
I. FEATURES

1. Compact size scanner with A3 capable

External dimensions (tray closed): 398 (W) Δ 312 (D) Δ 191 (H) mm

2. High-speed/high-quality scanning

Newly 3-line contact image sensor

Simplex: 50 ppm, duplex: 100 ipm (200 dpi, A4 size) with black & white, grayscale and color modes

3. Dual-path mechanism (U-turn/straight path)

Straight path is provided for thicker documents

4. No periodic maintenance

Periodic maintenance is not necessary by service technician.

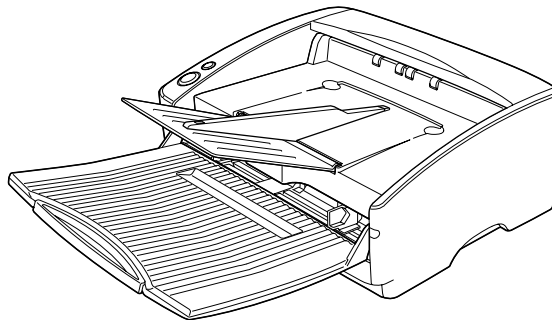


Figure 1-101

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II. SPECIFICATIONS

1. Appearance/Installation

No.	Item	Specifications
1	Type	Desktop type sheet fed scanner
2	Voltage models	1) 100 V model: 100 VAC, 50/60 Hz 2) 120 V model: 120 VAC, 60 Hz 3) 220-240 V model: 220-240 VAC, 50/60 Hz
3	Rating power consumption/current	1) 100 V model: 83 W 2) 120 V model: 1 A 3) 220-240 V model: 0.5 A *Energy Star conformity
4	Operating environment	10 to 32.5°C (50 to 90.5°F) 20 to 80%RH *No condensation allowed.
5	Noise	1) Sound power level In standby mode: 40 dB or less In operating mode: 71 dB or less 2) Sound pressure level: Bystanders (reference) In operating mode: 61 dB or less
6	Dimensions	Tray closed: 398 (W) Δ 312 (D) Δ 191 (H) mm Tray opened: 398 (W) Δ 668 (D) Δ 194 (H) mm at U-turn
7	Weight	Approx. 10 kg
8	Output interface	SCSI-3 (Ultra SCSI) USB2.0 (Hi-speed)
9	Expected product life (in-house information)	One of the following two items, whichever comes first. 1) 5 years 2) Sheets fed: 4,000,000 sheets (A4 size) There are parts needed to replace.
10	Estimated duty cycle	6,000 sheets/day (A4)
11	Installation	User
12	Bundle software	ISIS/TWAIN driver, CapturePerfect 3.0, Acrobat 7.0
13	Option	Barcode module *Imprinter will be released on 3rd Q, 2005
14	Consumable parts (commercial goods)	Exchange roller kit (Pickup, Feed, Retard rollers)

Table 1-201

2. Documents Feed

No.	Item	Specifications			
1	Document size		U-turn path	Straight path	
		1) Width	53 to 300 mm		
		2) Length	70 to 432 mm		
2	Document weight (converted thickness)	1) Separation-feed	52 to 128 g/m ² (0.06 to 0.15 mm)		
		2) Non-Separation	42 to 157 g/m ² (0.05 to 0.20 mm)	42 to 546 g/m ² (0.05 to 0.66 mm)	
3	ISO/JIS standard card	Available at straight path with non-separation feed only. Width: 53.9 mm, Length: 85.5 mm, Thickness: 0.84 mm or less *No embossment is permitted.			
4	Long-document mode	Available by service mode (Special users only) 1000 mm max. *Thickness: 0.2 mm or less, Image data size: 128 MB or less			
5	Document requirements	1) Pressure-sensitive paper: Can be fed with limitation of direction. 2) Carbon-backed paper: Cannot be fed. 3) Perforated paper for binder: Can be fed with limitation of holes. 4) Curled paper: Can be fed only if curl is 8 mm or less. 5) Creased paper: Can be fed, but crease must be straightened before being fed.			
6	Document storage		U-turn path	Straight path	
		1) Pickup	10 mm or less including curls (100 sheets or less with 80 g/m ² document)		
		2) Eject	12 mm or less (including curls)	(Not warranted because the eject tray length is short.)	
		3) Ejected face direction	Face down	Face up (inverted ordering)	
7	Feeding speed	Resolution	Binary	Grayscale	Color
		100/200 dpi	300 mm/sec		
		300/400 dpi	240 mm/sec		
		600 dpi	120 mm/sec		90 mm/sec
		*At 600 dpi, the numbers above may differ depending on the setting conditions.			

Table 1-202

3. Document Reading *using bundle software (CapturePerfect 3.0)

No.	Item	Specifications			
1	Type of sensor	3 Line Contact Image Sensor (CIS)			
2	Picture element	Density of element: 600dpi, Effective elements: 7328 Δ 3 line (310 mm)			
3	Light source	3-color (RGB) LEDs R: 620 nm, G: 530 nm, B: 467 nm			
4	Color dropout	Available: R/G/B/Custom-color, each side *Color emphasize modes are available also.			
5	Reading side	Simplex (Front)/Duplex (Both)/Blank skip *Reverse side selection is available.			
6	Reading size	1) Typical: A3/A4/A4-R/A5/A5-R/A6/A6-R, B4/B5/B5-R/B6/B6-R, LDR/LGL/LTR/LTR-R 2) Auto size detection 3) Maximum size (300 Δ 432mm) 4) Margin (∂ 10 mm) 5) User setting			
7	Output mode	1) Binary (Black&White/Error diffusion/ Hi-speed text enhancement/Advanced text enhance- 2) Grayscale (8 bit) 3) Color (24 bit) *MultiStream function is available.			
8	Output resolution	100 Δ 100 dpi, 150 Δ 150 dpi, 200 Δ 200 dpi, 240 Δ 240 dpi, 300 Δ 300 dpi, 400 Δ 400 dpi, 600 Δ 600 dpi,			
9	Reading speed	A4 size documents			
		Mode	Resolution	Single	Double
		Black&White	200 dpi	50 ppm	100 ipm
			300 dpi	40 ppm	80 ipm
			600 dpi	18 ppm	18 ipm
		Grayscale	200 dpi	50 ppm	100 ipm
			300 dpi	40 ppm	70 ipm
			600 dpi	18 ppm	16 ipm
		Color	200 dpi	50 ppm	100 ipm
			300 dpi	40 ppm	70 ipm
600 dpi	6 ppm		16 ipm		
*Settings of reading are default, and Grayscale/Color are JPEG. The numbers above may differ depending on the computer, the function settings and other conditions. Other detailed conditions are omitted.					

Table 1-203

4. Image Processing/Other Functions *using bundle software (CapturePerfect 3.0)

No.	Item	Specifications
1	Brightness adjustment	255 steps, back side individual setting, AE for B&W mode
2	Contrast adjustment	7 steps, back side individual setting
3	Gamma correction	Gray/R/B/G individual color, each side setting
4	Edge emphasize	5 steps
5	JPEG composition	Performed in scanner
6	Shading correction	Performed at each batch (shading plates are provided in scanner)
7	Skew correction (deskew)	Performed by image processing
8	Skew detection	Performed by end sensors (to prevent from tearing document)
9	Double feed detection	Length detection sensor/Ultra-sonic sensor
10	Other image processing	Black border removal, Binder hole removal, Image rotation, Text orientation, Batch code, Dots erase, Notch erase
11	Counter	Total fed count/Replacement count (memorize in scanner)
12	Operational button	Start button/Stop button

Table 1-204

The specifications above are subject to change for improvement of the product.

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. Power OFF in Emergency

When such abnormalities as abnormal noise, smoke, heat and odor occur, turn the power switch OFF and unplug the power cord immediately.

As it may cause injury, be careful not to get clothing (ties, long hair, etc.) caught in the machine. If this happens, unplug the power cord immediately. Also, do not insert your fingers in the feed section while feeding documents.

2. Prohibition of Modify

Do not change nor modify this machine. 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.

3. Electromagnetic Wave Interference Countermeasures

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

4. User Manual

Read the user manual thoroughly before using this machine.

5. Disposal

Following local regulations when disposing of the product and parts.

IV. NAME OF PARTS

1. Front

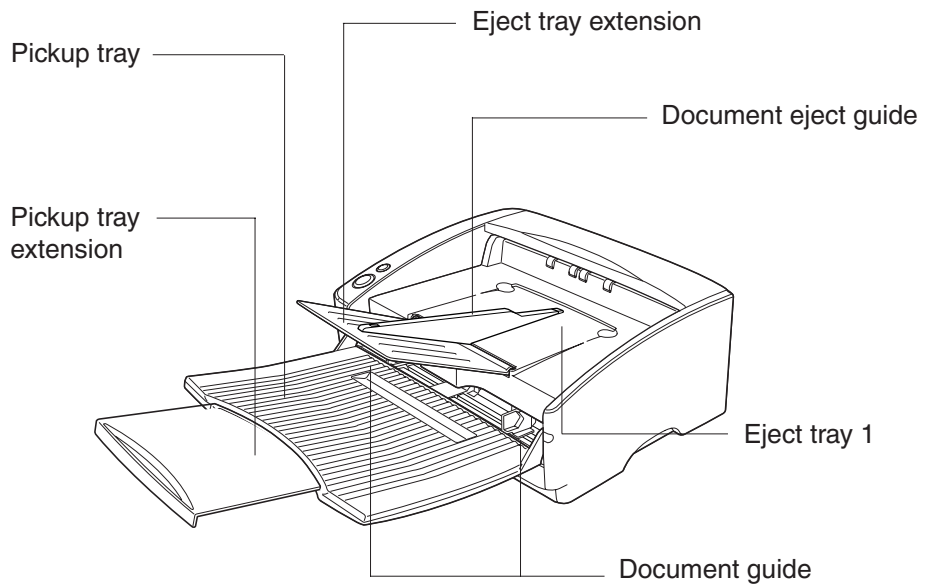


Figure 1-401

2. Operation Panel

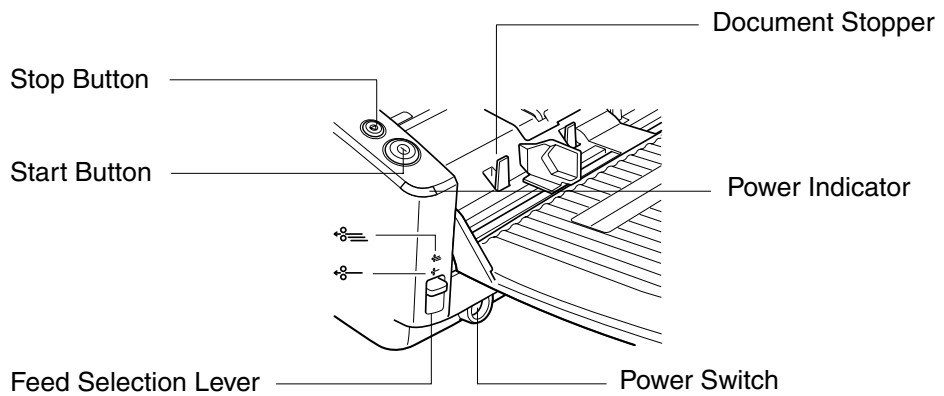


Figure 1-402

3. Rear

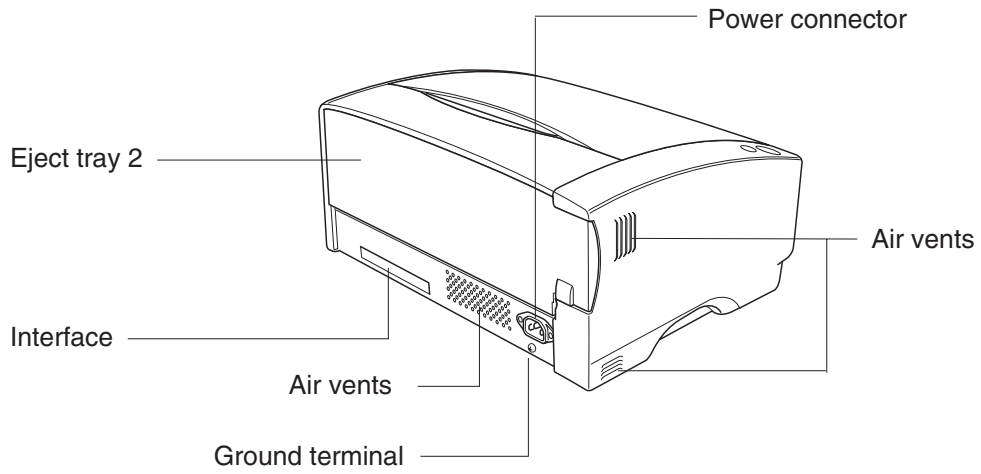


Figure 1-403

4. Interface

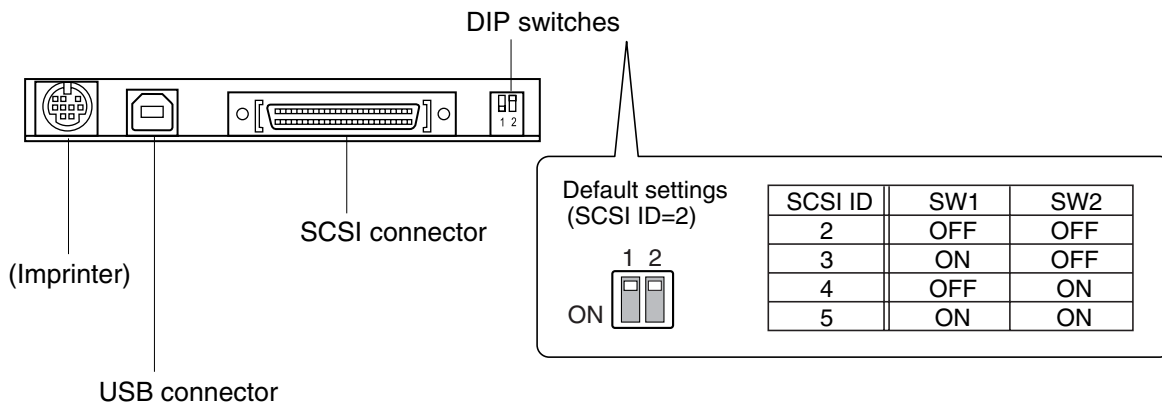


Figure 1-404

V. USER OPERATION

Refer to the software user manual for this machine for details.

1. Installation

This machine is installed by the user. Packing and installation are performed by the user. If they are performed by a service technician, refer to the user manual. CHAPTER 4, INSTALLATION & MAINTENANCE, provides an overview.

2. Operation Screen

Basic operation screens if CapturePerfect 3.0 is used are shown for reference. CapturePerfect 3.0 uses an ISIS driver.

