Model SY-P1
Machine Code: G186

SERVICE MANUAL

March 2007
Subject to change

Precautions

In order to prevent accidents and to prevent damage to the equipment, please read the precautions listed below carefully before servicing the printer and follow them closely.

Safety Warning

1. Only to be serviced by appropriately qualified service engineers.
    - High voltages and lasers inside this product are dangerous. This printer should only be serviced by a suitably trained and qualified service engineer.
2. Use only genuine replacement parts
    - There are no user serviceable parts inside the printer. Do not make any unauthorized changes or additions to the printer, these 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 so there is never any human access to laser radiation above a Class I level during normal operation, user maintenance, or prescribed service condition.

⚠WARNING

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

g186_laserdecal

Caution for safety

Toxic material

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. Contact with the skin should be avoided, wash any splashes from eyes or skin immediately and contact your doctor. If the liquid gets into the mouth or is swallowed, see a doctor immediately.
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 allow 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. When servicing the printer remove the power plug from the wall socket.
6. Use caution when inserting or removing the power connector. The power connector must be inserted completely otherwise a poor contact could cause overheating possibly leading to a fire. When removing the power connector grip it firmly and pull.
7. Take care of the power cable. Do not allow it to become twisted, bent sharply round corners or other wise damaged. Do not place objects on top of the power cable. If the power cable is damaged it could overheat and cause a fire or 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. Any such defects should be repaired 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. We recommend that this machine be disconnected 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. Damp 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 any metal objects into the machine through the ventilator fan or other part of the casing, it 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. The printer contains many rollers, gears and fans. Take great care to ensure that you do not catch your fingers, hair or clothing in any of these rotating devices.
3. Do not place any small metal objects, containers of water, chemicals or other liquids close to the printer which if spilled could get into the machine and cause damage or a shock or fire hazard.
4. Do not install the machine in areas with high dust or moisture levels, beside on open window or close to a humidifier or heater. Damage could be caused to the printer in such areas.

5. Do not place candles, burning cigarettes, etc on the printer. These could cause a fire.

Assembly/ Disassembly Precautions

Replace parts carefully, always use genuine parts. Take care to note the exact location of parts and also cable routing before dismantling any part of the machine. Ensure all parts and cables are replaced correctly.

Please carry out the following procedures before dismantling the printer or replacing any parts.

(1) Check the contents of the machine memory and make a note of any user settings. These will be erased if the main board or network card is replaced.

(2) Ensure that power is disconnected before servicing or replacing any electrical parts.

(3) Disconnect printer interface cables and power cables.

(4) Only use approved spare parts. Ensure that part number, product name, any voltage, 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 irreparably damaged if it is 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 five minutes can damage the surface's photoconductive properties and will result in print quality degradation. Take extra care when servicing the printer. 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) open 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.

Disregarding this warning may cause bodily injury

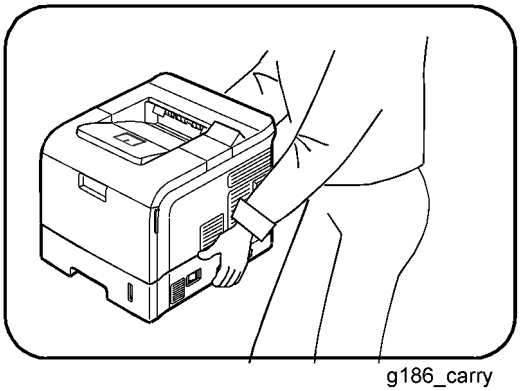
1. **Be careful with the high temperature part.**

   The fuser unit works at a high temperature. Use caution when working on the printer. Wait for the fuser to cool down before disassembly.

2. **Do not put fingers or hair into the rotating parts.**

   When operating a printer, do not put hand or hair into the rotating parts (Paper feeding entrance, motor, fan, etc.). If do so, you may get harm.

3. **When you move the printer.**



This printer weighs 17.8kg including the 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.

4. **Ensure the printer is installed safely.**

   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, 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 easily damaged by static electricity. Such components are commonly called "Electrostatically Sensitive (ES) Devices", or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor "chip" components.

The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

⚠CAUTION

- Be sure that 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 personal safety 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.

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1. Installation

Installation Requirements

Refer to the User's Guide.

2. Preventive Maintenance

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
Printer	Transfer roller	150 K	Service
	Fuser unit	150 K	Service
	Pick-up roller	150 K	Service
	Registration roller	150 K	Service
	Stopper roller unit	150 K	Service
	Rubber pad	150 K	Service

3. Replacement and Adjustment

General Precautions on Disassembly

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

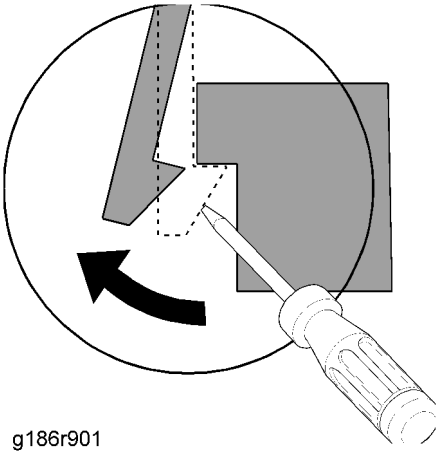
Check Points for Servicing

Whenever servicing the machine, you must perform as follows:

