

**Model CM-P1**  
**(Machine Code: G144/G145)**  
**SERVICE MANUAL**

20 July 2005  
Subject to Change

# PRECAUTIONS


In order to prevent accidents and damage to the equipment please read the precautions below before you service the machine.

## SAFETY WARNING

1. Only qualified service engineers can service this machine. High voltages and lasers inside this product are dangerous.
2. Use only approved replacement parts There are no user serviceable parts inside the printer. Do not make any unauthorized changes or additions to the printer. This could cause the printer to malfunction and create electric shock or fire hazards.
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. It 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 to not let humans get access to laser radiation during normal operation, user maintenance, or prescribed service condition.

**NOTE:** Never operate or service the printer with the protective cover removed from Laser/Scanner assembly. The reflected beam 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.

**WARNING**



CAUTION - CLASS II LASER RADIATION WHEN OPEN  
AVOID EXPOSURE TO THE BEAM.  
DANGER - LASER RADIATION AVOID DIRECT  
EXPOSURE TO BEAM.

DANGER - RADIATIONS INVISIBLES DU LASER EN CAS  
D'OUVERTURE. EVITER TOUTE EXPOSITION  
DIRECTE AU FASCEAU.

VORSICHT - UNSICHTBARE LASERSTRAHLUNG, WENN  
ABDECKUNG GEÖFFNET.  
NICHT DEN STRAHL AUSSETZEN.

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

PRECAUCIÓN - RADIACIÓN LASER INVISIBLE CUANDO SE ABRE.  
EVITAR EXPOSICIÓN AL RAYO.

PERIGO - RADIAÇÃO LASER INVISÍVEL AO ABRIR. EVITE  
EXPOSIÇÃO DIRECTA AO FEIXE.

GEWAAR - ONZICHTBARE LASERSTRALEN BIJ GEOPENDE  
KLEP. DEZE KLEP NIET OPENEN.

ADVARSEL - USYNLIG LASERSTRÅLNING VID ÅBNING.  
UNDGÅ UDBÆTTELSE FOR STRÅLNING.

ADVARSEL - USYNLIG LASERSTRÅLNING NÅR DEKSEL  
ÅPNEES. UNNGÅ EKSPONERING FOR STRÅLEN.

WARNING - OSYNLIG LASERSTRÅLNING NÅR DENNA ODEL  
ÄR ÖPPEN. STRÅLEN ÄR FARLIG.

VAROITUS - NÄKYMÄTÖNÄ LASERSÄTELYÄ AVITTAESSA.  
VÄÄÄ SUORAA ALTISTUMISTA SÄTEELLE.

注 意 - 严禁揭开光盖, 以免激光泄露灼伤  
주 의 - 이 덮개를 열면 레이저광에 노출될 수 있으므로  
주의하십시오.

JDSB-10066C07

# **SAFETY PECAUTIONS**

## **TOXIC MATERIALS**

This product contains toxic materials that could cause illness if ingested.

1. If the LCD control panel is damaged it is possible for the liquid inside to leak. This liquid is toxic and contact with skin should be avoided. Wash any splashes from eyes or skin immediately and contact your doctor if you get some liquid on your skin. See a doctor immediately if the liquid gets into the mouth or is swallowed.
2. Please keep toner cartridges away from children. The toner powder contained in the toner cartridge may be harmful and if swallowed you should contact a doctor.

## **ELECTRIC SHOCK AND FIRE SAFETY PRECAUTIONS**

Failure to follow the following instructions could cause electric shock or potentially cause a fire.

1. Use only the correct voltage. Failure to do so could damage the printer and potentially cause a fire or electric shock.
2. Use only the power cable supplied with the printer. Use of an incorrectly specified cable could cause the cable to overheat and potentially cause a fire.
3. Do not overload the power socket. This could lead to overheating of the cables inside the wall and could lead to a fire.
4. Do not allow water or other liquids to spill into the printer. This can cause electric shock. Do not let paper clips, pins or other foreign objects to fall into the printer. These could cause a short circuit leading to an electric shock or fire hazard.
5. Never touch the plugs on either end of the power cable with wet hands. This can cause electric shock. Remove the power plug from the wall socket when you service the printer.
6. Use caution when you insert or remove the power connector. The power connector must be inserted completely. Otherwise a poor contact could cause overheating and lead to a fire. When removing the power connector grip it firmly and pull.
7. Do not allow the power cable to become twisted, bent sharply round corners. Do not place objects on top of the power cable. If the power cable is damaged it could overheat and cause a fire. Exposed cables could cause an electric shock. Replace a damaged power cable immediately. Do not reuse or repair the damaged cable. Some chemicals can attack the coating on the power cable, weakening the cover or exposing cables causing fire and shock risks.

8. Ensure that the power sockets and plugs are not cracked or broken in any way. Repair such defects immediately. Take care not to cut or damage the power cable or plugs when moving the machine.
9. Use caution during thunder or lightening storms. Disconnect the machine from the power source when such weather conditions are expected. Do not touch the machine or the power cord if it is still connected to the wall socket in these weather conditions.
10. Avoid damp or dusty areas. Install the printer in a clean well-ventilated location. Do not position the machine near a humidifier. Dampness and dust build up inside the machine can lead to overheating and cause a fire.
11. Do not position the printer in direct sunlight. This will cause the temperature inside the printer to rise possibly leading to the printer failing to work properly and in extreme conditions could lead to a fire.
12. Do not insert metal objects into the machine through the ventilator fan or other part of the casing. This could make contact with a high voltage conductor inside the machine and cause an electric shock.

## **HANDLING PRECAUTIONS**

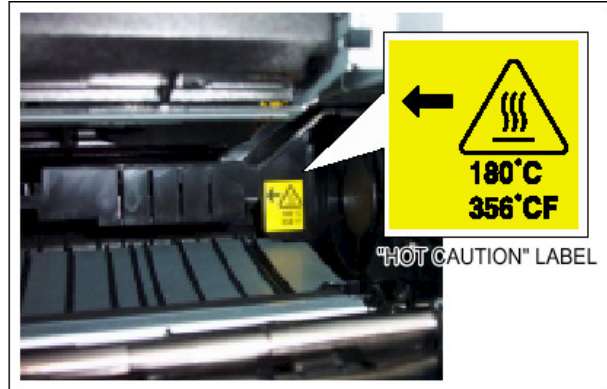
The following instructions are for your own personal safety, to avoid injury and so as not to damage the printer

1. Ensure the printer is installed on a level surface, capable of supporting its weight. Failure to do so could cause the printer to tip or fall.
2. Do not catch your fingers in the rollers, gears and fans.
3. Do not place any small metal objects, containers of water, chemicals or other liquids close to the printer. This can cause damage, shock or fire if spilled into the machine.
4. Do not install the machine in areas with high dust or moisture levels, beside open windows or close to a humidifier or heater.
5. Do not place candles, burning cigarettes, etc on the printer.

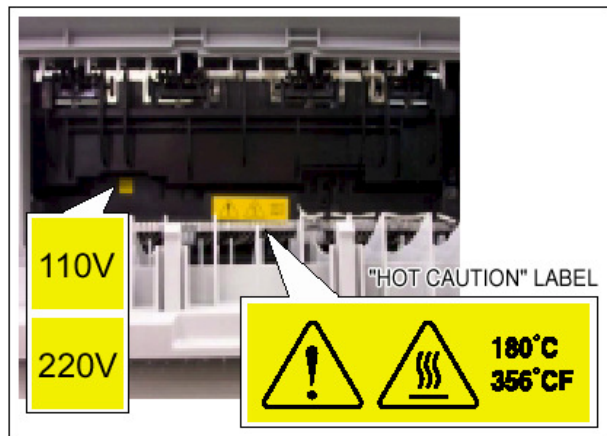
## ASSEMBLY/DISASSEMBLY PRECAUTIONS

Replace with recommended parts. Take care to note the exact location of parts and correct cable routing before you disassemble any part of the machine. Ensure all parts and cables are replaced correctly. Do the following procedures before you disassemble the printer or replace any parts.

1. Check the contents of the machine memory and make a note of any user settings. These will be erased if the mainboard or network card is replaced.
2. Ensure that power is disconnected before you service or replace any electrical parts.
3. Disconnect printer interface cables and power cables.
4. Only use approved spare parts. Ensure that part number, product name, voltages, current or temperature rating are correct.
5. When removing or re-fitting any parts do not use excessive force, especially when fitting screws into plastic.
6. Take care not to drop any small parts into the machine.
7. Handling of the OPC Drum.
  - The OPC Drum can be damaged if it gets exposed to light.
  - Take care not to expose the OPC Drum either to direct sunlight or to fluorescent or incandescent room lighting. Exposure for as little as 5 minutes can damage the surface's photoconductive properties and will result in print quality degradation. Remove the OPC Drum and store it in a black bag or other lightproof container. Take care when working with the covers (especially the top cover) as light is admitted to the OPC area and can damage the OPC Drum.
  - Take care not to scratch the green surface of OPC Drum Unit. If the green surface of the Drum Cartridge is scratched or touched the print quality will be compromised.



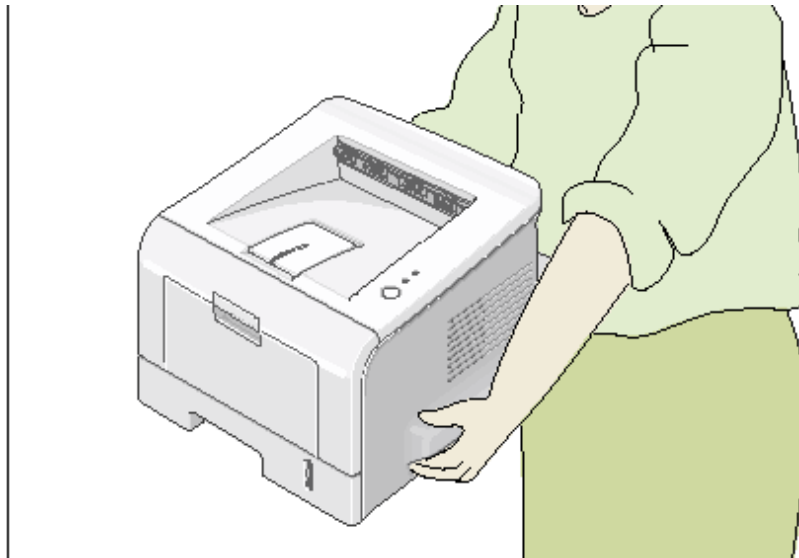
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Caution2.tif

## ADDITIONAL SAFETY PRECAUTIONS

1. Be careful with high temperature parts. The fusing unit works at a high temperature. Use caution when working on the printer. Wait for the fusing unit to cool down before disassemble it.
2. Do not put your fingers or hair into the rotating parts
3. This printer weighs 12.7kg including toner cartridge and cassette. Use safe lifting and handling techniques. Use the lifting handles located on each side of the machine. Back injury could be caused if you do not lift carefully.



CAUTION3.TIF

4. The printer weighs 12.7Kg. Ensure the printer is installed safely on a level surface, capable of supporting its weight. Failure to do so could cause the printer to tip or fall possibly causing personal injury or damaging the printer.
5. Do not install the printer on a sloping or unstable surface. After installation, double check that the printer is stable.

## ESD PRECAUTIONS

Certain semiconductor devices can be get 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.

**NOTE:** Make 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.

# TABLE OF CONTENTS

<b>1. INSTALLATION.....</b>	<b>1-1</b>
1.1 INSTALLATION PROCEDURE .....	1-1
<b>2. PREVENTIVE MAINTENANCE.....</b>	<b>2-1</b>
2.1 PM INTERVALS .....	2-1
<b>3. REPLACEMENT AND ADJUSTMENT .....</b>	<b>3-1</b>
3.1 GENERAL PRECAUTIONS.....	3-1
3.1.1 SERVICING THE MACHINE .....	3-1
3.1.2 RELEASING PLASTIC LATCHES.....	3-1
3.2 COVERS .....	3-2
3.2.1 FRONT COVER.....	3-2
3.2.2 BYPASS COVER.....	3-3
3.2.3 REAR COVER .....	3-4
3.2.4 TOP COVER .....	3-6
3.2.5 RIGHT SIDE COVER .....	3-7
3.2.6 LEFT SIDE COVER.....	3-8
3.2.7 MIDDLE COVER .....	3-9
3.3 EXIT ROLLER .....	3-10
3.4 ENGINE SHIELD ASSEMBLY AND EXIT BOARD .....	3-11
3.4.1 ENGINE SHIELD.....	3-11
3.4.2 EXIT BOARD.....	3-13
3.5 SMPS .....	3-14
3.6 FUSING UNIT.....	3-17
3.6.1 FUSING UNIT ASSEMBLY .....	3-17
3.6.2 THERMOSTAT .....	3-18
3.6.3 FUSING LAMP .....	3-19
3.6.4 STRIPPER PAWLS .....	3-20
When you Reassemble the Fusing Unit.....	3-21
Note.....	3-22
3.6.5 THERMISTOR.....	3-23
3.7 UNPLUG FAN .....	3-24
3.8 LASER SCANNING UNIT .....	3-25
3.9 DRIVE UNIT .....	3-27
3.10 TRANSFER UNIT.....	3-28
3.11 BYPASS TRAY UNIT AND FEED ROLLER.....	3-30
3.11.1 BYPASS TRAY UNIT .....	3-30
3.12 PICK-UP ASSEMBLY AND SOLENOID.....	3-32
Pick-up Roller and By-pass Pick-up Roller .....	3-35
Paper Feed Unit Pick-up Roller .....	3-35
By-pass pick-up roller .....	3-36
<b>4. TROUBLESHOOTING .....</b>	<b>4-1</b>
4.1 PAPER PATH.....	4-1
4.1.1 PAPER JAM CONDITIONS.....	4-2



Jam0 .....	4-2
Jam1 .....	4-2
Jam2 .....	4-3
4.2 CLEARING PAPER JAMS .....	4-4
4.2.1 JAM2 (PAPER EXIT AREA) .....	4-4
4.2.2 JAM0 (PAPER FEED AREA).....	4-6
4.2.3 JAM1 (TONER CARTRIDGE AREA).....	4-7
4.2.4 TIPS TO AVOID PAPER JAMS .....	4-8
4.3 SAMPLE PATTERN .....	4-9
4.3.1 PRINTING A DEMO PAGE AND CONFIGURATION PAGE .....	4-9
4.3.2 PRINTING A CLEANING SHEET .....	4-10
4.4 OPERATION PANEL DISPLAY.....	4-10
4.5 PERIODIC DEFECTIVE IMAGE.....	4-10
4.6 PRINTOUT PROBLEMS .....	4-11
4.6.1 INCORRECT PRINT POSITION .....	4-11
4.6.2 VERTICAL BLACK LINE AND BAND .....	4-11
4.6.3 VERTICAL WHITE LINE.....	4-11
4.6.4 HORIZONTAL BLACK BANDS .....	4-12
4.6.5 BLACK/WHITE SPOTS .....	4-12
4.6.6 LIGHT IMAGE .....	4-12
4.6.7 DARK/BLACK IMAGE .....	4-13
4.6.8 UNEVEN DENSITY .....	4-13
4.6.9 BACKGROUND .....	4-13
4.6.10 GHOST 1.....	4-14
4.6.11 GHOST 2.....	4-14
4.6.12 GHOST 3.....	4-14
4.6.13 GHOST 4.....	4-15
4.6.14 STAINS ON FRONT OF PAGE .....	4-15
4.6.15 STAINS ON BACK OF PAGE.....	4-15
4.6.16 BLANK PAGE 1.....	4-15
4.6.17 BLANK PAGE 2.....	4-16
4.7 PAPER FEED PROBLEMS.....	4-17
4.7.1 INCORRECT PRINT POSITION .....	4-17
4.7.2 JAM 0 .....	4-17
4.7.3 JAM 1 .....	4-17
4.7.4 JAM 2 .....	4-18
4.7.5 MULTI-FEEDING.....	4-18
4.7.6 PAPER ROLLED IN THE FUSING UNIT.....	4-18
4.7.7 PAPER STAYS IN THE OPC DRUM.....	4-19
4.8 SET MALFUNCTIONS .....	4-20
4.8.1 ALL LEDS BLINK (FUSING ERROR).....	4-20
4.8.2 ALL LEDS BLINK (SCAN ERROR) .....	4-20
4.8.3 PAPER EMPTY .....	4-20
4.8.4 PAPER EMPTY WITHOUT INDICATION.....	4-20
4.8.5 FUSING GEAR MELTS (OVERHEATS).....	4-21
4.8.6 COVER OPEN.....	4-21
4.8.7 NO ERROR LAMP WHEN COVER IS OPENED .....	4-21
4.8.8 DEFECTIVE MOTOR OPERATION .....	4-21
4.8.9 NO POWER.....	4-22

4.8.10 PRINTED VERTICAL LINES GET CURVED .....	4-22
4.9 TONER CARTRIDGE .....	4-23
4.9.1 TONER CARTRIDGE PRECAUTIONS .....	4-23
4.9.2 REDISTRIBUTING TONER .....	4-23
4.9.3 TONER CARTRIDGE ERROR MESSAGES .....	4-25
4.9.4 TONER CARTRIDGE DETAILS .....	4-26
4.10 SOFTWARE PROBLEMS .....	4-29
4.10.1 PRINTER DOES NOT OPERATE CORRECTLY 1 .....	4-29
4.10.2 PRINTER DOES OPERATE CORRECTLY 2 .....	4-30
4.10.3 ABNORMAL PRINTING .....	4-31
4.10.4 SPOOL ERROR .....	4-31
How to Delete Data in the Spool Manager .....	4-31
<b>5. SERVICE PROGRAM MODE .....</b>	<b>5-1</b>
5.1 FIRMWARE DOWNLOAD .....	5-1
5.1.1 DOWNLOAD PROCEDURE .....	5-1
DOS Command mode .....	5-1
EWS (Embedded Web Server) mode .....	5-2
5.1.2 FIRMWARE RECOVERY PROCEDURE .....	5-4
<b>6. DETAILED DESCRIPTIONS .....</b>	<b>6-1</b>
6.1 MACHINE OVERVIEW .....	6-1
6.1.1 FRONT VIEW .....	6-1
6.1.2 REAR VIEW .....	6-2
6.1.3 OPERATION PANEL .....	6-3
On Line/Error Button .....	6-3
Toner Save Button .....	6-4
On Line/Error Button and Toner Save Button .....	6-4
Cancel Button .....	6-4
6.2 MACHINE OVERVIEW .....	6-5
6.2.1 FIRMWARE .....	6-5
6.2.2 PRINT ENGINE .....	6-5
Paper Feed Mechanism .....	6-5
Drive Mechanism .....	6-5
Development Unit .....	6-5
Transfer Unit .....	6-5
Fusing Unit .....	6-5
Electrical Components (PBA) .....	6-6
6.3 SYSTEM LAYOUT .....	6-7
6.3.1 PAPER FEED UNIT .....	6-8
Paper Separation Method .....	6-8
Paper Tray .....	6-8
Pick-up roller .....	6-8
By-pass tray .....	6-8
Optional Paper Feed Unit .....	6-8
6.3.2 TRANSFER UNIT .....	6-9
6.3.3 DRIVE .....	6-9
6.3.4 FUSING UNIT .....	6-9
Thermostat .....	6-9

Thermistor.....	6-9
Hot Roller.....	6-9
Pressure Roller.....	6-9
Safety Features.....	6-10
Safety Devices.....	6-10
6.3.5 LASER SCANNING UNIT (LSU).....	6-10
6.3.6 TONER CARTRIDGE.....	6-11
6.3.7 NEW AIO DETECTION.....	6-12
6.3.8 TONER END DETECTION.....	6-12
6.4 ASIC(SPGP).....	6-13
6.4.1 MEMORY.....	6-13
6.4.2 FLASH MEMORY.....	6-13
6.4.3 SDRAM.....	6-14
6.4.4 SENSOR INPUT CIRCUIT.....	6-15
Paper Empty Sensor.....	6-15
By-pass Tray Sensor.....	6-15
Paper Feeding.....	6-15
Paper Exit Sensor.....	6-15
Cover Open Sensor.....	6-15
DC Fan/Solenoid Driving Circuit.....	6-15
Motor Drive Circuit.....	6-16
Transfer.....	6-16
Fusing.....	6-16
LSU.....	6-17
6.5 SMPS AND HVPS.....	6-18
6.5.1 HVPS (HIGH VOLTAGE POWER SUPPLY).....	6-19
1. Transfer High Voltage (THV+).....	6-19
2. Charge Voltage (MHV).....	6-19
3. Cleaning Voltage (THV-).....	6-19
4. Developing Voltage (DEV).....	6-20
5. Supply.....	6-20
6.5.2 SMPS (SWITCHING MODE POWER SUPPLY).....	6-21
1. AC Input.....	6-21
2. Rated Output Power.....	6-21
3. Consumption Power.....	6-21
6.6 ENGINE.....	6-22
6.6.1 PAPER FEED.....	6-22

## **SPECIFICATIONS**

## **APPENDIX**

## **PARTS CATALOG**

# **1. INSTALLATION**

## **1.1 INSTALLATION PROCEDURE**

Refer to the Operating Instructions for full installation procedures.

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## 2. PREVENTIVE MAINTENANCE

### 2.1 PM INTERVALS

The cycle period shown below is for maintenance.

Environmental conditions and use will change.

The cycle period shown is for reference only.

	Component	Replacement Cycle	Done by
<b>Printer</b>	Pick-up Ass'y	150,000 pages	Service
	Transfer Roller	60,000 Pages	Service
	Fuser Unit	80,000 Pages	Service

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## 3. REPLACEMENT AND ADJUSTMENT

This manual uses the following symbols.

☛ : See or refer to    ⚙ : Screw    📡 : Connector    ⚙ : C-clamp (snap ring)    Ⓒ : E-clamp

### 3.1 GENERAL PRECAUTIONS

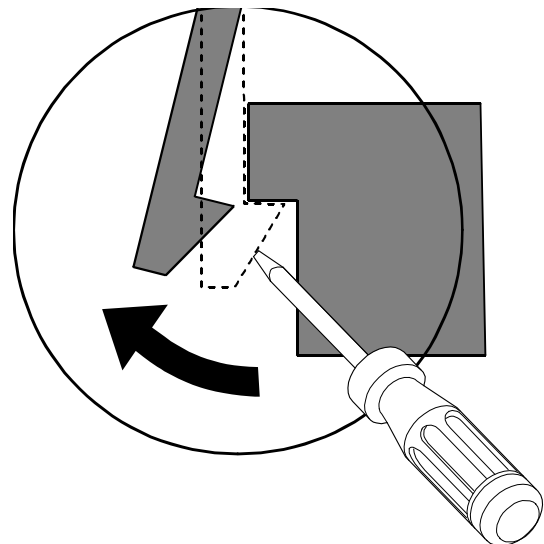
- Use high caution when you disassemble and reassemble components.
- Make sure all cables are correctly routed. Check the correct cable routing before you service the machine. Return all cables to their original position after you service the machine.

#### 3.1.1 SERVICING THE MACHINE

1. Make sure there are not documents stored in memory before you service the machine.
2. Remove the toner cartridge before you disassemble parts.
3. Unplug the power cord before you service the machine.
4. Use a flat clean surface to service the machine.
5. Use only approved replacement parts. Machine function cannot be guaranteed if you use unauthorized replacement parts.
6. Do not force plastic components.
7. Make sure all components are in their correct positions..

#### 3.1.2 RELEASING PLASTIC LATCHES

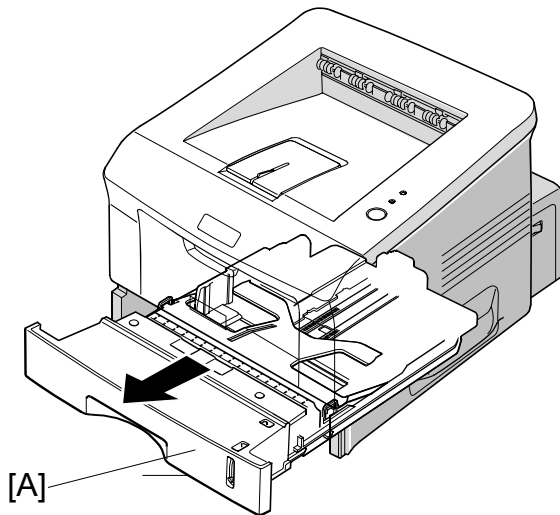
Many of the parts are held in place with plastic latches. The latches break easily. Release them carefully. To remove such parts, press the hook end of the latch away from the part to which it is latched.



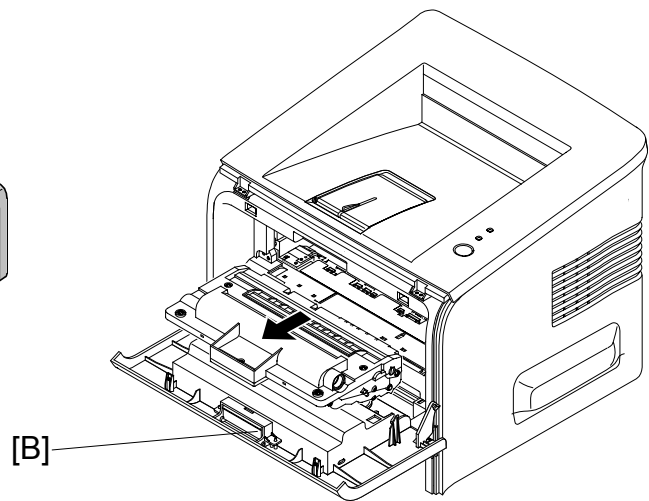
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## 3.2 COVERS

### 3.2.1 FRONT COVER

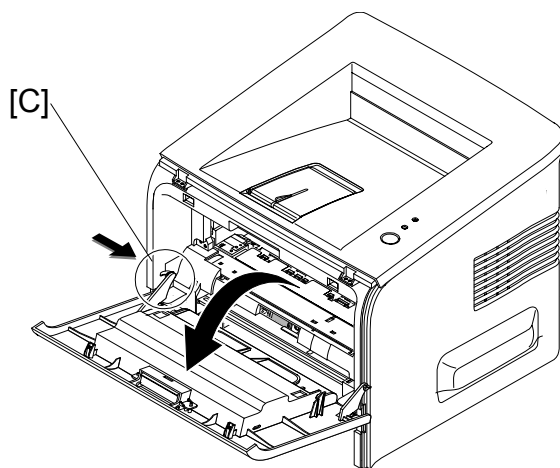


G144R002.WMF

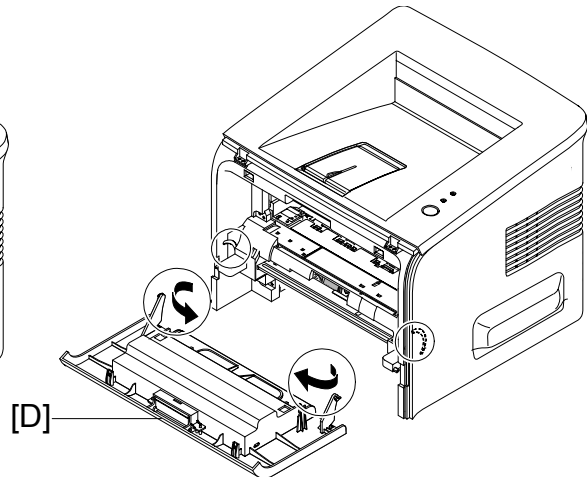


G144R003.WMF

1. Pull the cassette [A] out of the printer.
2. Open the front cover [B] and push the toner cartridge down. Then remove it from the machine.



