is instructed in the application Pickup of new documents is continued by placing a new document and pressing the start button on the Scan panel after all sheets in the first document are picked up. 4) Manual: Manual pickup when document is placed
	8. Feed speed	1) When binary or gray scale mode is selected. • 241.9 mm/sec (300 × 300 dpi: high speed) • 181.4 mm/sec (200 × 200 dpi) • 151.2 mm/sec (240 × 240 dpi) • 121.0 mm/sec (300 × 300 dpi) 2) When color mode is selected. (DR-3080C only) • 121.0 mm/sec (100 × 100 dpi) • 60.5 mm/sec (200 × 200 dpi)
	9. Delivery direction	Face down

Table 1-1 (cont.)

<table>
<tr><th>Category</th><th>Item</th><th>Specifications</th></tr>
<tr><td rowspan="11">Document feed</td><td rowspan="11">10. Number of scanned documents</td><td>Document size: A4
<table>
<tr><td>Mode</td><td>300 × 300 (high speed)</td><td>200 × 200</td><td>240 × 240</td><td>300 × 300</td></tr>
<tr><td>Binary, Simplex</td><td>40</td><td>30</td><td>25</td><td>20</td></tr>
<tr><td>Duplex</td><td>40</td><td>30</td><td>25</td><td>20</td></tr>
<tr><td>Gray scale, Simplex</td><td>40</td><td>30</td><td>25</td><td>20</td></tr>
<tr><td>Duplex</td><td>32</td><td>30</td><td>25</td><td>17</td></tr>
</table>
<table>
<tr><td colspan="2">Mode</td><td>100 × 100</td><td>200 × 200</td></tr>
<tr><td rowspan="2">Color</td><td>Simplex</td><td>20</td><td>10</td></tr>
<tr><td>Duplex</td><td>20</td><td>10</td></tr>
</table>
• Only DR-3080C produces color output.
• The above scanning speeds are achieved when image data is read but not stored to memory.
• In the color duplex mode, the setting is 24-bit color front side and 8-bit gray scale back side.
• The above numbers may differ depending on the personal computer used or other conditions.</td></tr>
<tr><td rowspan="10">Image processing on main body</td><td>1. Brightness adjustment</td><td>256 gradations (in binary, gray scale, color modes)
* Brightness cannot be adjusted when the text enhanced mode or gamma compensation custom settings are selected.</td></tr>
<tr><td>2. Contrast adjustment</td><td>Binary: Not possible, Gray scale: 7 steps, Color: 7 steps
* Only DR-3080C produces color output.</td></tr>
<tr><td>3. Black compensation</td><td>Possible</td></tr>
<tr><td>4. White compensation</td><td>Possible</td></tr>
<tr><td>5. Gamma compensation</td><td>Possible</td></tr>
<tr><td>6. Resolution conversion</td><td>Possible</td></tr>
<tr><td>7. Edge emphasis</td><td>Possible</td></tr>
<tr><td>8. Binarizing</td><td>Simple binary/error diffusion</td></tr>
<tr><td>9. Margin scan</td><td>Possible</td></tr>
<tr><td>10. Dropout color</td><td>Can be specified only on front side. Select from RGB.
* Only usable with DR-3080C.</td></tr>
<tr><td>11. Cumulative counter</td><td>Stored on EEPROM on the CPU PCB assembly.</td></tr>
<tr><td rowspan="5">Image processing on driver</td><td>1. Binary AE</td><td>Text enhanced mode</td></tr>
<tr><td>2. Double-striking in sub-scanning direction</td><td>Possible</td></tr>
<tr><td>3. Skew compensation</td><td>Possible</td></tr>
<tr><td>4. Automatic blank skip</td><td>Possible</td></tr>
<tr><td>5. Automatic size detection</td><td>Possible</td></tr>
</table>

Table 1-1 (cont.)

Category	Item	Specifications
Other	1. Other functions	1) Scan panel 2) Prescan 3) Count only 4) Automatic size detection 5) Total counter (stored to EEPROM on CPU PCB assembly)
	2. Software packed	ISIS/TWAIN device driver Pix Util
	3. Option	Endorser (ED500) * Note, however, that only endorsers that have been re-designed for use on this machine can be used.

Table 1-1

III. PRECAUTIONS

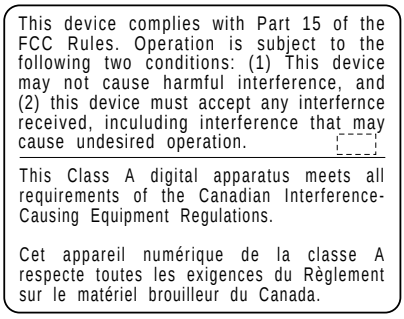
This section describes items that require particular care, for example, regarding human safety. These precautions must be observed. Explain to the user items that relate to user safety, and instruct the user to take appropriate actions.

1. Electromagnetic Wave Interference Countermeasures

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

Do not change nor modify this machine's specifications. If this has been carried out, its use may be forcibly discontinued on site. If this machine's specifications shall be changed, or the machine shall be disassembled and reassembled, follow the instructions described in this manual or in Service Information Bulletins.

The "CAUTION LABEL" is affixed on the rear of the machine.



CAUTION LABEL (120V model)

2. Power OFF in emergency

When such abnormalities as abnormal noise, smoke, heat and 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.

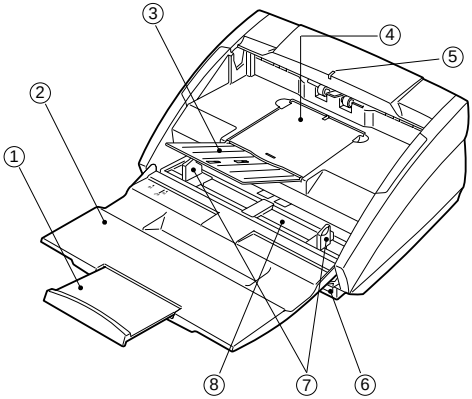
3. Instruction Manual

Read the instruction manual thoroughly before using this machine.

IV. NAMES OF PARTS

A. External Appearance

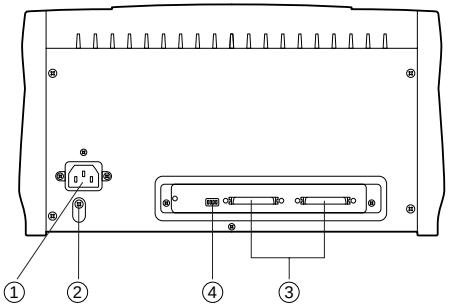
1. Front view



① Pickup tray extension
② Pickup tray
③ Delivery tray guide
④ Delivery tray
⑤ Power lamp
⑥ Power switch
⑦ Document guide
⑧ Document board

Fig. 1-1

2. Rear view



① Power cord connector
② Grounding terminal
③ SCSI connector
④ DIP switch

Fig. 1-2

V. EXPLANATION OF OPERATION

A. Basic Operation

The basic procedure for operating this machine is as follows.

1. Turn the machine ON.
2. Turn the personal computer ON.
3. Open the pickup tray.
4. Open the delivery tray guide.
5. Start up the application software.
6. Place the document on the document board.
7. Execute operation.
   Execute the required operations according to the operation procedure.
8. End operation.
9. Quit the application software.
10. Turn the personal computer OFF.
11. Turn this machine OFF.

Note: For details on how to operate it, refer to the start-up manual.

B. Operation panel

The scan panel is shown below.

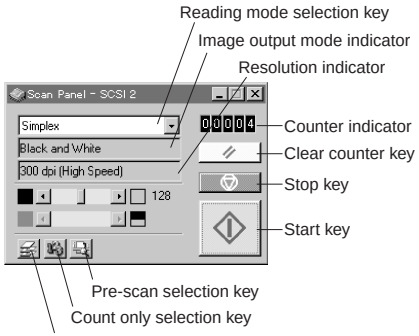


Fig. 1-3

C. Placing Documents

1. Open the pickup tray.

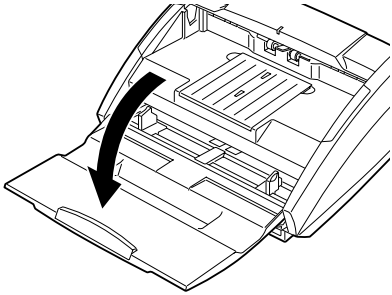


Fig. 1-4

2. Draw out the pickup tray extension.

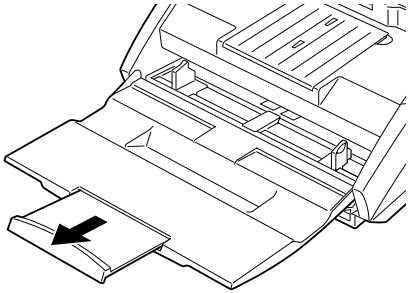


Fig. 1-5

3. Open the delivery tray guide.

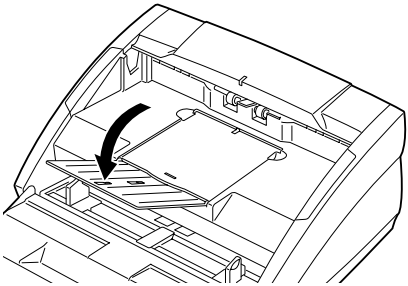


Fig. 1-6

4. Move the document guides to match the width of the document.

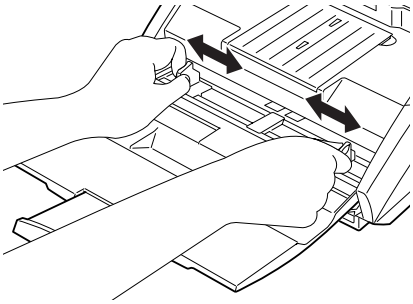


Fig. 1-7

5. Place the document on the pickup tray.

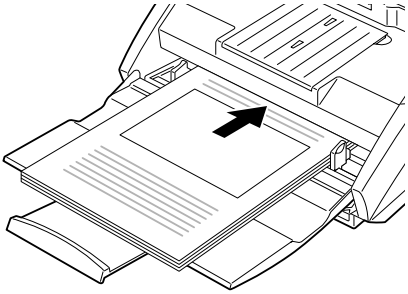


Fig. 1-8

6. Move the document guides again to match the width of the document.

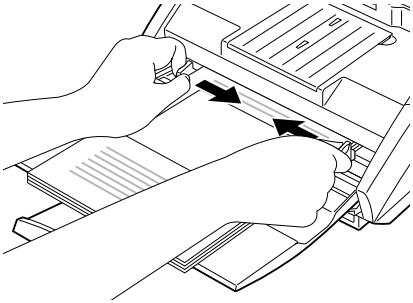


Fig. 1-9

D. Delivery Tray Extension Attachment Procedure

1. Open the delivery tray guide.

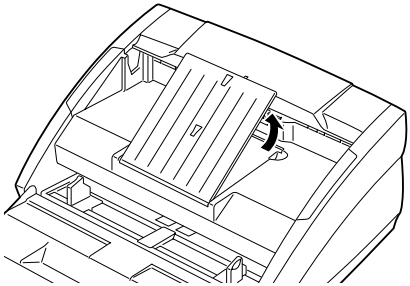


Fig. 1-10

2. Attach the delivery tray extension 2 to the delivery tray guide.

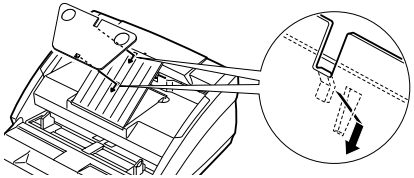


Fig. 1-11

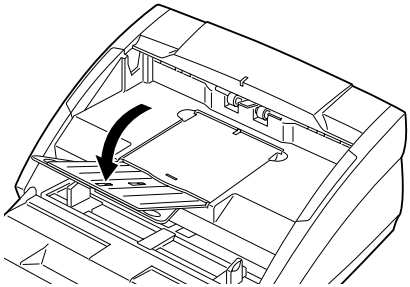


Fig. 1-12

3. Attach the delivery tray extension 1 to the delivery tray as shown in the illustration below.

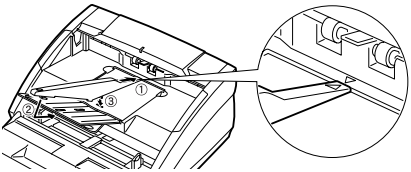


Fig. 1-13

Note: When attaching the delivery tray and the delivery tray extension 1 align the (△) marks.

VI. HOW TO REMEDY DOCUMENT JAMS

Follow the procedure below to remove jammed documents if a document becomes jammed in this machine during scanning.

a. Remove the document from the delivery tray, and remove the delivery tray extension if attached.

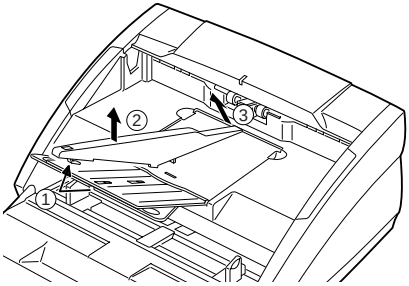


Fig. 1-14

b. Close the delivery tray guide.

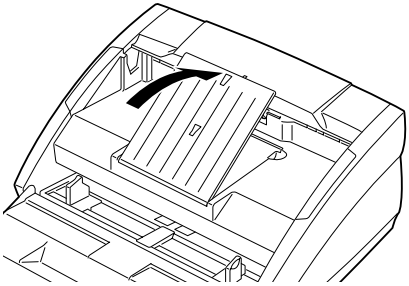


Fig. 1-15

c. Open the upper unit.

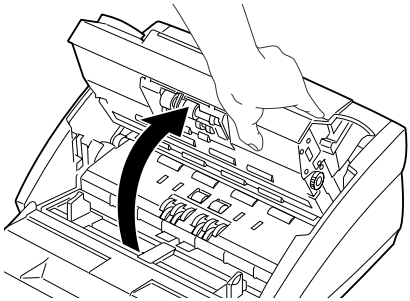


Fig. 1-16

d. Remove the jammed document.

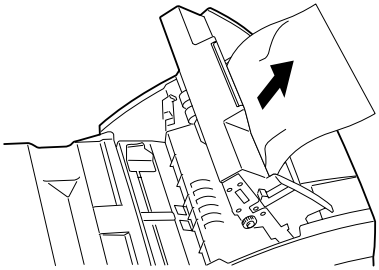


Fig. 1-17

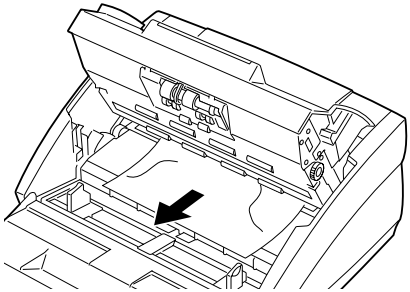


Fig. 1-18

e. Close the upper unit.

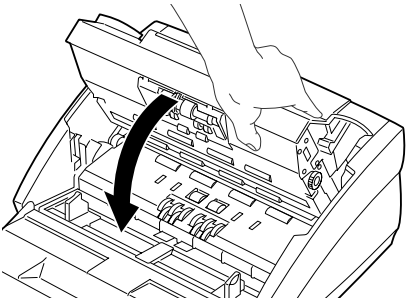


Fig. 1-19

f. Be sure the upper unit is completely closed.

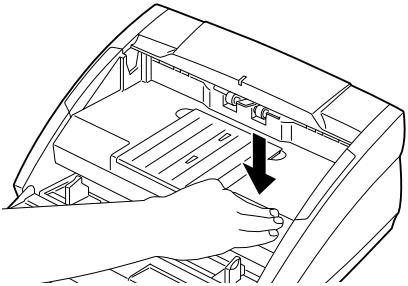


Fig. 1-20

VII. REGULAR INSPECTION BY USERS

A. Cleaning

Be sure to fully explain to the user that the following locations must be cleaned about once every week.

1. Image Reading Section

- Reading glass
  Wipe with a clean, soft cloth.

2. Document Feed Section

- Pickup roller
  Wipe clean with a moistened cloth and then wipe dry.
- Registration rollers
  (drive roller, follower roller)
  Wipe clean with a moistened cloth and then wipe dry.
- Feed roller
  Wipe clean with a moistened cloth and then wipe dry.
- Separation roller
  Wipe clean with a moistened cloth and then wipe dry.
- Reading roller (front)
  (drive roller, follower roller)
  Wipe clean with a moistened cloth and then wipe dry.
- Reading roller (back)
  (drive roller, follower roller)
  Wipe clean with a moistened cloth and then wipe dry.

Note: Clean each of the rollers while turning them in the feed direction.

CHAPTER 2

BASIC DESCRIPTION

I. OUTLINE

Fig. 2-1 shows a block diagram of image processing.

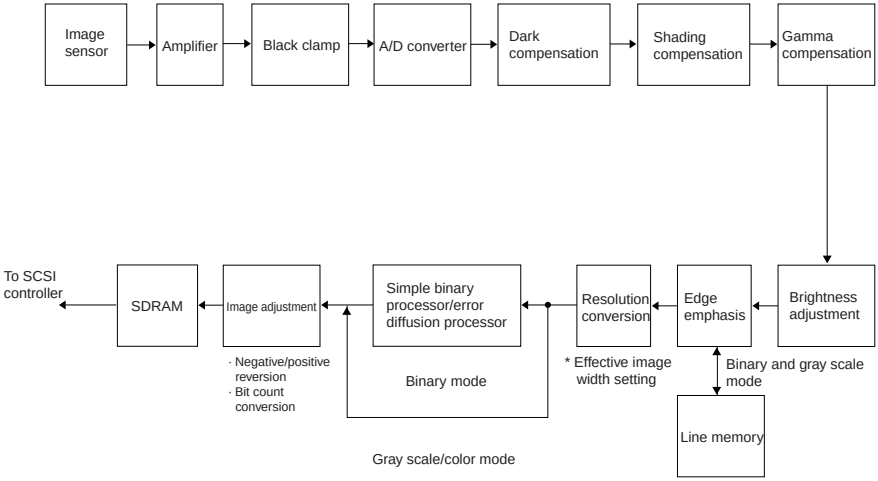


Fig. 2-1

Electric signals (analog signals) proportional to the density of each 10 bit set of pixels, read by the image sensor, are sent one after another to the amplifier. After the signals are amplified by the amplifier and black-clamped by the black clamp section, they are sent to the A/D converter. At the A/D converter, the signals are converted from analog to digital, and undergo various processing in order: dark compensation, shading compensation, gamma compensation, and brightness adjustment.

Next, the signals are sent to the edge emphasis section. If the signals are in the binary and gray scale mode they first go through the line memory before processing in the edge emphasis section. Color mode signals go through the edge emphasis section without being processed. Color mode signals are transferred to the personal computer for edge emphasis processing rather than being processed in the scanner. After processing in the edge emphasis section, the signals undergo resolution conversion.

If margin scan is selected at this time, the margin scan setting values are input to the effective image width setting section and image width processing is performed.

In the binary mode, the data after resolution conversion is binarized at the simple binary processor or error diffusion processor.

Then, if negative/positive reversion is selected, reversion is performed at image adjustment, and the signals are sent to SDRAM.

In the gray scale or color mode, the data processed by resolution conversion is input to the simple binary processor/error diffusion processor. This data, however, does not undergo processing and is output as it is. After that, the 10 bit sets of pixels bit count is converted at image adjustment, they are changed to 8 bit sets of pixels and sent to SDRAM.

Image data that has undergone the above processing is stored to SDRAM, and then sent to

the personal computer via the SCSI controller.

This machine has the following image processing function advantages when compared to the previous model.

- Processing is faster because the CPU data Bus and the Image Data Bus are completely separated.
- Data can be read from the personal computer without waiting for the data to finish being read into the memory because the writing and reading to the SD-RAM occurs in parallel and can be delivered to the bus.

On this machine, the driver performs the following processes:

1. Text enhanced mode
2. Double striking in the sub-scanning direction [When 300 × 300 (high speed) is selected.]
3. Skew compensation
4. Automatic blank skip
5. Automatic size detection
6. Image compression
7. Edge emphasis (when color mode is selected)

II. IMAGE READING ASSEMBLY

1. Outline

Fig. 2-2 shows a composite diagram of the image reading assembly.

First, the front and back of a document are illuminated by two, upper and lower, LED arrays. The reflected light is detected by photosensitive elements and converted to electrical signals.

The DR-3080C uses an RGB 3-color LED on the front side (top) and a yellow-green LED on the back side (bottom). The DR-3060 uses yellow-green LEDs both on the front side (top) and back side (bottom).

The image of the document is broken down into pixels by the photosensitive elements, and the electrical signals, which correspond to the density of each pixel, are subjected to various processes by the image processor of the CPU PCB assembly.

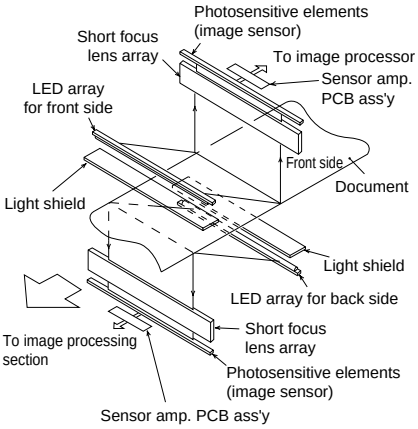


Fig. 2-2

2. Image Sensor

In this machine, a CMOS CIS (Contact Image Sensor) is used as a photosensitive element device.

On a single PCB assembly, there are 3,042 photosensitive elements lined up every 84.7 µm in a row and 13 chips which respectively contain a circuit to provide the scanning function. In this manual, this entire PCB assembly is called the image sensor.

Fig. 2-3 is the equivalent circuit of one photosensitive element (single pixel).

The function of one photosensitive element is explained as follows.

First, by turning on the TRES terminal signal, the potential of the buffer 1 (BUF1) gate is made the same as the bias potential, and by turning off the TRES terminal signal, the voltage converted from light by the photo-diode (PD) is accumulated in buffer 1.

Next, by turning on the TM terminal signal, the accumulated voltage is stored in the capacitor memory (CM), read out by buffer 2 (BUF2), and voltage EOUT corresponding to the density is obtained.

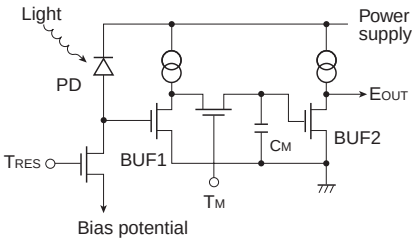


Fig. 2-3

3. LED Array

The LED array on the front and back side of the DR-3060 and on the back side of the DR-3080C are yellow-green LEDs.

The front LED array on the DR-3080C consists of a 3-color (RGB) LED making it capable of scanning color documents. The three color LEDs are arranged as shown in Fig. 2-4.

In the color mode, its composition is read by illuminating the RGB LEDs in succession and detecting the respective reflected RGB light with the image sensor. The reading position slides very little, because the document is fed at a constant speed.

In the binary and gray scale modes, composition is read with the white light generated by illuminating the RGB LEDs simultaneously.

Fig. 2-4

4. Short Focus Lens Array

The short focus lens has a fiber type configuration as shown in Fig. 2-5. The characteristic of this lens is that only a short focal distance is required.

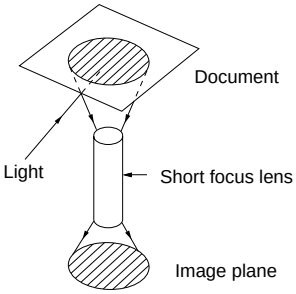


Fig. 2-5

Light rays entering the lens are repeatedly reflected inside the lens as shown in Fig. 2-6. The interval between these light ray reflections is proportionate to the wave length of the incident light.

For instance, when the lens is shorter than the ratio of the light wave length as in (A) of Fig. 2-6, the emerging light rays are focused. When it is longer as in (B), the emerging light rays are diffused. When the lens matches the ratio of the wave lengths as in (C), the emerging light rays are parallel rays and the image of the document is focused at its original size on the image plane.

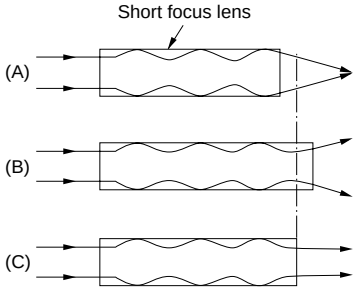


Fig. 2-6

In DR-3080C machine, short focus lenses that do not produce RGB color aberrations are used only on the front side for simplex color documents. Also, in order to increase the amount of light entering the lenses, the short focus lenses are arranged in two rows. (See Fig. 2-7.)

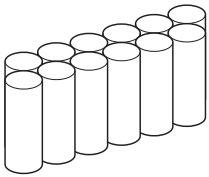


Fig. 2-7

5. Sensor Amplifier PCB Assembly

This machine outputs scanned documents to the personal computer as image data. The DR-3060 can output binary image data and gray scale mode image data, while the DR-3080C outputs binary image data, gray scale mode image data and color image data.

When the image sensor reads an image, a voltage proportionate to the density of the image and a standard voltage are output from the image sensor. The sensor amp. circuit amplifies and outputs the difference between the voltage proportionate to the image density and the standard voltage. (See Fig. 2-8.)

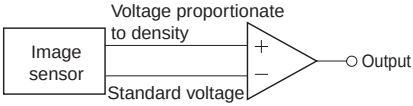


Fig. 2-8

6. Image Data

This machine outputs scanned documents to the personal computer as image data. The DR-3060 can output binary image data and gray scale mode image data, while the DR-3080C outputs binary image data, gray scale mode image data and color image data.

The following describes the differences between the respective image data.

a. Binary image data

Image data that expresses an image in two values, black and white, is called binary image data.

As binary image data has just two tones, black and white, per pixel, it cannot output gray and other half tones. (See Fig. 2-9.)

There are three types of processes, simple binarizing, error diffusion and text enhanced mode (binary AE). Simple binarizing divides tones into two at the specified level, error diffusion compensates the reproducibility of the tones, and text enhanced mode automatically adjusts the density.

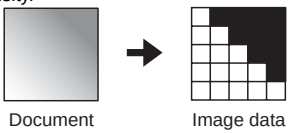


Fig. 2-9

b. Gray scale image data

This machine can output 8-bit gray scale image data.

Image data which can express not only black and white but gray and other half tones is called gray scale image data.

The greater the number of tones becomes, the more the number of bits per pixel. (See Fig. 2-10.)

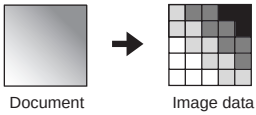


Fig. 2-10

c. Color image data

DR-3080C can output image data as a total of 24 bits, with eight bits used for each of the three basic colors red, green and blue.

It expresses color by the mixed ratios of the three basic colors of light, red (R), green (G), and blue (B). (See Fig. 2-11.)

Each pixel contains RGB data and, as in gray scale image data, each data has its own tone.

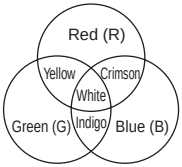


Fig. 2-11

Note: This machine is equipped with a temperature adjustment function to prevent changes in color images caused by heat from the LEDs. When the temperature is low the color reproduction becomes brighter and when the temperature is high the color becomes darker. To compensate for this, this machine has a temperature detection function and a function to change the brightness of the LED according to the temperature.

- Temperature measurement location
  On the CPU circuit board TH102 (thermostat)

III. IMAGE PROCESSING

The following describes the various image processings. (See Fig. 2-1 for the overall block diagram.)

1. Black Clamp

Amplifying and black clamping of signals are carried out at the amplifier.

The light from the LEDs cannot reach some parts of the photosensitive elements of the image sensor. The signals of those parts are called black level signals.

The difference between the voltage proportionate to the image density and the standard voltage is output from the image sensor.

As the true signal is the difference between the voltage proportionate to the image density and the black level signal, if the black level signal differs from the standard voltage, the true signal will not be amplified. (See Fig. 2-12.)

Making the black level signal the same as the standard voltage is called black clamping. This process makes it possible to amplify the true signal.

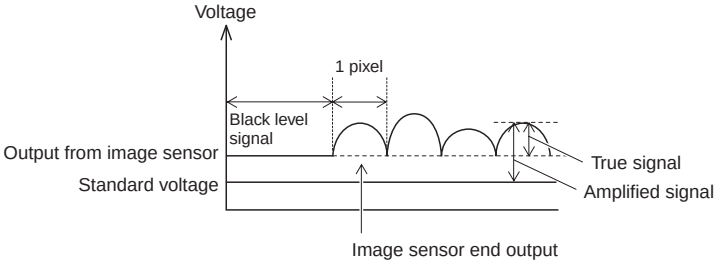


Fig. 2-12

2. A/D Conversion

As mentioned previously, the signals sent from the image sensor are analog signals. These signals are converted to digital signals in order to process them into an image.

Fig. 2-13 shows the outputs of digital signals after A/D conversion when they are 4-bit signals. (The input voltages shown differ from the actual values.)

If it were only necessary to judge whether the image density of the document was black or white, the output needed would be only one bit. However, actually, it is necessary to reproduce half tones such as gray.

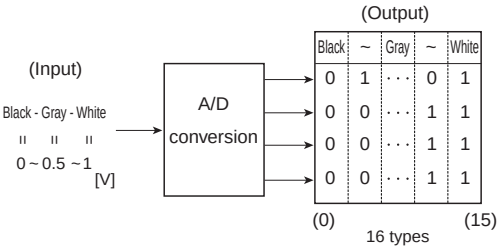


Fig. 2-13

If the output is four bits, it is possible to output 16 types of values. Consequently, the input signal (analog) which changes from 1 [V] to 0 [V] as the image of the document changes progressively through white, gray, and black, is converted to a digital signal of one of the above 16 levels corresponding to the particular values.

This machine outputs 8 bits, and internally processes 10 bits, so 1,024 tonal values can be obtained.

As the number of output bits increases, the resulting digital signal represents the changes in image density of the document more faithfully with good tonal reproduction.

3. Dark Compensation

The dark output of each photosensitive element in the image sensor (the output when light does not reach the elements) varies. So, the output when reading a black document is not definite, because it becomes the added output with different values depending on each element. To compensate this output is called dark compensation.

