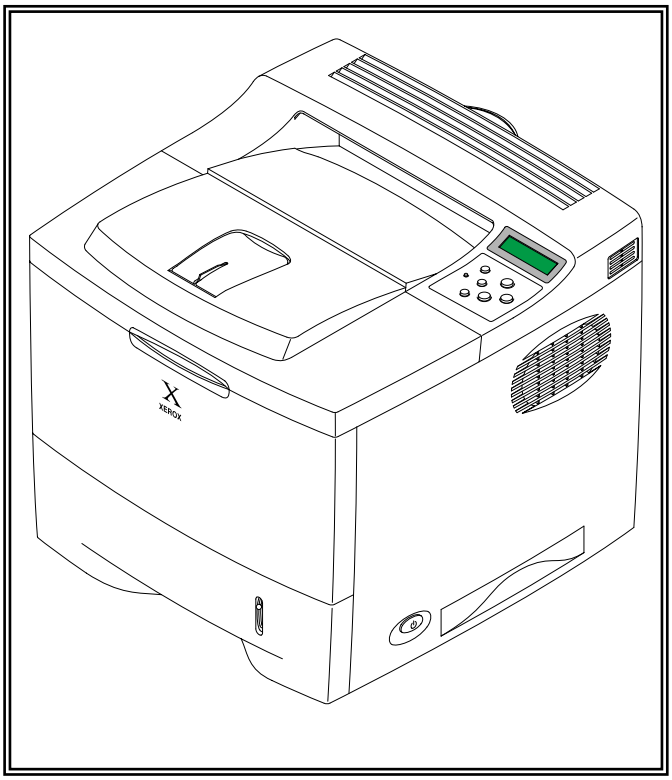
LASER PRINTER
Phaser 3450

SERVICE Manual

LASER PRINTER



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1. Precautions

The cautions in the below are items needed to keep in mind when maintaining and servicing.
Please read carefully and keep the contents in mind to prevent accidents while servicing and prevent any damages to the damage.

1.1 Warning for safety.

(1) Request the service by qualified service person.
The service for this machine must be performed by a service person who took the additional education of this field. It is dangerous if unqualified service person or user tries to fix the machine.

(2) Do not rebuild it discretionary.
Do not attach or change parts discretionary. Do not disassemble, fix, and rebuilt it. If you do, printer will not work and electric shock or a fire can be occurred.

(3) Laser Safety Statement
The Printer is certified in the U.S. to conform to the requirements of DHHS 21 CFR, chapter 1 Subchapter J for Class 1(1) laser products, and elsewhere, is certified as a Class I laser product conforming to the requirements of IEC 825. Class I laser products are not considered to be hazardous. The laser system and printer are designed so there is never any human access to laser radiation above a Class I level during normal operation, user maintenance, or prescribed service condition.

Warning >> Never operate or service the printer with the protective cover removed from Laser/Scanner assembly. The reflected beam, although invisible, can damage your eyes. When using this product, these basic safety precautions should always be followed to reduce risk of fire, electric shock, and injury to persons.

CAUTION - INVISIBLE LASER RADIATION
WHEN THIS COVER OPEN.
DO NOT OPEN THIS COVER.

VORSICHT - UNSICHTBARE LASERSTRAHLUNG,
WENN ABDECKUNG GE FFNET.
NICHT DEM STRAHL AUSSETZEN.

ATTENTION - RAYONNEMENT LASER INVISIBLE EN CAS
D OUVERTURE. EXPOSITION DANGEREUSE
AU FAISCEAU.

ATTENZIONE - RADIAZIONE LASER INVISIBILE IN CASO DI
APERTURA. EVITARE L ESPOSIZIONE AL
FASCIO.

PRECAUCION - RADIACION LASER IVISIBLE CUANDO SE ABRE.
EVITAR EXPONERSE AL RAYO.

ADVARSEL. - USYNLIG LASERSTR LNING VED BNING, N R
SIKKERHEDSBRYDERE ER UDE AF FUNKTION.
UNDG UDSAETTELSE FOR STR LNING.

ADVARSEL. - USYNLIG LASERSTR LNING N R DEKSEL
PNES. STIRR IKKE INN I STR LEN.
UNNG EKSPONERING FOR STR LEN.

VARNING - OSYNLIG LASERSTR LNING N R DENNA DEL
R PPNAD OCH SP RREN R URKOPPLAD.
BETRAKTA EJ STR LEN. STR LEN R FARLIG.

VARO! - AVATTAESSA JA SUOJALUKITUS OHITETTAESSA
OLET ALTTIINA N KYM TT M LLE LASER-
S TEILYLLE L KATSO S TEESEEN.

注 意 - 严禁渴开此盖, 以免激光泄露灼伤

주 의 - 이 덮개를 열면 레이저광에 노출될 수 있으므로
주의하십시오.

1.2 Caution for safety

1.2.1 Precaution related noxious material

There is a possibility to get harm from noxious material if you ignore the below information.

(1) Do not touch the damaged LCD. This PRINTER has LCD in control panel. Noxious liquid to human body exists in the LCD. If it gets into your mouth, immediately see a doctor. If it gets into eyes or on skin, immediately wash it off for more than 15 minutes with flowing water and see a doctor.
(2) The toner in a printer cartridge contains a chemical material, which might harm human body if it is swallowed. Please keep children out of the toner cartridge.

1.2.2 Precaution related electric shock or fire

It is possible to get electric shock or burn by fire if you don't fallow the instructions of the manual.

(1) Use exact voltage. Please do use an exact voltage and wall socket. If not, a fire or an electric leakage can be caused.
(2) Use authorized power cord. Do use the power cord supplied with PRINTER. A fire can occur when over current flows in the power cord.
(3) Do not insert many cords in an outlet. If you do, a fire can be occurr due to flow over current over flow in an outlet.
(4) Do not put water or extraneous matter in the PRINTER. Please do not put water, other liquid, pin, clip, etc. It can cause a fire, electric shock, or malfunction. If it happens, turn off the power and remove the power plug from the outlet immediately.
(5) Do not touch the power plug with wet hands. When servicing, do remove the power plug from outlet. And do not insert or take off it with wet hands. Electric shock can be occur.
(6) Caution when inserting or taking off the power plug. The power plug has to be inserted completely. If not, a fire can be caused due to poor contact. When taking off the power plug, do grip the plug and take it off. If grip the line and pull over, it could be damaged. This could cuase a fire or electric shock.
(7) Management of power cord. Do not bend, twist, or bind it and place other materials on it. Also, do not fix it with staples. If the power cord gets damage, a fire or electric shock can be caused. A damaged power cord must be replaced immediately. Do not repair the damaged part and reuse it. A repaired part with plastic tape can be occurred a fire or electric shock. Do not spread chemicals on the power cord. Do not spread insecticide on the power cord. A fire or electric shock can be occurred due to thinner(weak) cover of the power cord.
(8) Check whether the power outlet and the power plug are damaged, pressed, chopped, or on fire. When such poor conditions are found, repair it immediately. Avoid pressure or cut when moving the machine.
(9) Caution when thundering, and being flash of lightening. It causes a fire or electric shock. Take the power plug off when thundering. Do not touch cable and device when thundering and being flash of lightening.
(10) Avoid places where there is moisture or dust. Do not install the printer in a place where lots of dusts or humidifier are around. A fire can occur. A plug part needs to be cleaned well with dried fabric to remove dust. If water drops are dripped on the place cover with dust, a fire can occur.
(11) Avoid direct sunlight. Do not install the printer near to window where directly contacts to the sunlight. If the machine contacts sunlight long time, the machine cannot work properly because inner temperature of the machine is getting higher. A fire can be caused.
(12) Turn off the power and take off the plug when a smoke, strange smell, or sound from the machine. If you keep using it, a fire can occur.
(13) Do not insert steel or metal piece inside/outside of the machine. Do not put steel or metal piece into a ventilator. An electric shock can happen.

1.2.3 Precaution related handling the machine.

If you ignore this information, you get hurt and machine could be damaged.

(1) Do not install unit on uneven surfaces or slanted floors.
Please confirm that unit is correctly balanced after installation. Machine may fall over when itis not balanced correctly.
(2) Be careful not to insert a finger or hair in the rotating unit.
Be careful not to insert a finger of hair in the rotating unit (motor, fan, paper feeding part, etc) while the machine is operating. Once it happens, you could harm.
(3) Do not place any containers of water/chemical or small metals. If those are got into the inner side of machine, a fire or electric shock can occur.
(4) Do not install machine in areas where moisture or dust exists. For example, do not install machine near open windows, damage maybe caused by these conditions.
(5) Do not place a candle, burning cigarettes, and etc. on the machine. Do not install it near to a heater. A fire can occur.

1.2.4 Precaution when assembly/disassembly

When replace parts, do it very carefully. Do memorize the location of each cable before replace parts for reconnecting it afterwards. Do memorize. Please perform the below before replace or disassemblying any parts.

(1) Check the contents stored in the memory. All the information will be erased after replace main board. The information needed to keep has to be written down.
(2) Remove printer cables and power cord.
(3) Take off printer cables and power code connected to printer.
(4) Do use formal parts and same standardized goods when replacing parts.Must check the product name, part cord, rated voltage, rated current, operating temperature, etc.
(5) Do not give an over-force when release or tighten up the plastic parts.
(6) Be careful not to drop the small parts such as screws in the printer.
(7) Be careful not to change the location of small parts such as screws when assembling and disassembling.
(8) Do remove dust or foreign matters completely to prevent fire of tracking, short, or etc.
(9) After finished repair, check the assembled state whether it is the same as before the repair or not.

1.3 ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called “Electrostatically Sensitive (ES) Devices”, or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor “chip” components.
The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

Caution >>Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, which should be removed for your personal safety reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.
3. Use only a grounded tip soldering iron to solder or desolder ESDs.
4. Use only an “anti-static” solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESDs.
5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.
7. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.
9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one’s foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

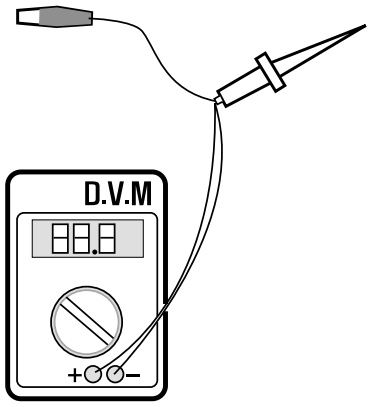
2. Reference Information

This chapter describes the reference information for applying this training manual, and it is consisted of the tool list, the abbreviation table, the outline of model, and so on.

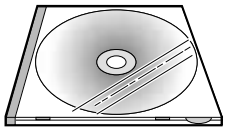
2.1 Tool for Troubleshooting

The following tools are recommended for safe and smooth troubleshooting described in this service manual.

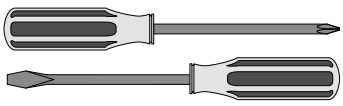
1 DVM(Digital Volt Meter)
Standard : Indicates more than 3 digits.



2 Software(Driver) installation CD ROM



3 Driver
Standard : "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).



4 Tweezers
Standard : For general home use, small type.

5 Cotton Swab
Standard : For general home use, for medical ser-vice

6 Spring Hook
Standard : For general use

7 Cleaning Equipments a IPA (Isopropyl Alcohol)dry cloth or a soft stuff neutral detergent

2.2 Acronyms and Abbreviations

The table in the below explains abbreviations used in this service manual.
The contents of this service manual are declared with abbreviations in many parts. Please refer to the table.

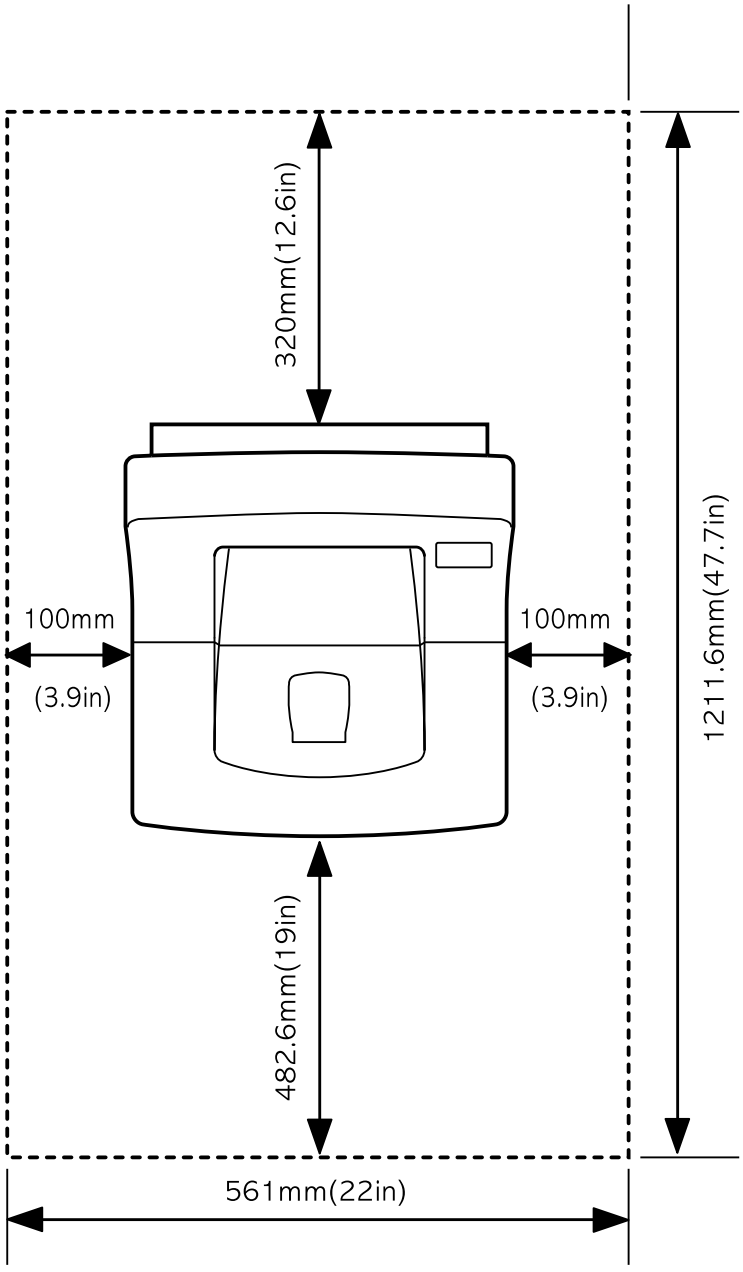
AC	Alternating Current
ASIC	Application Specific Integrated Circuit
ASSY	assembly
BIOS	Basic Input Output System
CMOS	Complementary Metal Oxide Semiconductor
CN	connector
CON	connector
CPU	Central Processing Unit
dB	decibel
dbA	decibelampere
dBM	decibel milliwatt
DC	direct current
DCU	Diagnostic Control Unit
DPI	Dot Per Inch
DRAM	Dynamic Random Access Memory
DVM	Digital Voltmeter
ECP	Enhanced Capability Port
EEPROM	Electronically Erasable Programmable Read Only Memory
EMI	Electro Magnetic Interference
EP	electrophotographic
EPP	Enhanced Parallel Port
F/W	firmware
GDI	graphics device interface
GND	ground
HBP	Host Based Printing
HDD	Hard Disk Drive
HV	high voltage
HVPS	High Voltage Power Supply
I/F	interface
I/O	Input and Output
IC	integrated circuit
IDE	Intelligent Drive electronics or Imbedded Drive Electronics
IEEE	Institute of Electrical and Electronics Engineers. Inc
IPA	Isopropy Alcohol
IPM	Images Per Minute
LAN	local area network
lb	pound(s)
LBP	Laser Beam Printer
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LSU	Laser Scanning Unit
MB	megabyte
MHz	megahertz
MPF	Multi Purpose Feeder
NIC	Network Interface Card
NVRAM	nonvolatile random access memory
OPC	Organic Photo Conductor
PBA	Printed Board Assembly
PCL	Printer Command Language , Printer Control Language
PDL	Page Discription Language
PPM	Page Per Minute
PS	Post Script
PTL	Pre-Transfer Lamp
Q-PID	Quick Printer Initiating Device
Q ty	quantity
RAM	Random Access Memory
ROM	Read Only Memory
SCF	Second Cassette Feeder
SMPS	Switching Mode Power Supply
SPGP	Samsung Printer Graphic Processor
SPL	Samsung Printer Language
Spool	Simultaneous Peripheral Operation Online
SW	switch
sync	synchronous or synchronization
USB	Universal Serial Bus

2.3 Selecting a Location

Select a level,stable place with adequate space for air circulation.Allow extra space for opening covers and trays. The area should be well-ventilated and away from direct sunlight or sources of heat,cold,and humidity.Do not set the printer close to the edge of your desk or table.

CLEARANCE SPACE

- **Front :** 482.6 mm (enough space so that trays can be removed)
- **Back :** 320 mm (enough space to allow opening of the rear cover)
- **Right :**100 mm
- **Left :**100 mm (enough space for ventilation)



3. Specifications

Product specifications are subject to change without notice.See below for product specifications.

3.1 General Specifications

ITEM	DESCRIPTION	
Print Method	Non-impact Electro-photography	
Development system	Non-Magnetic, Mono-Component Toner	
Transfer system	Conductive roller transfer	
Fuser Unit(Toner fix)	Pressure and Heating with Lamp	
Print Speed	24 PPM : A4 size , IDC 5% pattern	
	25 PPM : Letter size , IDC 5% pattern	
Resolution	True 600 X 600 DPI	
	Addressable 1200 X 1200 DPI	
Source of Light	Laser diode (LSU : Laser Scanner Unit)	
Warm-Up Time	Power-on boot : 50 seconds or less	
First Print Time	12 seconds or less	
Feed Method	Cassette & Manual , Option Feeder(SCF)	
Media Size	76mm * 128mm(3 * 5") to 216mm * 356mm(8.5 *14")	
Media Thickness	Cassette : 16 ~ 28 lb, Manual : 16 ~43lb	
Dimension(W X D X H)	386 X 436 X 326 mm	
Weight	Net : 13 Kg	
	Gross : 15.5 Kg	
Acoustic Noise	Stand by : Less than 35 dB	
	Printing: Less than 53 dB	
	Sleep mode : Background Noise	
Power save mode	Enable	
Toner save mode	Enable	
Consumption Parts	Pick Up Roller	100,000 Pasges
	Transfer Roller	100,000 Pasges
	Fuser Assembly	100,000 Pasges
Optional Parts	SCF	Paper Capacity : 500 Sheets
	NIC	Ethernet 10/100 base TX Protocols : TCP/IP, SPX/IPX, Ethertalk, SNMP, HTTP1.1, DLC/LLC 16MB RAM Buffer for faster graphics performance 2MB Flash Memory for upgrade Throughput : 200 ~ 300K TCP/IP
	SDRAM DIMM	16, 32, 64, 128MB 100PIN SDRAM DIMM
	Postscript	Flash ROM 4MB

3.2 Controller Specification

ITEM	DESCRIPTION
Processor(CPU)	ARM946E-S (CLOCK SPEED 166Mhz)
Memory	FLASH ROM(PROGRAM) : 2MB flash
	RAM : 16MB (Expandable to 144MB)
	Option DIMM module : 16,32,64,128MB (SDRAM)
	100Pin SDRAM DIMM (Samsung Printer Only)
	EEPROM(NVRAM) : 512byte
Emulation	PCL6 : win 3.1/95/98/ME/NT/2000/XP
	Postscript Level3 : win 95/98 PPD , win NT4.0 PPD , Mac PPD
	PCL5e : Linux
Interface	Parallel : IEEE 1284 Bidirectional Parallel
	- Modes supported : Compatible,Nibble,Byte,ECP
	USB(without HUB mode)
	-USB 2.0 compliant -12 Mbps 1 port
	Serial : RS-232C
	Network Interface : option for ML-2150
	-10/100 Base TX -10/100 Base TX 802.11b Wireless LAN (option for ML-2151N)
Interface switching	Automatic
Interface time-out	5min(Max.)
Font	45 Scalable Font , 1 Bitmap Font ,Postscript 3 internal font 136

3.3 Electrical Specification

ITEM	DESCRIPTION		REMARK
Input Voltage	Nominal input voltage	200-240 VAC / 100~127VAC	
	Input voltage range	189-264 VAC/ 90~132VAC	
	Nominal frequency	50/60 MHz	
	Frequency tolerance	+3Hz	
Power Consumption	Printing : 450W Avg or less (with SCF)		
	Idling : 100W Avg or less		
	Power Save : 20W Avg or less		

3.4 TONER Cartridge (Developer)

ITEM	DESCRIPTION	REMARK
Life span	Starter : 5,000 sheets	A4 Size, IDC 5% pattern, SIMPLEX
	Running : 10,000 sheets	
Developing	Non-magnetic Contact Developing	
Charging	Conductive Roller Charging	
Toner supply Method	Exchange the Developer	
Toner checking sensor	Enable	
Ozone	0.1PPM or less	
Style	Single cartridge	

3.5 Environmental Condition

ITEM	OPERATING	STORAGE
Temperature	10~30 oC(50-90 oF)	-20~40 oC (-4~104 oF)
Humidity	20~80%RH	10~80%RH

3.6 Paper Handling Specifications

>> Input Paper Size

PAPER	PAPER SIZE	1ST CASSETTE	2ND CASSETTE	MP TRAY	DUPLEX
A4	210 X 297 mm	O	O	O	O
Letter	216 X 279 (8.5 X 11")	O	O	O	O
Folio (Legal13")	216 X 330 (8.5 X 13")	O	O	O	O
Legal (Legal14")	216 X 356 (8.5 X14")	O	O	O	O
Executive	184 X 267 ((7.25 X10.5")	O		O	
Statement	140 X 216 (5.5 x8.5")			O	
ISO B5	176 X 250	O		O	
JIS B5	182 X257	O		O	
A5	148.5 X 210	O		O	
A6	105 X148.5			O	
Com-10 Envelope	105 X 241 (4.15 X 9.5")			O	
Monarch Envelope	98 X191 (3.87 X 7.5")			O	
DL Envelope	110 X 220 (4.33 X 8.66")			O	
C5 Envelope	162 X 229 (6.38 X 9.01")			O	
C6 Envelope	114 X 162 (4.49 X 6.38")			O	
Transparency(OHP)	A4 or Letter			O	
Label paper	A4 or Letter			O	

O : Enable

>> Input capacity

ITEM	DESCRIPTION	
Cassette	550 sheets	
MP tray	Paper	100 sheets
	Transparencies	25 sheets
	Envelopes	10 sheets
	Labels	25 sheets
Option Cassette	500 sheets	

>> Output capacity

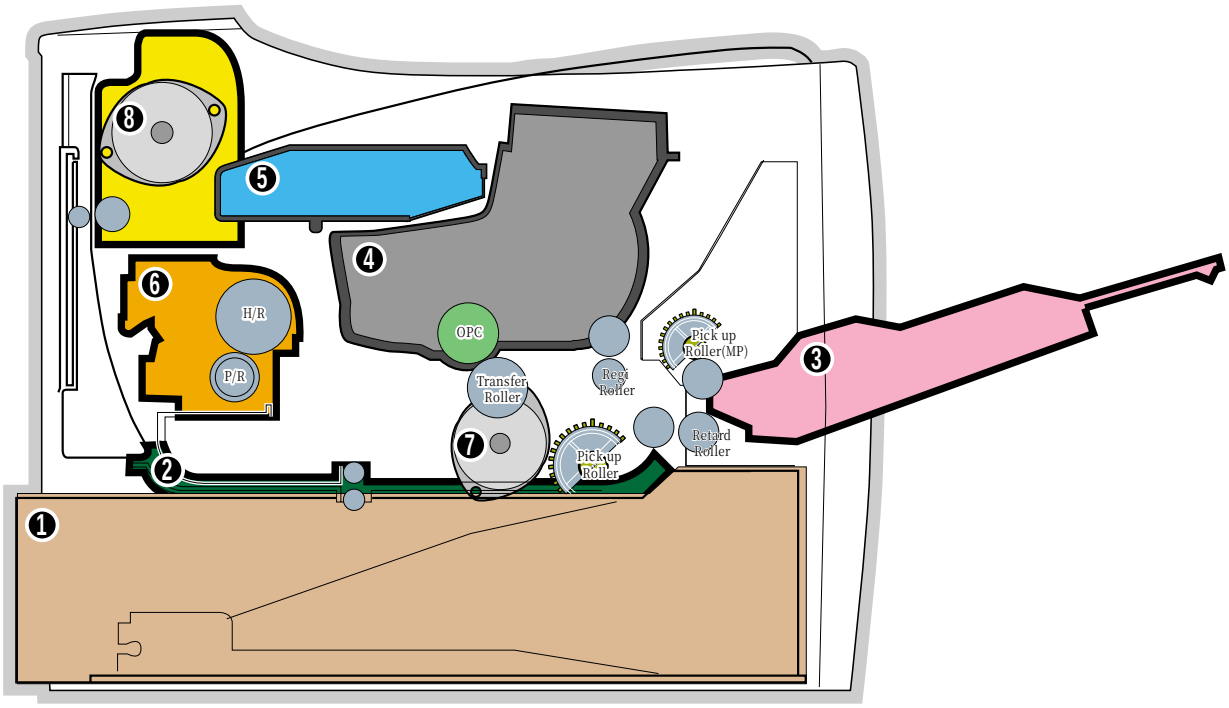
ITEM	DESCRIPTION
Face Down	250 sheets
Face UP	100 sheets

Memo

4. Summary of Product

This chapter describes the functions and operating principal of the main component.

4.1 System Layout



1. Cassette
2. Duplex Unit
3. MPF
4. Toner Cartridge
5. LSU
6. Fuser
7. Main Motor
8. Exit Motor

4.1.1 Feeding

It is consists of a basic cassette, an MP tray for supplying different types of media : envelope, label special paper, duplex unit, and parts related to paper transferring.

1) Separation method

Separate it from the finger mounted to the cassette side guide and apply retard roller that uses a spring clutch. A feed roller uses an electronic clutch to control driving power.

2) Basic cassette

It takes a center loading method and applies 'both side finger separating method.' It means that there is a paper sensor, but a paper size is detected after detecting the first paper by software.
Both the side guide and the rear guide can be adjusted for for various types of papers from A5 to legal size paper.
It has a paper existence sensing function (Capacity : 500 sheets of general paper), paper arranging function, various size papers accepting function, SCF paper path function, and displaying function of paper remaining amount.
In the front side, there is a paper level indicator.

3) Pick-up roller

It has functions such as a paper pickup function, driving control function, paper feeding function, and removing electronic static function.

4) Retard roller

It takes an arrangement method which uses a stopper roller and a weight without electric actuator.It has paper separating function, driving control function, and multi feeding prevention function.

6) Registration roller

It has a paper arranging function, paper transferring function, paper detecting function, jam removing function, and so on.

7) MP tray

It has a paper arranging function, paper transferring function, jam removing function, and so on.
It uses rubbing pad method to feed 100 sheets of general papers and 100 envelops.
It is possible to extend to 300mm for accepting a legal size paper.

8) Duplex unit

It has paper transferring function, paper guide function, jam removing function, paper sensing function, and main board supporting function.
It is designed for basic attachment, and the duplex feeding takes a side feeding method. Usable papers are A4, letter, and legal size paper.
For removing a jam occurred in a front part, it is designed to open a cassette and a guide.
It is designed to open a rear cover to remove a jam in a rear part.
If a face up tray is open, the duplex option cannot be used.

9) SCF (Second Cassette Feeder)

It is the same method with the main cassette, and the capacity is 500 sheets.
It has a separate driving mechanism and feeds only A4, letter, and legal size paper.
It is designed for a common use with a main cassette, but it cannot be attached with the main cassette.

4.1.2 Transfer

It consists of a PTL (Pre-transfer Lamp) and a transfer roller. A PTL sheds light on an OPC drum, lowers an electric potential of an OPC drum's surface, and improves the efficiency of the transfer.
A transfer roller transfers toner on an OPC drum to the paper.
Life span : Print over 60,000 sheets (In 15~30(C)

4.1.3 Driver Ass'y

By driving the motor, the system takes power. It is consisted of a main motor for feeding and a developer, and sub-motors for fuser and duplex reverse turn.

4.1.4 Fuser

It is consisted of a heat lamp, heat roller, pressure roller, thermistor and thermostat. It sticks the toner on a paper by heat and pressure to complete the printing job.

1) Thermostat

When a heat lamp is overheated, a Thermostat cuts off the main power to prevent over-heating.

3) Heat roller

The heat roller transfers the heat from the heat lamp to apply a heat on the paper. The surface of a heat roller is coated with Teflon, so toner does not stick to the surface.

4) Pressure roller

A pressure roller mounted under a heat roller is made of a silicon resin, and the surface also is coated with Teflon. When a paper passes between a heat roller and a pressure roller, toner adheres to the surface of a paper permanently.

5) Items for safety

Protecting device for overheating

- 1st protection device : Hardware cuts off when overheated
- 2nd protection device : Software cuts off when overheated
- 3rd protection device : Thermostat cuts off main power.

Safety device

- A fuser power is cut off when a front cover is opened
- Maintain a temperature of fuser cover's surface under 80(C for user, and attach a caution label at where customer can see easily when customer open a rear cover.

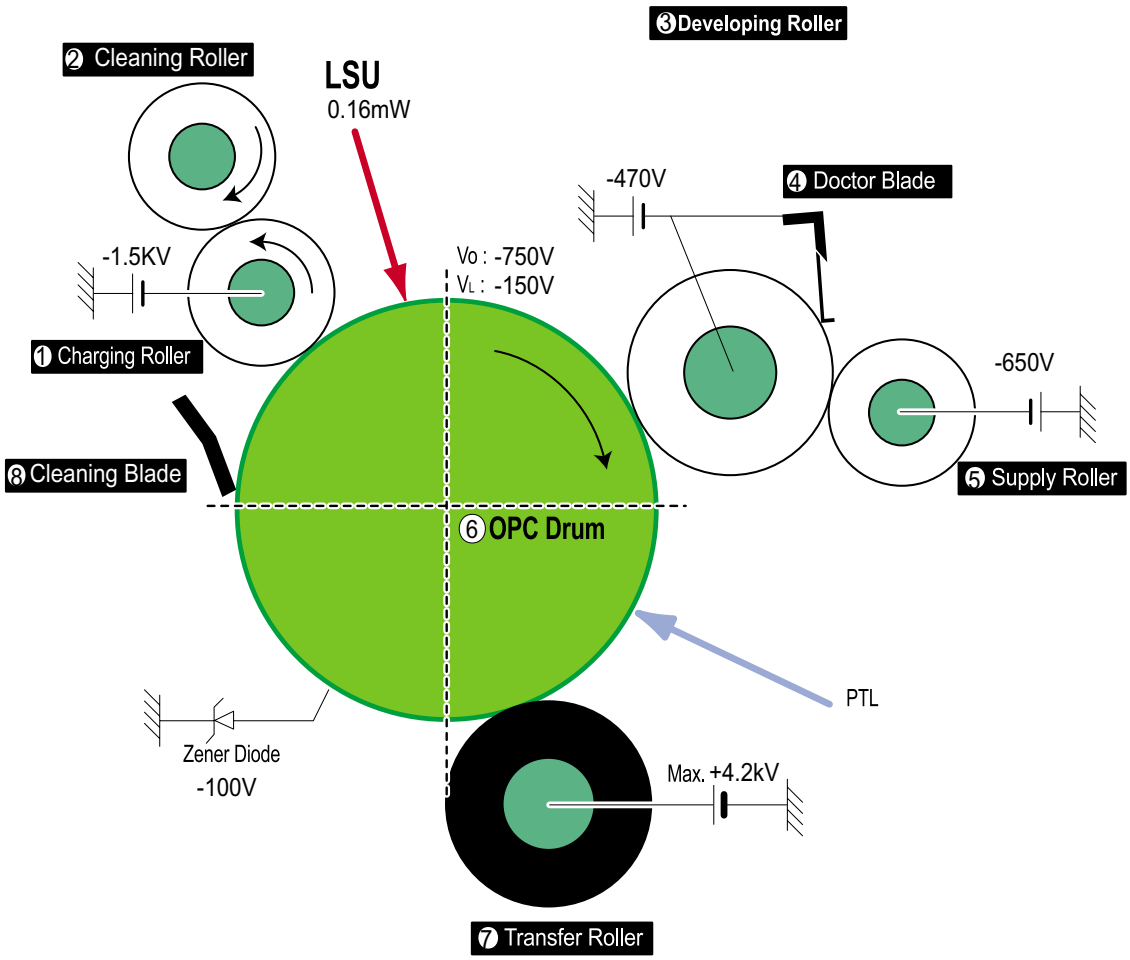
4.1.5 LSU (Laser Scanner Unit)

It is the core part of the LBP which switches from the video data received to the controller to the electrostatic latent image on the OPC drum by controlling laser beam, exposing OPC drum, and turning principle of polygon mirror. The OPC drum is turned with the paper feeding speed. The /HSYNC signal is created when the laser beam from LSU reaches the end of the polygon mirror, and the signal is sent to the controller. The controller detects the /HSYNC signal to adjust the vertical line of the image on paper. In other words, after the /HSYNC signal is detected, the image data is sent to the LSU to adjust the left margin on paper. The one side of the polygon mirror is one line for scanning.

4.1.6 Toner Cartridge

By using the electronic photo process, it creates a visual image. In the toner cartridge, the OPC unit and the developer unit are in a body. The OPC unit has OPC drum and charging roller, and the developer unit has toner, toner cartridge, supply roller, developing roller, and blade (Doctor blade)

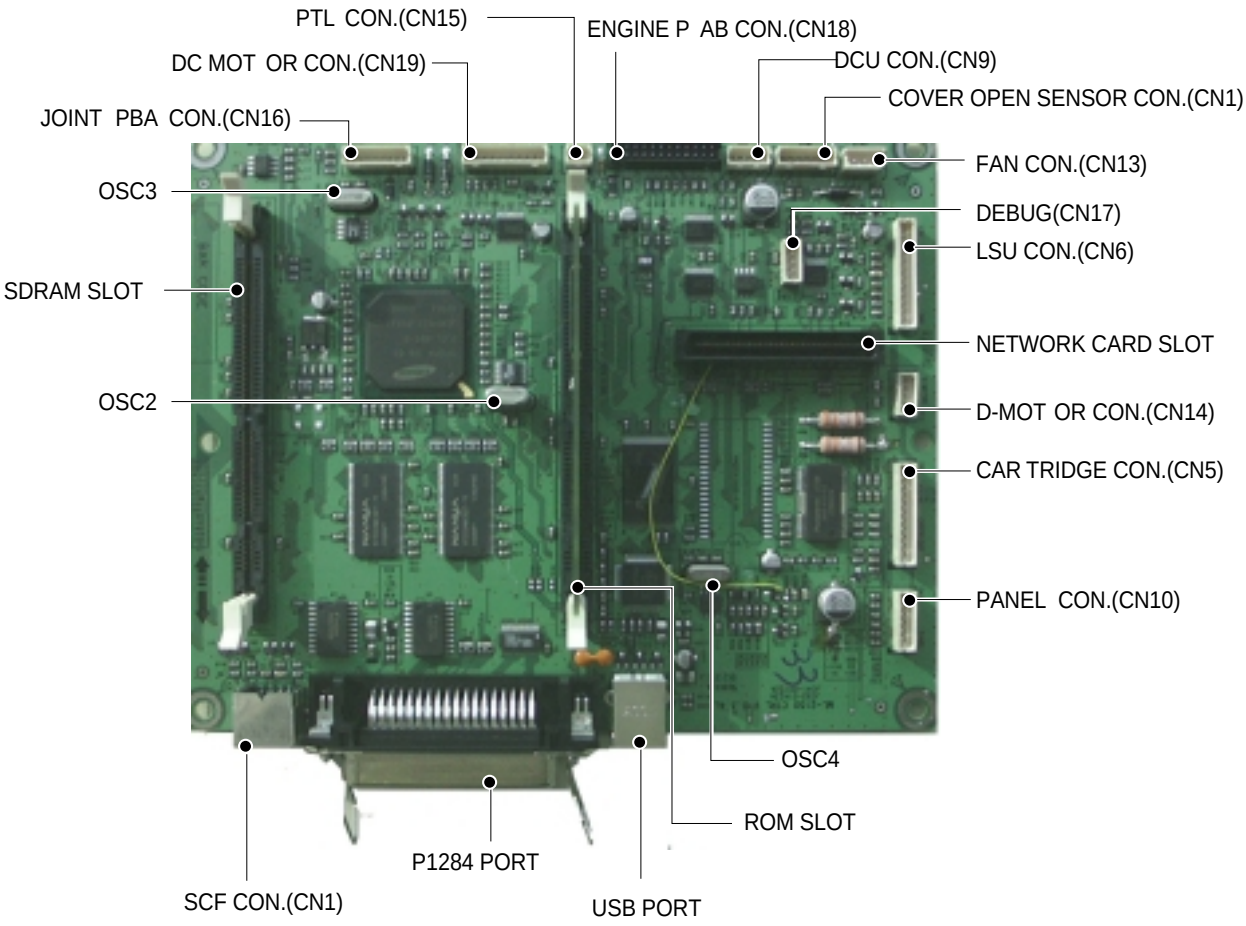
- Developing Method : Non magnetic 1 element contacting method
- Toner : Non magnetic 1 element shatter type toner
- The life span of toner : 8,000 sheets (IDC Pattern/A4 standard)
- Toner remaining amount detecting sensor : None
- OPC Cleaning : Cleaning blade type
- Management of disusable toner : Collect the toner by using electric static (Clenerless Type- No disusable toner)
- OPC Drum protecting Shutter : None
- Classifying device for toner cartridge : ID is classified by interruption of the frame channel.



<Toner Cartridge Layout>

4.2 Main Board

Main controller part is organized with Asic (SPGPm) part, Memory part, and Engine interface part, and it is functions as a Bus control, I/O handling, Drivers, and PC interface by CPU.
Memory access has program memory (supports 16bit operation) and working memory (supports 32bit operation).



4.2.1 ASIC (SPGPm)

ARM946ES

- 32-bit RISC embedded processor core
- 16KB instruction cache and 16KB data cache
- No Tightly Coupled Memory
- Memory Protection Unit & CP15 control program (Dual bus architecture for bus traffic distribution
- AMBA High performance Bus (AHB)
- System Bus with SDRAM

IEEE1284 compliant parallel port interface

Printer Video Controller for LBP engines

Graphic Execution Unit for Banding support of Printer Languages

Printer Video Controller for LBP engines

- PVC : Printer Video Controller without RET Algorithm
- HPVC : Printer Video Controller with RET algorithm (Line Memory & Lookup Table Memory : 512 x 8 , 4096 x 16)

Engine Controller

- Motor Control Unit
- Motor Speed Lookup Table Memory (128 x 16 x 2)
- Pulse Width Modulation Unit
- 4 Channels are supported
- ADC Interface Unit
- 3 ADC Channels are available
- ADC Core (ADC8MUX8) maximum clock frequency : 3 MHz

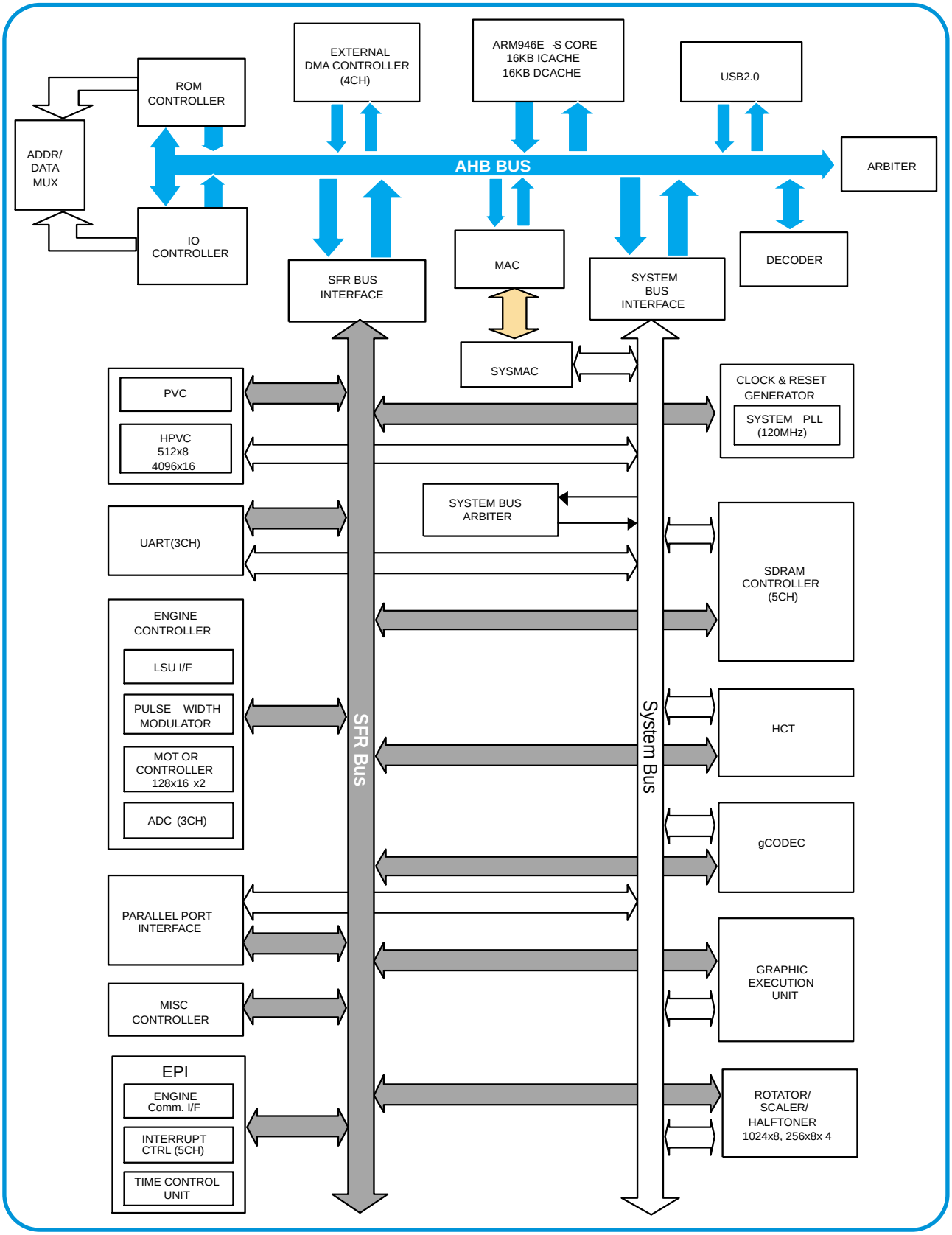
USB 2.0 Interface

Package : 272 pins PBGA

Power : 1.8V(Core), 3.3V(IO) power operation

Speed : 166MHz core(ARM946ES) operation, 60MHz bus operation

4.2.1.1 SPGPm Internal Block Diagram



4.2.2. Memory part

>> Flash Memory

It stores the System Program.

- Capacity : 2M Byte
- Access Time : 70 nsec

>>SDRAM

It is used as Swath buffer, System working memory area, etc. when printing. It stores the font list, compressed into flash memory, on DRAM and uses it as PCL font.

- Capacity : 16M Byte (Basic), upto 144M Byte (Option)
- DIMM : 16MB / 32MB / 64MB /128MB
- Type : SDRAM 100MHz/133MHz , 16bit

>>ROM DIMM

It supports the option ROM DIMM 1 Slot for supporting the Postscript level 3.

- Capacity : 4MByte
- Access Time : 70nsec

4.2.3. RESET Circuit

After printer power is ON and 50~200 ms are passed, the reset signal from RESET IC (XC61FN3112MR) resets various IC such as the CPU, Memory, etc. to prevent malfunction of the set by setting the initial value of port.

4.2.4. ClOCK Circuit

Basically, it consists of the Crystal (12MHz) and Capacitor (27pF) which is connected to the crystal in parallel, and it is inputted to the MCLLK_Signal via the FS781. The purpose of the adding FS781 is substitution of EMI.

4.2.5. INTERFACE Part

>>IEEE1284

It supports the IEEE 1284 B Type Connection, and the protocol supports the IPP, ECP, Compatibility, Byte, and Nibble mode.

>>USB2.0

USB2.0 Compliant, 12Mbps 1 port

>>Network

- Option : Ethernet 10/100 Base TX
- Protocol : SPX/IPX, TCP/IP,Appletalk, SNMP, HTTP 1.1, DLC/LLC

>>Panel

- LCD : 16Char. * 2 Line / Back-light(Blue)
- Key : 9 Key
- LED : 3 LED

The UART method is used for the controller and panel interface, and the HR 48R50 Holtak Micom is used

4.2.6. Sensor input circuit

4.2.6.1. Paper Empty Sensing

The Paper empty sensor (Photo Interrupter) on the engine board informs the state of paper to CPU whether it is empty or not by operation of the actuator.
When cassette is empty, it detects the fact by reading the D24 Bit of CPU, and then displays the fact on the LCD panel.

4.2.6.2. MP Sensing

By operation of the MP Sensor (Photo Interrupter) on frame and Actuator, it informs the state of paper to CPU whether it is empty or not. It reads the D25 Bit of CPU for recognizing paper in MP, and paper is fed from MP if there is.

4.2.6.3. Paper Feeding

When paper passes the actuator on the feed sensor part, it detects the signal of Photo interrupter, informs the paper feeding state to CPU, and then sprays the image data after certain time.
If it doesn't detect the feed sensor within 1 sec. after paper is fed, paper jam0 (CPU #Y13) is occurred. (Displays on the LCD panel)

4.2.6.4. Toner Remain Sensing

The Developer terminal is mounted to the joint board located on frame. When the developer is inserted, it is adhered to the contacting point of the joint board to sense whether the developer exists or not, ID, amount of toner, and so on.

4.2.6.5. Paper Exit Sensing

It detects paper state whether paper gets out from the set with operation of exit sensor on the engine board and actuator on the frame. Paper detects the on/off time of exit sensor by reading CPU #W11, and the normal operation or jam information is informed to the CPU.
The paper JAM2 is informed. (Displays the state on LCD panel)

4.2.6.6. Cover Open Sensing

The Cover open sensor is located on the front cover. After the front cover is opened, +24V and +5V (DC fan, solenoid, main motor, polygon motor part of LSU, HVPS, LSU Laser diode), which is supplied to each unit, is cut off.

4.2.6.7. DC FAN/Solenoid Driving Circuit

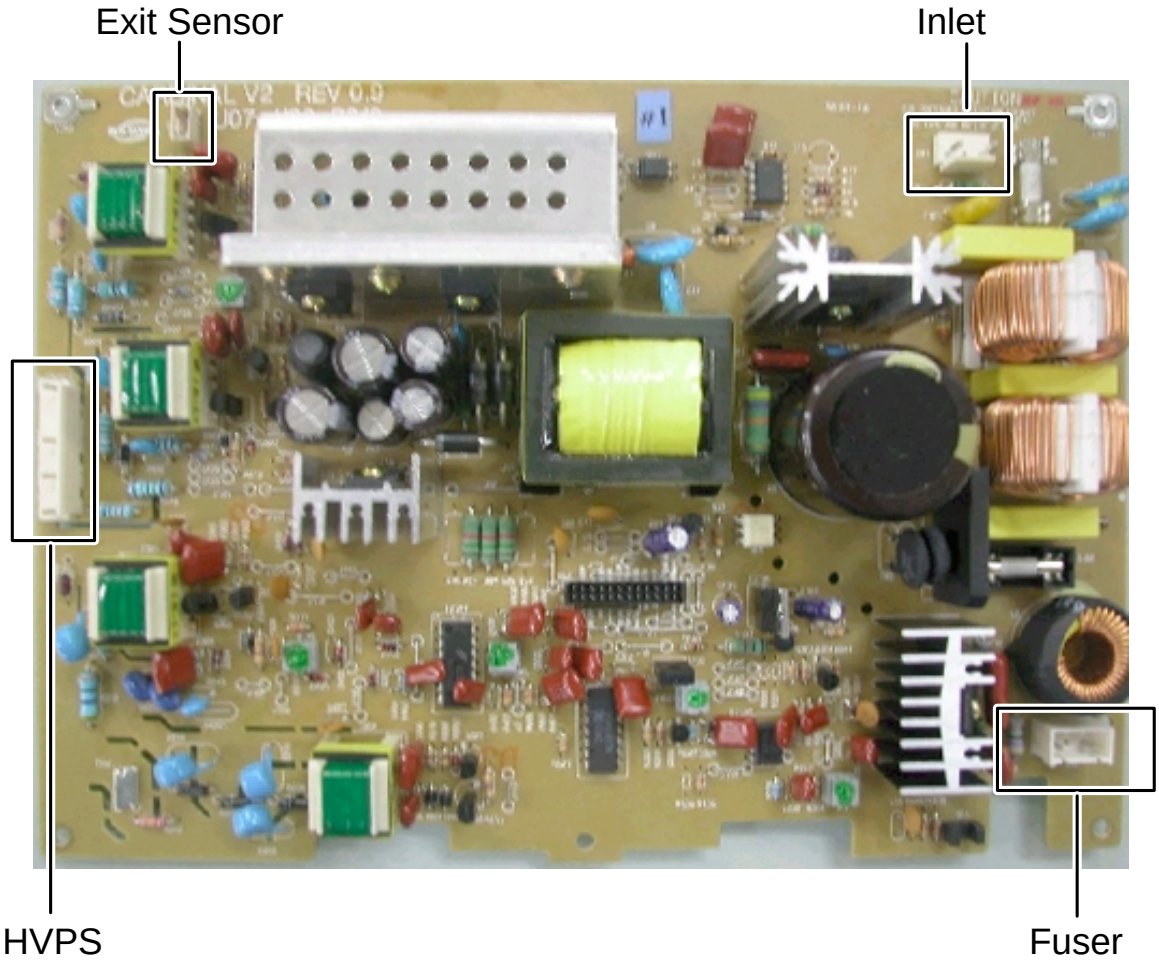
A fan driving circuit is driven by a transistor and a controller which is in the CPU.
It is automatically turned off when a machine turns to sleep mode.
There are two solenoids, and it is driven by an MP signal and a paper pick-up signal.

4.2.6.8. Motor Driving Circuit

A main motor (BLDC) drives a feeding and developing unit and an exit motor (Step) drives a Fuser and an Exit ass'y.
When printing with a duplex function, it rotates the Exit Motor to a normal/reverse direction. It controls by dividing the acceleration section, standard speed section, and reducing speed section. A BLDC Motor is operated by a clock and enable signal, and a Step Motor is managed with an AN8495 driver IC.

4.3 SMPS & HVPS board

The SMPS and HVPS are in one united board. The SMPS part supplies the DC power to the system.
It takes either 110V or 220V and outputs the +3.3V and +24V to supply the power to the main board.
The HVPS part creates the high voltage of THV/MHV/Supply/Dev and supplies it to the developer part for making the best condition to display the image.
The HVPS part takes the 24V and outputs the high voltage for THV/MHV/BIAS, and the outputted high voltage is supplied to the toner, OPC cartridge, and transfer roller.



4.3.1. HVPS(High Voltage Power Supply)

1) Transfer high voltage (THV (+))

- Function : It is a voltage that transfers toner on an OPC Drum to paper.
- Output voltage : MAX +4.2 KV +/- 5% (Duty is changeable, Not loading)
- 1.6KV +/- 15% (When cleaning, 200MOhm - It transfers toners with (+) polarity of transfer roller to an OPC Drum.
- Error type : IF THV (+) is not outputted, it causes a low density due to toner on an OPC Drum if it is not transferred to paper. It is possible that over-flow occurs if toner is piled up in a toner vessel continuously.

2) Charge voltage (MHV)

- Function : It is a voltage that charges a surface of OPC to -750V~-900V.
- Output voltage : -1.3KV~1.5KV DC +/- 50V
- Error type : IF MHV is not outputted, toner overflows and reaches to an OPC drum if surface of an OPC is not charged. A black paper is printed out when it happens.

3) Cleaning voltage : THV (-)

- Function : It removes contamination at a rear by sending (-) polarity in a transfer roller to OPC drum to take toner.
- Output voltage : A change range is large according to a load because there is no feedback control =(-600V~-1200V)
- Error type : An error due to contamination of toner on a backside of printing paper.

4) Developing voltage (DEV)

- Function : It is a voltage that develops toner with electronic potential difference of the section exposed by LSU (Laser Scanning Unit).
  * When printing, exposing voltage of OPC is -250V and exposing voltage of DEV is -470V. Therefore, toner with (-) polarity is developed on an exposed section.
- Output voltage : -400V~470DC +/- 20V
- Error type : a) If DEV is GND, a density gets extremely low.
  b) When DEV is floating due to instable of terminal's contacting point, and etc., density gets extremely high.

5) Supplying voltage (SUP)

- Function : It is a voltage that supplies toner to a developing roller.
- Output voltage : -580V~650V DC +/- 50V (Use AENER, Gearing of DEV - (-)180V more than DEV)
- Error type : a) When SUP is GND, density gets extremely low.
  b) If SUP is floating due to instable of terminal's contacting point, and etc., density gets extremely low that it is hard to catch up with eyes.