G144R004.WMF

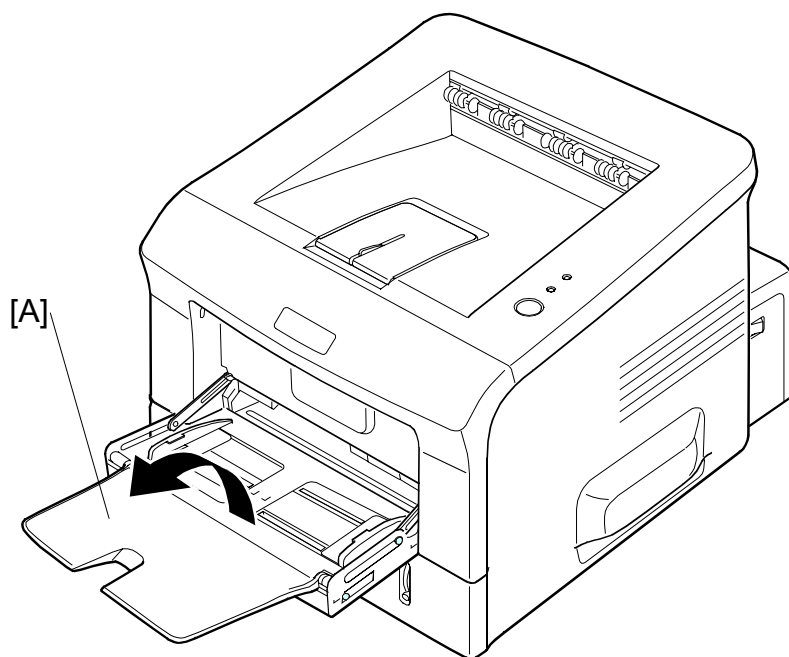


G144R005.WMF

3. Pull inward to release the hinges [C].
4. Pull the front cover [D] away from the machine.

**NOTE:** To prevent damage to the toner cartridge do not expose it to light for more than a few minutes.

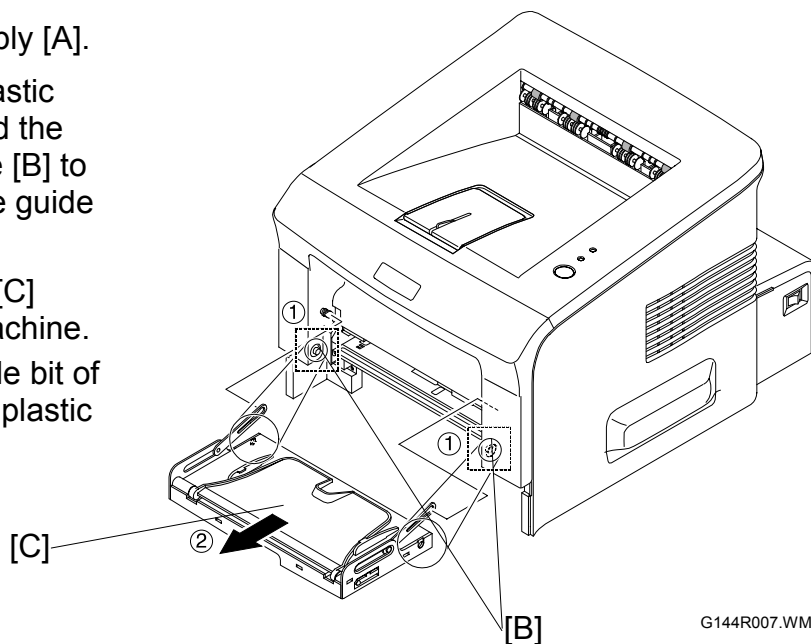
### 3.2.2 BYPASS COVER



G144R006.WMF

1. Open the tray assembly [A].
2. Carefully bend the plastic hinge supports toward the center of the machine [B] to release them from the guide hooks.
3. Pull the by-pass tray [C] outwards from the machine.

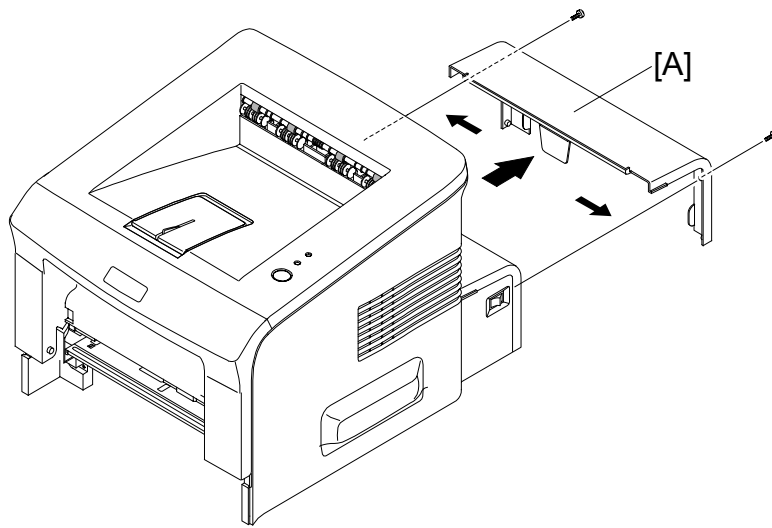
**NOTE:** You can use a little bit of force when you bend the plastic hinges.




G144R007.WMF

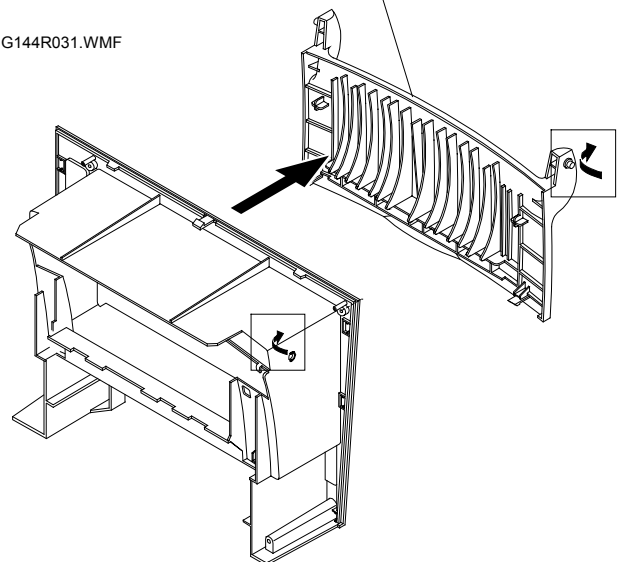


### 3.2.3 REAR COVER

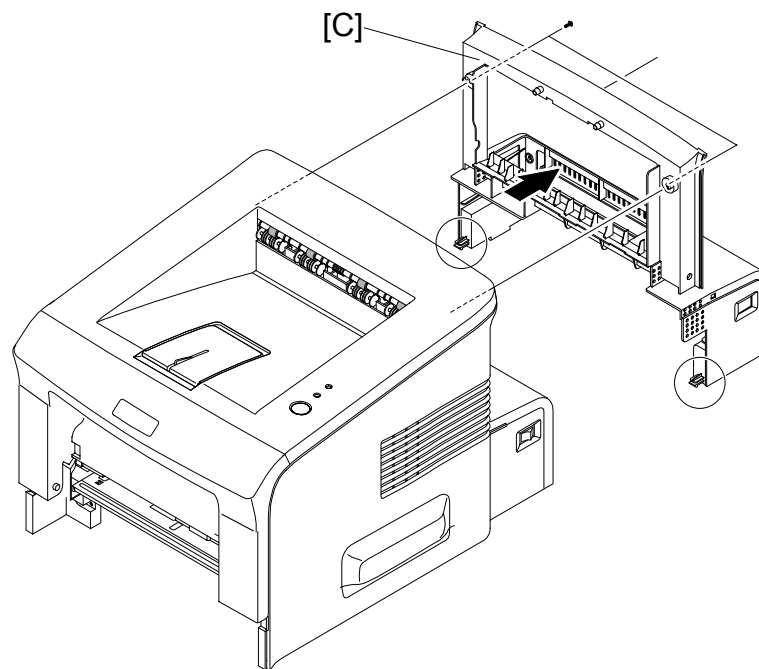


G144R031.WMF


1. Remove the 2 x  and remove the option cover assembly [A].
2. Remove the cover face [B] in the direction of the arrow as shown above.



G144R032.WMF



G144R033.WMF

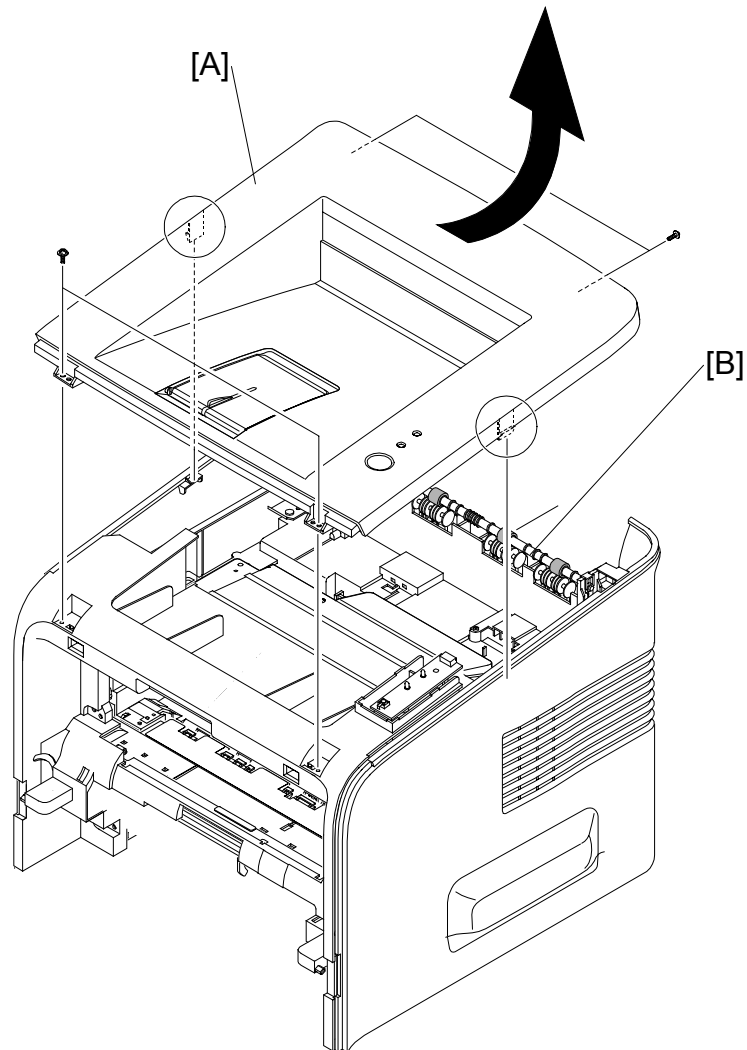
3. Remove the 2 x  as shown above and snap the rear cover [C] out of the machine.

### 3.2.4 TOP COVER

Remove the following before you remove the top cover.

☛: Front Cover

☛: Rear Cover



G144R008.WMF

1. Remove the 4 x ☛ as shown above. Then lift the top cover [A] from the machine.

**NOTE:** Make sure you do not damage the exit roller [B] when you remove the top cover.

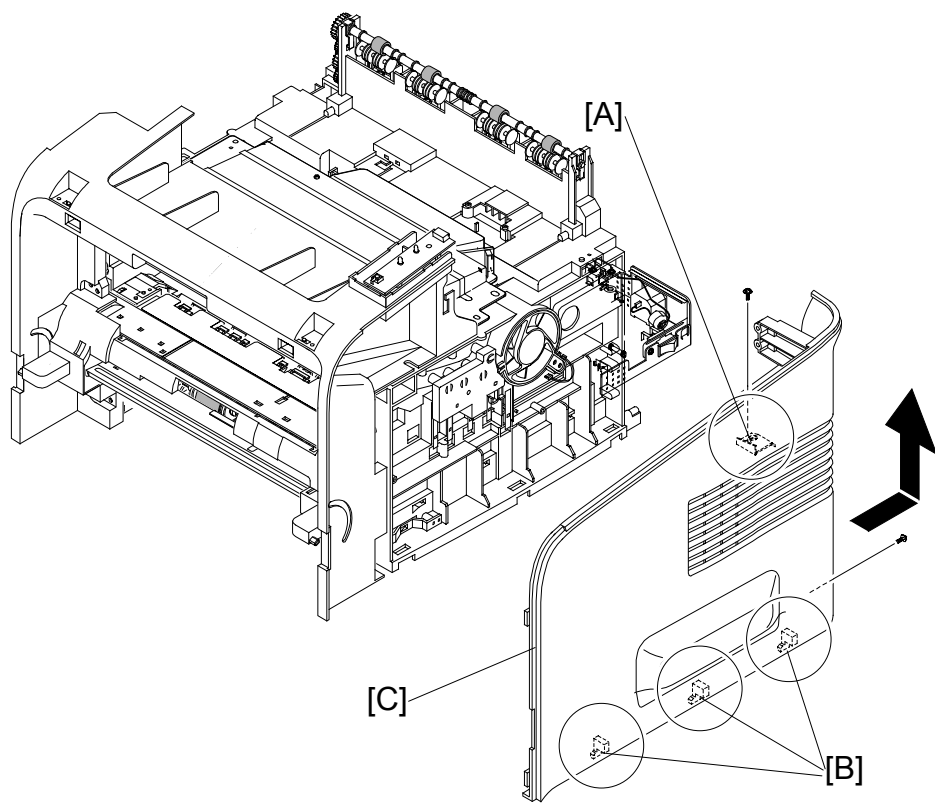
### 3.2.5 RIGHT SIDE COVER

Remove the following before you remove the right side cover.

☛: Front Cover

☛: Rear Cover

☛: Top Cover



G144R010.WMF

1. Remove the 2 x ☛ as shown above
2. Release the top latch [A] and the three bottom latches [B] from the frame assembly in the direction of the arrow.
3. Remove the right side cover [C].

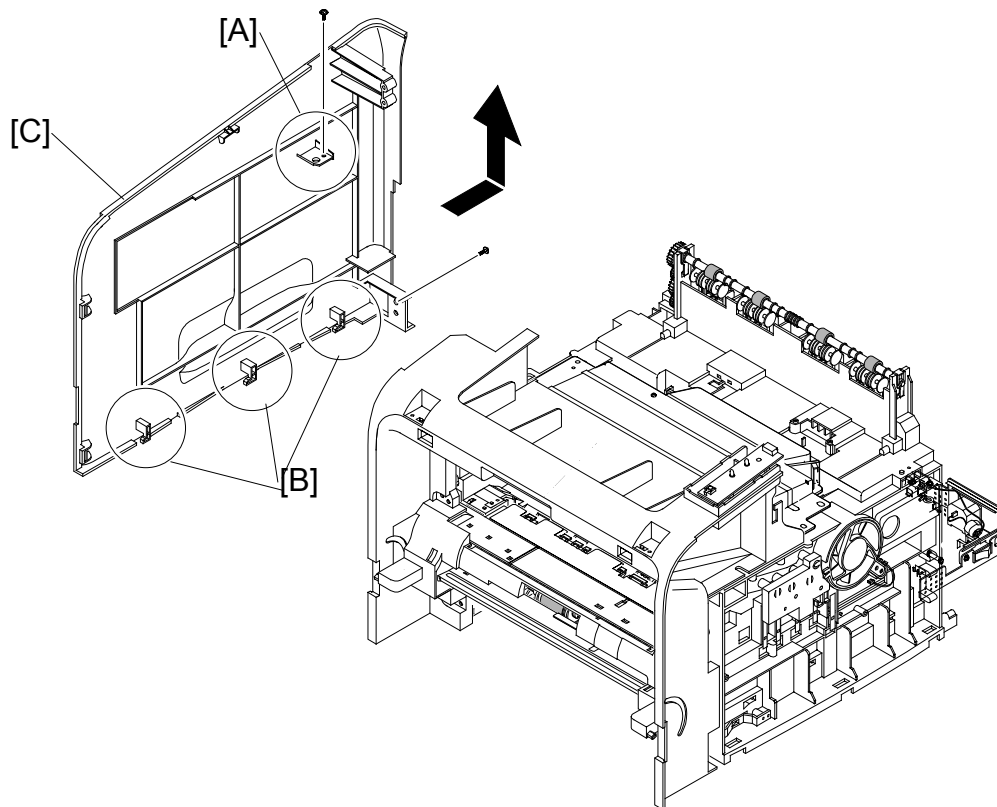
### 3.2.6 LEFT SIDE COVER

Remove the following before you remove the left side cover.

☛: Front Cover

☛: Rear Cover

☛: Top Cover



G144R011.WMF

4. Remove the 2 x ☛ as shown above
5. Release the top latch [A] and the three bottom latches [B] from the frame assembly in the direction of the arrow. Remove the left side cover [C].

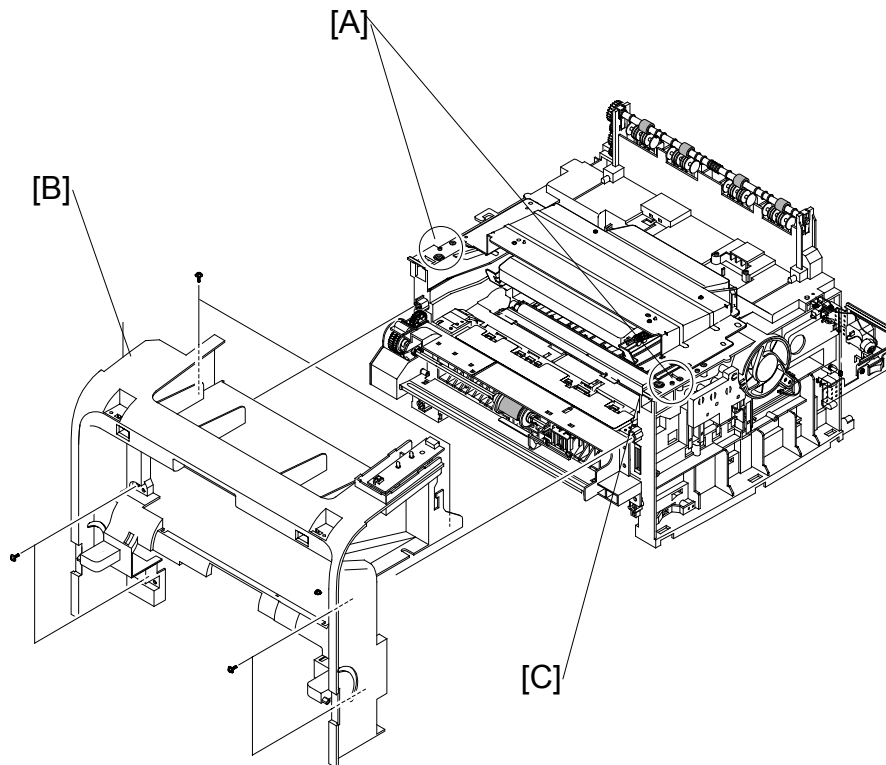
### 3.2.7 MIDDLE COVER

Remove the following before you remove the middle cover.

☛: Front Cover ☛

☛: Rear Cover

☛: Top Cover



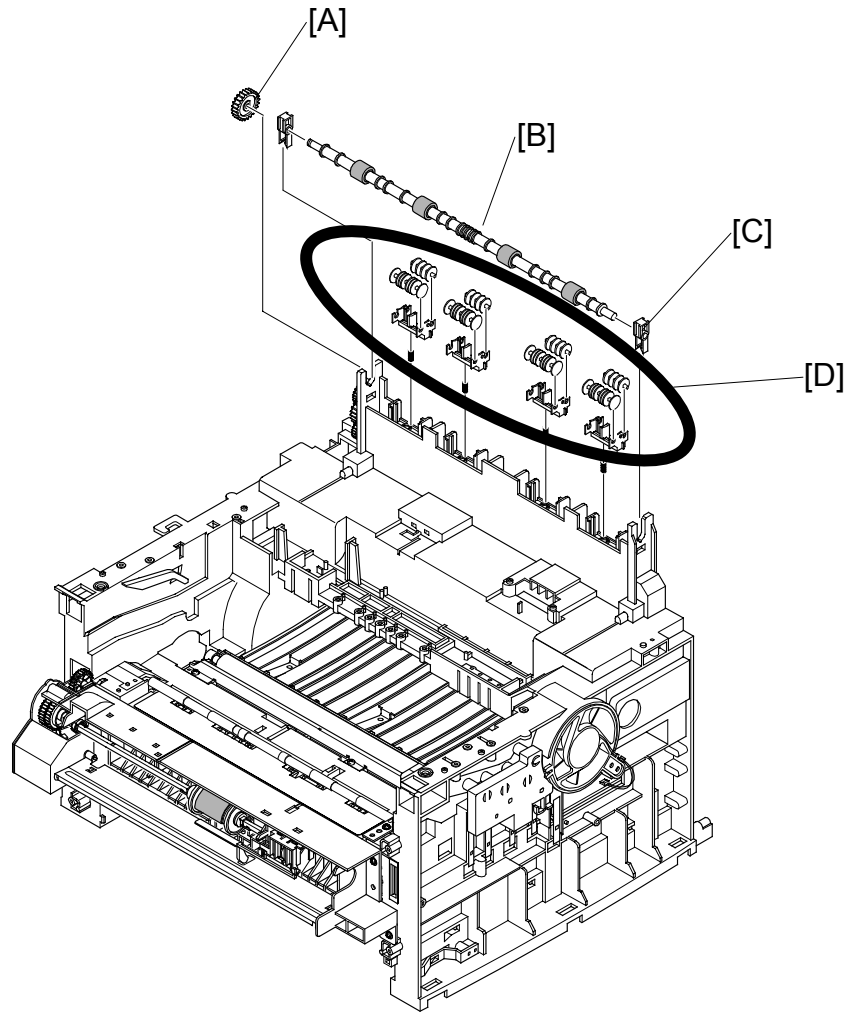
G144R009.WMF

1. Remove the 2 x ☛ from the top of the middle cover [B] (screws are on the inside)
2. Remove the 4 x ☛ from the base frame (screws are outside at the back (bottom, center, left, right))
3. Disconnect the operation panel harness [C] from the operation panel before you remove the middle cover [B]. Make sure to not damage the hook [A]

### 3.3 EXIT ROLLER

Remove the following before you remove the exit roller.

- ☛: Front Cover
- ☛: Rear Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover



G144R012.WMF

1. Gently pull the gear [A] and remove from the exit roller [B].
  2. Pull on the latch [C] and slide the exit roller [B] out.
  3. Remove 4 bushings [D] and 4 springs from the machine.
- NOTE:** The bushings contain grease. Be careful when you remove them.

### 3.4 ENGINE SHIELD ASSEMBLY AND EXIT BOARD

Remove the following before you remove the engine shield and exit board.

- ☛: Front Cover
- ☛: Rear Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover

#### 3.4.1 ENGINE SHIELD





G144R013.JPG

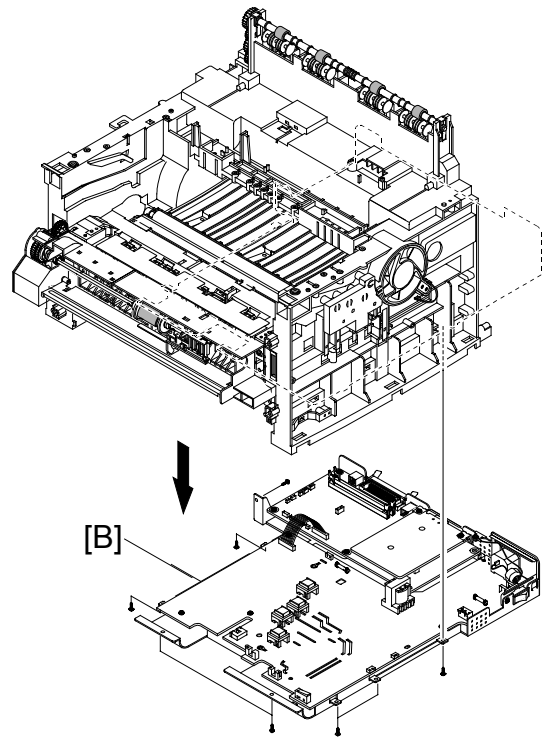
Do the following before you remove the engine shield assembly.

1. Release 1 x ☛ (black arrow) from the SMPS shield [A]. **Do not remove it at this time.**

**NOTE:** The SMPS is a safety shield to separate the high voltage area from the rest IC chips.

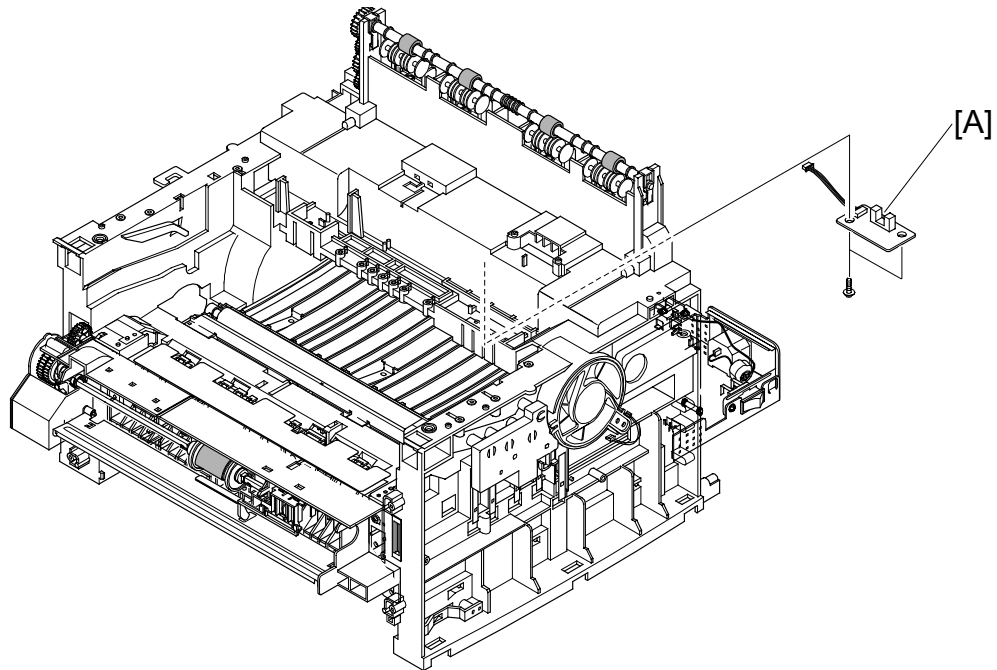


2. Turn the machine on its side and remove the 12 x  from the engine shield assembly [B].  
**NOTE:** All screws must be removed before you can remove the safety shield.
3. Unplug 5x  from the operation panel, fan and fusing unit.
4. Turn the machine back upright and remove the SMPS shield [A].
5. Remove the engine shield assembly [B] from the machine.




