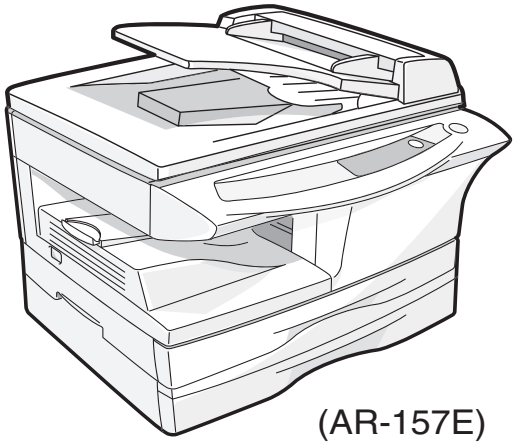
SHARP SERVICE MANUAL

CODE : 00ZAR157E/A1E



(AR-157E)

DIGITAL LASER COPIER/ PRINTER

AR-122E
AR-152E
AR-153E
MODEL AR-157E

CONTENTS

Parts marked with "⚠" are important for maintaining the safety of the machine. Be sure to replace these parts with the replacement parts specified to maintain the safety and performance of the machine.

SHARP CORPORATION

This document has been published to be used for after sales service only.
The contents are subject to change without notice.

CAUTION

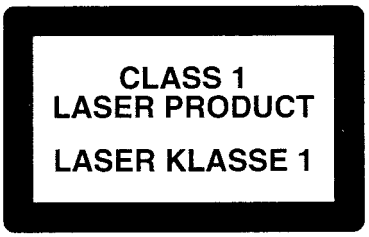
This product is a class 1 laser product that complies with 21CFR 1040 of the CDRH standard and IEC825. This means that this machine does not produce hazardous laser radiation. The use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

This laser radiation is not a danger to the skin, but when an exact focusing of the laser beam is achieved on the eye's retina, there is the danger of spot damage to the retina.

The following cautions must be observed to avoid exposure of the laser beam to your eyes at the time of servicing.

1) When a problem in the laser optical unit has occurred, the whole optical unit must be exchanged as a unit, not as individual parts.
2) Do not look into the machine with the main switch turned on after removing the developer unit, toner cartridge, and drum cartridge.
3) Do not look into the laser beam exposure slit of the laser optical unit with the connector connected when removing and installing the optical system.
4) The middle frame contains the safety interlock switch.

   Do not defeat the safety interlock by inserting wedges or other items into the switch slot.



LASER WAVE – LENGTH : 770 ~ 795nm
Pulse times : 11.82μs/7mm
Out put power : 0.17mW ± 0.01mW

CAUTION

INVISIBLE LASER RADIATION,
WHEN OPEN AND INTERLOCKS DEFEATED.
AVOID EXPOSURE TO BEAM.

VORSICHT

UNSICHTBARE LASERSTRAHLUNG,
WENN ABDECKUNG GEÖFFNET UND
SICHERHEITSVERRIEGELUNG ÜBERBRÜCKT.
NICHT DEM STRAHL AUSSETZEN.

VARO !

AVATTAESSA JA SUOJALUKITUS
OHITETTAESSA OLET ALTTIINA
NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE ÄLÄ
KATSO SÄTEESEEN.

ADVARSEL

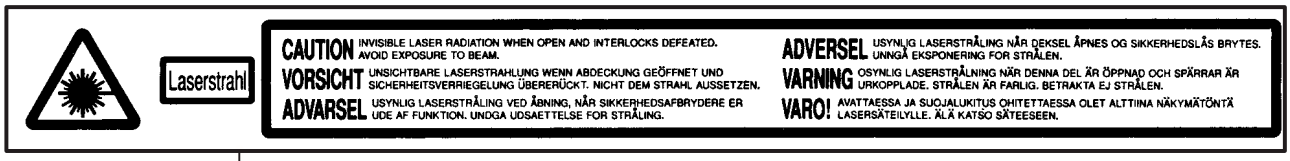
USYNLIG LASERSTRÅLNING VED ÅBNING, NÅR
SIKKERHEDSBRYDERE ER UDE AF
FUNKTION. UNDGÅ UDSAETTELSE FOR
STRÅLNING.

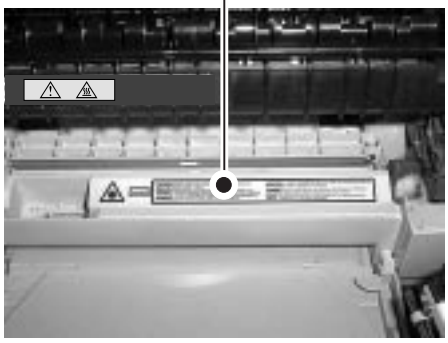
VARNING !

OSYNLIG LASERSTRÅLNING NÄR DENNA DEL
ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD.
BETRAKTA EJ STRÅLEN. – STRÅLEN ÄR
FARLIG.

At the production line, the output power of the scanner unit is adjusted to 0.57 MILLI-WATT PLUS 20 PCTS and is maintained constant by the operation of the Automatic Power Control (APC). Even if the APC circuit fails in operation for some reason, the maximum output power will only be 15 MILLI-WATT 0.1 MICRO-SEC. Giving and accessible emission level of 42 MICRO-WATT which is still-less than the limit of CLASS-1 laser product.

Caution
This product contains a low power laser device. To ensure continued safety do not remove any cover or attempt to gain access to the inside of the product. Refer all servicing to qualified personnel.



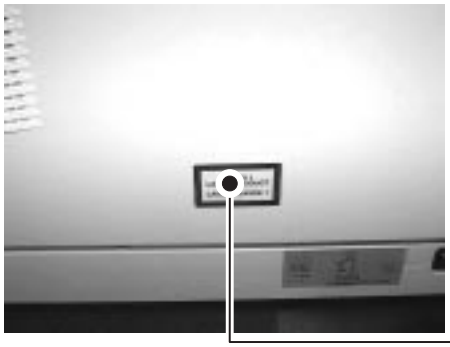


Caution label on the unit

The label (⚠ ♨) in the fusing area of the unit indicates the following:

⚠ : Caution, risk of danger

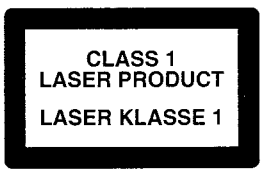
♨ : Caution, hot surface



The foregoing is applicable only to the 220V model, 230V model and 240V model.

VAROITUS! LAITTEEN KÄYTTÄMINEN MUULLA KUIN TÄSSÄ KÄYTTÖOHJEESSA MAINITULLA TAVALLA SAATTAA ALTISTAA KÄYTTÄJÄN TURVALLISUUSLUOKAN 1 YLITTÄVÄLLE NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE.

VARNING - OM APPARATEN ANVÄNDS PÅ ANNAT SÄTT ÄN I DENNA BRUKSANVISNING SPECIFICERATS, KAN ANVÄNDAREN UTSÄTTAS FÖR OSYNLIG LASERSTRÅLNING, SOM ÖVERSKRIDER GRÄNSEN FÖR LASERKLASS 1.



LUOKAN 1 LASERLAITE
KLASS 1 LASER APPARAT

CONTENTS

[1] GENERAL

1. Major functions

Configurations

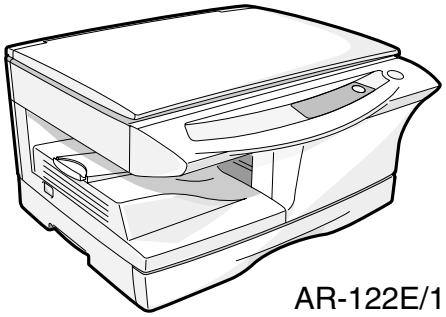
Item / Model	CPM	SB/MB	2 Tray	SPF	R-SPF	Color Scanner	GDI printer	PCL printer	SOPM	Duplex	Memory	FAX
AR-122E	12CPM	SB	×	×	×	Opt ∗1	Opt ∗1	×	○	×	8M	×
AR-152E	15CPM	SB	×	×	×	Opt ∗1	Opt ∗1	×	○	×	8M	×
AR-153E	15CPM	MB	Opt	Opt	×	Opt ∗2	Opt ∗2	×	○	×	8M	×
AR-157E	15CPM	MB	○	×	○	Opt ∗2	Opt ∗2	×	○	○	16M	×

Descriptions of items

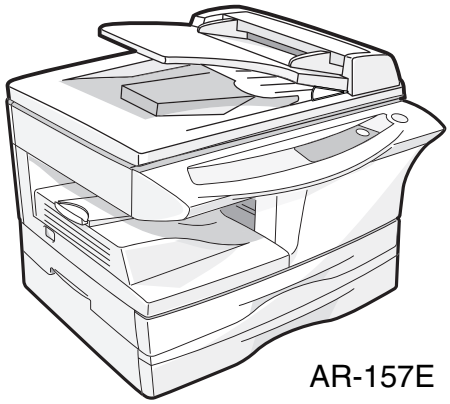
CPM: Copy speed (Copies Per Minute)
SB/MB: SB = Manual feed single bypass, MB = Manual feed multi bypass
2 tray: Second cassette unit.
SPF: Original feed unit
R-SPF: Duplex original feed unit
Color scanner: Color scanner function
GDI printer: GDI printer function with USB.
PCL printer: PCL printer function with USB.
SOPM: Scan Once Print Many function (Many copies are made by one scan.)
Duplex: Auto duplex copy function
Memory: Standard page memory
FAX: FAX function.

Descriptions of table

○: Standard provision
×: No function or no option available
Opt: Option
∗1: AL-12PKM
∗2: AR-PG2



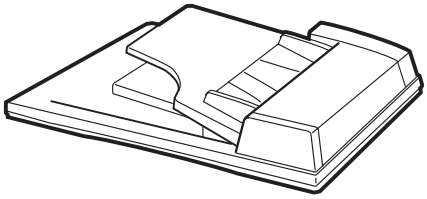
AR-122E/152E/153E



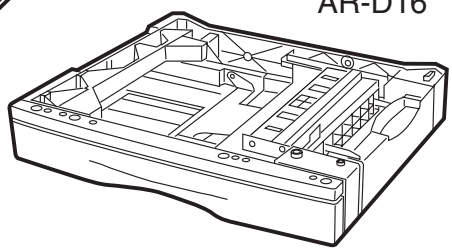
AR-157E

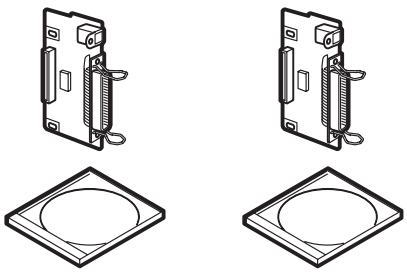
(Options)

AR-SP5



AR-D16





AL-12PKM AR-PG2

[2] SPECIFICATIONS

1. Basic Specifications

Item			
Type		Desktop	
Copy system		Dry, electrostatic	
Segment (class)		Digital personal copier	
Copier dimensions	AR-122E	20.4"(W)X18.2"(D)X11.6"(H) (518mm(W)X462.5mm(D)X295.6mm(H))	
	AR-152E	20.4"(W)X18.2"(D)X11.6"(H) (518mm(W)X462.5mm(D)X295.6mm(H))	
	AR-153E	20.4"(W)X19.4"(D)X11.6"(H) (518mm(W)X492.5mm(D)X295.6mm(H))	
	AR-157E	20.4"(W)X19.4"(D)X18.3"(H) (518mm(W)X492.5mm(D)X465.4mm(H))	
Weight (Approximately)	AR-122E	35.3lbs.(17Kg)	TD and drum cartridges included
	AR-152E	35.3lbs.(17Kg)	
	AR-153E	35.3lbs.(17Kg)	
	AR-157E	50.7lbs.(24Kg)	

2. Operation specifications

Section, item			Details	
Paper feed section	Paper feed system		AR-122E/152E	1 tray (250 sheet) + single bypass
			AR-153E	1 tray (250 sheet) + multi bypass (50 sheet)
			AR-157E	2 tray (500 sheet) + multi bypass (50 sheet)
	AB system	Tray paper feed section	Paper size	A4, B5, A5 (Landscape)
			Paper weight	56 - 80g/m^2 (15 - 21 lbs.)
			Paper feed capacity	250 sheets
			Kinds	Standard paper, specified paper, recycled paper
			Remark	User adjustment of paper guide available
		Multi bypass paper feed section	Paper size	A4, B5, A5, B6, A6 (Landscape)
			Paper weight	52 - 128g/m^2 (14 - 34.5 lbs.)
			Paper feed capacity	50 sheets
			Kinds	Standard paper, specified paper, recycled paper, OHP, Label, Envelop (Single copy)
			Remark	User adjustment of paper guide available
		Single bypass paper feed section	Paper size	A4, B5, A5, B6, A6 (Landscape)
			Paper weight	52 - 128g/m^2 (14 - 34.5 lbs.)
			Paper feed capacity	1 sheet
			Kinds	Standard paper, specified paper, recycled paper, OHP, Label, Postal card, Envelop, Post card (Including double postal without fold line)
			Remark	User adjustment of paper guide available
	Inch system	Tray paper feed section	Paper size	8-1/2" x 14", 8-1/2 x 11", 8-1/2" x 5-1/2" (Landscape)
			Paper weight	15 - 21 lbs.
			Paper feed capacity	250 sheets
			Kinds	Standard paper, specified paper, recycled paper
			Remark	User adjustment of paper guide available
		Multi bypass paper feed section	Paper size	8-1/2" x 14", 8-1/2 x 11", 8-1/2" x 5-1/2", 3-1/2" x 5-1/2" (Landscape)
			Paper weight	14 - 34.5 lbs.
			Paper feed capacity	50 sheets
			Kinds	Standard paper, specified paper, recycled paper, OHP, Label, Envelop (Single copy)
			Remark	User adjustment of paper guide available
		Single bypass paper feed section	Paper size	8-1/2" x 14", 8-1/2 x 11", 8-1/2" x 5-1/2" (Landscape)
			Paper weight	14 - 34.5 lbs.
			Paper feed capacity	1 sheet
			Kinds	Standard paper, specified paper, recycled paper, OHP, Label, Envelop
			Remark	User adjustment of paper guide available
Paper exit section		Exit way		Face down
		Capacity of output tray		100 sheets
Originals		Original set		Center Registration (left edge)
		Max. original size		A4 (8-1/2" x 14")
		Original kinds		sheet, book
		Original size detection		None

Section, item			Details		
Optical section	Scanning section	Scanning system			3 CCDs (RGB) sensor scanning by lighting white lamp
		CCD sensor	Resolution		600 dpi
		Lighting lamp	Type		CCFL
			Voltage		1100Vrms (Min)
			Power consumption		9.6W (Max)
		Output data			R, G, B 1 or 8 bits/pixel / A/D 16bit
	Writing section	Writing system			Writing to OPC drum by the semiconductor laser
		Laser unit	Resolution		600 dpi
Image forming		Photoconductor	type		OPC (30ø)
			Life		25k
		Charger	Charging system		Saw -tooth charging with a grid, / (-) scorotron discharge
			Transfer system		(+) DC scorotron system
			Separation system		(-) DC scorotron system
		Developing	Developing system		Dry, 2-component magnetic brush development system
		Cleaning	Cleaning system		Counter blade system (Counter to rotation)
Fusing section		Fusing system			Heat roller system
		Upper heat roller	type		Teflon roller
		Lower heat roller	type		Silicon rubber roller
		Heater lamp	type		Halogen lamp
			Voltage		120V/230V
			Power consumption		800W
Electrical section		Power source	Voltage		100V, 110V, 120/127V, 230V, 240V
			Frequency		Common use for 50 and 60Hz
		Power consumption	Max.		Less than 1000W
			Average (during copying)	AR-122E	300 Wh/H *1)
				AR-152E	300 Wh/H *1)
				AR-153E	300 Wh/H *1)
				AR-157E	310 Wh/H *1)
			Average (stand-by)		80Wh/H *1)
			Pre-heat mode		18Wh/H *1)
			Auto power shut-off mode		4.5Wh/H *1)

*1) May fluctuate due to environmental conditions and the input voltage.

3. Copy performance

Section, item			Details	AR-122E	AR-152E	AR-153E	AR-157E
Copy magnification		Fixed magnification ratios		3 Reduction + 2 Enlargement (AB system : 25, 70, 86, 100, 141, 400%) (Inch system : 25, 64, 78, 100, 129, 400%)			
		Zooming magnification ratios		25 - 400% (376 steps in 1% increments)			
Manual steps (manual, photo)				5 steps			
Copy speed		First copy time	Tray paper feed	9.6 sec. (Pre-heat mode:25 sec. / Auto power-shut-off mode : 40 sec.) A4 or Letter/100%/Auto Exposure			
	AB system A4 (Landscape)	Copy speed (CPM)	Same size	12	15	15	15
			Enlargement	12	15	15	15
			Reduction	12	15	15	15
	AB system B5 (Landscape)	Copy speed (CPM)	Same size	12	15	15	15
			Enlargement	12	15	15	15
			Reduction	12	15	15	15
	Inch system 8-1/2" x 14" (Landscape)	Copy speed (CPM)	Same size	12	12	12	12
			Enlargement	12	12	12	12
			Reduction	12	12	12	12
	Inch system 8-1/2" x 11" (Landscape)	Copy speed (CPM)	Same size	12	15	15	15
			Enlargement	12	15	15	15
			Reduction	12	15	15	15
Max. continuous copy quantity				99			
Void		Void area	leading edge	1 - 4mm			
			Trailing edge	4mm or less, 6mm or less (Duplex copying/both image)			
			Side edge void area	0.5mm or more (per side) 4.5mm or less (total of both sides)			
		Image loss	leading edge	same size: 3.0mm or less (OC) / 4mm or less (SPF/R-SPF/Duplex) Enlarge: 2mm or less (OC) / 3mm or less (SPF/R-SPF/Duplex) Reduction (50%): 6.0mm or less (OC) / 8mm or less (SPF/R-SPF/Duplex)			
Warm-up time				0 sec.			
Power save mode reset time				0 sec.			
Paper jam recovery time				0 sec.			

4. RSPF

Original capacity		30 sheets (52 to 90g/m^2)(14 to 23.9 lbs.)	
Original size		A4 to A5/10" x 14" to 5-1/2" x 8-1/2"	
Original replacement speed		12CPM(A4/8-1/2" x 11"Landscape)(15CPM model)	
Job speed(Tray1,Landscape)	Single copy	S to S	12CPM
		S to D	5.6CPM
		D to S	5.5CPM
		D to D	5.2CPM
	Multi copy	S to S	15CPM
		D to S	15CPM
Original placement		Face up	
Original weight		52 to 90g/m^2(14 - 23.9lbs.)	
Mixed feeding(Paper size)		Performance Degraded	
Original which cannot		Thermal papers, originals with punch holes for files, be used folded paper, transparent originals such as OHP films, stapled or clip used originals with cover up liquid used, Originals with tape sealed, originals with high level frictional coefficient such as photos or catalogs.	

[3] CONSUMABLE PARTS

1. Supply system table

A. SEC governments

No.	Name	Content	Life	Product name	Package	Remark
1	Toner CA(Black)	Toner × 10 (Toner: Net Weight 210g) Polyethylene bag × 10	80K	AR-152MT-J	1	∗ Life setup is based on A4 6%. MT=NT ∗10

B. SEC/SECL/LAG

No.	Name	Content	Life	Product name	Package	Remark
1	Toner CA(Black)	Toner × 10 (Toner: Net Weight 210g) Polyethylene bag × 10	80K	AR-152MT	1	∗ Life setup is based on A4 6%. MT=NT ∗10
2	Developer	Developer × 10 (Developer: Net Weight 170g)	250K	AR-152MD	1	MD=ND ∗10
3	Drum kit	Drum × 1 Drum fixing plate × 1	25K	AR-152DR	10	

Note: Printing of the master/individual cartons is made in 2 languages, English/French.
Packed together with the machine: DR 25K/Developer UN/Process UN

C. Europe subsidiaries/East Europe/SCA/SCNZ

No.	Name	Content	Life	Product name	Package	Remark
1	Toner CA(Black)	Toner × 10 (Toner: Net Weight 210g) Polyethylene bag × 10	80K	AR-152LT	1	LT=T ∗10
2	Developer	Developer × 10 (Developer: Net Weight 170g)	250K	AR-152LD	1	LD=DV ∗10
3	Drum kit	Drum × 1 Drum fixing plate × 1	25K	AR-152DM	10	

Note: Printing of the master/individual cartons is made in 4 languages, English/French/German/Spanish.
Packed together with the machine: DR 25K/Developer UN/Process UN

D. SMEF (Middle East, Africa) Israel/Russia/CIS/Taiwan/Philippines

No.	Name	Content	Life	Product name	Package	Remark
1	Toner CA(Black)	Toner × 10 (Toner: Net Weight 210g) Polyethylene bag × 10	80K	AR-152ET	1	∗ Life setup is based on A4 6%. ET=FT ∗10
2	Developer	Developer × 10 (Developer: Net Weight 170g)	250K	AR-152CD	1	CD=SD ∗10
3	Drum kit	Drum × 1 Drum fixing plate × 1	25K	AR-152DR	10	

Note: Printing of the master/individual cartons is made in 4 languages, English/French/German/Spanish.
Packed together with the machine: DR 25K/Developer UN/Process UN

E. Asia (Subsidiary)

No.	Name	Content	Life	Product name	Package	Remark
1	Toner CA(Black)	Toner × 10 (Toner: Net Weight 210g) Polyethylene bag × 10	80K	AR-152CT	1	∗ Life setup is based on A4 6%. CT=ST ∗10
2	Developer	Developer × 10 (Developer: Net Weight 170g)	250K	AR-152CD	1	CD=SD ∗10
3	Drum kit	Drum × 1 Drum fixing plate × 1	25K	AR-152DR	10	

Note: Printing of the master/individual cartons is made in 4 languages, English/French/German/Spanish.
Packed together with the machine: DR 25K/Developer UN/Process UN

F. SRH Chinese language version

No.	Name	Content		Life	Product name	Package	Remark
1	Toner CA(Black)	Toner (Toner: Net Weight 210g) Polyethylene bag	× 10 × 10	80K	AR-152CT-C	1	∗ Life setup is based on A4 6%. CTC=STC ∗10
2	Developer	Developer (Developer: Net Weight 170g)	× 10	250K	AR-152CD-C	1	CDC=SDC ∗10
3	Drum kit	Drum Drum fixing plate	× 1 × 1	25K	AR-152DR-C	10	

Note: Printing of the master/individual cartons is made in 2 languages, English/Chinese.
Packed together with the machine: DR 25K/Developer UN/Process UN

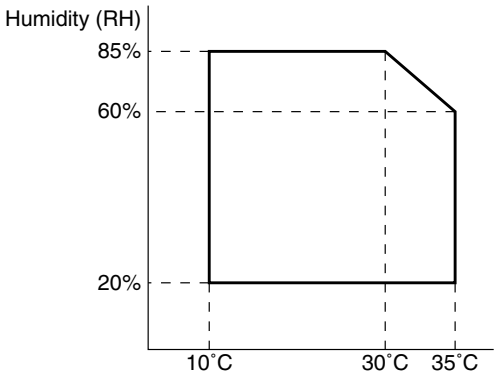
2. Environmental

The environmental conditions for assuring the copy quality and the machine operations are as follows:

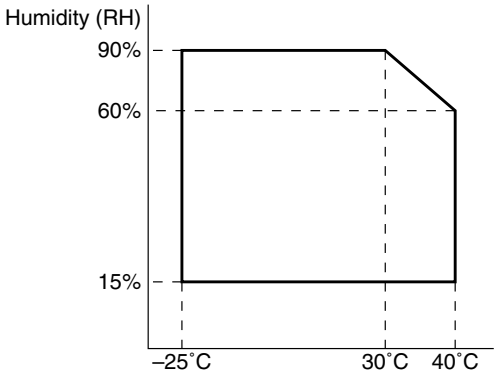
(1) Normal operating condition

Temperature: 20°C to 25
Humidity: 65 ± 5%RH

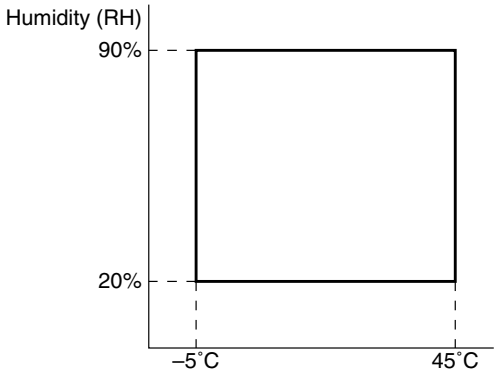
(2) Acceptable operating condition



(3) Optical condition

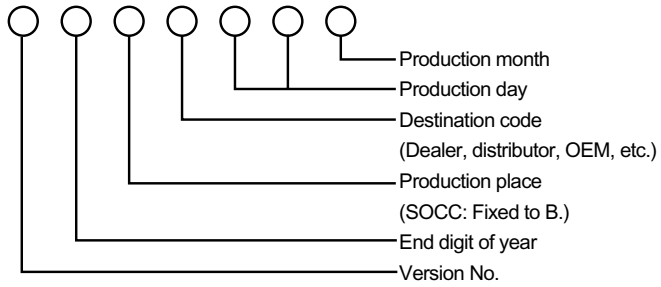


(4) Supply storage condition



3. Production control number (lot No.) identification

<Toner cartridge>

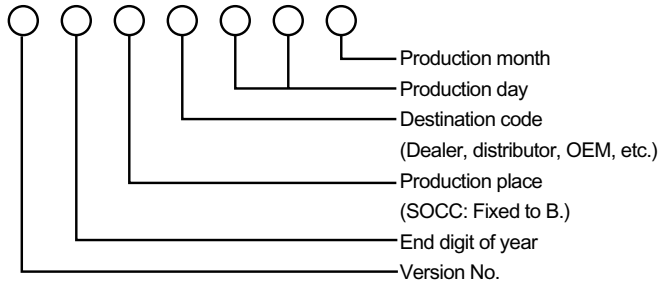


∗: Destination

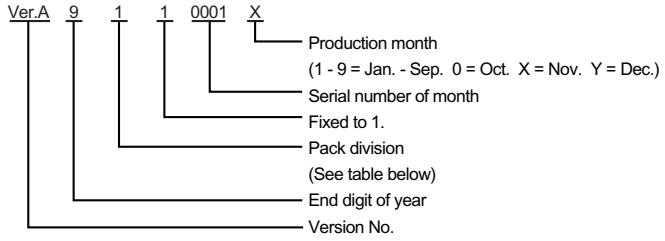
Division		No.
EX Destination	A same pack	G
	B same pack	H
Option Destination	A	P
	B	Q

<Drum cartridge>

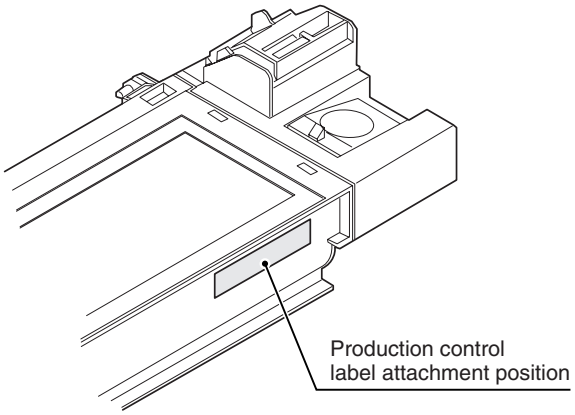
The label on the drum cartridge shows the date of production.
(SOCC production)

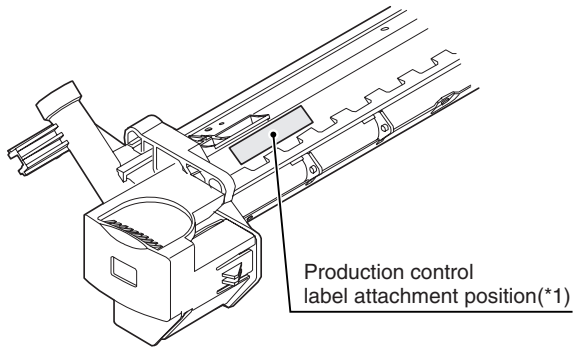


<JAPAN production>



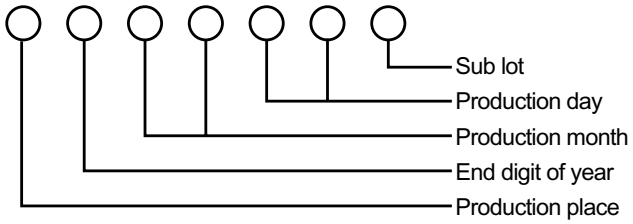
Division	No.
Ex production	1
Option	2
Same pack	3





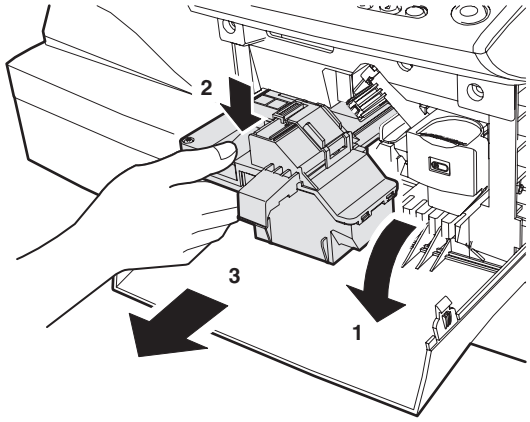
∗1 The production control label is not attached to the cartridge of a China product.

<Developer>

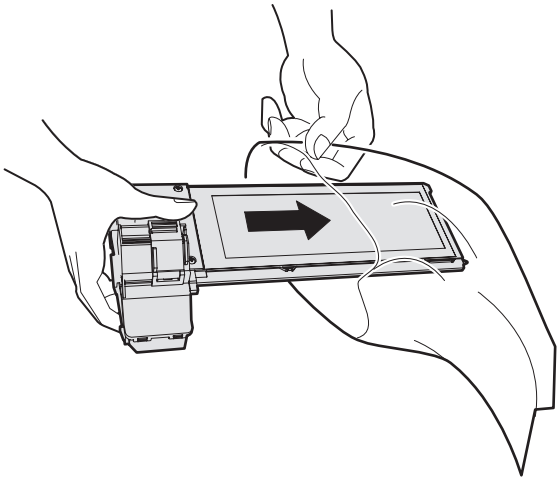


4. TD cartridge replacement

1) Open the front and side cabinets of the copier.
2) Keep holding Toner lover, and
3) Carefully pull out Toner unit from the copier.



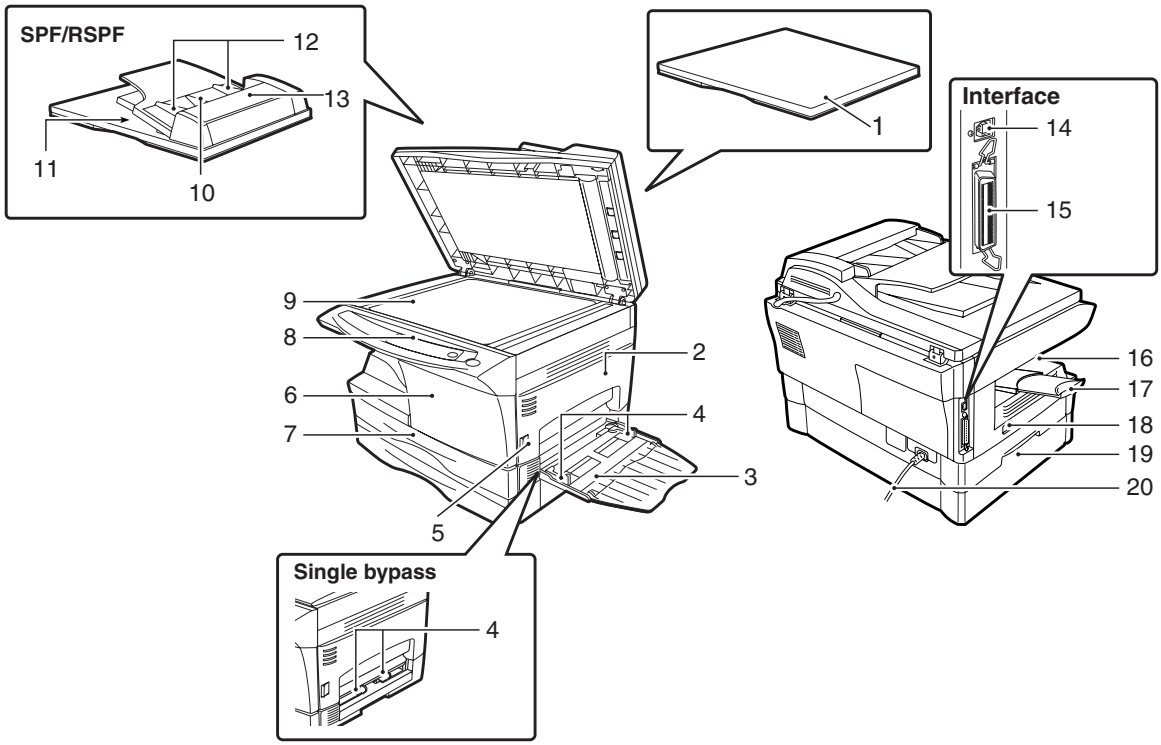
4) Put Toner unit in a collection bag immediately after removing it from the copier



Note: Never carry exposed Toner unit. Be sure to put it in the collection bag.

[4] EXTERNAL VIEWS AND INTERNAL STRUCTURES

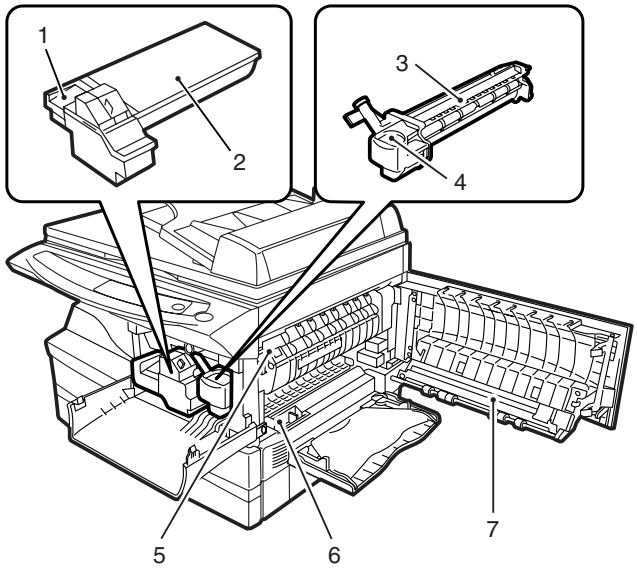
1. Appearance



1	Original cover	2	Side cover	3	Bypass tray
4	Bypass tray guides	5	Side cover open button	6	Front cover
7	Paper tray	8	Operation panel	9	Original table
10	Document feeder tray	11	SPF exit area *1 / RSPF exit area *2	12	Original guides
13	Feeding roller cover	14	USB interface	15	Parallel interface
16	Paper output tray	17	Paper output tray extension	18	Power switch
19	Handle	20	Power cord		

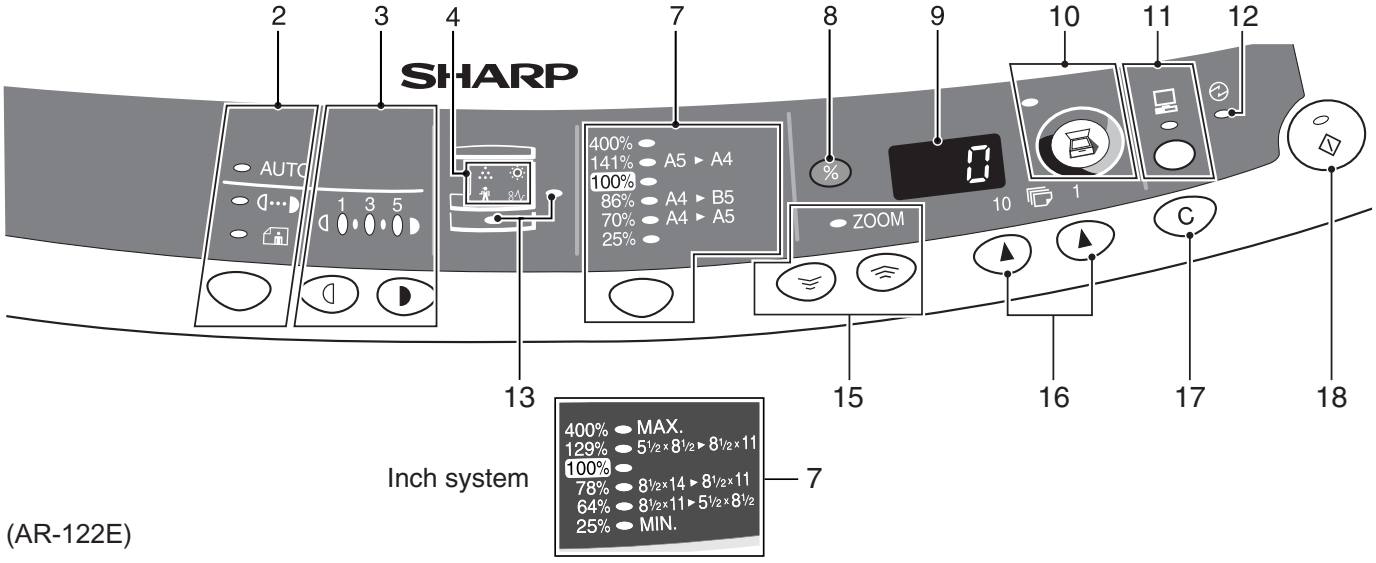
*1 SPF only *2 RSPF only

2. Internal



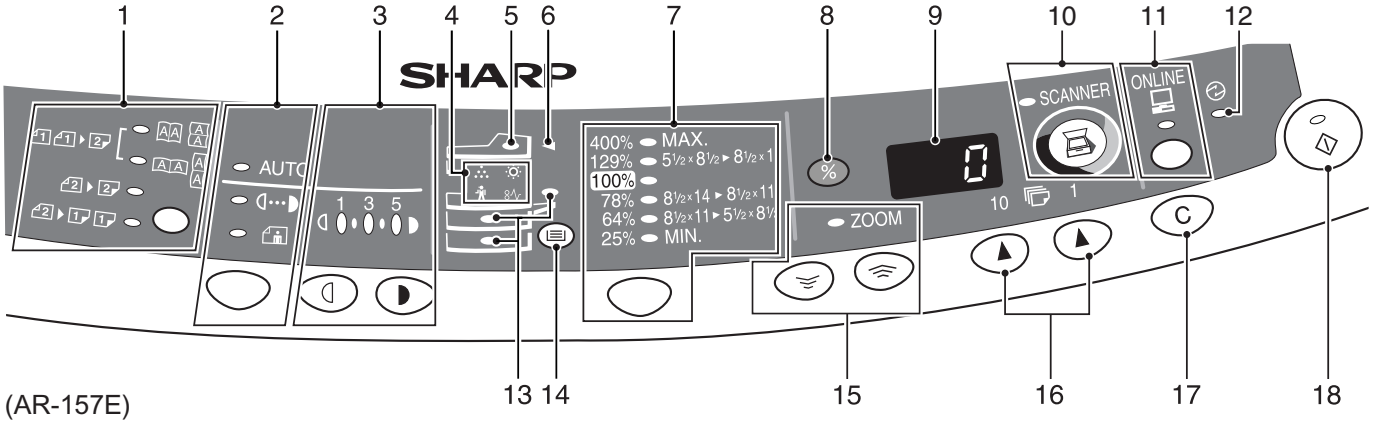
1	Toner cartridge lock release button	2	Toner cartridge	3	Drum cartridge
4	Drum cartridge handle	5	Fusing unit release lever	6	Charger cleaner
7	Transfer charger				

3. Operation panel



Inch system

(AR-122E)



(AR-157E)

1	**Duplex Mode select key and indicator** (RSPF only)	2	**Exposure mode selector key and indicators** Use to sequentially select the exposure modes: AUTO, MANUAL or PHOTO. Selected mode is shown by a lit indicator.
3	**Light and dark keys and exposure indicators** Use to adjust the MANUAL or PHOTO exposure level. Selected exposure level is shown by a lit indicator. Use to start and terminate user program setting.	4	**Alarm indicators** Developer replacement required indicator Misfeed indicator Toner cartridge replacement required indicator *1 Maintenance indicator
5	**SPF/RSPF indicator**	6	**SPF misfeed indicator**
7	**Copy ratio selector key and copy ratio indicators** Use to sequentially select preset reduction/enlargement copy ratios. Selected copy ratio is shown by a lit indicator.	8	**Copy ratio display (%) key**
9	**Display** Displays the specified copy quantity, zoom copy ratio, user program code, and error code.	10	**SCANNER key and indicator** *2, *3
11	**ON LINE key / indicator** Lights up when the machine is used as a printer and scanner. *2	12	**Power save indicator** Lights up when the copier is in a power save mode.
13	**Paper feed location indicators** Light up to show the selected paper feed station.	14	**Tray select key** Use to select a paper feed station (paper tray or bypass tray).
15	**Zoom keys / indicator** Use to select any reduction or enlargement copy ratio from 25% to 400% in 1% increments.	16	**Copy quantity keys** • Use to select the desired copy quantity (1 to 99). • Use to make user program entries.
17	**Clear key** • Press to clear the display, or press during a copy run to terminate copying. • Press and hold down during standby to display the total number of copies made to date.	18	**Print key and ready indicator** • Copying is possible when the indicator is on. • Use to set a user program. • Press to start copying

***1. Toner Developer Cartridge Replacement**

When toner density is lower than a specified level, the TONER DEVELOPER CARTRIDGE REPLACEMENT indicator lights up to warn the user. If the Toner Developer Cartridge is not replaced in that time, the Ready Lamp changes to blinking and then start to supply the toner after around 10 copies. (Cartridge replacement lamp continues to light.) If toner density is not back to specific level after two minutes, the READY indicator goes out and Toner Developer indicator starts blinking, and the copier stops.

***2. Indicators on the operation panel**

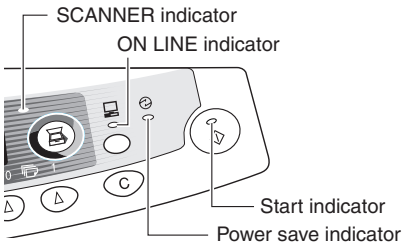
The ON LINE indicator and the start ( ) indicator indicate the state of the printer or scanner.

Start indicator

On: Indicates the unit is ready for copying or scanning is being performed.

Blinking: Indicates that an interrupt print job is in progress, or that the unit is initializing (the cover has been opened and closed or the power turned off and on).

Off: Indicates copying or scanning is being performed or the unit is in the auto power shut-off mode.



ON LINE indicator

The ON LINE key is pressed and on line and off line are changed.

On: Indicates the unit is ready for printing or scanning is being performed. (On line)

Blinking: Printing or data is being received from a computer.

Off: Copying is being performed. (Off line)

Power save indicator

On: Indicates the unit is in a power save mode.

Scanner indicator

On: The SCANNER ( ) key has been pressed and the unit is in scanner mode.

Blinking: A scan job is being executed from the computer, or scan data is stored in the unit's memory.

Off: The unit is in the copy mode.

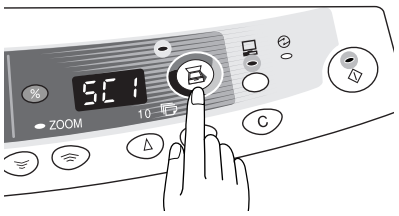
***3. Using the SCANNER key to begin scanning**

This scanning method can only be used if the Button Manager has been installed using the installer. To scan using this method, you must first complete the settings in Button Manager in your computer. For more information on Button Manager, see the online manual or the help file for Button Manager.

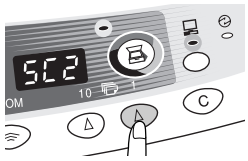
Note:

- Scanning is not possible during a copy job.
- If the unit is used to begin a scan job during a print job using the parallel interface connection or the USB interface connection, the scan job will be stored and scanning will begin when the print job is completed.
- When scanning an original that has been placed in the SPF/RSPF, only one original can be placed unless you are using Sharpdesk.

1) Press the SCANNER ( ) key.
   The unit enters scan mode.



2) Place the original you wish to scan on the original table/SPF/RSPF.
   For the procedure for placing the original, see "ORIGINAL PLACEMENT".
3) Press the right copy quantity key to display the number of the application that you wish to use for scanning.
   The application numbers are initially as follows.

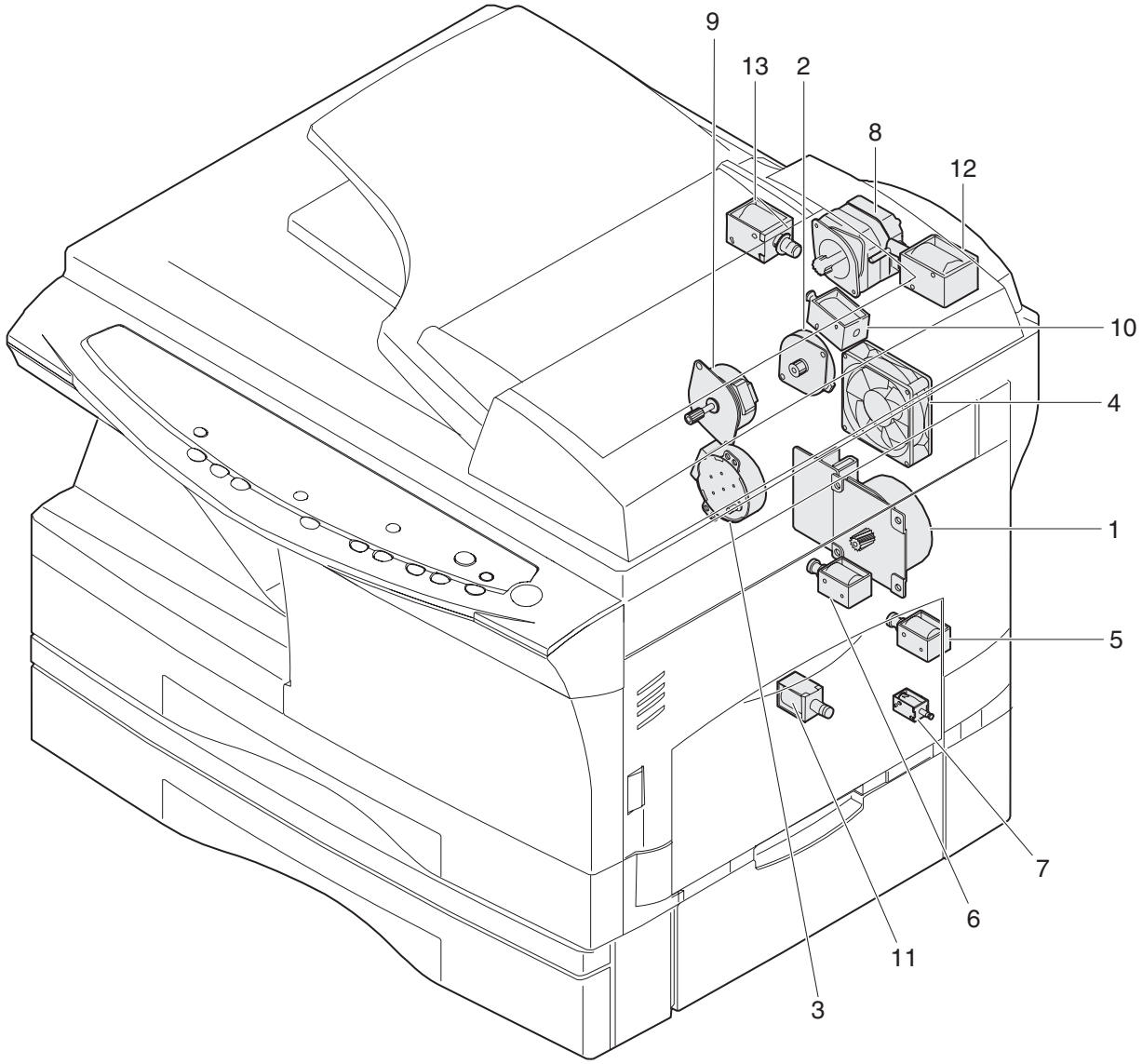


The application numbers are initially as follows.

Application number	Application launched
SC1	Sharpdesk (if installed)
SC2	E-mail (your standard e-mail program in the Windows OS you are using)
SC3	Fax (if a fax program is installed)
SC4	OCR (if an OCR program is installed)
SC5	Microsoft Word (if installed)
SC6	Any application set in Button Manager

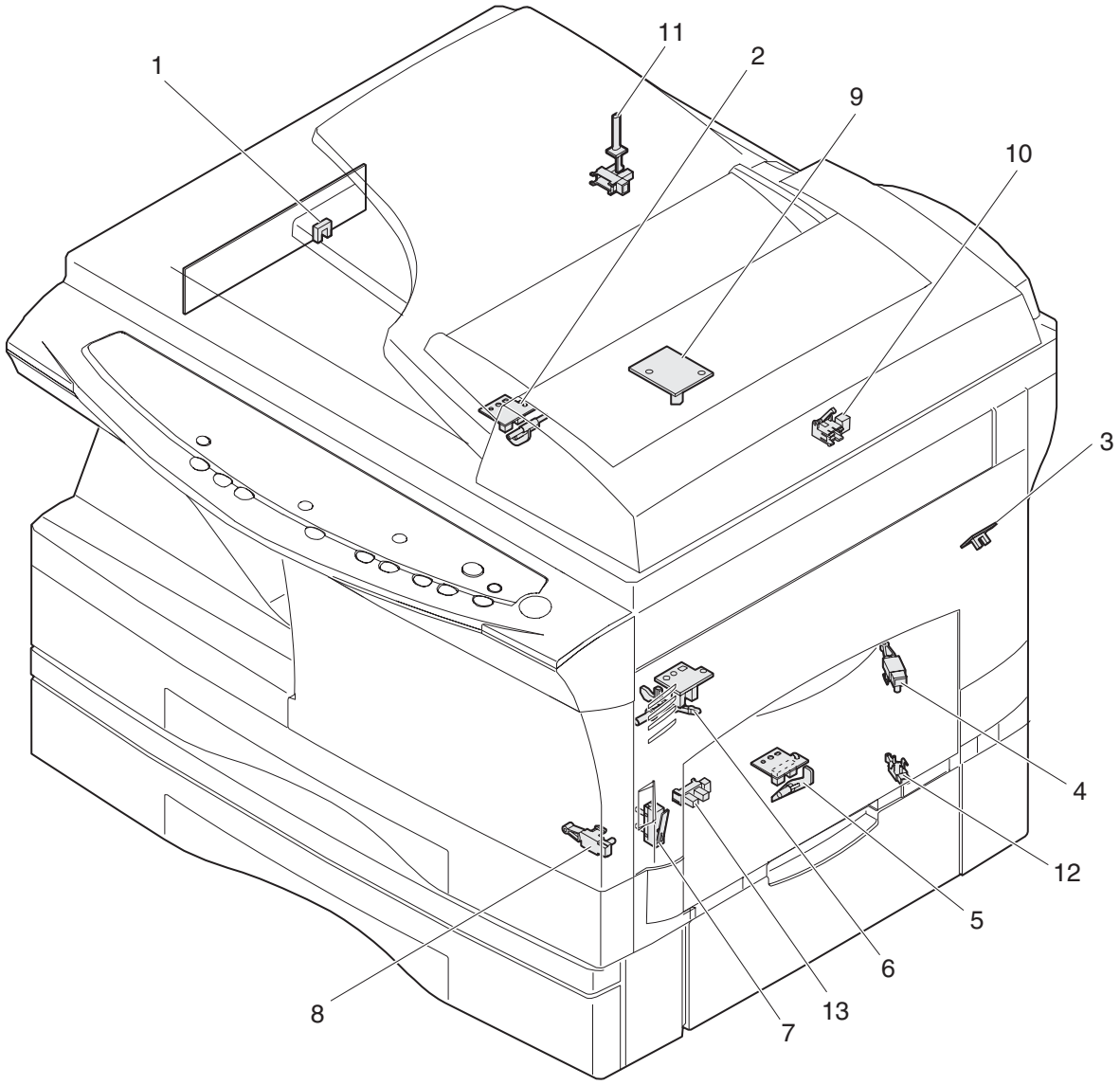
4) Press the start ( ) key.
   The selected application launches and scanning begins.

4. Motors and solenoids



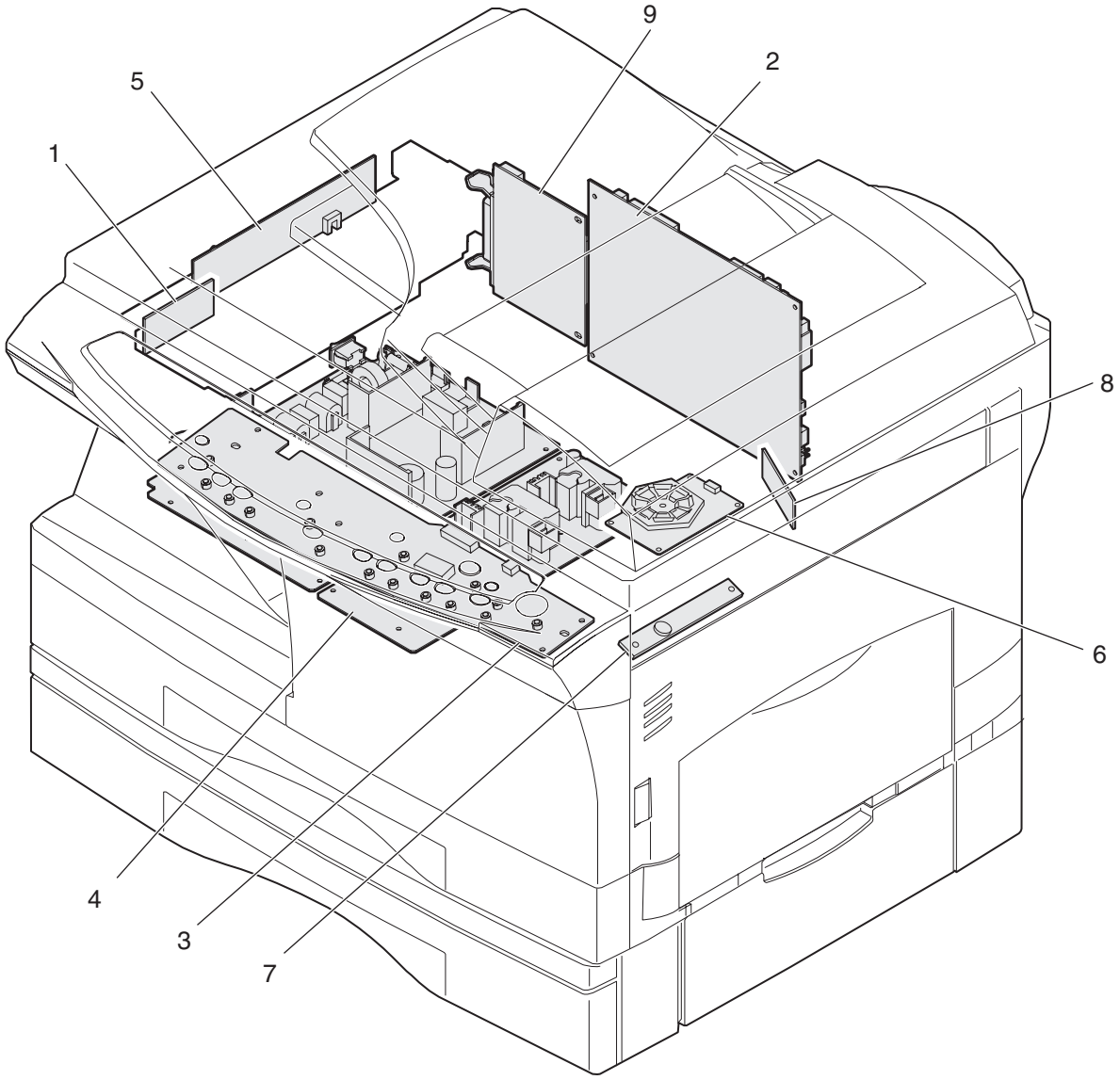
No.	Part name	Control signal	Function / Operation
1	Main motor	MM	Drives the copier.
2	Scanner motor	MRMT	Drives the optical mirror base (scanner unit).
3	Toner motor	TM	Supplies toner.
4	Cooling fan motor	VFM	Cools the optical section.
5	Resist roller solenoid	RRS	Resist roller rotation control solenoid
6	Paper feed solenoid	CPFS1	Cassette Paper feed solenoid 1
7	Multi paper feed solenoid	MPFS	Multi manual pages feed solenoid
8	SPF motor	SPFM	Drives the single pass feeder
9	Duplex motor	DMT	Devices the duplex paper transport section
10	Original feed solenoid	SPUS	Original feed solenoid
11	Paper feed solenoid	CPFS2	Cassette Paper feed solenoid 2
12		SRRC	Original resist roller solenoid
13		SPFS	Original paper feed solenoid

5. Sensors and switches



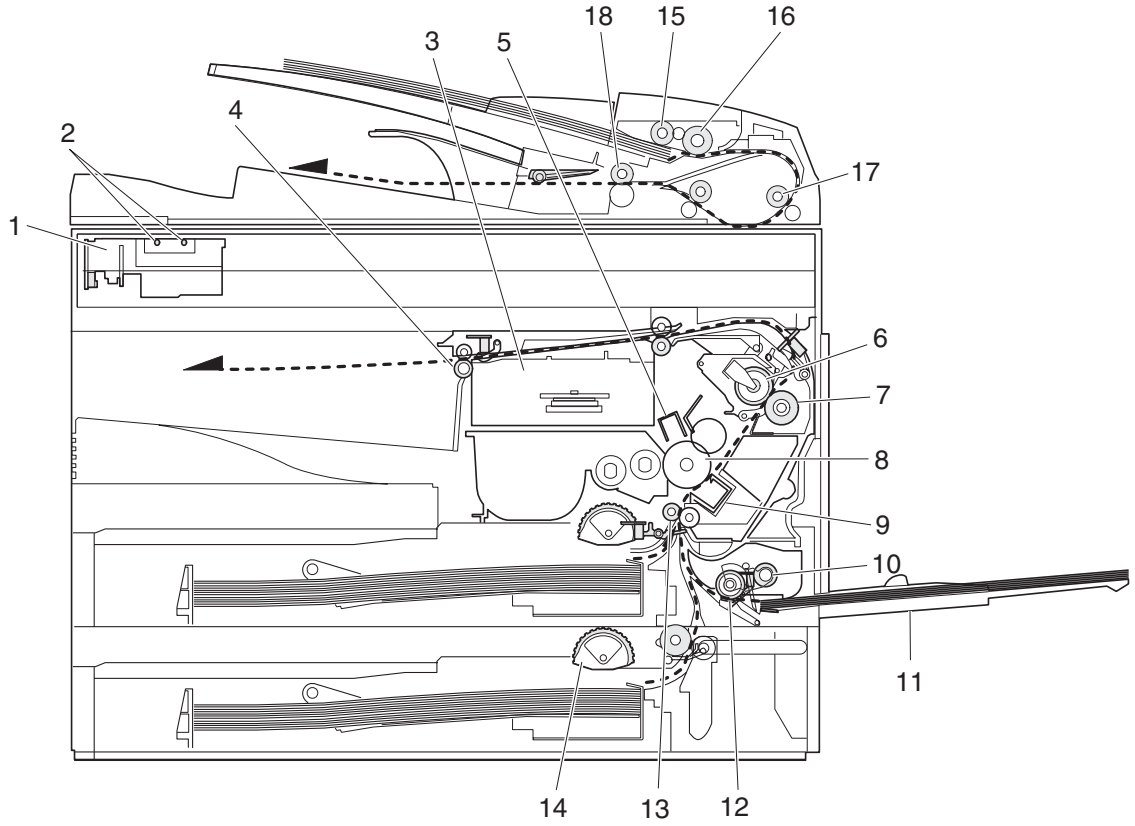
No.	Name	Signal	Type	Function	Output
1	Scanner unit home position sensor	MHPS	Transmission sensor	Scanner unit home position detection	"H" at home position
2	POD sensor	POD	Transmission sensor	Paper exit detection	"H" at paper pass
3	PPD2 sensor	PPD2	Transmission sensor	Paper transport detection 2	"L" at paper pass
4	Cassette detection switch	CED1	Micro-switch	Cassette installation detection	"L" at cassette insertion
5	Manual feed detection switch	MFD	Transmission sensor	Manual feed paper detection (single only)	"L" at paper detection
6	PPD1 sensor	PPD1	Transmission sensor	Paper transport detection 1	"L" at paper pass
7	Door switch	DSW	Micro-switch	Door open/close detection (safety switch for 24V)	1 or 0V of 24V at door open
8	Drum reset switch	DRST	Micro-switch	New drum detection switch	Instantaneously "L" at insertion of new drum
9	SPF sensor	SPID/ SD SW	Transmission sensor	Paper entry detection Cover open/close detection	"L" at paper pass
10	SPPD sensor	SPPD	Transmission sensor	Paper transport detection	"L" at paper pass
11	SDOD sensor	SDOD	Transmission sensor	SPF open/close detection Book sensor	"L" at paper pass
12	2nd cassette	DSW	Micro-switch	2nd cassette door open detection	1 or 0V of 5V at door open
13	PPD3 sensor	PPD3	Transmission sensor	Paper transport detection 3	"L" at paper pass

6. PWB unit



No.	Name	Function
1	Exposure lamp invertor PWB	Exposure lamp (CCFL) control
2	Main PWB (MCU)	Copier control
3	Operation PWB	Operation input/display
4	Power PWB	AC power input, DC voltage control, High voltage control
5	CCD sensor PWB	For image scanning
6	LSU motor PWB	For polygon motor drive
7	TCS PWB	For toner sensor control
8	LSU PWB	For laser control
9	I/F PWB	Scanner/GDI Printer control (parallel I/F, USB I/F)

7. Cross sectional view



No.	Part name	Function and operation
1	Scanner unit	Illuminates the original with the copy lamp and passes the reflected light to the lens unit(CCD).
2	Exposure lamp	Exposure lamp (CCFL) Illuminates original
3	LSU (Laser unit)	Converts the original image signal into laser beams and writes onto the drum.
4	Paper exit roller	Roller for paper exit
5	Main charger	Provides negative charges evenly to the drum surface.
6	Heat roller	Fuses toner on the paper. (Teflon roller)
7	Pressure roller	Fuses toner on the paper. (Silicon rubber roller)
8	Drum	Forms images.
9	Transfer unit	Transfers images onto the drum.
10	Pickup roller	Picks up the manual feed paper. (In multi feed only)
11	Manual paper feed tray	Tray for manual feed paper
12	Manual paper feed roller	Transport the paper from the manual paper feed port.
13	PS roller unit	Takes synchronization between the lead edge and the rear edge of the paper.
14	Paper feed roller	Picks up a sheet of paper from the cassette.
15	Pickup roller	Picks up documents.
16	Separation roller	Separates documents to feed properly.
17	PS roller	Feeds documents to the scanning section.
18	Paper exit roller	Discharges documents.

[5] UNPACKING AND INSTALLATION

1. Copier installation

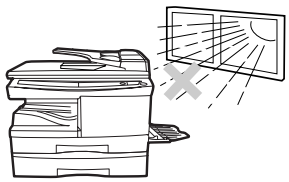
Improper installation may damage the copier. Please note the following during initial installation and whenever the copier is moved.

Caution: If the copier is moved from a cool place to a warm place, condensation may form inside the copier. Operation in this condition will cause poor copy quality and malfunctions.
Leave the copier at room temperature for at least 2 hours before use.

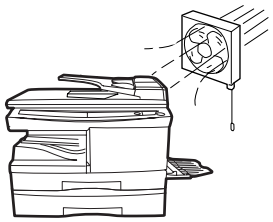
Do not install your copier in areas that are:

- damp, humid, or very dusty

- exposed to direct sunlight



- poorly ventilated



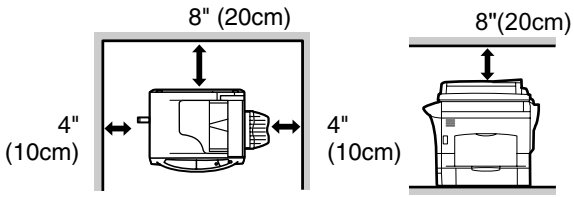
- subject to extreme temperature or humidity changes, e.g., near an air conditioner or heater.

The copier should be installed near an accessible power outlet for easy connection.

Be sure to connect the power cord only to a power outlet that meets the specified voltage and current requirements.

Also make certain the outlet is properly grounded.

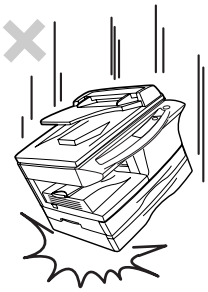
Be sure to allow the required space around the machine for servicing and proper ventilation.



2. Cautions on handling

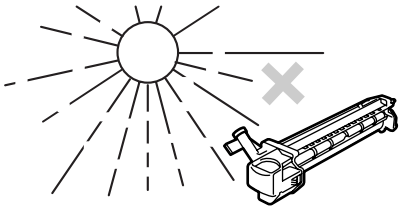
Be careful in handling the copier as follows to maintain the performance of this copier.

Do not drop the copier, subject it to shock or strike it against any object.



Do not expose the drum cartridge to direct sunlight.

Doing so will damage the surface (green portion) of the drum cartridge, causing poor print quality.



Store spare supplies such as drum cartridges and TD cartridges in a dark place without removing from the package before use.

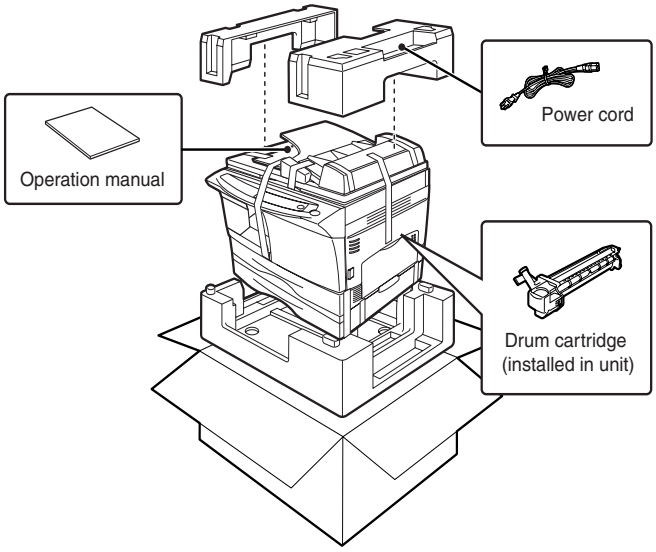
If they are exposed to direct sunlight, poor print quality may result.

Do not touch the surface (green portion) of the drum cartridge.

Doing so will damage the surface of the cartridge, causing poor print quality.

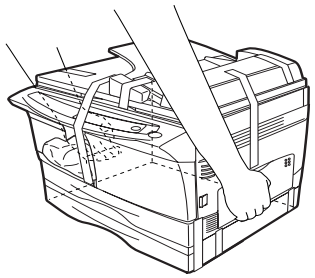
3. Checking packed components and accessories

Open the carton and check if the following components and accessories are included.



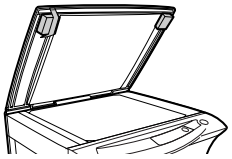
4. Unpacking

Be sure to hold the handles on both sides of the copier to unpack the copier and carry it to the installation location.

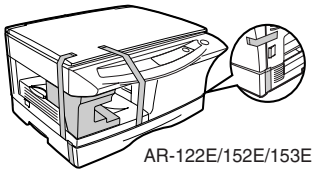


5. Removing protective packing materials

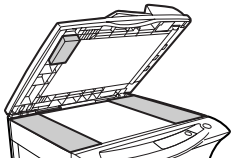
1) Remove pieces of tape and protective cover. Then open the original cover and remove protective materials (a) and (b).



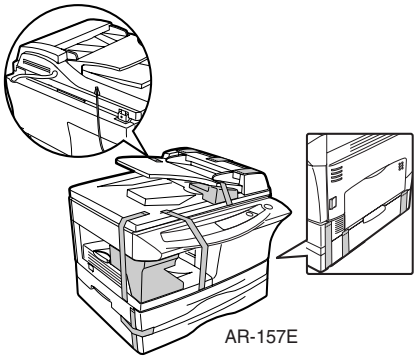
AR-122E/152E/153E



AR-122E/152E/153E

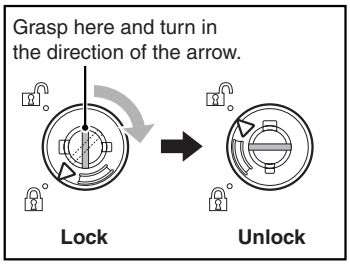


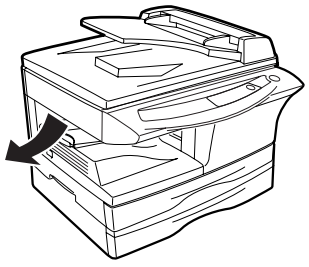
AR-157E



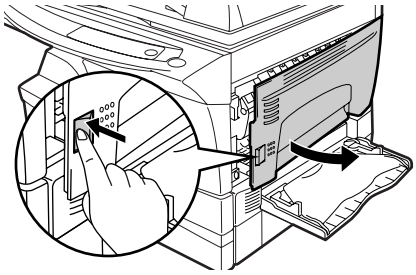
AR-157E

2) Release the scan head locking switch.