1) Main screen

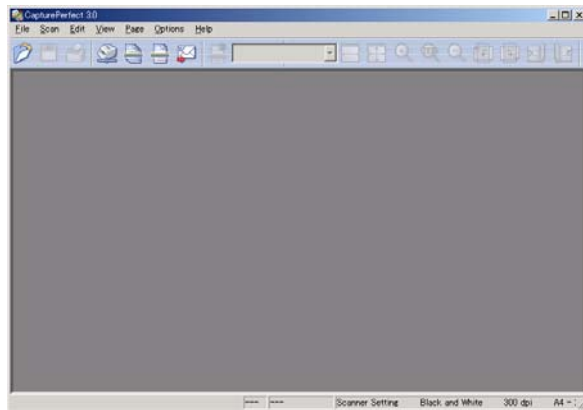


Figure 1-501

2) Basic settings

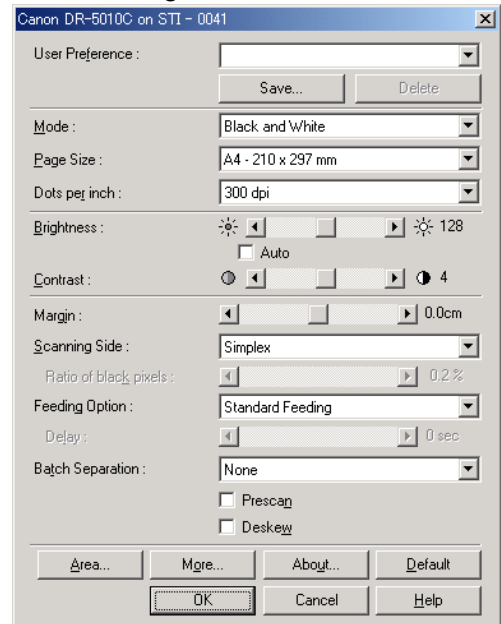


Figure 1-502

3) Detailed settings

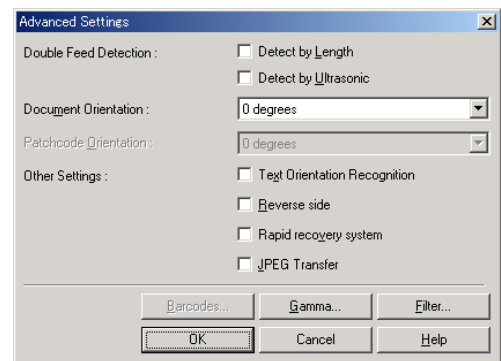


Figure 1-503

4) Filter

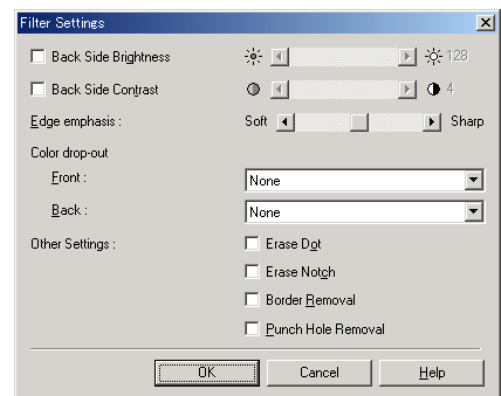


Figure 1-504

5) Gamma

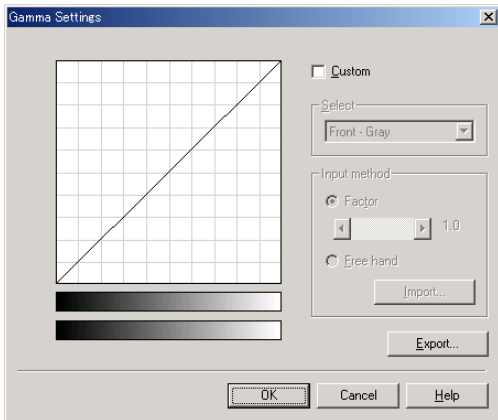


Figure 1-505

3. Clearing Jams

- 1) Remove documents left on the eject tray and then close the eject tray extension.

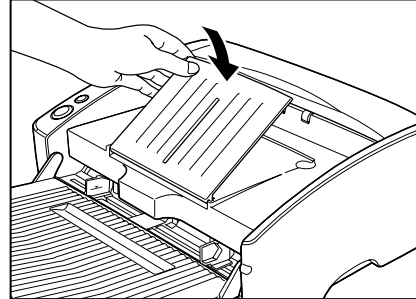


Figure 1-506

- 2) Open the upper unit slowly.

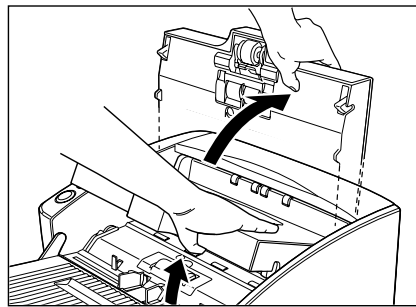


Figure 1-507

Note: Do not hold the pickup roller at the center when opening or closing the upper unit.

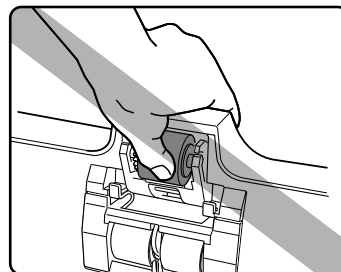


Figure 1-508

3. Electrical Circuits

Figure 2-103 shows an overview of the electrical circuits block diagram of this machine.

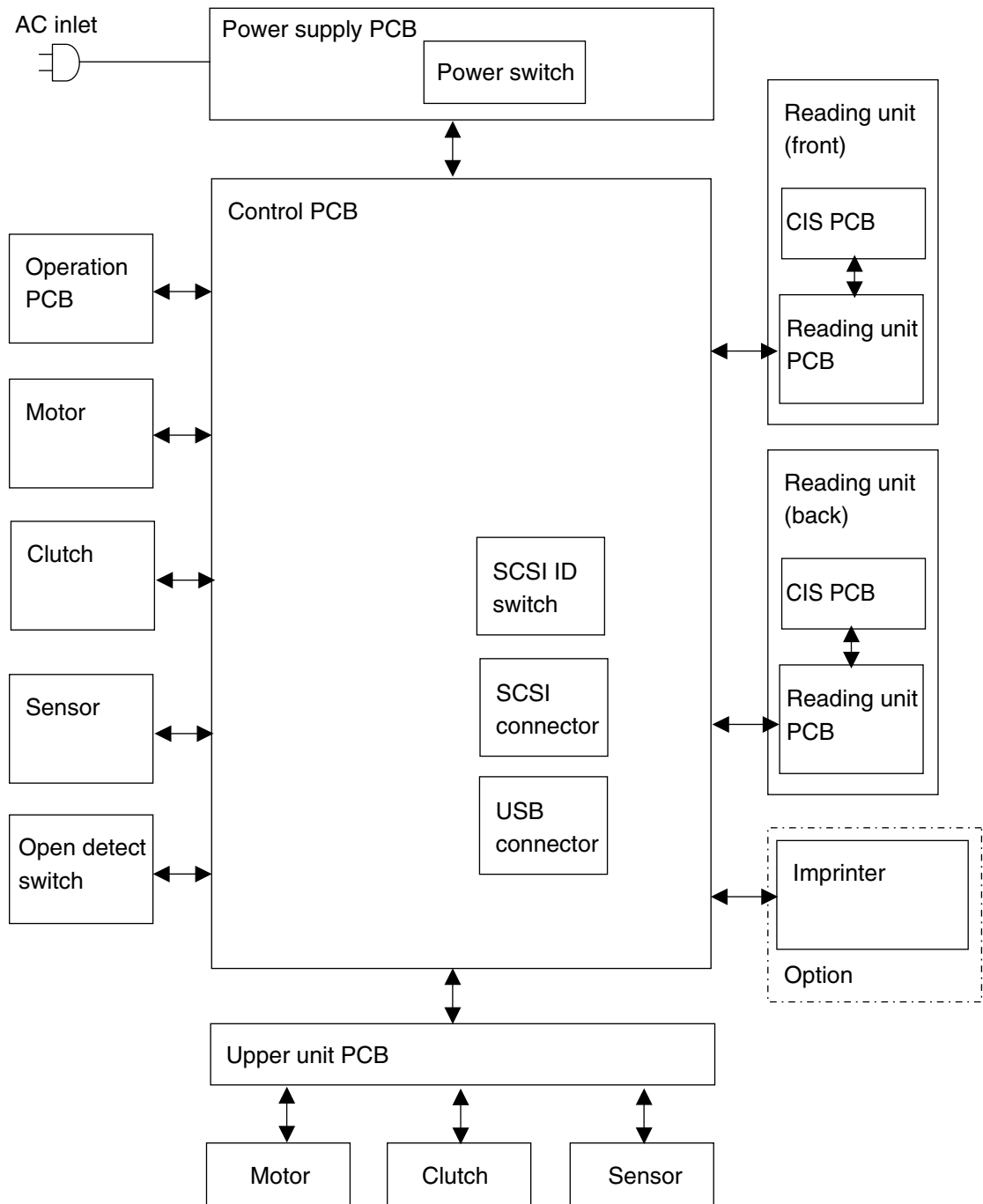


Figure 2-103

4. Timing Chart

Figure 2-104 describes the timing chart when you separately feed two sheets of document by using a U-turn path without temporarily suspending the machine.

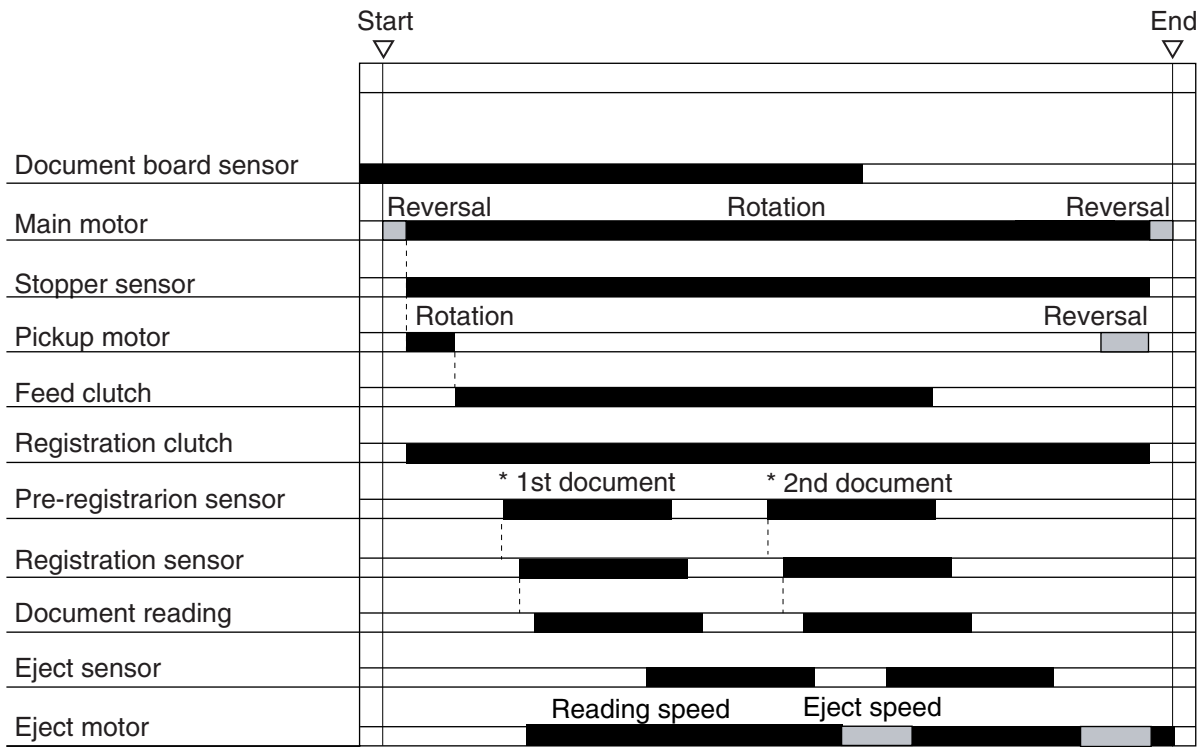


Figure 2-104

The RGB analog signals output from the CIS unit are input to the reading unit PCB.

After those signals are converted into the digital signals in the reading unit PCB, the dedicated image processing IC (YUME-chip) rearranges the order of the data to compensate shading and align three lines. The image data used at this time consist of 10bit digital signals.

According to the scanner settings, an optical resolution between 600 dpi and 300 dpi can be selected. In case that the resolution is set at 400 dpi or less, 300dpi data are output. In case that the resolution is set at 600 dpi, 300 or 600dpi data are automatically selected depending on the volume of data.

The image data output from the reading unit PCB are input to the control PCB and processed by the dedicated image processing IC (DRADRA-chip).

Since the data are processed as 8 bits within the IC, they are converted from 10 bits to 8 bits at the image reading section. And, the image data is rearranged.

The image processing section 1 changes the resolution of the main-scanning direction, performs the grayscale conversion and the dropout color in accordance with the scanner settings in order to convert the data into basic image data.

This machine is provided with the "MultiStream" function. Thus, the data can be converted into image data which meet two types of settings, simultaneously. The basic image data are stored in the SDRAM through the SDRAM interface. SDRAM is 128 Mega-bytes in capacity.

And then, the 3-dimensional color space processing section performs the 3-dimensional gamma correction which is a newly developed processing in order to im-

prove the quality of colors.

The image processing section 2 changes the resolution, performs the 1-dimensional gamma correction (adjustment of brightness and contrast, and custom gamma correction) and the grayscale conversion.

The image processing section 3 handles the edge emphasis, binarizing (simple binarizing, error diffusion), and binary AE processing (ABC, High-speed text enhancement).

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

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

In case that the MultiStream is selected, the image data stored in the SDRAM are processed again in accordance with the secondary settings.

The following image processing are carried out inside the computer.

- ⊕ Advanced text enhancement
- ⊕ Automatic size detection
- ⊕ Skew correction
- ⊕ Black border removal
- ⊕ Binder hole removal
- ⊕ Blank skip
- ⊕ Add-on
- ⊕ Patch code detection
- ⊕ Text orientation
- ⊕ Image rotation
- ⊕ Dots erasing
- ⊕ Notch erasing

V. IMAGE PROCESSING

Note:The principle of the processing described in this section is simplified to make it easily understandable. In actual cases, the procedure may be somewhat complicated.

1. Image Processing in Main Body

1) A/D Conversion

The image data output from the image sensor are analog signals. These signals are converted to digital signals in order to process them into each image. This is called A/D conversion.

Figure 2-501 shows the outputs of digital signals after A/D conversion when they are 4bit signals.

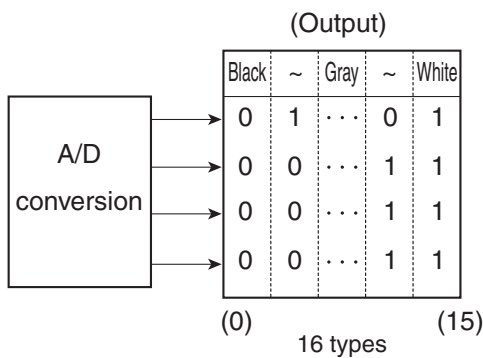


Figure 2-501

If the output is four bits, it is possible to output 16 types of values. Consequently, the input analog signal as the image brightness 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 eight bits, so 256 levels can be obtained.

The offset and gain are adjusted for the analog signals to successfully convert those signals into digital signals.

In the offset adjustment, the minimum output value of perfect black is changed to the predefined value. In the gain adjustment, the maximum output value of perfect white is changed to the predefined value.

The offset and gain adjustments are sometimes called “black clamp” and “amplification” processing, respectively.

2) Shading Correction

Even if the image brightness is consistent, the values output from the image sensor are not necessarily consistent because the sensitivities of each element of the image sensor and the performance of each reading system would vary. In the shading correction, the variations of each element are compensated. This processing is done for the digital signals after A/D conversion.

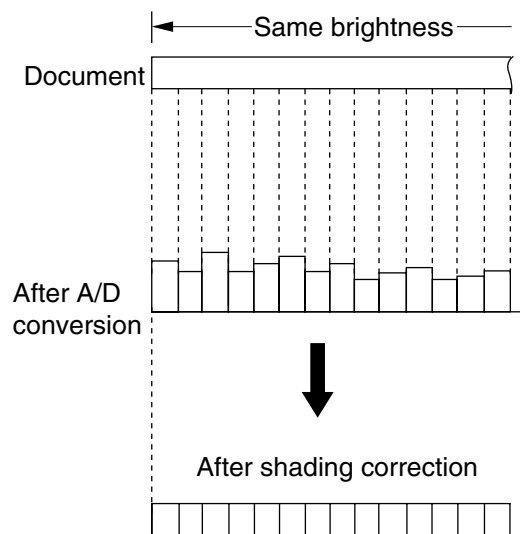


Figure 2-502

The correction values of each element are calculated in advance and stored in a memory. This machine stores those values in the memory installed on the reading unit PCB.

There are two types of correction values: black and white correction values. For

black correction value, readout indicated when an LED does not illuminate, in other words, when a black image is read (intense black) is set as a target value. For white correction value, readout of standard white sheet is set as a target value (pure white).

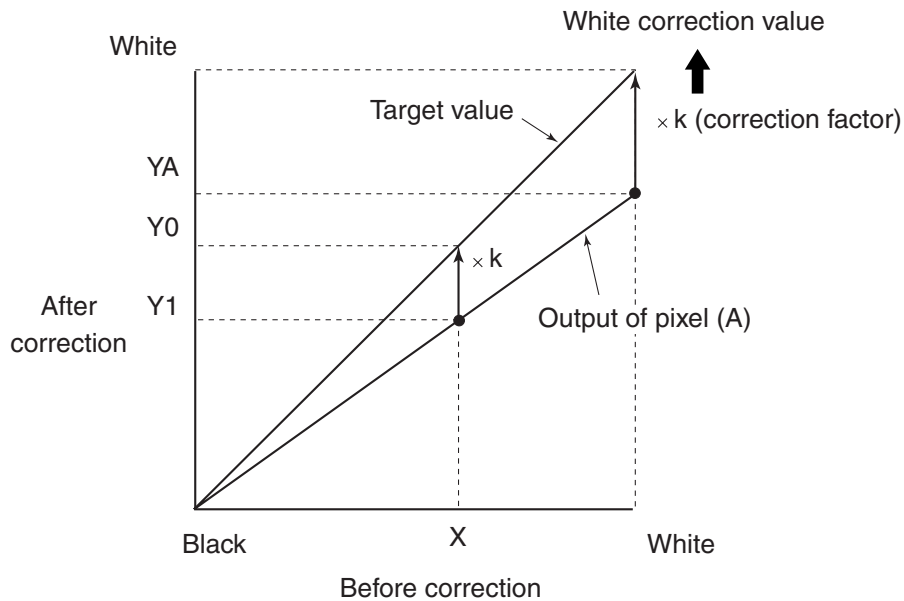


Figure 2-503

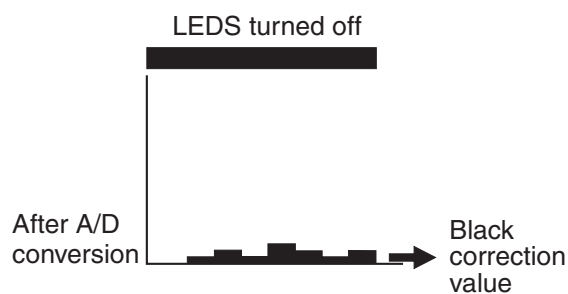


Figure 2-504

The data of each element which have been converted into digital signals are compensated in accordance with the corresponding values.