6) OPC Ground ZENER voltage

- Function : It is a voltage to prevent an image contamination under the condition of low temperature and low humidity environment.
- When a set prints without an output voltage, -100V is maintained on OPC ground. (-100V AENER diode is connected to OPC ground)
- Error type : a) When ZENER diode is - 0V, there is no serious image problem in general environment, but in low temperature and low humidity environment, it is possible that a contamination occur on entire image
  b) When ZENER diode is disconnected, a blank page is printed out. (It is the same case as when a ZENER diode is disconnected to OPC ground.)

4.3.2 SMPS(Switching Mode Power Supply)

It is the power source for the whole system. It is an independent module so it is possible to use for common use. It is mounted at the bottom of the set.
It consists of the SMPS part, which supplies the DC power for driving the system, and the AC heater control part, which supplies the power for fuser. SMPS has three outputting channels (3.3V, 5V and +24V).
There are three kinds of power, 120V exclusive (America), 220V exclusive (Europe), and 220V for china (nations with instable power supply).

>>AC Input

- Inputting rated voltage : AC 220V ~ 240V AC 120V / AC 220V
- Inputting voltage fluctuating range : AC 198V ~ 264V AC 90V ~ 135V / AC 198V ~ 264V
- Rated frequency : 50/60 Hz
- Frequency fluctuating range : 47 ~ 63 Hz
- Inputting voltage : Under 5.0Arms/2.5Arms

>>Rated Power Output

NO	Item	CH1	CH2	CH3	Remark
1	Channel name	+3.3V	+5V	+24.0V	
2	CONNECTOR PIN	CON 3 3.3V PIN : 12, 14 GND PIN : 16, 18	CON 3 5V PIN : 8 GND PIN : 7	CON 3 24V PIN : 2, 4, 6 GND : 7, 8, 10	
3	Rated outputting voltage	3.3V ± 5% (3.2 ~ 3.4V)	+5V ± 5% (4.75 ~ 5.25V)	+24V ± 5%, -5% (21.6 ~ 26.4V)	
4	Maximum outputting voltage	1.5 A	0.5 A	0.5 A	
5	Peak loading voltage	1.5 A	0.5 A	0.5 A	1ms
6	Ripple noise voltage	200mVp-p	100mVp-p	500mVp-p	
7	Maximum output	5 W	2.5 W	84 W	
8	Peak output	5 W	2.5 W	84 W	1ms

>>Consumption Power

NO	Item	CH1 (+3.3V)	CH2 (+5V)	CH3 (+24V)	System
1	Stand-By	0.6 A	0.07 A	0.4 A	AVG : 100 Wh
2	PRINTING	1.0 A	0.14 A	2.0 A	AVG : 350 Wh
3	Sleep-Mode	0.4 A	0.01 A	0.4 A	AVG : 15 Wh

>>Length of Power Cord : 1830 ± 50mm

>>Power Switch : Use

>>Feature

- Insulating resistance : over 50MΩ(at DC 500V)
- Insulating revisiting pressure Must be no problem within 1min. (at 1500Vzc, 10mA)
- Leaking voltage : under 3.5mA
- Running voltage : under 50A peak (at 25°C, Cold start)
  Under 60A peak (in other conditions)
- Rising Time : Within 2sec
- Falling Time : over 20ms
- Surge : Ring Wave 6KV-500A (Normal, Common)

>>Environment Condition

- Operating temperature range : 0°C~50°C
- Maintaining temperature range : -25°C~85°C
- Maintaining humid range : 10% ~90% RH
- Operating atmospheric pressure range : 1

>>EMI Requirement

CISPR ,FCC, CE, MIC, C-Tick,

>>Safty Requrement

IEC950 UL1950, CSA950, C-UL, NOM, TUV, Semko, Nemko, iK, CB, CCC(CCIB),GOST, EPA

4.3.3 Fuser AC Power Control

Fuser (HEAT LAMP) gets heat by using AC power. The AC power controls the switch with the Triac, a semiconductor switch. The 'On/Off control' is operated when the gate of the Triac is turned on/off by Photo triac, which is insulting part. In the other words, the AC control part is passive circuit, so it turns the heater on/off with taking signal from engine control part. When the 'HEATER ON' signal is turned on at engine, the LED of PC1 (Photo Triac) takes the voltage and flashes. From the flashing light, the Triac part (light receiving part) takes the voltage, and the voltage is supplied to the gate of Triac and flows into the Triac. As a result, the AC current flows in the heat lamp, and heat is occurred.
On the other hand, when the signal is off, the PC1 is off, the voltage is cut off at the gate of Triac, the Triac becomes off, and then the heat lamp is turned off.

>>Triac (THY1) feature :12A,600V SWITCHING

>>Phototriac Coupler (PC3)

- Turn On If Current : 16mA
- High Repetive Peak Off State Voltage : Min 600V

4.4 Engine F/W

4.4.1 Feeding

If feeding from a cassette, the drive of the pickup roller is controlled by controlling the solenoid. The on/off of the solenoid is controlled by controlling the general output port or the external output port. If feeding from a manual feeder, decide to insert the paper according to the operation of the manual sensor, and by driving the main motor, insert the paper in front of the feed sensor. While paper moves, occurrence of jam is judged as below. (Refer to the [6.2 Paper Transfer rout])

4.4.1.1 Jam 0

- After picking up, paper cannot entered due to paper mis-feed.
- After picking up, paper entered but it cannot reach to the feed sensor in certain time due to slip, etc.
- After picking up, if the feed sensor is not on, repack up. After repacking up, if the feed sensor is not on after certain time, it is Jam 0.
  - It is a status that the leading edge of the paper doesn't pass the feed sensor.
- Even though the paper reaches to the feed sensor, the feed sensor doesn't turn on.
  - It is a status that the leading edge of the paper already passed the feed sensor.

4.4.1.2 Jam 1

- After the leading edge of the paper passes the feed sensor, the tailing edge of the paper cannot pass the feed sensor after certain time. (The feed sensor cannot be Off)
- After the leading edge of the paper passes the feed sensor, the paper cannot reach the exit sensor after certain time. (The exit sensor cannot be On)
  - The paper exists between the feed sensor and the exit sensor.

4.4.1.3 Jam 2

- After the tailing edge of the paper passes the feed sensor, the paper cannot pass the exit sensor after certain time.

4.4.1.4 Duplex Jam 1

A leading edge of a paper didn't reach a Duplex Sensor after certain time passes.

4.4.1.5 Duplex Jam 2

After a leading edge of the paper passes the Duplex Sensor, the rear edge of the paper does not pass a Duplex Sensor within a certain time.

4.4.2 Drive

A main motor (BLDC) drives a feeding and developing unit and an exit motor (Step) drives a Fuser and an Exit ass'y.
When printing with a duplex function, it rotates the Exit Motor to a normal/reverse direction. It controls by dividing the acceleration section, standard speed section, and reducing speed section. A BLDC Motor is operated by a clock and enable signal, and a Step Motor is managed with an AN8495 driver IC.

4.4.3 Transfer

The charging voltage, developing voltage and the transfer voltage are controller by PWM (Pulse Width Modulation). The each output voltage is changeable due to the PWM duty. The transfer voltage admitted when the paper passes the transfer roller is decided by environment recognition. The resistance value of the transfer roller is changed due to the surrounding environment or the environment of the set, and the voltage value, which changes due to the environments, is changed through AD converter. The voltage value for impressing to the transfer roller is decided by the changed value.

4.4.4 Fusing

The temperature change of the heat roller's surface is changed to the resistance value through the thermistor. By converting the voltage value, which impressed to the resistance, to the digital value through the AD converter, the temperature is decided. The AC power is controlled by comparing the target temperature to the value from the thermistor. If the value from the thermistor is out of the controlling range while controlling the fusing, the error stated in the table occurs. (For the domestic model, the Q-PID method has been applied.)

Error	Description	LCD Displat
Open Heat Error	When warming up, it has been lower than 68°C over 28 seconds	Engine Fuser Error
Lower Heat Error	• Standby : It has been lower than 130°C over 10 seconds • Printing : - 3 consecutive page; it has been 20°C lower than the fixed fusing temperature over 7 seconds.	Engine Fuser Low Heat Error
Over Heat Error	It have been higher than 230°C over 10 seconds	Engine Fuser Over Heat Error

4.4.5 LSU

The LSU is consisted of the LD (Laser Diode) and the polygon motor control. When the printing signal occurs, it turns the LD and drives the polygon motor. When the receiving light part detects the beam, Hsync occurs. When the polygon motor speed becomes a normal, LReady occurs. If two conditions are satisfied, the status bit of the LSU controller register becomes 1 to be judged that the LSU is ready. If two conditions are not satisfied, the error shown in below occurs.

Error	Description	LCD
Polygon motor error	When the polygon motor's speed doesn't become a normal	Photo Error
Hsync error	The polygon motor's speed is normal, but the Hsync signal is not created.	HSYNC Error

Memo

5. Disassembly and Reassembly

5.1 General Precautions on Disassembly

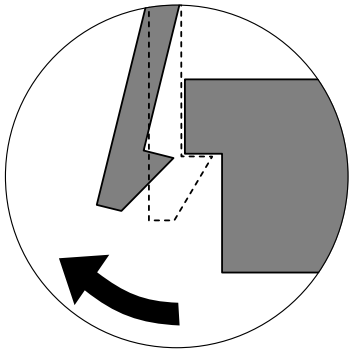
When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must.
If components are removed, any cables disturbed by the procedure must be restored as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

Whenever servicing the machine, you must perform as follows:

1. Check to verify that documents are not stored in memory.
2. Be sure to remove the toner cartridge before you disassemble parts.
3. Unplug the power cord.
4. Use a flat and clean surface.
5. Replace only with authorized components.
6. Do not force plastic-material components.
7. Make sure all components are in their proper position.

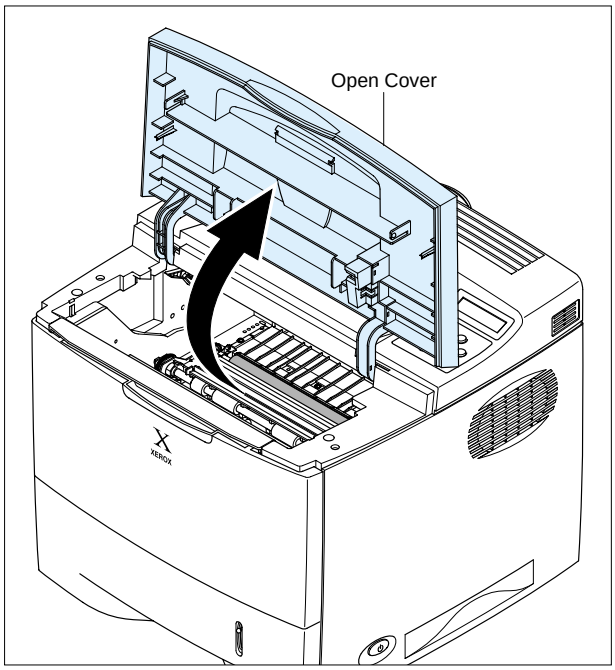
Releasing Plastic Latches

Many of the parts are held in place with plastic latches. The latches break easily; release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.

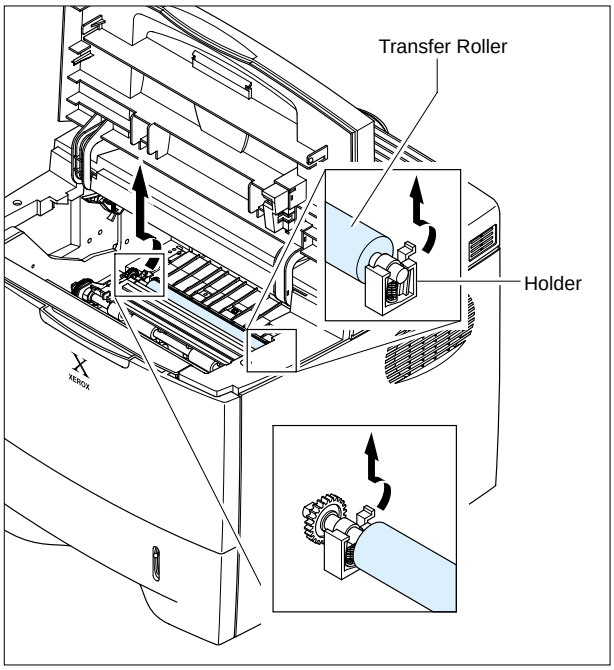


5.2 Transfer Roller

1. Open the Open Cover.

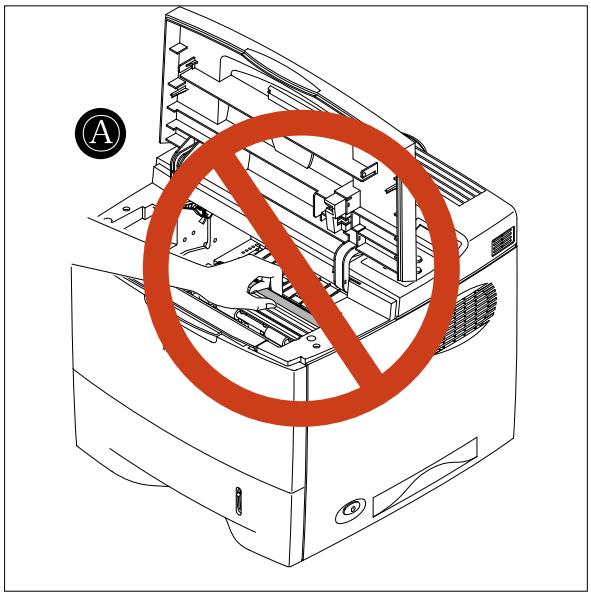


2. Hold the lever at both ends of the roller, then remove the roller.

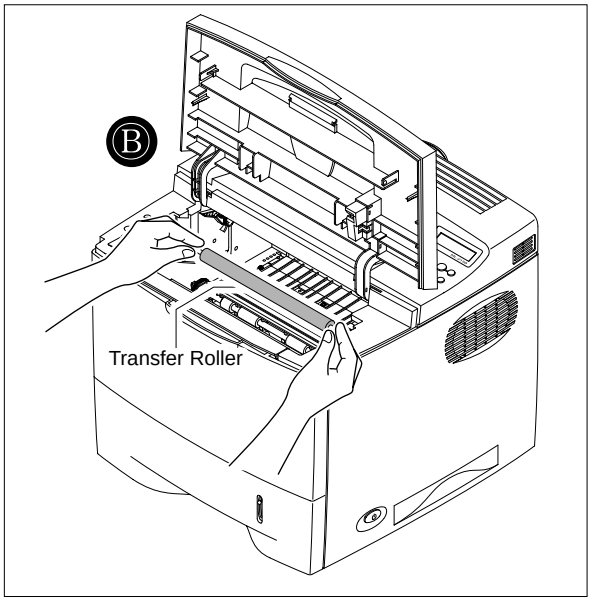


<Cautions When Replacing a Transfer Roller>

* Do not grab the transfer roller shown in picture (A). It may cause a malfunction due to a foreign object.
* Hold the both sides of the transfer roller shown in picture (B) when replacing it.



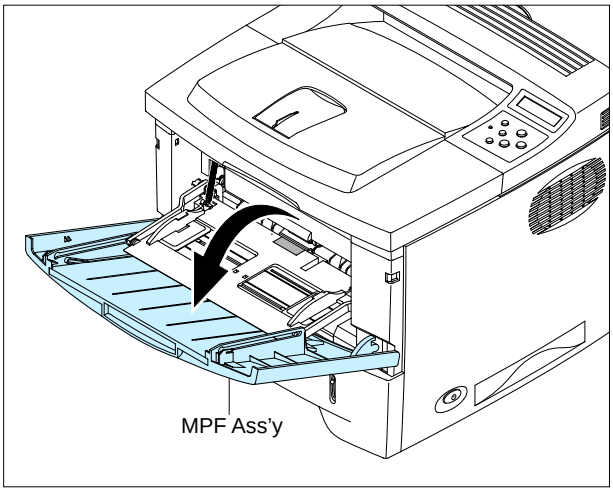
(A)



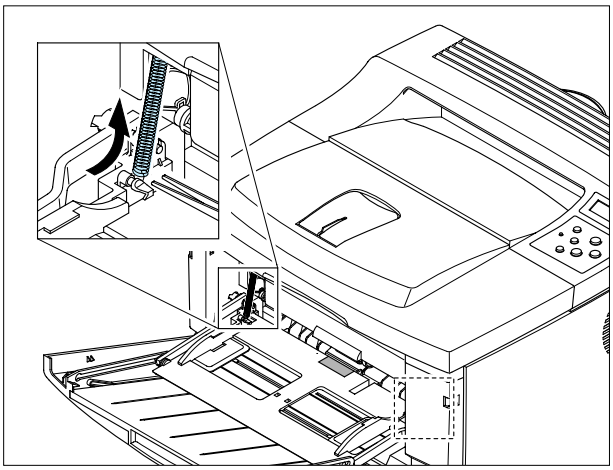
(B)

5.3 MPF Ass'y

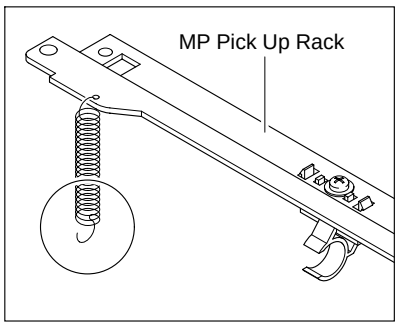
1. Open the MPF Ass'y.



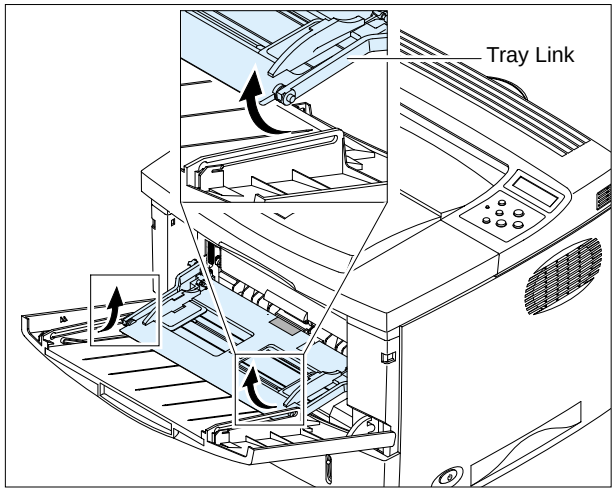
2. Remove two springs from the Knock Up Plate Ass'y.



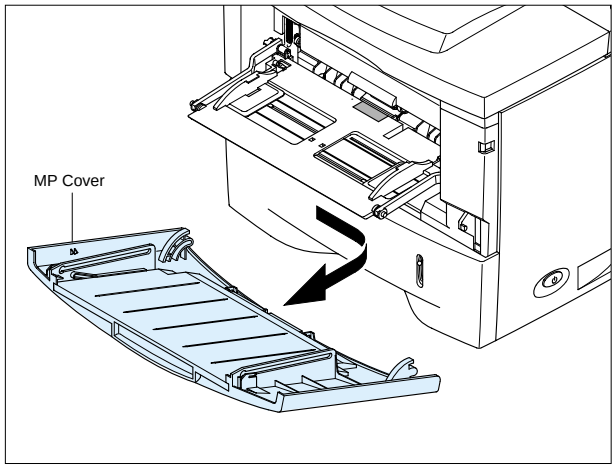
⚠ *NOTICE : Do not separate the spring from the MP Pick-up rack for convenience of assembling. Locate the hook section of the spring that is connected to the Knock Up Plate ass'y as shown in the picture below toward the outside for convenience of assembling.*



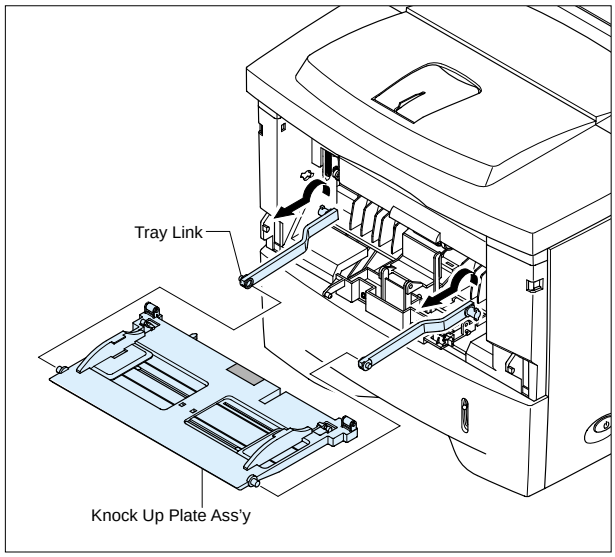
3. Remove the Tray Links from the MP Cover



4. Push the MP Cover and remove it as shown below.

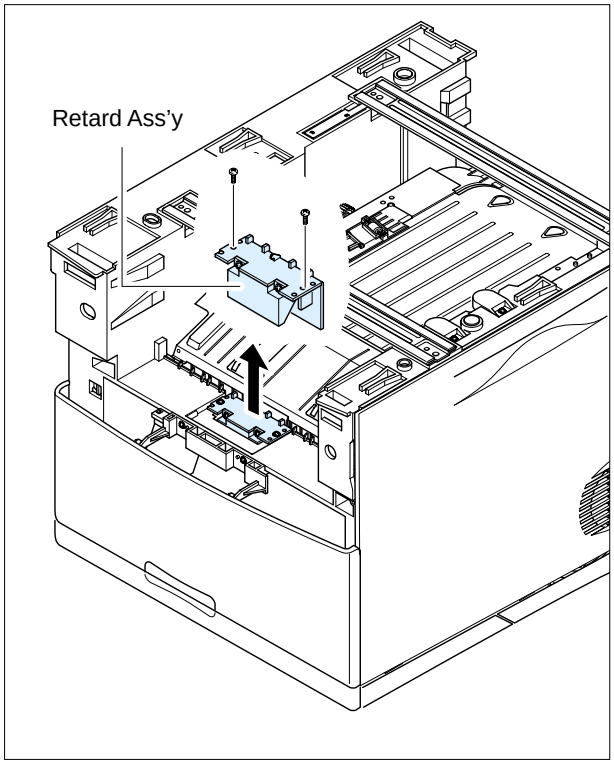


5. Remove MP Cover in the direction of arrow

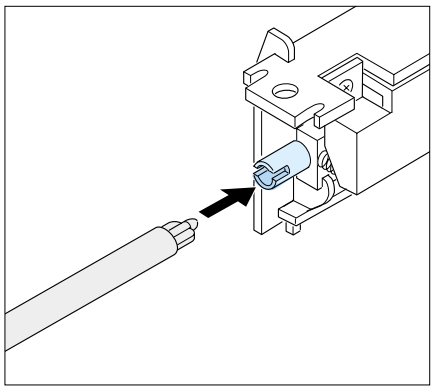


5.4 Retard Ass'y

1. Remove two screws. Then lift the Roller Ass'y, as shown below.

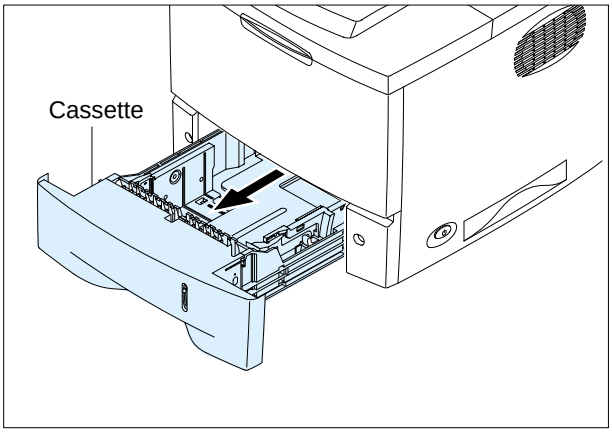


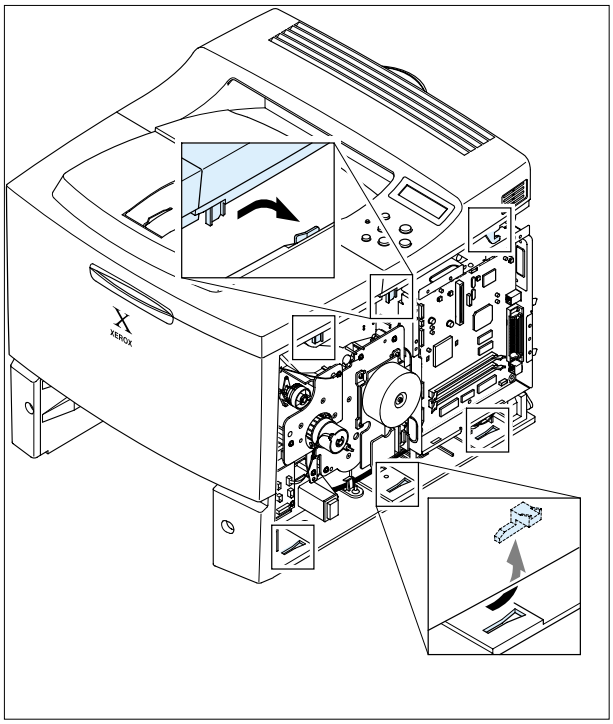
⚠ *Notice: When you reassemble the Retard Roller ass'y make sure that the let and of the Retard roller fits into the Retard shaft.*



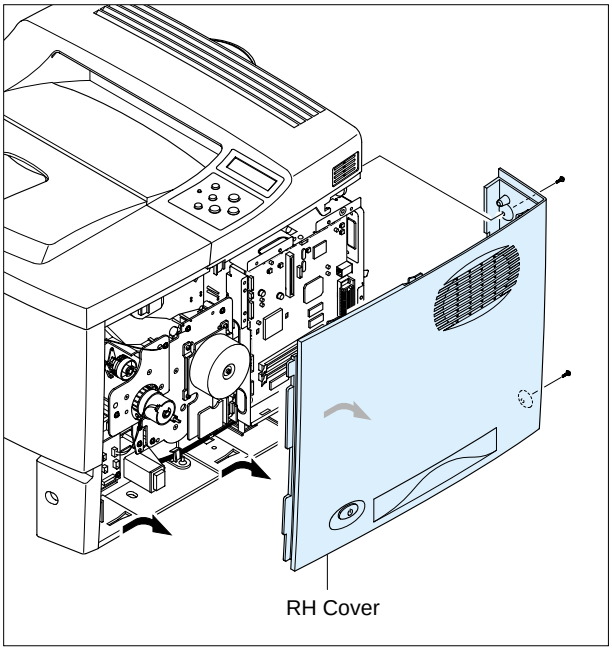
5.5 RH Cover

1. Pull the Cassette out of the printer.





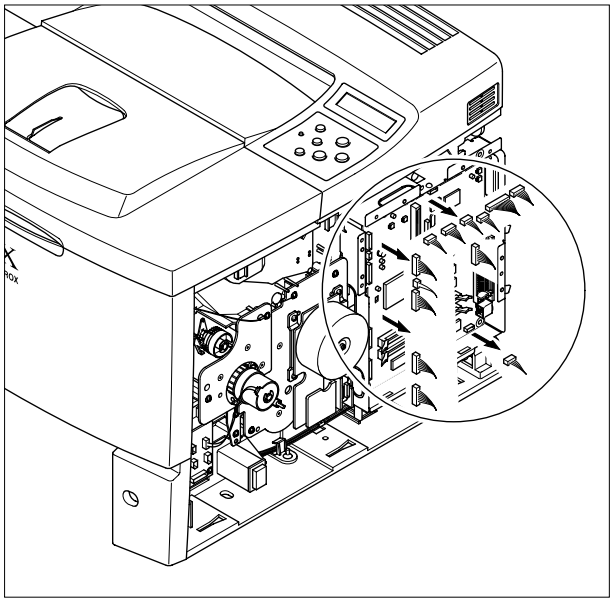
2. Remove two screws and take out the Right Side.



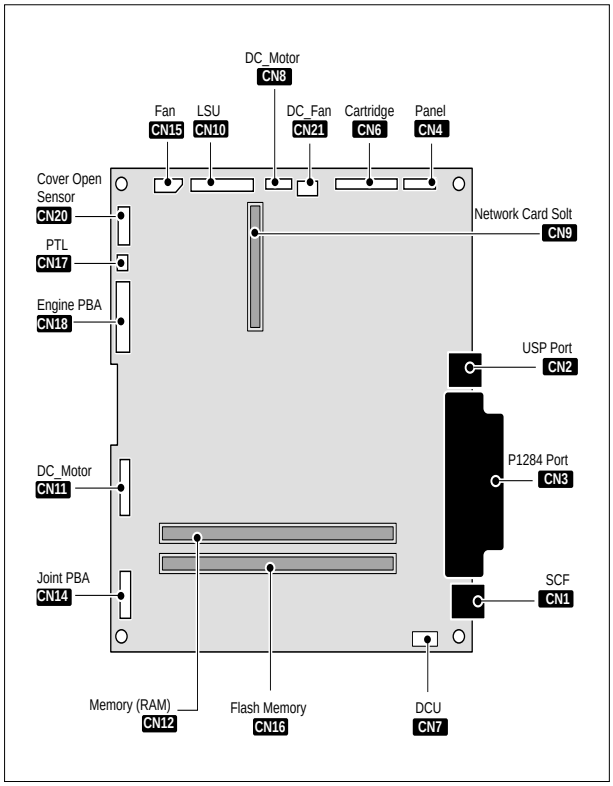
5.6 Main PBA

1. Before you remove the Main PBA you should remove:
   - RH Cover (Refer to the 5.5)

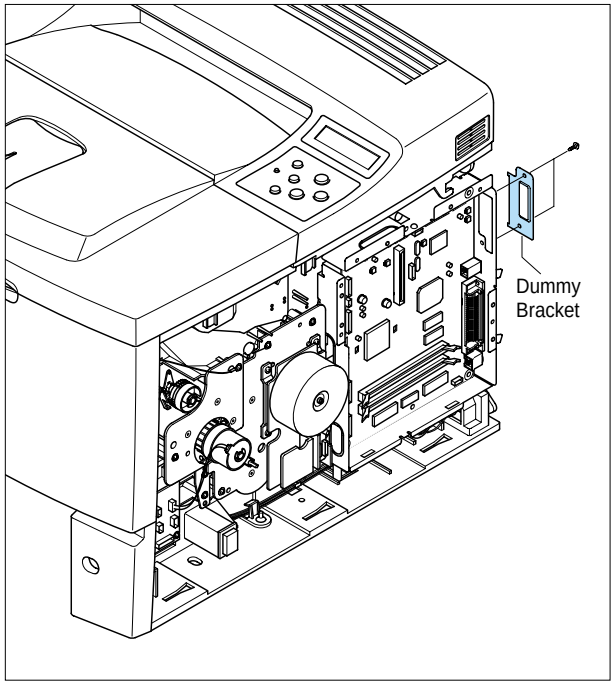
2. Unplug all the connectors, as shown below.



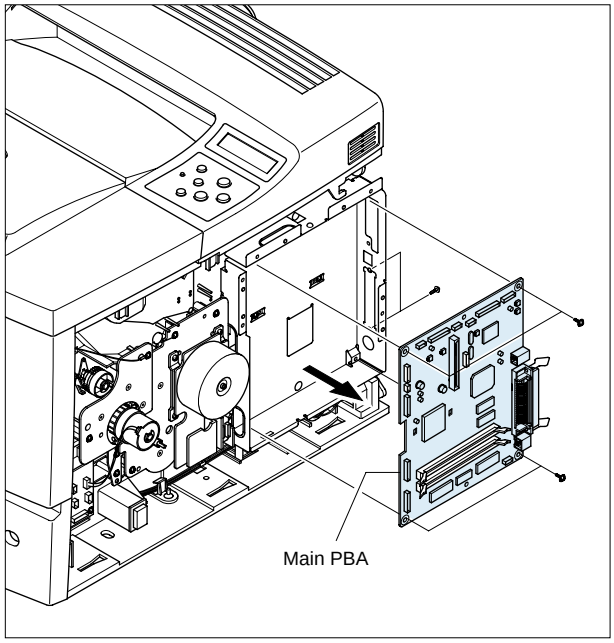
3. The connectors are located as shown below.



4. Remove two screws and take out the Dummy Bracket.



5. Remove six screws and take out the Main PBA.

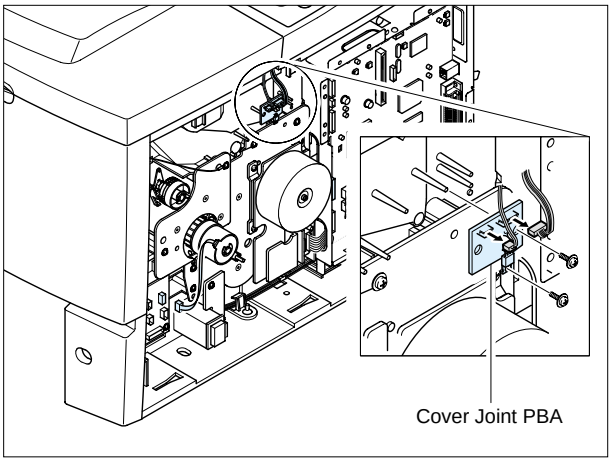


⚠ *NOTICE : One screw among the screws is locked on the Engine Shield.(Refer to 5.25.3)*

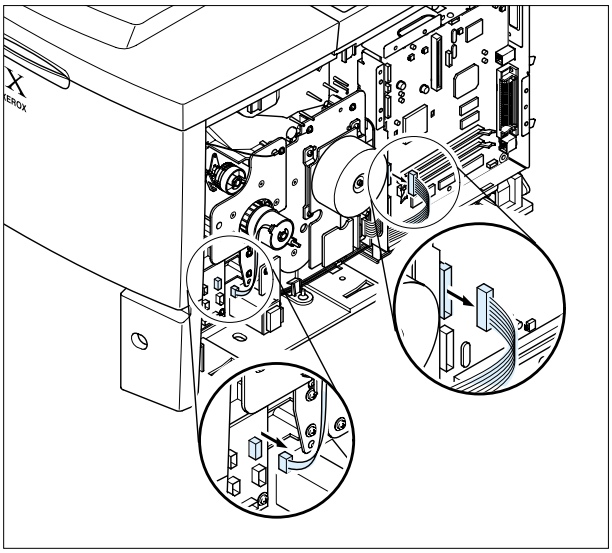
5.7 Main Drive Ass'y

1. Before you remove the Right Side Ass'y, you should remove:
   - RH Cover (Refer to the 5.5)

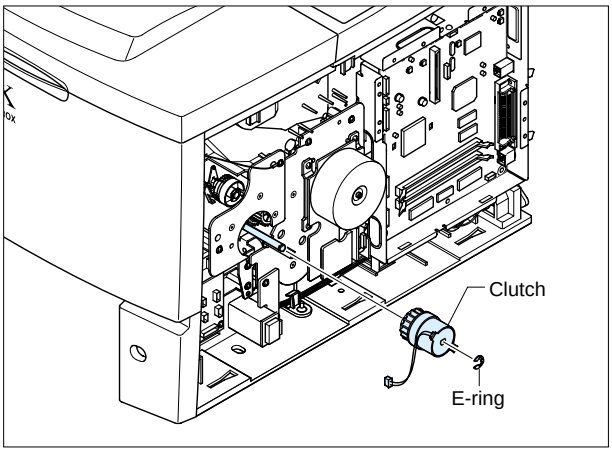
2. Unplug the two Connectors after you remove the two scres and take out the Cover Joint PBA.



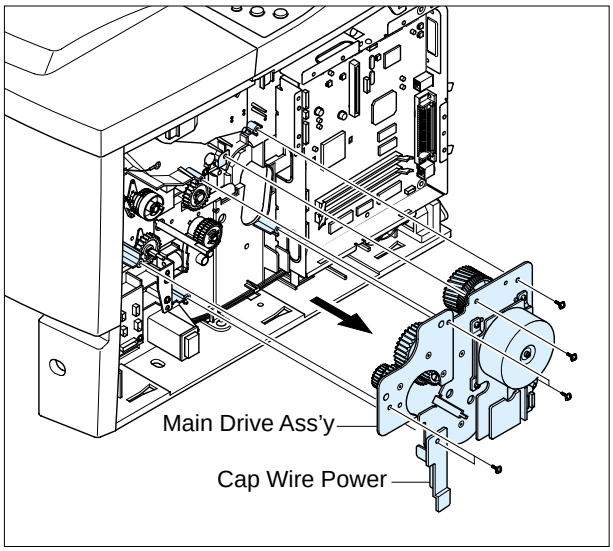
3. Unplug the two connectors from the Main PBA and the Connector PBA.



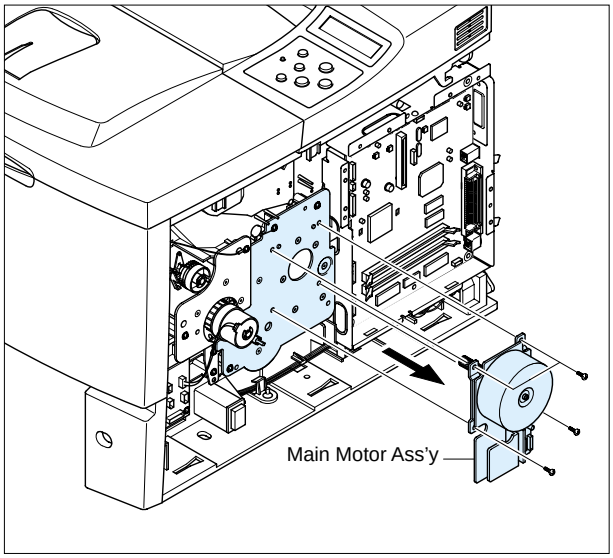
4. Remove the E-ring and take out the Clutch.



5. Remove six screws and take out the Main Drive Ass'y.



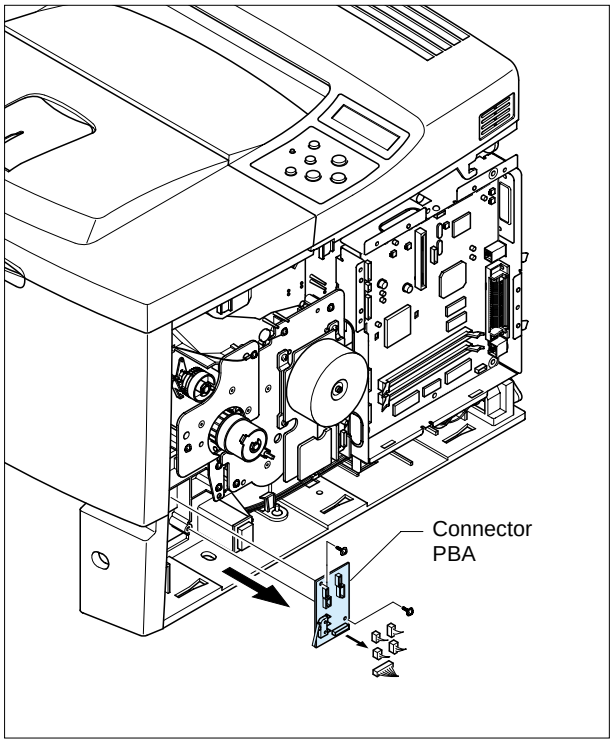
6. When separating the Main Motor ass'y, disconnect the connector form the Main PBA, remove 4 screws, and then remove the Main Motor ass'y.



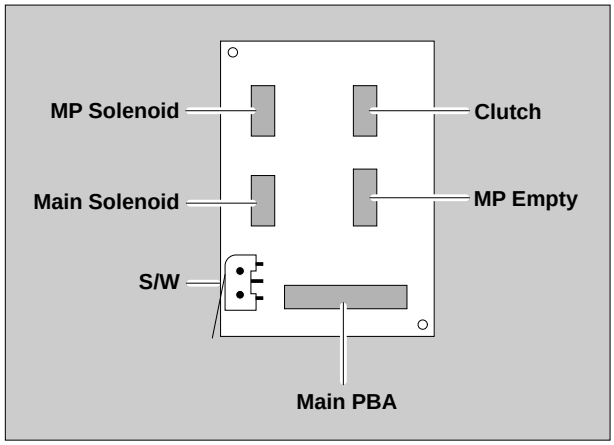
5.8 Connector PBA

1. Before you remove the Connector PBA, you should remove:
   - RH Cover (Refer to the 5.5)

2. Unplug all of the connectors from the Connector PBA and take it out.



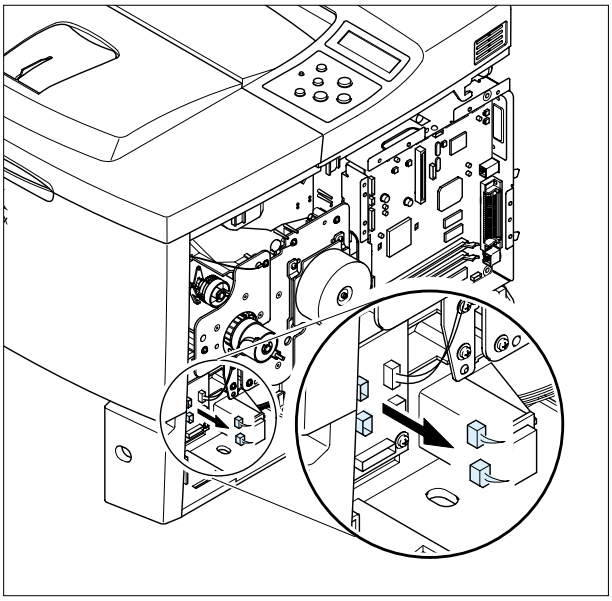
3. The connectors are located as shown below.



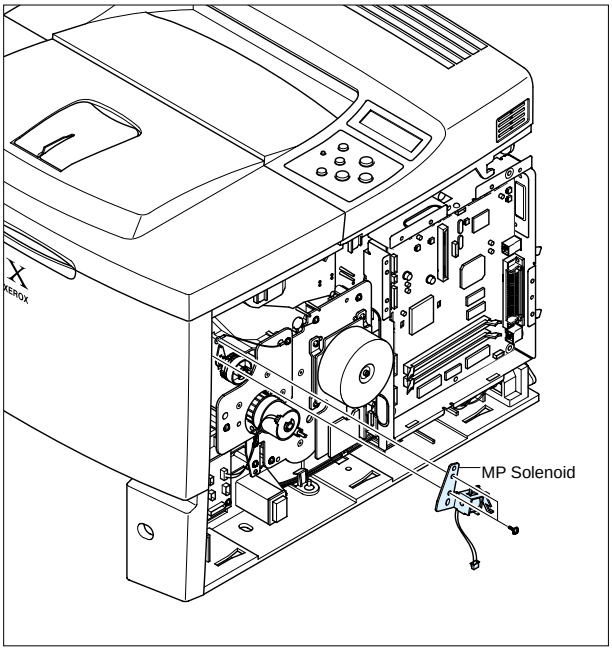
5.9 Solenoid

1. Before you remove the Connector PBA, you should remove:
   - RH Cover (Refer to the 5.5)
   - Main Drive Ass'y (Refer to the 5.7)

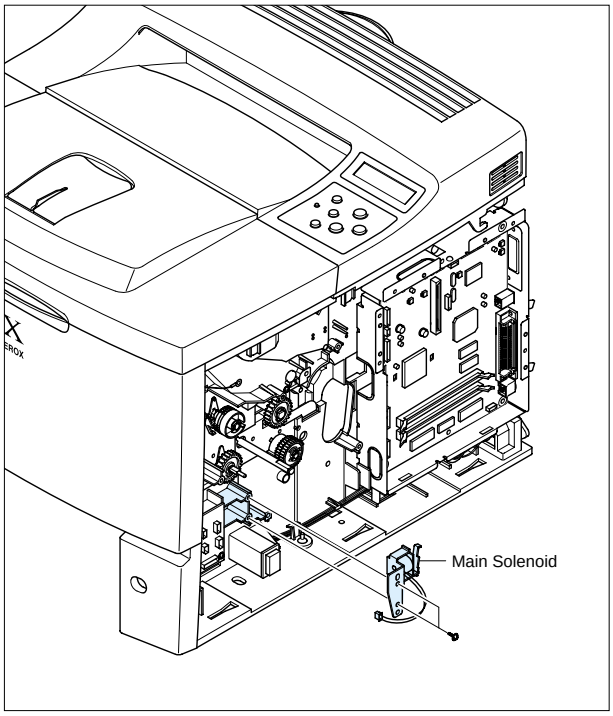
2. Unplug the MP Solenoid Harness and the Main Solenoid Harness from the Connector PBA.



3. Remove two screws and take out the MP Solenoid.



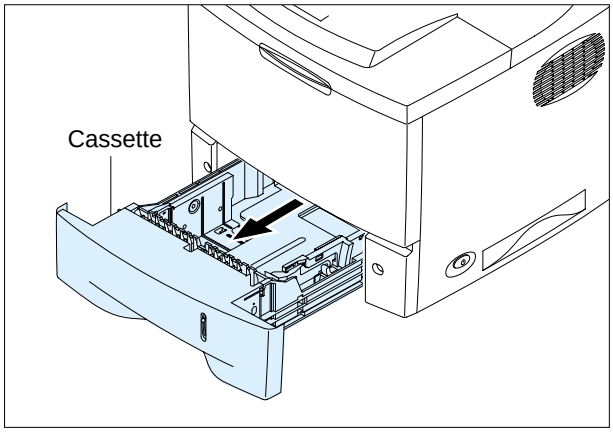
4. Remove two screws and take out the Main Solenoid.



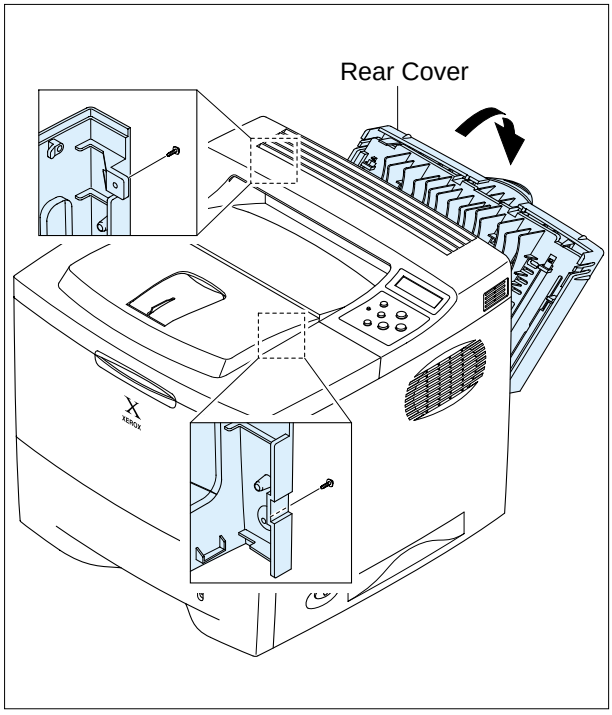
⚠ *NOTICE : It is not necessary to disassemble the Main Drive Ass'y to remove the MP Solenoid*

5.10 LH Cover

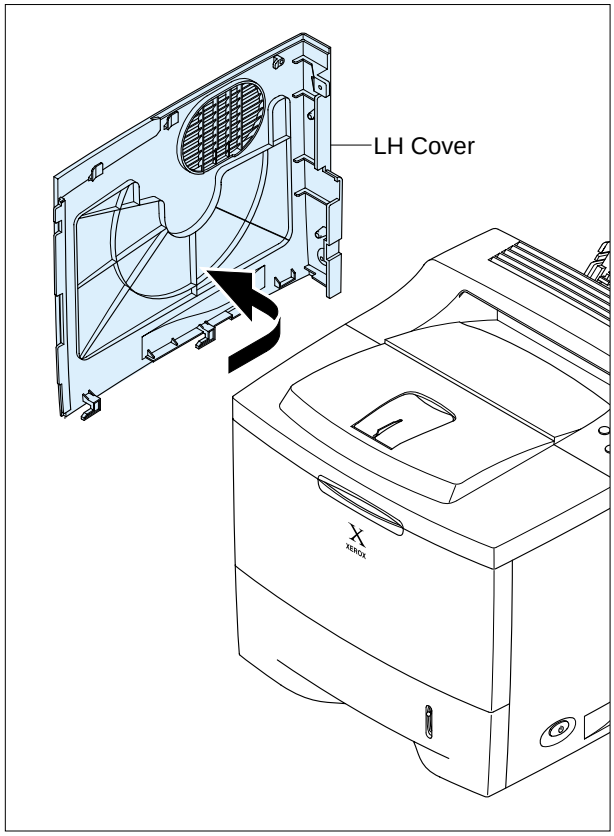
1. Pull the Cassette out of the printer.



2. Remove two screws and take out the Right Side.



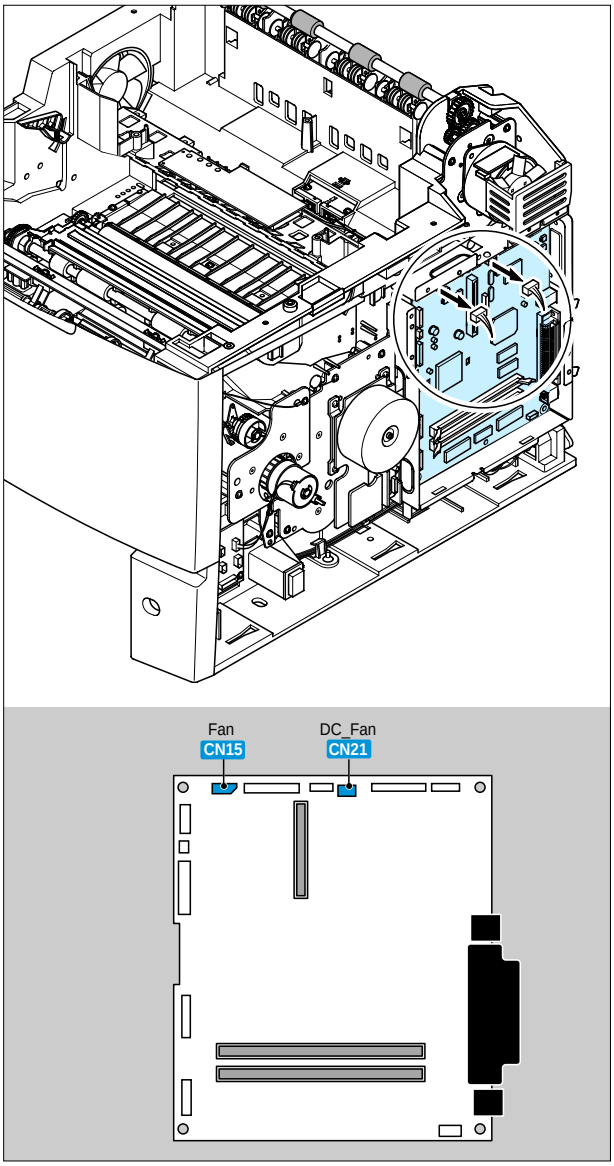
3. Remove two screws and take out the LH Cover



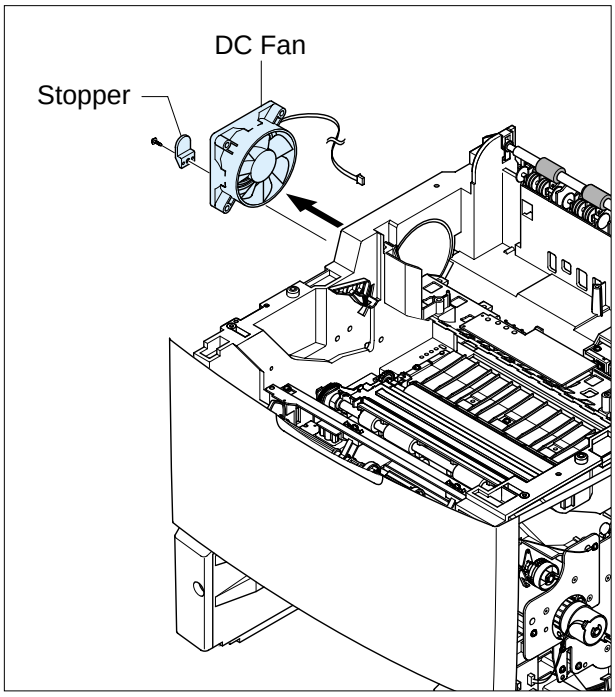
5.11 DC Fan

1. Before you remove the DC Fan, you should remove:
   - RH Cover (Refer to the 5.5)
   - LH Cover (Refer to the 5.10)

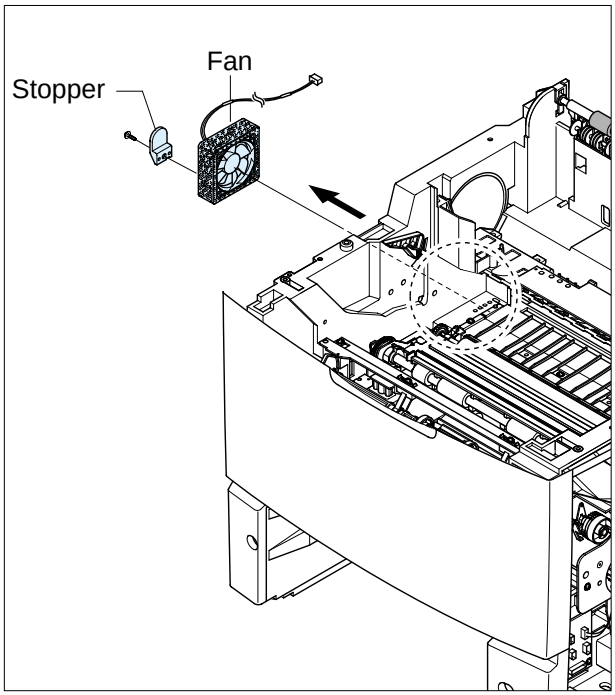
2. Unplug the two Connectors from the Connector PBA.