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

Releasing Plastic Latches

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



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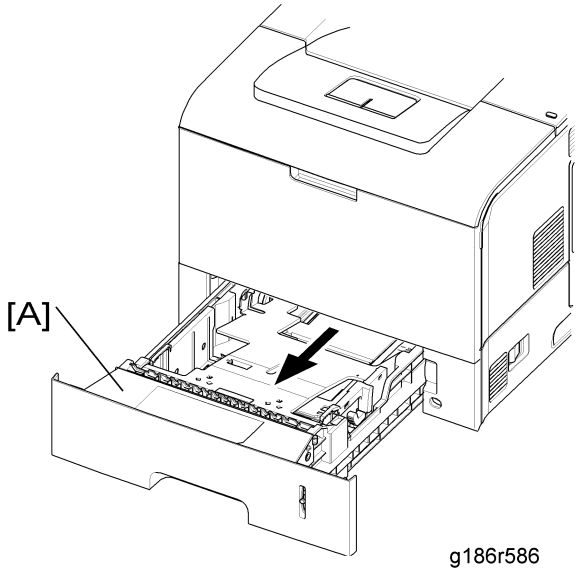
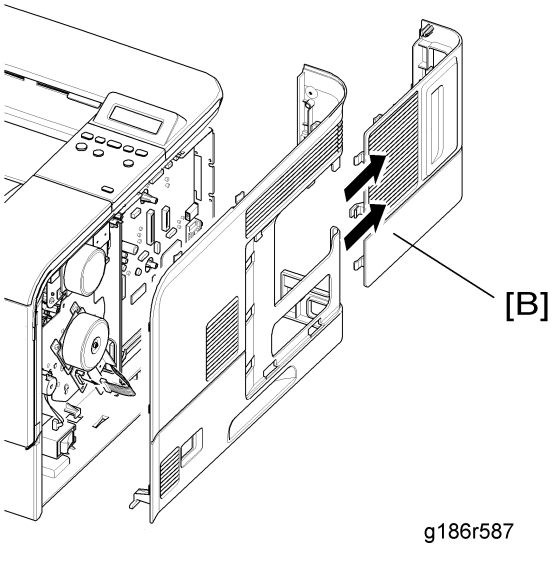
Exterior Cover

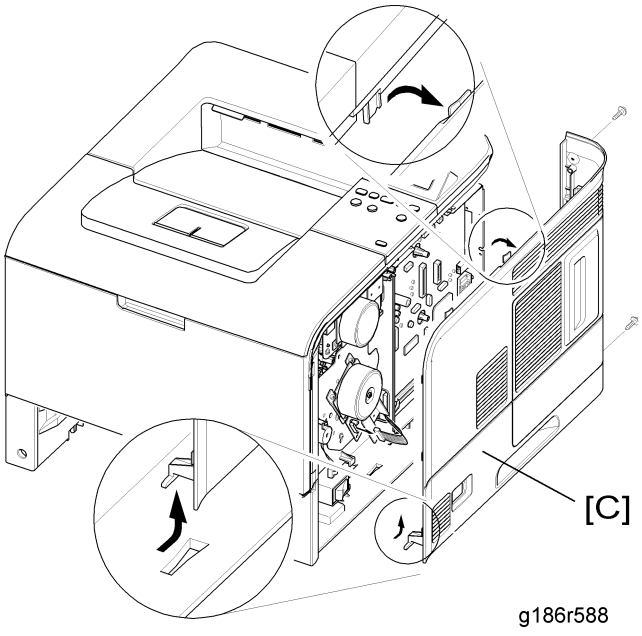
Cover Right



1. Pull the cassette [A] out of the printer.



2. Remove the cover control box [B].



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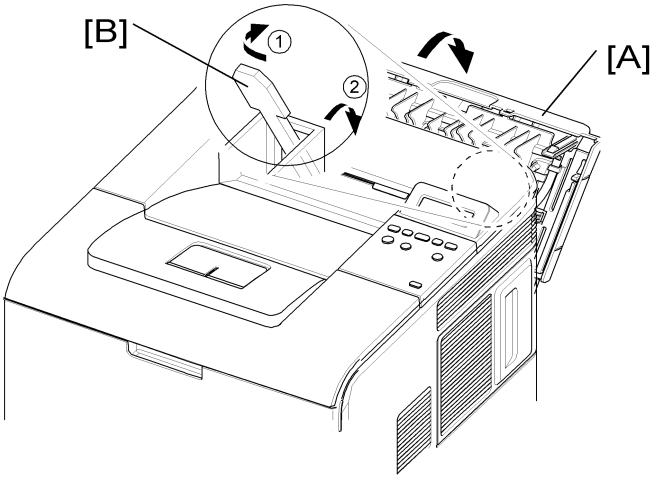
3. Remove two screws and take out the cover right [C], as shown.

Rear Cover



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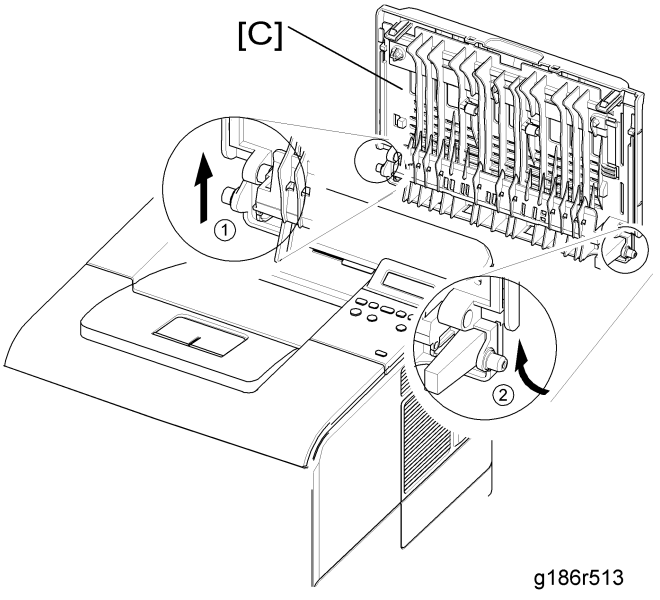
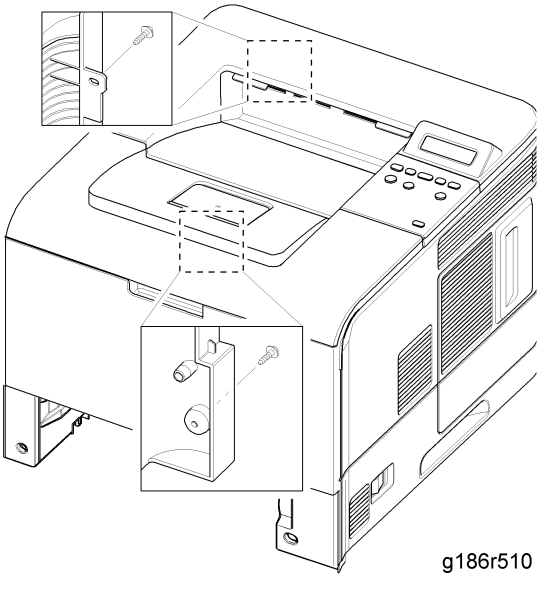
1. Open the rear cover [A], and then take out the stopper [B].