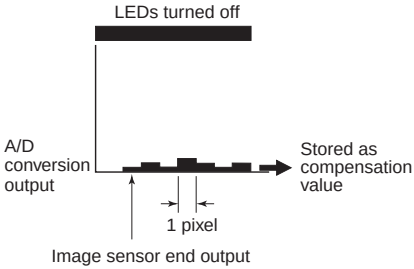


Fig. 2-14

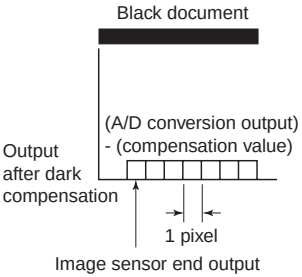


Fig. 2-15

Compensation is carried out by storing the output from the image sensor in memory as compensation values on the condition that LEDs are turned off, and then subtracting the compensation values from the output when an image is scanned. (See Fig. 2-14 and Fig. 2-15.)

Black clamping together with black compensation is sometimes called dark compensation.

4. Shading Compensation (White Compensation)

The output from the image sensor corresponding to each pixel cannot be a uniform value, even if all the reflected light is detected by the image sensor from a document whose overall density is uniform in the scanning direction. The reasons are as follows:

1) The light intensity of each LED is different.
2) The light intensity irradiated on the image sensor differs depending on each individual short focus lens.
3) The sensitivity of each photosensitive element in the image sensor is different.

Compensating unevenness in the output from the image sensor, as mentioned above, is called shading compensation.

In other words, when the light reflected from a document with uniform density is detected by the image sensor, as each output from the image sensor is different, compensation is carried out by multiplying each image sensor output (corresponding to each pixel) with a fixed compensation factor so that all the outputs are equal. (See Fig. 2-16 and Fig. 2-17.)

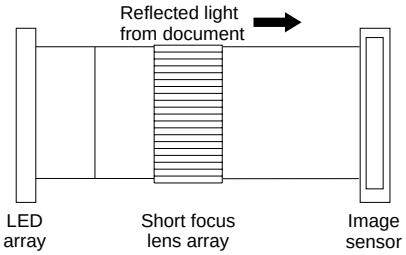


Fig. 2-16

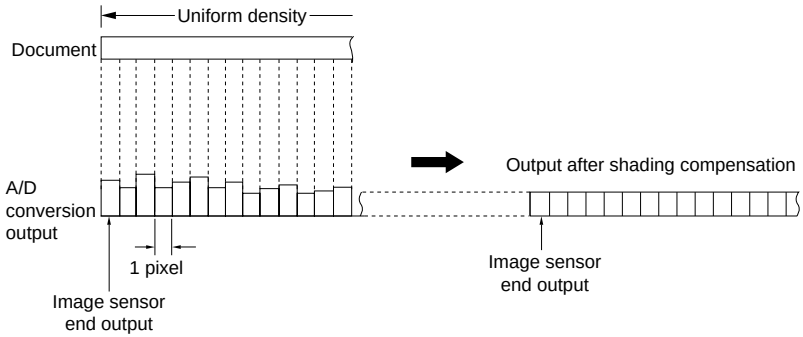


Fig. 2-17

Fig. 2-18 shows the output of an element (A) of the image sensor when the document density changes from black to white, and the output of the standard value of the image sensor, if the A/D conversion output is assumed to be four bits.

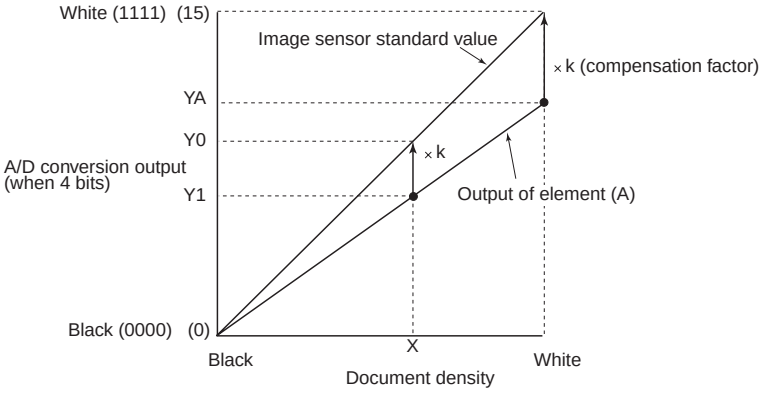


Fig. 2-18

At first, a standard white sheet is scanned, and the respective output data of the image sensor is stored in memory.

Then, the compensation factor is calculated by comparison with the standard value of the image sensor so as to make each output data level from the image sensor uniform. The compensation factor is then saved to memory.

When actually scanning a document and its image density is X, the output Y0 after shading compensation is obtained by multiplying the pre-compensation output Y1 with the compensation factor k.

5. Gamma Compensation

This is one processing method for improving the reproducibility for documents.

Gamma compensation converts each pixel of the image data one at a time according to a preset gamma curve before the image is output.

In the gray scale and color modes on this machine, contrast adjustment is performed according to a 7-setting gamma curve.

Also, in the error diffusion mode, brightness adjustment is also performed according to a 7-setting gamma curve.

Gamma compensation performs compensation on digitized signals.

The following shows typical gamma curves.

1) Gamma curve for weak compensation

This gamma curve is used when contrast adjustment is set to a low setting on this machine in the gray scale and color modes.

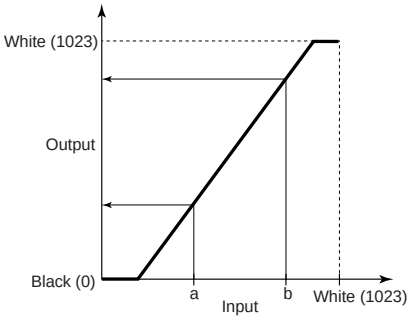


Fig. 2-19

2) Gamma curve for strong compensation

This gamma curve is used when contrast adjustment is set to a high setting on this machine in the gray scale and color modes.

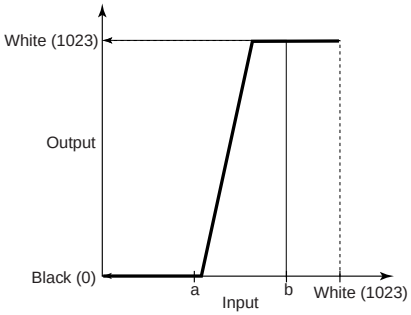


Fig. 2-20

3) Gamma curve for weak compensation

This gamma curve is used when brightness adjustment is set to a low setting in the error diffusion mode on this machine.

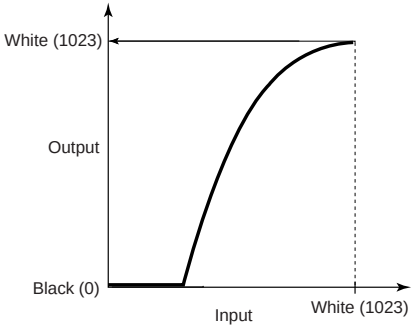


Fig. 2-21

4) Gamma curve for strong compensation

This gamma curve is used when brightness adjustment is set to a high setting in the error diffusion mode on this machine.

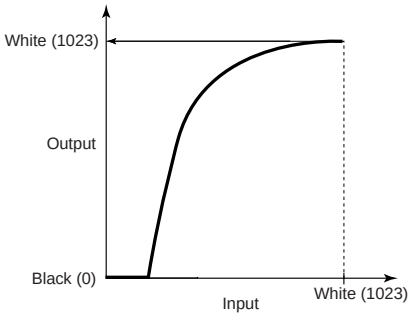


Fig. 2-22

6. Brightness Adjustment

Brightness adjustment is the process of adjusting the overall brightness of the image.

On this machine, the brightness of the overall image can be lightened or darkened more than the value obtained by the image sensor by adding or subtracting the value within the range -512 to 511 preset to inputs 0 to 1023 (10 bits).

On this machine, the following adder/subtractor is used to adjust the brightness when the gray scale or color mode is selected. (See Fig. 2-23.)

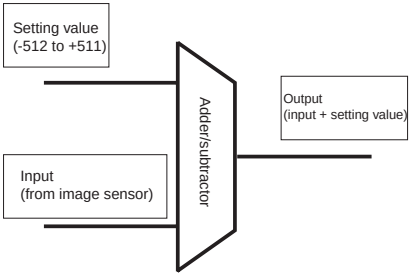


Fig. 2-23

Figs. 2-24 and 2-25 show brightness I/O 0 to 1023 and input A that is sent from the image sensor.

1) When the brightness adjustment setting on this machine is set to the +a setting

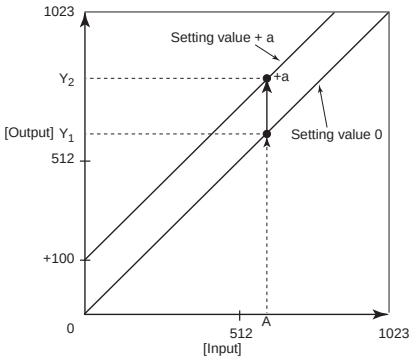


Fig. 2-24

When the setting value is 0, input A is output as Y_1. However, if the setting value is set as the +a value, output becomes Y_1+a and the value Y_2 is output.

2) When the brightness adjustment setting on this machine is set to the -a setting

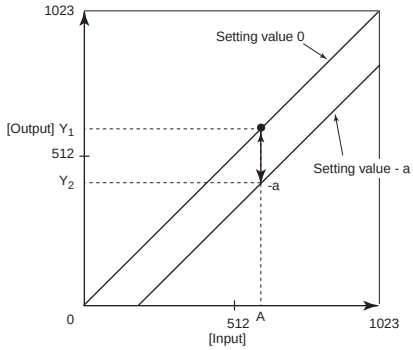


Fig. 2-25

When the setting value is 0, input A is output as Y_1. However, if the setting value is set as the -a value, output becomes Y_1+(-a) and the value Y_2 is output.

7. Edge Emphasis

Edge emphasis is a kind of processing which emphasizes light and shade in order to make the image appear sharper. (See Fig. 2-26.)

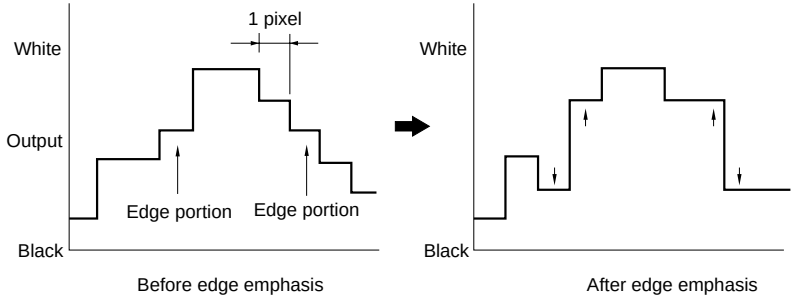


Fig. 2-26

Density processing is performed by comparing the data in the conversion table provided for performing edge emphasis, with the target pixel. (See Fig. 2-27.)

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

Arithmetic processing in the main-scanning direction is performed simultaneous with scanning, while arithmetic processing of the sub-scanning direction in binary and gray scale mode uses the line memory. In color mode, the personal computer's internal memory is used to convert front line data.

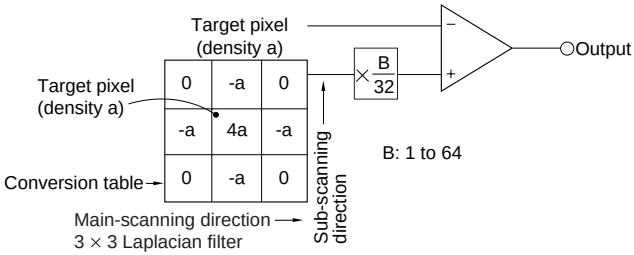


Fig. 2-27

8. Line Memory

Line memory is used for comparing the image density of the former and the next when processing the image by edge emphasis.

Because the DR-3060 produces binary mode/gray scale mode image output and is equipped with two line memory units, it can compare three lines of data at a time. (See Fig. 2-28.)

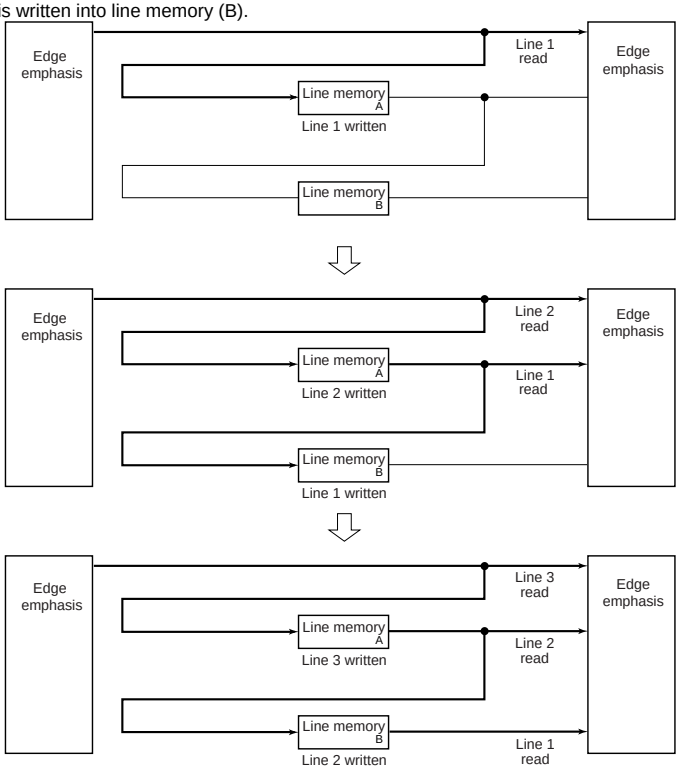
The following shows the flow of image data of each line. The data of the three lines are called Line 1, Line 2, and Line 3 in the order in which they are read from the image sensor.

1) Line 1 is read into edge emphasis. At the same time, it is written into line memory (A).
2) Line 2 is read into edge emphasis. Line 1 is read from line memory (A) and at the same time, Line 2 is written into line memory (A). Line 1 is written into line memory (B).
3) Line 3 is read into edge emphasis. Line 2 is read from line memory (A) and at the same time, Line 3 is written into line memory (A). Line 1 is read from line memory (B) and at the same time, Line 2 is written into line memory (B).

The data of subsequent lines are successively read and written in the same manner.

When the color mode is selected, the DR-3080C uses the personal computer's memory instead of its own line memory to process color data. (For details, see Section IV "IMAGE PROCESSING BY DRIVER.")

In binary and gray scale mode, it uses its two line memory units to perform edge emphasis, just like the DR-3060.



Note: Bold lines show the flow of data.

Fig. 2-28

9. Resolution Conversion

The resolution of the machines is 300 × 300 dpi (high speed), 200 × 200 dpi, 240 × 240 dpi, 300 × 300 dpi in binary and gray scale mode and 200 × 200 and 100 × 100 dpi in color mode (DR-3080C only).

Note: For details on 300 × 300 dpi (high speed), see "Chapter 2 IV. IMAGE PROCESSING BY DRIVER."

a. Sub-scanning direction

Documents are scanned in the sub-scanning direction by changing the document feed speed.

In the case of 200 dpi, the feed speed is made 1.5 times that of 300 dpi, and the case of 240 dpi, the feed speed is made 1.25 times and the case of 300 dpi (high speed) the feed speed is made 2 times that of 300 dpi. (See Fig. 2-29.)

Note: 300 dpi (high speed) is 150 dpi.

• Conversion of Sub-scanning Resolution

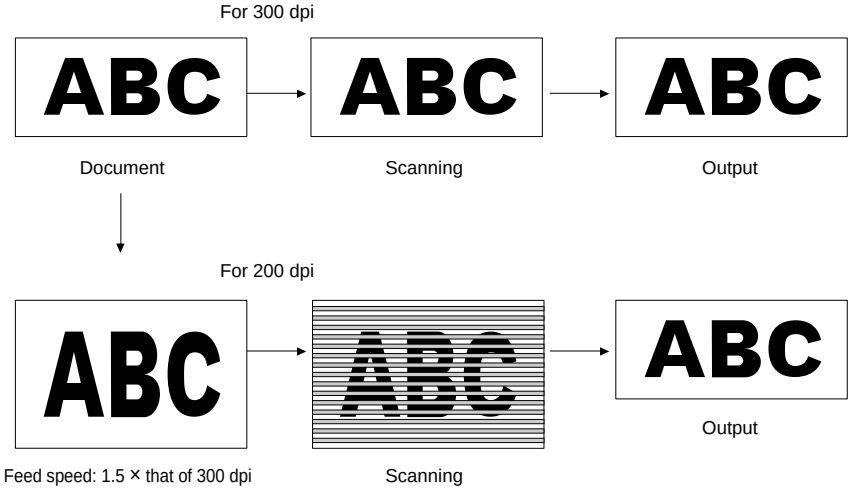


Fig. 2-29

b. Main-scanning direction

Conversion of the main-scanning resolution to less than 300 dpi is performed by thinning out the standard clocks for image processing in accordance with the resolution.

When converting to 200 dpi, the standard clock thinned out to 1/1.5 is used as the operating clock. (See Fig. 2-30.)

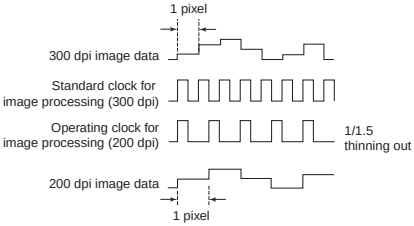


Fig. 2-30

10. Margin Scan

Margin scan is processing for adding a margin around the scanned image or reducing the image size. Margin scan on this machine can be set within the range ±10 mm.

When the setting value is determined and scanning is started, the preset value is stored to the effective image width setting section.

For the vertical width, the paper is detected by the registration sensor, and the scan timing of the image sensor is shifted by the preset value (±10 mm) to determine the length of the margin.

The horizontal width is processed by the value (±10 mm) stored to the effective image width setting section.

1) When the margin scan setting value is set to a plus (+) value

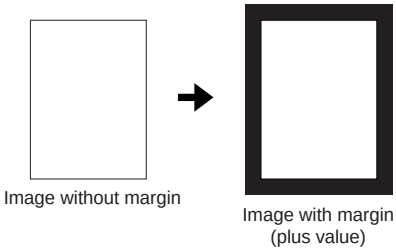


Fig. 2-31

2) When the margin scan setting value is set to a minus (-) value

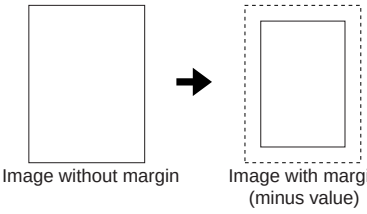


Fig. 2-32

11. Simple Binarizing

As mentioned previously, binary image data can only express pixels in either “black” or “white.”

In order to separate one pixel into either black or white, signals corresponding to the image density of the document must be cut off at a certain level, and anything above that level judged as “white” and anything below as “black.” This is called binarizing.

The level at which pixels are to be divided into white or black is called the “slice level” (or threshold value).

To binarize by changing the slice level without error diffusion processing (See the next item) is called simple binarizing. This is good for text documents.

For example, when the image sensor output is converted to 4-bit digital signals by A/D conversion, one of the values from “0” to “15” is set as the slice level, and compared with the digital signals. (See Fig. 2-33.)

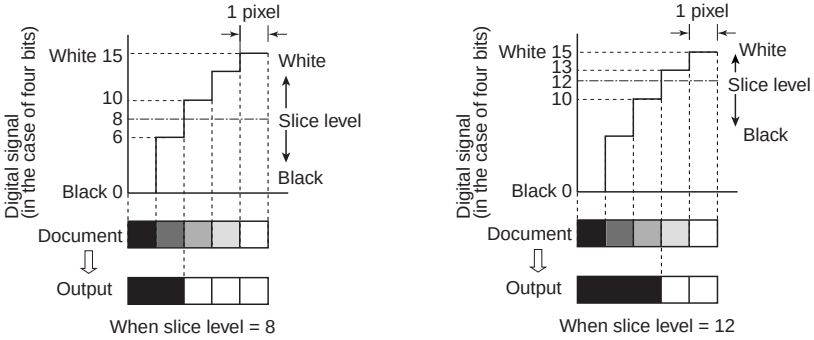


Fig. 2-33

Fig. 2-34 shows examples of when digital signal output after A/D conversion is four bits and slice level is “8.” (This machine processes with 10 bits.)

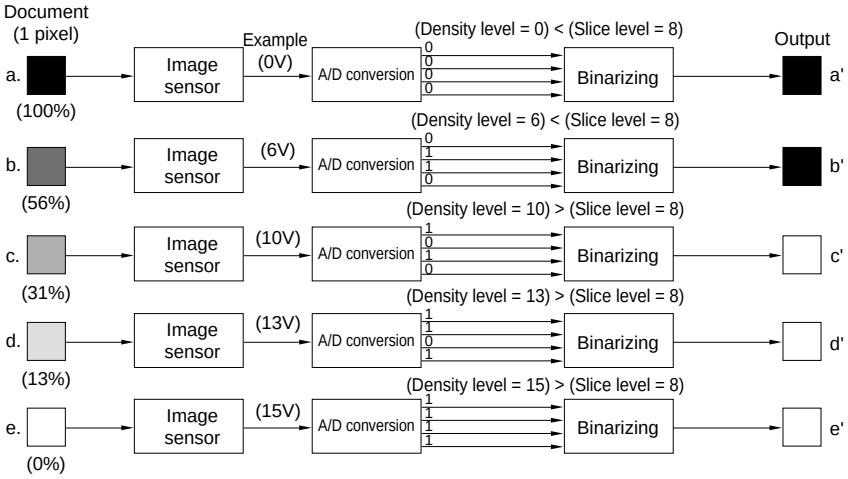


Fig. 2-34

12. Error Diffusion

Error diffusion processing is used to binarize images that contain gray color such as pictures or photographs.

The value of one pixel of input image data is compared with the slice level, and either “0” or “15” (in the case of four bits) is output.

The difference between the values of the input and output pixels is then added to the next pixel to be processed.

The following describes an actual example with the slice level set to “8.”

First, when processing the first row of Line 1, since density “12” is larger than slice level “8,” the output density is “15” and the resultant error is -3 (=12-15). (See Fig. 2-35.)

Next, when processing the second row of Line 1, since the error is diffused to the right, the density of the picture element of Line 1, 2nd Row becomes “6” (= 9-3).

As this value is smaller than the slice level, the output density is “0” and the error becomes “+6” {= (9-3) –0}. (See Fig. 2-36.)

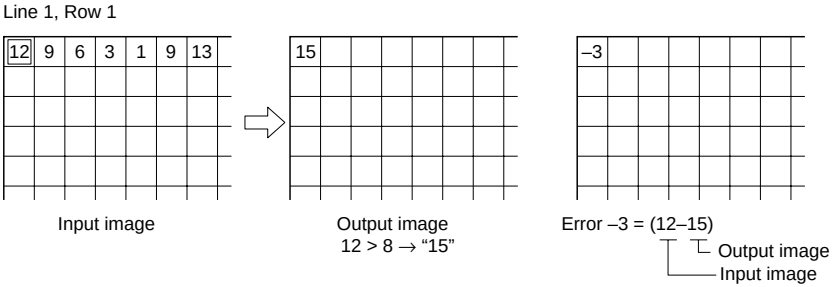


Fig. 2-35

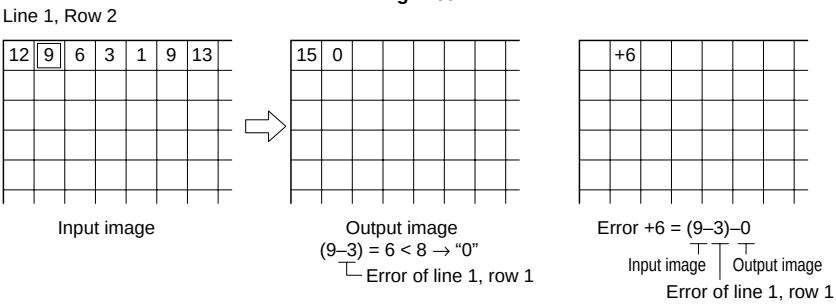


Fig. 2-36

Processing is performed in the same manner from the third row onwards.

In the case of Line 2, processing is performed referenced to the first row of Line 2. Processing is performed as shown in Fig. 2-37 if performed in the same manner as the above.

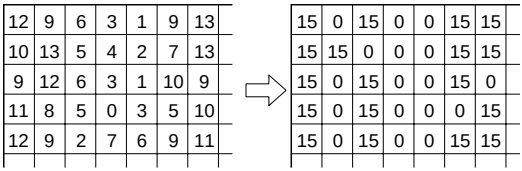


Fig. 2-37

Fig. 2-38 shows the results of binarizing with error diffusion processing and binarizing without error diffusion processing (simple binarizing).

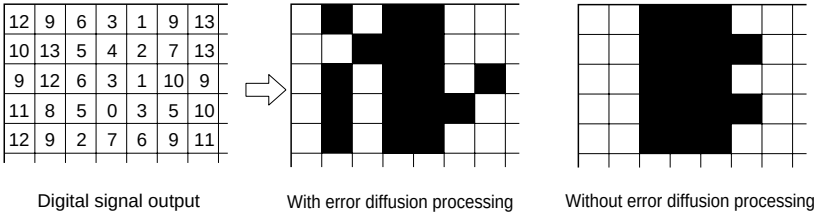


Fig. 2-38

13. Neg./Pos. Reversion (RIF)

The density level of image data is reversed against the document, as shown in Fig. 2-39, by reversing the binary data. This is called Negative/Positive reversion or RIF (Reverse Image Function).

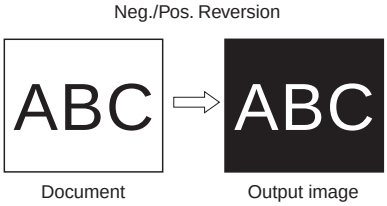


Fig. 2-39

14. Dropout Color (DR-3080C only)

DR-3080C can be set so that it does not scan red, green or blue (the same colors as RGB of the LEDs). This is called "dropout color."

Dropout color can be specified for the front page only as the front side (upper reading unit side) of DR-3080C reads color.

When red is specified as the dropout color, only the red LED lights when the document is scanned. When the red in the document is the same color as the LED light, the reflected light has the same quantity of light as that as the white part and is detected as white. (See Fig. 2-40.)

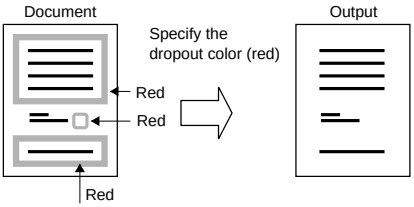


Fig. 2-40

15. Cumulative Counter

This is the cumulative count of the number of sheets fed and is stored to EEPROM on the CPU PCB assembly.

Display procedure

1) Select "Scan Setup" in "PixUtil" packaged with this machine.

Fig. 2-41

2) Select "About…" in the dialog box.

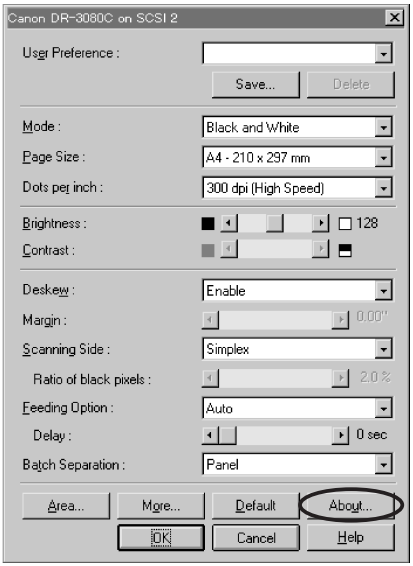


Fig. 2-42

3) The cumulative counter is displayed in “Total Scanning Count” in “About”.

Fig. 2-43

IV. IMAGE PROCESSING BY DRIVER

1. Text Enhanced Mode

In this mode, a histogram for each single block within the scanned data is calculated, and the 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. 2-44, a histogram for each single block is calculated, and the optimum slice level is determined to binarize the pixels.

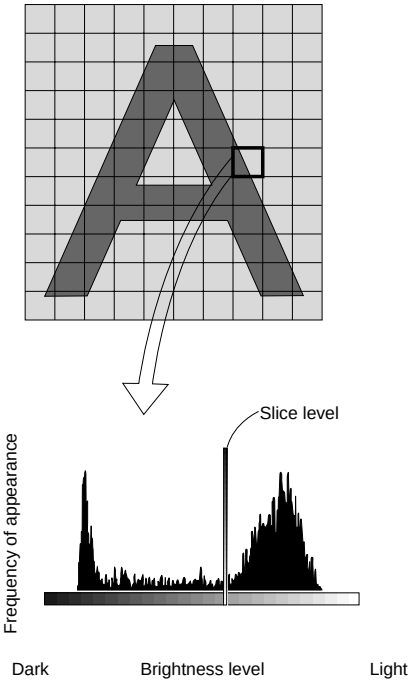


Fig. 2-44

2. Double Striking in Sub-scanning Direction

300 × 300 dpi (high speed) processes 300 × 150 dpi data images within the driver, in the sub-scanning direction.

To convert image data in read at 300 × 150 dpi to 300 × 300 dpi image data in the sub-scaning direction, each line is output twice, to make it 300 × 300 dpi image data.

- When selecting 300 × 300 dpi.

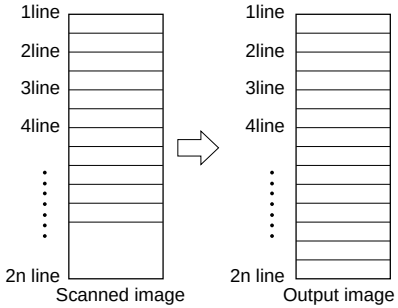


Fig. 2-45

- When selecting 300 × 300 dpi (High Speed)

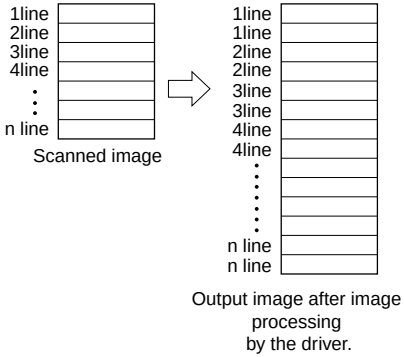


Fig. 2-46

3. Skew Compensation

When skew compensation is enabled the driver detects the angle of skew from the black frame that is formed. Then image data is loaded to this machine at a size slightly larger than the user-specified paper size. This angle is compensated so that the image data is restored to the set image size.

* Skew compensation may fail if the black frame is not detected.
Skew compensation may not be performed properly if the document has dark areas on its left and right edges or if the brightness setting is incorrect.
"Skew compensation" and "margin scan" cannot be used simultaneously for the same purpose.