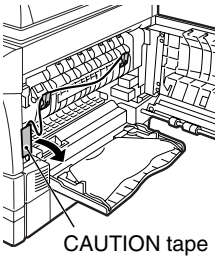




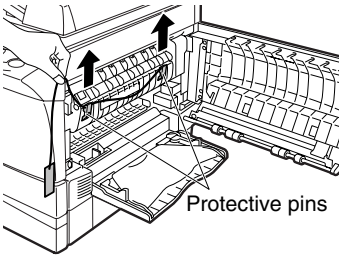
3) Ensure that the bypass tray is open and then open the side cover by pressing the open button on the side cover.



4) Remove the CAUTION tape from the front cover and remove the two protective pins from the fusing unit by pulling the strings upward one at a time.

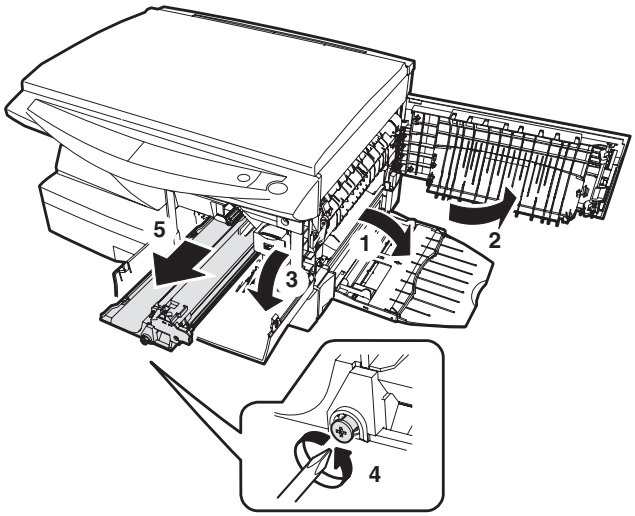


CAUTION tape

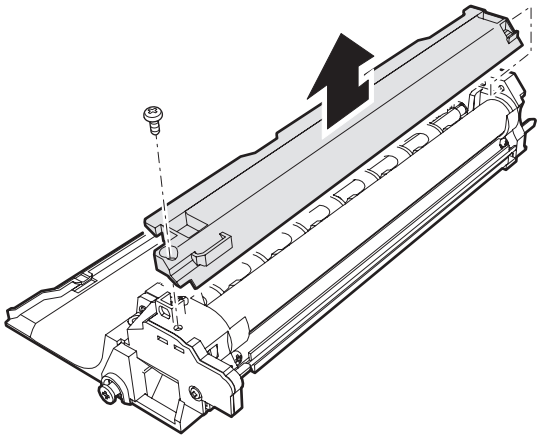


6. Developer unit installation

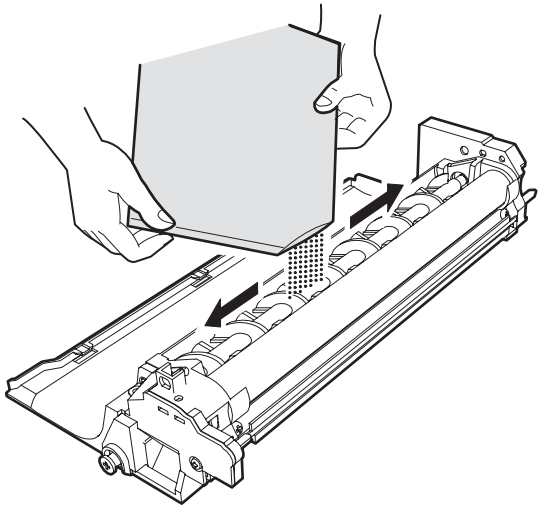
1) 2) 3) Open the side and front cabinets of the copier.
4) Remove the locking tape of the developer unit.
5) Remove the screw which is fixing the copier and Developer unit.
6) Remove Developer unit slowly from the copier.



7) Remove the screw (1 pc).
8) Remove Upper developer unit.

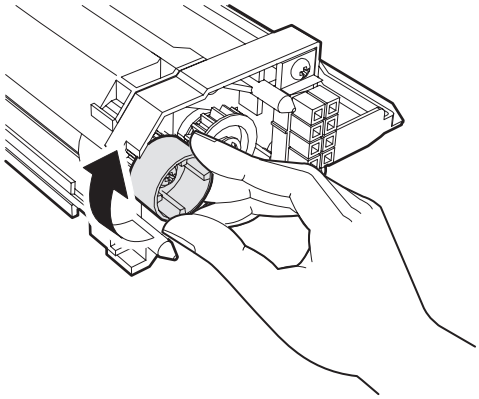


9) Shake the aluminum bag to stir developer
10) Supply developer from the aluminum bag to the top of the MX roller evenly.



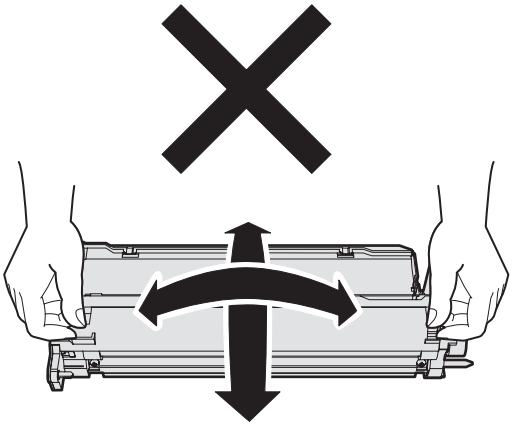
Note: Be careful not to splash developer outside Developer unit.

11) Attach Upper developer unit and fix it with a screw.
12) Rotate the MG roller gear to distribute developer evenly.



Note: Never rotate the gear in the reverse direction.

Note: When carrying Developer unit, do not tilt it extremely as shown with the arrow in the figure below.
(Prevention of splash of developer)



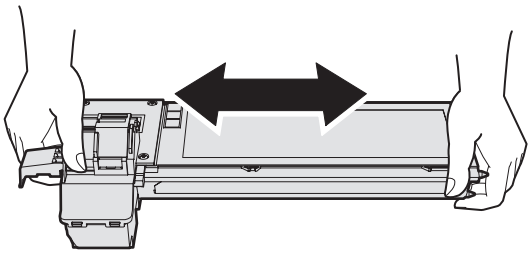
13) Insert Developer unit carefully into the copier.

Note: Quick insertion may result in splash of developer. Be sure to insert carefully.

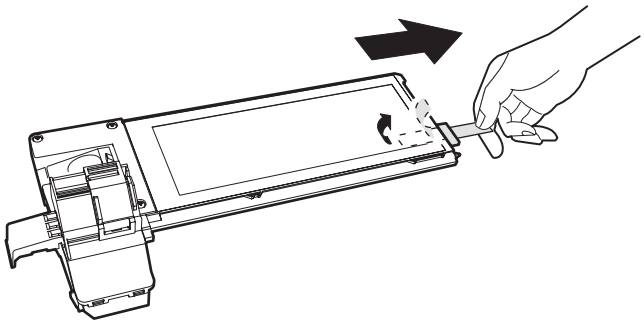
14) Confirm that Developer unit is completely inserted to the bottom of the machine, fix Developer unit and the machine with a screw.
15) Completion of Developer unit installation

7. Toner cartridge installation

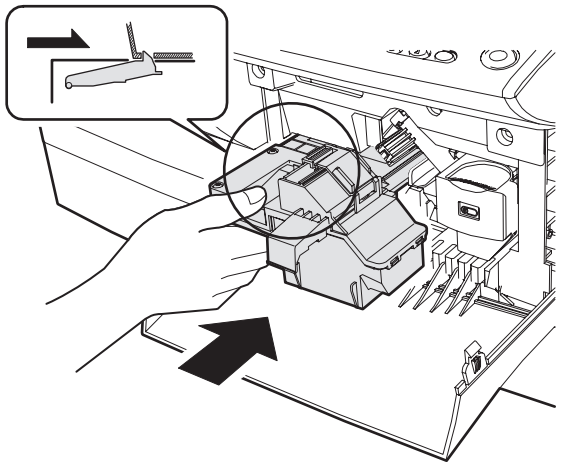
1) To prevent against uneven distribution of toner, hold Toner unit with both hands and shake it several times horizontally.



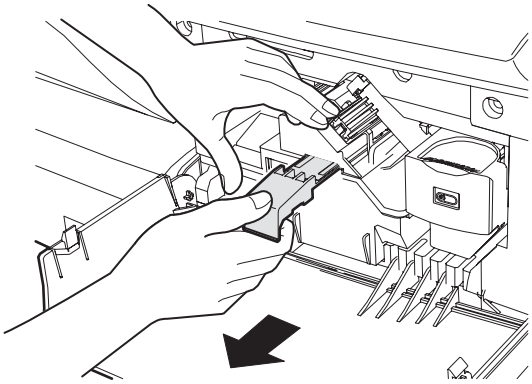
2) Hold the section of Toner unit shown in the figure below, remove the packing tape, and remove the cushion.
3) Pull out the cushion in the arrow direction.



4) Insert Toner unit carefully into the copier.
5) Insert until the hook is engaged with the copier as shown in the figure below.



6) Pull out the shutter in the arrow direction.



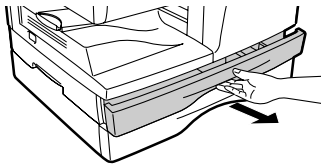
Note: Do not hold and carry the shutter. Otherwise the shutter may drop and Toner unit may drop.

7) Completion of Toner unit installation
Close the front and side cabinets.

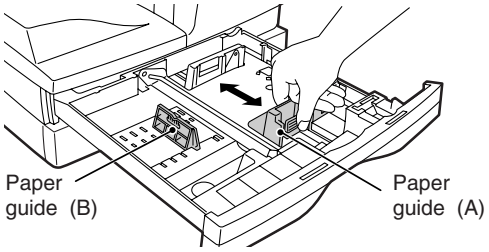
8. Loading copy paper

Note: This copier is equipped with two paper trays. Load copy paper into the two paper trays.

1) Raise the handle of the paper tray and pull the paper tray out until it stops.

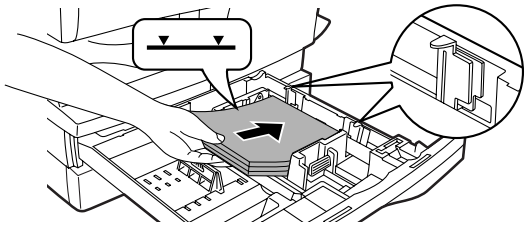


2) Remove the pressure plate lock. Rotate the pressure plate lock in the direction of the arrow to remove it while pressing down the pressure plate of the paper tray.
3) Store the pressure plate lock that was removed in step 2 and the screw that was removed when unpacking the machine in the front of the paper tray. To store the pressure plate lock, rotate the lock to fix it on the relevant location.
4) Adjust the paper guides on the paper tray to the copy paper width and length.
   Squeeze the lever of paper guide (A) and slide the guide to match with the width of the paper.
   Move paper guide (B) to the appropriate slot as marked on the tray.



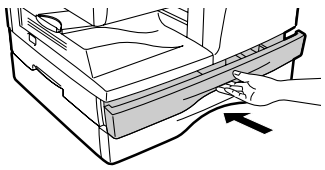
5) Fan the copy paper and insert it into the tray. Make sure the edges go under the corner hooks.

Note: Do not load paper above the maximum height line (▼▼). Exceeding the line will cause a paper misfeed.



6) Gently push the paper tray back into the copier.

Note: After loading copy paper, to cancel the blinking "H" without restarting copying, press the clear (Ⓒ) key. The "P" in the display will go out and the ready (⇳) indicator will light up.



9. Power to copier

1) Ensure that the power switch of the copier is in the OFF position. Insert the attached power cord into the power cord socket at the rear of the copier.
2) Plug the other end of the power cord into the nearest outlet.

10. Moving

Moving instructions

When moving the unit, follow the procedure below.

Note: When moving this unit, be sure to remove the TD cartridge in advance.

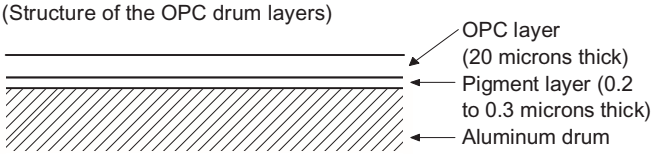
1) Turn the power switch off and remove the power cord from the outlet.
2) Open the side cover and front cover, in that order. Remove the TD cartridge and close the front cover and side cover, in that order.
   To open and close the side cover and front cover, and to remove the TD cartridge, see "TD CARTRIDGE REPLACEMENT".
3) Raise the handle of the paper tray and pull the paper tray out until it stops.
4) Push the center of the pressure plate down until it locks in place and lock the plate using the pressure plate lock which has been stored in the front of the paper tray.
5) Push the paper tray back into the unit.
6) Lock the scan head locking switch.

Note: When shipping the unit, the scan head locking switch must be locked to prevent shipping damage.

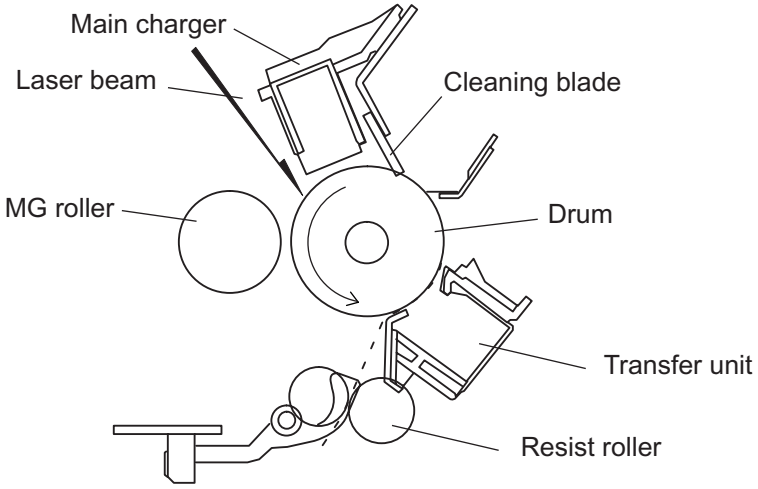
7) Close the multi-bypass tray and the paper output tray extension, and attach the packing materials and tape which were removed during installation of the unit. See "PREPARING THE UNIT FOR INSTALLATION".
8) Pack the unit into the carton. See "CHECKING PACKED COMPONENTS AND ACCESSORIES".

[6] COPY PROCESS

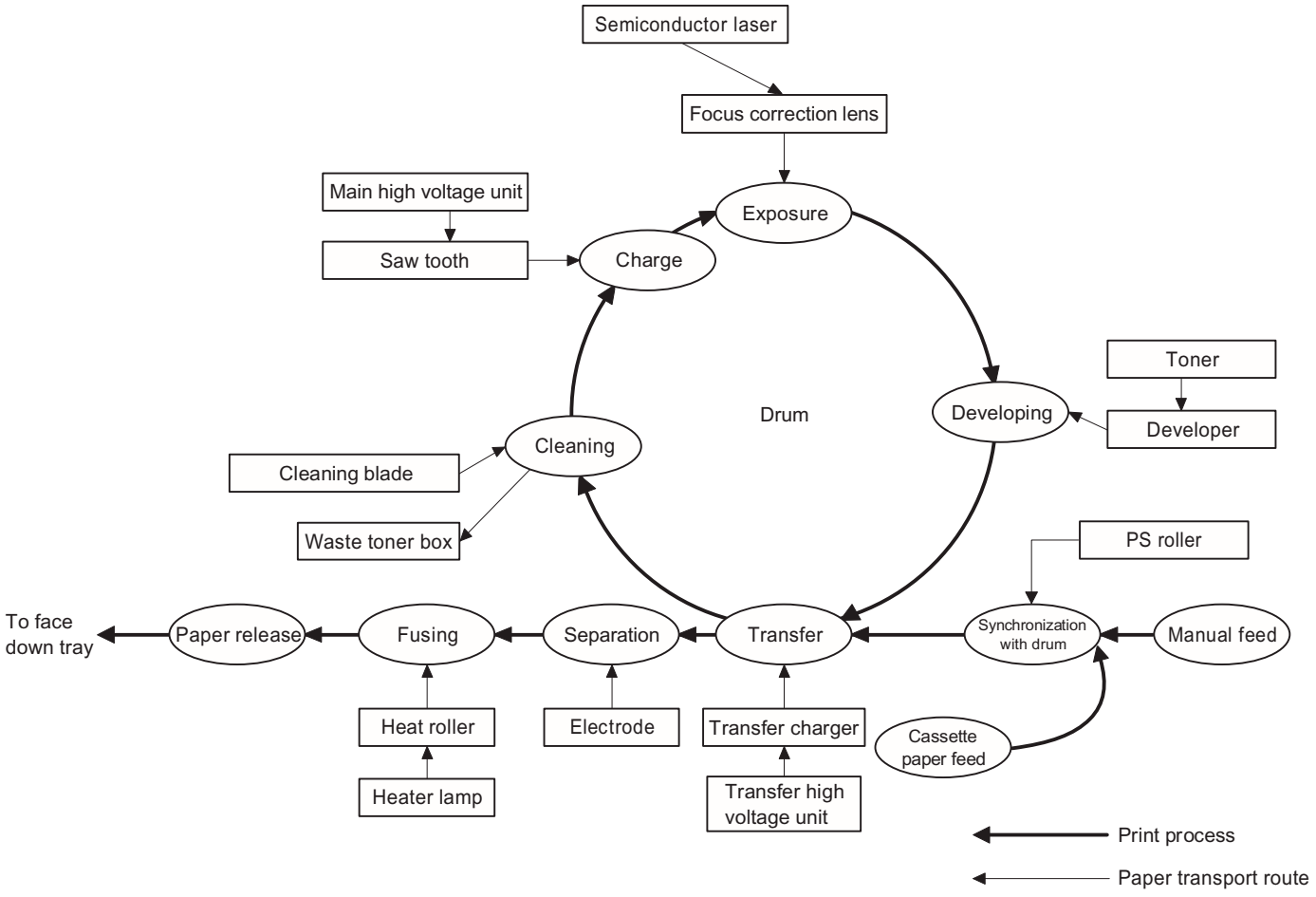
An OPC drum is used for the photoconductor.
(Structure of the OPC drum layers)



1. Functional diagram



(Basic operation cycle)



2. Outline of print process

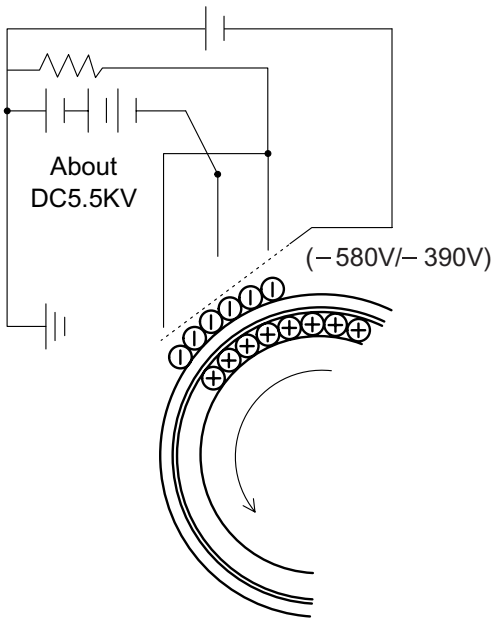
This printer is a non-impact printer that uses a semiconductor laser and electrostatic print process. This printer uses an OPC (Organic Photo Conductor) for its photoconductive material.
First, voltage from the main corona unit charges the drum surface and a latent image is formed on the drum surface using a laser beam. This latent image forms a visible image on the drum surface when toner is applied. The toner image is then transferred onto the print paper by the transfer corona and fused on the print paper in the fusing section with a combination of heat and pressure.

Step-1: Charge
Step-2: Exposure
* Latent image is formed on the drum.
Step-3: Developing
Latent image formed on the drum is then changed into visible image with toner.
Step-4: Transfer
The visible image (toner image) on the drum is transferred onto the print paper.
Step-5: Cleaning
Residual toner on the drum surface is removed and collected by the cleaning blade.
Step-6: Optical discharge
Residual charge on the drum surface is removed, by semiconductor laser beam.

3. Actual print process

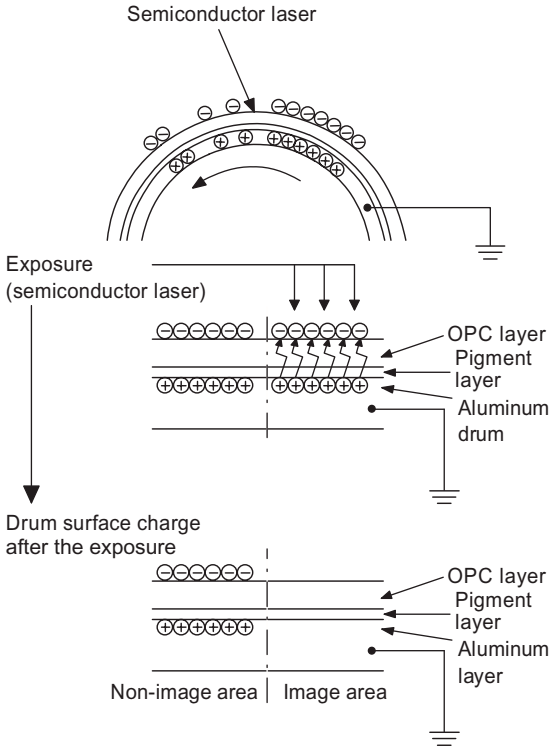
Step-1: DC charge

A uniform negative charge is applied over the OPC drum surface by the main charging unit. Stable potential is maintained by means of the Scorotron charger.
Positive charges are generated in the aluminum layer.



Step-2: Exposure (laser beam, lens)

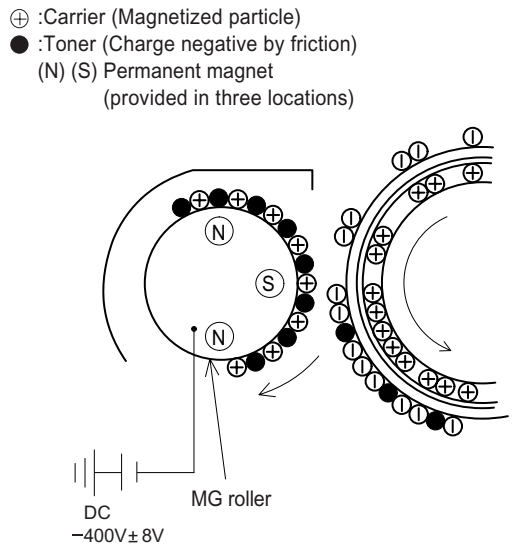
A Laser beam is generated from the semiconductor laser and controlled by the print pattern signal. The laser writes onto the OPC drum surface through the polygon mirrors and lens. The resistance of the OPC layer decreases for an area exposed by the laser beam (corresponding to the print pattern signal). The beam neutralizes the negative charge. An electrostatic latent image is formed on the drum surface.

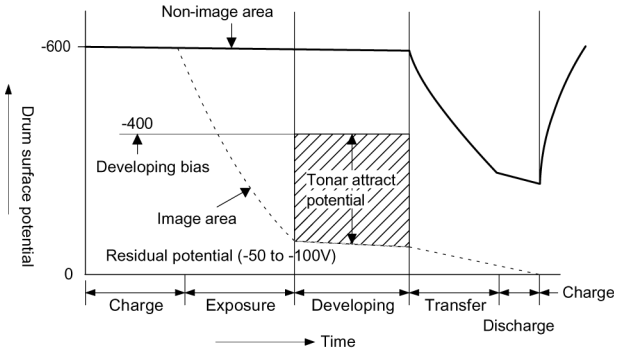


Step-3: Developing (DC bias)

A bias potential is applied to the MG roller in the two component magnetic brush developing method, and the toner is charged negative through friction with the carrier.

Non-image area of the drum surface charged with negative potential repel the toner, whereas the laser exposed portions where no negative charges exist, attract the toner. As a result, a visible image appears on the drum surface.

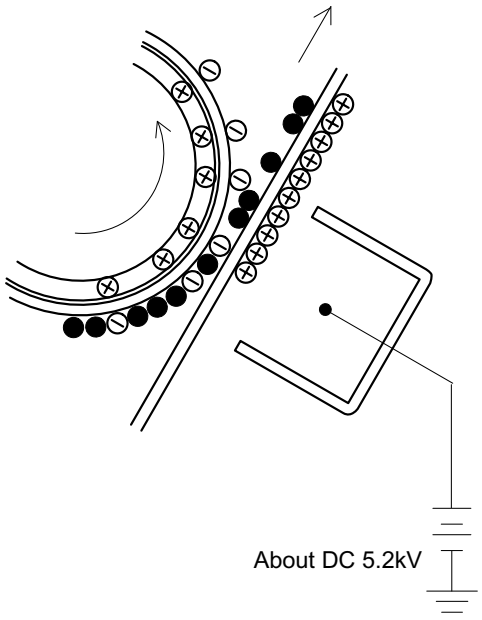




Toner is attracted over the shadowed area because of the developing bias.

Step-4: Transfer

The visible image on the drum surface is transferred onto the print paper by applying a positive charge from the transfer corona to the backside of the print paper.

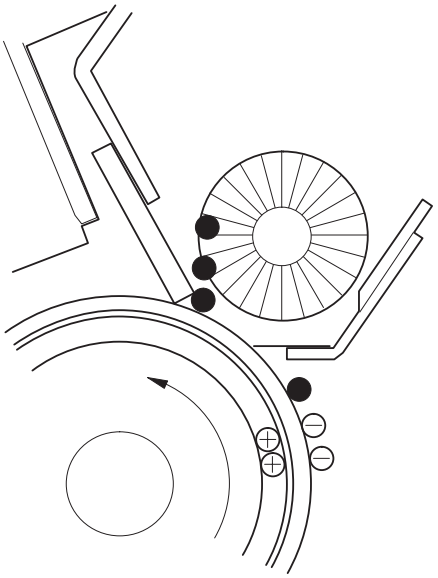


Step-5: Separation

Since the print paper is charged positively by the transfer corona, it is discharged by the separation corona. The separation corona is connected to ground.

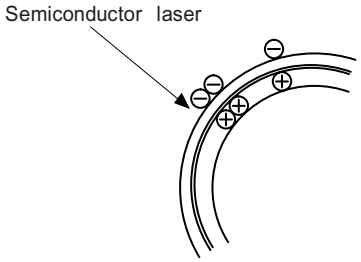
Step-6: Cleaning

Toner remaining on the drum is removed and collected by the cleaning blade. It is transported to the waste toner collecting section in the cleaning unit by the waste toner transport roller.



Step-7: Optical discharge (Semiconductor laser)

Before the drum rotation is stopped, the semiconductor laser is radiated onto the drum to reduce the electrical resistance in the OPC layer and eliminate residual charge, providing a uniform state to the drum surface for the next page to be printed.
When the electrical resistance is reduced, positive charges on the aluminum layer are moved and neutralized with negative charges on the OPC layer.



Charge by the Scorotron charger

Function

The Scorotron charger functions to maintain uniform surface potential on the drum at all times, It control the surface potential regardless of the charge characteristics of the photoconductor.

Basic function

A screen grid is placed between the saw tooth and the photoconductor. A stable voltage is added to the screen grid to maintain the corona current on the photoconductor.
As the photoconductor is charged by the saw tooth from the main corona unit, the surface potential increases. This increases the current flowing through the screen grid. When the photoconductor potential nears the grid potential, the current turns to flow to the grid so that the photoconductor potential can be maintained at a stable level.

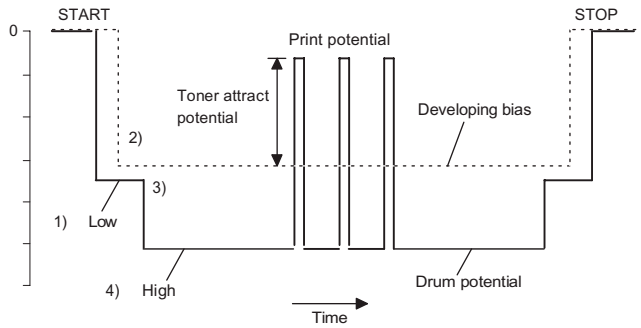
Process controlling

Function

The print pattern signal is converted into an invisible image by the semiconductor laser using negative to positive (reversible) developing method. Therefore, if the developing bias is added before the drum is charged, toner is attracted onto the drum. If the developing bias is not added when the drum is charged, the carrier is attracted to the drum because of the strong electrostatic force of the drum.
To avoid this, the process is controlled by adjusting the drum potential and the grid potential of the Scorotron charger.

Basic function

Voltage added to the screen grid can be selected, high and low. To make it easily understood, the figure below shows voltage transition at the developer unit.



Start

1) Because the grid potential is at a low level, the drum potential is at about -400V. (Carrier may not be attracted though the carrier is pulled towards the drum by the electrostatic force of -400V.
2) Developing bias (-400V) is applied when the photoconductor potential is switched from LOW to HIGH.
3) Once developing bias (-400V) is applied and the photo conductor potential rises to HIGH, toner will not be attracted to the drum.

Stop

The reverse sequence takes place.
Retaining developing bias at an abnormal occurrence

Function

The developing bias will be lost if the power supply was removed during print process. In this event, the drum potential slightly abates and the carrier makes deposits on the drum because of strong static power. To prevent this, the machine incorporates a function to retain the developing bias for a certain period and decrease the voltage gradually against possible power loss.

Basic function

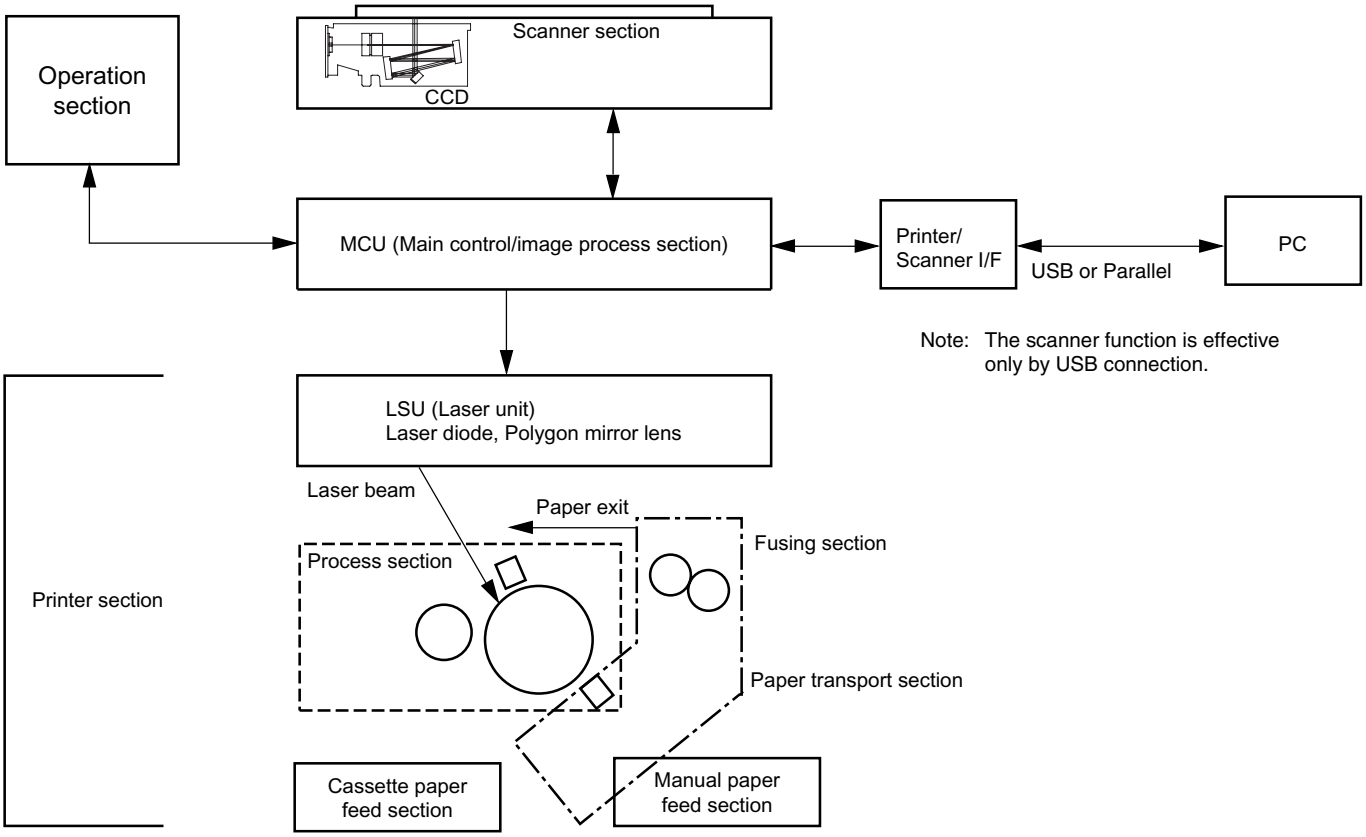
Normally, the developing bias voltage is retained for a certain time before the drum comes to a complete stop if the machine should stop before completing the normal print cycle. The developing bias can be added before resuming the operation after an abnormal interruption. Therefore, carrier will not make a deposit on the drum surface.

[7] OPERATIONAL DESCRIPTIONS

1. Outline of operation

The outline of operation is described referring to the basic configuration.

(Basic configuration)



(Outline of copy operation)

Setting conditions

1) Set copy conditions such as the copy quantity and the copy density with the operation section, and press the COPY button. The information on copy conditions is sent to the MCU.

Image scanning

2) When the COPY button is pressed, the scanner section starts scanning of images.
   The light from the copy lamp is reflected by the document and passed through the lens to the CCD.

Photo signal/Electric signal conversion

3) The image is converted into electrical signals by the CCD circuit and passed to the MCU.

Image process

4) The document image signal sent from the CCD circuit is processed under the revised conditions and sent to the LSU (laser unit) as print data.

Electric signal/Photo signal (laser beam) conversion

5) The LSU emits laser beams according to the print data.
   (Electrical signals are converted into photo signals.)
6) The laser beams are radiated through the polygon mirror and various lenses to the OPC drum.

Printing

7) Electrostatic latent images are formed on the OPC drum according to the laser beams, and the latent images are developed to be visible images(toner images).
8) Meanwhile the paper is fed to the image transfer section in synchronization with the image lead edge.
9) After the transfer of toner images onto the paper, the toner images are fused to the paper by the fusing section. The copied paper is discharged onto the exit tray.

(Outline of printer operation)

The print data sent from the PC are passed through the I/F and the MCU to the LSU. The procedures after that are the same as above 5) and later.

(Outline of scanner operation)

The scan data are passed through the MCU and the I/F to the PC according to the conditions requested by the PC or set by the operations with the operation panel.

2. Scanner section

A. Scanner unit

The scanner unit in the digital copier scans images.

It is composed of the optical unit and the drive unit. The optical unit performs scanning in the main scan direction with the light receiving elements (color CCD). The drive unit performs scanning in the sub scanning direction by moving the optical unit.

B. Optical system

Two white lamps are used as the light source.

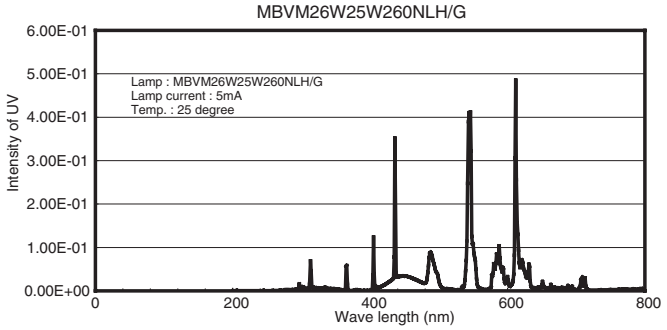
Light radiated from the light source is applied to the document on the document table. The reflected light from the document is reflected 5 times by No. 1 - No. 3 mirrors and passed through the reduction lens to form images on the light-receiving surface of 3-line CCD.

The light-receiving surface of the color CCD is provided with 3 line scanning sections for RGB. Separate images scanned in each color section are overlapped to complete color scanning. (When PC scanning)

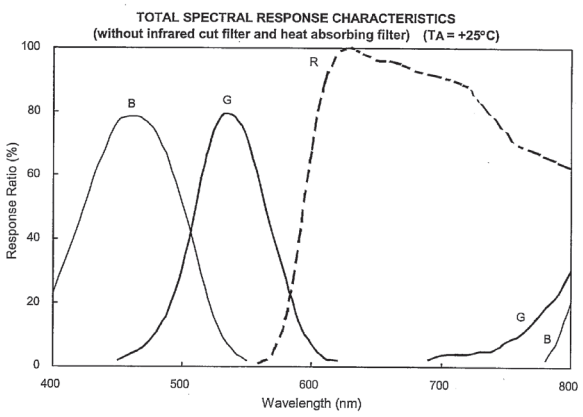
The resolution is 600dpi.

When copying, only the green component is used to print with the printer.

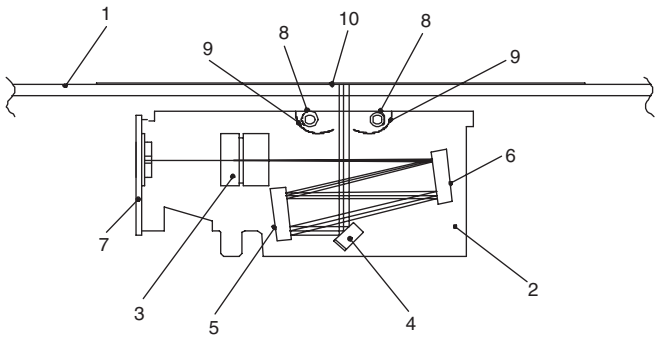
The color component for printing can be switched to red or blue by the service simulation.



(Spectrum characteristics of the lamp)



(Spectrum characteristics of the color CCD)



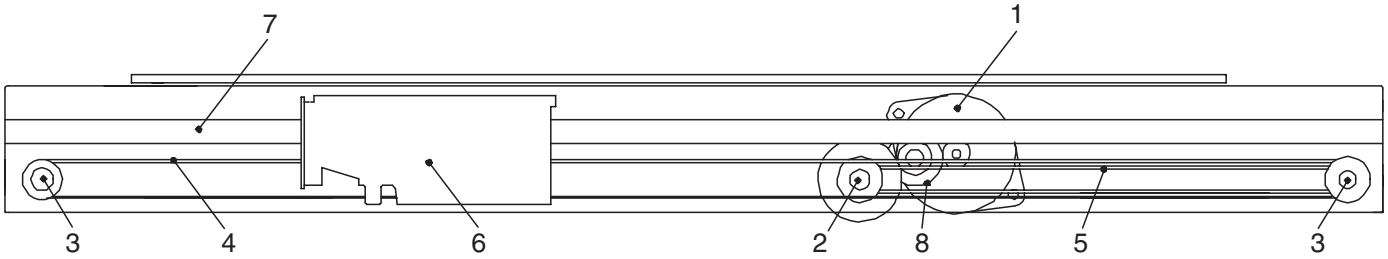
(Optical unit)

1	Table glass	2	Optical unit	3	Lens
4	Mirror 1	5	Mirror 2	6	Mirror 3
7	CCD PWB	8	Lamp	9	Reflector

C. Drive system

The drive system is composed of the scanner motor, the pulley gear, the idle pulley, the idle gear, the belt 473, the belt 190, and the shaft.

The motor rotation is converted into reciprocated movements of the belt 473 through the idle gear, the pulley gear, the belt 190, and the idle pulley to drive the optical unit.



1	Scanner motor	2	Pulley gear	3	Idle pulley
4	Belt 473	5	Belt 190	6	Optical unit
7	Shaft	8	Idle gear	9	

3. Laser unit

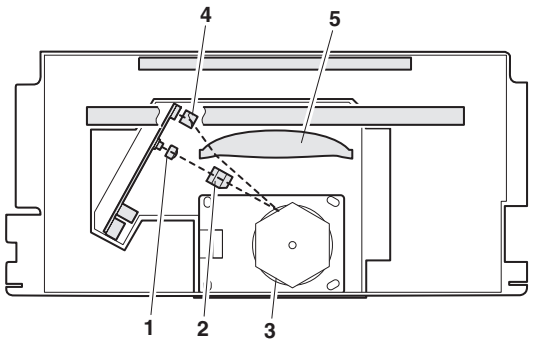
The image data sent from the MCU (image process circuit) is sent to the LSU (laser unit), where it is converted into laser beams.

A. Basic structure

The LSU unit is the writing section of the digital optical system.

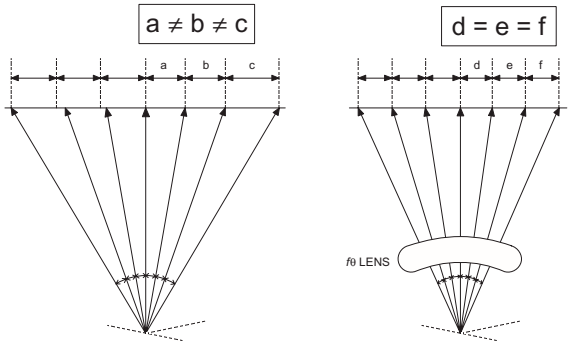
The semiconductor laser is used as the light source, and images are formed on the OPC drum by the polygon mirror and fθ lens, etc.

The laser beams are passed through the collimator lens, the cylindrical lens, the polygon mirror, the fθ lens, and the mirror to form images on the OPC drum in the main scanning direction. The laser emitting PWB is provided with the APC (auto power control) in order to eliminate fluctuations in the laser power. The BD PWB works for measurement of the laser writing start point.

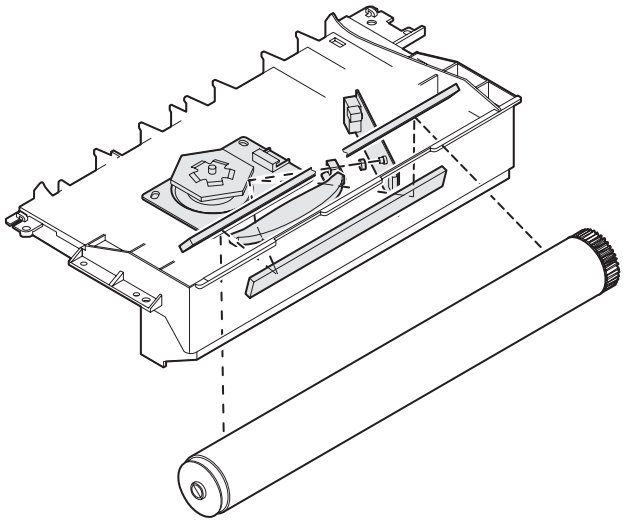


No	Component	Function
1	Semiconductor laser	Generates laser beams.
2	Collimator lens	Converges laser beams in parallel.
3	Polygon mirror, polygon motor	Reflects laser beams at a constant rpm.
4	BD (Mirror, lens, PWB)	Detects start timing of laser scanning.
5	fθ lens	Converges laser beams at a spot on the drum.
		Makes the laser scanning speeds at both ends of the drum same as each other. (Refer to the figure below.)

Makes the laser scanning speeds at both ends of the drum same as each other.



B. Laser beam path



C. Composition

Effective scanning width: 216mm (max.)

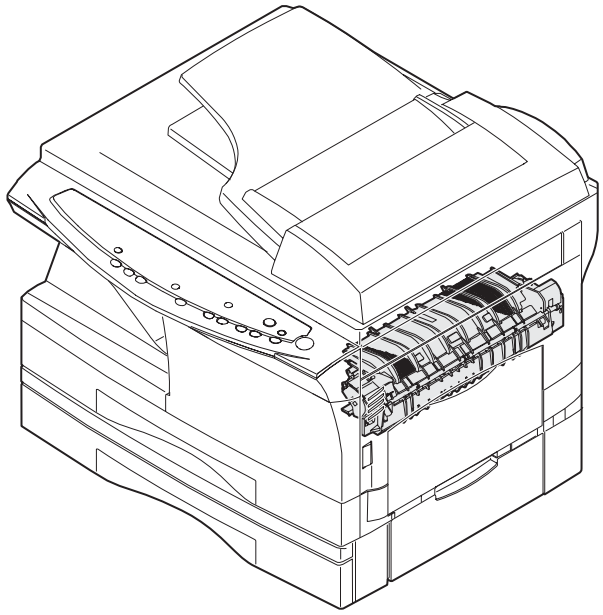
Resolution: 600dpi

Beam diameter: 75um in the main scanning direction, 80um in the sub scanning direction

Image surface power: 0.17 ±0.01mW (Laser wavelength 770 - 795nm)

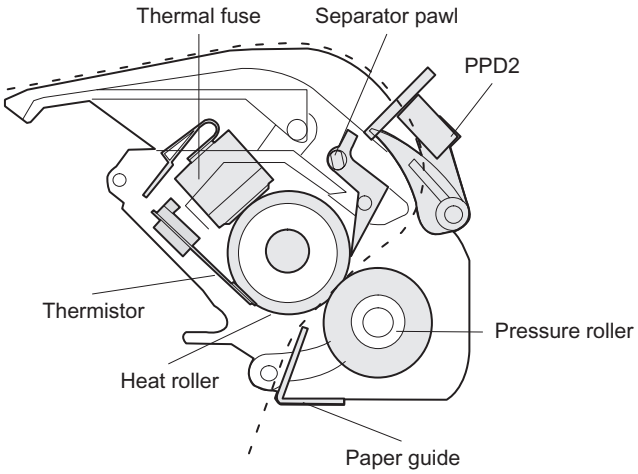
Polygon motor section: Brushless motor 20.787rpm
No. of mirror surfaces: 6 surfaces

4. Fuser section

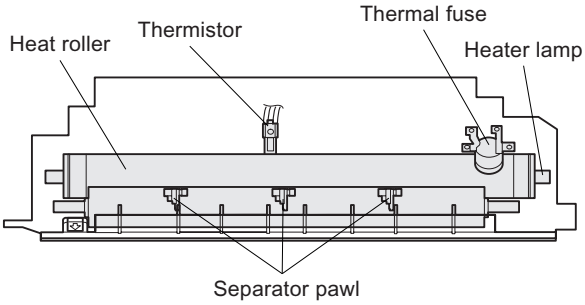


A. General description

General block diagram (cross section)



Top view



(1) Heat roller

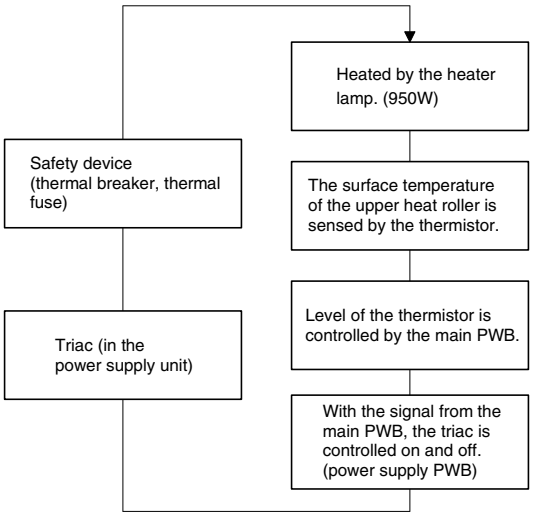
A Teflon roller is used for the heat roller and a silicone rubber roller is used for the lower heat roller for better toner fusing performance and paper separation.

(2) Separator pawl

Three separator pawls are used on the upper heat roller. The separator pawls are Teflon coated to reduce friction with the roller and prevent a smear on the paper caused by the separator pawl.

(3) Thermal control

1) The heater lamp, thermistor, main PWB, DC power supply PWB, and triac within the power supply unit are used to control the temperature in the fuser unit.
   To prevent against abnormally high temperature in the fuser unit, a thermal breaker and thermal fuse are used for safety purposes.



2) The surface temperature of the upper heat roller is set to 165 - 190℃. The surface temperature during the power save mode is set to 100℃.
3) The self-check function comes active when one of the following malfunctions occurs, and an "H" is displayed on the multicopy window.

a. When the heat roller surface temperature rises above 240℃.
b. When the heat roller surface temperature drops below 100℃ during the copy cycle.
c. Open thermistor
d. Open thermal fuse
e. When the heat roller temperature does not reach 190℃ within 27 second after supplying the power.

(4) Fusing resistor

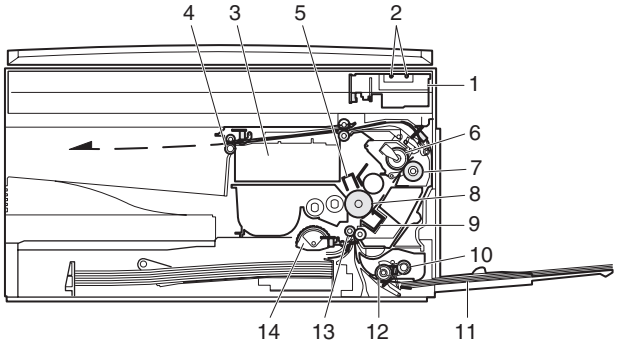
Fusing resistor

This model is provided with a fusing resistor in the fusing section to improve transfer efficiency.

Since the upper heat roller is conductive, when using copy paper that contains moisture and the distance between the transfer unit and the fusing unit is short, the transfer current may find a path to ground via the copy paper, the upper heat roller and the discharging brush.

5. Paper feed section and paper transport section

A. Paper transport path and general operations



1	Scanner unit	8	Drum
2	Copy lamp	9	Transfer unit
3	LSU (Laser unit)	10	Pickup roller
4	Paper exit roller	11	Manual paper feed tray
5	Main charger	12	Manual paper feed roller
6	Heat roller	13	PS roller unit
7	Pressure roller	14	Paper feed roller

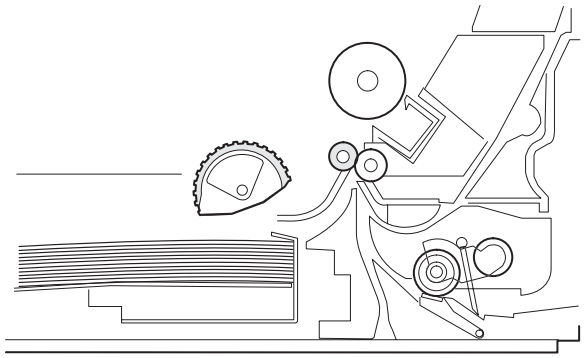
Paper feed is made in two ways; the tray paper feed and the manual paper feed. The tray is of universal-type, and has the capacity of 250 sheets.

The front loading system allows you to install or remove the tray from the front cabinet.

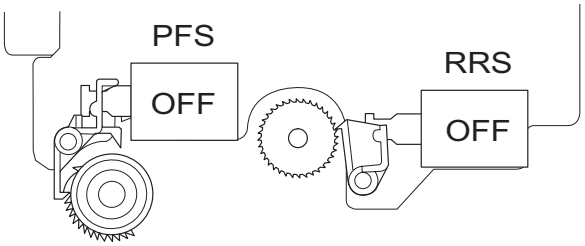
The general descriptions on the tray paper feed and the manual paper feed operation are given below.

(1) Cassette paper feed operation

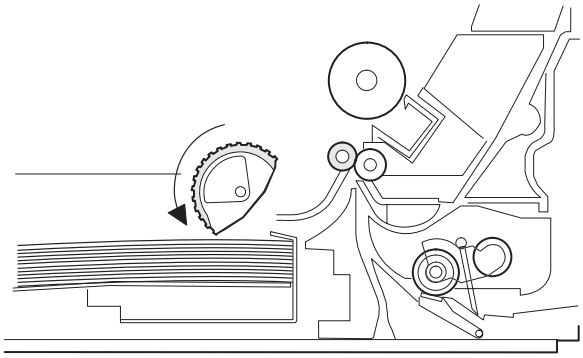
1) The figure below shows the positions of the pick-up roller, the paper feed clutch sleeve, and the paper feed latch in the initial state without pressing the COPY button after lighting the ready lamp.
The paper feed latch is in contact with the projection of the clutch sleeve.

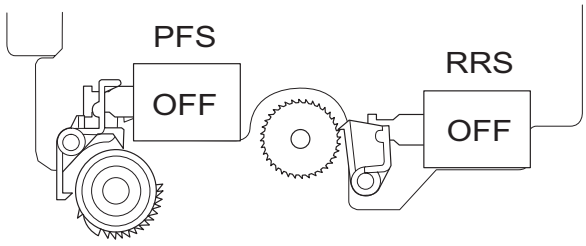


2) When the COPY button is pressed, the main drive motor starts rotating to drive each drive gear.
The pick-up drive gear also is driven at that time. Since, however, the paper feed latch is in contact with the projection of the clutch sleeve, rotation of the drive gear is not transmitted to the pick-up roller, which does not rotate therefore.



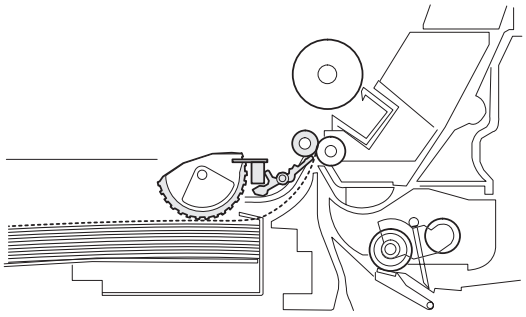
3) After about 0.1 sec from when the main motor start rotating, the tray paper feed solenoid (PFS) turns on for a moment.
This disengages the paper feed latch from the projection of the clutch sleeve, transmitting rotation of the pick-up drive gear to the paper feed roller shaft, rotating the pick-up roller to feed the paper.

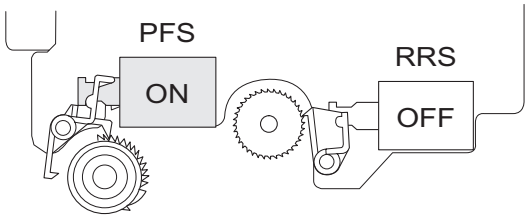




4) After more than half rotation of the pick-up roller, the paper feed latch is brought in contact with a notch on the clutch sleeve, stopping rotation of the pick-up roller.

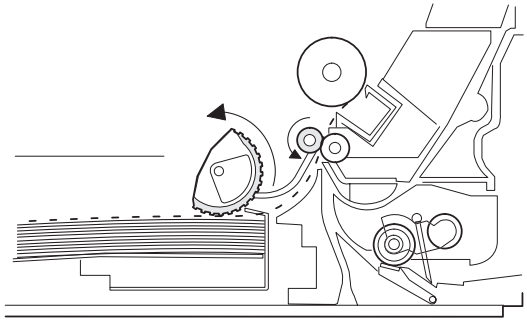
5) At this time, the paper is fed passed the paper entry detection switch (PPD1), and detected by it. After about 0.15 sec from detection of paper by PPD1, the tray paper feed solenoid (PFS) turns on so that the clutch sleeve projection comes into contact with the paper feed latch to stop the pick-up roller. Then the pick-up roller rotates for about 0.15 sec so that the lead edge of the paper is evenly pressed on the resist roller, preventing against skew feeding.

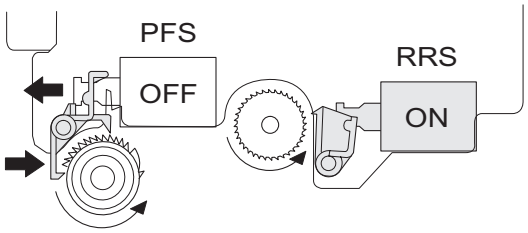




6) To release the resist roller, the tray paper feed solenoid and the resist solenoid are turned on by the paper start signal to disengage the resist start latch from the clutch sleeve, transmitting rotation of the resist drive gear to the resist roller shaft. Thus the paper is transported by the resist roller.

7) After the resist roller starts rotating, the paper is passed through the pre-transfer guide to the transfer section. Images are transferred on the paper, which is separated from the OPC drum by the drum curve and the separation section.

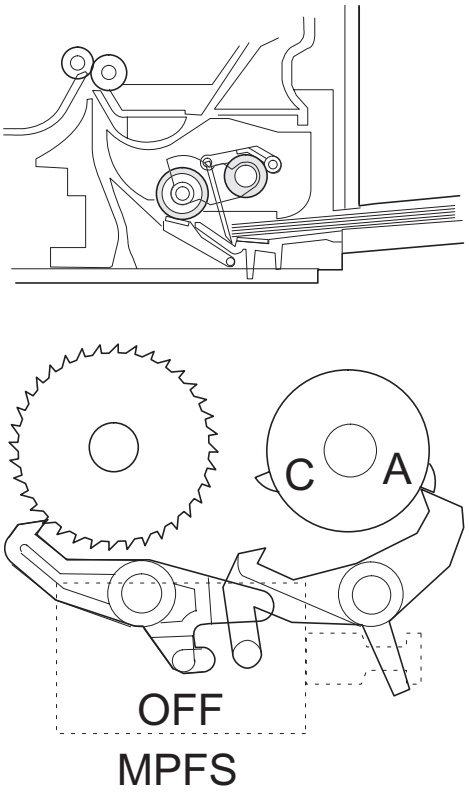




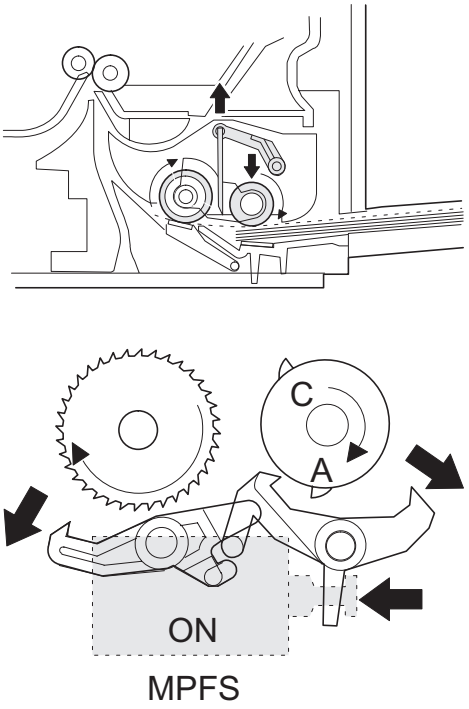
8) The paper separated from the drum is passed through the fusing paper guide, the heat roller (fusing section), POD (paper out detector) to the copy tray.

(2) Manual multi paper feed operation

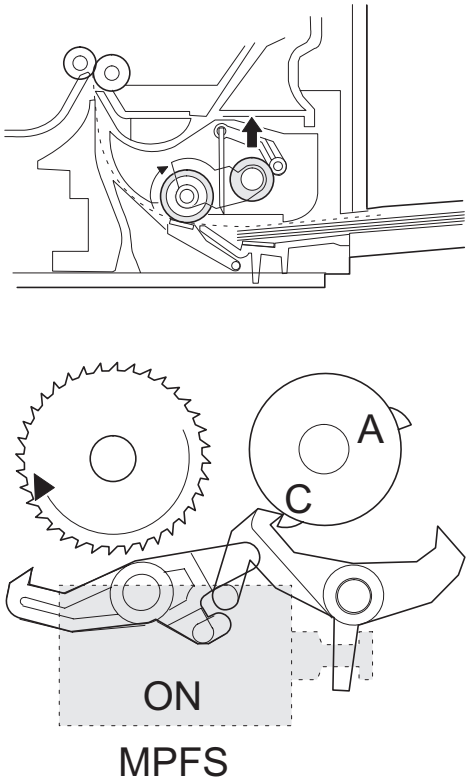
1) Before paper feed operation, the manual paper feed solenoid (MPFS) is turned OFF as shown in the figure below.



2) When the PRINT button is pressed, the manual paper feed solenoid (MPFS) turns on to disengage the manual paper feed latch.
A from the manual paper feed clutch sleeve A, rotating the manual paper feed roller and the manual take-up roller. At the same time, the manual paper feed stopper opens and the manual take-up roller is pressed to the surface of the paper to start paper feeding.

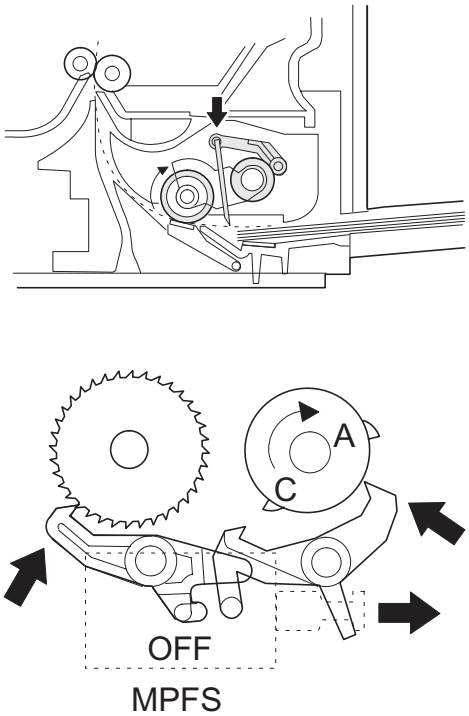


3) When pawl C of the manual paper feed clutch sleeve is engaged with the manual feed latch, the manual feed stopper falls and the manual take-up roller rises. At that time, the manual paper feed roller is rotating.



4) The lead edge of the transported paper is pressed on the resist roller by the transport roller. Then the paper is stopped temporarily to allow synchronization with the lead edge of the image on the OPC drum.
From this point, the operation is the same as the paper feed operation from the tray. (Refer to A-5 - 8.)

5) The solenoid turns off to close the gate and return to the initial state.



(3) Conditions of occurrence of paper misfeed

a. When the power is turned on:

PPD or POD is ON when the power is turned on.

b. Copy operation

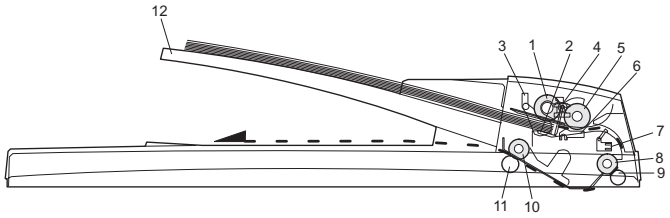
a	PPD1 jam	PPD1 does not turn off within 4 sec after turning on the resist roller.
b	PPD2 jam	PPD2 is off immediately after turning on the resist roller.
		PPD2 does not turn off within 1.2 sec after turning off the resist roller.
c	POD jam	POD does not turn on within 2.9 sec after turning on the resist roller.
		POD does not turn off within 1.5 sec - 2.7 sec after turning off PPD2.

6. SPF section

A. Outline

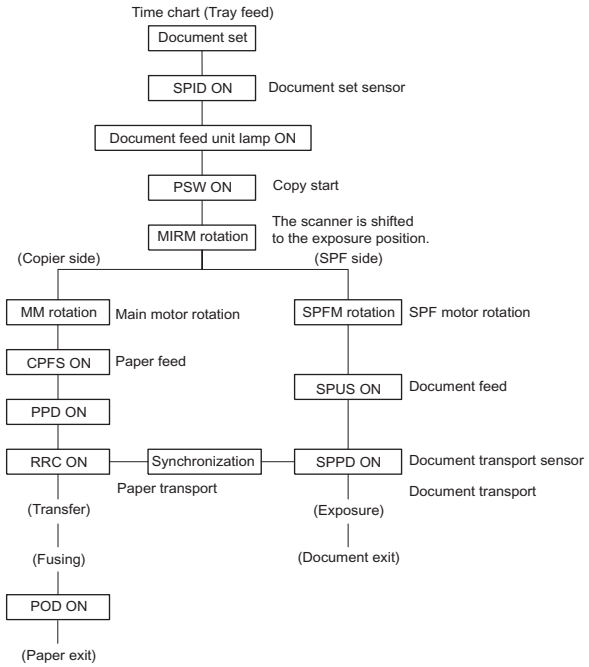
The SPF (Single Path Feeder) is installed to the AL-1456 as a standard provision, and it automatically copies up to 30 sheets of documents of a same size. (Only one set of copies)

B. Document transport path and basic composition

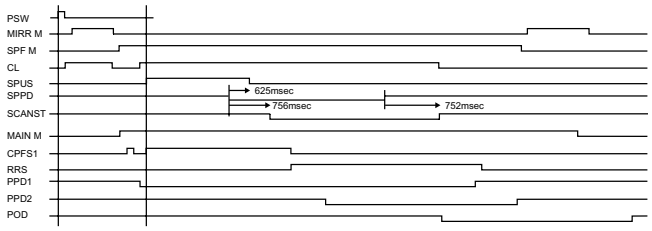


1	Pickup roller	2	Sheet of document for paper feed
3	Set detection ACT	4	Paper stopper
5	Document feed roller	6	Separation sheet
7	Paper entry sensor	8	PS roller D
9	Transport follower roller	10	Paper exit roller
11	Paper exit follower roller	12	Document tray

C. Operational descriptions



In the zooming mode, the magnification ratio in the sub scanning direction (paper transport direction) is adjusted by changing the document transport speed.



D. Cases where a document jam is caused

1) When SPPD is ON (document remaining) when the power is turned on.
2) When SPPD is not turned ON within about 1.5 sec (at 100% copy) after starting the document feed operation.
3) When SPPD is not turned on within about 4.7 sec (at 100% copy) after turning on SPPD.
4) When the SPF document jam release door or the OC cover is opened during document transport (SPF motor rotating).

7. D-D (Duplex to Duplex) mode paper/ document transport (Duplex model)

A. Initial state

Set duplex documents on the document tray.

Set paper on the cassette. (In the duplex mode, the manual feed tray cannot be selected.)

B. Front copy

Document transport:

The document feed roller feeds the document from the paper feed roller to the PS roller.

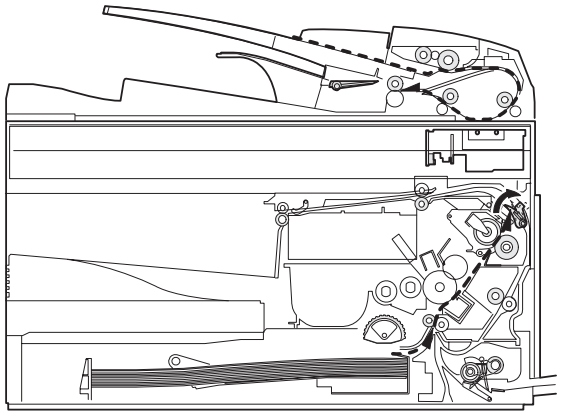
- The document is exposed in the exposure section, and sent to the document exit section
- by the transport/paper exit roller.
- R-SPF gate solenoid ON
- The document is sent to the intermediate tray. (but not discharged completely.)
- The document is stopped once, then switchback operation is performed. (To the back copy)

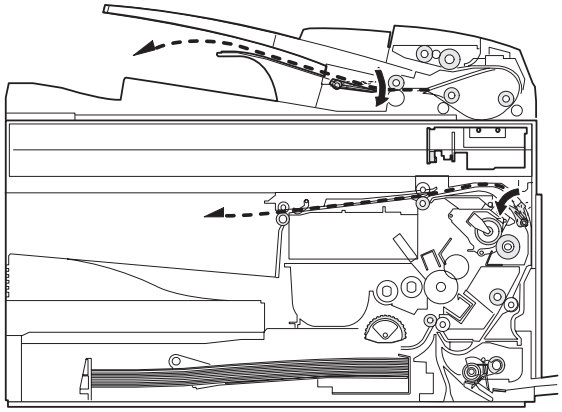
Paper transport:

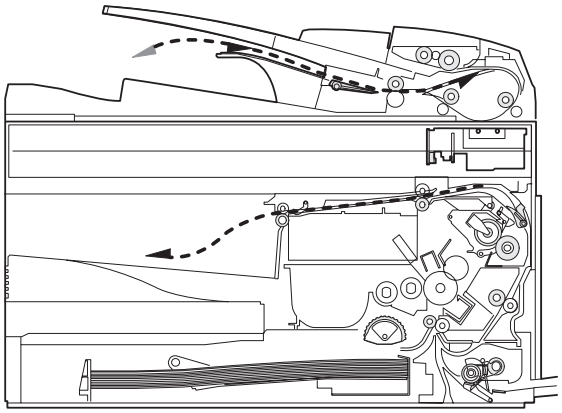
The document is passed through the paper feed roller and the PS roller by the paper feed roller

and the images on the front surface are transferred.

- The paper is passed through the fusing section and the lower side of the gate section to the paper exit tray side, (but not discharged completely.)
- It is stopped once and switchback operation is performed. (To the back copy)







C. Back copy

Document transport:

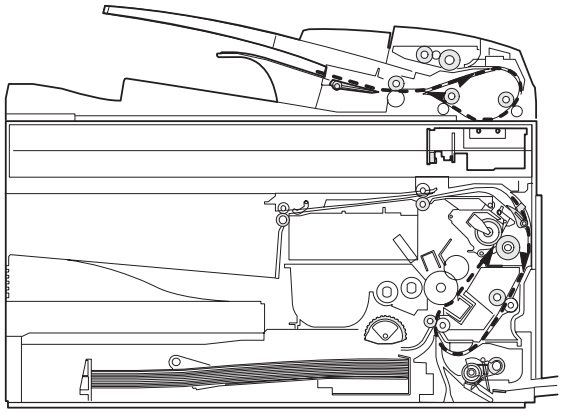
By switchback operation, the document is sent through the PS roller to the exposure section, where the back of the document is exposed.