3. Remove one screw for taking out the Stopper, and then take out the DC Fan.

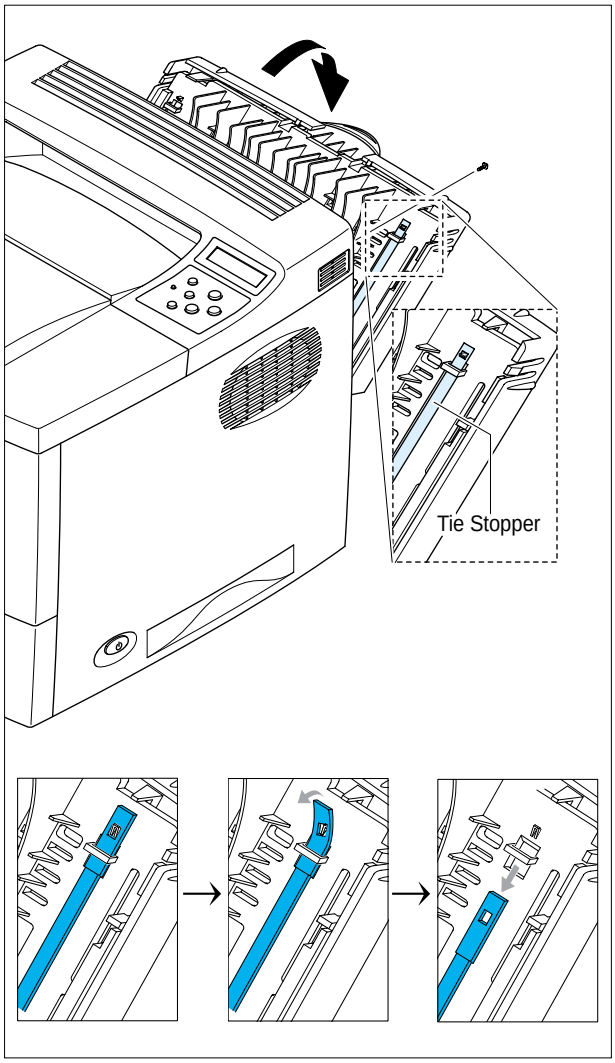


4. Remove one screw for taking out the Stopper, and then take out the Fan.

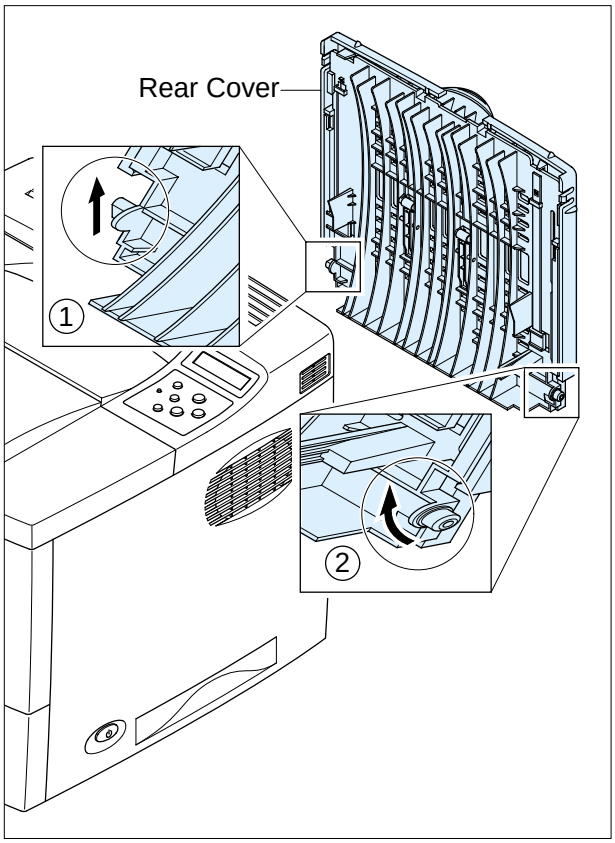


5.12 Rear Cover

1. Open the Rear Cover, and then take out the Stopper.



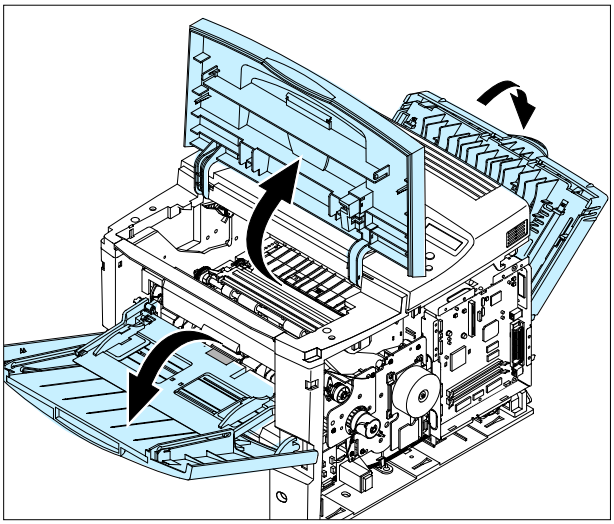
2. Remove the Rear Cover in the direction of arrow.



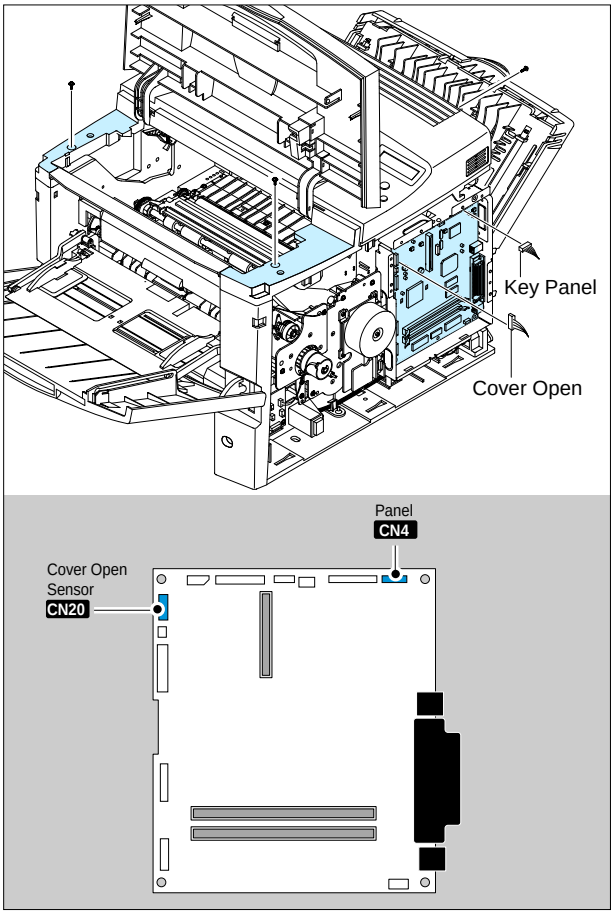
5.13 Top Cover

1. Before you remove the Top Cover, you should remove:
   - RH Cover (Refer to the 5.5)
   - LH Cover (Refer to the 5.10)

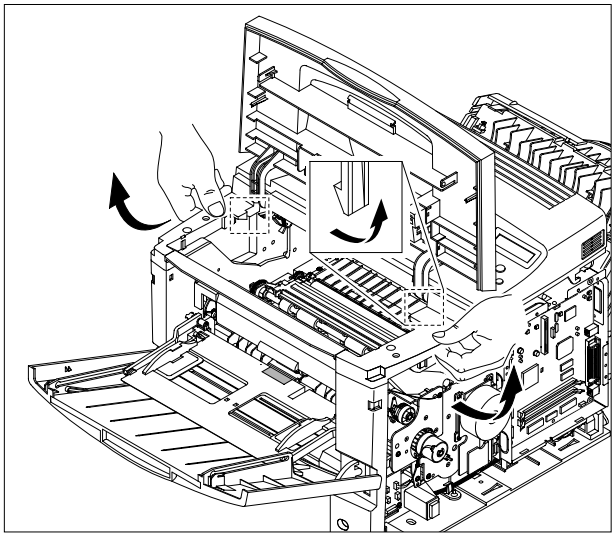
2. Open the MPF Ass'y, the Rear Cover, the Open Cover.



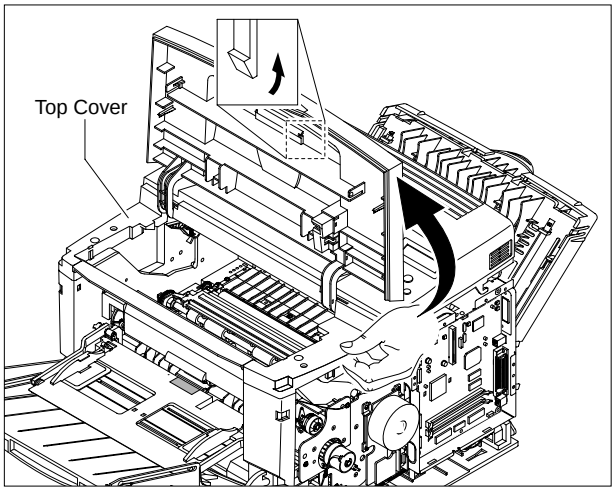
3. Unplug the two Connectors after you remove the three screws from the Main PBA.



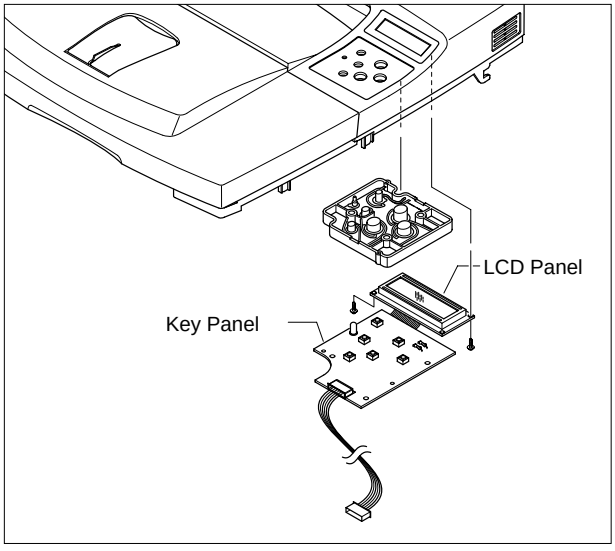
4. Unlatch both ends of the Top Cover.



5.Unlatch the hook and take out the Top Cover.



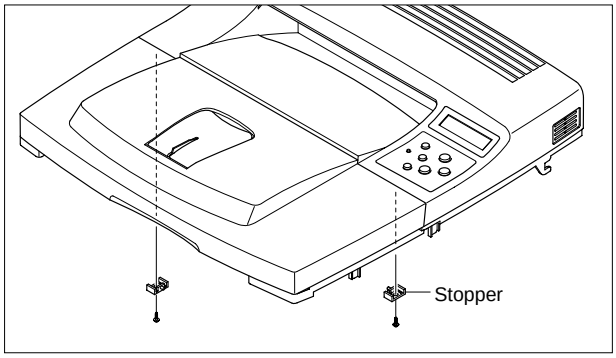
6. Remove 7 screws, and then take out the LCD Panel and the Key Panel.



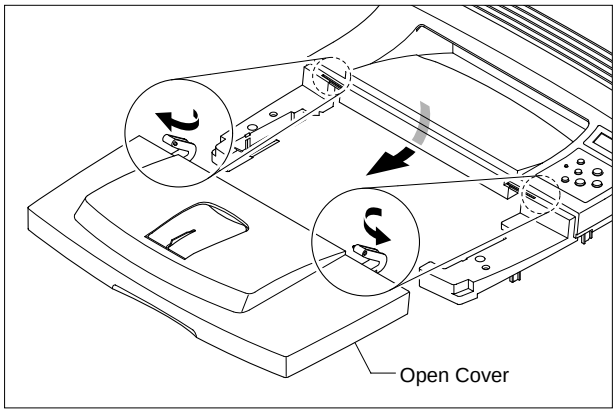
5.14 Open Cover

1. Before you remove the Open Cover, you should remove:
   - Top Cover (Refer to the 5.13)

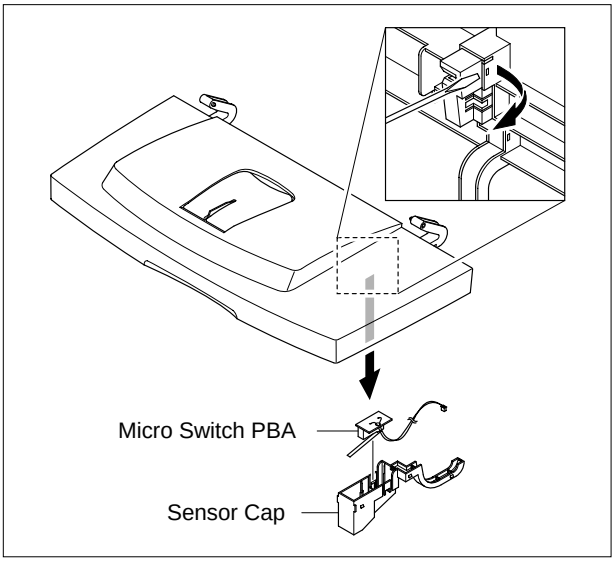
2. Remove two screws and take out the Stopper.



3. Take out the Open Cover as shown below.



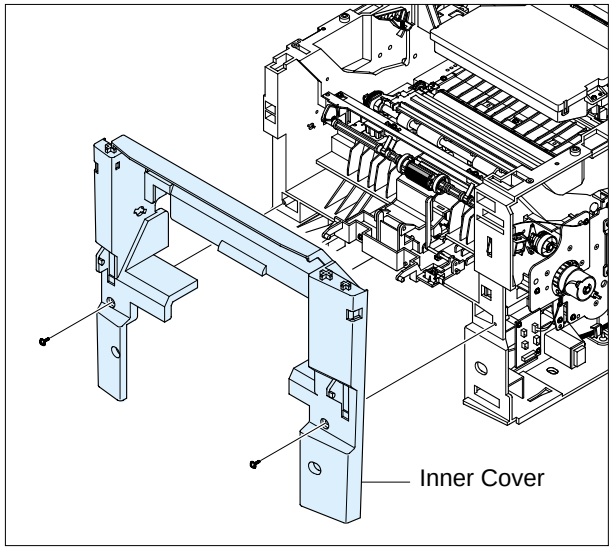
4. Release the lock as shown below and lift up the Sensor Cap.



5.15 Inner Cover

1. Before you remove the Inner Cover, you should remove:
   - MPF Ass'y (Refer to the 5.3)
   - Top Cover (Refer to the 5.13)

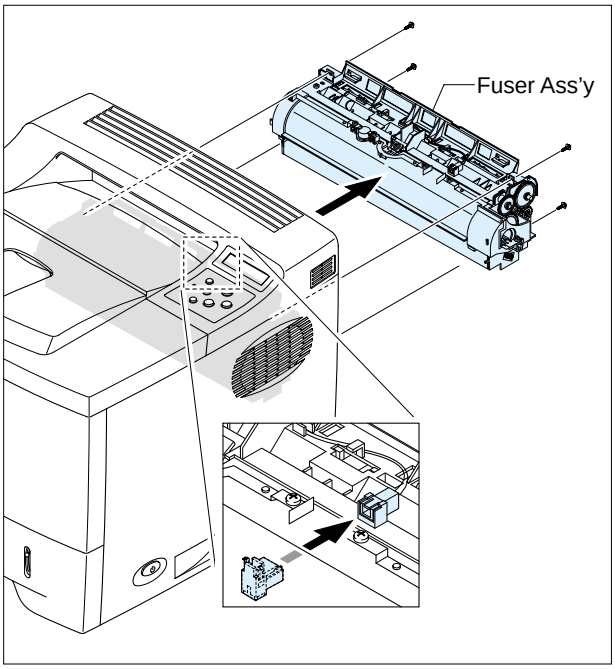
2. Remove two screws and take out the Inner Cover.



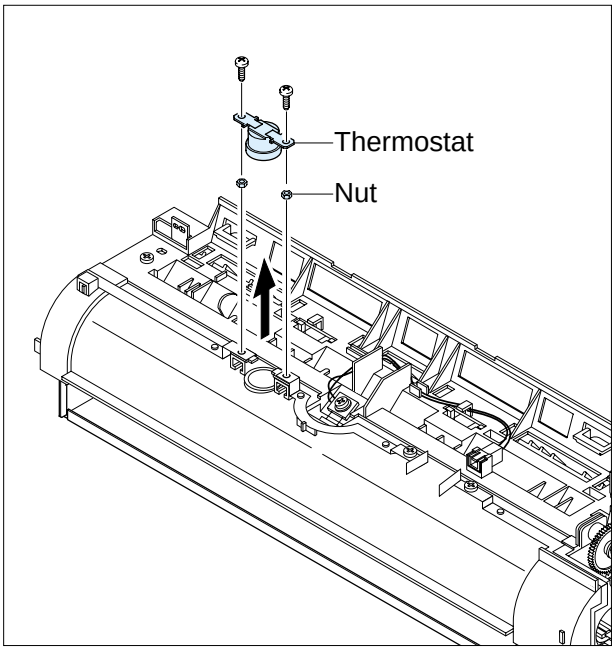
5.16 Fuser Ass'y

1. Before you remove the Fuser Ass'y, you should remove:
   - Rear Cover (Refer to the 5.12)

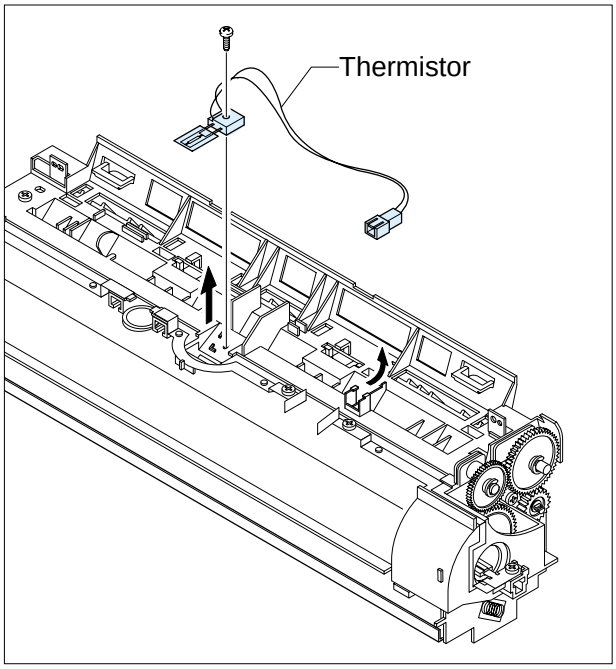
2. Remove four screws and take out the Fuser Ass'y.



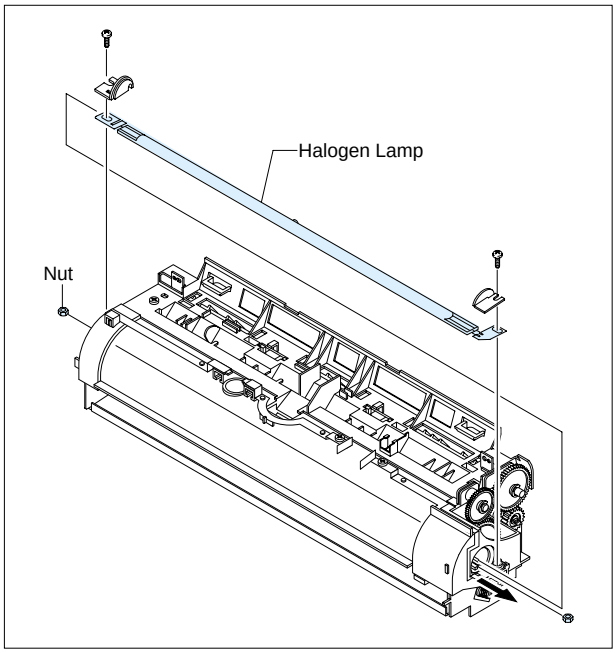
3. Remove two screws and take the Thermostat out of the Fuser Ass'y.



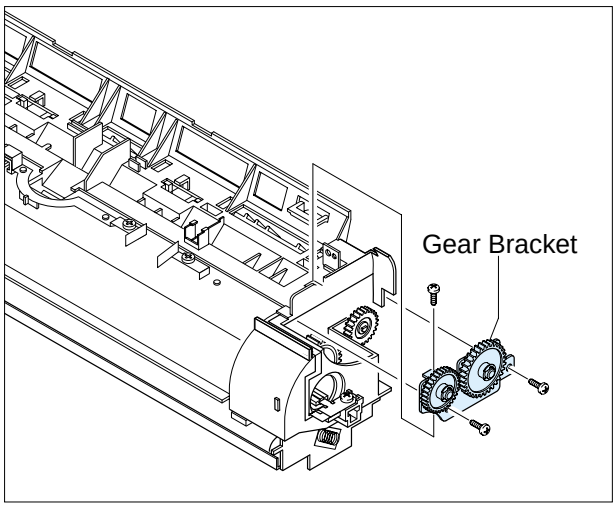
4. Remove one screw, and then take out the Thermistor from the Fuser Ass'y.



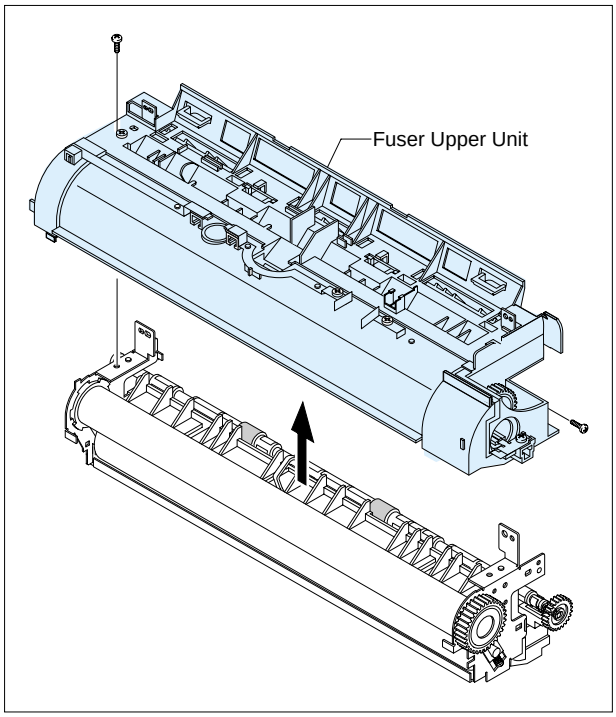
5. Remove two screws and take the Halogen Lamp out of the Heat Roller.



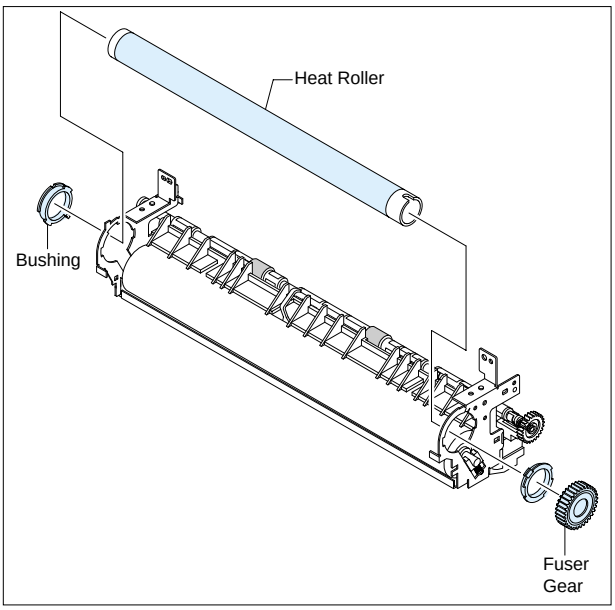
6. Remove three screws and take out the Gear bracket.



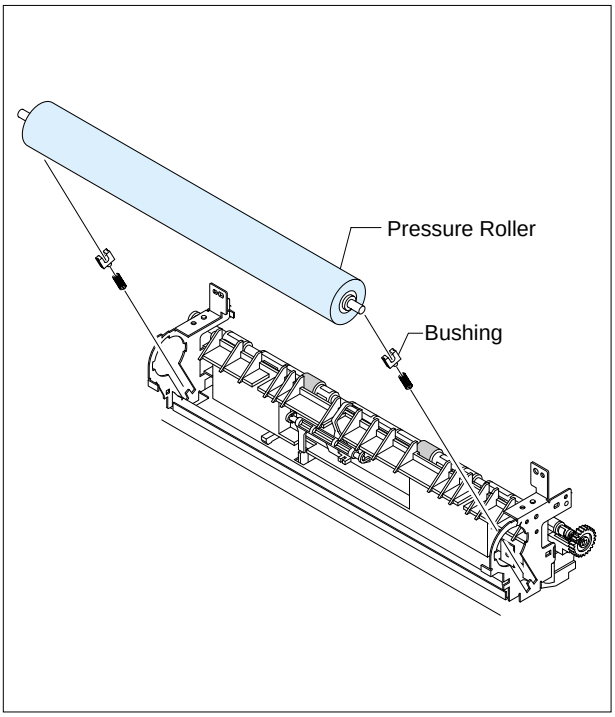
7. Remove two screws and divide the Fuser into two parts.



8. Take out the Heat Roller as shown below.



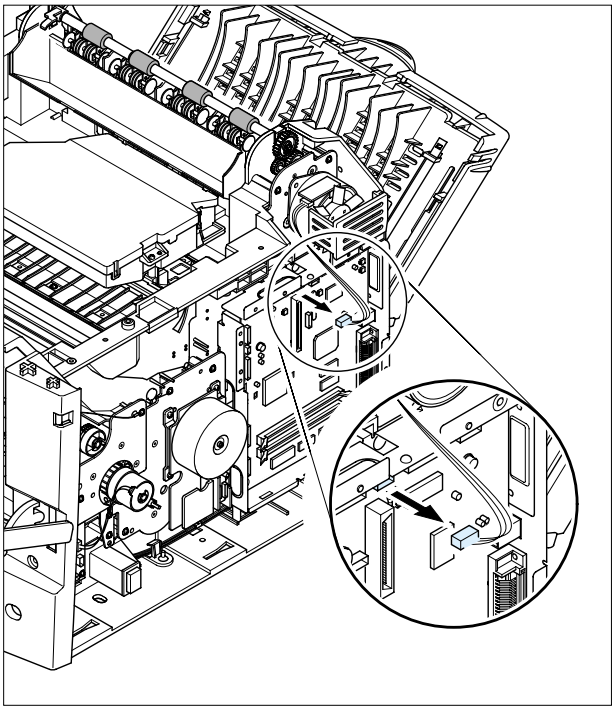
9. Take out the Pressure Roller as shown below.



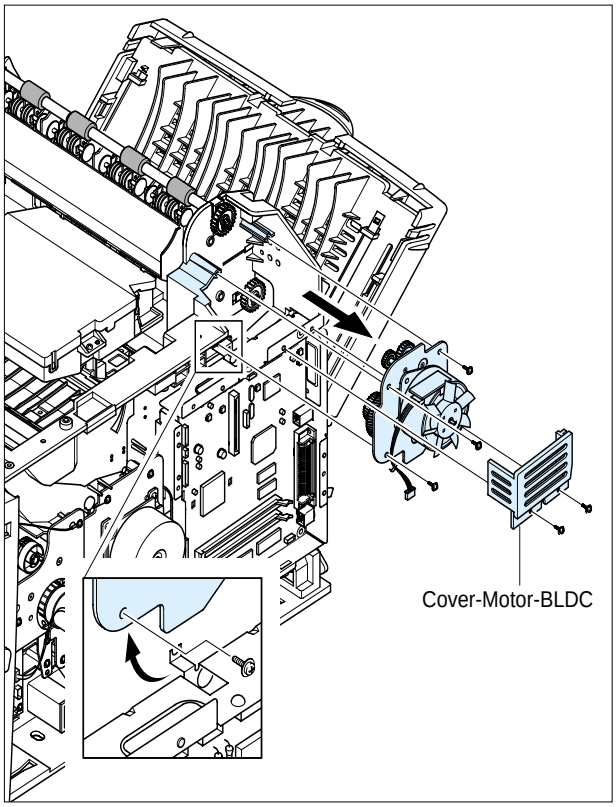
5.17 Exit Drive

1. Before you remove the Exit Driver, you should remove:
   - Top Cover (Refer to the 5.13)

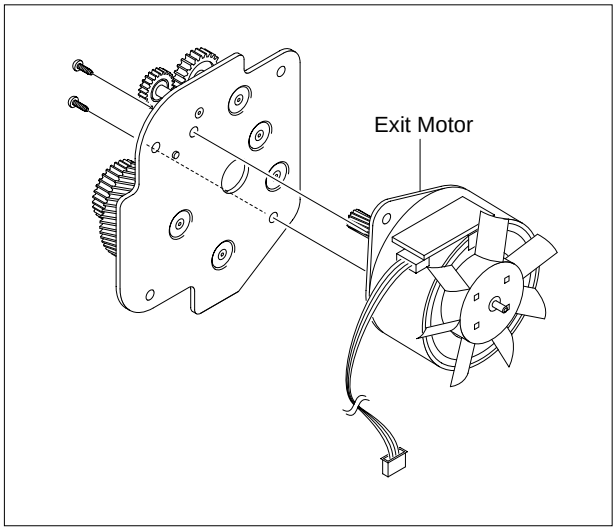
2. Unplug the Exit Driver Harness from the Main PBA.



3. Take out the Cover-Motor-BLDC after remove tow screws and take out the Exit Driver Ass'y after remove three screws.



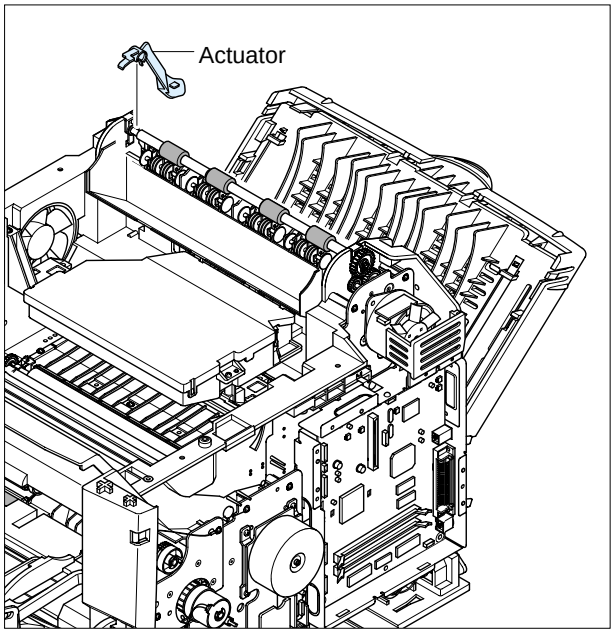
4.Remove two screws and take out the Exit Motor.



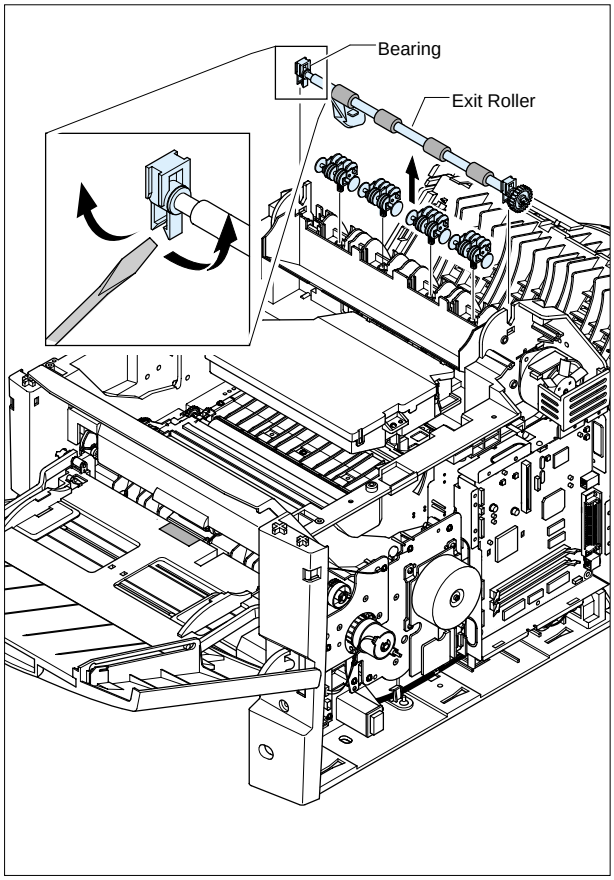
5.18 Exit Roller

1. Before you remove the Exit Roller, you should remove:
   - Top Cover (Refer to the 5.13)

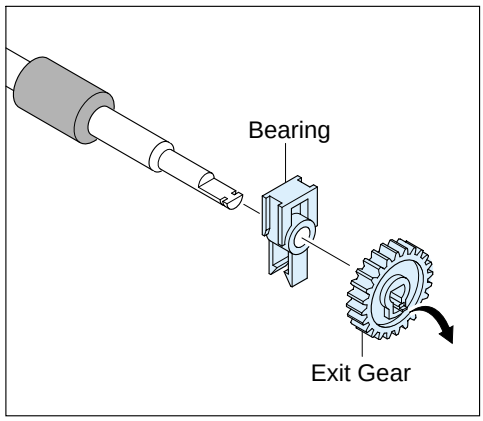
2. Take the Actuator out.



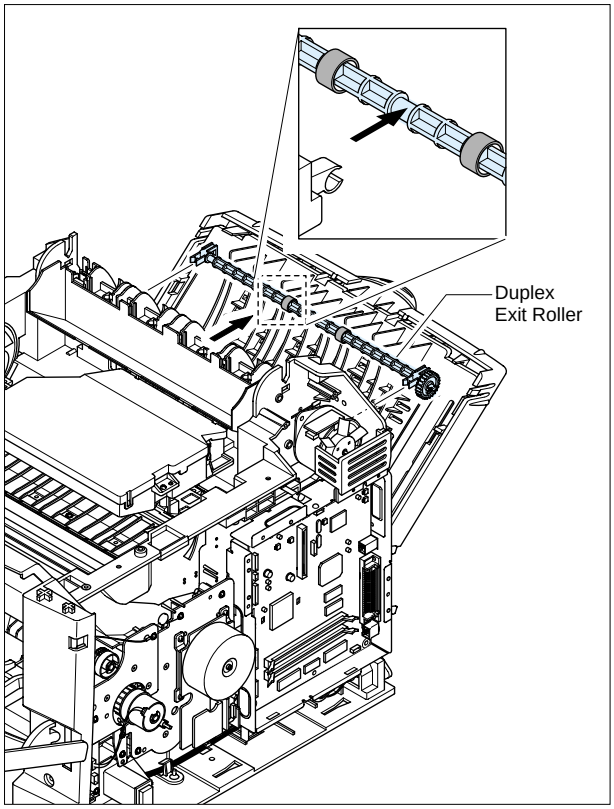
3. Remove the Exit Roller and Bearing as shown below.



4 Take out the Exit Gear as shown below.



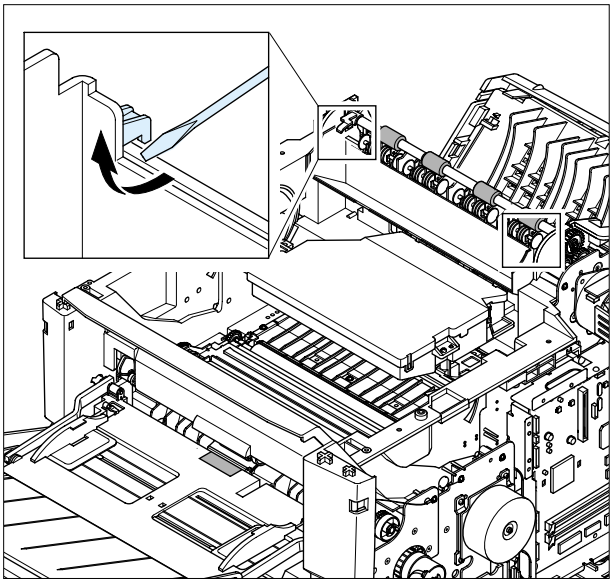
5. Take out the Duplex Exit Roller as same method.



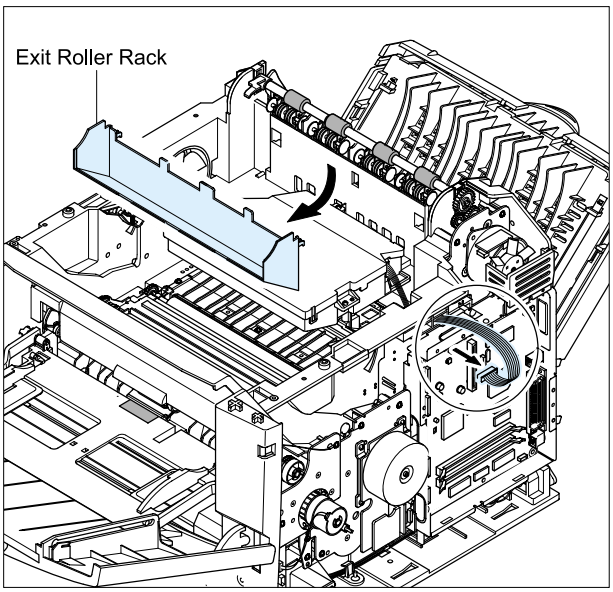
5.19 LSU

1. Before you remove the LSU, you should remove:
   - RH Cover (Refer to the 5.5)
   - LH Cover (Refer to the 5.10)
   - Top Cover (Refer to the 5.5)

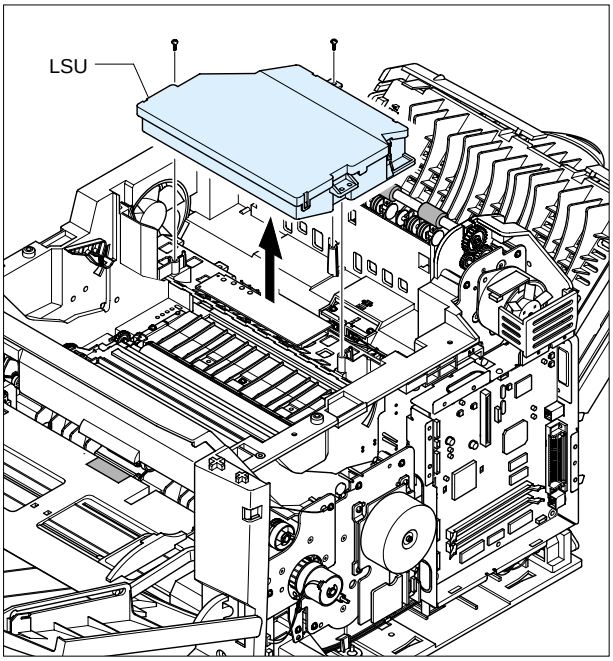
2. Release the lock as shown below.



3. Remove the Exit Roller Rack in the direction of arrow.



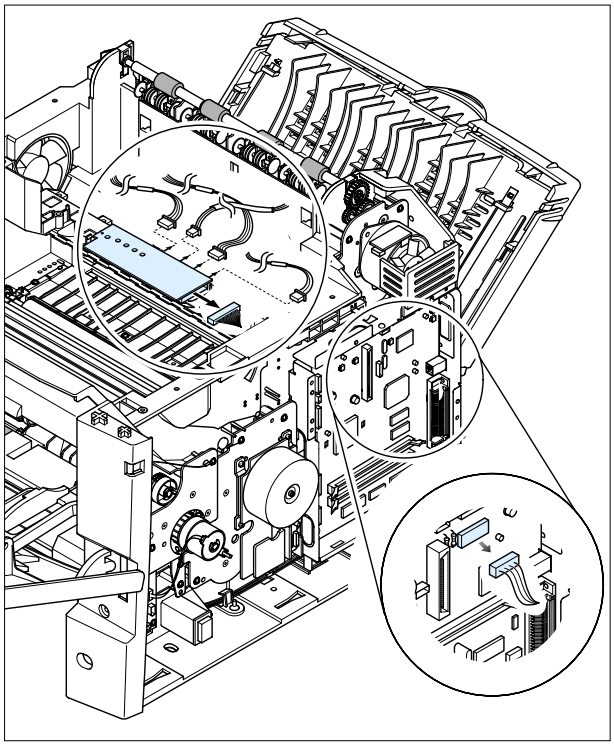
4. Remove three screws and take out the LSU.



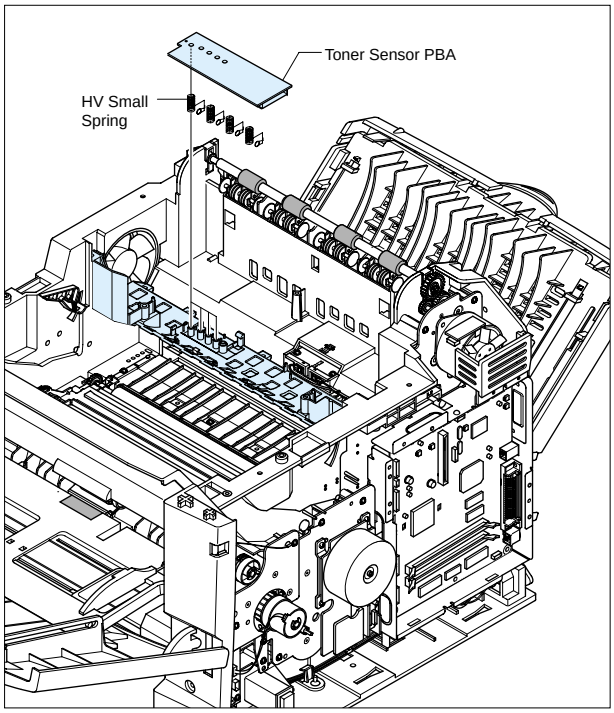
5.20 Toner Sensor Board

1. Before you remove the Toner Sensor Board, you should remove:
   - Top Cover (Refer to the 5.13)
   - LSU (Refer to the 5.19)

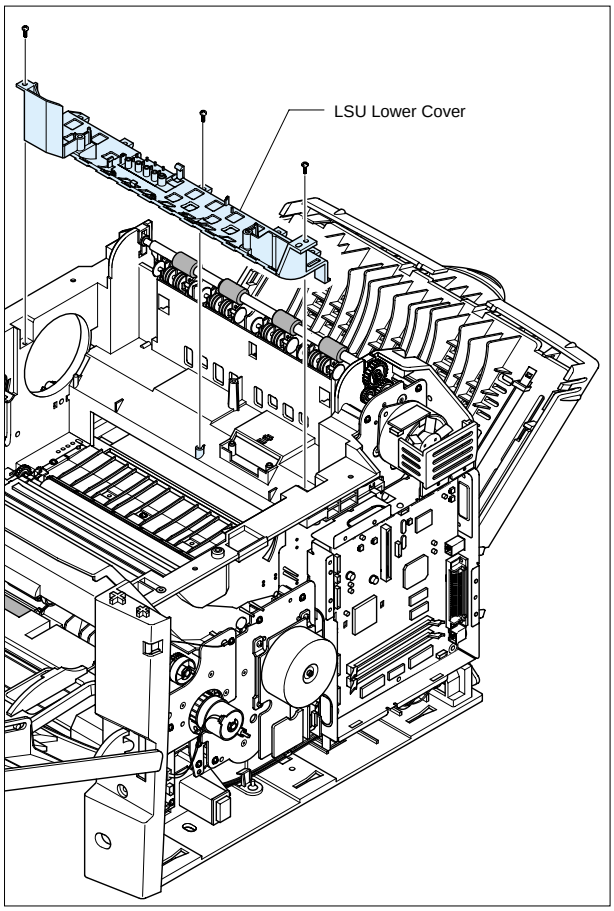
2. Unplug 5 Harness from the Toner Sensor PBA.



3. Take out the Toner Sensor PBA.



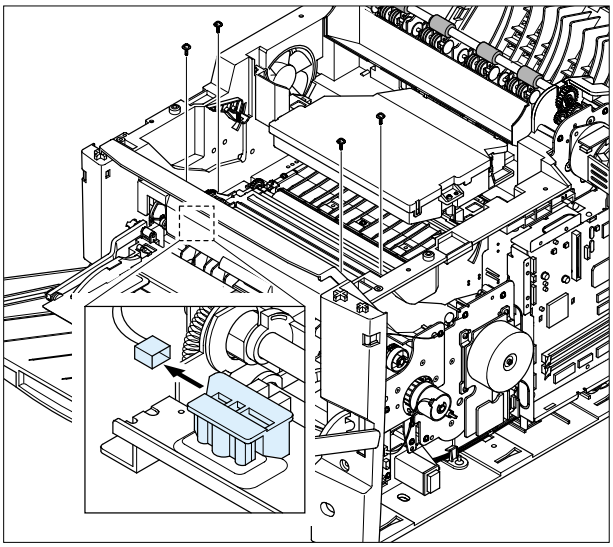
4. Remove 3 screws and take out the LSU Lower Cover.



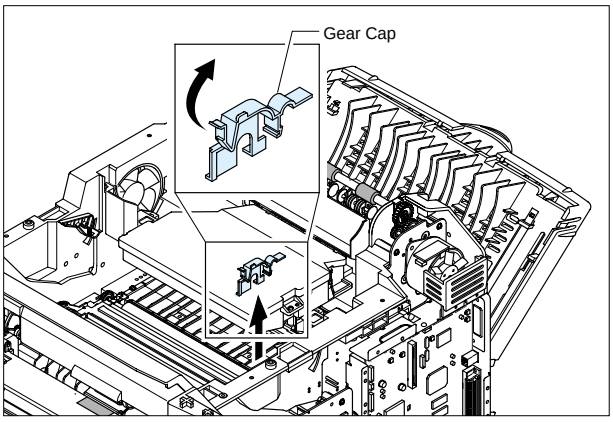
5.21 REGI Ass'y

1. Before you remove the REGI Ass'y, you should remove:
   - Top Cover (Refer to the 5.13)

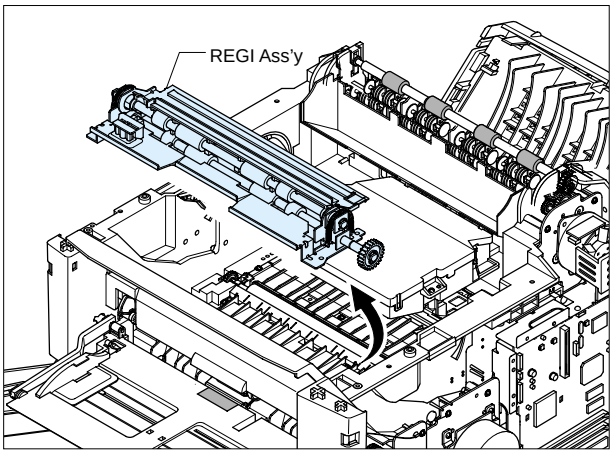
2. Unplug the Harness, Remove 3 screws.



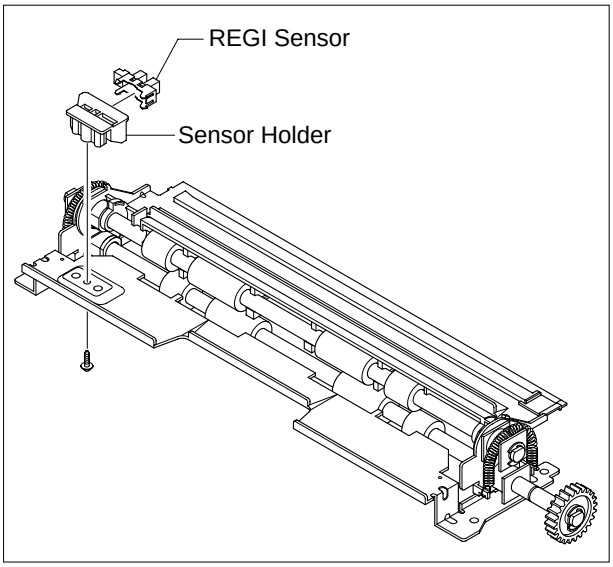
3. Release the lock as shown below and lift up the Gear Cap.



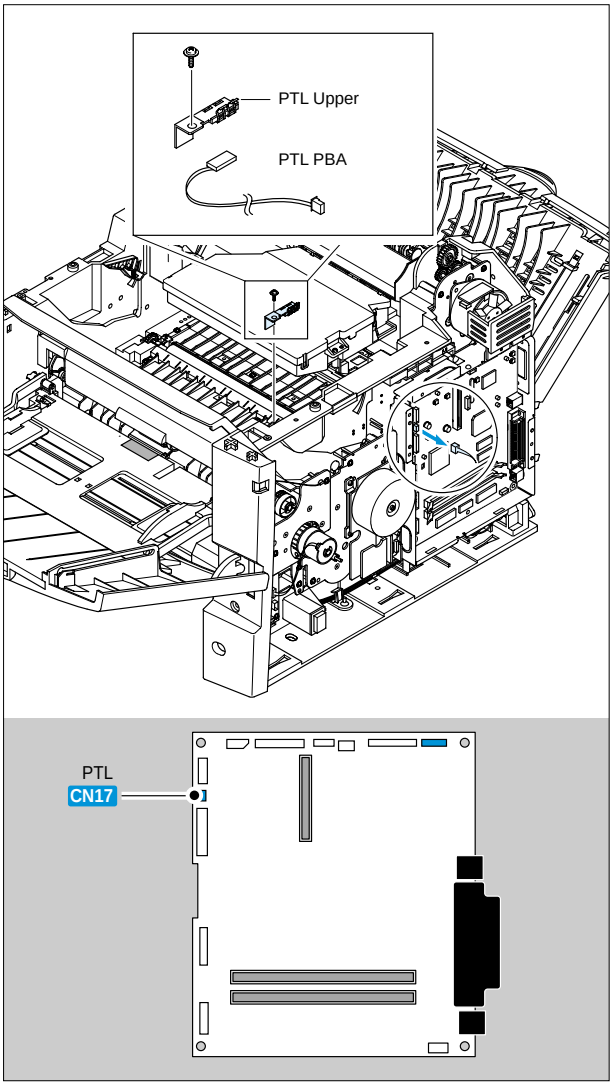
4. Take out the Regi. Ass'y as shown below.



5. Remove one screw and take out the Regi. Sensor.



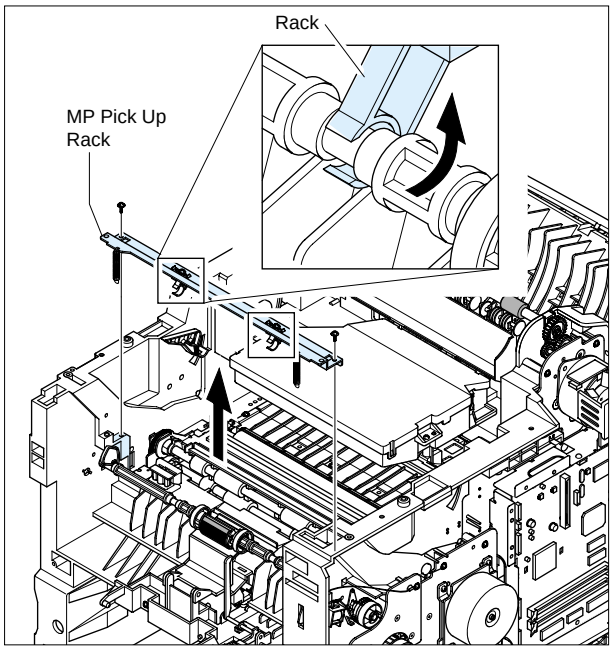
6. Unplug the Harness, remove one screw and take out the PTL PBA.