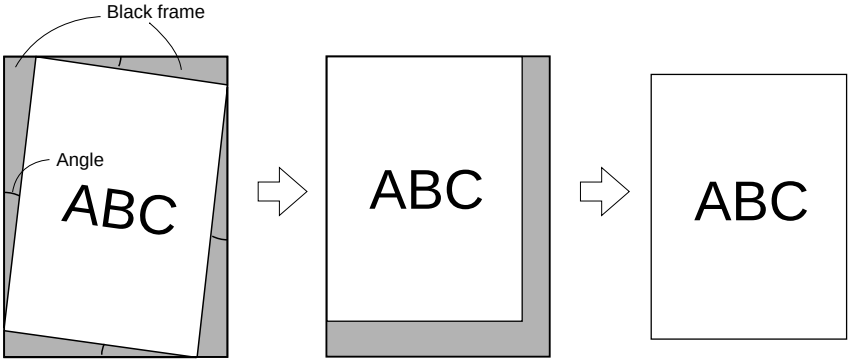


Image data
(set size image data + a)

Image data after
skew compensation

Output image data
(set size image data)

Fig. 2-47

4. Automatic Blank Skip

"Automatic blank skip" is processing for not automatically scanning white pages that are fed in with other document pages.

Judgment as to whether or not to read a page is determined by comparing the actual number of black pixels of the document with a preset percentage (0% to 20%) of number of black pixels as follows. First, image data read at the leading 10% and trailing 10% of the document in the main-scanning direction and 10% on both sides of the sub-scanning direction are excluded. The number of black pixels in the remaining 80% in both main- and sub-scanning directions is then judged referenced to the preset percentage of black pixels of the image data that is read. If the number of black pixels is at the preset percentage of number of black pixels or higher, the page is read. Alternately, if number of black pixels is less than the preset percentage, the page is not read.

When the percentage of black pixels is set to a%

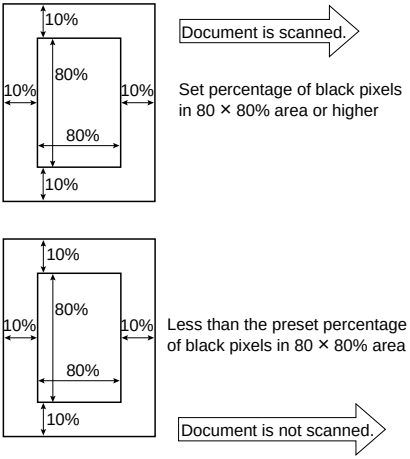


Fig. 2-48

5. Automatic Size Detection

When you select automatic size detection, this machine detects the document length by the registration sensor, reads the document width by the maximum size, and hands the image data over to the driver.

The driver, then, searches for pixels other than black pixels from the left and right edges one line at a time in the image data sent from this machine, and discards black pixel data on the outside.

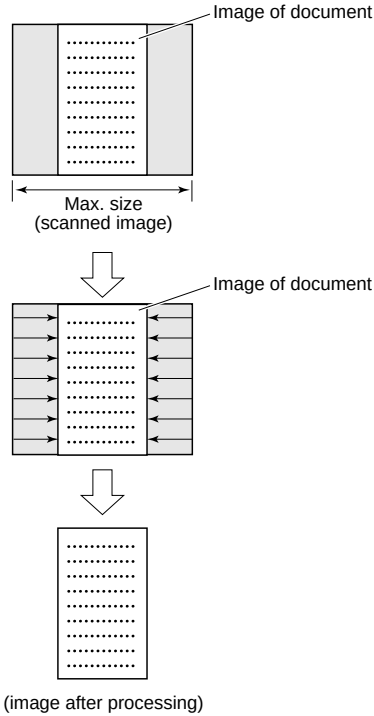


Fig. 2-49

6. Image Compression

Image compression is not performed internally by this machine as improvement of the scanning speed is not considered a priority. Image compression is performed by the compression driver, which is installed at the same time as the application “Pix Util” provided with this machine.

Example

- TIFF → MMR
- JPEG → JPEG
- JBIG → JBIG
- BMP → Not compressed

7. Edge emphasis (when color mode is selected)

When the color mode is selected, the DR-3080C uses the personal computer's memory instead of its own line memory to process color data. (See Fig. 2-50) Edge emphasis is performed in the personal computer in the same way as in binary and gray scale mode. For details, see Section 7, "Edge Emphasis" in Chapter 2 III.

In color mode, RGB data is transferred from the scanner to the personal computer line by line. Since each RGB color has to be compared to the previous line during edge emphasis, color mode requires three times as much memory as binary and gray scale mode.

Data for each color is read out from the line memory in A, B, C, D, E and F order.

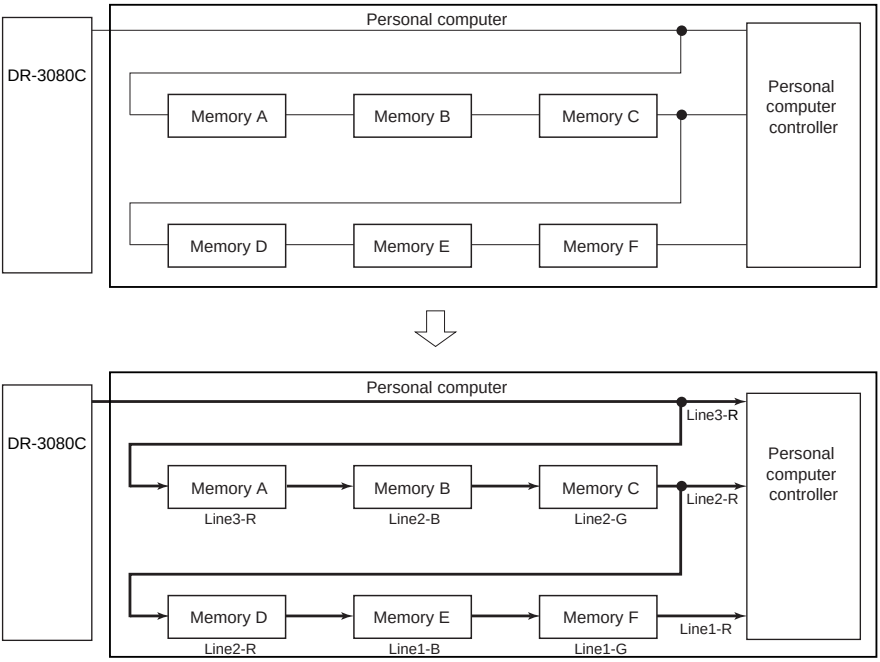


Fig. 2-50

V. SCAN PANEL

The “Scan Panel” is an operation panel that exists permanently in the OS task tray.

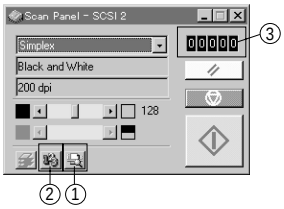


Fig. 2-51

1. Prescan

When prescan, activated on the Scan Panel Fig. 2-51 ①, is executed, the first page of the document is scanned. The brightness, contrast and other image quality settings can be adjusted while viewing the image of the first scanned page displayed in the prescan window.

After the desired image quality has been obtained, the data is transferred to the application software.

Up till now, preview was selected, the image quality adjustments made on the image, and the image was rescanned.

The prescan function not only eliminates the need to place the first page of the document on the scanning glass again but also improves operability.

After the image quality settings have been made, pages from the next page onwards are scanned continuously at the same image quality settings, and the data is transferred to the application software.

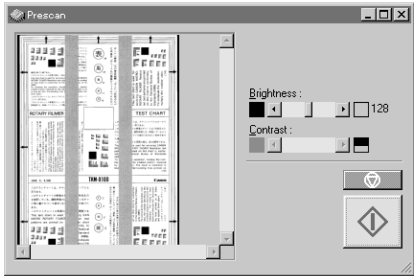


Fig. 2-52

2. Count Only

This function counts the document pages with the counter that is displayed on the Scan Panel Fig. 2-51 ③.

Counting can be started, stopped and the count value cleared on the Scan Panel.

When scan only is activated (Fig. 2-51 ②) by selecting start in the scan panel.

CHAPTER 3

FUNCTIONS & OPERATION

I. OUTLINE

1. System Configuration

Fig. 3-1 shows the system configuration.

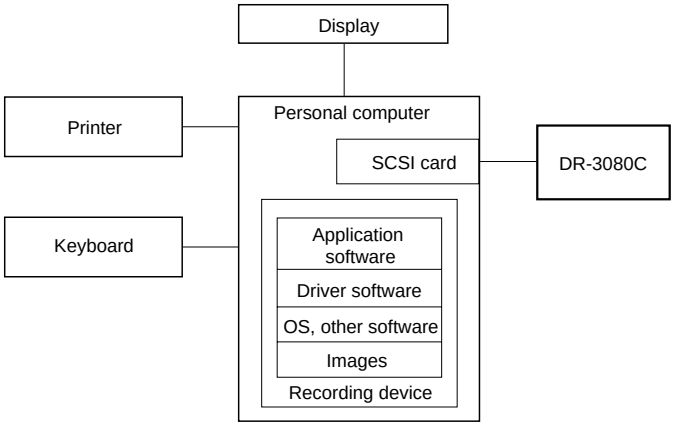


Fig. 3-1

Item	Function/Specification
DR-3080C	Reads images.
Personal computer	Controls the system, and is a PC/AT compatible machine. CPU : Pentium® II, Clock Speed: Min. 266 MHz (binary mode), Min. 400 MHz (gray scale and color modes) OS : Windows® 95/98, NT4.0 Workstation, Windows ME, or Windows® 2000 Professional RAM : Min. 128 MB is recommended
Display	Displays images, and displays searching and setting screen, etc.
Printer	Prints out images.
Keyboard	Instructs image input, searching, etc.
Recording device	Records images, search ID and software.
SCSI card	Carries out SCSI I/O operations. SCSI board for PC/AT compatible machine and driven by wnaspi32.dll Recommended: Adaptec AHA-2940, AHA-2930, APA-1480 etc.
Application software	Software for recording images
Driver software	Software for operating DR-3080C

Note: For details of the software packaged with DR-3080C, refer to the instruction manuals for the respective software.

Table 3-1

2. Machine Configuration

Fig. 3-2 shows the machine configuration.

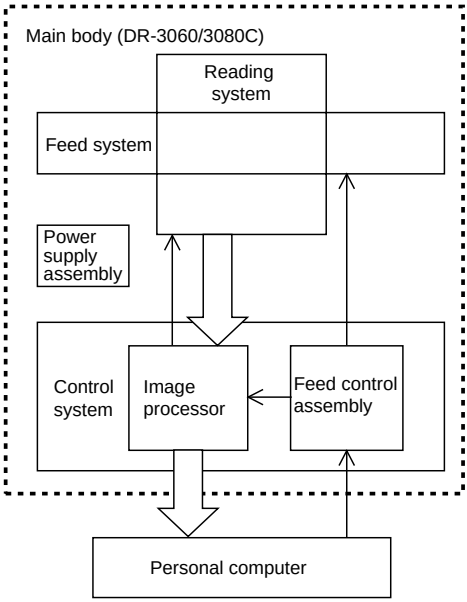


Fig. 3-2

a. Feed System

Picks up, feeds and delivers documents.

b. Reading System

Reads image data by means of image sensors.

c. Control System

The control system consists of the image processor and the feed control assembly.

The image processor controls the reading system, processes the image data read by the reading system, and outputs the data to the personal computer.

The feed control assembly controls the feed system.

d. Power Supply Assembly

The power supply assembly converts the AC power supplied from outside to +24 V DC, and supplies the converted power to the various PCB assemblies.

3. Main Drive

This machine has a main motor (M1) and a document board motor (M2). M1 is used to feed the document, and M2 is used to raise and lower the document board.

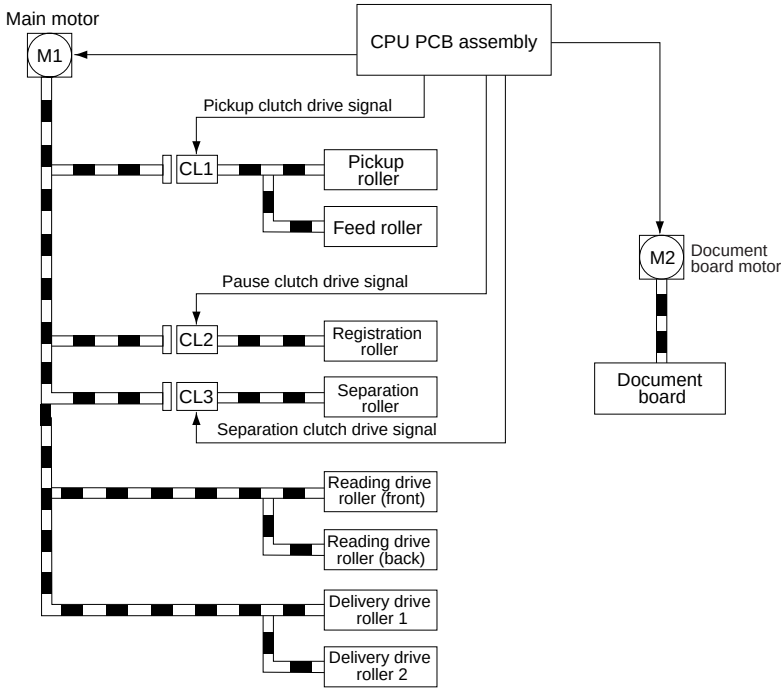


Fig. 3-3

4. OUTLINE OF ELECTRICAL CIRCUITS

The main electrical control of the machine is carried out by a single microprocessor on the CPU PCB assembly.

CPU PCB assembly
IC110
- Control of document feed
- Control of image data
- Communications with external devices

This microprocessor, in accordance with a pre-stored program, outputs the necessary signals to loads such as motors and clutches, and circuits in other PCB assemblies, in compliance with commands from sensors and the personal computer.

A flash ROM is connected to the microprocessor on the CPU PCB assembly.

The flash ROM is used to store communications exchanged with external devices, the sequence program for this machine, and other data.

Fig. 3-4 shows a block diagram of the electrical circuits.

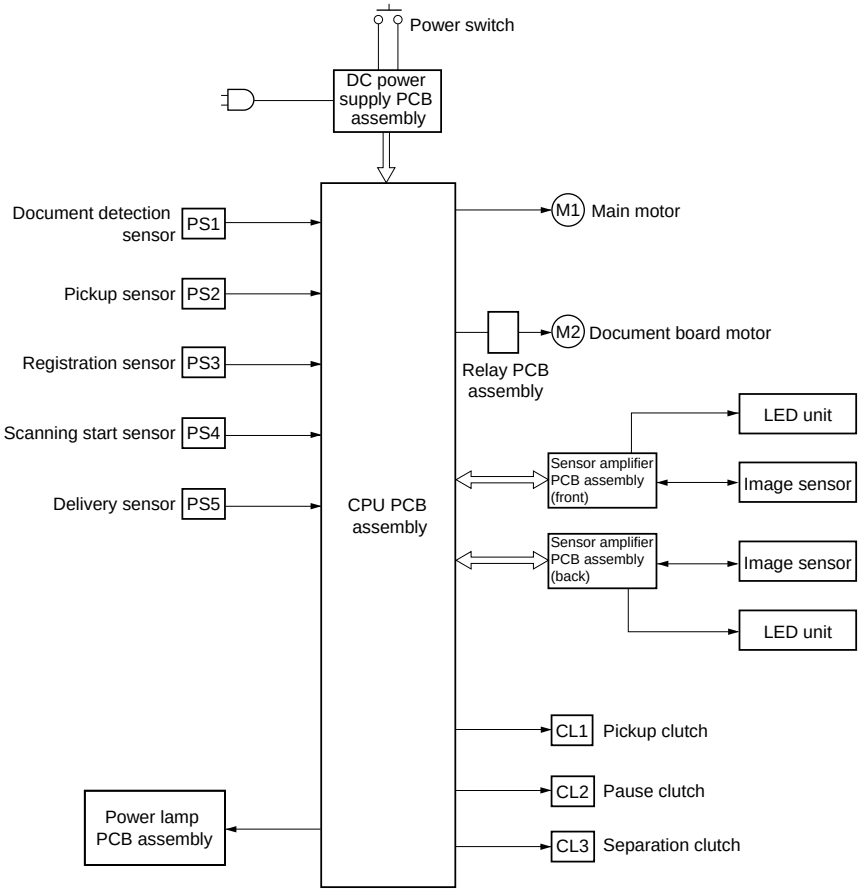


Fig. 3-4

5. INPUT TO & OUTPUT FROM MAIN PCB ASSEMBLIES

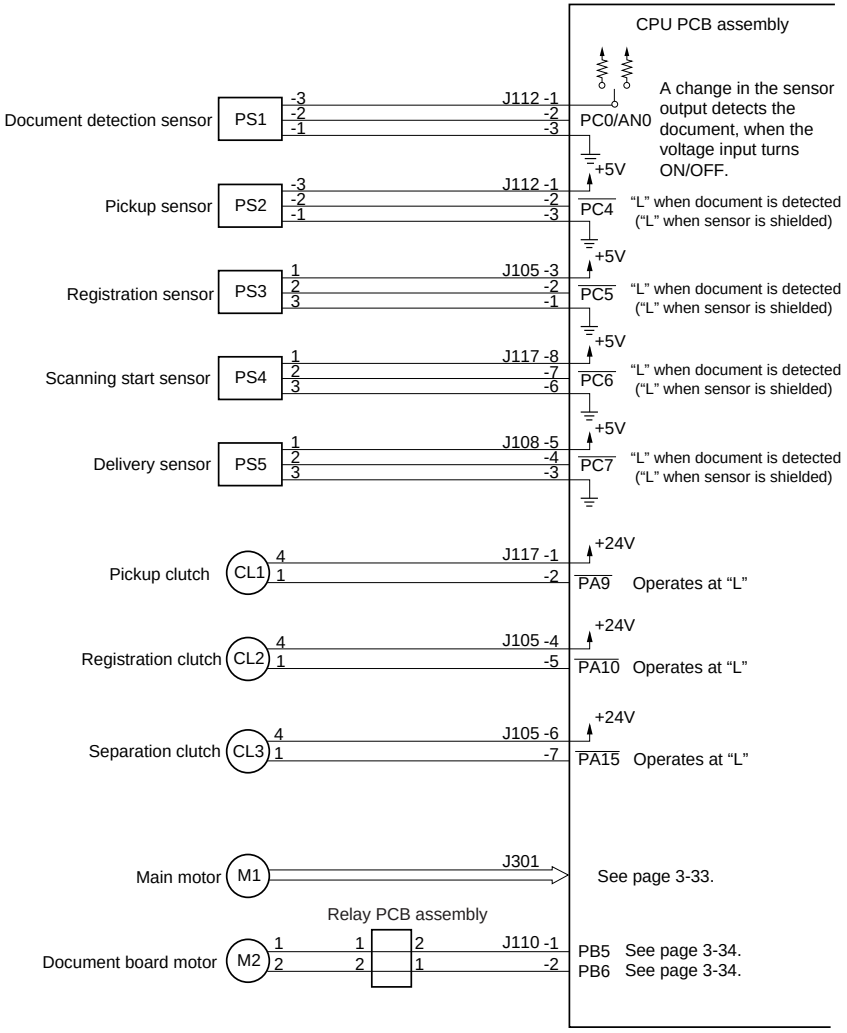


Fig. 3-5

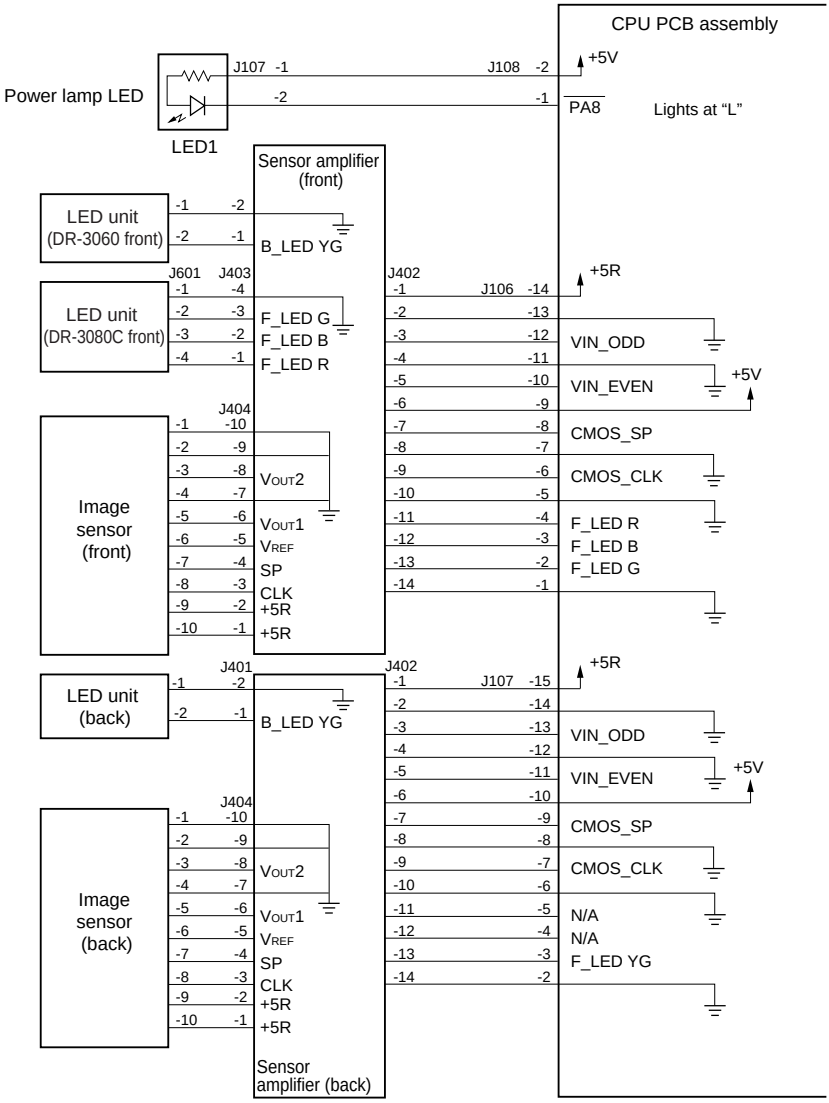


Fig. 3-6

6. Power ON Sequence

Fig. 3-7 shows the power ON sequence of this machine.

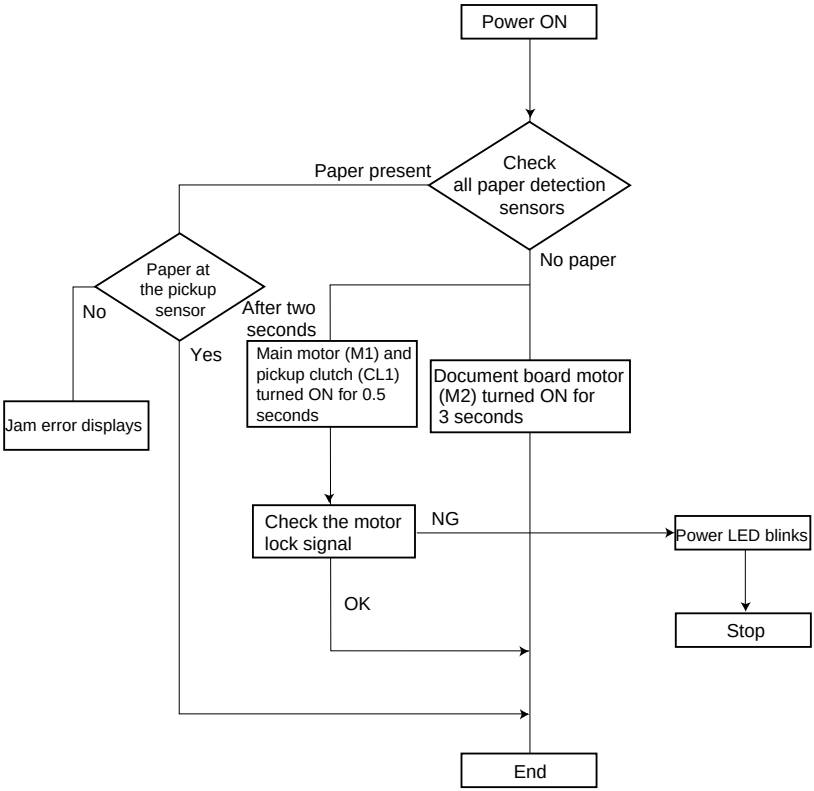


Fig. 3-7

II. EXPOSURE SYSTEM

1. Image Reading Assembly

Fig. 3-8 shows the image reading assembly.

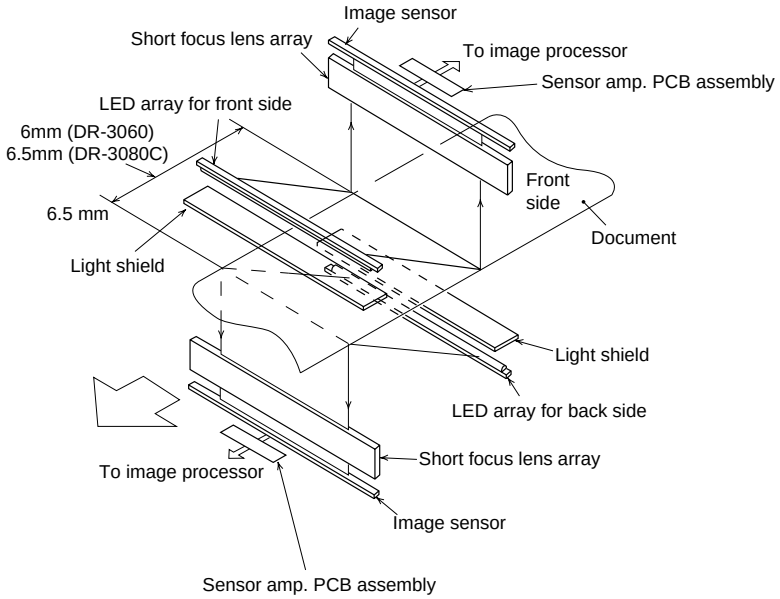


Fig. 3-8

The front and back of the document are illuminated at the image reading section by two LED arrays while being fed at a speed dependant on the output mode and resolution.

The light reflected from the document converges, via the short focus lens arrays, on the image sensor to form an image of equal size.

The front and back sides of the document are read at points that are offset by 6.5 mm in the DR-3080C and by 6 mm in the DR-3060 to prevent the image on the back side of the document from being read through to the front side.

Light reflected from the document is photoelectrically converted by the image sensors, and the resulting signals undergo various processing by the image processor.

While the image is being read, light in the vertical direction from the LED array is shielded by a light shield. By this means, the outside of the document is made "black."

III. DOCUMENT FEED

A. Outline

The document pickup assembly of this machine consists of the following assemblies.

1. Document board drive assembly

During automatic pickup, this assembly automatically pushes up the document board, and when pickup is finished, returns it to its original position.

2. Manual feed switchover assembly

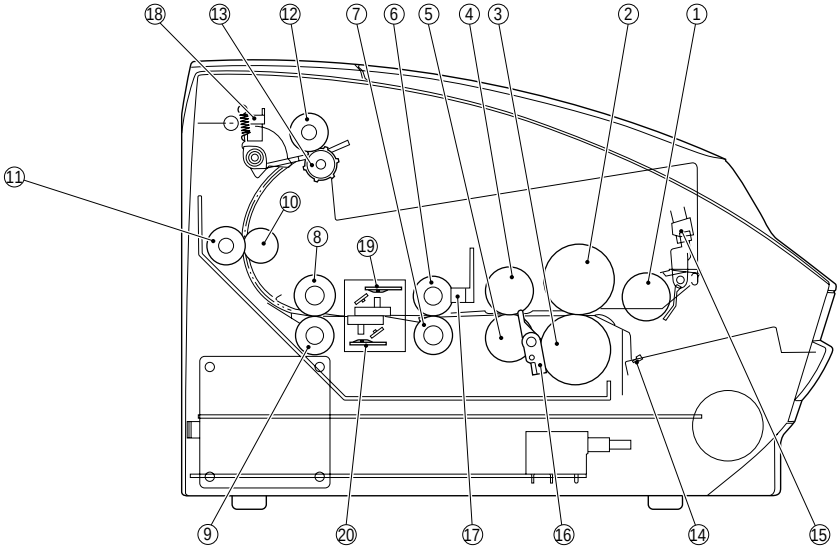
This assembly is designed to switch over from document paper pickup to manual feed.

This assembly also stops the drive of the separation roller to cancel the separation function.

3. Automatic adjust/separation assembly

This assembly automatically changes the space between the pickup roller and separation roller in accordance with the thickness of the document, and separates/feeds the document one page at a time without jamming or double feeding.

The position of parts is shown in Fig. 3-9.



① Pickup roller
② Feed roller
③ Separation roller
④ Registration drive roller
⑤ Registration follower roller
⑥ Reading follower roller (front)
⑦ Reading drive roller (front)
⑧ Reading follower roller (back)
⑨ Reading drive roller (back)
⑩ Delivery follower roller 1
⑪ Delivery drive roller 1
⑫ Delivery drive roller 2
⑬ Delivery follower roller 2
⑭ Document detection sensor
⑮ Document board sensor
⑯ Registration sensor
⑰ Scanning start sensor
⑱ Delivery sensor
⑲ Upper reading unit
⑳ Lower reading unit

Fig. 3-9

Timing Chart

Fig. 3-10 shows a timing chart for a duplex, two A4 sheets scanned at 300 × 300 dpi without a pause.