G144R013.WMF

### 3.4.2 EXIT BOARD



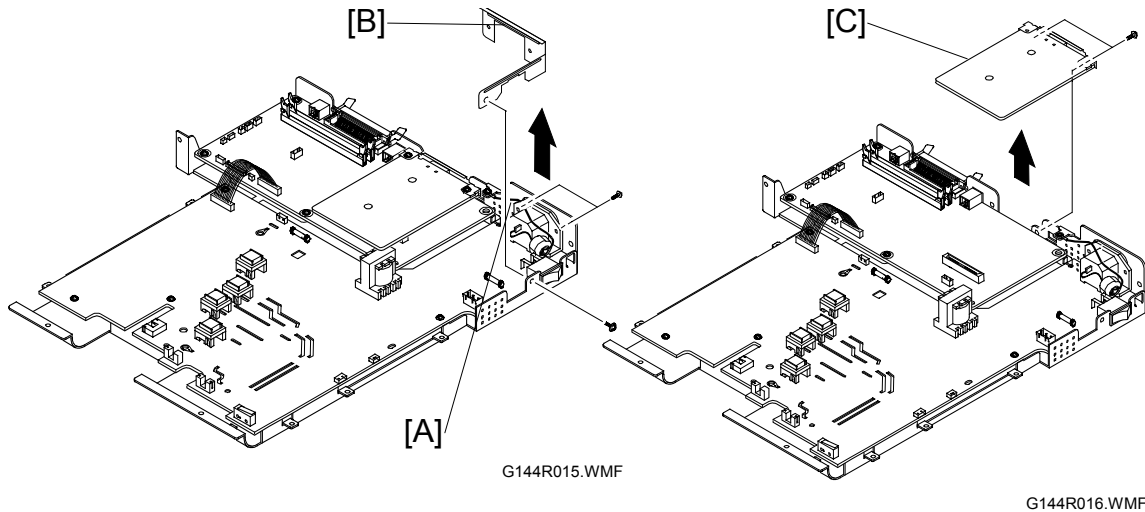
G144R014.WMF



1. Remove the 2 x  as shown above.
2. Remove the exit board [A].

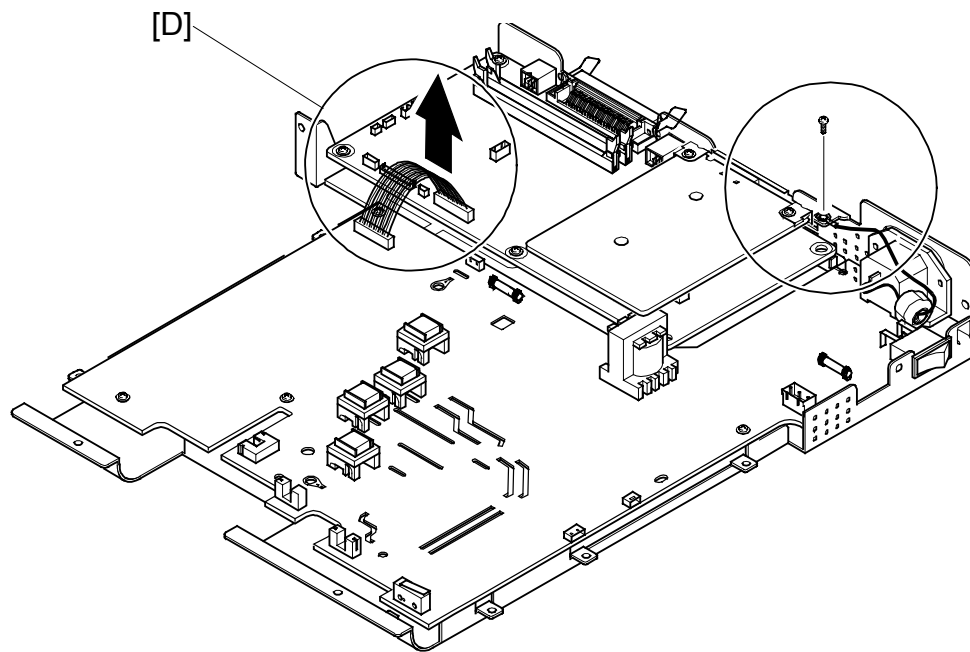
### 3.5 SMPS

Remove the following before you remove the SMPS.

- ☛: Front Cover
- ☛: Rear Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover

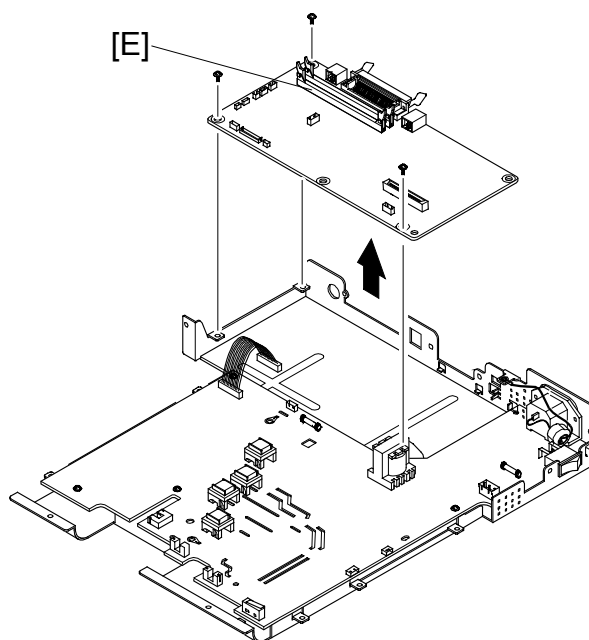


1. Unplug one wire [A].
2. Remove the 3 x  and remove the inlet bracket [B].
3. Remove the 2 x  and remove the network board [C].



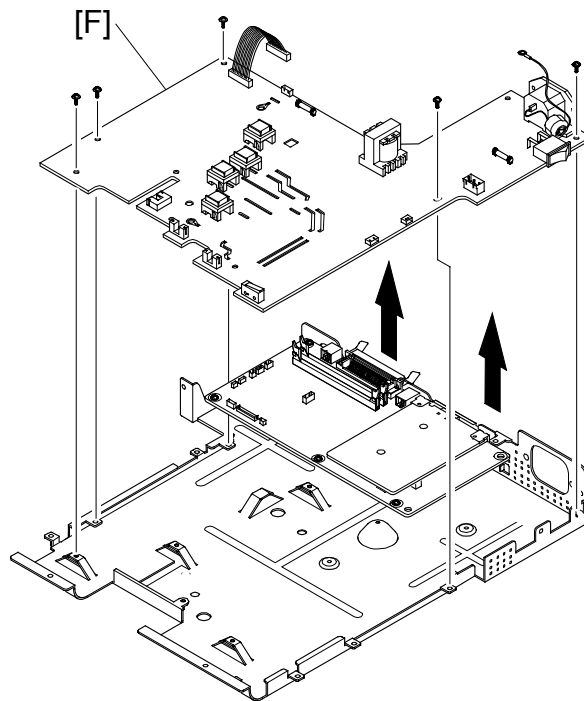
G144R017.WMF

4. Unplug the engine harness [D].





G144R018.WMF

5. Remove 2 x  from the IEEE1284 port and the main PBA [E].



G144R019.WMF

6. Remove 6 x  and remove the SMPS [F].

**NOTE:** If you only need to remove the optional memory units or the network card you only need to remove the optional cover.  : 3.2.3

## 3.6 FUSING UNIT

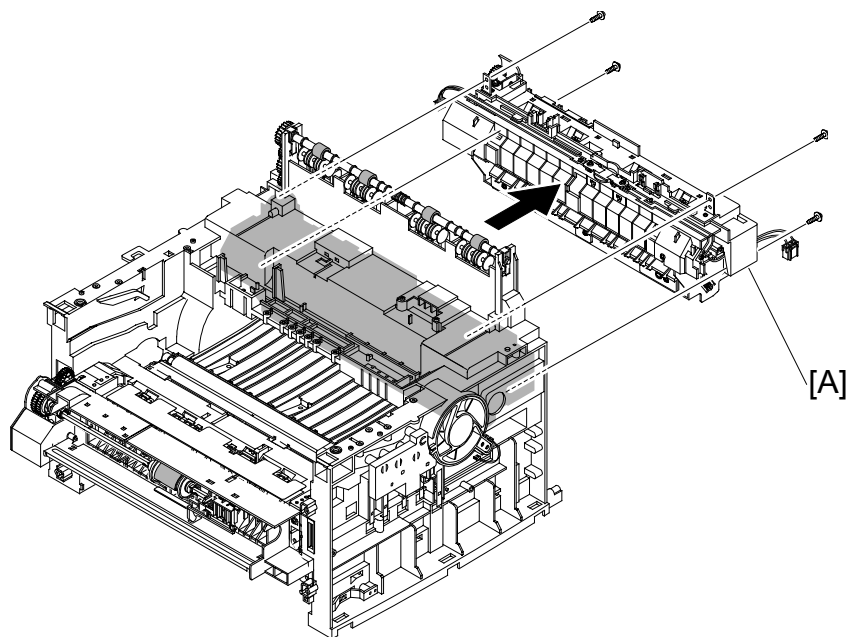
Remove the following before you remove the fusing unit.

☛: Rear Cover

**NOTE:** Do the following procedure if you only want to remove the entire fusing unit assembly.

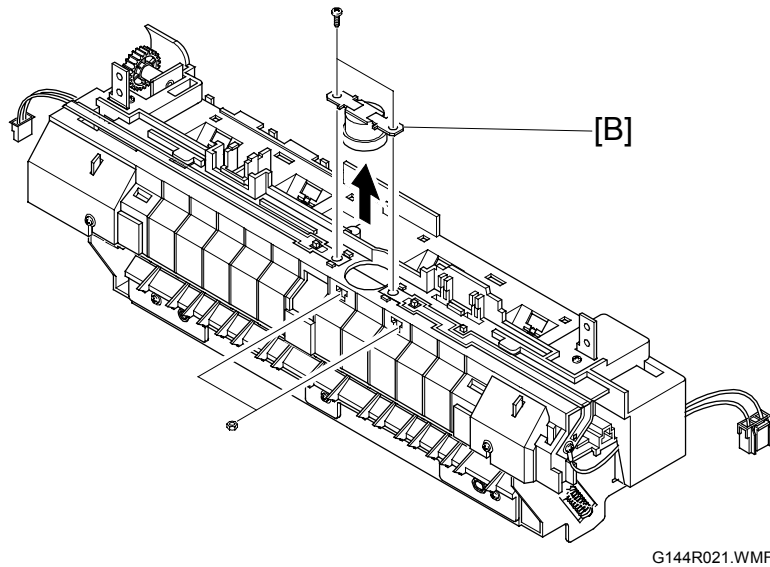
**NOTE:** Refer to the following sections if you want to remove components from the fusing unit. ☛ : 3.6.1, 3.6.2 and 3.6.3.


### 3.6.1 FUSING UNIT ASSEMBLY



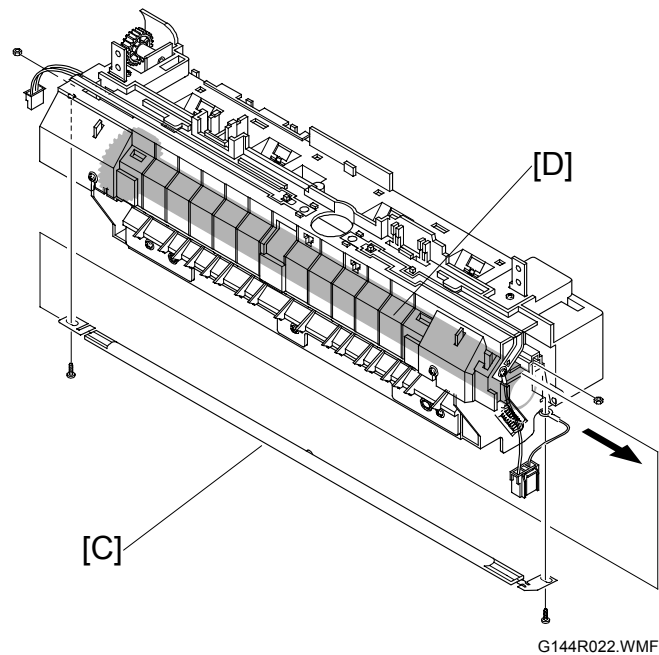
1. Unplug the 2 x ☛ from the main PBA and SMPS.
2. Remove 4 x ☛. Then remove the fusing unit assembly [A].


### 3.6.2 THERMOSTAT



3. Remove the 2 x . Then remove the thermostat [B]. Both screws have a nut and a bolt.

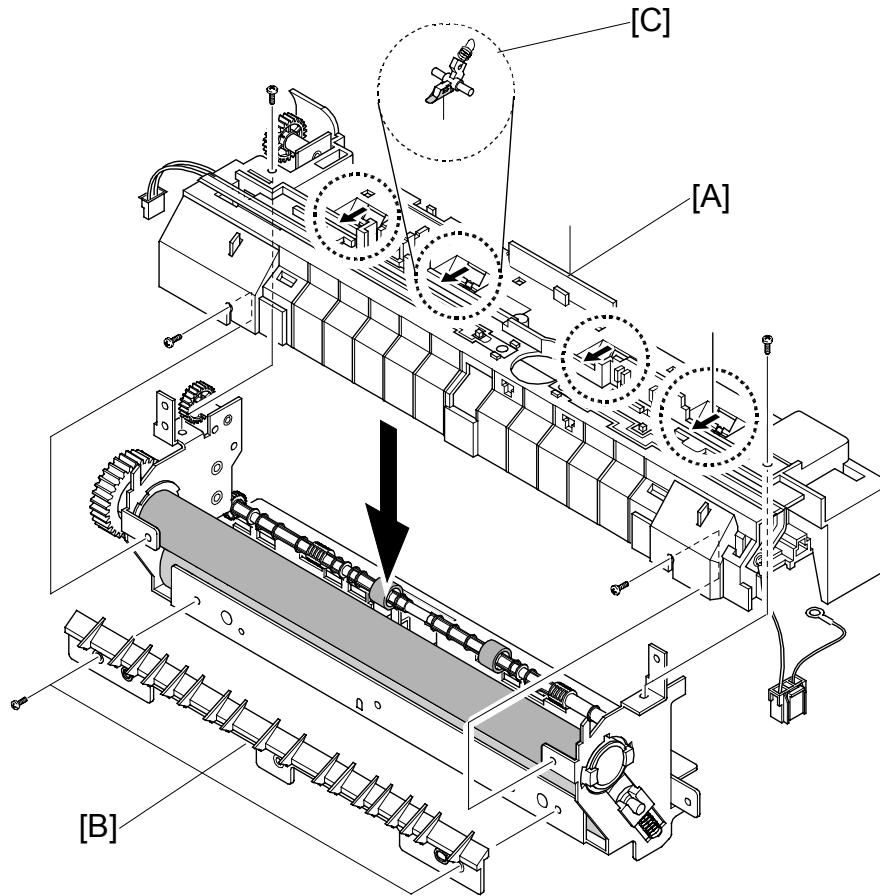
### 3.6.3 FUSING LAMP





4. Remove the 2 x  securing the fusing lamp [C]. Both screws have a nut and a bolt.
5. Slide the fusing lamp [C] out from the hot roller [D] in the direction of the arrow as shown above.



### 3.6.4 STRIPPER PAWLS



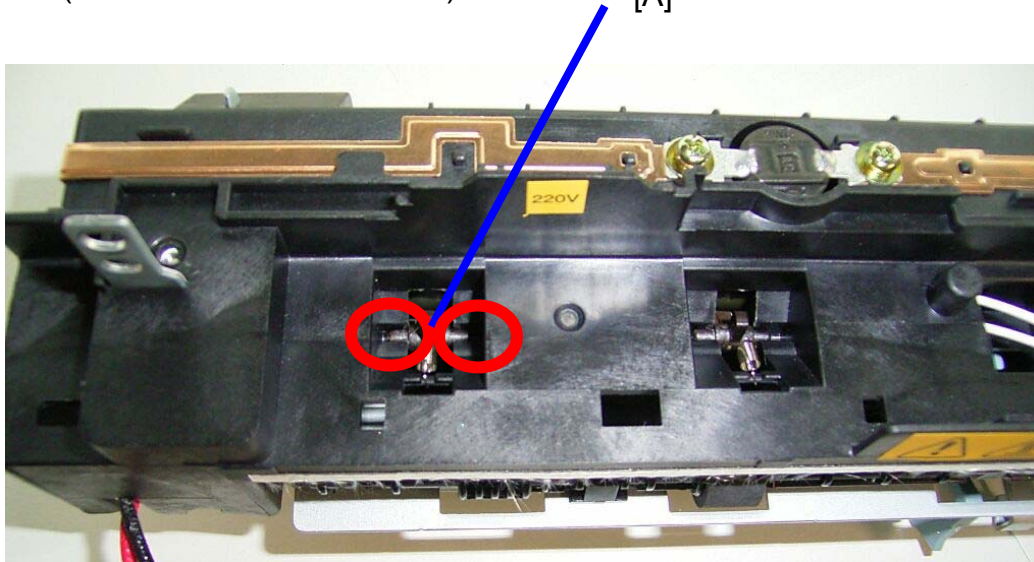
G144R049.WMF

- [A]: Remove the 4 x  securing the fusing unit cover [A].  
[B]: Remove the 2 x  securing the guide input [B].  
[C]: Disassemble the fusing unit.

***When you Reassemble the Fusing Unit***

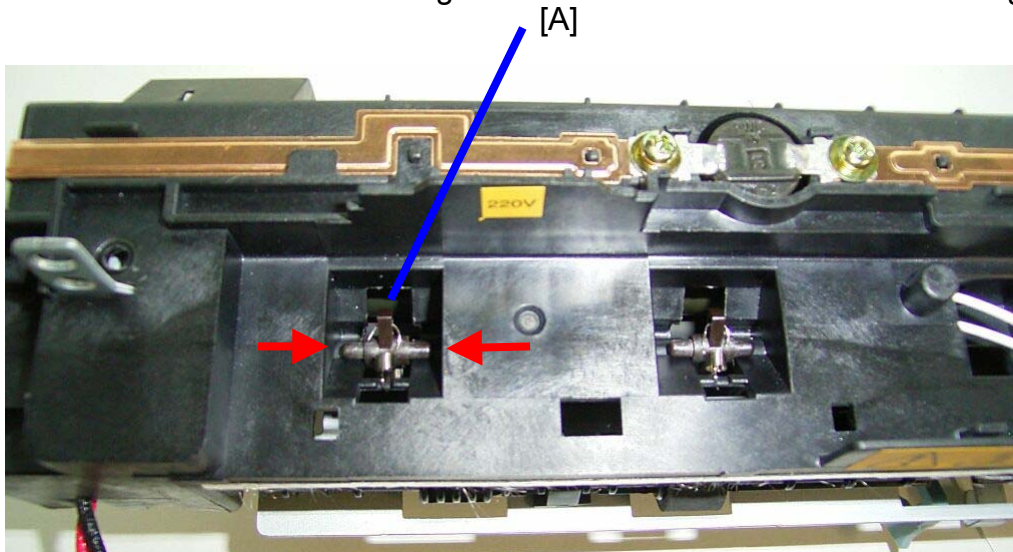
The 4 x stripper pawls must be put in the correct position before you can reassemble the fusing unit. Do the following procedure before you put the fusing unit back to the fusing unit assembly.

1. Snap the 4 x stripper pawls [A] out of the left and right side stripper pawl holder slots (shown in red circles below).



G144R901.TIF

2. Put the top part of the fusing unit onto the bottom part of the fusing unit.
3. Place the 4 x stripper pawls [A] back into the stripper pawl holder slots (shown with two red arrows in the illustration below).
4. Push the sides of the stripper pawls securely into the stripper pawl holder slots.
5. Reassemble the rest of the fusing unit and set is back into the machine again.



G144R902.TIF

**Note.**

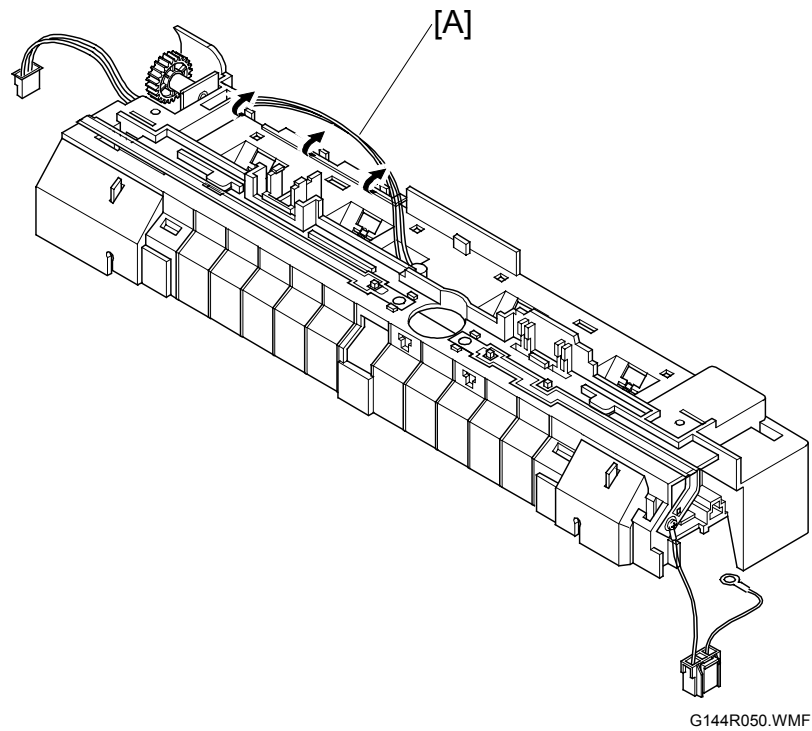
The illustration below shows the stripper pawls in the incorrect position.

Note that the stripper pawls are not correctly set into the stripper pawl holder slots. In this condition you cannot replace the fusing unit back to the machine.

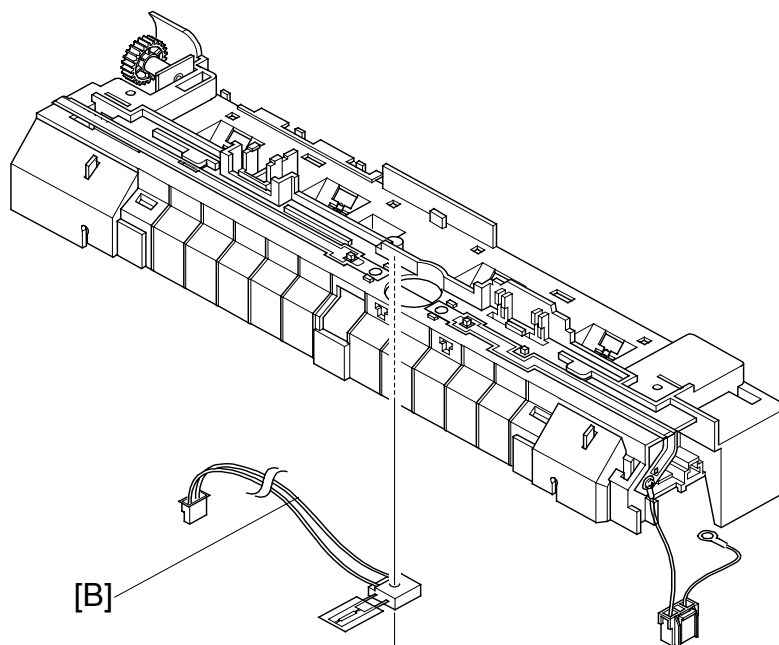



G144R903.TIF

### 3.6.5 THERMISTOR



[A]: Unwrap the thermistor harness [A] as shown above.

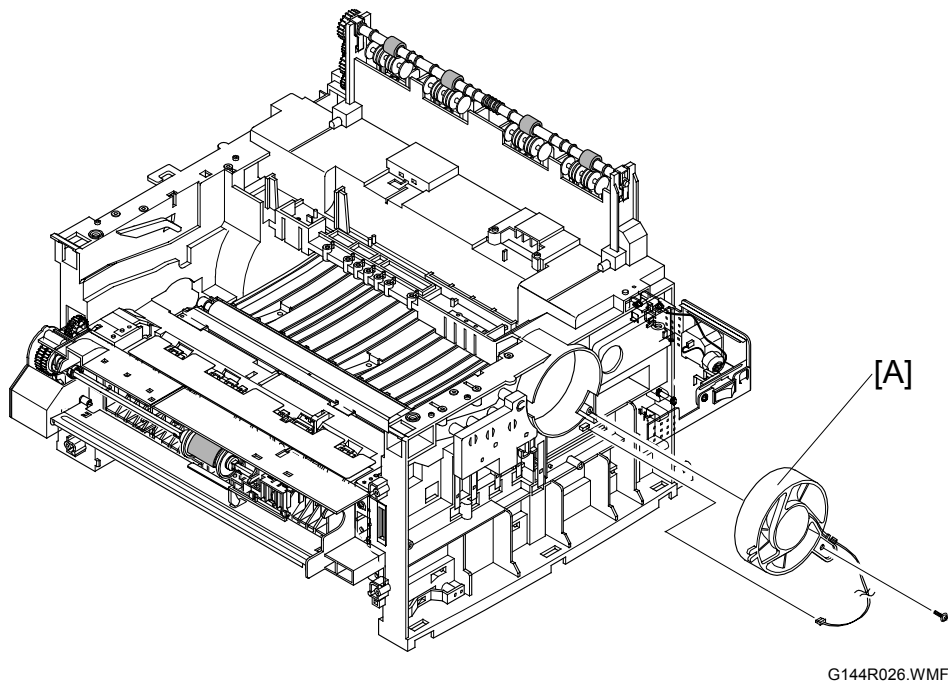




[B]: Remove 1 x  securing the thermistor [B] and remove it

### 3.7 UNPLUG FAN

Remove the following before you remove the fan.

- ☛: Front Cover
- ☛: Rear Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover

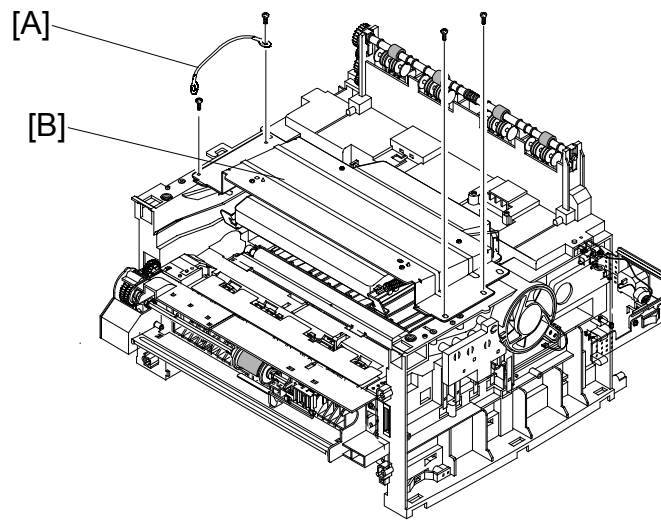


1. 1 x  from the SMPS.
2. Remove 1 x . Then remove the Fan [A].


### 3.8 LASER SCANNING UNIT

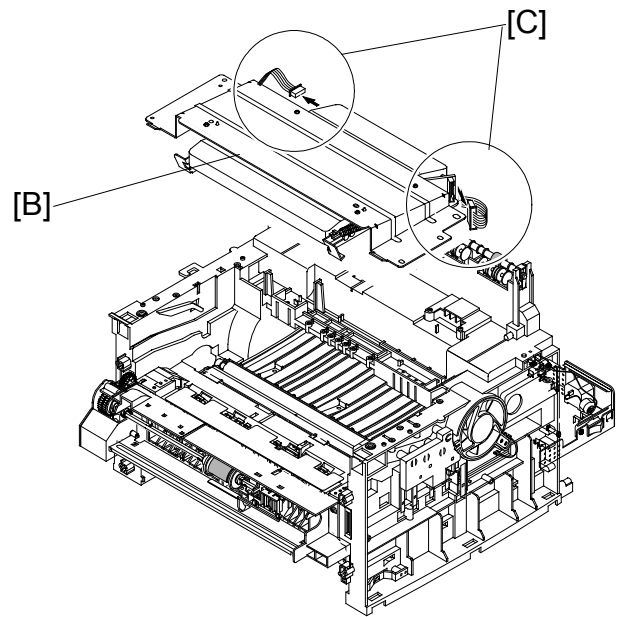
Remove the following before you remove the laser scanning unit.


- ☛: Front Cover
- ☛: Rear Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover



G144R027.WMF

1. Remove one ground wire [A].
2. Remove the 4 x  securing the laser scanning unit [B].



3. Unplug 2 x  [C] as shown above. Then remove the laser scanning unit [B].

**NOTE:** Do not touch the plastic shield of the laser scanning unit. Clean with a dry tissue if you touch, or, if dust gets on the plastic shield.

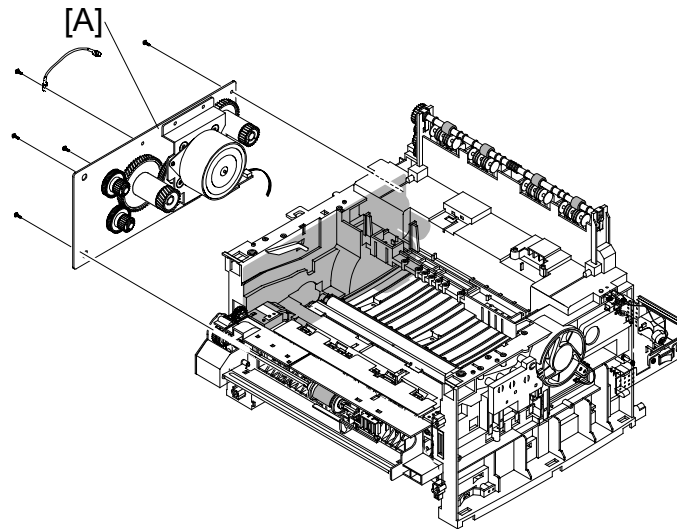
**NOTE:** The screw slots on the laser scanning unit are numbered. Use the following order when you disassemble/reassemble it.