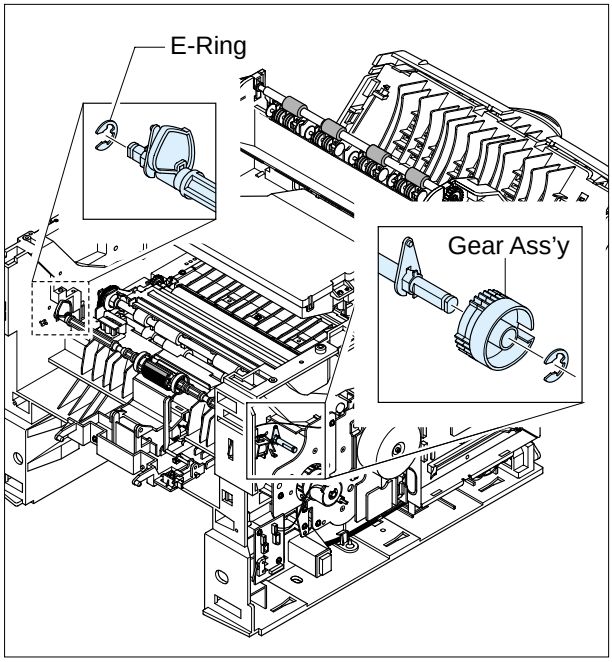
5.22 MP Pick-up Ass'y

1. Before you remove the MP Pick-up Ass'y, you should remove:
   - MPF Ass'y (Refer to the 5.3)
   - Main Drive Ass'y (Refer to the 5.7)
   - Top Cover (Refer to the 5.13)
   - Inner Cover (Refer to the 5.15)

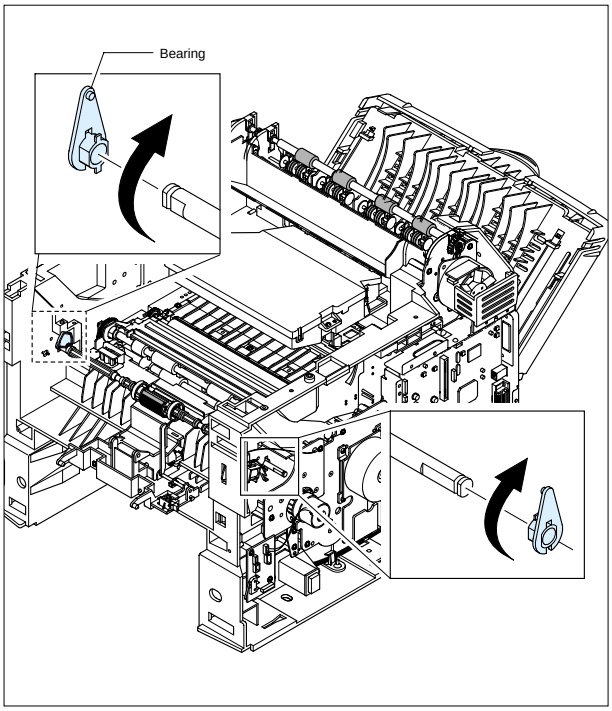
2. First of all remove two screws. Lift up the MP Pick-up Shaft for taking out the MP Pick-up Rack.



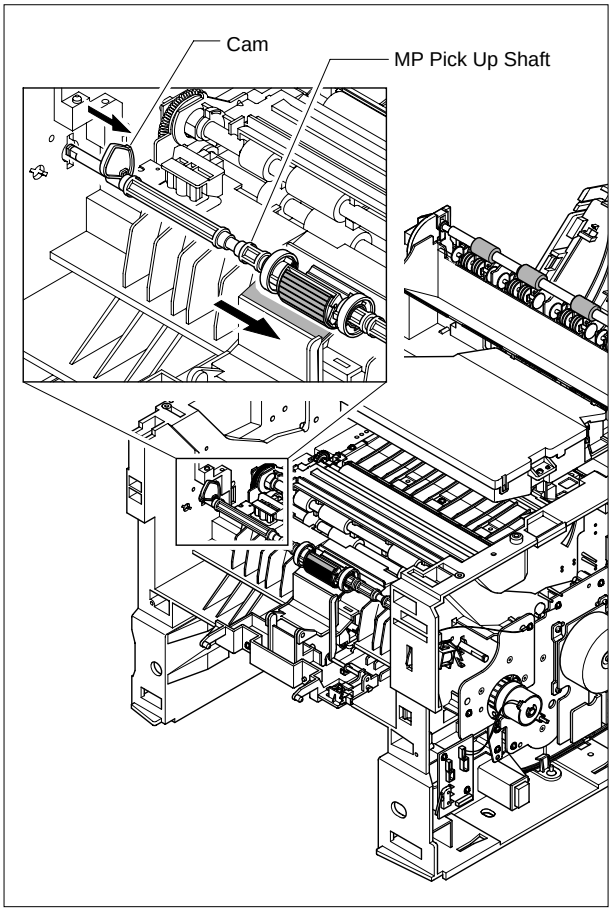
3. Remove the E-Rings on both ends of Gear Ass'y and remove Ass'y as shown below.



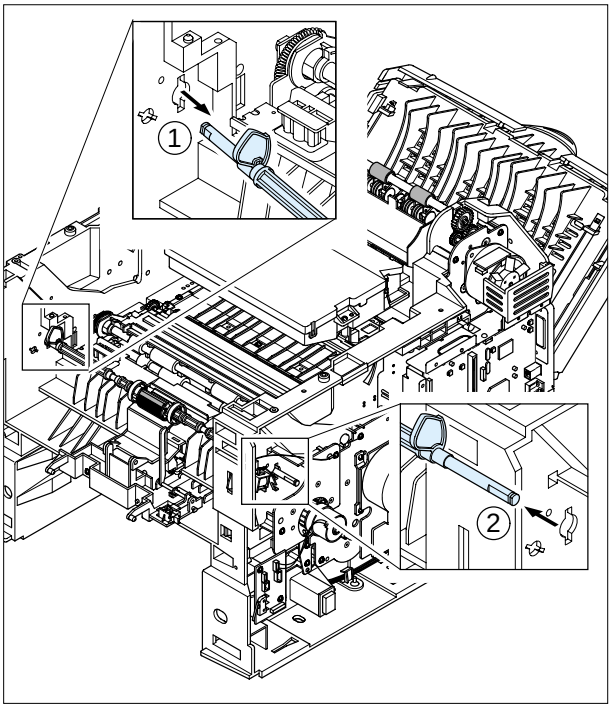
4. Pull and remove the lock equipment, then rotate the Bearing as shown below.



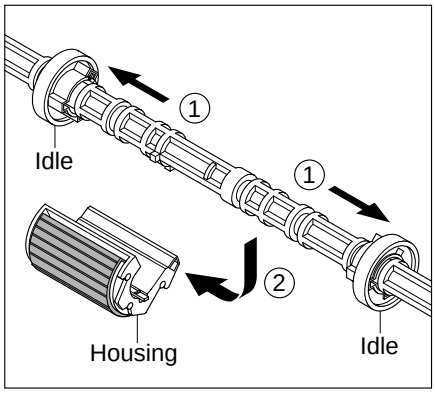
5. Slide the cam to the left by pulling on the MP Pick-up shaft



6. First lift the left side of the Shaft and then remove the Shaft.



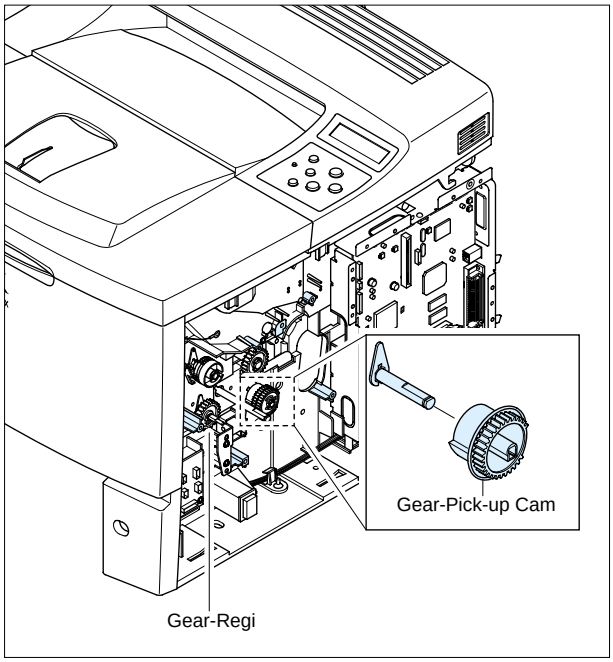
7. Push the idles toward the ends of shaft then take out the Housing as shown below.



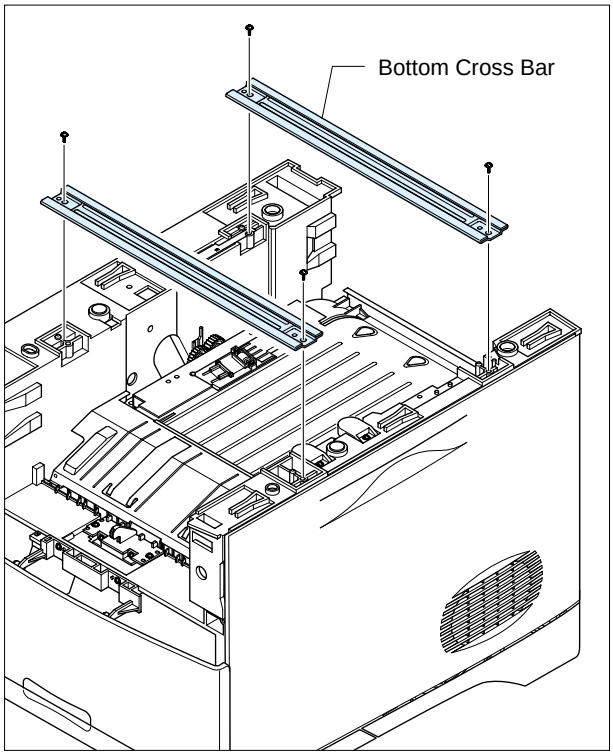
5.23 Pick-up Ass'y

1. Before you remove the Pick-up Unit, you should remove:
   - RH Cover (Refer to the 5.5)
   - Main Drive Ass'y (Refer to the 5.7)

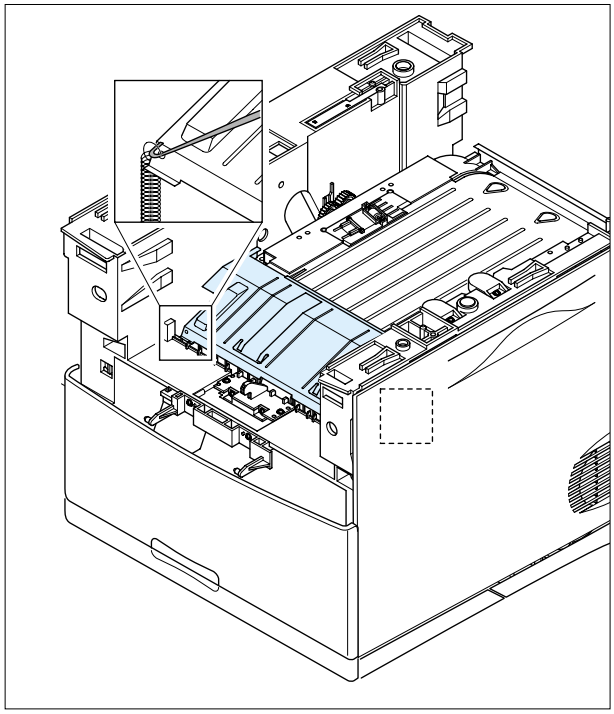
2. Remove E-Ring and take The Gear-Pick-up Cam out. Take the Gear-Regi out.



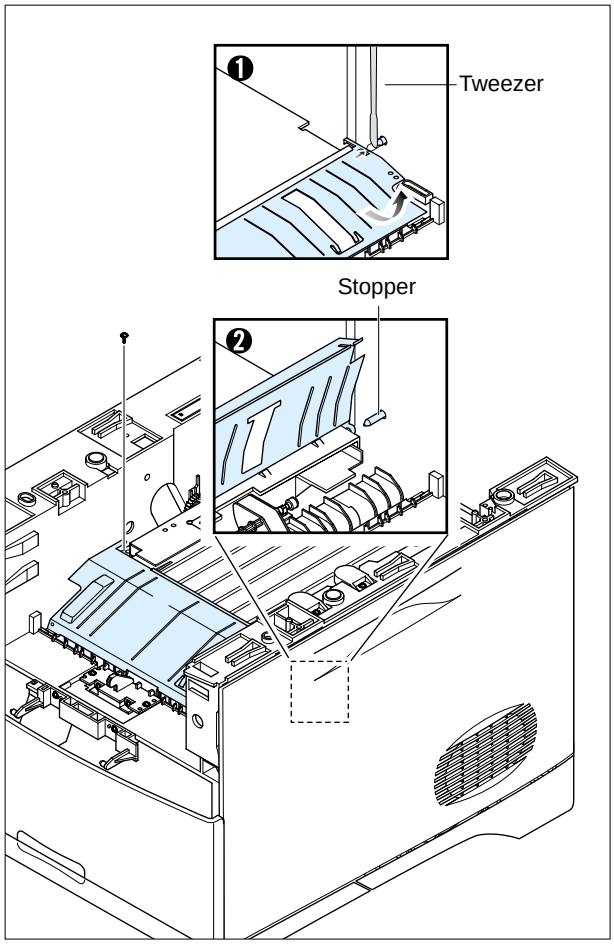
3. Remove four screws. Then lift the Bottom Cross Bar, as shown below.



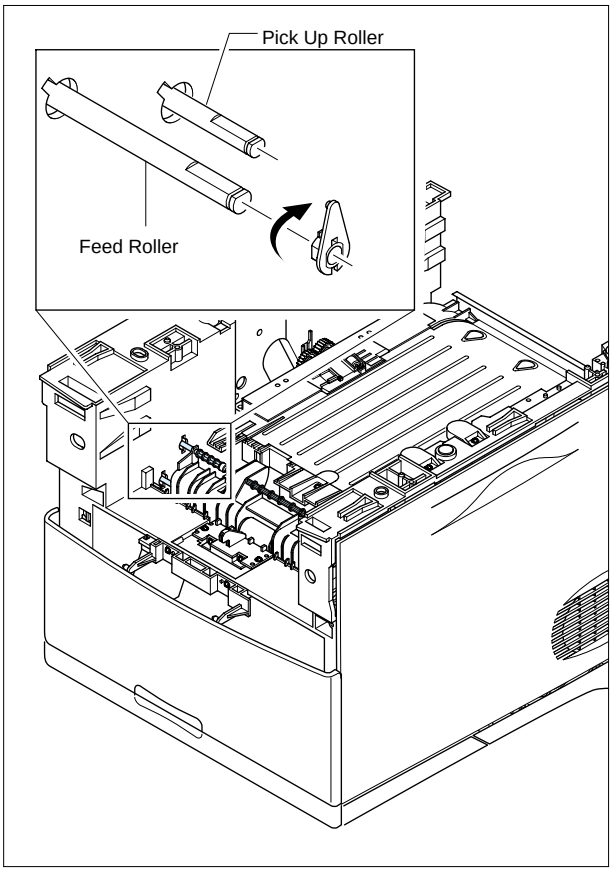
4. Remove two springs from the Pick-up Ass'y.



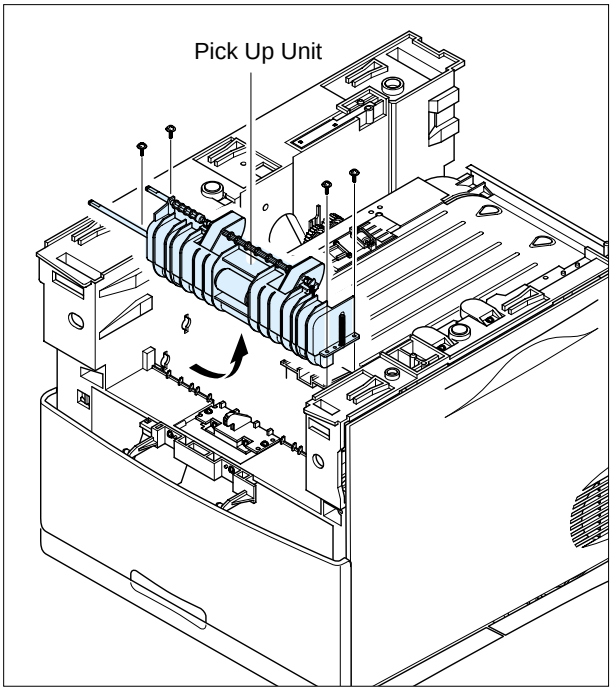
5. Lift Guide-Front-Dup out in the direction of arrow as shown below.



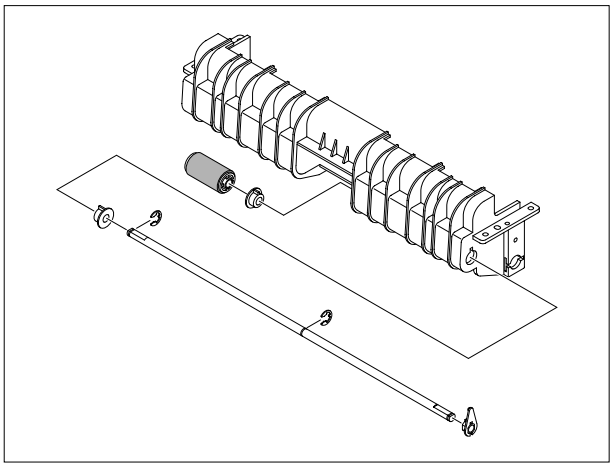
6. Remove the locking equipment rotate the Feed Roller Shaft's in the direction of the arrow and slide the bearing off as shown below.



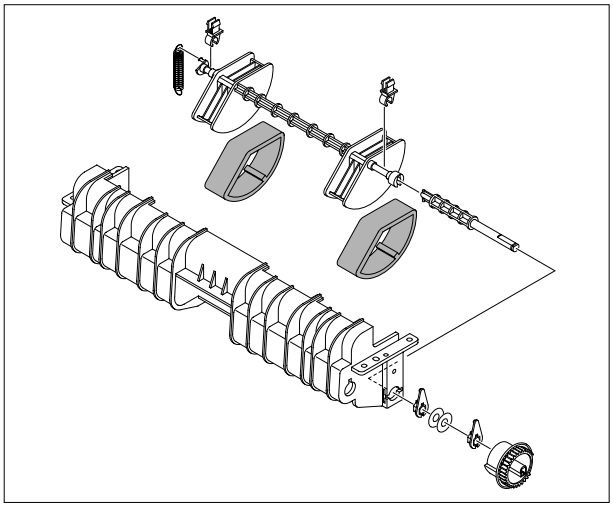
7. Remove four screws and lift the Pick-up Unit out in the direction of the arrow as shown below.



8. Remove the Feed Ass'y as shown below.



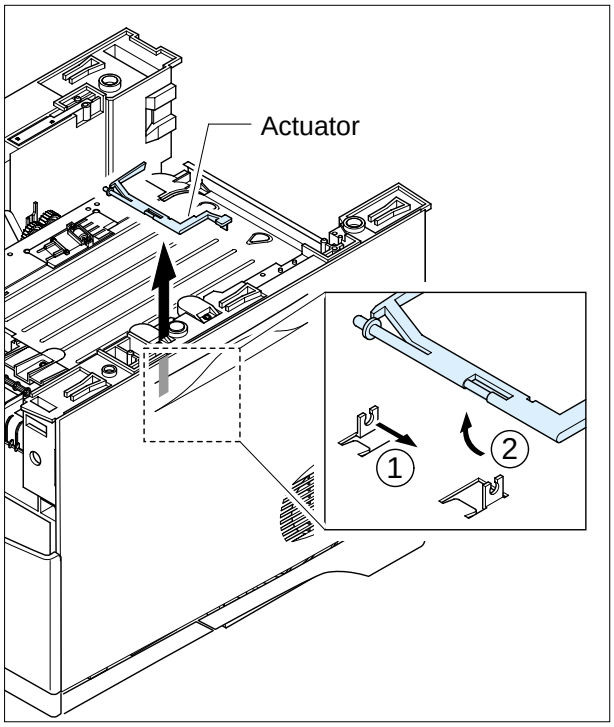
9. Remove the Pick-up Ass'y as shown below.



5.24 Engine Shield

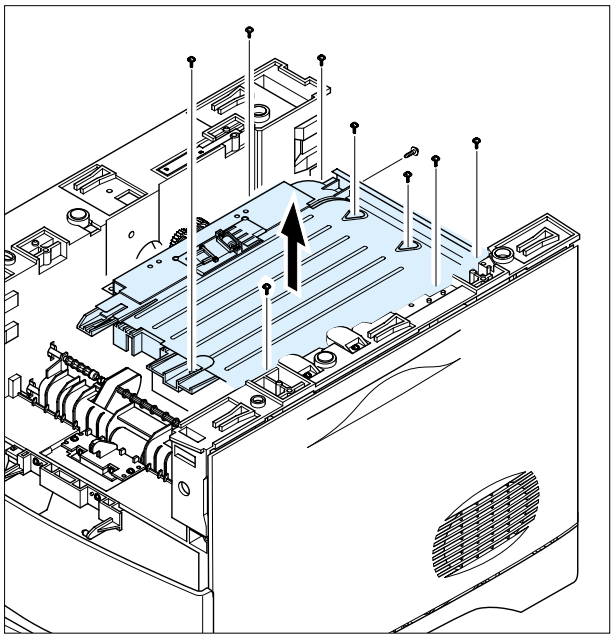
1. Remove the Guide-Front-Dup.(Refer to the 5.23.5)

2. Remove the Actuator as shown below.

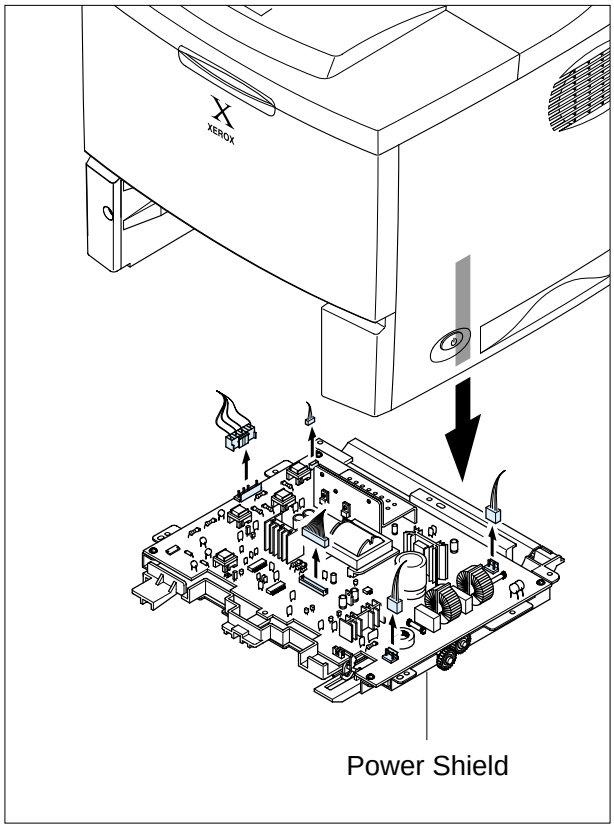


⚠ *Notice: Be careful not to get burnt when separating an Engine PBA.*

3. Remove nine screws and slightly lift the Engine Shield, as shown below.



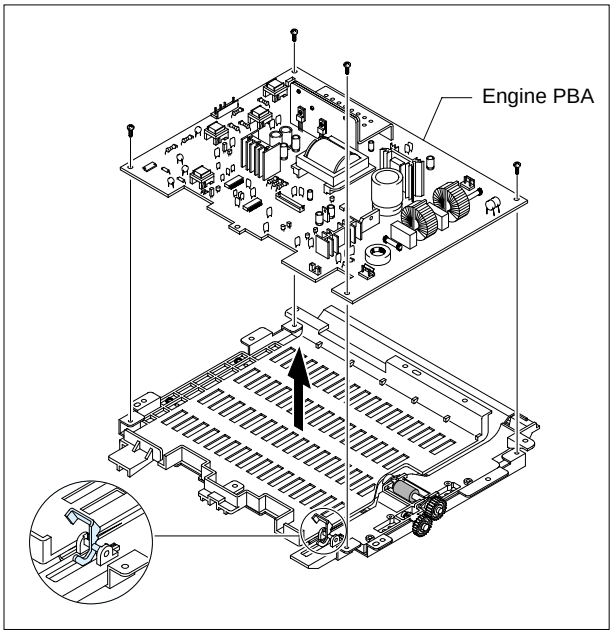
4. Unplug all of the connectors from the Engine PBA. Then take out the Engine Shield Ass'y.



5.25 Engine PBA

1. Before you remove the Engine Shield, you should remove:
   - Engine Shield (Refer to the 5.25)

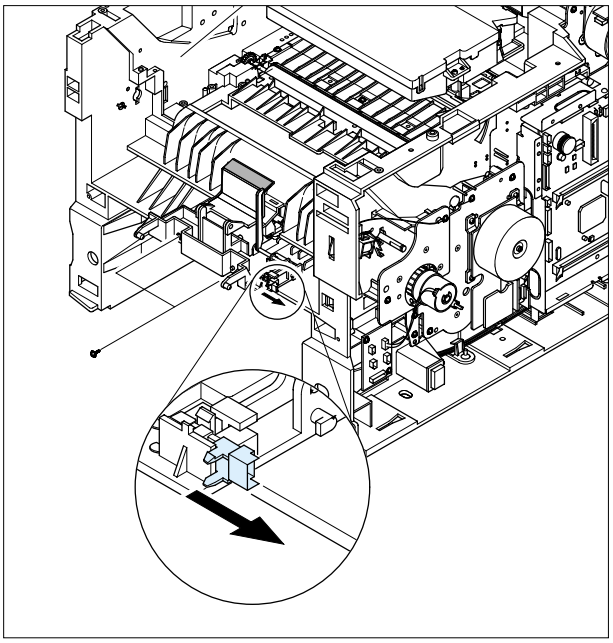
5. Remove four screws and take the Engine Board out of the Duplex Unit.



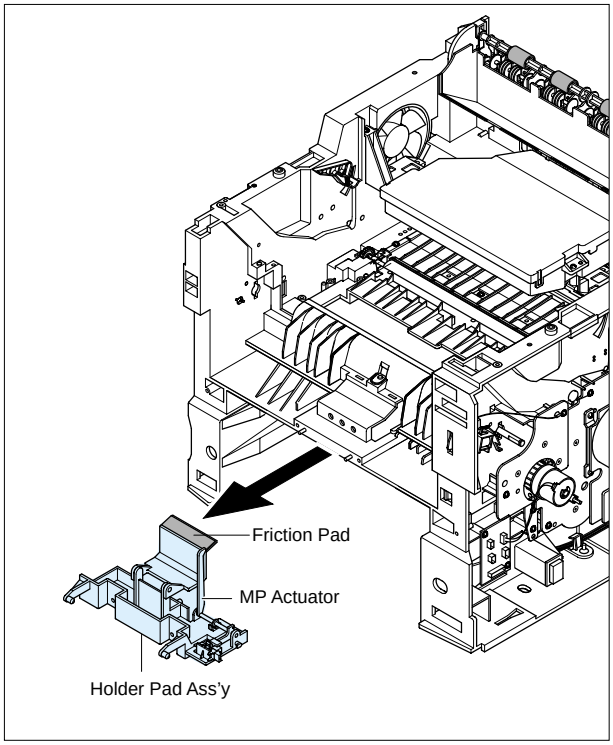
5.26 Holder Pad Ass'y

1. Before you remove the Holder Pad Ass'y, you should remove:
   - MPF Ass'y (Refer to the 5.3)
   - All Cover (Refer to the 5.5, 5.10, 5.12, 5.13, 5.14, 5.15)
   - MP Pick-up Ass'y (Refer to the 5.22)

2. Unplug the connector and remove the two screws, as shown below.



3. Remove the photo interrupter and the MP Actuator as shown below.



6. Alignment and Adjustments

This chapter describes the main functions for service, such as the product maintenance method, the test output related to maintenance and repair, DCU using method, Jam removing method, and so on. It includes the contents of manual.

6.1 How to use EDC (Engine Diagnostic Control) Mode

6.1.1 EDC Setup

- EDC(Engine Diagnostic Control, EDC will be used below) is considered to test and check whether each functions of machinery and h/w module are normal or not. All of the test function are able to be controlled by the keys and LCD window on the panel without any other kits.
- It's developed for related engineers, not for users.

6.1.2 Entering/Exiting Method For EDC

<1> Outline

- The method for entering "EDC" mode is especial because it is intended for technicians and not users
- After Entering the mode, the message, "**Engine EDC Mode**" is displayed.
- On the mode, an engineer should press the "Menu Key" to search each function he would like to test.
- Turn the power off, after the test is entirely end.

<2> Usage

1. Power off the printer.
2. Pressing the **"Select key"**, power the printer on.
3. Keep pressing it until the message, "**Engine EDC Mode**" is shown on the panel.
4. Follow the usage for a function you would like to use.
5. Turn the power off, after the test is complete.

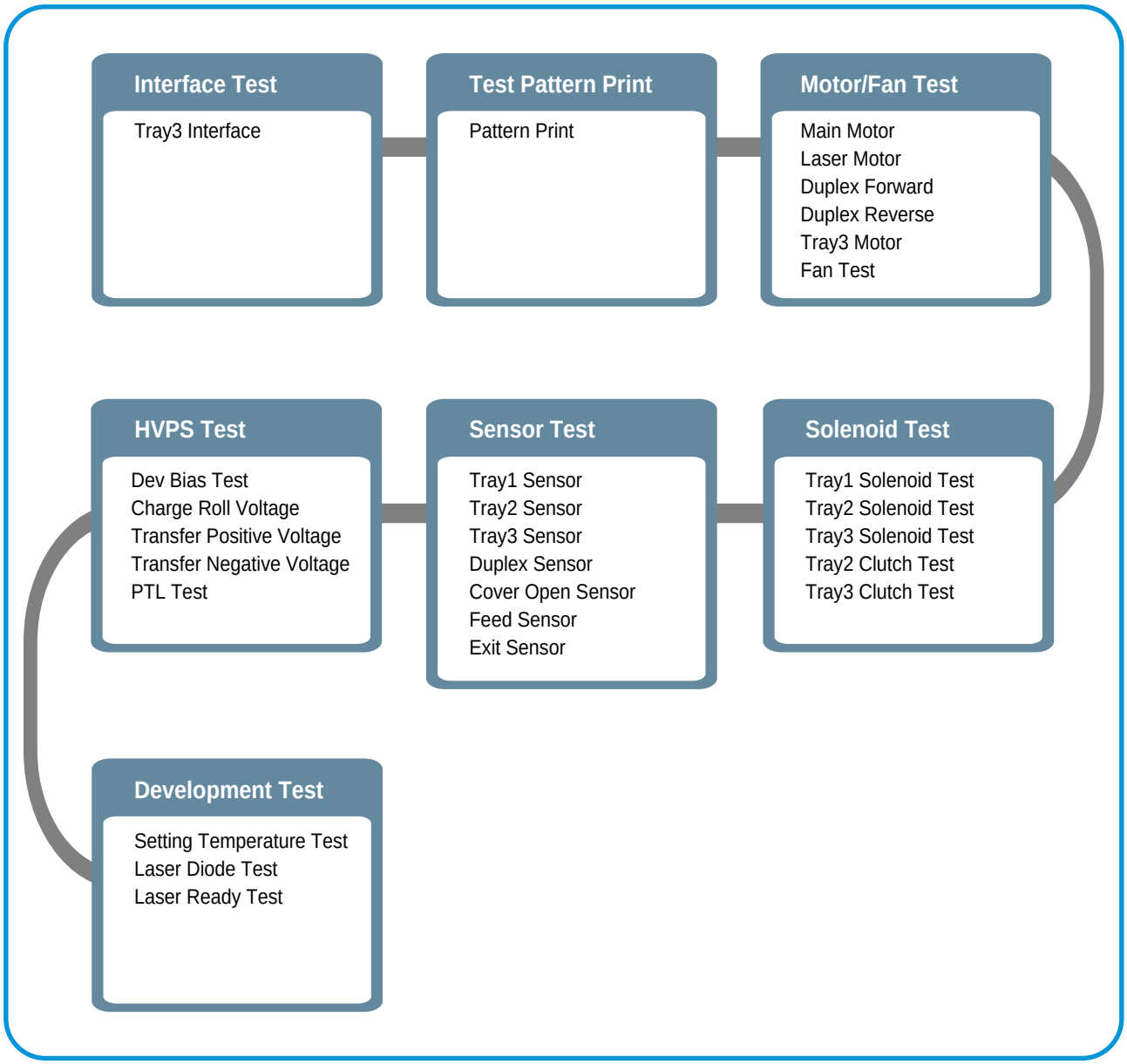
6.1.3 Usage & Function of Key on OPE

Key	Function	Description	Remarks
Menu	Menu	To enter the main Menu	
Arrow (right)	Search a Menu/ Input Data	To search a Menu and input a data	
Arrow (left)	Search a Menu/ Input Data	To search a Menu and input a data	
Select	Execute / Select	To execute a function	
Cancel	Stop / Cancel	To stop a function	
Upper Level	Move	To move to the upper level	

6.1.4 Usage & Function of LCD

Line	Characters	Description	Remarks
Top	16	Make engineers recognizing a test location. [Main Menu] or [Function] is displayed.	
Bottom	16	Make engineers recognizing a menu or function to be tested A menu or function name displayed	

6.1.2 How to use EDC (Engine Diagnostic Control) Mode



6.1.2.1 Interface Test (Main controller and Tray3 controller)

- This Function is used to check the communication state between the main controller and the tray 3 controller.

1. Press the "Menu Key", until finding "Interface Test" message on the panel.
2. Press the "Select Key", when it's found.

Sub Menu	Description	Display (LCD)
Tray3 Interface	After it is on the test, confirm a message on the panel. The I/F is normal for the message, "PASS" and abnormal for the message, "FAIL" on the bottom line.	Tray 2 I/F : PASS(FAIL)

6.1.2.2 Test Pattern and Paper path

- These Functions are considered to check the total print process state.
- On the EDC mode, a Test pattern is able to be printed. While the printing job is processing, the location of the paper is continuously displayed.

1. Press the “Menu Key” until finding “Test Pattern Print” message on the panel.
2. Press the “Select Key”, when it’s found.
3. Confirm the message “Choose a tray : 1”(default : 1).
4. Press the “Arrow keys” (< / >) to select a tray you would like to choose.
5. Fill a Tray(1, 2, 3) with papers.
5. Press the “Select Key”, if you would like to print it.

Sub Menu	Description	Display (LCD)	Remark
Test Pattern Print	The test pattern is printed after the execution key is chosen and “More?” is displayed. Press the “Select Key” for printing more, the “Cancel Key” for stopping.	Pattern Print (Location)	Example -> Pattern Print : Exit On

Location order : Pick up a Feed On → Exit On → Feed Off → Exit Off → End
(It is possible that Feed Off → Exit On, when a paper size is small)

6.1.2.3 Motor & Fan Test

- These Functions are used to check the present state (normal or not) of the motors and fan.

1. Press the "Menu Key", until finding "Motor/Fan Test" is displayed on the panel.
2. Press the "Select Key", when it's found.
3. Press the "Arrow keys" (< / >), until finding the desired function
   (Refer to the table below).
4. Press the "Select Key", when it's found.
5. Press the "Select Key" for execution or the "Cancel key" to stop.

Sub Menu		Description	Remarks
Main Motor		The main motor keeps running after the execution key is chosen and stops when the stop key is chosen.	Main Motor On(Off)
Laser Motor		The laser motor keeps running after the execution key is chosen and stops when the stop key is chosen.	Laser Motor On(Off)
Duplex Motor	Duplex Forward	The duplex motor keeps running on the forward direction after the execution key is chosen and stops when the stop key is chosen.	Duplex Forward On(Off)
	Duplex Reverse	The duplex motor keeps running on the backward direction after the execution key is chosen and stops when stop key is chosen.	Duplex Backward On(Off)
Tray3 Motor		The Tray3 motor keeps running after the execution key is chosen and stops when the stop key is chosen. --> When a tray 3 is not installed, this function is not processed and "Tray 3 Not Installed" is shown.	Tray 3 Motor On(Off)
FAN		The fan keeps running after the execution key is chosen and stops when the stop key is chosen.	Fan On(Off)

6.1.2.4 Solenoid & Clutch Test

- These Functions are used to check the present state (normal or not) of the solenoids and clutches.

1. Press the "Menu Key", until finding "Solenoid Test" is displayed on the panel.
2. Press the "Select Key", when it's found.
3. Press the "Arrow keys" (< / >), until finding the desired function.
   (Refer to the table below)
4. Press the "Cancel Key", when it's found.
5. Press the "Select Key" for execution

Sub Menu	Description	Remarks
Tray1 Solenoid Test	The tray1 solenoid is on for 150ms and then it automatically stops, when the execution is chosen.	Tray 1 Solenoid On/Off
Tray2 Solenoid Test	The tray2 solenoid is on for 150ms and then it automatically stops, when the execution is chosen.	Tray 2 Solenoid On/Off
Tray3 Solenoid Test	The tray3 solenoid is on for 150ms and then it automatically stops, when the execution is chosen.	Tray 3 Solenoid On/Off
Tray2 Clutch Test	The tray2 clutch is on for 1sec and then it automatically stops, when the execution is chosen. On this function, the main motor runs before 2sec from the point of the clutch on in order to check the clutch state.	Tray 2 Clutch On/Off
Tray3 Clutch Test	The tray3 clutch is on for 1sec and then it automatically stops, when the execution is chosen. On this mode, the tray 3 motor runs before 2sec from the point of the clutch on in order to check the clutch state. --> When a tray 3 is not installed, this function is not processed and "Tray 3 Not Installed" is shown.	Tray 3 Clutch On/Of

6.1.2.5 Sensor Test

- These Functions are considered to check the present state (normal or not) of the Sensors.

1. Press the "Menu Key", until finding "Sensors Test" message on the panel.
2. Press the "Select Key", when it's found.
3. Press the "Arrow keys" (< / >), until finding a suitable function.
4. Press the "Select Key", when it's found.
3. Touch a sensor you would like to test.
4. Confirm a message on the LCD window for the state of it.

Sub Menu	Description	Display(LCD)	
		Before touching	After touching
Tray1 Sensor	After the tray 1 is gotten down, touch the sensor and confirm the message changed "Tray 1 Sensor Off" to "Tray 1 Sensor On"	Tray 1 Sensor Off	Tray 1 Sensor On
Tray2 Sensor	After the tray 2 is pulled out, touch the sensor and confirm the message changed "Tray 2 Sensor Off" to "Tray 2 Sensor On".	Tray 2 Sensor Off	Tray 2 Sensor On
Tray3 Sensor	After the tray 3 is pulled out, touch the sensor and confirm the message changed "Tray 3 Sensor Off" to "Tray 3 Sensor On".	Tray 3 Sensor Off	Tray 3 Sensor On
Duplex Sensor	After the back cover is open, push a paper into the duplex path and confirm the message changed "Duplex Sensor Off" to "Duplex Sensor On".	Duplex Sensor Off	Duplex Sensor On
Cover Open Sensor	After the cover is open, touch the sensor and confirm the message changed "Cover Open" to " Cover Close"	Cover Open	Cover Close
Feed Sensor	Touch the Feed sensor.	Feed Off	Feed On
Exit Sensor	Touch the Feed sensor.	Exit Off	Exit On

6.1.2.6 HVPS Test Item : High Voltage Power Supply

- These Functions are used to check whether the control for HVPS is normal or not.

1. Press the "Menu Key", until finding "Developing Test" is displayed on the panel.
2. Press the "Select Key", when it's found.
3. Press the "Arrow keys" (< / >), until finding a suitable function (Refer to the table below).
4. Press the "Select Key", when it's found.
5. Press the "Select Key" for execution or the "Cancel key" for stop.

Sub Menu	Description	Display (LCD)	Remarks
Dev Bias Test	Dev bias(- 470V) and Supply bias(- 650V) are supplied and after the execution key is chosen and it stops when the stop key is chosen.	Dev Bias On (Off)	
Charge Roll Voltage Test	Charge roll voltage (- 1500V) is supplied after the execution key is chosen and it stops when the stop key is chosen.	Charge : -1500V [Value]	ADC value displayed
Transfer (+) Test	Transfer positive voltage (+1000V) is supplied after the execution key is chosen and it stops when the stop key is chosen.	Transfer : +1000V [Value	ADC value displayed
Transfer (-) Test	Transfer negative voltage(- 600 ~ -1000 V) is supplied after the execution key is chosen and it stops when the stop key is chosen.	Transfer(-) On(Off)	Voltage in the range
PTL Test	PTL(Pre-Transfer Lamp) is on after the execution key is chosen and it stops when the stop key is chosen.	PTL On(Off)	

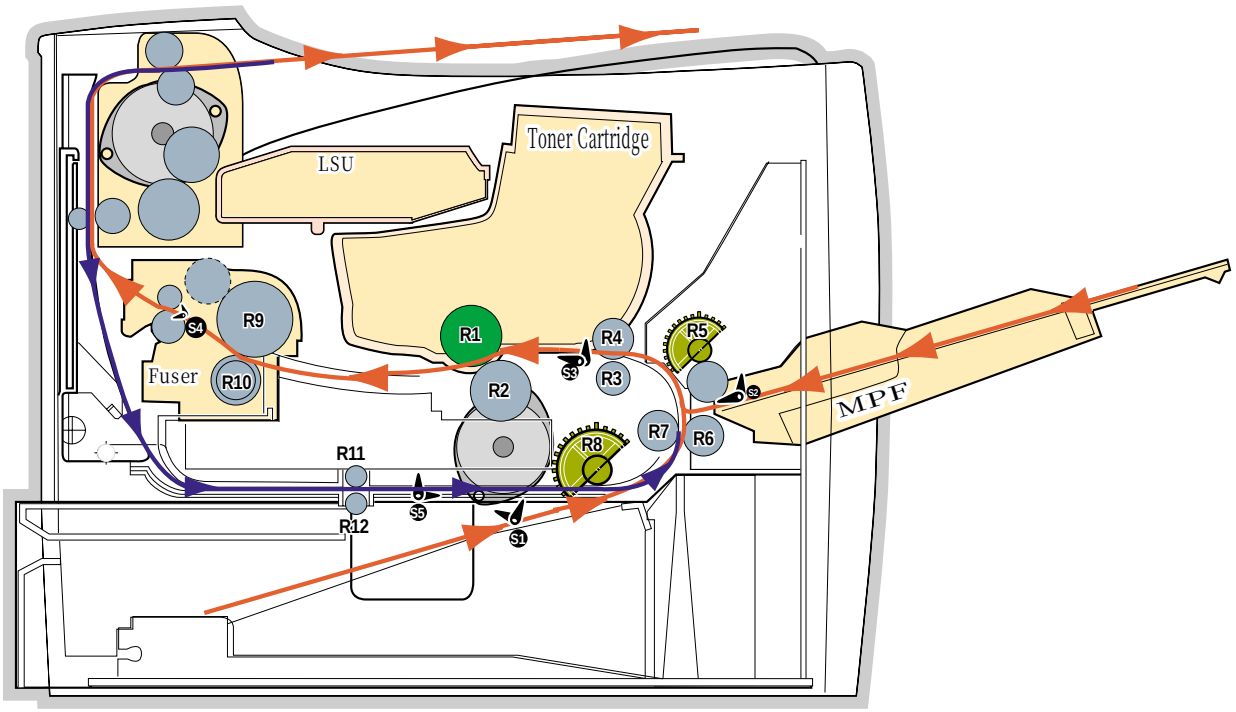
6.1.2.7 Developing Test Item : Fuser,Laser Scanning Unit

- These Functions are used to check whether functions related to the development are normal or not. (Fuser, OPC, LSU)

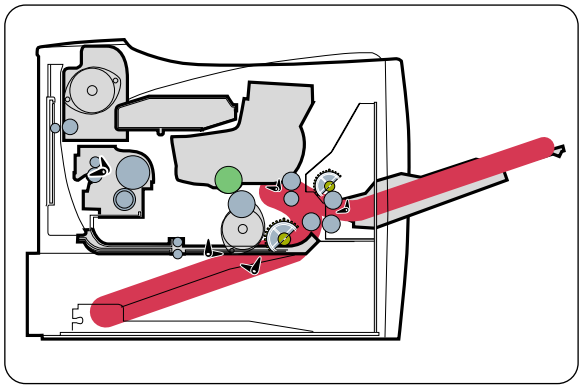
1. Press the "Menu Key", until finding "Developing Test" is displayed on the panel.
2. Press the "Select Key", when it's found.
3. Press the "arrow keys" (< / >), until finding a suitable function (Refer to the table below).
4. Press the "Select Key", when it's found.
5. Press the "Select Key" for execution or the "Cancel key" for stop.

Sub Menu	Description	Display (LCD)	Remarks
Setting Temperature value]	When “Temp” is displayed, Input a temperature you would like to set with the “arrow keys(◀ / ▶)”.	[Temperature] : Test	T :[target value] C :[current
Laser Diode Test	It will be displayed on the bottom line. “Diode On” is displayed, when the laser diode is on.	Ld On(Off)	on/off
Laser Ready Test	On the other case “Diode Off” is displayed. “Laser Leady” is displayed, When the Laser Scanning Unit is ready to print. On the other case	Laser Leady (Error)	

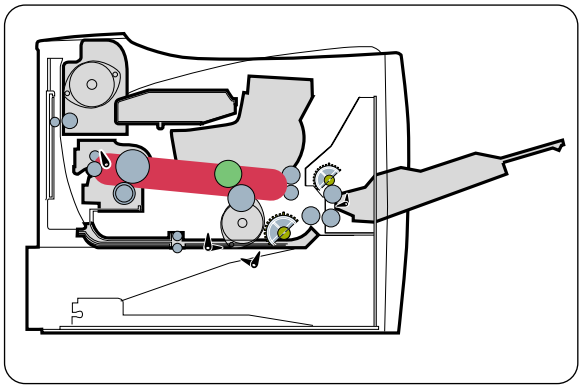
6.2 Paper Path



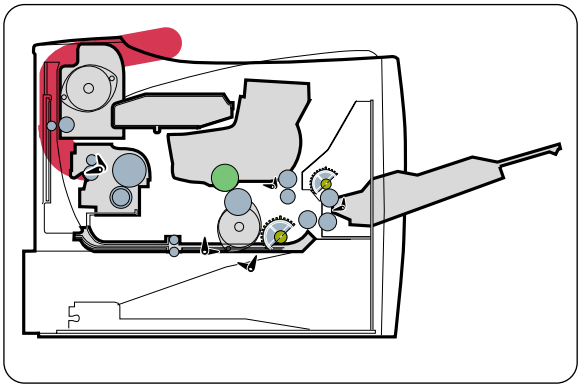
R1 : OPC Drum	R7 : Feed Roller	S1: Paper Empty(Cassette) Sensor
R2 : Transfer Roller	R8 : Pick-UP Roller	S2: Paper Empty(MPF) Sensor
R3 : Regi Roller	R9 : Heat Roller	S3: Regi Sensor
R4 : Idle Roller	R10 : Pressure Roller	S4: Exit Sensor
R5 : MP Pick-UP Roller	R11 : Duplex Roller	S5: Duplex Sensor
R6 : Retard Roller	R12 : Duplex Idle Roller	



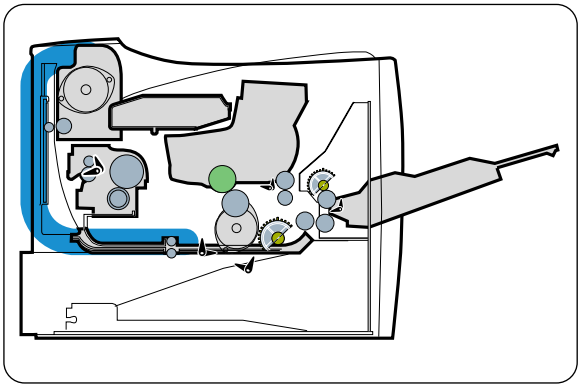
<Jam 0>



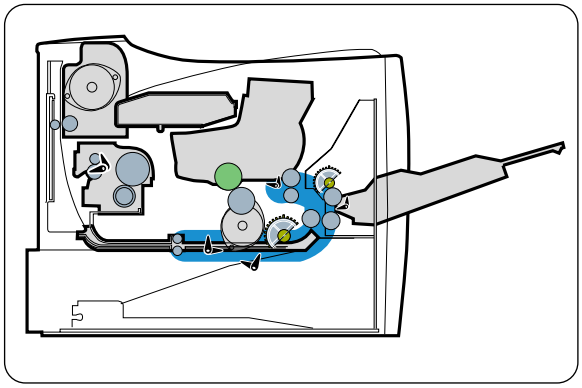
<Jam 1>



<Jam 2>



<Jam Duplex 1>



<Jam Duplex 2>

• Simplex

1) A paper is fed from a cassette or MPF by a printing order.
2) The fed paper passes a paper feeding sensor.
   - If the sensor does not operate after feeding the paper, the Jam0 occurs.
3) The paper passes a paper exit sensor, and it comes out from a machine.
   - If the tailing edge of the paper does not come out from a machine after the leading edge of the paper passes the sensor, then certain time later, a Jam2 occurs.

• Duplex

1) A paper is fad from a cassette or MPF by a printing order.
2) The fed paper passes a paper feeding sensor.
   - If the sensor does not operate after feeding the paper, a Jam0 occurs.
3) The paper that passes a paper exit sensor takes several printing processes, and moves to a paper exit sensor.
   - If the sensor does not operate after certain time, a Jam 1 occurs.
4) If the paper does not discharge until the paper passes an exit roller and a Roller-Exit-F/Down, a Jam 2 occurs.
5) The printing paper starts to be printed for duplex only by reversing rotation by an exit motor. The printing paper enters to a machine through an exit roller, and reaches to duplex sensor.
   - If the printing paper cannot reach to the duplex sensor after certain time, a duplex Jam 1 occurs.
6) The printing paper that passes the duplex sensor reaches to a feed sensor again and a printing operation is tried over again.
   - If the printing paper cannot reach to a feed sensor after certain time later, a duplex Jam 2 occurs.

6.2.1 Clearing Paper Jams

When a paper jam occurs,the display on the control panel shows the message indicating the corresponding location of the paper jam.

6.2.1.1 Tips for Avoiding Paper Jams

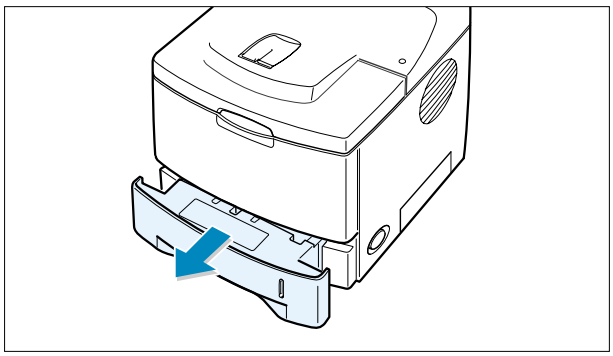
By selecting the correct paper types, most paper jams can be avoided. If a paper jam occurs, follow the steps outlined in

- Ensure that the adjustable guides are positioned correctly.
- Do not overload the tray. Ensure that the paper is below the paper capacity mark on the right inside of the tray.
- Do not remove the paper from the tray while printing.
- Flex, fan and straighten the paper before loading.
- Do not use creased, damp or highly curled paper.
- Do not mix paper types in the input tray.
- Use only recommended print media.
- Ensure that the recommended print side is facing down when loading paper into the input tray.

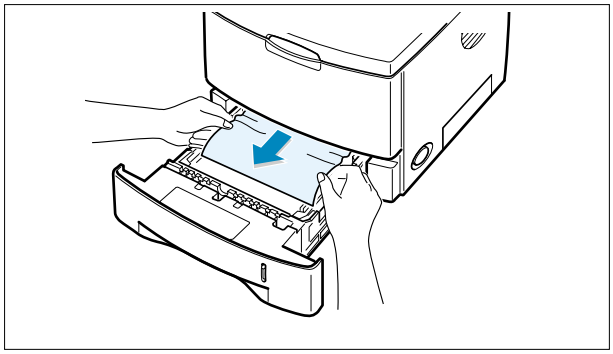
6.2.1.2 In the Paper Feed Area(Jam 0)

• In the Tray1

1. Slide out the Tray1 to expose the jammed paper.

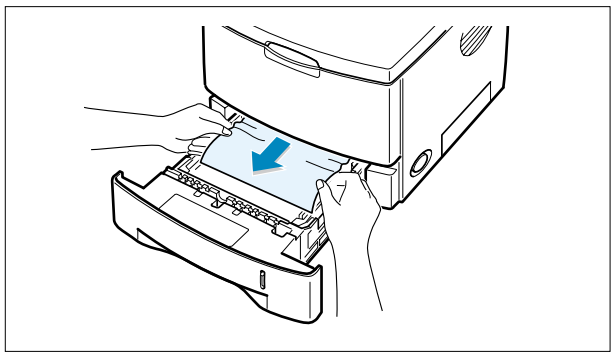


2. Remove any misfed paper by pulling it out by the visible edge from the tray.Make sure that all of the paper is properly aligned in the tray.