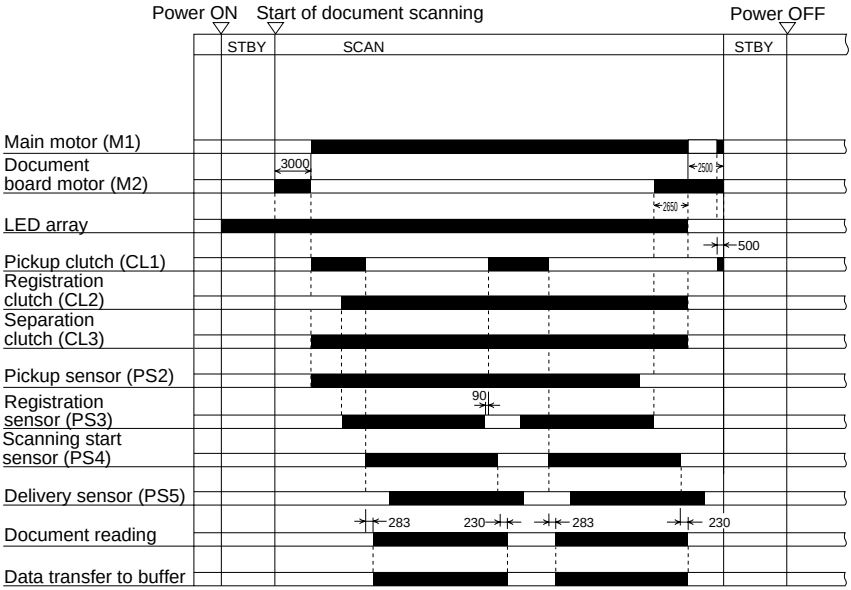


Fig. 3-10

Duration		Purpose
SCAN	Time during which the document is being fed or image data is being read	• To pick up the document • To illuminate the document by the LED arrays and project its reflected light onto the CMOS
STBY	Time during which commands can be accepted	To prepare for acceptance of document scanning

Table 3-2

B. Automatic Adjust/Separation Assembly

Fig. 3-11 shows an outline of the document pickup assembly.

The pickup assembly consists of a pickup roller, feed roller, registration roller, planetary gear device, torque limitter, and other components.

Figs. 3-12 and 3-13 show an outline of the planetary gear device.

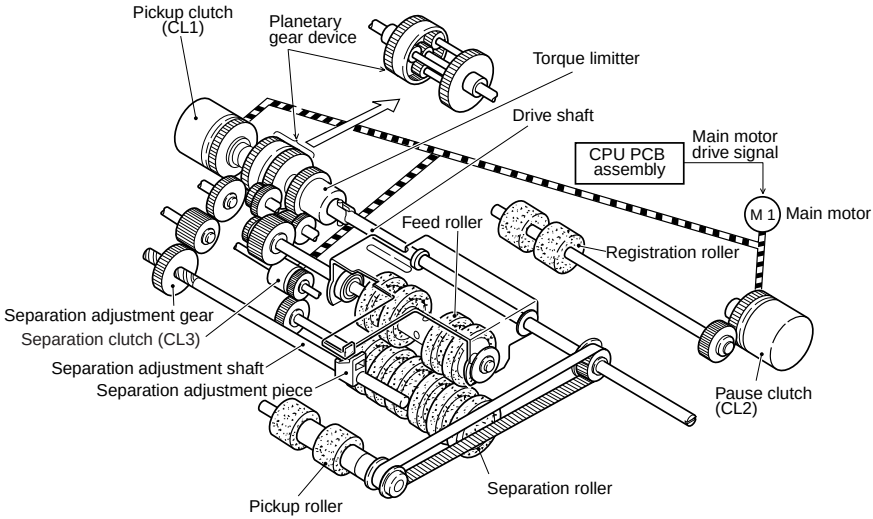


Fig. 3-11

1. Planetary Gear Device

1) The planetary gear device consists of a sun gear that transmits the drive of the drive shaft, a carrier that transmits the drive from the feed roller, an internal gear that drives the separation adjustment piece, and three planetary gears that transmit the drive from the sun gear and carrier.
2) The carrier and internal gear of the planetary gear device have been installed to rotate freely on the drive shaft. The planetary gears also have been installed to rotate freely on the planetary shaft.
3) The sun gear is directly connected to the drive shaft.
4) The internal gear of the planetary gear device is driven by the carrier and the sun gear.
5) The carrier rotates the three planetary gears attached to the planetary shaft of the carrier.
6) On the other hand, the sun gear drives the planetary gears.
7) Rotation of the internal gear is as follows:
   ① When rotation speed of carrier > rotation speed of sun gear (planetary gears)
   → Turns in counterclockwise direction.
   ② When rotation speed of carrier < rotation speed of sun gear (planetary gears)
   → Turns in clockwise direction.

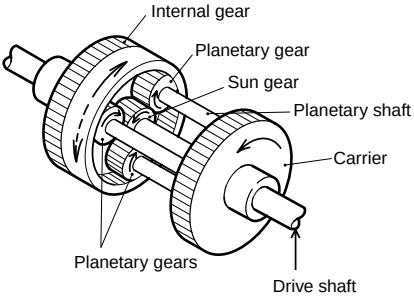


Fig. 3-12

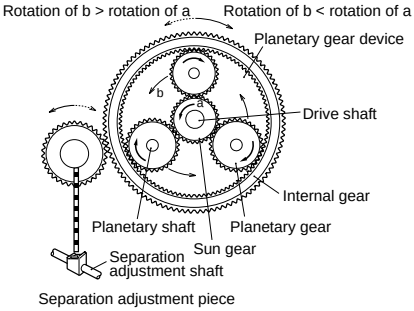


Fig. 3-13

2. At Start of Document Feed

Figs. 3-14 and 3-15 illustrate an outline of document feeding.

1) When pickup is started, first the pickup clutch (CL1) turns ON. ①
2) When pickup is started, a load does not act on the feed roller as the document is not fed to the feed roller section. For this reason, the drive power from the main motor is transmitted to the feed roller to turn the roller. ② →③ →④
3) The drive power transmitted to the feed roller is then transferred to the carrier to turn the planetary gears of the planetary gear device. ④ →⑤ →⑥ →⑦
4) On the other hand, rotation of the sun gear of the planetary gear device is transmitted to the planetary gears to turn the internal gear. ⓐ →ⓑ
5) However, as a load is not acting on the feed roller, the inner gear rotates in the counterclockwise direction as the rotation speed from the feed roller to the carrier transmitted to the inner gear of the planetary gear device is faster than that from the planetary gears. ⑦
6) Rotation of the planetary gear device is transmitted to the separation adjustment gear to move the separation adjustment shaft to the right. ⑧ →⑨ →⑩ →⑪
7) Movement of the separation adjustment piece to the right causes the feed roller to fall to the lowermost limit. ⑫
8) When the feed roller falls to the lowermost limit, the space between the feed roller and the separation roller is at its minimum.

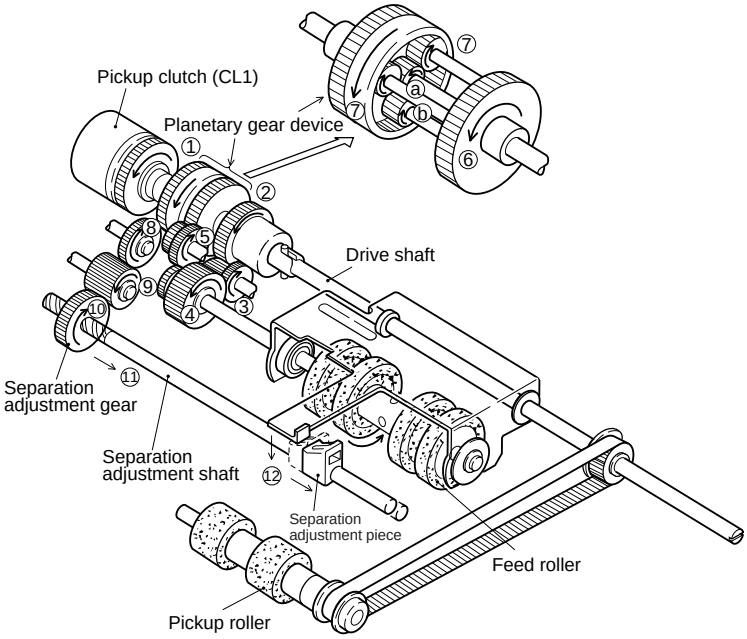


Fig. 3-14

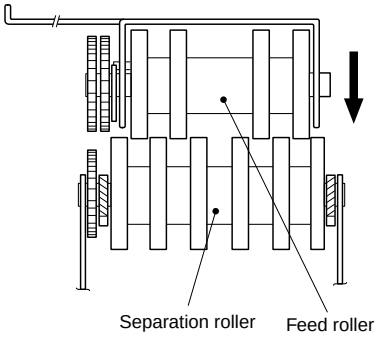


Fig. 3-15

3. Document Feed

Figs. 3-16 and 3-17 illustrate an outline of document pickup.

1) When the document is fed to the feed roller section by rotation of the pickup roller, it is not fed any further as the space between the feed roller and the separation roller is at its minimum.
2) Although the feed roller is rotating, there is a load on the feed roller because of the thrust of the document. ①
3) The feed roller stops when its load becomes greater than the value set by the torque limitter. ② →③ →④
4) The rotation drive to the carrier of the planetary gear device stops because rotation of the feed roller stops. ⑤
5) For this reason, the drive power to the planetary gears themselves also stops.
6) On the other hand, the planetary gears rotate since the sun gear is always rotating. a
7) As the drive transmitted to the internal gear of the planetary gear device is transmitted to only the planetary gears from the sun gear, the internal gear begins to rotate in the clockwise direction. a → b
8) Reverse rotation is transmitted to the separation adjustment gear, and the separation adjustment shaft moves to the left. ⑧ →⑨ →⑩ →⑪
9) Due to this action, the separation adjustment piece now moves to the left, and the feed roller starts to rise. ⑫
10) The space between the feed roller and separation roller begins to widen, and the document is fed when the space becomes equal to the thickness of the document.
11) When the thickness of the second and subsequent pages of the document is the same as the first page, the rotation of the internal gear of the planetary gear device is stopped as the load on the feed roller is uniform.
12) For this reason, the separation adjustment shaft does not rotate, the separation adjustment piece also stops, and the document is fed at all times.

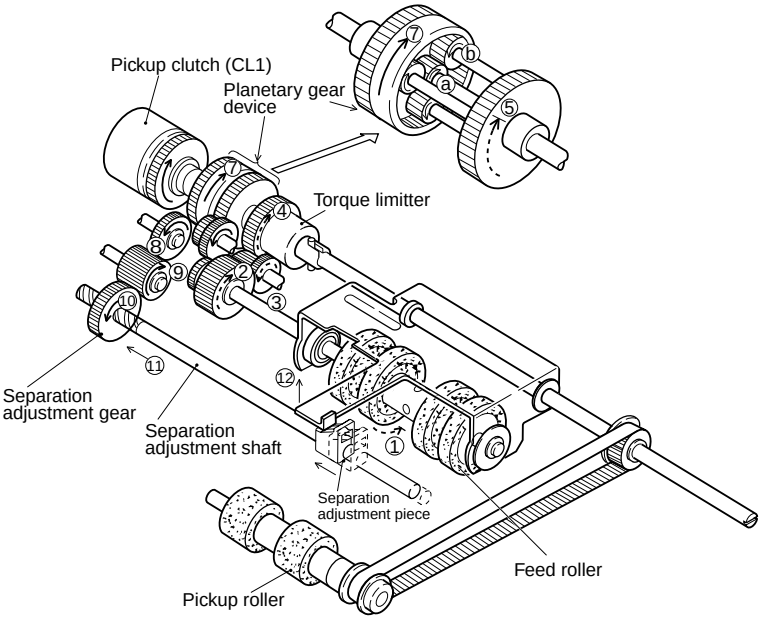


Fig. 3-16

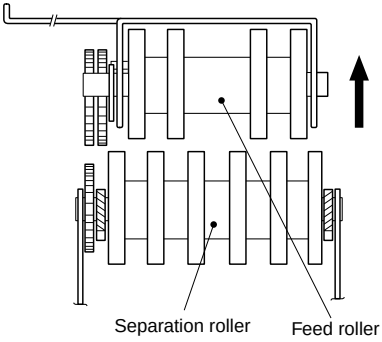


Fig. 3-17

4. Pickup Action Due to Change in Document Thickness

1) When the document becomes thinner:
   ① The load on the feed roller becomes smaller, and rotation of the feed roller becomes faster.
   ② The rotation of the carrier of the planetary gear device becomes faster, and the internal gear rotates in the counterclockwise direction.
   ③ The separation adjustment gear rotates in reverse, the separation adjustment shaft moves to the right, the separation adjustment piece moves to the right, and the feed roller begins to fall.
2) When the document becomes thicker:
   ① Action is reverse to that when the document becomes thinner.

C. Detection of Faulty Document Feed

This machine has sensors installed in it to detect whether or not a document has been fed properly.

Judgment as to whether or not a document is fed properly is carried out by whether or not the document is present in the sensor section at the check timing that is output from the CPU PCB assembly.

No.	Name of Sensor	Name of Signal
PS2	Pickup sensor	$\overline{PC4}$
PS3	Registration sensor	$\overline{PC5}$
PS4	Scanning start sensor	$\overline{PC6}$
PS5	Delivery sensor	$\overline{PC7}$

Table 3-3

1. Pickup Assembly Jams

a. Pickup assembly delay jam

When the document, after passing the pickup sensor (PS2), does not reach the registration sensor (PS3) within the specified time (T1)

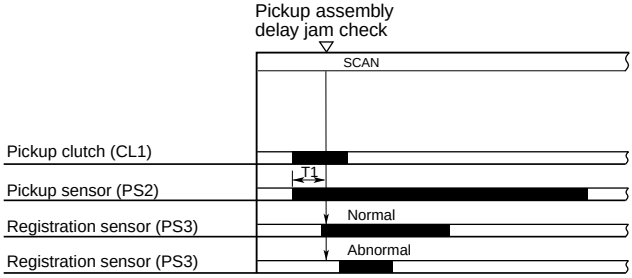


Fig. 3-18

	Sub-scanning Direction Resolution					
	Binary, gray scale mode				Color mode (DR-3080C only)	
	300 dpi	240 dpi	200 dpi	150 dpi	200 dpi	100 dpi
T1	3000	3000	3000	3000	3000	3000

Unit: ms

Table 3-4

2. Feed Section Jams

a. Feed section delay jam

When the document, after passing the registration sensor (PS3), does not reach the scanning start sensor (PS4) within the specified time (T2)

b. Feed section residual jam 1

When the document, after passing the scanning start sensor (PS4), does not pass the registration sensor (PS3) within the specified time (T3)

c. Feed section residual jam 2

When the document, after passing the scanning start sensor (PS4), does not pass the scanning start sensor (PS4) within the specified time (T4)

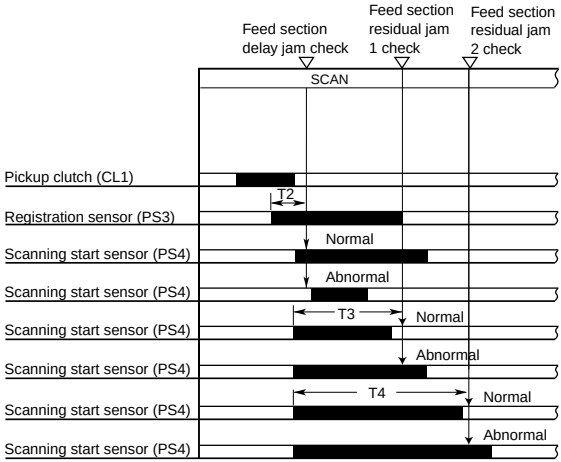


Fig. 3-19

	Sub-scanning Direction Resolution					
	Binary, gray scale mode				Color mode (DR-3080C only)	
	300 dpi	240 dpi	200 dpi	150 dpi	200 dpi	100 dpi
T2	3000	2400	2000	1500	6000	3000
T3	4200	3360	2800	2100	8400	4200
T4	4200	3360	2800	2100	8400	4200

Unit: ms

Table 3-5

3. Delivery Assembly Jams

a. Delivery assembly delay jam

When the document, after passing the scanning start sensor (PS4), does not reach the delivery sensor (PS5) within the specified time (T5)

b. Delivery assembly residual jam

When the document, after passing the scanning start sensor (PS4), does not pass the delivery sensor (PS5) within the specified time (T6)

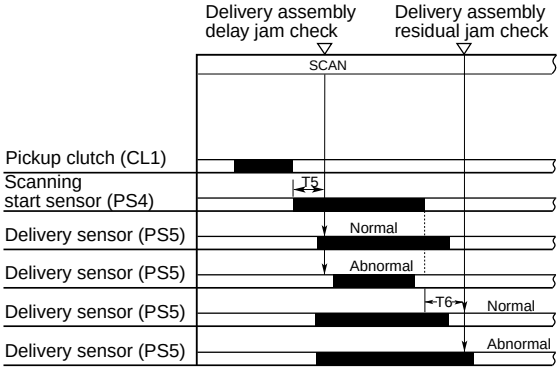


Fig. 3-20

	Sub-scanning Direction Resolution					
	Binary, gray scale mode				Color mode (DR-3080C only)	
	300 dpi	240 dpi	200 dpi	150 dpi	200 dpi	100 dpi
T5	1601	1284	1070	802	3202	1601
T6	1601	1284	1070	802	3202	1601

Unit: ms

Table 3-6

IV. DESCRIPTION OF ELECTRICAL CIRCUITS

CPU PCB ASSEMBLY

1. Outline

This machine's CPU PCB assembly mainly carries out image processing.

Fig. 3-21 shows a block diagram of the flow of image data. The block diagram shows the main functions as individual elements.

The analog signals output from the image sensor in two blocks are made into a composite signal by an amplifier and an analog switch. They are then converted to 10-bit digital signals by an A/D converter, and sent to the image processing controller (Drug-Chip). This machine outputs 8 bits, and internally processes 10 bits. The 8 bit data is changed to 8 bit image data in the image adjustment section.

The image data input to the image processing controller is subjected to re-arrangement of the pixels and combining of the front and back. After that, dark compensation, shading compensation, and gamma compensation, are carried out. In the gray scale and color modes, bright adjustment is carried out.

When gamma compensation is completed, edge emphasis processing is performed in the line memory when binary and gray scale mode is selected. In the color mode, the data is output without processing since edge emphasis processing is carried out in the personal computer. Then the resolution is converted by skipping clock cycles.

After resolution conversion, the image data is binarized by simple binarizing or error diffusion.

If negative/positive reversion is selected, processing is carried out, and the result of processing is written to memory.

After that, the data is stored in image memory and transferred to external devices via the SCSI controller.

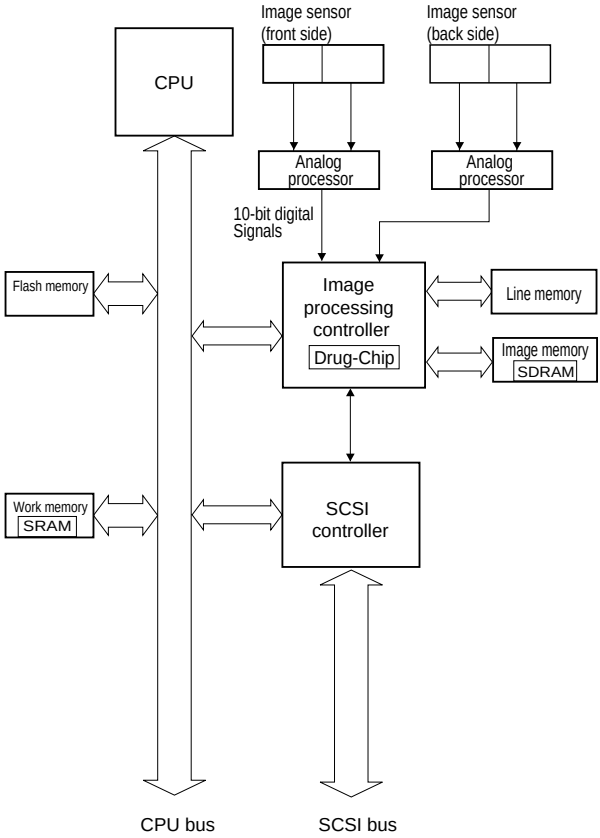


Image sensor
(front side)
Image sensor
(back side)
CPU
Analog
processor
Analog
processor
10-bit digital
Signals
Flash memory
Image
processing
controller
Drug-Chip
Line memory
Image memory
SDRAM
Work memory
SRAM
SCSI
controller
CPU bus
SCSI bus

Fig. 3-21

2. CPU Circuit

Table 3-7 shows the main functions of the IC, and Fig. 3-22 shows a block diagram of the main CPU PCB assembly.

Control of this machine is carried out by a 32-bit CPU (IC110).

IC No.	Description
IC106 (SRAM)	CPU work memory (32,000 bytes)
IC108, IC109 (SDRAM)	Memory for image data (2 each 16 byte memory)
IC110 (CPU)	Microprocessor for controlling this machine
IC112 (EEPROM)	Memory for writing log (2K bits)
IC116 (Drug-Chip)	Gate array for driving image sensors and for gray scale image processing
IC120, IC121	Gate array for amplification, A/D conversion and selector image processing
IC125	Flash memory for writing various data (500K bytes) + program
IC127	Gate array for controlling the SCSI interface
IC129, IC132	Line memory (16K bytes × 2)

Table 3-7

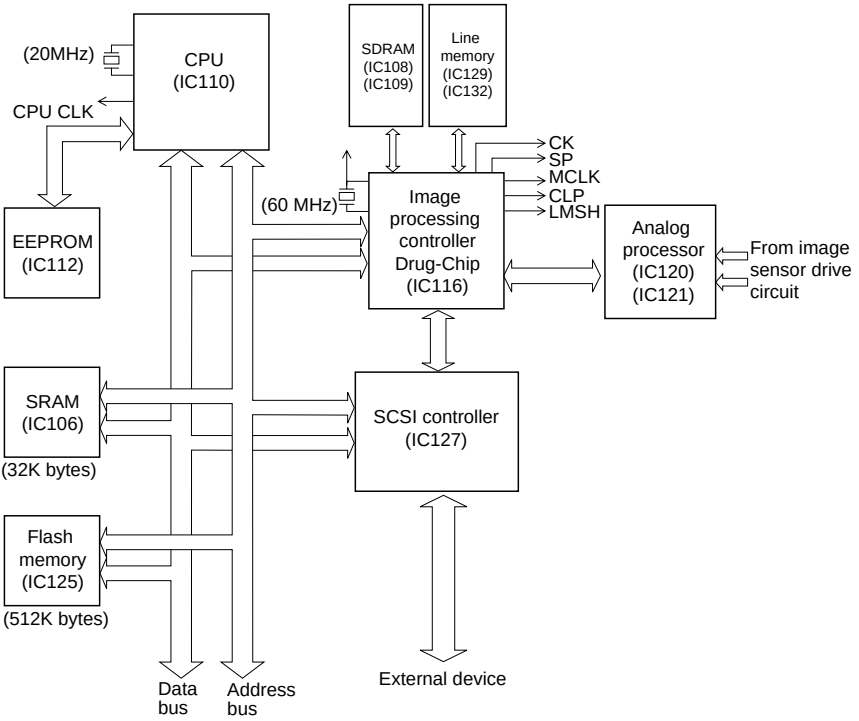


Fig. 3-22

3. Image Sensor Drive Circuit

a. Outline

This circuit consists of amplifier section, A/D converter section and analog switches.

This circuit amplifies and combines the two blocks of analog signals that are output from the image sensor. After that, the signals are converted to digital signals, and output to the image processing controller (Drug-Chip).

b. Configuration of Image Sensor

Fig. 3-23 shows the configuration of the image sensor.

The image sensor used in this machine consists of 13 chips, with each chip having 234 photosensitive elements arranged in it.

The 13 chips are divided into two blocks of seven and six chips. The document is read simultaneously by the two blocks, and analog signals are output from each block.

The first nine bits of chip 1 and the last nine bits of chip 13 of the image sensor are not used as they are dummy bits.

The maximum number of pixels of the image sensor is calculated as follows:

13 (number of chips) × 234 (number of elements per chip) - 18 (number of elements not in use) = 3024 pixels.

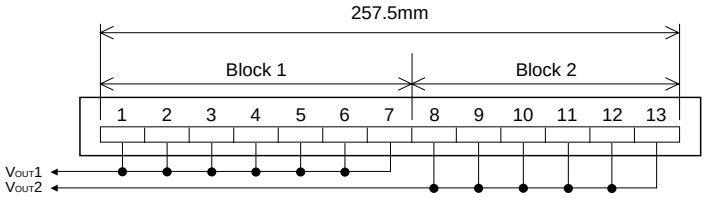


Fig. 3-23

This machine has two image sensors, each of which reads the image on the front and back of the document.

The data of each block are output simultaneously in order to speed up reading of image data. Also, the front side and the back side data are output simultaneously.

Fig. 3-24 shows the timing chart of image sensor operation.

SP is the line interval signal that indicates the interval of one line.

CK operates at 1.25 MHz and is the image sensor drive clock.

The two blocks of signals are image sensor output taken to be $V_{OUT}1$ and $V_{OUT}2$.

The 1 to 26 pulse intervals of the CK clock of $V_{OUT}1$ and $V_{OUT}2$ are the clamp intervals (52 bits).

The 27 to 31 pulse intervals of the CK clock of $V_{OUT}1$ are the dummy bits (nine bits) and are the invalid bits of the image sensor.

With $V_{OUT}1$, the 31 to 495 pulse intervals of the CK clock are valid bits, and are output from the 10th bit to the 1629th bit as image signals (S1 to S1629).

With $V_{OUT}2$, the 27 to 607 pulse intervals of the CK clock are valid bits, and are output from the 1st bit to the 1395th bit as image signals (S1630 to S3024).

The 607 to 611 pulse intervals of the CK clock of $V_{OUT}2$ are dummy bits (nine bits), and are the invalid bits of the image sensor.

As a result of totaling these bits, 3,024 (S1 to S3024) image signals per one line are output.

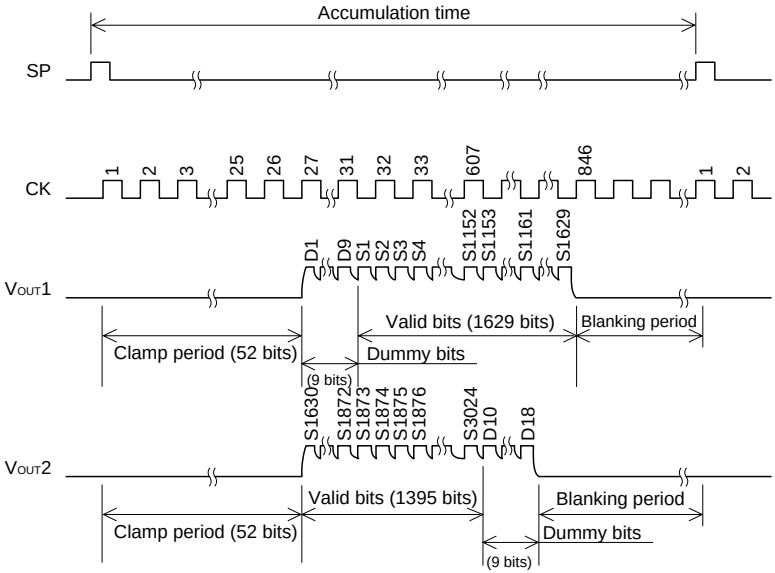


Fig. 3-24

c. Operation

Fig. 3-25 shows a block diagram of the image sensor drive circuit.

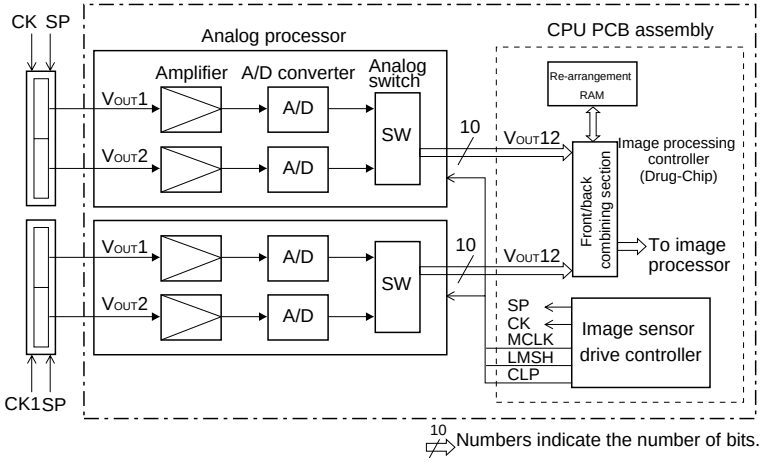
The two blocks of analog signals from the image sensor are respectively output to the main CPU PCB assembly as $V_{OUT}1$, and $V_{OUT}2$.

Image sensor drive clock (CK) and line interval signals (SP) are input to the image sensor.

When the line interval signal turns ON, the potential that is held synchronizes with the drive clock, and is output successively.

The analog signals output from the image sensor are sent to the analog processor. These signals are amplified by amplifiers in the analog processor, and are converted by A/D converters to 10-bit digital signals.

After that, they are sent to the image processing controller (Drug-Chip) where image data re-arrangement and combining of the front and back are carried out.



SP : Line interval signal
CK : Image sensor drive clock
MLCK : Analog processor drive clock
LMSH : Analog processor read timing signal
CLP : Clamp signal

Fig. 3-25

Fig. 3-26 shows the procedure by which the analog signals output from the image sensor are combined. The procedure shown here is for the binary and gray scale modes.

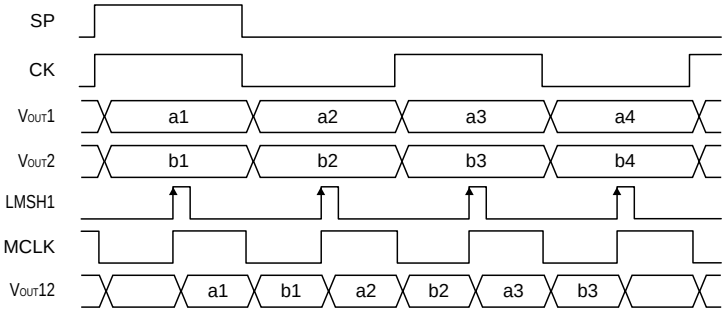


Fig. 3-26

The pixels output from $V_{OUT}1$ are each expressed as a1, a2, a3 and so on.

Likewise, the pixels output from $V_{OUT}2$ are expressed as b1, b2, b3, and so on.

The analog signals of each element of the two blocks are synchronized with the image sensor drive clock (CK) to be successively output to the analog processor as $V_{OUT}1$ and $V_{OUT}2$.

The various processing sections of the amplifier, A/D converters and selector (digital multiplexer) are located in the analog processor. Here, the analog signals undergo various processing by the analog processor drive clock (MCLK), analog processor read timing signal (LMSH) and clamp signal (CLP).

Each of the analog signals output from the image sensors is input to each of the amplifiers, and output to the A/D converter as $V_{OUT}1$ and $V_{OUT}2$.

After $V_{OUT}1$ and $V_{OUT}2$ have been processed by the A/D converter, they are input to the selector as 10-bit digital signals.