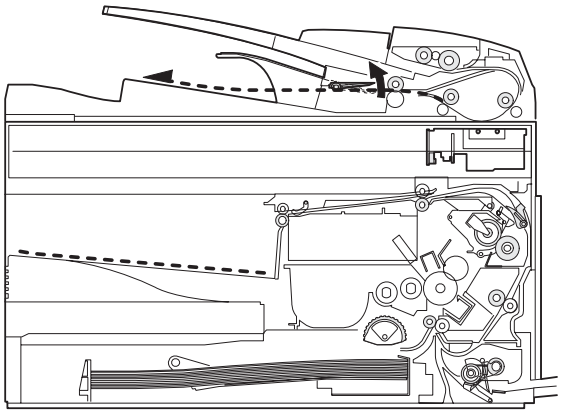
- It is sent to the document exit section by the transport roller and the paper exit roller.
- R-SPF gate solenoid ON. The document is sent to the intermediate tray, (but not discharged completely.)
- It is stopped once and switchback operation is performed.
- It is sent through the PS roller and the exposure section (without exposure operation) to the document exit section.
- R-SPF gate solenoid OFF
- The document is discharged to the document exit tray.

Paper transport:

Switchback operation is performed.

- The paper is sent through the upper side of the gate section and the duplex transport section, and the PS roller, and the images on the back are transferred.
- It is sent through the fusing section and discharged to the paper exit tray.





Switchback operation is made after back copying in order to discharge documents according to the setting.

Set document Documents after discharge,

$\frac{1}{2}$ with empty feed $\frac{4}{3}$ without empty feed $\frac{3}{4}$

$\frac{3}{4}$ $\frac{2}{1}$ $\frac{1}{2}$

There are following job modes as well as D-D mode.

S - S (Simplex to Simplex)

S - D (Simplex to Duplex),

Rotation copy mode (The back images are rotated 180°C.)

S - D (Simplex to Duplex), Copy mode without rotation

D - S (Duplex to Simplex)

Rotation copy mode:

The front and the back are in upside down each other.

Copy mode without rotation:

The front and the back are not in upside down.

[8] DISASSEMBLY AND ASSEMBLY

Before disassembly, be sure to disconnect the power cord for safety.

1. **Do not disconnect or connect the connector and the harness during the machine is powered. Especially be careful not to disconnect or connect the harness between the MCU PWB and the LSU (MCU PWB: CN119) during the machine is powered. (If it is disconnected or connected during the machine is powered, the IC inside the LSU will be destroyed.)**
2. **To disconnect the harness after turning on the power, be sure to turn off the power and wait for at least 10 sec before disconnection. (Note that a voltage still remains immediately after turning off the power.)**

The disassembly and assembly procedures are described for the following sections:

1. High voltage section
2. Operation panel section
3. Optical section
4. Fusing section
5. Tray paper feed/transport section
6. Manual paper feed section
7. Rear frame section
8. Power section
9. 2nd cassette section
10. Duplex motor section
11. Reverse roller section
12. RSPF section

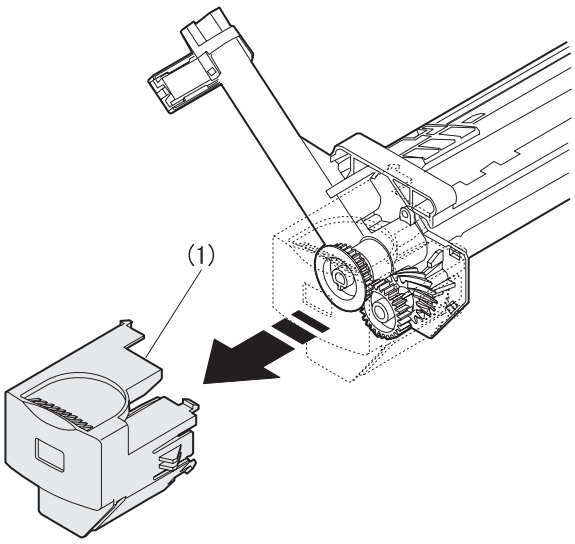
1. High voltage section

A. List

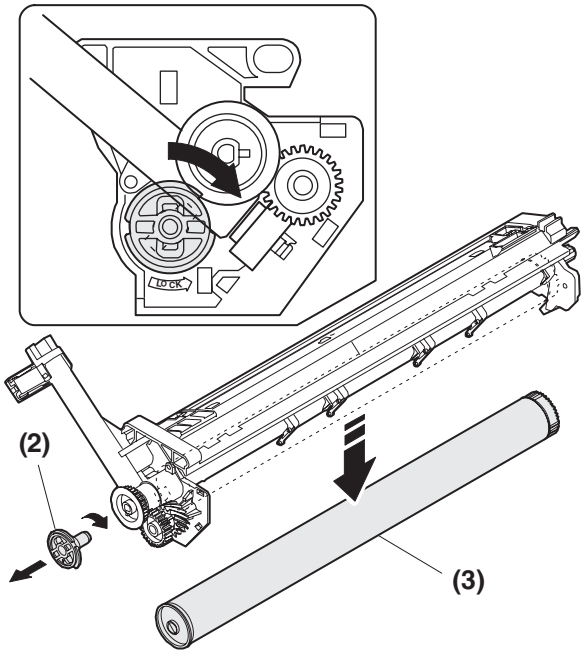
No.	Part name Ref.
1	Drum
2	Transfer charger unit
3	Charger wire

B. Drum replacement

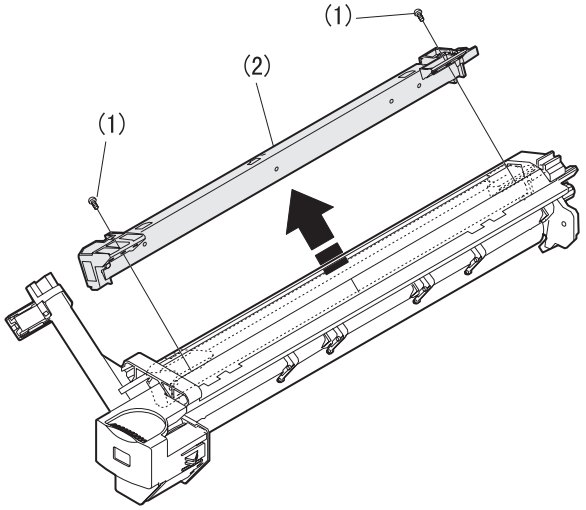
1) Remove the drum cover. (4 Lock Tabs)



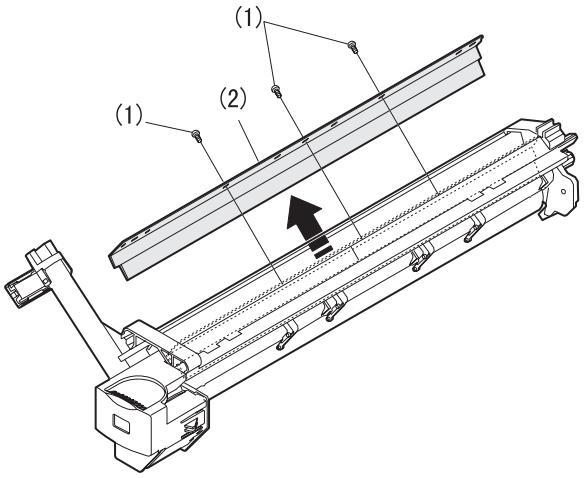
2) Remove the drum fixing plate and the photoconductor drum.
(Note) Dispose the drum fixing plate which was removed.



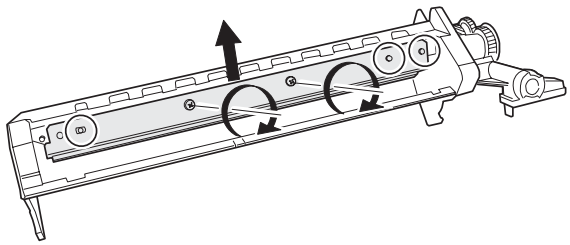
3) Check the cleaning blade and the red felt for no damage.
   - If there is any damage, execute all procedures from item 5) and later.
   - If there is no damage, execute the procedure of item 12).
4) Remove the main charger.
(Cleaning the screen grid and the sawteeth.)



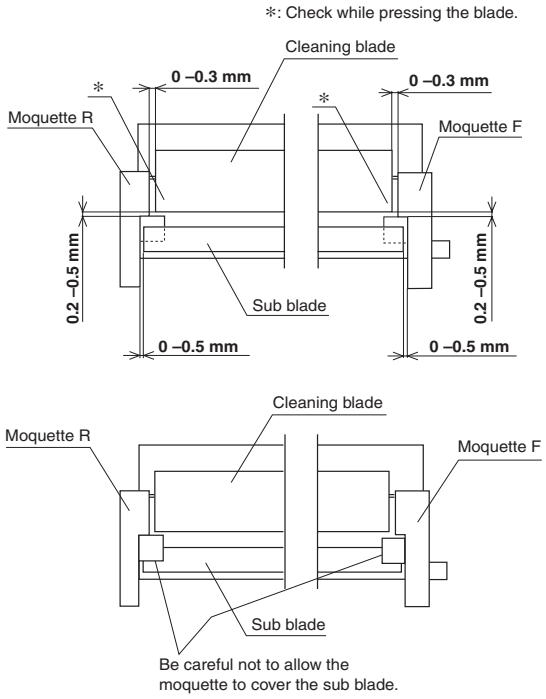
5) Remove the cleaning blade.
Note: Dispose the cleaning blade which was removed.



6) Clean the cleaning section and the waste toner pipe to remove waste toner completely with a vacuum cleaner.
7) Remove the felt and duplex tape completely.
Note: Be careful not to scratch or bend the sub blade.
8) Attach the cleaning blade.
Securely insert the plate section of the cleaning blade into the unit and fix it with a screw.
Do not touch the cleaning blade rubber with your hand.
When attaching the cleaning blade, press the cleaning blade in the arrow direction and attach.



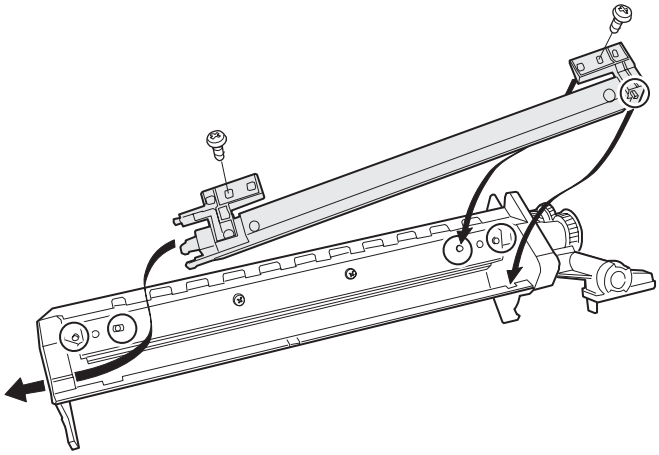
9) Attach the felt.



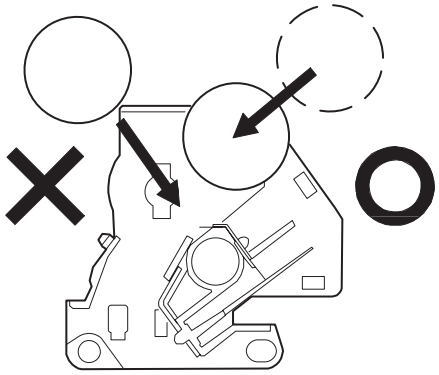
Example of NG

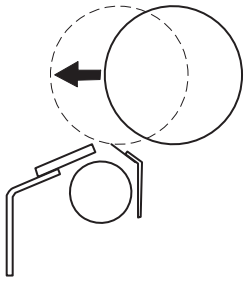
Attach the mocket with slightly pressing section A of the cleaning blade.
Do not touch the tip of the cleaning blade.
Do not put the mocket under the cleaning blade.
Do not put the mocket on the sub blade.
Do not press the sub blade with the mocket.

10) Attach the main charger.
Securely set the MC holder on the projection of the process frame.
Securely insert two projections of the MC holder into the groove in the process frame.
When attaching the MC holder ass'y, be careful not to make contact with the cleaning blade.



11) Attach the drum fixing plate and the photoconductor drum.
Apply grease to the inside of the photoconductor drum. (Dia. 2)



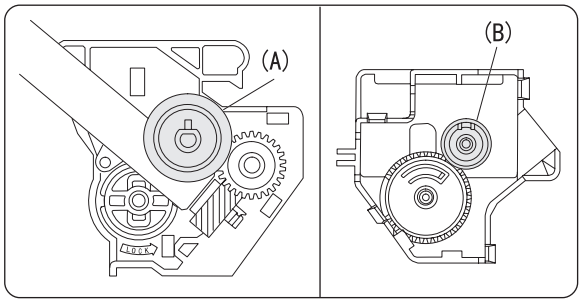


Attach the drum from (b). (Prevention against the sub blade edge breakage)
Attach the drum so that its position with the sub blade is as shown.

12) Attach the detection gear.

Note:

- The detection gear is not installed to the drum cartridge packed with the main body. Add a new one.

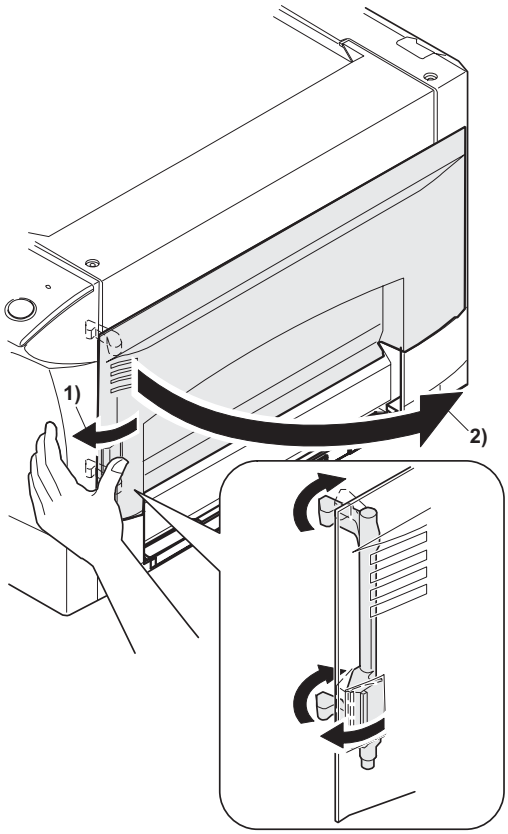


13) Attach the drum cover.

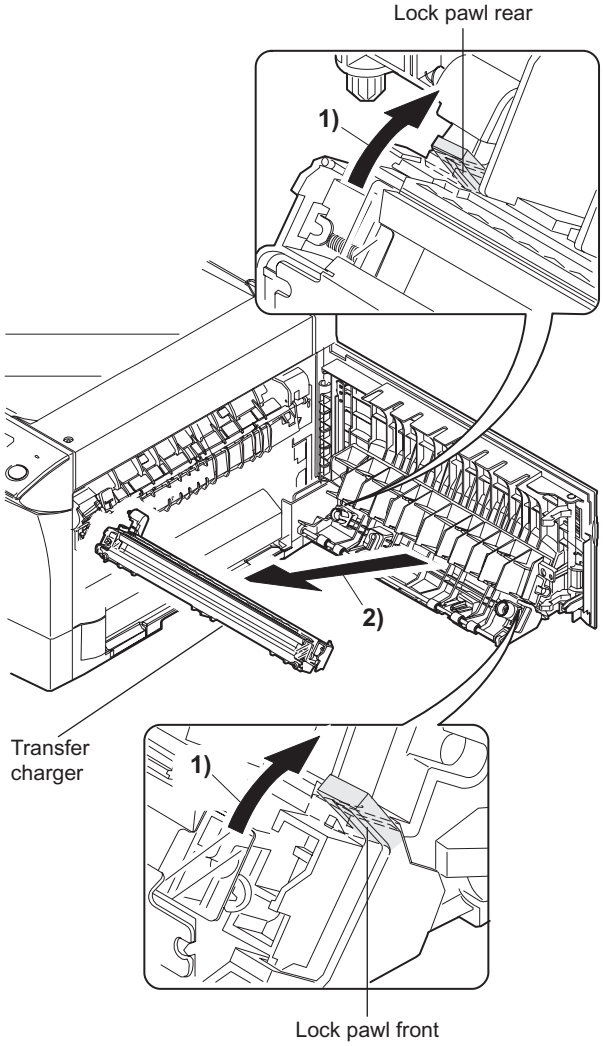
Note: After attaching the drum cover, do not make a copy.
When attaching the drum cover, engage the detection gear 20T rib with the 30T gear rib, and attach the drum cover to the process frame.

C. Disassembly procedure (Transfer changer unit)

1) Press the side cover open/close button and open the side cover.



2) Push up the lock pawls (2 positions) of the side cover, and remove the transfer charger.

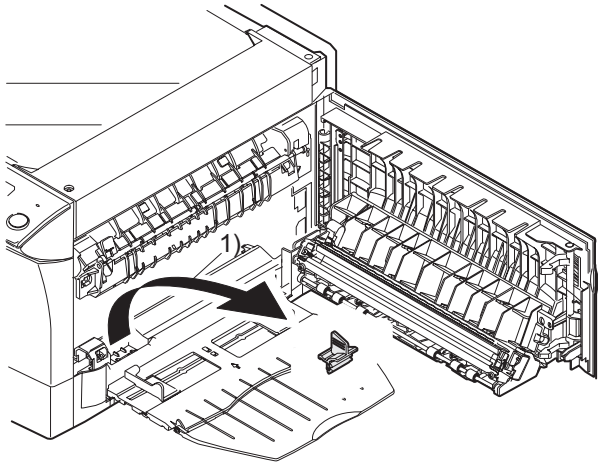


D. Assembly procedure

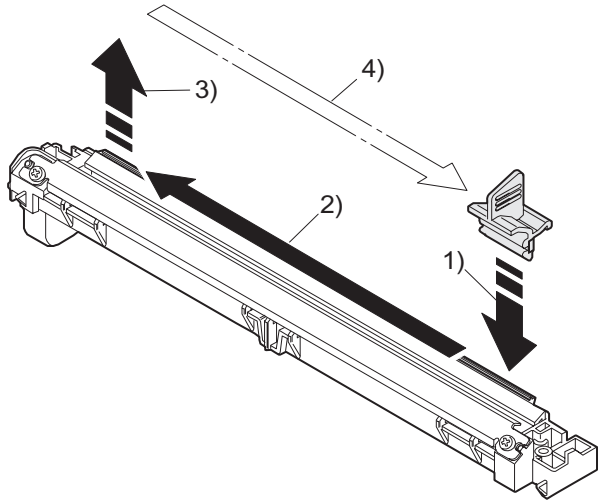
For assembly, reverse the disassembly procedure.

E. Charger wire cleaning

1) Remove the charger cleaner from the manual paper feed unit.



2) Set the charger cleaner to the transfer unit, and move it reciprocally a few times in the direction of the arrow shown in the figure below.



F. Charger wire replacement

1) Remove the TC cover and remove the screw.
2) Remove the spring and remove the charger wire.
3) Install a new charger wire by reversing the procedures (1) and (2). At that time, be careful of the following items.

- The rest of the charger wire must be within 1.5mm. Refer to Fig.1
- The spring hook section (charger wire winding section) must be in the range of the projection section.
- Be careful not to twist the charger wire.

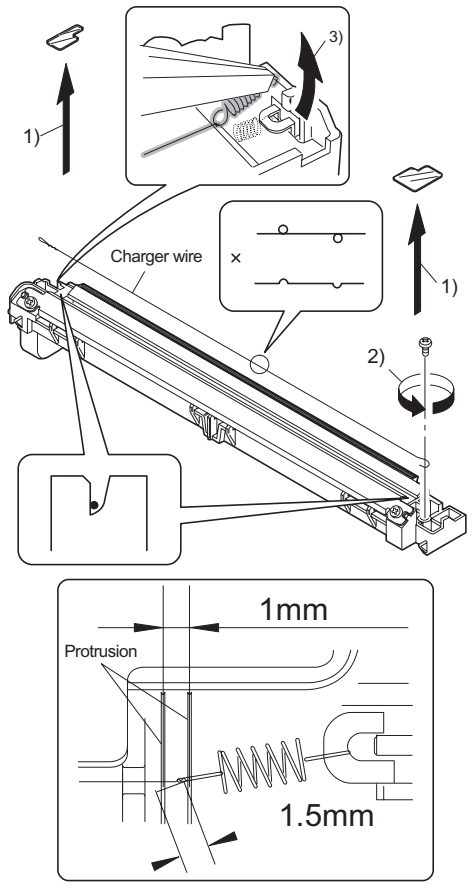


Fig.1

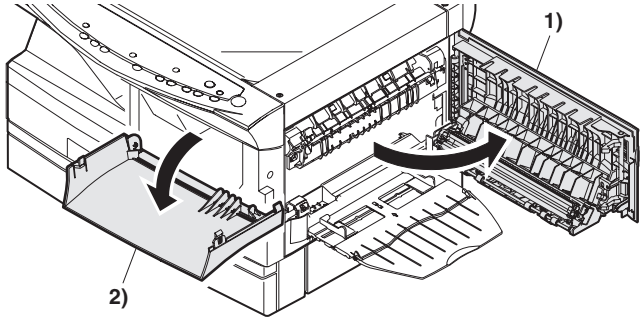
2. Operation panel section

A. List

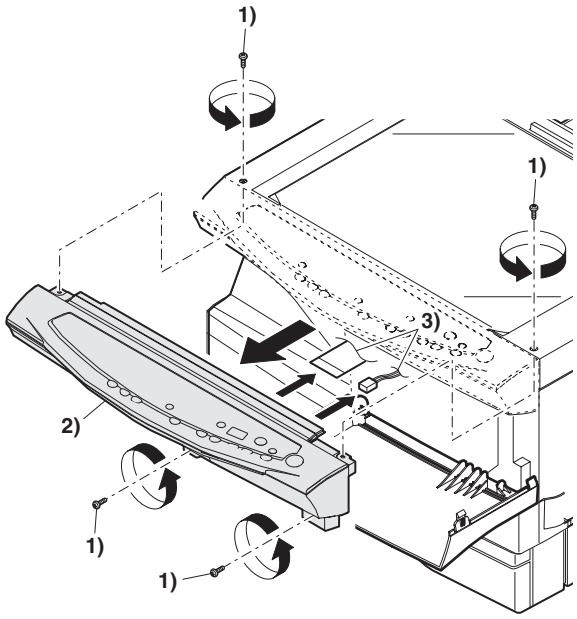
No.	Part name Ref.
1	Operation panel unit
2	Operation PWB

B. Disassembly procedure

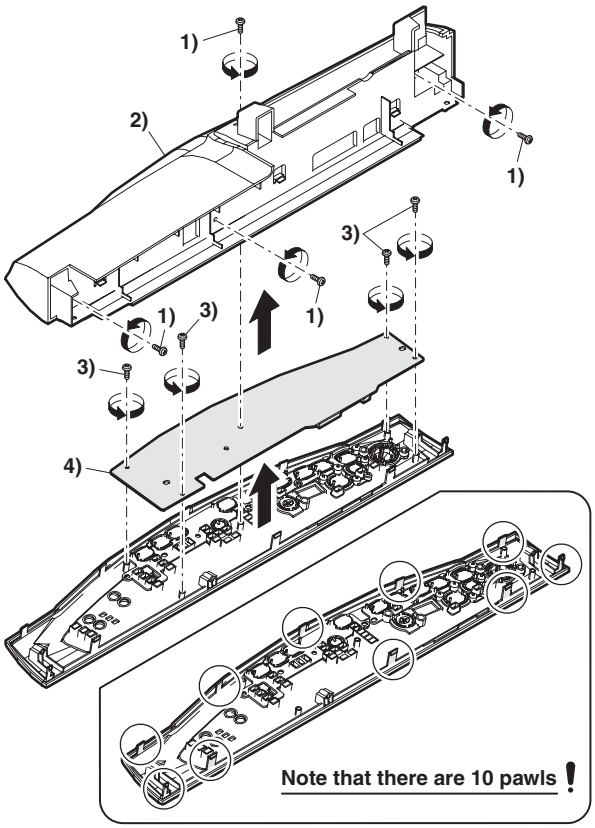
1) Open the side door, and Open the front cover.



2) Remove the screws (4 pcs.), the harness, and the operation panel unit.



3) Remove four screws, and remove the operation cabinet.
4) Remove four screws, and remove the operation PWB.



C. Assembly procedure

For assembly, reverse the disassembly procedure

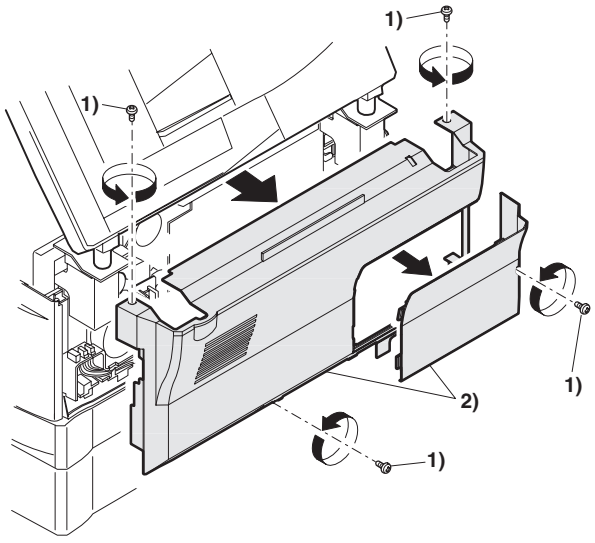
3. Optical section

A. List

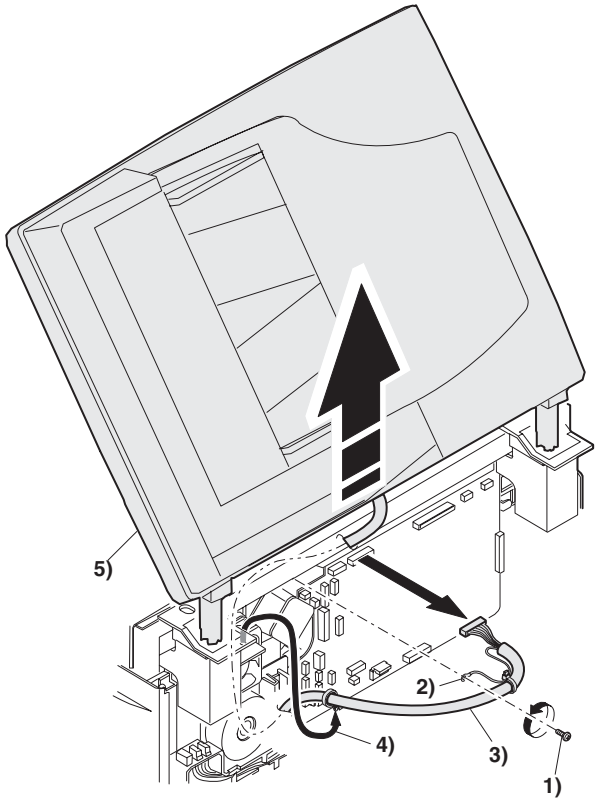
NO.	Part name Ref.
1	Copy lamp unit
2	Copy lamp
3	Lens unit

B. Disassembly procedure

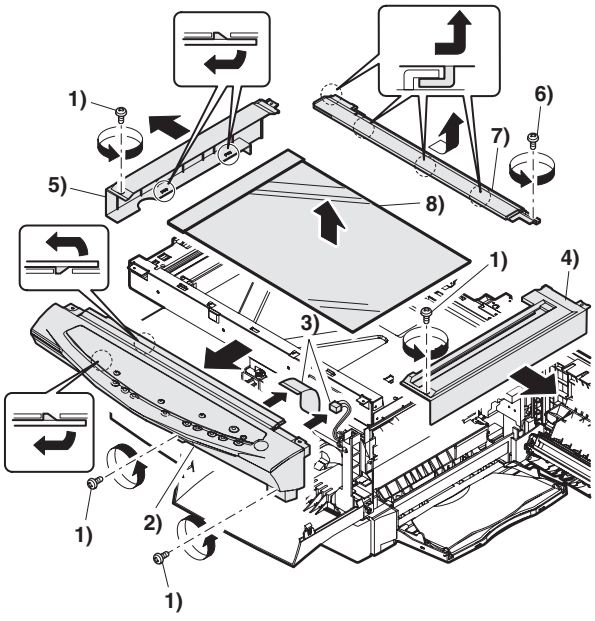
1) Remove four screws, and remove the rear cabinet and the rear cabinet cover.



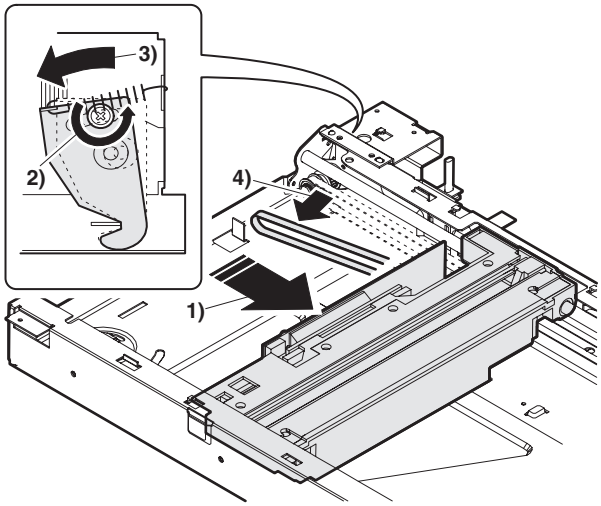
2) Remove the connector and the clamp, and remove the RSPF unit.



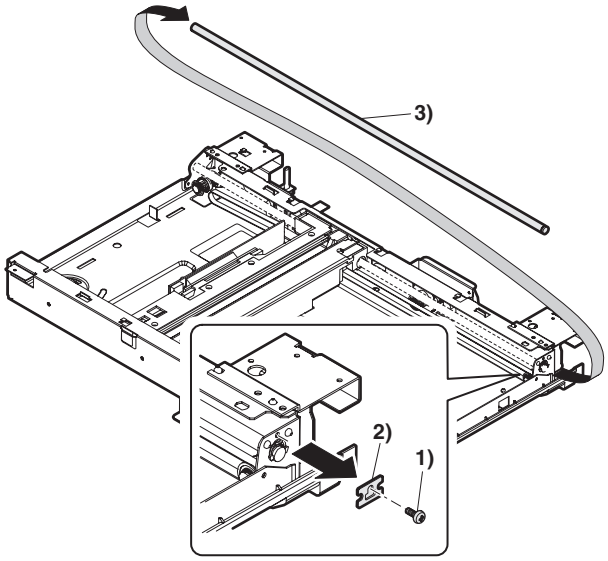
3) Remove the four screws, remove the operation unit, and disconnect the connector.
4) Remove the right cabinet.
5) Remove the left cabinet.
6) Remove the screw, and remove the rear cover.
7) Remove the table glass.



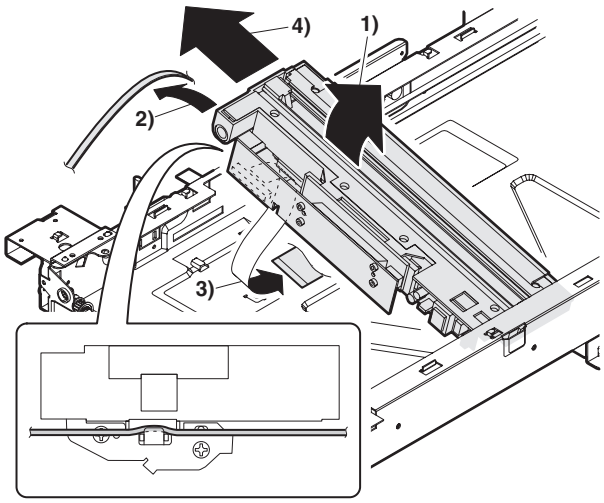
8) Move the carriage to the position indicated on the figure.
9) Loosen the screw which is fixing the tension plate.
10) Move the tension plate in the arrow direction to release the tension, and remove the belt.



11) Remove the screw, and remove the rod stopper.
12) Remove the rod.



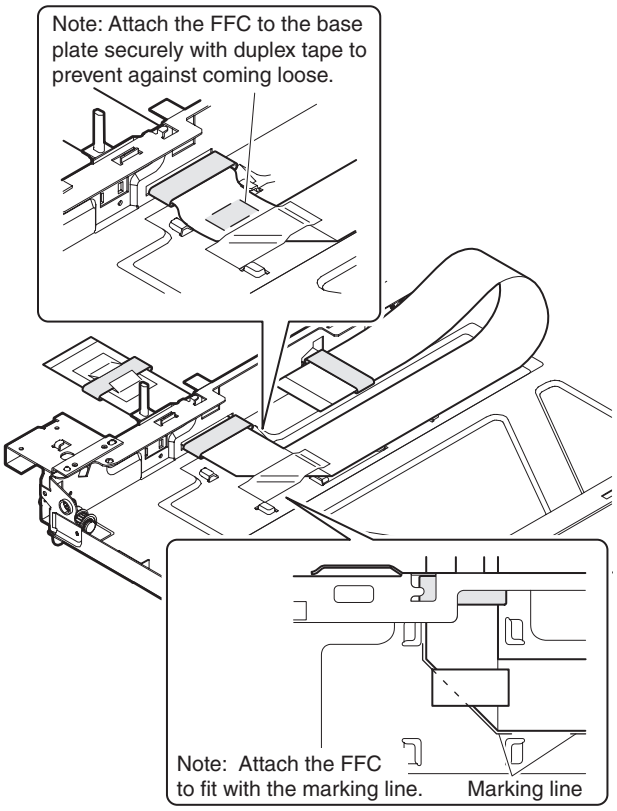
13) Lift the rear side of the carriage, remove the belt and the connector, and remove the carriage.

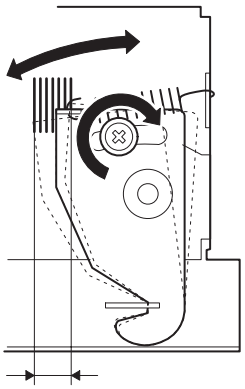


C. Assembly procedure

CCD core

1) Pass the core through the CCD-MCU harness.
2) Insert the CCD-MCU harness into the CCD PWB connector of the carriage unit.
3) Move the core which was passed through the CCD-MCU harness near the CCD PWB connector as shown in the figure below, and fix it with a filament tape (19mm wide, 40mm long). For the attachment reference, refer to the figure below. Clean and remove oil from the attachment section.
4) Attach the CCD-MCU harness to the duplex tape on the back of the carriage unit.
5) Attach the PWB holder to the position specified in the figure below.
6) Pass the core through the FFC and the PWB holder, and fix the core.





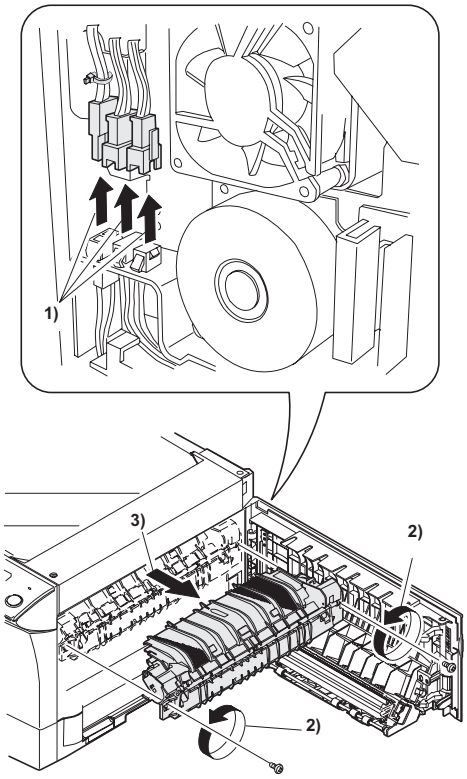
4. Fusing section

A. List

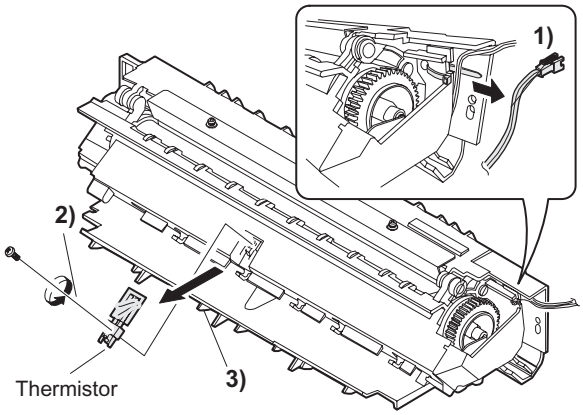
No.	Part name Ref.
1	Thermistor
2	PPD2 sensor
3	Heater lamp
4	Pressure roller
5	Heat roller

B. Disassembly procedure

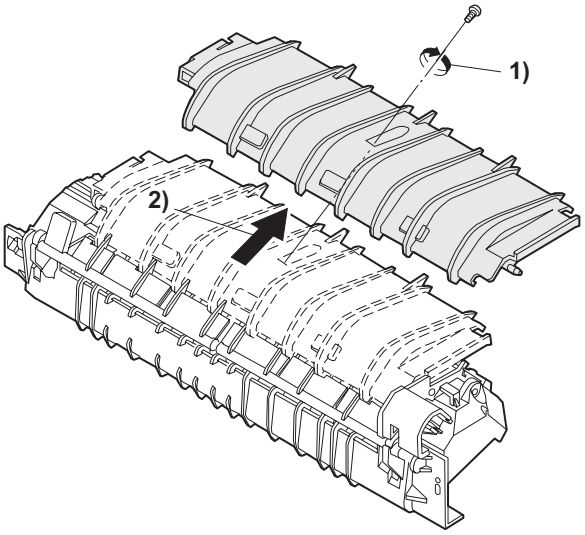
1) Remove the connectors (3 pcs.) of the rear cabinet.
2) Open the side cover, remove two screws, and remove the fusing unit.



3) Cut the binding band, remove the screw, and remove the thermistor.

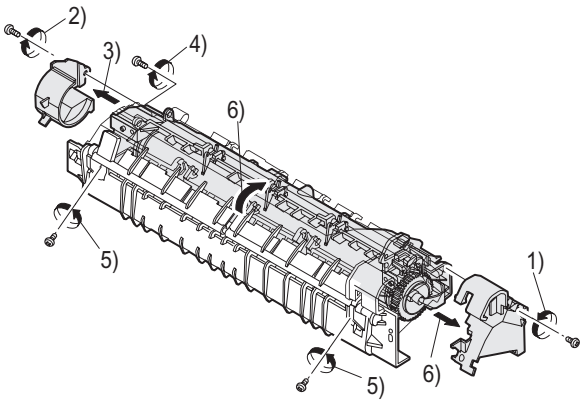


4) Remove the screw and remove the U-turn guide.

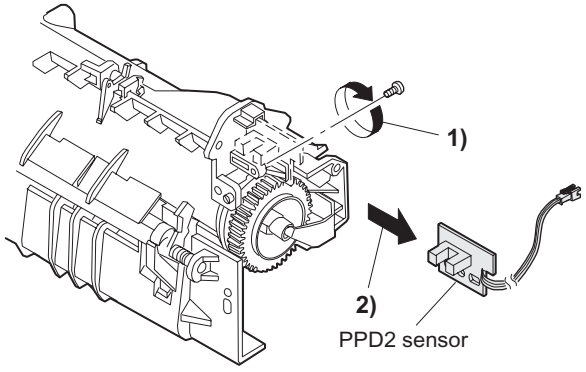


Pressure roller section disassembly

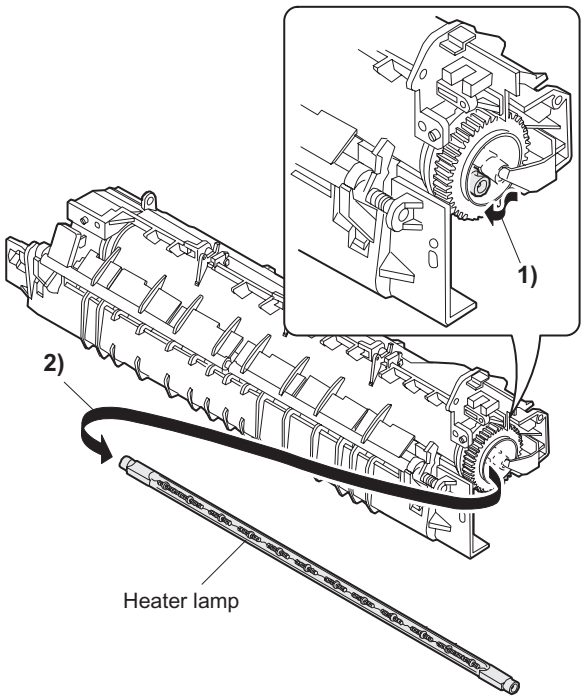
5) Remove the three screws, remove the fusing cover lower on the right side, and open the heat roller section.



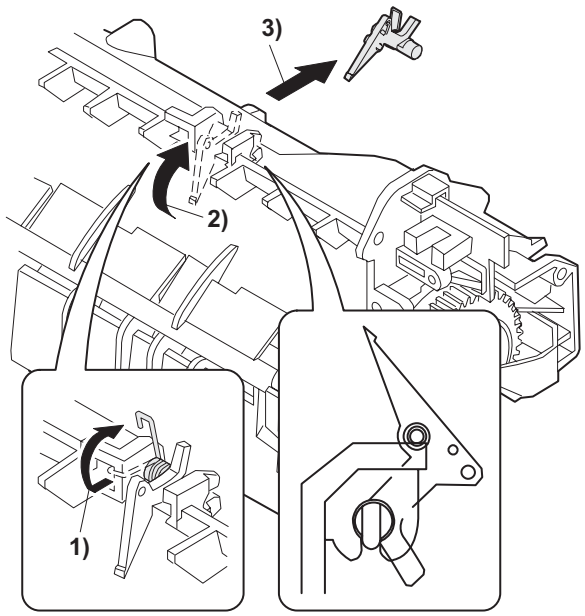
6) Remove the screw and remove the PPD2 sensor.



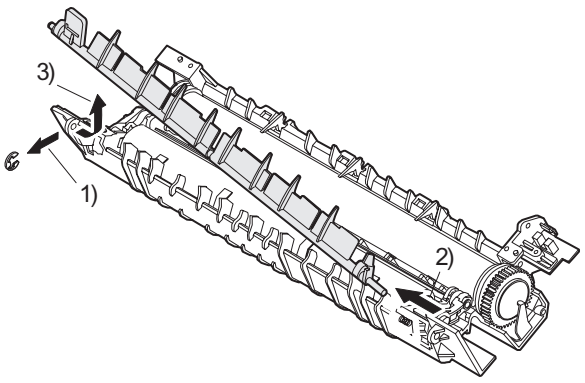
7) Remove the plate spring on the right and remove the heater lamp.



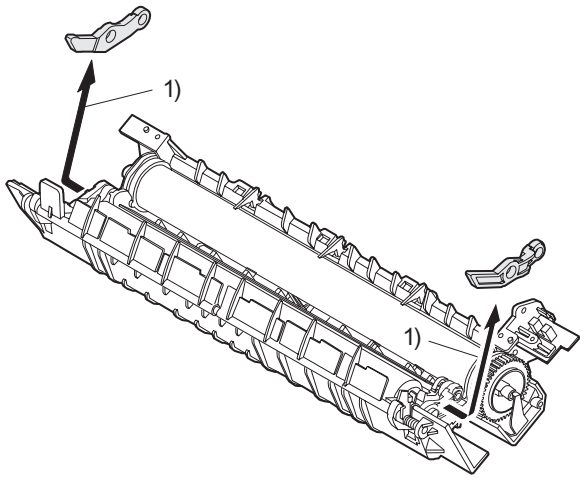
8) Remove the spring and remove the separation pawls (3 pcs.).



9) Remove the E-ring and remove the reverse gate.

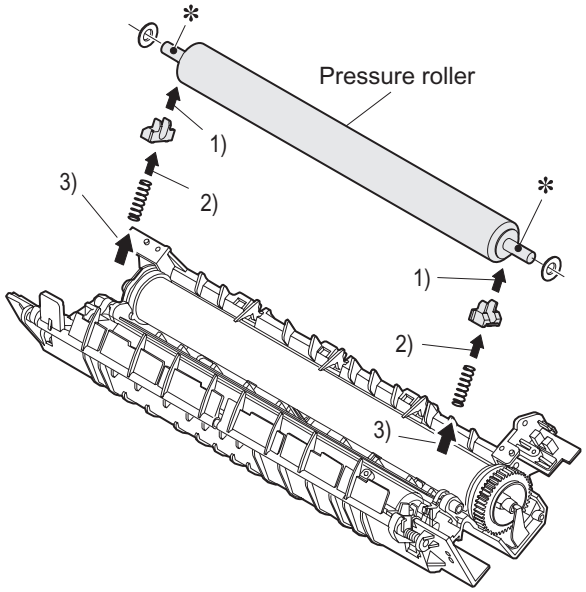


10) Remove the pressure release levers on the right and the left sides.



11) Remove the pressure roller, the pressure bearing, and the spring.

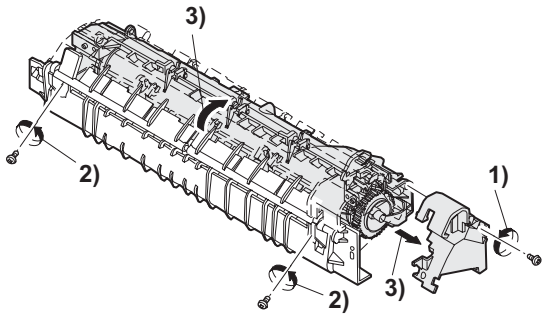
Note: Apply grease to the sections specified with an asterisk (*).



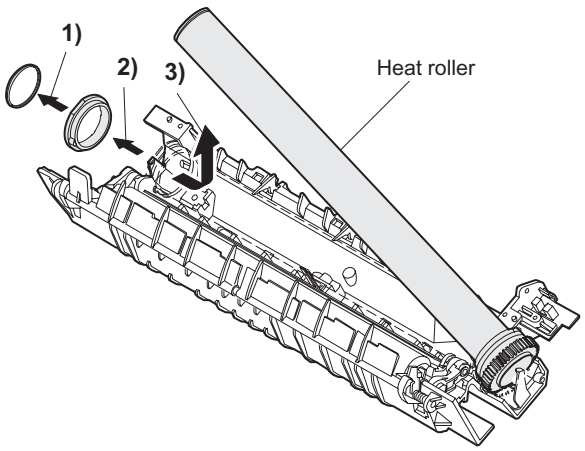
Heat roller disassembly

(Continued from procedure (4).)

5) Remove screws, remove the fusing cover, and open the heat roller section.

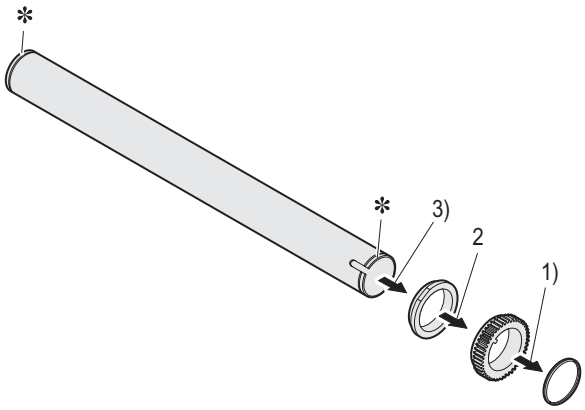


6) Remove the C-ring and the fusing bearing, and remove the heat roller.

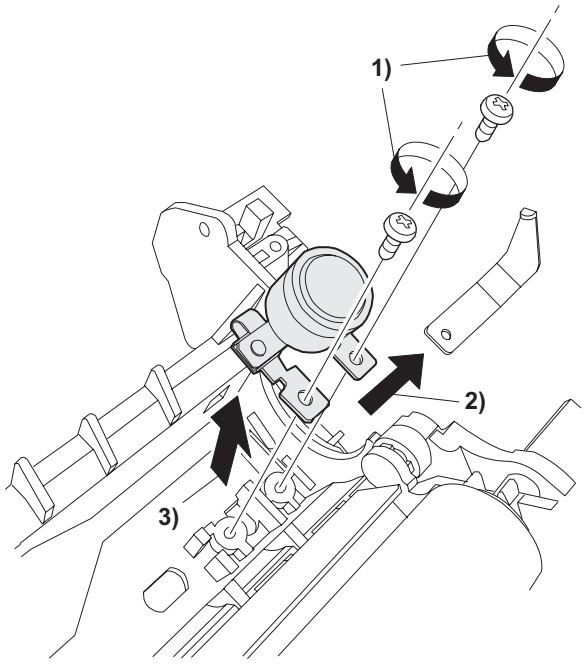


7) Remove the parts from the heat roller.

Note: Apply grease to the sections specified with *.



8) Remove two screws and remove the thermo unit.



C. Assembly procedure

For assembly, reverse the disassembly procedure.

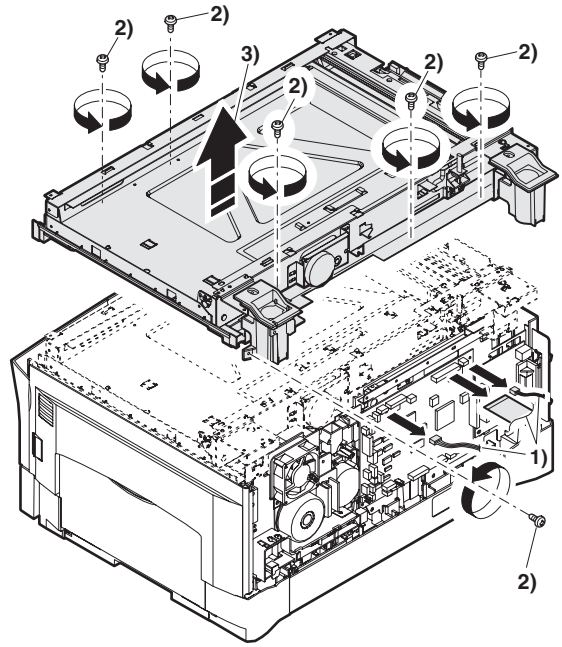
5. Tray paper feed/transport section

A. List

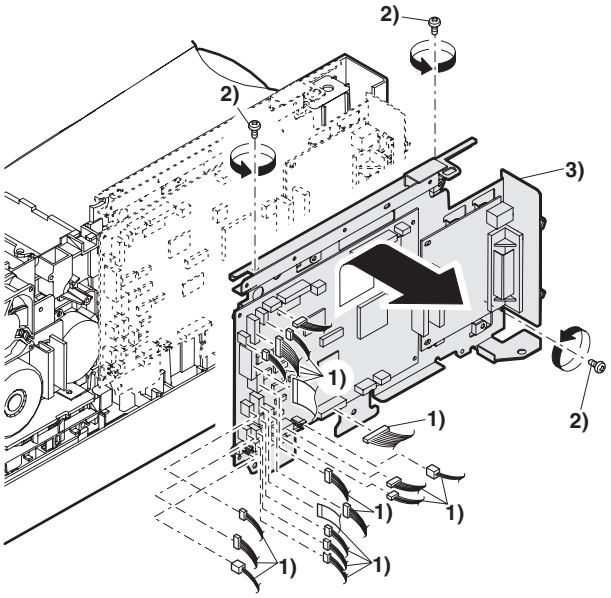
No.	Part name Ref.
1	PPD1 sensor PWB
2	LSU unit
3	Intermediate frame unit
4	Paper feed roller

B. Disassembly procedure

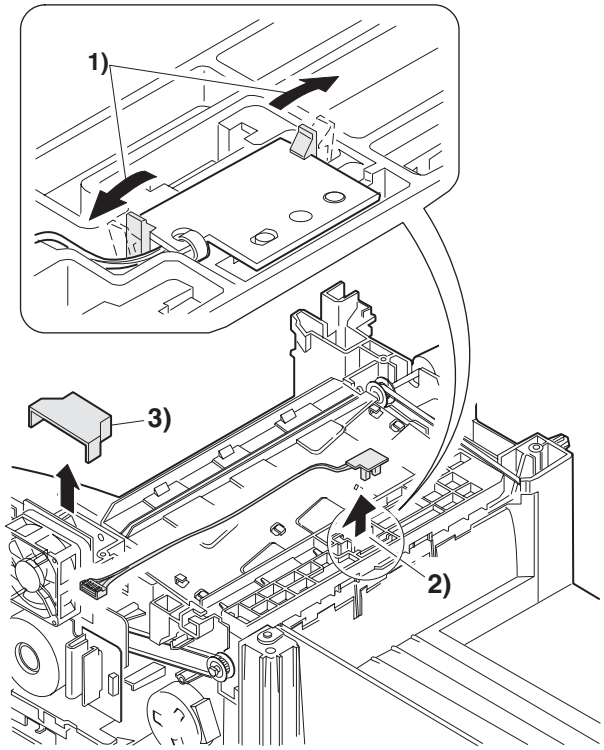
1) Remove two screws, and remove the hinge guide R.
2) Disconnect three positions of the connectors.
3) Remove six screws, and remove the scanner unit.
4) Remove the fan duct.



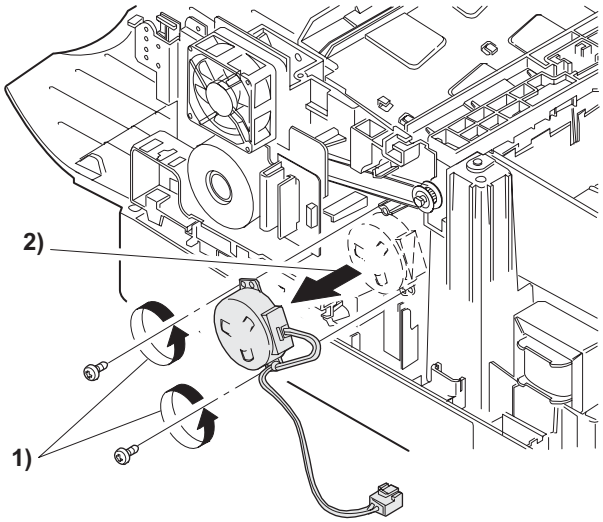
4) Remove each connector and three screws, and remove the MCU PWB.



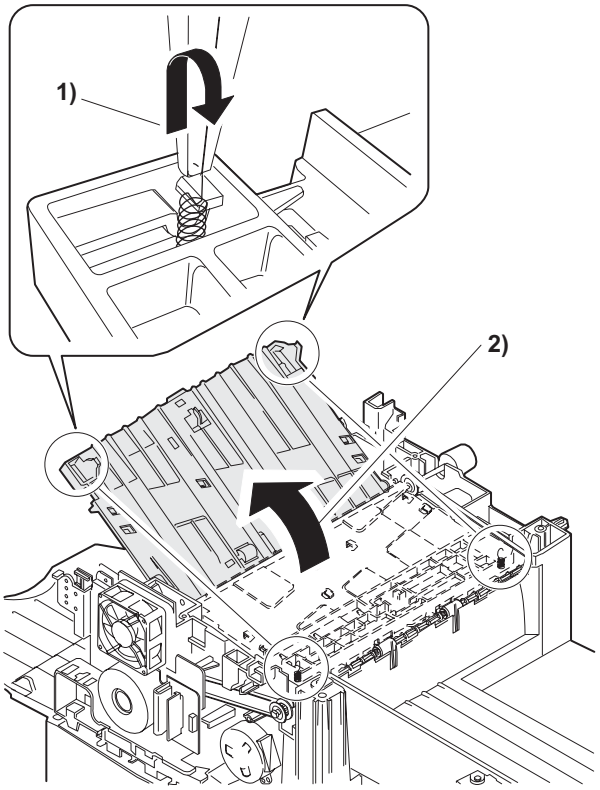
5) Remove the PWB insulation mylar and remove the paper transport detection sensor (PPD2).



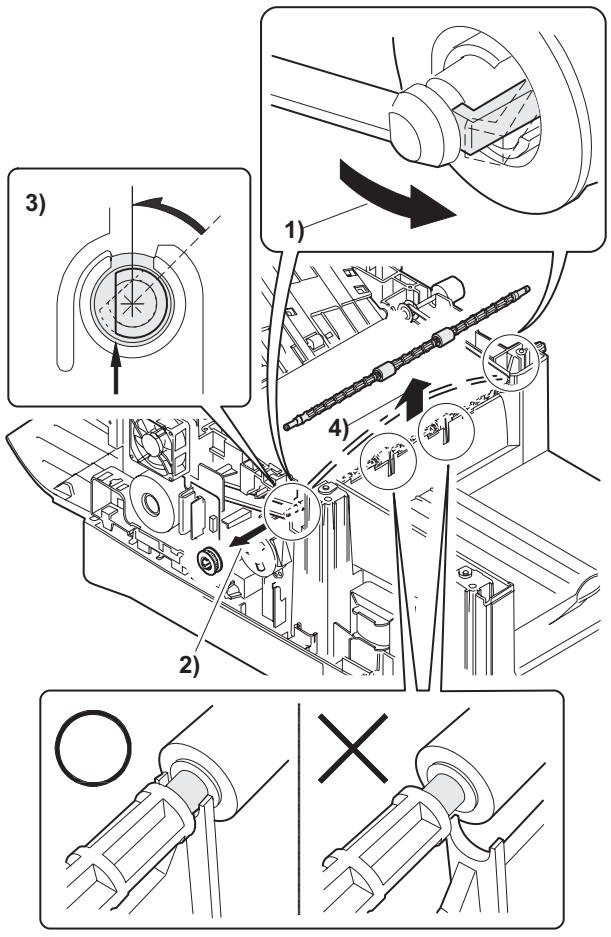
6) Remove two screws and remove the toner motor.



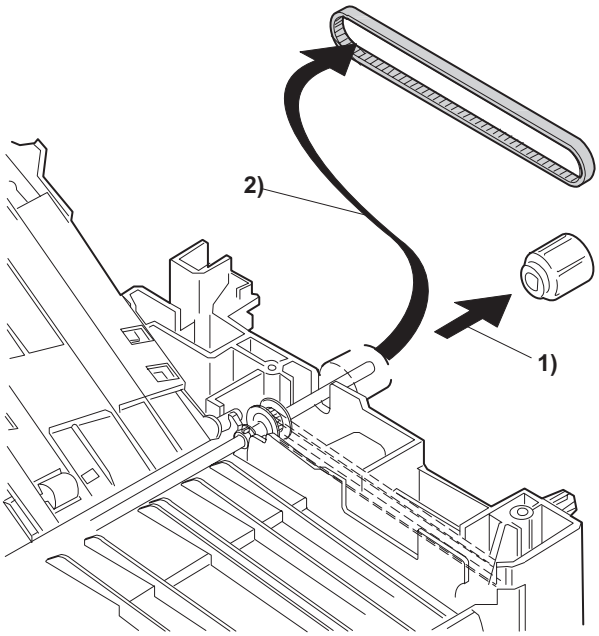
7) Remove two springs and open the intermediate frame unit.



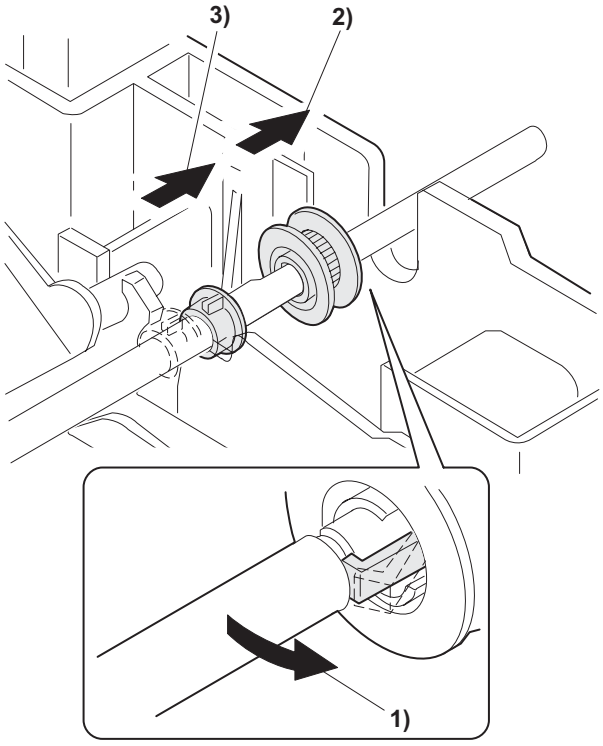
8) Remove the pulleys on the both sides and remove the paper exit roller.



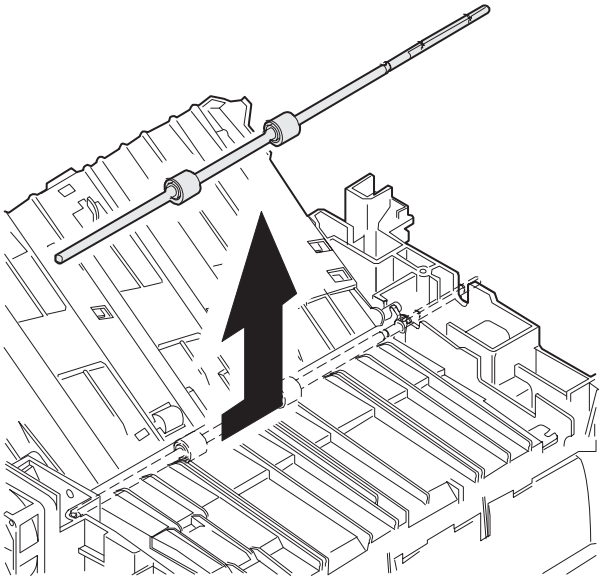
9) Pull out the paper exit roller knob and remove the belt.



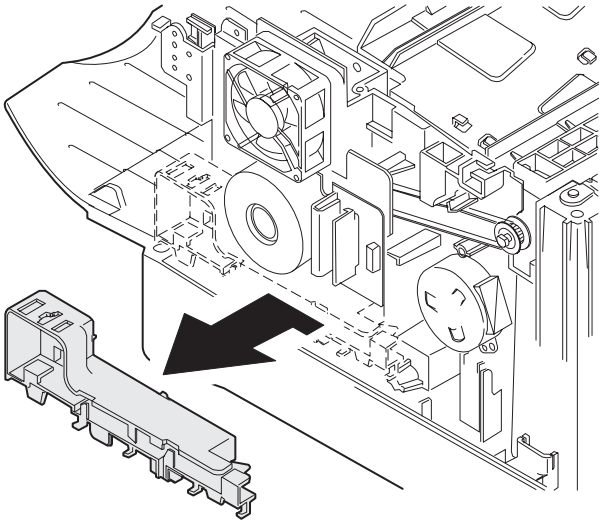
10) Release the belt pulley (a) lock and remove the belt pulley bearing.



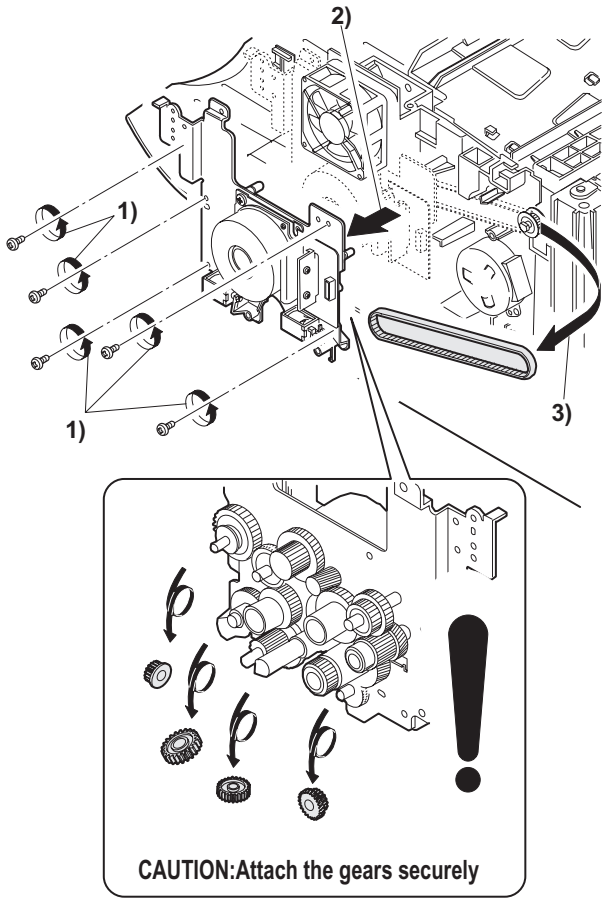
11) Remove the paper exit roller.



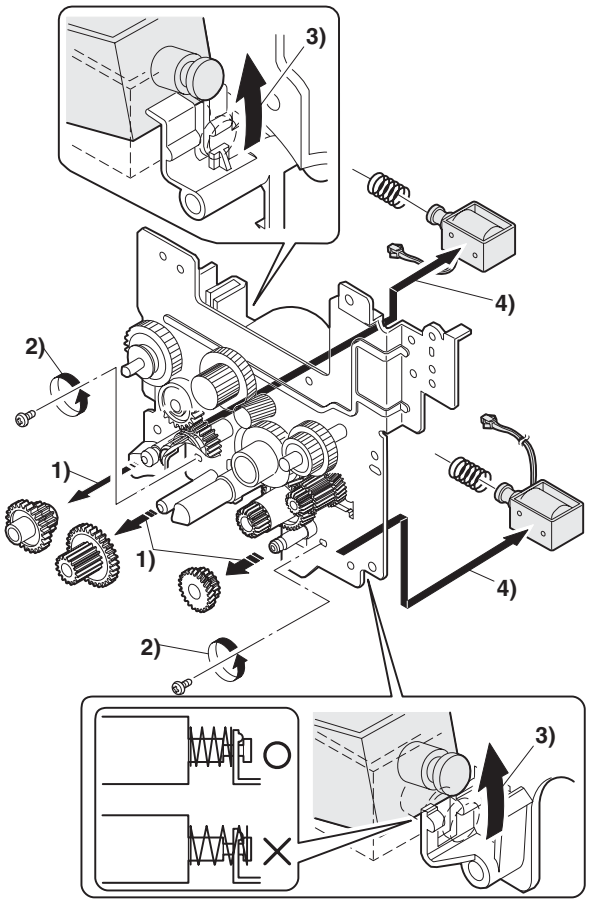
12) Remove the harness guide.



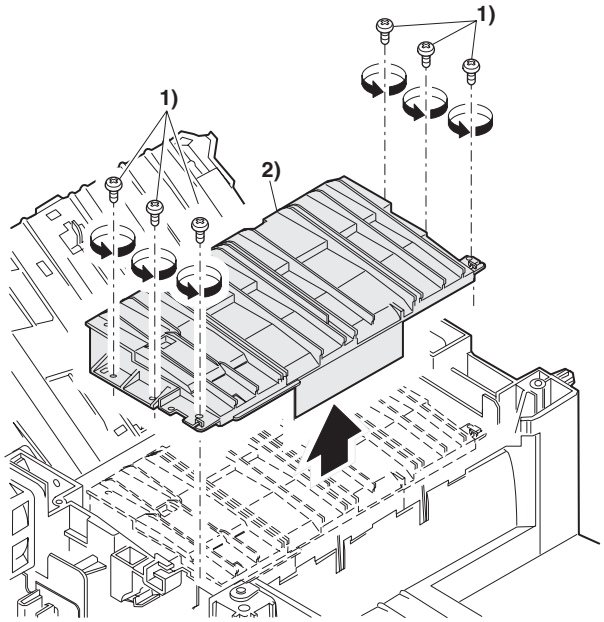
13) Remove five screws and remove the main drive plate and the belt.



14) Remove the parts as shown below, and remove the pressure release solenoid and the paper feed solenoid.



15) Remove six screws and remove the LSU unit.



The scan inclination classification is indicated on the right or the left of the LSU production number label according to the classification.

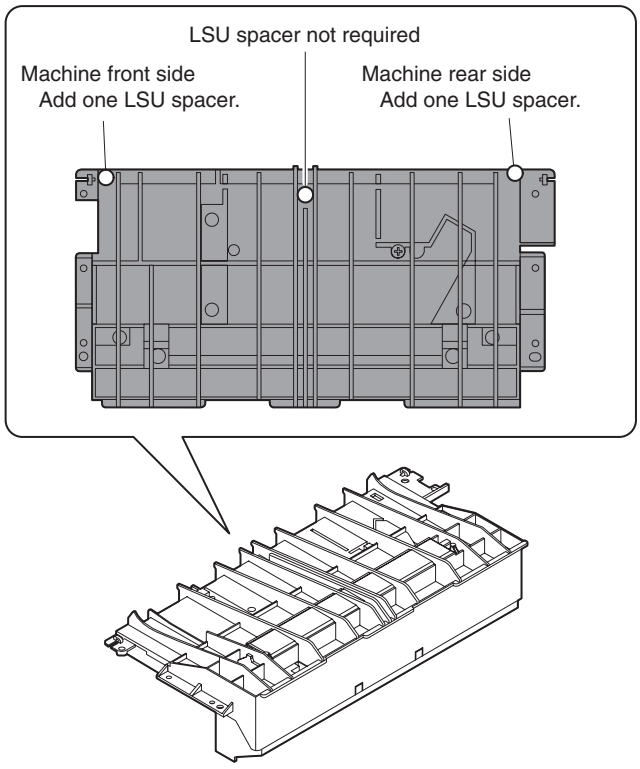
When replacing the LSU, add the spacer according to the scan inclination classification. (The spacer is packed together with every LSU.)