NOTE : If the jammed paper is not invisible or if there is resistance when you pull the paper,remove the tray from the printer and carefully pull the jammed paper free from the printer.

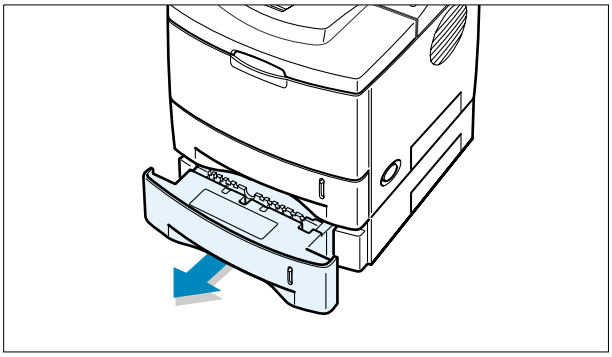
3. Slide the tray back into the printer.



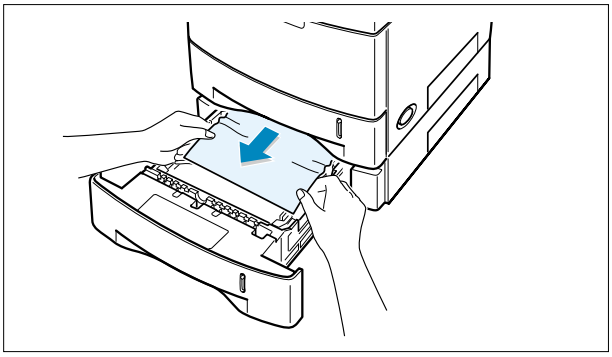
4. Open and close the top cover to resume printing.

• In the Optional Tray2

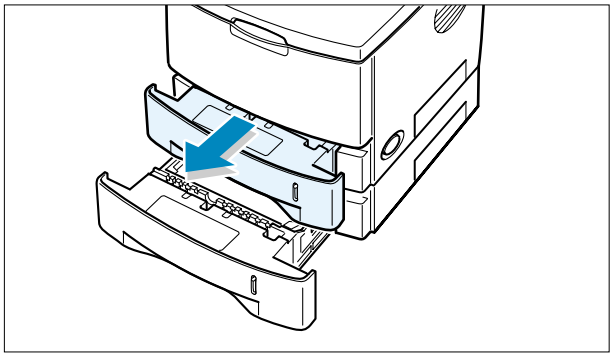
1. Pull the optional Tray2 out of the printer.



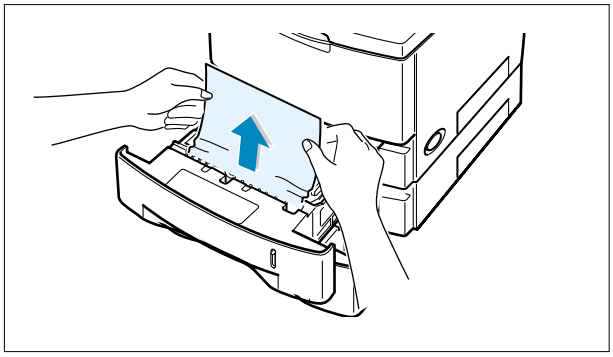
2. If you see the jammed paper,remove the paper from the tray.



3. If you cannot find the jammed paper in the Tray2,pull the Tray1 half way out of the printer,and remove the paper.



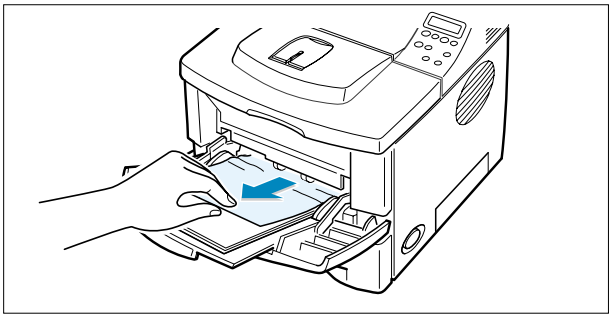
4. Slide the trays back into the printer. Open and close the top cover.Printing can be resumed.



• In the Multi-Purpose Tray

1. Open the Multi-Purpose Tray.

2. Carefully remove the jammed paper from the tray.



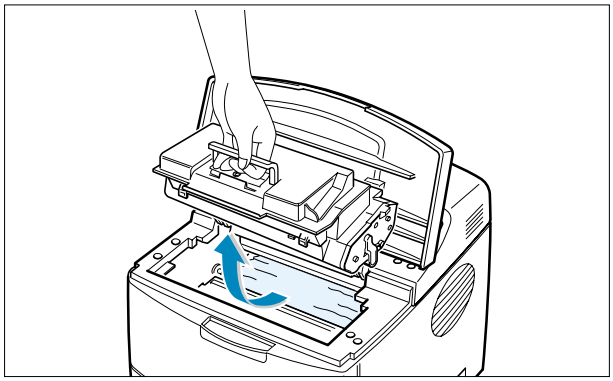
3. Open and close the top cover.Printing can be resumed.

6.2.1.3 Around the Toner Cartridge (Jam1)

1. Open and close the top cover,and the jammed paper should exit the printer.

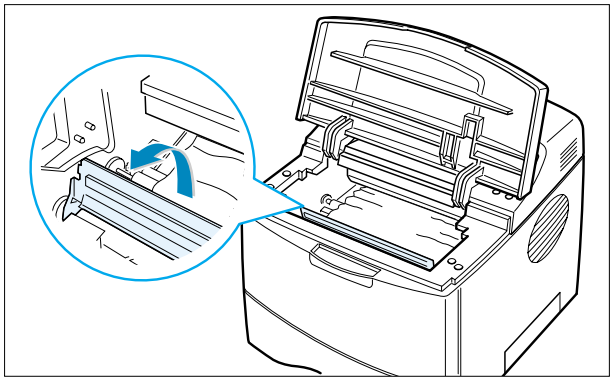
   If not,continue to Step 2.

2. Open the top cover and remove the toner cartridge.

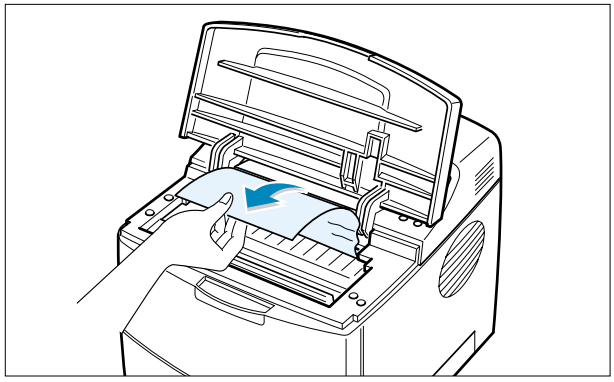


CAUTION : To prevent damage to the toner cartridge,do not expose it to light for more than a few minutes.Place a piece of paper over the top of the toner cartridge to shield it while it is out of the printer.

3. Carefully lift up the guide feed.

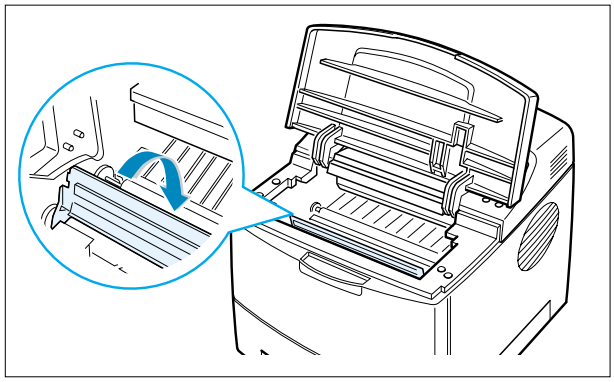


4. Gently pull the jammed paper towards you to remove it from the printer.



If the jammed paper is not visible or there is resistance when you pull the paper,go to “In the Paper Exit Area ”.

5. Flip down the guide feed and reinstall the toner cartridge.

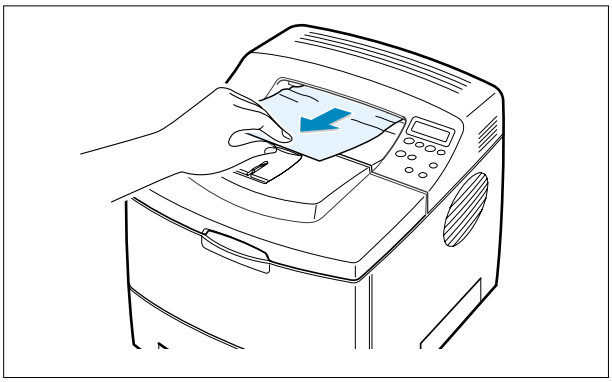


NOTE : If the toner cartridge is difficult to reinstall,make sure that the guide feed has been flipped back down into position.

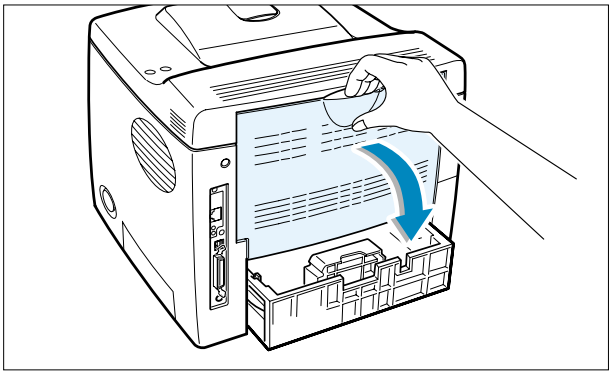
6. Close the top cover.Printing can be resumed.

6.2.1.4 In the Paper Exit Area (Jam 2)

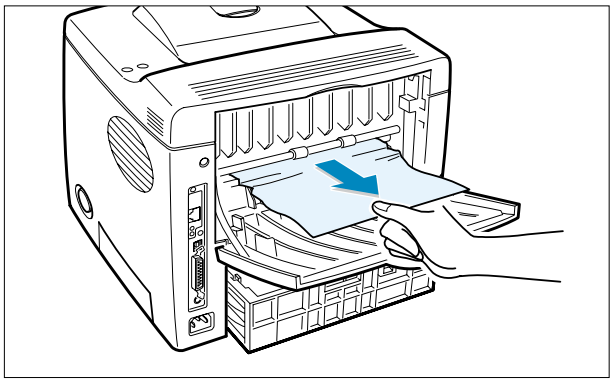
1. If a long portion of the paper is visible,pull it straight out. If not,continue to Step 2.



2. Open the rear output tray.



3. Loosen the paper if it is caught in the feed rollers. Then gently pull the paper out.



4. Close the rear output tray.

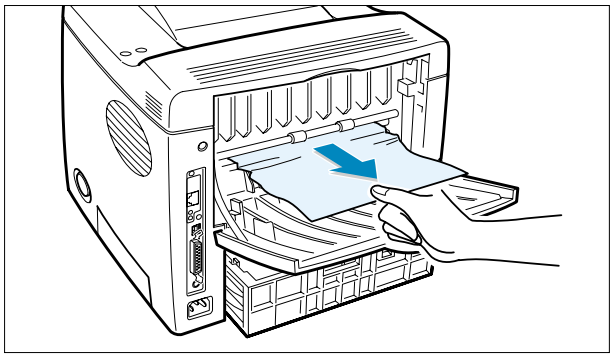
5 Open and close the top cover.Printing can be resumed.

6.2.1.5 In the Duplex Area

• Duplex Jam 1

1. Open the rear output tray.

2. Remove the jammed paper.



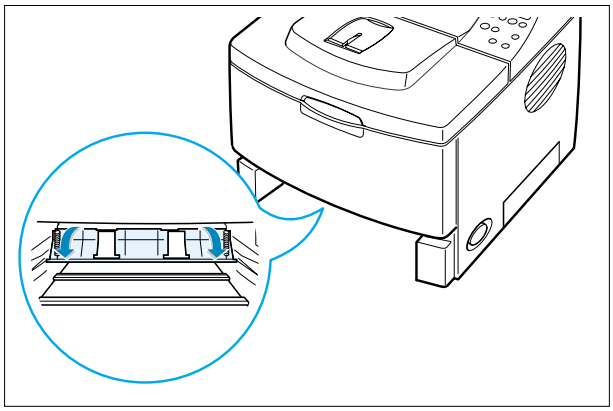
3. Close the rear output cover.

4. Open and close the top cover.Printing can be resumed.

• Duplex Jam 2

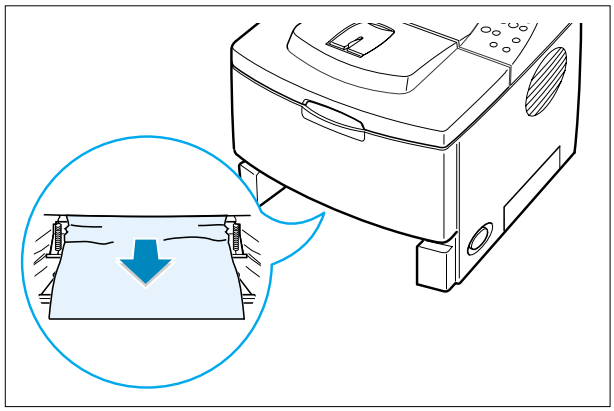
1. Pull the paper tray out of the printer.

2. Pull down the metal plate inside of the printer.



CAUTION : Pulling the plate could cause an injury.Use the lever on the left.

3. Remove the jammed paper.



4. Slide the tray back into the printer.

5. Open and close the top cover.Printing can be resumed.

6.3 Sample Pattern

This product has the several sample patterns for maintenance. With the sample patterns, check the existence of the abnormality. The patterns help to regularly maintain the product.

6.3.1 Printing a Demo Page

Print a demo page to make sure that the printer is operating correctly.

1. Press the **Menu** button ( ) on the control panel until you see “Information ” on the bottom line of the display..
2. Press the **Enter** button ( ) to access the Menu.
3. Press the scroll button (or) until you see “Demo Page ” on the bottom line.
4. Press the **Enter** button ( ) .

A demo page showing the printer ’s features and capabilities prints out.

6.3.2 Printing a cleaning sheet

If you are experiencing blurred,faded or smeared printouts,you can clear the problem by printing a cleaning sheet,provided by your printer.You can print :

• OPC Cleaning sheet :cleans the OPC drum of the toner cartridge.
• Fuser Cleaning sheet :cleans the fuser unit inside the printer.

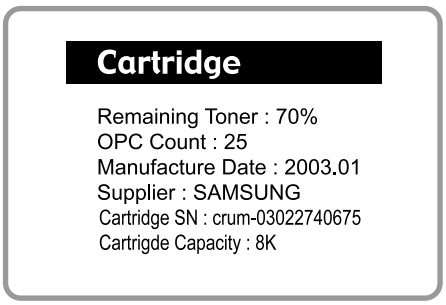
This process will produce a page with toner debris,which should be discarded.

1. Ensure that the printer is turned on and in ready mode with paper loaded in the tray.
2. Press the **Menu** button ( ) on the control panel until you see “Setup ” on the bottom line of the display..
3. Press the **Enter** button ( ) to access the Menu.
4. Press the scroll button (or) until “Maintenance ” displays on the bottom line and press the **Enter** button ( ) .
5. Press the scroll button (or) to select the required option,“OPC Cleaning ” or “Fuser Cleaning.”
6. Press the Enter button ( ) .

Your printer automatically picks up a sheet of paper from the tray and prints out a cleaning sheet with dust or toner particles on it.

6.3.3 Checking the toner cartridge count

Information about the 'toner cartridge count' can be checked by printing the Configuration Sheet.



6.3.3.1 Remaining Toner : xx%

- Contents : Shows the remaining amount of toner.
- Description : It starts with 100%, and it reduces every 5% unit until it becomes 0%. (A message "Low Toner" is displayed in a LCD when it reaches 10%.)
  * In a low toner status, additional 800 sheets can be printed (5% coverage pattern standard-8K cartridge)

6.3.3.2 OPC Count : XXXXXX

- Contents : It starts with 0 and increases to display count.
- Description : It is an imaginary page count that accumulates a rotating time of a Main Motor. When the count reaches 20,000(pages), a message "Replace cart" is displayed in LCD. It means the life span of the toner cartridge (except a toner part) has ended. Even though it is a case that a toner is refilled, the rest of major parts should end, so entire toner cartridge should be replaced. In the worst case, when an OPC rotates over 20,000 pages, it is possible that a toner may overflow. When the count reaches to 20,000 pages, the printed image becomes misty, and an On-Line key that is flashing on a set must be pressed for a single print. If an OPC count is under 8,000 when displaying a message "Remaining Toner :0%", it means that a high-coverage has been used. If an OPC count is over 8,000 and if it has not been reached to 0% yet, a low-coverage should was used.

6.3.3.3 Manufacture Date : 2003.01

- Contents : Shows the product year and the month of the developer.

6.3.3.4 Supplier

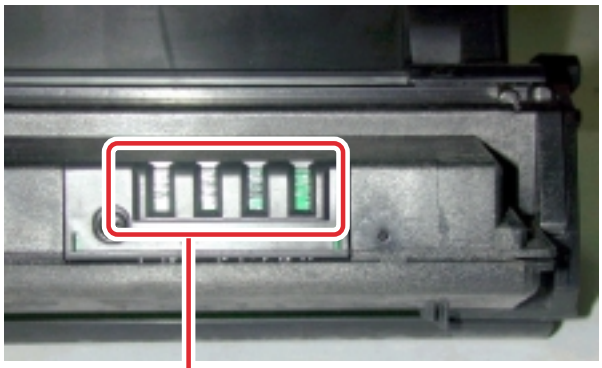
- Contents : shows the brand name of the developer.
- Description : If a supplier is other OEM, the other OEM's name is displayed. If a supplier is different between a set and developer, a message "invalid toner" will be displayed in a LCD of a set, and a machine turns to an impossible status to print.

6.3.3.5 A checking method of a toner remaining amount

(1) Check a configuration sheet.
(2) Check by using a key of a set. (Setup-maintenance-remain toner)
(3) Check with a network : Check on a Webthru (Setup Menu-remaining toner)

Caution

(1) Please be careful not to damage a toner sensor part when assembling and disassembling a developer.
(2) Please be careful not to stain anything to jumper (4), which is shown in the picture.



6.4 Consumables and Replacement Parts

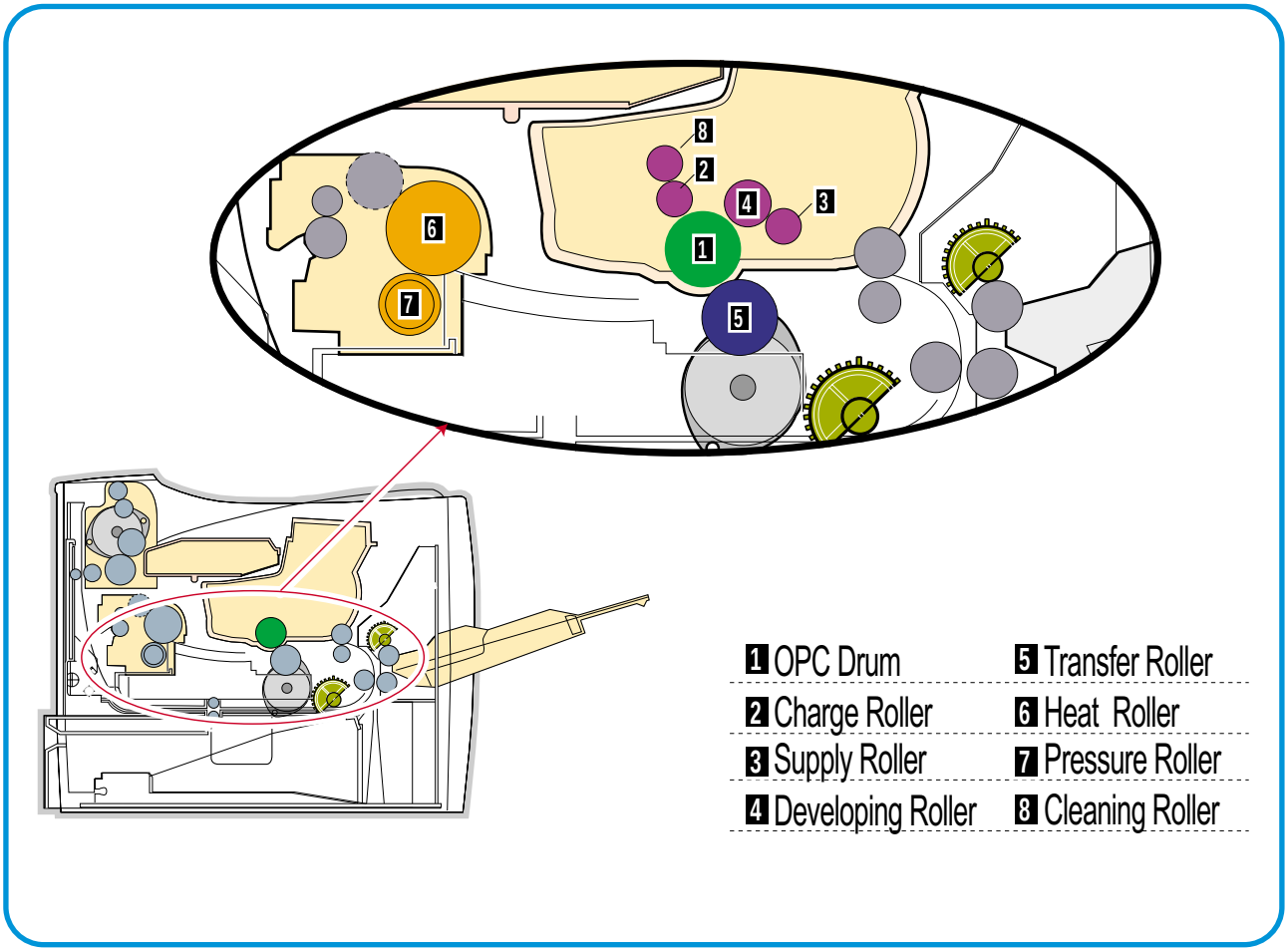
The cycle period outlined below is a general guideline for maintenance.
The example list is for an average usage of 50 transmitted and received documents per day.
Environmental conditions and actual use will vary these factors.
The cycle period given below is for reference only.

COMPONENT	REPLACEMENT CYCLE
Pick-up Roller	100,000 Pages
Paper Feeding Roller(Friction Pad)	100,000 Pages
Transfer Roller	100,000 Pages
Fuser	100,000 Pages
Toner Cartridge	Normal cartridge : 8,000 Pages (A4 5% Pattern) Starter cartridge : 4,000 Pages (A4 5% Pattern)

6.5 Periodic Defective Image

If the delinquent image regularly occurs in the printed-paper, it is due to delinquent or damaged roller. Refer to the table in below and check the condition of the roller.

No	Roller	Defective image	Typical defect
1	OPC Drum	95 mm	white spot on black image or black spot
2	Charge Roller	38 mm	black spot
3	Supply Roller	45 mm	light or dark horizontal image band
4	Developing Roller	49 mm	horizontal image band
5	Transfer Roller	57 mm	image ghost
6	Heat Roller	82 mm	Black spot and image ghost
7	Pressure Roller	92 mm	black spot on the backside



<Rollers Layout>

Memo

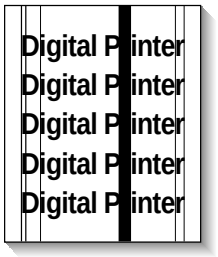
7. Troubleshooting

7.1 The cause and solution of Bad image

7.1.1 Vertical Black Line and Band

• Description

1. Straight thin black vertical line occurs in the printing.
2. Dark black vertical band occur in the printing.



Check and Cause	Solution
1. Damaged develop roller in the Toner cartridge. Deformed Doctor-blade or cleaning-blade.	1. If causes 1 and 2 occur in the toner cartridge, replace the toner cartridge and try to print out.
2. Scratched surface of the discharge roller in the toner cartridge.	2. Replace the transfer roller if occurred as No. 3.
3. Partly depression or deformation on the surface of the transfer roller.	

7.1.2 Vertical White Line

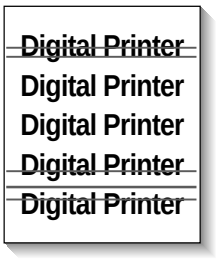
• Description White vertical voids in the image.

Check and Cause	Solution
1. Foreign matter stuck onto the window of internal lenses of LSU mirror.	1. Foreign matter stuck onto the window : Clean the LSU window with recommended cleaner(IPA) Clean the window with a clean cotton swab.
2. Foreign matter or toner particles between the toner cartridge roller and blade. (In case the life of the toner cartridge has been expired, white lines or light image occur in front of the image.)	2. Replace the toner cartridge.
3. It may occur when Burr and foreign substances are on the window of the toner cartridge frame.	3. No 3. : Remove the foreign matter and burr of the exposure window. (toner cartridge)
4. If the fuser is defective, voids occur periodically at the top of a black image.	4. No. 4. : Open the front cover and check ribs that corresponds to the position of the voids. Remove if found.
5. It may occur when foreign substances are on the OPC Drum.	5. If the problems are not solved, replace the toner cartridge.

7.1.3 Horizontal Black Band

• Description

1. Dark or blurry horizontal stripes occur in the printing periodically. (They may not occur periodically.)



Check and Cause	Solution
1. Bad contacts of the voltage terminals to toner cartridge.	1. Clean each voltage terminal of the Charge, Supply, Develop and Transfer roller. (remove the toner particles and paper particles)
2. The rollers of toner cartridge may be stained. Charge roller = 38mm Supply roller = 45mm Develop roller = 49mm Transfer roller = 57mm	2. Clean the left Gear that has relatively small gap of the teeth in the OPC. 3. If the malfunction persists, replace the toner cartridge.

7.1.4 Black/White Spot

• Description

1. Dark or blurry black spots occur periodically in the printing.
2. White spots occur periodically in the printing.

Check and Cause	Solution
1. If dark or blurry black spots occur periodically, the rollers in the Toner cartridge may be contaminated with foreign matte or paper particles. (Charge roller : 38 mm interval OPC drum : 95 mm interval)	1. Run OPC cleaning Mode Print and run the Self-test 2 or 3 times.
2. If faded areas or voids occur in a black image at intervals of 95 mm, or black spots occur elsewhere, the OPC drum surface is damaged.	2. In case of 95 mm interval unremovable in 1, cleanly remove foreign substances stuck on the OPC location equivalent to black spots and white spots with a dry duster.
3. If a black image is partially broken, the transfer voltage is abnormal or the transfer roller's life has expired.	3. The transfer roller guarantees 10,000 sheets printing. If the roller's life is expired, replace it. 4. In case of 95 mm interval unremovable in 1, take measures as to replace the toner cartridge and try to print out. 5. Clean the inside of the set against the paper particles and foreign matter in order not to cause the trouble.

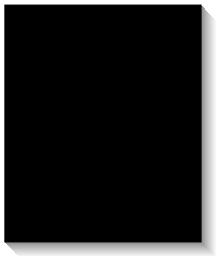
7.1.5 Light Image

• **Description** The printed image is light, with no ghost.

Check and Cause	Solution
1. Develop roller is stained when the toner of toner cartridge is almost consumed.	1. Check if the Toner Save mode is off.
2. Ambient temperature is below than 10°C.	2. No 1 : Replace the toner cartridge and try to print out.
3. Bad contact caused by the toner stains between the high voltage terminal in the HVPS and the one in the set.	3. No 2 : Wait 30 minutes after printer is powered on before you start printing.
4. Abnormal output from the HVPS. (Run self-test and check 1~4)	4. No3 : Clean up the contaminated area by the toner.
	5. Replace the HVPS if the problems are not solved by the above four instructions.

7.1.6 Dark Image or a Black Page

• **Description** The printed image is dark.



Check and Cause	Solution
1. No charge voltage in the engine board.	1. Clean the high voltage charge terminal.
2. Charge voltage is not turned on due to the bad contacts between power supply in the side of the Toner cartridge and charge terminal of HVPS.	2. Check the state of the connector which connects the engine board and HVPS.
	3. Replace the HVPS if not solved by the above direction 1 and 2.
3. VD0 signal of the Main PBA is Low state.	4. Replace the LSU Unit or Main PBA.

7.1.7 Uneven Density

• **Description** Print density is uneven between left and right.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause	Solution
1. The pressure force on the left and right springs of the transfer roller is not even, the springs are damaged, the transfer roller is improperly installed, or the transfer roller bushing or holder is damaged.	1. Replace both the left and right Spring Holder.
2. The life of the Toner cartridge has expired.	2. Occur in the toner cartridge, replace the toner cartridge and try to print out.
3. The toner level is not even on the toner cartridge roller due to the bad blade.	

7.1.8 Background

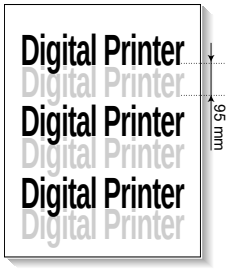
• **Description** Light dark background appears in whole area of the printing.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause	Solution
1. Does character exist less than 2% per a page, and hasn't it been used long time?	1. The toner cartridge is basically designed to print 8,000 sheets with 5% image. If it prints more than 12,000 sheets with 2% coverage, a background can occur.
2. Is a recycled toner cartridge be used?	2. The B/S is not guaranteed if using a recycled the toner cartridge.
3. Has the life span of the toner cartridge ended?	3. Replace the toner cartridge when the life span of it has been ended.
4. Is the movement(Up and Down) of the transfer roller smooth?	4. Clean the bushing part of the transfer roller.
5. Is the HVPS normal?	5. If the problem is still not solved, replace the toner cartridge.

7.1.9 Ghost (1)

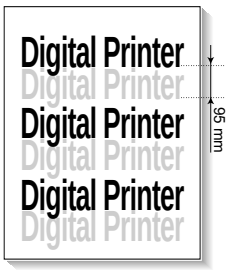
• **Description** Ghost occurs at 95 mm intervals of the OPC drum in the whole printing.



Check and Cause	Solution
1. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the electrode of the Toner cartridge.	1. Clean the terminals when contaminated by toner particles.
2. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the one in the HVPS board.	2. Occur in the toner cartridge, replace the toner cartridge and try to print out.
3. The life of toner cartridge is expired.	3. Replace the engine board if not solved by the above directions 1-2.
4. Transfer roller lifetime(100,000 sheets) has expired.	4. If not solved by the direction 3, check the transfer roller lifetime and replace it.
5. Abnormal low temperature(below 10°C).	5. Wait about 1 hour after power on before using printer.
6. Damaged cleaning blade in the toner cartridge.	6. Occur in the toner cartridge, replace the toner cartridge and try to print out.

7.1.10 Ghost (2)

• **Description** Ghost occurs at 95 mm intervals of the OPC drum in the whole printing.
(When printing on card stock or transparencies using manual feeder)



Check and Cause	Solution
When printing on card stock thicker than normal paper or transparencies such as OHP, higher transfer voltage is required.	Select 'Thick Mode' on paper type menu from the software application and after using returning to the original mode is recommended.

7.1.11 Ghost (3) : Fuser

• **Description** Ghost occurs at 82 or 92 mm intervals.

Check and Cause	Solution
The temperature of the fuser is maintained high.	1. Disassemble the fuser and remove the contaminated toner particles on the roller and clean the foreign matter between Thermistor and Heat roller. (Caution: can be deformed)

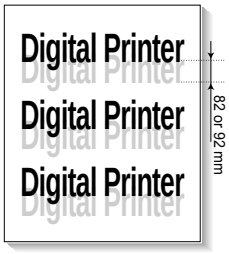
7.1.12 Satins on the Face of Page

• **Description** The background on the face of the printed page is stained.

Check and Cause	Solution
1. Toner leakage due to improperly sealed toner cartridge.	1. Replace the toner cartridge.
2. If the transfer roller is contaminated, stains on the face of page will occur.	2. If the transfer roller is contaminated, run PC Cleaning Mode Print 2 or 3 times. And perform Self-Test 2 or 3 times to remove contamination.

7.1.13 Satins on Back of Page

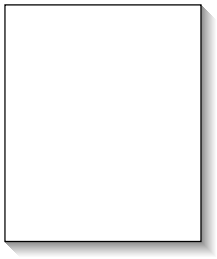
• **Description** The back of the page is stained at 57 or 92 mm intervals.



Check and Cause	Solution
1. 57mm : Transfer roller is contaminated.	1. Perform the OPC Cleaning Mode Print 2 or 3 times. Run Self-Test to remove the contamination of the transfer roller.
2. 92mm : Pressure roller is contaminated.	2. Replace the transfer roller if contaminated severely.
	3. Disassemble the fuser and clean the H/R(Heat Roller) and P/R(Pressure roller). And check the area between H/R and Thermistor. If contaminated, clean the area not to be deformed.

7.1.14 Blank Page Print out (1)

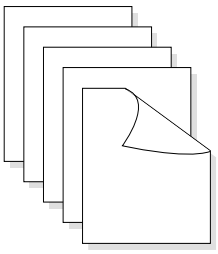
• **Description** Blank page is printed.



Check and Cause	Solution
Bad ground contacts in OPC and/or toner cartridge.	Remove contamination of the terminals of the toner cartridge and the unit.

7.1.15 Blank Page Print out (2)

• **Description**
1. Blank page is printed.
2. One or several blank pages are printed.
3. When the printer turns on, several blank pages print.



Check and Cause	Solution
1. Bad ground contacts in OPC and/or toner cartridge.	1. Remove contamination of the terminals of the toner cartridge.
2. Abnormal solenoid.	2. Perform the engine self test using EDC Mode to check if the Solenoid is normal.
	3. If not solved by the above directions 1-2, Replace the engine board.
	4. Turn the power off, delete the data of PC and try printing again.

7.2 The cause and solution of the bad discharge

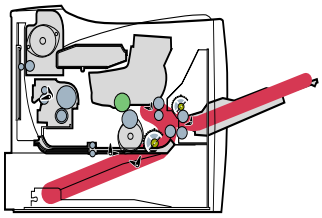
7.2.1 Wrong Print Position

• **Description** Printing begins at wrong position on the paper.

Check and Cause	Solution
Wrong sense time caused by defective feed sensor actuator.	Replace the defective actuator

7.2.2 JAM 0

• **Description**
1. Paper is not exited from the cassette.
2. Jam-0 occurs if the paper feeds into the printer.

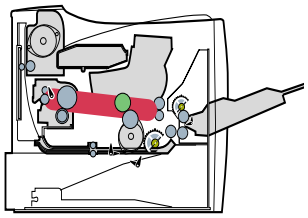


Check and Cause	Solution
1. Check the Solenoid by using EDC Mode.	1. Replace the solenoid.
2. Check if the pad is loose due to bad sealing of the side-pad.	2. Replace the side-pad Assembly L or R, if necessary.
3. Check the surface of the roller-pick-up for foreign matter.	3. Clean with soft cloth dampened with IPA(Isopropyl Alcohol) or water.
4. If continuous clusters occur, check whether the assembly slot between shaft-pickup and housing-pickup opens or is broken away.	4. Replace the Main PBA and/or Sensor.
5. If the paper feeds into the printer and Jam 0 occurs, perform EDC Mode to check feed-sensor of the engine board.	

7.2.3 JAM 1

• Description

1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.

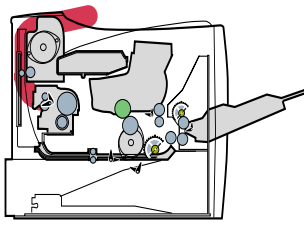


Check and Cause	Solution
1. If the recording paper is jammed in front of or inside the fuser.	1. Replace the SMPS or Exit-Sensor. 2. Replace the Main PBA.
2. If the recording paper is stuck in the discharge roller and the fuser just after passing through the Actuator-Feed, Feed Actuator may be defective.	3. Reassemble the Actuator-Feed and Spring-Actuator if the movement is bad.

7.2.4 JAM 2

• Description

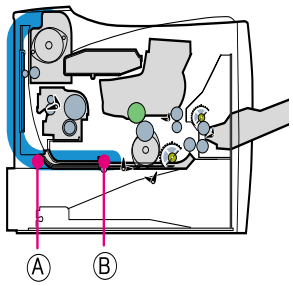
1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.



Check and Cause	Solution
1. If the paper is completely fed out of the printer, but Jam 2 occurs : Exit sensor is defective. • After the paper is completely discharged, actuator Exit should return to the original position to shut the photo-sensor. Sometimes it takes longer hour than it should and does not return.	1. Check if the exit sensor actuator is defective. • Check if the actuator exit is deformed (Check if the lever part is deformed in shape). • Check whether burrs occur in the assembly part of the actuator exit or not and if the actuator is smoothly operated. • Check if foreign matter and wire get caught in the actuator exit's operation.
2. If the paper is rolled in the Fuser Roller: • This occurs when a Guide claw is broken away or transformed. • It occurs when the Spring of a Guide claw is broken away or transformed. • It occurs when the Heat-Roller or Pressure-Roller is seriously contaminated with the toner.	2. If the paper is stuck in the fuser : disassemble the fuser and remove the jammed paper, and clean the surface of the pressure roller with dry gauze.
3. Paper is accordion in the fuser.	3. Remove the jammed paper after disassembling the fuser : Clean the surface of the pressure roller with dry gauze. • Remove the toner particles stained on the rib. • Check the assemblage and performance of the exit.

7.2.5 JAM Duplex 1

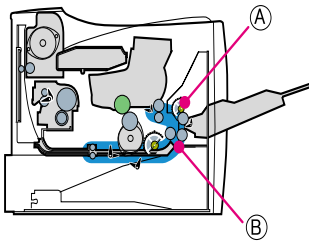
• **Description** A message 'Jam duplex 1' is displayed in a LCD window.



Check and Cause	Solution
1. It is a case when a paper cannot operate a duplex sensor. 2. It is a case when a paper cannot reach to a duplex sensor due to a paper jam on a duplex path.	1. Replace a SMPS or main PBA 2. A case that a paper jam occurs on (A) after it is reversed: replace a 2nd exit roller after checking its operation. 3. A case that a paper jam occurs on (B) after it is reversed: replace a duplex roller after checking its operation

7.2.6 JAM Duplex 2

• **Description** A message 'Jam duplex 2' is displayed in a LCD window.



Check and Cause	Solution
1. It is a case that a paper cannot pass a duplex sensor. 2. It is a case that a paper cannot reach to a registration sensor after it is passed a duplex sensor.	1. Replace a SMPS or main PBA. 2. A case that a leading edge of a paper is jammed on (A) check an operation of a guide front. If it is worn or defective, replace it. 3. Check an operation of a feed roller and a registration roller. If they are worn or defective replace them.

7.2.7 Multi-Feeding

• **Description** Multiple sheets of paper are fed at once.

Check and Cause	Solution
1. Solenoid malfunction(the solenoid does not work properly): Perform EDC Mode.	1. Replace the solenoid if necessary.
2. Pad-Friction is contaminated with foreign matter.(oil..)	2. Replace the Main PBA.
3. The face of paper is blended.	3. Clean the pad friction with soft cloth dampened with IPA(Isopropyl Alcohol).
	4. Use the smooth paper.

7.2.8 Paper rolled in the fuser

• **Description** If contaminated at intervals of 57mm on the back of a paper.

Check and Cause	Solution
1. Contamination of the pressure roller or heat roller (Background, Hot off set).	1. After disassembling the fuser, clean contamination between the heat roller and the thermostor and remove the contamination of the pressure roller.
2. Check the claw of the fuser whether it is deformed.	2. If there is heavy background, repair it by the background troubleshooting method.
	3. Clean the surface of the heat roller with IPA or water
	4. Check the warp or separation of the print claw and the holder plate claw, and then manage it.

7.2.9 Paper rolled on the OPC Drum

• **Description** Paper is rolled up in the OPC.

Check and Cause	Solution
1. Paper is too much thin. 2. The face of paper is curled.	1. Recommend to use normal paper. 2. How to remove the rolled paper in the OPC. • Remove the paper while turning the OPC against the ongoing direction. • Clean fingerprints on the OPC softly with soft cloth dampened with tissue.

7.3 The cause and solution of the malfunction

7.3.1 Fuser Error

• **Description** A message "Open fuser/Over heat/Low heat' is displayed in a LCD panel.

Check and Cause	Solution
1. Check whether a thermostat, AC wire, and heat lamp are open or not.	1. Replace the fuser if a thermostat is open.
2. Check whether a thermistor is open or not.	2. Replace the fuser if a thermistor sensor is located deep inside of a sponge.
3. Heat lamp ON/OFF test	3. Check whether the overheat mode circuit operates normally or not.
4. It could not operate due to a gear of a fuser is melted.	4. Replace the fuser.

7.3.2 LSU Error

• **Description** A message "PMOTOR ERROR/HSYNC ERROR' is displayed in a LCD panel.

Check and Cause	Solution
1. Check whether the LSU connector is disconnected or not.	- Replace a LSU
2. Check whether the LSU motor is rotating or not.	- Replace a main board if the same error occurs again after replacing a LSU.
3. Check the HSYNC signal.	

7.3.3 Not function of the gear of the fuser due to melting away

• **Description** The motor breaks away from its place due to gear melting away.

Check and Cause	Solution
1. Check the Heat Lamp.	1. Replace the Fuser. 2. Replace the Main PBA. 2. Replace the SMPS.

7.3.4 Paper Empty

• **Description** The paper lamp on the operator panel is on even when paper is loaded in the cassette.

Check and Cause	Solution
1. Bending or deformation of the actuator of the paper sensor. 2. The function of the engine board is defective 3. Check the Connector.	1. Replace the defective actuator. 2. Replace the Sensor PBA.

7.3.5 Paper Empty without indication

• **Description** The paper lamp on the operator panel does not come on when the paper cassette is empty.

Check and Cause	Solution
1. Bending or deformation of the actuator of the paper sensor.	1. Replace the defective actuator.
2. The function of the engine board is defective	2. Replace the engine board.

7.3.6 Cover Open

• **Description** The ERROR lamp is on even when the print cover is closed.

Check and Cause	Solution
1. The hook lever in the top cover may be defective.	1. Replace the hook lever, if defective.
2. Check the connector and circuit of the cover switch department in the Main Control board.	2. Check the insertion of the Cover Open S/W Connect.
	3. Replace the Main Control board or Cover Open S/W.

7.3.7 No error message when the cover is open

• **Description** The ERROR message does not come on even when the printer cover is open

Check and Cause	Solution
1. Check the connector and circuit of the cover switch department in the Main Control board. Perform EDC mode	1. Check the insertion of the Cover Open S/W Connect. 2. Replace the Main Control board or Cover Open S/W.

7.3.8 Defective motor operation

• **Description** Main motor is not driving when printing, and paper does not feed into the printer, resulting 'Jam 0'.

Check and Cause	Solution
1. The Motor harness or Motor PCB may be defective.	1. Check the motor harness, replace it, if defective.
2. Check the motor operation in the EDC Mode.	2. Replace the Main PBA.

7.3.9 No Power

• **Description** When system power is turned on, all lamps on the operator panel do not come on.

Check and Cause	Solution
1. Check if the power input and SMPS output are normal.	1. Replace the power supply cord or SMPS.
2. Check the inferiority of LED-Panel or LDC window on the front-cover if the OP panel does not appear after normal warming-up.	2. Replace the control board. 3. Replace the OP panel.

7.3.10 Vertical Line Getting Curved

• **Description** When printing, vertical line gets curved.

Check and Cause	Solution
1. If the supply of +24v is unstable in the Main Control board linking with LSU, check drive by EDC Mode: LSU Check.	1. Replace LSU.
2. Check the Deve PBA in the Toner Cartridge.	2. Replace the Toner Joint PBA. 2. Replace the Main PBA.

7.4 Toner Cartridge Service

It is not guaranteed for the default caused by using other toner cartridge other than the cartridge supplied by the Samsung Electronic or caused by non-licensed refill production.

7.4.1 Precautions on Safe-keeping of Toner Cartridge

Excessive exposure to direct light more than a few minutes may cause damage to the cartridge.

7.4.2 Service for the Life of Toner Cartridge

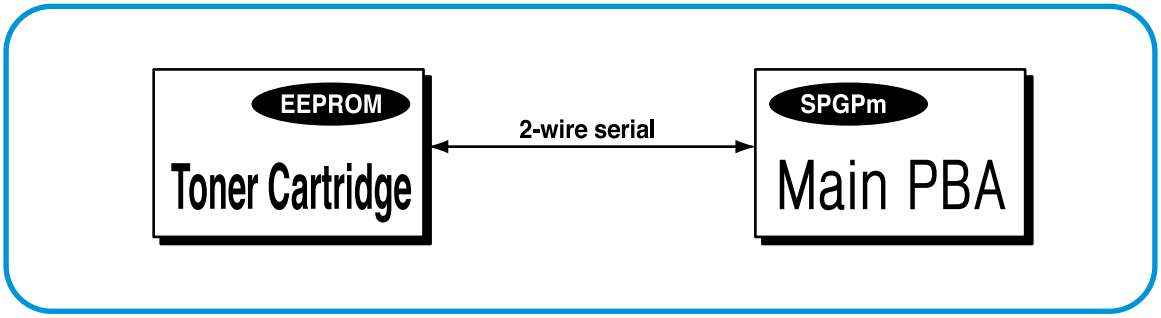
If the printed image is light due to the life of the toner, you can temporarily improve the print quality by redistributing the toner(Shake the toner cartridge), however, you should replace the toner cartridge to solve the problem thoroughly.

7.4.3 Distinguish function for choice cartridge

• Distinguish function for choice cartridge

An EEP ROM is mounted to a cartridge for distinguishing a choice developer. Items written in below are detected by checking up memory information.
If the data of the EEP ROM is broken, it cannot be detected.

1) Detecting existence of a toner cartridge: It detects whether a toner cartridge is mounted or not.
2) Detecting a serial no of a developer: If a serial no code is different with a supplying company°Øs serial no., it is not operated.
3) Detecting a developer supplying company: If it is not Samsung's, it is not operated.
4) Detecting page counter: It detects the life span of a developer.
5) Detecting an OPC rotating counter: It detects the life span of an OPC drum.



• Distinguish a refilled cartridge. (with eyes)

1) Check whether One-way screw is damaged or not
2) Check the page counter (Print out the self-test configuration)
   : Even though a toner has left a lot, a page counter is over 8K (7~8K). It is suspected as a refilled cartridge.

7.4.4 Error message (LCD window) related in a toner sensor

It explains a message related in toner sensor in a LCD.

7.4.4.1 Invalid Toner

- Contents: It is displayed when a supplier is different between a developer and a set. If this message is shown up, a printing process cannot operate.
- Solution: Attach a suitable developer (the same supplier's) to a set. (A unique key has been applied.)

7.4.4.2 Low Toner

- Contents: This message shows up when a message "remaining toner: 10%" is displayed in a cartridge count information. And the same message shows up when an OPC count becomes 18,000 (page).
- Solution: It means that a toner in the developer has been almost ended. Replace the developer.

7.4.4.3 Replace Cartridge

- Contents: This message shows up when an OPC count becomes 20,000 (pages). It means the life span of a toner cartridge (except a toner part) has been ended. Even though a case that a toner is refilled, the rest of major parts have been ended, so entire toner cartridge might be replaced.
- Solution: If an OPC rotates about 20,000 (page), in a worst case, a toner overflows and it may cause a system fail. Therefore, recommend a user to replace a developer. When continuously using, even though a count reaches to 20,000 pages, a printed image becomes misty, and an on-line key that is flashing on a set must be pressed for a single print.

7.4.5 Signs and Measures at Poor toner cartridge

Fault	Signs	Cause & Check	Solution
Light image and partially blank image (The life is ended.) Digital Printer Digital Printer Digital Printer Digital Printer Digital Printer	• The printed image is light or unclean and untidy. • Some part of the image is not printed. • Periodically a noise as "tick tick" occurs.	1. If the image is light or unclean and untidy printed image - Shake the toner cartridge and then recheck. (1)NG: Check the weight of the toner cartridge (2)OK: Lack of toner, so the life is nearly closed. 2. Some part of image is not printed - Shake the toner cartridge and then recheck. (1)NG: Check the weight of the toner cartridge and clean the LSU window with a cotton swab, then recheck. (2)OK: Lack of toner, so the life is nearly closed. 3. Periodically a noise as "tick tick" occurs - Measure the cycle and the weight of the toner cartridge. 4. White vertical stripes on the whole screen or partly : Check the weight of the toner cartridge.	1. All of 1, 2, 3 above- If it become better by shaking, replace with a new toner cartridge after 50-100 sheets in the closing state of the life span. 2. In case of 2- If it becomes better after cleaning the LSU window, then the toner cartridge is normal. (Because of foreign substance on the LSU window, the image has not been printed partly.) 3. In case of 3- If the cycle of noise is about 2 seconds, the toner inside the toner cartridge has been nearly exhausted.(Purchase and replace with a new toner cartridge after using about 200 sheets at the point of occurrence) 4. In case of 3- This is a phenomenon caused by lack of toner, so replace with a new toner cartridge.
Toner Contamination	• Toner is fallen on the papers periodically. • Contaminated with toner on prints partly or over the whole surface.	1. Toner is fallen on the paper periodically. (1)Check the cycle of the falling of the toner. (2)Check the appearance of both ends of the toner cartridge OPC drum. 2.The center of the printed matter is contaminated with toner. (1)Check whether foreign substances or toner are stuck to the terminal (contact point) of the toner cartridge. (2)Check whether the state of the terminal assembly is normal.	1. If both ends of the OPC drum are contaminated with toner: Check the life of the toner cartridge. 2. Check whether it could be recycled. 3. If it cannot be recycled: Replace the toner cartridge.

Fault	Signs	Cause & Check	Solution
White Black spot  	• Light or dark black dots on the image occur periodically. • White spots occur in the image periodically.	1. If light or dark periodical black dots occur, this is because the toner cartridge rollers are contaminated with foreign substance or paper particles. (1)38mm interval : Charged roller (2)95mm interval : OPC cycle 2. If white spots occur in a black image at intervals of 95mm, or black spots occur elsewhere, the OPC drum is damaged or foreign substance is stuck to the surface. 3. If a black and white or graphic image is partially broken at irregular intervals, the transfer roller's life has been expired or the transfer voltage is abnormal.	1. In case of 1 above - Run OPC Cleaning Mode Print 4-5 times repeatedly to remove. Especially check foreign substance on the OPC surface, then remove them with a clean gauze moistened with IPA(Isopropyl Alcohol) not to damage OPC if necessary. ⚠ **Never use usual alcohol.** 2. In case of 2 If they are not disappeared by running OPC Cleaning Mode Print 4-5 times. : at intervals of 38.5mm - Replace the toner cartridge. : at intervals of 96mm - Remove foreign substance. : Broken image - Replace the toner cartridge according to carelessness. 3. In case of 3 - Exchange the transfer roller because the life of the transfer roller in use has been expired. (Check the transfer voltage and readjust if different.)
Recycled product	• Poor appearance of the toner cartridge. • Unclean and rough printouts. • Bad background in the image.	1. Poor appearance of the toner cartridge. (1)Check the damage to label and whether different materials are used. (2)Check the appearance of parts of the toner cartridge, such as frame, hopper. 2. Unclean and rough printouts. (1)Check whether foreign substance or toner are stuck to the terminal (contact point) of the toner cartridge. (2)Check whether the state of the terminal assembly is normal.	1. In case of 1 - (1)If there is an evidence of disassembling the toner cartridge. (2)If materials other than normal parts of the toner cartridge are added or substituted. 2. In case of 2 - If there are any abnormals in connection with the situation of 1. (1)It occurs when the toner cartridge is recycled over 2 times. (2)If toner nearly being expired are collected to use, it is judged as the recycled toner cartridge.

Fault	Signs	Cause & Check	Solution
Ghost & Image Contamination	• The printed image is too light or dark, or partially contaminated black. • Totally contaminated black. (Black image printed out) • The density of printouts is too dark and ghost occurs.	1. The printed image is too light or dark, or partially contaminated black. (1)Check whether foreign substance or toner are stuck to the terminal(point of contact) of the toner cartridge. (2)Check whether the terminal assembly is normal.	1. All of 1, 2, 3 above (1)Remove toner and foreign substances adhered to the contact point of the toner cartridge. (2)The contact point of the unit facing that of the toner cartridge also must be cleaned. (3)If the terminal assembly is unsafe: • Fully stick the terminal to or reassemble it after disassembling. • Disassemble the side plate and push the terminal to be stuck, then reassemble it.
		2. Totally contaminated black. (Black image printed out) (1)Check whether foreign substances are stuck to the terminal(point of contact) of the toner cartridge and the state of assembly. (Especially check the charged roller terminal.)	2. In case of 2 It is a phenomenon when the OPC drum of the toner cartridge is not electrically charged. Clean the terminals of the charged roller, then recheck it.
		3. The printed image is dark and ghost occurs. (1)Check foreign substance attached to the terminal (point of contact) of the toner cartridge and the state of assembly. (Especially check the developing roller terminal.)	3. In case of 3 It is a phenomenon as the developing bias voltage of the toner cartridge. Clean the terminals of the developing roller, then recheck it.