The selector combines A/D converted $V_{OUT}1$ and $V_{OUT}2$ according to signals sent from the drive controller, and outputs them as 10-bit digital signal $V_{OUT}12$.

As the sequence of the pixels of one line of combined image data has been re-arranged, the pixels are re-arranged using the re-arrangement RAM in the image processing controller, and sent to the image processor with the front and back as one set.

4. Image Processing Controller Circuit (Drug-Chip)

a. Outline

This circuit carries out image processing on the image data output from the image sensor drive circuit. The processed image data is stored to SDRAM and is output to the SCSI controller.

This circuit has the following functions:

- Image processing
- Generation of standard clock for memory
- Generation of drive timing signals for two (front and back) image sensors
- LED control
- Changing of number of image data bits
- SDRAM (image memory) control

b. Operation

Figs. 3-27, 3-28 and 3-29 show block diagrams of the image processing controller (Drug-Chip).

The image data from the image sensor drive circuit of the front side and back side of the document are sent simultaneously to the image processing controller.

The front/back combining section in the image processing controller re-arranges the image data in one line, and combines the front and back sides. (See Fig. 3-30.) RAM in the image processing controller is used for these processes.

The combined image data is tranferred to and undergoes processing at the dark compensation, shading compensation and gamma compensation sections in this order.

The compensation factor, compensation values for dark compensation, shading compensation and gamma compensation are stored in RAM in the image processing controller.

Then brightness is adjusted by the adder/subtractor in the brightness compensation section and the resulting data is sent to the edge emphasis section via the line memory. In the binary and gray scale mode, edge emphasis is performed in the line memory.

In the color mode, edge emphasis processing is performed in the personal computer so the data is output without being processed in the edge emphasis section of the scanner.

If a resolution less than 300 dpi is selected, resolution conversion is carried out by thinning out the read timing signals at this time.

If the paper size is selected at this time, the image width is determined by the valid image width setting section.

After resolution conversion is carried out, binarizing of the image data is carried out.

If the simple binarizing mode is selected, the data is sent to the simple binary processor and binarized.

If the error diffusion mode is selected, the data is sent to the error diffusion processor. After error diffusion processing is carried out, the data is sent to the SDRAM transfer buffer.

If the gray scale or color mode is selected, the data is input to the simple binary/error diffusion processor. However, no processing is performed on the data; it is output as it is, and sent to the SDRAM transfer buffer.

The 10-bit image data input to the SDRAM transfer buffer is converted to 8-bit data at the SDRAM transfer buffer.

The 8-bit image data output from the SDRAM transfer buffer is stored to SDRAM by burst transfer.

The image data stored to SDRAM is returned to the SDRAM transfer buffer by burst transfer. After that, the data is sent via the dedicated 8-bit bus to the SCSI controller.

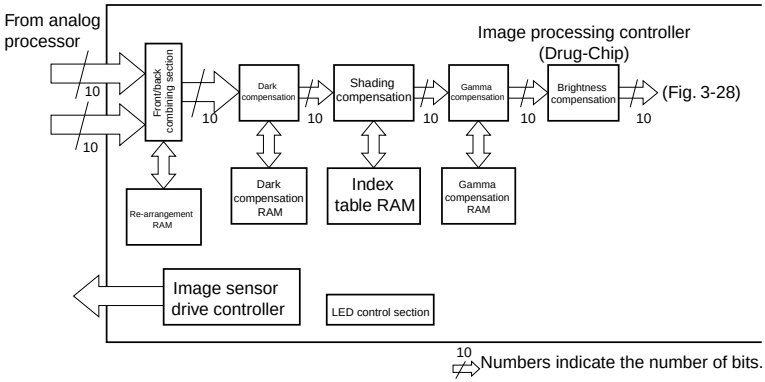


Fig. 3-27

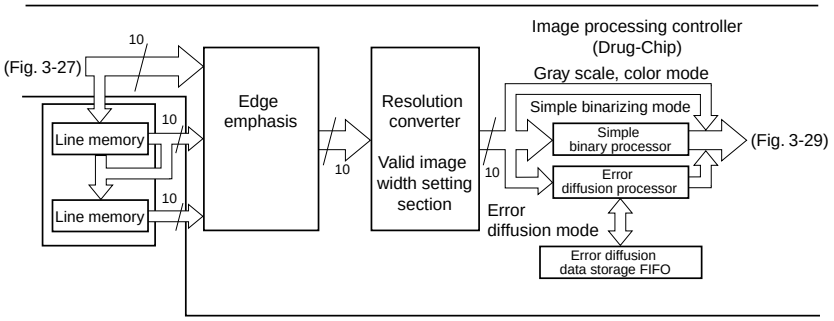
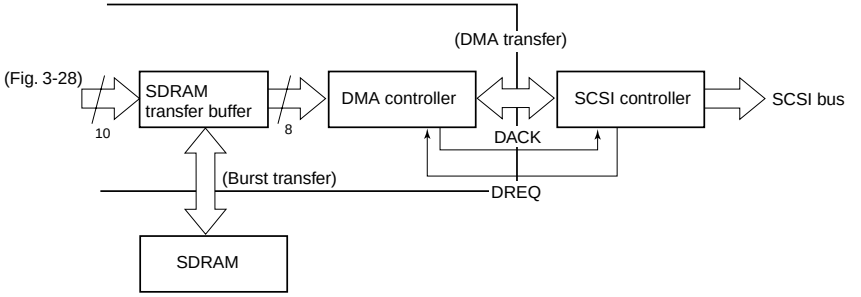


Fig. 3-28



The names and meanings of signals are as follows:

DREQ: DMA transfer request signal

DACK: DMA request acknowledge signal

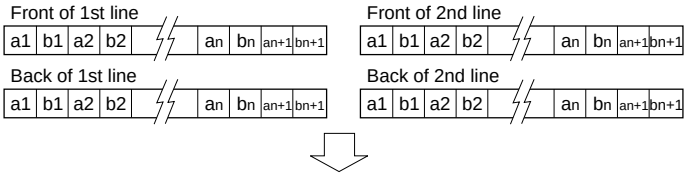
Fig. 3-29

Reference

- DMA (Direct Memory Access)
  DMA is a direct way of moving data between memory and devices that bypasses CPU. Control is performed by the DMA controller.
- Burst Transfer
  Burst transfer refers to writing image data to memory at high speed.

This machine writes image data in 8-word burst transfer using 32 MByte memory (SDRAM), and at the same time reads the required data from memory to output it to the personal computer.

- Front/back combining section input



- Front/back combining section output

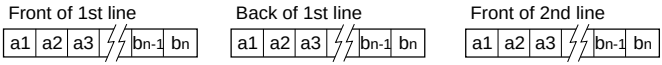


Fig. 3-30

5. Main Motor Drive Circuit

Fig. 3-31 shows an outline of the main motor drive circuit.

A DC brushless motor is used as the main motor.

The main motor can be set to five speeds by a combination of the MOTOR_CLK, SPD_SEL_A, SPD_SEL_B and FG_SEL signals from the CPU. In the binary and gray scale mode, 300 dpi (high speed), 200 dpi, 240 dpi and 300 dpi can be selected. In color mode (DR-3080C only), five speeds at 200 dpi can be selected. (The 100 dpi color mode resolution is the same speed as 300 dpi in binary and gray scale mode.))

If the motor stops because of an abnormality, the state of the MOTOR_READY signal is set to "H," transmitting an abnormality signal to the CPU to automatically stop the motor.

Sub-scanning direction density	SPD_A	SPD_B	FG_SEL	Rotating speed	Feed speed
300 dpi (high speed)	H	L	L	2258 rpm	241.9 (mm/s)
200 dpi	H	L	L	1693 rpm	181.4 (mm/s)
240 dpi	L	H	L	1411 rpm	151.2 (mm/s)
300 dpi/100 dpi (color)	L	H	L	1129 rpm	121.0 (mm/s)
200 dpi (color)	L	L	H	564 rpm	60.5 (mm/s)

Table 3-8

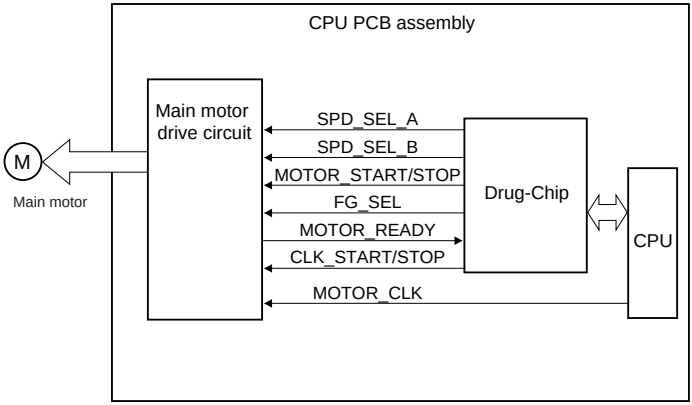


Fig. 3-31

6. Document Board Motor Drive Circuit

Fig. 3-32 shows an outline of the document board motor drive circuit.

A DC motor is used as the document board motor. The document board motor is controlled by a combination of the PB5, PB6 from the CPU, (See Fig. 3-9) and moves up, down and stops.

	UP	DOWN	STOP
PB5	H	L	H
PB6	L	H	H

Table 3-9

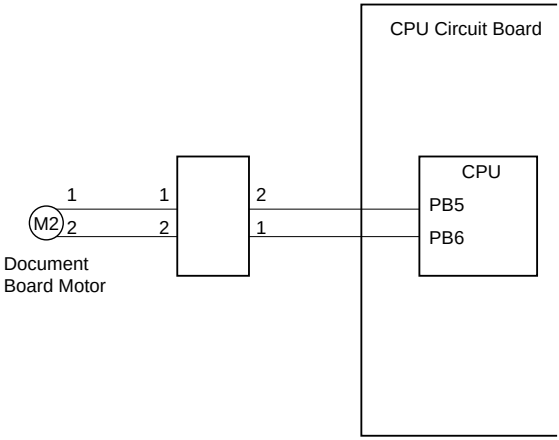


Fig. 3-32

V. INTERFACE

1. Outline

When sending data from this machine to a personal computer, the data is transmitted through an interface. This machine uses SCSI-2 (Small Computer System Interface-2) as the interface.

Also, data transmission at a maximum of 10 MB/sec. is possible as this machine supports Fast SCSI.

Fig. 3-33 shows the input and output of data used by SCSI, and Table 3-10 shows the names of the signals assigned to the connectors. The connector numbers on the CPU PCB assembly are J105 and J106.

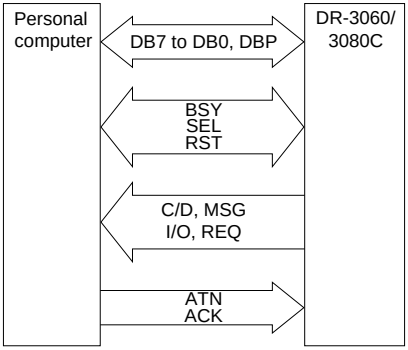


Fig. 3-33

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

The bar "—" above the name of a signal denotes that the signal is a low active one.

Table 3-10

A total of 18 signals, data signals (1 byte + parity bit = 9 signals) and control signals (9 signals), are handled on the data transmission path, the SCSI bus.

2. Control Method

The following briefly describes how the DR-3080C is controlled on the SCSI bus.

Data is transmitted by setting the required state (phase) with control signals. Table 3-11 shows an explanation of the various phases.

Equipment connected to the SCSI bus is called a SCSI device. The side that issues the command for data transmission is called the "initiator" and the side that receives the command and provides the data is called the “target.” (See Fig. 3-34)

No.	Name	Explanation	
1	BUS FREE phase	State in which SCSI bus is not used in any SCSI device	Phase that decides the state of use of the SCSI bus
2	ARBITRATION phase	Decides the SCSI device to use the SCSI bus.	
3	SELECTION phase	Decides the target when the initiator uses the SCSI bus.	
4	RESELECTION phase	The target requests the initiator for re-connection.	
5	COMMAND phase	Command from initiator to target	Transmission phase of data
6	DATA phase	Data input/output is carried out in accordance with the command.	
7	STATUS phase	Denotes the result of whatever was carried out in accordance with the command.	
8	MESSAGE phase	Control data is being input/output between the initiator and target.	

Table 3-11

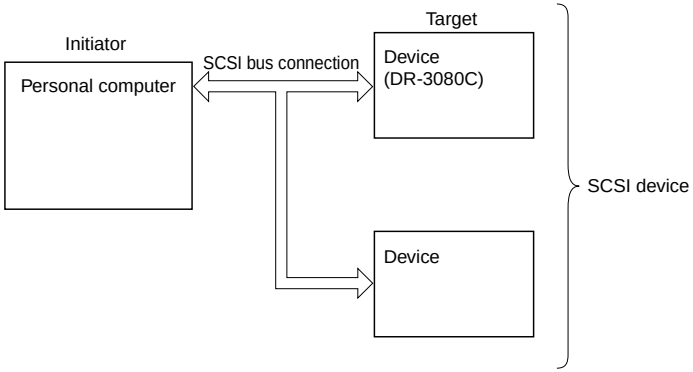


Fig. 3-34

Table 3-12 shows the basic communications sequence.

No.	Personal computer	Communication direction	On this machine (DR-3060/3080C)
1	Recording start command	→→	
2			Feed starts
3	Command inquiring about whether or not there is data and the state of feeding	→→	
4		←←	Availability or not of data and status of feed
5	1) If feeding is in progress and there is no data, return to No. 3. 2) If feeding is stopped and there is no data, go to No. 9. 3) If there is data, go to No. 6.		
6	Data read command	→→	
7		←←	Data output
8	1) Return to No. 6 until there is no more data for one document page. 2) Return to No. 3 when there is no more data for one document page.		
9	End		

Table 3-12

VI. POWER SUPPLY

1. Outline

The DC power supply PCB assembly of this machine can handle power supply input of 100 to 240V AC.

Fig. 3-35 shows the block diagram of the DC power supply PCB assembly.

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

The supplied 100 to 240V AC power is converted by the rectifying bridge to unsmoothed 100 to 240V UN and sent to the transformer. After being transformed at the transformer, 100 to 240V UN is converted to +24V by a DC/DC converter and output to the CPU PCB assembly.

A fuse is used in the DC power supply PCB assembly to protect against overcurrent.

Only + 24V DC is output from the DC power supply PCB assembly, and the necessary voltage is then generated by the DC/DC converter on the CPU PCB assembly.

Fig. 3-36 shows the power supply related block diagram.

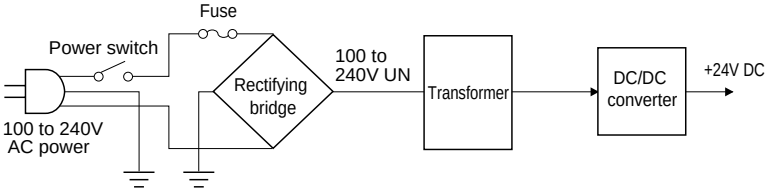


Fig. 3-35

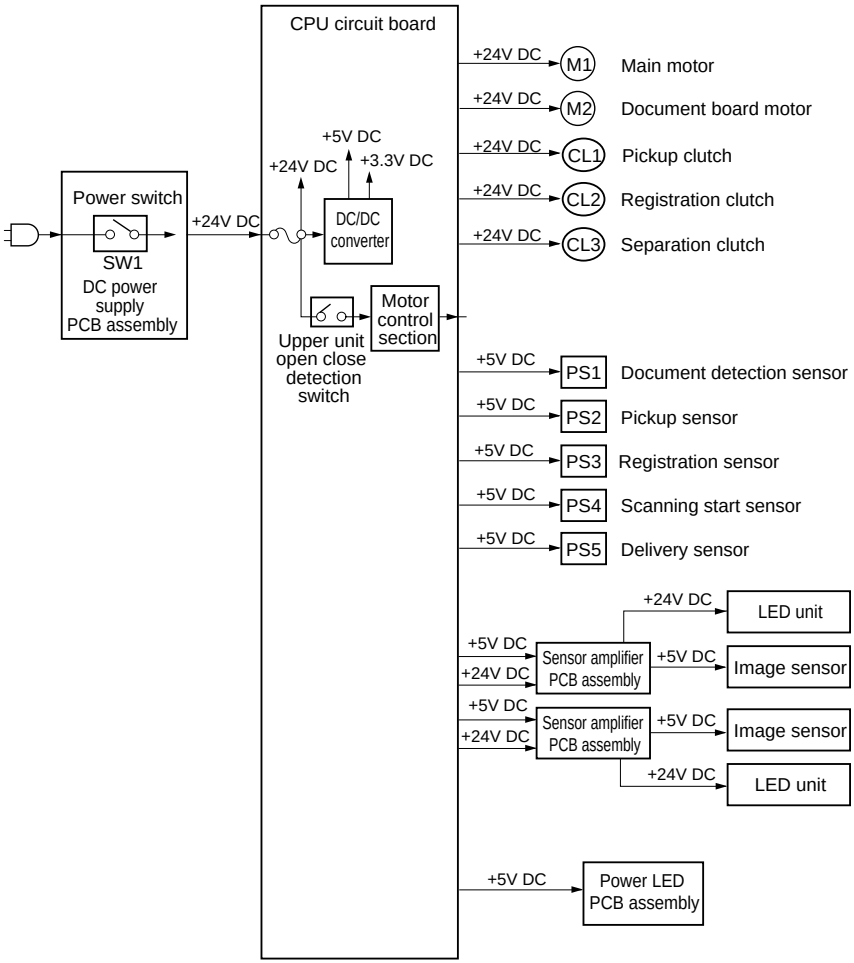


Fig. 3-36

2. Protective Function of Power Supply Circuit

The DC power supply PCB assembly is a switching regulator type assembly.

If the load goes into a short circuit state due to some abnormality, and there is an overcurrent, the protective function is activated and output is stopped. Also, if the DC/DC converter that generates ± 5V DC and + 3.3V DC on the main CPU PCB assembly breaks down, causing +24V DC to be applied, the protective function is activated and output is stopped.

When 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 in the CPU circuit board is used as protection for each PCB assembly. If an overcurrent flows into the DC/DC converter, the fuse blows and stops the power supply to the PCB assembly.

A fuse is also used for protection of the main motor. If an overcurrent flows into the part of the main motor where + 24V DC is supplied, the fuse blows and stops the power supply to the main motor.

3. Energy Saving Mode

This mode is designed to reduce electricity consumption by automatically entering the energy saving mode when the scanner has been in standby for 3 consecutive minutes.

Electricity consumption	
Scanning	36 W
Standby	15 to 18 W
Energy saving mode	10 W

In the energy saving mode, the CPU circuit board, image processor control and motor functions are stopped. Return from the energy saving mode happens through a command from the SCSI, which automatically returns it to standby.

VII. LAYOUT OF ELECTRICAL COMPONENTS

A. Sensors

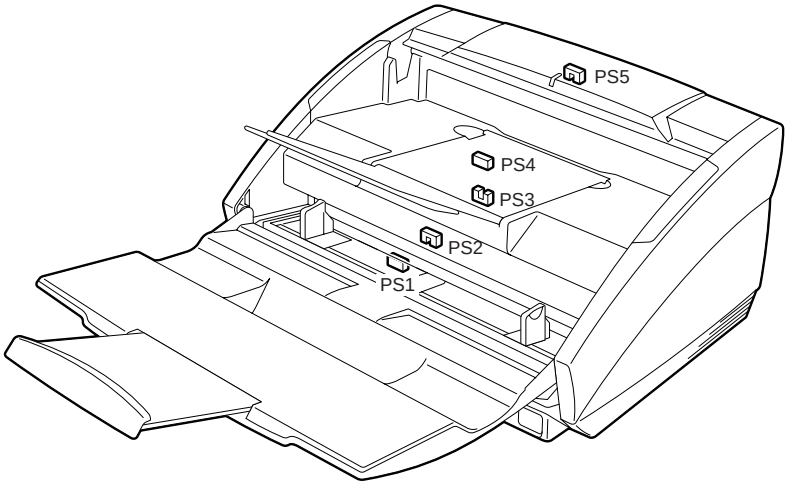


Fig. 3-37

Symbol	Name	Code	Function
⊔	Photo interrupter	PS1	Document detection on the document board
		PS2	Document detection in the pickup assembly
		PS3	Document detection at registration
		PS4	For starting scanning
		PS5	Document detection in the delivery assembly

Table 3-13

B. Switches/LEDs

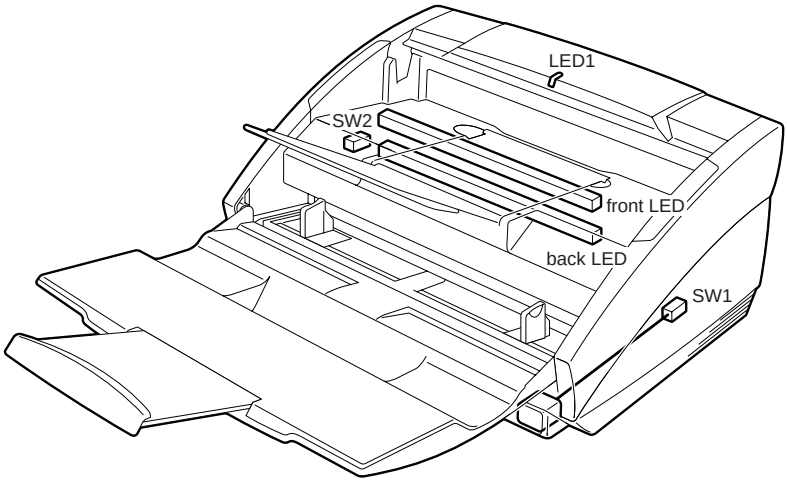


Fig. 3-38

Symbol	Name	Code	Function
	Push switch	SW1	For turning power ON and OFF
	Microswitch	SW2	Upper unit open close detection switch
	LED	LED1 (front LED) (back LED)	For DC power supply display For illuminating document (front) For illuminating document (back)

Table 3-14

C. Clutches/Motors

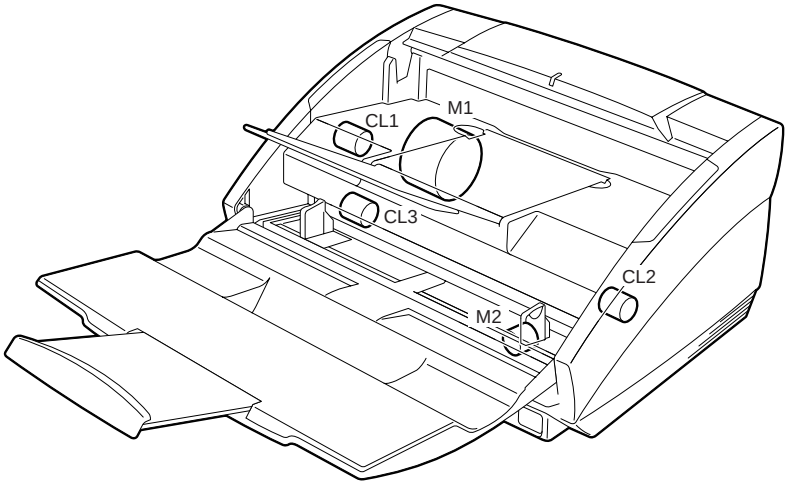


Fig. 3-39

Symbol	Name	Code	Function
(CL)	Clutch	CL1 CL2 CL3	For document pickup For document pause For document separation
(M)	Motor	M1 M2	For feeding document For moving document board up and down

Table 3-15

D. PCBs/Units

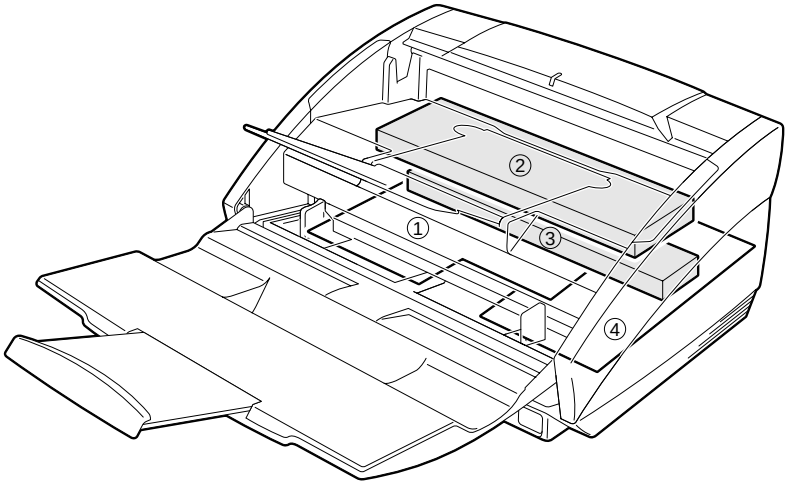


Fig. 3-40

Symbol	Name	Function
①	CPU PCB assembly	For sequence control and transmission with external devices
②	Upper reading unit	For reading the document (front side)
③	Lower reading unit	For reading the document (back side)
④	DC power supply PCB assembly	For DC power supply

Note1: For details on sensor PCB assemblies, see “A. Sensors”.

Table 3-16

VIII. REFERENCE LIST OF VARIABLE RESISTORS, SWITCHES & LEDS FOR EACH PCB ASSEMBLY

The VR (variable resistors), and LEDs that are necessary for servicing the machine at the customer's premises are shown below.

VRs not listed in the table are for factory adjustment only. Special tools and measuring instruments are required to perform adjustments and checks using these VRs, and often a high degree of accuracy is demanded. So, do not touch these VRs and check pins in the field.

Note: This machine does not have any VRs that require adjustment in the field.

A. CPU PCB Assembly

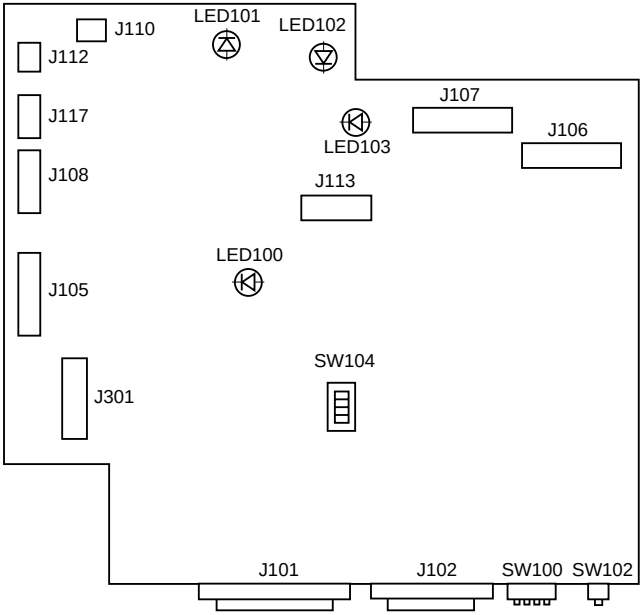
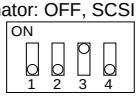
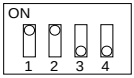
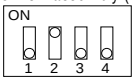


Fig. 3-41

<table>
<tr><th>LED No.</th><th>Display</th></tr>
<tr><td>LED100</td><td>• CPU state indications
<table><tr><th>LED100</th><th>State</th></tr><tr><td>FLASHING</td><td>Operating normally</td></tr><tr><td>ON, OFF</td><td>Sleep mode active</td></tr></table></td></tr>
<tr><td>LED101</td><td>• +5 V normal → lit</td></tr>
<tr><td>LED102</td><td>• +3.3 V normal → lit</td></tr>
<tr><td>LED103</td><td>• +24 V normal → lit</td></tr>
<tr><td>LED 701</td><td><table><tr><th>LED701</th><th>State</th></tr><tr><td>ON</td><td>Power is ON</td></tr><tr><td>OFF</td><td>Power is OFF</td></tr><tr><td>FLASHING</td><td>In the service mode, (See chapter 7 III SERVICE MODE)</td></tr></table></td></tr>
</table>

Table 3-17

<table>
<tr><th>Switch No.</th><th>Setting</th></tr>
<tr><td>SW100</td><td>• Switch for SCSI related parts
1: Terminator ON/OFF
2 to 4: SCSI ID setting
For details, refer to the instruction manual.
Initial setting
Terminator: OFF, SCSI ID: 2
 
</td></tr>
<tr><td>SW102</td><td>• Load switch
(See chapter 7, III SERVICE MODE)</td></tr>
<tr><td>SW104</td><td>• DIP switches
1: DR-3060, DR-3080C switches
ON: 3060 OFF: 3080C
Note: The old CPU PCB assembly (MG1-3164) is used solely for the DR-3080C and must be set to OFF.
2: Line memory setting
ON: no line memory
OFF: line memory provided
Note: The CPU PCB assembly (MG1-3164) is provided with line memory, while the new CPU PCB assembly (MG1-3175) is not.
3: Not used (set to OFF)
4: Not used (set to OFF)
Default setting
DR-3060
 

DR-3080C
New CPU PCB assembly (MG1-3175)
 

Old CPU PCB assembly (MG1-3164)
 
</td></tr>
</table>

Table 3-18

CHAPTER 4

DISASSEMBLY & REASSEMBLY

I. MAIN EXTERNAL COVERS

A. Outside Covers

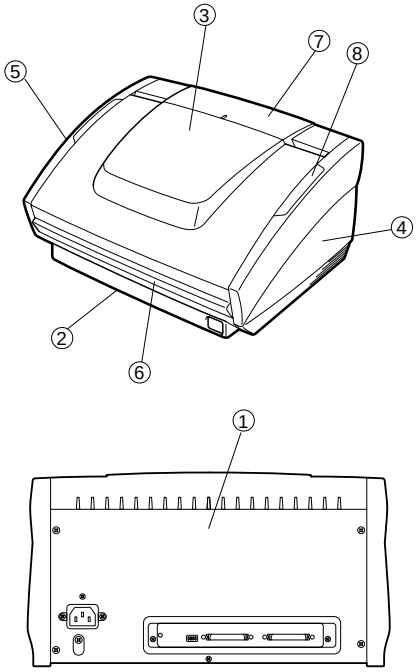


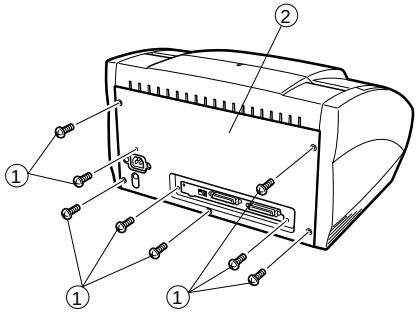
Fig. 4-101

		Screw	Hook
①	Rear cover	(8)	[0]
②	Lower front cover assembly	(4)	[0]
③	Pickup tray	(0)	[0]
④	Right cover	(0)	[1]
⑤	Left cover	(0)	[1]
⑥	Front cover	(0)	[0]
⑦	Top cover	(0)	[0]
⑧	Delivery cover	(2)	[0]

Note: The figures in ( ) and [ ] mean the numbers of fixing screws and mounting hooks, respectively.