- 1) Disassemble: 4-3-2-1
- 2) Reassemble: 1-2-3-4



### 3.9 DRIVE UNIT

Remove the following before you remove the drive assembly.

- ☛: Front Cover
- ☛: Rear Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover



G144R029.WMF

1. Unplug 1 x  from the drive assembly board [A].
2. Remove the 6 x  (white screws) and 2 x ground wires. Then remove the drive assembly board [A].

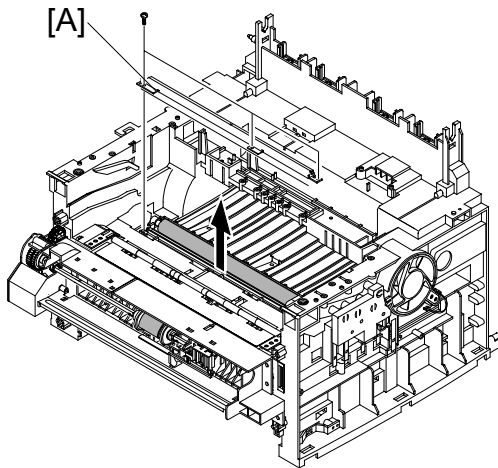
**NOTE:** The screws and the screw slots on the drive assembly board are numbered. Use the order shown on the board when you disassemble/reassemble it.



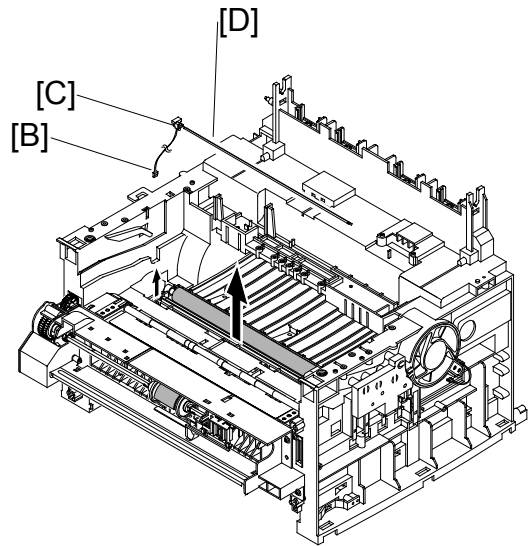
### 3.10 TRANSFER UNIT

Remove the following before you remove the transfer assembly.



- ☛: Front Cover
- ☛: Rear Cover
- ☛: Middle Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover

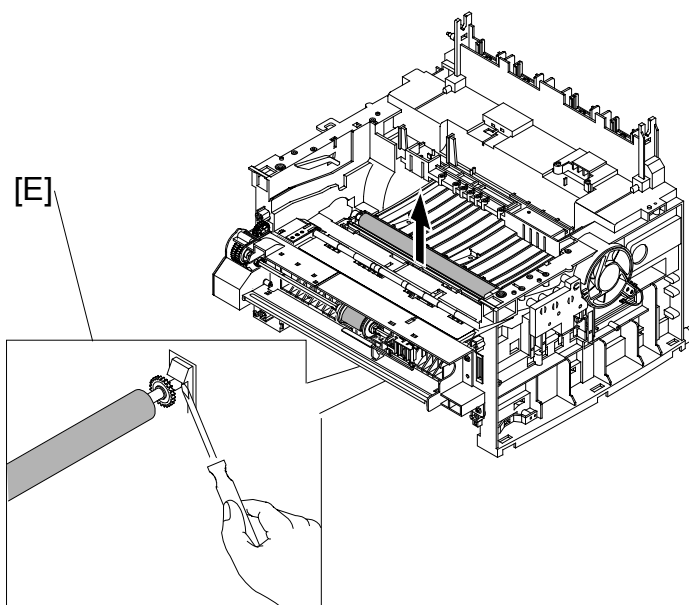


G144R034.WMF



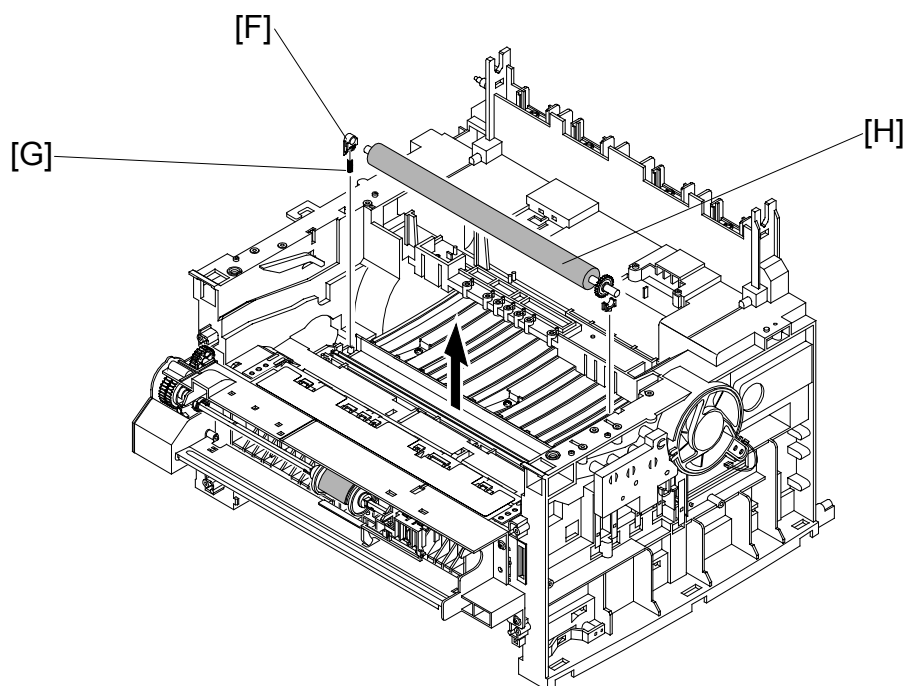
G144R035.WMF

1. Remove the 3 x . Then remove the transfer earth [A].  
The transfer earth is a yield part to not let unwanted particles get on the transfer roller.
2. Unplug 1 x  [B].
3. Remove the PLT holder [C] and the PTL lens [D].



G144R036.WMF

4. Unlatch the transfer roller [E] as shown above.



G144R037.WMF

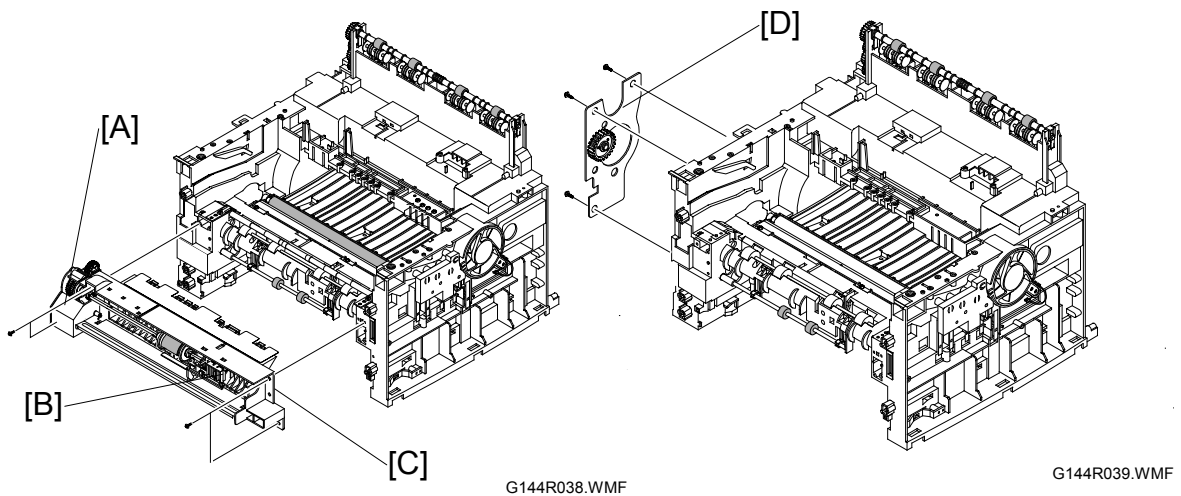
5. Unlatch two bushes (both sides) [F] and two springs (both sides) [G] and remove them.
6. Remove the transfer roller [H] from the machine.

### 3.11 BYPASS TRAY UNIT AND FEED ROLLER

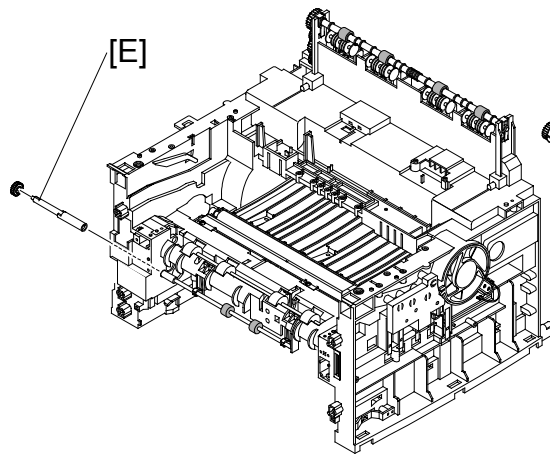
Remove the following before you remove the bypass tray and feed roller.

- ☛: Front Cover
- ☛: Rear Cover
- ☛: Middle Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover

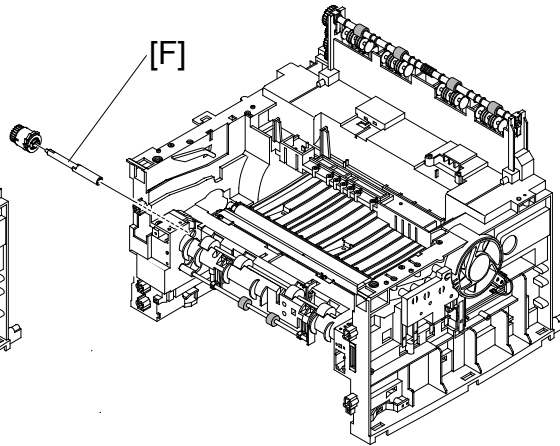
#### 3.11.1 BYPASS TRAY UNIT



1. Disconnect 1 x ☛ for the MP solenoid [A] and 1 x ☛ for the MP sensor [B].
2. Remove the 4 x ☛. Then remove the by-pass assembly. (make sure to thread the cables through the frame).
3. Remove the 2 x ☛ from the feed bracket [D]. Then remove it from the machine.



G144R040.WMF

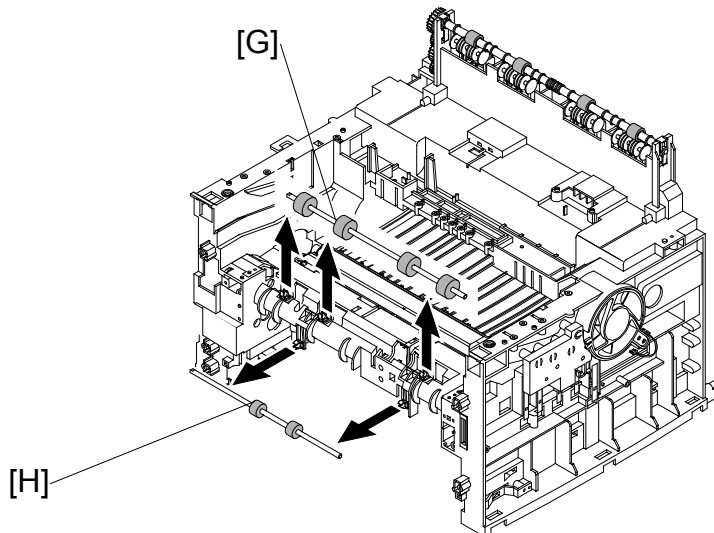


G144R041.WMF

4. Remove feed gear 2 [E] from the machine.

5. Remove feed gear 1 [F] from the machine.

**NOTE:** Feed gear 1 has a bigger bushing than feed gear 2. This will let you tell know which gear is feed gear one and which gear is feed gear two.



G144R042.WMF

6. Remove the feed roller [G] from the machine.

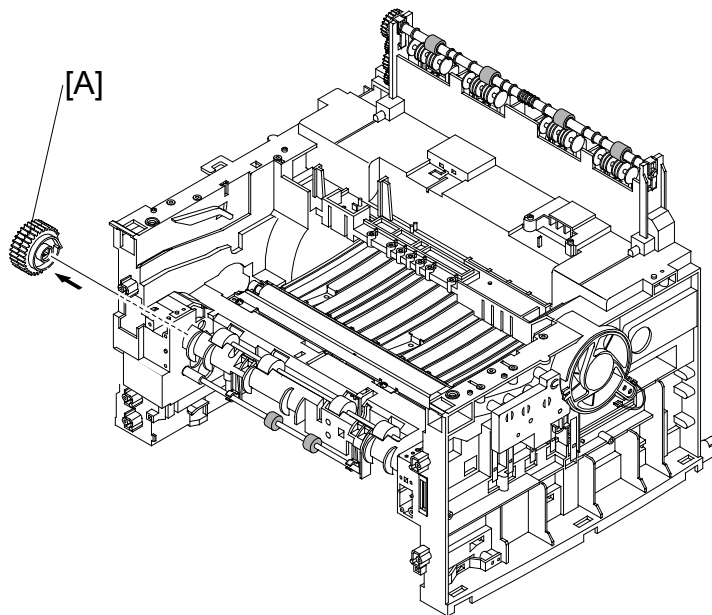
7. Remove feed roller 1 [H] from the machine.

### 3.12 PICK-UP ASSEMBLY AND SOLENOID

Remove the following before you remove the pick-up assembly and solenoid.

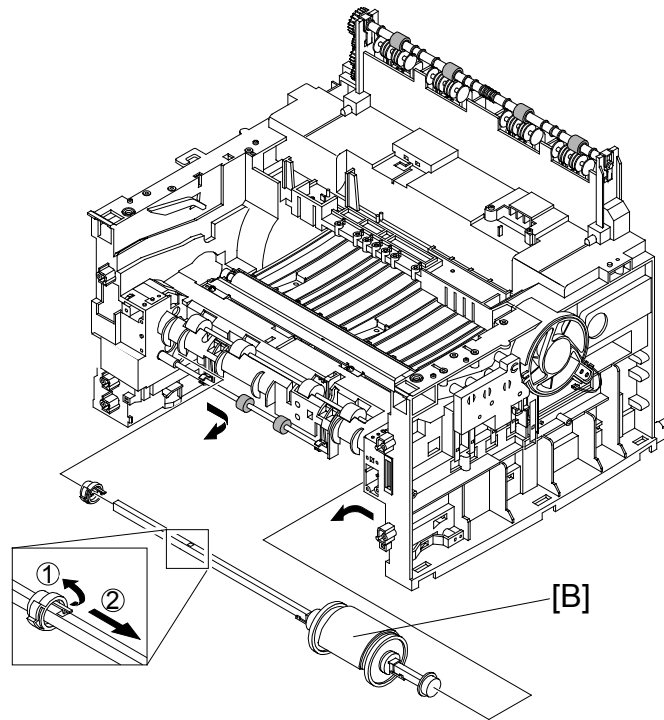
- ☛: Front Cover
- ☛: Rear Cover
- ☛: Middle Cover
- ☛: Top Cover
- ☛: Left and Right Side Cover

1. Remove the pick-up gear [A].

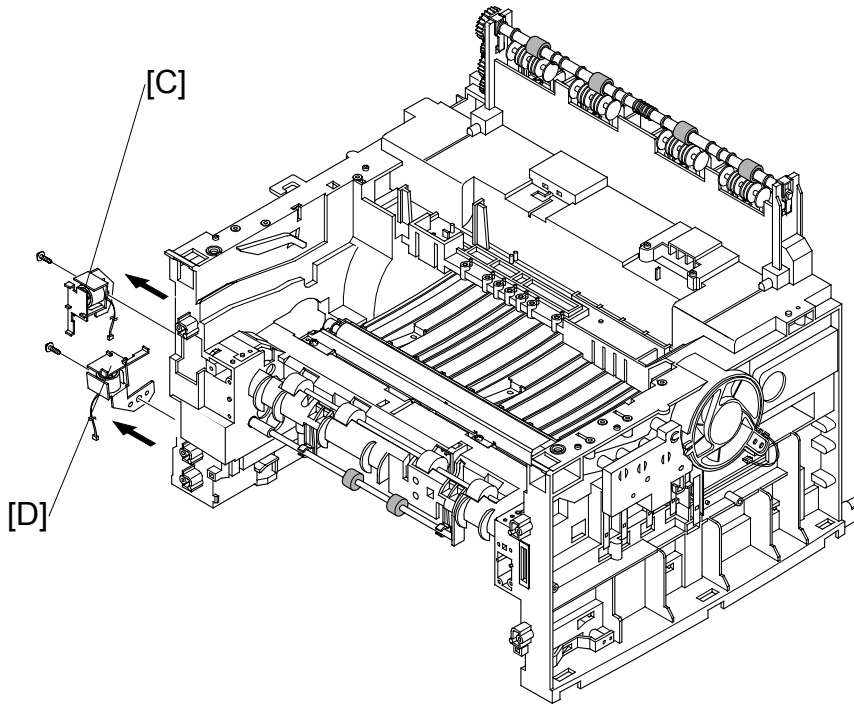


G144R043.WMF



2. Remove the pick-up assembly [B] as shown

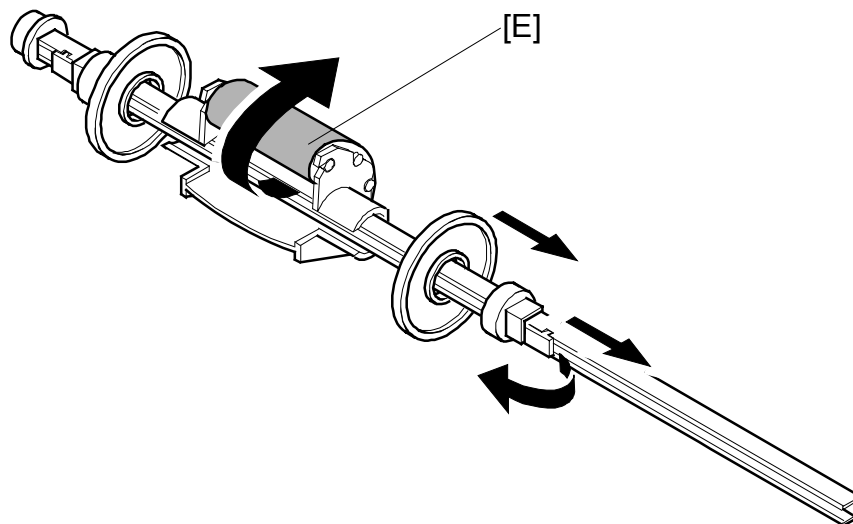


G144R044.WMF



G144R045.WMF

3. Disconnect 2 x  from the main board.
4. Remove the 2 x . Then remove the pick-up solenoid [C] and the manual solenoid [D]. (make sure to thread the cables through the frame).

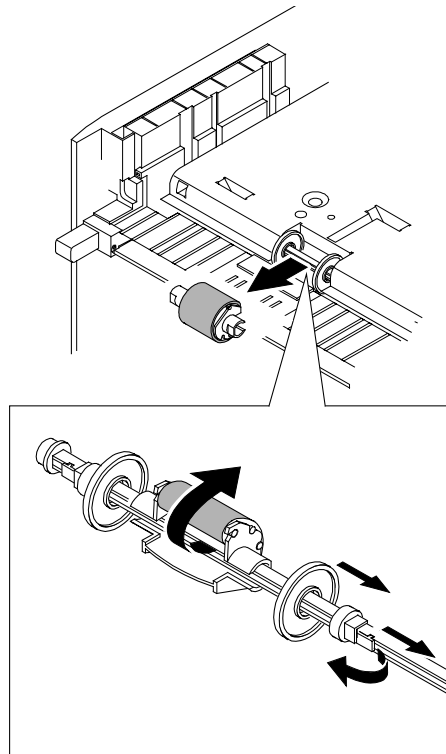


G144R046.WMF

5. Remove the rubber pick-up [E] from the pick-up roller as shown above.

***Pick-up Roller and By-pass Pick-up Roller***

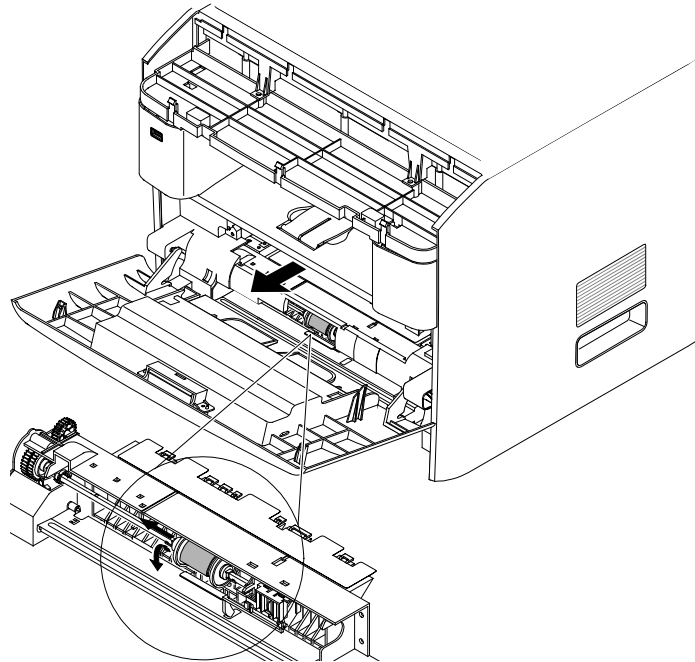
It is not necessary to disassemble the main cassette if you only want to replace the pick-up roller and/or the by-pass pick-up roller. The following procedures show how to replace these two rollers only.

***Paper Feed Unit Pick-up Roller***

G144R047.WMF

1. Turn the machine upside down.
2. Release the white catch. Then slide the locking piece as far to the side as possible.
3. Slide the white collar as far to the side as possible.
4. Slide the pick-up roller to the side until it gets free from the white collar.
5. Rotate the pick-up roller around the drive until it can be removed.



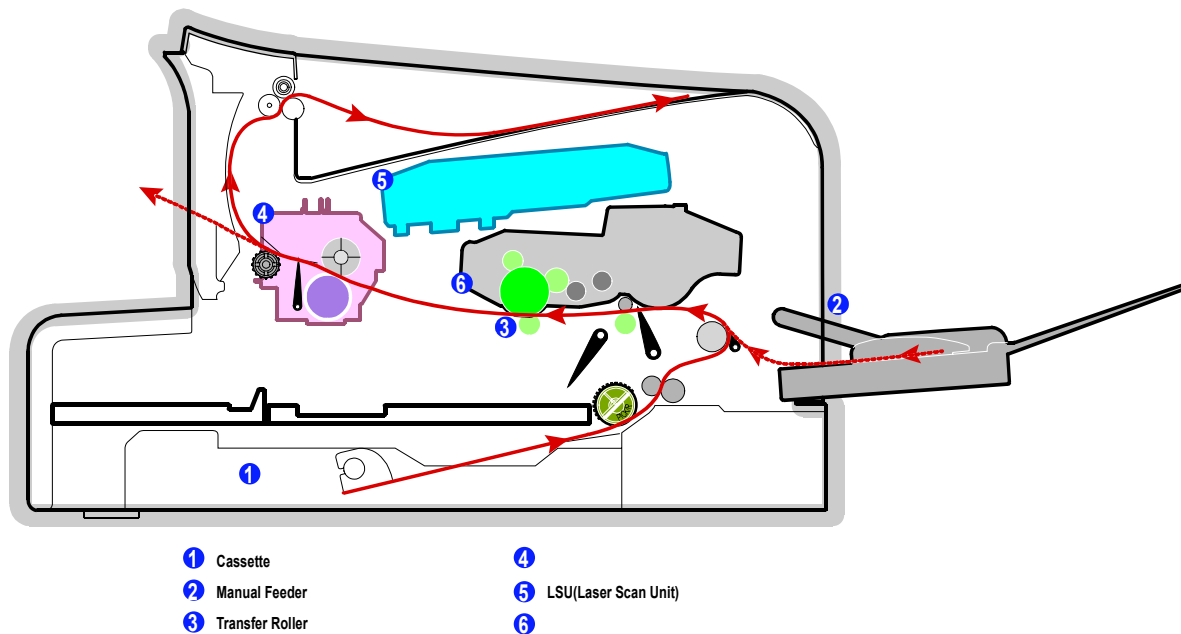
***By-pass pick-up roller***

G144R048.WMF

1. Release the white catch and slide the locking piece as far to the side as possible.
2. Slide the white collar as far to the side as possible.
3. Slide the pick-up roller as far as possible to the side until it gets free from the white collar.
4. Rotate the pick-up roller around the drive shaft until it can be removed.