Scan inclination classification check

Scan inclination classification 1: +0.26 – +0.5 (White marking on the right of the production number label)

Scan inclination classification 2: –0.25 – +0.25 (White marking)

Scan inclination classification 3: –0.5 – –0.26 (White marking on the left of the production number label)



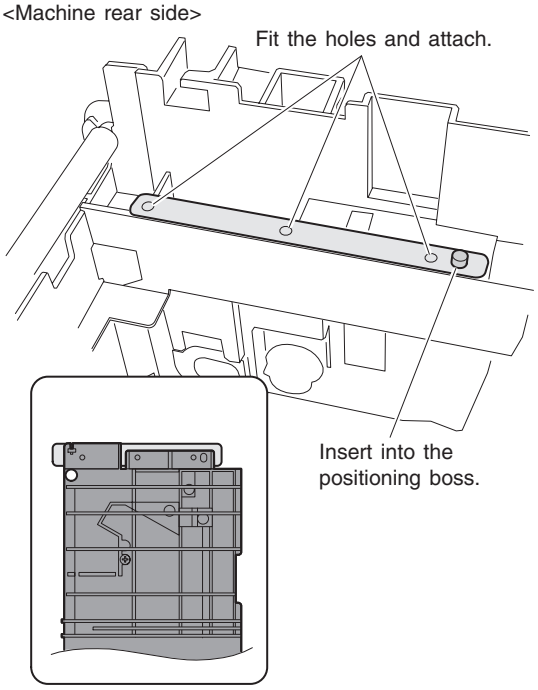
Addition of the spacer

Scan inclination classification 1: Add the LSU spacer to the rear side of the machine.

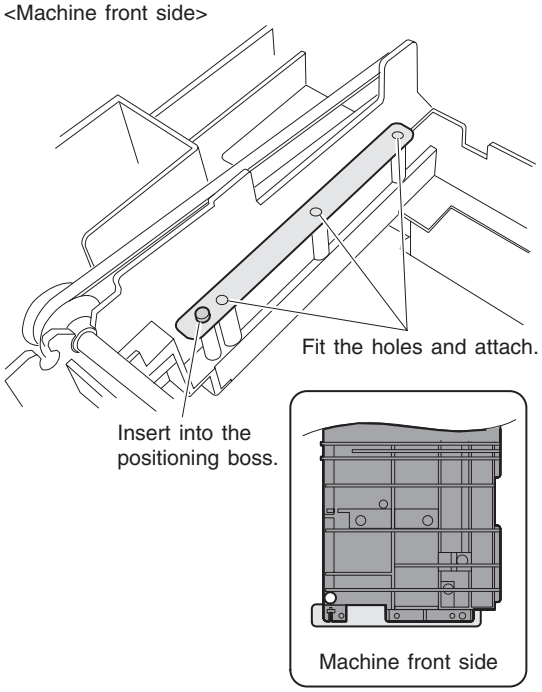
Scan inclination classification 2: No need to add the spacer.

Scan inclination classification 3: Add the LSU spacer to the front side of the machine.

<Machine rear side>



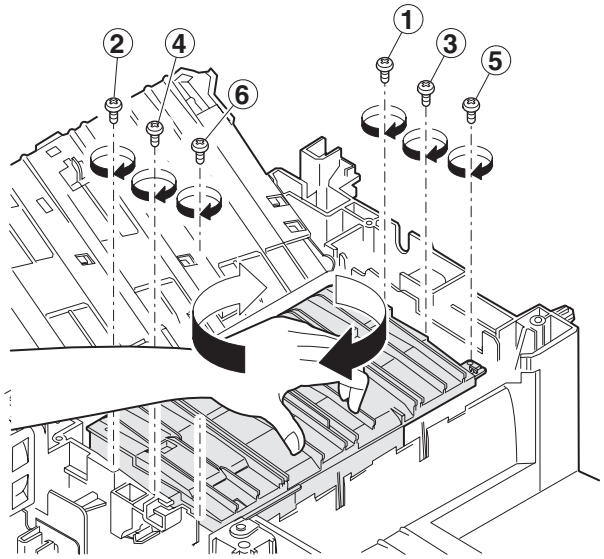
<Machine front side>



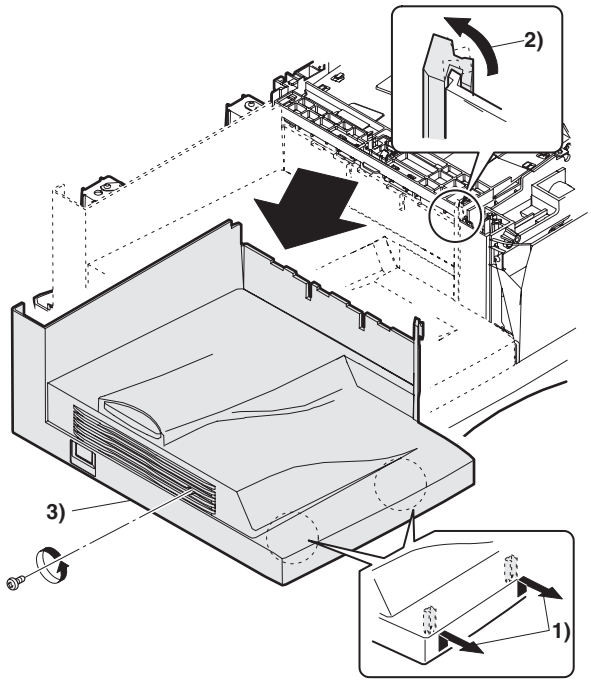
[Note for assembling the LSU]

When installing the LSU, turn the LSU clockwise and fix with screws in order to provide an attachment backlash in the proper direction.

Observe the following sequence of fixing screws.

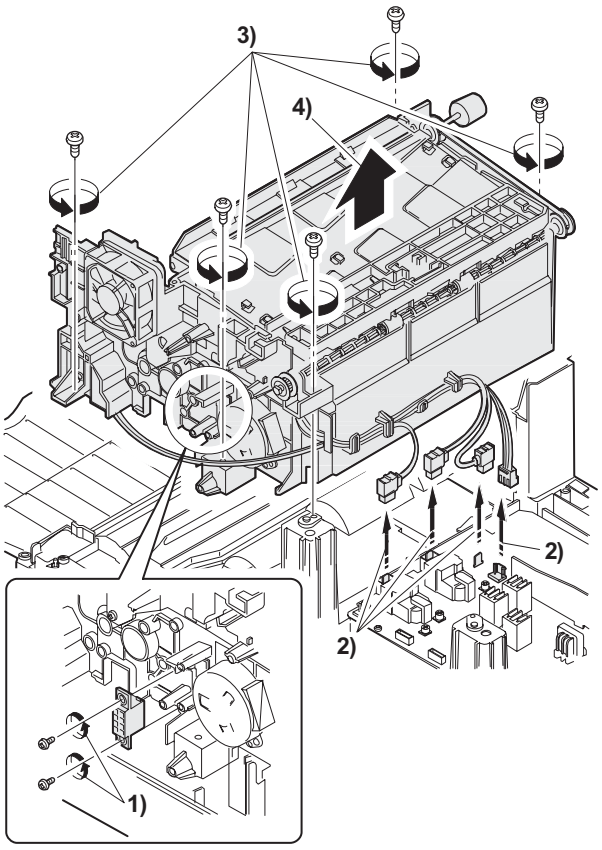


16) Remove each pawl, and remove the paper exit tray.



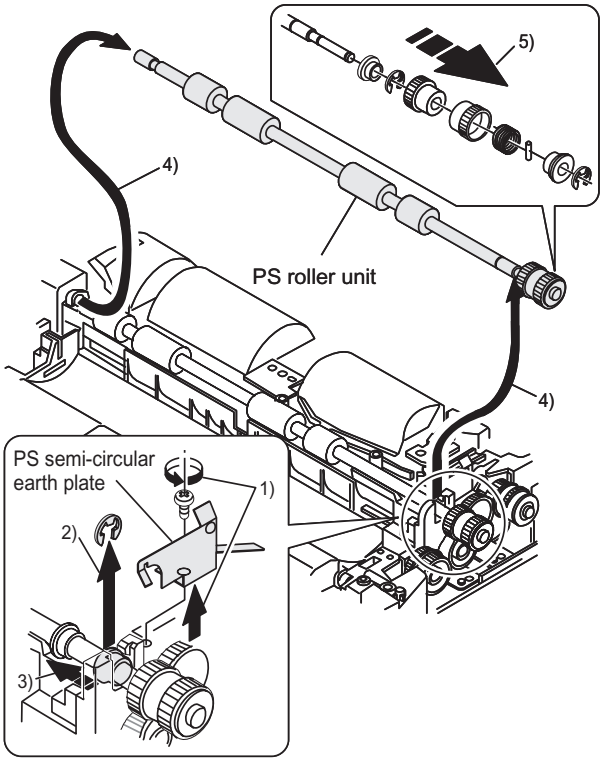
17) Remove two screws and remove the fusing connector.

18) Remove five screws and the connector, and lift the intermediate frame unit to remove.

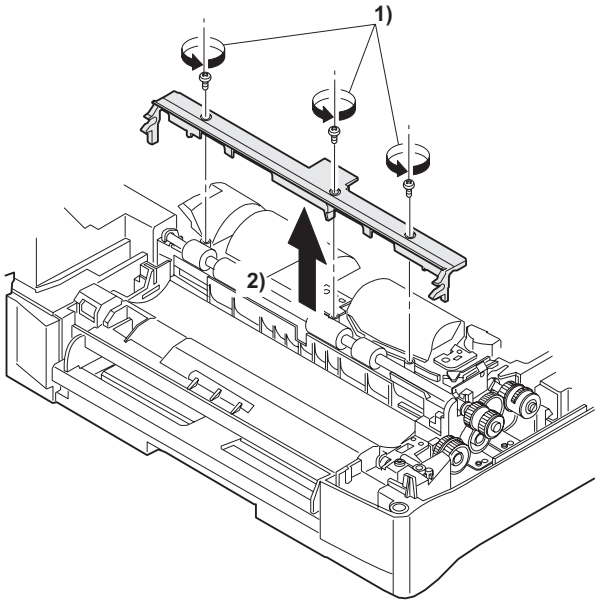


19) Remove the screw and the E-ring, and remove the PS semi-circular earth plate and the PS roller unit.

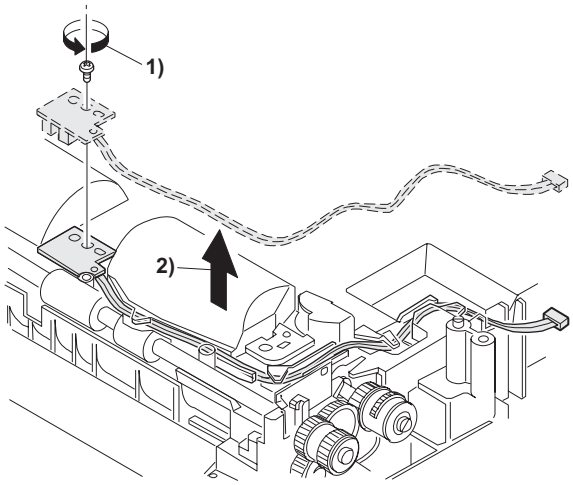
20) Remove the E-ring and remove the spring clutch from the PS roller unit.



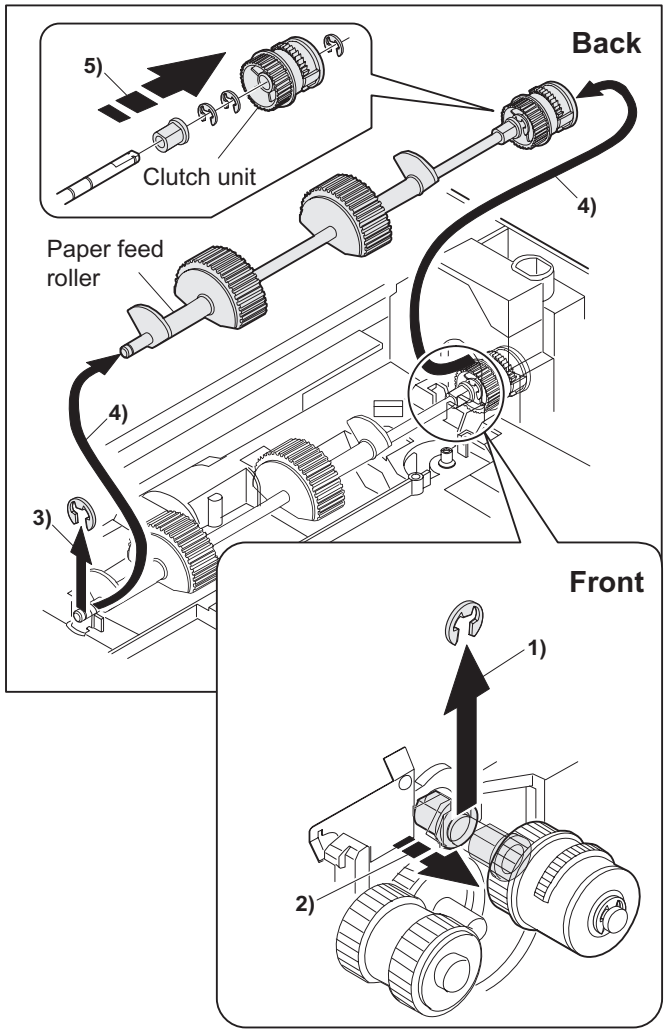
21) Remove three screws and remove the TC front paper guide.



22) Remove the screw and the connector, and remove the PPD1 sensor PWB.



23) Remove two E-rings and remove the paper feed roller.
24) Remove three E-rings and remove the clutch unit.



C. Assembly procedure

For assembly, reverse the disassembly procedure.

6. Manual paper feed section

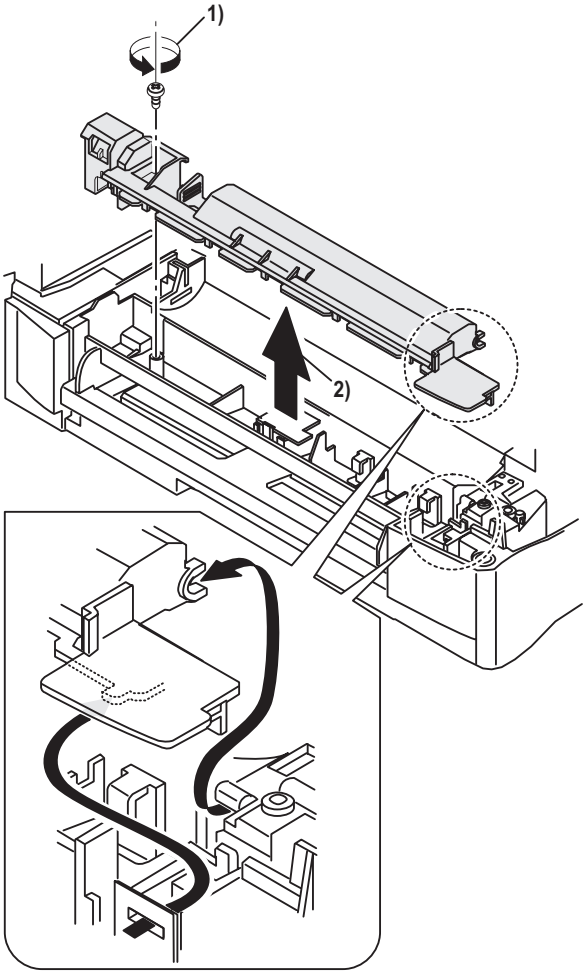
A. List

No.	Part name Ref.
1	Manual transport roller
2	Cassette detection switch
3	PPD1 sensor PWB
4	Side door detection unit

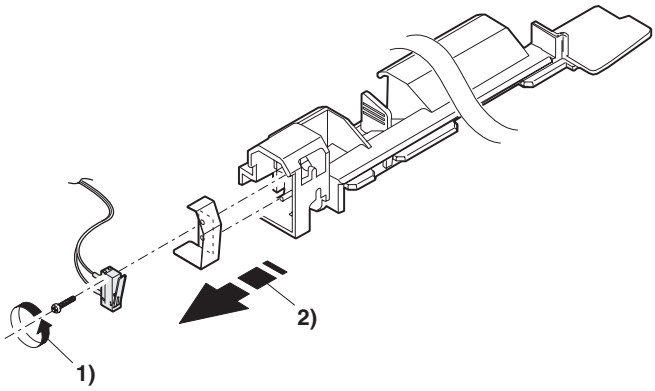
B. Disassembly procedure

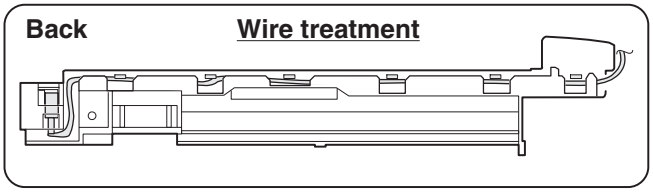
Single unit

1) Remove the screw and remove the single upper cover.

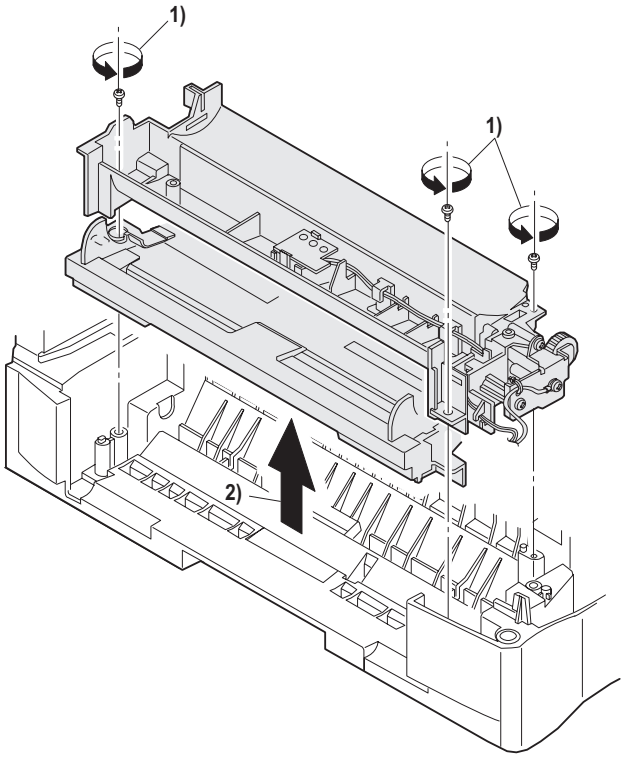


2) Remove the screw and remove the side door detection unit.

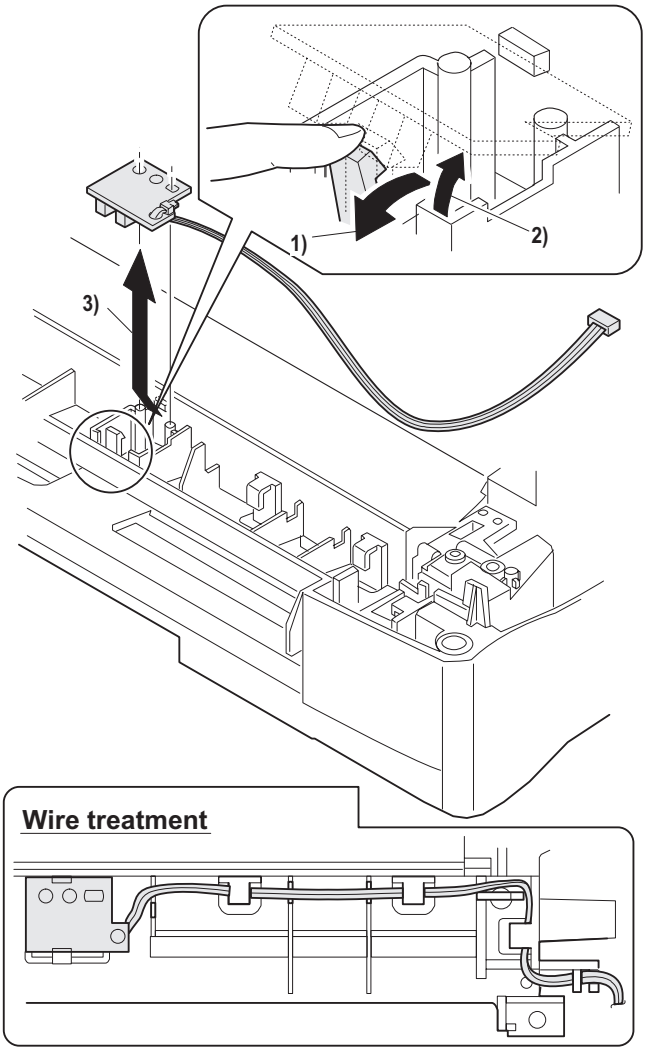




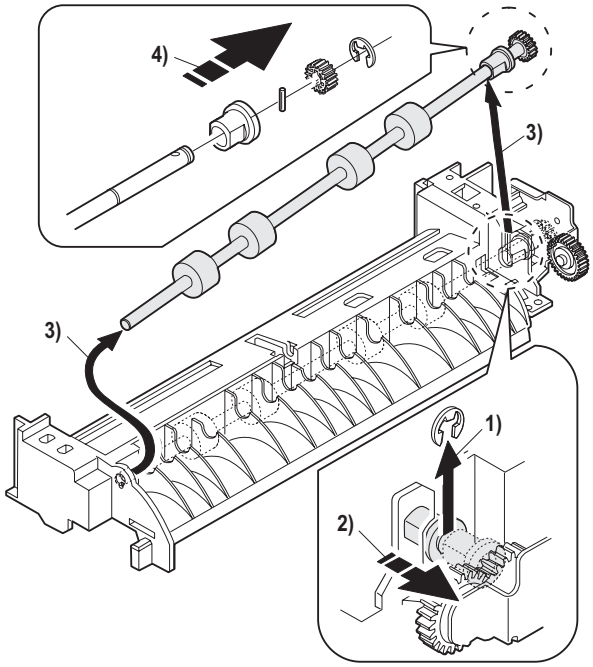
3) Remove three screws and remove the single manual feed upper frame.



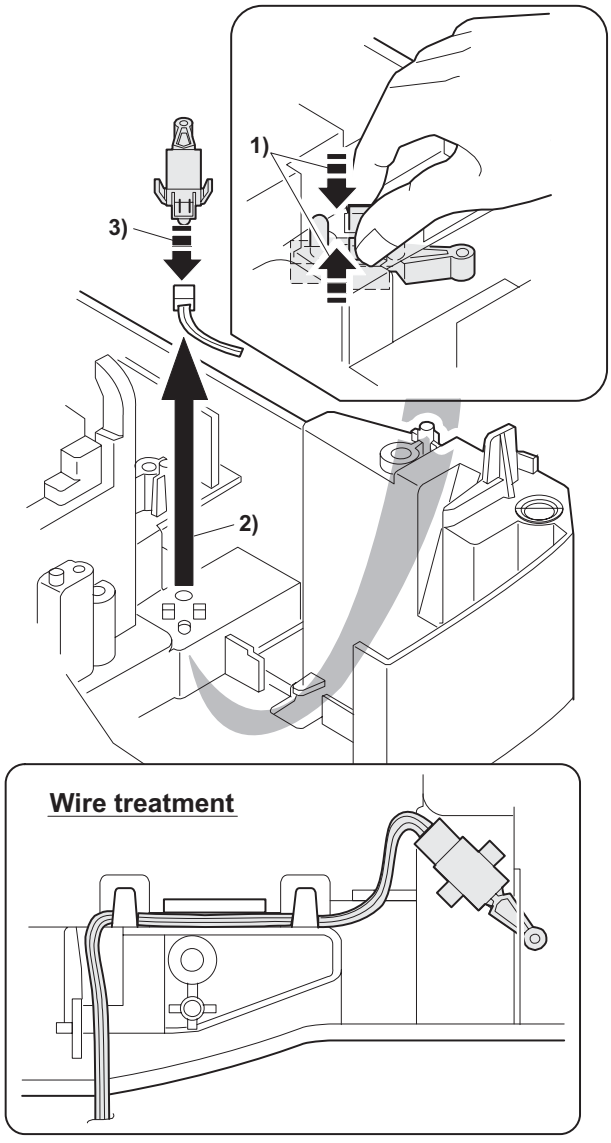
4) Remove the PPD1 sensor PWB.



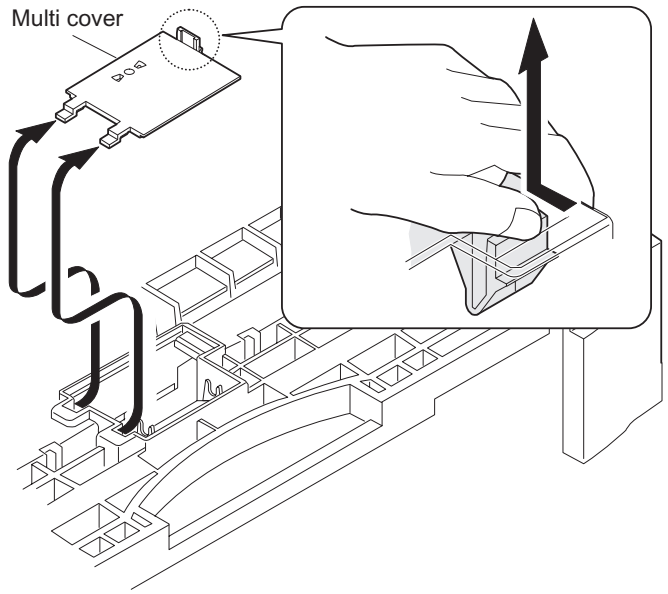
5) Remove the E-ring and remove the manual paper feed transport roller.



6) Remove the cassette detection switch.

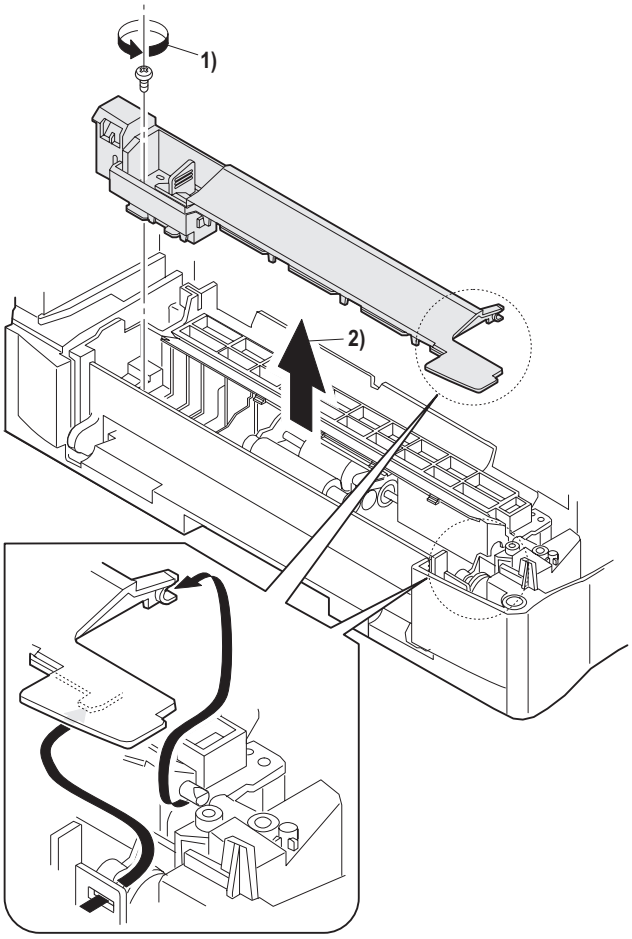


7) Remove the multi cover.

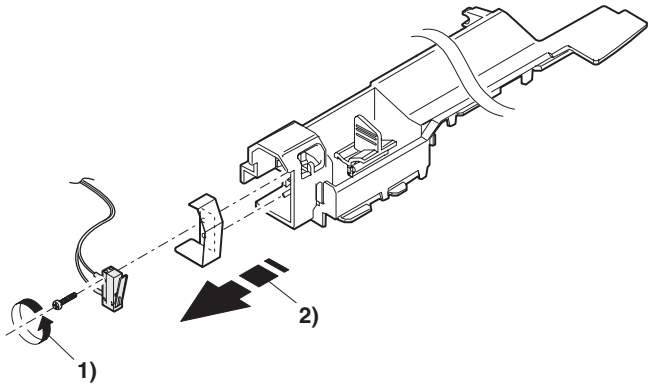


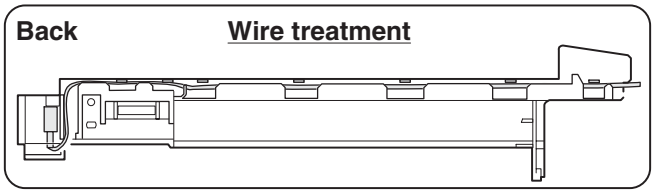
Multi unit

1) Remove the screw and remove the multi upper cover.

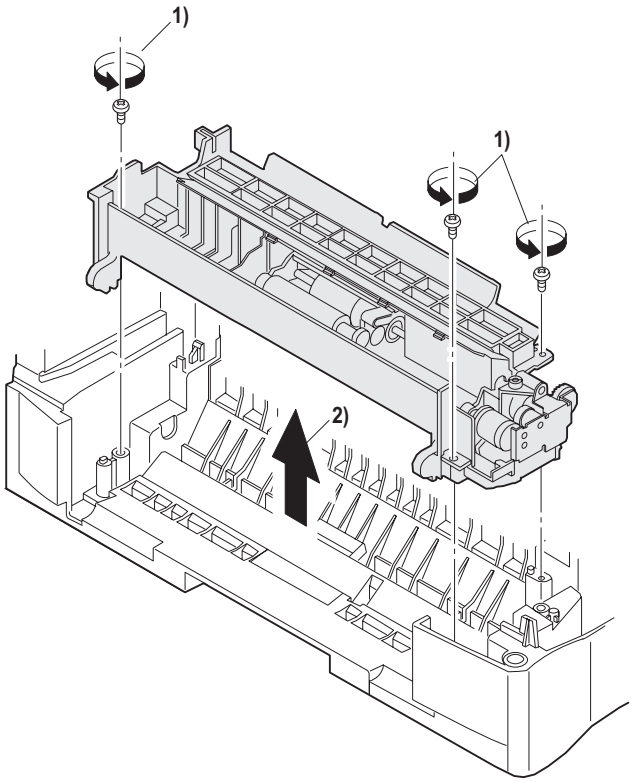


2) Remove the screw and remove the side door detection unit.

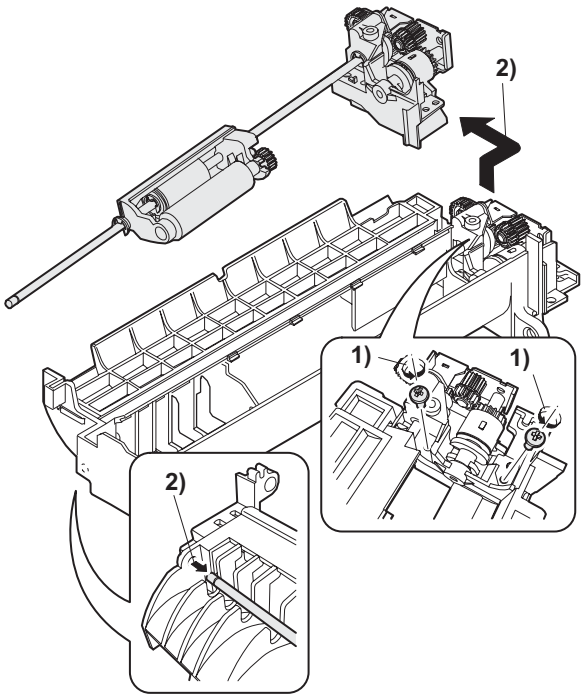




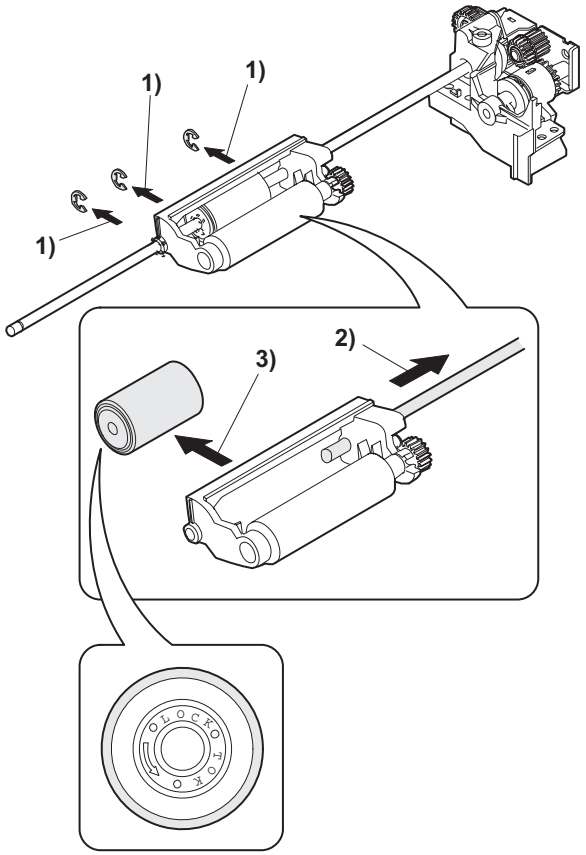
3) Remove three screws and remove the multi paper feed upper frame.



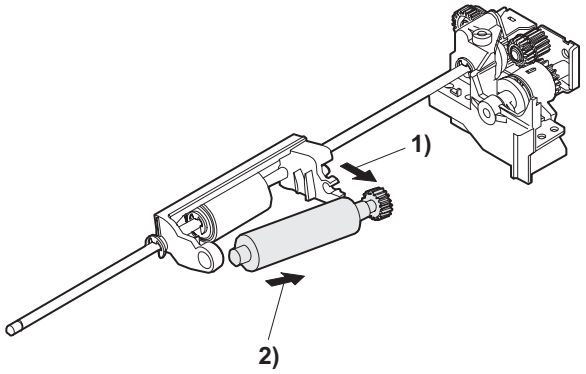
4) Remove two screws and remove the multi feed bracket unit from the multi paper feed upper frame.



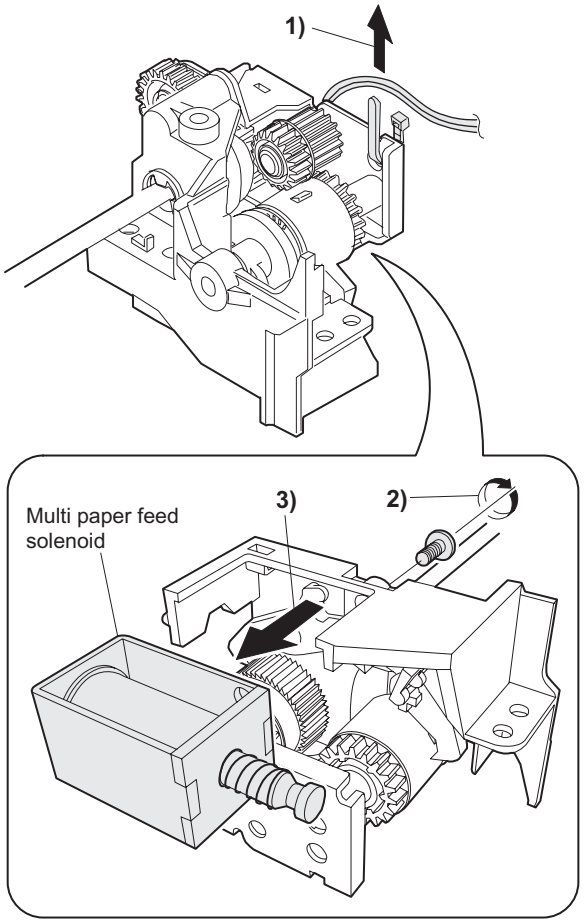
5) Remove three E-rings and remove the manual paper feed roller B9.



6) Remove the pick-up roller.



7) Cut the binding band and remove the multi paper feed solenoid.

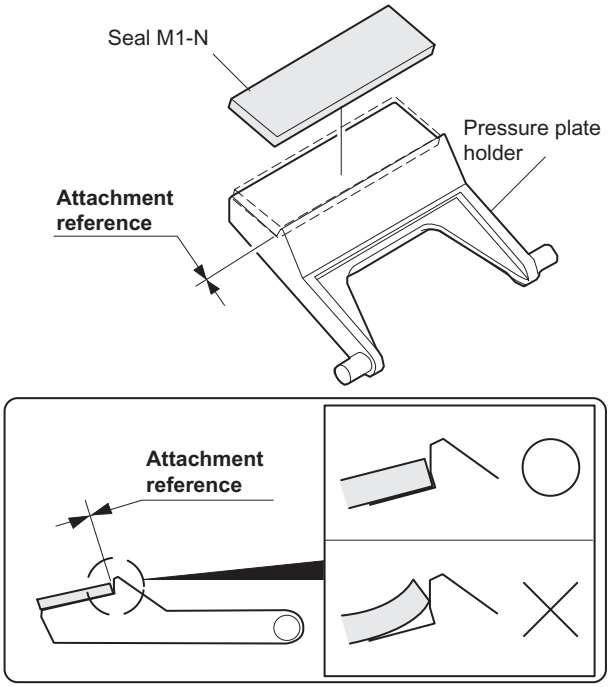


C. Assembly procedure

For assembly, reverse the disassembly procedure.

D. Pressure plate holder attachment

1) Attach the pressure plate holder so that the resin section is not covered with the seal M1-N.



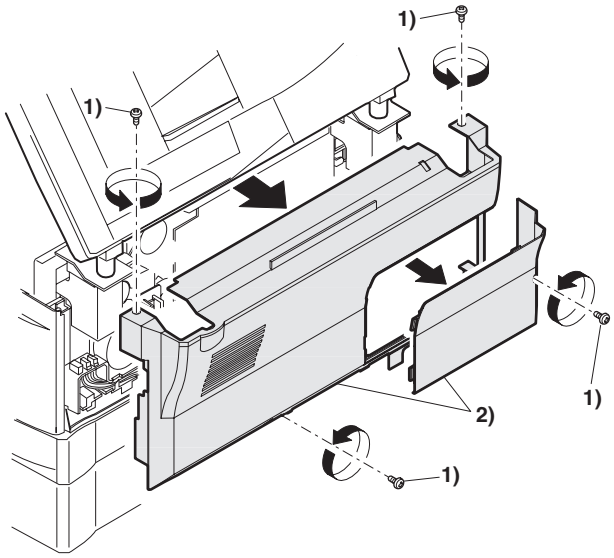
7. Rear frame section

A. List

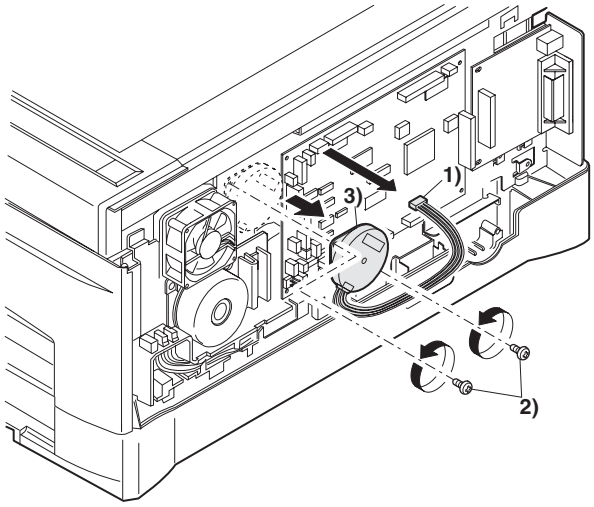
No.	Part name Ref.
1	Mirror motor
2	Main motor
3	Exhaust fan motor

B. Disassembly procedure

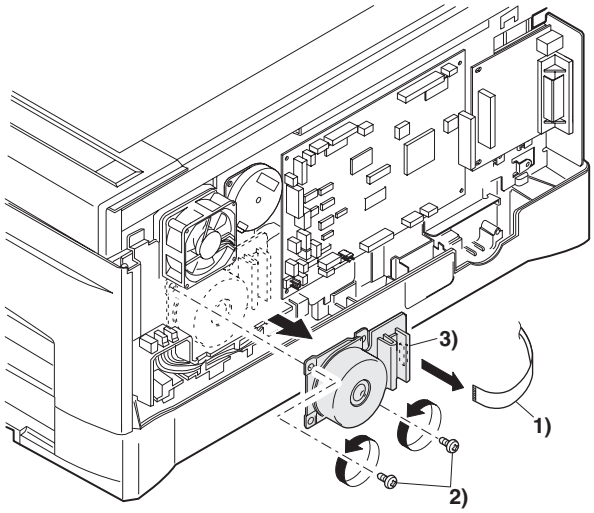
1) Remove four screws, and remove the rear cabinet and the rear cabinet cover.



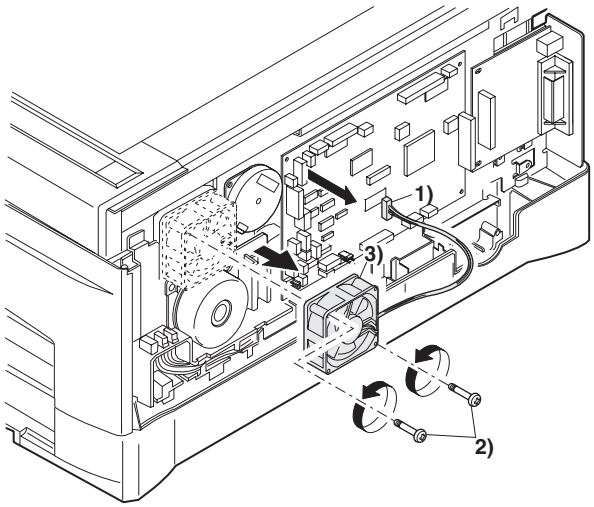
2) Disconnect the connector.
3) Remove two screws, and remove the scanner motor.



4) Remove two screws and one harness, and remove the main motor.



5) Remove two screws and one connector, and remove the exhaust fan motor.



C. Assembly procedure

For assembly, reverse the disassembly procedure.

8. Power section

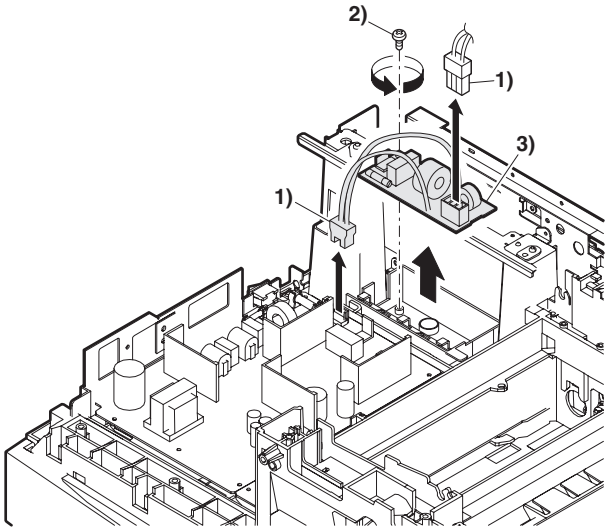
A. List

No.	Part name Ref.
1	Noise filter PWB
2	Power PWB

B. Disassembly procedure

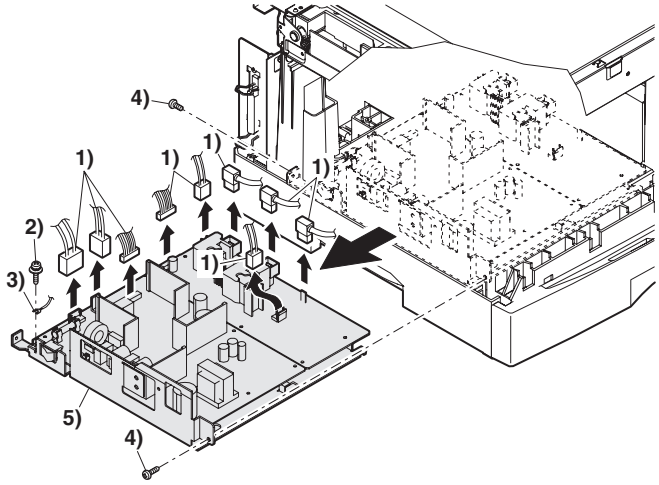
Noise filter PWB

1) Disconnect the connector at two positions.
2) Remove the screw, and remove the noise filter PWB unit.



Power PWB

1) Disconnect each connector.
2) Remove the screw, and remove the earth line.
3) Remove two screws, and remove the power PWB unit.



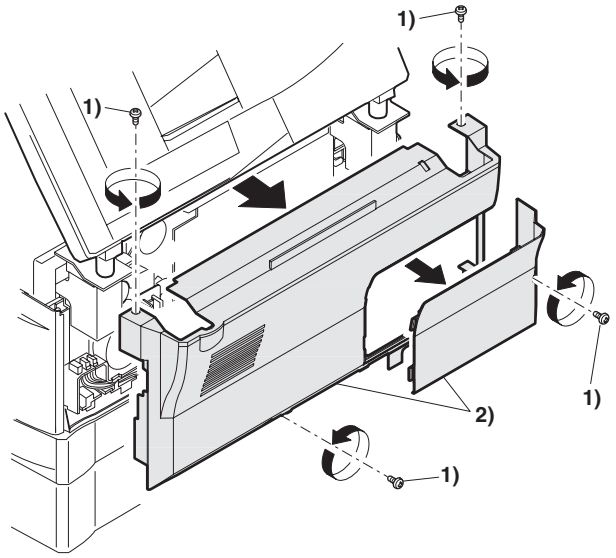
C. Assembly procedure

For assembly, reverse the disassembly procedure.

9. 2nd cassette section

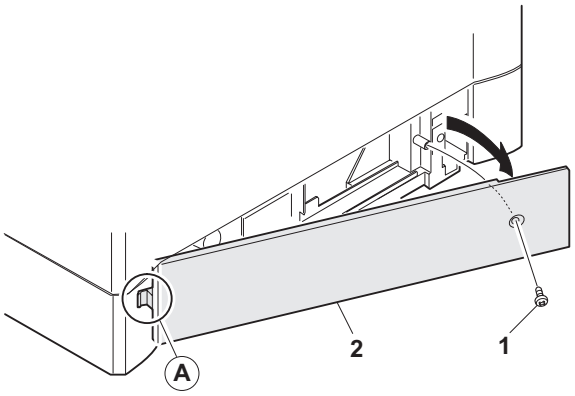
No.	Part name Ref.
A	Paper sensor
B	Cassette detection SW
C	Paper feed solenoid
D	Transport roller
E	Paper feed clutch
F	2nd paper feed roller

Paper feed unit removal

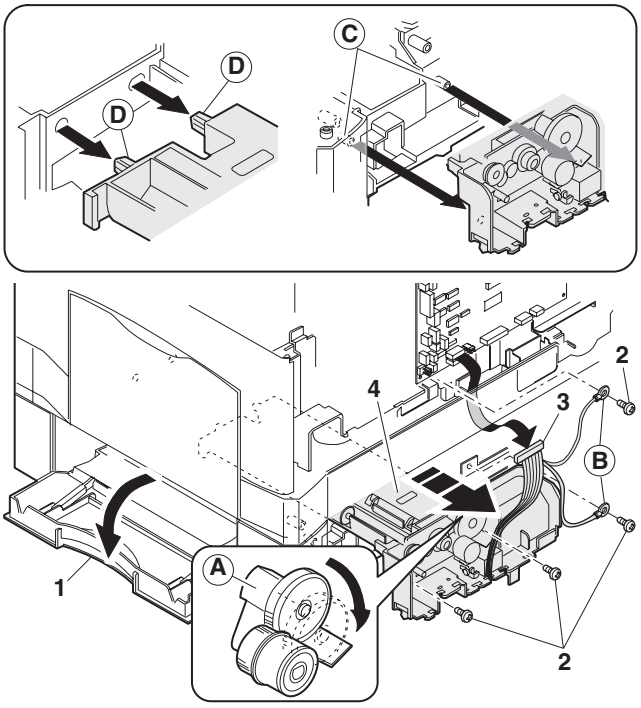


1) Remove the screw.
2) Remove the rear cover.

* When installing, engage the pawl and install the unit.



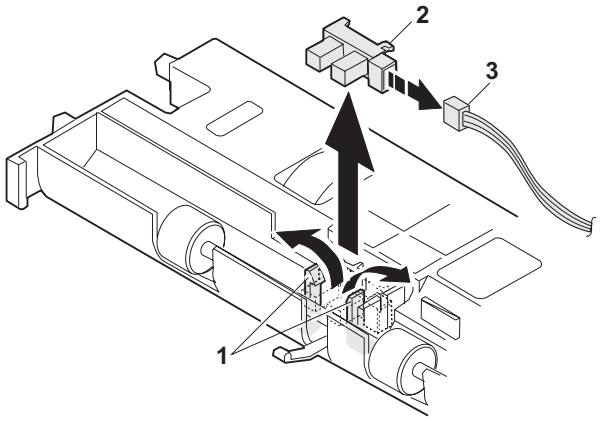
1) Open the right cabinet.
2) Remove three screws.
3) Remove one connector from MCU.
4) While tilting down the 2nd connection arm A, pull and remove the paper feed unit toward you.



* When installing, securely insert two bosses C on the machine side and two bosses D on the paper feed unit side. Be sure to secure the ground wire B.
* Insert the 2nd page feed.

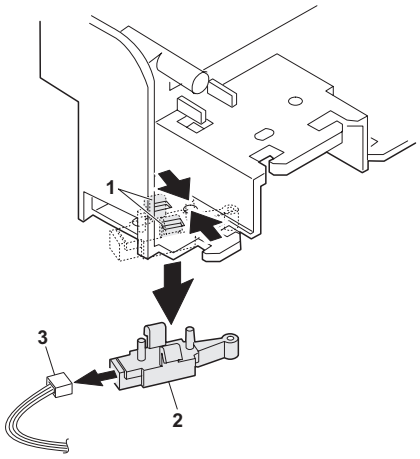
A. Paper sensor

1) Remove the pawl.
2) Remove the paper sensor.
3) Remove the harness.



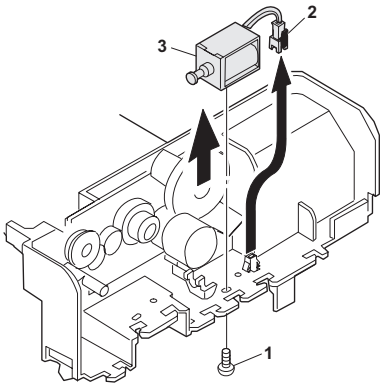
B. Cassette detection switch

1) Remove the pawl.
2) Remove the cassette detection switch.
3) Remove the harness.



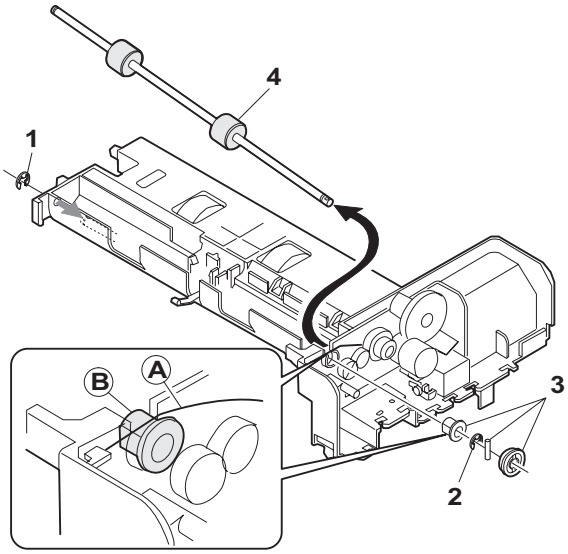
C. Paper feed solenoid

1) Remove the screw.
2) Remove the connector.
3) Remove the paper feed solenoid.



D. Transport roller

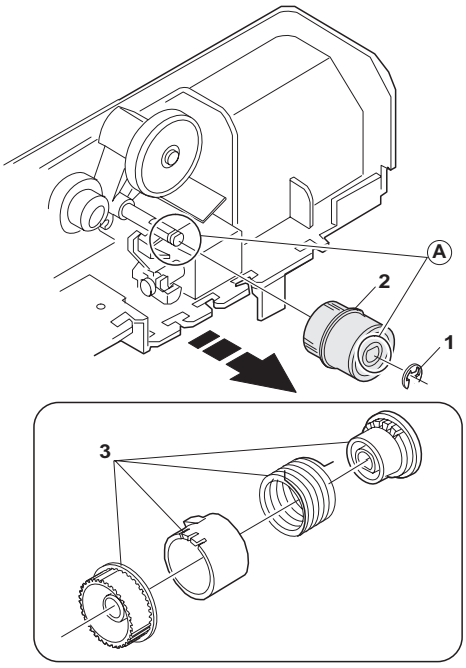
1) Remove two E-rings.
2) Remove the transport roller.



* Install so that the earth spring A is brought into contact over bearing B.

E. Paper feed clutch

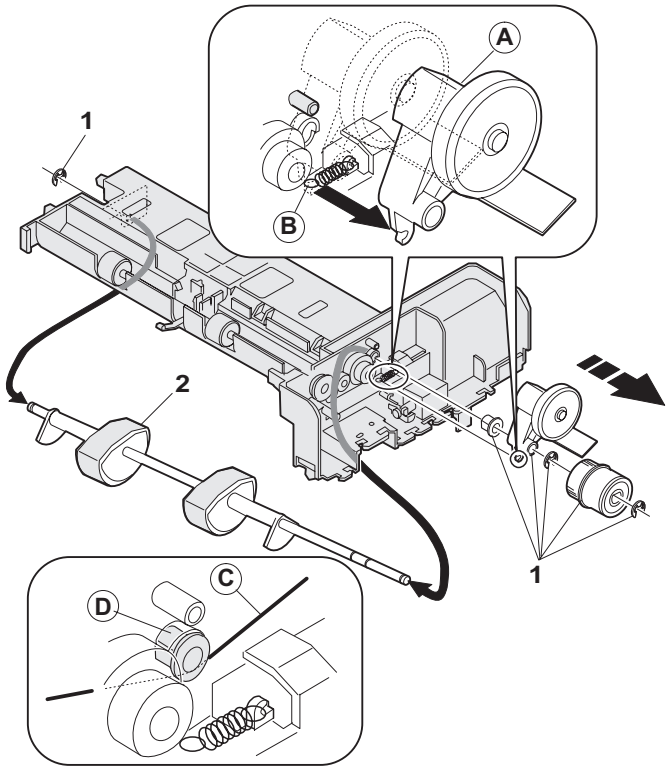
1) Remove the E-ring.
2) Remove the paper feed clutch.
3) Remove the parts.



* When installing, fit the cut surface A.

F. 2nd paper feed roller

1) Remove the E-ring and the parts.
2) Remove the 2nd paper feed roller.



* When installing, hang the 2nd connection arm on the 2nd connection arm Spring B. Be sure to install so that the earth spring C is in contact under the bearing D.

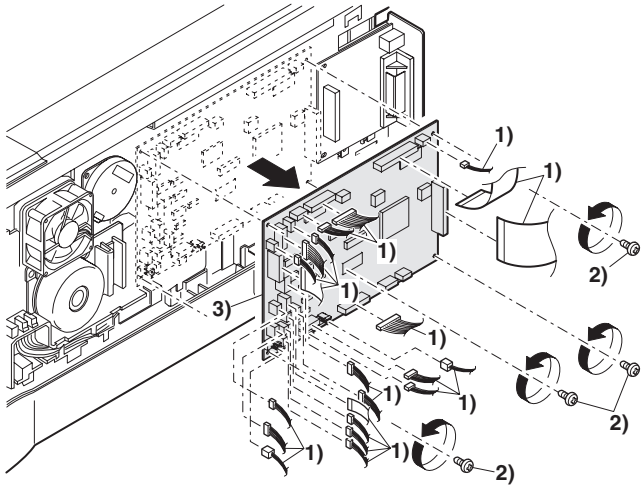
10. Duplex motor section (RSPF model only)

A. Remove the rear cabinet.

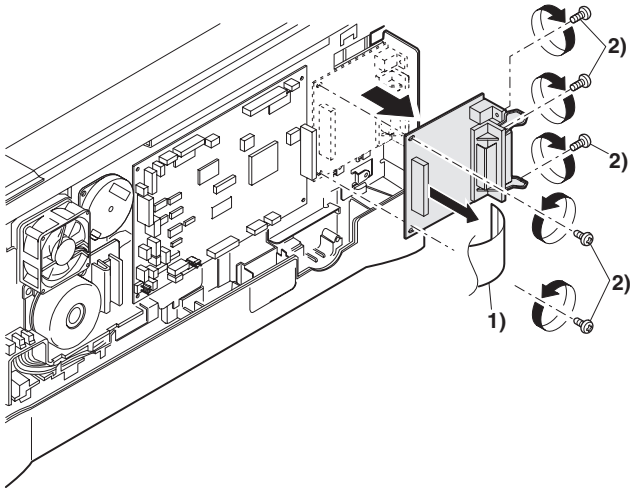
1) Remove four screws.
2) Remove the rear cabinet.

B. Remove the main PWB.

1) Disconnect each connector.
2) Remove four screws, and remove the MCU PWB.

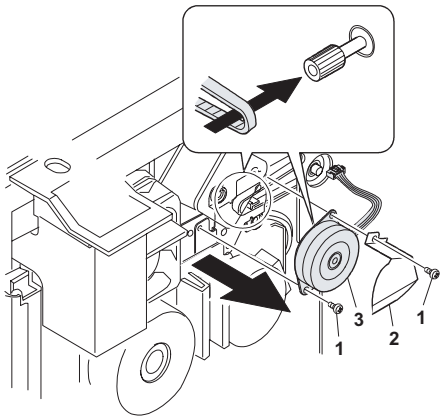


3) Disconnect the connector.
4) Remove five screws, and remove the I/F PWB.



C. Remove the Duplex motor.

1) Remove two screws.
2) Remove the Duplex motor cover.
3) Remove the Duplex motor.

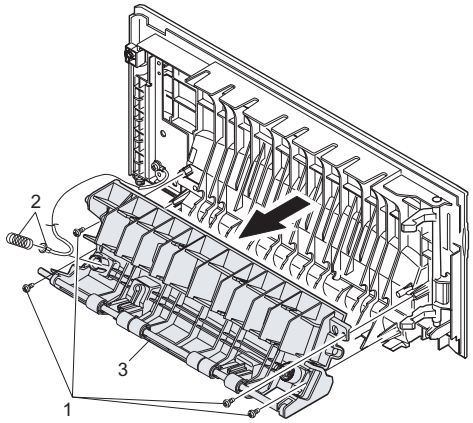


Note: When reassembling, be sure to engage the Duplex motor gear with the belt on the main body side.

11. Reverse roller section (RSPF model only)

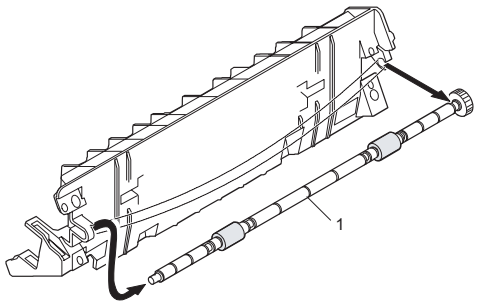
A. Remove the reverse unit.

1) Remove four screws
2) Remove the spring, and the earth wire
3) Remove the reverse unit.



B. Remove the reverse roller.

1) Bend the reverse roller and remove it.



12. RSPF section (RSPF model only)

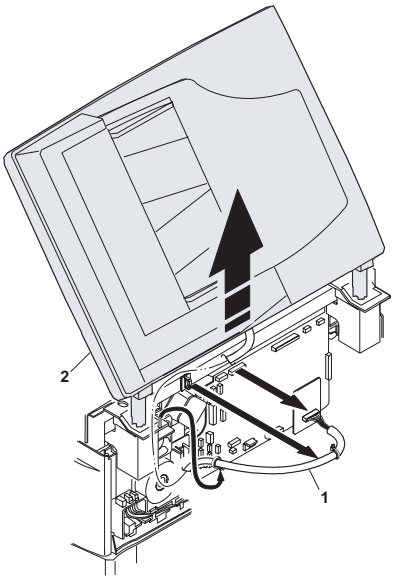
A. RSPF

(1) Remove the rear cabinet.

1) Remove four screws.
2) Remove the rear cabinet.

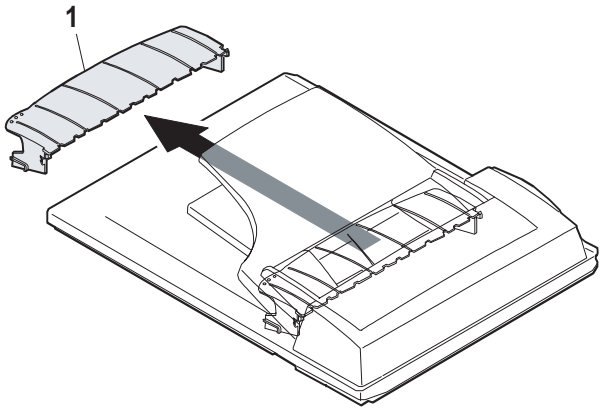
(2) Remove the RSPF.

1) Remove the connector and the cable.
2) Remove the RSPF.



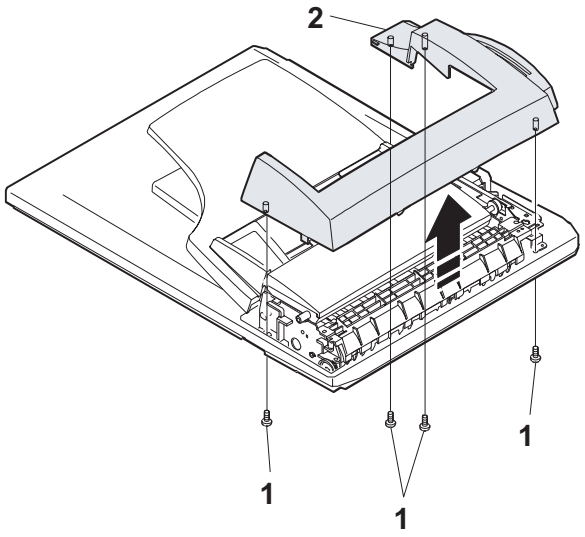
B. Intermediate tray

1) Remove the intermediate tray.



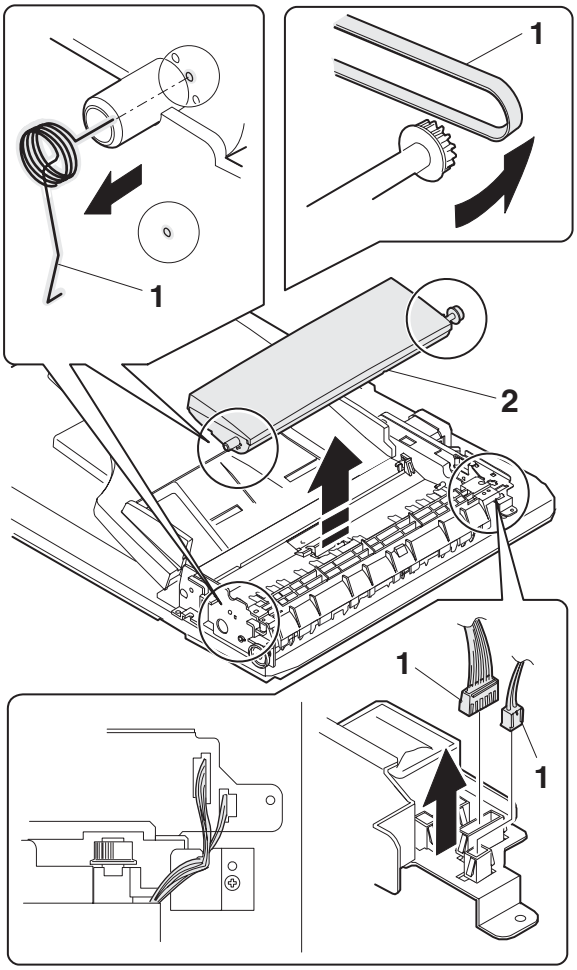
C. Upper cover

1) Remove four screws from the bottom of the main body.
2) Remove the upper cover.



D. Pickup unit

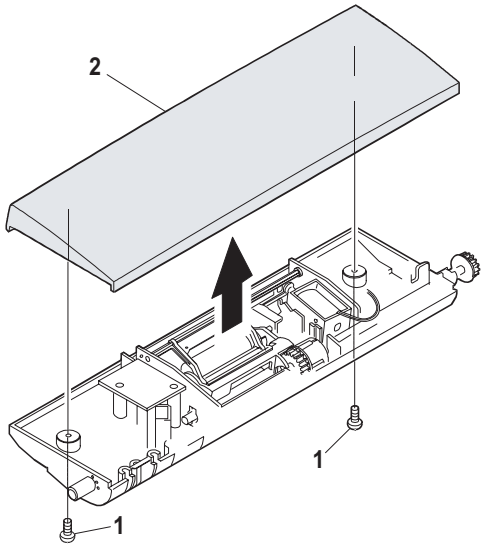
1) Remove the belt, the paper feed frame spring, and two harnesses.
2) Remove the pickup unit.



Note: When reassembling, be careful of the hole position for the paper feed frame spring.

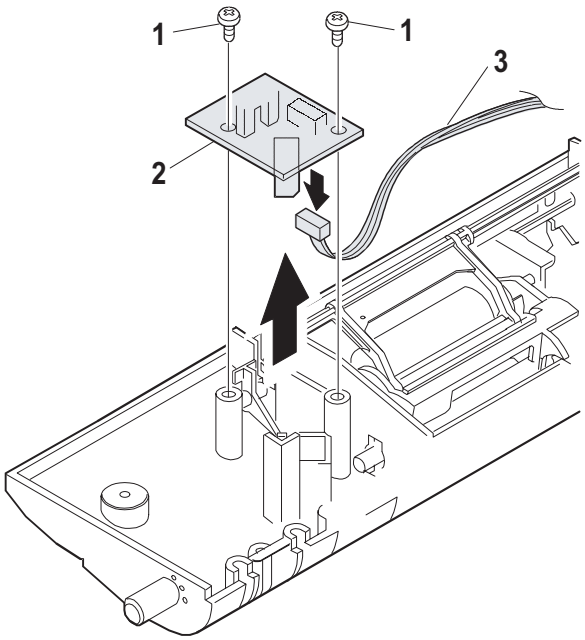
E. Upper cover of the pickup unit.

1) Remove two screws from the bottom of the pickup unit.
2) Remove the upper cover.



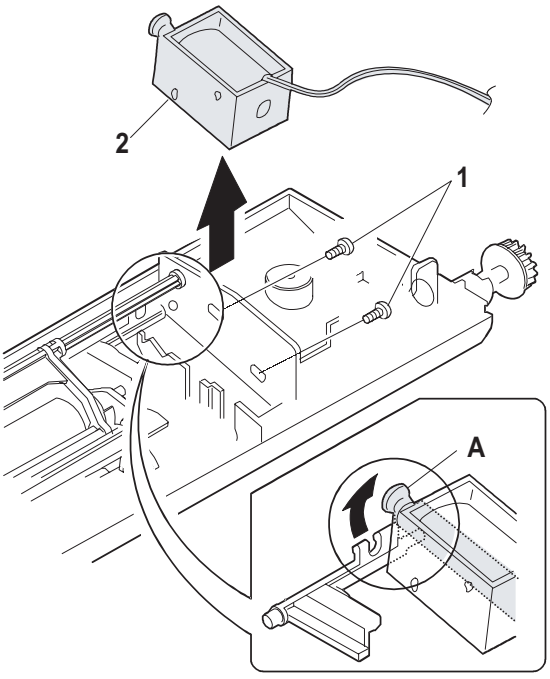
F. Sensor PWB

1) Remove two screws.
2) Remove the sensor PWB.
3) Remove the harness.



G. Pickup solenoid

1) Remove two screws.
2) Remove the pickup solenoid.

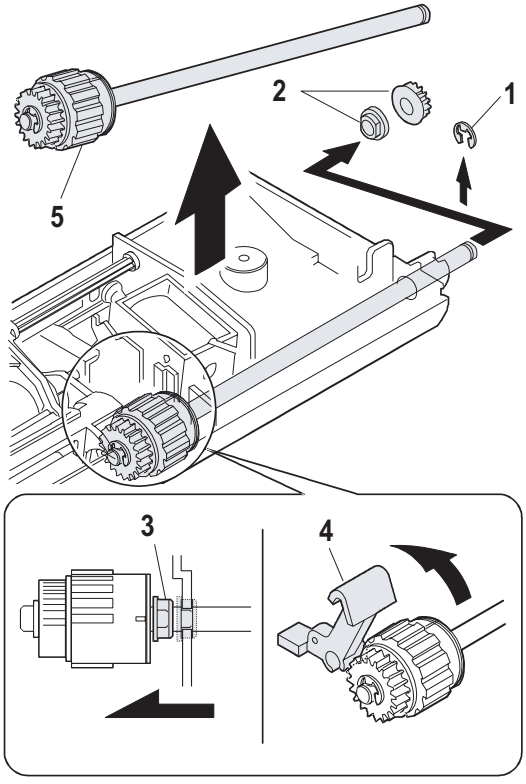


Note: When reassembling, hang the iron core on the solenoid arm.

H. Clutch

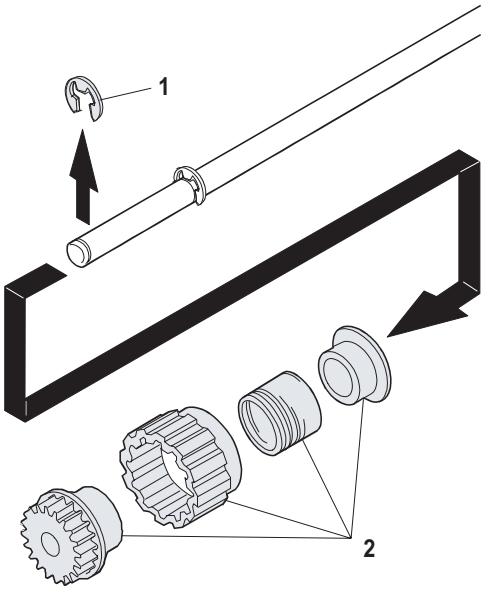
(1) Remove the clutch unit.