1. Rear cover

1) Remove eight screws ① , and remove the rear cover ② .

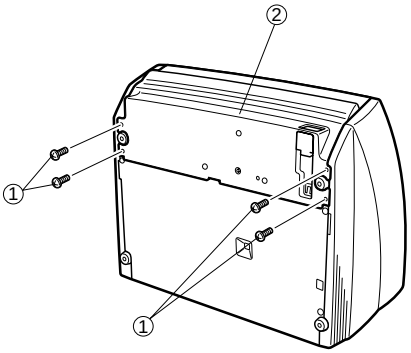


① Screws ② Rear cover

Fig. 4-102

2. Lower front cover assembly

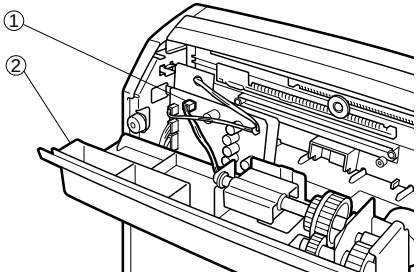
1) Remove four screws ①, and pull out the lower front cover assembly ②.



① Screws
② Lower front cover assembly

Fig. 4-103

2) Disconnect connector ① and remove lower front cover assembly ②.

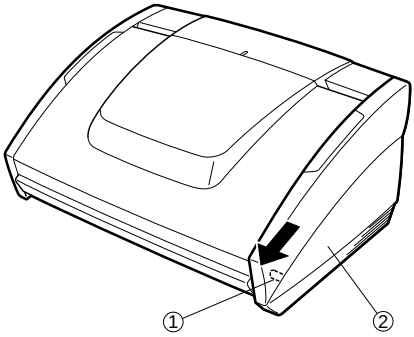


① Connector
② Lower front cover assembly

Fig. 4-104

3. Right cover

1) Remove the rear cover.
2) Remove the lower front cover assembly.
3) Push hook ① on the right cover in the direction of the arrow to detach hook ① and remove right cover ②.

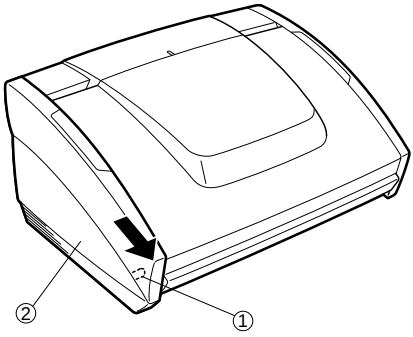


① Hook ② Right cover

Fig. 4-105

4. Left cover

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly.
3) Push hook ① on the left cover in the direction of the arrow to detach hook ① and remove left cover ②.

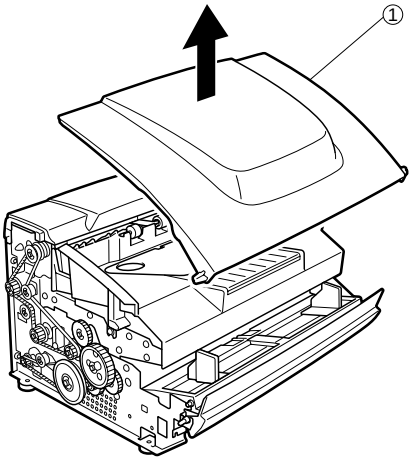


① Hook ② Left cover

Fig. 4-106

5. Pickup Tray

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the left and right covers.
4) Remove the pickup tray.

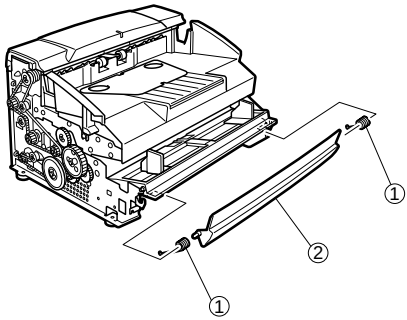


① Pickup Tray

Fig. 4-107

6. Front cover

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove two springs ①, and remove the front cover ②.



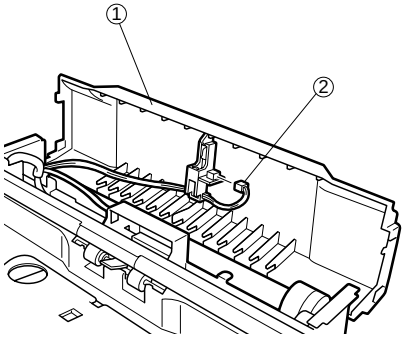
① Springs ② Front cover

Fig. 4-108

Note: When reassembling the front cover, assemble the springs in the order that they were removed in step 6 as the shape of the springs on the left and right is different.

7. Top cover

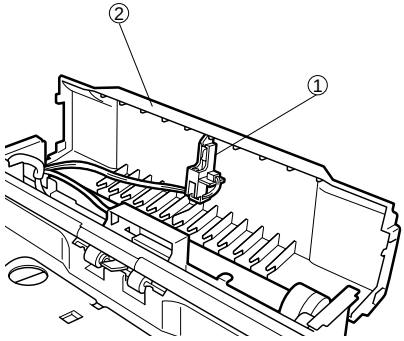
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Lift up the top cover ① , and disconnect the connector ② on the rear side.



① Top cover ② Connector

Fig. 4-109

Note: When reassembling the top cover, pass the harness removed in step 6, through the rib of the LED mounting board ① . If the harness is not passed through the rib, the harness may become nipped by the delivery roller and become broken.

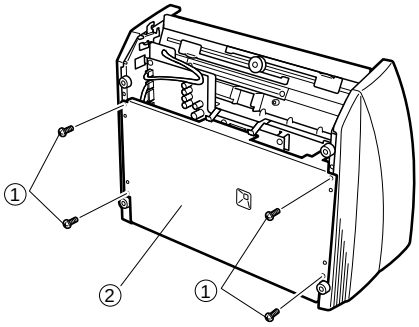


① LED mounting board ② Top cover

Fig. 4-110

8. Bottom plate cover assembly

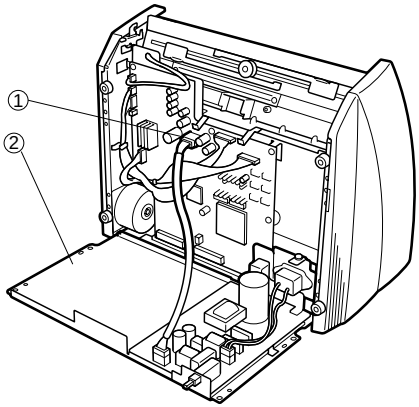
1) Rear cover (8 screws)
2) Lower front cover assembly (4 screws)
3) Remove four screws ① , and remove the bottom plate cover assembly ② .



① Screws
② Bottom plate cover assembly

Fig. 4-111

4) Disconnect the connector ① , and remove the bottom plate cover assembly ② .

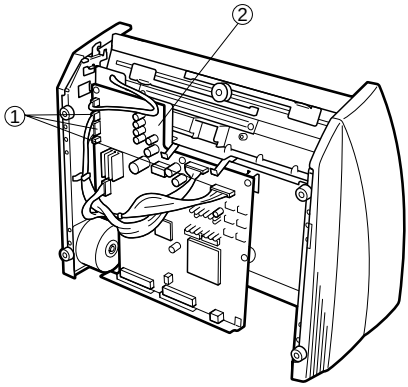


① Connector
② Bottom plate cover assembly

Fig. 4-112

9. Upper unit

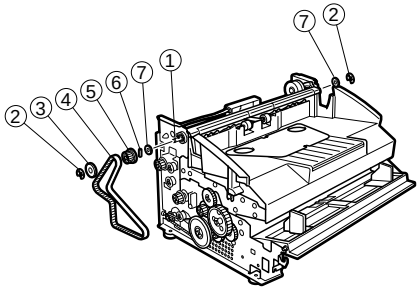
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the bottom plate cover assembly. (4 screws)
4) Disconnect three connectors ① (J106, J108, J117) from the CPU PCB assembly ② .
5) Remove the right cover.



① Connectors ② CPU PCB assembly

Fig. 4-113

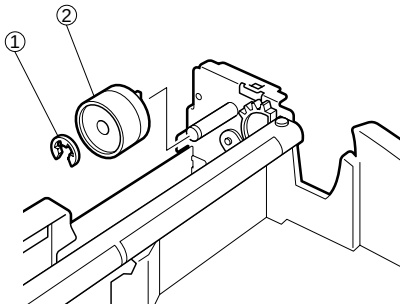
6) Remove the left cover.
7) Remove the pickup tray.
8) Remove the top cover.
9) Remove the two E-rings ② on both sides of the delivery drive roller 2 ① , and after removing flange ③ (black) and belt 1 ④ , remove gear ⑤ , pin ⑥ and two washers ⑦ .



① Delivery drive roller 2 ② E-rings
③ Flange ④ Belt 1
⑤ Gear ⑥ Pin
⑦ Washer

Fig. 4-114

10) Remove the E-ring ① , and disengage the damper gear ② .

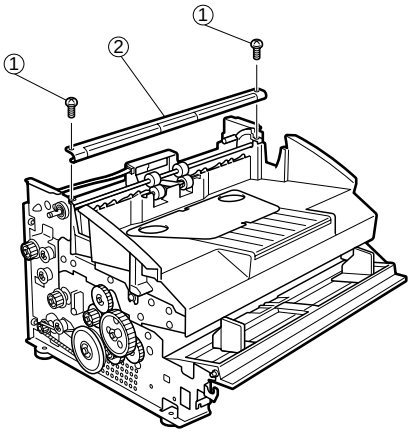


① E-ring ② Damper gear

Fig. 4-115

Note: Pay attention to the upper unit when the upper unit is opened and take your hands away from it after the damper gear is removed as the upper unit falls down.

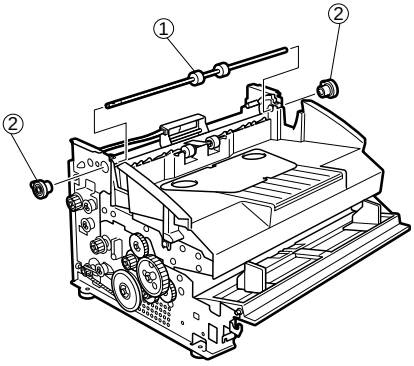
11) Remove two screws ① , and the decharging stay ② .



① Screws ② Decharging stay

Fig. 4-116

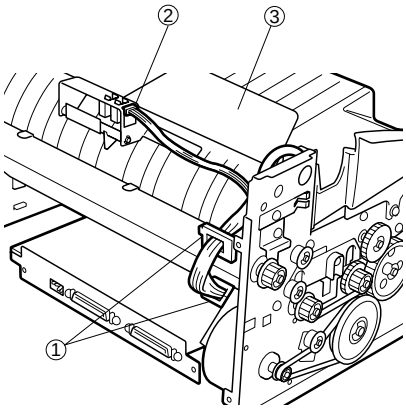
12) Remove the bearings ② on both sides of delivery drive roller 2 ① , and remove the delivery drive roller 2.



① Delivery drive roller 2 ② Bearings

Fig. 4-117

13) Disconnect the square bushes ① , and the delivery sensor connector ② , and remove the upper unit ③ .

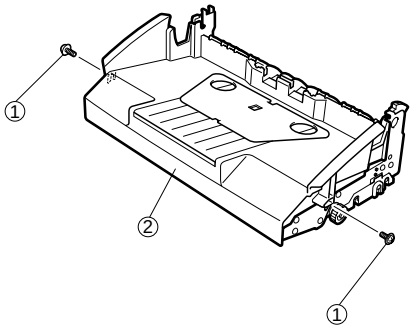


① Square bushes ② Connectors
③ Upper unit

Fig. 4-118

10. Delivery cover

1) Remove the upper unit.
2) Remove the delivery follower roller 1. (See III Feed Rollers)
3) Remove the delivery follower roller 2. (See III Feed Rollers)
4) Remove two screws ①, and remove the delivery cover ②.



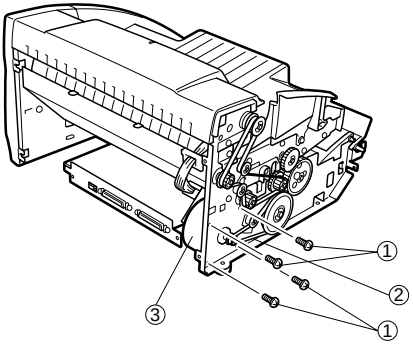
① Screws ② Delivery cover

Fig. 4-119

II. DRIVE (MOTORS)

1. Main motor

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the bottom plate cover assembly. (4 screws)
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove four screws ①, the belt 2 ②, and pull out the main motor ③.

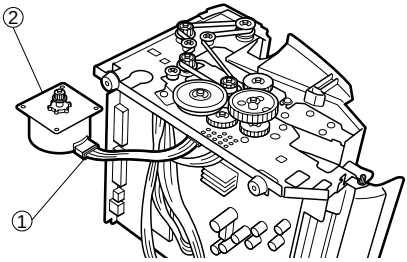


① Screws ② Belt 2
③ Main motor

Fig. 4-201

Note: Check the belt tension during reassembly. See III Feed Roller if it is tight or loose.

7) Disconnect the connector ①, and remove the main motor ②.



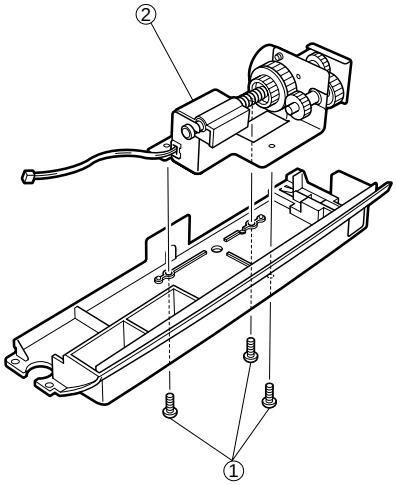
① Connector ② Main motor

Fig. 4-202

Note: When placing this machine on its side, prevent it from falling by holding it firmly.

2. Document board motor

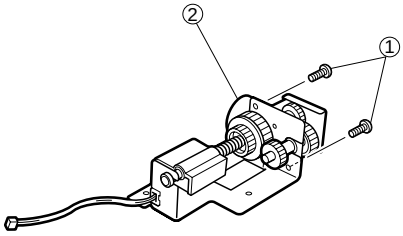
1) Remove the lower front cover assembly. (4 screws)
2) Remove three screws ①, and then remove the document board motor assembly ②.



① Screws
② Document board motor assembly

Fig. 4-203

3) Remove two screws ①, and then remove the document board motor ②.

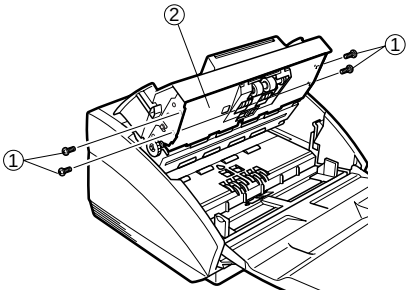


① Screws
② Document board motor

Fig. 4-204

3. Upper pickup guide plate

1) Remove four screws ①, and then remove the upper pickup guide plate ②.

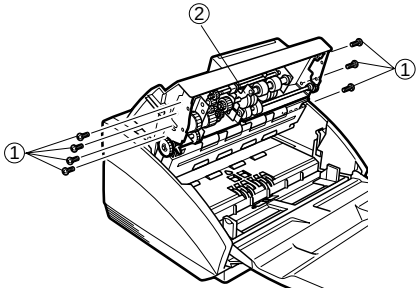


① Screws
② Upper pickup guide plate

Fig. 4-205

4. Pickup unit

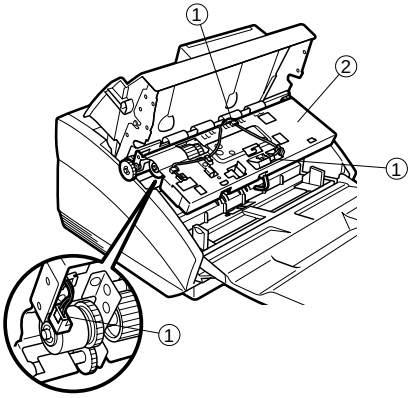
1) Remove the upper pickup guide plate. (4 screws)
2) Remove seven screws ①, and pull out the pickup unit ②.



① Screws ② Pickup unit

Fig. 4-206

3) Disconnect three connectors ①, and then remove the pickup unit ②.

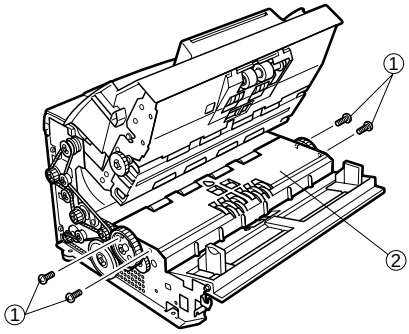


① Connectors ② Pickup unit

Fig. 4-207

5. Lower pickup guide plate

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove four screws ①, and then remove the lower pickup guide plate ②.

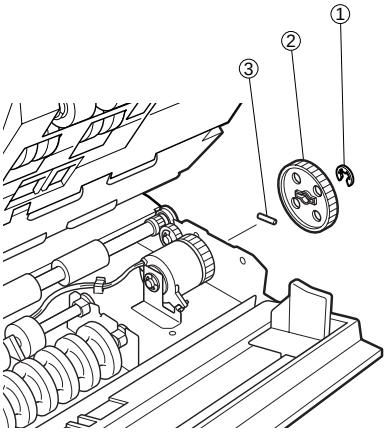


① Screws
② Lower pickup guide plate

Fig. 4-208

6. Registration clutch

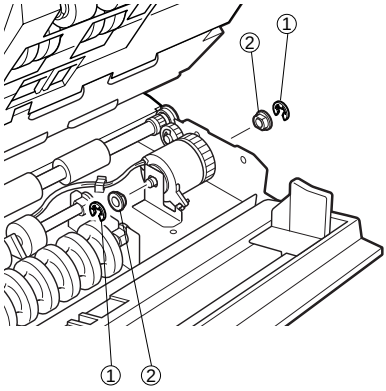
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the pickup tray.
4) Remove the right cover.
5) Remove the left cover.
6) Remove the lower pickup guide plate. (4 screws)
7) Remove E-ring ① , gear ② and pin ③ .



① E-ring ② Gear
③ Pin

Fig. 4-209

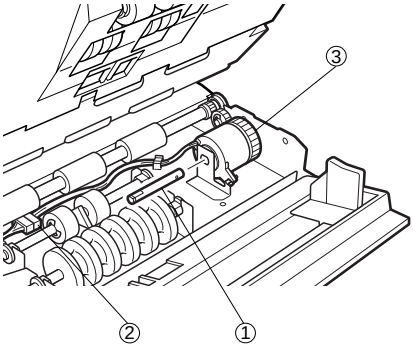
8) Remove two E-rings ① , and the two bearings ② .



① E-rings ② Bearings

Fig. 4-210

9) Remove the shaft ① , disconnect connector ② , and then remove the registration clutch ③ .

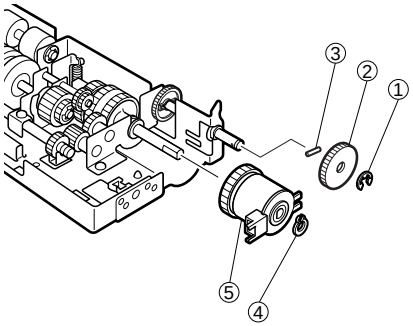


① Shaft ② Connector
③ Registration clutch

Fig. 4-211

7. Pickup clutch

1) Remove the pickup unit.
2) Remove the E-ring ①, gear ②, pin ③ and G-ring ④, and then remove the pickup clutch ⑤.



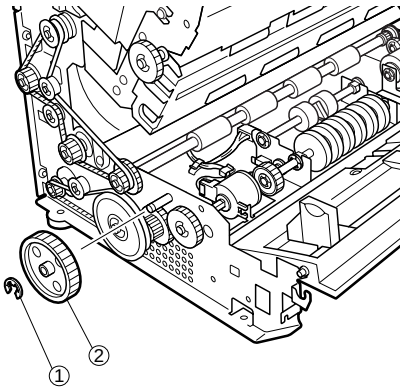
① E-ring ② Gear
③ Pin ④ G-ring
⑤ Pickup clutch

Fig. 4-212

Note: During reassembly, align the D-cut on the shaft and clutch with the rotation stopper.

8. Separation clutch

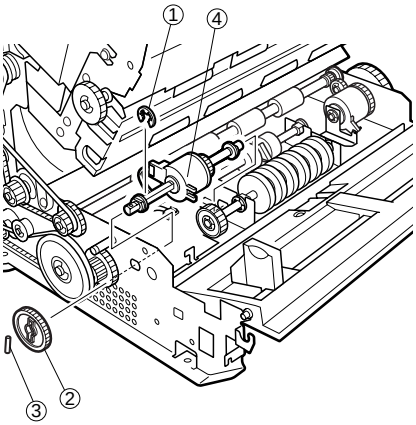
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the lower pickup guide plate. (4 screws)
7) Remove E-ring ①, and remove the gear ②.



① E-ring ② Gear

Fig. 4-213

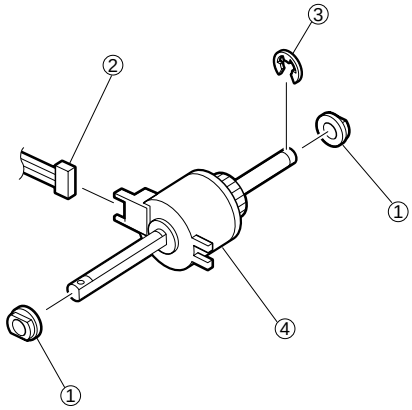
8) Remove E-ring ①, slide the separation clutch to the gear ② side, remove pin ③, and then remove the separat ion clutch ④ .



① E-ring
② Gear
③ Pin
④ Separation clutch

Fig. 4-214

9) Remove the two bearings ① , disconnect the connector ② , remove E-ring ③ , and then remove the separation clutch ④ .



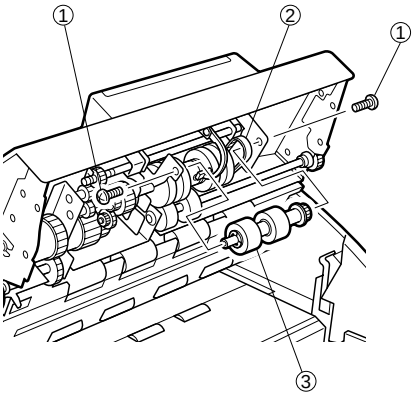
① Bearings
② Connector
③ E-ring
④ Separation clutch

Fig. 4-215

III. FEED (ROLLERS)

1. Pickup roller

1) Remove the upper pickup guide plate. (4 screws)
2) Remove two screws ① . When removing the belt ② , also remove the pickup roller ③ .

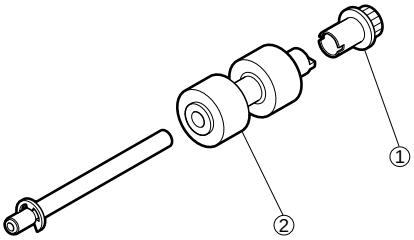


① Screws ② Belt
③ Pickup roller

Fig. 4-301

Note 1: To remove the pickup roller, slightly push, but avoid bending, the plates on the left and right outwards.

3) Remove the gear ① , and separate the pickup roller ② .

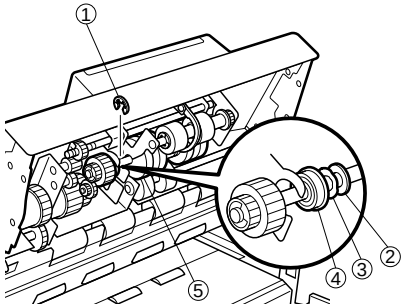


① Gear ② Pickup roller

Fig. 4-302

2. Feed Roller

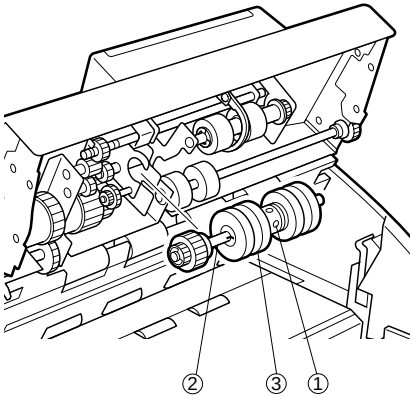
1) Remove the upper pickup guide plate.
2) Remove the E-ring ① , and slide the washer ② , the wave washer ③ and the bearing ④ to the feed roller ⑤ side.



① E-ring ② Washer
③ Wave washer ④ Bearing
⑤ Feed roller

Fig. 4-303

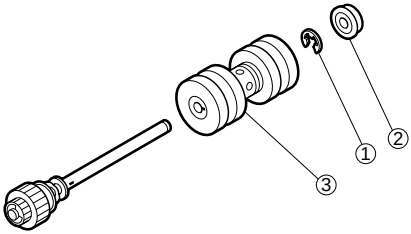
3) Loosen the two hexagon socket head screws ① to remove the feed roller shaft ② and the feed roller ③ at the same time.



① Hexagon socket head screws
② Feed roller shaft ③ Feed roller

Fig. 4-304

4) Remove the E-ring ① and bearing ② , and then remove the feed roller ③ .



① E-ring ② Bearing
③ Feed roller

Fig. 4-305

Note: Feed Roller Adjustment
When attaching the feed roller, make the following adjustment.

- Loosen hexagon socket head screws ① , and adjust the gap between the feed roller and separation roller so that the gap on the left ② and right ③ is the same.

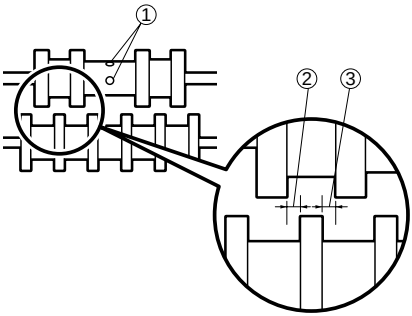
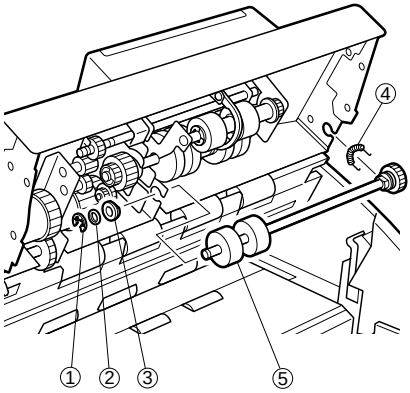


Fig. 4-306

3. Registration drive roller

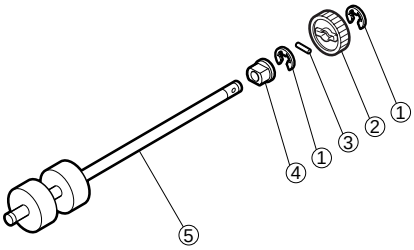
1) Remove the upper pickup guide plate. (4 screws)
2) Remove the E-ring ① , washer ② , bearing ③ and spring ④ , and then remove the registration drive roller shaft ⑤ .



① E-ring ② Washer
③ Bearing ④ Spring
⑤ Registration drive roller shaft

Fig. 4-307

3) Remove two E-rings ① , draw out the gear ② , pin ③ and bearing ④ , and remove the registration drive roller ⑤ .

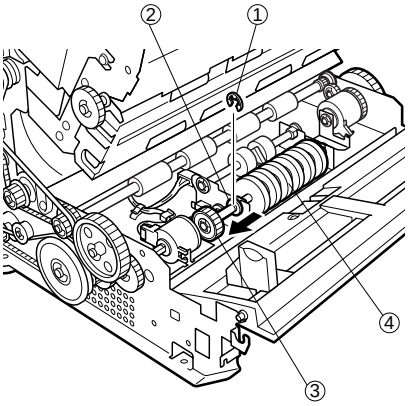


① E-rings ② Gear
③ Pin ④ Bearing
⑤ Registration driver roller

Fig. 4-308

4. Separation drive roller

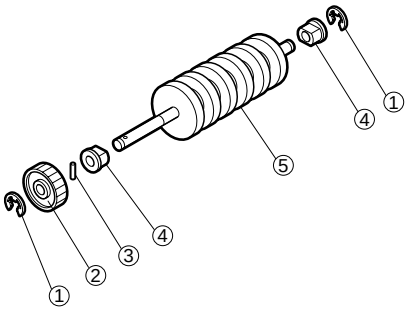
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the lower pickup guide plate. (4 screws)
7) Remove the E-ring ① , slide the bearing ② to the gear ③ side, and remove the separation roller ④ .



① E-ring ② Bearing
③ Gear ④ Separation roller

Fig. 4-309

8) Remove two E-rings ① , draw out the gear ② , pin ③ and two bearings ④ , and separate from the separation drive roller ⑤ .



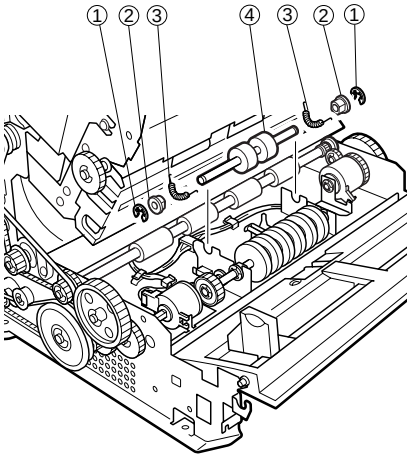
① E-rings ② Gear
③ Pin ④ Bearings
⑤ Separation drive roller

Fig. 4-310

Note: When attaching the separation roller, adjust the gap between the separation roller and the feed roller.
(See page 4-16, “Note: Feed Roller Adjustment.”)

5. Registration follower roller

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the lower pickup guide plate. (4 screws)
7) Remove two E-rings ①, two bearings ②, two springs ③ and remove the registration follower roller ④.