## 4. TROUBLESHOOTING

### 4.1 PAPER PATH

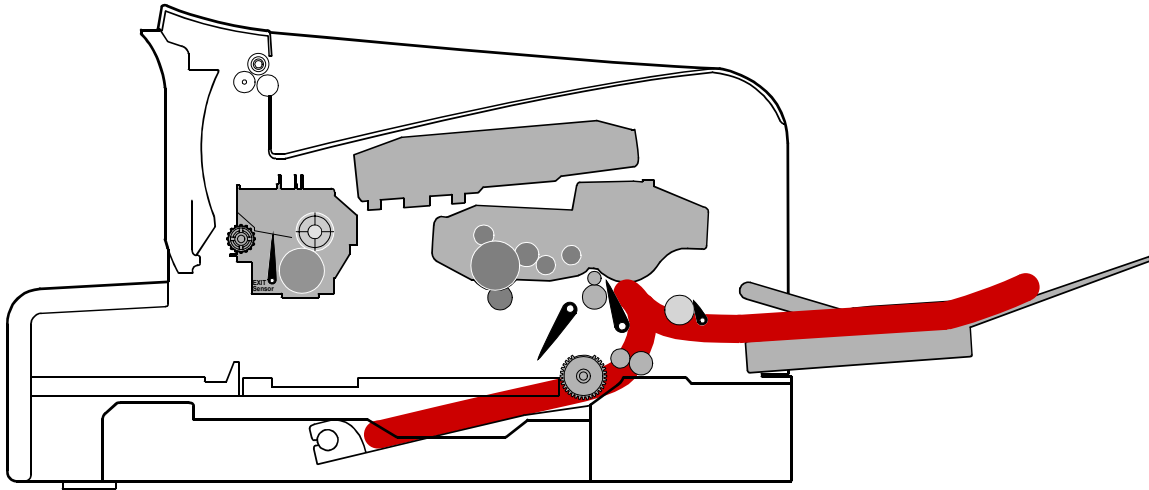


G144T001.WMF

- |                        |                        |
|------------------------|------------------------|
| 1. Paper feed cassette | 4. Fusing unit         |
| 2. By-pass tray        | 5. Laser scanning unit |
| 3. Transfer roller     | 6. Toner cartridge     |

### 4.1.1 PAPER JAM CONDITIONS

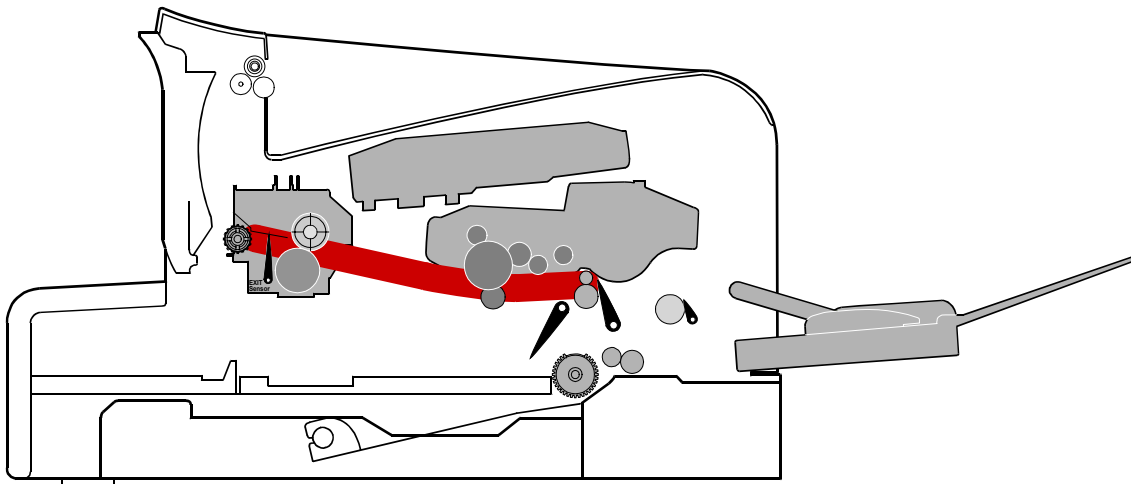
#### ***Jam0***



G144T002.WMF

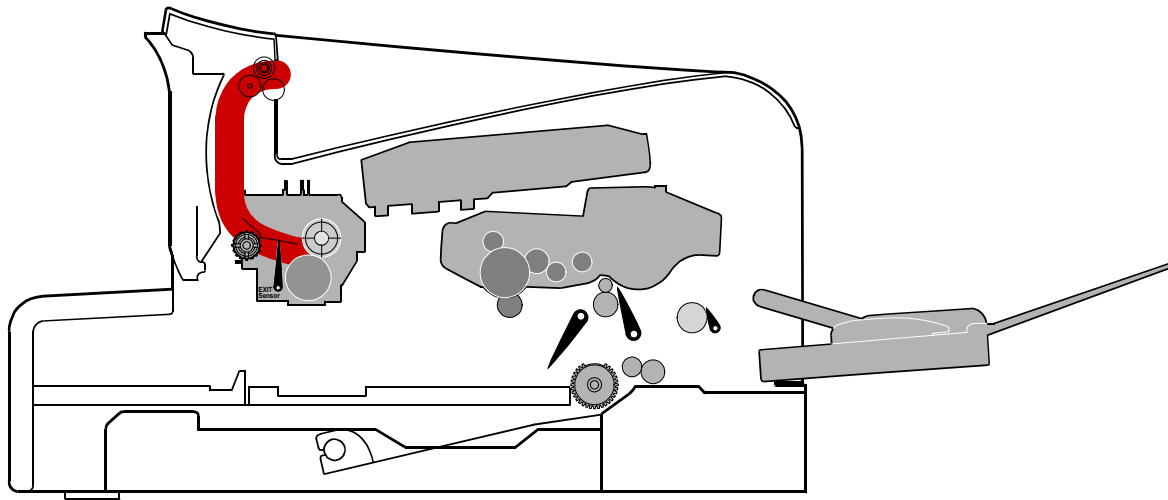
The printer feeds paper from the main/optional paper feed unit, or, by-pass tray after it gets the print command. The fed paper passes the paper feed sensor. Jam0 occurs if the sensor is not operated within a certain time.

#### ***Jam1***



G144T003.WMF

The paper moves to the paper exit sensor after it passes the paper feed sensor. Jam1 occurs if the sensor is not operated within a certain time.

**Jam2**

G144T004.WMF

The paper passes through the paper exit sensor and out of the machine. Jam2 occurs if the trailing edge of the paper does not pass the exit sensor within a certain time of the paper leading edge activating the exit sensor.

## 4.2 CLEARING PAPER JAMS

Paper can get jammed under the following the conditions.

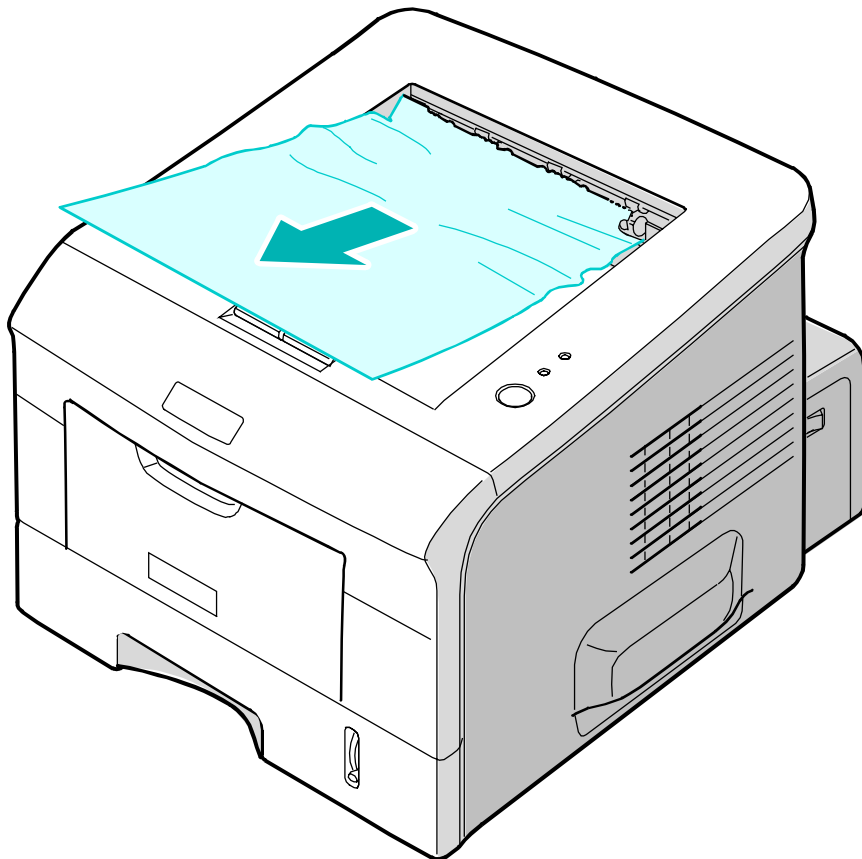
- The tray is loaded incorrectly or overfilled.
- The tray has been pulled out during a print job.
- The front cover has been opened during a print job.
- Incorrect paper has been used.

The On Line/Error LED on the control panel lights red if a paper jam occurs. Find and remove the jammed paper. Look inside the printer if no paper visible. Do not use tweezers or other sharp metal tools to remove jammed paper.

**NOTE:** Make sure you remove all paper fragments from the machine if the paper tears when you remove it from the machine. Otherwise a jam will occur again

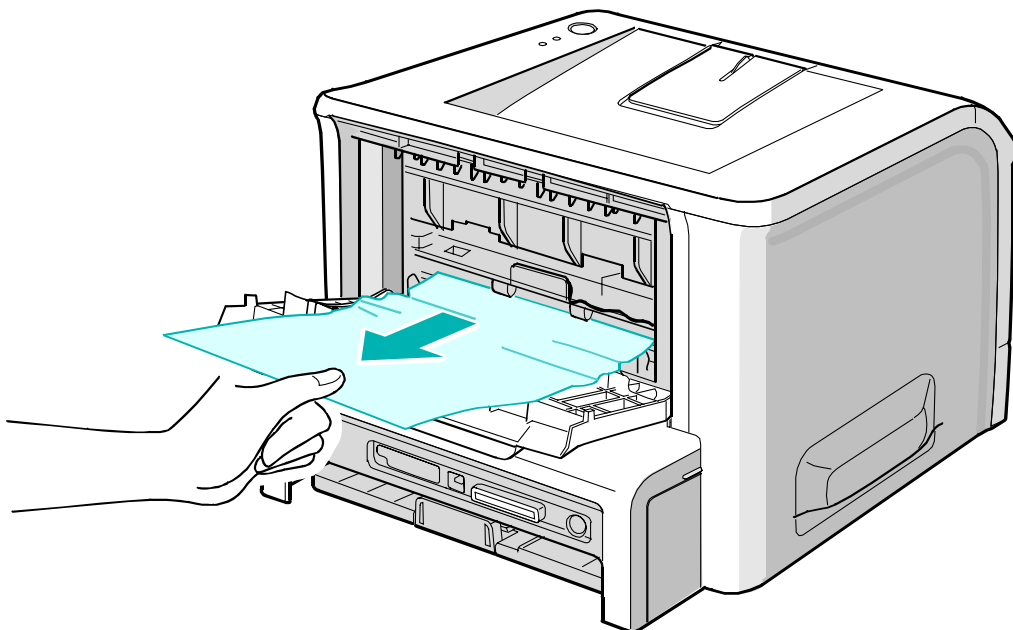
### 4.2.1 JAM2 (PAPER EXIT AREA)

Do the following procedure to solve this paper jam type.



G144T005.WMF

1. Pull the paper straight out if paper gets jammed when it exits to the output tray. Do not continue to pull the paper if there is resistance and the paper does not move. In this condition, go to the next step.



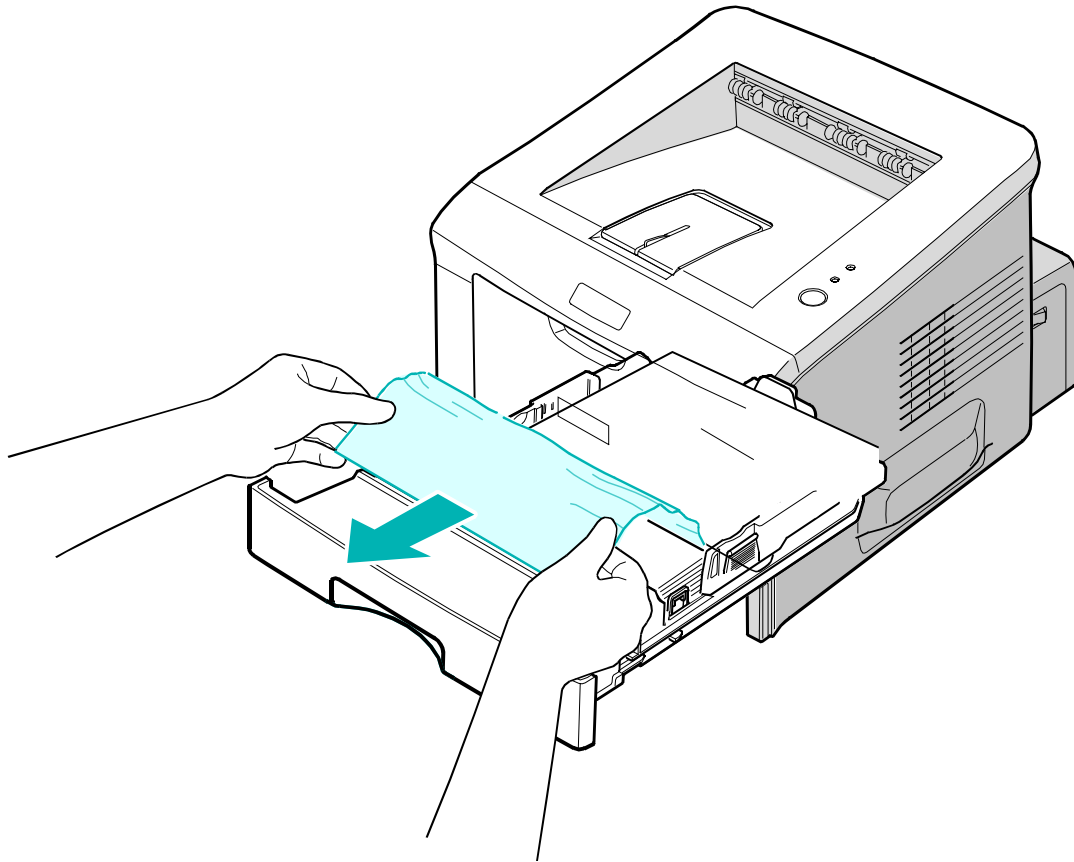
G144T006.WMF

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. Then open and close the front cover. Printing starts again.

**NOTE:** Paper jammed in this area is very close to the fusing unit. The fusing unit can get very hot. Use high caution when you remove paper in this area.

### 4.2.2 JAM0 (PAPER FEED AREA)

Do the following procedure to solve this paper jam type.

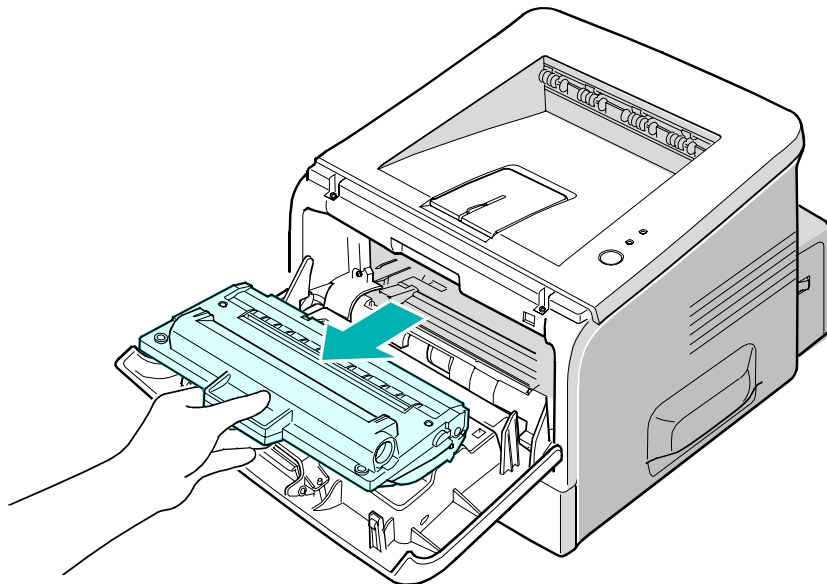


G144T007.WMF

1. Slide out the paper tray unit.
2. Grab the visible edge of the paper and gently pull it out of the paper tray as shown above. Then make sure the remaining paper in the paper tray unit is correctly aligned.
3. Slide the tray back into the machine. Then open and close the front cover. Printing starts again.

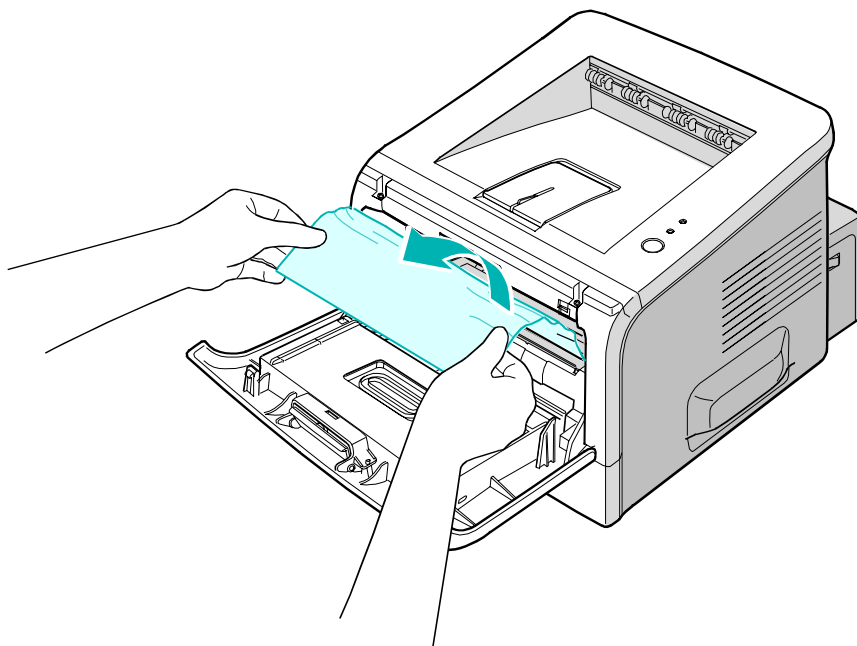
### 4.2.3 JAM1 (TONER CARTRIDGE AREA)

Do the following procedure to solve this paper jam type.



G144T008.WMF

1. Open the front cover and remove the toner cartridge.



G144T009.WMF

2. Gently pull the paper toward you as shown above.
3. Make sure there is no more paper in the machine.
4. Re-install the toner cartridge and close the cover. Printing starts again.



#### **4.2.4 TIPS TO AVOID PAPER JAMS**

Do the following to reduce paper jam occurrences.

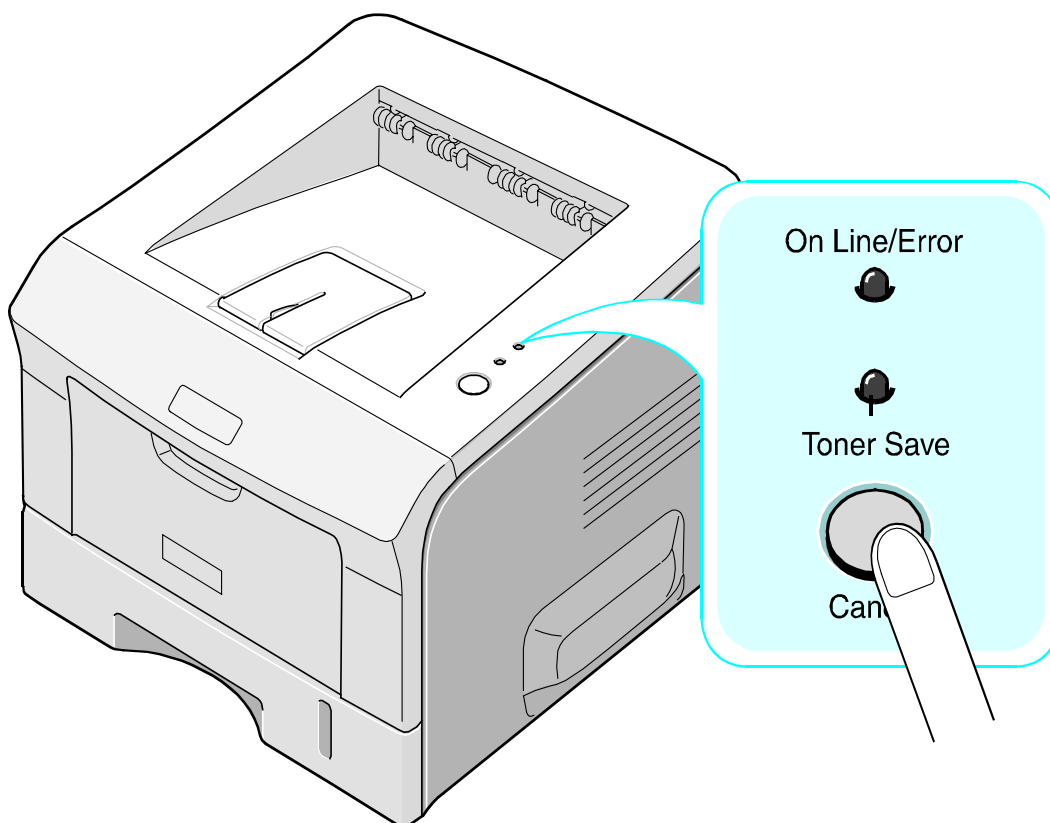
- Make sure that the adjustable guides are positioned correctly.
- Do not overload the tray. Ensure that the paper is below the paper capacity mark on the right inside of the tray.
- Do not remove the paper from the tray at the time the machine prints.
- Flex, fan and straighten the paper before you load it to the paper feed unit.
- Do not use creased, damp or highly curled paper.
- Do not mix paper types.
- Use only recommended print media.
- Ensure that the recommended print side is facing down when you load paper to the input tray.

## 4.3 SAMPLE PATTERN

The sample pattern lets you maintain and check the machine for abnormal conditions.

### 4.3.1 PRINTING A DEMO PAGE AND CONFIGURATION PAGE

The demo page and configuration sheet lets you check if the machine operates correctly.



G144T010.WMF

1. Press and hold the cancel button for about 2 seconds to print the "Demo page".
2. Press and hold the cancel button for about 6 seconds to print the "Configuration page".

### 4.3.2 PRINTING A CLEANING SHEET

You should print a cleaning sheet if printed images are blurred, faded or smeared. The machine cleans the drum inside the toner cartridge when you print a cleaning sheet. A page with toner debris gets output when you print the cleaning sheet. Make sure you discard this sheet.

Do the following procedure to print the cleaning sheet.

1. Make sure the machine is turned on and in the 'Ready Mode' and paper is loaded in the paper tray unit.
  2. Press and hold the cancel button for about 10 seconds. The machine automatically prints out the cleaning sheet.
- The print a cleaning sheet operation takes time.

## 4.4 OPERATION PANEL DISPLAY

The table below shows error messages that show on the operation panel.

Error	LED Status
Open fusing unit error	The [Error] LED (red) and the [Toner Save] LED flash simultaneously at 1 second intervals.
Over heat error	The [Error] LED (orange) and the [Toner Save] LED flash simultaneously at 1 second intervals.
Low heat error	The [Error] LED (red) and the [Toner Save] LED flash simultaneously at 4 second intervals.
LSU not ready error (polygon motor error)	The [Error] LED (green) and the [Toner Save] LED flash simultaneously at 1 second intervals.
LSU not ready error (HSYNC error)	The machine stops printing and the [Error] LED (green) and the [Toner Save] LED flash simultaneously at 4 second intervals.

## 4.5 PERIODIC DEFECTIVE IMAGE

Number	Roller	Defective Image	Description
1	OPC drum	75.5 mm	White spots on black image, or black spots.
2	Charge roller	37.7 mm	Black spots
3	Supply roller	44.9 mm	Light or dark horizontal bands
4	Developing roller	35.3 mm	Horizontal image band
5	Transfer roller	47.1 mm	Ghosting
6	Hot roller	78 mm	Black spot and ghosting
7	Pressure roller	75.5 mm	Black spots on the rear side of the printout

## 4.6 PRINTOUT PROBLEMS

### 4.6.1 INCORRECT PRINT POSITION

**Description:** The print job starts when the paper is not in the correct position

Cause	Solution
1. Defective feed sensor actuator	1. Replace the defective actuator

### 4.6.2 VERTICAL BLACK LINE AND BAND

**Description.** Straight thin or dark black vertical line shows in the printout

Cause	Solution
1. Damaged developer roller, or defective doctor/cleaning blade in the toner cartridge.	1. Replace the toner cartridge and test again.
2. Charge roller surface is scratched.	2. Replace the toner cartridge and test again.
3. Damage to the surface of the transfer roller	3. Replace the transfer roller and test again.

### 4.6.3 VERTICAL WHITE LINE

**Description.** White vertical lines show. In this condition, parts of the image get blocked.

Cause	Solution
4. Window or internal lenses of LSU mirror are contaminated.	4. Clean the LSU window with isopropyl alcohol. Replace the LSU if there is unwanted particles inside.
5. Unwanted particles inside the toner cartridge or low toner.	5. Replace the toner cartridge.
6. Unwanted particles, contamination or burr on the edge of the toner cartridge window.	6. Clean the exposure window.
7. Fusing unit is defective if voids periodically show on the top of black images.	7. Check the ribs of the fusing unit and remove unwanted particles if found.
8. OPC drum is contaminated.	8. Replace the toner cartridge.
9. Depression or deformation on the surface of the transfer roller.	9. Replace the transfer roller.

#### 4.6.4 HORIZONTAL BLACK BANDS

**Description:** Dark or blurry horizontal stripes show periodically on the printout

Cause	Solution
<ol style="list-style-type: none"> <li>1. Bad contacts on the toner cartridge high voltage terminals.</li> <li>2. The following rollers in the toner cartridge are damaged <ul style="list-style-type: none"> <li>• Charge roller</li> <li>• Supply roller</li> <li>• Development roller</li> <li>• Transfer roller</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Clean all high voltage terminals on the toner cartridge and set frame. Remove toner and dust particles.</li> <li>2. Clean the gear on the OPC. Replace the toner cartridge if the problem stays.</li> </ol>

#### 4.6.5 BLACK/WHITE SPOTS

**Description:** Dark, white or blurry spots show periodically on the printout.

Cause	Solution
<ol style="list-style-type: none"> <li>1. Developer is covered with unwanted matter or paper dust.</li> <li>2. The OPC drum surface is damaged.</li> <li>3. Transfer roller has reached the end of its life.</li> </ol>	<ol style="list-style-type: none"> <li>1. Print several OPC cleaning mode prints. Then run the self-test 2-3 times.</li> <li>2. Examine the OPC drum surface and remove any unwanted particles with a soft lint free cloth. Replace the toner cartridge if the problem stays.</li> <li>3. Replace the toner cartridge if it is past the 60 K PM interval.</li> </ol>

#### 4.6.6 LIGHT IMAGE

**Description:** Printed image too light (no ghost)

Cause	Solution
<ol style="list-style-type: none"> <li>1. Toner save mode is enabled.</li> <li>2. Developer roller is contaminated or the toner cartridge is almost empty.</li> <li>3. Ambient temperature is below 10 C.</li> <li>4. Bad contact because of dirty terminals on the toner cartridge set.</li> <li>5. Abnormal output from the HVPS</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn the toner save more off.</li> <li>2. Replace the toner cartridge.</li> <li>3. Turn the machine off. Wait 30 minutes and turn the machine on again. Then try to print.</li> <li>4. Clean dirt from the toner cartridge and cartridge set contacts.</li> <li>5. Replace the HVPS.</li> </ol>

### 4.6.7 DARK/BLACK IMAGE

**Description:** Printed image is dark

Cause	Solution
1. No charge voltage in the engine board.	1. Check the connector that connects the HVPS and the engine board.
2. Charge voltage fault due to bad contact between toner cartridge and cartridge set	2. Clean the high voltage charge terminals. Replace the HVPS if the problem stays.
3. VD0 signal from main PBA is low	3. Replace the LSU or main PBA.

### 4.6.8 UNEVEN DENSITY

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

Cause	Solution
1. Pressure force on the left and right springs of the transfer roller is not even, springs are damaged, transfer roller is not correctly installed, transfer roller bushings or holders are damaged.	1. Replace both the left and right bush and spring assemblies.
2. Toner cartridge has reached the end of its life.	2. Replace the toner cartridge.
3. Toner inside the cartridge is not level due to damaged blade or low toner.	3. Gently shake the toner cartridge side to side 5-6 times and try to print again. Replace the toner cartridge if the problem stays.

### 4.6.9 BACKGROUND

**Description:** Light dark background shows throughout the printout.

Cause	Solution
1. The machine has not printed large quantities of low coverage pages, or, the machine has not been used for a long time.	1. The toner cartridge is deigned to print 3,000 sheets with 5% coverage. Background can show if the machine prints more than 3,600 pages with 2% coverage.
2. A recycled toner cartridge is used.	2. Machine operation is not guaranteed with recycled toner cartridges. Gently shake the toner cartridge side to side 5-6 times and try to print again. Replace the toner cartridge if the problem stays.
3. The toner cartridge has reached the end of its life.	3. Replace the toner cartridge.
4. The up/down movement of the transfer roller is not smooth.	4. Clean the transfer roller bushes.
5. HVPS is abnormal.	5. Clean the high voltage charge terminals. Replace the HVPS if the problem stays.

### 4.6.10 GHOST 1

**Description:** Ghost shows at 75.5 mm intervals of the OPC drum in the printout.

Cause	Solution
1. Bad contacts caused by unwanted toner particles between the high voltage terminal in the main body and the electrode of the toner cartridge.	1. Clean all HV contacts. Replace the HVPS if the problem stays.
2. Bad contacts caused by unwanted toner particles between the high voltage terminal in the main body and the in the HVPS board.	2. Clean all HV contacts. Replace the HVPS if the problem stays.
3. The toner cartridge has reached the end of its life.	3. Replace the toner cartridge.
4. Transfer roller has reached the end of its life.	4. Replace the transfer roller
5. Ambient temperature below 10 C.	5. Turn the machine off. Wait 30 minutes and turn the machine on again. Then try to print.
6. Damaged cleaning blade in the toner cartridge.	6. Replace the toner cartridge.

### 4.6.11 GHOST 2

**Description:** Ghost shows at 75 mm intervals of the OPC drum in the printout.

Cause	Solution
1. Higher voltage required when printing on card stock, thick paper or OHP sheets.	1. Set the machine to print to print for these media types in the printer driver or application software.