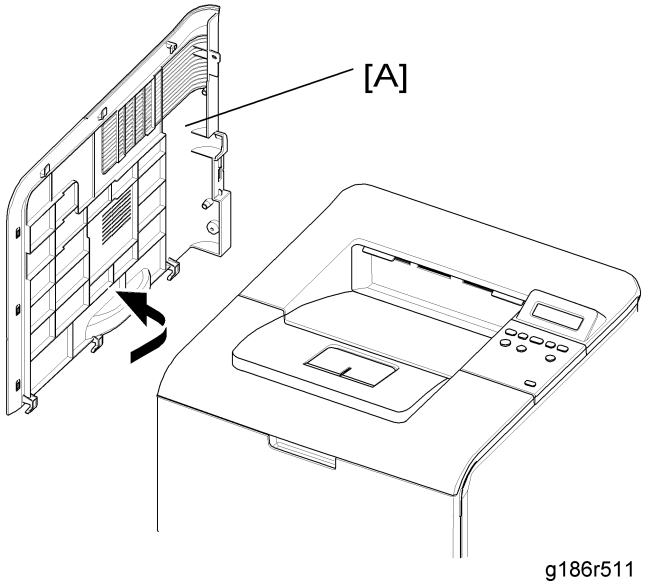
2. Remove the rear cover [C] in the direction of arrow.

Cover Left

1. Pull the cassette out of the printer.



2. Remove two screws at the rear left side.



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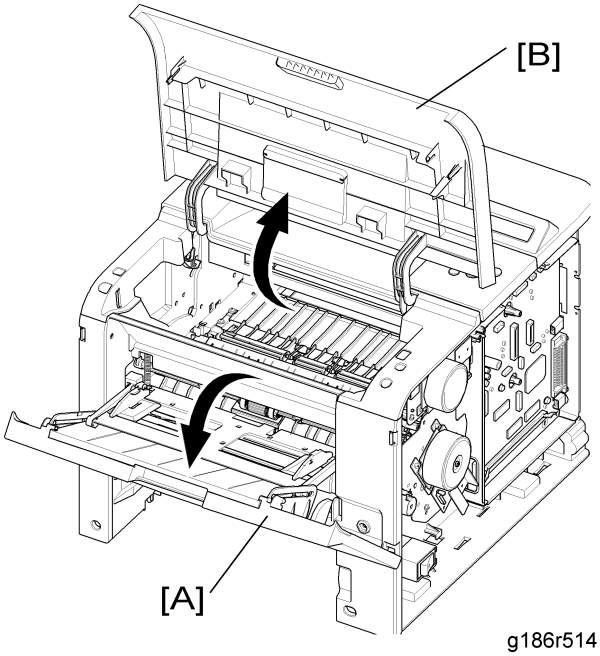
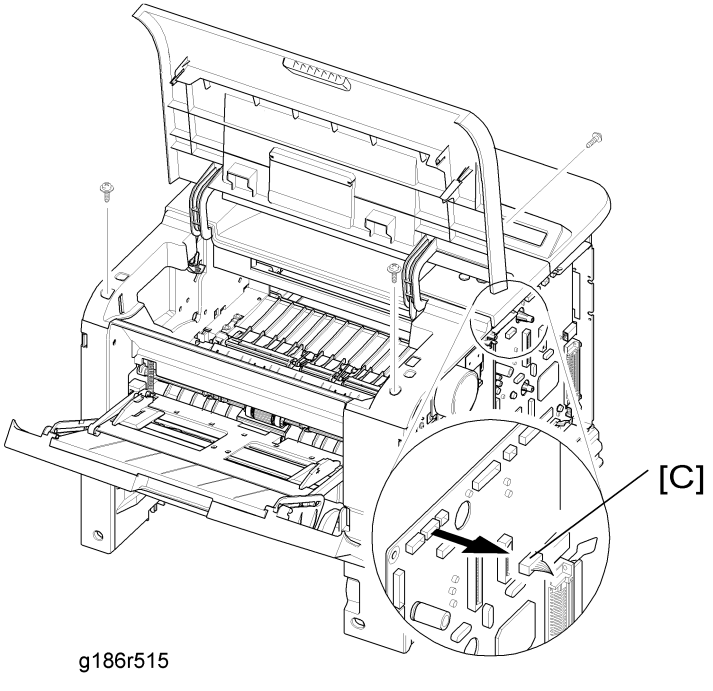
3. Take out the cover left [A].

Top Cover

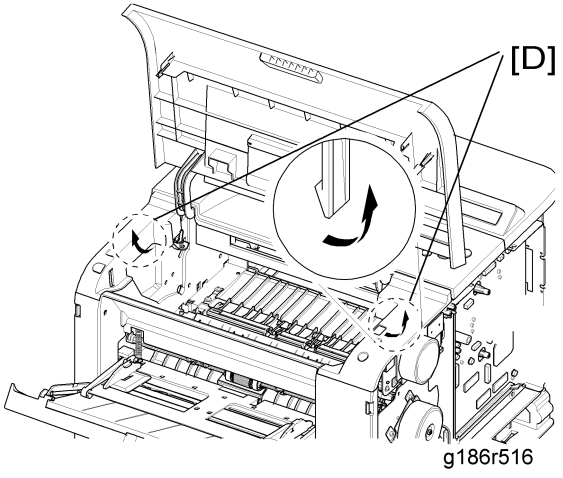
1. Before you remove the top cover, you should remove:
    - Rear cover (☛ "Rear Cover")
    - Cover right (☛ "Cover Right")
    - Cover left (☛ " Cover Left")