Some models use a standard white sheet, which is one of service tools, in the ser-

vice mode in order to calculate correction values. However, this machine is equipped with the standard white sheet (called shading plate). Thus, correction values can be automatically calculated during normal operation.

3) Data Rearrangement

The data arrangement change is necessary to create appropriate image data.

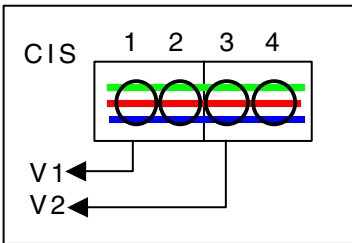
The data rearrangement is performed after the A/D conversion.

Each block parallel data of the CIS unit is rearranged as serial data in the reading unit PCB and those data are rearranged to correct the positions of three lines. And,

the final, they are rearranged in output order of the final picture elements in the control PCB.

The following shows the data arrangement in case that the CIS unit configuration is set to simplex, four picture elements, and two blocks for easy understanding.

* CIS unit configuration

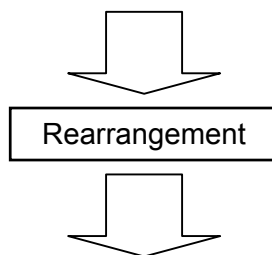


i) CIS unit output (each block output)

	Line 1						Line 2						Line 3
V1	1R	1G	1B	2R	2G	2B	1R	1G	1B	2R	2G	2B	1R
V2	3R	3G	3B	4R	4G	4B	3R	3G	3B	4R	4G	4B	3R

ii) Reading unit PCB (rearrangement)

	Line 1												
	1R	3R	1G	3G	1B	3B	2R	4R	2G	4G	2B	4B	↓ Sequential
Sequential ↓	1R	3R	1G	3G	1B	3B	2R	4R	2G	4G	2B	4B	



iii) Control PCB (in order of final output)

	L(x)	L(x-2)	L(x+2)	L(x)	L(x-2)	L(x+2)	L(x)	L(x-2)	L(x+2)	L(x)	L(x-2)	L(x+2)	
	1R	1G	1B	2R	2G	2B	3R	3G	3B	4R	4G	4B	↓ Sequential

4) Image Resolution Conversion

a) Main-Scanning Direction

For the main-scanning direction, the image resolution conversion is executed by thinning out the standard clocks for image processing according

to the resolution.

For example, when converting to 200 dpi from 300 dpi, the standard 300 dpi clock is used, with 1 clock pulse removed from every three pulses. (Figure 2-505)

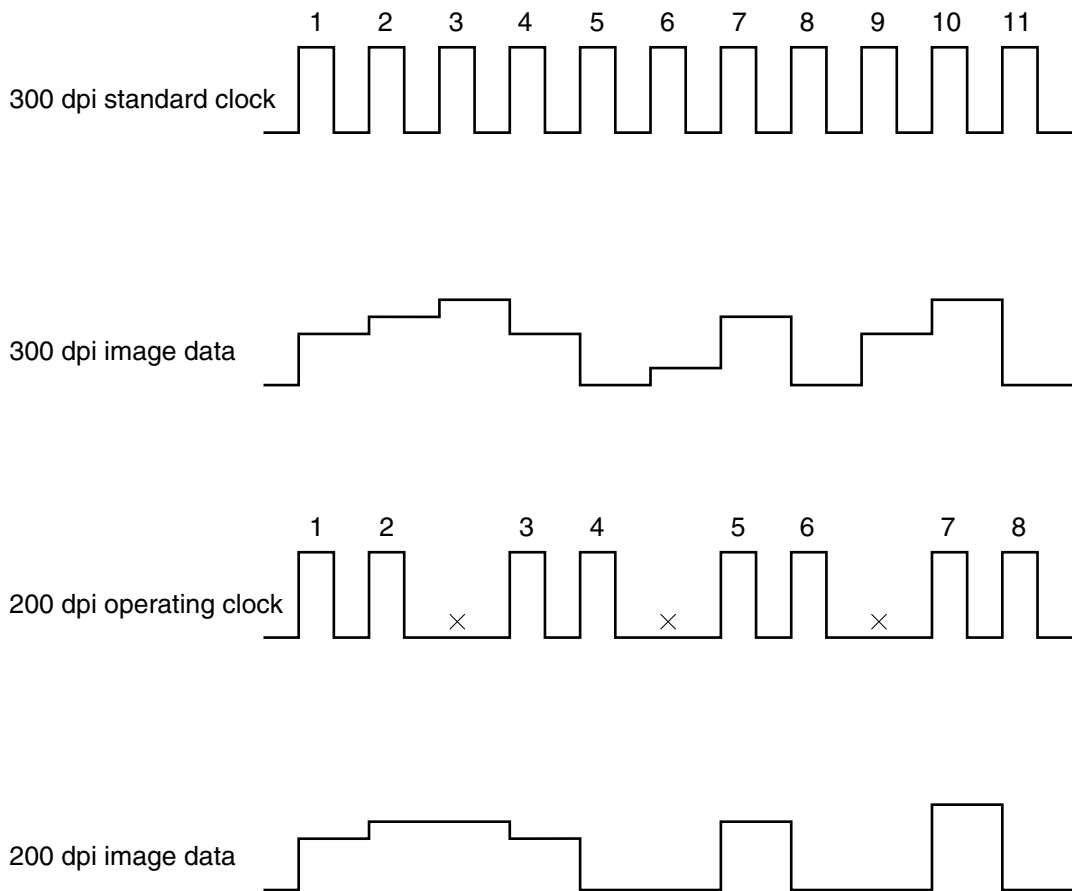


Figure 2-505

b) Sub-Scanning Direction

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

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

When the timing for reading the data

from the image sensor is the same, the resolution in the sub-scanning direction can be converted by changing the feeding speed. (Figure 2-506)

However, the feeding speed is limited depending on the specifications of feed motor. If the feeding speed can not be raised, the read timing is thinned out. (Figure 2-507)

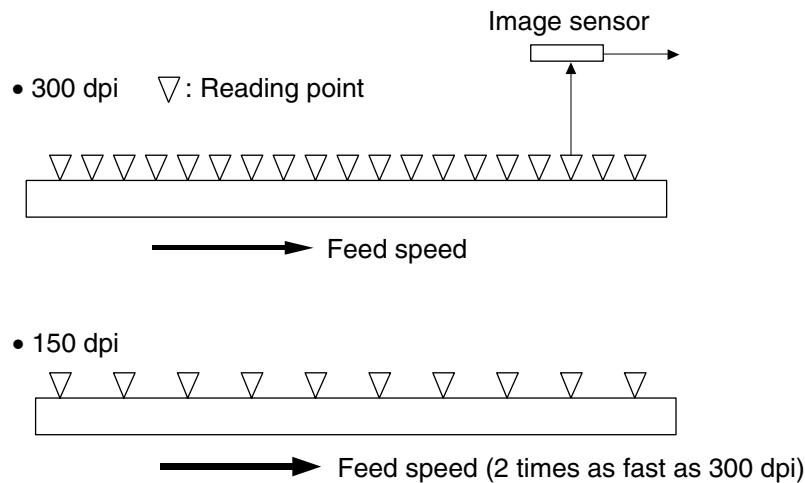


Figure 2-506

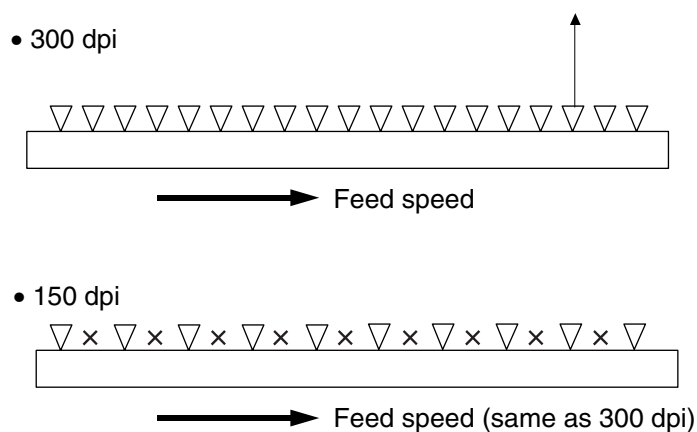


Figure 2-507

d) Interpolation processing

This section describes how to convert a 300dpi image data into a higher-resolution one in case that the image data cannot be read at a high resolution depending on memory capacities or reading speed specifications.

The method of simply and repeatedly outputting an original image data to convert it into a high-resolution one is called simple interpolation processing, and the method of averaging the resolution of data to convert it into a high-resolution one is called averaging interpolation processing.

This machine has an SDRAM with the capacity of 128 MB. In case of an image data which cannot be stored in the SDRAM, for example, in case that it is processed in the 600dpi/color mode, average a 300dpi image data to convert it into a 600dpi data. In case of a 400dpi image data processed through 3-line CIS layout dimension, use averaged 600dpi data as original data to convert it into a 400dpi image data.

Table 2-510 includes original image data and picture element data after the averaging interpolation processing.

≠ Original data (300 dpi)

A	B	C	D
E	F	G	H
I	J	K	L

≠ Picture element data after the averaging interpolation processing (600 dpi)

A	$\frac{A+B}{2}$	B	$\frac{B+C}{2}$	C	$\frac{C+D}{2}$	D
$\frac{A+E}{2}$	$\frac{A+B+E+F}{4}$	$\frac{B+F}{2}$	$\frac{B+C+F+G}{4}$	$\frac{C+G}{2}$	$\frac{C+D+G+H}{4}$	$\frac{D+H}{2}$
E	$\frac{E+F}{2}$	F	$\frac{F+G}{2}$	G	$\frac{G+H}{2}$	H
$\frac{E+I}{2}$	$\frac{E+F+I+J}{4}$	$\frac{F+J}{2}$	$\frac{F+G+J+K}{4}$	$\frac{G+K}{2}$	$\frac{G+H+K+L}{4}$	$\frac{H+L}{2}$
I	$\frac{I+J}{2}$	J	$\frac{J+K}{2}$	K	$\frac{K+L}{2}$	L

Figure 2-510

5) Gray scale conversion

In case that the binary or gray scale mode is selected, three image data (R, G and B) which were input in the control PCB should be converted into a single brightness data.

Thus, an average of red, green and blue data is used as a single brightness data. Where a brightness data is "L," $L = (R + G + B) / 3$.

Suppose that $R = 50$, $G = 200$, $B = 50$. In this case, the green data should be converted into a gray data, which is calculated by $L = (50 + 200 + 50) / 3 = 100$.

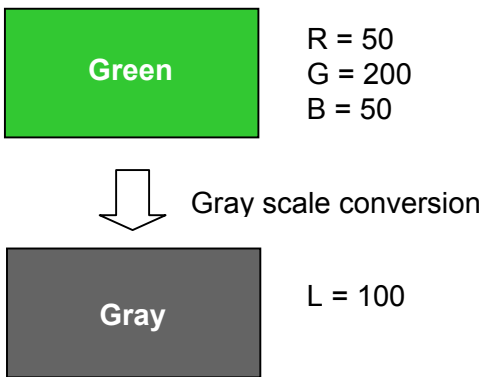


Figure 2-511

6) Color dropout (RGB)

In case that the color dropout mode only for R is selected, of three image data (R, G and B) which were input in the control PCB, only the red data is used as a brightness data.

Suppose that $R = 220$, $G = 3$ and $B = 7$. The red data should be converted into a near white data which is $L = 220$.

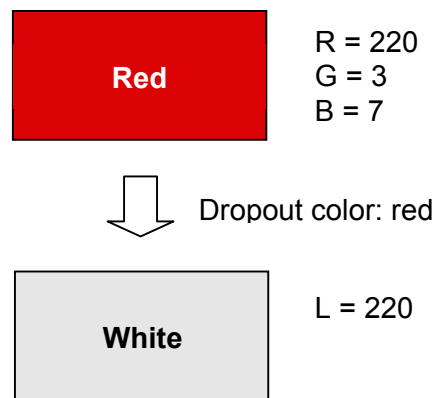


Figure 2-512

In case that the color emphasis mode only for R is selected, of three image data (R, G and B) which were input in the control PCB, the G and B data are converted into a single brightness data.

Thus, an average of G and B is used as a single brightness data. Where a brightness data is "L," $L = (G + B) / 2$.

Suppose that $R = 220$, $G = 3$ and $B = 7$. The red data should be converted into a near black data which is calculated by $L = (3 + 7) / 2 = 5$.

The following paragraphs describe the overview of processing based on the block diagram.

The edges are detected through filters 1 and 2 and output to the binarizing processing section. Through filter 3, the threshold values of each picture element are calculated in accordance with the averaging method using 5x5 matrix data and output to the binarizing processing section.

The binarizing processing section breaks the picture elements of each edge image which was input down to “edge picture elements,” “inside picture element” and “background picture elements.” And then, it binarizes the edge picture elements according to the threshold values of each corresponding position. And it binarizes the inside picture elements according to the average of the threshold values calculated by binarizing the edge picture elements, and outputs all the background picture elements as white. Those picture element data is restored to images to create binary AE images.

10) 3-dimensional Gamma Correction

A conventional machine compensates R, G and B individually. Thus, the 1-dimensional gamma correction is applied (Figure 2-257).

On the other hand, the 3-dimensional gamma correction applies to this machine to improve the quality of color images (Figure 2-528).

The 3-dimensional gamma correction

means that how (R, G, B) data should be output is determined based on the original (R, G, B) 3-dimensional data. The colors, R, G and B correlate with each other. Thus, if R is changed, the other colors should be changed. This improves the color repeatability. This processing is not performed in case of grayscale data.

* 1-dimensional gamma correction

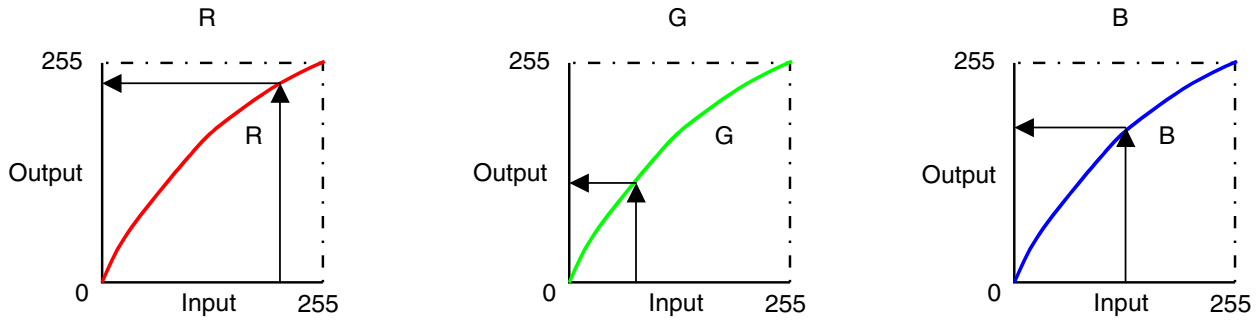


Figure 2-527

* 3-dimensional gamma correction

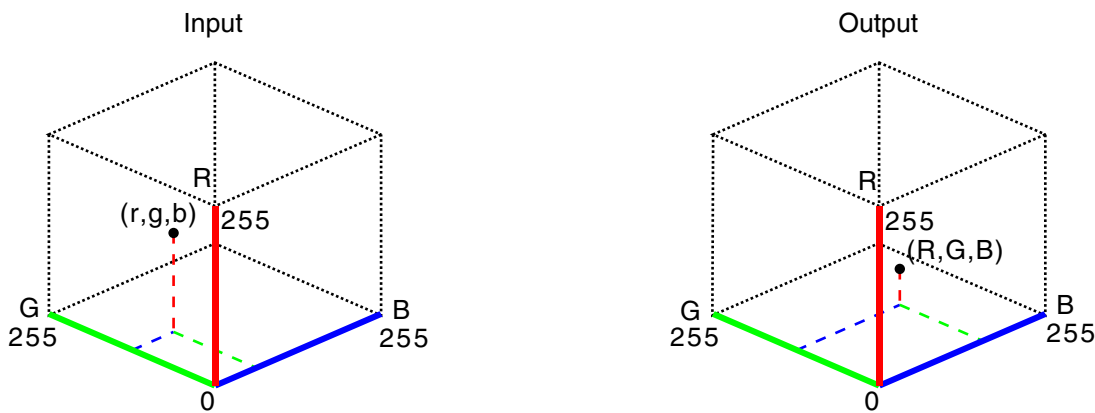


Figure 2-528

12) MultiStream

MultiStream is a function that outputs data in two different modes at a single scan.