### 4.6.12 GHOST 3

**Description:** Ghost shows at 66.3 or 75.5 mm intervals of the OPC drum in the printout.

Cause	Solution
1. Fusing unit is contaminated	1. Disassemble the fusing unit and remove unwanted matter from the rollers. Clean unwanted particles between the thermistor and the hot roller (Use high caution not to damage the rollers)

### 4.6.13 GHOST 4

**Description:** White ghost shows at 32 mm intervals of the OPC drum in the printout.

Cause	Solution
<ol style="list-style-type: none"> <li>Developer has reached the end of its life.</li> <li>Abnormal output from the HVPS.</li> </ol>	<ol style="list-style-type: none"> <li>Replace the toner cartridge.</li> <li>Check the HVPS supply voltage. Clean the HV terminals on the cartridge and cartridge set. Replace the HVPS if the problem stays.</li> </ol>

### 4.6.14 STAINS ON FRONT OF PAGE

**Description:** Background on the face of the printout is stained.

Cause	Solution
<ol style="list-style-type: none"> <li>Toner leakage due to incorrectly sealed toner cartridge.</li> <li>Transfer roller is contaminated.</li> </ol>	<ol style="list-style-type: none"> <li>Replace the toner cartridge.</li> <li>Do the PC cleaning mode 2-3 times. Then do the self-test 2-3 times.</li> </ol>

### 4.6.15 STAINS ON BACK OF PAGE

**Description:** The backside of the printout is stained at 47.1 or 75.4 mm intervals.

Cause	Solution
<ol style="list-style-type: none"> <li>Transfer roller is contaminated</li> <li>Pressure roller is contaminated.</li> </ol>	<ol style="list-style-type: none"> <li>Do the PC cleaning mode 2-3 times. Then do the self-test 2-3 times. Replace the transfer roller if the problem stays.</li> <li>Disassemble the fusing unit and clean the hot roller and the pressure roller. Clean the area between the hot roller and the thermistor. (Use high caution not to damage the rollers)</li> </ol>

### 4.6.16 BLANK PAGE 1

**Description:** Blank page gets printed

Cause	Solution
<ol style="list-style-type: none"> <li>Bad ground contacts in the OPC and/or toner cartridge.</li> </ol>	<ol style="list-style-type: none"> <li>Check if the ground OPC or the OPC ground Zener diode are defective. Clean the terminals on the toner cartridge and cartridge set.</li> </ol>



**4.6.17 BLANK PAGE 2**

**Description:** Blank page or several blank page (s) get printed, or, several blank pages get printed when the machine is turned on.

<b>Cause</b>	<b>Solution</b>
<ol style="list-style-type: none"><li>1. Bad ground contacts in the OPC and/or toner cartridge.</li><li>2. Abnormal solenoid</li></ol>	<ol style="list-style-type: none"><li>1. Check if the ground OPC or the OPC ground Zener diode are defective. Clean the terminals on the toner cartridge and cartridge set.</li><li>2. Do the engine self test mode in Tech Mode to check if the solenoid is normal. Replace the main PBA if the problem stays.</li></ol>

## 4.7 PAPER FEED PROBLEMS

### 4.7.1 INCORRECT PRINT POSITION

**Description:** The print job starts when the paper is not in the correct position

Cause	Solution
1. Defective feed sensor actuator	1. Replace the defective actuator

### 4.7.2 JAM 0

**Description:**

- 1) Paper does not exit from the cassette
- 2) Jam 0 shows when the paper feeds into the printer

Cause	Solution
1. Defective solenoid. Check the solenoid in Tech Mode.	1. Replace the solenoid
2. Cassette/By-pass knock-up plate and springs.	2. Repair/Replace as required
3. Paper separator pad	3. Clean with a soft cloth dampened with isopropyl alcohol or water. Replace if necessary.
4. Pick-up roller may be contaminated or not installed correctly.	4. Clean with a soft cloth dampened with isopropyl alcohol or water. Replace if necessary.
5. The area between the pick-up roller and registration sensor may be contaminated.	5. Make sure all rollers are clean.
6. Feed sensor may be defective. Check in Tech Mode.	6. Check the SMPS PBA, Main PBA and all connectors. Replace any faulty parts.

### 4.7.3 JAM 1

**Description:**

- 1) Paper gets jammed in front of, or, inside the fusing unit.
- 2) Paper gets stuck in the discharge roller and in the fusing unit after it passes through the actuator feed.

Cause	Solution
1. Paper gets jammed in front of, or, inside the fusing unit.	1. Replace the SMPS
2. Feed actuator may be defective.	2. Disassemble and then reassemble the actuator feed and spring.

#### 4.7.4 JAM 2

**Description:**

- 1) Paper gets jammed in front of, or, inside the fusing unit.
- 2) Paper gets stuck in the discharge roller and in the fusing unit after it passes through the actuator feed.

Cause	Solution
<ol style="list-style-type: none"> <li>1. Jam 2 can show even if the paper is completely fed out of the printer. The exit sensor may be defective. This sensor should go back to its original position to the shut the photo sensor. It may stay open due to debris.</li> <li>2. Paper stays rolled in the fusing unit. The guide claw could be broken or damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check if the exit sensor or actuator exit is damaged. <ul style="list-style-type: none"> <li>• Check if burrs show on the assembly part of the exit actuator.</li> <li>• Check if unwanted particles prevent correct operation of the actuator.</li> </ul> </li> <li>2. Disassemble the fusing unit and remove the jammed paper. Then clean the surface of the pressure roller with dry gauze. Check all ribs, claws and springs.</li> </ol>

#### 4.7.5 MULTI-FEEDING

**Description:** Multiple sheets of paper get fed at the same time.

Cause	Solution
<ol style="list-style-type: none"> <li>1. Paper size guides may not be set correctly (main paper tray unit and by-pass tray)</li> <li>2. Solenoid does not operate correctly.</li> <li>3. Friction pad is contaminated.</li> <li>4. Paper has a rough surface edge.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the paper guides</li> <li>2. Replace the solenoids or PBA</li> <li>3. Clean the friction with a soft cloth dampened with isopropyl alcohol or water.</li> <li>4. Use paper with a smoother surface</li> </ol>

#### 4.7.6 PAPER ROLLED IN THE FUSING UNIT

**Description:** Paper stays rolled around the rollers in the fusing unit.

Cause	Solution
<ol style="list-style-type: none"> <li>1. Pressure roller or hot roller may be contaminated</li> <li>2. Ribs, claws or springs may be damaged or deformed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean the roller surfaces and area between the hot roller and thermistor with isopropyl alcohol or water.</li> <li>2. Check for damage. Replace the fusing unit if necessary.</li> </ol>

### 4.7.7 PAPER STAYS IN THE OPC DRUM

**Description:** Paper stays rolled in the OPC drum

Cause	Solution
<ol style="list-style-type: none"><li>1. Paper is too thin</li><li>2. The face of the paper is curled</li></ol>	<ol style="list-style-type: none"><li>1. Use paper supported by the machine.</li><li>2. Make sure paper is stored correctly. To remove paper in the OPC<ol style="list-style-type: none"><li>1) Remove the toner cartridge from the machine (do not touch the green surface with bare hands).</li><li>2) Rotate the gear wheel and remove the paper from the cassette.</li><li>3) Clean all fingerprints from the OPC with a soft tissue. Make sure to not scratch the surface.</li></ol></li></ol>

## 4.8 SET MALFUNCTIONS

### 4.8.1 ALL LEDS BLINK (FUSING ERROR)

**Description:** All LEDs on the operation panel blink

Cause	Solution
1. Thermostat, fusing power cable or heat lamp circuit is open	1. Replace the heat lamp or cable harness, or, replace the entire fusing unit if necessary
2. Defective thermostat	2. Examine the thermistor mounting. If there is no heat damage replace the thermistor. Otherwise replace the entire fusing unit.
3. Drive gear melted	3. Replace the fusing unit.

### 4.8.2 ALL LEDS BLINK (SCAN ERROR)

**Description:** All LEDs on the operation panel blink

Cause	Solution
1. Defective LSU cable or faulty connector.	1. Replace the LSU
2. LSU motor is defective	2. Replace the main board. If the problem stays, replace the LSU.
3. Check the HSYNC signal	

### 4.8.3 PAPER EMPTY

**Description:** The paper empty lamp stays on even if there is paper in the machine.

Cause	Solution
1. Defective paper sensor actuator or faulty sensor	1. Replace defective actuator or sensor
2. Defective PBA	2. Replace the main PBA
3. Defective cables or connectors	

### 4.8.4 PAPER EMPTY WITHOUT INDICATION

**Description:** The paper empty lamp does not light when the paper cassette is empty

Cause	Solution
1. Defective paper sensor actuator or faulty sensor	1. Replace defective actuator
2. Defective PBA	2. Replace the main PBA
3. Defective cables, connectors or lamp	3. Check and replace the cable harness or OPC if necessary.

### 4.8.5 FUSING GEAR MELTS (OVERHEATS)

**Description:** Constant jam when paper enters the fusing unit, or, fusing unit rollers do not turn.

1. Paper constantly gets jammed in the fusing unit.
2. Fusing unit rollers do not turn

Cause	Solution
1. Fusing lamp, thermostat or thermistor are damaged.	<ol style="list-style-type: none"> <li>1. Replace the fusing unit</li> <li>2. Replace the main PBA</li> </ol>

### 4.8.6 COVER OPEN

**Description:** The error lamp stays on even when the cover is closed

Cause	Solution
<ol style="list-style-type: none"> <li>1. Hook lever or actuator may be stuck.</li> <li>2. Hook lever on the front cover may be damaged or broken.</li> <li>3. Sensor switch on the main PBA may be defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and replace the actuator if necessary.</li> <li>2. Replace the front cover.</li> <li>3. Replace the main PBA if necessary.</li> </ol>

### 4.8.7 NO ERROR LAMP WHEN COVER IS OPENED

**Description:** The error lamp does not light even when the print cover is opened.

Cause	Solution
<ol style="list-style-type: none"> <li>1. Hook lever or actuator may be stuck.</li> <li>2. Operation panel LED may be faulty. Check the connector and cables between the PBA and the operation panel.</li> <li>3. Sensor switch on the main PBA may be defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and replace the actuator if necessary.</li> <li>2. Replace the cable or operation panel if necessary.</li> <li>3. Replace the main PBA if necessary.</li> </ol>

### 4.8.8 DEFECTIVE MOTOR OPERATION

**Description:** Cover open message shows on the LCD when the front cover is closed.

Cause	Solution
<ol style="list-style-type: none"> <li>1. Main motor harness or motor PCB may be defective.</li> <li>2. Main PBA may be defective.</li> <li>3. Defective SMPS</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the motor harness and connectors. Replace if necessary. If the problem stays, check and replace the PBA or SMPS if necessary.</li> </ol>

### 4.8.9 NO POWER

**Description:** LEDS on the operation panel do not light when the power is turned on.

Cause	Solution
1. Check if the power input and SMPS operate correctly.	1. Replace the power supply cord or SMPS. Replace the power or SMPS fuses if necessary.
2. Normal sounds are heard but lamps do not come on.	2. Check the operation panel connector. Replace if necessary.
3. No sounds are heard and lamps do not come on after you replace the SMPS	3. Replace the main PBA

### 4.8.10 PRINTED VERTICAL LINES GET CURVED

**Description:** Vertical lines on the printout are not straight.

Cause	Solution
1. Check the +24V power supply to the LSU.	<ul style="list-style-type: none"><li>• Replace the LSU if +24 is stable. Replace the SMPS if +24V is not stable. If the problem stays replace the main PBA.</li></ul>

## 4.9 TONER CARTRIDGE

Make sure you only use toner cartridges approved by the manufacturer. Machine operation is not guaranteed if you use toner cartridges not approved by the manufacturer.

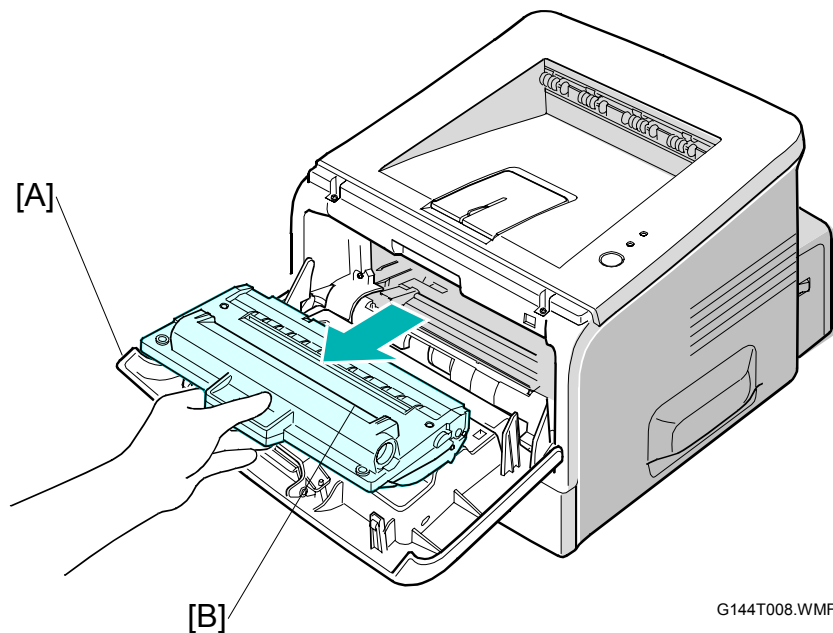
### 4.9.1 TONER CARTRIDGE PRECAUTIONS

Do not expose the toner cartridge to direct light for more than a few minutes.

You can temporarily improve the print quality by redistributing the toner if the printed image is light due to low toner supply. In this condition, shake the toner cartridge side-to-side 5-6 times. However, you should replace the toner cartridge to ensure high quality printouts.

### 4.9.2 REDISTRIBUTING TONER

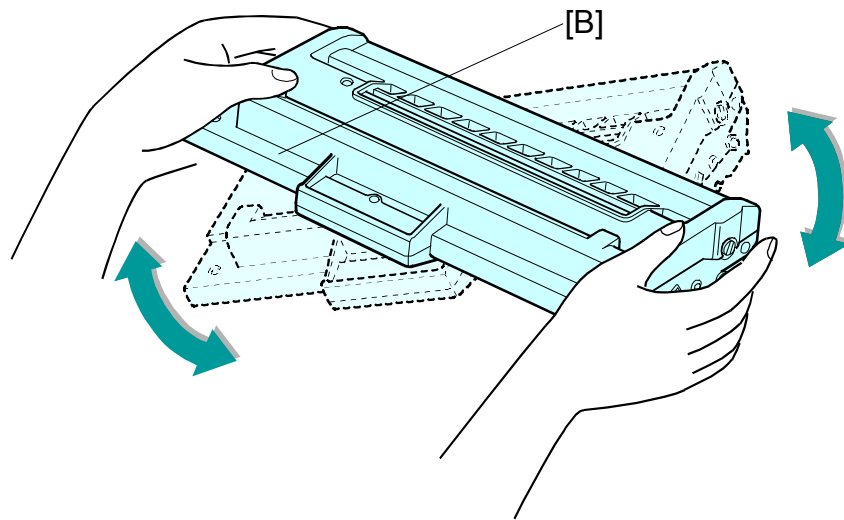
White streaks or light printouts show when the toner cartridge is near the end of its life. At this time the LCD displays shows the 'Toner Low' message. To temporarily solve this problem, you can redistribute the remaining toner in the cartridge.



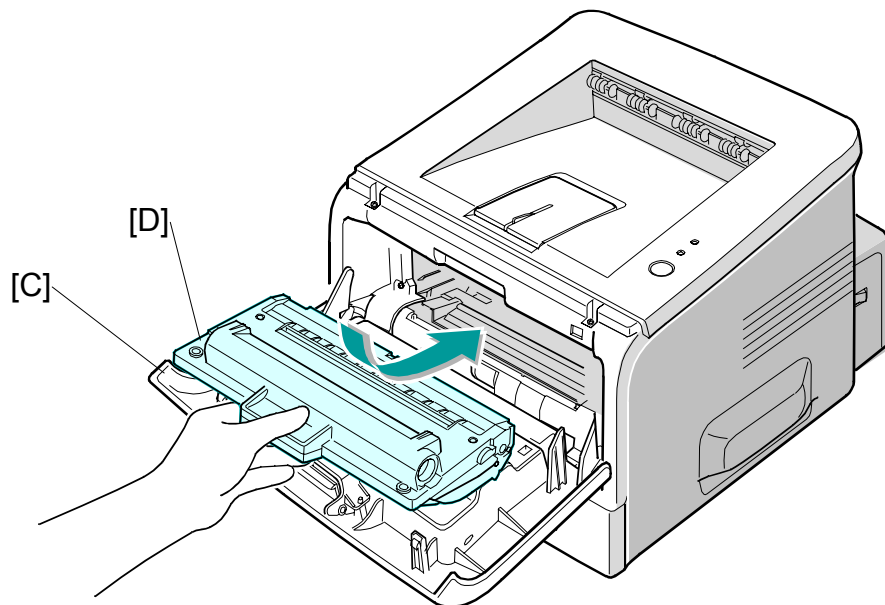
G144T008.WMF

1. Open the front cover [A]. Then gently push the toner cartridge [B] down and remove it from the machine.





G144T011.WMF



G144T012.WMF

2. Gently shake the toner cartridge [D] in the direction of the arrow as shown above. Then put the toner cartridge [D] back into the machine again and close the front cover [C].

### 4.9.3 TONER CARTRIDGE ERROR MESSAGES

The following table shows error message that show on the LCD. The messages are related to data stored in the EEPROM in the toner cartridge.

Error Message	Description	Solution
Toner Low	The amount of remaining toner is less than 10%	Replace the cartridge.
Toner Empty	The toner cartridge is empty.	Replace the cartridge.
Drum Warning	OPC drum is near the end of its life (14,000 pages).	Replace the cartridge even if there is still toner in it.
Replace Drum	Toner cartridge mechanical life has expired.	Replace the cartridge.

#### 4.9.4 TONER CARTRIDGE DETAILS

Description	Signs	Cause and Check and Solution
Light image/partially blank image (cartridge has reached the end of its life)	<ul style="list-style-type: none"> <li>Printed image is light, dirty or not clear.</li> <li>Parts of the image are not printed.</li> <li>A strange 'tick-tick' noise is periodically heard.</li> </ul>	<ol style="list-style-type: none"> <li>If the image is light, shake the toner cartridge and try to print again. If the problem stays, the cartridge has reached the end of its life. Replace the toner cartridge.</li> <li>Shake the toner cartridge if some parts of the image do not get printed. If the problem stays, clean the LSU window and try to print again. If the problem still stays, the cartridge has reached the end of its life.</li> <li>Measure the time between 'ticks' if you hear this sound. If the time interval of 'ticks' is about 2 seconds, the toner has almost reached the end of its life. Replace the toner cartridge.</li> <li>Shake the toner cartridge if white vertical bands show and try to print again. If the problem still stays, the cartridge has reached the end of its life. Replace the toner cartridge.</li> </ol>
Toner contamination	<ul style="list-style-type: none"> <li>Toner contamination shows at regular intervals on the printout.</li> <li>Toner contamination shows at random intervals over the whole or parts of the printout.</li> </ul>	<ol style="list-style-type: none"> <li>Contamination at regular intervals <ul style="list-style-type: none"> <li>A). Check the distance between contamination marks.</li> <li>B). Check both ends of the toner cartridge OPC drum. If both ends are contaminated with toner, the waste toner collector is full.</li> </ul> </li> <li>Random page contamination. <ul style="list-style-type: none"> <li>A). Make sure the terminal contact points of the toner cartridge are clean. Clean all HV contacts if they are dirty. Replace the toner cartridge if the problem stays.</li> <li>B). Make sure the terminal contact points of the toner cartridge are not damaged. Replace the toner cartridge if there is damage to the contact terminals.</li> </ul> </li> </ol>

White/Black Spot	<ul style="list-style-type: none"> <li>• Light or dark black dots show periodically on the image.</li> <li>• White spots show periodically on the image.</li> </ul>	<ol style="list-style-type: none"> <li>1. Toner cartridge rollers are contaminated with unwanted particles if light or dark black dots show periodically on the image. In this condition do the OPC clean mode print 4-5 times. Then check for unwanted matter on the OPC surface. Clean with isopropyl alcohol if necessary.             <ol style="list-style-type: none"> <li>1) 38 mm interval: Charge roller</li> <li>2) 95 mm interval: OPC cycle</li> </ol> </li> <li>2. The OPC drum is damaged or unwanted matter stays on the drum if white spots show at 95 mm intervals in a black image, or, if black spots show in areas where they should not show. Do the following if running the OPC clean mode print 4-5 times does not solve the problem.             <ol style="list-style-type: none"> <li>1) 37.7 mm intervals: Replace the toner cartridge.</li> <li>2) 75.5 mm intervals: Clean the OPC drum.</li> </ol> </li> <li>3. The transfer rollers life has expired if a black or white image is broken at irregular intervals. In this condition replace the transfer roller. Also, check the transfer voltage and readjust it if necessary.</li> </ol>
Recycled Product	<ul style="list-style-type: none"> <li>• Toner cartridge appears to be in poor condition.</li> <li>• Dirty or rough printouts.</li> <li>• Poor background in the image.</li> </ul>	<ol style="list-style-type: none"> <li>1. The toner cartridge is recycled if the following are true.             <ol style="list-style-type: none"> <li>1) There is evidence that the toner cartridge has been disassembled.</li> <li>2) Materials that are not approved by the manufacturer have been added or substituted to the toner cartridge.</li> </ol> <ul style="list-style-type: none"> <li>• Check the toner cartridge for the following. Replace the toner cartridge if necessary.                 <ol style="list-style-type: none"> <li>1) Check the toner cartridge for damage.</li> <li>2) Check the appearance of following toner cartridge parts                     <ul style="list-style-type: none"> <li>• Frame, hopper screws.</li> </ul> </li> </ol> </li> </ul> </li> <li>2. Check the following if the printouts are not clear or rough.             <ol style="list-style-type: none"> <li>1) Make sure the terminal contact points are clean and the set is not damaged. Clean the terminal points if the problem stays.</li> </ol> <p>The above problems can happen if the toner cartridge is recycled 2 times or more.</p> </li> </ol>

<p>Ghost image and other contamination</p>	<ul style="list-style-type: none"> <li>• Print out is too light or dark, or, partially contaminated.</li> <li>• Black image gets printed out.</li> <li>• Printout density is too dark and ghosting occurs.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check the following if the printout is too light, too dark or partially contaminated.               <ol style="list-style-type: none"> <li>1) Check if unwanted matter stays on terminal contact points of the cartridge set.</li> <li>2) Make sure the terminal is correctly assembled.</li> </ol> </li> <li>• Do the following if the above are true.               <ol style="list-style-type: none"> <li>1) Clean the contacts on the toner cartridge.</li> <li>2) Clean the contact points on the set.</li> <li>3) Repair or replace the terminals if they are damaged. Replace the toner cartridge if the problem stays.</li> </ol> </li> <li>2. Check the following if a black image gets printout out.               <ol style="list-style-type: none"> <li>1) Check if unwanted matter stays on terminal contact points of the cartridge set.</li> <li>2) Check if the terminal and charge roller contacts are correctly assembled.</li> </ol> </li> <li>• Do the following if the above are true.               <ol style="list-style-type: none"> <li>1) Examine the charge roller contacts. Clean them if they appear dirty or contaminated. Replace the toner cartridge if the problem stays.</li> </ol> </li> <li>3. Check the following if the printout too dark and ghosting occurs               <ol style="list-style-type: none"> <li>1) Check if unwanted matter stays on terminal contact points of the cartridge set.</li> <li>2) Check if the terminal and developer roller contacts are correctly assembled.</li> </ol> </li> <li>• Do the following if the above are true               <ol style="list-style-type: none"> <li>1) Check developer bias voltage contact. Clean it if it appears dirty or contaminated.</li> <li>2) Examine the charge roller contacts. Clean them if they appear dirty or contaminated.</li> </ol> </li> </ol>
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## 4.10 SOFTWARE PROBLEMS

### 4.10.1 PRINTER DOES NOT OPERATE CORRECTLY 1

**Description:** The printer does not operate in printing mode when the power is turned on.

Description	Solution
Do the self-test mode. Use the menu buttons (menu, enter, enter) and print the test page.	There are no problems with the machine if the test print works correctly. The machine is faulty if the test print does not work correctly. In this condition the problem is not due to computer software or printer driver settings.
Make sure the PC and the printer are correctly connected. Make sure the toner cartridge is correctly installed.	Replace the printer cable. Check the amount of remaining toner if the problem stays. Replace the toner cartridge if necessary.
Printing does not work in Windows.	<p>Check that the connection between PC and printer. Check the following if you use Windows.</p> <ol style="list-style-type: none"> <li>1) Check that the printer driver in the controller is correctly set up</li> <li>2) Make sure the correct port is selected and 'Use On-line' is selected in the driver.</li> </ol> <p>Print a test page from the driver properties if the printer driver is correctly set up. Check which program printing does not work. Open 'Memo Pad' and try to print. Adjust the setup within that program. If the printer does not work in a certain program.</p> <p>Sometimes the printout is normal within Windows basic programs, but does not work in some programs. In this condition, uninstall and re-install the new driver.</p> <p>Check the following if the printer does not work in Windows basic programs, and you are using the parallel port.</p> <ul style="list-style-type: none"> <li>• Check the port setting in CMOS is on ECP and that the address is IRQ 7 and 378 (for parallel port 1).</li> <li>• Try using USB instead of parallel port or vice-versa.</li> </ul>
Make sure the printer cable is directly connected to the printer.	Uninstall other devices that share the printer port and check if the printer works by itself. Connect directly to the back of the PC if you are using a USB hub.

### 4.10.2 PRINTER DOES OPERATE CORRECTLY 2

**Description:** After receiving the print command there is either no response or the print speed is low. Incorrect machine set-up and not printer malfunction is the cause of this condition.

Description	Solution
Not enough free hard disk space to accommodate temporary work files created during printing.	'Insufficient Printer Memory' message means there is a hard disk space problem rather than a printer RAM problem. In this condition, provide more space on the hard disk with the disk utilities program.
Printer error occurs even if there is enough space in the hard disk.	Make sure the connection between the cable and printer port is correct. Make sure the port settings in CMOS are correct if you use the parallel port.
Parallel port related problems in the CMOS set-up.	Select ECP for the printer port. SPP and normal modes support 8-bit data transfer. ECP mode supports 12-bit data transfer.
System needs to reboot to print.	The cable of printer driver may be defective if regular fonts do not get printed. At this time turn off the PC and reboot the system. If the problem stays, double click the printer icon in my computer. Replace the cable if the regular fonts are still not printed.

### 4.10.3 ABNORMAL PRINTING

**Description:** The printer does not work even after you replace the cables, or, strange fonts get printed.

Description	Solution
Parallel port problem with CMOS set-up	Make sure ECP (recommended), or SPP is selected in the CMOS (BIOS) set-up.
Printer driver error	Make sure the correct driver is loaded. Use the driver supplied on the CD, or, download the correct driver from the Ricoh web site. DO NOT use the Microsoft driver supplied with the Windows operating system. If the printer is a GDI or SPL type printer, ensure that ALL OTHER GDI or SPL drivers are uninstalled as Windows only lets 1 of this type of driver to be loaded.
'Insufficient Memory' message shows. Print jobs may suddenly stop due to insufficient space on the hard disk.	Delete unnecessary files to free up space on the hard disk. Then try to print again.

### 4.10.4 SPOOL ERROR

**Description:** Jobs are processed and stored on the hard disk until the printer is ready to accept them

Description	Solution
Insufficient space on the hard disk in the directory assigned for the basic spool.	Delete unnecessary files to free up space for spool storage.
Previous printing errors were not solved.	Delete '.jnl' files. Then reboot Windows and try to print again.
There may be conflict with other drivers or programs.	Close all programs except the one you need.
An application program or printer driver are damaged.	Delete the printer driver completely. Then reinstall it.
OS related files are damaged or virus infected.	Reboot the computer. Then check for viruses. Restore damaged files and reinstall application programs that do not work correctly.
Not enough memory exists.	Add more memory to the PC.