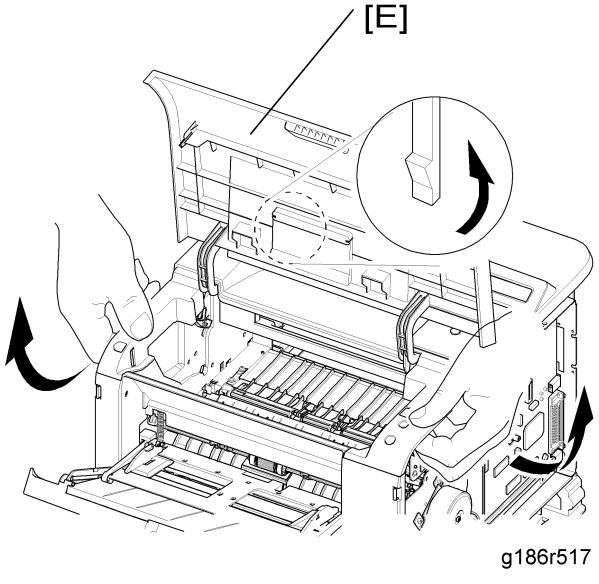
2. Open the By-pass tray [A], rear cover, and open cover [B].



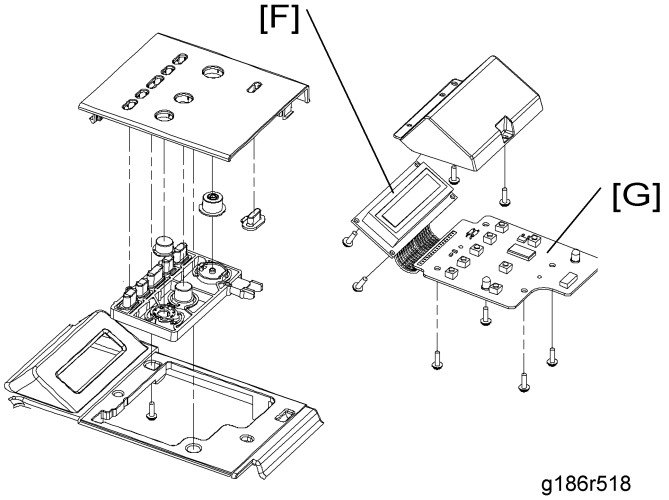
3. Unplug the two connectors [C] after you remove the three screws from the main PCB.



4. Unlatch both ends [D] of the top cover.



5. Unlatch the hook and take out the top cover [E].



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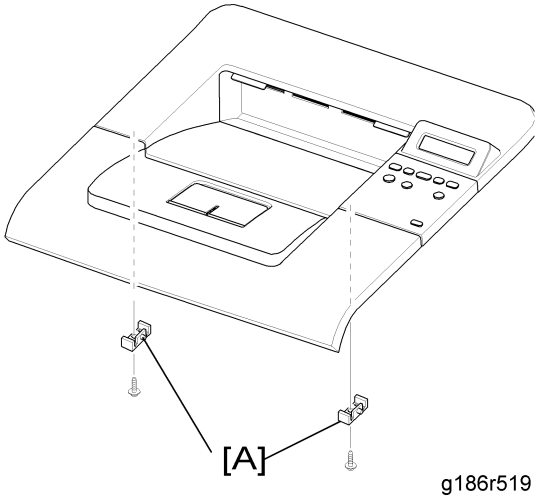
6. Remove seven screws and then take out the LCD panel [F] and the key panel [G].

Open Cover

1. Before you remove the open cover, you should remove:
   - Top cover (☛ "Top Cover")



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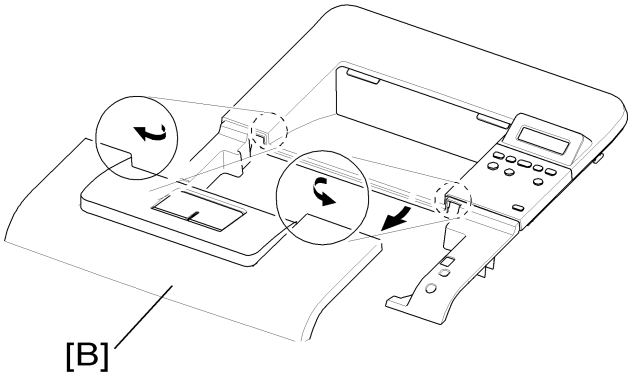
2. Remove two screws and take out the stoppers [A].



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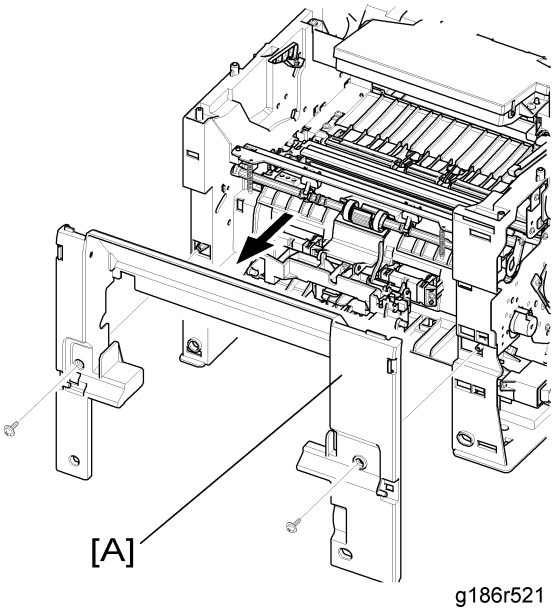
3. Take out the open cover [B] as shown.