Figure 2-532 shows a screen where 600dpi resolution for grayscale and 100dpi resolution for black & white have been set on the front side of the document,

and the resulting outputs.

In this case, the SDRAM in this machine stores 600dpi gray scale data, outputs this data primarily and then, outputs 100dpi black & white data converted from the stored 600dpi data secondarily.

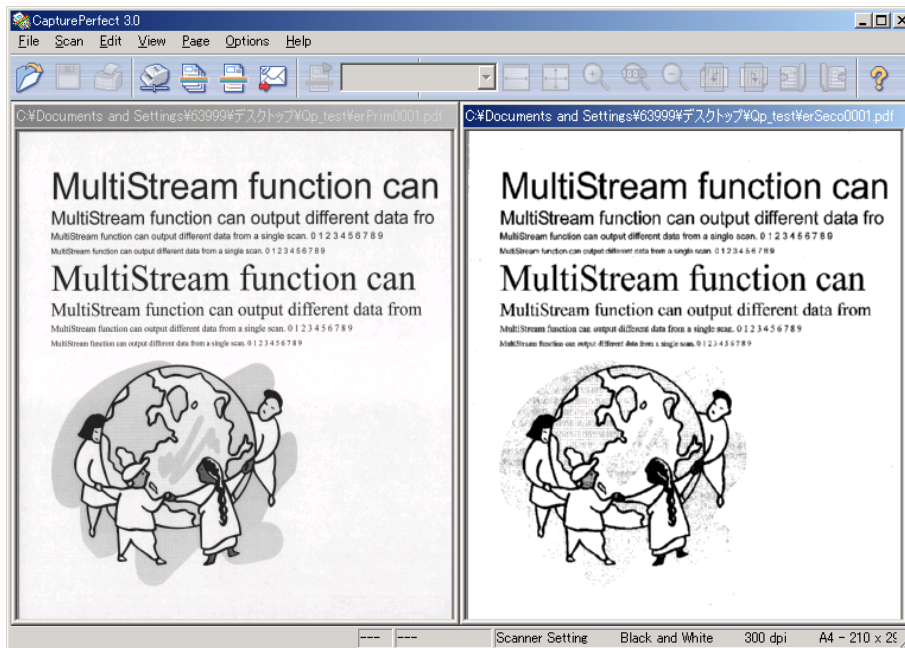
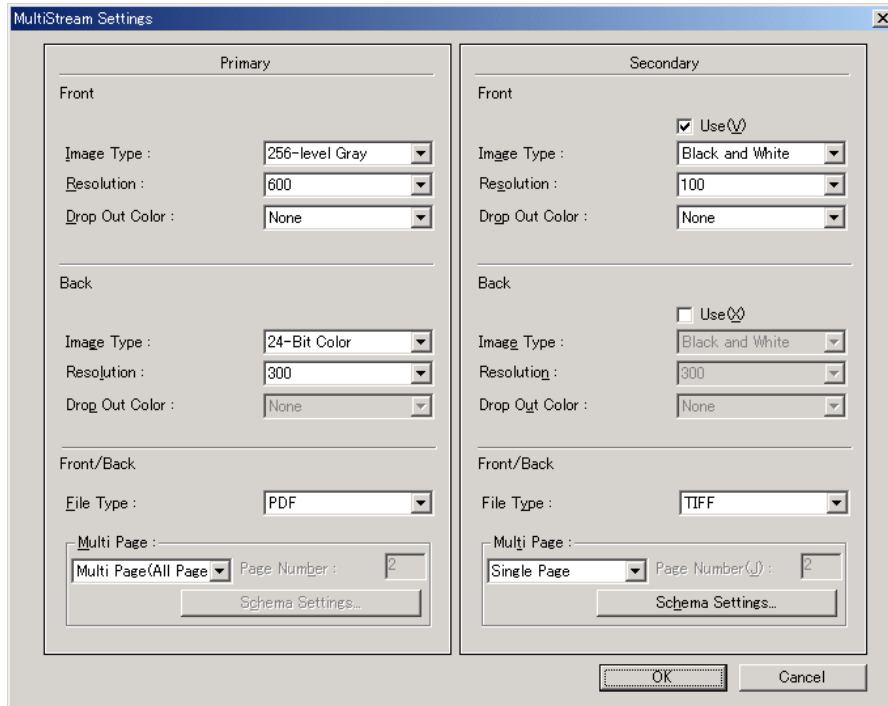


Figure 2-532

2. Image Processing in the Computer

1) Advanced Text Enhancement

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

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

For example, as shown in the image in Figure 2-533, a histogram for each block is calculated, and the optimum slice level is determined to binarize the picture elements.

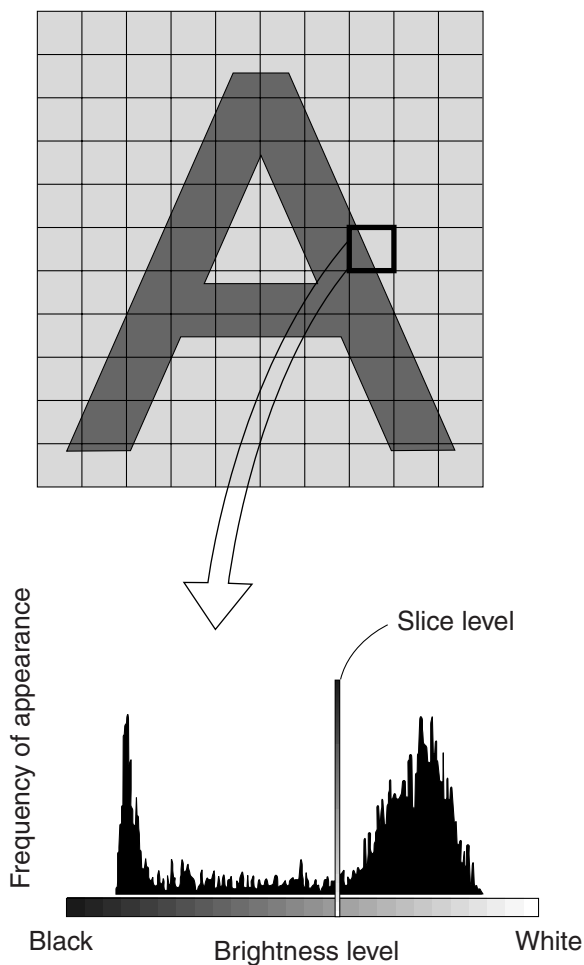


Figure 2-533

2) Automatic Size Detection

In case that the automatic size detection mode is selected, an image data with the maximum width and the length detected by the registration sensor in the feed direction is read.

However, this machine has an A4 width sensor so that it should not read unnecessary data. In case that the width of document guides is the same as or more than that of A4-size paper, an image data with the maximum width of 310 mm is read. And in case that the width of image data is less than that of A4-size paper, an image data with the width of 220 mm is read.

The maximum outside frame is detected from the image data which has been read. The inside of the data is defined as the paper size and the margins are removed. Moreover, in case that the mode which makes the volume of data increase is selected to enhance the processing speed, the machine converts the data into a black and white/100dpi data and outputs it to a computer. The maximum outside frame is computed based on this converted data. And an original data which is equal to such frame in size is output to a computer.

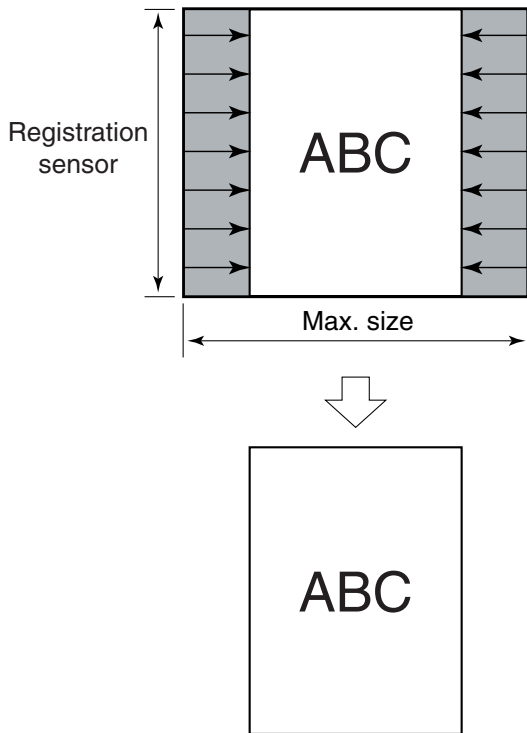


Figure 2-534

If a document skews when you select automatic size detection, but do not select skew correction, parts of leading and trailing edges of the image will be missing.

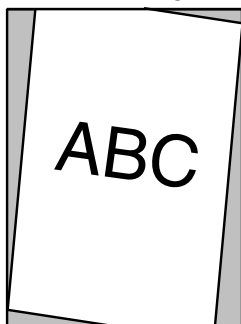


Figure 2-535

Note: In case that part of circumference of document is dark or brightness level is not appropriately set, this function may not successfully work. This may also happen when the skew correction or black frame removal described later is performed.

3) Skew Correction (Deskew)

If the skew correction is selected, the size of document read is broadened by 10 mm compared with the user-specified size. The skew is detected based on the data read to compensate the skew. The image data is then restored to the user-specified image size. (Figure 2-538)

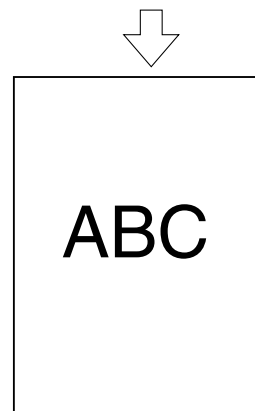
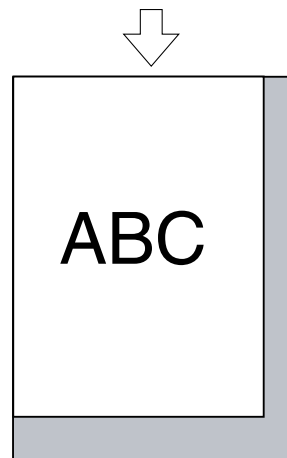
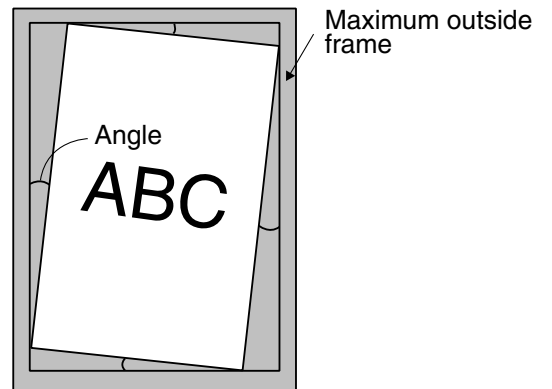


Figure 2-536

4) Black Border Removal

When the black border removal is selected, the image data is read with the specified read size.

The frame of document is detected based on this image data and the outside of the frame is converted into the white data. (Figure 2-537)

The conventional black border removal may vanish the letters if there are some letters on the edge of document and the document is skewed too much. This machine extracts the outer shape of document without the hollow. Thus, no letters vanish. (Figure 2-538)

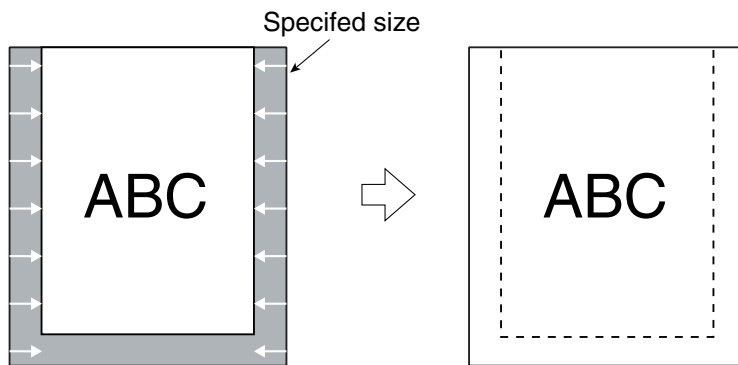


Figure 2-537

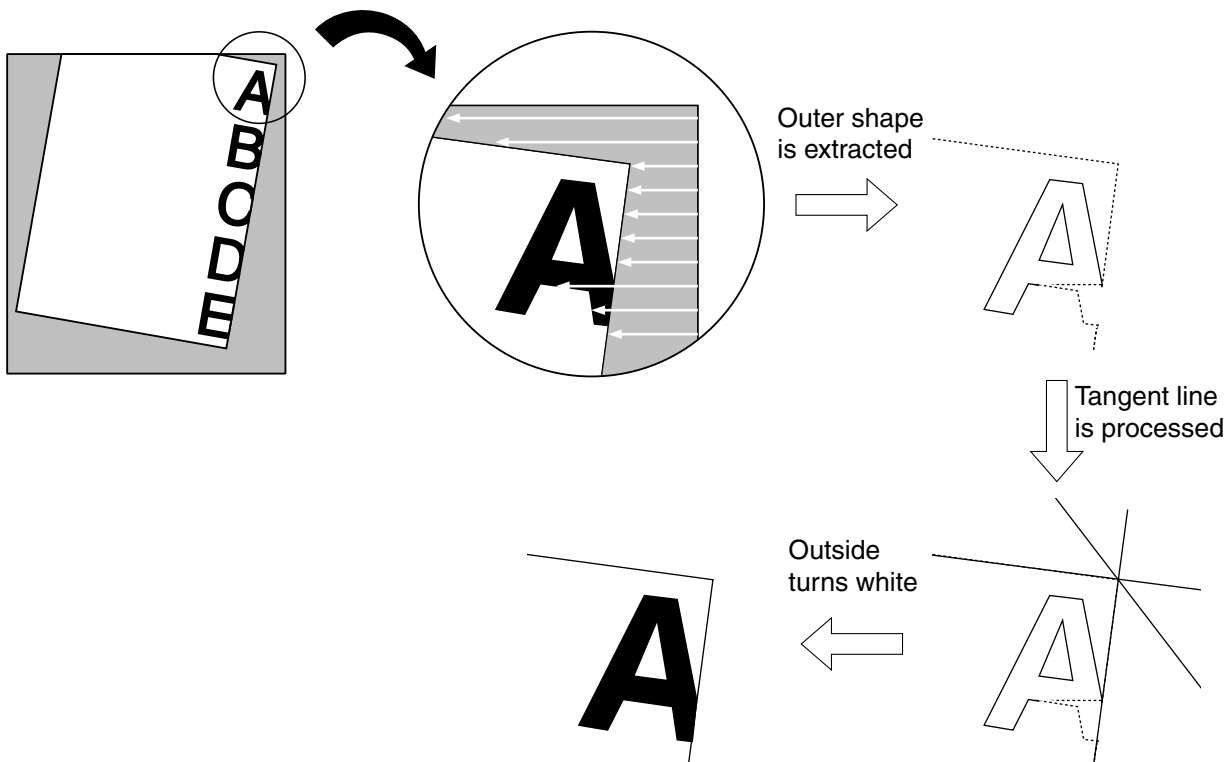


Figure 2-538

7) Dot Erasing

Dot erasing is the process of erasing any unnecessary small black dots in the binary data in the document.

This is called black dot erasing.

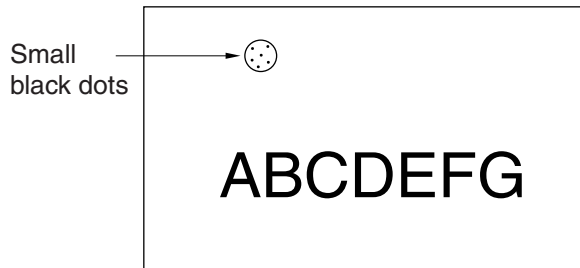


Figure 2-545

For dot erasing, the conversion table shown in Figure 2-546 is used.