#### ***How to Delete Data in the Spool Manager***

The installed drivers and the list of the documents waiting to be printed show in the spool manager. Select the document you want to delete and check delete in the menu. If the job you want to delete is the current job, data that has already been transferred to the printer's memory will still be printed. The job may take a long time to delete as it must wait for a time out if there is a problem with the printer such as out of toner, offline, out of paper etc.



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## 5. SERVICE PROGRAM MODE



### 5.1 FIRMWARE DOWNLOAD

#### 5.1.1 DOWNLOAD PROCEDURE

There are two ways to upgrade the machine firmware.



1. Command Prompt
2. EWS (Embedded Web Server)

Connect the machine to a PC with the parallel “Command Prompt” or through the network for “EWS” before you do the firmware upgrade procedure.

It is very rare to lose data and settings after the program has downloaded. However you should print out the Configuration page list before you start the download procedure.

#### ***DOS Command mode***

Program (firmware) for this machine is upgraded by connecting to a PC via a Parallel cable. A Command to upgrade the program must be entered.

You must save the correct firmware file to the PC.

You can only use the following operating systems to upgrade the Firmware.

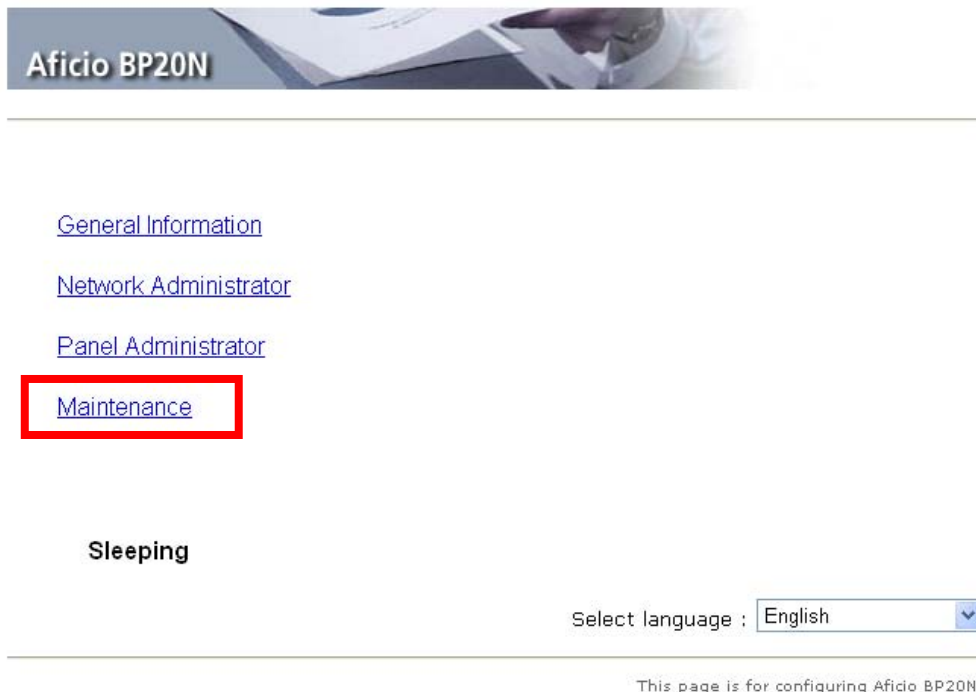
- 1) Windows NT
- 2) Windows 2000
- 3) Windows XP.

1. Print out the Configuration page for back up the data and setting.
2. In Command prompt, type *copy /b filename lpt1:.* Then press Enter
3. The program automatically upgrades.

***EWS (Embedded Web Server) mode***

Program (firmware) for this machine is upgraded by connecting to a PC through a Network. A Command to upgrade the program must be entered.  
You must save the correct firmware file to the PC.

1. Print out the Configuration page for back up the data and setting.
2. Download the Firmware on the PC.  
**NOTE:** Make sure to download both the 'Printer Firmware' and 'Network Firmware' if you want to upgrade both.
3. Access the "EWS" with the correct IP address.
4. Select 'Maintenance' as shown below.



G144S901.TIF

5. Make sure 'Upgrade Firmware' is selected as shown below. If not, select it.

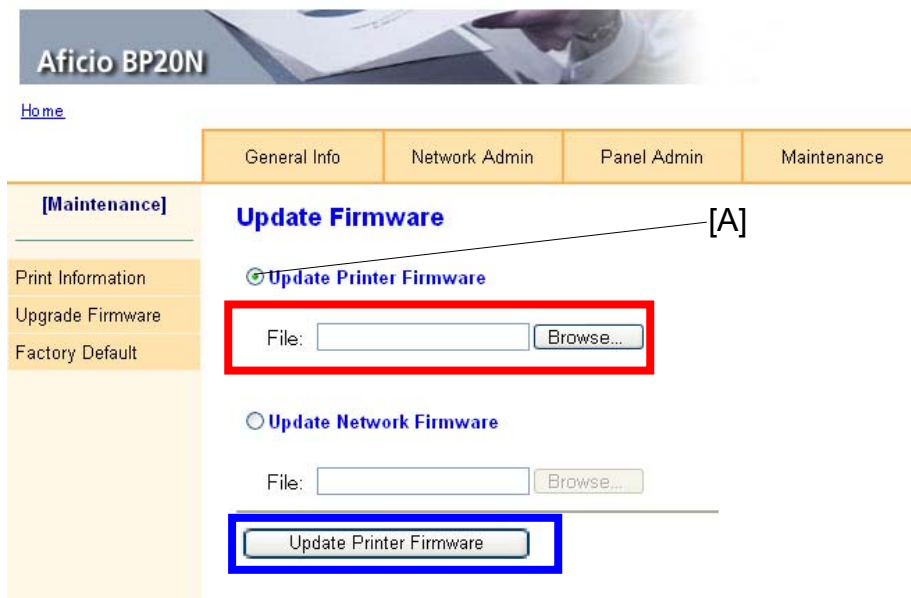


G144S902.TIF

6. Select 'Upgrade Printer Firmware [A]' as shown below. Then click the browse button and select the Printer Firmware file you saved in the PC.

**NOTE:** Go to step 9 if you only want to upgrade the 'Network Firmware'.

7. Click the 'Update Printer Firmware' button

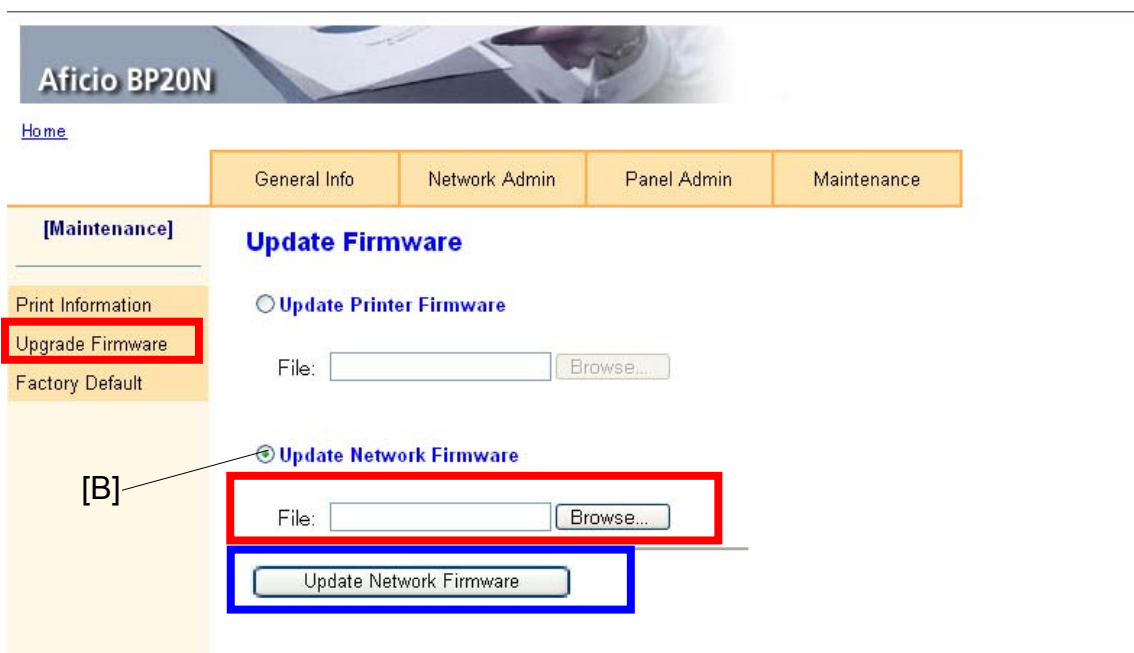


G144S904.TIF

8. Make sure the firmware has been completely updated.

**NOTE:** Do not turn off the power while updating the Firmware.

9. Make sure 'Upgrade Firmware' is selected as shown below. If not, select it.
  10. Select 'Upgrade Network Firmware [B]' as shown below. Then click the browse button and select the Network Firmware file you saved in the PC.
  11. Click the 'Update Network Firmware' button.
  12. Make sure the firmware has been completely updated.
- NOTE:** Do not turn off the power while updating the Firmware.



G144S903.TIF

### 5.1.2 FIRMWARE RECOVERY PROCEDURE

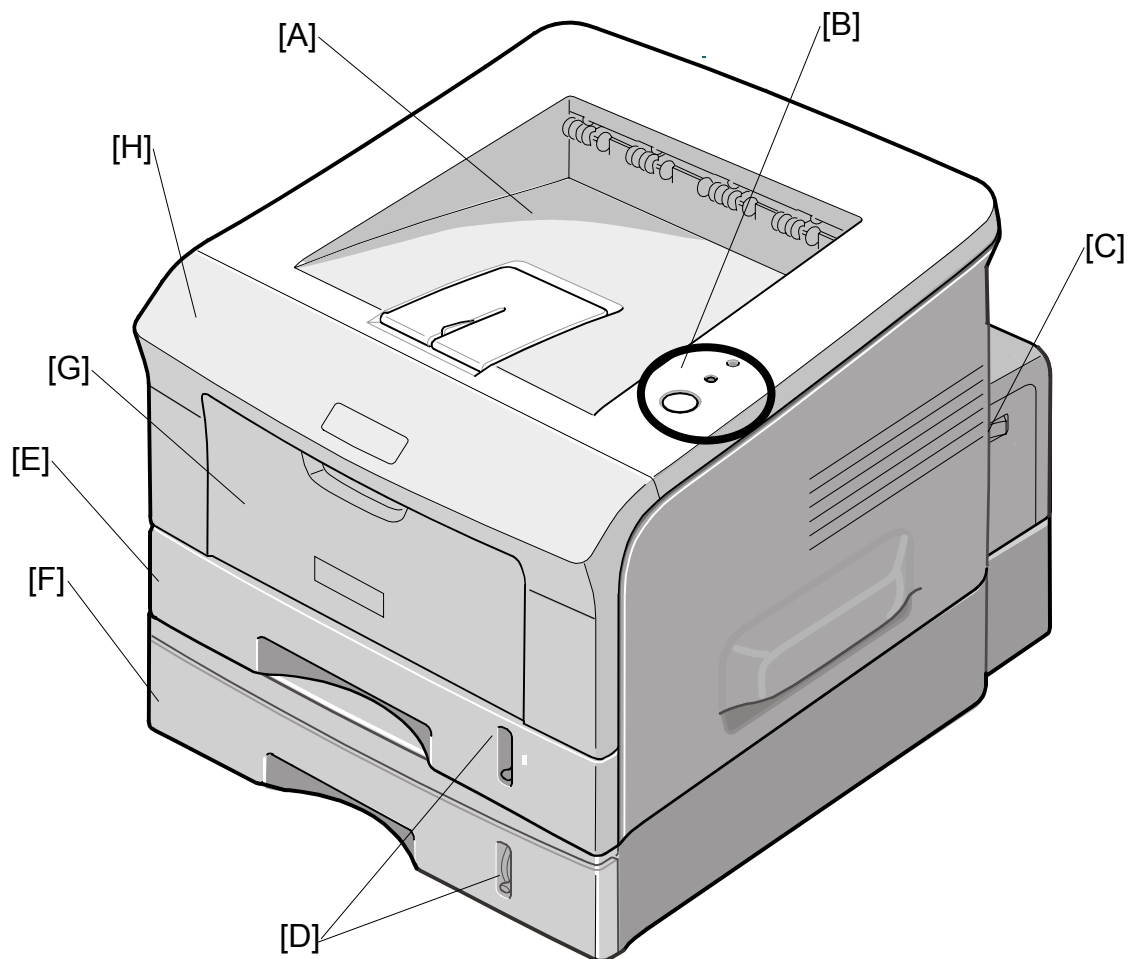
The machine will not operate if the update procedure did not work correctly. At this time, do the following steps.

1. Turn the power off and then on.
  2. Do the steps in the above download procedure.
- The machine will start the upgrade again.

## 6. DETAILED DESCRIPTIONS

### 6.1 MACHINE OVERVIEW

#### 6.1.1 FRONT VIEW



G144D001.WMF

[A]: Paper output tray

[B]: Operation panel

[C]: Power switch

[D]: Paper level indicator

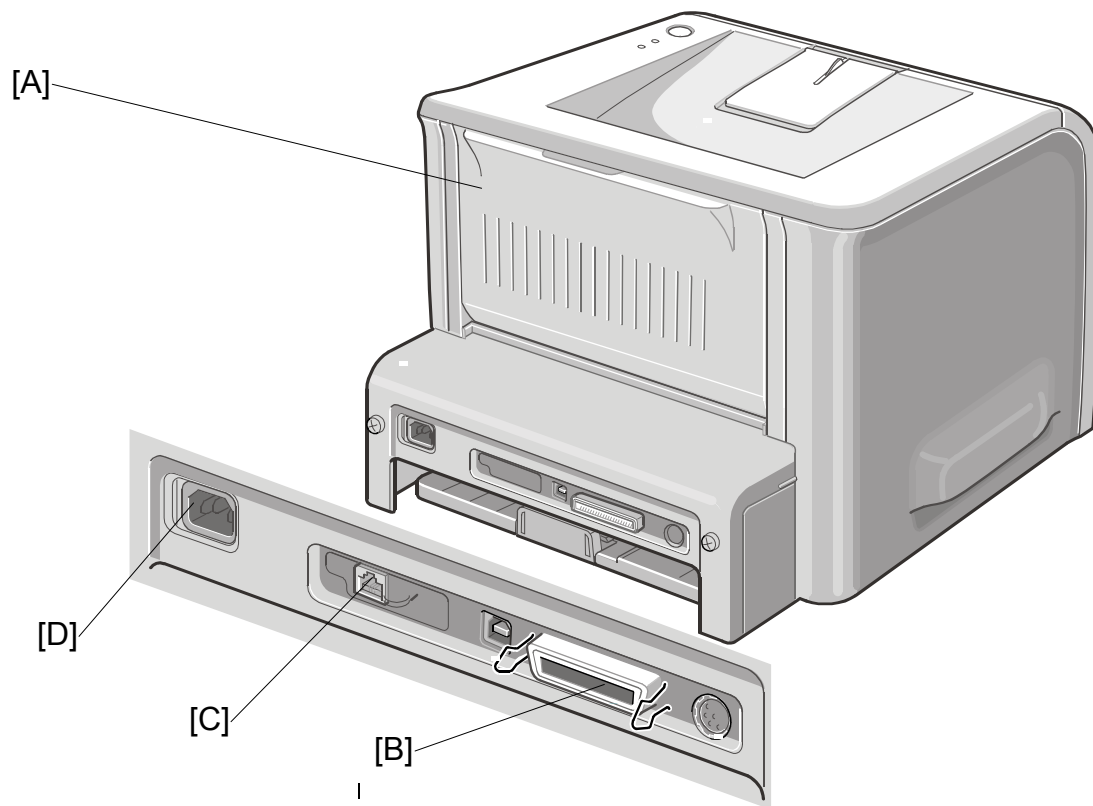
[E] Standard paper feed unit

[F] Optional paper feed unit

[G] Bypass tray

[H] Front cover

## 6.1.2 REAR VIEW



G144D002.WMF

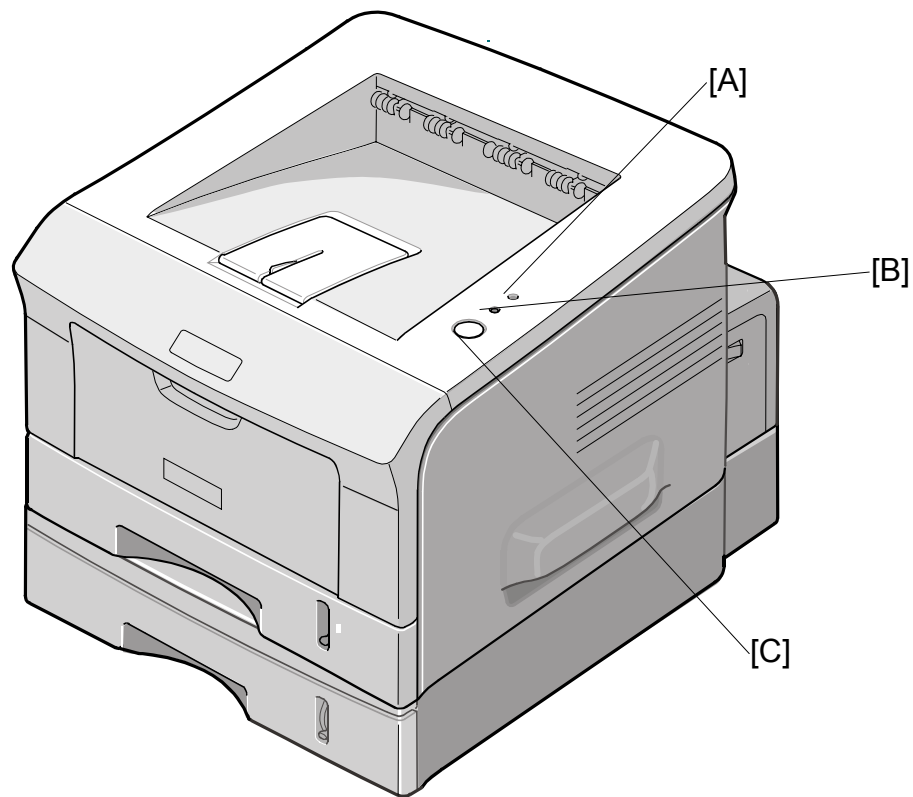
[A] Face up door

[B] Parallel port

[C] USB port

[D] Power receptacle

### 6.1.3 OPERATION PANEL



G144D001.WMF

The machine has the following buttons on the operation panel.

- [A]: On line/error
- [B]: Toner save
- [C]: Cancel

#### ***On Line/Error Button***

- The machine is ready to print when this button is green.
- The machine is experiencing an error such as jammed paper, cover open or empty toner cartridge when this button is red.
- The button blinks red and cancels the print job if you press the cancel button when the printer is receiving data.
- The button blinks red if there is no paper in the paper feed unit. Load paper to the paper feed to stop the blinking.
- The button blinks green slowly when the printer receives print data. The button blinks green quickly when the machine prints the received data.

***Toner Save Button***

- This LED goes on and the toner save mode gets enabled when you press the cancel button 0.5 sec. The LED goes off and toner save mode gets disabled when you press the cancel button again.

***On Line/Error Button and Toner Save Button***

- The machine experiences internal problems if On Line/Error and Toner Save button LEDs blink at the same time.

***Cancel Button***

The cancel button lets you do the following functions.

1. Print demo page: In Ready mode press and hold this button for about 2 seconds until all LEDs blink slowly. Then release the button.
2. Print configuration page: In Ready mode press and hold this button for about 6 seconds until all LEDs blink quickly. Then release the button.
3. Clean inside of the printer: In Ready mode press and hold this button for about 10 seconds until all LEDs turn on. Then release the button. The machine prints one cleaning sheet after this procedure.
4. Cancel a print job: Press this button during printing. The On Line/Error LED blinks while the print job gets cleared from both the printer and the computer. Then the machine goes back Ready mode. This may take some time depending on the size of the print job. You cannot do this procedure in Manual Feed mode.
5. Toner save mode on/off: In Ready mode, press this button to turn the Toner Save mode on or off (about 0.5sec).



## **6.2 MACHINE OVERVIEW**

### **6.2.1 FIRMWARE**

- The machine firmware controls the printing process

### **6.2.2 PRINT ENGINE**

#### ***Paper Feed Mechanism***

The paper feed mechanism consists of the following.

- 1) 250 sheet paper feed unit.
- 2) By-pass tray
- 3) Pick-up rollers, friction pads and feed rollers.

Together with sensors in the feed path these serve to control paper registration and guide the paper through the Image transfer, image development, image fusing and exit assemblies. The paper path has an anti-static connection to earth and eliminate paper feed problems due to static charge on the paper.

#### ***Drive Mechanism***

The main drive mechanism uses a Bi-polar 2 phase motor. It drives the OPC, paper pick-up and paper feed rollers using a gear train mechanism.

#### ***Development Unit***

The machine uses the laser scanning unit (LSU) of the mechanism to create images on the OPC drum.

#### ***Transfer Unit***

High voltages supplied by the HVPS move the image from the developer unit onto paper.

#### ***Fusing Unit***

The fusing unit applies the toner image onto the paper. This is achieved with a temperature controlled heating unit.

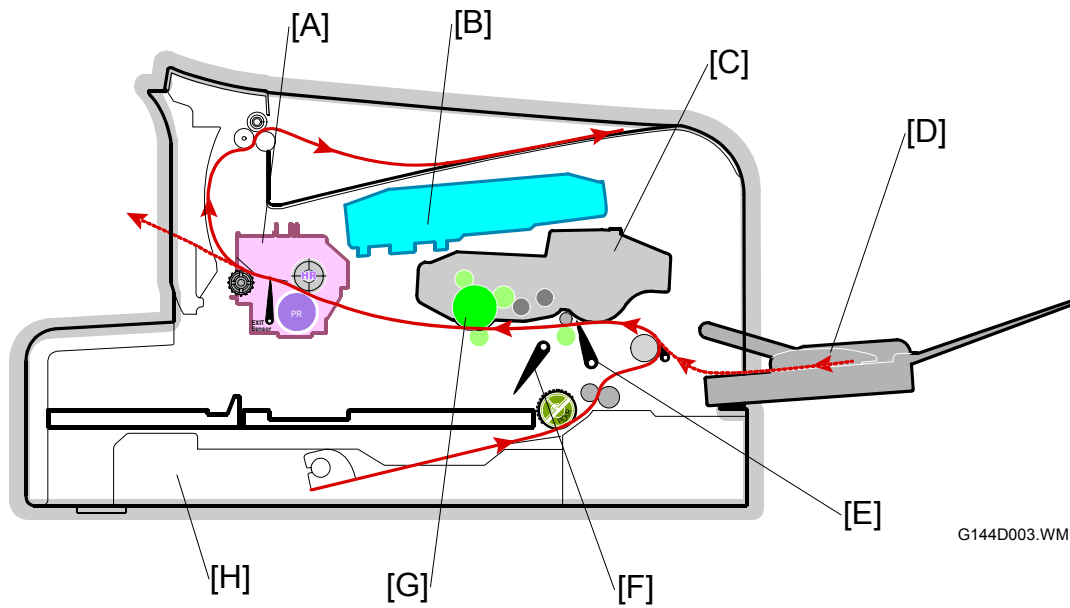
***Electrical Components (PBA)***

The main control board consists of the following.

1. Main processor ASIC (166MHz SPGPm)
2. Memory parts (Flash Rom, control program and DRAM)
3. Engine interface parts (motor control, fusing unit control, HVPS control, sensors etc)
4. PC Interface (USB , Parallel, Network ((wired and wireless))
5. Bus, DMA and I/O handling

The operation panel and PC interface are also included as part of the electrical components.

### 6.3 SYSTEM LAYOUT



- |                         |                        |
|-------------------------|------------------------|
| [A] Fusing unit         | [E] Paper feed sensor  |
| [B] Laser scanning unit | [F] Paper empty sensor |
| [C] Toner cartridge     | [G] OPC                |
| [D] By-pass tray        | [H] Paper feed unit    |

### **6.3.1 PAPER FEED UNIT**

The paper feed unit consists of the following.

- Standard paper tray unit
- Optional paper feed unit
- By-pass tray

#### ***Paper Separation Method***

Individual sheets get separated in the paper feed unit with the friction pad method. Paper passes over a spring loaded friction pad that separates the sheets of paper when paper gets fed into the machine.

#### ***Paper Tray***

The paper cassette uses a centre loading method. The machine does not have a paper size sensor. Software detects the size of the first sheet of paper as it is fed through the machine. Both the rear and side paper guides get adjusted to handle the various paper sizes.

A paper empty sensor detects the presence of paper (capacity: 250 sheets). An indicator flag on the front of the paper tray unit shows the amount of paper remaining.

#### ***Pick-up roller***

The pick-up roller picks up and feeds paper into the printer. It also removes static charge on the paper.

#### ***By-pass tray***

The by-pass tray holds non-standard paper sizes and special media (envelopes, transparencies etc.). The by-pass tray has a paper empty sensor. A friction pad makes sure paper separates correctly. The by-pass tray holds a maximum of 50 sheets of paper or envelopes.

#### ***Optional Paper Feed Unit***

The optional paper feed unit is the same as the standard paper tray unit and has a capacity of 250 sheets.

### 6.3.2 TRANSFER UNIT

A PTL (Pre-transfer Lamp) and a transfer roller move toner from the OPC drum onto the paper. The PTL shines light onto the OPC. This reduces the electrical charge on the surface of the OPC drum and improves the transfer efficiency. The transfer roller moves toner from the OPC drum to the paper.

### 6.3.3 DRIVE

The main PWA supplies power to the paper drive assembly. The main motor supplies power to the following.

- Paper feed unit
- Toner cartridge
- Fusing unit
- Pick-up, feed and exit rollers.

### 6.3.4 FUSING UNIT

The fusing unit consists of the following.

- Fusing lamp
- Hot roller
- Pressure roller
- Thermistor and thermostat.

The fusing unit uses pressure and heat to melt toner to the paper.

#### ***Thermostat***

The thermostat cuts off the power to the fusing lamp to not let the machine overheat. Power gets cut when the thermostat temperature gets to 160 C.

#### ***Thermistor***

The thermistor detects the surface temperature of the hot roller. This information goes to the main processor which uses this information to regulate the temperature of the hot roller.

#### ***Hot Roller***

The fusing lamp heats the surface of the hot roller. Toner gets melted and stays on the surface of the paper when the paper passes between the hot roller and pressure roller. The surface of the hot roller is coated with Teflon to ensure that toner does not stay on the roller surface.

#### ***Pressure Roller***

The pressure roller is mounted under the hot roller. It is made of a silicon resin, and the surface of the roller is coated with Teflon. This ensures that toner does not stay on the roller surface.

**Safety Features**

The machine has the following countermeasures to prevent overheating.

1. 1st protection device: Hardware cuts off when the machine temperature gets to 207 C
2. 2nd protection device: Software cuts off when the machine temperature gets to 220 C for 3 seconds
3. 3rd protection device: Thermostat measures the temperature of the hot roller and cuts off main power to the fusing lamp when the temperature gets to a pre-determined level.