Inner Cover

1. Before you remove the Inner Cover, you should remove:
   - By-pass tray (☛ "By-pass Tray")
   - Top cover (☛ "Top Cover")



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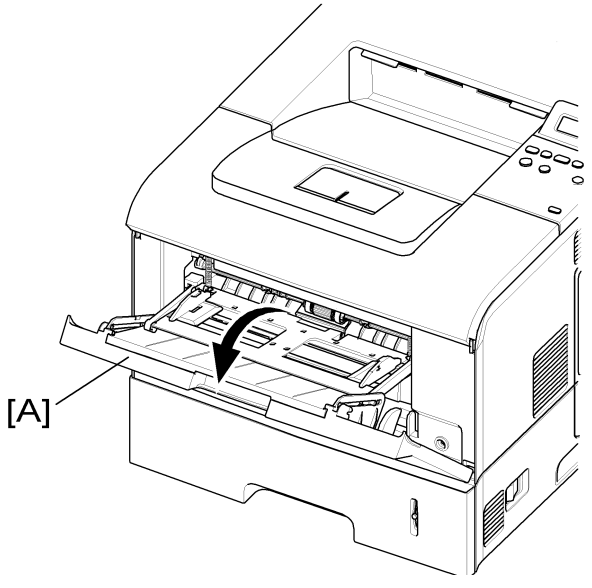
2. Remove two screws and take out the inner cover [A].

By-pass Tray



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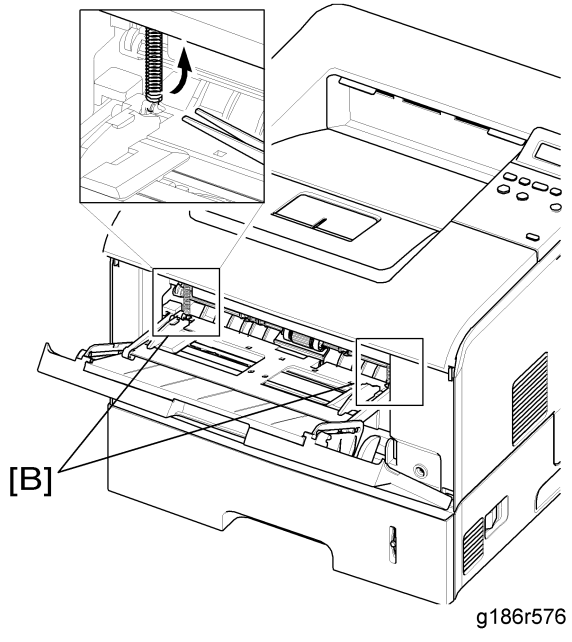
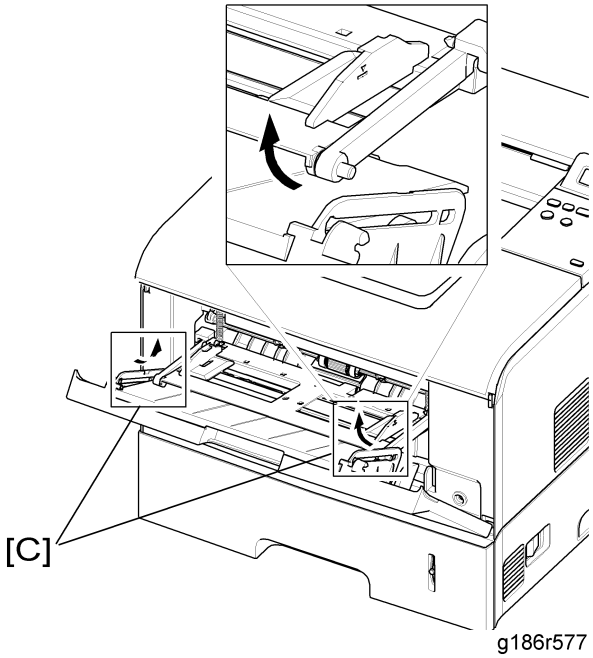
1. Open the by-pass tray [A].