7.5 The cause and solutions of bad environment of the software

7.5.1 The printer is not working (1)

• **Description** While Power turned on, the printer is not working in the printing mode.

Check and Cause	Solution
1. Run Self-Test Mode: Turn the power on while pressing the test printing button for 2 or 3 seconds before printing works.	1.Check the power of the printer and perform the Self-Test. If the test printing works, that means no problems in the printer itself. If the test printing does not work, that means bad functioning of the printer(not because of software).
2. Check if the PC and the printer is properly connected and the toner cartridge installed.	2. Replace the printer cable. If the problems not solved even after the cable replaced, check the amount of the remaining tone. (refer to Toner Cartridge Service 4-5)
3. Printing is nor working in the Windows.	3. Check if the connection between PC and printer port is proper. If you use windows, check if the printer driver in the controller is set up. If the printer driver is properly set up, check in which program the printing is not working. The best way to find out is to open the memo pad to check the function of printing. If it is not working in a certain program, adjust the setup the program requires. Sometimes, the printout is normal within the Windows basic programs, but it's not working in a particular program. In such case, install the new driver again. If not working in the Windows basic program, Check the setup of the port of CMOS is on ECP. And check the address of IRQ 7 and 378
4. Check if the printer cable is directly connected to peripheral devices	4. If the scanner needs to be connected to the printer, first the remove the scanner from the PC to see if the printer is properly working alone.

7.5.2 The printer is not working (2)

• Description After receiving the printing order, no response at all or the low speed of printing occurs due to wrong setup of the environment rather than malfunction of the printer itself.

Check and Cause	Solution
1. Secure more space of the hard disk.	1. Not working with the message 'insufficient printer memory' means hard disk space problem rather than the RAM problem. In this case, provide more space for the hard disk. Secure more space using the disk utilities program.
2. Printing error occurs even if there is enough space in the hard disk.	2. The connection of the cable and printer port is not proper. Check if the connection is properly done and if the parallel port in CMOS is rightly set up.
3. Check the parallel-port-related items in the CMOS Setup.	3. As a printer port, Select ECP or SPP among SPP(Normal), ECP, and EPP modes(increase printing speed) SPP normal mode support 8-bit data transfer, while ECP Mode transfer the 12-bit data.
4. Reboot the system to print.	4. If the regular font is not printing, the cable or the printer driver may be defective. Turn the PC and printer off, and reboot the system to print again. If not solved, double-click the printer in my computer If the regular fonts are not printed this time again. the cable must be defective so replace the cable with new one.

7.5.3 Abnormal Printing

• **Description**	The printing is not working properly even when the cable has no problem. (even after the cable is replaced) If the printer won't work at all or the strange fonts are repeated, the printer driver may be defective or wrong setup in the CMOS Setup.

Check and Cause	Solution
1. Set up the parallel port in the CMOS SETUP.	1. Select SPP(Normal) or ECP LPT Port the among ECP, EPP or SPP in the CMOS Setup.
2. Printer Driver Error.	2. Check the printer in My Computer.(to see if the printer driver is compatible to the present driver or delete the old driver, if defective and reinstall the new driver)
3. Error message from insufficient memory. (The printing job sometimes stops or due to insufficient virtual memory, but it actually comes from the insufficient space of the hard disk.)	3. Delete the unnecessary files to secure enough space of the hard disk and start printing job again.

7.5.4 SPOOL Error

• **Description**	To spool which stands for "simultaneous peripheral operations online" a computer document or task list (or "job") is to read it in and store it, usually on a hard disk or larger storage medium so that it can be printed or otherwise processed at a more convenient time (for example, when a printer is finished printing its current document).

Check and Cause	Solution
1. Insufficient space of the hard disk in the directory assigned for the basic spool.	1. Delete the unnecessary files to provide more space to start printing job.
2. If the previous printing error not solved.	2. If there are some files with the extension name of ****.jnl, Delete them and Reboot the Windows to restart printing job.
3. When expected to collide with other program.	3. Shut down all other programs except the current one, if possible.
4. When an application program or the printer driver is damaged.	4. Delete the printer driver completely and reinstall it.
5. When some files related to OS are damaged or virus infected.	5 After rebooting the computer, check for viruses, restore the damaged files and reinstall the program to do the printing job.
6. Memory is less than suggested one.	6. Add up enough memory to the PC.

How to delete the data in the spool manager.

In the spool manager, the installed drivers and the list of the documents waiting to be printed are shown. Select the document to be deleted and check the delete menu.

If you intend to delete the current document being printed, the data being transferred to the printer will be put out and then the document is removed. Before choosing the document, the menu is still inactive.

Or put the document out of the list and repeat the routine as in the above or finish the spool manager.

Memo

8. Exploded Views and Parts List

8.1 Main Assembly ..... page(8-2)
8.2 Base-Houshing Assembly ..... page(8-6)
8.3 Frame Assembly (0 ~ 37) ..... page(8-7)
Frame Assembly (37 ~ 71) ..... page(8-8)
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8.5 Main Driver Assembly ..... page(8-16)
8.6 Exit Driver Assembly ..... page(8-17)
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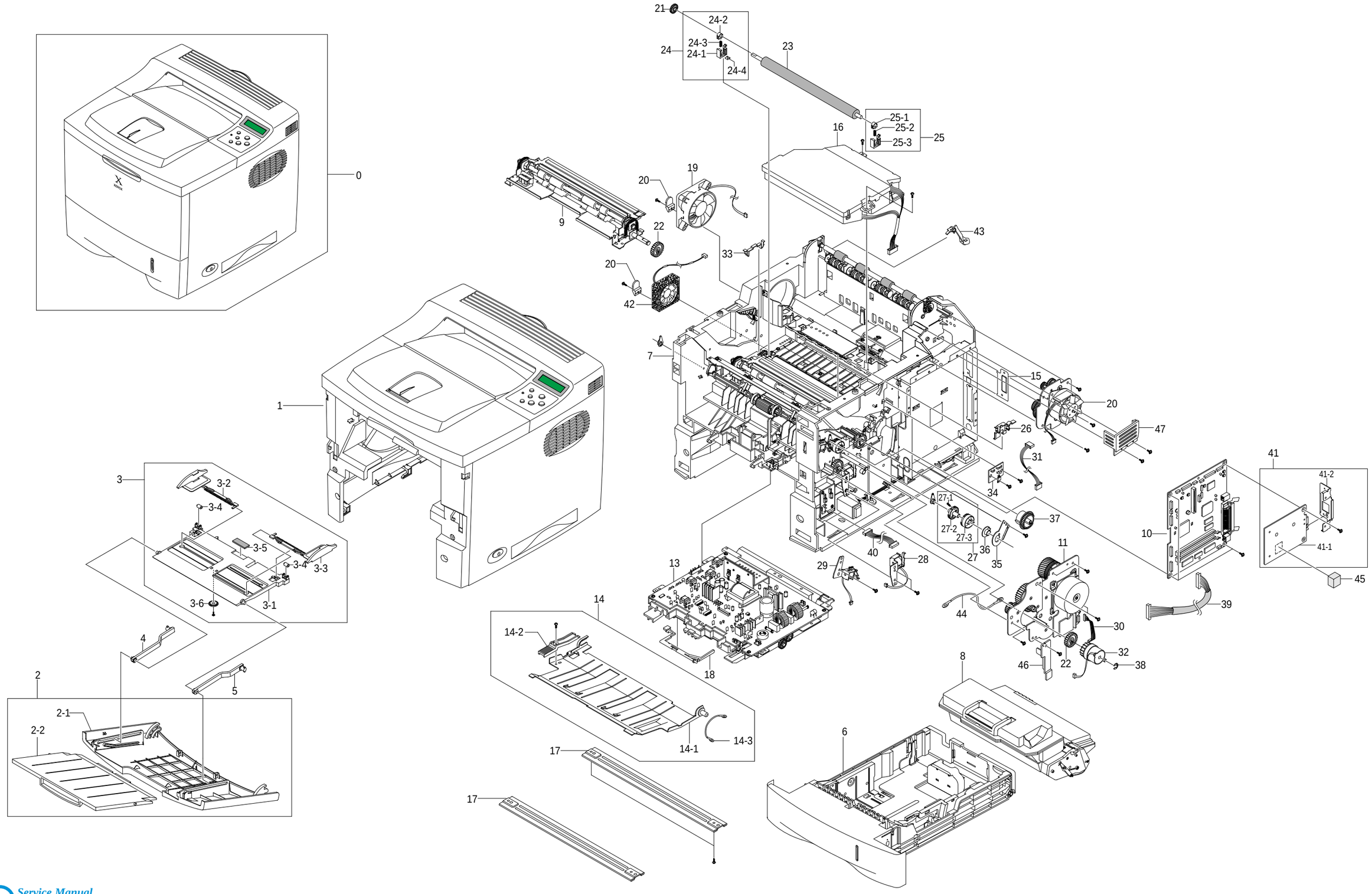
8.9 Cassette Assembly ..... page(8-21)
8.10 SCF Assembly ..... page(8-23)

8.1 Main Assembly



Main Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

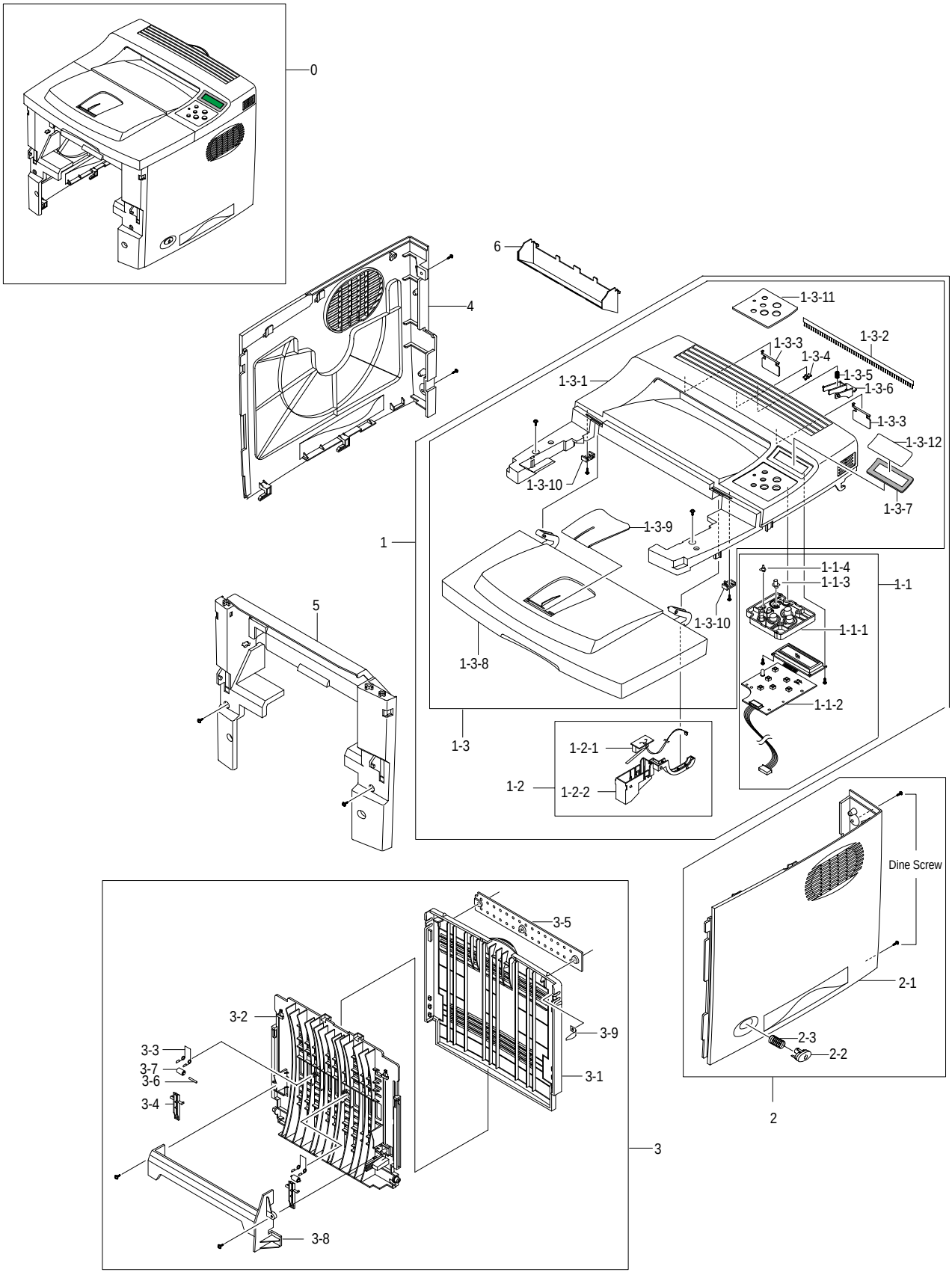
No.	Description	SEC.Code	Q'ty	SA	Remark
1	ELA HOU BASE-HOUSHING	JC96-02695P	1	X	
2	ELA UNIT-COVER MP	JC96-02679E	1	O	
2-1	COVER-M-MP	JC63-00127E	1	X	
2-2	TRAY-M-EXTEND MP	JC63-00128B	1	X	
3	ELA UNIT-KNOCK UP MP	JC96-02680B	1	O	
3-1	PLATE-M-KNOCK UP MP	JC61-00686B	1	X	
3-2	PMO-SIDE GUIDE MP(L)	JC72-01005B	1	X	
3-3	PMO-SIDE GUIDE MP(R)	JC72-01006B	1	X	
3-4	PMO-IDLE KNOCK UP MP	JC72-01004A	2	X	
3-5	MPR-PAD KNOCK UP MP	JC74-00011A	1	X	
3-6	GEAR-PINION	JG66-40003A	1	X	
3-7	SCREW-TAPTITE	6003-000264	1	X	
4	TRAY-M-LINK MP(L)	JC63-00129B	1	X	
5	TRAY-M-LINK MP(R)	JC63-00130B	1	X	
6	ELA UNIT-CASSETTE(550)	JC96-02687B	1	O	
7	ELA UNIT-FRAME BASE	JC96-02627C	1	X	⚠ 220V
	ELA UNIT-FRAME BASE	JC96-02627D	1	X	⚠ 110V
8	ELA UNIT-DEVE	JC96-02851A	1	O	5K
	ELA UNIT-DEVE	JC96-02851C	1	O	10K
9	ELA UNIT-REGI	JC96-02626A	1	O	
10	PBA MAIN-CONTROLLER	JC92-01487A	1	O	Duplex
	PBA MAIN-CONTROLLER	JC92-01531A	1	O	None Duplex
11	ELA UNIT-MOTOR MAIN CARDINAL	JC96-02725B	1	O	
12	ELA UNIT-MOTOR EXIT CARDINAL	JC96-02857A	1	O	
13	ELA HOU-SMPS_HVPS_V1(110V)	JC96-02779A	1	X	⚠ 110V
	ELA HOU-SMPS_HVPS_V2(220V)	JC96-02777A	1	X	⚠ 220V
14	MEA UNIT-GUIDE FRONT, DUP	JC97-01715A	1	X	
14-1	GUIDE-P-FRONT, DUP	JC61-00660A	1	X	
14-2	LEVER-M-OPEN, DUP	JC66-00443A	1	X	
14-3	CBF HARNESS-EARTH (TX MOTOR)	JB39-00017A	1	X	None N/W Card
15	BRACKET-P_DUMMY CTRL	JC61-00679A	1	X	
16	UNIT-LSU_CARDINAL	JC59-00019B	1	O	
17	BAR-P_CROSS BOTTOM	JC71-00042A	2	X	
18	PMO-ACTUATOR EMPTY	JC72-00991A	1	O	
19	FAN-DC	JC31-00029A	1	O	
20	STOPPER-M-FAN80	JC61-00667A	2	X	
21	GEAR-TR29	JC66-00039A	1	O	
22	GEAR-REGI Z25	JC66-00420A	2	X	
23	ROLLER-TRANSFER	JC66-00540A	1	O	
24	ELA UNIT-HOLDER TR R	JC96-01729A	1	O	
24-1	PMO-TRANSFER HOLDER R	JC72-41145C	1	X	
24-2	PMO-BUSHING TR	JC72-41142A	1	X	
24-3	SPRING ETC-TR R HAWK	JC61-00046A	1	X	
24-4	IPR-PLATE TR	JC70-11053A	1	X	

Main Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
25	ELA UNIT-HOLDER TR L	JC96-01730A	1	O	
25-1	PMO-BUSHING TR	JC72-41142A	1	X	
25-2	SPRING ETC-TR L HAWK	JC61-00047A	1	X	
25-3	PMO-TRANSFER HOLDER L	JC72-41145D	1	X	
26	CAP-M-GEAR	JC67-00039A	1	O	
27	MEA UNIT-GEAR P/UP MP CARDINAL	JC97-01738A	1	O	
27-1	SPRING ETC-CAM MP	JC61-00003A	1	X	
27-2	GEAR-MP PICK_UP	JC66-00423A	1	X	
27-3	GEAR-MP HOLDER_CAM	JC66-00424A	1	X	
28	SOLENOID-MAIN	JC33-00012A	1	O	
29	SOLENOID-MP	JC33-00013A	1	O	
30	CBF HARNESS-MAIN MOTOR	JC39-00257A	1	X	
31	CBF HARNESS-MOTOR	JC39-00157A	1	X	
32	MEP-CLUTCH FEED CARDINAL	JC47-00009A	1	O	
33	PMO-CAP TR	JC72-41292A	1	X	
34	PBA SUB-COVER JOINT	JC92-01510A	1	X	
35	BRACKET-P-SHAFT MP	JC61-00755A	1	X	
36	BEARING-PICK UP	JC66-10202A	1	X	
37	GEAR-PICK_UP CAM	JC66-00533A	1	X	
38	RING-E	6044-000125	1	X	
39	CBF HARNESS-SMPS	JC39-00253A	1	X	
40	CBF HARNESS-MPF JOINT	JC39-00205A	1	X	
41	ELA HOU-NPC3_PRT	JC96-02699A	1	X	N/W Card
41-1	BRACKET-P_NETWORK	JC61-00680A	1	X	
41-2	PBA SUB-NPC3_PRT	JC92-01466A	1	X	
42	FAN-DC, CARDINAL	JC31-00027B	1	O	
43	ACTUATOR-OUTFULL	JC72-01310A	1	X	
44	CBF-HARNESS-OPE	JB39-40532A	1	X	
45	STOPPER-NETWORK	JC61-00837A	1	X	
46	CAP-WIRE-POWER	JC67-00058A	1	X	
47	COVER-MOTOR-BLDC	JC63-00277A	1	X	
S	SCREW-TAPTITE	6003-000008	1	X	
S	SCREW-TAPTITE	6003-000267	1	X	

8.2 Base-Houshing Assembly

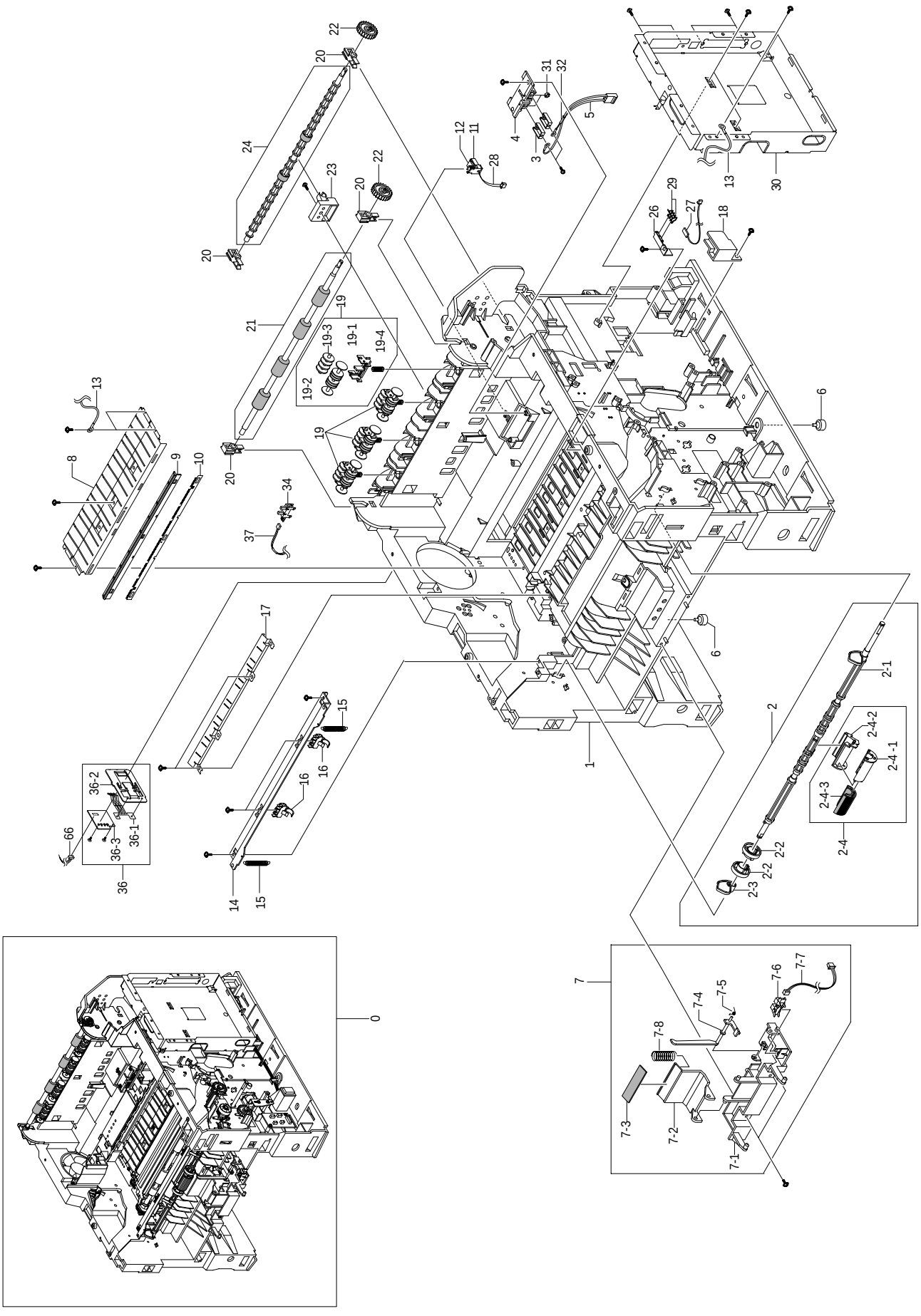


Base-Houshing Assembly Parts List

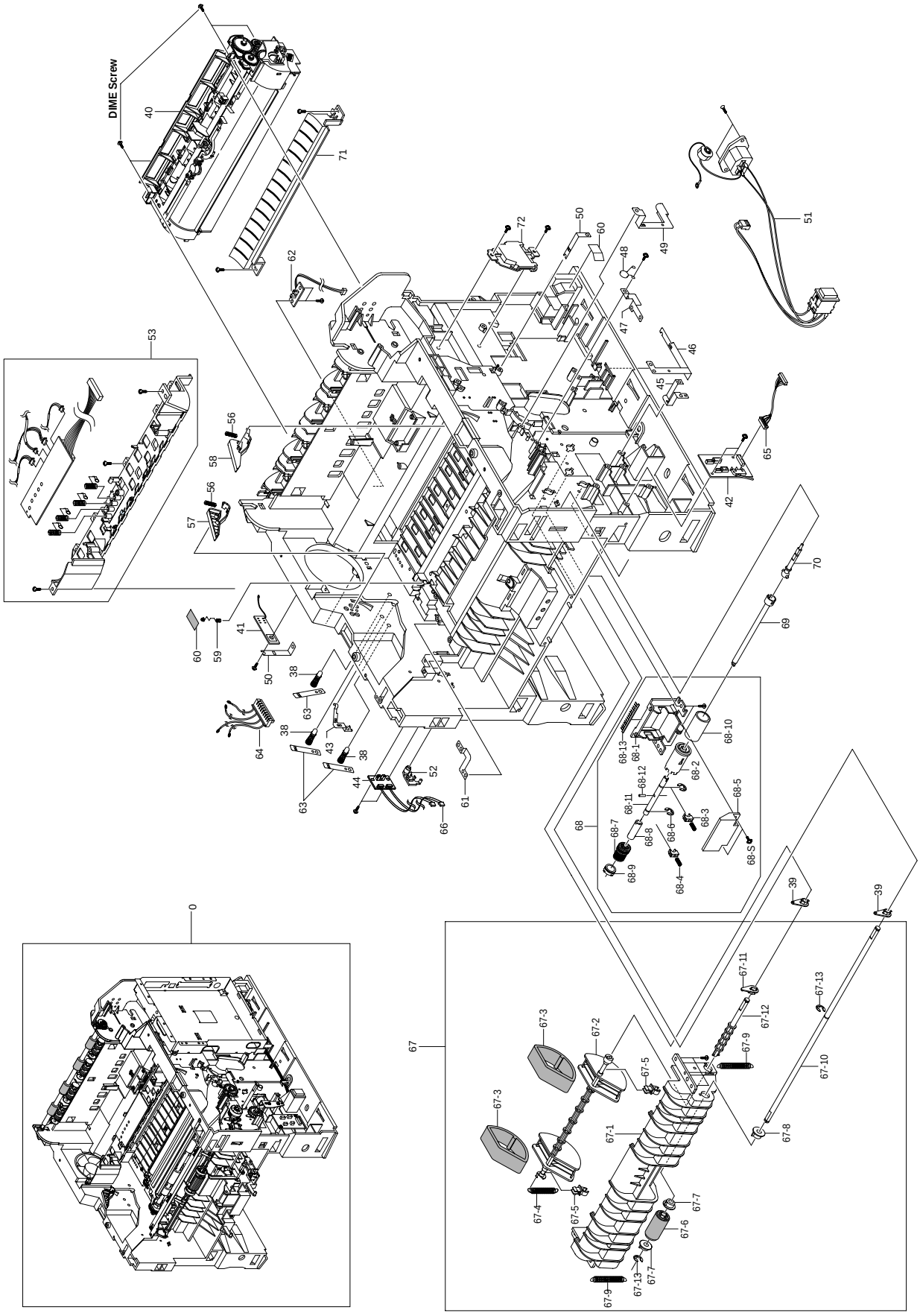
SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU BASE-HOUSHING	JC96-02695P	1	X	
1	ELA UNIT-COVER TOP	JC96-02696L	1	X	
1-1	AS-PBA LCD PNL_KB	JC81-01731A	1	O	
1-1-1	KEY-M-BUTTON	JC64-00082A	1	X	
1-1-2	PBA MAIN_LCD PANEL	JC92-01473A	1	X	
1-1-3	KEY-M-CANCEL	JC64-00083A	1	X	
1-1-4	CAP-M-LED	JC67-00051A	1	X	
1-2	AS-PBA OPEN_CAP	JC81-01738A	1	O	
1-2-1	CAP-M-SENSOR	JC67-00034B	1	X	
1-2-2	PBA SUB-COVER OPEN	JC92-01514A	1	X	
1-3	AS_UNIT COVER TOP	JC81-01737A	1	O	
1-3-1	COVER-M-TOP	JC63-00258A	1	X	
1-3-2	MEC-BRUSH ANTISTATIC	JC75-00095A	1	X	
1-3-3	PMO-LEVER STACKING	JC66-00646A	2	X	
1-3-4	BUSH-M-RETAINER	JC61-00657A	1	X	
1-3-5	SPRING ETC-DUPLEX COVER	JC61-00391A	1	X	
1-3-6	PMO-STACKER LOCKER	JC72-00995A	1	X	
1-3-7	WINDOW-M-LCD	JC64-00048C	1	X	
1-3-8	COVER-M-OPEN	JC63-00116B	1	X	
1-3-9	PMO-STACKER_RX	JC72-00973F	1	X	
1-3-10	STOPPER-M-HINGE OPEN	JC61-00656A	2	X	
1-3-11	SHEET-OVERLAY BUTTON	JC63-00288A	1	X	
1-3-12	COVER-WINDOW	JC63-00256A	1	X	
2	ELA UNIT-COVER RIGHT	JC96-02697B	1	O	
2-1	COVER-M-RIGHT	JC63-00115B	1	X	
2-2	BUTTON-M-POWER	JC64-00043B	1	X	
2-3	SPRING-CS(CAP)	6107-000014	1	X	
3	MEA UNIT-COVER REAR	JC97-01743B	1	O	
3-1	COVER-M-REAR	JC63-00120B	1	X	
3-2	PMO-STACKER REAR	JC72-00996B	1	X	
3-3	SPRING-TS	6107-001160	2	X	
3-4	GUIDE-M-DUPLEX	JC61-00658A	2	X	
3-5	ICT-BRKT REAR COVER	JC70-00007A	1	X	
3-6	IEX-SHAFT IDLE,F/UP	JC70-20901A	2	X	
3-7	PMO-ROLLER_F/UP(2)	JC72-20902A	2	X	
3-8	PMO-DUMMY FRAME FUSER	JC72-00999A	1	X	
3-9	TENSION-PLATE	JC70-00465A	1	X	
4	COVER-M-LEFT	JC63-00117B	1	O	
5	COVER-M-FRONT INNER	JC63-00118B	1	O	
6	COVER-M-FRAME EXIT	JC63-00122B	1	O	
S	SCREW-SPECIAL	6009-001351	4	X	
S	SCREW-TAPTITE	6003-000196	9	X	
S	SCREW-TAPTITE	6003-000119	5	X	

8.3 Frame Assembly (1)



Frame Assembly (2)



Frame Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA UNIT-FRAME BASE	JC96-02627C	1	X	⚠ 110V
	ELA UNIT-FRAME BASE	JC96-02627D	1	X	⚠ 220V
1	FRAME-M-BASE	JC61-00677A	1	X	
2	ELA UNIT-PICKUP MP	JC96-02681A	1	O	
2-1	SHAFT-M-PICK UP MP	JC66-00453A	1	X	
2-2	PMO-IDLE PICK UP MP	JC72-01003A	2	X	
2-3	CAM-M-PICK UP MP	JC66-00452A	1	X	
2-4	ELA UNIT-ROLLER P/UP MP	JC96-02686A	1	O	
2-4-1	HOLDER-M-PICKUP MP	JC61-00705A	1	X	
2-4-2	HOUSING-M-PICK UP MP	JC61-00685A	1	X	
2-4-3	RUBBER-PICK UP MP	JC73-00131A	1	X	
3	IPR-TERMINAL FU	JC70-10961A	2	X	
4	PMO-HOUSING TERMINAL	JC72-41010A	1	X	
5	CBF HARNESS-FUSER 220V	JC39-00279A	1	X	
6	FOOT-ML80	JC61-40001A	2	X	
7	AS-HOLDER PAD	JC81-01715A	1	O	
7-1	FRAME-M-HOLDER PAD	JC61-00683A	1	X	
7-2	HOLDER-M-PAD	JC61-00684A	1	X	
7-3	RPR-FRICTION PAD MP	JC73-00132A	1	X	
7-4	PMO-ACTUATOR MP	JC72-01002A	1	X	
7-5	SPRING ETC-EMPTY	JC61-70965A	1	X	
7-6	PHOTO-INTERRUPTER	0604-001095	1	X	
7-7	CBF HARNESS-MP EMPTY	JC39-00256A	1	X	
7-8	SPRING ETC-PAD	JC61-00387A	1	X	
8	GUIDE-P_TRANSFER	JC61-00678A	1	X	
9	PMO-HOLDER PLATE SAW	JC72-40247B	1	X	
10	IPR-PLATE SAW	JC70-10232C	1	X	
11	PMO-CAP CONNECTOR L	JC72-00463A	1	X	
12	PMO-CAP CONNECTOR U	JC72-00465A	1	X	
13	CBF HARNESS OPE	JB39-40532A	1	X	
14	GUIDE-P_REGI UPPER	JC61-00675A	1	X	
15	SPRING ETC-LEVER	JC61-70918A	2	X	
16	HOLDER-M-BUSHING TX	JC61-00671A	2	X	
17	GUIDE-PLATE PAPER	JC61-00691A	1	X	
18	CAP-WIRE INLET	JC67-00059A	1	X	
19	MEA RACK-EXIT ROLLER	JC97-01034A	4	O	
19-1	PMO-HOLDER EXIT ROLL	JC72-41006A	1	X	
19-2	PMO-ROLLER FD F	JC72-41007A	1	X	
19-3	PMO-ROLLER FD R	JC72-41008A	1	X	
19-4	SPRING ETC-EXIT ROLL FD	JC61-70911A	1	X	
20	MEC-BEARING,EXIT	JC75-10529A	4	O	
21	ROLLER-EXIT_F/DOWN	JC66-00668A	1	O	
22	GEAR-EXIT	JC66-40209A	2	O	
23	HOLDER-M-BUSHING EXIT	JC61-00673A	1	X	

Frame Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

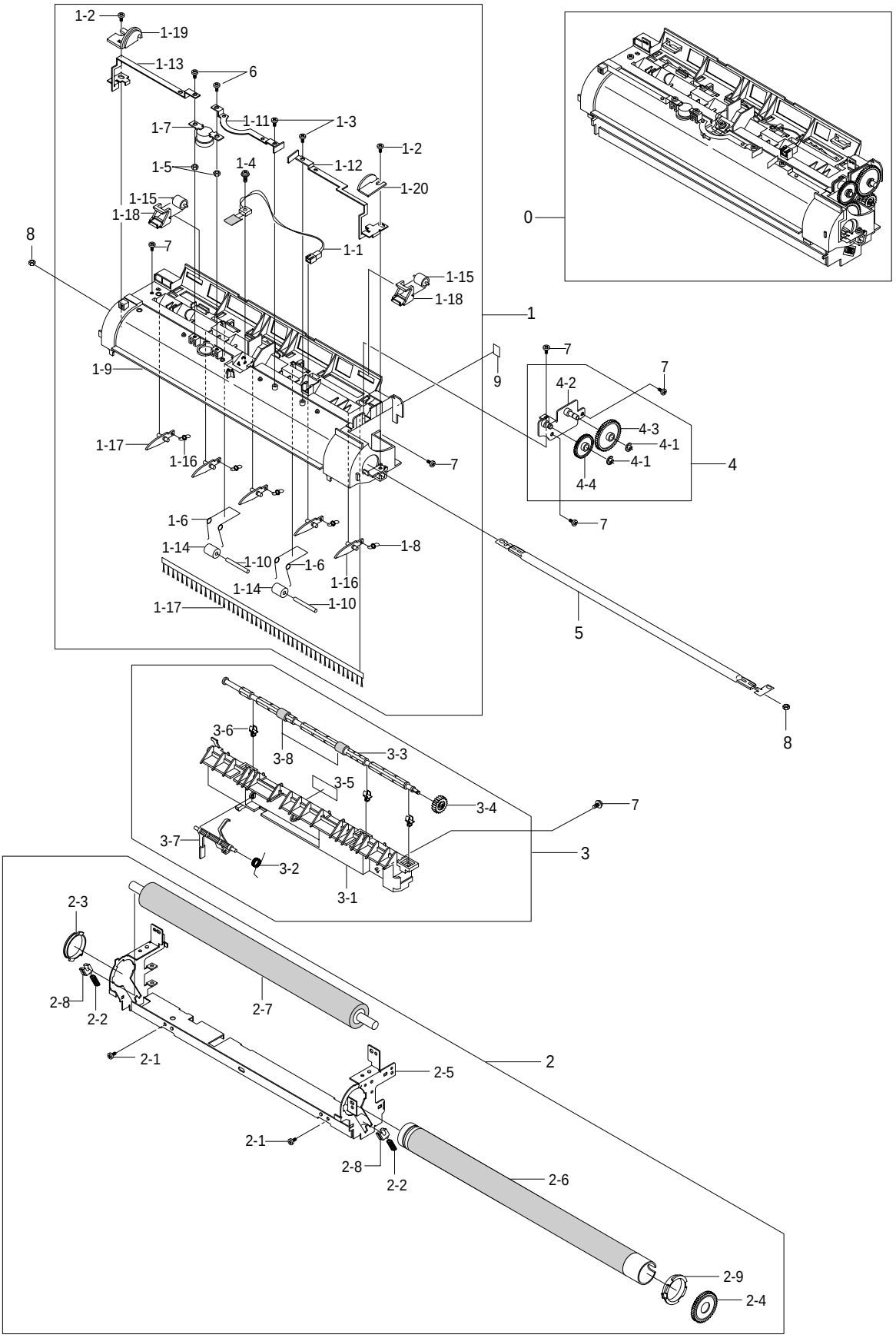
No.	Description	SEC.Code	Q'ty	SA	Remark
24	AS-ROLLER EXIT_DUPLEX	JC81-01732A	1	O	
25	IPR-TERMINAL TR HAWK	JC70-00132A	1	X	
26	CAP-M-WIRE PTL LOWER	JC67-00036A	1	X	
27	PBA SUB-PTL2	JC92-01516A	1	X	
28	CBF HARNESS-THERMISTOR	JC39-00255A	1	X	
29	TERMINAL-P_PTL	JC65-00001A	2	X	
30	SHIELD-P_CONTROLLER	JC63-00124A	1	X	
31	NUT-HEXAGON	6021-000222	2	X	
32	CABLE TIE	6501-000004	1	X	
34	PHOTO-INTERRUPTER	0604-001095	1	X	
36	ELA HOU-CST SENSOR	JC96-02127A	1	O	
36-1	IPR-PLATE-SENSOR	JC70-00192A	1	X	
36-2	IPR-BRKT-SENSOR	JC70-00195A	1	X	
36-3	PBA-SUB CASSETTE	JC92-01336A	1	X	
37	HARNESS-OUT FULL	JC39-00250A	1	X	
38	MEA UNIT-TERMINAL:L	JC97-01401A	3	X	
39	PMO-BEARING SHAFT	JC72-41191B	5	X	
40	ELA UNIT-FUSER	JC81-01728A	1	O	⚠ 110V
	ELA UNIT-FUSER	JC81-01729A	1	O	⚠ 220V
41	PBA MAIN-ZENER	JC92-01488A	1	X	
42	PBA SUB-PANEL	JC92-01519A	1	O	
43	IPR-P_GROUND OPC	JC70-00332A	1	X	
44	PBA SUB-EMPTY SENSOR	JC92-01511A	1	O	
45	IPR-P_GND SOLENOID FEED	JC70-00336A	1	X	
46	IPR-P_GROUND SCF MAIN	JC70-00334A	1	X	
47	IPR-P_GROUND REGI ROLLER	JC70-00333A	1	X	
48	ELA HOU-VARISTOR	JC96-01772A	1	X	
49	IPR-P_GROUND MOTOR MAIN2	JC70-00330A	1	X	
50	IPR-P_GROUND GUIDE TR	JC70-00328A	2	X	
51	CBF HARNESS-INLET	JC39-00246A	1	O	
52	HINGE-M-FRONT GUIDE, DUP	JC61-00666A	1	X	
53	AS-FRAME LSU LOWER	JC81-01727A	1	O	
56	SPRING ETC-GUIDE DEVE	JC61-70932A	2	X	
57	PMO-GUIDE DEVE L	JC72-00317A	1	X	
58	PMO-GUIDE DEVE R	JC72-00318A	1	X	
59	TERMINAL-P_TR CARDINAL	JC65-00005A	1	X	
60	SHEET-COVER TR	JC63-00132A	1	X	
61	IPR-P_GROUND PLATE PAPER	JC70-00339A	1	X	
62	PBA SUB-EXIT SENSOR	JC92-01512A	1	O	
63	TERMINAL-P_HV CARDINAL	JC65-00006A	3	X	

Frame Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
64	CBF HARNESS-HVPS	JC39-00247A	1	X	
65	CBF HARNESS-CONNECTOR	JC39-00259A	1	X	
66	CBF HARNESS-SENSOR	JC39-00261A	1	X	
67	ELA UNIT-PICK UP	JC96-02683A	1	O	
67-1	FRAME-M-PICKUP	JC61-00641A	1	X	
67-2	HOUSING-M-PICKUP	JC61-00636A	1	X	
67-3	RUBBER-PICK UP	JC73-00127A	2	O	
67-4	SPRING ETC-EXTENSION	JC61-70950A	1	X	
67-5	PMO-BUSHING FEED	JC72-00382B	2	X	
67-6	HOUSING-M-FEED	JC61-00637A	1	X	
67-7	RUBBER-FEED	JC73-00128A	1	X	
67-8	BEARING-PICK UP	JC66-10202A	3	X	
67-9	SPRING ETC-KNOCK UP MP	JC61-70913A	2	X	
67-10	SHAFT-FEED	JC66-00592A	1	X	
67-11	PMO-BEARING SHAFT	JC72-41191B	1	X	
67-12	SHAFT-M-PICK UP	JC66-00440A	1	X	
67-13	RING-E	6044-000125	2	X	
68	ELA UNIT-RETARD	JC96-02682A	1	O	
68-1	FRAME-M-RETARD	JC61-00640A	1	X	
68-2	HOUSING-M-RETARD	JC61-00635A	1	X	
68-3	BUSH-M-RETARD	JC61-00652A	2	X	
68-4	SPRING ETC-PAD	JC61-00013A	2	X	
68-5	HOLDER-M-RETARD	JC61-00638A	1	X	
68-6	RING-E	6044-000231	2	X	
68-7	SPRING-TS	6107-001157	1	X	
68-8	PMO-HUB IN RETARD	JC72-00994A	1	X	
68-9	PMO-HUB OUT RETARD	JC72-00993A	1	X	
68-10	RUBBER-RETARD	JC73-00129A	1	X	
68-11	SHAFT-RETARD	JC66-00590A	1	X	
68-12	SHAFT-HUB IN	JC66-00591A	1	X	
68-13	MEC-BRUSH ANTISTATIC	JC75-00095A	0.25	X	
68-S	SCREW-TAPTITE	6003-000196	2	X	
69	SHAFT-M-COUPLING RETARD	JC66-00439A	1	X	
70	SHAFT-M-GEAR RETARD	JC66-00438A	1	X	
71	GUIDE-M-FRONT	JC61-00801A	1	X	
72	CAP-FUSER-FRAME	JC67-00060A	1	X	

8.4 Fuser Assembly



Fuser Unit Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

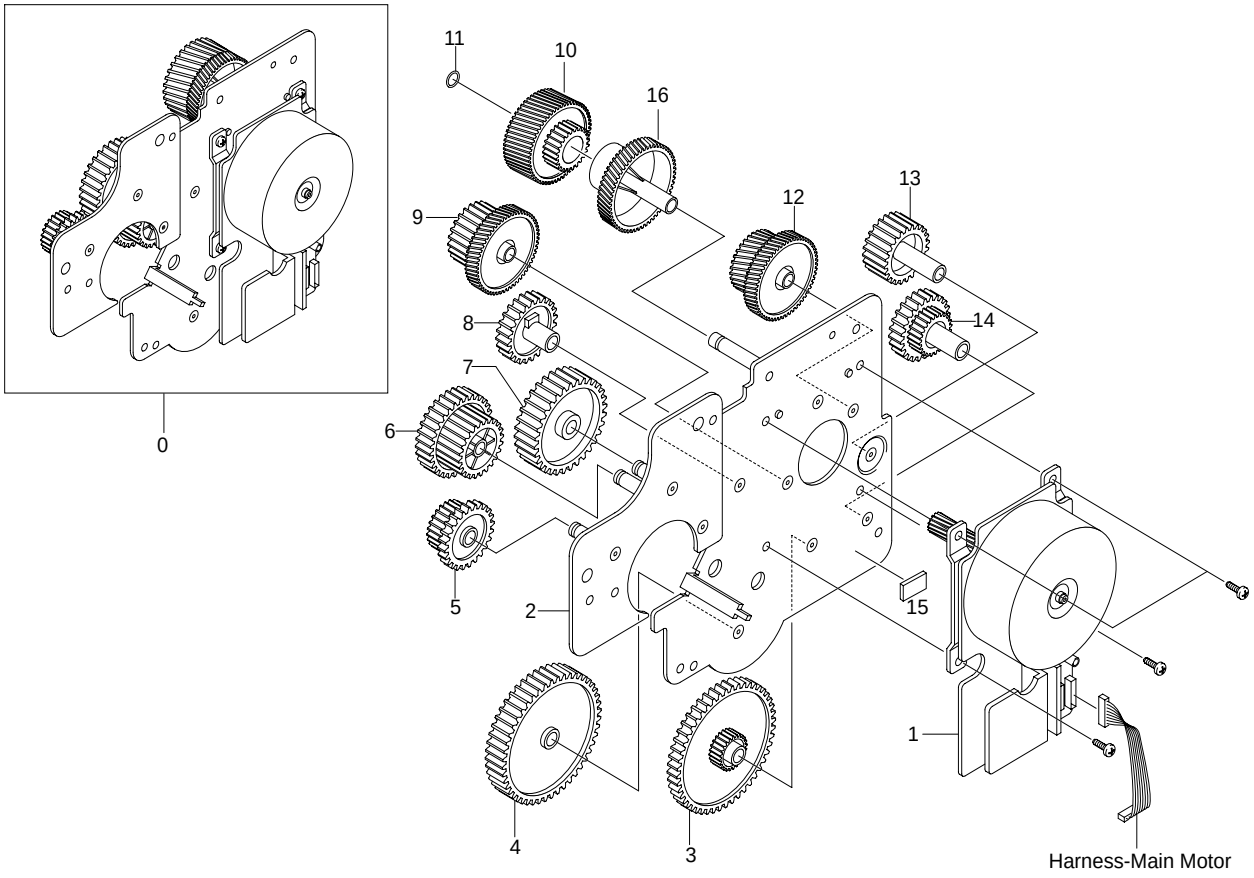
No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA UNIT-FUSER	JC81-01728A	1	O	⚠ 110V
	ELA UNIT-FUSER	JC81-01729A	1	O	⚠ 220V
1	ELA UNIT-UPPER FUSER	JC96-02694A	1	X	
1-1	THERMISTOR-NTC	1404-001305	1	X	
1-2	SCREW-MACHINE	6001-000131	2	X	
1-3	SCREW-TAPTITE	6003-000119	2	X	
1-4	SCREW-TAPTITE	6003-000196	1	X	
1-5	NUT-HEXAGON	6021-000222	2	X	
1-6	SPRING-TS	6107-001159	2	X	
1-7	THERMOSTAT-150	JC47-00005A	1	X	
1-8	SPRING ETC-SAPERATION	JC61-70909A	5	X	
1-9	COVER-M-FUSER	JC63-00110A	1	X	
1-10	IEX-SHAFT IDLE,F/UP	JC70-20901A	2	X	
1-11	ELECTRODE-P-FU_M	JC71-00039A	1	X	
1-12	ELECTRODE-P-FU_R	JC71-00040A	1	X	
1-13	ELECTRODE-P_FU_L	JC71-00041A	1	X	
1-14	PEX-ROLLER F/UP(2)	JC72-20902A	2	X	
1-15	PMO-ROLLER UPPER DP	JC72-40981A	2	X	
1-16	PMO-GUIDE CLAW	JC72-41012B	5	X	
1-17	MEC-BRUSH ANTISTATIC	JC75-00095A	1	X	
1-18	HOLDER-IDLE ROLLER	JC61-00785A	2	X	
1-19	CAP-FUSER L	JC67-00056A	1	X	
1-20	CAP-FUSER R	JC67-00057A	1	X	
2	MEA UNIT-LOWER FUSER	JC97-01718A	1	X	
2-1	SCREW-TAPTITE	6003-000179	2	X	
2-2	SPRING ETC-PR(7300)	JC61-00056A	2	X	
2-3	BUSH-M-HR_R	JC61-00615A	1	X	
2-4	GEAR-FUSER 7300	JC66-40913B	1	X	
2-5	FRAME-P-FUSER	JC61-00621A	1	X	
2-6	ROLLER-HEAT	JC66-00597A	1	X	
2-7	ROLLER-PRESSURE	JC66-00599A	1	X	
2-8	BEARING-PRESSURE/R	JC66-10901A	2	X	
2-9	BEARING-H/R L	JC66-10902A	1	X	
3	MEA UNIT-GUIDE REAR	JC97-01719A	1	X	
3-1	GUIDE-M-REAR	JC61-00620A	1	X	
3-2	SPRING ETC-ACTUATOR	JC61-70903A	1	X	
3-3	SHAFT-EXIT-F/UP	JC66-00402A	1	X	
3-4	GEAR-EXIT	JC66-40209A	1	X	
3-5	LABEL(R)-CAU_HOT_FU	JC68-30928B	1	X	
3-6	PMO-BUSHING TX	JC72-00382A	3	X	
3-7	PMO-ACTUATOR EXIT	JC72-00988A	1	X	
3-8	RMO-RUBBER EXIT_F/UP	JC73-40909B	2	X	

Fuser Unit Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
4	MEA UNIT-BRK GEAR FU	JC97-01720A	1	X	
4-1	RING-E	6044-000231	2	X	
4-2	BRACKET-P-FUSER	JC61-00617A	1	X	
4-3	GEAR-IDLE 33	JC66-00425A	1	X	
4-4	GEAR-IDLE 23	JC66-00426A	1	X	
5	LAMP-HALOGEN	4713-001186	1	X	⚠ 110V
	LAMP-HALOGEN	4713-001187	1	X	⚠ 220V
6	SCREW-MACHINE	6001-000131	2	X	
7	SCREW-TAPTITE	6003-000179	6	X	
8	NUT-HEXAGON	6021-000222	2	X	
9	LABEL(R)-LV FUSER	JC68-00408A	1	X	⚠ 110V
	LABEL(R)-LV FUSER	JC68-00407A	1	X	⚠ 220V

8.5 Main Driver Assembly

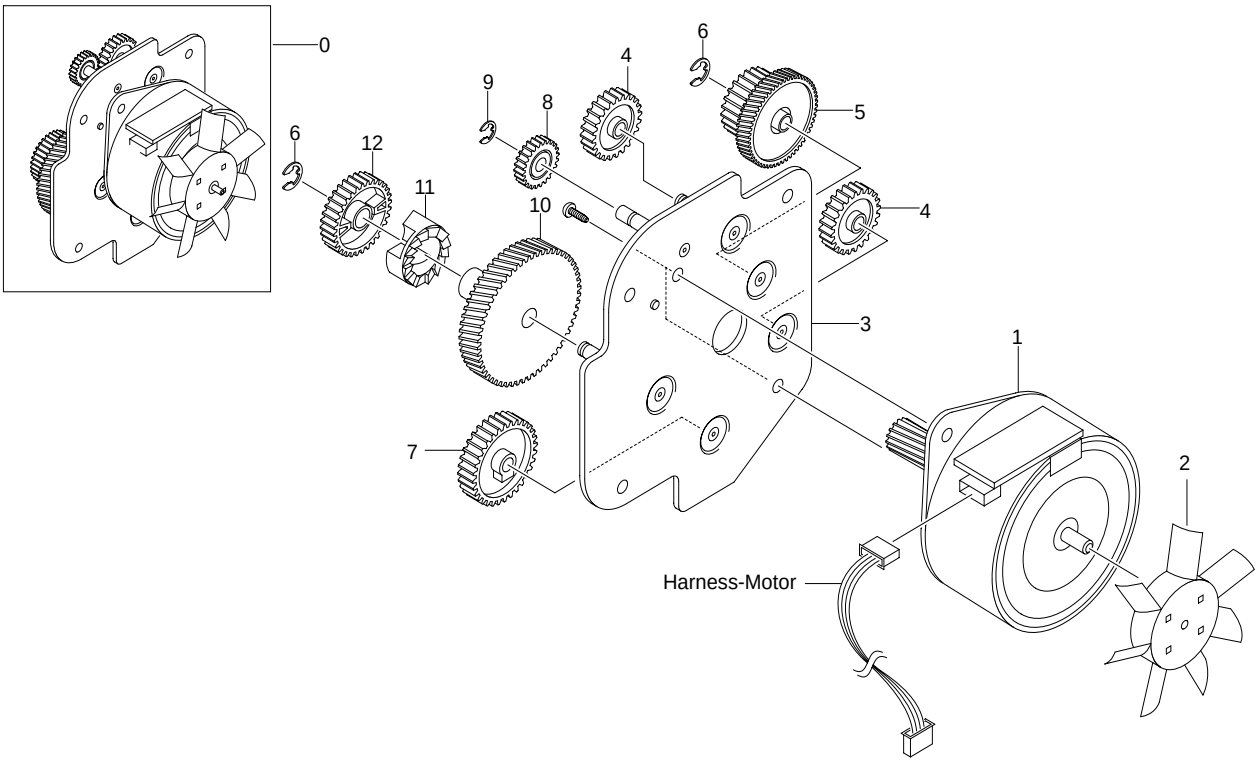


Main Driver Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA UNIT-MOTOR MAIN CARDINAL	JC96-02725B	1	O	
1	MOTOR DC-BLDC CARDINAL	JC31-00024A	1	X	
2	BRACKET-P-MAIN	JC61-00622A	1	X	
3	GEAR-RDCN PICK_UP	JC66-00411A	1	X	
4	GEAR-PICK_UP DRV	JC66-00412A	1	X	
5	GEAR-RDCN RETARD	JC66-00410A	1	X	
6	GEAR-RDCN FEED	JC66-00409A	1	X	
7	GEAR-MP DRV	JC66-00413A	1	X	
8	GEAR-REGI IDLE	JC66-00408A	1	X	
9	GEAR-RDCN REGI	JC66-00407A	1	X	
10	GEAR-OPC DRV INNER	JC66-00644A	1	X	
11	WASHER-PLAIN	6031-001255	2	X	
12	GEAR-RDCN OPC	JC66-00405A	1	X	
13	GEAR-DUPLEX IDLE	JC66-00415A	1	X	
14	GEAR-RDCN DUPLEX	JC66-00414A	1	X	
15	FOOT-SF4000	JG61-40001A	1	X	
16	GEAR-OPC DRV OUTER	JC66-00645A	1	X	
S	SCREW-TAPTITE	6003-000301	4	X	