1) Remove the E-ring.
2) Remove the pulley and the bush.
3) Slide the bush in the arrow direction.
4) Lift the clutch pawl.
5) Remove the clutch unit.



(2) Remove the clutch

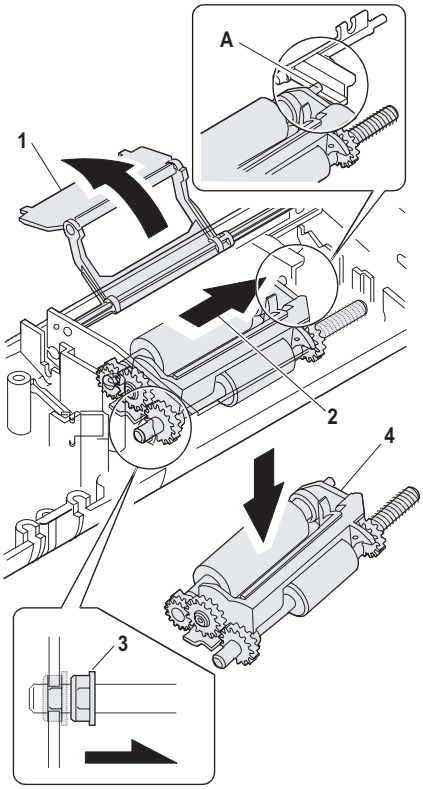
1) Remove the E-ring.
2) Remove the parts.



I. Manual paper feed roller, pickup roller

(1) Remove the pickup unit.

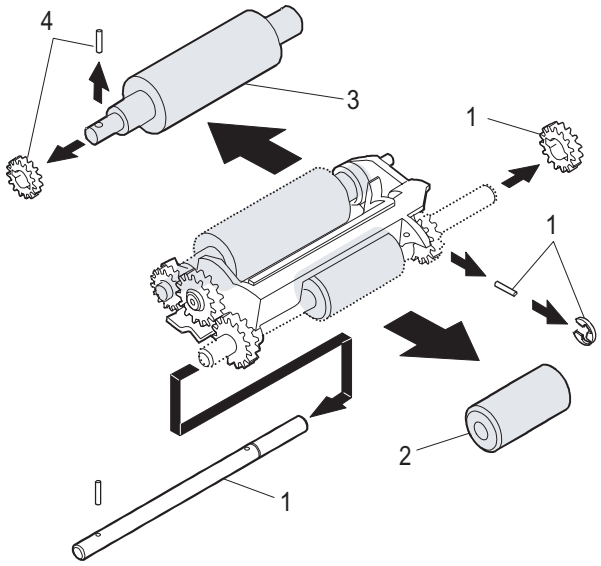
1) Lift the paper stopper.
2) Slide the take-up roller unit.
3) Slide the bushing in the arrow direction.
4) Remove the take-up roller.



Note: When reassembling, hang the convex portion of the roller unit on the solenoid arm.

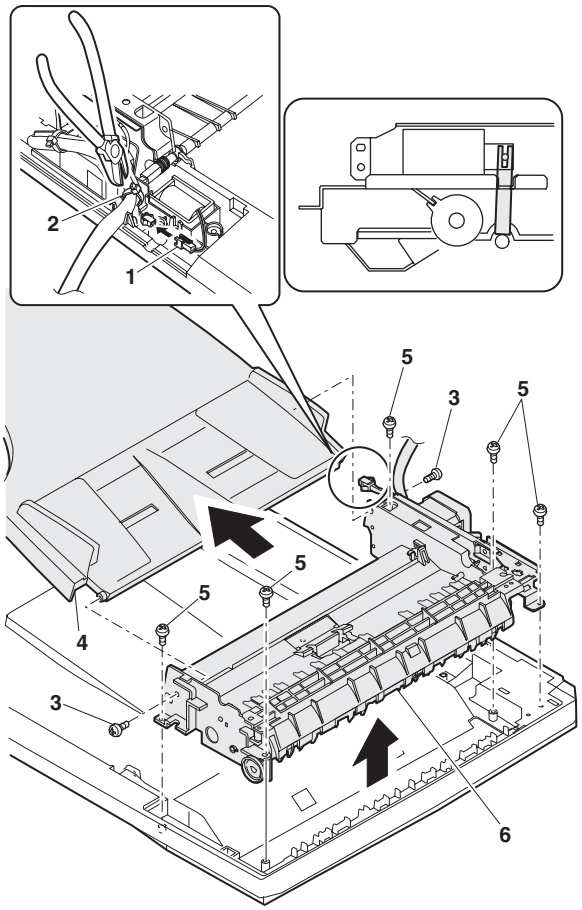
(2) Remove the Manual paper feed roller, pickup roller.

1) Remove the parts.
2) Remove the manual paper feed roller.
3) Remove the pickup roller.
4) Remove the parts.



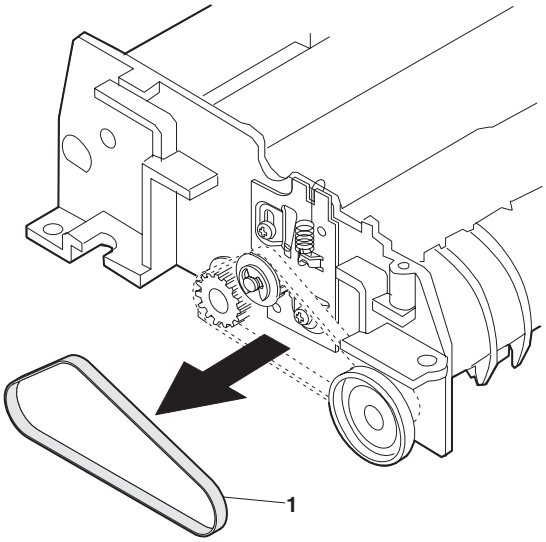
J. Transport unit removal

1) Disconnect the connector, and cut the binding band.
2) Remove two screws, and remove the document tray unit.
3) Remove five screws, and remove the transport unit.



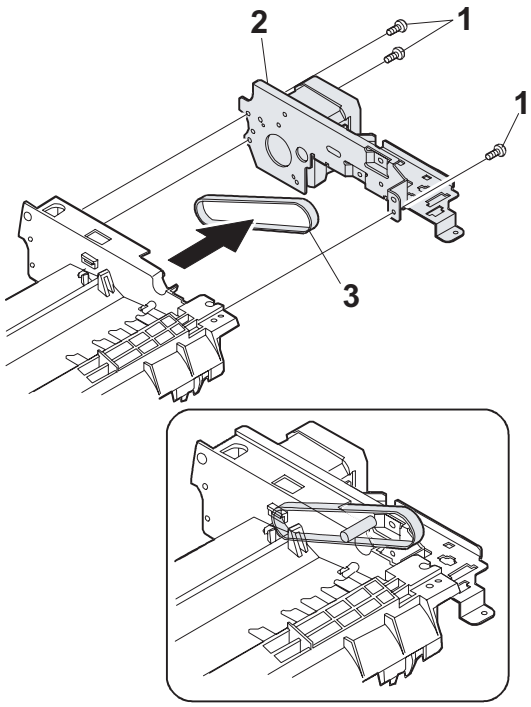
K. Belt 1

1) Remove the belt.



L. Belt 2

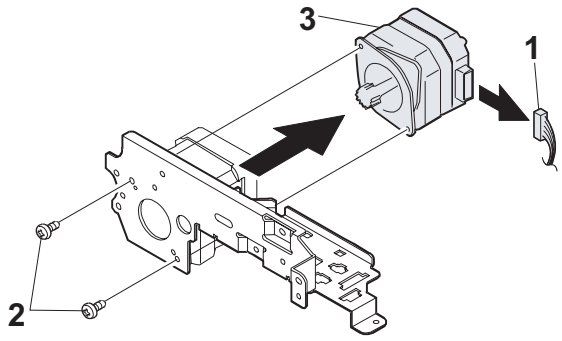
1) Remove three screws.
2) Remove the drive unit.
3) Remove the belt.



Note: When reassembling, hang the belt on the boss.

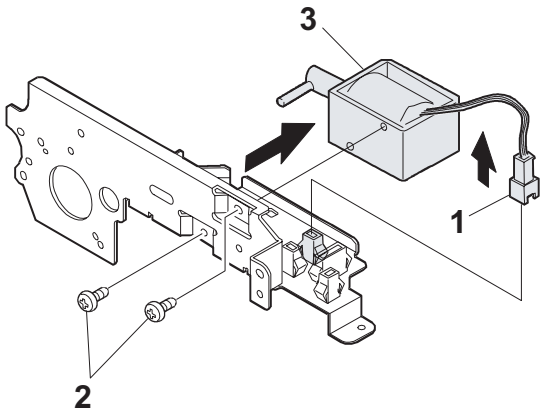
M. SPF motor

1) Remove the harness.
2) Remove two screws.
3) Remove the SPF motor.



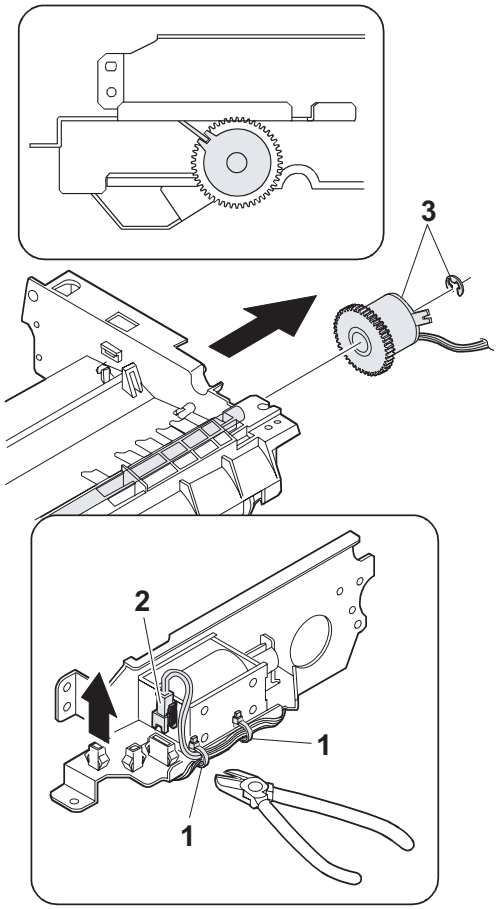
N. Solenoid

1) Remove the harness.
2) Remove two screws.
3) Remove the solenoid.



O. Clutch

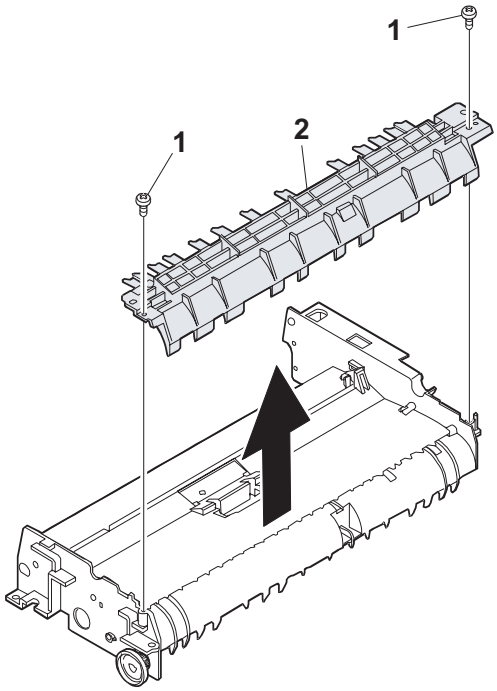
1) Cut the band with nippers.
2) Remove the harness.
3) Remove the clutch.



P. Paper supply roller

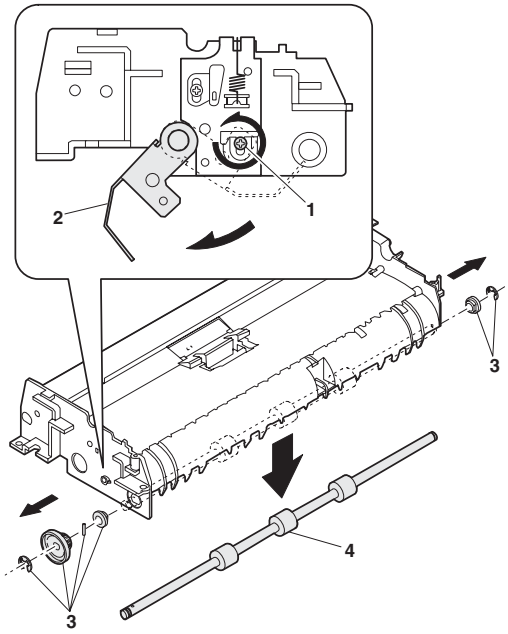
(1) Remove the parts.

1) Remove the two screws.
2) Remove the parts.



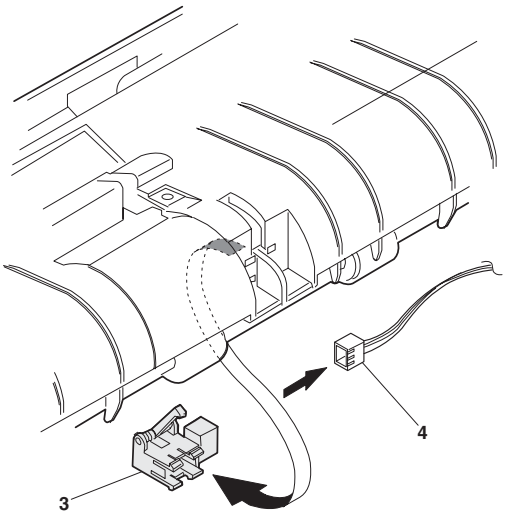
(2) Remove the paper supply roller.

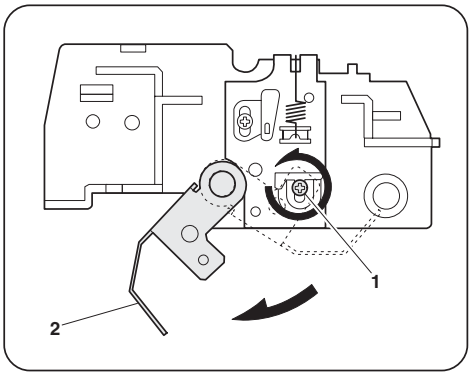
1) Loosen the screw.
2) Open the paper exit paper guide.
3) Remove the parts.
4) Remove the paper supply roller.



Q. Paper entry sensor

1) Loosen the screw.
2) Open the paper exit paper guide.
3) Remove the paper entry sensor.
4) Remove the harness.

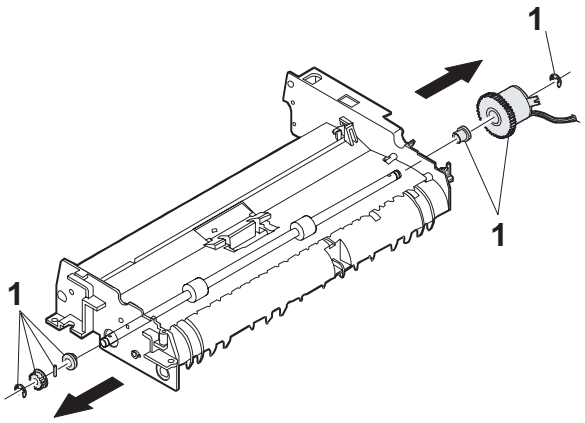




R. Transport roller 1.

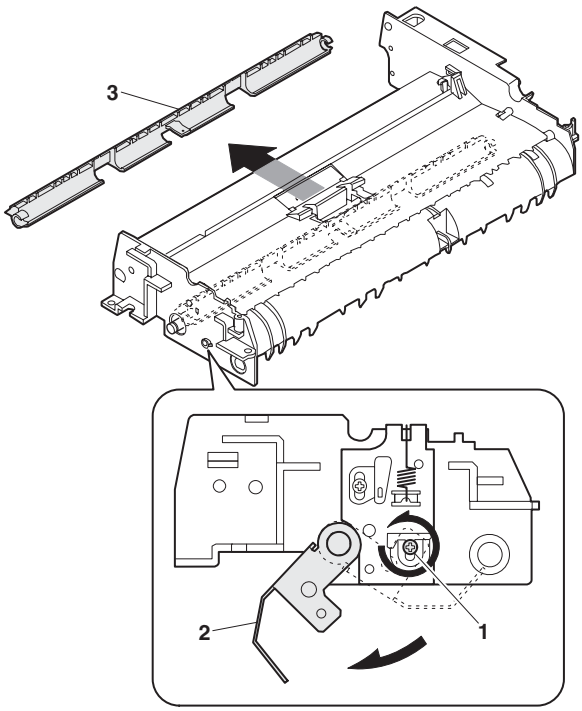
(1) Remove the parts.

1) Remove the parts.



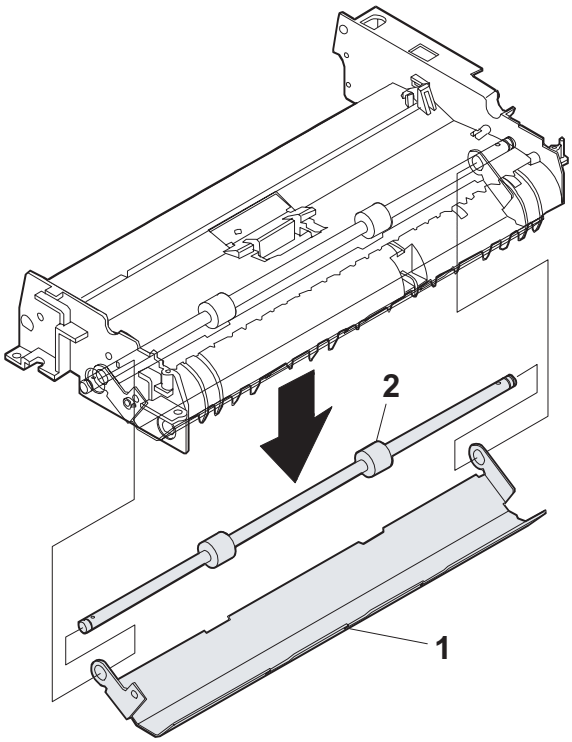
(2) Remove the parts.

1) Loosen the screw.
2) Open the paper exit paper guide.
3) Remove the parts.



(3) Remove the transport roller.

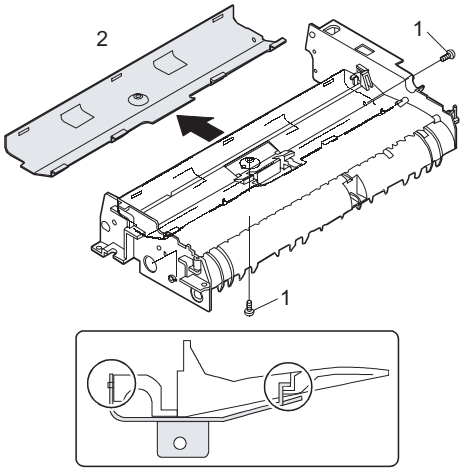
1) Remove the paper exit paper guide.
2) Remove the transport roller.



S. Paper exit roller

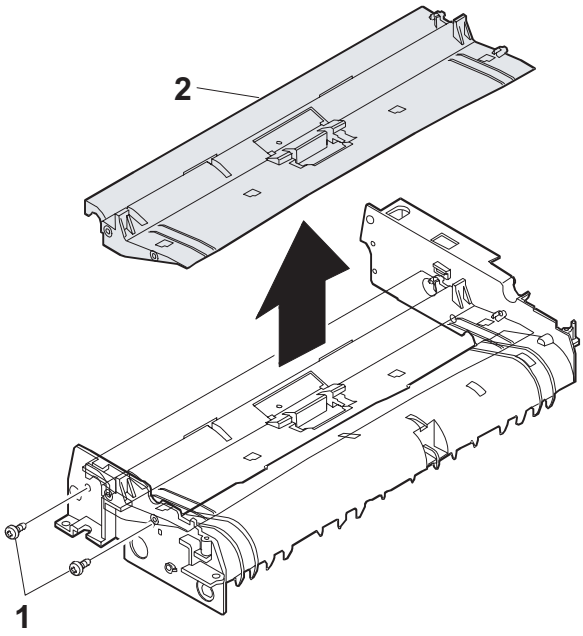
(1) Remove the parts.

1) Remove two screws.
2) Remove the parts.



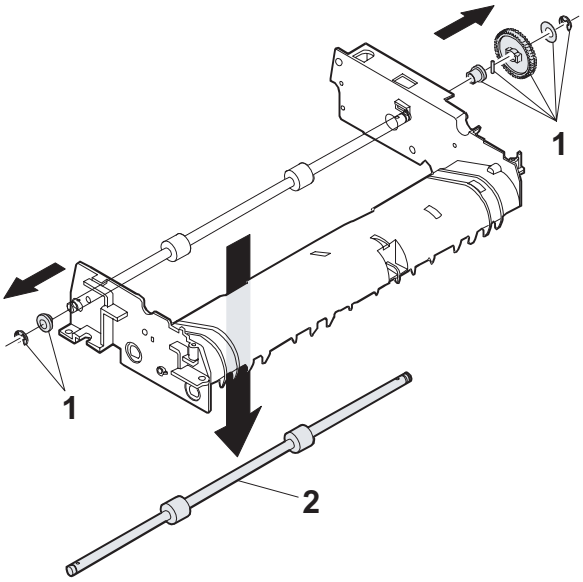
(2) Remove the paper feed paper guide upper.

1) Remove two screws.
2) Remove the paper feed paper guide upper.



(3) Remove the paper exit roller.

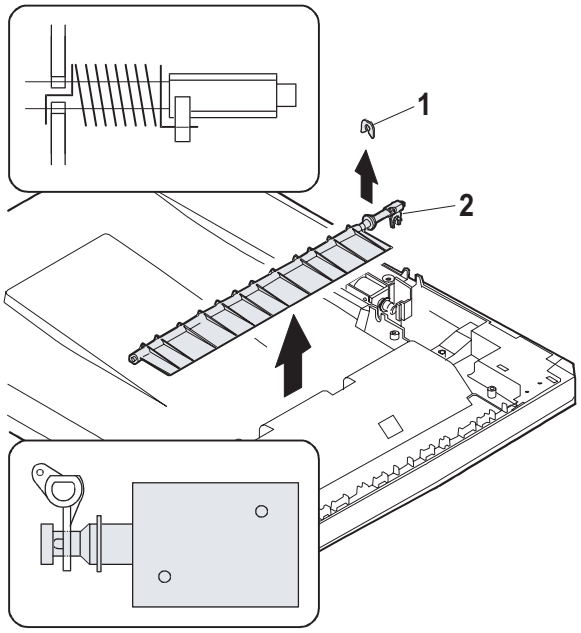
1) Remove the parts.
2) Remove the paper exit roller.



T. Solenoid

(1) Remove the reverse gate

1) Remove the ring
2) Remove the reverse gate

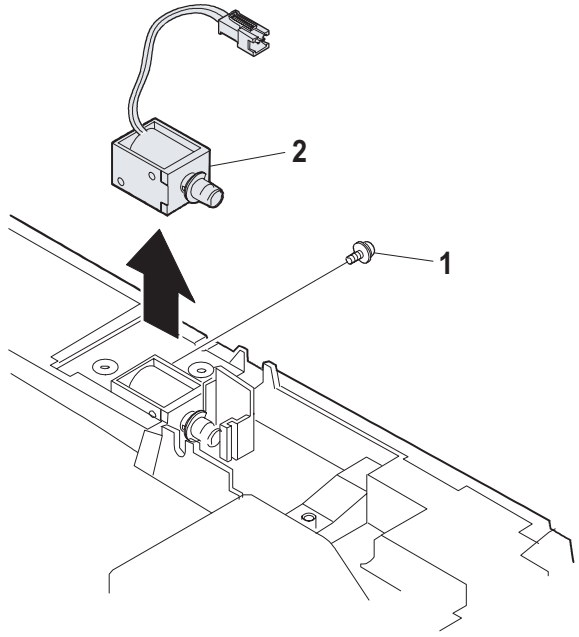


Note: When reassembling, be careful of the groove and the hole positions of the spring.

Note: When reassembling, hang 2) on the solenoid.

(2) Remove the solenoid.

1) Remove the screw.
2) Remove the solenoid.



[9] ADJUSTMENTS

1. Optical section

A. Copy magnification ratio adjustment

The copy magnification ratio must be adjusted in the main scanning direction and in the sub scanning direction. To adjust, use SIM 48-1.

(1) Outline

The main scanning (front/rear) direction magnification ratio adjustment is made automatically or manually.

Automatic adjustment: The width of the reference line marked on the shading correction plate is scanned to perform the main scanning (front/rear) direction magnification ratio adjustment automatically.

Manual adjustment: The adjustment is made by manual key operations. (In either of the automatic and manual adjustments, the zoom data register set value is changed for adjustment.)

The magnification ratio in the sub scanning direction is adjusted by changing the carriage (scanner) scanning speed.

(2) Main scanning direction magnification ratio adjustment

a. Cases when the adjustment is required

1) When the main PWB is replaced.
2) When the EEPROM in the main PWB is replaced.
3) When "U2" trouble occurs.
4) When repairing or replacing the optical section.

b. Necessary tools

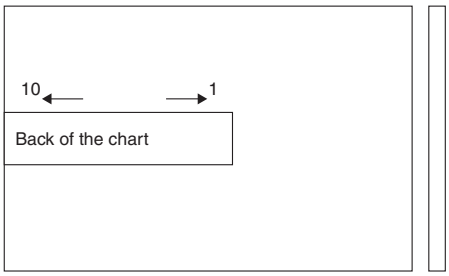
- Screwdriver (+)
- Scale

c. Adjustment procedure

Automatic adjustment

In the first place, perform SIM48-1 (Main scanning direction magnification ratio adjustment and black level correction (CCD dark component target value setup)).

To perform the automatic adjustment, place the gray gradation chart (UKOG-0162FCZZ) face down so as to fit with the left center of the platen with the darker side (Density 10) on the left of OC.



In the case of the automatic adjustment, when the PRINT switch is pressed, the mirror base unit moves to the white plate for shading to scan the width of the reference line, calculating the correction value and displaying and storing this value.

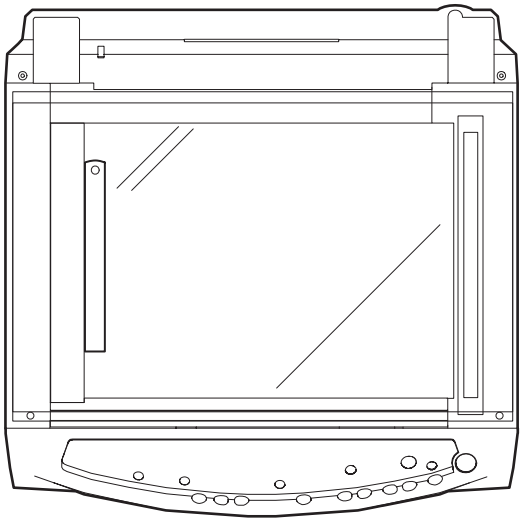
After completion of the automatic adjustment, press the density adjustment Down key, and the black level will be displayed in hexadecimal number (3 digits) of 12bits.

After execution of the automatic adjustment, go out from the simulation mode and make a copy to check the magnification ratio.

Adjustment mode	Lighting lamp
Main scanning direction auto copy magnification ratio adjustment and black level automatic correction	Auto exposure lamp ON
Main scanning direction manual copy magnification ratio adjustment	Manual exposure lamp ON
Sub scanning direction copy magnification ratio adjustment	Photo exposure lamp ON
SPF mode scanning direction magnification ratio adjustment	Auto, Manual, Photo lamp ON

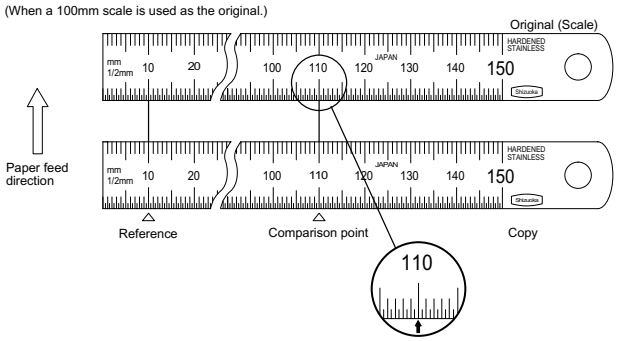
Manual adjustment

1) Set the scale vertically on the document table. (Use a long scale for precise adjustment.)



2) Set the copy magnification ratio to 100%.
3) Make a copy on A4 or 81/2" x 11" paper.
4) Measure the length of the copied scale image.
5) Calculate the main scanning direction magnification ratio.
   Main scanning direction magnification ratio

$$= \frac{\text{Copy image dimensions}}{\text{Original dimension}} \times 100\ (\%)$$



6) Check that the copy magnification ratio is within the specified range. If it is not within the specified range, perform the following procedures.
7) Execute SIM 48-1 to select the main scanning direction copy magnification ratio adjustment mode.
   To select the adjustment mode, use the copy mode select key.

If the magnification ratio is not in the specified range (100±1.0%), manually adjust as follows.

8) Set the adjustment mode to Manual with the copy mode select key.
9) Enter the new set value of main scanning direction copy magnification ratio with the copy quantity set key, and press the COPY button.
10) Change the set value and repeat the adjustment until the ratio is within the specified range.
    When the set value is changed by 1, the magnification ratio is changed by 0.1%.

(3) Sub scanning direction copy magnification ratio

a. Cases when the adjustment is required

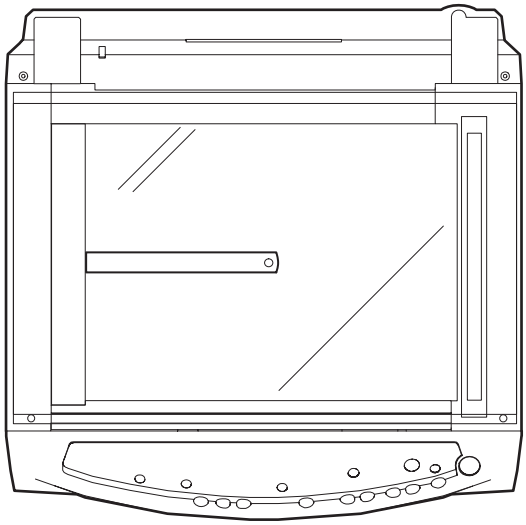
1) When the scanner unit drive section is disassembled or the part is replaced.
2) When the main PWB is replaced.
3) When the EEPROM in the main PWB is replaced.
4) When "U2" trouble occurs.

b. Necessary tools

- Scale

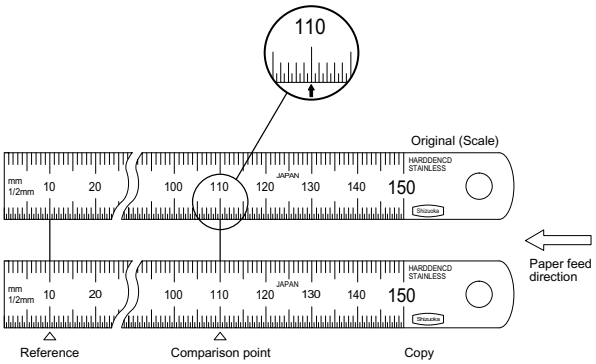
c. Adjustment procedure

1) Set the scale on the document table as shown below. (Use a long scale for precise adjustment.)



2) Set the copy magnification ratio to 100%.
3) Make a copy on A4 or 81/2" x 11" paper.
4) Measure the length of the copied scale image.
5) Calculate the sub scanning direction copy magnification ratio using the formula below.

$$= \frac{\text{Copy image dimensions}}{\text{Original dimension}} \text{ X } 100\ (\%)$$



6) Check that the actual copy magnification ratio is within the specified range. (100 ± 1.0%).
   If it is not within the specified range, perform the following procedures.
7) Execute SIM 48-1 to select the sub scanning direction copy magnification ratio adjustment mode.
   To select the adjustment mode, use the copy mode select key. (Photo exposure lamp ON)
8) Enter the new set value of sub scanning direction copy magnification ratio with the copy quantity set key, and press the COPY button.

Repeat procedures 1) - 8) until the sub scanning direction actual copy magnification ratio in 100% copying is within the specified range.

When the set value is changed by 1, the magnification ration is changed by 0.1%.

B. Image position adjustment

There are following five kinds of image position adjustments, which are made by laser control except for the image scan start position adjustment. For the adjustments, SIM 50 - 01, 50 - 10, 50 - 18 and SIM 50 - 19 are used.

No.	Adjustment item	Simulation
1	Print start position	50 - 01
2	Image lead edge void amount	50 - 01
3	Image scan start position	50 - 01
4	Image rear edge void amount	50 - 01
5	SPF image scan start position	50 - 01
6	Center offset	50 - 10
7	Memory reverse position adjustment in duplex copy	50 - 18
8	Duplex copy rear edge void adjustment	50 - 19
9	Duplex back print start position	50 - 19

To select the adjustment mode with SIM 50 - 01, use the copy mode select key.

The relationship between the adjustment modes and the lighting lamps are as shown in the table below.

Adjustment mode	Lamp ON
Print start position (Main cassette paper feed)	AE, main cassette lamp
☆ Print start position (2nd cassette paper feed)	AE, 2nd cassette lamp
Print start position (Manual paper feed)	AE, manual feed lamp
Image lead edge void quantity	TEXT lamp
Image scan start position	PHOTO lamp
Image rear edge void quantity	AE, TEXT, PHOTO lamp
☆ SPF image scan start position	AE, TEXT lamp

☆: Supported for the installing model and skipped for non-installing mode.

To select the adjustment mode with SIM 50 - 10, use the copy mode select key.

The relationship between the adjustment modes and the lighting lamps are as shown in the table below.

Machine with the multi manual paper feed unit

Adjustment mode	Lamp ON
Print center offset (Main cassette paper feed)	AE, main cassette lamp
Print center offset (Manual paper feed)	AE, manual paper feed lamp
OC/document center offset	AE, TEXT lamp

Machine with the single manual paper feed unit

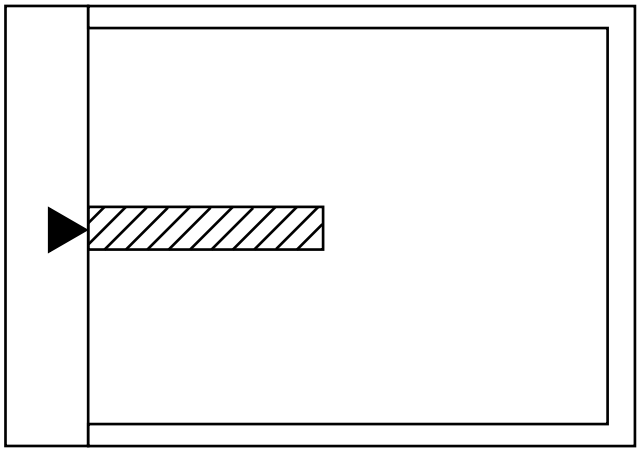
Adjustment mode	Lamp ON
Print center offset (Main cassette paper feed)	AE, main cassette lamp
Print center offset (Manual paper feed)	AE, manual paper feed lamp
OC/document center offset	AE, TEXT lamp

Duplex copy rear edge void adjustment mode

Adjustment mode	Lamp ON
Image cut rear edge void quantity (RSPF)	AE lamp
Paper rear edge void quantity	TEXT lamp
Print start position (Duplex back)	PHOTO lamp
RSPF (Back) original center offset	AE, TEXT, PHOTO lamps

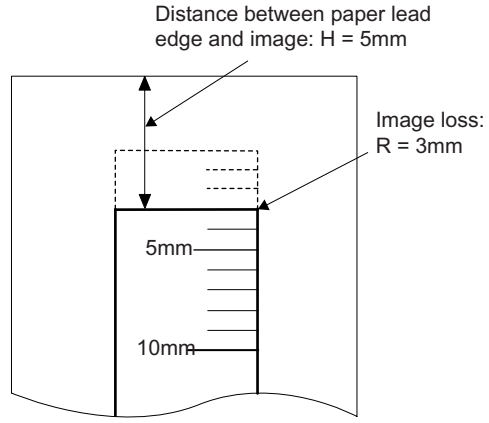
(1) Lead edge adjustment

1) Set a scale to the center of the paper lead edge guide as shown below, and cover it with B4 or 8 1/2" x 14" paper.



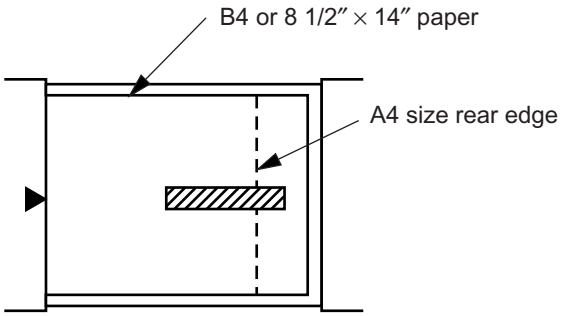
2) Execute SIM 50 - 01
3) Set the print start position (AE lamp ON) (A), the lead edge void amount (TEXT lamp ON) (B), and the scan start position (PHOTO lamp ON) (C) to 0, and make a copy of a scale at 100%.
4) Measure the image loss amount (R mm) of the scale image.
   Set C = 10 X R (mm). (Example: Set the value of C to 30.)
   When the value of C is increased by 10, the image loss is decreased by 1mm. (Default: 50)
5) Measure the distance (H mm) between the paper lead edge and the image print start position.
   Set A = 10 X H (mm). (Example: Set the value of A to 50.)
   When the value of A is increased by 10, the image lead edge is shifted to the paper lead edge by 1mm. (Default: 50)
6) Set the lead edge void amount to B = 50 (2.5mm).
   When the value of B is increased by 10, the void amount is increased by about 1mm. For 25 or less, however, the void amount becomes zero. (Default: 50)

(Example)



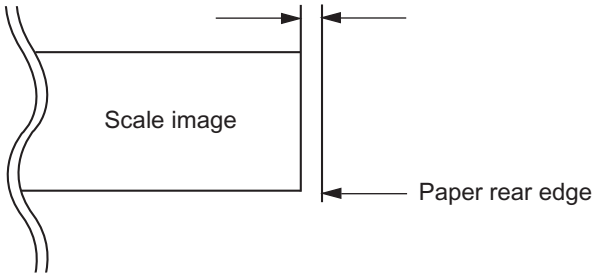
(2) Image rear edge void amount adjustment

1) Set a scale to the rear edge section of A4 or 11" x 8 1/2" paper size as shown in the figure below, and cover it with B4 or 8 1/2" x 14" paper.



2) Execute SIM 50 - 01 to select the image rear edge void amount adjustment mode.
   The set adjustment value is displayed on the copy quantity display.
3) Make a copy and measure the void amount of image rear edge.

Void amount (Standard value: 2 3mm)



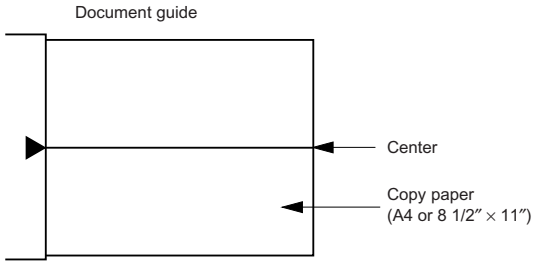
4) If the measurement value is out of the specified range, change the set value and repeat the adjustment procedure.
   The default value is 50.

Note: The rear edge void cannot be checked with the first sheet after entering the simulation mode, the first sheet after turning off/on the power, or the first sheet after inserting the cassette. Use the second or later sheet to check the rear edge void.

(3) Center offset adjustment

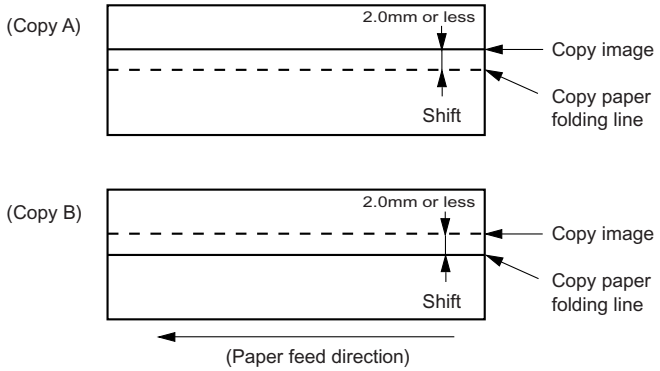
1) Set the self-made test chart for the center position adjustment so that its center line is aligned with the center mark of the document guide.

- Test chart for the center position adjustment.
  Draw a line at the center of A4 or 8 1/2" x 11" paper in the paper transport direction.



2) Execute SIM 50 - 10 to select the print center offset (cassette paper feed) adjustment mode.
   The set adjustment value is displayed on the copy quantity display.

3) Make a copy and check that the copied center line is properly positioned.
The standard value is 0 ±2mm from the paper center.



4) If the measured value is out of the specified range, change the set value and repeat the adjustment procedure.
When the set value is increased by 1, the copy image is shifted by 0.1mm toward the rear frame.

- For the manual paper feed, change the manual paper feed adjustment mode and perform the similar procedures.
- Since the document center offset is automatically adjusted by the CCD which scan the reference lines (F/R) on the back of document guide, there is no need to adjust manually.

2. Copy density adjustment

A. Copy density adjustment timing

The copy density adjustment must be performed in the following cases:

- When maintenance is performed.
- When the developing bias/grid bias voltage is adjusted.
- When the optical section is cleaned.
- When a part in the optical section is replaced.
- When the optical section is disassembled.
- When the OPC drum is replaced.
- When the main control PWB is replaced.
- When the EEPROM on the main control PWB is replaced.
- When the memory trouble (U2) occurs.

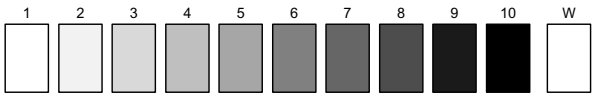
B. Note for copy density adjustment

1) Arrangement before execution of the copy density adjustment

- Clean the optical section.
- Clean or replace the charger wire.
- Check that the voltage at the high voltage section and the developing bias voltage are in the specified range.

C. Necessary tool for copy density adjustment

- One of the following test charts:
UKOG-0162FCZZ, UKOG-0089CSZZ, KODAK GRAY SCALE
- B4 (14" x 8 1/2") white paper
- The user program AE setting should be "3."



Test chart comparison table

UKOG-0162FCZZ DENSITY No.	1	2	3	4	5	6	7	8	9	10	W
UKOG-0089CSZZ DENSITY No.	0.1		0.2		0.3				0.5	1.9	0
KODAK GRAY SCALE		1		2		3		4		19	A

D. Features of copy density adjustment

For the copy density adjustment, the image data shift function provided in the image process LSI is used.

List of the adjustment modes

Auto Mode	Brightness 1 step only
Manual Mode	Brightness 5 steps. Adjustment of only the center brightness is made.
Photo Mode	Brightness 5 steps. Adjustment of only the center brightness is made.
Manual T/S mode	Brightness 5 steps. Adjustment of only the center brightness is made.
T/S Auto mode	Brightness 1 step only

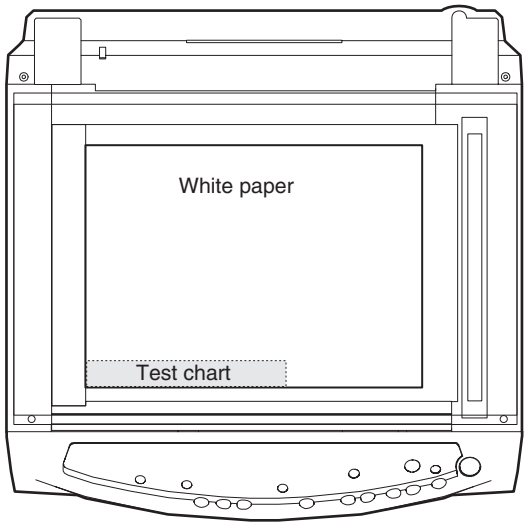
E. Copy density adjustment procedure

Use SIM 46 - 01 to set the copy density for each copy mode.

For selection of modes, use the copy mode select key.

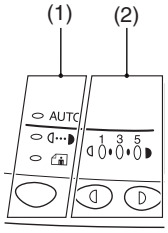
(1) Test chart (UKOG-0162FCZZ) setting

1) Place the test chart so that its edge is aligned with the A4 (Letter) reference line on the document table. Then place a A4 (14" x 8 1/2") white paper on the test chart and close the document cover.



(2) Perform the adjustment in each mode.

1) Execute SIM 46-1.
2) Select the mode to be adjusted with the exposure mode select key. Set the exposure level to 3 for all adjustment. (Except for the auto mode.)

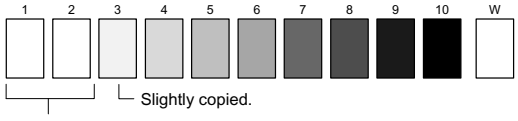
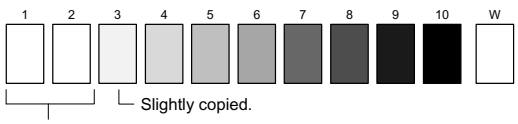


(1) Mode select key/display lamp

(2) Exposure level select key/display lamp

Adjustment mode	Exposure mode display lamp	Sharp gray chart adjustment level
Auto mode	Auto lamp ON	"3" is slightly copied.
Manual mode	Manual lamp ON	"3" is slightly copied.
Photo mode	Photo lamp ON	"3" is slightly copied.
Manual T/S mode	Manual lamp/Photo lamp ON	"3" is slightly copied.
Auto T/S mode	Auto lamp/Photo lamp ON	"3" is slightly copied.

3) Make a copy.
Check the adjustment level (shown in the above table) of the exposure test chart (Sharp Gray Scale).

	Sharp Gray Scale adjustment level
Non toner save mode	
Toner save mode	

(When too bright): Decrease the value displayed on the copy quantity display.

(When too dark): Increase the value displayed on the copy quantity display.

* The value can be set in the range of 1 - 99.

3. High voltage adjustment

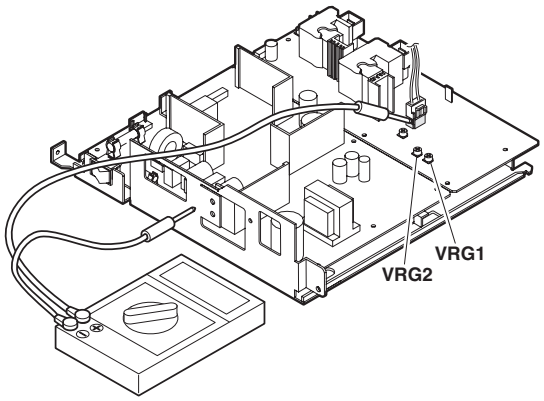
A. Main charger (Grid bias)

Note:

- Use a digital multi meter with internal resistance of 10MΩ or more measurement.
- After adjusting the grid LOW output, adjust the HIGH output. Do not reverse the sequence.

Procedures

1) Set the digital multi meter range to DC700V.
2) Set the positive side of the test rod to the connector CN11-3 (GRID) of high voltage section of the power PWB and set the negative side to the frame ground (power frame).
3) Execute SIM 8-3. (The main charger output is supplied for 30 sec in the grid voltage LOW output mode.)
4) Adjust the control volume (VRG2) so that the output voltage is –390 ±20V.
5) Execute SIM 8-2. (The main charger output is supplied for 30 sec in the grid voltage HIGH output mode.)
6) Adjust the control volume (VRG1) so that the output voltage is 580 ±12V.

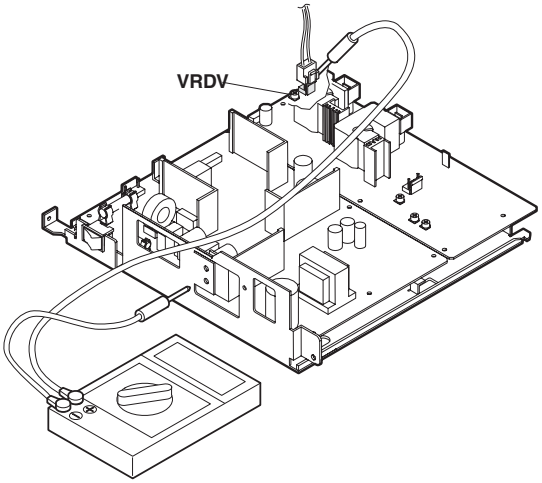


B. DV bias check

Note:
- A digital multi meter with internal resistance of 1GΩ must be use for correct check.
- The adjustment volume is locked, and no adjustment can be made.

Procedures

1) Set the digital multi meter range to DC500V.
2) Set the positive side of the test rod to the connector CN-10-1 (DV BIAS) and set the negative side to the frame ground (power frame).
3) Execute SIM 25-1 to output the developing bias for 30sec, and check that the output is –400 ±8V.



4. Duplex adjustment

A. Adjusting the paper reverse position in memory for duplex copying

This step adjusts the front surface printing (odd-number pages of a document set) in the S-D mode copying and the leading edge position of an image on even-number pages in the D-S mode.

That is, it covers the adjustment of the second surface printing mode (image loss at the front edge of an image) in which image data is once stored in memory.

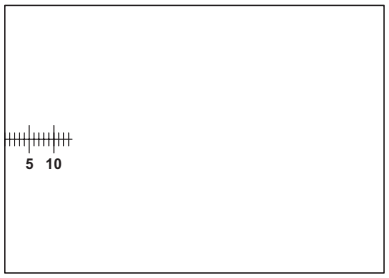
The image data is read, starting from its front end in the document delivery direction (Reference direction of document setting in the OC mode)and stored in memory.

This stored image data is printed starting at the printing start position, in the order of last-stored data to the first-stored data.

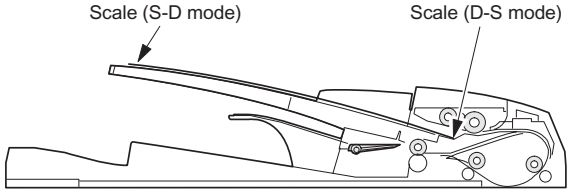
In other words, the front edge image loss of the image can be adjusted by changing the document read end position.

(Adjustment procedure)

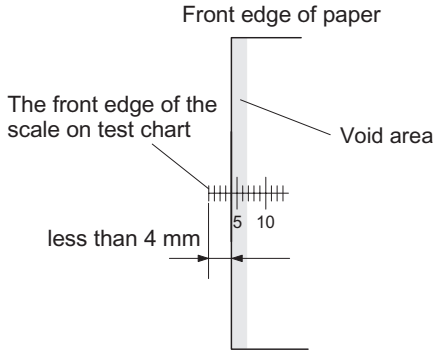
1) Preparing test chart (Draw a scale at the rear end of one side of a sheet of A4 white paper or letter paper)

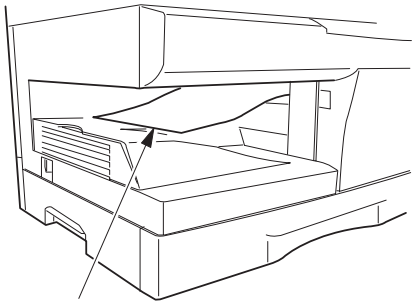


2) Set the test chart so that the scale is positioned as shown below, in the S-D mode and the D-S mode.



3) Execute simulation 50-18 to make a copy and check the front edge image loss at the area where the scale is printed.
Adjust the setting so that the front edge image loss is less than 4.0 mm in the R-SPF mode.
An increase of 1 in setting represents an increase of 0.1 mm in image loss.





2nd printing surface where scale is printed (lower side)

B. Adjusting trailing edge void in duplex copy mode

This is the adjustment of the first surface printing mode (rear end void) in duplex copying.

In a duplex copying operation, the paper is delivered starting from the rear end of the first printing surface. It is therefore necessary to make a void area at the rear end on the first printing surface to prevent paper jam at the fusing part.

There are two adjustment modes:

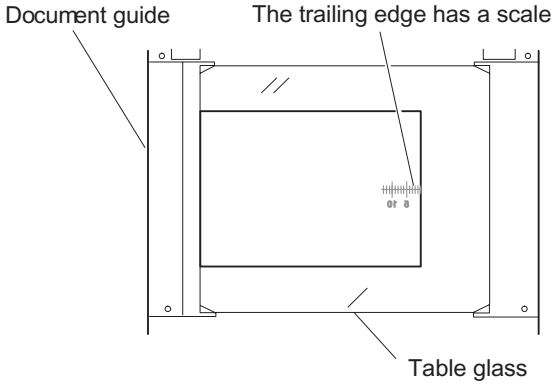
1) Image cut rear end void quantity (R-SPF) 50-19(AE)
The size (length) of a document read from the R-SPF is detected, the image at the trailing edge of the first printing surface is cut to make a void area. (The adjustment of void quantity at the time when the cassette paper size is not recognized.)
2) Paper trailing edge void quantity 50-19 (TEXT)
This adjustment is made when the cassette paper size is recognized. The trailing edge void quantity can be adjusted by changing the trailing edge image laser OFF timing.

The paper void quantity should be first adjusted before the image cut trailing edge void quantity (R-SPF) is adjusted.

(Adjustment procedure)

(1) Paper trailing edge void quantity

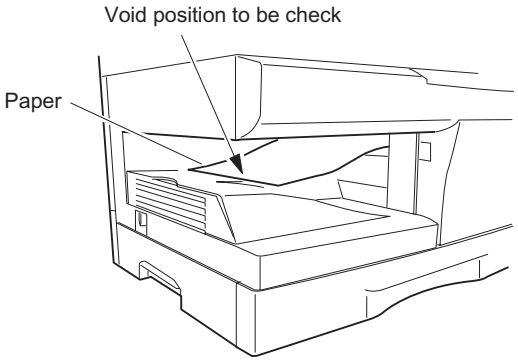
1) Preparing test chart (Draw a scale at the rear end of one side of a sheet of A/4 white paper or letter paper)
2) Set the test chart on the document glass as shown below.



3) Using the user simulation [18], set the paper size of the first cassette.

- Letter paper: 4
- A4 paper: 3

4) Execute simulation 50-19 to turn on the TEXT lamp and make the printing mode in OC-D mode.
Make a copy of the test chart to check the void area of the scale on the image.

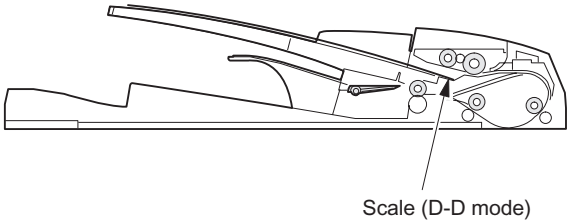


The trailing edge void on the first printing surface is shown above.

Adjust the setting so that the void area is 4 - 5 mm. An increase in 1 of setting represents 0.1 mm in void area.

(2) Image cut trailing edge void quantity (R-SPF)

1) Set the test chart so that the scale is positioned as shown below.



2) Execute simulation 50-19 to turn on the AE lamp(on the operation panel) and make the printing mode in the D-D mode.
3) Remove and reinsert the cassette.

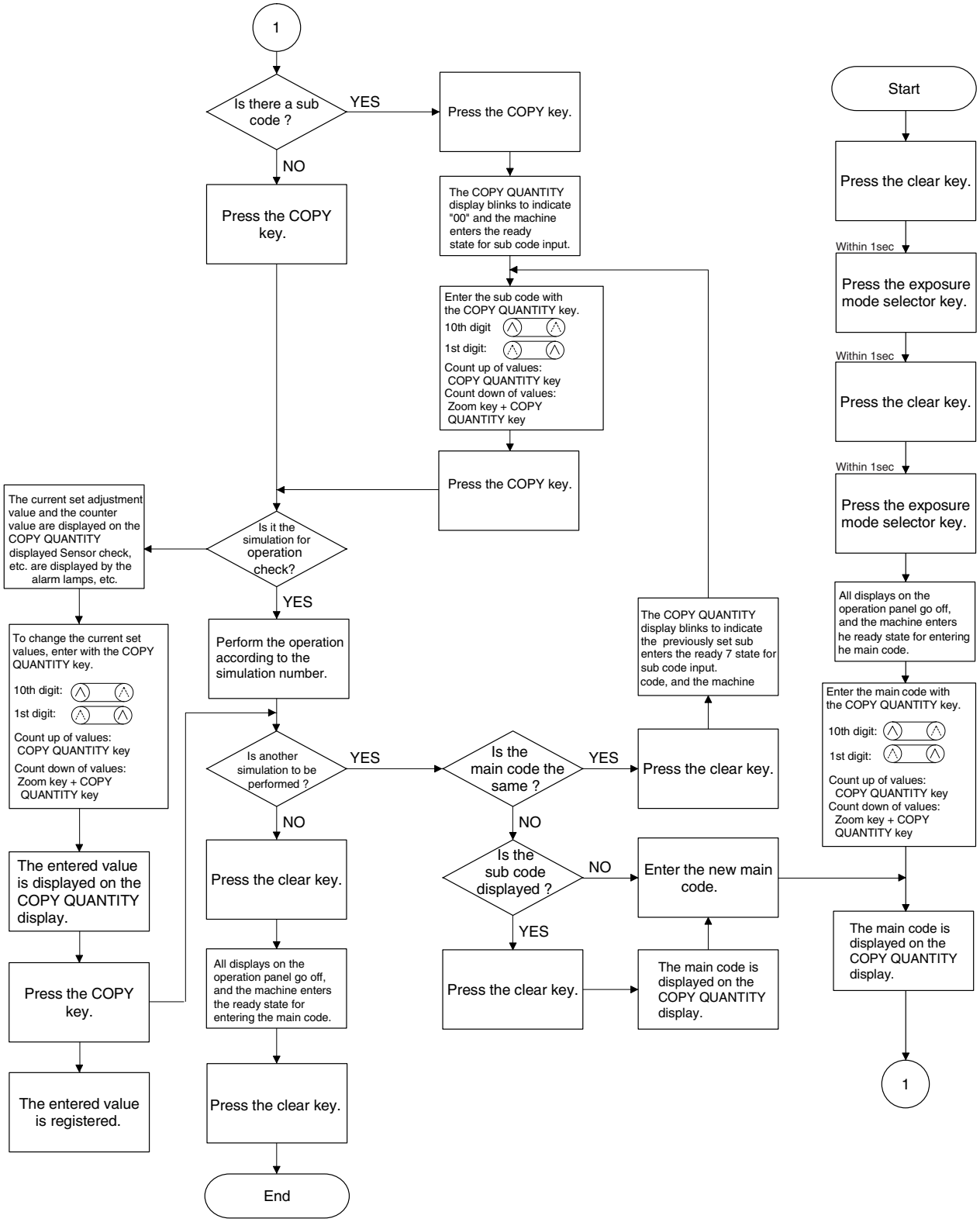
Note: Make sure to carry out this step before making a copy during this adjustment.

4) Make a copy and check the void area of the scale on the image.
Adjust the setting so that the void area is 2 - 4 mm. An increase of 1 in setting represents an increase of 0.1 mm in void area.
l Void position to be checked

[10] SIMULATION, TROUBLE CODES

1. Entering the simulation mode

To enter the serviceman simulation mode, press the keys as follows:
Clear → Density select → Clear→ Density select
To cancel the simulation mode, press the clear key.
Flow chart of entering the simulation mode



2. List of simulations

Sim No.	Kind of main code	Sub code	Operation
01	Optical system	01	Mirror scan operation
		06	Aging of mirror scanning
02	SPF Individual load operation	02	SPF sensor status display
		03	Motor ON
		04	Paper feed solenoid ON
		05	Pressure release solenoid ON (RSPF)
		06	Resist clutch ON (RSPF)
		07	Gate solenoid ON (RSPF)
05	Lamp ON check	01	Operation panel display check
		02	Fusing lamp, cooling fan operation check
		03	Copy lamp ON
06	Machine individual load operation	01	Paper feed solenoid ON
		02	Resist solenoid ON
07	Aging	01	Warm-up display and aging with jam
		06	Intermittent aging
08	High voltage output check	01	Developing bias
		02	Main charger (Grid high)
		03	Grid voltage (Low)
		06	Transfer charger
10	Other	None	Toner motor aging
14	Trouble reset	None	Cancel of troubles other than U2
16	U2 trouble reset	None	Cancel of U2 trouble
20		01	Maintenance counter clear
21		01	Maintenance cycle setup
		02	Mini maintenance cycle setup (Valid only when the destination is set to Japan AB series.)
22	Counter display	01	Maintenance counter display
		02	Maintenance preset value display
		04	JAM total counter display
		05	Total counter display
		06	Developer counter display
		08	SPF counter display
		12	Drum counter display
		14	P-ROM version display
		17	Copy counter display
		18	Printer counter display
		19	Scanner mode counter display
		21	Scanner counter display
		22	SPF JAM counter display
24	Special counter clear	01	JAM total counter clear
		04	SPF counter clear
		06	Developer counter clear
		07	Drum counter clear
		08	Copy counter clear
		09	Printer counter clear
		13	Scanner counter clear
		14	SPF JAM total counter clear
		15	Scanner mode counter clear
25	Main motor ON	01	Main motor operation check (Cooling fan motor rotation check)
		10	Polygon motor ON
26	Various setup	01	Manual feed setup
		02	(R) SPF setup
		03	Second cassette setup
		04	Machine duplex setup
		06	Destination setup
		07	Machine conditions check
		20	Rear edge void setup
		30	CE mark support control ON/OFF
		37	Developer life-over termination cancel
		38	Cancel of stop at drum life over
		39	Memory capacity check
		40	Polygon motor OFF time setup (Time required for turning OFF after completion of printing)
		42	Transfer ON timing control setup
		43	Side void setup
		44	SPF document rear edge read setup
		62	Energy-save mode copy lamp setup
		63	Fan control select setup
		64	Heater control setup during the scanner mode
30	Sensor operation check (Standard provision)	01	Paper sensor status display
43	Fusing temperature setup	01	Fusing temperature setup (Normal copy)
		04	Fusing temperature setup 2
		05	Fusing temperature setup in duplex copy
		09	Setup of fusing control of postcard size paper
46	Exposure adjustment	01	Copy density adjustment (300dpi)
		02	Copy density adjustment (600dpi)
		18	Image contrast adjustment (300dpi)
		19	γ table setup or AE operation mode setup
		20	SPF exposure correction
		29	Image contrast adjustment (600dpi)
		31	Image sharpness adjustment
		32	Copier color reproduction setup
48	Magnification ratio correction and black level adjustment	01	Front/rear (main scanning) direction and scan (sub scanning) direction magnification ratio adjustment and black level adjustment
49		01	Flash ROM program writing mode
50	Lead edge adjustment	01	Lead edge image position
		10	Center offset adjustment
		18	Memory reverse position adjustment in duplex copy
		19	Duplex copy rear edge void adjustment
51	Timing adjustment	02	Resist quantity adjustment
53		08	SPF scan position automatic adjustment
61	Laser system operation	03	Polygon motor check (HSYNC output check)
63	Shading	01	Shading check
64	Self print	01	Self print

3. Contents of simulations

Input method: Clear key → Exposure Select key → Clear key → Exposure Select key

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>01</td><td>01</td><td>Mirror scan operation
(Operation/Procedure)
1. When this simulation is executed, the mirror home position is detected.
<table><tr><th>Sensor name</th><th>Display lamp</th></tr><tr><td>Mirror home position sensor</td><td>OPC drum cartridge replacement lamp</td></tr></table>
2. When the _START key is pressed, scanning is executed at the speed corresponding to the currently set copy magnification ratio. The copy magnification ratio can be arbitrarily set with the magnification ratio select key/zoom key.</td></tr>
<tr><td></td><td>06</td><td>Aging of mirror scanning
When the PRINT switch is pressed, the mirror base performs full scan at the speed of the set magnification ratio. After 3 sec, the mirror case performs full scan again. These procedures are repeated until the clear key is pressed. (When the PRINT switch is pressed once, the ready lamp keeps OFF.)
The status of the mirror home position sensor is displayed with the photoconductor cartridge lamp. (The lamp is ON when the mirror is at the home position.)
During aging, the copy lamp keeps ON.</td></tr>
<tr><td>02</td><td>02</td><td>SPF sensor status display
ON/OFF of the sensors in the SPF can be checked with the following lamps.
<table><tr><th>Display</th><th>Sensor</th></tr><tr><td>Developer cartridge replacement lamp</td><td>Document set detection (SPID)</td></tr><tr><td>Jam lamp</td><td>SPF document transport detection (SPPD)</td></tr><tr><td>Photoconductor cartridge replacement lamp</td><td>SPF cover open/close detection (SDOD)</td></tr><tr><td>SPF jam lamp</td><td>SPF open/close detection (SDSW)
FAX document size detection
Paper size detection</td></tr></table></td></tr>
<tr><td></td><td>03</td><td>Motor ON
(Operation/Procedure)
When the start key is pressed, the SPF motor rotates for 10 sec at the speed corresponding to the currently set magnification ratio.</td></tr>
<tr><td></td><td>04</td><td>Paper feed solenoid ON
(Operation/Procedure)
When the start key is pressed, the SPF paper feed solenoid repeats ON (500 ms) and OFF (500 ms) 20 times.</td></tr>
<tr><td></td><td>05</td><td>Pressure release solenoid ON (RSPF)
(Operation/Procedure)
When the start key is pressed, the RSPF document transport solenoid (SPFS) repeats ON (500 ms) and OFF (500 ms) 20 times.</td></tr>
<tr><td></td><td>06</td><td>Resist clutch ON (RSPF)
(Operation/Procedure)
When the start key is pressed, the RSPF resist clutch (SRRC) repeats ON (500 ms) and OFF (500 ms) 20 times.</td></tr>
<tr><td></td><td>07</td><td>Gate solenoid ON (RSPF)
(Operation/Procedure)
When the start key is pressed, the RSPF gate solenoid (SGS) repeats ON (500 ms) and OFF (500 ms) 20 times.</td></tr>
<tr><td>05</td><td>01</td><td>Operation panel display check
• When the PRINT switch is pressed, all LEDs (including 7-segment LEDs) on the operation panel are lighted. (LED check mode)
• When 1Up key is pressed, the LEDs on the operation panel are lighted individually from the top left to the bottom right in sequence. After completion of all individual lighting, all LEDs are lighted simultaneously. (The 7-segment LED lights the three-digit sections at the same time.)
Individual lighting frequency ON: 300ms, OFF: 20ms
• When the CLEAR key is pressed, this simulation is terminated.
• When the PRINT switch is pressed in the LED check mode, the machine enters the Key input check mode.
“Key input check mode”
When the machine enters the Key input check mode, the value display section indicates “—-” Every time any key on the operat ion panel is pressed, the entered value is added and displayed on the value display section. However, the keys that were pressed once are not counted again.
• When the PRINT switch is pressed, the entered value is added and displayed for 3 sec and all the LEDs are lighted. (LED lighting check mode)
(Note for Key input check mode)
• Press the PRINT switch at the end. (If it is pressed in the middle of the process, the entered value up to that moment is displayed for 3 sec and the machine enters the LED lighting check mode. (ALL the LEDs are lighted.))
• Multiple key inputs are ignored.</td></tr>
<tr><td></td><td>02</td><td>Fusing lamp, cooling fan operation check
When the PRINT switch is pressed, the fusing lamp repeats operations of 500ms-ON and 500ms-OFF 5 times. During that time, the cooling fan motor rotates.</td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>05</td><td>03</td><td>Copy lamp ON
(Operation/Procedure)
When the START key is pressed, the copy lamp is lighted for 5 sec.</td></tr>
<tr><td>06</td><td>01</td><td>Paper feed solenoid ON
(Operation/Procedure)
When the START key is pressed, the paper feed solenoid selected by the tray select key repeats ON (500ms) and OFF (500ms) 20 times.</td></tr>
<tr><td></td><td>02</td><td>Resist solenoid ON
(Operation/Procedure)
When the START key is pressed, the resist solenoid (RRS) repeats ON (500ms) and OFF (500ms) 20 times.</td></tr>
<tr><td>07</td><td>01</td><td>Warm-up display and aging with jam
(Operation/Procedure)
1. When the simulation is executed, warming up is started.
2. Warm-up time is counted and displayed every second on the copy quantity display.
3. After completion of warm-up, the time count is stopped and the ready lamp is lighted.
4. Press the clear key to clear the warm-up time display, set the copy quantity, and press the START key, and the machine will copy the set quantity repeatedly.
This simulation is canceled by turning off the power or executing any simulation which performs hardware reset.</td></tr>
<tr><td></td><td>06</td><td>Intermittent aging
(Operation/Procedure)
1. When the simulation is executed, warming up is started.
2. After completion of warm-up, the ready lamp is lighted.
3. Set the copy quantity and press the START key, and the machine will copy the set quantity repeatedly.
4. After 3 sec of the interval time from completion of copying the set quantity, the machine will resume copying.
5. The above operation 4 is repeated.
This simulation is canceled by turning off the power or executing any simulation which performs hardware reset.</td></tr>
<tr><td>08</td><td>01</td><td>Developing bias
(Operation/Procedure)
When the START key is pressed, the developing bias is outputted for 30 sec.</td></tr>
<tr><td></td><td>02</td><td>Main charger (Grid high)
(Operation/Procedure)
When the START key is pressed, the main charger output is supplied for 30 sec in the grid voltage HIGH mode.</td></tr>
<tr><td></td><td>03</td><td>Grid voltage (Low)
(Operation/Procedure)
When the START key is pressed, the main charger output is supplied for 30 sec in the grid voltage LOW mode.</td></tr>
<tr><td></td><td>06</td><td>Transfer charger
(Operation/Procedure)
When the START key is pressed, the transfer charger output is supplied for 30 sec.</td></tr>
<tr><td>10</td><td>None</td><td>Toner motor aging
(Operation/Procedure)
When the START key is pressed, the toner motor output is supplied for 30 sec.</td></tr>
<tr><td>14</td><td>None</td><td>Cancel of troubles other than U2
(Operation/Procedure)
After canceling the trouble, the simulation is also automatically canceled.</td></tr>
<tr><td>16</td><td>None</td><td>Cancel of U2 trouble
(Operation/Procedure)
1. When the START key is pressed, the EEPROM total counter check sum is rewritten and the trouble is canceled.
2. After canceling the trouble, the simulation is also automatically canceled.</td></tr>
<tr><td>20</td><td>01</td><td>Maintenance counter clear
When the PRINT switch is pressed, the maintenance count is cleared and the value “000000” is displayed.</td></tr>
<tr><td>21</td><td>01</td><td>Maintenance cycle setup
The currently set code (default) of the maintenance cycle is displayed, and the newly set data are saved.
<table>
<tr><th>Code</th><th>Setup</th></tr>
<tr><td>0</td><td>3,000 sheets</td></tr>
<tr><td>1</td><td>6,000 sheets</td></tr>
<tr><td>2</td><td>9,000 sheets</td></tr>
<tr><td>3</td><td>13,000 sheets</td></tr>
<tr><td>4</td><td>25,000 sheets *Default</td></tr>
<tr><td>5</td><td>Free (999,999 sheets)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>21</td><td>02</td><td>Mini maintenance cycle setup (Valid only when the destination is set to Japan AB series.)
The currently set code (default) of the mini maintenance cycle is displayed, and the newly set data are saved.