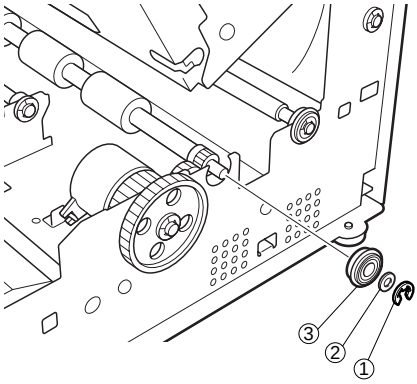


① E-rings ② Bearings
③ Springs
④ Registration follower roller

Fig. 4-311

6. Reading drive rollers (front, back)

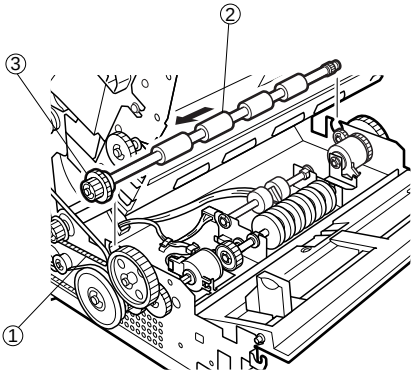
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the lower pickup guide plate. (4 screws)
7) Remove the lower reading unit. (See IV Exposure)
8) Remove the E-ring ①, washer ② and bearing ③.



① E-ring ② Washer
③ Bearing

Fig. 4-312

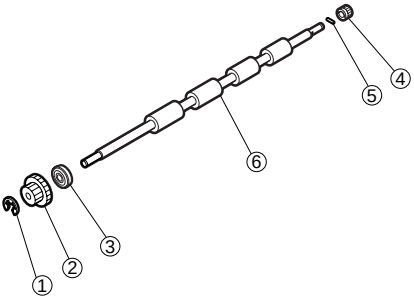
9) Remove the belt 1 ① , and slide the reading drive roller shaft ② to the gear ③ side.



① Belt 1
② Reading drive roller shaft ③ Gear

Fig. 4-313

10) Remove E-ring ① , and then gear ② and bearing ③ .
Remove the gear ④ and pin ⑤ , and separate from reading drive roller ⑥ .



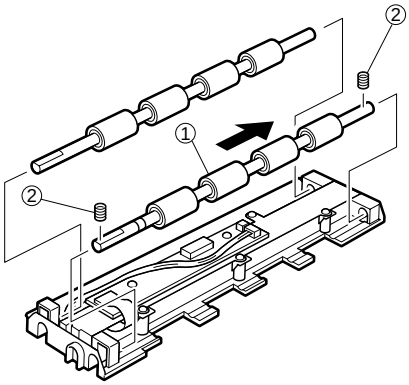
① E-ring ② Gear
③ Bearing ④ Gear
⑤ Pin ⑥ Reading drive roller

Fig. 4-314

Note: The reading drive roller (back) is not provided with gear ④ and pin ⑤ .

7. Reading follower rollers (front, back)

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the upper reading unit. (See IV Exposure)
7) Slide the reading follower roller shaft ① in the direction of the arrow and remove two springs ② .



① Reading follower roller shaft ② Springs

Fig. 4-315

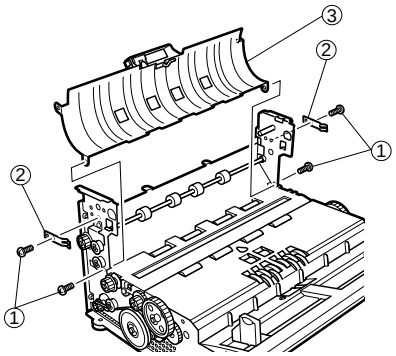
Note 1: Remove the spring first from the notched reading follower roller shaft. If you remove the spring from the other side of the shaft, the spring will become caught on the notch midway.

Note 2: When reassembling, first insert the spring, and then insert the reading follower roller shaft while pressing down the spring.

Note 3: When reassembling, do not mistake the front/rear and left/right sides of the reading follower roller shaft.

8. Delivery drive roller 1

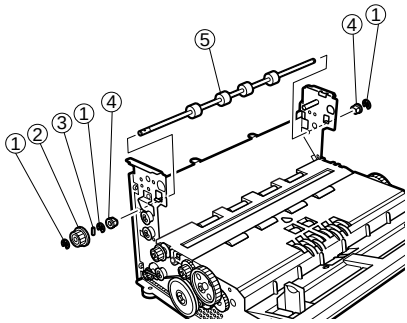
1) Remove the upper unit.
2) Remove four screws ① and two leaf springs ② , and then remove the U-turn guide ③ .



① Screws ② Leaf springs
③ U-turn guide

Fig. 4-316

3) Remove three E-rings ① , gear ② , pin ③ and two bearings ④ , and then remove the delivery drive roller 1 ⑤ .

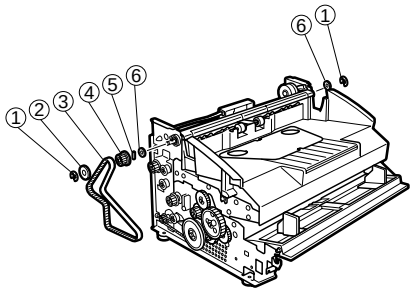


① E-rings ② Gear
③ Pin ④ Bearings
⑤ Delivery drive roller 1

Fig. 4-317

9. Delivery drive roller 2

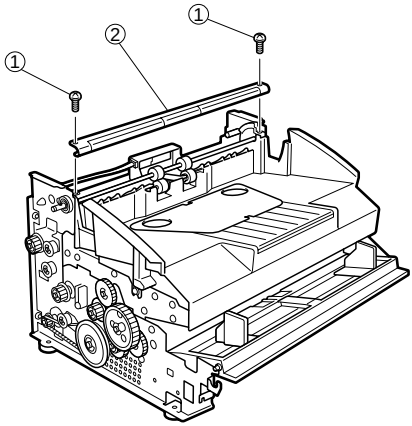
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the top cover.
7) Remove two E-rings ① , flange ② , belt 1 ③ , gear ④ , pin ⑤ and then two washers ⑥ .



① E-rings ② Flange
③ Belt 1 ④ Gear
⑤ Pin ⑥ Washers

Fig. 4-318

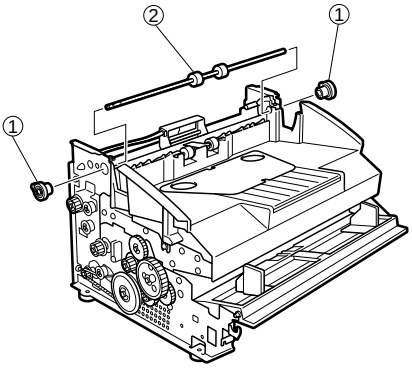
7) Remove two screws ① and the decharging stay ② .



① Screws ② Decharging stay

Fig. 4-319

8) Remove the two bearings ① , and the delivery drive roller 2 ② .

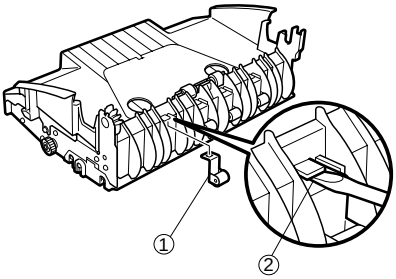


① Bearings ② Delivery drive roller 2

Fig. 4-320

10. Delivery Follower Roller 1

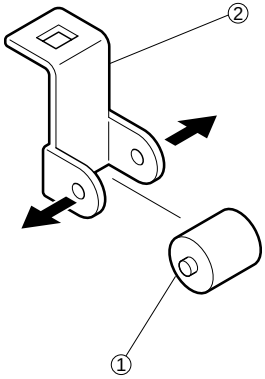
1) Remove the delivery cover.
2) Remove the delivery follower roller stay ② while pushing up the delivery cover rear clip ① .



① Delivery cover rear clip
② Delivery follower roller stay

Fig. 4-321

3) Extend the delivery follower roller stay ① to remove delivery follower roller ② .

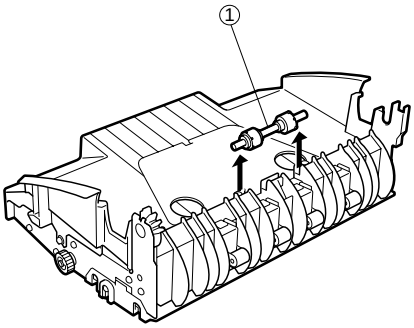


① Delivery follower roller stay
② Delivery follower roller

Fig. 4-322

11. Delivery Follower Roller 2

1) Remove delivery drive roller 2.
2) Remove delivery follower roller 2 ① in the direction of the arrow.

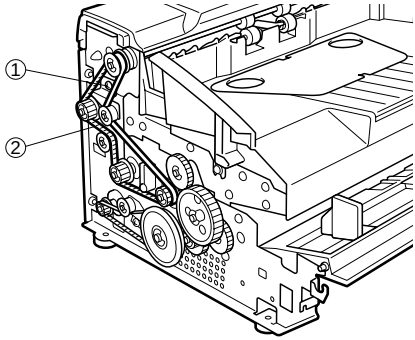


① Delivery follower roller 2

Fig. 4-323

12. Belt 1

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the left cover.
4) Remove the pickup tray.
5) Loosen screw ① and remove belt 1 ② .

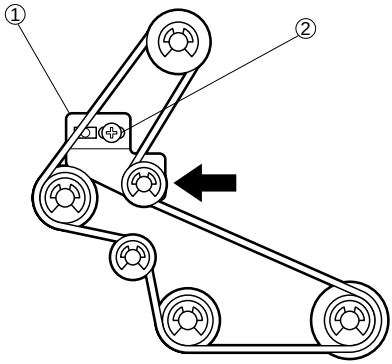


① Screw ② Belt 1

Fig. 4-324

Note: When reassembling, adjust the tension of the belt.

- Belt Tension Adjustment
  Fasten screw ② while pressing in tension plate ① by a force of 2.5 N (250 gf) in the direction of the arrow.

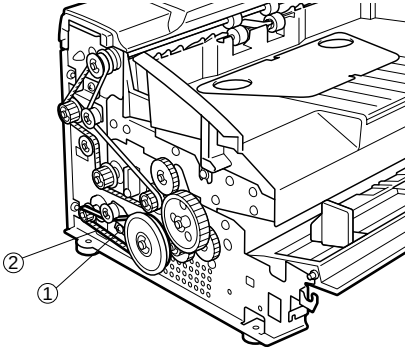


① Tension plate ② Screw

Fig. 4-325

13. Belt 2

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the pickup tray.
4) Remove the left cover.
5) Loosen screw ① and remove belt 2 ② .

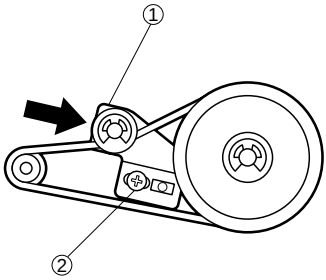


① Screw ② Belt 2

Fig. 4-326

Note: When reassembling, make sure that the belt is not loose.

- Belt Tension Adjustment
  Fasten screw ② while pressing in tension plate ① by a force of 2.5 N (250 gf) in the direction of the arrow.

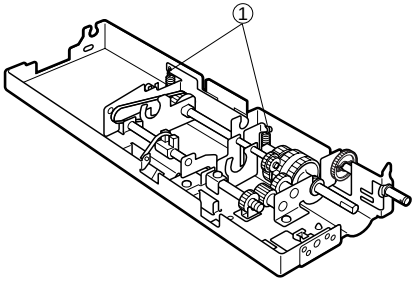


① Tension plate ② Screw

Fig. 4-327

14. Belt 3

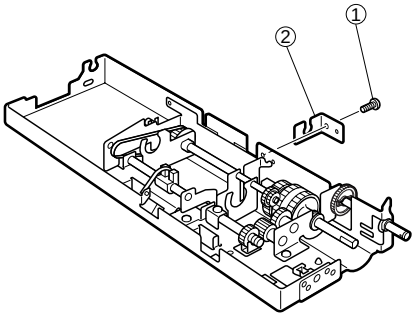
1) Remove the pickup unit.
2) Remove the pickup roller.
3) Remove the pickup clutch.
4) Remove the registration roller.
5) Remove the separation roller.
6) Remove the two springs ① .



① Springs

Fig. 4-328

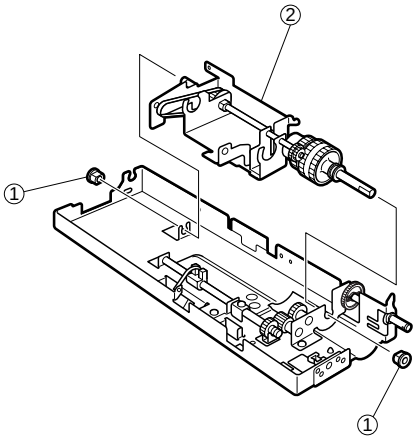
7) Remove screw ① and the registration roller stay ② .



① Screw
② Registration roller stay

Fig. 4-329

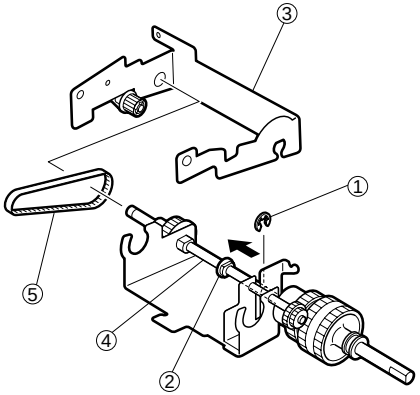
8) Remove the two bearings ① and the drive unit ② .



① Bearings ② Drive unit

Fig. 4-330

9) Remove the E-ring ① and bearing ② , draw out the pickup roller stay ③ from the planetary gear shaft ④ , and remove the belt 3 ⑤ .



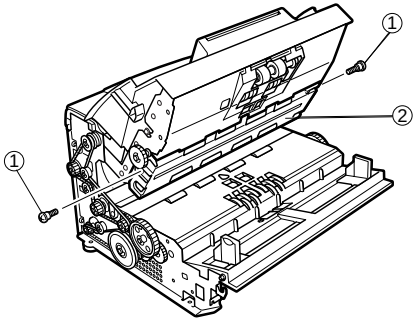
① E-ring ② Bearing
③ Pickup roller stay ④ Planetary gear shaft
⑤ Belt 3

Fig. 3-331

IV. EXPOSURE

1. Upper reading unit

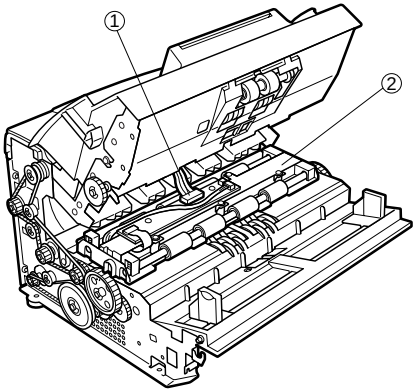
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the front cover. (2 springs)
7) Remove two screws ① (notched), and pull out the upper reading unit ② to the front.



① Screws ② Upper reading unit

Fig. 4-401

8) Disconnect the connector ① (J402), and take out the upper reading unit ② .

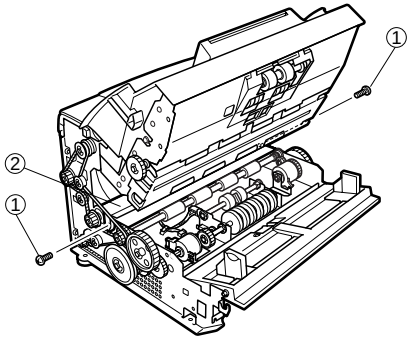


① Connector ② Upper reading unit

Fig. 4-402

2. Lower reading unit

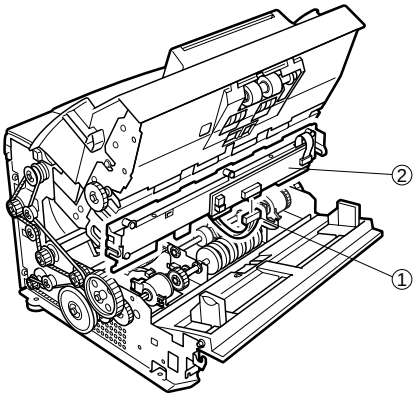
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the right cover.
4) Remove the left cover.
5) Remove the pickup tray.
6) Remove the lower pickup guide plate. (4 screws)
7) Remove two screws ① , lift the lower reading unit ② straight up and remove it.



① Screws ② Lower reading unit

Fig. 4-403

8) Disconnect the connector ① (J402), and take out the lower reading unit ② .



① Connector ② Lower reading unit

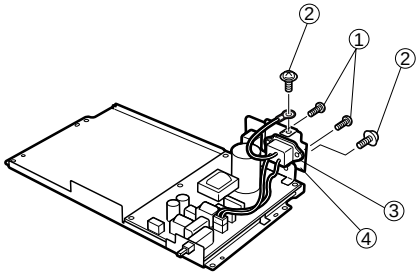
Fig. 4-404

Note: When reassembling, firmly fit wiring into the harness fastener.

V. ELECTRICAL

1. Power supply PCB

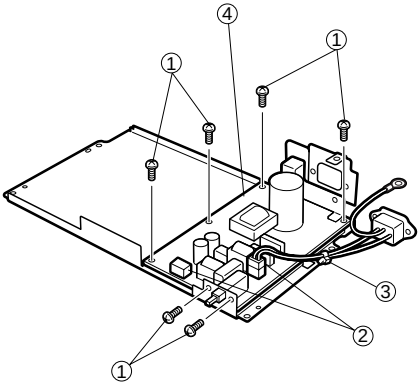
1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the bottom plate cover assembly.
4) Remove two screws ① , two screws ② , and disconnect the power cord connector ③ from the plate ④ .



① Screws ② Screws
③ Power cord connector
④ Plate

Fig. 4-501

5) Remove six screws ① , disconnect both ends of the connector ② , remove the harness fastener and remove the power supply PCB ④ .

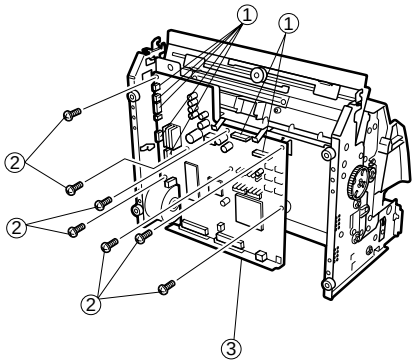


① Screw ② Connector
③ Harness fastener
④ Power supply PCB

Fig. 4-502

2. CPU PCB assembly

1) Remove the rear cover. (8 screws)
2) Remove the lower front cover assembly. (4 screws)
3) Remove the bottom plate cover assembly.
4) Disconnect seven connectors ① (J105, J106, J107, J108, J112, J117, J301), remove seven screws ② , and then remove the CPU PCB assembly ③ .



① Connectors ② Screws
③ CPU PCB assembly

Fig. 4-503

CHAPTER 5

INSTALLATION

I. SELECTION OF LOCATION

It is recommended that the customer engineer personally inspects the customer's premises before installing the 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 grounding plug must be used.

Ground Items
1) Power outlet ground terminal
2) Lead that has been grounded for office equipment

■The temperature should be between 15 to 27.5°C (59 to 90.5°F), and relative humidity between 25 to 75% RH. 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, intensive vibration or near machinery that generates electromagnetic waves.

* Prevent cigarette smoke from coming into direct contact with the machine.
* At the places where installation of the machine in the direct sunlight is unavoidable, a heavy curtain should be installed on the windows to protect the machine.

■Avoid installing the machine near equipment that generates magnetic waves such as speakers, TVs, or radios.

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

* The power cord is located at the rear of the machine. So, 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 up when the machine is to be moved.

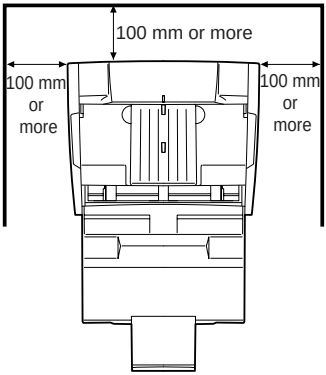
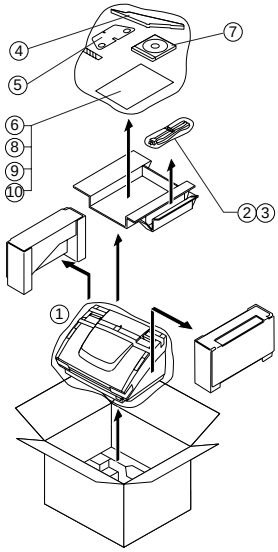
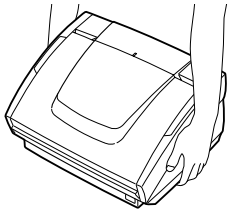


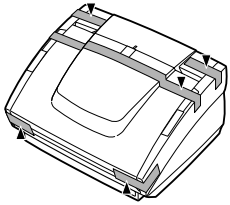
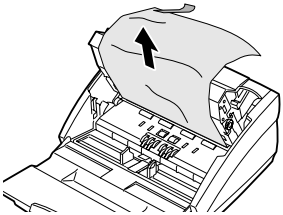
Fig. 5-1

II. UNPACKING & INSTALLATION

Water droplets sometimes form on the surface of metal parts when the machine is brought into a warm place from a cold place. This phenomenon is called “condensation.” Using the machine when condensation has occurred might cause machine trouble.

At least one hour should be allowed for the machine to warm up to room temperature before the shipping container is opened after it has been moved to a warm place from a cold place.

No.	Procedure	Check Items/Remarks
1	Open the container and take out the parts and other materials packed inside. Check if anything is missing. The container weighs approx. 108 N (11 kgf). Its external dimensions are approx. 470 (W) × 372 (D) × 359 (H) mm. ① Main body ② Power cord ③ Grounding wire (100 V model only) ④ Delivery support tray1 ⑤ Delivery support tray2 ⑥ Startup Manual ⑦ Setup disk (CD-ROM) ⑧ Software license agreement ⑨ Warranty card (100 V and 120 V models only) ⑩ Customer registration card (100 V model only)	
2	Move the main body to where it is to be installed. **Note:** When moving it, hold the bottom center at the left and right sides of the cover with both hands. The machine weighs approx. 79 N (8.1 kgf).	

No.	Procedure	Check Items/Remarks
3	Peel off all the protective tapes securing the various parts.	Check all the covers for possible damage incurred during transportation. 
4	Open the upper unit and remove the protective sheet from the reading glass.	
5	Connect the power cord. In the case of the 100 V model, connect the grounding wire also.	
6	Connect a personal computer to the main body using a SCSI cable. Change the SCSI ID and terminator settings if necessary.	
7	After turning the machine ON, turn the personal computer ON.	
8	Install the driver software and application software in the personal computer. For details, refer to the Startup Manual.	
9	Check if the machine operates normally. For details on how to operate it, refer to the start-up manual.	

CHAPTER 6

MAINTENANCE & SERVICING

I. BASIC PERIODIC SERVICING PROCEDURE

Before you visit the user site for periodic servicing, check the Service Ledger, and take any parts that you expect need to be replaced.

No.	Procedure	Inspection	Remarks
1	Pay your respects to the supervisor.	Check current status.	
2	Record a document and conduct a document search.	• Document feed • Results of document record and search • Abnormal noise	Check the counters in the service mode.
3	Replace parts (only when necessary).		
4	Clean the document feed assembly and optical assembly.		Clean inside the machine.
5	Perform shading compensation (only when necessary).		For details, refer to Chapter 7. III Service Mode.
6	Re-check the results, record a document, and conduct a document search again.		
7	Clean around the machine.		
8	Make any required entries into the Service Sheet, and report to the supervisor.		

Table 6-1

II. PARTS TO BE REPLACED PERIODICALLY

Parts must be replaced periodically to maintain the machine's functions at 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.

No.	Parts Name	Parts No.	Q'ty	Replacement Cycle (number of sheets)	Remarks
1	Pickup roller	MA2-4321	1	250,000	
2	Separation roller	MA2-6041	1	250,000	
3	Feed roller	MA2-4342	1	500,000	
4	Registration drive roller	MA2-4335	1	1,000,000	
5	Reading drive roller	MA2-6068	2	1,000,000	
6	Delivery follower roller 2	MA2-4349	2	1,000,000	
7	Document board motor	MA9-5437	1	1,000,000	M2
8	Pickup clutch	MH7-5040	1	1,000,000	CL1
9	Registration clutch	MH7-5041	1	1,000,000	CL2
10	Reading unit (upper)	MG1-8218	1	1,500,000	For DR-3080C
		MG1-8220			For DR-3060
11	Reading unit (lower)	MG1-8219	1	1,500,000	
12	Damper	XH9-0124	1	1,500,000	This machine has an expectancy of 900 open-close cycles.

Table 6-2

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

III. CONSUMABLE PARTS

This machine has no consumable parts.

IV. PERIODIC SERVICING LIST

Note: Use only the specified solvents and oils. Do not use other solvents and oils.

[△ : Cleaning ● : Replacement ☆ : Oiling □ : Adjustment ◎ : Inspection]

Unit Name	Location	Maintenance Cycle				Remarks
		Every 250,000 sheets scanned	Every 500,000 sheets scanned	Every million sheets scanned	Every 1.5 million sheets	
Document feed	Pickup roller	●				
	Separation roller	●				
	Feed roller	△	●			
	Registration drive roller	△	●			
	Registration follower roller	△				
	Reading drive roller	△	●			
	Reading follower roller	△				
	Delivery follower roller 1	△				
	Delivery follower roller 2	△	●			
	Document board motor			●		
	Pickup clutch			●		
	Registration clutch			●		
	Damper				●	
Optical path	Reading glass	△				
	Reading units (upper and lower)		□		●	Every 500,000 sheets and after replacement “Perform all adjustments” in the service mode. For details refer to Chapter 7. III Service Mode.

Table 6-3

Note: For cleaning each roller and reading glass, wipe with a cloth moistened with water, and then wipe dry. Be sure to clean the rollers while turning them in the document feed direction. If the rollers and reading glass are very dirty, instruct the user to perform “Daily User Inspection” again.

CHAPTER 7

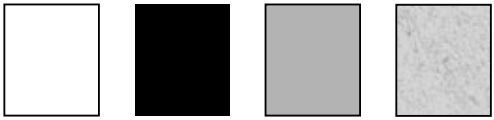
TROUBLESHOOTING

I. IMAGE TROUBLESHOOTING

Note 1: There are times when image trouble is caused by the display device or the printer used by the user. In such a case, the trouble cannot be corrected on this machine.

Note 2: There are times when, depending on the type of the image and on the settings, document reproducibility is impaired. Uneven color may occur particularly when a fine grain image is output in the color mode. In such a case, the image may be improved by changing the setting items.

1	**Image is not output (completely white, completely black, all gray, mottled)**



Cause/Faulty Location	Step	Check Item	Result	Action
"Brightness" setting	1	Is "Brightness" setting appropriate?	NO	Change the setting. Also change "Contrast" setting if necessary.
Reading glass	2	Is reading glass clean?	NO	Clean. Also clean roller if necessary.
Reading unit connection	3	Are J106/107 of CPU PCB assembly and J401/J402/J403/J404 of reading unit correctly connected?	NO	Connect firmly.
White compensation	4	Is trouble solved when white compensation in service mode is carried out?	YES	End.
Reading unit	5	Is trouble solved when reading unit is replaced?	YES	End.
CPU PCB assembly	6	Is trouble solved when CPU PCB assembly is replaced?	YES	End.

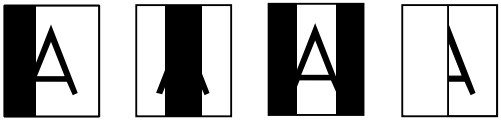
2 Uneven density, streak (main-scanning direction)

Cause/Faulty Location	Step	Check Item	Result	Action
Roller	1	Dirty or deformed?	NO	Clean, replace roller.
Gear, belt	2	Turning smoothly?	NO	Adjust assembly, replace parts.
Main motor (M1)	3	Is trouble solved when main motor is replaced?	YES	End.
Reading unit	4	Is trouble solved when reading unit is replaced?	YES	End.
CPU PCB assembly	5	Is trouble solved when CPU PCB assembly is replaced?	YES	End.

3 Uneven density, streak (sub-scanning direction)

Cause/Faulty Location	Step	Check Item	Result	Action
Reading glass	1	Is reading glass clean?	NO	Clean. Also clean roller if necessary.
White compensation	2	Is trouble solved when shading compensation in service mode is carried out?	YES	End.
Reading unit	3	Is trouble solved when reading unit is replaced?	YES	End.
CPU PCB assembly	4	Is trouble solved when CPU PCB assembly is replaced?	YES	End.

4	Part of image is not output



Cause/Faulty Location	Step	Check Item	Result	Action
White compensation	1	Is trouble solved when white compensation in service mode is carried out?	YES	End.
Reading unit	2	Is trouble solved when reading unit is replaced?	YES	End.
CPU PCB assembly	3	Is trouble solved when CPU PCB assembly is replaced?	YES	End.

II. OPERATION TROUBLESHOOTING

1 This machine is not recognized by the personal computer

A probable cause of this trouble is that the SCSI I/F connection is wrong. Refer to the Start Up Manual for this machine and the User's Manual for the personal computer.

2 AC power does not come on

Cause/Faulty Location	Step	Check Item	Result	Action
Disconnection of power cord	1	Is power plug inserted into wall outlet?	NO	Firmly insert power plug into wall outlet.
Power supply voltage	2	Is specified voltage being supplied to wall outlet?	NO	Explain to the customer that the trouble is not with this machine.
Insufficient DC power supply	3	Is LED103 on CPU PCB assembly lit?	YES	Carry out procedure described in “DC power does not come on.”
Power supply PCB	4	Is electricity passing both ends of the power switch?	NO	Replace DC power supply unit.
			YES	Check electrical continuity of the power cord.

3 DC power does not come on

Cause/Faulty Location	Step	Check Item	Result	Action
Insufficient DC power supply	1	Is LED103 on CPU PCB assembly lit?	YES	Carry out step 3.
Power supply PCB	2	Is trouble solved when DC power supply unit is replaced?	YES	End.
CPU PCB assembly	3	Is trouble solved when CPU PCB assembly is replaced?	YES	End.
			NO	Check 24V power cable and clutches, and replace, if necessary.