8.6 Exit Driver Assembly

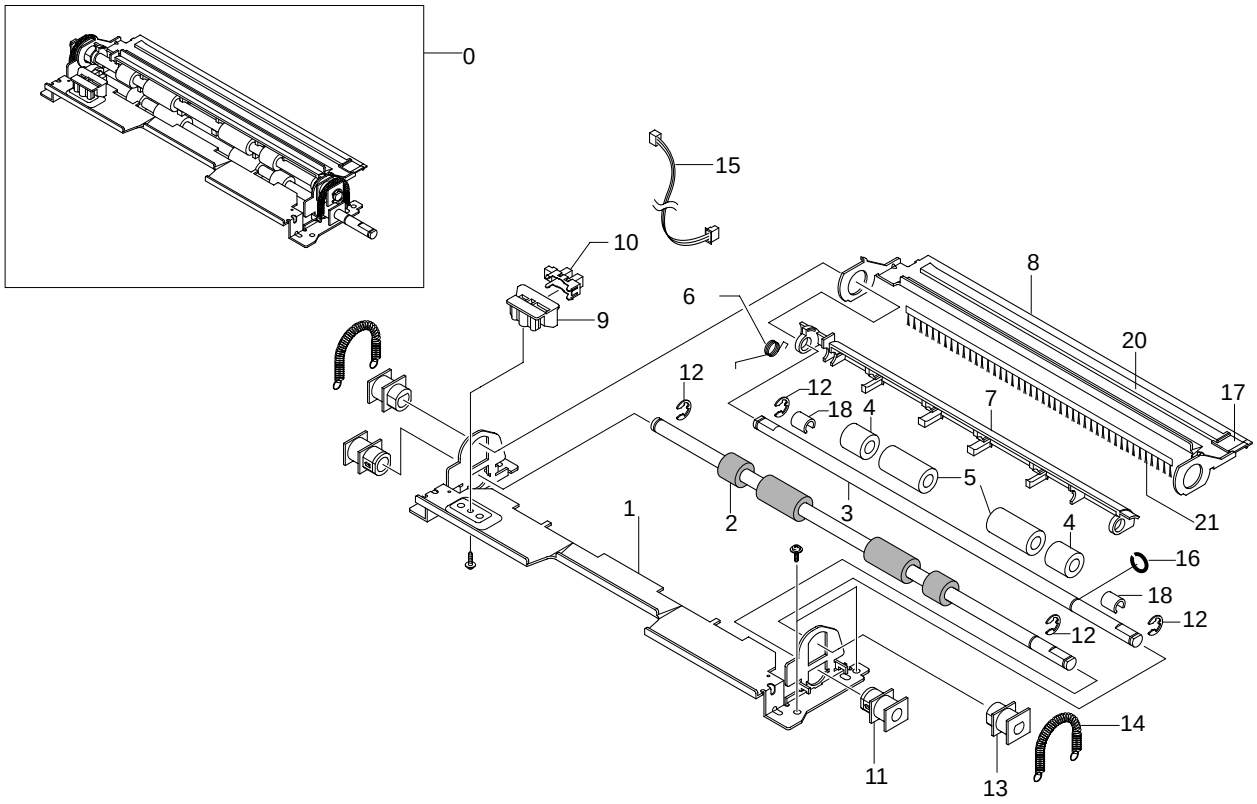


Exit Drive Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA UNIT-MOTOR EXIT CARDINAL	JC96-02857A	1	O	
1	MOTOR-STEP-CARDINAL 2	JC31-00028C	1	X	
2	PMO-IMPELLER_DRV	JC72-00825A	1	X	
3	BRACKET-P-EXIT	JC61-00623A	1	X	
4	GEAR-DP,IDLE	JC66-40911A	2	X	
5	GEAR-RDCN EXIT	JC66-00419A	1	X	
6	RING-E	6044-000231	2	X	
7	GEAR-FUSER IDLE	JC66-00418A	1	X	
8	GEAR-EXIT/U,ID	JC66-40211B	1	X	
9	RING-E	6044-000125	2	X	
10	GEAR-RDCN FUSER IN	JC66-00416A	1	X	
11	GEAR-HUB CLUTCH	JC66-00340A	1	X	
12	GEAR-RDCN FUSER OUT	JC66-00417A	1	X	
S	SCREW-MACHINE	6001-000131	2	X	

8.7 Regi Assembly

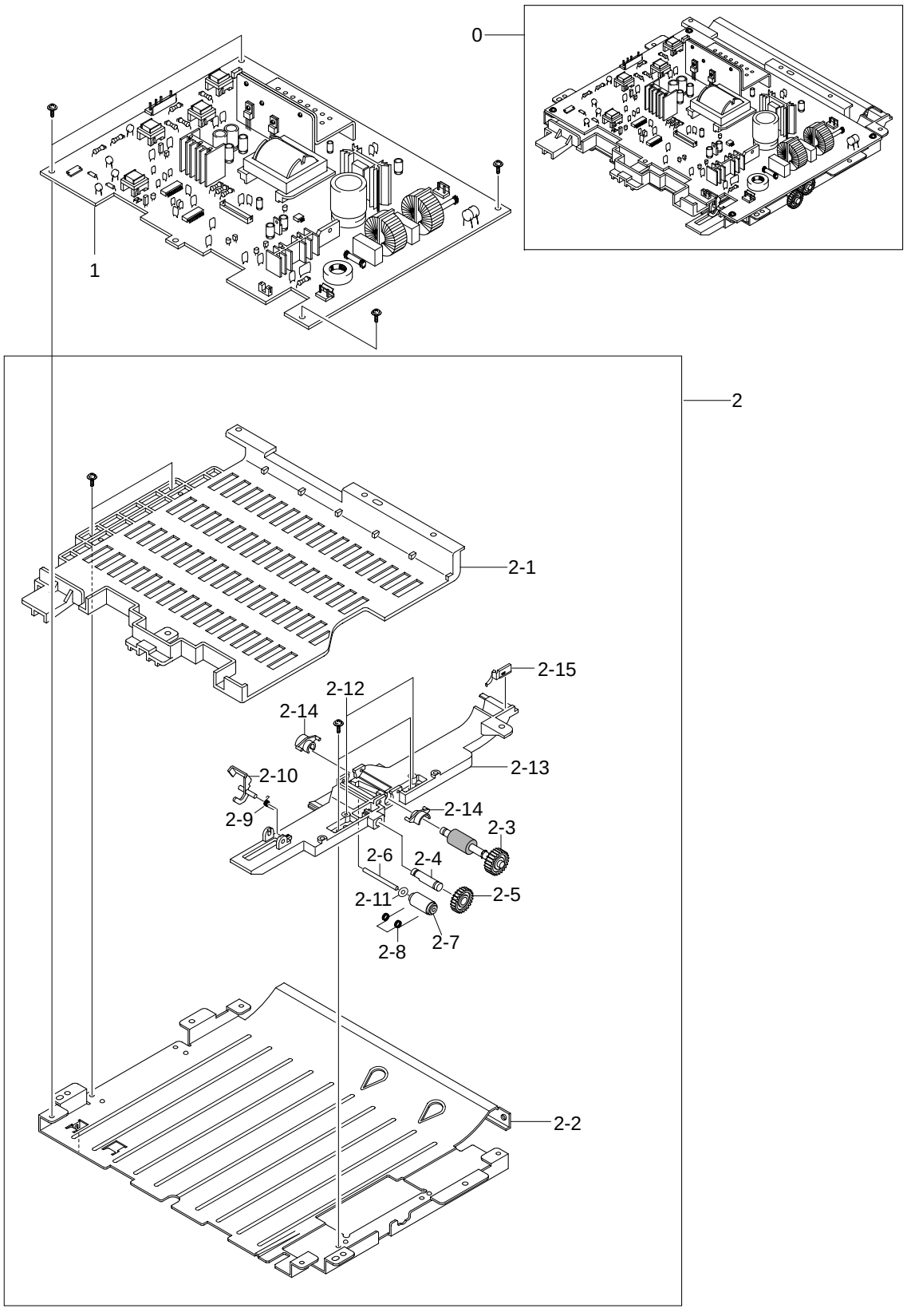


Regi Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA UNIT-REGI	JC96-02626A	1	O	
1	GUIDE-P_REGI LOWER	JC61-00674A	1	X	
2	ROLLER-REGI LOWER L	JC66-00450A	1	X	
3	SHAFT-REGI UPPER	JC66-00446A	1	X	
4	ROLLER-M-REGI IDLE S	JC66-00648A	2	X	
5	ROLLER-M-REGI IDLE L	JC66-00647A	2	X	
6	SPRING-TS	6107-001158	1	X	
7	PMO-ACTUATOR REGISHUTTER	JC72-00998A	1	X	
8	GUIDE-P_REGI PLATE	JC61-00670A	1	X	
9	HOLDER-M-SENSOR	JC61-00672A	1	X	
10	PHOTO-INTERRUPTER	0604-001095	1	O	
11	BUSH-M-ROLLER REGI L	JC61-00668A	2	X	
12	RING-E	6044-000231	4	X	
13	BUSH-M-ROLLER REGI U	JC61-00669A	2	X	
14	SPRING-ES	6107-001155	2	X	
15	CBF HARNESS-MP EMPTY	JC39-00256A	1	X	
16	WASHER-PLAIN	6031-001255	1	X	
17	CAP-M-WIRE PTL UPPER	JC67-00035A	1	X	
18	CAP-M_BUSHING ACTUATOR	JC67-00047A	2	X	
19	CAP-P_BUSHING REGI LOWER	JC67-00038A	2	X	
20	PBA MAIN-PTL1	JC92-01475A	1	X	
21	BRUSH-ANTISTATIC	JC75-00095A	1	X	
S	SCREW-TAPTITE	6003-000196	1	X	

8.8 SMPS Assembly

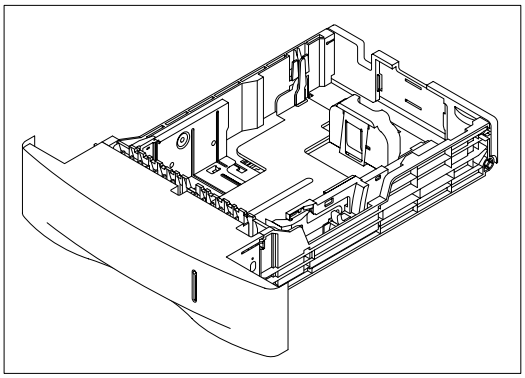


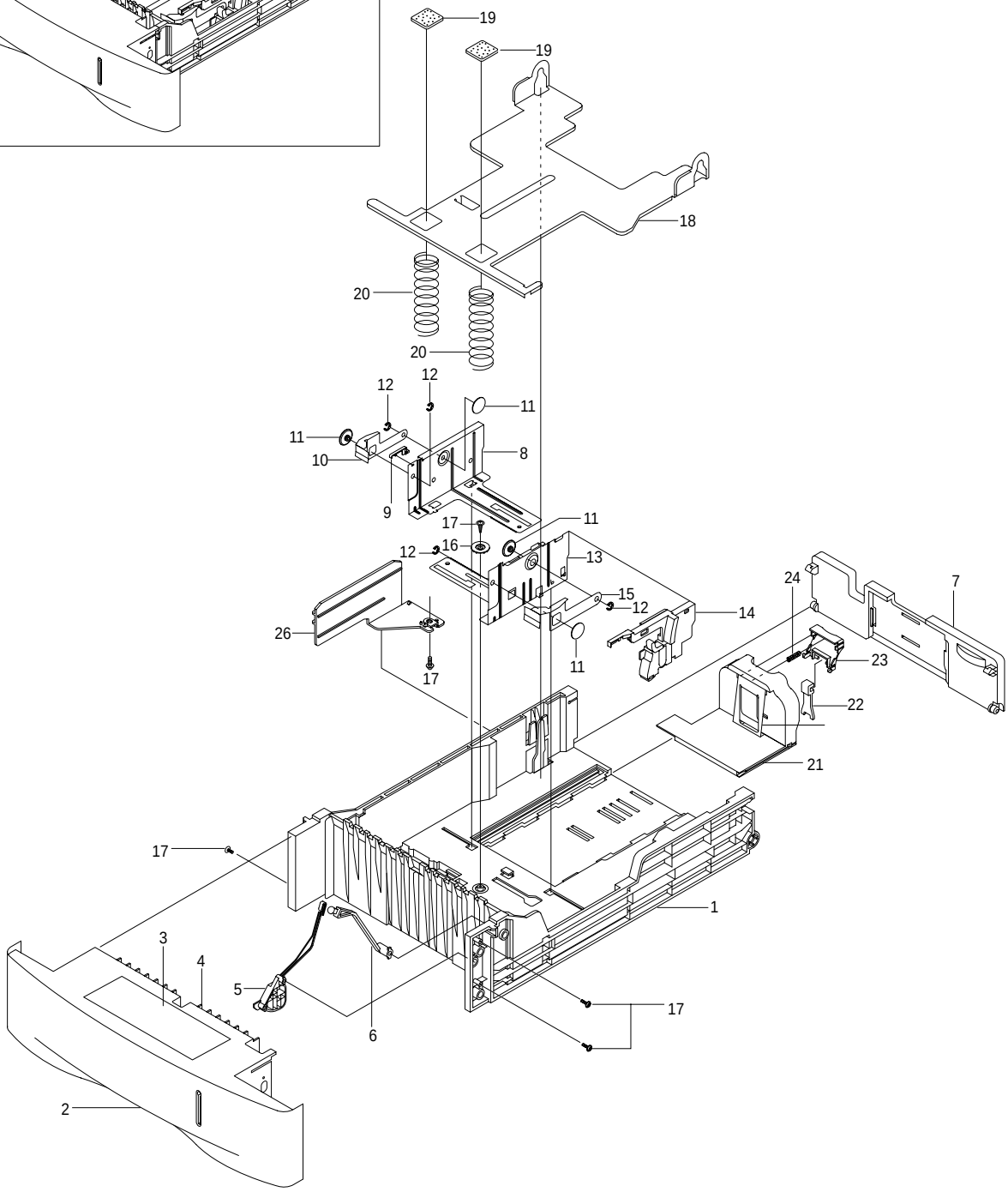
SMPS Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-SMPS_HVPS_V1(110V)	JC96-02779A	1	O	⚠ 110V
	ELA HOU-SMPS_HVPS_V2(220V)	JC96-02777A	1	O	⚠ 220V
1	SMPS-V1_HVPS	JC44-00052A	1	X	⚠ 110V
	SMPS-V2_HVPS	JC44-00053A	1	X	⚠ 220V
2	MEA UNIT-DUPLEX	JC97-01714A	1	O	
2-1	GUIDE-M-LEFT, DUP	JC61-00664A	1	X	
2-2	GUIDE-P-BOTTOM, DUP	JC61-00661A	1	X	
2-3	MEA UNIT-ROLLER FEED, DUP	JC97-01713A	1	X	
2-4	ICT-STUD DRV GEAR, DUP	JC70-00327A	1	X	
2-5	GEAR-DP,IDLE	JC66-40911A	1	X	
2-6	SHAFT-IDLE ROLL, DUP	JC66-00444A	1	X	
2-7	ROLLER-M-IDLE, DUP	JC66-00442A	1	X	
2-8	SPRING-TS	6107-001156	1	X	
2-9	SPRING ETC-EMPTY	JC61-70965A	1	X	
2-10	PMO-ACTUATOR FEED, DUP	JC72-00997A	1	X	
2-11	PCT-SILP WASHER	JK72-00058A	1	X	
2-12	ICT-STUD PAPER GUIDE, DP	JC70-00457A	2	X	
2-13	GUIDE-M-RIGHT, DUP	JC61-00662A	1	X	
2-14	BUSH-M-FEED, DUP	JC61-00665A	2	X	
2-15	GUIDE-SKEW DUP	JC61-00787A	1	X	
S	SCREW-TAPTITE	6003-000266	4	X	
S	SCREW-TAPTITE	6003-000266	2	X	
S	SCREW-TAPTITE	6003-000266	2	X	

8.9 Cassette Assembly



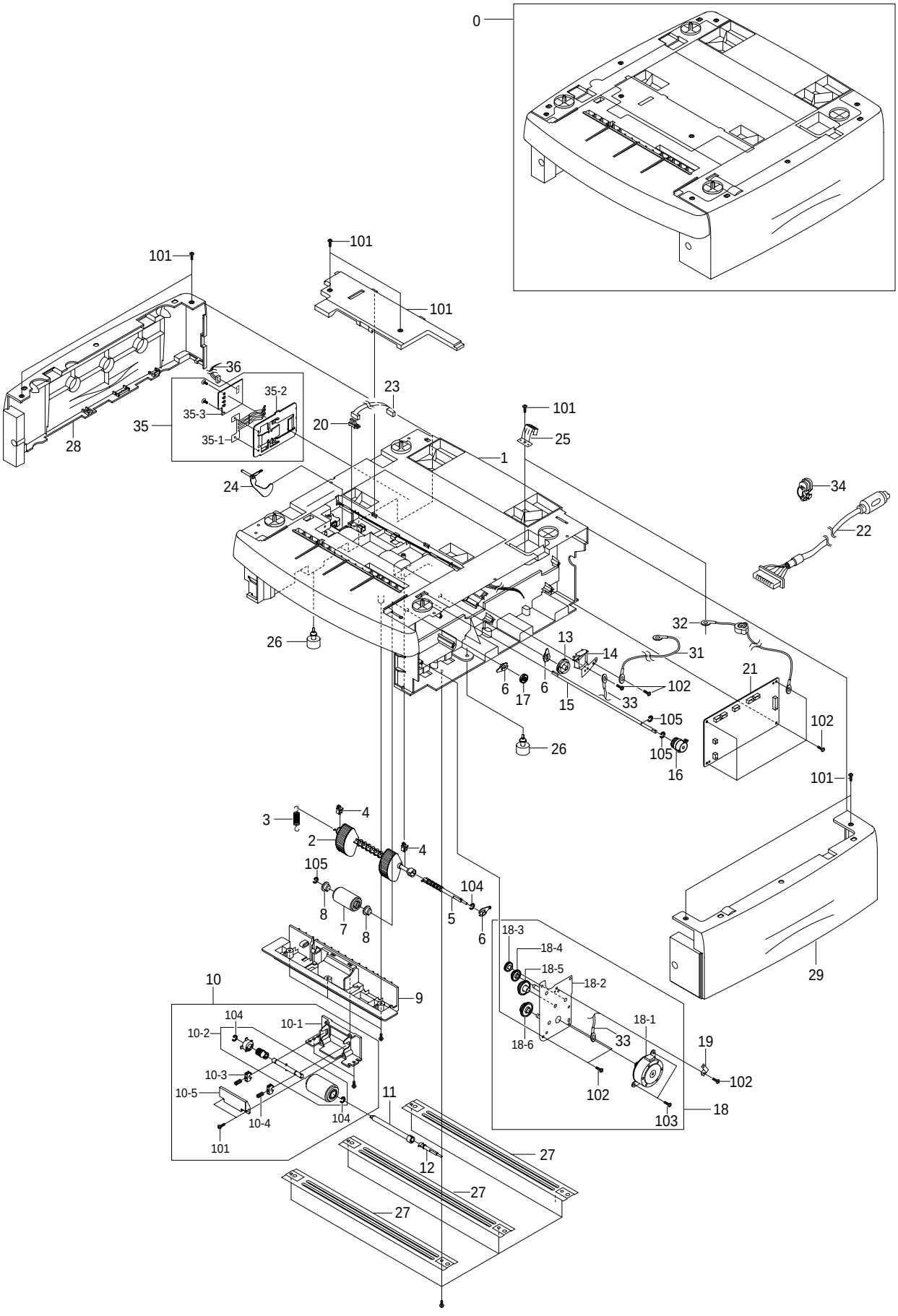


Cassette Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA UNIT-CASSETTE(550)	JC96-02687B	1	O	
1	FRAME-M-CASSETTE	JC61-00642B	1	X	
2	GUIDE-M-HANDLE	JC61-00655B	1	X	
3	LABEL(R)-CASSETTE	JC68-01031A	1	X	
4	GUIDE-M-INNER CST	JC61-00704A	1	X	
5	HOLDER-M-INDICATOR	JC61-00639A	1	X	
6	INDICATOR-M-EMPTY	JC64-00041B	1	X	
7	GUIDE-M-EXTENSION CST	JC61-00644B	1	X	
8	GUIDE-P-SIDE,L	JC61-00647A	1	X	
9	CAP-M-GUIDE SIDE,L	JC67-00037A	1	X	
10	IPR-P-FINGER LEFT	JC70-00325A	1	X	
11	BUSH-M-FINGER,F	JC61-00653A	4	X	
12	WASHER-PLAIN	6031-001255	4	X	
13	GUIDE-P-SIDE,R	JC61-00649A	1	X	
14	GUIDE-M-SIDE LOCK	JC61-00645B	1	X	
15	IPR-P-FINGER RIGHT	JC70-00326A	1	X	
16	GEAR-PINION	JG66-40003A	1	X	
17	SCREW-TAPTITE	6003-000196	5	X	
18	PLATE-P-KNOCK_UP	JC61-00651A	1	X	
19	RPR-PAD CST	JC73-10910A	2	X	
20	SPRING-CS	6107-001174	2	X	
21	GUIDE-M-REAR	JC61-00646B	1	X	
22	GUIDE-M-LOCK A	JC61-00267C	1	X	
23	KNOB-M-REAR	JC64-00042B	1	X	
24	SPRING ETC-REMAIN	JC61-00414A	1	X	
25	GUIDE-P-REAR PAPER CST	JC61-00751A	1	X	
26	GUIDE PAPER SIZE	JC61-00648A	1	X	

8.10 SCF Assembly



SCF Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

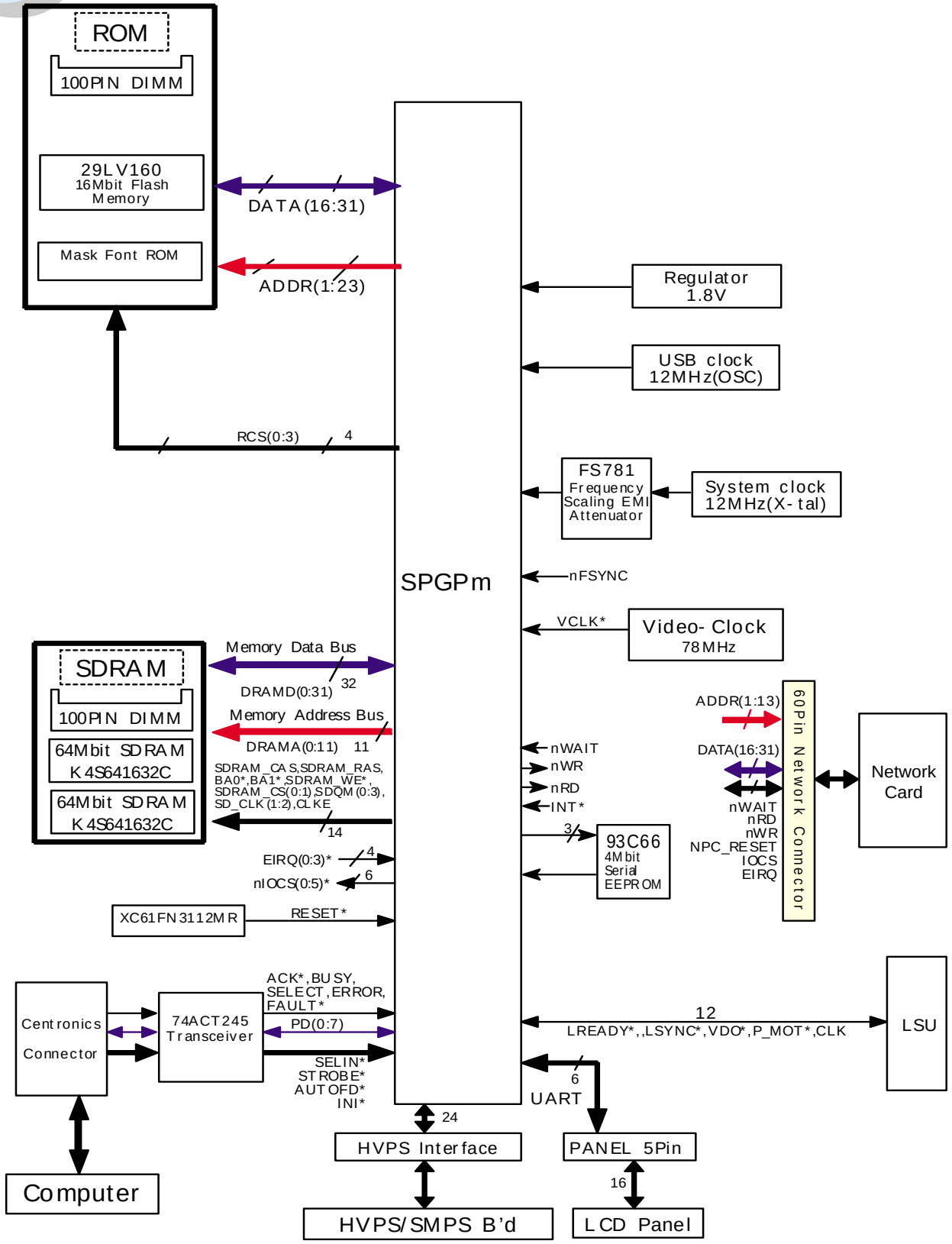
No.	Description	SEC.Code	Q'ty	SA	Remark
0	MEA UNIT-SECOND FEEDER	JC96-02842B	1	X	
1	PMO-FRAME SCF	JC61-00643B	1	X	
2	MEA UNIT-PICK UP	JC96-02683A	1	O	
2-1	HOUSING-PICK UP	JC61-00636A	1	X	
2-2	RUBBER-PICK UP	JC73-00127A	2	X	
3	SPRING-PICK UP	JC61-70950A	1	X	
4	PMO-BUSHING FEED	JC72-00382B	2	X	
5	SHAFT-PICK UP	JC66-00440A	1	X	
6	PMO-BEARING SHAFT	JC72-41191B	4	X	
7	MEA UNIT ROLLER FEED	JC96-02685A	1	X	
8	BEARING-PICK UP	JC66-10202A	2	X	
9	PMO-GUIDE INNER-SCF	JC61-00650A	1	X	
10	ELA UNIT-RETARD	JC96-02682A	1	O	
11	COUPLING-RETARD SHAFT-SCF	JC66-00441A	1	X	
12	SHAFT-GEAR RETARD	JC66-00438A	1	X	
13	GEAR-PICK UP CAM SCF	JC66-00534A	1	X	
14	SOLENOID-WHITE	JC33-00013A	1	O	
15	SHAFT FEED SCF	JC66-00593A	1	X	
16	CLUTCH-FEED SCF	JC47-00009B	1	O	
17	GEAR-REGI Z25	JC66-00420A	1	X	
18	ELA UNIT-BRACKET SCF	JC96-02858A	1	X	
18-1	MOTOR-SCF	JC31-00005E	1	O	
18-2	IPR-BRK MOTOR SCF	JC61-00624A	1	X	
18-3	GEAR REGI IDLE	JC66-00408A	1	X	
18-4	GEAR SCF RDCN RETARD	JC66-00410A	1	X	
18-5	GEAR SCF RDCN PICKUP	JC66-00428A	1	X	
18-6	GEAR SCF RDCN FEED	JC66-00427A	1	X	
19	IPR-GND SPRING,FEED	JC70-00464A	1	X	
20	PHOTO-INTERRUPTER	0604-001095	1	X	
21	PCB CONTROLLER ASSY	JC92-01436A	1	O	
22	CBF HARNESS-SCF	JC39-00248A	1	O	
23	CABLE PHOTO-INTERRUPTER	JC39-00250A	1	X	
24	PMO-ACTUATOR EMPTY SCF	JC72-00992A	1	O	
25	IPR-GND TOP	JC70-11028A	1	X	
26	FOOT-RUBBER HAWK16	JC61-40001A	2	X	
27	IPR-BAR CROSS BOTTOM	JC71-00042A	3	X	
28	PMO-COVER L-SCF	JC63-00112B	1	X	
29	PMO-COVER R-SCF	JC63-00113B	1	X	
30	PMO-COVER DUMMY-SCF	JC63-00114B	1	X	
31	CBF HARNESS-SCF GND	JC39-40608A	1	X	
32	CBF HARNESS-LIU GND	JB39-00103A	1	X	
33	CBF HARNESS-OPE	JC39-40532A	1	X	
34	BUSH-CABLE	JC61-00804A	1	X	
35	ELA HOU-CST SENSOR HAWK16	JC96-02127A	1	X	
35-1	IPR-PLATE SENSOR	JC70-00192A	1	X	
35-2	IPR-BRACKET SENSOR	JC70-00195A	1	X	
35-3	PBA SUB-CASSETTE	JC92-01336A	1	X	
36	HARNESS PAPER-SIZE	JC96-02127A	1	X	

SCF Assembly Parts List

SA : Service Available
O : Service available **X** : Service not available

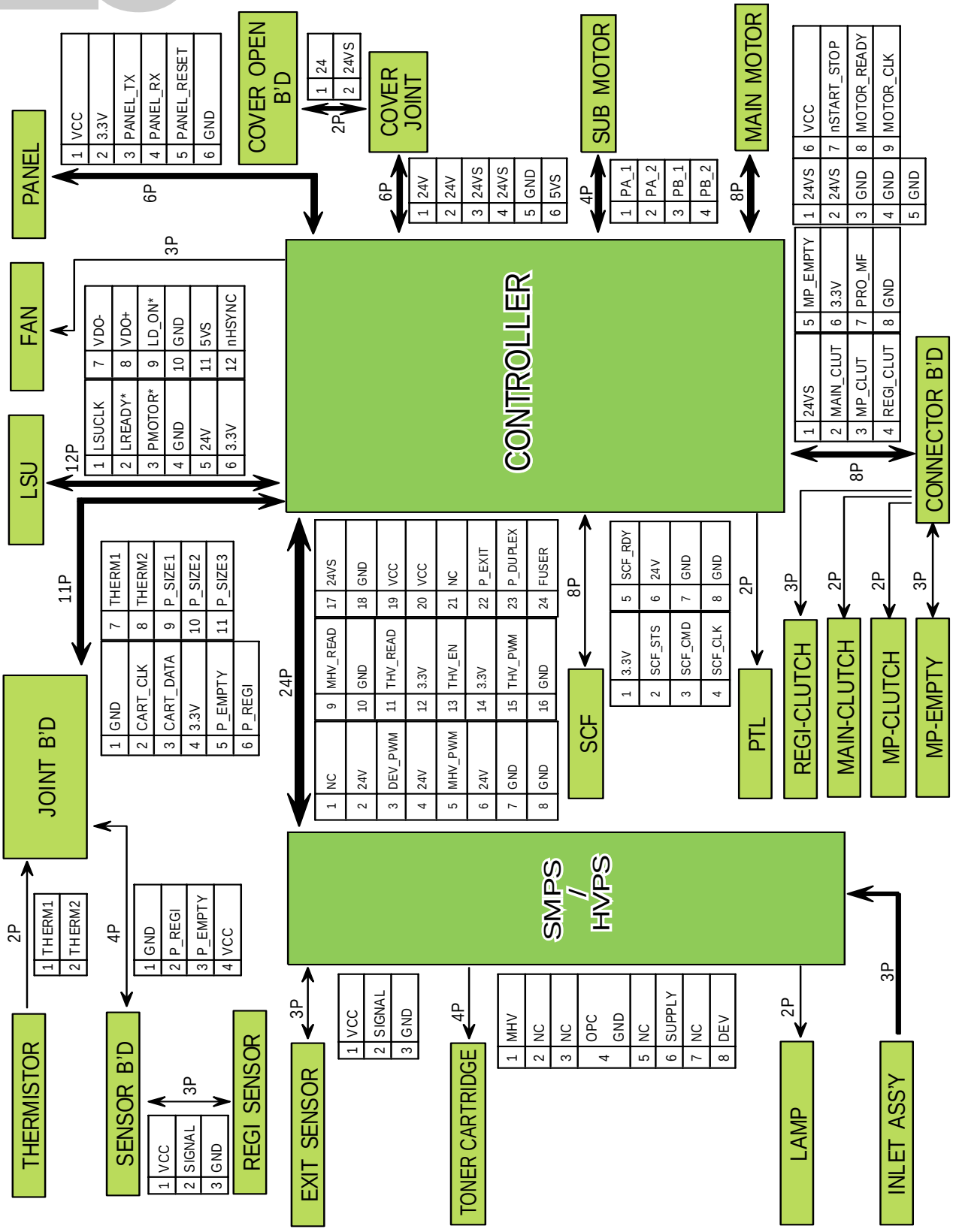
No.	Description	SEC.Code	Q'ty	SA	Remark
101	SCREW-TAPTITE	6003-000196	25	X	
102	SCREW-TAPTITE	6003-000259	9	X	
103	SCREW-MACHINE	6001-000131	4	X	
104	RING-E	6044-000231	3	X	
105	RING-E	6044-000125	3	X	

9. Block Diagram



메모(Memo)

10. Connection Diagram



Memo

11. Circuit Description

11.1 Engine Specification

11.1.1 General Specification

Item	Specification & Descriptions	Remark
1. Engine	Phaser 3450	
2. Type	Desktop	
3. Print Speed	24 PPM (A4 Size,5% Character Pattern)	At Copy Mode
4. Resolution	1200 X 1200 DPI addressable	
5. Source of Light	Laser Diode(LSU)	
6. Print Method	Non-impact Electrophotography,	Laser Beam
7. Feed Method	Cassette & Manual	
8. Feed Reference	Center Reference Loading	
9. Paper	•Size	. Cardstock . Label
	1) Normal Paper : A4,Letter,Legal,B5,	
	Executive	
	2) Envelope : Normal Envelope	
	3) Other : OHP	
	4) Length : 125 ~ 365mm	
	Width : 75 ~ 216mm	
	•Weight : For Bin Cassette, 60 ~ 163g/m^2	
	For Manual, 60 ~ 163g/m^2	
10.Paper Capacity	Cassette : 550 Sheets	
	Manual Slot : 100 Sheets	
11.Paper Stacker Capacity	Face Down : 250 Sheets	
	Face up : 100 Sheets	
12.Warming up Time	Less than 50 sec	
13.First Printing Time	Stand-By : 12 Sec	
14.Power Rating	AC 110V ± 15% 50/60Hz ± 3Hz,	
	AC 220V ± 15% 50/60Hz ± 3Hz	
15.Power Consumption	Max. 630 W	
	Avr. 400 W	
16.Power Saving Consumption	Max 20 Wh	Sleeping Mode
17.Power Switch	Right Side Backward	
18.Certification & Compliance	c-UL, TUV/GS , CB	
	CDRH	
	CE, FCC	
19.Acoustic Noise	Standby : 35 dB Operating : 53 dB	

Item	Specification & Descriptions	Remark
20.Reliability	MPBF : 150,000 pages	
	MTTR : 30 min.	
21.Toner Cartridge	SAMSUNG- Toner Cartridge	
22.Expected Life Span	400,000 pages or 5 years (whichever comes	
	first, A4, 5%)	
23.Operating Environment	Temperature : 10 ~ 32.5°c	
	Humidity : 20 ~ 80%	
24.Storage Environment	Temperature : -20 ~ 40°c (Packed)	
	Humidity : 20 ~ 95% (Packed)	
25.Weight	Net : Max. 18kg	
26.External Dimension	380(W) X 412(D) X 320(H)mm	
27.Toner Cartridge	.Life Span : 5% Pattern,Min. 5,000/10,000 Sheets	
	.Developing : Non-magnetic Contact	
	Developing	
	.Charging : Conductive Roller Charging	Negative PWM
	.Density Adjustment : Possible	
	.Transfer System : Pre-transfer By LED & Pre-transfer Lamp	
	.Conductive Roller Transfer	
	.Fusing System : Temperature & Pressure	
	.OZONE Emission : Average 0.1ppm or less (8 Hours)	
28.Packing (Main Kit)	.Printer 1 Set	
	.Toner Cartridge 1 Piece	
	.Power Cord 1 Piece	

11.1.2 Quality Specification

Item		Specification & Descriptions	Remark
1. Conditions	Paper	Core Media List	75g/m^2
	Environment	Temperature : 15 ~ 25°C	Temperature
		Humidity : 40 ~ 60%	
2. Print Quality	Optical Density	-Avr. 1.30 (Temperature : 15 ~ 25°C) :	
		After 1hr. from Power On	
		-Over 1.0 (min.) if left in low temperature.	
	Background	OD delta less than 1.0 (croma meter)	
	Uniformity	Max. 0.2(Including Continuous Print)	
	Fusing	Min 75% ('All Black' & '2 by 2 Pattern')	
	Skew	Vertical : Max. 1.75 mm / 250 mm	
		Horizontal : Max. 1.5 mm / 200 mm	
	Bowing	Horizontal(applied to 200mm) : less than 0.5 mm	
	Special Paper Exception	Image Density : Min1.0(Envelope)	
		Fusing : Min. 70%	
		(Envelope/OHP/Postcard:More than 120g/m^2)	
	Paper Jam	Less than 1/2000 (75g/m^2 Paper, in L/L condition)	
	Paper Curl	First : Less than 16mm (10 Sheets)--> measured in 1 min. after printing 10 pages.	
3. Reliability	Insulation Resistance	over 100 MΩ (at DC 500V / 1 mm)	
	Voltage Strength	less than 130V / AC 1.0 kV	
	(Hi-Pot)	less than 250V / AC 1.5 kV	
	Ground Continuous	Less than 0.1Ω (25A / 3 sec)	
	Voltage DIP	100%/1cycle, 50%/2cycle, 20%/4cycle	
	Leakage Current	Less than 3.5mA (1.5 kohm)	
	Surge	IEC61000-4-5, Normal ±1KV, Common ±3KV	
	OZONE Emission	Average 0.1 PPM or less	
	Top Cover Open	Isolating the input power from below parts ;LSU, High Voltage Part, DC fan, Clutch, Fuser Motor	
	Overcurrent Protect	Fuse inside the SMPS	
4. Fusing System	Trouble Sensing	.The temperature does not rise to the specific temperature in the specific time. .The temperature is too high.	Indicate the Fuser error
	Overheat Sensing	230 - 240°C(The thermostat cuts off the Fuser from the power.) Thermistor Open Sensing : Without the initial tempera turn change of the Fuser	

11.1.3 Maintenance

Item	Specification & Descriptions	Remark
1.Toner Saving	-.Using the DRAFT printing -.62%	
2.Density Adjustment	Normal, Dark,Light	
3.Power Save Time	OFF,15,30,45,60 minutes selectable	
4.Installing the Printer	1) Unpack the box. 2) Get the new image cartridge out of its bag. And then remove the plastic strip from the cartridge. 3) Insert the cartridge into the Printer 4) Load the paper into the cassette 5) Connect the POWER CORD and Power On 6) To check the Basic Print state. At the Ready state, press the Demo Key for 7sec, print Self Test Pattern. 7) Check the print quality	

11.2 System Composition

11.2.1 System Configuration

11.2.1-1 Video Controller Board

Video Controller Board receives image data from the Host Computer then convert into Bitmap (Binary) image or directly receive Bitmap image from the Host and connect to the input/output section to process data and print out the created image.

11.2.1.2 SMPS Board (Engine)

AC is received to create the needed quantity of +5V,+3.3V and +24V DC level. Adequate amount of voltage is supplied to each units. It also supplies AC voltage to the Heat Lamp of the fixed unit.

11.2.1.3 Engine Board (SMPS)

Engine Board uses the voltage received from SMPS to control electric photo process, which is the basic operation principle of LBP. Detailed explanation on each composition elements are in the section 2.4 Engine Controller.

11.2.1.4 HVPS Board

HVPS board creates optimum image formation condition by supplying High Voltage from THV/MHV/Supply/Dev to the developer.

11.2.1.5 Develop Unit

Develop unit creates image using electric photo process. This unit consists of Charge Roller, OPC drum, Developer Roller, Supply Roller and Toner.

11.2.1.6 LSU(Laser Scanning Unit)

LSU is controlled by Video Controller. It is the core part that forms charge ripple at the OPC drum by applying video data from the video controller, exposure from OPC drum and the rotation principle of polygon mirror. OPC drum synchronously rotates with the paper feeding speed. At this point, when the laser beam within the LSU reaches the edge of the polygon mirror, /HSYNC signal is sent to the engine. The engine then detects the /HSYNC signal and properly adjust the vertical image lines of the paper. The image data is sent to the LSU at the set time, followed by /HSYNC signal detection to adjust the left margin. It becomes one of the lines scanned by one side of polygon mirror.

11.2.1.7 Transfer Section

Transfer unit is composed of PTL(Pre-Transfer Lamp) and Transfer Roller PTL investigates Beam from OPC drum and decreases the electric potential and the toner adhesion to increase the transfer efficiency. The transfer roller transfers the toner from the OPC drum to the paper surface.

11.2.1.8 Printing Section

Printing unit is composed of Heat Lamp, Heat Roller, Pressure Roller, Thermistor and Thermostat. Printing unit completes the printing job by applying toner from the transfer unit with pressure and high temperature to stick to the paper.

11.2.1.9 Driving Section

Driving unit applies Bi-Polar Motor and controls current in 2-2.

11.2.1.10 Cover Open Board

Cover Open board has Cover Open Sensing unit, which shuts off Main Motor, LSU, Fan, Clutch and +24V when the front cover is opened.

11.2.1.11 Toner Sensor Board

Toner Sensor board transfers various signals(Cartridge detect, paper detect, paper size detect etc.)

11.2.1.12 Cassette Detect Board

Various signals(Feed Clutch, MP-empty, Cassette detect) connect to the Video Controller Board through the Cassette Detect Board.

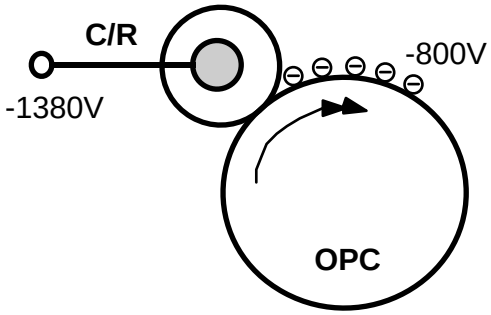
11.2.2 Development Process

11.2.2.1 Paper Feed

Paper feed unit is operated by the engine and solenoid rotates the feed roller to feed one sheet of paper. The paper then moves on to the set and hits the actuator of
the feed sensor. The engine at this time detects that signal and prepare to spread the the image data. If problems occurs in the feed sensor, Paper Jam Error will appear in the OP panel. The feed sensor section is also closely related to the top margin of the paper.

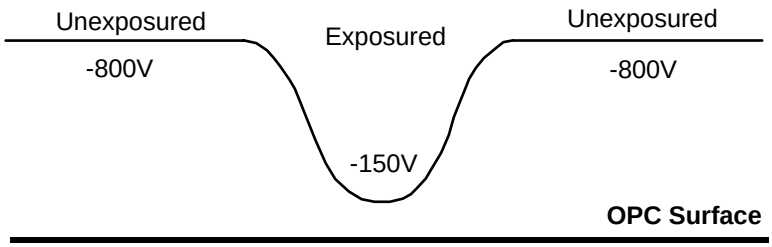
11.2.2.2 Electric Charge

This section charges uniform (-)voltage to OPC. When (-1380V) is charged to the Charge Roller, OPC drum is evenly charged with approximately -800V. This is the first stage of the electric photo creation.

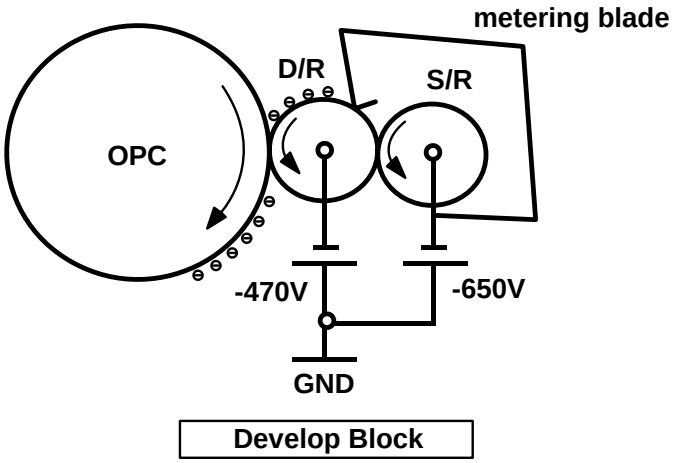


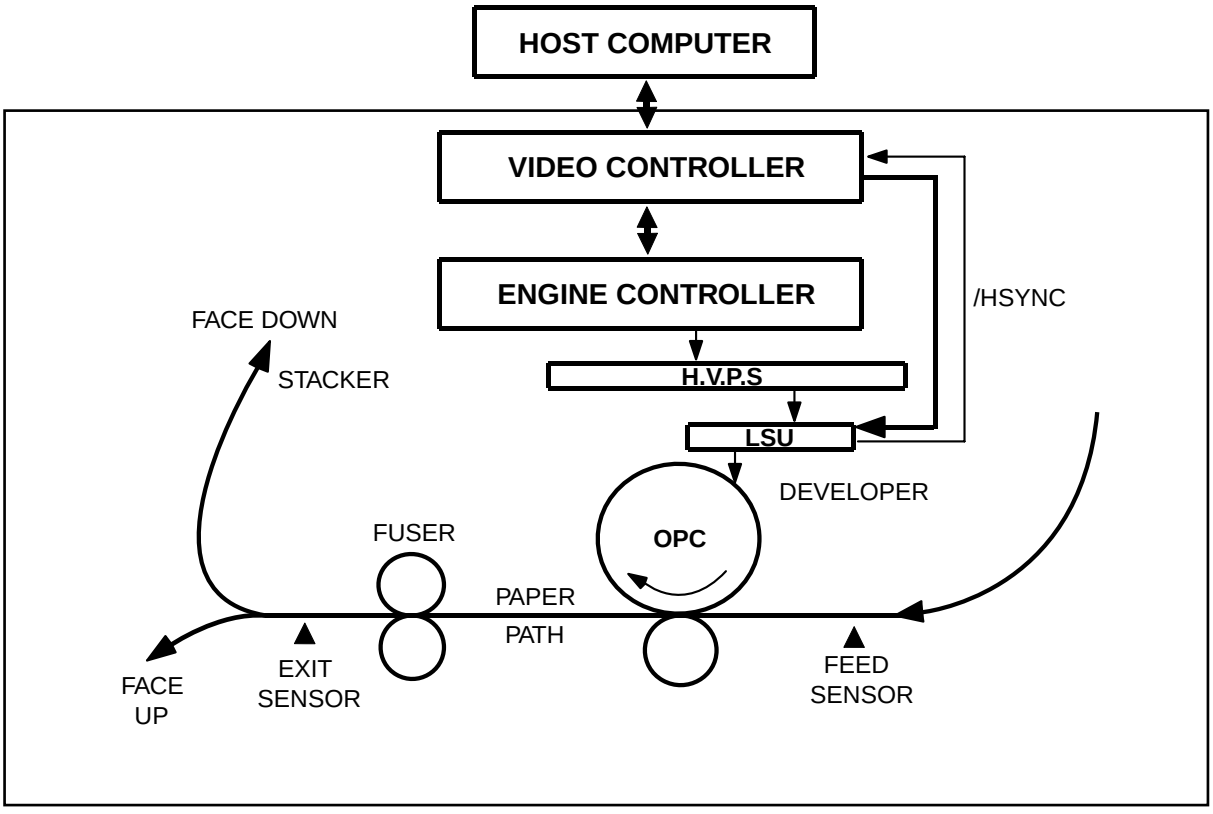
11.2.2.3 Exposure Unit

LSU exposes OPC drum by turning Laser Diode On/Off according to the digital data of the bitmap image data received from the controller board. The voltage difference created at this point is shown above. The exposed area to the laser is -150V, which relatively increases the electric potential and forms charge ripple. The areas that are not exposed to the laser due to no video data will maintain -800V. As a result, image(black dot) is created in the -150V area and the -800V area will show up white, which creates the basic condition of image formation.

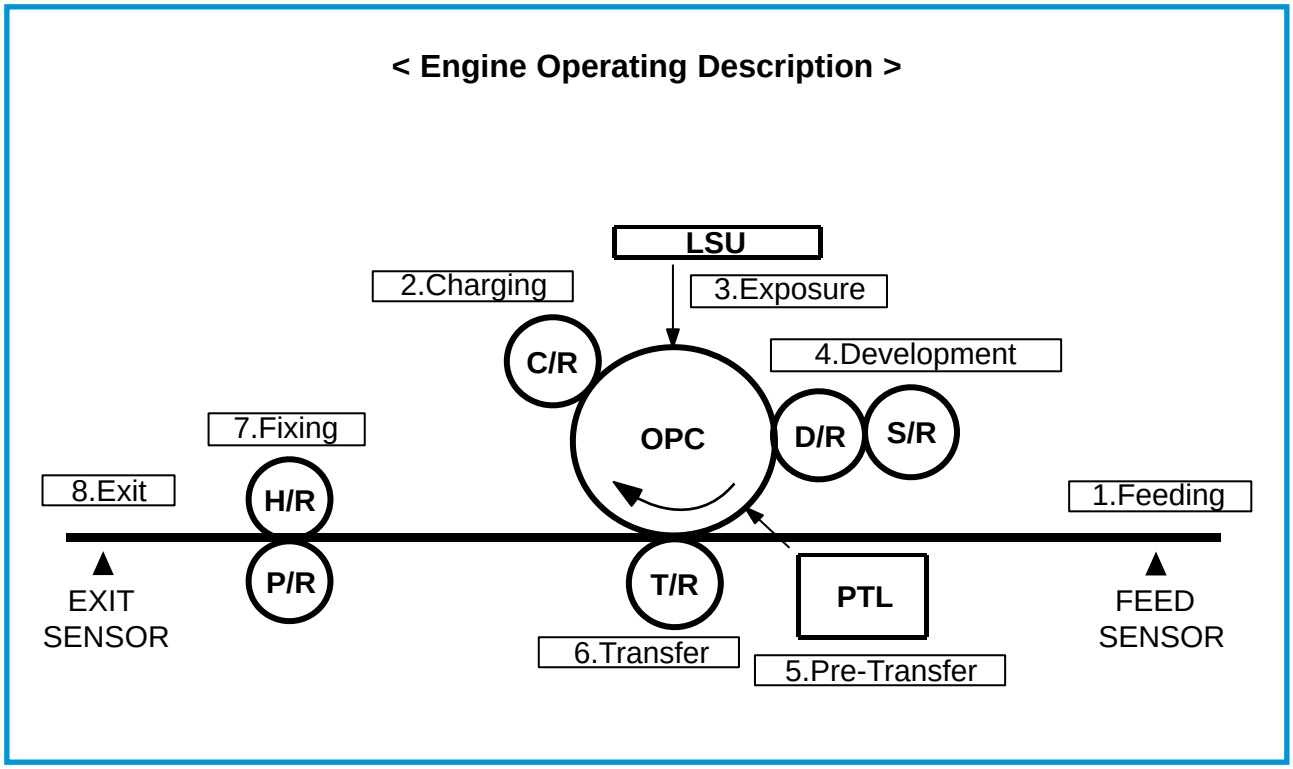


< Engine Operating Description >





[Fig1] System OPerating Structure

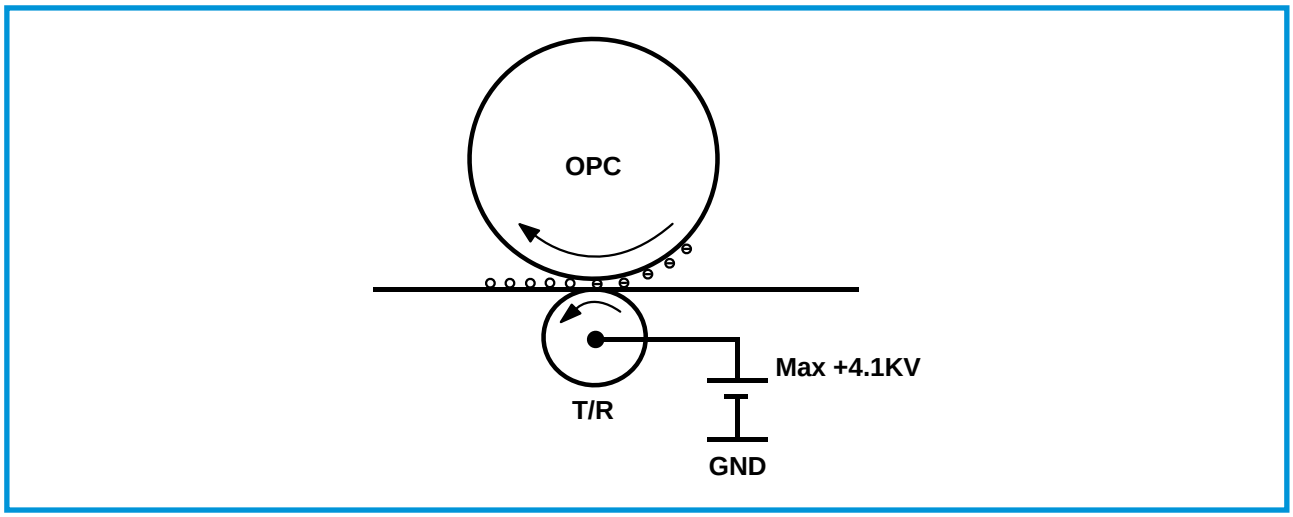


[Fig 2]

11.2.2.4 Development Section

From the contact surface where OPC drum and the Developer Roller rotate in opposite direction, Toner with it's (-) electric characteristics transfers to the exposed part (-150V) of the OPC drum due to the electric potential difference. But the areas not exposed (-800V) do not transfer.