<table><tr><th>Code</th><th>Setup</th></tr><tr><td>0</td><td>5,000 sheets *Default</td></tr><tr><td>1</td><td>10,000 sheets</td></tr><tr><td>2</td><td>Free (999,999 sheets)</td></tr></table></td></tr>
<tr><td>22</td><td>01</td><td>Maintenance counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>02</td><td>Maintenance preset value display
The quantity corresponding to the code set with 21-01 and 21-02 is displayed.
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>04</td><td>JAM total counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>05</td><td>Total counter display
The total count value is displayed in 3 digits X 2 times repeatedly.
<Display example: 12345>

012 → Blank → 345 → Blank → 012
0.7s 0.3s 0.7s 1.0s 0.7s</td></tr>
<tr><td></td><td>06</td><td>Developer counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>08</td><td>SPF counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>12</td><td>Drum counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>14</td><td>P-ROM version display
The main code and the sub code of the P-ROM version is displayed on the value display section in 2 digits alternately.
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>17</td><td>Copy counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>18</td><td>Printer counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>19</td><td>Scanner mode counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>21</td><td>Scanner counter display
The display method is the same as the total count value display.</td></tr>
<tr><td></td><td>22</td><td>SPF JAM counter display
The display method is the same as the total count value display.</td></tr>
<tr><td>24</td><td>01</td><td>JAM total counter clear
When the PRINT switch is pressed, the JAM total count value is reset to 0.</td></tr>
<tr><td></td><td>04</td><td>SPF counter clear
When the PRINT switch is pressed, the SPF count value is reset to 0.</td></tr>
<tr><td></td><td>06</td><td>Developer counter clear
When the PRINT switch is pressed, the developer count value is reset to 0.</td></tr>
<tr><td></td><td>07</td><td>Drum counter clear
When the PRINT switch is pressed, the drum count value is reset to 0.</td></tr>
<tr><td></td><td>08</td><td>Copy counter clear
When the PRINT switch is pressed, the copy count value is reset to 0.</td></tr>
<tr><td></td><td>09</td><td>Printer counter clear
When the PRINT switch is pressed, the printer count value is reset to 0.</td></tr>
<tr><td></td><td>13</td><td>Scanner counter clear
When the PRINT switch is pressed, the scanner count value is reset to 0.</td></tr>
<tr><td></td><td>14</td><td>SPF JAM total counter clear
When the PRINT switch is pressed, the SPF JAM total count value is reset to 0.</td></tr>
<tr><td></td><td>15</td><td>Scanner mode counter clear
When the PRINT switch is pressed, the scanner mode counter is reset to 0.</td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>25</td><td>01</td><td>Main motor operation check (Cooling fan motor rotation check)
When the PRINT switch is pressed, the main motor (as well as the duplex motor in the duplex model) is operated for 30 sec. If the developing unit is installed at that time, the developing bias, the main charger, and the grid are outputted together in order to avoid toner consumption. Since, in this case, laser discharge is required when stopping the motor, the polygon motor is rotated at the same time. If the developing unit is not installed, the above high voltage is not outputted and only the motor is rotated.
☆: Do not execute this simulation by forcibly turning ON the door ON/OFF switch.</td></tr>
<tr><td></td><td>10</td><td>Polygon motor ON
(Operation/Procedure)
When the START key is pressed, the polygon motor is operated for 30 sec.</td></tr>
<tr><td>26</td><td>01</td><td>Manual feed setup
(Operation/Procedure)
1. When this simulation is executed, the currently set bypass code number is displayed.
2. Enter the code number corresponding to the bypass and press the START key, and the setting will be changed.
<table><tr><th>Code number</th><th>Bypass</th></tr><tr><td>0</td><td>Single bypass</td></tr><tr><td>1</td><td>Multi bypass</td></tr></table></td></tr>
<tr><td></td><td>02</td><td>(R) SPF setup
When this simulation is executed, the current setup of the SPF code number is displayed. Enter the code number corresponding to the SPF and press the PRINT switch to enable the setup.
<table><tr><th>Code number</th><th>SPF</th></tr><tr><td>0</td><td>SPF not installed</td></tr><tr><td>1</td><td>SPF installed</td></tr><tr><td>2</td><td>RSPF installed</td></tr></table></td></tr>
<tr><td></td><td>03</td><td>Second cassette setup
(Operation/Procedure)
1. When this simulation is executed, the currently set code number of the second cassette is displayed.
2. Enter the code number and press the start key. The setting is changed.
<table><tr><th>Code number</th><th>Second cassette</th></tr><tr><td>0</td><td>Without second cassette</td></tr><tr><td>1</td><td>With second cassette</td></tr></table></td></tr>
<tr><td></td><td>04</td><td>Machine duplex setup
(Operation/Procedure)
1. When this simulation is executed, the currently set duplex code number is displayed.
2. Enter the code number corresponding to the duplex and press the ENTER key, and the setup will be changed.
<table><tr><th>Code number</th><th>Duplex</th></tr><tr><td>0</td><td>Without Duplex</td></tr><tr><td>1</td><td>With Duplex</td></tr></table></td></tr>
<tr><td></td><td>06</td><td>Destination setup
When this simulation is executed, the current setup of the destination code number is displayed. Enter the code number corresponding to the destination and press the PRINT switch to enable the setup.
<table><tr><th>Code number</th><th>Destination</th></tr><tr><td>0</td><td>Inch series</td></tr><tr><td>1</td><td>EX JAPAN AB series</td></tr><tr><td>2</td><td>JAPAN AB series</td></tr><tr><td>3</td><td>China (EX JAPAN AB series + Chinese paper support)</td></tr></table></td></tr>
<tr><td></td><td>07</td><td>Machine conditions check
When this simulation is executed, the current machine setup is displayed.
<table><tr><th>CPM</th><th>Copy quantity display</th></tr><tr><td>10 cpm</td><td>10</td></tr><tr><td>12 cpm</td><td>12</td></tr><tr><td>13 cpm</td><td>13</td></tr><tr><td>14 cpm</td><td>14</td></tr><tr><td>15 cpm</td><td>15</td></tr></table></td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>26</td><td>20</td><td>Rear edge void setup
When this simulation is executed, the current setup of the rear edge void code number is displayed. Enter the code number corresponding to the rear edge void and press the PRINT switch to enable the setup.
<table><tr><th>Code number</th><th>Rear edge void setup</th></tr><tr><td>0</td><td>Rear edge void provided * Default</td></tr><tr><td>1</td><td>Rear edge void not provided</td></tr></table></td></tr>
<tr><td></td><td>30</td><td>CE mark support control ON/OFF
When this simulation is executed, the current setup of the CE mark support code number is displayed. Enter the code number corresponding to the CE mark support setup and press the PRINT switch to enable the setup.
<table><tr><th>Code number</th><th>CE mark support setup</th></tr><tr><td>0</td><td>CE mark support control OFF * Default (100V series)</td></tr><tr><td>1</td><td>CE mark support control ON</td></tr></table>The default for CE-support 200V series is “1.”</td></tr>
<tr><td></td><td>37</td><td>Developer life-over termination cancel
When this simulation is executed, the currently set code number is displayed. Enter a desired code number and press the PRINT switch, and the new setup is enabled.
<table><tr><th>Code number</th><th>Setup</th></tr><tr><td>0</td><td>Developer life-over termination</td></tr><tr><td>1</td><td>Developer life-over termination cancel</td></tr></table></td></tr>
<tr><td></td><td>38</td><td>Cancel of stop at drum life over
When this simulation is executed, the current setup of the code number is displayed. Enter the code number and press the PRINT switch to enable the setup.
<table><tr><th>Code number</th><th>Setup</th></tr><tr><td>0</td><td>Stop at drum life over * Default (AL model)</td></tr><tr><td>1</td><td>Cancel of stop at drum life over</td></tr></table></td></tr>
<tr><td></td><td>39</td><td>Memory capacity check
When this simulation is executed, the current memory capacity is displayed.
<table><tr><th>Code number</th><th>Setup</th></tr><tr><td>8</td><td>8 Mbyte</td></tr><tr><td>16</td><td>16 Mbyte</td></tr></table></td></tr>
<tr><td></td><td>40</td><td>Polygon motor OFF time setup (Time required for turning OFF after completion of printing)
When this simulation is executed, the current setup of the code number is displayed. Enter the code number and press the PRINT switch to enable the setup.
<table><tr><th>Code number</th><th>Setup</th></tr><tr><td>0</td><td>0 sec</td></tr><tr><td>1</td><td>30 sec * Default</td></tr><tr><td>2</td><td>60 sec</td></tr><tr><td>3</td><td>90 sec</td></tr></table></td></tr>
<tr><td></td><td>42</td><td>Transfer ON timing control setup
(Operation/Procedure)
1. When this simulation is executed, the currently set code number is displayed.
2. Enter the code number and press the START key, and the setting will be changed. (For any number different from the following ones, the default time is automatically set.)
<table><tr><th>Code number</th><th>Setting</th></tr><tr><td>0</td><td>Default (330 msec)</td></tr><tr><td>1</td><td>–40 msec</td></tr><tr><td>2</td><td>–30 msec</td></tr><tr><td>3</td><td>–20 msec</td></tr><tr><td>4</td><td>–10 msec</td></tr><tr><td>5</td><td>Default (330 msec)</td></tr><tr><td>6</td><td>+10 msec</td></tr><tr><td>7</td><td>+20 msec</td></tr><tr><td>8</td><td>+30 msec</td></tr><tr><td>9</td><td>+40 msec</td></tr></table></td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>26</td><td>43</td><td>Side void setup
(Operation/Procedure)
1. When this simulation is executed, the currently set code number of the side void amount is displayed.
2. Enter the code number and press the start key. The setting is changed.

<table><tr><th>Code number</th><th>Setting</th></tr><tr><td>0</td><td>0 mm</td></tr><tr><td>1</td><td>0.5 mm</td></tr><tr><td>2</td><td>1.0 mm</td></tr><tr><td>3</td><td>1.5 mm</td></tr><tr><td>4</td><td>2.0 mm * Default</td></tr><tr><td>5</td><td>2.5 mm</td></tr><tr><td>6</td><td>3.0 mm</td></tr><tr><td>7</td><td>3.5 mm</td></tr><tr><td>8</td><td>4.0 mm</td></tr><tr><td>9</td><td>4.5 mm</td></tr><tr><td>10</td><td>5.0 mm</td></tr></table></td></tr>
<tr><td></td><td>44</td><td>SPF document rear edge read setup + Fax document rear edge scan setup.
When this simulation is executed, the currently set code number is displayed. Enter the desired code number and press the START key, and the display will be changed. The document rear edge scanning area in SPF reduction (less than 100%) copy is changed.
The code number is changeable in the range of 0 –8.
The default value is 4, and 2 mm of the document rear edge is cut.
When the value is changed by 1, the area is changed by 1 mm.</td></tr>
<tr><td></td><td>62</td><td>Energy-save mode copy lamp setup
Used to set half-ON (50%)/OFF of the copy lamp in the pre-heat mode.
When this simulation is executed, the current setup of the code number is displayed. Enter the code number and press the PRINT switch to enable the setup.

<table><tr><th>Code number</th><th>Setup</th></tr><tr><td>0</td><td>Copy lamp half-ON (50%) * Default</td></tr><tr><td>1</td><td>Copy lamp OFF</td></tr></table></td></tr>
<tr><td></td><td>63</td><td>Fan control select setup
Used to set the cooling fan operation mode.
When this simulation is executed, the current setup of the code number is displayed. Enter the code number and press the PRINT switch to enable the setup.

<table><tr><th>Code number</th><th>Setup</th></tr><tr><td>1</td><td>1-speed fan control</td></tr><tr><td>2</td><td>2-speed fan control * Default when starting mass production</td></tr></table></td></tr>
<tr><td></td><td>64</td><td>Heater control setup during the scanner mode
When this simulation is executed, the currently set code number of heater control setup is displayed. Enter a desired code number of heater control setup and press the PRINT switch, and the new setup is enabled.

<table><tr><th>Code number</th><th>Heater control setup</th></tr><tr><td>0</td><td>Heater control ON * Default (Except for Europe)</td></tr><tr><td>1</td><td>Heater control OFF * Default (For Europe only)</td></tr></table></td></tr>
<tr><td>30</td><td>01</td><td>Paper sensor status display
Indicates the paper sensor status using the lamps on the operation panel.

<table><tr><th>Sensor name</th><th>Display lamp</th></tr><tr><td>Before-resist paper sensor (PPD1)</td><td>Developer cartridge replacement lamp</td></tr><tr><td>Fusing section paper sensor (PPD2)</td><td>JAM lamp</td></tr><tr><td>Paper exit sensor (POD)</td><td>Photoconductor cartridge replacement lamp</td></tr><tr><td>2nd CS paper sensor (PPD3)</td><td>2nd cassette lamp</td></tr><tr><td>New drum cartridge sensor (PUIS)</td><td>Zoom lamp</td></tr><tr><td>Single manual feed paper sensor (MFD)</td><td>AE lamp</td></tr></table></td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>43</td><td>01</td><td>Fusing temperature setup (Normal copy)
(Operation/Procedure)
1. When this simulation is executed, the currently set code number is displayed.
2. Enter the code number and press the START key, and the setting will be changed.

<table><tr><th>Code number</th><th>Set temperature (℃)</th></tr><tr><td>0</td><td>175</td></tr><tr><td>1</td><td>180</td></tr><tr><td>2</td><td>185</td></tr><tr><td>3</td><td>190</td></tr><tr><td>4</td><td>195 (* Default)</td></tr><tr><td>5</td><td>200</td></tr></table></td></tr>
<tr><td></td><td>04</td><td>Fusing temperature setup 2
(Operation/Procedure)
1. When this simulation is executed, the currently set code number is displayed.
2. Enter the code number and press the START key, and the setting will be changed.

<table><tr><th>Code number</th><th>Set temperature (℃)</th></tr><tr><td>0</td><td>155</td></tr><tr><td>1</td><td>160</td></tr><tr><td>2</td><td>165</td></tr><tr><td>3</td><td>170 (* Default)</td></tr><tr><td>4</td><td>175</td></tr><tr><td>5</td><td>180</td></tr></table></td></tr>
<tr><td></td><td>05</td><td>Fusing temperature setup in duplex copy
In duplex copy, this setup value is added to the fusing temperature of single copy. When this simulation is executed, the current setup of the code number is displayed. Enter the code number and press the PRINT switch to enable the setup.

<table><tr><th>Code number</th><th>Temperature shift (℃)</th></tr><tr><td>0</td><td>±0℃ * Default</td></tr><tr><td>1</td><td>–8℃</td></tr><tr><td>2</td><td>–6℃</td></tr><tr><td>3</td><td>–4℃</td></tr><tr><td>4</td><td>–2℃</td></tr><tr><td>5</td><td>±0℃</td></tr><tr><td>6</td><td>+2℃</td></tr><tr><td>7</td><td>+4℃</td></tr><tr><td>8</td><td>+6℃</td></tr><tr><td>9</td><td>+8℃</td></tr></table></td></tr>
<tr><td></td><td>09</td><td>Setup of fusing control of postcard size paper

<table><tr><th>Code number</th><th>Setup</th></tr><tr><td>0</td><td>Cancel * Default</td></tr><tr><td>1</td><td>Setup</td></tr></table>The default for Japan model is “1.”</td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>46</td><td>01</td><td>Copy density adjustment (300dpi)
Used to set the copy density in each mode.
(Operating procedure)
When this simulation is executed, warm-up and shading operations are performed and the current setup is displayed in two digits (default: 50).
Change the setup value with the copy quantity keys. Press the PRINT switch and a copy is made according to the new setup.
The greater the setup value is, the darker the copy is. The smaller the setup value is, the brighter the copy is. Only EXP.3 copy is made in this simulation. When set to a darker level, Exp.1 and Exp.5 copies also become darker. When set to a brighter level, Exp.1 and Exp.5 copies also become brighter. Press the CLEAR key to save the setup and exit from the simulation mode.
Use the copy mode select key to select a copy mode . The setup value of the selected copy mode is displayed on the copy quantity display.
(adjustment range: 0 –99)
<table><tr><th>Copy mode</th><th>Display lamp</th></tr><tr><td>AE mode (300dpi)</td><td>AE mode lamp</td></tr><tr><td>TEXT mode (300dpi)</td><td>TEXT mode lamp</td></tr><tr><td>PHOTO mode</td><td>PHOTO mode lamp</td></tr><tr><td>TS mode (TEXT) (300dpi)</td><td>TEXT mode lamp & PHOTO mode lamp</td></tr><tr><td>TS mode (AE) (300dpi)</td><td>AE mode lamp & PHOTO mode lamp</td></tr></table></td></tr>
<tr><td></td><td>02</td><td>Copy density adjustment (600dpi)
Used to set the copy density in each mode.
(Operation/Procedure)
When this simulation is executed, the machine performs warm-up and shading, and the current setup value is displayed in two digits. (Default: 50)
Use the copy quantity key to change the setup value, and press the PRINT switch to make a copy with the new setup.
The greater the setup value is, the darker the copy is, and vise versa. Only EXP.3 copy is made. If it is set to a darker density, EXP.1 and EXP.5 copies also become darker. If it is set to a brighter density, they also become brighter.
When the CLEAR key is pressed, the entered setup value is saved and the simulation is terminated.
Any copy mode can be selected with the copy mode select key. The setup value of the selected copy mode is displayed on the copy quantity display.
(Setup range: 0 –99)
<table><tr><th>Copy mode</th><th>Display lamp</th></tr><tr><td>AE mode (600dpi)</td><td>AE mode lamp</td></tr><tr><td>TEXT mode (600dpi)</td><td>TEXT mode lamp</td></tr><tr><td>PHOTO mode</td><td>PHOTO mode lamp</td></tr><tr><td>TS mode (TEXT) (600dpi)</td><td>TEXT mode lamp & PHOTO mode lamp</td></tr><tr><td>TS mode (AE) (600dpi)</td><td>AE mode lamp & PHOTO mode lamp</td></tr></table></td></tr>
<tr><td></td><td>18</td><td>Image contrast adjustment (300dpi)
Used to set the image contrast in each mode.
(Operating procedure)
When this simulation is executed, warm-up and shading operations are performed and the current setup value is displayed in two digits. (Default: 50)
Change the setup value with the copy quantity keys. Press the PRINT switch and a copy is made according to the new setup. The greater the setup value is, the higher the contrast is. The smaller the setup value is, the lower the contrast is. Though only EXP.3 copy is made in this simulation, the contrast levels in EXP.1 and EXP.5 are also changed. Press the CLEAR key to save the setup and exit from the simulation mode.
Use the copy mode select key to select a copy mode . The setup value of the selected copy mode is displayed on the copy quantity display.
(adjustment range: 0 –99)
<table><tr><th>Copy mode</th><th>Display lamp</th></tr><tr><td>AE mode (300dpi)</td><td>AE mode lamp</td></tr><tr><td>TEXT mode (300dpi)</td><td>TEXT mode lamp</td></tr><tr><td>PHOTO mode</td><td>PHOTO mode lamp</td></tr><tr><td>TS mode (TEXT) (300dpi)</td><td>TEXT mode lamp & PHOTO mode lamp</td></tr><tr><td>TS mode (AE) (300dpi)</td><td>AE mode lamp & PHOTO mode lamp</td></tr></table></td></tr>
</table>

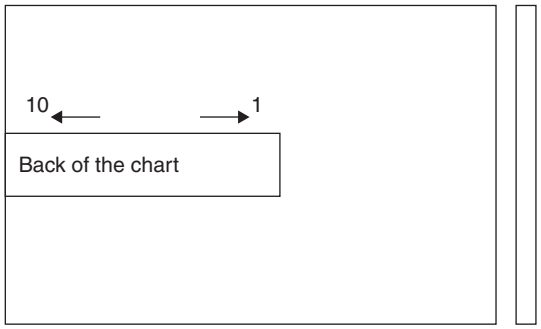
<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>46</td><td>19</td><td>γ table setup or AE operation mode setup
When this simulation is executed, the current setup of the gamma table code number is displayed. (Default: Japan = 1, EX Japan = 2)
Enter the code number corresponding to desired gamma table, and press the PRINT switch or the copy mode select key to enable the setup.

<table><tr><th>Code number</th><th>γ table</th></tr><tr><td>1</td><td>Image quality priority mode</td></tr><tr><td>2</td><td>Toner consumption priority mode</td></tr></table>
When the copy mode select key is pressed during setup of the gamma table, the mode is switched to the AE operation setup mode and the current setup of the AE operation mode code number is displayed. (Default: 0) Enter the code number corresponding to your desired AE operation mode, and press the PRINT switch or the copy mode select key to switch the setup. (When the copy mode select key is pressed, the mode is returned to the gamma table setup mode.)

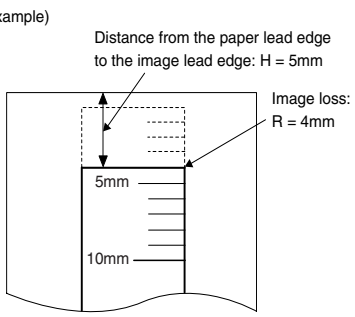
<table><tr><th>Code number</th><th>AE operation mode</th></tr><tr><td>0</td><td>Fixed process * Default</td></tr><tr><td>1</td><td>Real time process</td></tr></table></td></tr>
<tr><td></td><td>20</td><td>SPF exposure correction
Used to adjust the exposure correction quantity in the SPF mode by adjusting the differential of Vref voltage for the OC mode.
(Operating procedure)
When this simulation is executed, the current setup is displayed. Enter the adjustment value with the 10-key and press the PRINT key to enable the setup and make a copy.
When the CLEAR key is pressed, the entered value is saved and the simulation mode is terminated.
* The greater the value is the darker the exposure is.
The smaller the value is, the brighter the exposure is.</td></tr>
<tr><td></td><td>29</td><td>Image contrast adjustment (600dpi)
Used to set the contrast in each mode.
(Operation/Procedure)
When this simulation is executed, the machine performs warm-up and shading, and the current setup value is displayed in two digits. (Default: 50)
Use the copy quantity keys to change the setup value, and press the PRINT switch to make a copy with the new setup.
The greater the setup value is, the greater the contrast is, and vise versa. Only EXP.3 copy is made, however, EXP.1 contrast and EXP.5 contrast are also changed accordingly.
When the CLEAR key is pressed, the entered setup value is saved and the simulation is terminated.
Any copy mode can be selected with the copy mode select key. The setup value of the selected copy mode is displayed on the copy quantity display.
(Setup range: 0 –99)

<table><tr><th>Copy mode</th><th>Display lamp</th></tr><tr><td>AE mode (600dpi)</td><td>AE mode lamp</td></tr><tr><td>TEXT mode (600dpi)</td><td>TEXT mode lamp</td></tr><tr><td>PHOTO mode</td><td>PHOTO mode lamp</td></tr><tr><td>TS mode (TEXT) (600dpi)</td><td>TEXT mode lamp & PHOTO mode lamp</td></tr><tr><td>TS mode (AE) (600dpi)</td><td>AE mode lamp & PHOTO mode lamp</td></tr></table></td></tr>
</table>

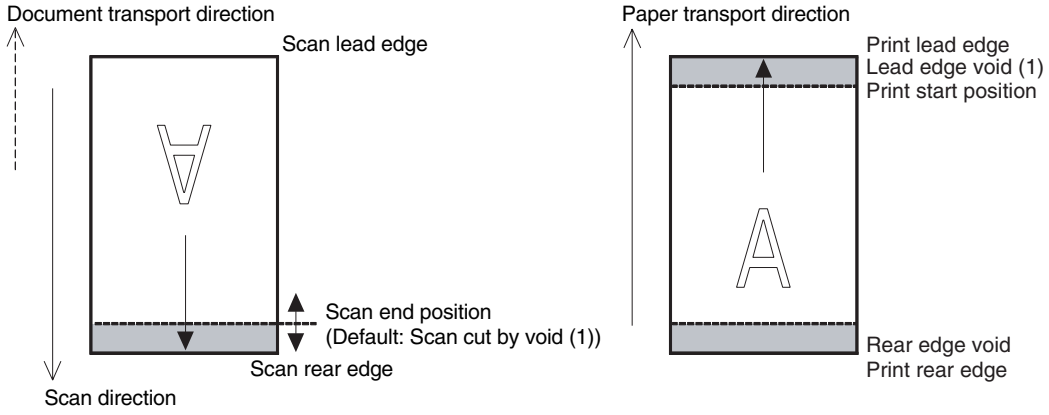
<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>46</td><td>31</td><td>
Image sharpness adjustment
Used to adjust the clear/shading-off of an image in each mode.
(Operating procedure)
When this simulation is executed, warm-up and shading operations are performed and the current setup value is displayed. (Default: 1)
Change the setup value with the copy quantity keys. Press the PRINT switch and a copy is made according to the new setup. When the clear key is pressed, the entered setup value is saved and the simulation is terminated.
<table>
<tr><th>Setup value</th><th>Image quality</th></tr>
<tr><td>0</td><td>Shading off</td></tr>
<tr><td>1</td><td>Standard * Default</td></tr>
<tr><td>2</td><td>Clear</td></tr>
</table>
Any desired copy mode can be selected with the copy mode select key. The code number of the selected copy mode is displayed on the copy quantity display.
<table>
<tr><th>Copy mode</th><th>Display lamp</th></tr>
<tr><td>AE mode</td><td>AE mode lamp</td></tr>
<tr><td>TEXT mode</td><td>TEXT mode lamp</td></tr>
<tr><td>PHOTO mode</td><td>PHOTO mode lamp</td></tr>
<tr><td>TS mode (TEXT)</td><td>TEXT mode lamp & PHOTO mode lamp</td></tr>
<tr><td>TS mode (AE)</td><td>AE mode lamp & PHOTO mode lamp</td></tr>
</table>
</td></tr>
<tr><td></td><td>32</td><td>
Copier color reproduction setup
Used to set color reproduction for each mode. Colors which are easily copied or which are not easily copied are selected.
<table>
<tr><th>Setup value</th><th>Easy-to-copy colors</th><th>Difficult-to-copy colors</th></tr>
<tr><td>0</td><td>Purple/Blue/Red</td><td>Yellow/Green/Light blue</td></tr>
<tr><td>1</td><td>Light blue/Green/Blue</td><td>Purple/Red/Yellow</td></tr>
<tr><td>2</td><td>Yellow/Red/Green</td><td>Blue/Light blue/Purple</td></tr>
</table>
∗ This setup does not affect black-and-white copies.
(Operating procedure)
When this simulation is executed, the current setup of the code number for each copy mode is displayed. (Default: 0)
Change the setup value with the copy quantity keys and press the Print switch. A copy will be made according to the setup. At that time, the color component used for copying is changed.
When the clear key is pressed, the entered code number is saved and the simulation mode is terminated.
Any desired copy mode can be selected with the copy mode select key. The selected copy mode is displayed on the copy quantity display.
<table>
<tr><th>Code number</th><th>Component of use</th></tr>
<tr><td>0</td><td>Green * Default</td></tr>
<tr><td>1</td><td>Red</td></tr>
<tr><td>2</td><td>Blue</td></tr>
</table>
<table>
<tr><th>Copy mode</th><th>Display lamp</th></tr>
<tr><td>AE mode (including TS)</td><td>AE mode lamp</td></tr>
<tr><td>TEXT mode (including TS)</td><td>TEXT mode lamp</td></tr>
<tr><td>PHOTO mode</td><td>PHOTO mode lamp</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>48</td><td>01</td><td>
Front/rear (main scanning) direction and scan (sub scanning) direction magnification ratio adjustment
(1) Front/rear direction magnification ratio auto correction: The width of the reference line marked on the shading correction plate is scanned to perform automatic correction of the front/rear (main scanning) direction magnification ratio as well as automatic setup of the OC/document center offset value and of the image scan start position.
In addition, the black level automatic adjustment is performed simultaneously.
The OC/document center offset value and the image scan start position automatically set in this simulation, can be checked by the respective manual setup simulation for each adjustment shown below.
<table>
<tr><td>OC/document center offset</td><td>→</td><td>Sim50-10</td><td>Center offset adjustment</td></tr>
<tr><td>Image scan start position</td><td>→</td><td>Sim50-01</td><td>Lead edge image position</td></tr>
</table>
(2) Front/rear direction magnification ratio manual correction: By key operations, the front/rear (main scanning) direction magnification ratio is set by changing the setup value of the ZOOM DATA register to AISC.
(3) Scan direction magnification ratio correction: The scan direction magnification ratio in the OC mode is set by changing the scan speed.
(4) SPF mode scan direction magnification ratio correction: The SPF mode scan direction magnification ratio is set by changing the scan speed.
(Operating procedure)
When this simulation is executed, the current setup value is displayed in two digits. (Center value: 50) Press the copy mode select key to select each setup mode and the setup display will change accordingly.
In the case of the front/rear direction automatic adjustment.
To perform the automatic adjustment, place the gray gradation chart (UKOG-0162FCZZ) face down so as to fit with the left center of the platen with the darker side (Density 10) on the left of OC.


When the PRINT switch is pressed, the mirror base unit moves to the shading white board, and the width of the reference line is scanned, and the correction value is calculated, and the value is saved.
After completion of the automatic adjustment, press the density adjustment Down key, and the black level will be displayed in hexadecimal number (3 digits) of 12bits.
For manual adjustment, enter the adjustment value with the 10-key and press the PRINT switch, the set value will be saved and a copy will be made. When the clear key is pressed, the value entered will be saved and the simulation will be terminated. (Increasing the setup value by 1 increases 0.1%.)
<table>
<tr><th>Adjustment mode</th><th>Lamp ON</th></tr>
<tr><td>Front/rear direction magnification ratio automatic correction and black level adjustment</td><td>AE lamp</td></tr>
<tr><td>Front/rear direction magnification ratio manual correction</td><td>TEXT lamp</td></tr>
<tr><td>Scan direction magnification ratio correction</td><td>PHOTO lamp</td></tr>
<tr><td>SPF mode scan direction magnification ratio correction</td><td>AE, TEXT, PHOTO lamps</td></tr>
</table>
In the front/rear direction magnification ratio automatic correction
(1) When the calculated value of the scan correction value is within ±5%, "—" is displayed.
(Cause) Erroneous position of the reference line on the white board, improper installation of the lens unit, etc.
(2) In case of a scan error of the reference line, the jam lamp lights up.
(Cause) CCD error, no white board installed.
∗ If the automatic correction of the magnification ratio cannot provide a satisfactory result, use the manual correction.
</td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>49</td><td>01</td><td>
Flash ROM program writing mode
(Operating procedure)
When this simulation is executed, “d” is displayed on the display and the machine enters the Flash ROM program writing mode. Use the writing tool to write the program from PC. During writing, the display indicates as shown below. After completion of downloading, turn OFF/ON the power to reset.
<table>
<tr><th>Status</th><th>Display</th><th>Pre-heat lamp</th><th>Ready lamp</th></tr>
<tr><td>Download data reception</td><td>“d” ON</td><td>ON</td><td>OFF</td></tr>
<tr><td>Data erase start</td><td>“d” ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>Data writing (Boot section)</td><td>“d” ON</td><td>Blink</td><td>OFF</td></tr>
<tr><td>Data writing (program section)</td><td>“d” ON</td><td>Blink</td><td>Blink</td></tr>
<tr><td>Sum check</td><td>“d” ON</td><td>ON</td><td>ON</td></tr>
<tr><td>Download complete</td><td>“0FF” ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>Error state</td><td>“E *” ON</td><td>OFF</td><td>OFF</td></tr>
</table>
∗ “*” in an error display indicates the error position.
<table>
<tr><td>1</td><td>Data reception error</td></tr>
<tr><td>2</td><td>Loader function transfer</td></tr>
<tr><td>3</td><td>FLASH ROM delete</td></tr>
<tr><td>4</td><td>FLASH ROM writing (Boot section)</td></tr>
<tr><td>5</td><td>FLASH ROM writing (Program section)</td></tr>
<tr><td>6</td><td>Sum check (Loader section)</td></tr>
<tr><td>7</td><td>Sum check (Boot section)</td></tr>
<tr><td>8</td><td>Sum check (Program section)</td></tr>
</table>
</td></tr>
<tr><td>50</td><td>01</td><td>
Lead edge image position
Used to adjust the copy image position and the lead edge void quantity on the copy paper. The adjustment is made by adjusting the image scan start position and the print start position (resist roller ON timing) at 100%.
(Operating procedure)
When this simulation is executed, the current setup value is displayed the current setup value is displayed in two digits. (Center value: 50) Press the copy mode select key to select your desired coy mode, and the display will change. Enter the adjustment value with the 10-key and press the PRINT switch, and the setup value will be saved and a copy will be made. Press the clear key to save the setup value and exit from the simulation mode. When the adjustment is made for the main cassette feed, all the adjustment values at all the paper feed ports become the same. (Increasing the setup value by 1 corresponds to about 0.1mm shift.)
<table>
<tr><th>Adjustment mode</th><th>Lamp ON</th></tr>
<tr><td>Print start position (Main cassette paper feed)</td><td>AE, main cassette lamp</td></tr>
<tr><td>☆ Print start position (2nd cassette paper feed)</td><td>AE, 2nd cassette lamp</td></tr>
<tr><td>Print start position (Manual paper feed)</td><td>AE, manual feed lamp</td></tr>
<tr><td>Image lead edge void quantity</td><td>TEXT lamp</td></tr>
<tr><td>Image scan start position</td><td>PHOTO lamp</td></tr>
<tr><td>Image rear edge void quantity</td><td>AE, TEXT, PHOTO lamp</td></tr>
<tr><td>☆ SPF image scan start position</td><td>AE, TEXT lamp</td></tr>
</table>
☆: Supported if the model is installed and skipped if it is not installed.
(Adjustment procedure)
AE ON ↓ TEXT ON ↓ PHOTO ON ↓
1. Set the print start position (A), the lead edge void quantity (B) and the scan start position (C) to 0, and make a copy at 100%.
2. Measure the image loss quantity (R mm) of the scale.
Set C = 10 × R (mm) (Example: Set 40.)
When the value C is increased by 10, the image loss is decreased by 1mm.
(Default: 50)
3. Measure the distance (H mm) from the paper lead edge to the image print start position.
Set A = 10 × H (mm) (Example: set 50)
When the value A is increased by 1mm, the image lead edge is shifted to the paper lead edge by 1mm. (Default: 50)
4. Set the lead edge void quantity to B = 50 (2.5mm). (Default: 50)
When the value B is increased by 10, the void is increased by about 1mm.
(When set to 25 or less, the void becomes zero.)
∗ The SPF adjustment is performed by adjusting the SPF image scan start position.
(Example)


</td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>50</td><td>10</td><td>Center offset adjustment
Used to adjust the copy image position on the copy paper and the center offset position when scanning a document.
(Operating procedure)
When this simulation is executed, the current setup value is displayed. Enter the adjustment value with the 10-key and press the PRINT switch, and the entered value will be saved and a copy will be made. When the clear key is pressed, the entered value will be saved and the simulation will be terminated. (When the setup value is increased by 1, shift is increased by 0.1mm.)
<table><tr><th>Adjustment mode</th><th>Lamp ON</th></tr><tr><td>Print center offset (Main cassette paper feed)</td><td>AE, main cassette lamp</td></tr><tr><td>☆ Print center offset (2nd cassette paper feed)</td><td>AE, 2nd cassette lamp</td></tr><tr><td>Print center offset (Manual paper feed)</td><td>AE, manual paper feed lamp</td></tr><tr><td>OC/document center offset</td><td>AE, TEXT lamp</td></tr><tr><td>☆ SPF/RSPF (front) document center offset</td><td>AE, TEXT, PHOTO lamp</td></tr></table>☆: Supported only for installing models, and skipped for not-installing models.
* When the setup value is too great, outside of the shading area may be read, and black streaks may be produced on the edges.
When the adjustment value is increased, the image is shifted to the left.
When the adjustment value is decreased, the image is shifted to the right.</td></tr>
<tr><td></td><td>18</td><td>Memory reverse position adjustment in duplex copy
When this simulation is executed, the current setup value of correction is displayed. Enter the correction value with the 10-key and press the PRINT switch, and the entered value will be saved. (Correction value 1 – 99, correction zero = 0, or 50) When the correction value is set to 0, the correction value is written as 50.
Front surface printing in the S-D mode and printing on even pages in the D-S mode are reverse memory copy operations from the document rear edge section.
When, therefore, the output image print position adjustment is required, adjust as follows:
In the reverse memory copy operation, if the document scan direction is in the direction of the arrow in the figure, the scan rear edge section of the image is printed first.
When, therefore, the print lead edge is shifted, set the reference chart so that the reference position is in the rear edge section, and use this simulation to adjust so that the print image lead edge comes to the lead edge.
Since printing is performed by processing the scanned image from the scan end position to the scan lead edge, the print lead edge position adjustment is performed by changing the end data position stored in memory with the simulation setup value.
 
</td></tr>
<tr><td></td><td>19</td><td>Duplex copy rear edge void adjustment
Used to adjust the rear edge void quantity in duplex copy.
(Operating procedure)
When this simulation is executed, the current setup value is displayed the current setup value is displayed in two digits. (Center value: 50 However, setup 50 = setup 0) When the correction value is set to 0, the correction value is written as 50. Press the copy mode select key to select your desired copy mode, and the display will change. Enter the adjustment value with the 10-key and press the PRINT switch, and the setup value will be saved and a copy will be made. (The paper information is cleared for every copying.) Press the clear key to save the setup value and exit from the simulation mode. (Increasing the setup value by 1 increases the void quantity by about 0.1mm.)
<table><tr><th>Adjustment mode</th><th>Lamp ON</th></tr><tr><td>Image cut rear edge void quantity (RSPF)</td><td>AE lamp</td></tr><tr><td>Paper rear edge void quantity</td><td>TEXT lamp</td></tr><tr><td>Print start position (Duplex back)</td><td>PHOTO lamp</td></tr><tr><td>RSPF (Back) original center offset</td><td>AE, TEXT, PHOTO lamps</td></tr></table></td></tr>
</table>

<table>
<tr><th>Main code</th><th>Sub code</th><th>Content</th></tr>
<tr><td>51</td><td>02</td><td>Resist quantity adjustment
Used to adjust the contact pressure of paper against the machine resist roller and the RSPF resist roller.
(Operating procedure)
When this simulation is executed, the current setup value is displayed.
Enter the adjustment value with the 10-key and press the PRINT switch, the entered set value will be saved and a copy will be made.
When the clear key is pressed, the entered value will be saved and the machine will exit from the simulation mode.

<table>
<tr><th>Adjustment mode</th><th>Lamp ON</th></tr>
<tr><td>Main cassette paper feed</td><td>AE, main cassette lamp</td></tr>
<tr><td>☆ 2nd cassette paper feed</td><td>AE, 2nd cassette lamp</td></tr>
<tr><td>Manual paper feed</td><td>AE, manual paper feed lamp</td></tr>
<tr><td>☆ RSPF document feed (front)</td><td>AE, TEXT, PHOTO lamp</td></tr>
<tr><td>☆ RSPF document feed (back)</td><td>AE, TEXT lamp</td></tr>
<tr><td>☆ duplex back</td><td>TEXT, PHOTO lamp</td></tr>
</table>
☆: Supported only for installing models, and skipped for not-installing models.</td></tr>
<tr><td>53</td><td>08</td><td>SPF scan position automatic adjustment
Place a black chart so that it covers the SPF scan glass and the OC glass, and execute the simulation with the OC cover open, the mirror unit scans from the home position to the SPF scan position to identify the SPF glass cover edge position by the difference in the CCD output levels of the SPF glass cover edge and the OC side document glass.
Default is 50. Adjustment range is 0 – 99. Adjustment increment: 1 = about 0.127mm
If this adjustment is performed properly, the adjustment value is displayed. If it is abnormal, the jam lamp lights up. If the adjustment is not made properly, “– –” is displayed.</td></tr>
<tr><td>61</td><td>03</td><td>Polygon motor check (HSYNC output check)
(Operation/Procedure)
When the START key is pressed, HSYNC is performed and the polygon motor is rotated for 30 sec.
At that time, the Zoom lamp is lit for 100msec for every 3 times that the HSYNC is detected.</td></tr>
<tr><td>63</td><td>01</td><td>Shading check
Used to display the detection level of the white board for shading.
(Operating procedure)
When the PRINT switch is pressed, the mirror base unit moves to the white board for shading to light the copy lamp. Under this state, the level of one pixel at the CCD center which is not corrected for 10sec in 1 sec, and the result is displayed on the value display section.</td></tr>
<tr><td>64</td><td>01</td><td>Self print
Print of one page is made regardless of the status of the optical system.
(Operating procedure)
When this simulation is executed, warm-up is performed and the ready lamp is lighted. Enter the code number with the 10-key, and select the cassette with the cassette select key and press the PRINT switch, and paper feed operation will be made from the selected cassette and printing of the selected pattern will be made. Printing is in 1by2 mode, or grid pattern.

<table>
<tr><th>Code number</th><th>Pattern</th></tr>
<tr><td>0</td><td>1by2</td></tr>
<tr><td>1</td><td>Grid pattern</td></tr>
</table>
* 2 – 99: print in 1by2.</td></tr>
</table>

4. Trouble codes

A. Trouble codes list

Main code	Sub code	Trouble content	Detail of trouble
E7	01	Duplex model memory setup error, memory not-detected error	The memory is not set properly or the memory capacity is not set to the duplex setup (6M). Cancel method: Set SIM 26-39 code number to 2.
	02	HSYNC not detected.	LSU (laser diode, reception element, APC circuit) trouble LSU drive circuit (ASIC) trouble
	10	CCD black level trouble	CCD drive circuit (CCD PWB, ASIC, harness) trouble
	11	CCD white level trouble	CCD drive circuit (CCD PWB, ASIC harness) trouble Copy lamp lighting trouble (Copy lamp, inverter PWB)
	12	Shading trouble (White correction)	Dirt on white plate for scanning white level
	16	Laser output trouble	LSU (laser diode, reception element, APC circuit) trouble LSU drive circuit (ASIC) trouble
F5	02	Copy lamp disconnection trouble	Copy lamp or copy lamp drive circuit (inverter PWB) trouble Copy lamp disconnection
H2	00	Thermistor open detection	The fusing thermistor is open.
H3	00	Heat roller abnormally high temperature	The fusing temperature rises above 240°C.
H4	00	Heat roller abnormally low temperature	The fusing temperature does not reach 185°C within 27 sec of turning on the power, or the fusing temperature keeps at 140°C.
L1	00	Feeding is not completed within the specified time after starting feeding. (The scan head locking switch is locked)	The white area and the black marking on the shading plate are used to obtain the difference in the CCD level values for judgment of lock. When the difference in the levels of which and black is small, it is judged that the black mark could not be scanned by lock and the trouble code “L1” is displayed.
L3	00	Return is not completed within the specified time.	When the mirror base is returned for the specified time (6 sec) in mirror initializing after turning on the power, the mirror home position sensor (MHPS) does not turn ON. Or when the mirror base is returned for the specified time (about 6 sec) after start of copy return, the mirror home position sensor (MHPS) does not turn ON.
L4	01	Main motor lock	When the main motor encoder pulse is not detected for 100 msec.
L6	10	Polygon motor lock	The lock signal (specified rpm signal) does not return within a certain time (about 20 sec) from starting the polygon motor rotation
U2	01	Counter sum check error	When the counter check sum value stored in the EEPROM is abnormal.
	04	EEPROM serial communication error	When a communication trouble occurs with the EEPROM.

[11] MAINTENANCE

1. Maintenance table

×: Check (Clean, adjust, or replace when required.) ○: Clean ▲: Replace △: Adjust ☆: Lubricate

Section	Parts	25K	50K	75K	100K	125K	Remark
Developing	Developer	▲	▲	▲	▲	▲	
	DV blade	○	▲	○	▲	○	
	DV side seal (F/R)	○	▲	○	▲	○	
Process peripheral	Drum	▲	▲	▲	▲	▲	

2. Maintenance display system

Toner	Life	8K	
	Remaining quantity	NEAR EMPTY About 10%	EMPTY
	LED	ON	Flash
	Machine	Operation allowed	Stop
Developer	Life	25K	
	LED	ON at 25K of the developer count.	
	Machine	Selection is available between Not Stop and Stop by Service Simulation (SIM 26-37) Setup. (If Stop is selected, the LED will flash and stop at 25K.) ∗ Default: Not Stop ∗ Clear: SIM 24-06	
Maintenance	LED	Selection is available among 18K, 13K, 9K, 6K, 3K, and free (no lighting) with SIM 21-1. ∗ Default: free ∗ Clear: SIM 20-1	
	Machine	Not stop.	

[12] USER PROGRAMS

The conditions of factory setting can be changed according to the use conditions.

1. Functions that can be set with user programs

Function	Contents	Factory setting
Auto clear	• When a certain time is passed after completion of copying, this function returns to the initial state automatically. The time to reach the initial state can be set in the range of 30 sec to 120 sec by the unit of 30 sec. This function can be disabled.	60 sec
Pre-heat	• When the copier is left unused with the power ON, the power consumption is automatically reduced to about 40Wh/H (* Note).The time to start this function can be set in the range of 30 sec to 90 sec by the unit of 30 sec. This function cannot be disabled. • When this function is operated, the pre-heat lamp on the operation panel lights up. To return to the initial state, press any key on the operation panel. (When the COPY button is pressed, a copy is made after returning to the initial state.)	30 sec
Auto shut off passing time	• When the copier is left unused with the power ON, the power consumption is automatically reduced to about 18Wh/H (* Note). The time to start this function can be set in the range of 2 min to 120 min. • When this function is operated, all the lamps except for the pre-heat lamp on the operation panel turn off. To return to the initial state, press the COPY button.	5 min
Stream feeding	Only models with SPF	Set
Auto shut off setting	• Used to set or cancel this function.	Set
Auto/Manual mode resolution setup	• Used to set the resolution in the auto/manual mode. The speed priority (300dpi) and the resolution priority (600dpi) are effective for fine text and ultra fine text.	300 dpi

* Note: The power consumption values in pre-heat and auto shut off may be varied depending on the use conditions.

2. Change the setting

Example: Changing the time to operate the auto clear function (Change from 60 sec to 90 sec)

1) Press the right and the left exposure adjustment keys simultaneously to start setting.
- Keep pressing the keys for 5 sec.
- Display lamps (, , ,) blink simultaneously and " -- " is displayed on the copy quantity display.

2) Select the function code with the 10-digit key (copy quantity set key).
- The number of the selected function blinks on the digit of 10 on the copy quantity display.
- For auto clear, select " 1. "
- For setting, refer to the following function codes.

Function name	Function code
Auto clear	1
Pre-heat	2
Auto shut off passing time	3
Stream feeding	4*
Auto shut off setting	5
Auto/Manual mode resolution setup	6

[Cancel] If a wrong code is entered, press the clear key and enter the correct function code.

* SPF only

3) Press the COPY button.
- The number blinking on the digit of 10 of the copy quantity display is lighted.
- The number of the current set code blinks on the digit of 1.

4) Select the setting code with 1-digit key (copy quantity set key).
- To set to 90 sec, select " 4. "
- For setting, refer to the following set codes.

Function name	Set code
Auto clear	0 (OFF)
	1 (10 sec)
	2 (30 sec)
	*3 (60 sec)
	4 (90 sec)
	5 (120 sec)
Pre-heat	*0 (30 sec)
	1 (60 sec)
	2 (90 sec)
Auto shut off	0 (2 min)
	*1 (5 min)
	2 (15 min)
	3 (30 min)
	4 (60 min)
	5 (120 min)
Stream feeding	0 (Cancel)
	*1 (Setting)
Auto shut off setting	0 (Cancel)
	*1 (Setting)
Auto/Manual mode resolution setup	*0 (300 dpi)
	1 (600 dpi)

* Factory setting
- The number blinking on the digit of 1 of the copy quantity display is lit up. This means the setting is completed.

[Cancel] When a wrong number of the function code is set, press the clear key and perform the procedure again from step 2.

5) Press the COPY button.
- The number blinking on the digit of 1 of the copy quantity display is lit up. This means the setting is completed.

Note: To set another function, press the clear key after completion of this operation and perform the procedure from step 2.

6) Press either one of the exposure adjustment keys (or) to complete the setting.
- Display lamps (, , ,) go off and the copy quantity display returns to the normal state.

3. Density level adjustment

A. AE level adjustment (OC mode)

[Input procedure]

When the density select key is pressed and held for 5 sec after turning on the [PHOTO] mode lamp, the [AUTO] mode lamp blinks and the current setup of the density level is displayed.

[Adjustment]

The adjustment is made in 5 steps by pressing the density adjustment key.

[Terminating procedure]

When the density select key is pressed, the mode display is changed from blinking to lighting, and the AE level setup is completed.

- In the AE level adjustment mode, all the keys except for the [Density select] key, the [Density adjustment] keys ([>] key and [<] key) are disabled.
- In the AE level adjustment mode, the ready lamp and the online lamp are turned off.
- The auto mode level adjustment is applied only for the auto mode.
- When the machine enters the exposure adjustment mode of OC once, the adjustment mode is not changed though a document is set on the SPF until the setup is completed.

B. AE level adjustment (SPF mode)

[Input procedure]

With the SPF mode lamp ON, when the density select key is pressed and held for 5 sec after turning on the [PHOTO] mode lamp, the [AUTO] mode lamp blinks and the current setup of the density level is displayed.

[Adjustment]

The adjustment is made in 5 steps by pressing the density adjustment key.

[Terminating procedure]

When the mode select key is pressed, the mode display is changed from blinking to lighting, and the AE level setup is completed.

- During the AE level adjustment mode, all the keys except for the [Density select] key, the [Density adjustment] keys ([>] key and [<] key) are disabled.
- During the AE level adjustment mode, the ready lamp and the online lamp are turned off.
- The auto mode level adjustment is applied only for the auto mode.
- When the machine enters the SPF exposure adjustment mode once, the adjustment mode is not changed though a document is removed from the SPF until the setup is completed.
- This function is not available for the OC model.

4. Toner save mode setup and cancel

[Input procedure]

When the density select key is pressed and held for 5 sec after turning on the [TEXT] mode lamp, the [PHOTO] mode lamp blinks and the current setup of the density level is displayed.

[Setup/Cancel]

When the density adjustment key [<] is pressed, Level 1 is lighted and the toner save mode is set.
When the density adjustment key [>] is pressed, Level 5 is lighted and the toner save mode is canceled.

[Terminating procedure]

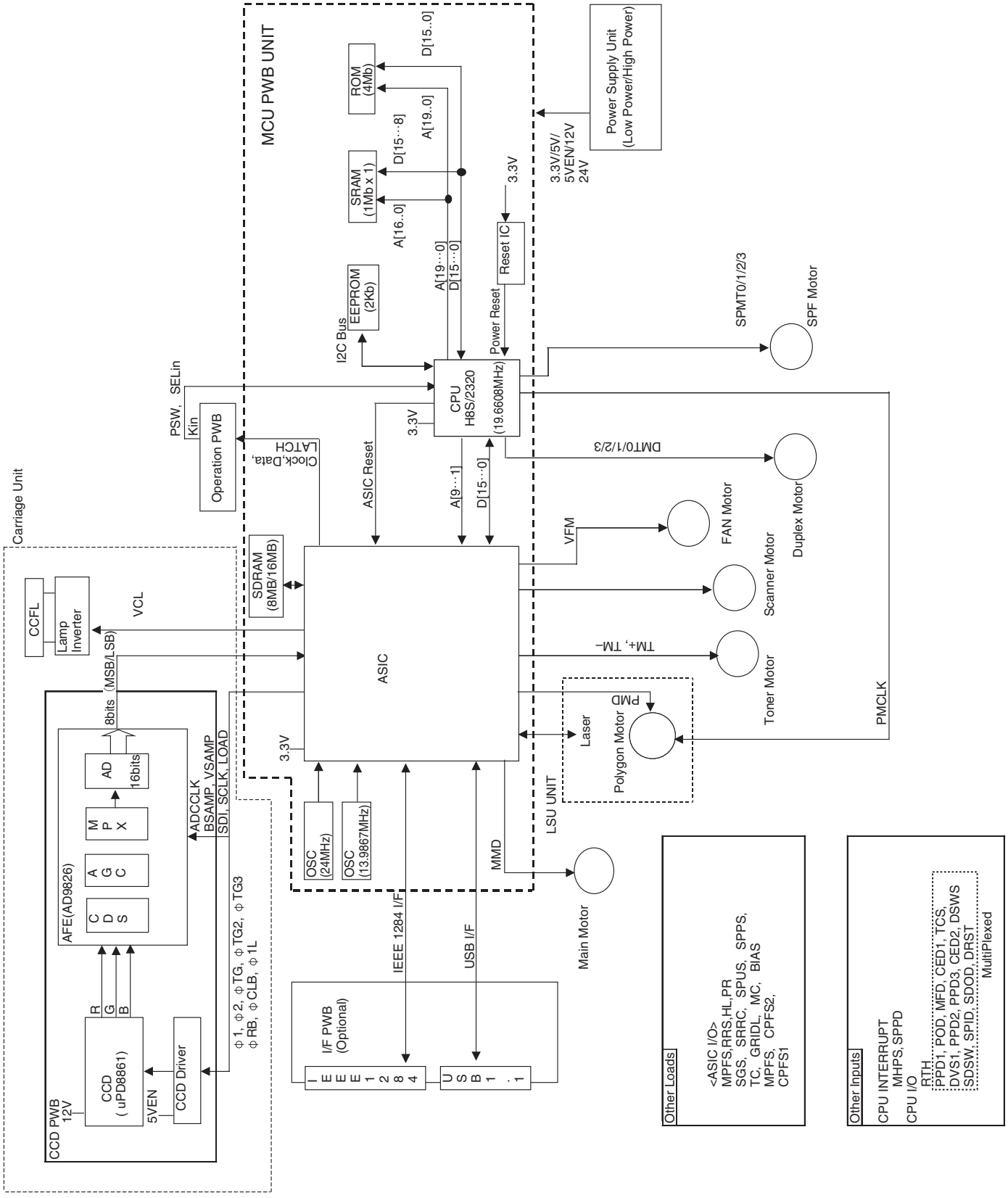
When the density select key is pressed, the mode display is changed from blinking to lighting, and the setup is completed.

- During the toner save mode setup, all the keys except for the [Density select] key, the [Density adjustment] keys ([>] key and [<] key) are disabled.
- During the toner save mode setup, the ready lamp and the online lamp are turned off.
- The toner save mode is applied in the auto mode and the manual mode.

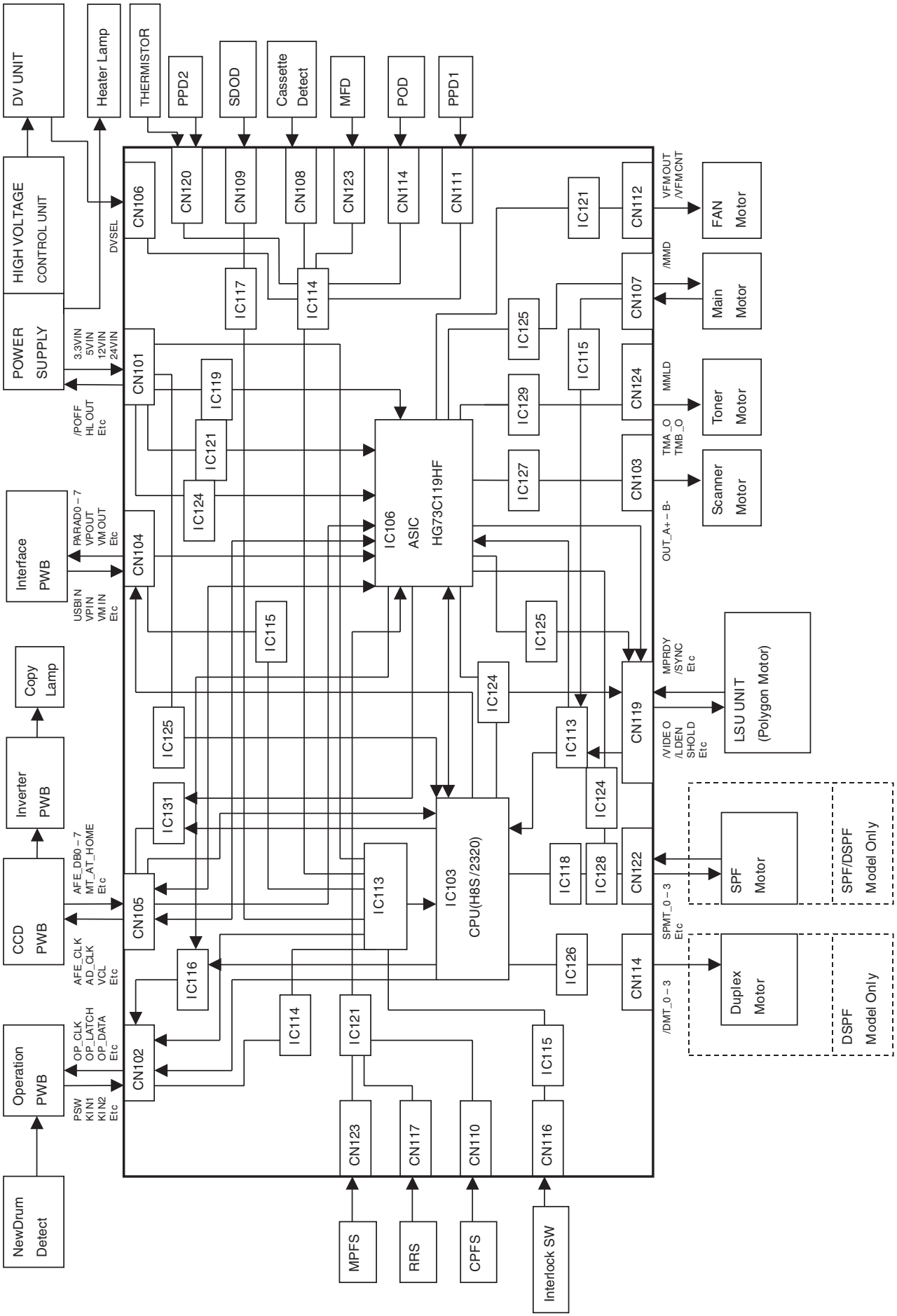
[13] ELECTRICAL SECTION

1. Block diagram

A. Overall block diagram



B. MCU PWB unit



2. Circuit descriptions

A. Main PWB (MCU)

(1) General

The MCU PWB is composed of:

- CPU peripheral sections which perform mechanical sequence control and function job management
- Image process ASIC which performs image process, CCD control, LSU control, and print control
- Motor control circuit
- Mechanical load, sensor I/O circuit

It controls the processes for copying, the transport loads, fusing, the optical system, the operation panel, and the option PWB.

(2) CPU signal table (HD6412320F)

PIN No.	Signal code	Input/ Output	Operating
1	/CS1	Output	SRAM chip select
2	/CS0	Output	Flash ROM chip select
3	GND		DGND
4	GND		DGND
5	Vcc		CPU3.3V
6	A0	Output	Address bus
7	A1	Output	Address bus
8	A2	Output	Address bus
9	A3	Output	Address bus
10	GND		DGND
11	A4	Output	Address bus
12	A5	Output	Address bus
13	A6	Output	Address bus
14	A7	Output	Address bus
15	A8	Output	Address bus
16	A9	Output	Address bus
17	A10	Output	Address bus
18	A11	Output	Address bus
19	GND		DGND
20	A12	Output	Address bus
21	A13	Output	Address bus
22	A14	Output	Address bus
23	A15	Output	Address bus
24	A16	Output	Address bus
25	A17	Output	Address bus
26	A18	Output	Address bus
27	A19	Output	Address bus
28	GND		DGND
29	A20		Pull-Up
30	PSW	Interruption level input	Print SW
31	SPPD	Interruption level input	SPF paper sensor
32	CCD_TG	Interruption level input	CCD horizontal sync signal
33	Mt_at_home	Interruption level input	Mirror Home Position
34	/CPUSYNC	Interruption level input	Horizontal sync (ASIC)
35	GND		DGND
36	GND		DGND
37	FW	Interruption level input	Zero cross signal
38	ARB_INT	Interruption level input	ASIC interruption
39	Vcc		CPU3.3V
40	D0	Data I/O	Data bus
41	D1	Data I/O	Data bus
42	D2	Data I/O	Data bus
43	D3	Data I/O	Data bus
44	GND		DGND
45	D4	Data I/O	Data bus
46	D5	Data I/O	Data bus
47	D6	Data I/O	Data bus
48	D7	Data I/O	Data bus
49	D8	Data I/O	Data bus
50	D9	Data I/O	Data bus
51	D10	Data I/O	Data bus
52	D11	Data I/O	Data bus
53	GND		DGND
54	D12	Data I/O	Data bus
55	D13	Data I/O	Data bus
56	D14	Data I/O	Data bus
57	D15	Data I/O	Data bus
58	Vcc		CPU3.3V
59	ONL	Output	Online LED control
60	TxD1	Output	For debug
61	D_CONT	Output	USB Pull-Up control
62	BEO	Output	OPE LED control
63	RESETOUT1	Output	ASIC Reset signal
64	CL_Reset	Output	Copy lamp control
65	GND		DGND
66	/DREQ0		Pull-Up
67	GND		DGND
68	GND		DGND
69	RY/BY	Input	Flash Busy signal
70	KIN1	Input	HC151 selector detection
71	KIN2	Input	HC151 selector detection
72	TMCLK	Output	Toner motor lock
73	TMEN	Output	Toner motor enable
74	POFF	Output	Shut off control
75	PMCLK	Output	Polygon clock
76	DMT0	Output	Duplex Motor signal
77	DMT1	Output	Duplex Motor signal
78	DMT2	Output	Duplex Motor signal
79	DMT3	Output	Duplex Motor signal
80	WDTOVF	Output	NC Pull-Up
81	/RES	Input	Reset
82	NMI	Output	NC Pull-Up
83	STBY	Output	NC Pull-Up
84	Vcc		CPU3.3V
85	XTAL	Input	Clock
86	EXTAL	Output	Clock
87	GND		DGND
88	CPUCLK	Output	NC
89	Vcc		CPU3.3V
90	Reset OUT		NC
91	/RD	Output	Read signal
92	/HWR	Output	Write signal (High address)
93	/LWR	Output	Write signal (Low address)
94	SELIN3	Output	HC151 select signal
95	SELIN2	Output	HC151 select signal
96	SELIN1	Output	HC151 select signal
97	FAXSTS		NC
98	FAXCMD		NC
99	GND		DGND
100	GND		DGND
101	SCL	Output	EEPROM clock
102	DSDA	Data I/O	EEPROM Data bus
103	AVcc		CPU3.3V
104	Vref		CPU3.3V
105	RTH	Analog input	Fusing thermistor
106		Analog input	NC Pull-Up
107	SIN1	Input	HC151 select detection
108	SIN2	Input	HC151 select detection
109	SIN3	Input	HC151 select detection

PIN No.	Signal code	Input/ Output	Operating
110	USBIN	Input	IF PWB detection signal
111		Input	NC
112		Input	NC
113	Avss		DGND
114	GND		DGND
115	/SCANSP	Output	Scan STOP signal
116	/SCANST	Output	Scan START signal
117	/TRANSST	Output	ASIC transfer signal
118	/PRINTST	Output	Print Start signal
119	SPMT3	Output	SPF motor signal
120	SPMT2/MIRCNT	Output/ Input	SPF motor signal/mirror counter
121	SPMT1	Output	SPF motor signal
122	SPMT0	Output	SPF motor signal
123	GND		DGND
124	GND		DGND
125	Vcc		CPU3.3V
126	PSL	Output	Power save LED control
127			NC
128	/CS2	Output	ASIC chip select

(3) Image process ASIC (HG73C119HF)

a. General

The ASIC is composed of the three major blocks: the image process section, the print control section, and the I/F section.

Image process section:

With image data from the CCD PWB in the operation mode determined by the register setup, shading, AE process, input γ correction, area separation, filter process, resolution conversion, zoom process, output γ correction, binary conversion (error diffusion, dither method, simple binary conversion) are performed.

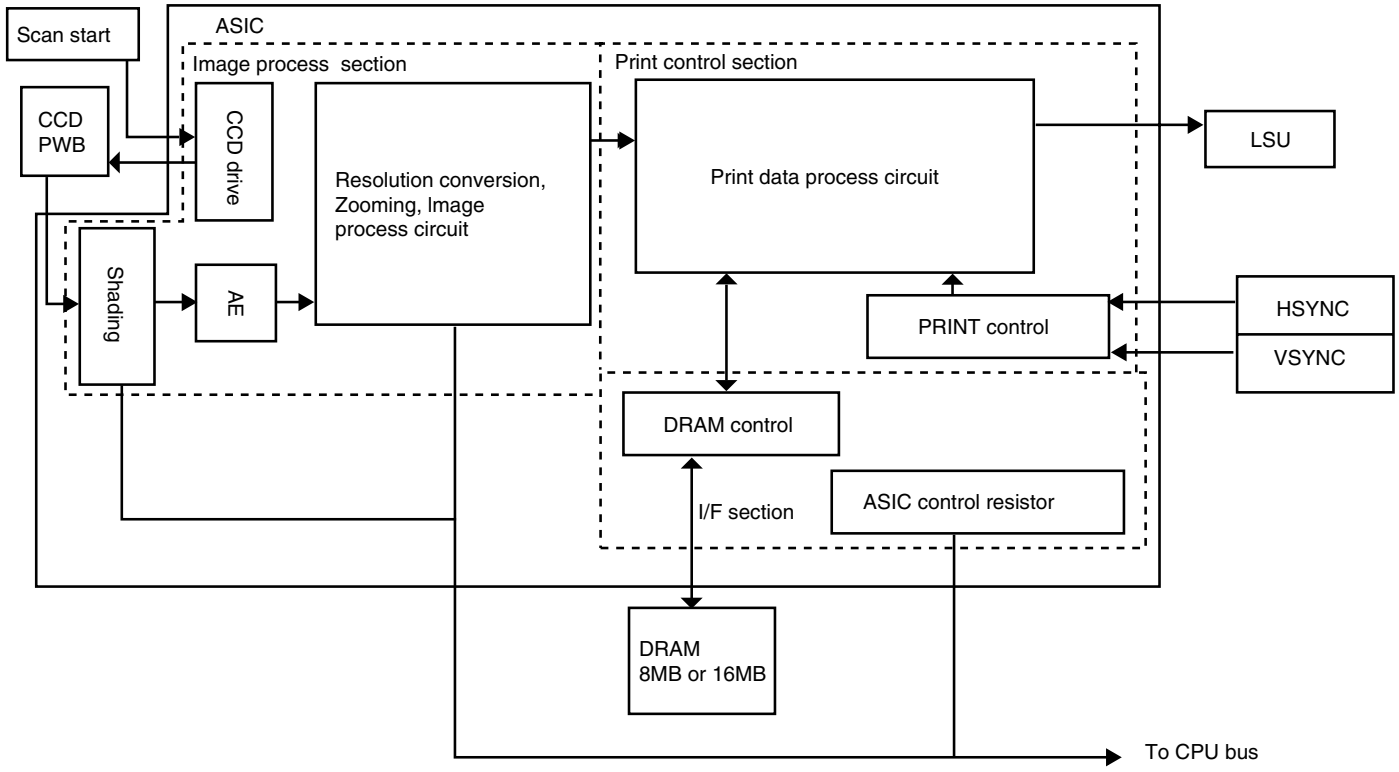
Print control section:

When copying, the image-processed data are outputted to the LSU according to the LSU writing timing. When scanning, the image data are made into 8bit width and outputted to the I/F section (USB).

I/F section:

Controls the DRAM which is the image data buffer, and processes data send/receive between the USB I/F and the IEEE1284 I/F.