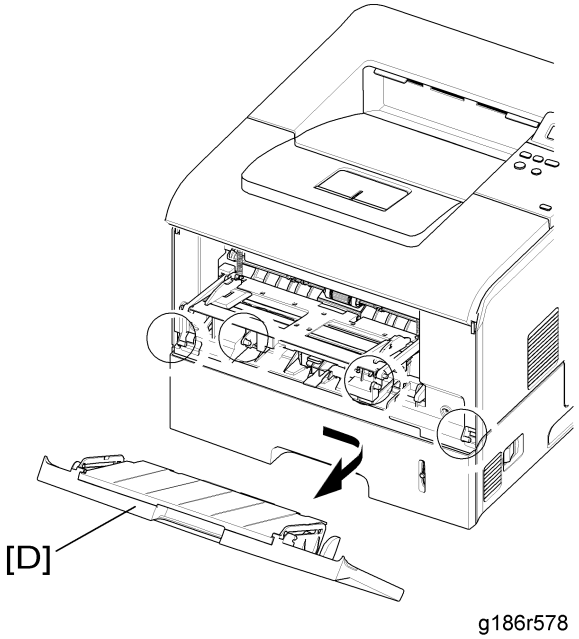
g186r576

2. Remove two springs [B] from the knock-up plate unit.



g186r577

3. Remove the tray links [C] from the by-pass tray.



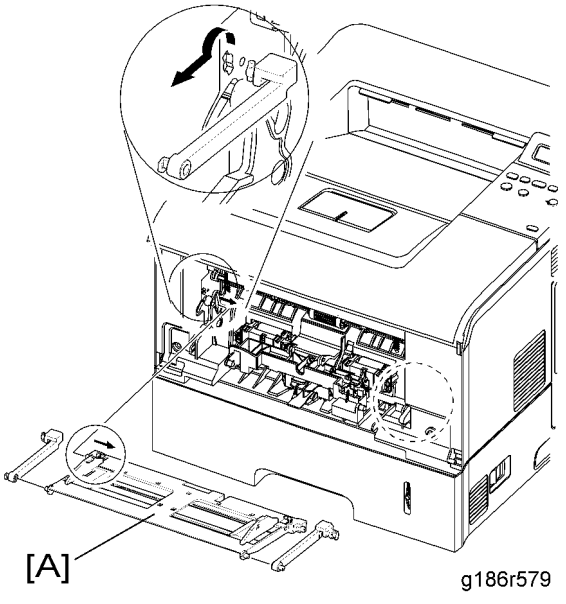
g186r578

4. Push the by-pass tray [D] and remove it, as shown.

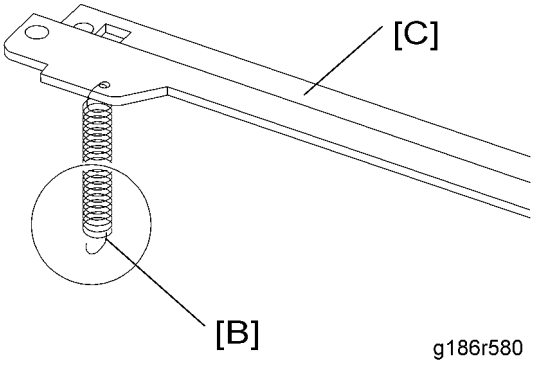
Paper Feed and Exit

Knock Up Plate Unit

1. Before you remove the knock up plate unit, you should remove:
   - By-pass tray (☛ "By-pass Tray")



2. Remove knock up plate unit [A] in the direction of arrow, as shown.

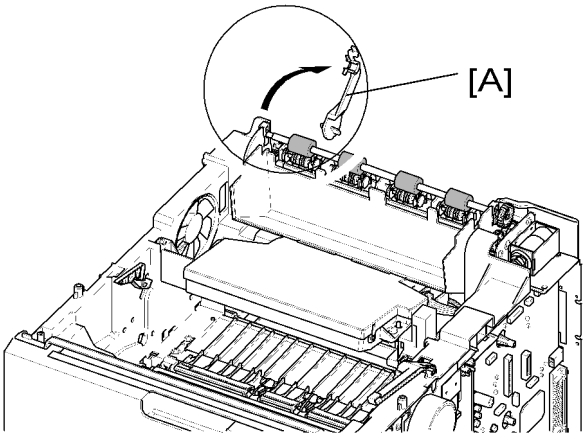


Note

- For convenience of assembly, do not separate spring [B] from by-pass pick up rack [C]. Also for more convenient assembly, locate hook section of spring that is connected to knock-up plate unit as shown on the outside.

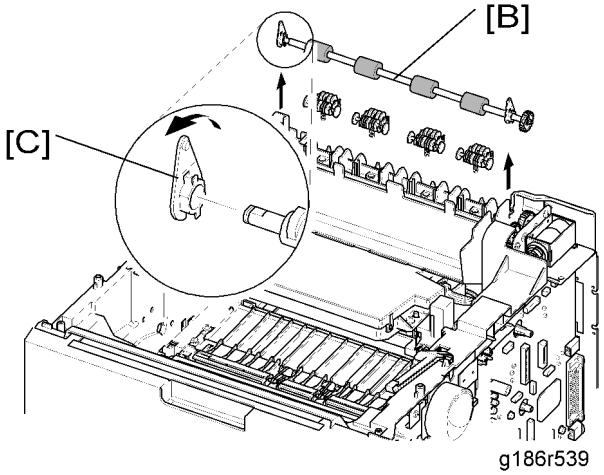
Exit Roller

1. Before you remove the exit roller, remove the top cover (☛ "Top Cover")



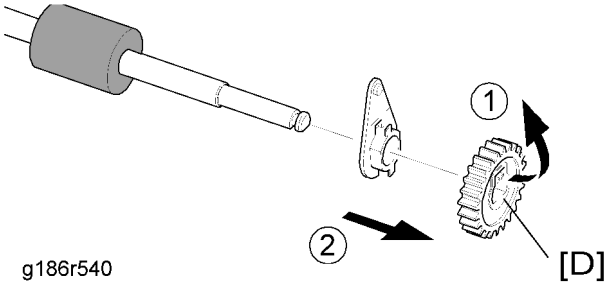
g186r538

2. Take out the actuator [A].



g186r539

3. Remove exit roller [B] and bearing [C] as shown.



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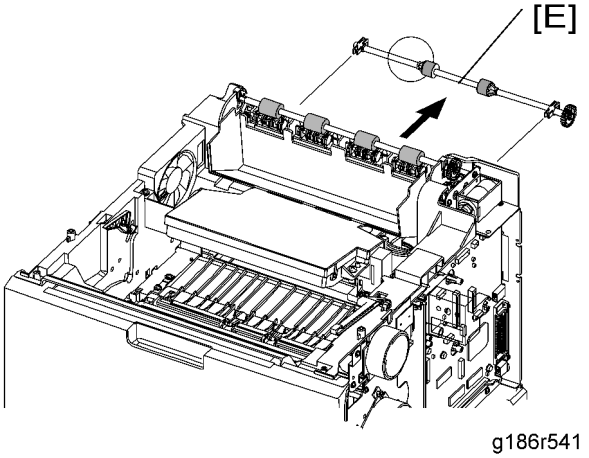
3

4. Release the exit gear [D] as shown.



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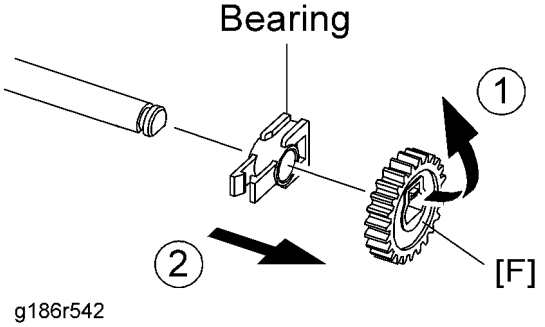
5. Remove the duplex exit roller [E] with the same method.