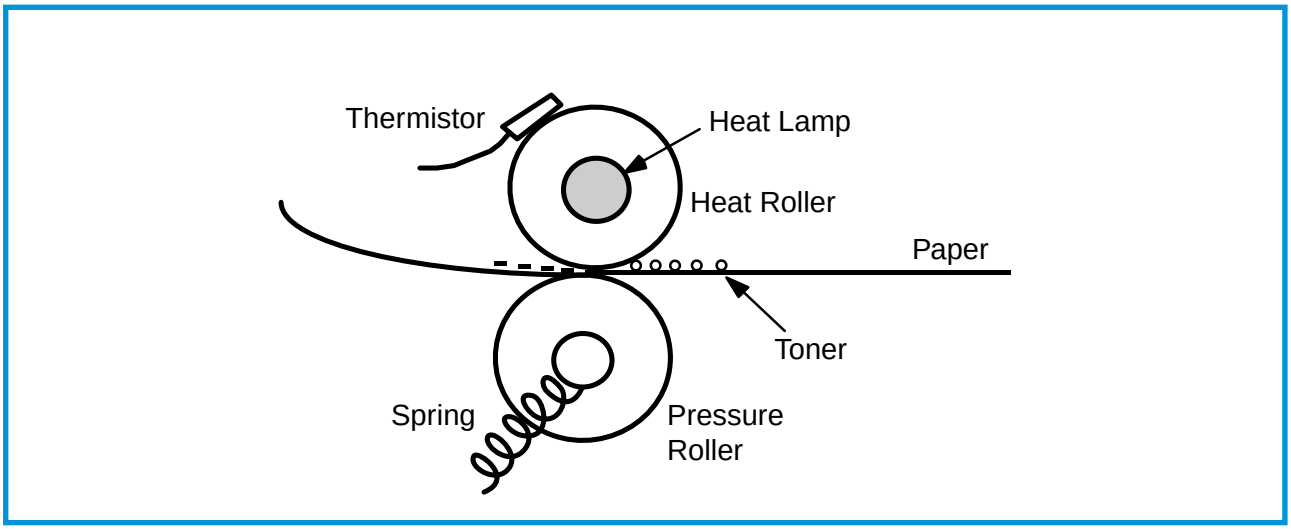
11.2.2.5 Transfer Section



The toner from the surface of the OPC drum is transferred to the paper by the transfer roller. In other words, the toner from the surface of the OPC drum is transferred by the transfer roller charged with approximately +1.0kV(300~ 4100V adjustable). At this time, the adjustable voltage of 300~ 4100V is decided by the temperature and humidity. This process is called transfer.

11.2.2.6 Printing Section

The toner on the surface of a paper, which passed the transfer section is at a low electric state. Therefore, it can easily spread. At this point, high temperature of 180°C and pressure of 4.5 Kg are applied to permanently stick the toner to the paper. The resulted image remains permanently. The heat roller transfers the heat from the internal heat lamp to the surface to apply the heat to the paper that passes the surface. The melted toner due to the heat does not stay on the surface of the Teflon coated heat roller. The pressure roller located on the bottom of the heat roller is made from Silicon Resin and it's surface is also coated with Teflon. The thermistor of the printing section senses the temperature of the heat roller and feedback the information to maintain 185°C during printing mode and 175°C at standby mode. The thermostat used as secondary safety feature prevents overheat by turning off the main power when the heat lamp is overheated.



11.2.2.7 Exit

The paper that completed the electric photo process exits the printer through the Exit Sensor. The detected signal is then sent to the engine to inform the location of the paper. When the actuator and senor mal functions, Paper Jam 2 error will be displayed.

11.2.3 Engine/SMPS Section

SMPS(Switching Mode Power Supply) is the PWM(Pulse Width Modulation) method of power supply unit that supplies DC+3.3V, DC+5Vand DC+24V to the engine and DC+3.3V, DC+5V to the video controller and the assembly panel. It also supplies AC voltage to the heat lamp of the printing section.

11.2.3.1 SMPS Specification

Item		Specification	
Input (AC)	AC input voltage	Europe	America
	minimum	198V	90V
	optimum	230V	120V
	maximum	264V	132V
	max input AC current	2Arms	5Arms
	max Inrush current	50 Ap-p (at 25 °C)	
Output (DC)	Line Regulation	24V ± 10% 5V ± 5%, 3.3V ± 5%	
	Ripple Noise	24V : 500mVp-p 5V : 100mVp-p 3.3V : 100mVp-p	
	Over Current Protect	24V : 5.0A	

11.2.3.2 Power Supply Section of SMPS

Output	Application	Remark
+ 5V(DC) + 3.3V(DC)	Board Logic section of engine, Panel, Video Controller Board & LSU Laser	Video Controller board
+24V(DC)	Main Motor, Solenoid, LSU Motor HVPS & lamp adjustment in the printing section	
AC	Activates Lamp (print)	Print

11.2.3.3 Circuit

1) AC Input and DC

AC input unit is composed of FUSE, VARISTOR, NOISE CAPACITOR and LINE FILTER. DC unit is composed of BRIDGE DIODE and ELECTRIC CAPACITOR. The FUSE(F1) has specification of 125V/8A for 110V and 250V/5A for 220V. FUSE contains the function to prevent damage due to SMPS fire in the event of malfunction of 1 st. PWM Control and parts causing excess voltage. NOISE CAPACITOR is EMI counter part, which is composed of CAPACITOR(C1, C14) for the normal mode noise and CAPACITOR(C3, C4, C9, C34) for common mode noise. Larger the capacity of the CAPACITOR, greater the NOISE absorption effect. But, adequate capacitor should be carefully selected since leakage current increases with the increased capacity in capacitor, which has high potential of electric shock. The Line Filter connected to the Capacitor has the EMI Noise eliminating function. Especially, the filter and the capacitor not only absorbs the noise being transferred out of the printer through power line, it also absorbs the opposite noise coming from the exterior.

2) SWITCHING Control Section

SMPS is driven by OSC. It has uniform switching frequency and the range of 'On Time' Pulse may vary depending on the surrounding condition. Basic operation procedure is as following.

Turn on the AC power. AC input voltage will pass through the Noise Filter circuit, Bridge Diode(BD1) and capacitor (C6). The rectified DC voltage supplies the bias voltage to the pin6 of PWM contract IC IC1 (2BS01) through R2 ad R3. Then, turn on the Gate in the FET. At this point the current passed through FET will flow through the 1st trance coil T1. Pin #4 and the supporting current in the trance #7 and 8 will be abandoned.

The current flowing through the 1st trance coil Q1(IIN60) will rapidly increase current in #2 Drain and this process will block the abandoned current in the 2nd trance coil of the transformer to flow out. Followed by this operation, due to the surrounding condition change, Drain current reaches the critical rigging point of Q1(hfe). This is caused by the relative decrease in Drain current compared to time. This indicates that Q1 is unable to maintain On status. Such condition is the area of Insufficient Gate Current.

According to the FET characteristics. The drain voltage of Q1 operate in switching models which are composed of turn on state and turn off state. When Q1 is turned off, the created electrical power in 1st trans (#2~#4) will be transfered to the 2nd trans. (#13, 14, 15, 9~#10, 11, 12)

The current then flows into PC1(PHOTO COUPLER) to bypass the IC1 feedback. Then, U1 turns on. Through such repetitious process, the current flowing through 2nd trance coil is filtered to create necessary DC voltage. DC output and feedback circuit are created by +24V of D5 and C19. +5V is created by abandoned voltage from the 2nd. trance coil due to D5 and C19. In order to maintain uniform DC output level, detect the output level from R11 and R12 to maintain uniform level, then enabled feedback by disconnecting the Shunt Regular IC(IC2) and used PHOTO COUPLER (PC1).

3) Fixed Temperature Control

To control the fixed lamp, the control signal of "FUSER ON" in Logic section and the supply of DC voltage in the SMPS section is necessary. The circuit turns on when the "FUSER ON" sends the operation signal and the DC power is supplied. The operation principle of control circuit of fixed lamp is as following. Trigger current flows to Triac Driver IC6 LED due to "FUSER ON" of Logic. Then the Photo detector of IC6 will detect the infrared ray and the Triac of IC5 will activate. The current will then send the Trigger input to the Gate of Triac IC5.

At this point IC5 will be activated and AC power will be supplied to the fixed lamp, then the lamp will turn on and the temperature will rise. Because the fixed lamp circuit uses AC voltage as it's voltage supply, bidirectional Triac (IC5) is applied, since it has advantage in price, size and reliability compared to unidirectional SCR.

The Gate terminal of Triac can be triggered as ordered or opposite direction signal. Once the triac turns on, it cannot be controlled by the Gate signal. It maintains until the level of current flowing in the main terminal falls below the level of maintaining current. In other words, it cannot be turned off by counter current as that of SCR. Such characteristics is categorized as Critical Rigging Time Rate (Commutation : dv/dt). In the application of electric power exchange, Triac either turns off the activation or switches twice in each period at Zero Crossing. Such switching movement is called Commutation.

It is able to turn off the triac at the end of the half period by deleting the Gate signal. It is possible when the level of (IL) current is below the level of maintaining current. When the Triac commutation is Off, the voltage will instantly change to opposite direction and the VAC will increase to the maximum level. At this time, the range of increase rate is decided by dv/dt and the Overshoot voltage is decided by the circuit. Also, the voltage of Triac will have same level of voltage when the commutation of Triac is Off.

11.2.3.4 Sensor Input Circuit

1) Paper Empty Sensing
The Paper Empty Sensor(Photo Interrupter), which is located in the Engine Board informs the CPU the status of paper volume through the operation of actuator fixed on the frame. If there is no paper in the Cassette, it notifies the second LED(yellow) of the panel LED by reading the #103 of U18.

2) Paper Feeding Sensing
When the fed paper passes through the actuator of the feed sensor, it notifies that the paper is being transferred to CPU by detecting the Photo Interrupter signal and the image data is distributed after set amount of time passes.(related to top layer of paper) If the feed sensor does not detect within 1 second of paper feeding, JAM 0(U18 #105) will occur.

3) Paper MP Sensing(Photo Interrupt)
By operating of actuator, which is attached to frame, MP sensor detects existence of paper in MP, and informs status to CPU. Paper status is detected by U27 K26pin. If paper exists, it is fed in MP status.

4) Paper Exit Sensing(Photo Interrupt)
Actuator, which is attached to frame and connected to Engine Board (SMPS) CN4, detects if paper exits from fusing unit. CPU detects information of normal operation and jam by that U18109pin detects on/off signal of exit sensor (photo interrupt), and it display jam2 status on LCD Panel.

5) Paper Duplex Sensing(Photo Interrupt)
Sensor (OP1) attached on engine board(SMPS) detects paper information when operating duplex printing. CPU detects information of jam and normal operation by that U18 102pin detects the detecting signal, and it displays duplex jam1 or duplex jam2 on LCD panel according to status of entering duplex paper.

6) Paper Out Bin Full Sensing(Photo Interrupt)
Out Bin Full Sensor detects existing paper amount by operating actuator attached to frame, and informs the status to CPU. U18 114pin detects existing paper amount and displays the status on LCD panel.

7) Paper Size Sensing(tact switch)
It detects each size of fed papers in cassette, and it arranges and manages data when printing. It distinguishes 8 kinds of paper by 3 switch combinations, and it is consisted of 8 combinations of U18 106/107/108pin.

8) Cassette Sensing(micro switch)
By U27 K25pin, cassette detecting function checks whether tray2 is open or not. When Tray2 is open, LCD panel displays error status.

9) Toner Cartridge Sensing
It controls memory data of EEPROM in developing unit by contacting to contacting point of joint board mounted to frame, and it detects supplier, manufacturing date, toner remained amount. It writes and reads data by U27 A25/D23/J24 pin and operates with 2-WIRE bus method. When toner remaining amount is 15%, it displays low toner on LCD panel to inform toner cartridge detecting signal.

11.2.3.5 Output Control Circuit

1) Main / Sub Fan

Main Fan and Sub Fan are in-take-type. Main Fan is off in sleep mode, and Sub Fan operates when printing to control temperature of inside SMPS.

Main Fan is controlled by TR of Q10 by receiving signal from U18 18pin, and Sub Fan becomes chopping by signal of U18 20pin and controlled by TR of Q12.

2) Main Motor

In initial set up stage, Main motor's talk amount about operating load is set up as BLDC type. It delivers power for feed device and operation device (Fusing unit is operated by exit motor) Main Motor has driver IC and supplies +24V/+5V. It sends Start/stop (L operation) and clock signal to motor unite to operate motor, and its rotating speed is controlled by clock frequency. Among controlling signals, start/stop signal controls U18 19pin, and clock signal controls U18 68pin. If moving current is high when driving, it maintains speed within 600ms (standard speed). Current is changed depending on loading.

3) Exit Motor

Exit motor drives a fuser, and it rotates clockwise or counterclockwise when simplex or duplex printing is working.

4) Main / MP Solenoid

Solenoid functions to pick up fed paper from cassette or MP. Operating time is 150ms. Main solenoid is controlled by Q4 TR with U27 E23pin signal, and MP solenoid is controlled by Q5 TR with U27 C24pin signal. Operating current is under 250mA.

5) Regi Clutch

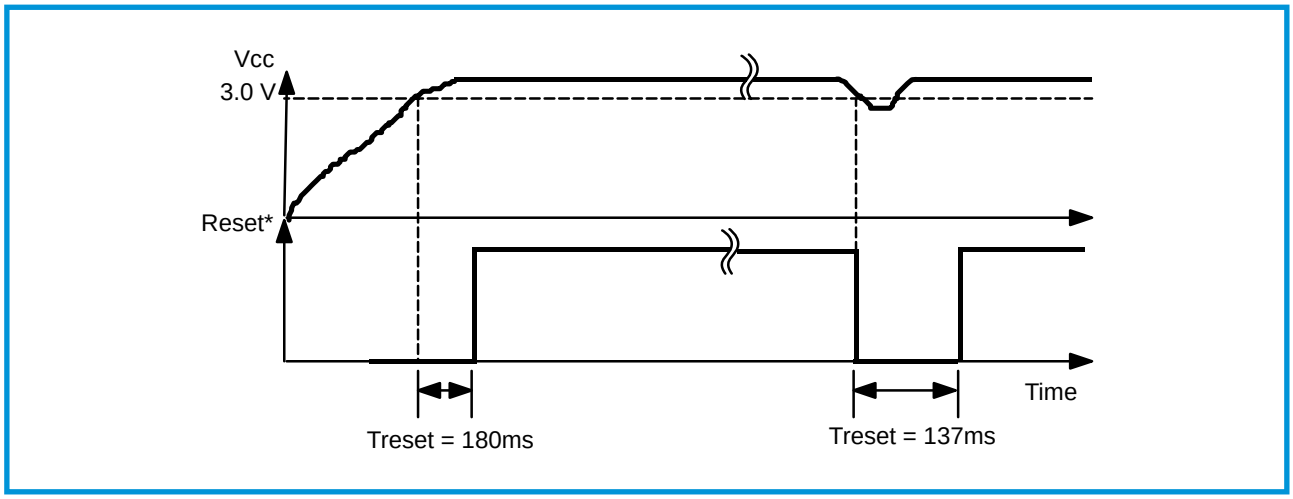
Regi Clutch functions to separate paper. Clutch prevents overlapping delivery of fed paper. After passing 500ms, when paper detects the feed signal, it turns off and separates papers.

U27 A26 pin signal controls Q6 TR, and operating current is under 150mA.

11.2.4 Video Controller

11.2.4.1 Power On Reset Circuit

Reset circuit initializes PPC(U26) and SPGPi(U27) when the power turns on and prevents unstable CPU operation until the power reaches standard level. This circuit is composed of R-C circuit, which decides the value of XC61FN3112MR(U20) Reset IC and Reset time. Reset takes place 0.2seconds after the power is on and when the power level falls below 3.0V. Then, CPU(U2) carries out initialization accordingly. 'RESET' signal is set at High followed by voltage change approximately after 50~150ms.



As shown in the diagram, when the power reaches 3.0V after initial power(Vcc) is on, Reset signal is sent to CPU after 180ms by reset circuit. At this time CPU initializes itself and the surrounding elements. Also, it prevents various malfunctions by sending the reset signal when the Vcc falls below 3.0V during operation.(Initial operation voltage of IC : 3.3±5% 0.5V) Since IC guarantees operation at minimum 3.1V, before the level falls below the minimum value, the circuit is designed to activate reset function at 3.0V.

11.2.4.2 CPU

CPU is 32bit microprocessor SPGPi(U27, 352pin). CPU receives 12.5MHz OSC Clock and operates at 50MHz. All surrounding IC's are controlled by CPU. (Refer to Data Book for detailed CPU Specification.)

11.2.4.3 CPU Circuit

OSC(12.5MHz) is applied. Clock is applied to CPU #A5 using CY25814. The DC connected Bead and Resistance re used for EMI counter measures.

11.2.4.4 Fuser Control / Thermistor Circuit

To settle the toner to the surface of a paper, this circuit adequately controls the temperature of heat lamp. It is composed of thermistor, LM393(voltage comparison) and transistor for switching. Basic principle is that the thermistor attains resistance value that is inversely proportional to the heat lamp temperature. The voltage value distributed between the resistance R8 and R9 is read at #69 AD0_IN of LPEC1. This voltage value becomes active(inactive) when Fuser signal is High(low) according to the set temperature table and the Rom program. Based on the Q2 switching, if the 'FUSERON*' signal is low, TLP3061(U201) turns on. AC voltage is applied to the heat lamp by turning on the bidirectional Thyristor(THY201) or shut off by turning off the bidirectional Thyristor(THY201). LM393 is the hardware type safety feature to prepare for abnormal heat lamp control. When the temperature of thermistor rises to 210 °C, #1 pin of LM393 falls to low level, which turns the 'FUSERON*' signal to High.(Q3 is forced Off). Therefore, the heat lamp is forced to go Off.

11.2.4.5 Sensing Circuit

1) Cover Open Sensing

Cover Open Sensor is located on the top right side of the Cover Open Board. When the front cover opens, it shuts off +24V(DC fan, Solenoid, Main Motor, LSU Polygon Motor and HVPS) supplied to each unit. B2 Bit of U4 senses cover open by sensing the developing section with B111 Bit of U18. In this case, the red LED, which is located on top of the OP Panel informs the user of the situation.

2) Paper Exit Sensing

The exit sensor assembled on the engine board and the actuator attached to the frame detect the paper exiting the printer. The paper recognizes the On/Off time of the exit sensor through B5 Bit of U4 and notifies the normal operation or jam information to the CPU. Paper JAM2 is also notified.(Both Red & Yellow LED from OP Panel Let go on)

11.2.4.6 LSU Circuit

1) Polygon Motor (+24V)

Polygon motor inside the LSU rotates by 'PMOTOR*' signal. It passes Transient section and reaches the motor section, 'LREADY*' signal is notified to U18 #115 pin. When LSU uses external clock for the motor rotation frequency, 'CLOCK' pin accepts the necessary frequency. Clock circuit is composed inside the engine. Crystal frequency of 58.36 MHz is activated by Engine CPU and uses 3562Hz for the rotation frequency of the polygon motor.

2) Laser (+5V)

When the laser is turned on by 'LDON*' signal, horizontal scan takes place due to the 6 sided reflection mirror(Polygon mirror) attached to the polygon motor, which rotates in clockwise direction. At this time, when the laser beam reaches the starting corner of each surface, 'HSYNC*' signal(pulse) is activated. The video controller uses 'HSYNC*' signal to form left margin of the image.(horizontal synchronous signal) When the 'Vdout*' signal in inputted to the LSU, it becomes 'LDON*' and ANDring to investigate suitable laser beam(Vdout data contained).(ON/OFF switching)

11.2.4.7 Clock Circuit

Clock uses 4 X-Tal. CPU is operated by 50MHz. USB is operated by 30MHz X-tal. Video Clock is operated by 23.88MHz.

11.2.4.8 Memory Circuit

CPU initialization is composed of Flash-Rom capable of PGM, DRAM capable of reading and writing data and the Font Rom, which supports font in PCL6 operation. Due to the variation of Flash and Font Rom by models, basic control of 16Bit for Rom and 32Bit for Ram is necessary. Domain of Flash Rom is divided into Boot and PGM. PGM can be changed by download. The storage RAM for the data download from PC is composed of 2MByte * 2.

11.2.4.9 DCU Interface Circuit

DCU(Diagnostic Control Unit) tests the LBP and used as a tool in Trouble-shooting and according to it's purpose, Diagnostic code, Normal Status code and Error Status code can be applied. At this time, Diagnostic Test takes place through 'DCU-DIN' signal and the Normal/Error status check takes place through 'DCU_DOUT' signal. 'DCU_CLK' is the DCU clock input unit.(CLK Frequency : approximately 17.6KHz)

11.2.4.10 HVPS Interface Circuit

HVPS Interface section is composed of various control areas. When high voltage on signal is received from the engine CPU, each high voltage turns on according to the electric photo process. The signals that turn on the high voltage are 'THV_EN', 'DEV_PWM', 'MHV_PWM', 'THV_PW,M' and the 'THV_READ, which feedback the results of transfer environment to the CPU.

11.2.4.11 PTL Circuit

PTL circuit is located in the Video Controller Board and applies NPN type TR for drive

11.2.4.12 Panel Circuit

Panel is consisted of 2*16 LCD(with back lite), 1 LED, and 6 keys. It has HT48C5A that is 8bit I/O control MCU, it supplies clock (7.37MHz), and it controls data with CPU by UART method.
LCD back lite for supply needs +5V, and logic for control needs +3.3V. TXD, RXD, and Reset signal are used. Back lite is operated with 240mA, and LCD dot is controlled by VEE voltage.

11.2.4.13 SCF Circuit

In SCF circuit, 6.9MHz clock is supplied to 8bit CPU 4616. SCF circuit controls step motor, solenoid clutch, Regi. clutch, and paper size function & empty function.
It operates with controller and SIO method. PPS controls motor speed and it is downloaded to RAM to operate and control the circuit in controller. U18 9/10/11/116 pin signal, control signal, make it to operate.

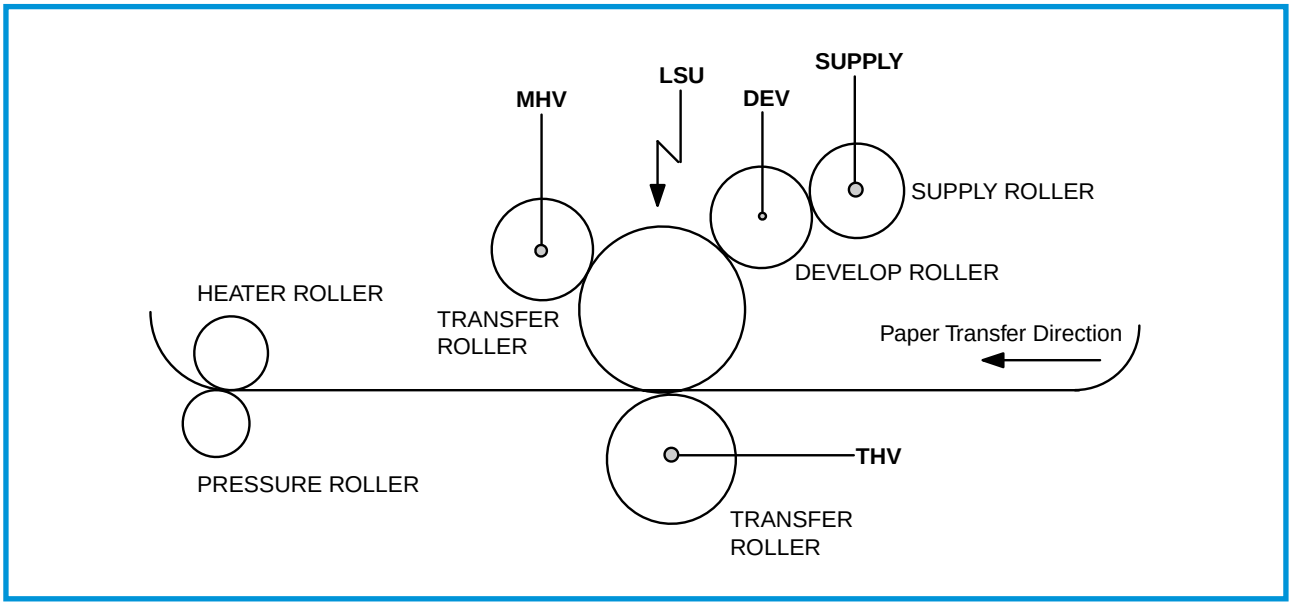
11.2.5 H.V.P.S. (High Voltage Power Supply)

11.2.5.1 Introduction

HVPC applies DC+24V/ DC+5V, which is used to form image in the electric photo development process of OA equipments. It yields MHV, SUPPLY, DEV, and THV.

11.2.5.2 Electric Photo Process

Electric photo process is widely used to the image creation features of copying machines, laser beam printers and facsimiles. It's process involves transferring, exposing, developing, transferring and settling in respective order.
First, form uniform electric charge of -800V on the surface of OPC with -1,380V(adjusted) through transfer roller. The electrically charged OPC drum surface react to the image data from LSU, which received print order based on the rotation and becomes exposed. At this time, the areas that are not exposed will maintain the previous electric potential of -800V. The exposed image areas by LSU will contain approximately -150V and form charge ripple. Such drum surface of reduced exposure, which formed charge ripple, reaches the develop roller according to the drum rotation and goes through the development process. The charge ripple formed on the OPC drum surface is developed by the toner on the develop roller and transforms into image. This step converts the image formed on the OPC drum surface by LSU to the image formed by toner.



Each high voltage printing indicates the voltage required in the electric photo process.
The supply roller that received -650V(adjusted) from HVPS and the DEVE roller that received -470V(adjusted) will rotate in the same direction. The toner supplied to the OPC drum becomes negatively(-) charged due to the static formed between the two rollers. The toner supplied to the develop roller is transferred(BIAS) to the development section. The negatively charged toner is attached to the develop roller, then transferred to the exposed high electric potential surface(-250V) rather than low electric potential surface(-800V). The image is formed since the toner is not spread on the low electric potential surface. The transfer process takes place when the OPC drum continuously rotates and reaches the transfer section. The (-) toner on the OPC drum surface is transferred to the paper surface by transfer roller. The (-) toner on the OPC drum surface receives hundreds up to thousands of (+) volts from HVPS and transferred to the paper surface since the (+) voltage is larger than the (-) toner on the OPC. The toner with weak static energy settles on the paper by pressure and heat from the pressure roller and heat roller. The printing process is completed when the pressure from the pressure roller and the heat from the heat roller forces the melted toner to settle the image on the paper surface and the paper exits the printer.

11.3.1 Introduction

HVPC applies DC+24V/ DC+5V, which is used to form image in the electric photo development process of OA equipments. It yields MHV, SUPPLY, DEV, and THV.
Each high pressure output indicate the voltage required for the electric photo process.

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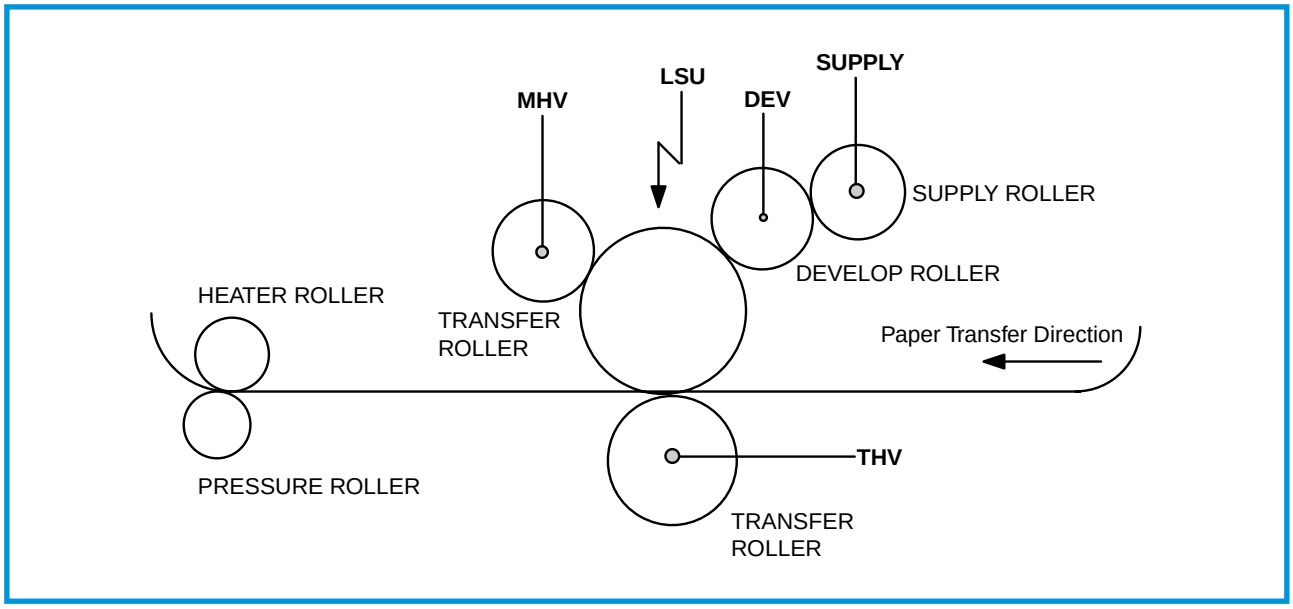
Electric photo process is widely used to the image creation features of copying machines, laser beam printers and facsimiles. It's process involves transferring, exposing, developing, transferring and settling in respective order.



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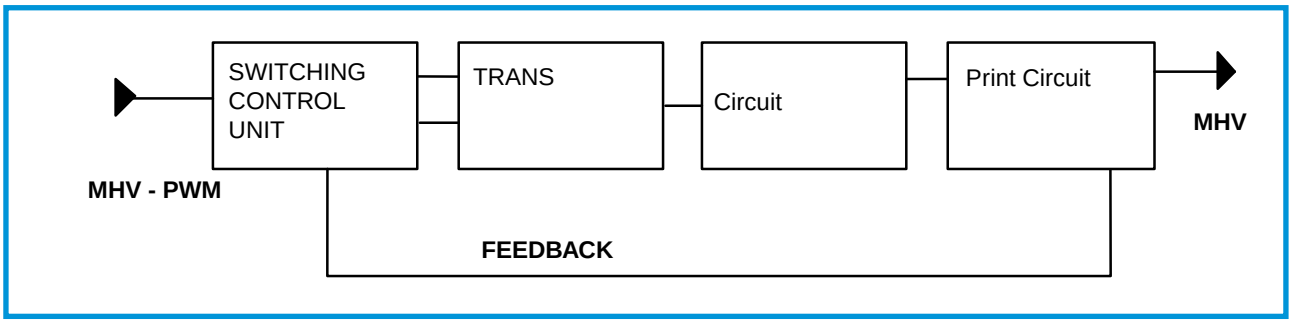
11.3.3 Composition

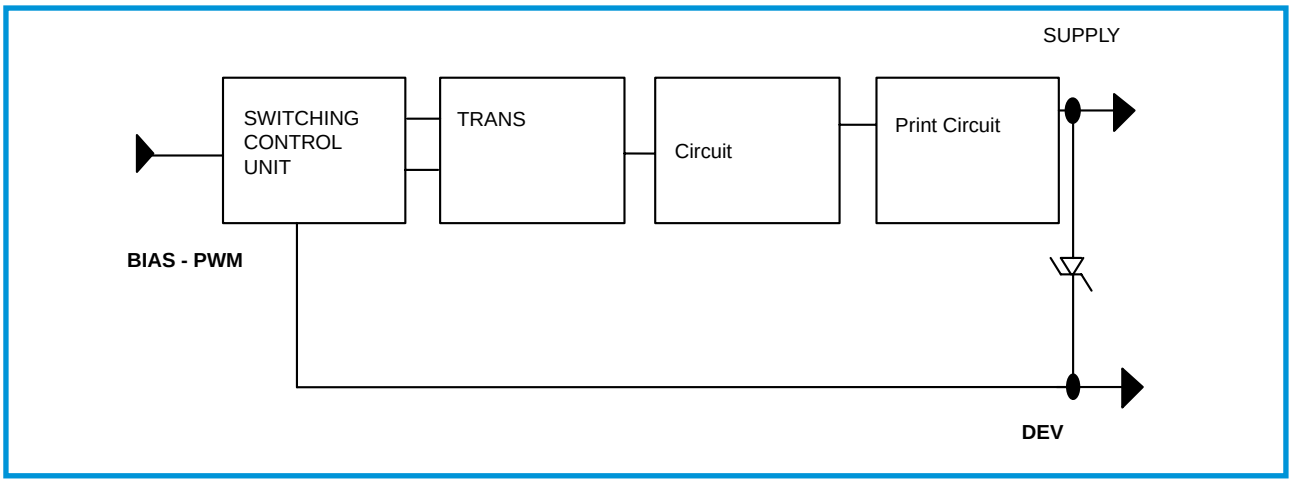
HVPS is composed of electric charge printing section, BIAS printing section and transfer printing section.

1) Input section
2) Electric charge printing(ENABLE) section : MHV(MAIN HIGH VOLTAGE)
3) BIAS printing (ENABLE)section :
   DEV(DEVELOPMENT VOLTAGE)/SUPPLY(SUPPLY VOLTAGE)
4) Transfer '+' printing (ENABLE)section : THV(+)(TRANSFER HIGH VOLTAGE(+))
5) Transfer '-' printing (ENABLE)section :
   THV(-)(TRANSFER HIGH VOLTAGE(-))
6) Switching section
7) Feedback section
8) Rectification section
9) Printing section

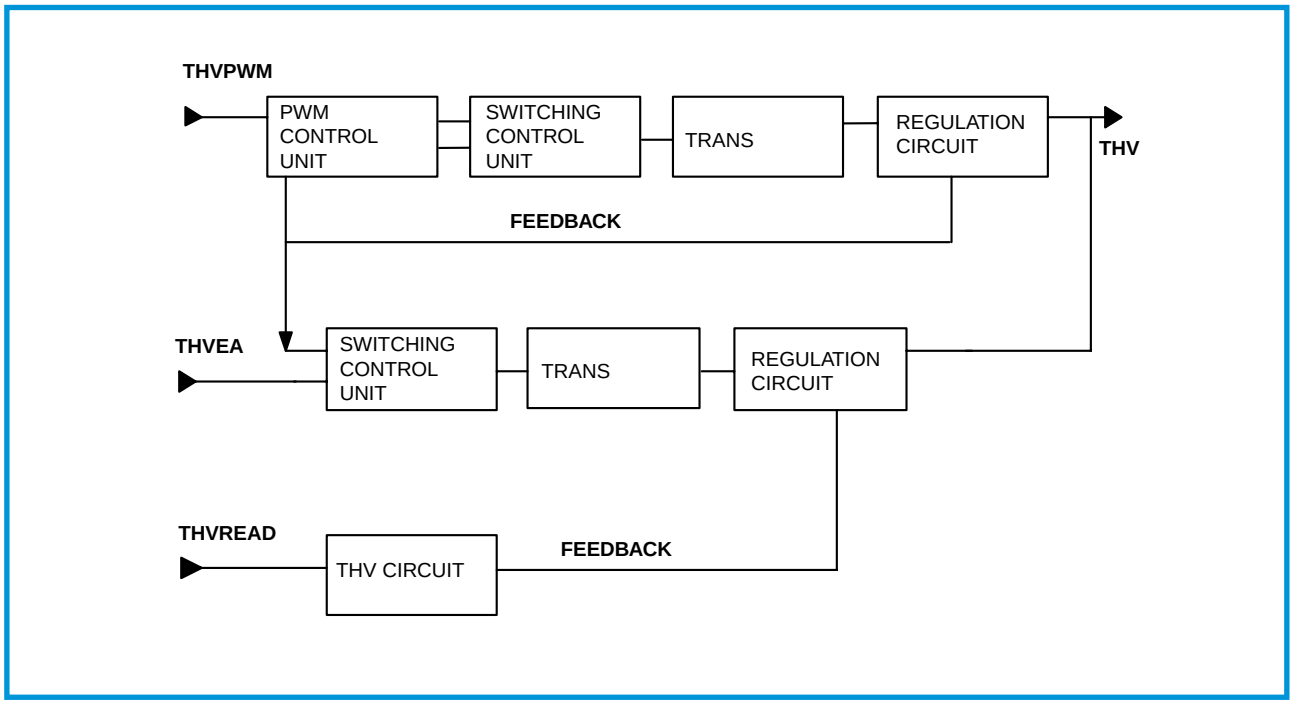
11.3.3.1 BLOCK-DIAGRAM of Electric Charge Printing Section



11.3.3.2 BLOCK-DIAGRAM of BIAS Printing Section



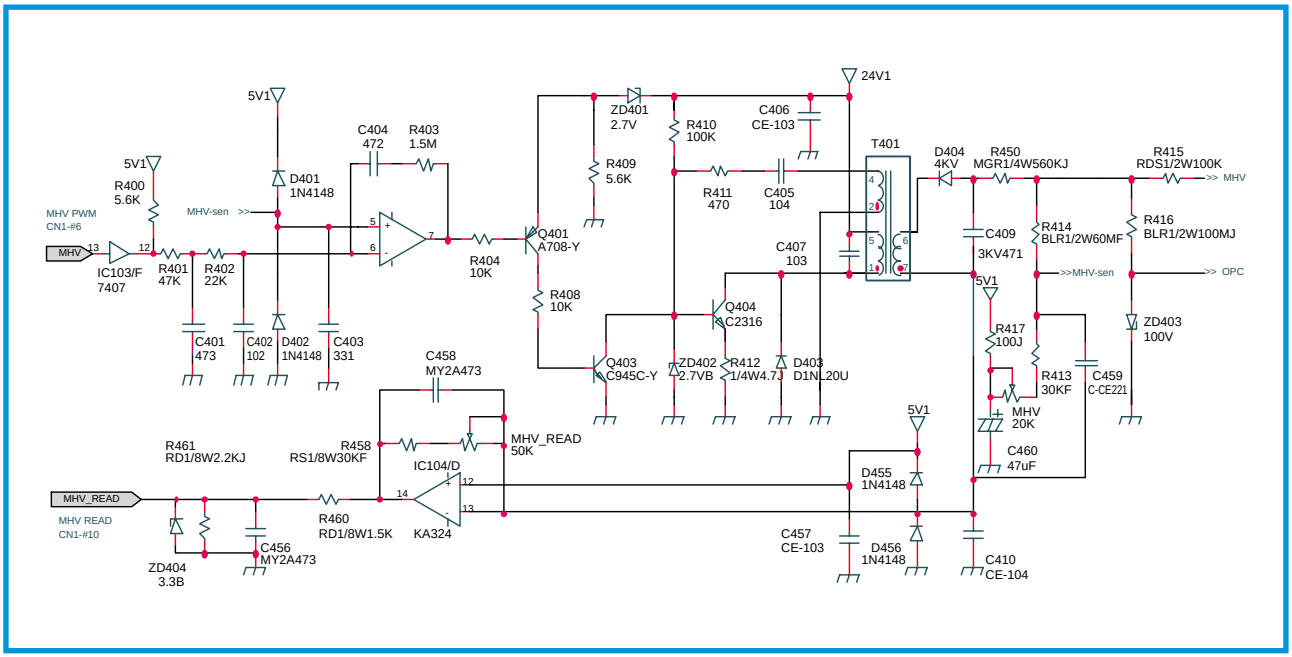
11.3.3.3 BLOCK-DIAGRAM of Transfer Printing Section



11.4 High Pressure Printing

11.4.1 MHV (Electric Charge Printing Section)

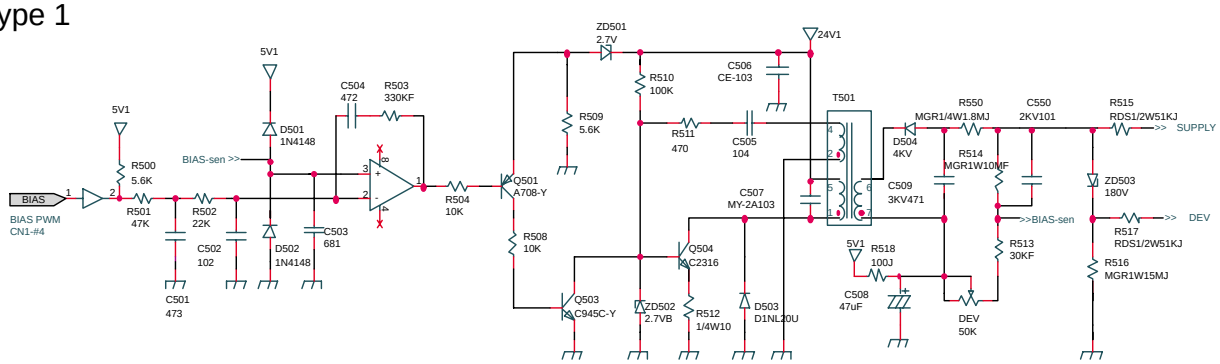
Charging output of ENABLE is 'MHV-PWM LOW ACTIVE', which is charging output controlling signal. When MHV-PWM signal is applied, regular voltage flows to OP-AMP non-inverting terminal via filter R401, C401, R402, and C402. It becomes HIGH or LOW in comparison with feedback voltage which flows to OP-AMP inverting terminal. If OP-AMP output becomes high, Q401 turns off, and voltage of 24V1 flows normally to base unit of Q404, switching TR, and it turns on.
After voltage flows to Q404, IC passes the first T401, and it increases as voltage, which is proportionate to time. When this voltage reaches to the HFE critical point of Q404, it turns off. At this time, counter electromotive force is created on trans 1 by turn-off action, and energy is emitted to trans 2 to send voltage to output MHV voltage via high voltage output unit consisted of rectifier circuit.
When OP-AMP output becomes low, Q401 and Q403 turn on. At this time, base voltage of Q404 becomes GND voltage and Q404 turns off to prevent to create high voltage.
Charging circuit detects changes due to environment of charging roller, and applies proper voltage to OPC for each environment. The environment changes (resistance) are detected by comparator, and comparator converts analog input to digital output.
Depending on such digital output, program inputted in ROM of engine controller applies proper charging voltage for each environment in consideration of resistance changes.



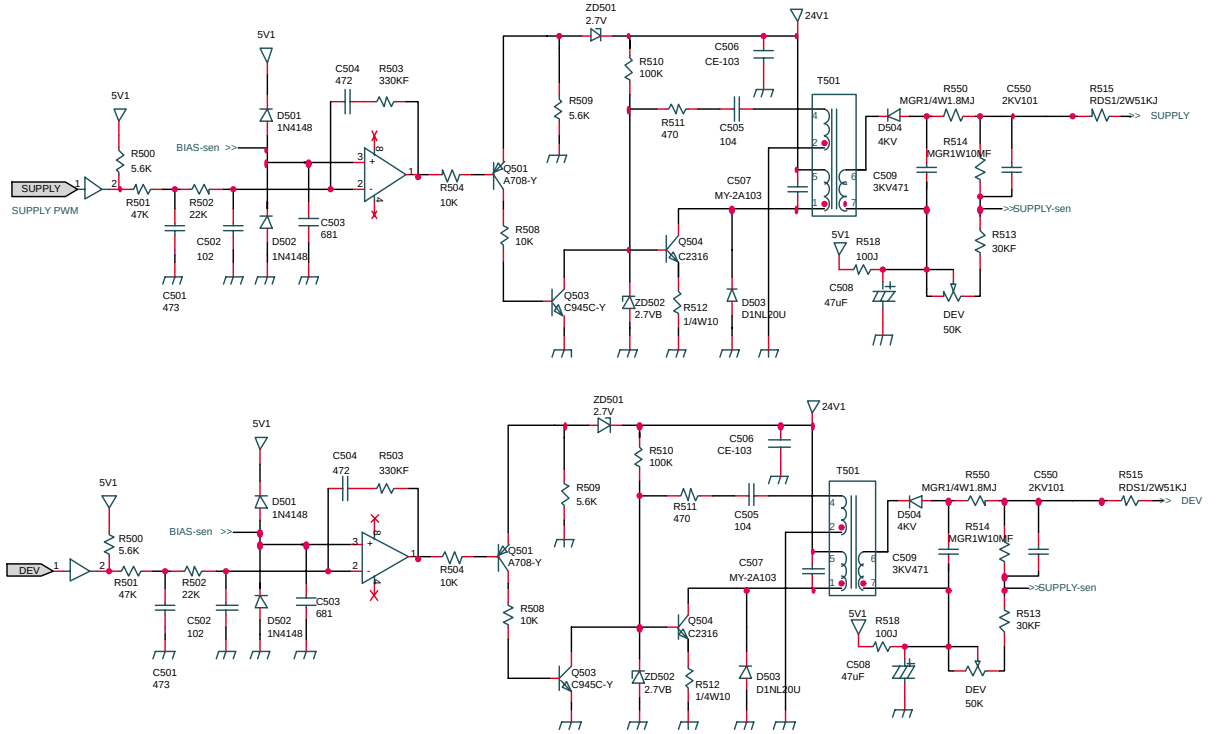
11.4.2 DEV/SUPPLY

DEV /SUPPLY have same circuit construction and same driving condition with MHV. Type 1 is a composition for driving DEV and Supply at the same type with one high trans, and type2 is a composition for driving each bias with two trans.

Type 1

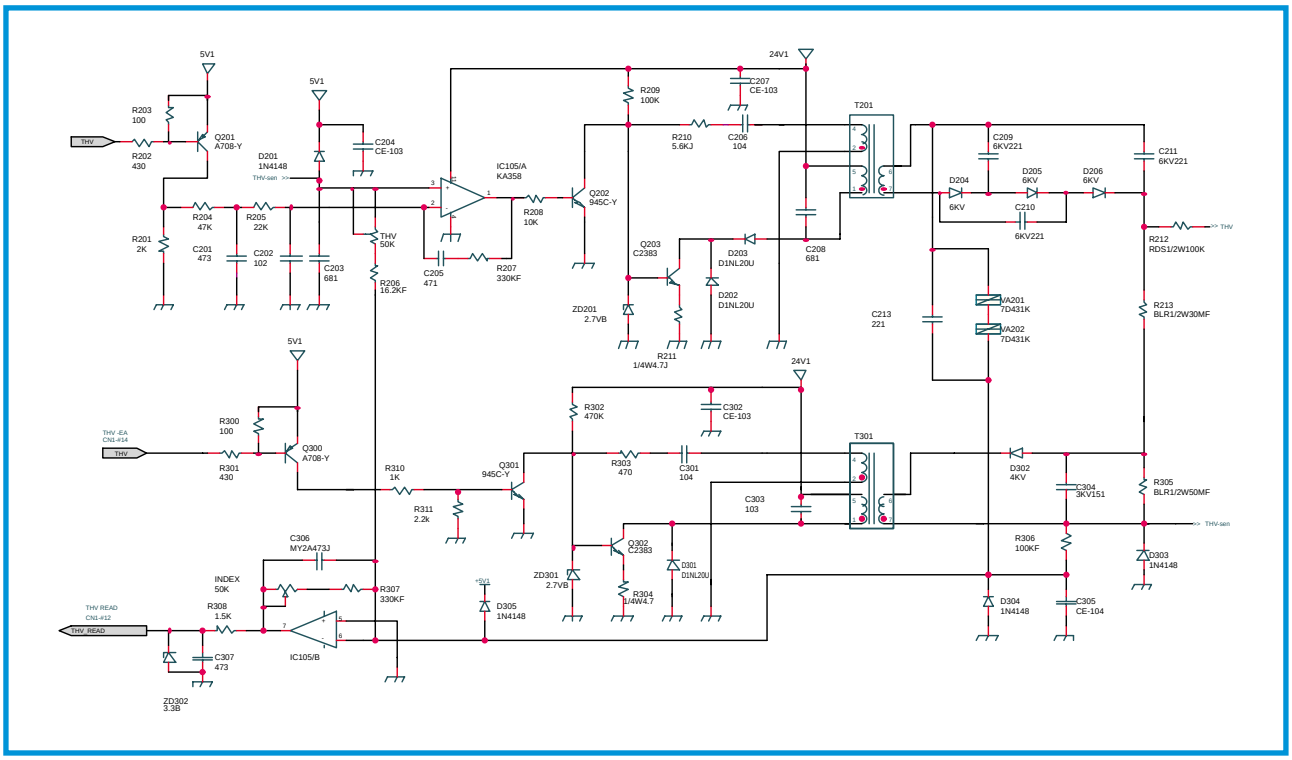


Type 2



11.4.3 THV(THV(+) / THV(-) Section)

Transfer (+) output enable is 'THV-PWMLOW ACTIVE', transfer output controlling signal.
When THV-PWMLOW signal is applied, Q201 turns on, and regular voltage flows to OP-AMP non-inverting terminal via filter R;204 C201, R205, and C202. It becomes HIGH or LOW in comparison with feedback voltage which flows to OP-AMP inverting terminal. If OP-AMP output becomes high, Q202 turns off, and voltage of 24V1 flows normally to base unit of Q203, switching TR, and it turns on.
After voltage flows to Q203, IC passes the first T201, and after passing coil, it is increased as voltage that is proportionate to time. When this voltage reaches to the HFE critical point of Q203 it turns off. At this time, counter electromotive force is created on trans 1 by turn-off action, and energy is emitted to trans 2 to send voltage to output THV voltage (+) via high voltage output unit consisted of rectifier circuit.
When OP-AMP output becomes low, Q202 turns on. At this time, base voltage of Q203 becomes GND voltage and Q203 turns off to prevent to create high voltage.
Charging circuit detects changes due to environment of charging roller, and applies proper voltage to OPC for each environment. The environment changes (resistance) are detected by comparator, and comparator converts analog input to digital output.
Depending on such digital output, program inputted in ROM of engine controller applies proper charging voltage for each environment in consideration of resistance changes.
Transfer (-) output enable is 'THV- EA HIGH ACTIVE', transfer output controlling signal.
When THV-EA HIGH SIGNAL is applied, Q300 turns off and voltage of 24V1 flows normally to base unite of Q302, switching TR, for turn-on.
After voltage flows to Q302, IC passes the coil of first T301, and after passing coil, it is increased as voltage that is proportionate to time. When this voltage reaches to the HFE critical point of Q203, it becomes off. At this time, counter electromotive force is created on trans 1 by turn-off action of Q302, and energy is emitted to trans 2 to send voltage to output THV voltage (-) via high voltage output unit consisted of rectifier circuit.
When THV-EA LOW signal is applied, Q300 and Q301 turn on. Base voltage of Q302 becomes ground voltage, and it is turned off to prevent to create high voltage.



11.4.4 Environment

THV voltage recognizes the change in the transfer roller environment and then supplies optimum voltage for the environment to create optimum image. Analog data is converted to digital by the environment sensor of the transfer roller. According to such digital output stored in the program in the engine controller Rom, and with the consideration of the paper type printing environment, optimum transfer voltage is supplied.
The environment recognition setting for the ML-6000 series is as following.
First set the THV(+) standard voltage. Then, set the 800V standard voltage by using VR201, which has 200ß supplied in the output section. Next, set the standard CPU index value to 80 using VR302. This is to set the CPU standard of feedback current to 8ßÀ when the output voltage is 800V and resistance is 100ß. If dif ference resistance value appear at 800V, the feedback current and the index value will also vary accordingly. Based on the index value read by CPU and already set Transfer Table, the corresponding transfer voltage is generated. The change in transfer output required in each section is adjusted by PWM-DUTY.