When all the colors of the 8 dots around the target picture element differ from that of the target picture element, the target picture element is judged an "isolated dot" and erased.

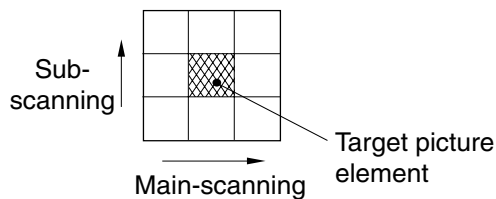


Figure 2-546

The white dots in a document with a black background can be erased using the same method. This is called white dot erasing.

8) Notch Erasing

Notch erasing is the process of compensating for any unevenness in binary output when horizontal and vertical straight lines are scanned. (Figure 2-547)

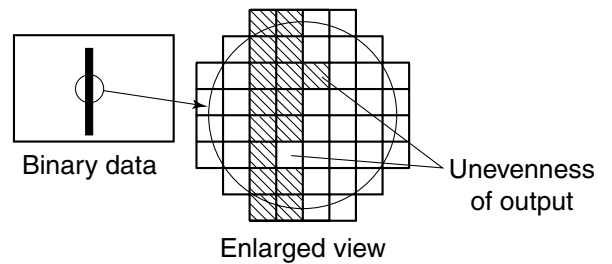


Figure 2-547

When the sequential three dots next to a target picture element among the eight dots are the same color as the target picture element and other five dots are different color, the target picture element is judged to be a notch and its output is reversed. (Figure 2-548)

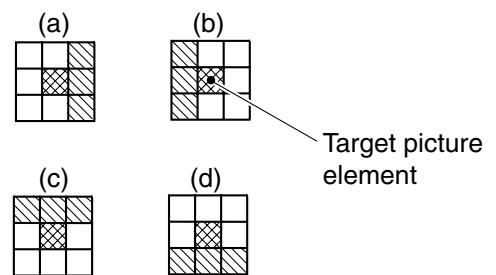


Figure 2-548

VI. POWER SUPPLY

1. Power Supply

The power supply PCBs of this machine use the dedicated parts for the 100V and 200V units. Figure 2-601 shows a block diagram of the power supply PCB.

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

The supplied AC power is converted by a rectifying bridge to unsmoothed 100 to 240

VUN and converted to 24 VDC.

24 VDC is output from the power supply PCB to the control PCB. The necessary voltage are generated in the control PCB. Each PCB receives DC voltage from the control PCB.

Note:A suffix, "U," which is attached to voltage figures, means that those power supplies are turned OFF when the machine is placed in the sleep mode.

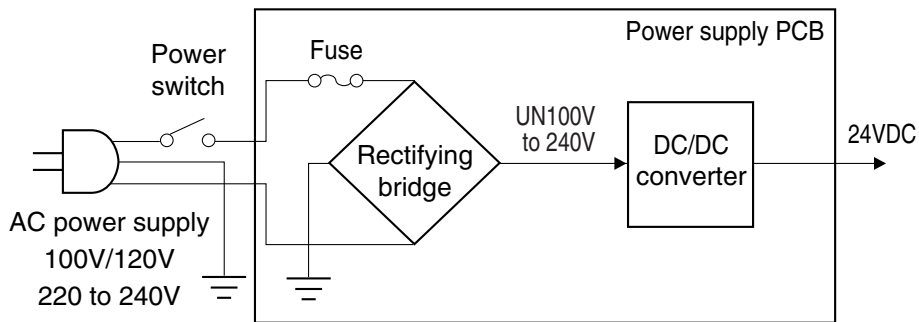


Figure 2-601

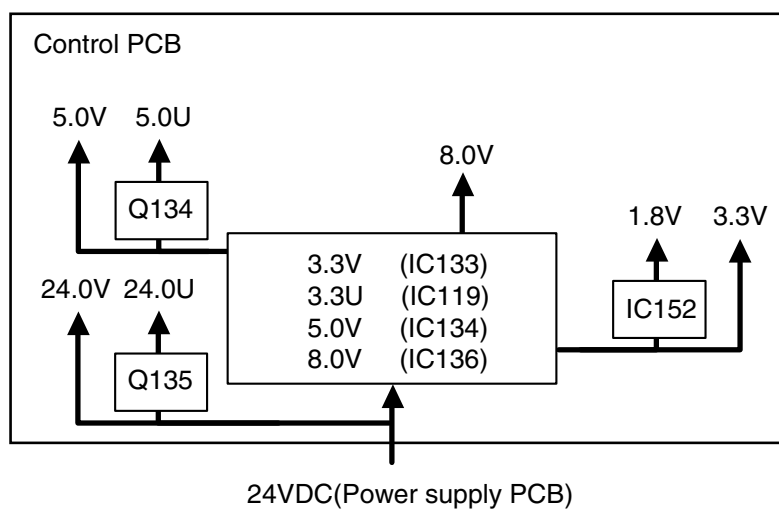


Figure 2-602

Connector		Description
J108	3P	Open detect switch
J109	16P	Lower unit sensor (PS3/4/5/8/9)
J118	14P	Reading unit (front)
J119	14P	Reading unit (back)
J122	3P	DC power supply standby
J125	4P	DC power supply (+24V)
J129	5P	Reading unit (front) DC power
J131	6P	Reading unit (back) DC power
J132	8P	Reading unit (front)
J134	9P	Reading unit (back)
J136	32P	Upper unit PCB
J140	4P	Eject motor
J141	4P	Ultrasonic sensor PCB (drv)
J143	5P	Shading motor (lower)
J144	8P	Operation PCB, Registration clutch
J146	6P	Lower unit sensor (PS1/2)
J147	11P	Main motor

Table 2-801

LED	Description
LED101	CPU normal operation: Flashing
LED106	+24VDC supply: Lit

Table 2-803

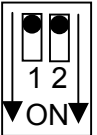
Switch	Description															
SW101	<p>SCSI ID settings</p> <table border="1"> <tr> <td></td> <td>1</td> <td>2</td> </tr> <tr> <td>ID2</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>ID3</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>ID4</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>ID5</td> <td>ON</td> <td>ON</td> </tr> </table> <p>Setting at shipping: ID2</p> 		1	2	ID2	OFF	OFF	ID3	ON	OFF	ID4	OFF	ON	ID5	ON	ON
	1	2														
ID2	OFF	OFF														
ID3	ON	OFF														
ID4	OFF	ON														
ID5	ON	ON														

Table 2-802

2. Power Supply PCB

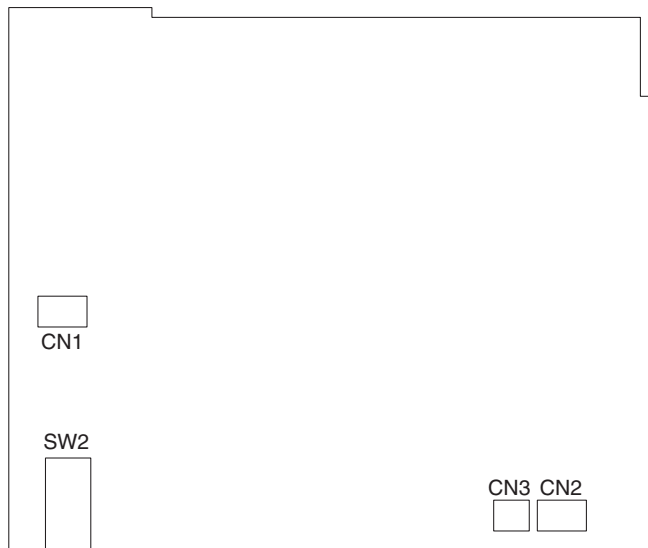


Figure 2-802

Connector		Description
CN1	2P	AC power supply input
CN2	4P	DC24V power supply out-put
CN3	3P	DC power supply standby signal

Table 2-802

Switch	Description
SW2	Power supply ON/OFF

Table 2-803

*** Notes on disassembling and assembling**

- 1) When the self-tapping screws are installed, fit them into the screw thread as before the disassembly in order not to damage the threads on the parts.
- 2) Many parts of this machine are secured by fittings. The parts must not be damaged by deforming excessively during work. They must be assembled so that they are not shifted or lifted.
- 3) When the parts are installed, be careful for the cables not to be pinched in a gap.

I. EXTERNAL COVERS

1. Pickup Tray

- 1) Bend the arm ①, unhook the fitting part. And remove the pickup tray ②.

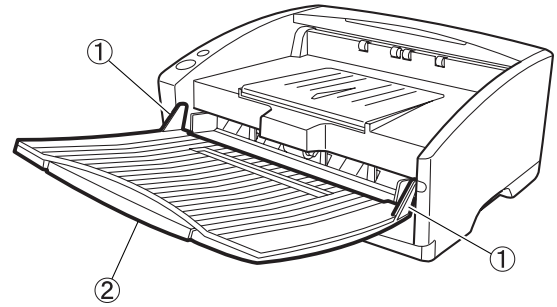


Figure 3-101

2. Top Cover

- 1) Remove the 2 screws ① (M3 self-tapping type). And then, turn the top cover ② and unhook the left and right fitting parts. And then, remove top cover.

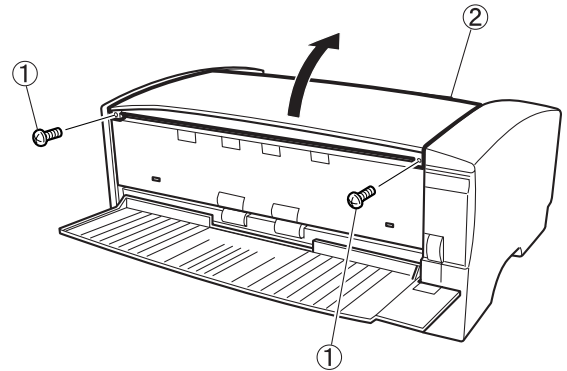


Figure 3-102

3. Eject Cover

- 1) Remove the top cover.
- 2) Push the right and left fitting parts ① downward, turn the eject cover ② and pull it out to remove it.

Note: In this state of things, the eject tray 2 can be removed as well.

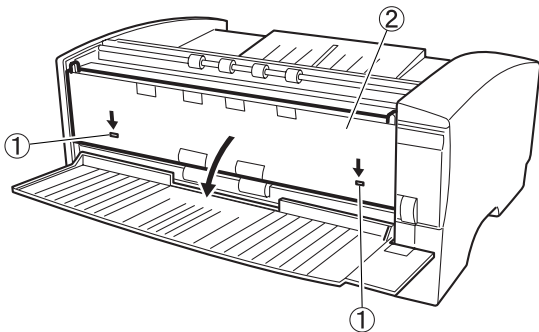


Figure 3-103

4. Eject Tray 2

- 1) Remove the top cover.
- 2) Remove the eject cover.
- 3) Pull out the eject tray 2 ① toward to remove it.

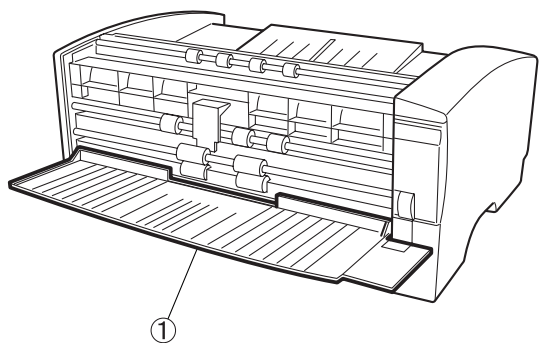


Figure 3-104

5. Left Cover

- 1) Remove the top cover and eject cover.
- 2) Slide the gear cover ①, unhook the side fitting part, unhook the upper and lower fitting parts and remove the gear cover.

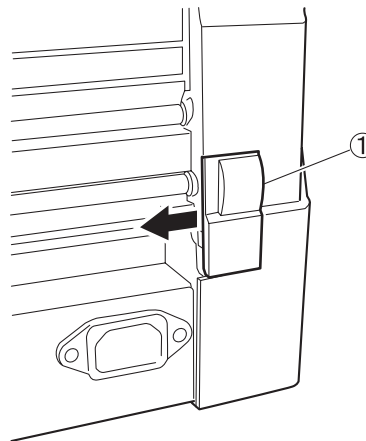


Figure 3-105

- 3) Remove the screws ① (M3 self-tapping type) which are put one each on the inside of the front and backside.

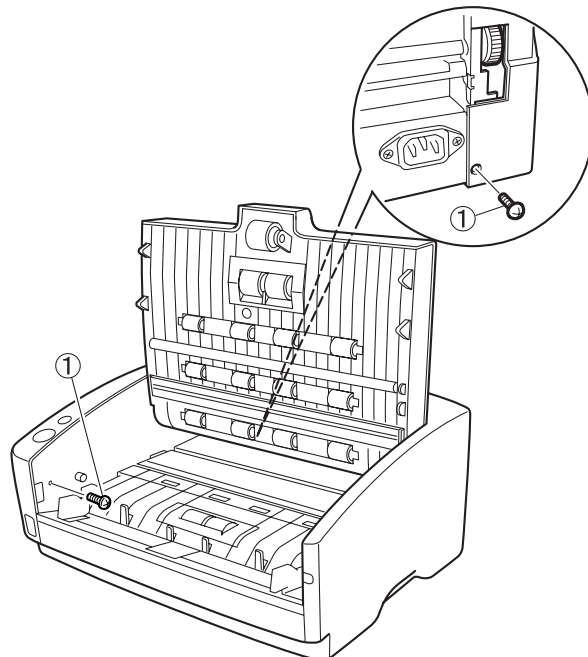


Figure 3-106

7. Eject Tray 1

- 1) Remove the screws ① (M4 self-tapping type) which are put one each on the right and left sides. And then, pull out the eject tray 1 ② about 10 mm. After unhooking the inside fitting part, lift the front side of the eject tray 1 to remove it.

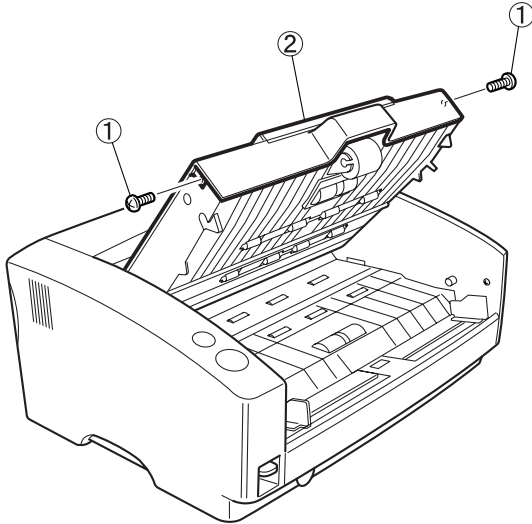


Figure 3-113

Note: Because the eject tray extension and eject roller U (follower) are included in the eject tray 1 removed, remove such parts if necessary.

* Notes on replacing parts

The eject tray 1 ① as a service part does not have a charge eliminating brush ②. If the eject tray 1 is replaced, prepare for a charge eliminating brush and attach it to the eject tray 1. Align the end of the silver sheet of the charge eliminating brush with the end of the eject tray and attach it straightly.

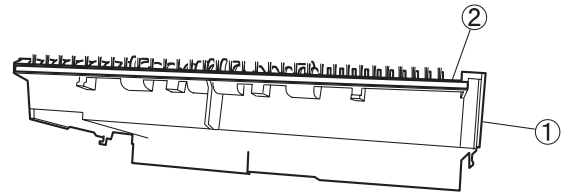


Figure 3-114

8. Lower Front Cover

- 1) Remove the left and right covers.
- 2) Unhook the left and right fitting parts ①. And then, remove lower front cover ②.

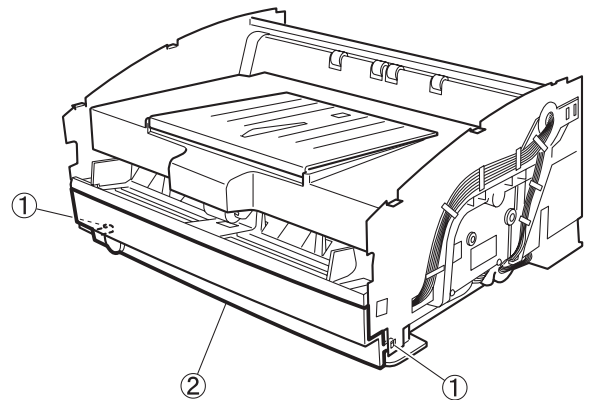


Figure 3-115

9. Entrance Guide Assembly

Note:In case that the document stopper is lowered, start from Step 3 because the left cover does not need to be removed.