The ASIC is controlled by writing the operation mode and the necessary setup values of the operation mode into the ASIC control register before starting each operation. (For ASIC Pin configuration, refer to the table at the end of this document.)



b. ASIC (Signal table)

PIN No.	Signal Name	IN/OUT	Connected to	Description
1	cpu_ad7	IN	CPU	CPU address bus
2	cpu_ad6	IN	CPU	CPU address bus
3	cpu_ad5	IN	CPU	CPU address bus
4	cpu_ad4	IN	CPU	CPU address bus
5	VCC(CORE/DC) 3.3V	Power		
6	cpu_ad3	IN	CPU	CPU address bus
7	cpu_ad2	IN	CPU	CPU address bus
8	GND(CORE/DC)	Power		
9	cpu_ad1	IN	CPU	CPU address bus
10	sgs	OUT	Tr array IC	SPF/RSPF gate solenoid control signal "H":ON
11	srrc	OUT	Tr array IC	SPF/RSPF resist roller clutch control signal "H":ON
12	spus	OUT	Tr array IC	SPF/RSPF document feed solenoid control signal "H":ON
13	spfs	OUT	Tr array IC	SPF/RSPF document transport solenoid control signal "H":ON
14	mrps1	OUT	Tr array IC	SPF/RSPF motor current control signal
15	mrps2	OUT	Tr array IC	SPF/RSPF motor current control signal

PIN No.	Signal Name	IN/OUT	Connected to	Description
16	ope_latch	OUT	Tr array IC	Operation circuit latch signal. Data take-in at "L"
17	op_data	OUT	Tr array IC	Operation circuit data signal
18	VCC(AC) 3.3V	Power		
19	op_clk	OUT	Tr array IC	Operation circuit clock signal
20	vfmcnt	OUT	Tr array IC	Ventilation fan rotation speed control signal. "H": High speed, "L": Low speed
21	GND(AC)	Power		
22	vfm	OUT	Tr array IC	Ventilation fan control signal. "H": Fan ON
23	tc	OUT	Tr array IC	Transfer charger control signal. "H":ON
24	gridl	OUT	Tr array IC	Main charger grid control signal. "H": L output
25	mc	OUT	Tr array IC	Main charger control signal. "H": ON
26	mrps3	OUT	Tr array IC	SPF/RSPF motor current control signal
27	mm_y3	OUT	Tr array IC	Carriage motor current control signal
28	bias	OUT	Tr array IC	DV bias control signal. "H":ON
29	lden	OUT	Tr array IC	Laser circuit control signal. "H": Laser circuit ON
30	pmd	OUT	Tr array IC	Polygon motor control signal. "H": Polygon motor ON
31	GND(CORE/DC)	Power		
32	mmd	OUT	Tr array IC	Main motor control signal. "H": Main motor ON
33	GND(CORE/DC)	Power		
34	VCC(CORE/DC) 3.3V	Power		
35	mpfs	OUT	Tr array IC	Manual feed solenoid control signal. "H": ON
36	cpfs2	OUT	Tr array IC	Second cassette paper feed solenoid control signal. "H":ON
37	cpfs1	OUT	Tr array IC	Cassette paper feed solenoid control signal. "H":ON
38	poffr			(Not used)
39	rrs	OUT	Tr array IC	Resist roller solenoid control signal. "H":ON
40	pr	OUT	Tr array IC	Power relay control signal. "H":ON
41	hl	OUT	Tr array IC	Heater lamp control signal. "H":ON
42	TMON	OUT	Tr array IC	(Not used)
43	TM_	OUT	Buffer IC	Toner motor control signal
44	VCC(AC) 3.3V	Power		
45	TM	OUT	Buffer IC	Toner motor control signal
46	miron	OUT	Buffer IC	SPF scanner select signal
47	GND(AC)	Power		
48	spfon	OUT	Buffer IC	SPF ON signal
49	mircnt	OUT	Buffer IC	SPF scanner select signal
50	GND(AC)	Power		
51	pcl_s_print			(Not used)
52	fax_s_print			(Not used)
53	es_s_print			(Not used)
54	prareaen			(Not used)
55	d_s_ATDI_B			(Not used)
56	GND(CORE/DC)	Power		
57	VCC(CORE/ GND) 3.3V			
58	pfclko			(Not used)
59	RESET	IN		ASIC reset signal
60	GND(CORE/DC)	Power		
61	ATRST	IN		(Not used)
62	ATCK			(Not used)
63	ATMS			(Not used)
64	VCC(AC) 3.3V	Power		
65	ie1284_stb	IN	I/F board connector	/STB signal (IEEE1284 communication port)
66	ie1284_autofd	IN	I/F board connector	/AUTOFD signal (IEEE1284 communication port)
67	ie1284_slctin	IN	I/F board connector	/SLCTIN signal (IEEE1284 communication port)
68	ie1284_init	IN	I/F board connector	/INIT signal (IEEE1284 communication port)
69	VCC(CORE/DC) 3.3V	Power		
70	ie1284_slct	OUT	I/F board connector	SLCT signal (IEEE1284 communication port)
71	ie1284_pe	OUT	I/F board connector	PE signal (IEEE1284 communication port)
72	GND(CORE/DC)	Power		
73	ie1284_busy	OUT	I/F board connector	BUSY signal (IEEE1284 communication port)
74	ie1284_ack	OUT	I/F board connector	/ACK signal (IEEE1284 communication port)
75	ie1284_fault	OUT	I/F board connector	/FAULT signal (IEEE1284 communication port)
76	ie1284_rev	OUT	I/F board connector	/REV signal (IEEE1284 communication port)
77	ie1284_parad7	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
78	ie1284_parad6	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
79	ie1284_parad5	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
80	ie1284_parad4	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
81	ie1284_parad3	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
82	VCC(AC) 3.3V			
83	ie1284_parad2	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
84	ie1284_parad1	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
85	GND(AC)	Power		

PIN No.	Signal Name	IN/OUT	Connected to	Description
86	ie1284_parad0	IN/OUT	I/F board connector	DATA bus (IEEE1284 communication port)
87	suspend	OUT	I/F board connector	SUSPEND signal (USB communication port)
88	vmin	IN	I/F board connector	VMIN signal (USB communication port)
89	vpin	IN	I/F board connector	VPIN signal (USB communication port)
90	rcv	IN	I/F board connector	RCV signal (USB communication port)
91	oen	OUT	I/F board connector	OEN signal (USB communication port)
92	vmout	OUT	I/F board connector	VMOUT signal (USB communication port)
93	vpout	OUT	I/F board connector	VPOUT signal (USB communication port)
94	tm2_15m			(Not used)
95	VCC(PLL) 3.3V	Power		
96	GND(PLL)	Power		
97	VCC(PLL) 3.3V	Power		
98	GND(PLL)	Power		
99	pfclk	IN		Clock
100	VCC(CORE/DC) 3.3V	Power		
101	GND(CORE/DC)	Power		
102	ram_data0	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
103	ram_data1	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
104	ram_data2	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
105	GND(AC)	Power		
106	ram_data3	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
107	ram_data4	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
108	VCC(AC) 3.3V	Power		
109	ram_data5	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
110	ram_data6	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
111	GND(CORE/DC)	Power		
112	ram_data7	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
113	ram_data15	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
114	ram_data14	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
115	VCC(CORE/DC) 3.3V	Power		
116	ram_data13	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
117	ram_data12	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
118	GND(CORE/DC)	Power		
119	ram_data11	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
120	ram_data10	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
121	VCC(CORE/DC) 3.3V			
122	ram_data9	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
123	ram_data8	IN/OUT	SDRAM	SDRAM (Image process page memory) data bus
124	GND(AC)	Power		
125	ram_clk	OUT	SDRAM	SDRAM (Image process page memory) CLK signal
126	ram_cke	OUT	SDRAM	SDRAM (Image process page memory) CKE signal
127	xram_wde	OUT	SDRAM	SDRAM (Image process page memory) WDE signal
128	VCC(AC) 3.3V	Power		
129	GND(CORE/DC)	Power		
130	xram_cas	OUT	SDRAM	SDRAM (Image process page memory) CAS signal
131	xram_ras	OUT	SDRAM	SDRAM (Image process page memory) RAS signal
132	xram_cs	OUT		SDRAM (Image process page memory) CS signal
133	VCC(CORE/DC) 3.3V	Power		
134	ram_banks0	OUT	SDRAM	SDRAM (Image process page memory) BANK signal
135	ram_banks1	OUT	SDRAM	SDRAM (Image process page memory) BANK signal
136	GND(CORE/DC)	Power		
137	ram_dqm0	OUT	SDRAM	SDRAM (Image process page memory) DQM signal
138	ram_dqm1	OUT	SDRAM	SDRAM (Image process page memory) DQM signal
139	ram_mad12	OUT	SDRAM	SDRAM (Image process page memory) address bus
140	VCC(CORE/DC) 3.3V	Power		
141	ram_mad11	OUT	SDRAM	SDRAM (Image process page memory) address bus
142	ram_mad9	OUT	SDRAM	SDRAM (Image process page memory) address bus
143	GND(AC)			
144	ram_mad8	OUT	SDRAM	SDRAM (Image process page memory) address bus

PIN No.	Signal Name	IN/OUT	Connected to	Description
145	ram_mad7	OUT	SDRAM	SDRAM (Image process page memory) address bus
146	VCC(AC)			
147	ram_mad6	OUT	SDRAM	SDRAM (Image process page memory) address bus
148	ram_mad5	OUT	SDRAM	SDRAM (Image process page memory) address bus
149	GND(CORE/DC)			
150	ram_mad4	OUT	SDRAM	SDRAM (Image process page memory) address bus
151	ram_mad10	OUT	SDRAM	SDRAM (Image process page memory) address bus
152	ram_mad0	OUT	SDRAM	SDRAM (Image process page memory) address bus
153	VCC(CORE/DC)			
154	ram_mad1	OUT	SDRAM	SDRAM (Image process page memory) address bus
155	ram_mad2	OUT	SDRAM	SDRAM (Image process page memory) address bus
156	ram_mad3	OUT	SDRAM	SDRAM (Image process page memory) address bus
157	d_s_ATDO_B			(Not used)
158	cl	OUT	Logic IC	Copy lamp control signal
159	VCC(CORE/DC) 3.3V	Power		
160	afp_oeb			(Not used)
161	ccd_tg	OUT	CCD PWB	CCD control signal
162	GND(CORE/DC)	Power		
163	afp_vsmp	OUT	CCD PWB	AFE control signal
164	ccdrs	OUT	CCD PWB	CCD control signal
165	ccdcp	OUT	CCD PWB	CCD control signal
166	VCC(AC) 3.3V	Power		
167	afp_bsmp	OUT	CCD PWB	AFE control signal
168	ccd_ph2	OUT	CCD PWB	CCD control signal
169	afp_afesdi	OUT	CCD PWB	AFE control signal
170	GND(AC)	Power		
171	ccd_ph1	OUT	CCD PWB	CCD control signal
172	VCC(CORE/DC)			
173	afp_adcclk	OUT	CCD PWB	AFE control signal
174	afp_afesen	OUT	CCD PWB	AFE control signal
175	GND(CORE/DC)	Power		
176	afp_afesck	OUT	CCD PWB	AFE control signal
177	mtr_at_home	IN	CCD PWB	Carriage home position signal
178	VCC(CORE/DC)	Power		
179	afp_data7	IN	CCD PWB	Image scan data
180	afp_data6	IN	CCD PWB	Image scan data
181	afp_data5	IN	CCD PWB	Image scan data
182	GND(CORE/DC)	Power		
183	afp_data4	IN	CCD PWB	Image scan data
184	afp_data3	IN	CCD PWB	Image scan data
185	VCC(AC) 3.3V	Power		
186	afp_data2	IN	CCD PWB	Image scan data
187	afp_data1	IN	CCD PWB	Image scan data
188	GND(AC)	Power		

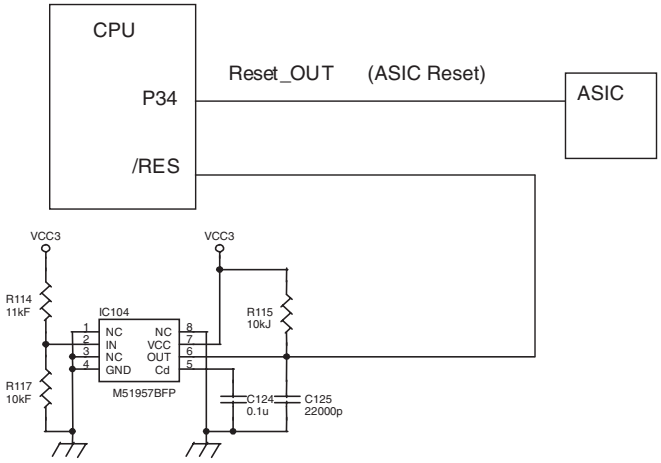
PIN No.	Signal Name	IN/OUT	Connected to	Description
189	afp_data0	IN	CCD PWB	Image scan data
190	GND(CORE/DC)	Power		
191	sfclk	IN		Clock
192	tm2_24m			(Not used)
193	GND(PLL)	Power		
194	VCC(PLL) 3.3V	Power		
195	GND(PLL)	Power		
196	VCC(PLL) 3.3V	Power		
197	VCC(CORE/DC) 3.3V	Power		
198	mtr_y1	OUT	Tr array IC	Carriage motor current control signal
199	mtr_phase1	OUT	Motor driver	Carriage motor control signal
200	GND(CORE/DC)	Power		
201	mtr_i01	OUT	Motor driver	Carriage motor control signal
202	mtr_i11	OUT	Motor driver	Carriage motor control signal
203	mtr_i21	OUT	Motor driver	Carriage motor control signal
204	mtr_phase2	OUT	Motor driver	Carriage motor control signal
205	VCC(CORE/DC) 3.3V	Power		
206	mtr_i02	OUT	Motor driver	Carriage motor control signal
207	mtr_i12	OUT	Motor driver	Carriage motor control signal
208	mtr_i22	OUT	Motor driver	Carriage motor control signal
209	mtr_y2	OUT	Tr array IC	Carriage motor current control signal
210	VCC(AC) 3.3V	Power		
211	xsync	IN	LSU	Horizontal sync signal from LSU (/SYNC)
212	xld	OUT	LSU	Laser drive signal (/VIDEO)
213	GND(AC)	Power		
214	xlend	OUT	LSU	Laser APC signal (/LEND)
215	xcpuwr	IN	CPU	CPU write signal
216	xcpurd	IN	CPU	CPU read signal
217	scanstop	IN	CPU	Scan stop signal
218	scanst	IN	CPU	Scan start signal
219	transst	IN	CPU	Data transfer start signal
220	printst	IN	CPU	Print start signal
221	tmen	IN	CPU	Toner motor clock enable signal
222	testpin4			(Not used)
223	VCC(CORE/DC) 3.3V	Power		
224	testpin3			(Not used)
225	tmclk	IN		Toner motor clock signal
226	GND(CORE/DC)	Power		
227	testpin2			(Not used)
228	testpin1			(Not used)
229	testpin0			(Not used)
230	cpudata15	IN/OUT	CPU	CPU data bus
231	cpudata14	IN/OUT	CPU	CPU data bus
232	cpudata13	IN/OUT	CPU	CPU data bus
233	cpudata12	IN/OUT	CPU	CPU data bus
234	cpudata11	IN/OUT	CPU	CPU data bus

PIN No.	Signal Name	IN/OUT	Connected to	Description
235	cpudata10	IN/OUT	CPU	CPU data bus
236	VCC(AC) 3.3V	Power		
237	cpudata9	IN/OUT	CPU	CPU data bus
238	cpudata8	IN/OUT	CPU	CPU data bus
239	GND(CORE/DC)	Power		
240	cpudata7	IN/OUT	CPU	CPU data bus
241	cpudata6	IN/OUT	CPU	CPU data bus
242	cpudata5	IN/OUT	CPU	CPU data bus
243	cpudata4	IN/OUT	CPU	CPU data bus
244	VCC(CORE/DC) 3.3V	Power		
245	cpudata3	IN/OUT	CPU	CPU data bus
246	cpudata2	IN/OUT	CPU	CPU data bus
247	cpudata1	IN/OUT	CPU	CPU data bus
248	cpudata0	IN/OUT	CPU	CPU data bus
249	VCC(AC) 3.3V	Power		
250	xcpucs	IN	CPU	CS signal
251	mem_intr			(Not used)
252	GND(AC)	Power		
253	arb_intr	OUT	CPU	INTR signal
254	cpusync	OUT	CPU	CPU SYNC signal
255	cpu_ad9	IN	CPU	CPU address bus
256	cpu_ad8	IN	CPU	CPU address bus

(3) Reset circuit

This circuit detects ON/OFF of power to control start/stop of each circuit. The 3.3V voltage of the main PWB is detected by the reset IC to generate the reset signal.

When the power voltage reaches the specified level, the circuit operations are started. Before the power voltage falls below the specified level, the circuit operations are stopped to prevent against malfunctions.

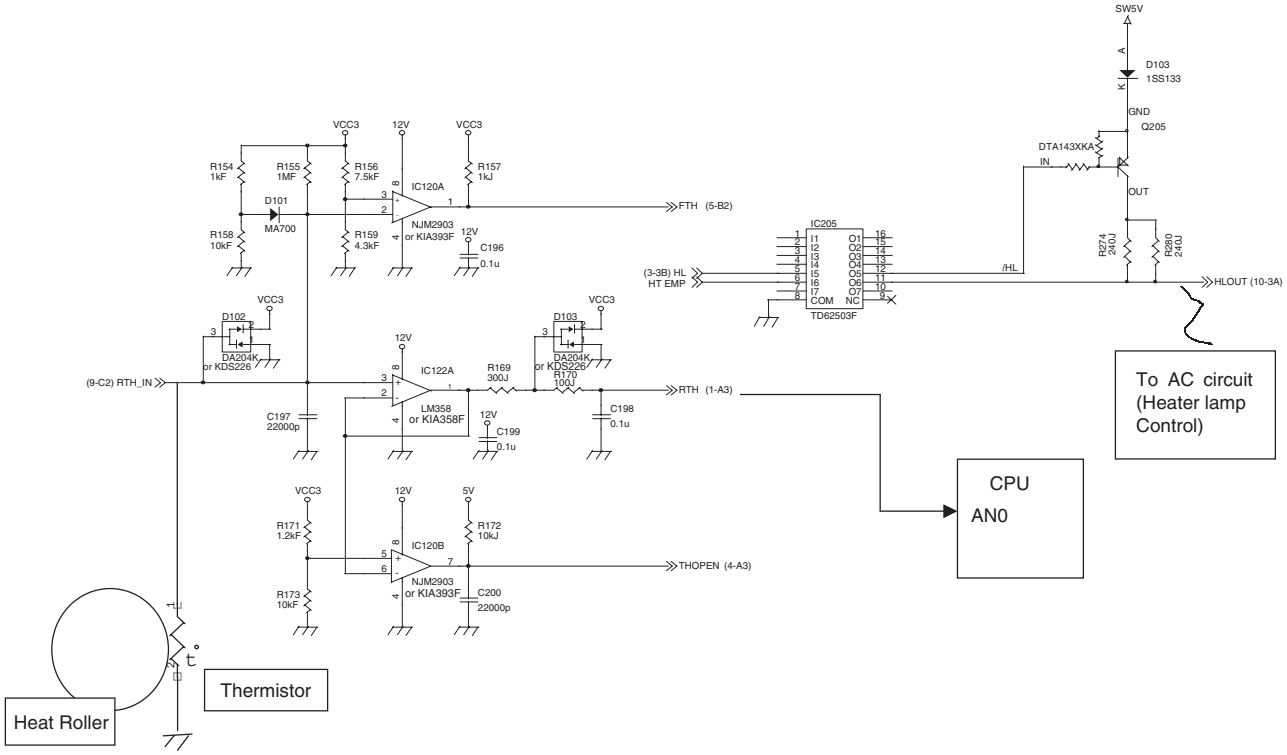


(4) Heater lamp control circuit

a. Outline

The heater lamp control circuit detects the heat roller surface temperature and converts in into a voltage level. The converted voltage is inputted to the CPU analog input pin.

The CPU converts the inputted analog voltage into a digital signal level and compares it with the set value of the simulation to control on/off the heater lamp according to the level, maintaining the heat roller surface temperature at a constant level.



The lower the heat roller surface temperature is, the greater the thermistor resistance is, and vise versa.

Therefore, the lower the heat roller surface temperature is, the higher the thermistor terminal voltage is, and vise versa. The thermistor terminal voltage is inputted to the CPU analog port.

The CPU controls ON/OFF of the heater lamp by this input voltage level.

[High temperature protect circuit in case of CPU hung up]

For IC120 3pin (reference voltage), +3.3V is divided by the resistor.

The thermistor terminal voltage is inputted to IC120 2pin.

When, the voltage at 2pin becomes lower than the voltage at 3pin (when the heat roller temperature is about 220 – 230°C), IC120 1pin becomes HIGH, and the HL signal is lowered to the GND potential through IC124, stopping generation of the heater lamp ON signal. (IC120 1pin is normal LOW.)

[When the heat roller surface temperature is lower than the set level]

1) Since the thermistor terminal voltage is higher than the set level, the HL signal from the CPU becomes HIGH.
2) The HL signal is turned to be the HLOUT signal through IC124 protect circuit, and inputted to the photo triac coupler on the power PWB.
3) When the internal triac turns on, a pulse is applied to the gate of the external triac. Consequently a current flow from the power source through the heater lamp to the triac, lighting the heater lamp.

[When the heat roller surface temperature is higher than the set level]

1) Since the thermistor terminal voltage becomes lower than the set value, the HL signal from the CPU becomes LOW.
2) The HL turns LOW, the photo triac coupler on the power PWB turns OFF, the external triac turns OFF, and the heater lamp turns OFF.

[In case of the thermistor open]

The voltage at IC120 6pin over the voltage at 5pin to drive the output THOPEN at 7pin to LOW. This is passed to the CPU and the trouble code "H2" is displayed.

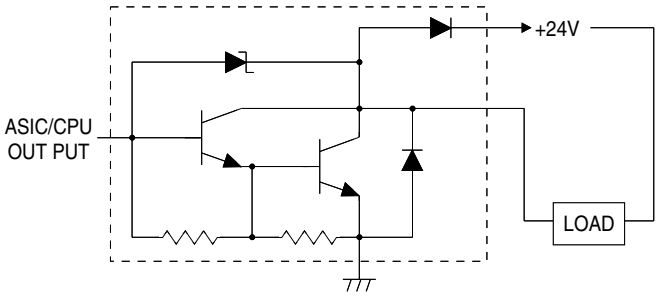
(5) Driver circuit (Solenoid)

a. Outline

Since the load signal from the CPU or the ASIC cannot drive the load directly, it is passed through the driver IC to drive the load.

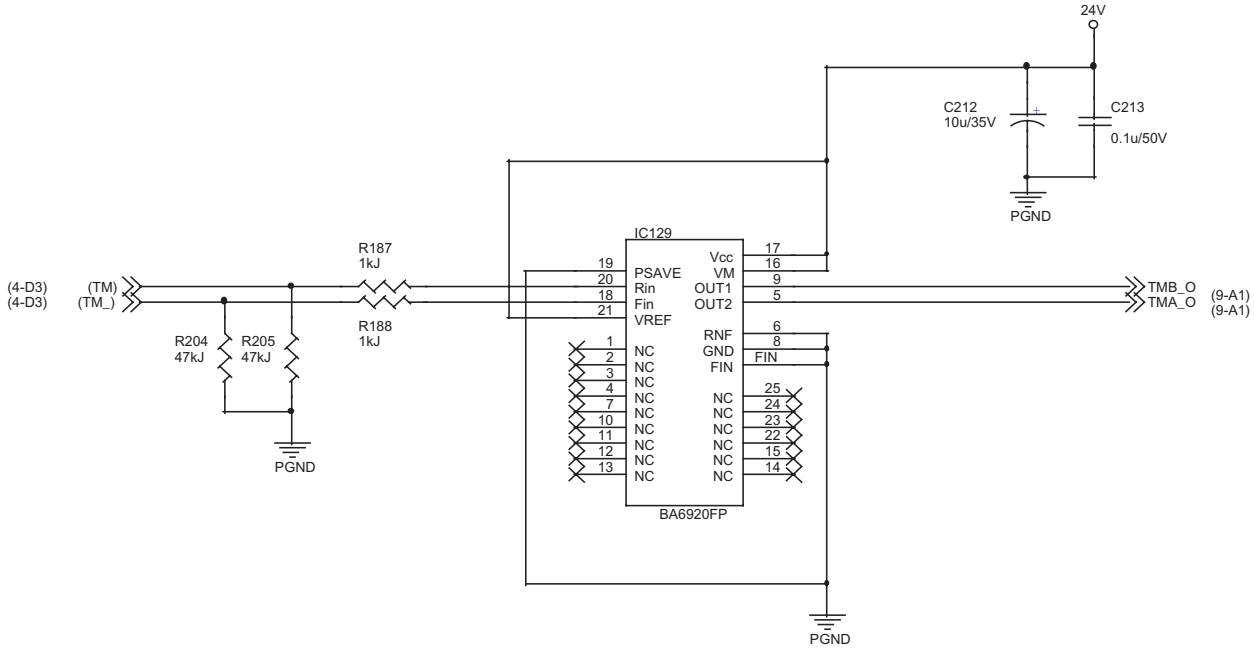
b. Operation

The driver circuit forms a Darlington circuit with transistors. Therefore a large drive current is obtained from a small current (ASIC output current). When the driver input voltage (base resistance input) is HIGH (+3.3V), the transistor turns ON to flow a current in the arrow direction, operating the load. When the driver is ON, the driver output terminal voltage is 0V.



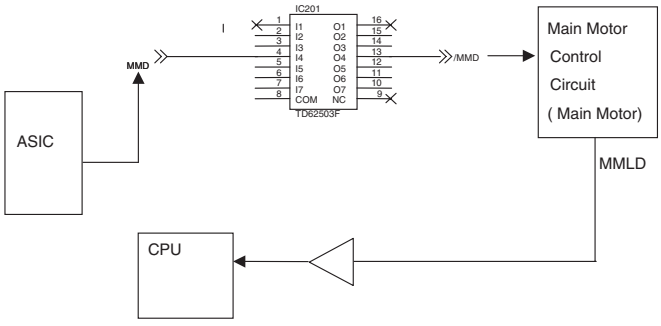
(6) Toner supply motor drive circuit

The IC129 is the motor control IC, which generates the pseudo AC waveform with the pulse signals (TM, TM-) outputted from ASIC, driving the toner supply motor.



(7) Main motor drive circuit

The main motor is driven by the MMD signal from ASIC. While the main motor is rotating, the MMD signal is driven to HIGH and passed through IC125 to the control circuit in the main motor to rotate the main motor. When the main motor speed reaches the specified rpm, the MMLD signal is turned LOW and passed through IC115 to the CPU.

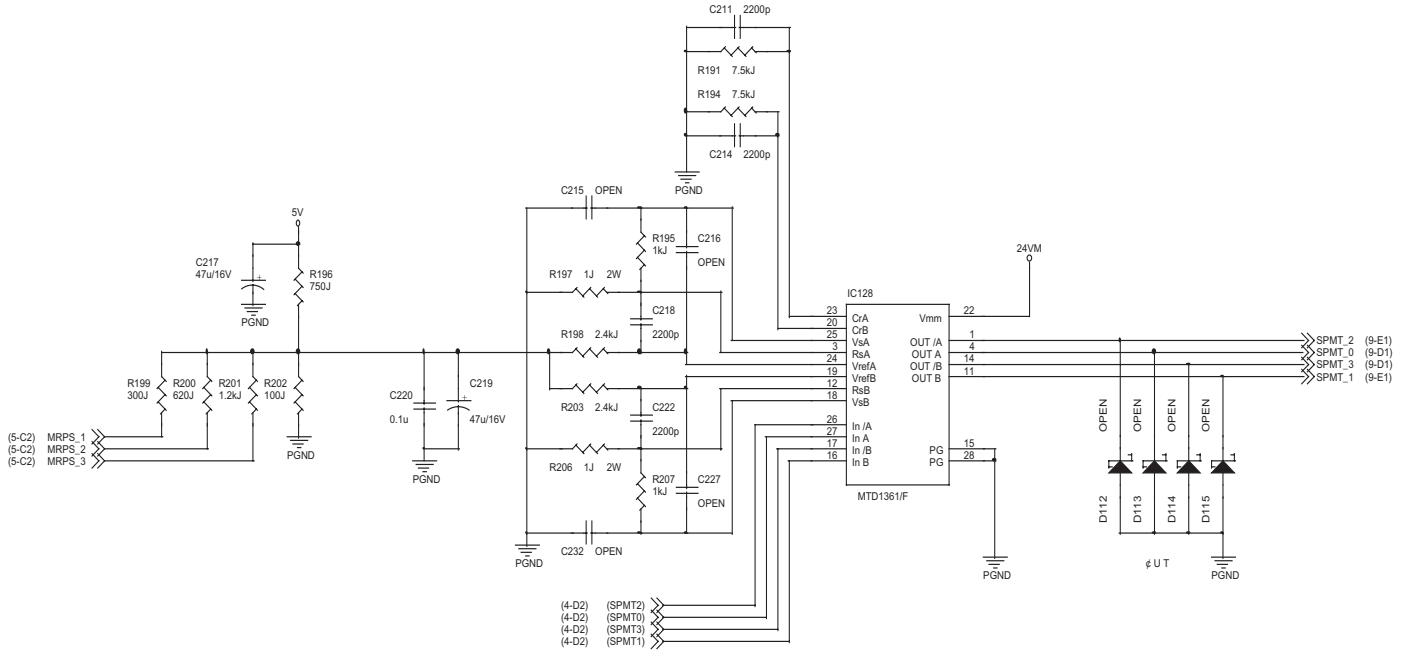


(8) Mirror motor control circuit, Duplex motor control circuit

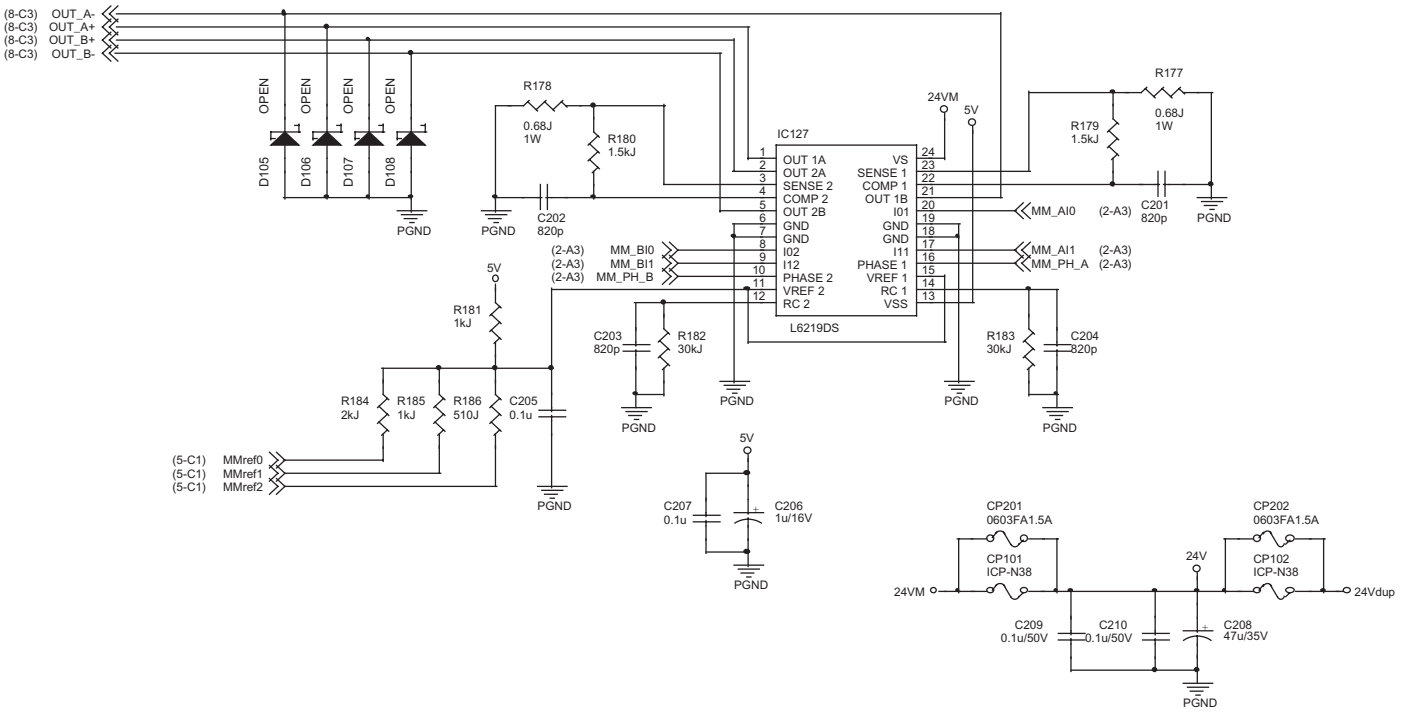
Stepping motors are employed for the mirror motor, the SPF motor, and the duplex motor. The driver for IC127 (for mirror motor) is the bipolar drive L6219DS, and the driver for IC128 (for SPF) is the unipolar drive IC MTD1361F. For control, the SPF outputs the drive signal from the CPU to the IC, and the mirror outputs the drive signal to the IC with the ASIC. They drive each motor in 1-2 phase excitement or 2-phase excitement.

Each motor switches the motor current value in each magnification ratio.

- SPF motor drive circuit



- Mirror motor drive circuit



(9) Operation circuit

a. General

The operation circuit is composed of the key matrix circuit and the display matrix circuit.

b. Key matrix circuit

Select signals SELIN 1 – 3 are sent from the CPU of the MCU to the selector in the operation circuit.

The signals detecting OFF/ON of the key are sent to the CPU as KIN 1 – 2.

c. Display circuit

The display is controlled by sending the data signal from the CPU of the MCU, the clock signals, and the latch signals from the ASIC to the LED driver in the operation circuit.

* The basic circuitry is the same as that of Puma.

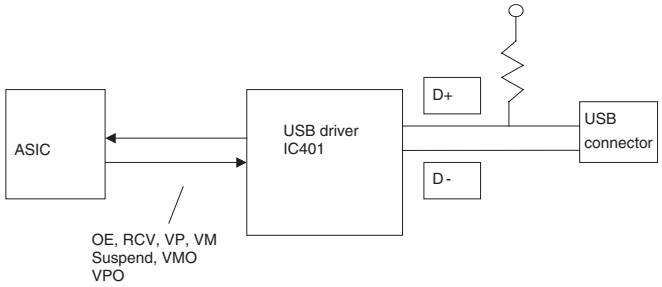
(10) I/F circuit

a. General

The I/F circuit is composed of the USB driver and the IEEE1284 driver, and performs hard interface with the ASIC (MCU PWB).

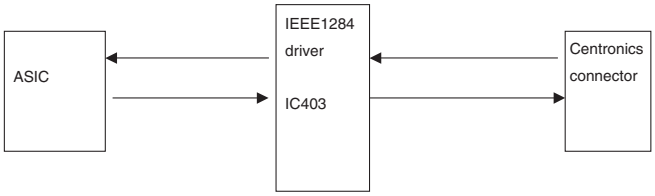
b. USB circuit

With the USB driver, the differential signals (analog) of USB are converted into digital signal, which are sent to the ASIC. In the reverse procedure, interface between the ASIC (engine) and the host is performed.



c. IEEE1284 circuit

The IEEE1284 driver is used to perform interface between the ASIC (engine) and the host.



(11) Carriage unit

a. General

The carriage unit is provided with the CCD PWB, the inverter PWB, and the lamps. It scans documents and transfers AD-converted image data to the ASIC.

b. CCD PWB

The CCD on the CCD PWB employs the color image sensor uPD8861 of 5400 pixels x 3 lines, and scans documents in the main scanning direction in the resolution of 600dpi/US letter size.

Image data scanned by the CCD are inputted to the AFE (AD9826), and subject to CDS, amplification, and AD-conversion. Then digital data are outputted to the MCU PWB and to the ASIC, which performs image process of the digital data.

c. Lamp inverter PWB

The transformer is controlled by the lamp control signal from the MCU PWB. The transformer output controls lighting of the cool cathode ray tube.

B. DC power circuit

The DC power circuit directly rectifies the AC power and performs switching-conversion with the DC/DC converter circuit, and rectifies and smoothes again to generate a DC voltage.

The constant voltage control circuit is of +5VEN. +24V and +12V are of the non-control system by winding from the +5VEN winding. As shown in fig (1), +24V, +12V, and +5V are provided with the ON/OFF function by external signals. +3.3V is outputted from +5VEN to the regulator IC.

Refer to the block diagram, fig (1).

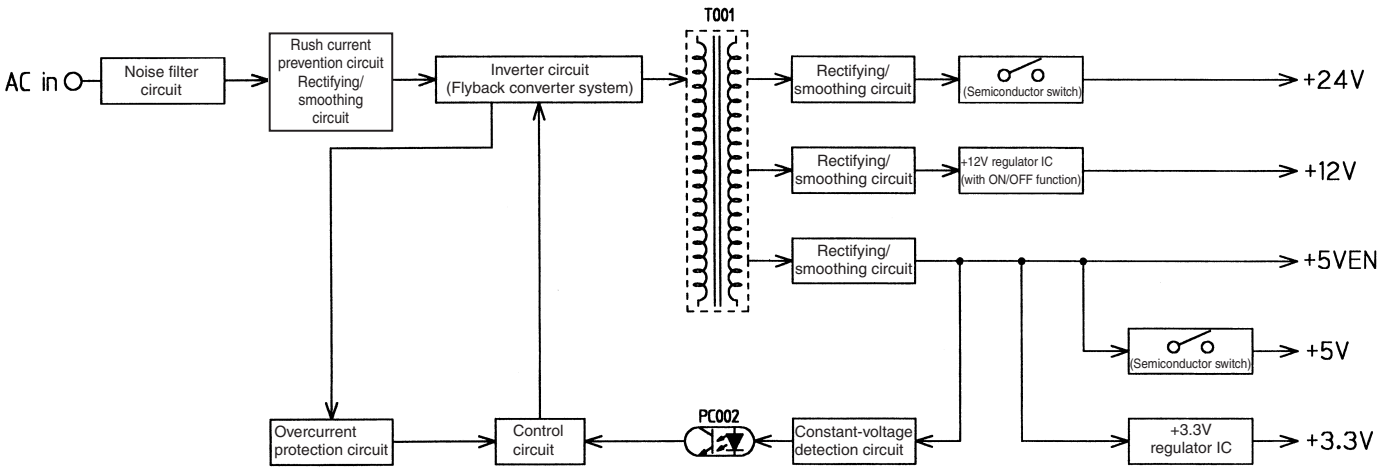


fig (1) Block diagram

(1) Noise filter circuit

The filter circuit is composed of L and C. It reduces common noises and normal mode noises generated from the AC line.

The common noise means that generated in each line for GND. Its noise component is delivered through C001, C003, and C007 to GND.

The normal noise means that overlapped in the AC line or the output line. It is attenuated by C002, L001, C006, and L002. Refer to fig (2).

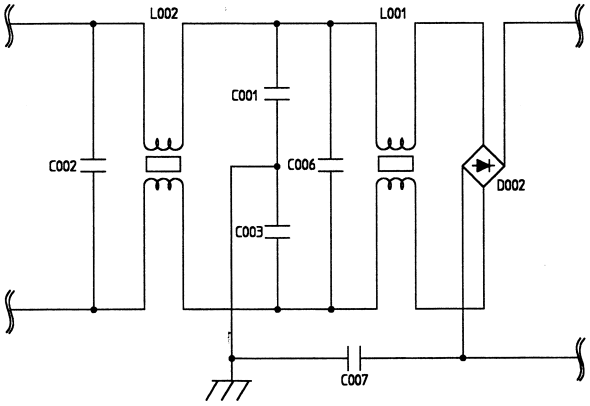


fig (2) Noise filter circuit

(2) Rush current prevention circuit and rectifying/ smoothing circuit

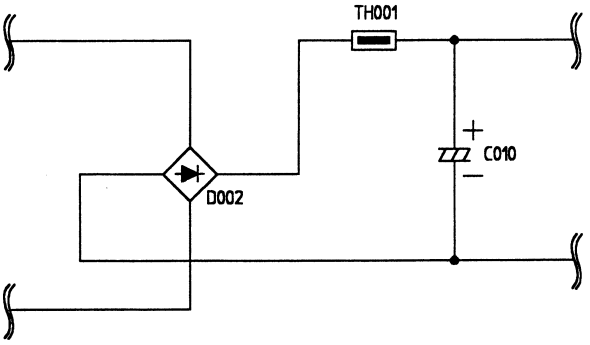


fig (3) Rush current prevention, rectifying/smoothing circuit

Since the AC power is directly rectified, if there were not this rush current prevention resistor (TH001), an extremely large rush current would flow due to a charging current flowing through the smoothing capacitor C010 when turning on the power.

To prevent against this, the rush current prevention resistor TH001 is provided between the rectifying diode D002 and the smoothing diode C010, suppressing a rush current.

The rectifying/smoothing circuit rectifies a 50/60Hz AC voltage with the rectifying circuit, and smoothes it with the smoothing capacitor C010.

(3) Inverter and control circuit (Flyback converter system)

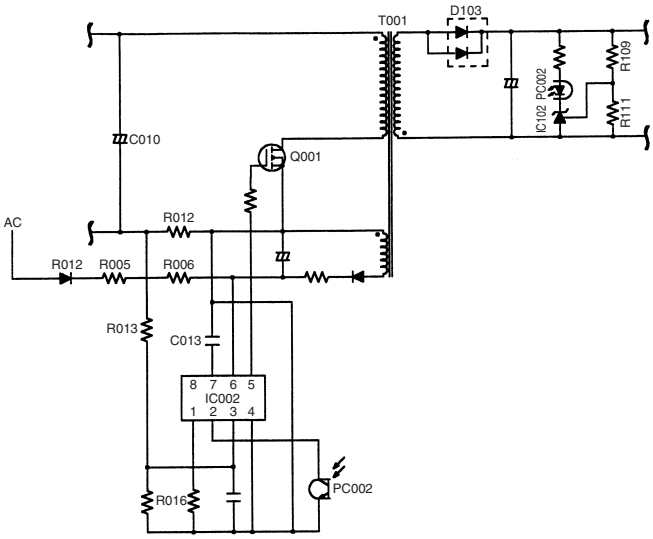


fig (4) Inverter and control circuit

This circuit is one-stone separate excitation DC-DC converter called flyback converter, as shown in fig (4).

When an electromotive voltage of IC is applied through D012, R005, and R006 to IC002, IC002 oscillates to conduct Q001.

As a result, a voltage is applied to the primary winding of the converter transformer (T001) and at the same time a voltage is generated in the driving winding of IC002 to operate IC002. Then IC002 turns ON/OFF Q001 at the frequency of about 70KHz determined by R016.

Under the ON state, the voltage in the secondary winding is reversed to the diode D103 and no current flows through the secondary winding of T001.

Under the OFF state, the current flowing through the primary winding is in the same direction as the primary winding, conducting D103 and transmitting energy to the secondary winding. Refer to fig (4).

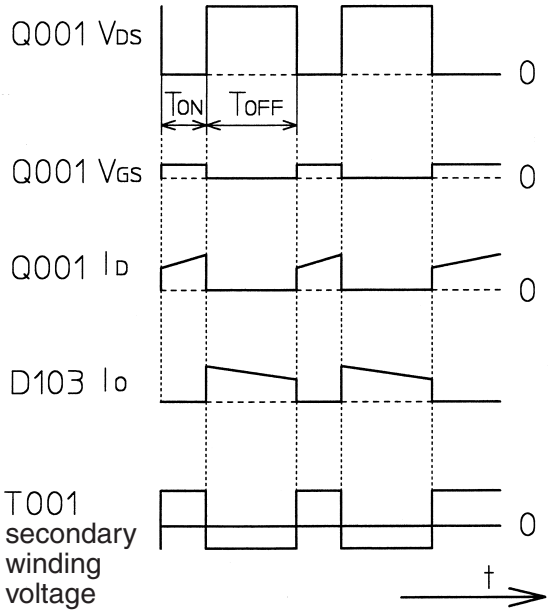


fig (5) Operation waveform of the flyback converter

The control circuit is subject to negative feedback from the secondary side as shown in fig (4). A photo coupler (PC002) is employed to insulate between the primary side and the secondary side to feed back the control signal to the primary side.

When the output voltage is increased by energy transmission from T001, the voltage detected by R109 and R111 is compared with the reference voltage of IC102. When it exceeds the reference voltage, the current flowing through IC102 (that is, the photo diode current of PC002) is increased and transmitted to the primary side. Then the potential at the feedback pin (2 pin) of IC102 is decreased to control Q001. Therefore, the change in the output voltage on the secondary side is passed through IC102 and PC002 to control Q001, stabilizing the output voltage.

(4) Overcurrent protection circuit (Primary side)

The inverter circuit of the primary side is connected with the current detection resistor R102. When an overcurrent occurs in the secondary side, the current flowing through the primary side inverter Q001 is increased. The current is detected by R012, and passed through R013 to IC701 overcurrent restricting pin (3 pin) to turn OFF Q002, shutting off all power. To resupply the power, turn off and on the power. Refer to fig (4).

(5) Rectifying/smoothing circuit (+5V)

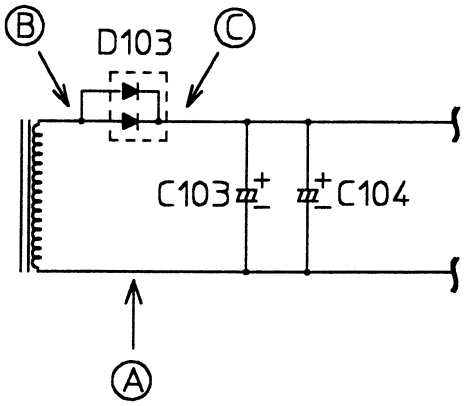


fig (6) Rectifying/smoothing circuit

The high frequency pulse generated by the inverter circuit is decreased by the converter transformer, rectified by the high frequency diode D103, and smoothed by C103 and C104.

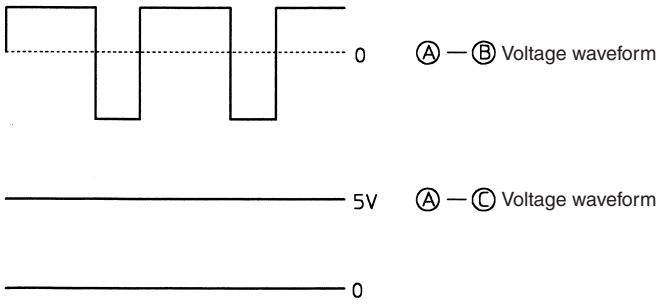


fig (7) +5V rectifying/smoothing circuit voltage waveform

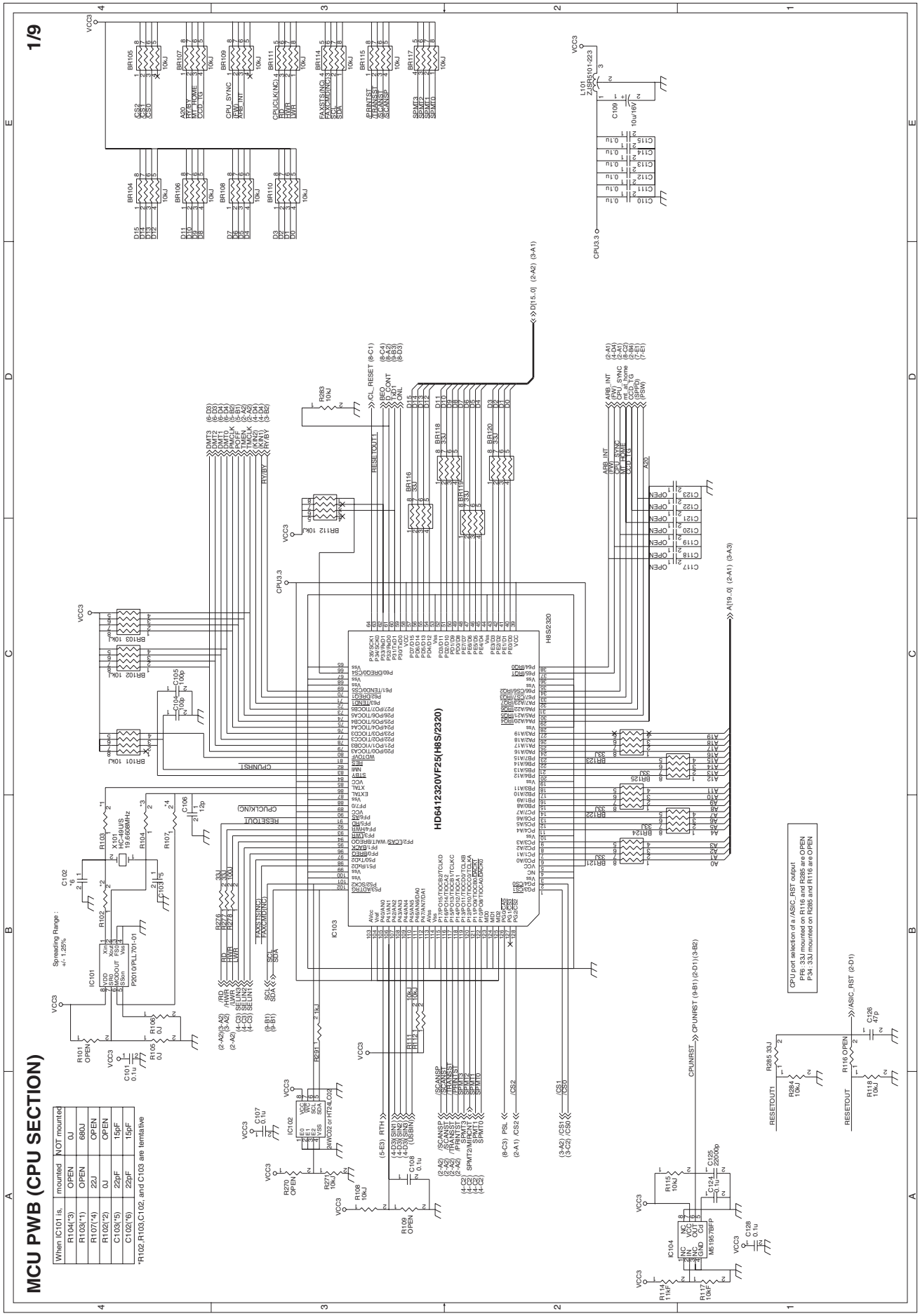
[14] CIRCUIT DIAGRAM

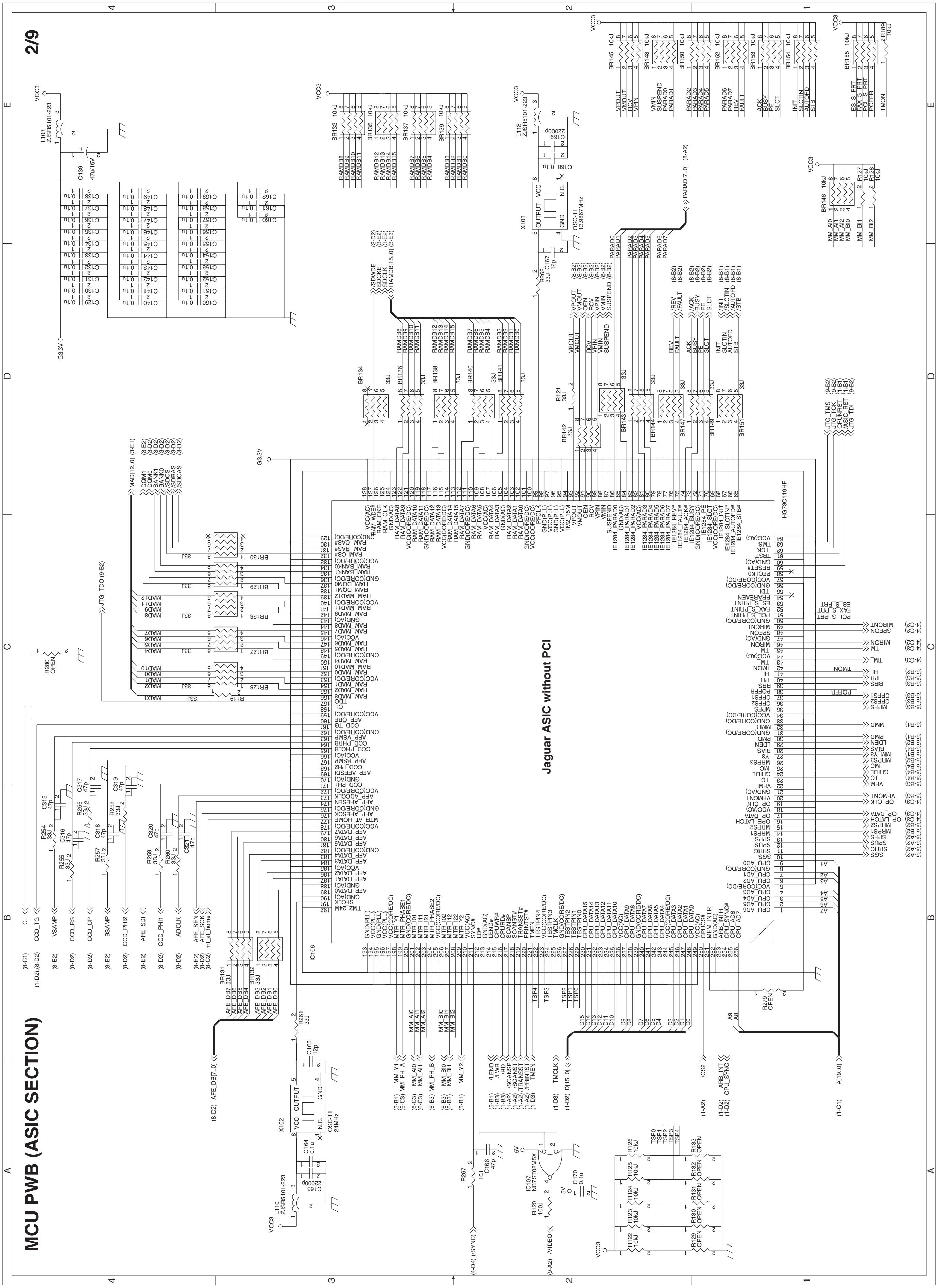
1. MCU PWB

MCU PWB (CPU SECTION)

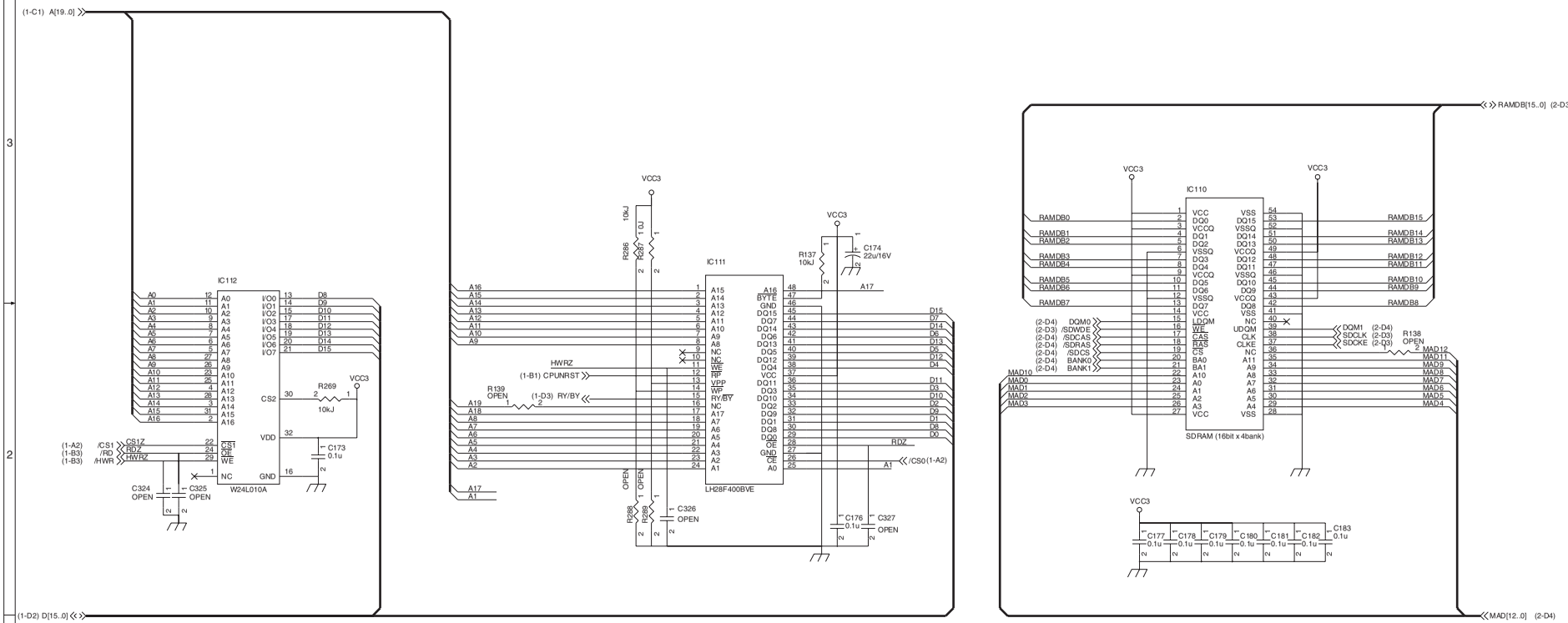
When IC101 is,	mounted	NOT mounted
R104(*3)	OPEN	0J
R103(*1)	OPEN	680J
R107(*4)	22J	OPEN
R102(*2)	0J	OPEN
C103(*5)	22pF	15pF
C102(*6)	22pF	15pF

*R102,R103,C102, and C103 are temtative



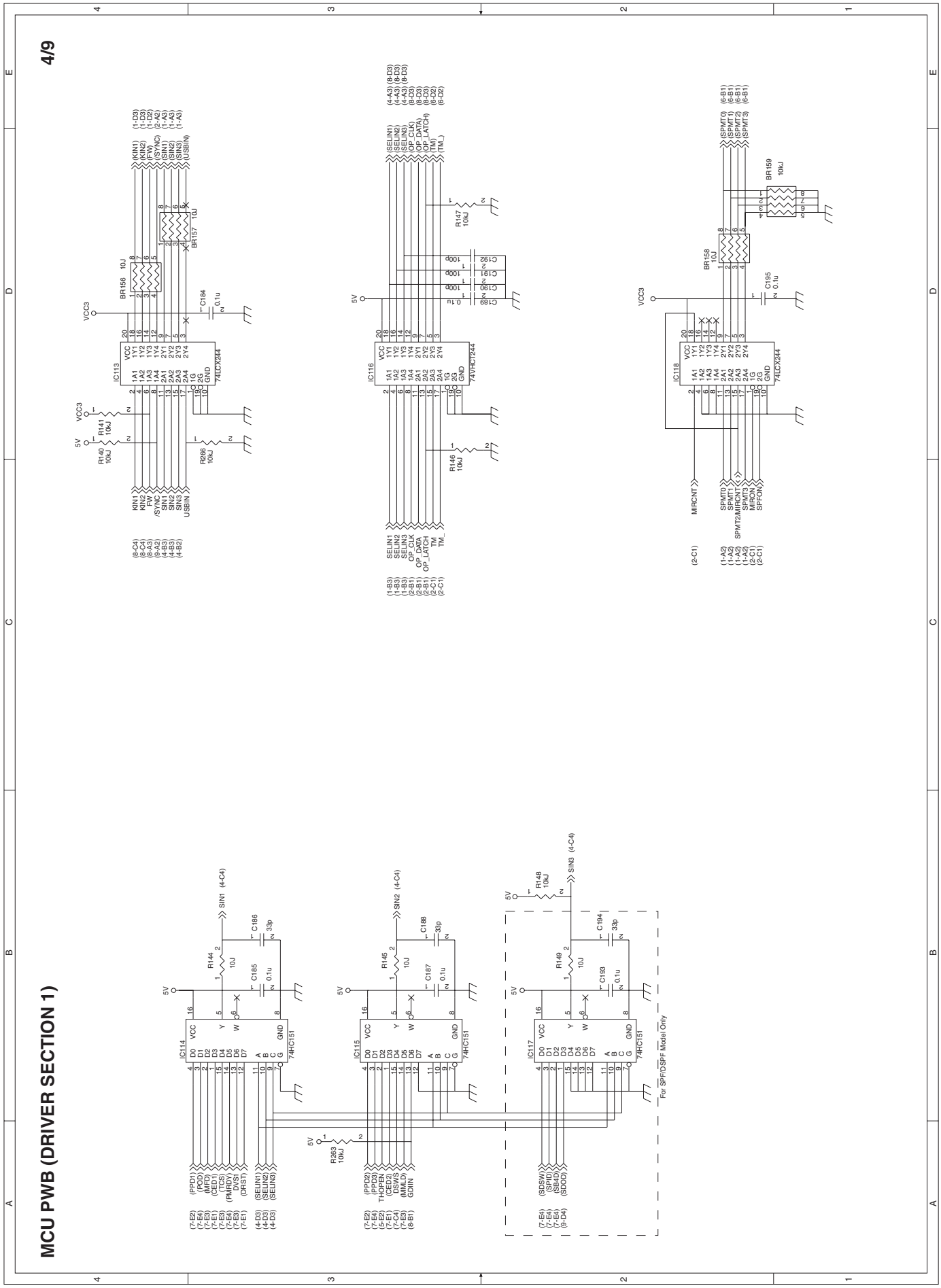

MCU PWB (ASIC SECTION)
2/9
Jaguar ASIC without PCI
IC106
HG73C119HF

MCU PWB (MEMORY SECTION)

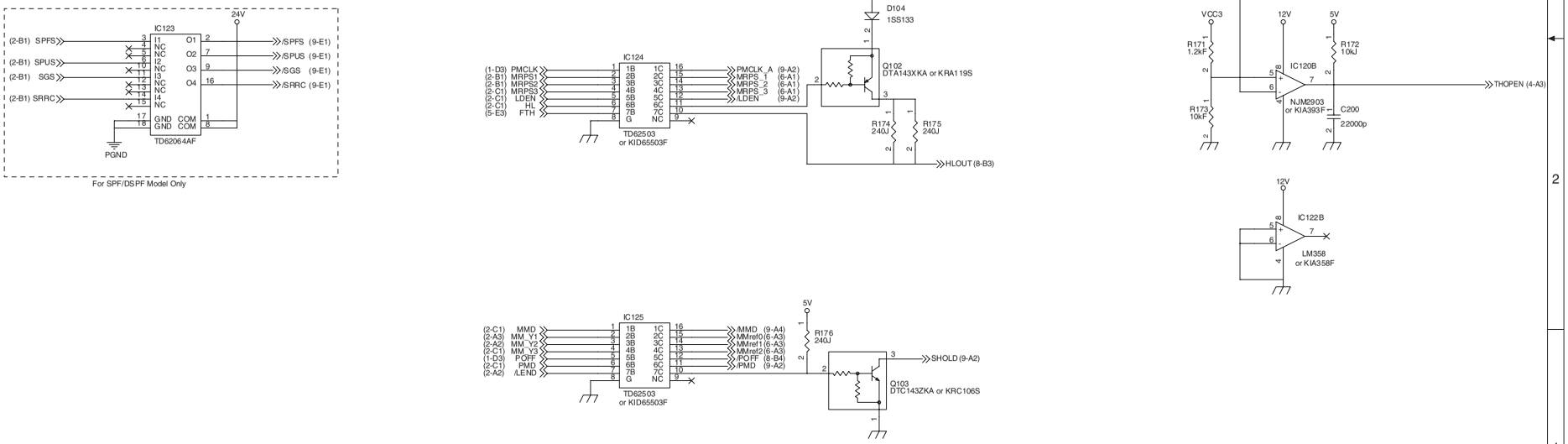


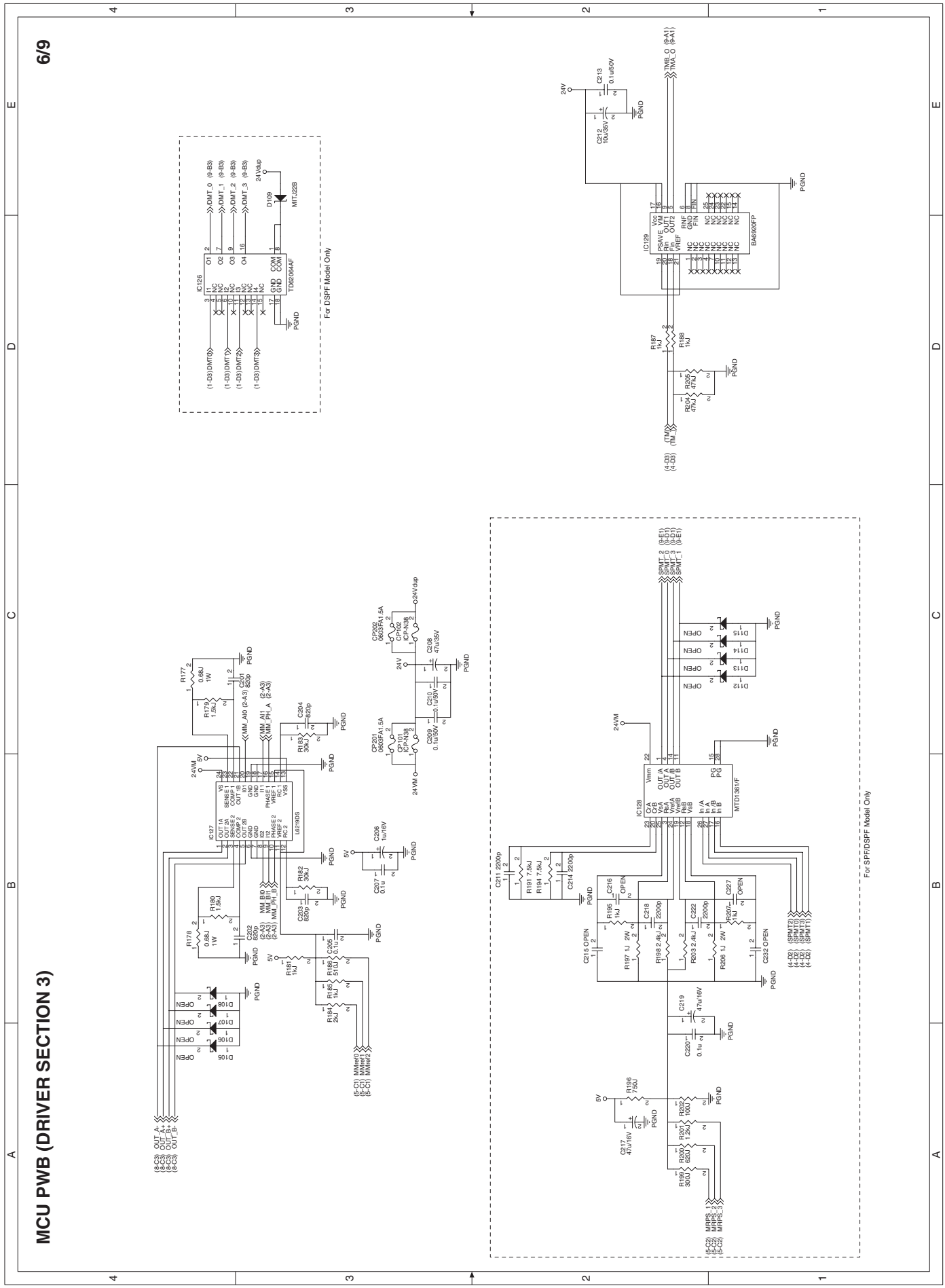
SDRAM

Model		Vendor/Type
12/13/14 CPM	64Mb(1Mx16bitx4bank)	HY57V641620HGT-P(Hyndai) MT48LC4M16A2TG-75(Micron) K4S641632F-TC75(Samsung) W986416DH-7(Winbond)
15CPM	128Mb(2Mx16bitx4bank)	MT48LC8M16A2TG-75(Micron) HY57V281620AT(Hyndai) K4S281632D-TC75(Samsung) W981216BH-75(Winbond)

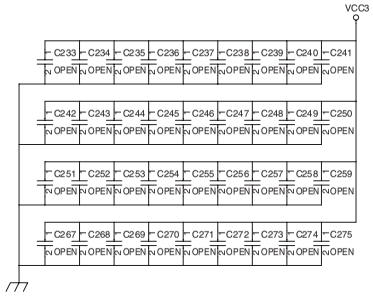

MCU PWB (DRIVER SECTION 1)
4/9
IC113
74LCX244
IC116
74VHC1244
IC118
74LCX244
IC114
74HC151
IC115
74HC151
IC117
74HC151
For SPF/DSPF Model Only

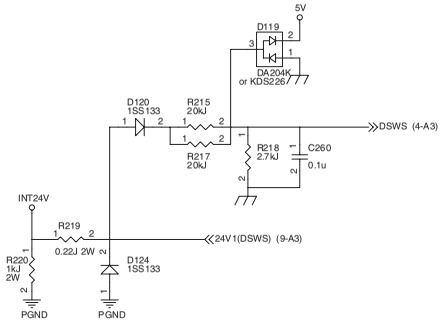
MCU PWB (DRIVER SECTION 2)

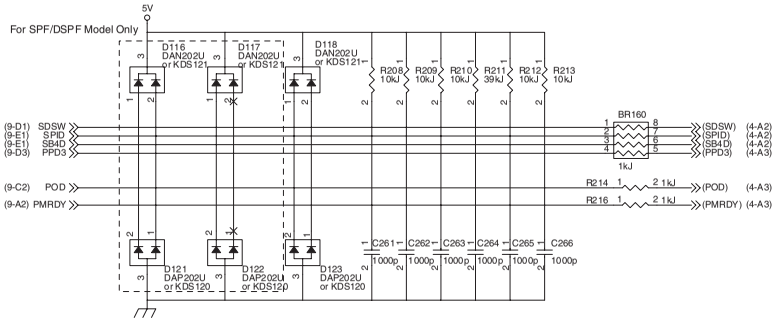


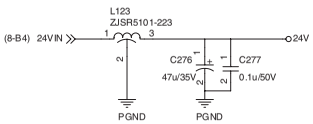

MCU PWB (DRIVER SECTION 3)
6/9
For DSPF Model Only
For SPF/DSPF Model Only

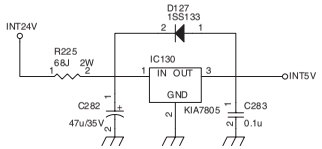
MCU PWB (NOISE FILTER/PULL-UP SECTION)