**Safety Devices**

1. Fusing power gets cut off when the front cover is opened.
2. LSU power gets cut off when the front cover is opened.

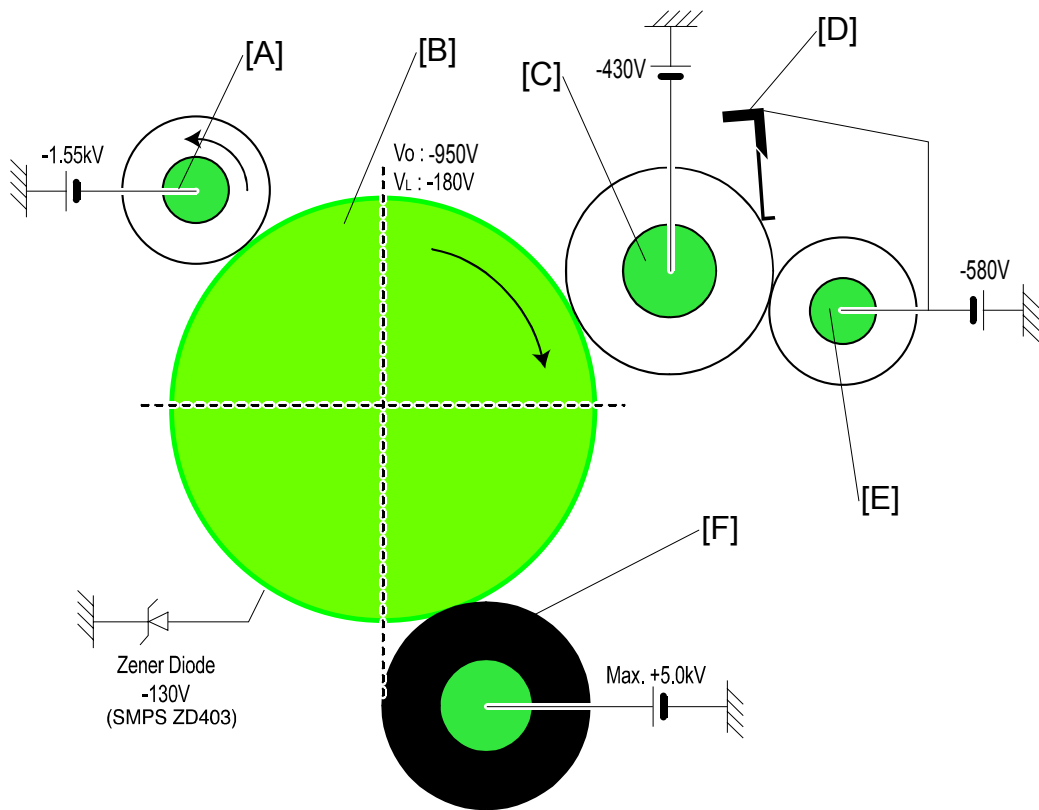
The temperature of the fusing units cover surface stays at less than 80°C. This protects the user. A caution label is attached where the customer can see it easily when the rear cover is opened

**6.3.5 LASER SCANNING UNIT (LSU)**

The LSU converts video data into an electrostatic latent image on the surface of the OPC drum. This gets done by controlling the laser beam and exposing the surface of the OPC drum to the laser light. A rotating polygon mirror reflects the laser light onto the OPC drum. Each side of the mirror is one scan line.

The OPC drum turns as the paper feeds to scan the image down the page. A /HSYNC signal gets created when the laser beam from LSU gets to the end of the polygon mirror. Then the signal goes 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 gets detected, the image goes to the LSU to adjust the left margin on the paper.

### 6.3.6 TONER CARTRIDGE



G144D901.WMF

- |                        |                      |
|------------------------|----------------------|
| [A]: Charging roller   | [D]: Doctor blade    |
| [B]: OPC drum          | [E]: Supply roller   |
| [C]: Developing roller | [F]: Transfer roller |

[The toner cartridge contains the OPC unit and toner unit. The OPC unit consists of the OPC drum and charging roller. The toner cartridge unit consists of the toner, supply roller, developing roller, and doctor blade.

There is no toner near end sensor in the machine. But the machine has a toner remaining amount sensor.

A cleaning blade is used to collect used toner.

- Developing method: Non magnetic 1 element contacting method
- Toner: non magnetic 1 element shatter type toner
- Toner life span: 3,000 sheets (IDC Pattern/A4 standard)
- OPC cleaning: Electrostatic process

### 6.3.7 NEW AIO DETECTION

A new supply AIO cartridge has a ID chip. The machine knows a new cartridge has been installed when the chip gets detected.

When the new cartridge is installed in the machine, the machine automatically detects by the chip that the cartridge is brand-new. Then the machine resets the total dot counter (TOTAL TONER COUNT) and CRU print counter (Cru Prints). and increments the counter for counting the number of CRU replaced (Replaced Toner Counts). Only the case when the "Replaced Toner Counts" was 0, the CRU currently installed is regarded as starter CRU. In this condition, threshold to detect toner end is shorter than that for supply CRU.

### 6.3.8 TONER END DETECTION

The machine does not have a toner end sensor. The machine checks the amount of toner with software. The machine counts and adds up black dots as toner consumption. For example, the following occurs when the machine prints 5% of black rate chart

- Starter cartridge: Approx. 4, 750, 000, 000 dots will be added.
- Supply cartridge: Approx. 7, 500, 000, 000 dots will be added.

When the total number of dots gets to a pre-programmed figure (as for toner near-end), the machine shows "TONER LOW". After another period of dots has been counted up, the machine finally shows "TONER EMPTY" (as for toner end), and the machine stops printing.

You can check the total dot counts from the current cartridge in the Configuration page in TECH mode.



## 6.4 ASIC(SPGP)

- ARM946ES
  - 32-bit RISC embedded processor core
  - 6KB 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

### 6.4.1 MEMORY

The machine has flash ROM and DRAM memory units. There are 2 SODIMM sockets to let extra DRAM or Flash ROM (Postscript Option) to be added.

### 6.4.2 FLASH MEMORY

- Record/download system program from the PC Interface.
- Fax for journal list
- Memory for one touch dial
- Speed dial list.
  - Size : 2M Byte
  - Access Time : 70 nsec

### **6.4.3 SDRAM**

SDRAM is used for the following.

- Swath buffer in printing
- Scan buffer in scanning,
- ECM buffer in fax receiving
- System working memory area
  - Size: 16MB
  - Max Frequency: 100MHz

## **6.4.4 SENSOR INPUT CIRCUIT**

### ***Paper Empty Sensor***

The CPU monitors the paper empty sensor (photo interrupter). The printer flashes the red ERROR LED when the paper feed unit is empty.

### ***By-pass Tray Sensor***

Paper in the by-pass tray gets detected by the by-pass sensor (photo interrupter) on the frame. The CPU monitors this sensor to detect if paper is in the by-pass tray. Paper gets fed from if the CPU detects paper is present.

### ***Paper Feeding***

Paper gets detected by the photo interrupter when it passes the actuator on the feed sensor. This CPU monitors the signal and makes the image after a certain time. Jam0 shows (red ERROR LED) if the feed sensor is not detected within 1 second after paper gets fed.

### ***Paper Exit Sensor***

The exit sensor on the engine board, and actuator on the frame detect when paper exits from the machine. The CPU detects the on/off time of the exit sensor and reports normal operation or jam status. The red ERROR LED lights if Jam 2 error occurs.

### ***Cover Open Sensor***

The cover open sensor is located on the power supply board and is operated by a molded tab on the front cover. Power (+24V and +5V ) to the following gets cut when the front cover is open.

- DC fan
- Solenoid
- Main motor
- Polygon motor
- HVPS and LSU

### ***DC Fan/Solenoid Driving Circuit***

The CPU uses a transistor to control the fan driving circuit. It is automatically turned off when a machine enters energy saver mode.

Two solenoids are driven by signals from the CPU (by-pass and paper pick-up).

### ***Motor Drive Circuit***

The main motor drives the following.

- Paper feed unit
- Developing unit
- Fusing unit
- Exit assembly

Software controls the acceleration, constant speed and deceleration. A A3977 driver IC drives the motor.

### ***Transfer***

PWM (Pulse Width Modulation) controls the charging voltage, developing voltage and the transfer voltage. The output voltage changes according to the PWM duty cycle. Environment recognition detects the transfer voltage used when the paper passes the transfer roller. The surrounding environment in the room or within the machine changes the resistance value of the transfer roller. This change in resistance in turn changes the value of the voltage due to loading. This voltage is fed back into the machine through the A/D converter. The PWM cycle changes to maintain the required transfer voltage based on this value.

### ***Fusing***

The resistance value of the thermistor detects the temperature of the heat roller's surface. The A/D converter measures the thermistor resistance and lets the CPU determine the temperature of the heat roller. The AC power is controlled by comparing the target temperature to the value from the thermistor. An error shows if the value from the thermistor is out of the controlling range during the fusing process.

### ***Error Type***

<b>Error</b>	<b>Description</b>	<b>LED Display</b>
Open heat error	Temperature stays lower than 68 C for more than 28 seconds during warm-up.	All LEDs flash
Low heat error	Standby: Temperature stays lower than 80 C for more than 10 seconds. Printing: Temperature stays lower than 145 C for more than 4 seconds for up to two consecutive print jobs. Temperature stays 25 C lower than the fixed fusing temperature for more than 4 seconds for up to two consecutive print jobs. Temperature stays higher than 220 C for more than 3 seconds.	All LEDs flash
Over heat error	Temperature stays higher than 220 C for more than 3 seconds.	All LEDs flash

**LSU**

The LSU consists laser diode and the polygon motor control. The laser diode turns on and the polygon motor is enabled when the printing signal occurs. Hsync occurs when the light sensor detects the beam, and LReady occurs when the polygon motor speed becomes a normal. The LSU is ready if these two conditions are satisfied. The errors in the table below show if the two conditions are not satisfied.

Error Type	Description
Polygon motor error	The polygon motor speed does not become stable.
Hsync error	The polygon motor speed is steady, but the Hsync is not generated.

## **6.5 SMPS AND HVPS**

The SMPS and HVPS are on the same board. The SMPS supplies DC power to the system. It takes either 110V or 220V and outputs the +5V and +24VS to the main and other PBAs.

The HVPS creates the high voltage of THV/MHV/Supply/Dev and supplies it to the toner cartridge. The CPU modifies the voltage settings to provide ideal voltages to create images. The HVPS part uses the 24V and outputs the high voltage for THV/MHV/BIAS. Then the outputted high voltage get supplied to the toner, OPC cartridge and transfer roller.

## 6.5.1 HVPS (HIGH VOLTAGE POWER SUPPLY)

### 1. *Transfer High Voltage (THV+)*

- Input voltage : 24 V DC  $\pm$  15%
- Output voltage : Max +5.0KV  $\pm$  5 %, (duty variable, no loading ). 1.2KV  $\pm$ 15%
- Output voltage trigger : 6.5  $\mu$ A
- Input contrast of the voltage stability degree :under  $\pm$  5 % (fluctuating input 21.6V~26.4V)
- Loading contrast :  $\pm$  5 % or less
- Output voltage rise time :100 ms max
- Output voltage fall time : 100 ms max
- Transfer voltage range as environment varies : +650 V(duty 10%) ~ 5 KV (duty 90%)
- Environment recognition : THV-PWM is a transfer active signal. It detects the resistance of the transfer roller/OPC with the THV voltage (fixed value). Then it measures the OPC voltage to let the resistance get determined. The resistance is affected by changes in temperature and humidity. The control program is then used to enable the THV voltage. Then it gets adjusted to compensate for the environmental conditions.
- Output voltage control method : Transfer output voltage is output and controlled by changing the duty cycle of the THV PWM signal.

### 2. *Charge Voltage (MHV)*

- Input voltage : 24 V DC  $\pm$  15%
- Output voltage : -1.3KV ~-1.8KV DC  $\pm$  50V
- Output voltage rise time : 50 ms max
- Output voltage fall time : 50 ms max
- Output loading range : 30 M $\Omega$ ~1000 M $\Omega$
- Output control signal (MHV-PWM): CPU is HV output when PWM is low

### 3. *Cleaning Voltage (THV-)*

- The (+) transfer voltage is not output because the THV PWM is high.
- The (-) transfer voltage is output because the THV-enable signal is low.
- The output fluctuation range is large because there is no Feedback control.

**4. Developing Voltage (DEV)**

- Input voltage : 24 V DC  $\pm$  15%
- Output voltage: -200V ~ -600V DC  $\pm$ 20V
- Output voltage fluctuation range: PWM control
- Input contrast of the output stability degree : $\pm$ 5 % or less
- Loading contrast :  $\pm$  5 % or less
- Output voltage rise time : 50 ms max
- Output voltage fall time : 50 ms max
- Output loading range : 10M $\Omega$ ~ 1000 M $\Omega$
- Output control signal (BIAS-PWM) : CPU output is HV output when PWM is low.

**5. Supply**

- Output voltage :-400 V ~-800V DC  $\pm$ 50 V (ZENER with DEV )
- Input contrast of the output stability degree :under  $\pm$  5%
- Loading contrast :  $\pm$  5% or less
- Output voltage rise time: 50 ms max
- Output voltage fall time: 50 ms max
- Output loading range: 10 M $\Omega$ .~ 1000 M $\Omega$
- Output control signal (BIAS-PWM) : CPU is HV output when PWM is low.



## 6.5.2 SMPS (SWITCHING MODE POWER SUPPLY)

This powers the entire system and is assembled by an independent module, so it is possible to use it for common use. It is mounted at the bottom of the set and consists of the AMPS part, which supplies the DC power for driving the system, and the AC heater control part, which supplies the power to fuser. SMPS has two output channels (3.3V and +24V).

### 1. AC Input

- Input Rated voltage : AC 220V ~ 240V AC 120V / AC 220V (EXP version)
- Input Voltage range : AC 198V ~ 264V AC 90V ~ 135V / AC 198V ~ 264V (EXP version)
- Rated Frequency : 50/60 Hz
- Frequency range : 47 ~ 63 Hz
- Input Current : Under 4.0A/2.0A. (When the fuser lamp is off and input/output voltages are in range)

### 2. Rated Output Power

No.	Item	CH1	CH2	CH3	Remark
1	Channel name	+3.3V	+5V	+24V	
2	Connector pin	CON 3 3.3V Pin: 3,4 GND Pin: 5.6	CON 3 5V Pin: 8 GND Pin: 7	CON 3 24V Pin: 11-13 GND Pin: 9-10	
3	Rated output	3.3 V $\pm$ 5% (3.2-3.4 V)	5 V $\pm$ 5% (4.75-5.25 V)	24 V $\pm$ 10% (21.6-26.4 V)	
4	Maximum output current	1.0 A	0.14 A	2.0 A	
5	Peak loading current	1.5 A	0.14 A	2.5 A	1 ms
6	Ripple noise voltage	Less than 100 mV	100 mV	Less than 500 mV	
7	Maximum output	3.3 W	0.35 W	48 W	
8	Peak output	4.95 W	0.7 W	60 W	1 ms
9	Overflow current protection	---	---	---	---

### 3. Consumption Power

No.	Item	CH1-+3.3V	CH2-+5V	CH3-+24V	Remark
1	Stand-by	1.0 A	0.07 A	0.4 A	Ave: 55W
2	Printing	1.0 A	0.14 A	2.0 A	Ave: 55W

## 6.6 ENGINE

### 6.6.1 PAPER FEED

Pick-up roller drive is controlled by the pick-up solenoid if paper gets fed from the paper tray unit. The on/off of the solenoid is controlled by the general output port or the external output port. The machine feeds the paper based on the operation of the manual sensor and the main motor.

The machine shows the following jam conditions when paper feed troubles occur.

Item	Description
Jam0	<ul style="list-style-type: none"><li>• Paper does not enter the unit due to a paper misfeed after a page was picked up.</li><li>• Paper entered, but did not get to the feed sensor in a certain time due to slip, etc after a page was picked up.</li><li>• A page was picked up, but the feed sensor is not on. Jam0 shows if the feed sensor is still not on after a certain time after the feed sensors tries again. This means that the leading edge of the paper doesn't pass the feed sensor within a certain time.</li><li>• The feed sensor does not turn on even though the paper reaches the feed sensor. This means that the leading edge of the paper already passed the feed sensor or that the sensor is faulty.</li></ul>
Jam1	<ul style="list-style-type: none"><li>• The trailing edge of the paper does not pass the feed sensor within certain time after the leading edge of the paper passes the feed sensor. (During this time the feed sensor cannot be Off)</li><li>• The paper does not reach the exit sensor within certain time after the leading edge of the paper passes the feed sensor. (The exit sensor cannot be On during this time)</li><li>• There is already paper between the feed sensor and the exit sensor.</li></ul>
Jam2	<ul style="list-style-type: none"><li>• The trailing edge of the paper does not pass the exit sensor within certain time after the trailing edge of the paper passes the feed sensor.</li></ul>

# SPECIFICATIONS

## 1.1 GENERAL SPECIFICATIONS

Configuration	Desktop	
Paper size	A4/Lt	
Print Resolution	Maximum	1200 x 1200 dpi
	Default	600 x 600 dpi
	RET Chip	Supported
	Gray Scale Level	128 Gray
Print Speed	A4-20 ppm	
	Letter-22 ppm	
Duplex Print Speed	Not Supported	
First Print Speed	Stand-by: 10 seconds	
	Energy saver mode: 50 seconds	
Copy Paper Weight	Paper Tray	60-105 g/m <sup>2</sup> (16-28 lb.)
	By-pass tray	52-162 g/m <sup>2</sup> (14-43 lb.)
	Optional paper tray	60-105 g/m <sup>2</sup> (16-28 lb.)
	Duplex	64-105 g/m <sup>2</sup> (17-28 lb.)
Warm-up Time	42 seconds from energy saver mode	
Paper Input Size	Standard tray	A3/DLT – A5
	By-pass tray	A3/DLT – A6, Free size
	By-pass tray-Custom size paper	Length: 160 - 432 mm (5.8" - 17"), Width: 90 - 305 mm (3.5" - 12"), Com#10, C5, C6, DL. Monarch
	Optional Envelope Feeder	Com#10, C5, C6, DL. Monarch
	Optional paper tray unit Up to 2 units can be installed.	A3/DLT – A5
Paper Input Capacity	Standard/Optional paper trays	2 x 250 sheets (80 g/m <sup>2</sup> , 20 lb.)
	By-pass tray	Normal paper: 50 sheets (80 g/m <sup>2</sup> , 20 lb.) Special paper: 5 sheets
Output Capacity (Maximum 151 sheets)	150 sheets (face down)	
	1 sheet (face up)	
Total Counter	Electric Counter	
Environmental Standard	US version: Energy Star Tier 1	
	EU version: BAM specifications	
Energy Saver Mode	Selectable 1/5/15/30/45/60 minutes	
Supply	5K AIO toner supply cartridge	
	3.5 K starter toner supply cartridge	

## 1.2 CONTROLLER

CPU	SPGPm 166 MHz	
Printer Languages	Standard	PCL6
	Auto Emulating Sensing	Supported
Interfaces	Standard	IEEE1284, USB 2.0
Memory (1 slot)	Standard/Max	16MB/144MB
	Type	SDRAM
Font	Type-Flash Memory Number- 45 Scalable, 1 Bitmap	
Network	10/100 Base TX	

## 1.3 SOFTWARE SPECIFICATIONS



OS	Windows 95/98/NT4.0/2000/Me/XP Linux OS including Red Hat, Caldera, Debian, Mandrake, Slackware, SuSE, and Turbo Linux	
Printer driver	Compatibility	SPL
	Default	SPL
	Remote control panel	Supported
	Status monitor	USB: Supported Network: Supported Parallel: Not supported
	Languages	English, Korean, German, French, Spanish, Italian, Dutch, Portuguese, Russian, Swedish, Norwegian, Finish, Danish, Chinese, Taiwanese
	Contents	Printer driver, Acrobat reader, Manual, SM, Electronic registration.
Driver Function	Layout	1. Orientation: Portrait, Landscape, Rotate 180 degrees 2. Layout options: Type, pages per slide, page order. 3. Favorites
	Paper	1. Copies 2. Paper options: Size, source, type 3. Favorites
	Graphics	1. Resolution: 1200 dpi, 600 dpi 2. Toner save: Printer setting (on/off) 3. Advanced options 4. Favorites
	Extras	1. Watermark 2. Overlay 3. Output options (Print order, re-print when jammed) 4. Favorites
	Printer	1. Printer configuration: High altitude correction

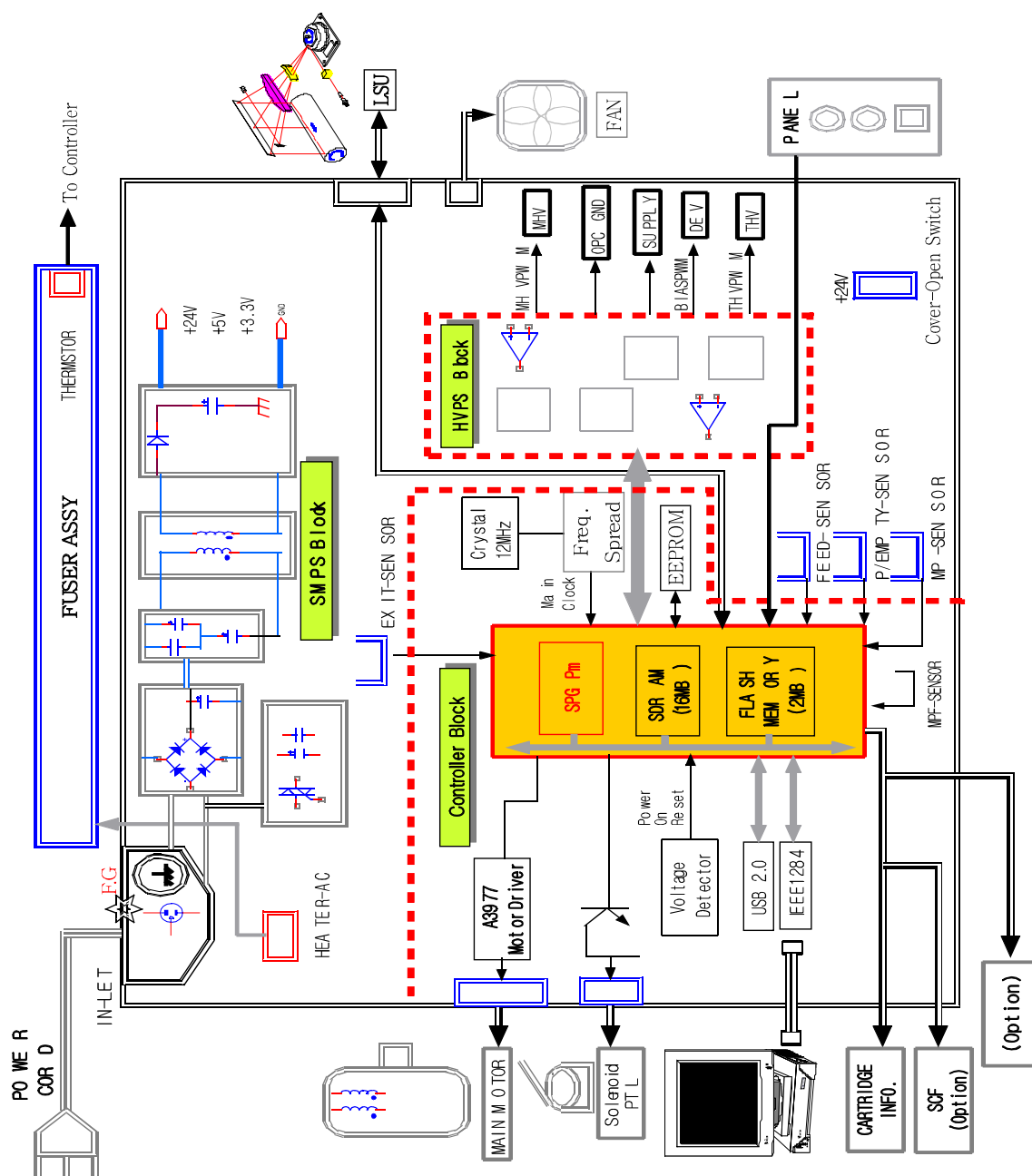
## 1.4 OPTIONAL UNIT SPECIFICATIONS

Paper tray unit	Capacity	250 sheets (Life: 150 K)
	Media	A4, A5, Letter, Legal, Executive, Oficio, Folio, ISO, B5, JIS B5
	Paper weight	16-24 lb (60-90 g/m <sup>2</sup> )
Memory	Memory upgrade	Supported
	Memory type	SDRAM
	Memory unit	32 MB, 128 MB
Network	Option	10/100 Base Tx
	Protocol	SPX/IPX, TCP/IP, Ethertalk, SNMP, HTTP 1.1, DLC/LLC
	Operating system	MS Windows 98/NT/ME/2000/XP, SUN Solaris, HP-UX, SCO, Novell Netware, Macintosh
Hard Disk	Not Supported	
Mailbox	Not Supported	
Serial	Not Supported	
Local talk	Not Supported	



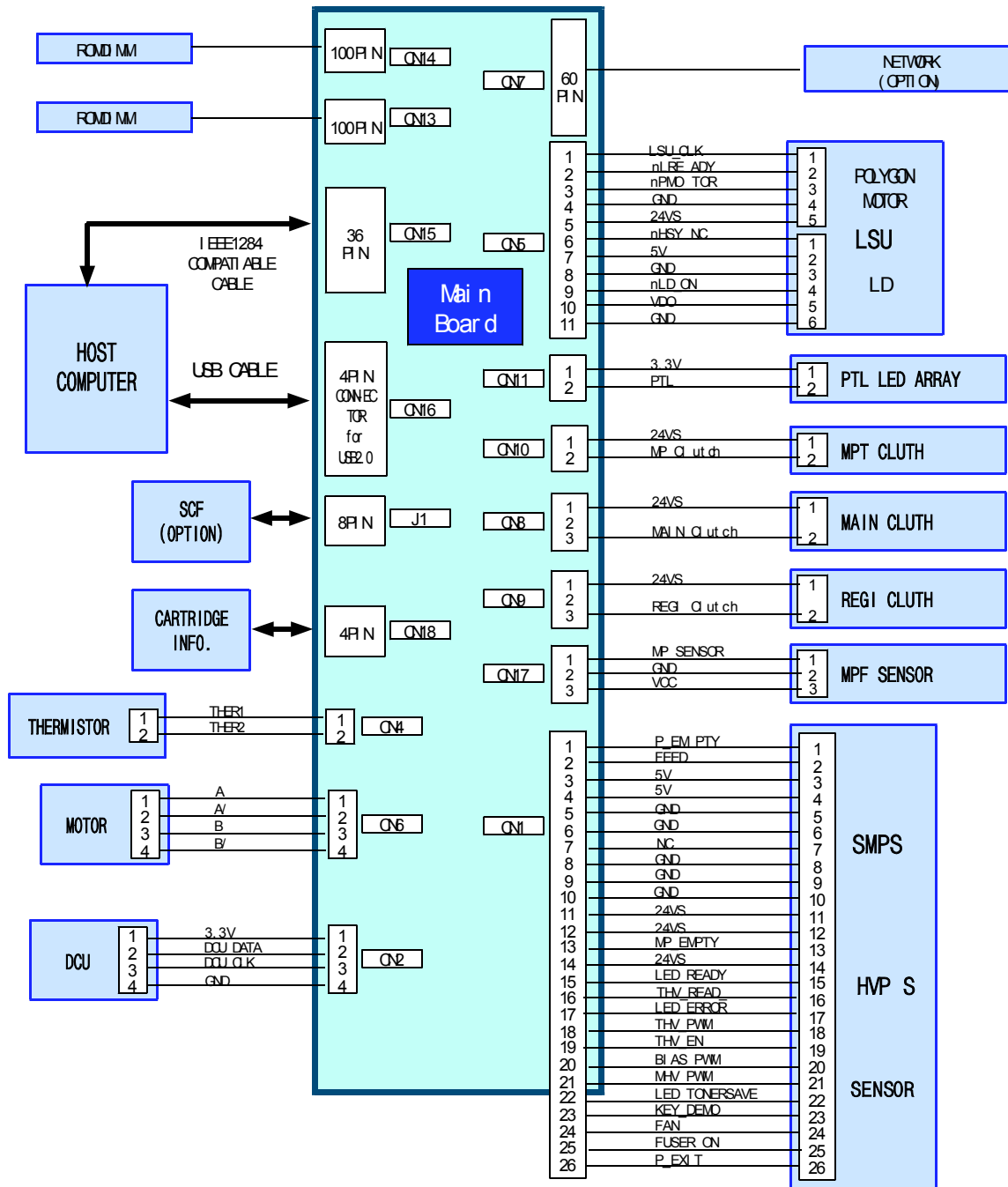
## APPENDIX

## BLOCK DIAGRAM



G144X01.WMF

## CONNECTION DIAGRAM



G144X02.WMF