- 1) Remove the left cover.
- 2) In case that the document stopper ① is raised, turn the rotor of the main motor ② counterclockwise to lower it.

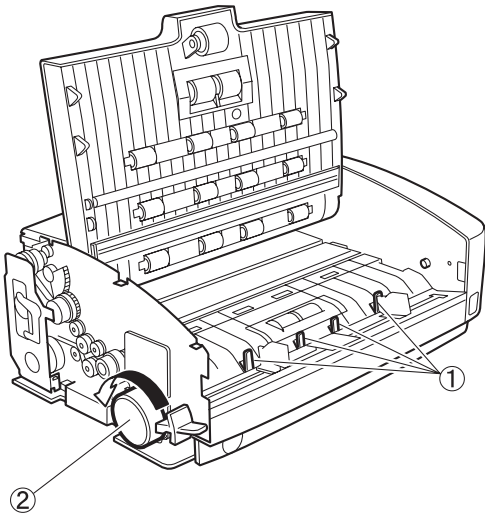


Figure 3-116

- 3) Remove the retard roller.

- 4) Remove the screws ② and shoulder ones ① two each. And then, lift the back-side of the entrance guide assembly ③ to unhook the inside fitting part. After that, displace the document stopper slightly and pull out the entrance guide assembly toward to remove it.

Note:Because the cables are connected to the backside of the entrance guide assembly, do not pull it too hard.

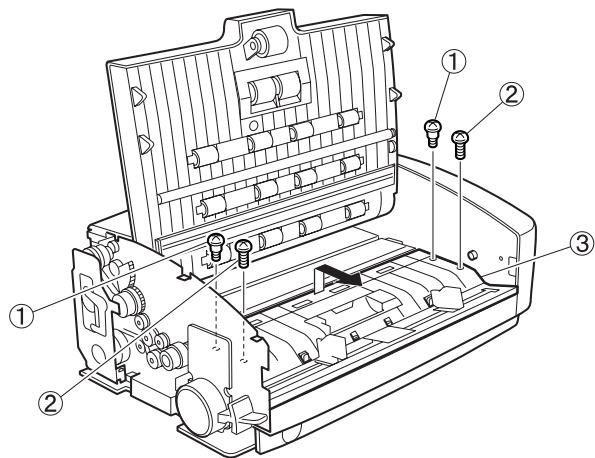


Figure 3-117

* **Notes on assembling**

Assemble the entrance guide assembly by passing it under the shaft projecting from the right and left side plates.

II. UPPER UNIT

A. Common Procedures

1. Upper Unit

- 1) Remove the left and right covers.
- 2) Remove the eject tray 1.
- 3) Disconnect the 3 connectors ① on the control PCB and remove the cable fastener. And then, put the cables ② in the upper unit. Disconnect the 2 connectors ③ on the upper unit PCB and remove the cable fastener. And then, put the cables ④ out of the upper unit.

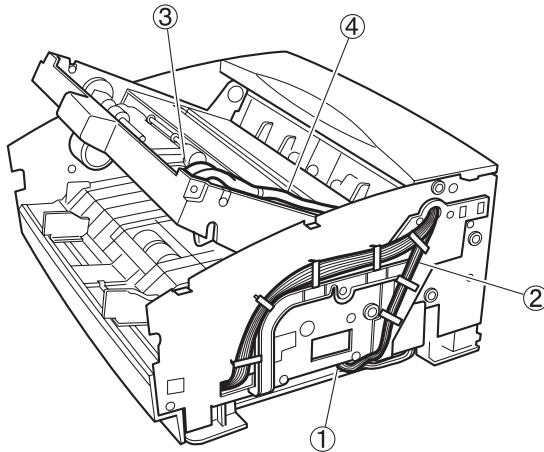


Figure 3-201

- 4) Remove the 4 screws ① (3 of 4 are M4 self-tapping type). And then, remove the eject drive assembly ②.

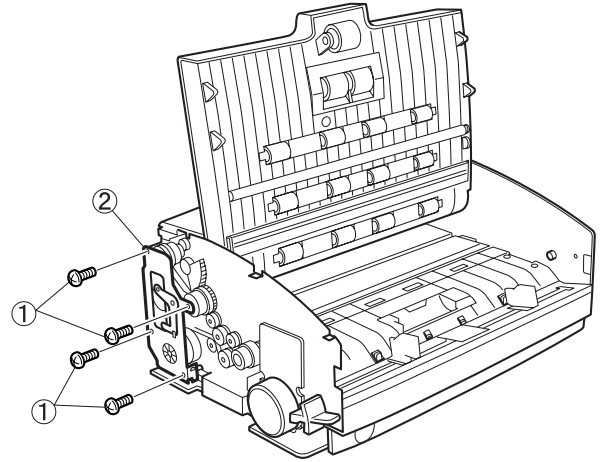


Figure 3-202

- 5) Remove the E ring ①. And then, remove the one way hinge ② and hinge gear ③. After that, unhook the inside fitting part to remove the upper unit gear ④.

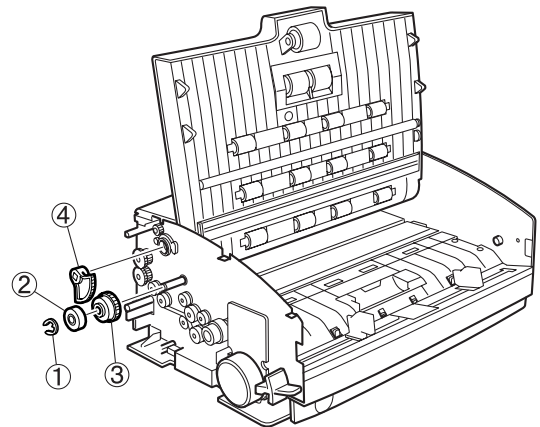


Figure 3-203

- 6) Remove the 2 screws ① (M3 x 3, with flange). And also, remove the hinge guide ② from the side plate to remove the upper unit ③.

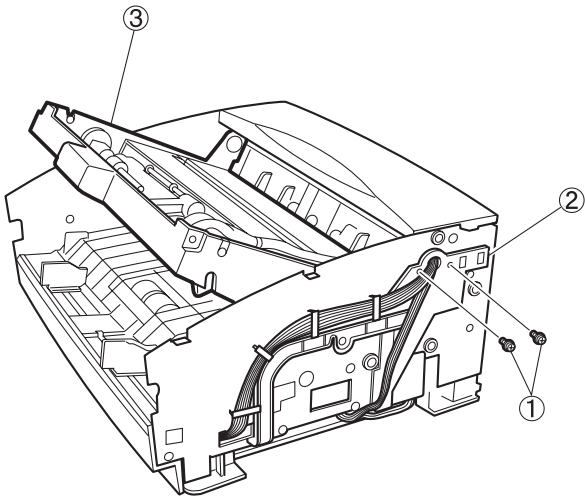


Figure 3-204

2. Shading Cover Assembly (Upper)

- 1) Remove the eject tray 1.
- 2) Disconnect the cable connected to the shading cover assembly.
- 3) Remove the 4 screws ① (M4 self-tapping type). And then, remove the 2 grounding plate ② and shading cover assembly ③.

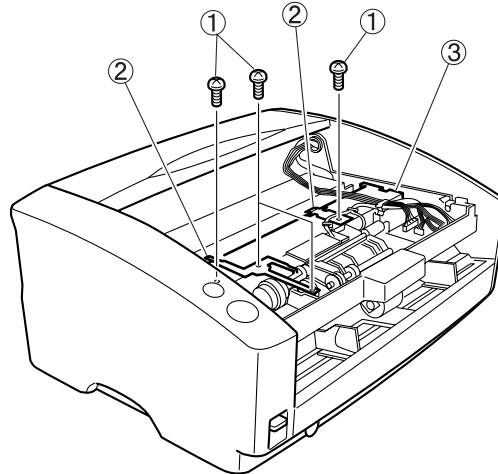


Figure 3-205

* Notes on assembling

Insert each protrusion of the cover into the left and right coil springs ① mounted on the right roller unit. Do not forget reinstalling the grounding plate removed when the cover assembly is removed. And be careful for the cables not to be pinched in a gap.

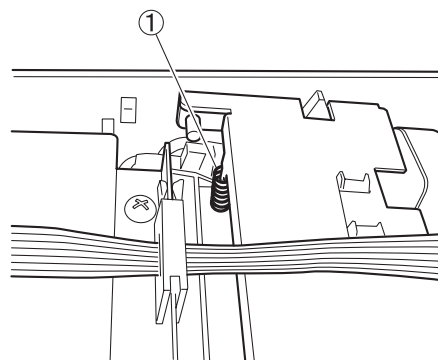


Figure 3-206

D. READING SYSTEM

1. Reading Unit (Front)

- 1) Remove the eject tray 1.
- 2) Disconnect the 2 connections ①.
Remove the 3 screws ② (M4 self-tapping type). And then, remove the cover ③.

Note: Remove them so that they are not damaged because the end of the grounding plate ④ is inserted in the cover.

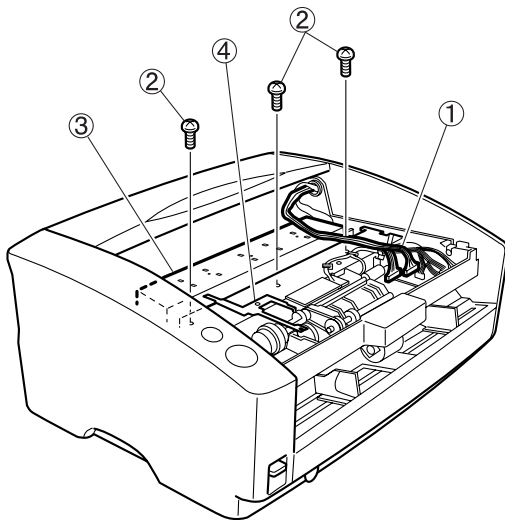


Figure 3-217

- 3) Disconnect the 3 connectors ①. And then, remove the reading unit (front).

Note: Because those connectors and pins of the cables for image signals are easily deformed, handle them with care.

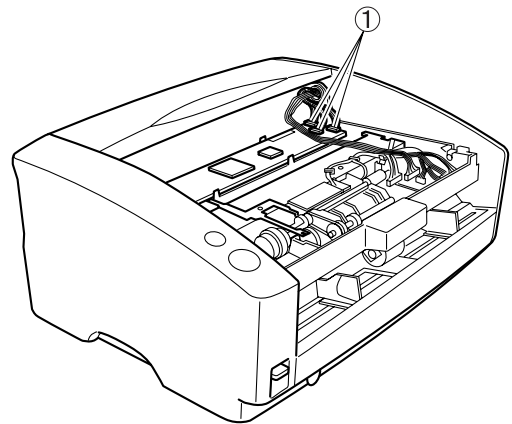


Figure 3-218

* Notes on assembling

To install the cover, place the rear projection ① under the torsion spring and insert the end of the grounding plate ② into the rectangular hole in the cover.

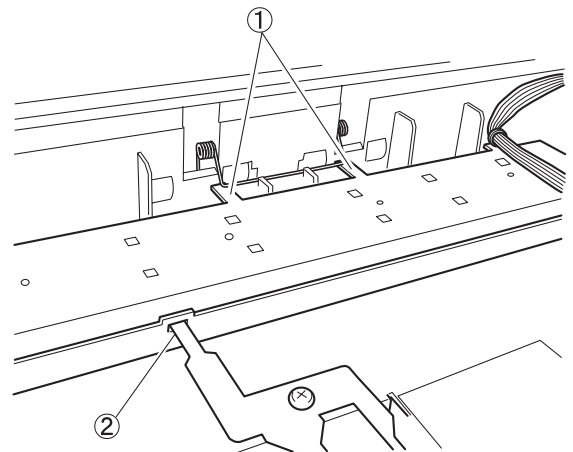


Figure 3-219

2. Reading Unit PCB (Front)

- 1) Remove the reading unit (front).
- 2) Remove the 4 screws ① (flat head and self-tapping types). After unhooking the 2 fitting parts ②, disconnect the 2 FFC cables ③. And then, remove the reading unit PCB (front) ④.

Note: Do not remove the components of the CIS unit such as the CIS PCB and light guide except for the reading glass.

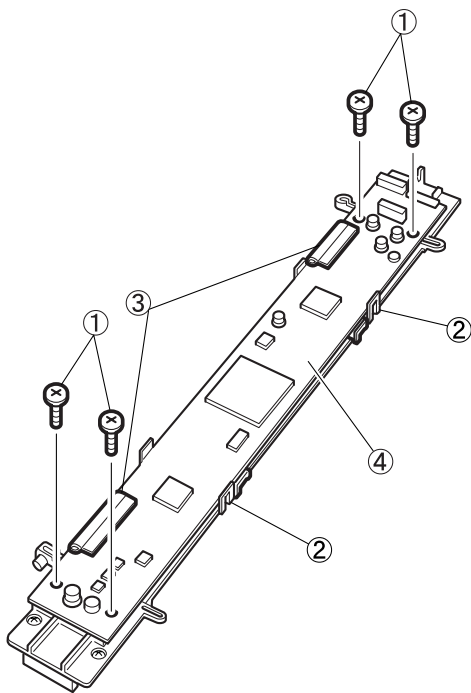


Figure 3-220

Note: The reading unit PCB for the front is totally the same as that for the back.

* Notes on assembling

Place the FFC cable between the CIS unit and the PCB so that it does not protrude to the outside.

3. CIS Unit (Front)

- 1) Remove the reading unit (front).
- 2) Remove the reading unit PCB.
- 3) After removing the 4 screws ① (self-tapping type, black), unhook the fitting part ②. And then, remove the holder ③.

Note: After removing the holder, the left and right grounding plates ④ installed between the CIS unit and holder drops off.

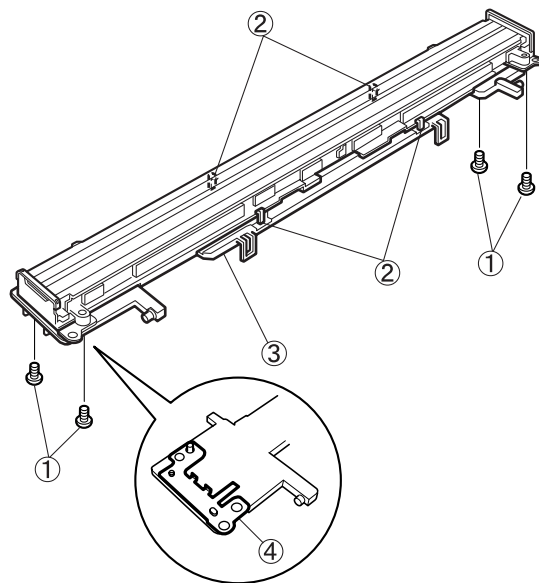


Figure 3-221

* Notes on assembling

When fixing the CIS unit on the holder, do not bend the CIS unit. If the reading glass is bent, the focal lengths will become inconsistent when a target is read.

Assemble the grounding plate by aligning it with the positioning.

Although both the CIS units for the front and back contain the same components, the directions of the glasses are different.

5. Adjustment of Tension of Timing Belt

- 1) Loosen the screw ① and release the hook of the spring ②. After that, stretch the timing belt ③ over the pulley and idler as described in the following figure.

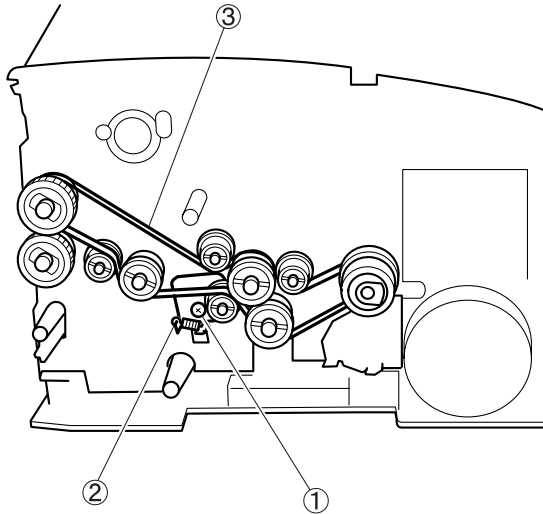


Figure 3-324

- 2) Put the hook of the spring back and tighten the screw. The tension of the timing belt is automatically adjusted in keeping with that of the spring.

D. READING SYSTEM

1. Reading Unit (Back)

- 1) Remove the right cover.
- 2) Remove the entrance guide assembly.
- 3) Remove the lower roller cover (front).
- 4) Remove the 3 connectors ① on the reading unit.