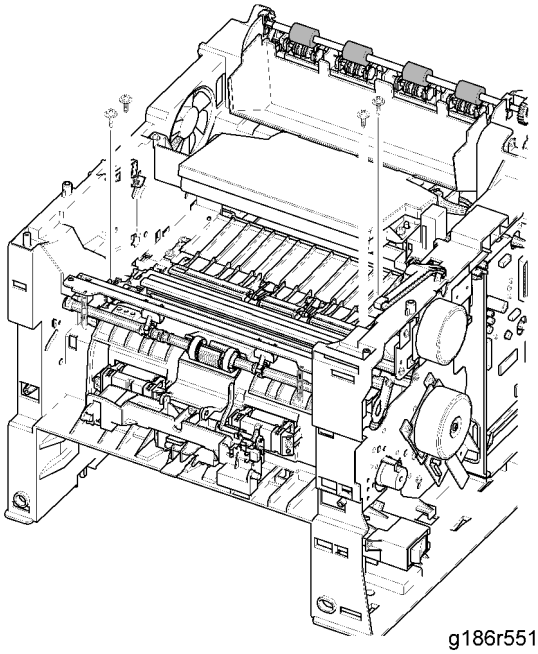


g186r542

6. Release the duplex exit gear [F], as shown.

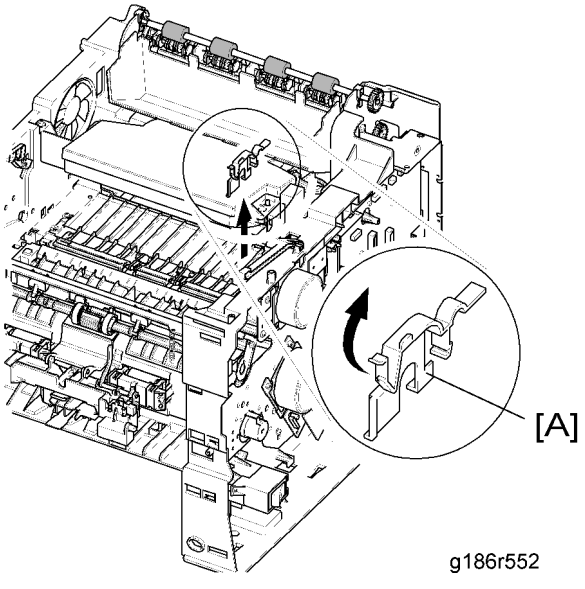
Registration Roller Unit

1. Before you remove the registration roller unit, remove the top cover (☛ " Top Cover ")



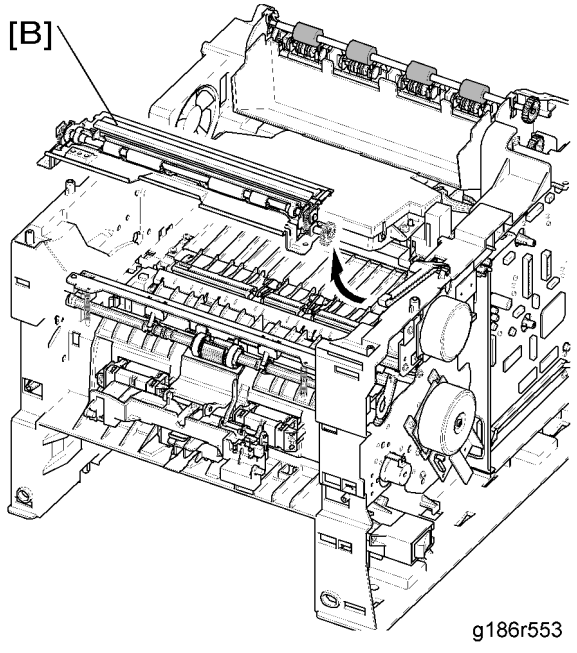
g186r551

2. Unplug the harness and remove the four screws shown above.



g186r552

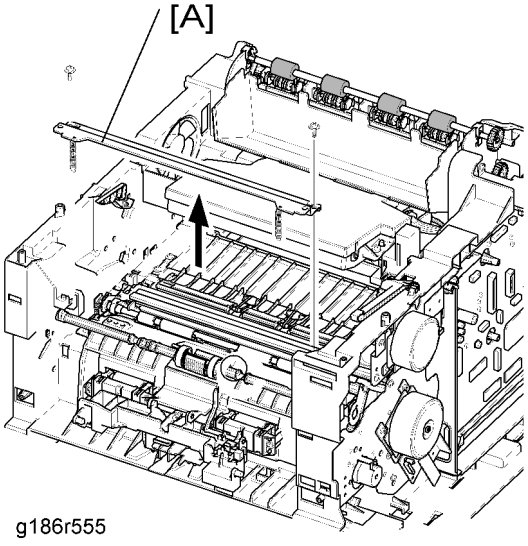
3. Release the lock as shown and lift up the gear cap [A].



4. Take out the registration roller unit [B] as shown.

By-pass Pick Up Unit

1. Before you remove the by-pass pick up unit, you should remove:
    - Knock up plate unit (☛ "By-pass Tray")
    - Main drive unit (☛ "Main Drive Unit")
    - Top cover (☛ " Top Cover ")
    - Inner cover (☛ "Inner Cover")