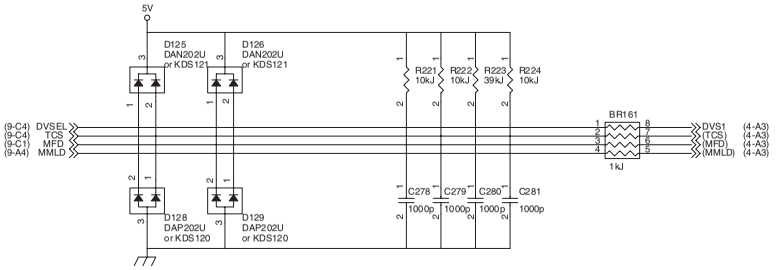


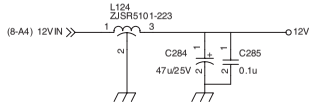


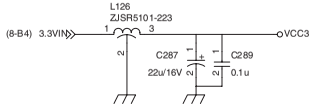


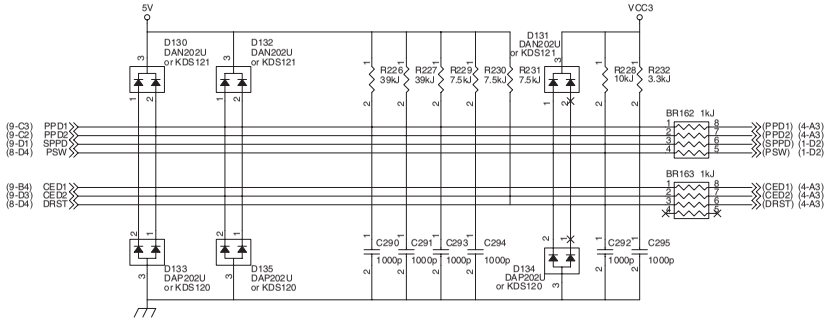


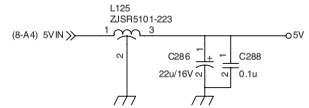


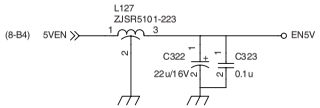






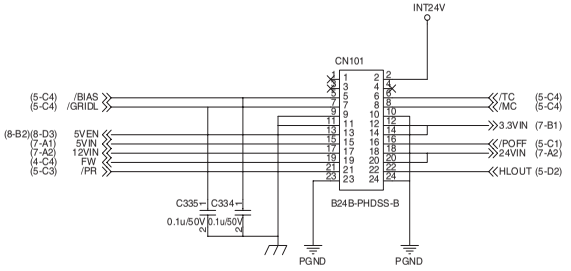




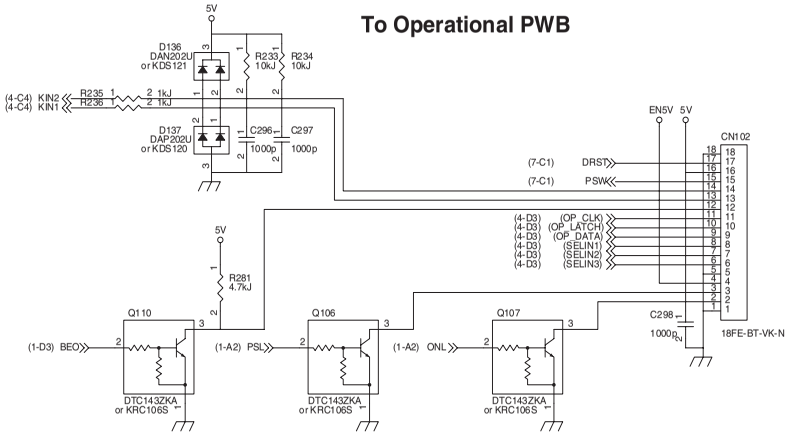


MCU PWB (CONNECTOR SECTION 1)

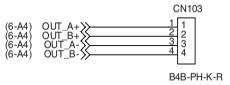
To Power unit



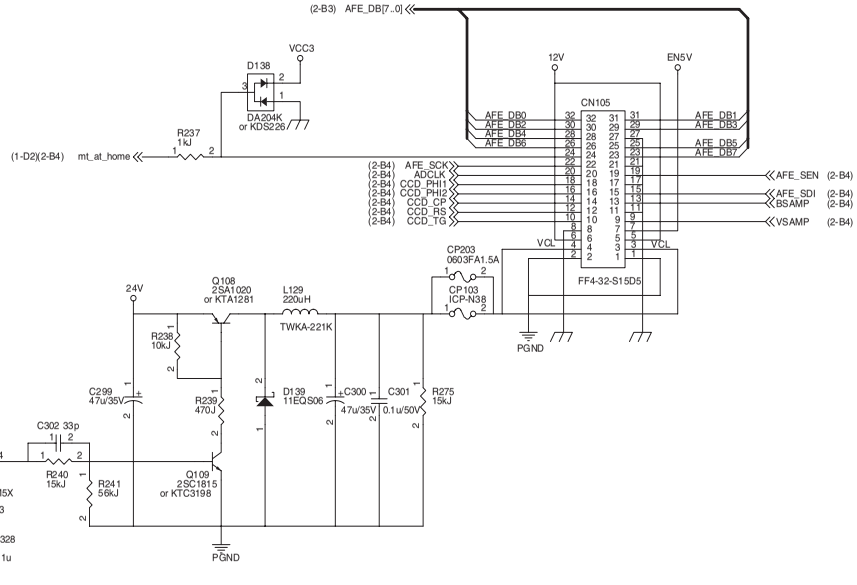
To Operational PWB



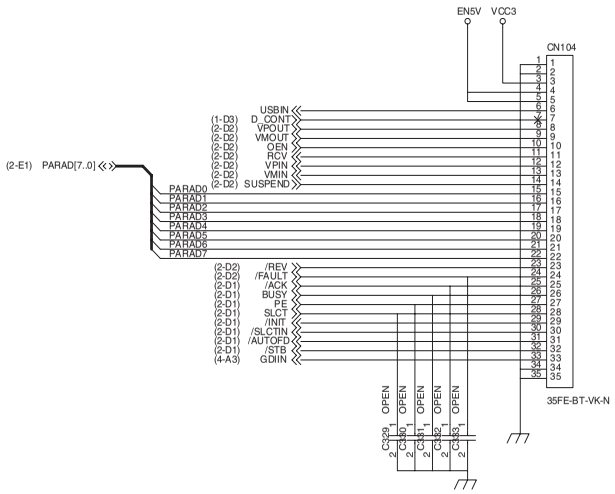
To Mirror motor



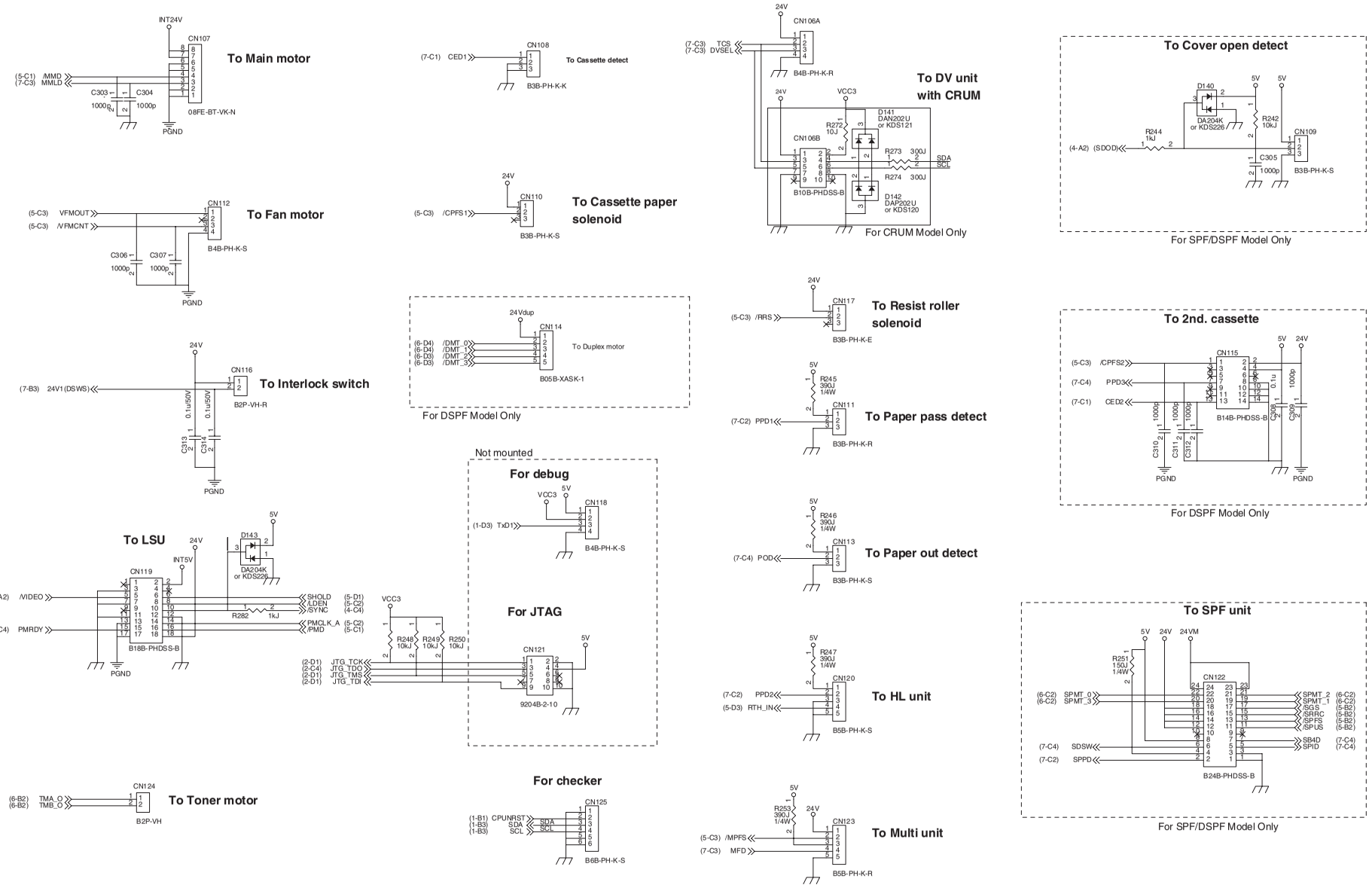
To Scanner unit



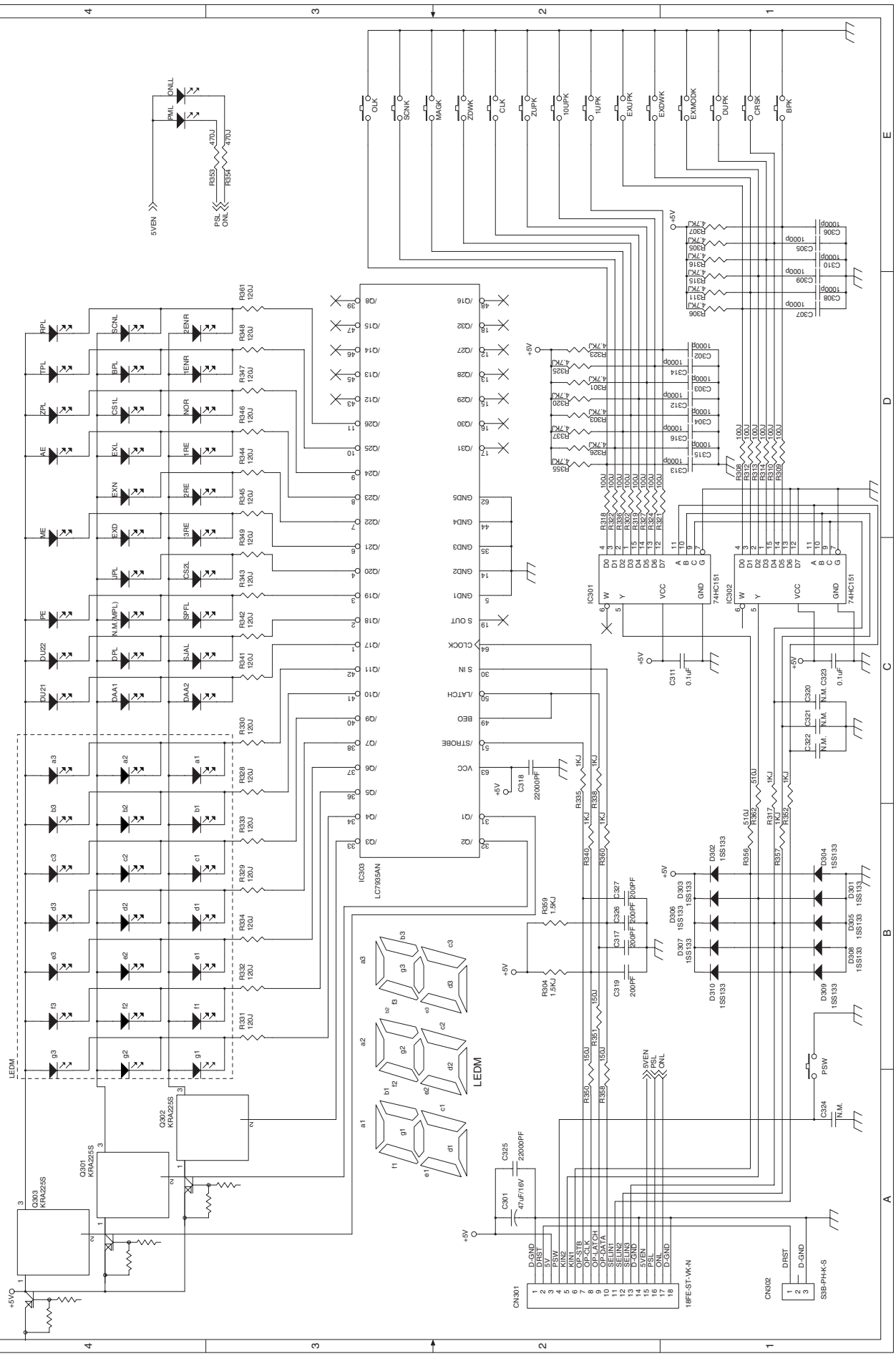
To Interface PWB



MCU PWB (CONNECTOR SECTION 2)

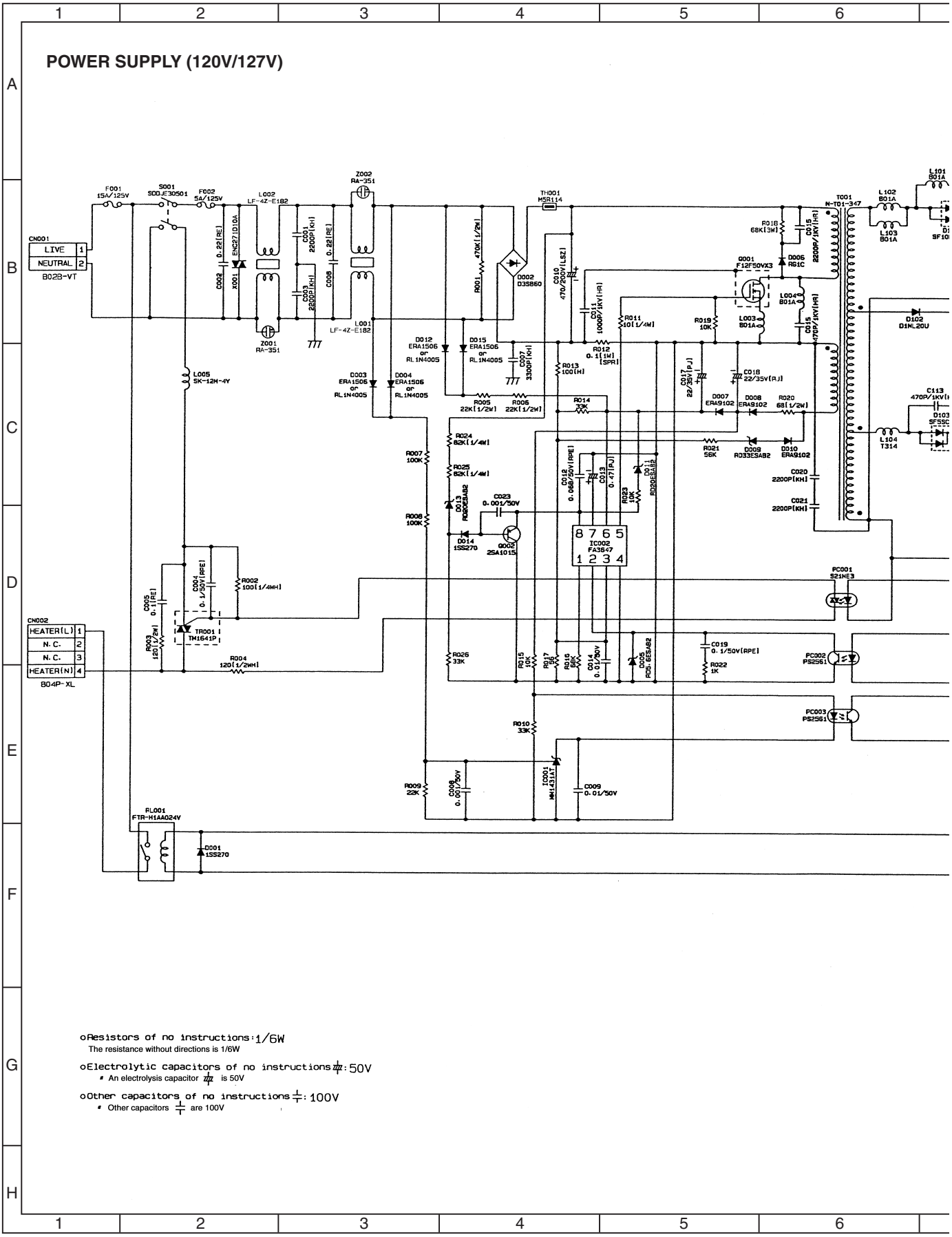


2. OPERATION PWB



3. POWER SUPPLY

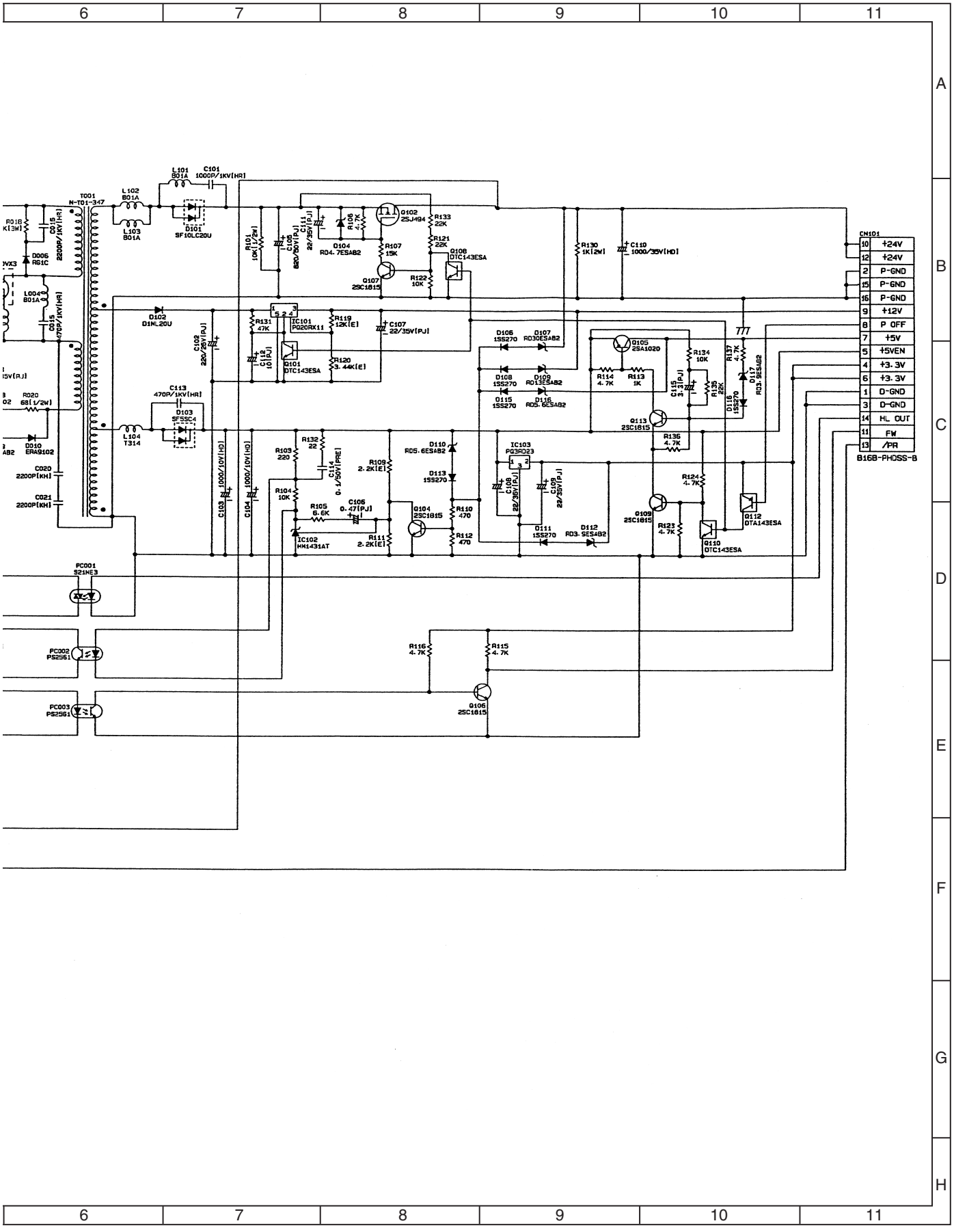
POWER SUPPLY (120V/127V)



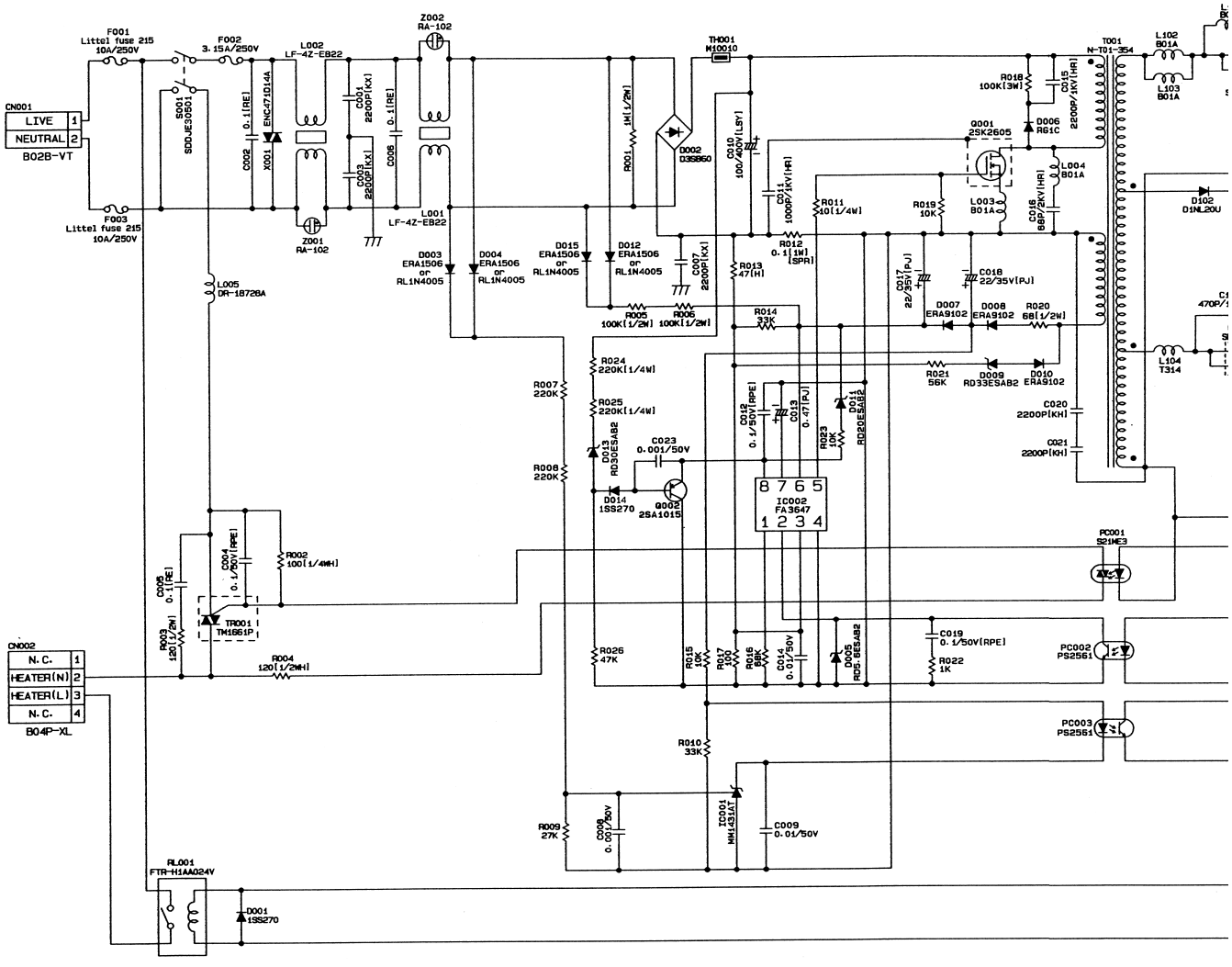
oResistors of no instructions: 1/6W
The resistance without directions is 1/6W

oElectrolytic capacitors of no instructions ⧻: 50V
- An electrolysis capacitor ⧻ is 50V

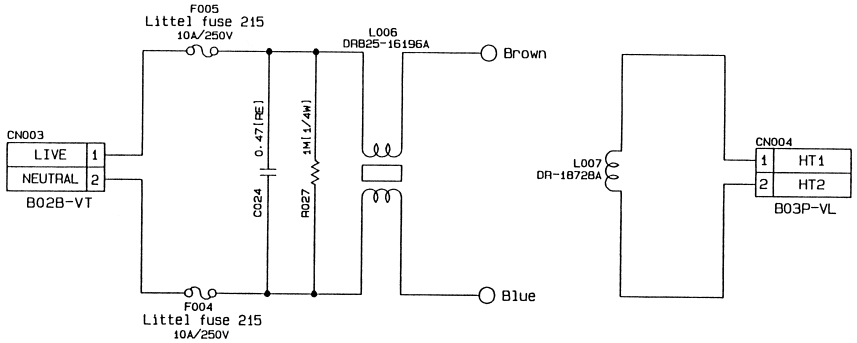
oOther capacitors of no instructions ⏤: 100V
- Other capacitors ⏤ are 100V

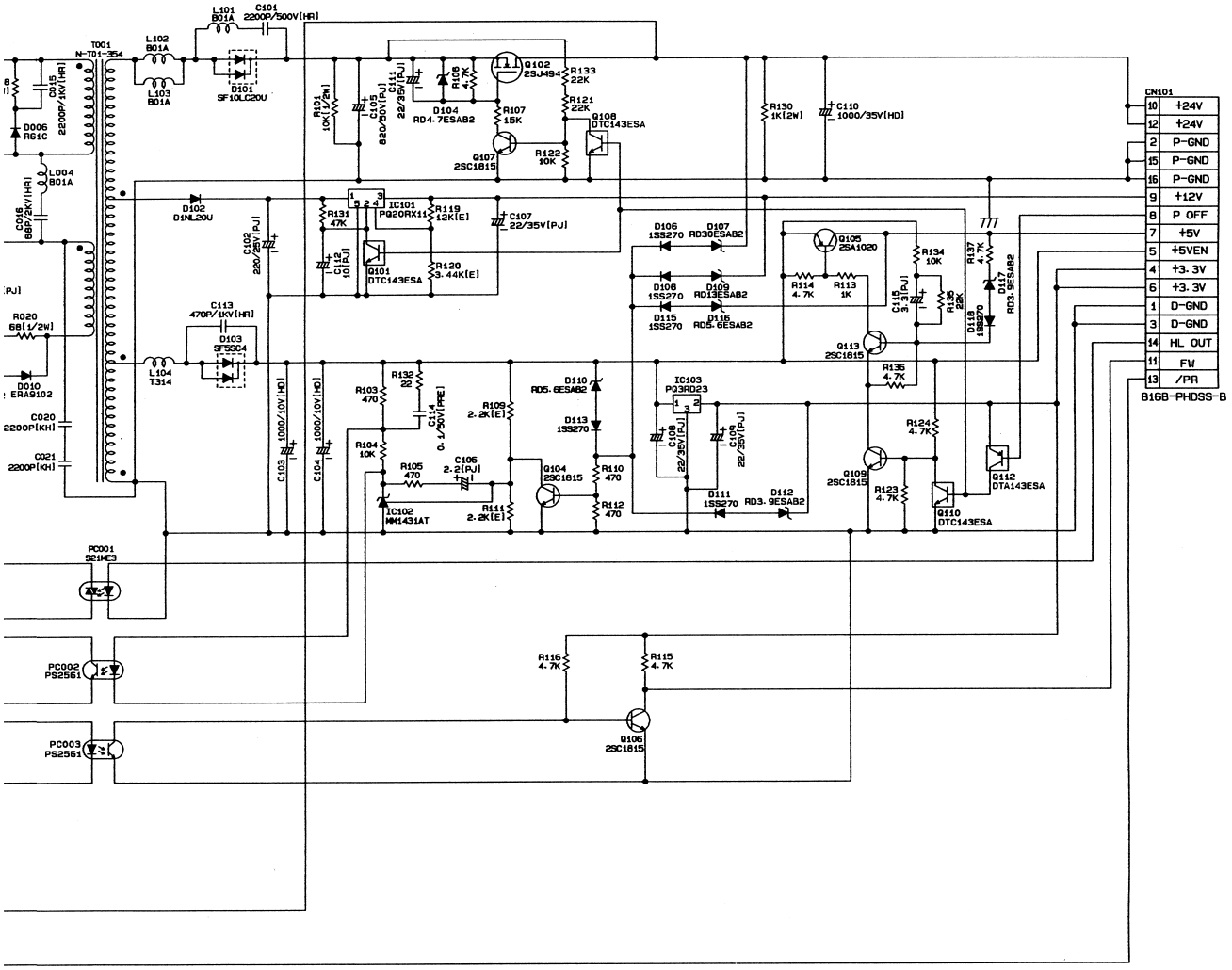

6
7
8
9
10
11
A
B
C
D
E
F
G
H
CN101
10 +24V
12 +24V
2 P-GND
15 P-GND
16 P-GND
9 +12V
8 P OFF
7 +5V
5 +5VEN
4 +3.3V
6 +3.3V
1 D-GND
3 D-GND
14 HL OUT
11 FW
13 /PR
B16B-PHDSS-B
T001
N-T01-347
L101 801A
C101 1000P/1KV(HR)
L102 801A
L103 801A
D101 SF10LC20U
D006 RB1C
L004 801A
D102 D1NL20U
D103 SFSSC4
L104 T314
D010 ERA91-02
C020 2200P(KH)
C021 2200P(KH)
R020 68(1/2W)
C113 470P/1KV(HR)
C102 220/25V(PJ)
C103 1000/10V(HD)
C104 1000/10V(HD)
R101 10K(1/2W)
C111 820/50V(PJ)
C112 22/35V(PJ)
Q102 2SJ494
R106 4.7K
D104 RD4.7ESA82
R107 15K
R133 22K
R121 22K
Q108 DTC143ESA
Q107 2SC1815
R122 10K
R130 1K(2W)
C110 1000/35V(HD)
R131 47K
IC101 PQ20RX11
R119 12K(E)
C107 22/35V(PJ)
C116 (10)(PJ)
Q101 DTC143ESA
R120 3.44K(E)
D106 1SS270
D107 RD30ESA82
D108 1SS270
D109 RD13ESA82
D115 1SS270
D116 RD5.6ESA82
Q105 2SA1020
R114 4.7K
R113 1K
R134 10K
R137 4.7K
C115 (1)(PJ)
R135 22K
D117 RD3.9ESA82
D118 1SS270
Q113 2SC1815
R136 4.7K
R132 22
R103 220
C114 0.47/50V(PRE)
R104 10K
R105 6.6K
C105 0.47(PJ)
R109 2.2K(E)
R111 2.2K(E)
IC102 KM1431AT
D110 RD5.6ESA82
D113 1SS270
Q104 2SC1815
R110 470
R112 470
IC103 PQ3RD23
C108 22/35V(PJ)
C109 22/35V(PJ)
D111 1SS270
D112 RD3.9ESA82
Q109 2SC1815
R124 4.7K
R123 4.7K
Q112 DTA143ESA
Q110 DTC143ESA
PC001 S21ME3
PC002 PS2561
PC003 PS2561
R116 4.7K
R115 4.7K
Q106 2SC1815

POWER SUPPLY (220V/240V)



4. NOISE FILTER CIRCUIT





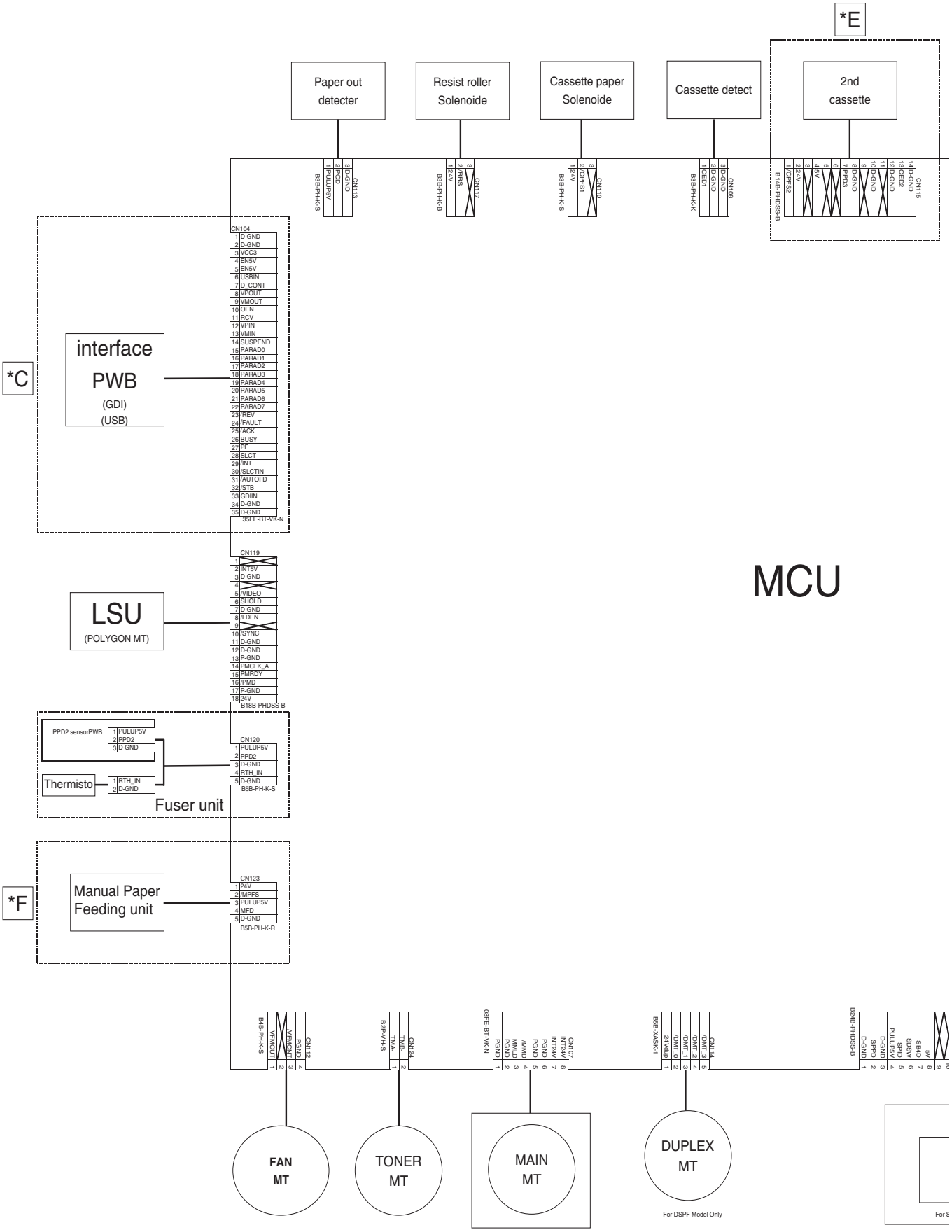
oResistors of no instructions: 1/6W
The resistance without directions is 1/6W

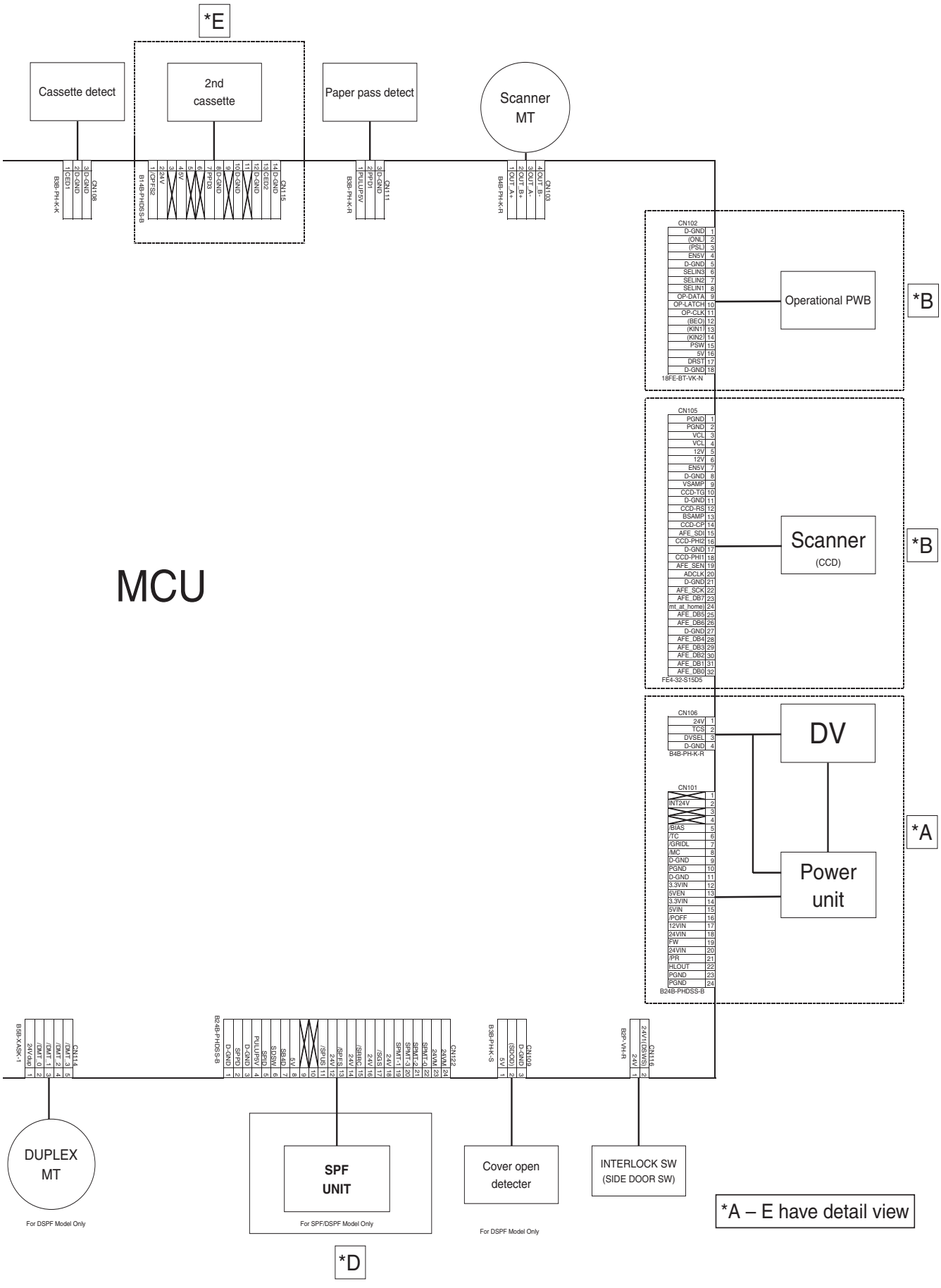
oElectrolytic capacitors of no instructions: 50V
An electrolysis capacitor is 50V

oOther capacitors of no instructions: 100V
Other capacitors are 100V

5. ACTUAL WIRING DIAGRAM

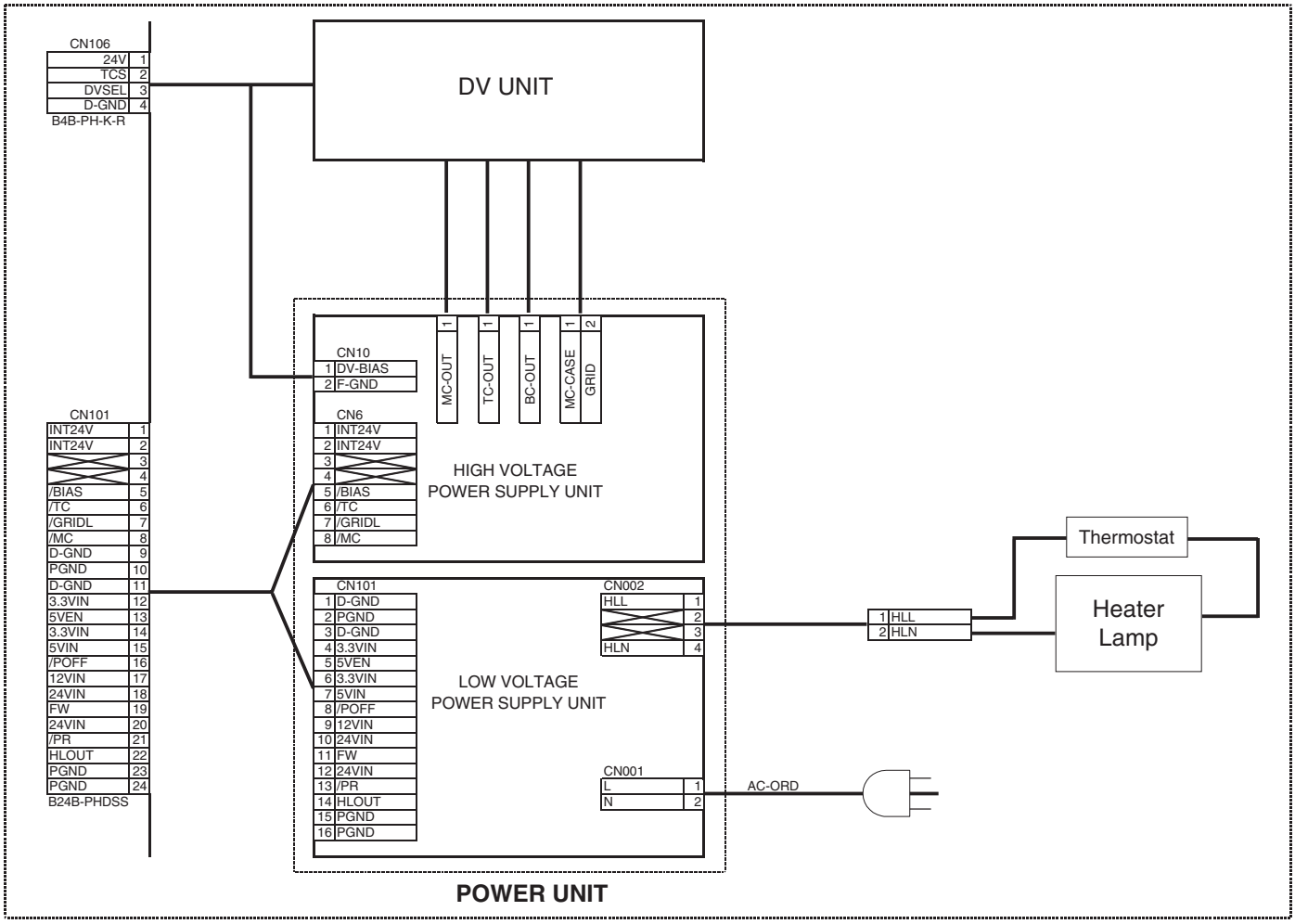
ACTUAL WIRING DIAGRAM 1/7



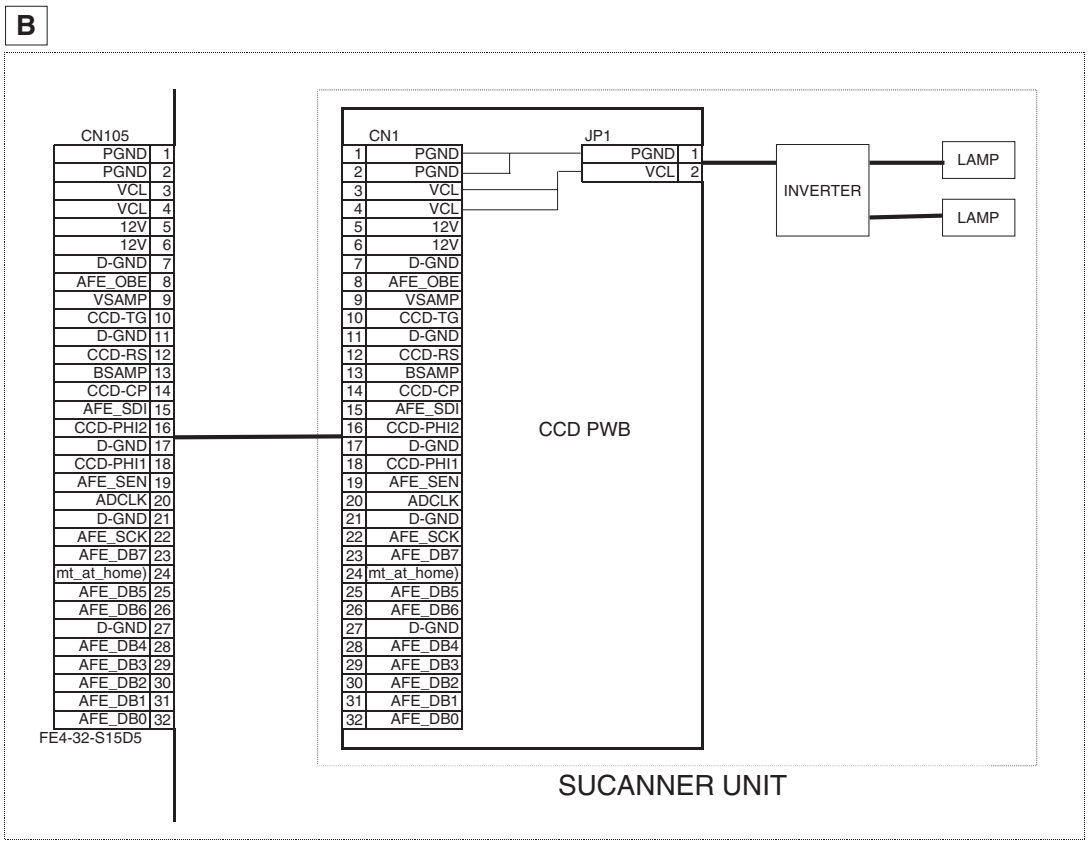

*E
Cassette detect
2nd cassette
Paper pass detect
Scanner MT
CN108
CN115
CN111
CN103
MCU
CN102
Operational PWB
*B
CN105
Scanner
(CCD)
*B
CN106
DV
CN101
*A
Power unit
CN114
CN122
CN109
CN116
DUPLEX MT
For DSPF Model Only
SPF UNIT
For SPF/DSPF Model Only
Cover open detecter
For DSPF Model Only
INTERLOCK SW (SIDE DOOR SW)
*D
*A – E have detail view

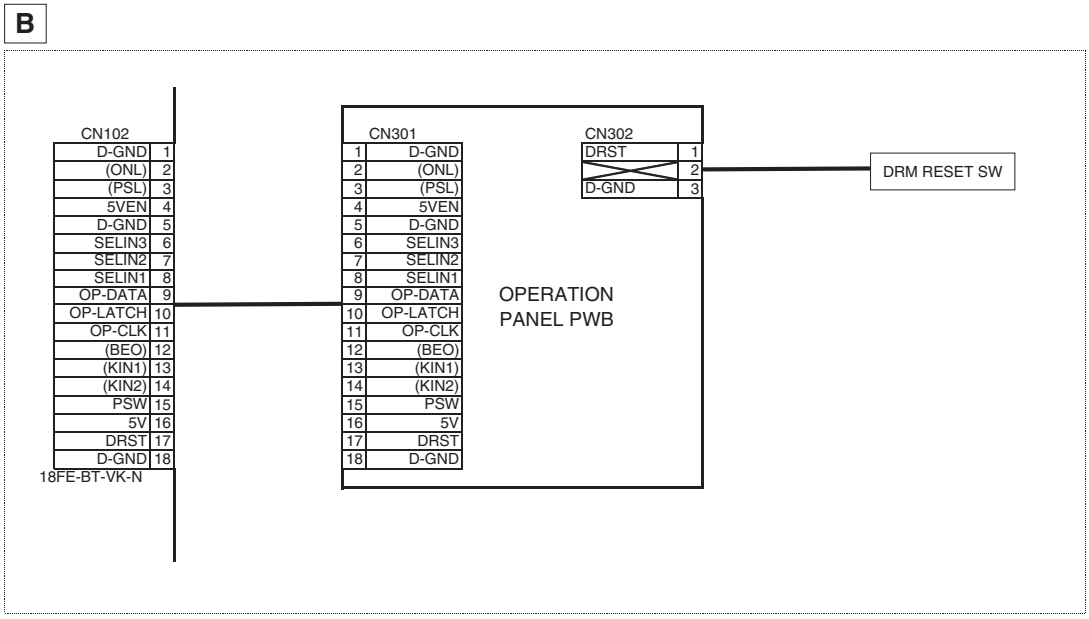
ACTUAL WIRING DIAGRAM 2/7 (POWER UNIT)

A



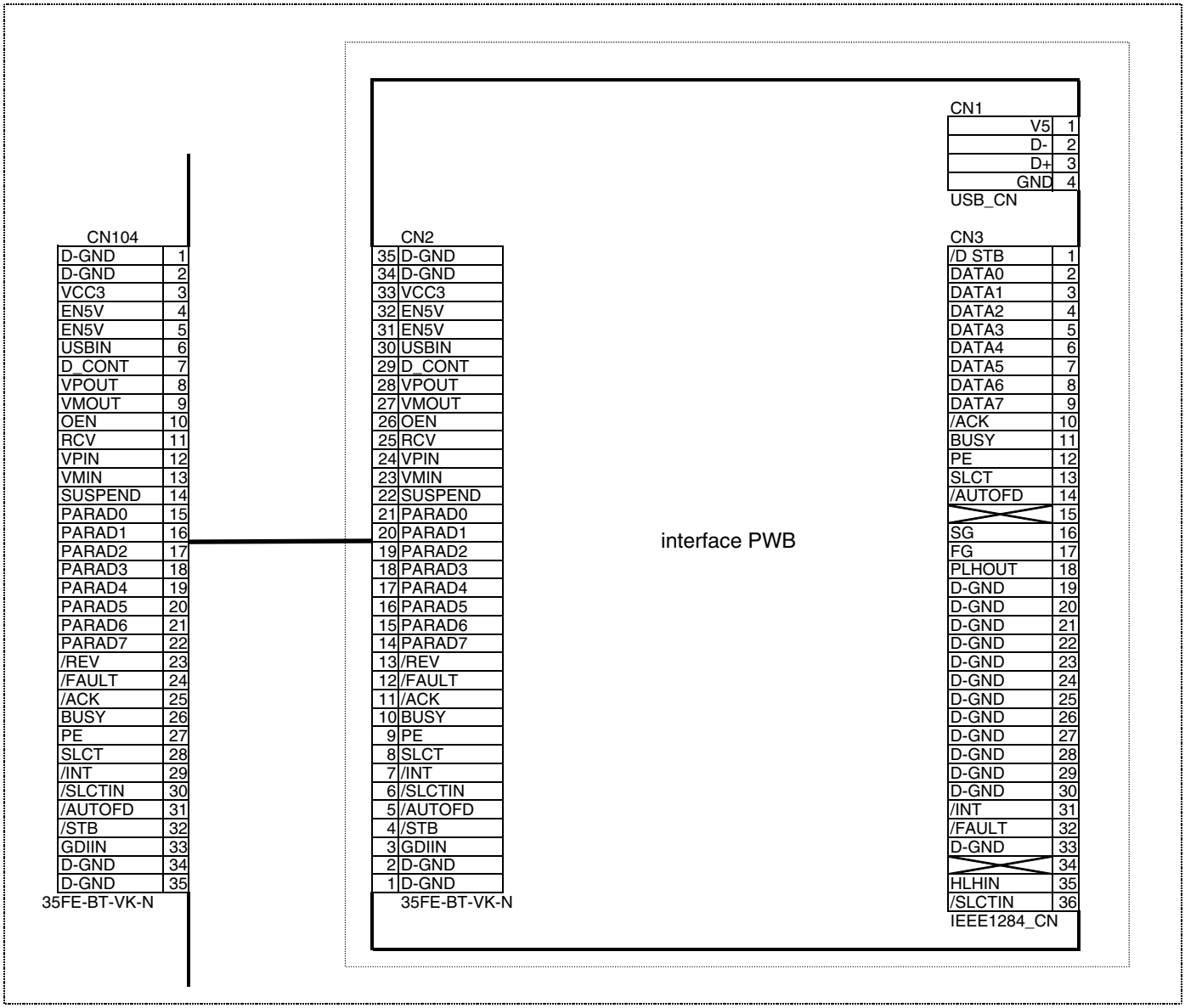
ACTUAL WIRING DIAGRAM 3/7 (SCANNER UNIT)





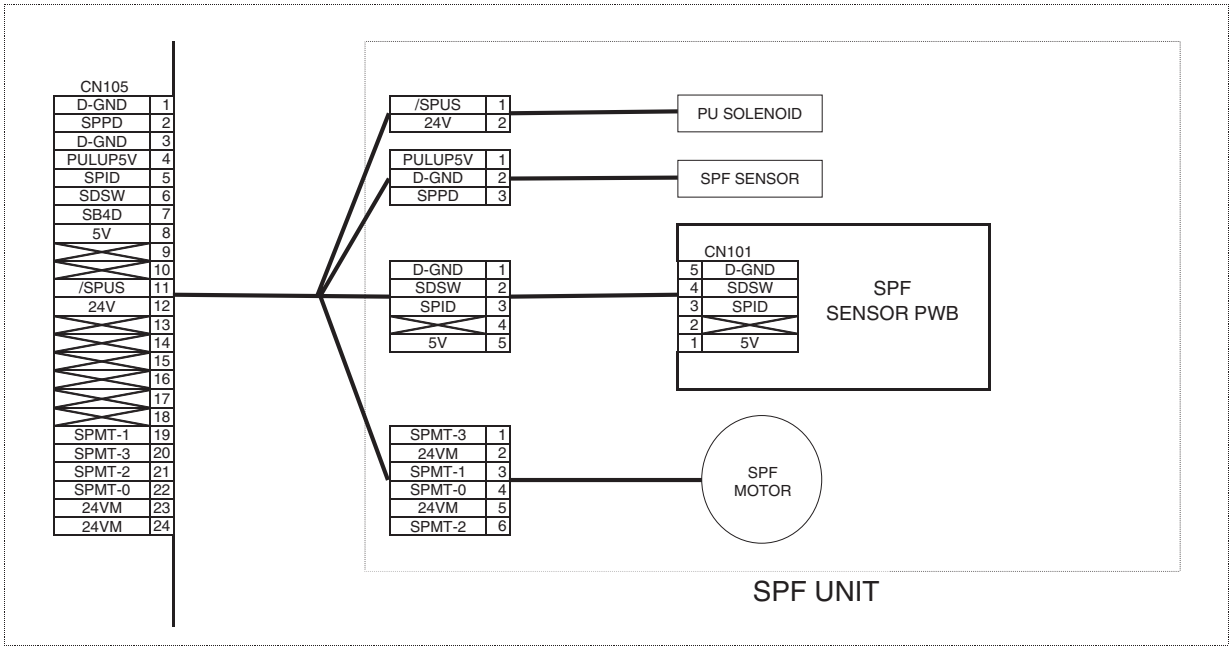
ACTUAL WIRING DIAGRAM 4/7 (INTERFACE)

C

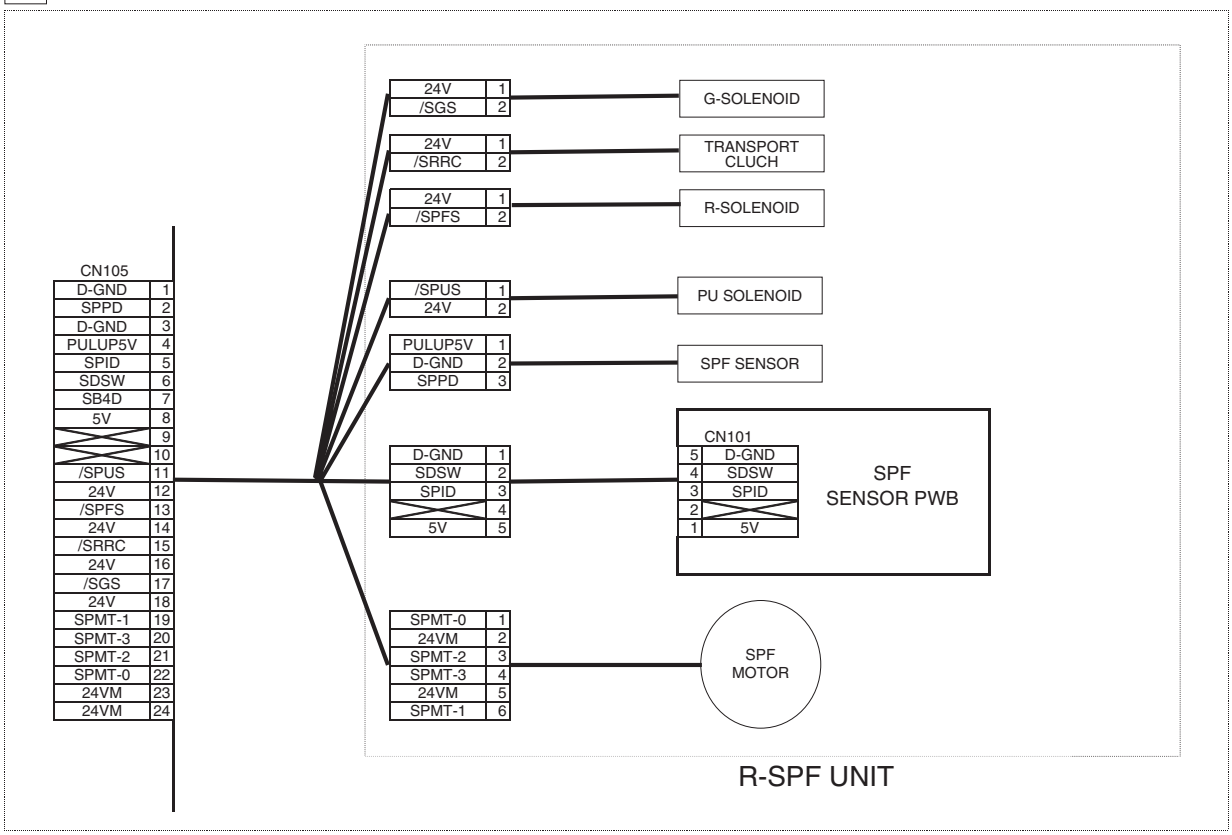


ACTUAL WIRING DIAGRAM 5/7 (SPF, R-SPF UNIT)

D

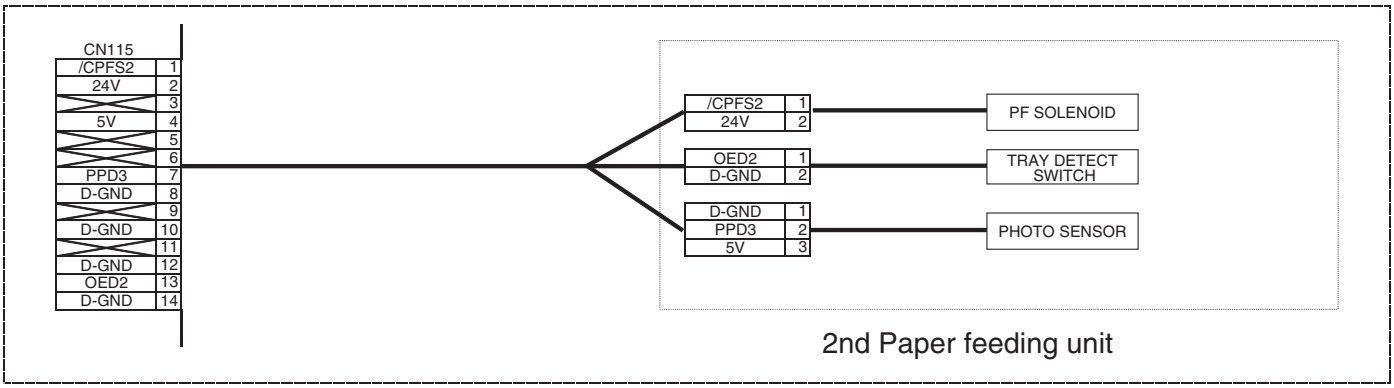


D

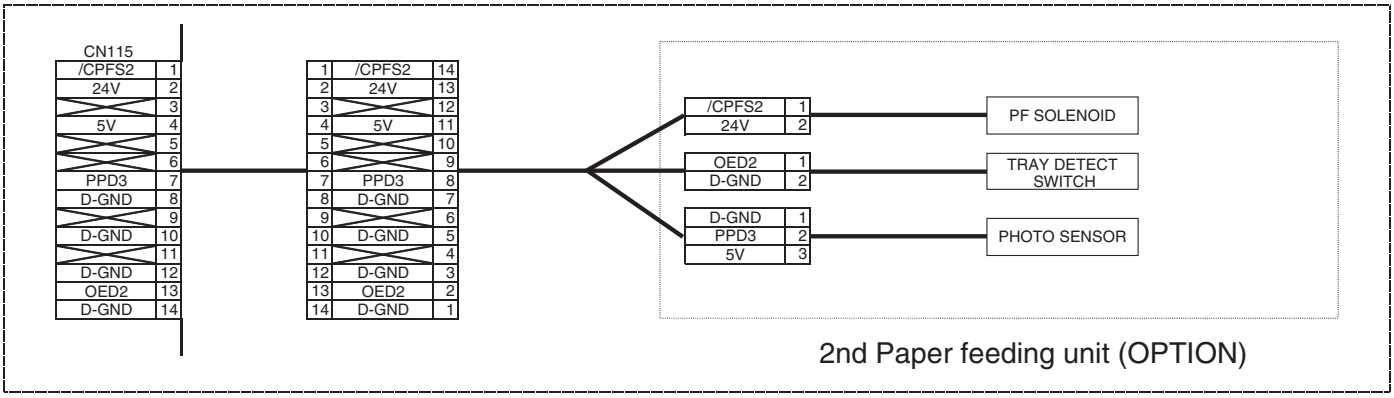


ACTUAL WIRING DIAGRAM 6/7 (2ND PAPER FEEDING UNIT)

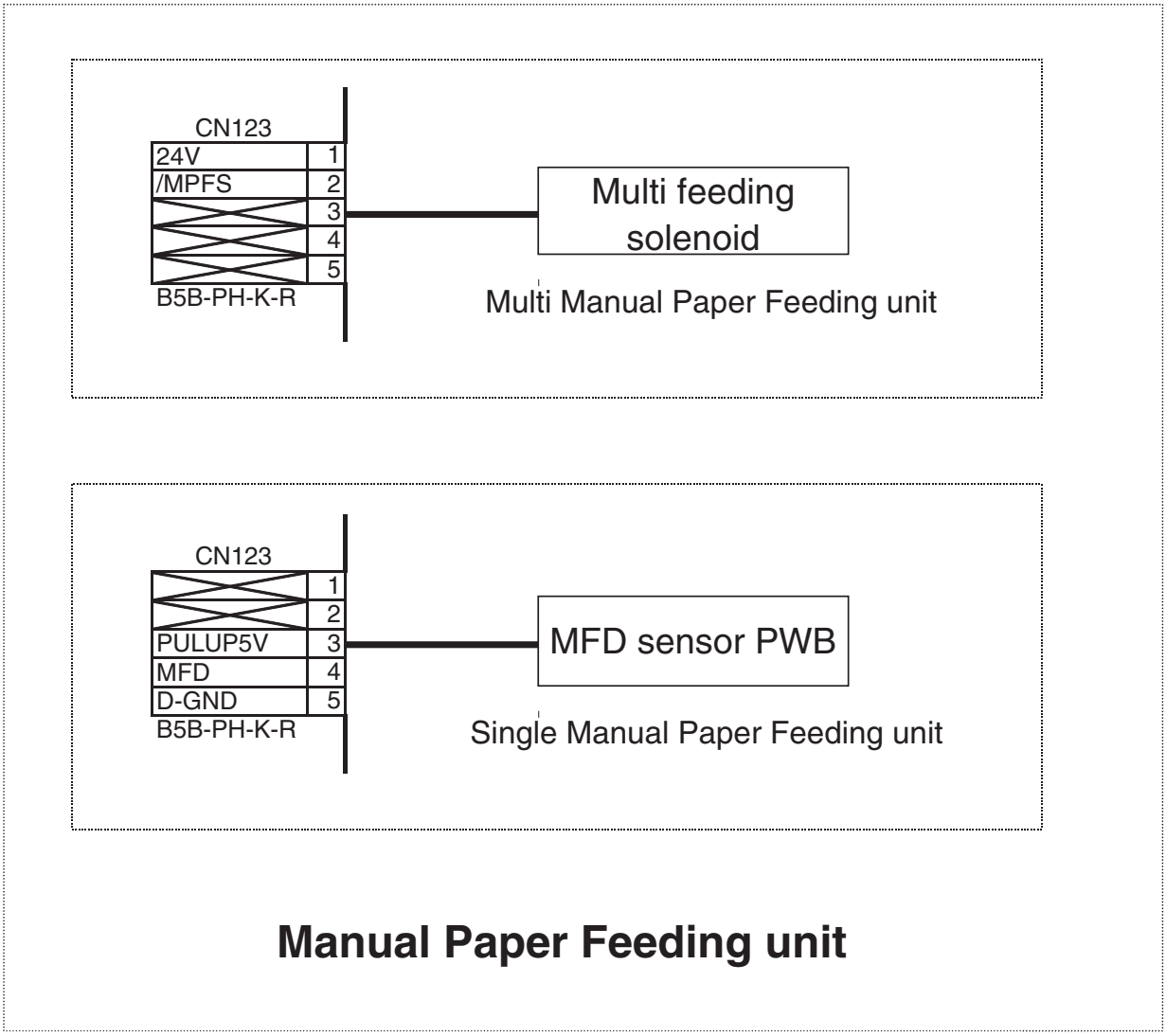
E



E



F


CN123
24V 1
/MPFS 2
3
4
5
B5B-PH-K-R
Multi feeding solenoid
Multi Manual Paper Feeding unit
CN123
1
2
PULUP5V 3
MFD 4
D-GND 5
B5B-PH-K-R
MFD sensor PWB
Single Manual Paper Feeding unit
Manual Paper Feeding unit

CAUTION FOR BATTERY REPLACEMENT

(Danish) ADVARSEL !
Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri
af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandoren.

(English) Caution !
Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type
recommended by the manufacturer.
Dispose of used batteries according to manufacturer's instructions.

(Finnish) VAROITUS
Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan
tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden
mukaisesti.

(French) ATTENTION
Il y a danger d'explosion s' il y a remplacement incorrect
de la batterie. Remplacer uniquement avec une batterie du
même type ou d'un type équivalent recommandé par
le constructeur.
Mettre au rebut les batteries usagées conformément aux
instructions du fabricant.

(Swedish) VARNING
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent
typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens
instruktion.

(German) Achtung
Explosionsgefahr bei Verwendung inkorrekter Batterien.
Als Ersatzbatterien dürfen nur Batterien vom gleichen Typ oder
vom Hersteller empfohlene Batterien verwendet werden.
Entsorgung der gebrauchten Batterien nur nach den vom
Hersteller angegebenen Anweisungen.

CAUTION FOR BATTERY DISPOSAL

(For USA,CANADA)

Contains lithium-ion battery. Must be disposed of properly.
Remove the battery from the product and contact
federal or state environmental
agencies for information on recycling and disposal options.

SHARP®

Trademark acknowledgments

Windows and Windows NT are trademarks of Microsoft Corporation in the U.S.A. and other countries.
IBM and PC/AT are trademarks of International Business Machines Corporation.
PCL is a trademark of Hewlett-Packard Company.
Pentium is a registered trademark of Intel Corporation.
All other trademarks and copyrights are the property of their respective owners.

SHARP CORPORATION
Digital Document System Group
Products Quality Assurance Department
Yamatokoriyama, Nara 639-1186, Japan
2002 July Printed in Japan