Note: Because those connectors and pins of the cables for image signals are easily deformed, handle them with care.

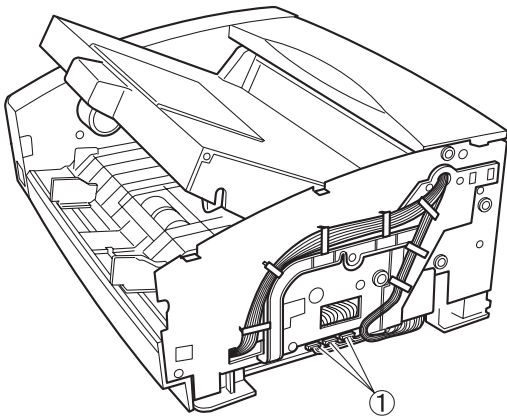


Figure 3-325

- 5) Remove the 2 screws ① (M3 x 8). And remove the reading unit (back) ②.

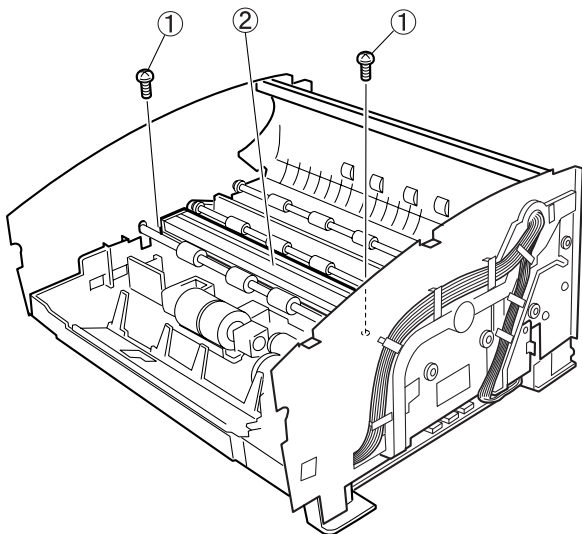


Figure 3-326

2. Reading Unit PCB (Back)

- 1) Remove the reading unit (back).
- 2) Remove the 4 screws ① (flat head and self-tapping type). And then, after unhooking the fitting parts ②, remove the 2 FFC cables ③. And remove the reading unit PCB (back) ④.

Note: Do not remove the components of the CIS unit such as the CIS PCB and light guide except for the reading glass.

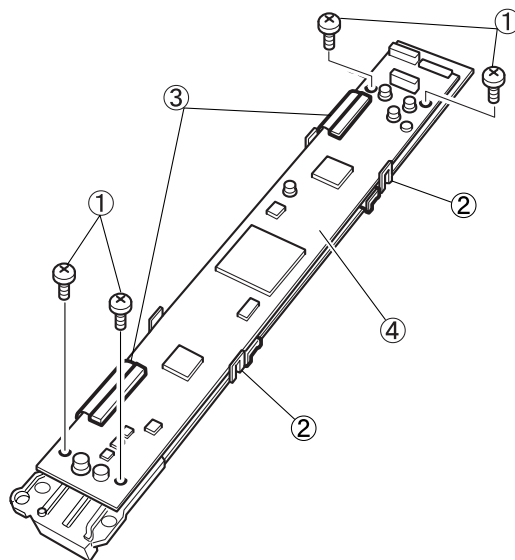


Figure 3-327

Note: The reading unit PCB for the front is totally the same as that for the back.

* Notes on assembling

Place the FFC cable between the CIS unit and the PCB so that it does not protrude to the outside.

E. ELECTRICAL SYSTEM (PCB AND OTHERS)

1. Control PCB

- 1) Remove the bottom box.
- 2) Remove the 2 connectors ① and 11 screws ② (round-end). And remove the control PCB ③.

Note:The connector for the power supply is equipped with a stopper.

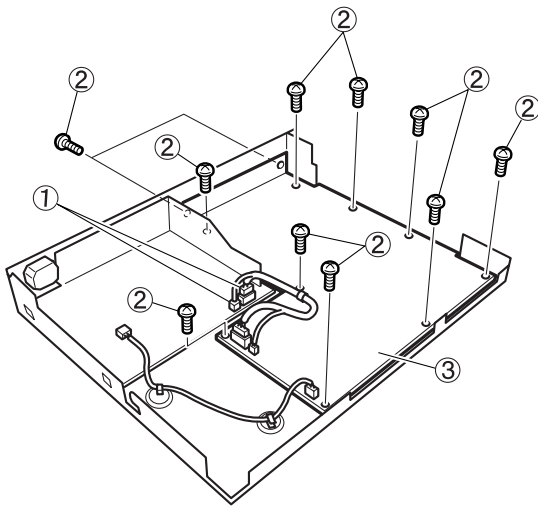


Figure 3-331

2. Power Supply PCB

- 1) Remove the bottom box.
- 2) Remove the 3 connectors ① and 6 screws ② (round-end). And remove the power supply PCB ③.

Note:The connector for the power supply is equipped with a stopper.

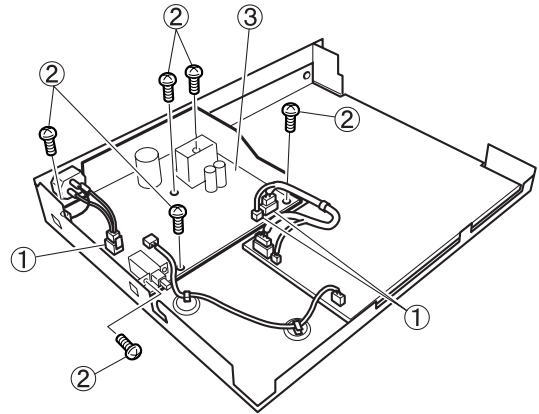


Figure 3-332

* Notes on assembling

Be aware that the power is turned off.

3. Document Board Sensor PCB

- 1) Remove the entrance guide assembly.
- 2) Unhook the fitting part ①. And remove the cover ②.

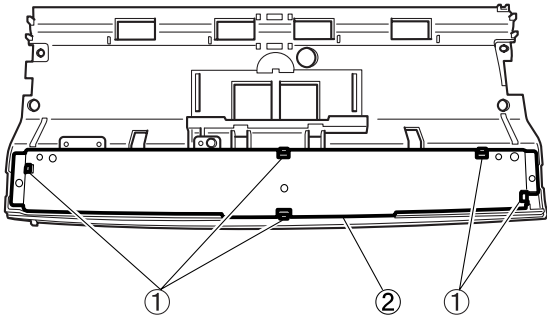


Figure 3-333

- 3) Remove the 2 screws ① (M3 self-tapping). And remove the document board sensor PCB ②.

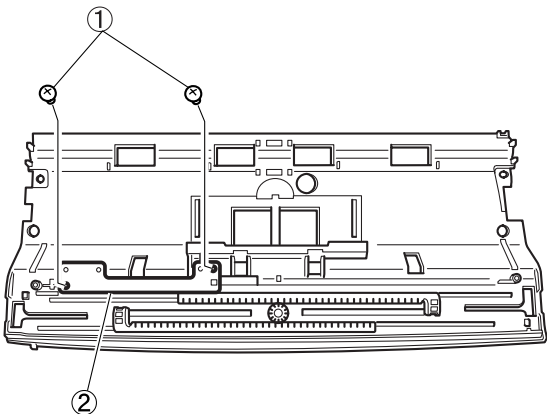


Figure 3-334

*** Notes on assembling**

Install the document guides so that the right document guide opens to the same level as the left one does.

4. Ultrasonic Sensor PCB (Drive)

- 1) Remove the entrance guide assembly.
- 2) Release the hook ① of the coil spring. And then unhook the left and right fitting parts ② and turn the bearing with stopper ③ to remove the axis. And remove the retard roller holder ④.

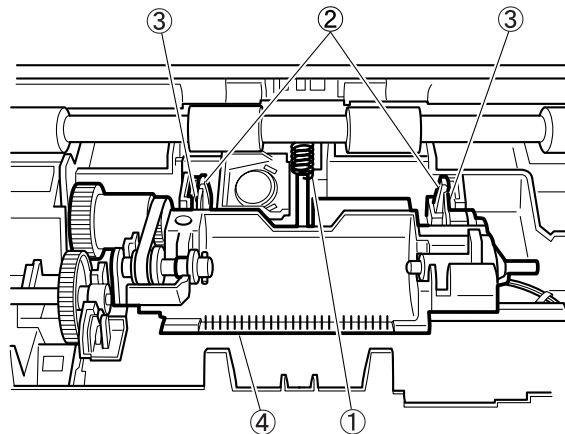


Figure 3-335

- 3) Push down the tops of the 3 fitting parts ① to remove the ultrasonic sensor ②. And unhook the fitting part ③. And then, remove the ultrasonic sensor PCB (drive) ④.

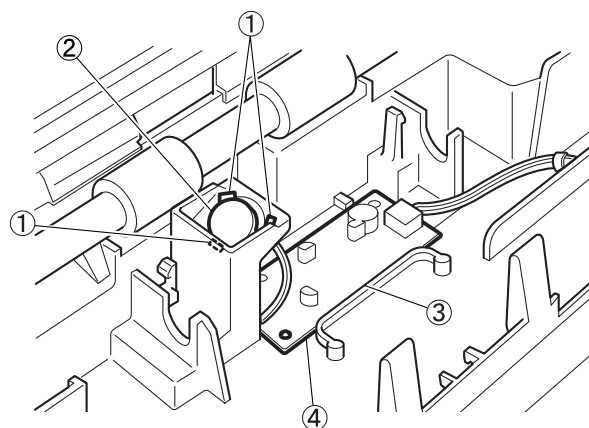


Figure 3-336

*** Notes on assembling**

Be sure to install the coil spring.

I. INSTALLATION

This machine is installed by the user. The user should be advised to install the machine by reading the user manual thoroughly.

If the machine is installed by a service technician, it must be carried out according to the user manual. The following section provides an overview.

1. Selection of Location

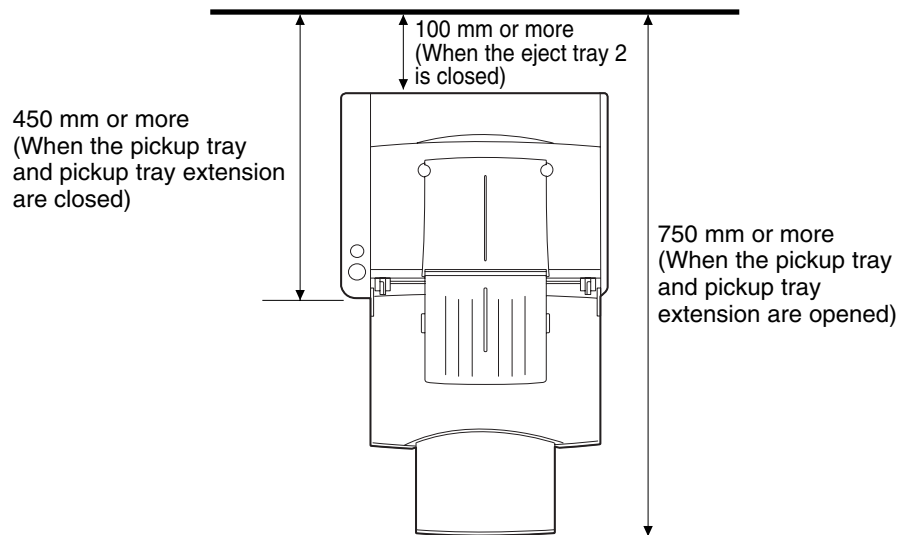


Figure 4-101

##Maintain sufficient spaces around the machine for operation and maintenance, and to allow ventilation.

##If read documents are ejected to the back of the machine (straight path), there must be a sufficient space for ejecting them behind it.

2. Checking Items

Open the outer packaging box and take out the main body and other items packed with it. Check that there are no missing items. The unpacking procedure is indicated on the box.

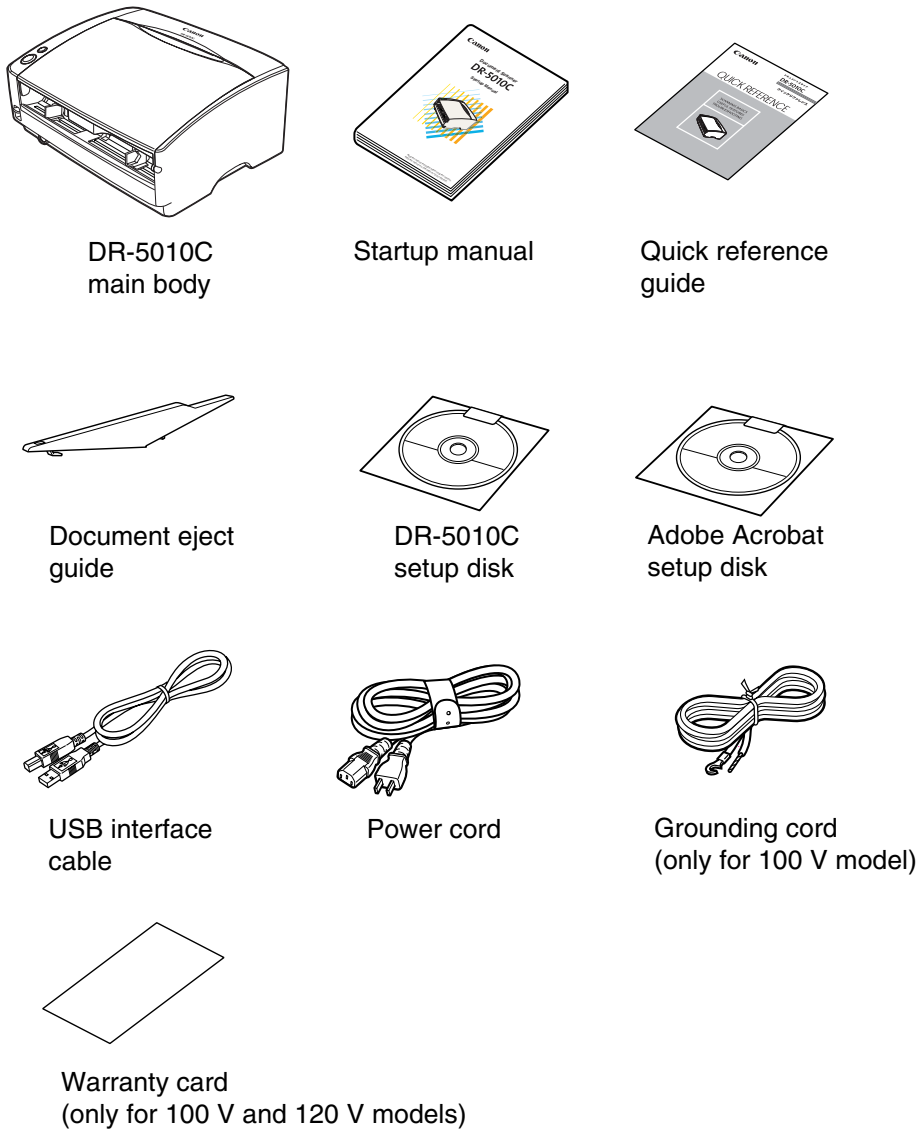


Figure 4-102

##The DR-5010C setup disk is inserted in the startup manual.

##Retain the outer packaging box and packing materials because they are required to store and transport this machine.

I. ERROR DISPLAY

1. Power Lamp

The DR-5010C does not have an error display area, but some errors are indicated by the power indicator on the operation panel of the DR-5010C.

If the DR-5010C operates normally, the power indicator lights. The power indicator flashes if the DR-5010C can not scan the document in case that the upper unit opens or the document jam occurs, etc.

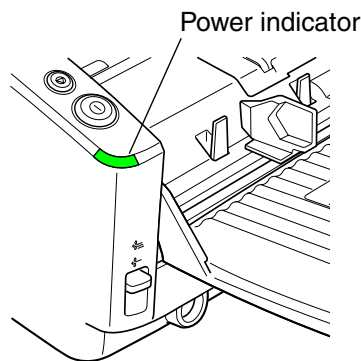


Figure 5-101

2. Error Messages

Error messages are displayed on the display connected to the computer.

The contents of the error message differ depending on the software that is used.

Most error messages are related to improper user operation and document jams. The user shall perform the remedy according to the error message. If the “motor abnormality,” etc. occur, the matter must be referred to a service technician.

The followings show the main error messages displayed when the “CapturePerfect 3.0” is used.