4 Pick up clutch (CL1) does not operate

Cause/Faulty Location	Step	Check Item	Result	Action
Load on transmission system	1	Is transmission system, load on pickup roller, in order?	NO	Eliminate abnormal loads.
Pickup clutch (CL1)	2	Are LEDs 103, 102 and 101 on CPU PCB assembly lit?	YES	Check wiring from CPU PCB assembly to pickup clutch, and if it is good, replace pickup clutch.
			NO	Carry out procedure described in "DC power does not come on."

5 Registration clutch (CL2)

Cause/Faulty Location	Step	Check Item	Result	Action
Load on transmission system	1	Is transmission system, load on registration roller, in order?	NO	Eliminate abnormal loads.
Registration clutch (CL2)	2	Are LED103, LED102 and LED101 on CPU PCB assembly lit?	YES	Check wiring from CPU PCB assembly to registration clutch, and if the wiring is good, replace registration clutch.
Insufficient DC power supply			NO	Carry out procedure described in "DC power does not come on."

6 Separation clutch (CL3)

Cause/Faulty Location	Step	Check Item	Result	Action
Load on transmission system	1	Is transmission system, load on separation roller, in order?	NO	Eliminate abnormal loads.
Separation clutch (CL3)	2	Are LED103, LED102 and LED101 on CPU PCB assembly lit?	YES	Check wiring from CPU PCB assembly sepration clutch, and if it is good, replace separation clutch.
Insufficient DC power supply			NO	Carry out procedure described in "DC power does not come on."

7 Main motor (M1) does not operate

Cause/Faulty Location	Step	Check Item	Result	Action
Upper unit incompletely closed	1	Is upper unit completely closed?	NO	Close upper unit completely.
Connection of connector	2	Is main motor connector firmly connected?	NO	Connect firmly.
CPU PCB assembly	3	Is fuse on CPU PCB assembly blown?	YES	Replace CPU PCB assembly.
Main Motor (M1)	4	Are LED103, LED102 and LED101 on CPU PCB assembly lit?	YES	Check wiring from CPU PCB assembly to main motor and if it is good, replace main moter.
Insufficient DC power supply			NO	Carry out procedure described in “DC power does not come on.”

8 Document board motor (M2) does not operate

Cause/Faulty Location	Step	Check Item	Result	Action
Load on document board	1	Is there anything applying a load on drive system from document board motor to document board?	NO	Eliminate abnormal loads.
Connection of connector	2	Is the document board motor connector firmly connected?	NO	Connect firmly.
Document board motor (M2)	3	Are LEDs 103, 102 and 101 on CPU PCB assembly lit?	YES	Check wiring from CPU PCB assembly to document board motor and if it is good, replace document board motor.
Insufficient DC power supply			NO	Carry out procedure described in “DC power does not come on.”

9 Front side LEDs do not light

Cause/Faulty Location	Step	Check Item	Result	Action
Connection of connector	1	Is the scanning unit connector firmly connected?	NO	Connect firmly.
Front side LEDs	2	Are LED103, LED102 and LED101 on CPU PCB assembly lit?	YES	Check wiring from CPU PCB assembly to front side LEDs and if it is good, replace upper reading unit.
Insufficient DC power supply			NO	Carry out procedure described in “DC power does not come on.”

10 Back side LEDs do not light

Cause/Faulty Location	Step	Check Item	Result	Action
Connection of connector	1	Is the scanning unit connector firmly connected?	NO	Connect firmly.
Back side LED	2	Are LEDs 103, 102 and 101 on CPU PCB assembly lit?	YES	Check wiring from CPU PCB assembly to back side LEDs and if it is good, replace lower reading unit.
Insufficient DC power supply			NO	Carry out procedure described in “DC power does not come on.”

III. SERVICE MODES

A. Outline

This machine is provided with the following service modes:

1. Light intensity adjustment mode for white compensation
   In this mode, the light intensity is adjusted for white compensation, and data is automatically written to this machine.

2. Black compensation mode
   In this mode, black compensation is carried out, and data is automatically written to this machine.

3. White compensation (shading compensation) mode
   In this mode, white compensation is carried out, and data is automatically written to this machine.

4. Color balance adjustment mode (DR-3080C only)
   In this mode, color balance is adjusted, and data is automatically written to this machine.

5. Registration adjustment mode
   In this mode, registration is adjusted, and data is automatically written to this machine.

6. Input port display mode
   In this mode, the input state of each sensor, SCSI ID, and internal DIP switch settings are displayed.

7. Port access mode
   In this mode, operation of each DC load is checked.

B. When Using the Service Modes

The machine itself does not have service modes.

For this reason, the following items are required for starting up the service mode.

1. Service tool program for service mode

Tool No.: TKM-0317
(CD type media)

2. Personal computer

PC/AT compatible machine

- SCSI card: Wnaspi32.dll operated on a SCSI board, recommended Adaptec AHA-2940, AHA-2930, AHA-1480.
- OS: Windows 95 or later, NT 4.0 or later
- CPU: Pentium II, 400 MHz or faster is recommended
- Memory: 128 MB or more is recommended
- Free space on hard disk: 100 MB or more

Note: Do not start up the service mode from the user's personal computer. Be sure to start up the service mode from the personal computer that is used exclusively for servicing.

C. Installing the Service Tool

1. Turn the personal computer ON.
2. Place the program CD (TKM-0317) for the service mode in the CD drive and start the CD drive.

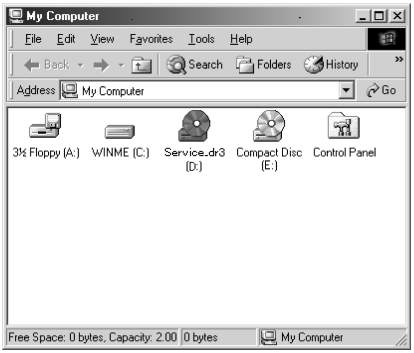


Fig. 7-1

3. Click [Setup.exe] to install.

Fig. 7-2

Note: Rebooting may be required depending on the personal computer used after the tool is installed.

D. Starting Up the Service Mode

1) Turn this machine ON.
2) Turn the personal computer ON, and boot up Windows.
3) Select [Start] from the task bar, and select [Su800 for DR-3080C] in [Program] to start up the program.

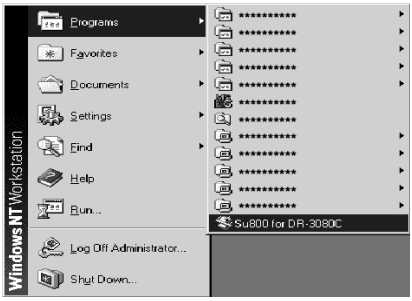


Fig. 7-3

4) Select [Scanner setting] in the File menu.

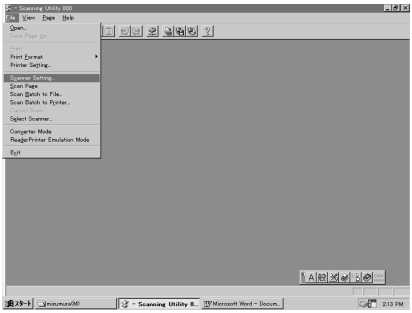


Fig. 7-4

5) Select [Service] in [Scanner setting].

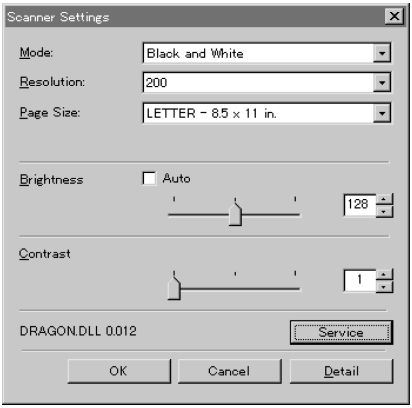


Fig. 7-5

*Service mode screen

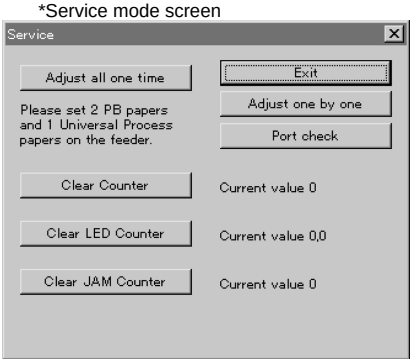


Fig. 7-6

Note: To assure correct scanning and operation, use the "PixUtil" application provided with this machine.

E. Exiting from the service mode

1) After making adjustments exit from the service mode.

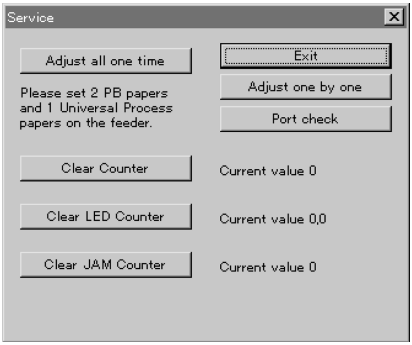


Fig. 7-7

2) Exit from the scanner setting.
3) Exit from "SU800 for DR-3080C".

F. Adjustment Items in Service Mode

1. Adjusting all

All of the adjustment items (light intensity adjustment, black compensation, white compensation, color balance and registration adjustment) can be carried out in a single operation.

• Operation procedure

① For the DR-3060, place one standard white sheet (TKM-0316) on top and then place one sheet of standard white copy paper (262 × 305 mm) cut to the same size as the standard white sheet underneath and place both sheets in the document tray.
For the DR-3080C, place one standard white sheet (TKM-0316) on top and then place two sheets of standard white copy paper (262 × 305 mm) cut to the same size as the standard white sheet underneath and place all three sheets in the document tray.

Note 1: Before starting the adjustment, check the surface of the reading glass for any dirt. Clean the reading glass if dirty.

Note 2: If the Standard white sheet (TKM-0316) or standard white copy paper (262 × 305 mm) is dirty or folded, either replace the sheet or remove the dirt from the sheet. Also, set the paper on the document board straight to prevent the paper from being fed into the machine skewed.

Note 3: "PB paper" indicated in the Service Mode screen as shown in Fig. 7-8 refers to "standard white copy paper (262 × 305 mm)" and "Universal Process paper" refers to "standard white sheet (TKM-0316)."

② Select [Adjust All] in the Service mode screen, and start adjustments.

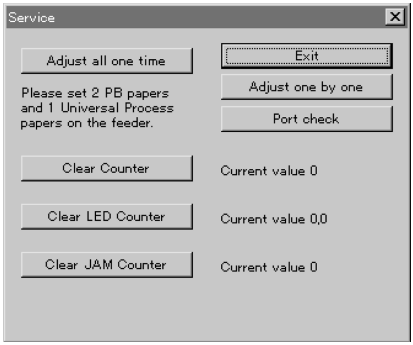


Fig. 7-8

Note 1: During the adjustment, the power lamp on this machine's top cover lights.
It takes about six minutes for adjustments to complete.
After all adjustments are completed, the message "Complete!!" is displayed.

Note 2: If adjustment fails, the fact that adjustment failed is displayed. If this happens, repeat the adjustment.

2. Adjusting individually

1) Light intensity adjustment

The light intensity of the LEDs and the output values (amplitude values) from the sensor are adjusted by LED lighting time control (for dropout black-and-white images) and LED applied voltage control (for color images and all LED lit black-and-white images). Light intensity adjustment processing is carried out internally by the scanner, and the setting values are written into flash ROM.

Operation procedure

① Select [Adjust one by one] in the Service mode screen.

② Set one Standard white sheet (TKM-0316) on the document board.

Note 1: Before starting the adjustment, check the surface of the reading glass for any dirt. Clean the reading glass if dirty.

Note 2: If the Standard white sheet (TKM-0316) is dirty or folded, either replace the sheet or remove the dirt from the sheet.

③ Select [Adjust Light] in the service mode.

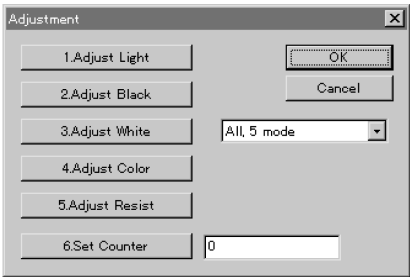


Fig. 7-9

Note 1: During the adjustment, the power lamp on this machine's top cover flashes. When the power lamp stops flashing and stays lit, this indicates that the adjustment is completed.

Note 2: If adjustment fails, the power lamp flashes faster. If this happens, repeat the adjustment.

2) Black compensation

This adjustment compensates the dark current of the sensors. Loads that are not "0" are compensated for each pixel by the subtraction circuit with the LEDs out. The compensation value is calculated internally by the scanner, and written into flash ROM on the scanner.

Operation procedure

① Select [Adjust one by one] in the Service mode screen.

② Select [Adjust Black] in the service mode.

Note 1: During the adjustment, the power lamp on this machine's top cover flashes. When the power lamp stops flashing and stays lit, this indicates that the adjustment is completed.

Note 2: If adjustment fails, the power lamp flashes faster. If this happens, repeat the adjustment.

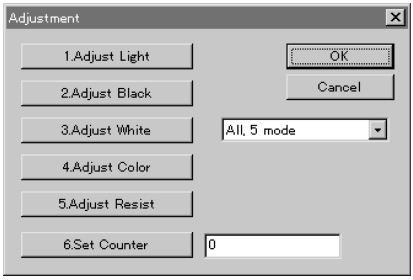


Fig. 7-10

3) White compensation

This compensation is carried out for each pixel by the multiplication circuit so that the current values when one Standard white sheet is scanned become the maximum value (10 bits, 0x03ff). The 10-bit (16-bit extended) scanned image is read by the personal computer, and the compensation values are calculated by the personal computer and written into flash ROM on the scanner. This compensation is carried out for each of the following, color, gray scale, red dropout, green dropout and blue dropout. White compensation can also be carried out individually for each selected color.

Operation procedure

① Select [Adjust one by one] in the Service mode screen.

② Set one Standard white sheet (TKM-0316) on the document board.

Note 1: Before starting the adjustment, check the surface of the reading glass for any dirt. Clean the reading glass if dirty.

Note 2: If the Standard white sheet (TKM-0316) is dirty or folded, either replace the sheet or remove the dirt from the sheet.

③ Select [Adjust White] in the service mode.

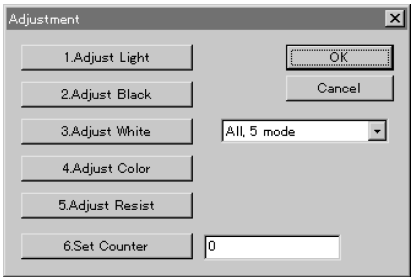


Fig. 7-11

Note 1: During the adjustment, the power lamp on this machine's top cover flashes. When the power lamp stops flashing and stays lit, this indicates that the adjustment is completed.

Note 2: If adjustment fails, the power lamp flashes faster. If this happens, repeat the adjustment.

Note 3: The selection display to the right of [Adjust White] should be [All, 5 mode] for the DR-3080C and [Gray] for the DR-3060. Do not change this setting in the field.

4) Color balance (DR-3080C only)

After light intensity adjustment, adjust the LED applied voltage so that the output values for each color on the front and back sides are uniform. Color adjustment is carried out internally by the scanner, and the setting values are written into flash ROM on the scanner.

Operation procedure

① Select [Adjust one by one] in the service mode screen.

② Set one sheet of standard white copy paper (262 × 305 mm) on the document board.

Note 1: The standard white copy paper (262 × 305 mm) should not be dirty, wrinkled or folded. Also, copy paper with little uneven color should be chosen.

Note 2: Set the standard white copy paper (262 × 305 mm) on the document board straight to prevent the paper from being fed into the machine skewed.

③ Select [Adjust Color] in the service mode.

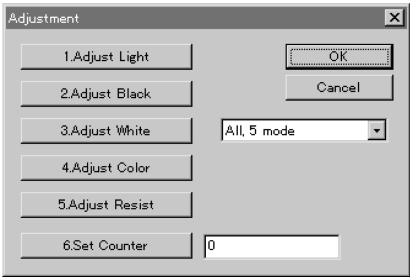


Fig. 7-12

Note 1: During the adjustment, the power lamp on this machine's top cover flashes. When the power lamp stops flashing and stays lit, this indicates that the adjustment is completed.

Note 2: If adjustment fails, the power lamp flashes faster. If this happens, repeat the adjustment.

5) Registration adjustment

Adjust the time from when the scanning start sensor turns ON up to start of reading and the time from when the scanning start sensor turns OFF up to end of reading so that the leading edge registration and trailing edge registration match. The registration adjustment value is calculated on the personal computer, and the adjustment values are written to flash ROM on the scanner.

Operation procedure

① Select [Adjust one by one] in the service mode screen.

② Set one sheet of standard white copy paper (262 × 305 mm) on the document board.

Note 1: The standard white copy paper (262 × 305 mm) should not be dirty, wrinkled or folded. Also, copy paper with little uneven color should be chosen.

Note 2: Set the standard white copy paper (262 × 305 mm) on the document board straight to prevent the paper from being fed into the machine skewed.

③ Select [Adjust Regist] in the service mode.

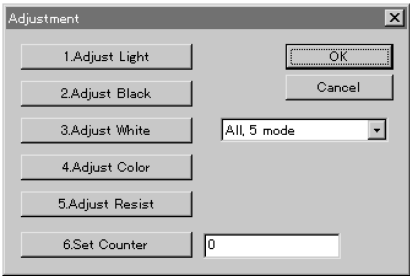


Fig. 7-13

Note 1: During the adjustment, the power lamp on this machine's top cover flashes. When the power lamp stops flashing and stays lit, this indicates that the adjustment is completed.

Note 2: If adjustment fails, the power lamp flashes faster. If this happens, repeat the adjustment.

6) Set Counter

Use this adjustment item to set the numerical value of the cumulative counter.

The data of the cumulative counter is stored on the CPU PCB assembly. For this reason, the data is reset when the CPU PCB assembly is replaced. Before replacing the CPU PCB assembly, note down the numerical value, and set the numerical value after the CPU PCB assembly is replaced.

Note: If the numerical value before the CPU PCB assembly is unknown, estimate the numerical value from the previous service record, for example.

Operation procedure

① Select [Adjust one by one] in the Service mode screen.

② Enter the numerical value noted down in the field to the right of [6. Set Counter] on the personal computer.

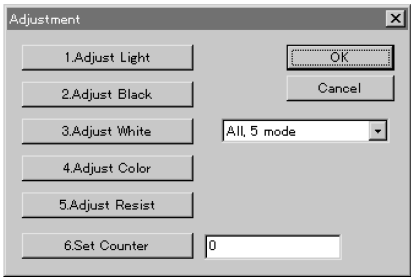


Fig. 7-14

③ When the numerical value is entered, select [6. Set Counter].

④ Reset this machine's power supply.

The numerical values are set to the CPU PCB assembly when the power is reset.

3. Port Check

Select [Port Check] in the in the service mode screen.

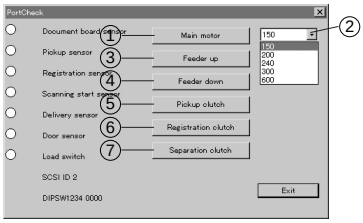


Fig. 7-15

The following section's DC loads can be checked by selecting the mode:

1) [Main Motor (M1)]
- Select ① and you can turn on or off the Main Motor.
- Select ② and you can adjust the motor speed to 5 levels.

150 dpi (Binary/gray scale modes 300 dpi high speed mode)
200 dpi (Binary/gray scale modes 200 dpi)
240 dpi (Binary/gray scale modes 240 dpi)
300 dpi (Binary/gray scale modes 300 dpi)
600 dpi (Color mode 200 dpi)

2) [Document Board Motor (M2)]
- Select ③ and you can raise the document board with the document board motor.
- Select ④ and you can lower the document board with the document board motor.

3) [Pickup Clutch (CL1)]
- Select ⑤ and you can turn ON/OFF the pickup clutch.

4) [Separation Clutch CL3]
- Select ⑥ and you can turn ON/OFF the separation clutch.

5) [Registration Clutch (CL2)]
- Select ⑦ and you can turn ON/OFF the registration clutch.

Note1: Do not lift the document board when the pickup roller is turning because it will rub against the pickup roller and the pickup roller will be scraped.

Note2: When finishing, be sure to turn OFF all modes.

4. Sensor Check

Select [Port Check] in the Service mode screen.

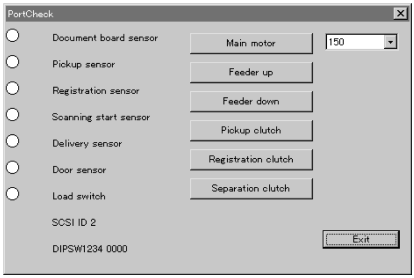


Fig. 7-16

Each sensor can be confirmed ON or OFF.

1) Document selection sensor (PS1)
2) Pickup sensor (PS2)
3) Registration sensor (PS3)
4) Scanning start sensor (PS4)
5) Delivery sensor (PS5)
6) Door sensor (SW2)
7) Load switch (SW102)

Note1: When a sensor turns ON, the o in the display changes to ●.

Note 2: [Document board sensor] on screen refers to the [document detection sensor].
Also, [Door sensor] refers to the [top unit open/close detection switch].

5. Counter

This machine is equipped with a cumulative counter, LED counter and a JAM counter.

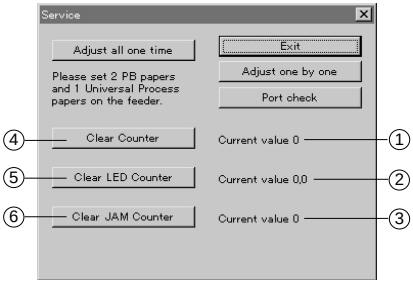


Fig. 7-17

① Cumulative counter
Indicates the total number of sheets fed through the machine. The cumulative counter can be reset to 0 by selecting [④ counter clear].
Note: Do not use this setting in the field.

② LED counter
Indicates total LED on time in seconds. The LED counter can be reset to 0.0 by selecting [⑤ Counter clear].
Note 1: Use LED on time as a rough indication.
Note 2: The LED counter is automatically updated at set intervals.

③ JAM counter
Indicates the total number of times sheets have become jammed in the machine. The JAM counter can be reset to 0 by selecting [⑥ JAM counter clear].
Note 1: Use JAM frequency as a rough indication.
Note 2: The JAM counter is automatically updated at set intervals.

G. Automatic feed mode

This machine has an automatic feed mode that enables you to check feeding of the document without using the personal computer.

Operation procedure

① Set the SCSI ID on the DIP switch (SW100) on the rear of this machine.

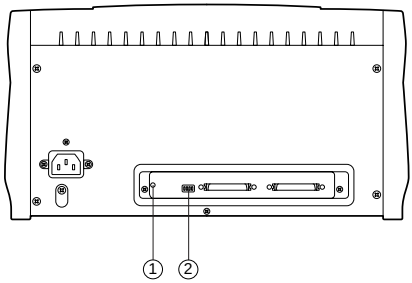
SCSI ID	SW2	SW3	SW4	Operation
0	OFF	OFF	OFF	Continuous 150 dpi feed
1	OFF	OFF	ON	Continuous 200 dpi feed
2	OFF	ON	OFF	Continuous 240 dpi feed
3	OFF	ON	ON	Continuous 300 dpi feed
4	ON	OFF	OFF	Continuous 600 dpi feed
5	ON	OFF	ON	Do not use
6	ON	ON	OFF	Do not use
7	ON	ON	ON	Do not use

Table 7-1

② Turn ON this machine.

③ Press the load switch (SW102) using a fine-tipped object for about four seconds.

④ After feeding the document, turn OFF this machine.



① Load switch
② DIP switch

Fig. 7-18

IV. AFTER REPLACING PARTS

Some of the functions of this machine cannot be fully demonstrated merely by replacing rollers or electrical parts used on this machine.

- CPU PCB assembly
- Reading unit
- Separation roller
- Feed roller

Note: Before replacing an electrical part, be sure to turn the machine OFF.

1. CPU PCB Assembly

1) Before replacing the CPU PCB assembly, note the SCSI ID.
2) After replacing the CPU PCB assembly, set the SCSI ID.
3) Execute [Adjust All] in the Service mode screen. (See Chapter 7, III Service Modes.)
4) Execute [Set Counter] in the service mode. (See Chapter 7, III Service Modes.)
5) When custom gamma data is used, that data must be re-installed.

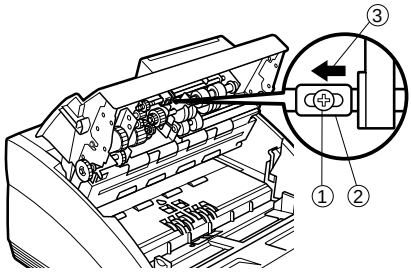
2. Reading Unit

1) Execute [Adjust All] in the Service mode screen. (See Chapter 7, III Service Modes.)

3. Separation Roller, Feed Roller

Carry out separation adjustment of the space between the feed roller and the separation roller.

1) Open the upper unit, and remove the upper pickup guide plate.
2) Loosen screw ① , and slide stopper ② in the direction of the arrow ③ .

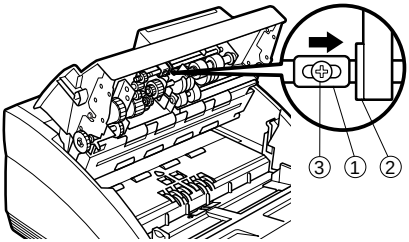


① Screw ② Stopper
③ Arrow

Fig. 7-19

3) Attach the upper pickup guide plate.
4) Turn the machine ON so that it is recognized by the personal computer.
5) Place at least three standard copy sheets (A4/LTR) in the document tray and feed them through the machine.
6) Turn this machine's power switch OFF while the third sheet is being fed.
7) Open the upper unit, and remove the upper pickup guide plate.

8) Press stopper ① against shaft support plate ② , and tighten screw ③ .



① Stopper ② Shaft support plate
③ Screw

Fig. 7-20

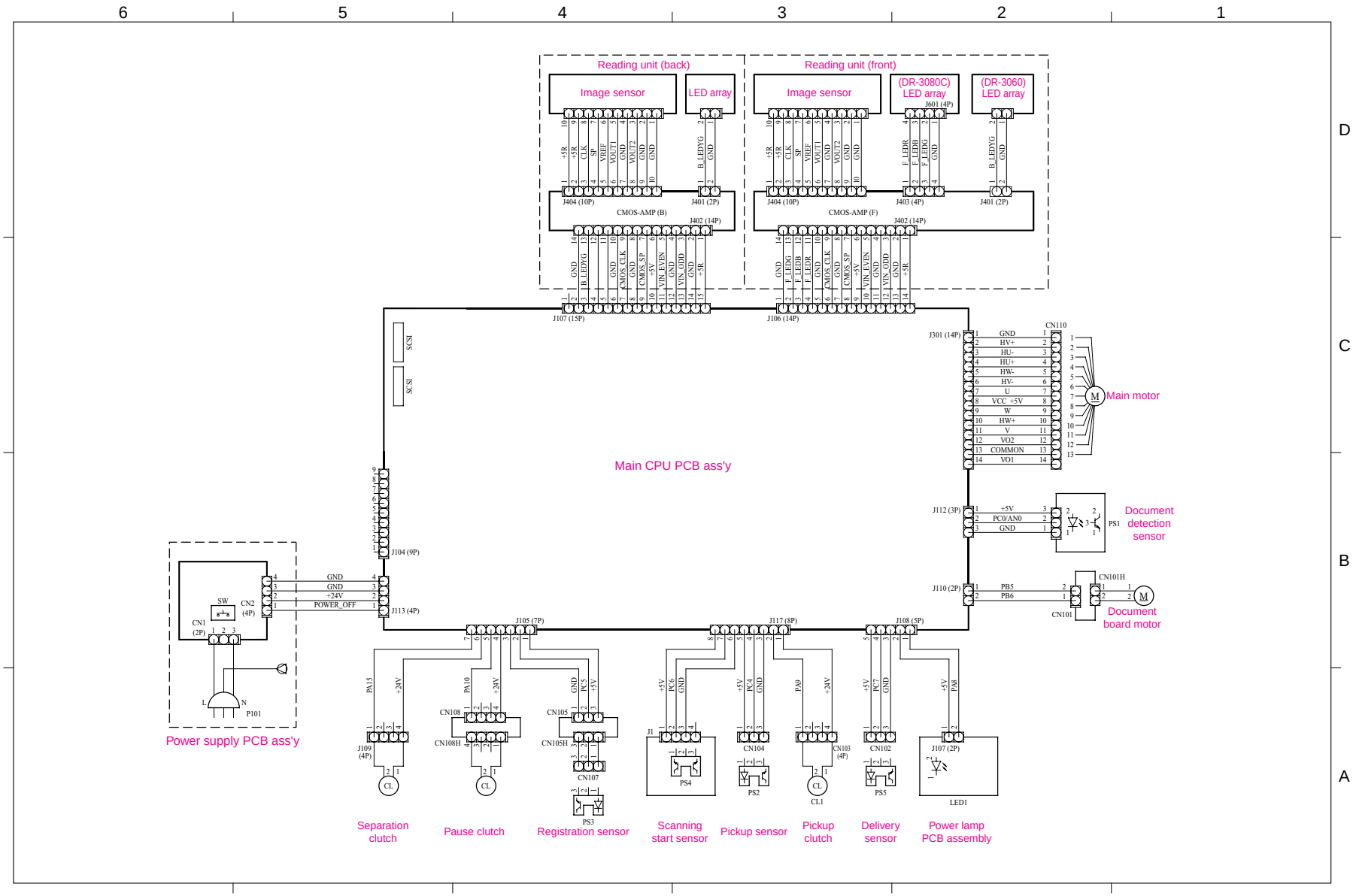
9) Attach the upper pickup guide.

4. Registration Adjustment

Execute [Adjust Resist] in the service mode if registration related parts such as the scanning start sensor (PS4) and the registration roller have been replaced, and when the positions of these have changed after disassembly and assembly. (See Chapter 7, III Service Modes.)

APPENDIX

I. GENERAL CIRCUIT DIAGRAM



II. LIST OF SPECIAL TOOLS

The following lists the special tools that are required for servicing this machine.

NO.	Tool Name	Tool No.	Shape	Rank	Purpose/Remarks
1	Test sheet	TKM-0271	A4 copy size	A	• 10 sheets/set • One side printed • Feed/Image checking
2	Standard white sheet	TKM-0316	Special size (262 × 305 mm)	B	• 10 sheets/set • For White Compensation
3	Check Program	TKM-0317	CD	B	Service mode activation program

Note: Rank Number

A = Each service technician should carry one with him.

B = A group of about five service technicians should share one.

C = Each workshop should keep one.

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