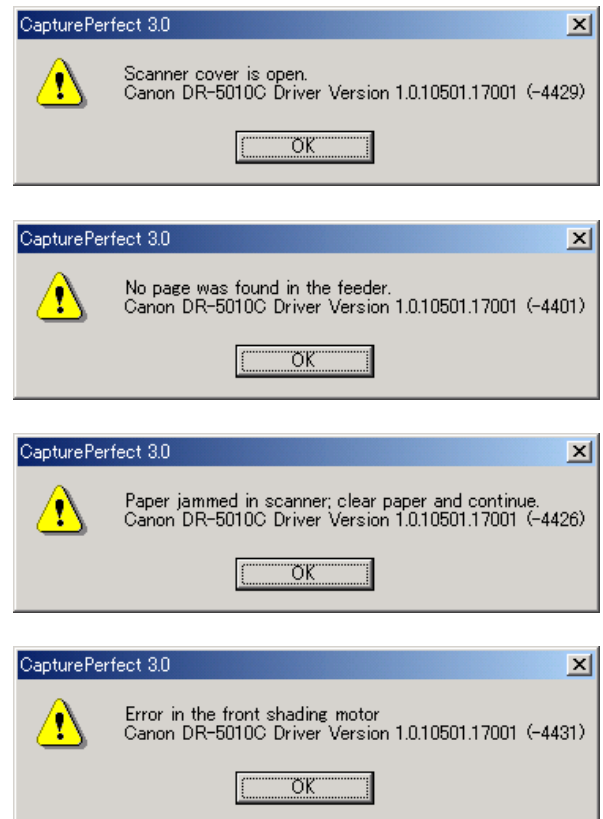


Figure 5-102

II. SERVICE MODE

1. Outline

The service mode of the DR-5010C can be executed by installing on the computer for servicing the service mode software located in the setup disk provided with the DR-5010C.

The system conditions for the computer to be used are the same as those described in the user manual. The lower the CPU performance or memory capacity, the longer the processing time, but the service mode can still be used.

Figure 5-201 shows the service screen.

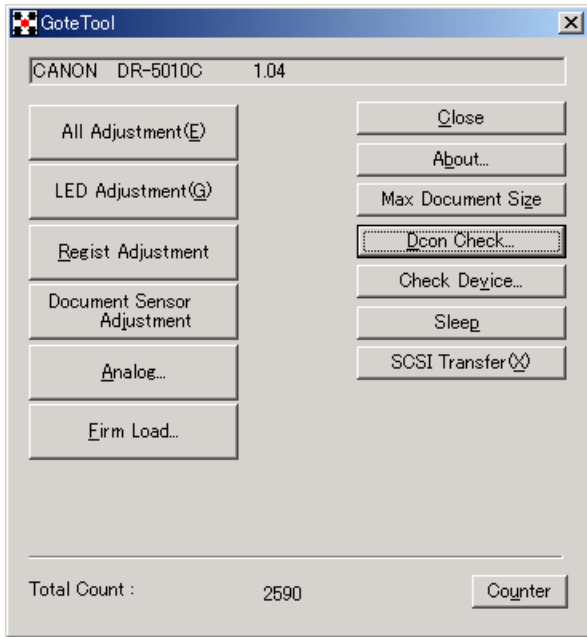


Figure 5-201

The service screen displays the buttons for selecting the various modes. Each service mode is started from this screen.

Table 5-201 shows the list of the service modes.

No.	Button name/Functions
1	All Adjustment Perform all adjustments related to image reading.
2	LED Adjustment Perform the CIS adjustments.
3	Regist Adjustment Perform the registration adjustments.
4	Document Sensor Adjustment Perform the document sensor adjustments.
5	Analog Display the analog value of each sensor.
6	Firm Load Change the firmware.
7	About Display this service mode version.
8	Max. Document Size Set the long document mode.
9	Dcon Check Check the operation of the hardware such as operation buttons, sensors, motors, etc.
10	Check Device Display the version of the internal devices of the DR-5010C.
11	Sleep Set the sleep mode.
12	SCSI Transfer Set the SCSI transfer speed.
13	Counter Display and change the total count (cumulative number of feed sheet) and the number of document jam.

Table 5-201

2. Installation Procedure

The service mode software installation procedure is described below. Do not install the service mode software on the user's computer.

- 1) Power ON the computer for servicing and start up the OS (Windows).
- 2) Set the setup disk supplied with the DR-5010C.
- 3) Copy the “\Driver\Tools” folder in the setup disk to one of the drives of the computer for servicing.

Note: For how to install the software provided with the DR-5010C, refer to the user manual.

However, for the specifications, such as the maximum number of documents that can be scanned at one time, see the computer system conditions described in the user manual.

3. Starting Up and Exiting Service Mode

The procedure for starting up the service mode is described below.

- 1) Connect the computer for servicing with the DR-5010C using a SCSI interface cable or a USB interface cable.
- 2) After powering ON the DR-5010C, power ON the computer.
- 3) Open the installed “Tools” folder and start up the “GoteTool.exe” file. (See Figure 5-202.)
- 4) The password screen is displayed, so after inputting the six characters “market,” select [OK]. (See Figure 5-203.)
- 5) The service screen is displayed.

To exit the service mode, select [Close] in the service screen.

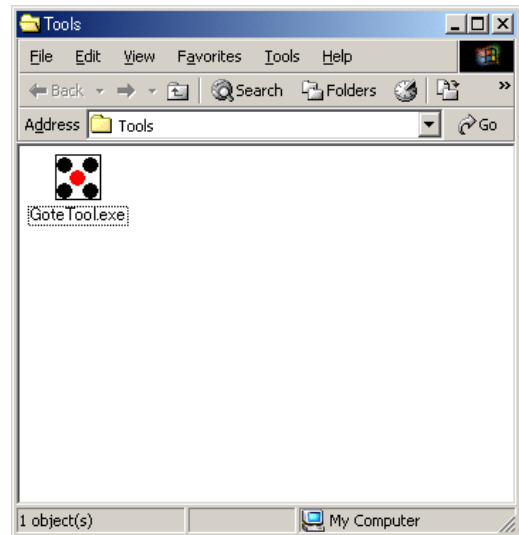


Figure 5-202



Figure 5-203

Note: After the DR-5010C is connected to the computer and the computer is powered ON for the first time, a screen requesting installation of “New Hardware” or a “Device Driver” is displayed. In this case, perform the “Scanner Recognition” according to the user manual.

Note: To execute the service mode with the user's computer, start up “GoteTool.exe” on the setup disk supplied with the DR-5010C. Do not copy this program to the user's computer. Do not let the user know the folder name and password to be used.

4. All Adjustment

This mode is used to adjust all image reading adjustments at the same time. Since the adjustment value is saved on the control PCB, be sure to execute this mode after the control PCB have been replaced.

This mode consists of three individual adjustment items: “LED Adjustment,” “Regist Adjustment” and “Document Sensor Adjustment.”

Operating Procedure

- 1) Clean the document board sensor window, the shading plate and the reading glass. Do not bend the shading plate.
- 2) Set a piece of regular white copy paper (A4/LTR). Set the document guide position to the paper. This paper is used to perform “Regist Adjustment.”
- 3) Select [All Adjustment] on the service screen.

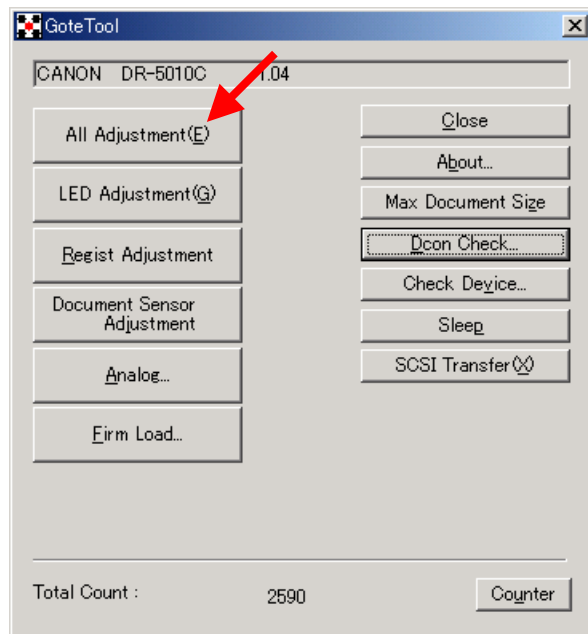


Figure 5-204

c. Motor 1

This section describes the operation check of the main motor and the eject motor.

When a reading mode and a resolution are selected from the pulldown box corresponding to each motor, the motor turns at the speed that meets the condition.

The operation screen is shown below.

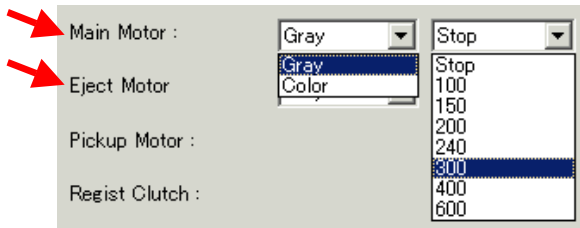


Figure 5-211

d. Motor 2, clutch

This section describes the operation check of other motor and clutch.

⌘ Pickup Motor

⌘ Regist Clutch (Registration clutch)

⌘ Shading One time (Shading motor)

⌘ Feed Clutch

The operation screen is shown below.

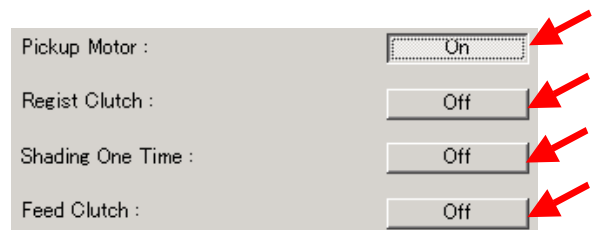


Figure 5-212

[Shading One time] can check the operation of both the upper and lower shading plates at the same time. The operation check of the shading plates can be performed by using the operation buttons for the user.

e. CIS unit LED

When the corresponding LED button is selected, the LED lights.

However, when the upper unit is opened to check lighting, the open detect switch turns OFF. Since the correct lighting operation is not performed in that state.

Therefore, after opening the upper unit, keep pressing the open detect switch with a sheet of thick paper, etc and then perform the operation.

Operating Procedure

- 1) Fully open the upper unit.
- 2) Press and hold the open detect switch with a sheet of folded thick paper or the flat end of a bar. (When the open detect switch is ON, the pickup roller is raised.)

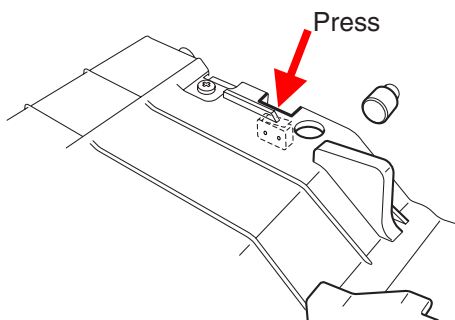


Figure 5-213

- 3) Select the corresponding LED button.

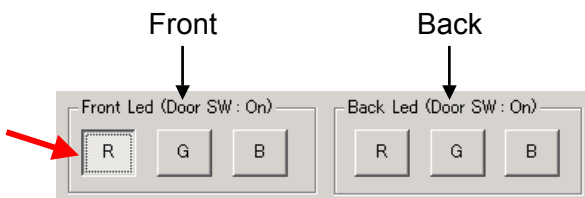


Figure 5-214

Note: If the open detect switch turns OFF when the LED lights, the machine may malfunction.

7. Analog

This mode is used to check analog data for sensors. However, the operation check of normal sensors is performed in the previous section "Dcon Check," so this section describes the ultrasonic sensor and A4 width sensor.

a. Ultrasonic sensor

When [Analog] is selected on the service screen, [USS screen] is displayed.

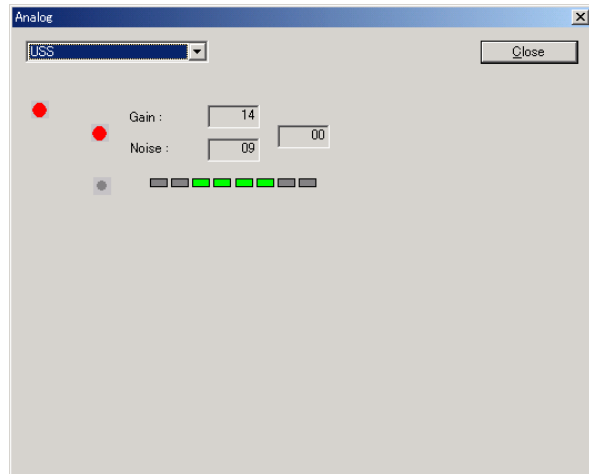


Figure 5-215

When two sheets of paper are set on the ultrasonic sensor section, the “double feed judgment indicator” and “amplitude judgment indicator” light in red. The “phase judgment indicator” may light under some conditions. The screen displayed when a double feed is detected is shown below.

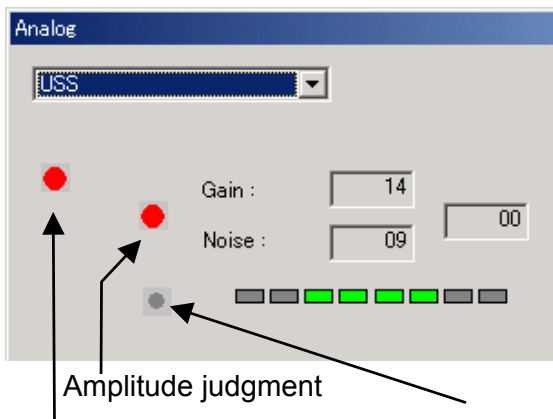


Figure 5-216

- b. A4 width sensor
When [Feeder1] is selected on the [USS screen] pulldown box, [Feeder1 screen] is displayed.

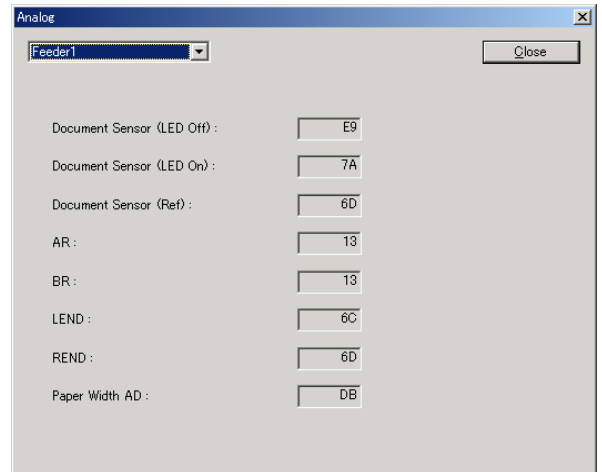


Figure 5-217

[Paper Width AD] at the bottom of the screen indicates the A4 width sensor. If the document guide is maximized, a large number, such as “DB,” is displayed. When the document guide is narrowed, the value decreases slightly before it becomes the A4 width, and when it reaches the A4 width position, the value becomes nearly zero, such as “0A,” and then the value does not change.



Figure 5-218

8. Max Document Size

This mode is used to set the long document mode. However, the long document mode is not standard specification, so it is used for special users only. Do not use it for general users.

When the long document mode is set, the document length is 1000 mm at the maximum, but there are restrictions shown below:

- # Document size: "Automatic detection" only
- # Document thickness: 0.2 mm or less
- # Image size: 128 MB or less
- # Feed: Feed a sheet of paper. Performance of paper pickup/eject is not guaranteed.

When [Max Document Size] is selected on the service screen, the setting screen is displayed. To set the long document mode, change the setting to [1000.0(mm)] and press the [OK] button.

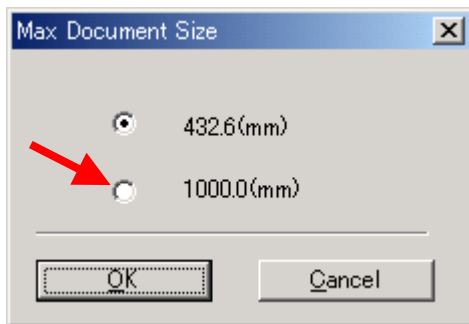


Figure 5-219

9. Sleep

This mode is used to set so that the sleep mode is not effective. However, the sleep mode OFF is not the standard specification, so it is used for special users only. Do not use it for general users.

When [Sleep] is selected on the service screen, the setting screen is displayed. To set the sleep mode OFF, change the setting to [Sleep Mode Off] and press the [OK] button.

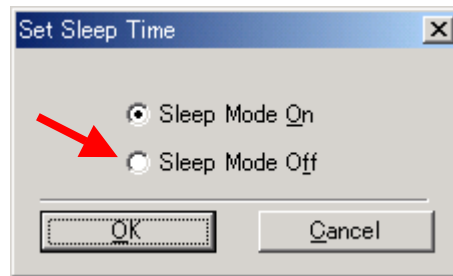


Figure 5-220