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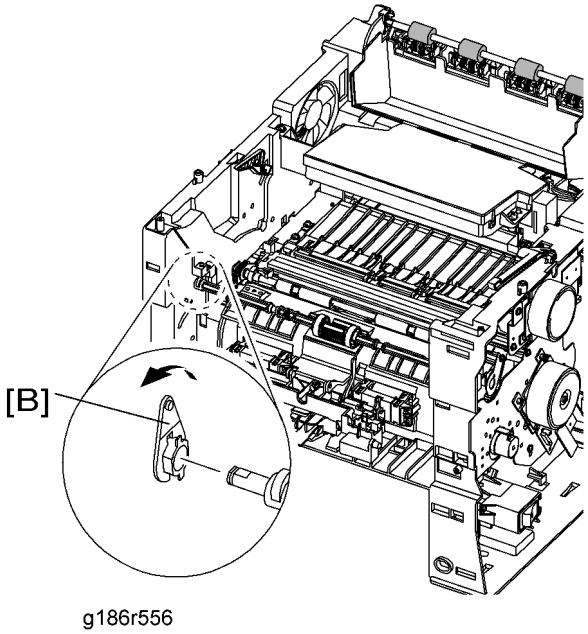
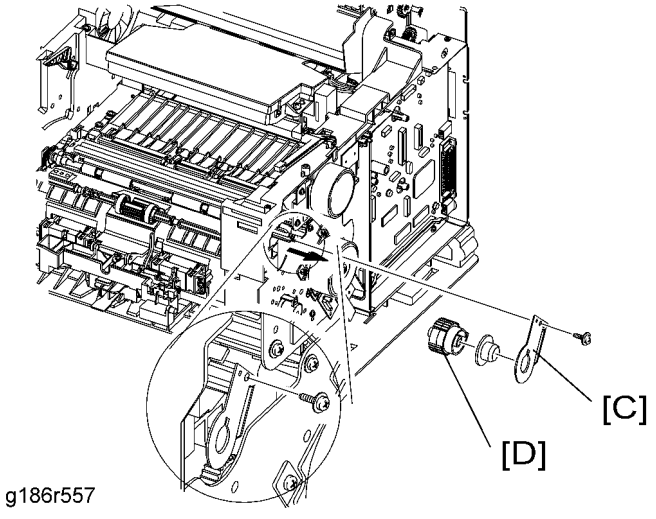
2. First of all remove the two screws, then lift up the by-pass pick up shaft for taking out the by-pass pick up rack [A].

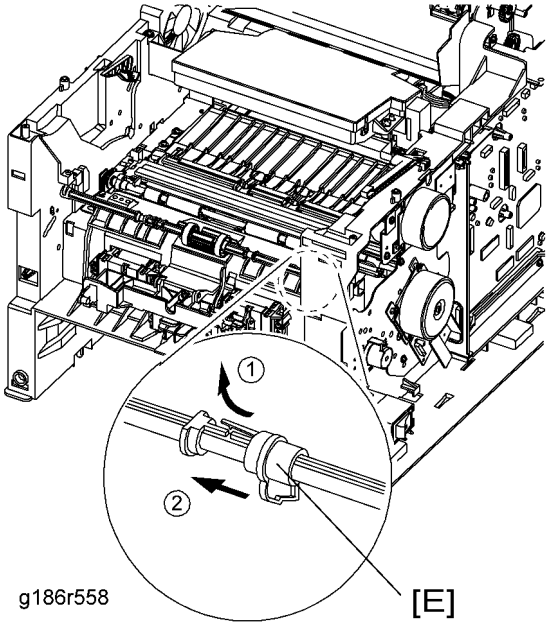


g186r556

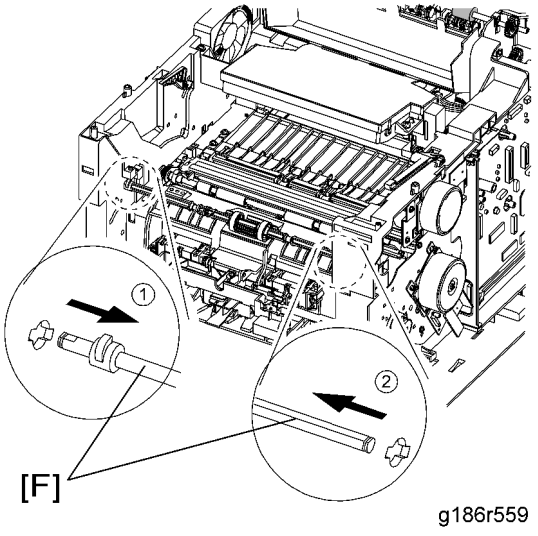
3. Remove the locking equipment to rotate the bearing [B] in the direction of arrow.



4. Remove the screw securing the bracket [C] and remove the gear unit [D], as shown.

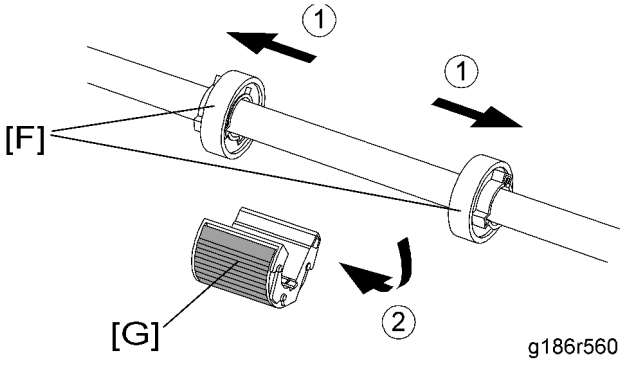


5. Slide the cam [E] to the right by pulling on the by-pass pick up shaft, as shown.



g186r559

6. First lift the side of the shaft [F] and then remove the shaft.

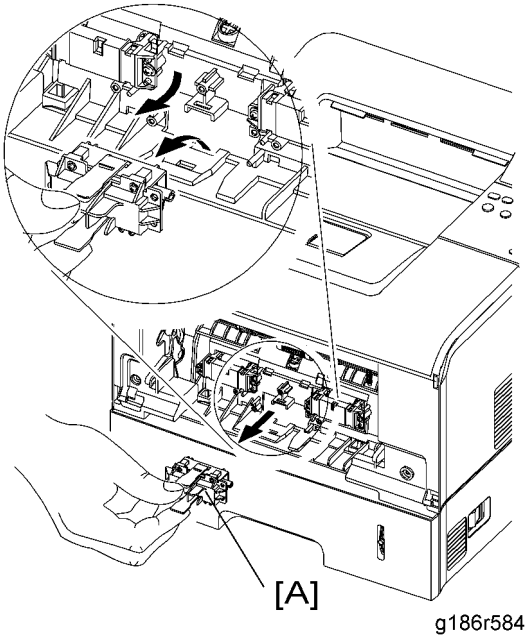


g186r560

7. Slide the roller positioners [F] toward the ends of shaft then take off the by-pass pick up roller [G], as shown.

Stopper Roller Unit

1. Before you remove the stopper roller unit, you should remove:
   - Knock Up Plate Unit (☛ "By-pass Tray")
   - Holder pad unit (☛ "Holder Pad Unit")

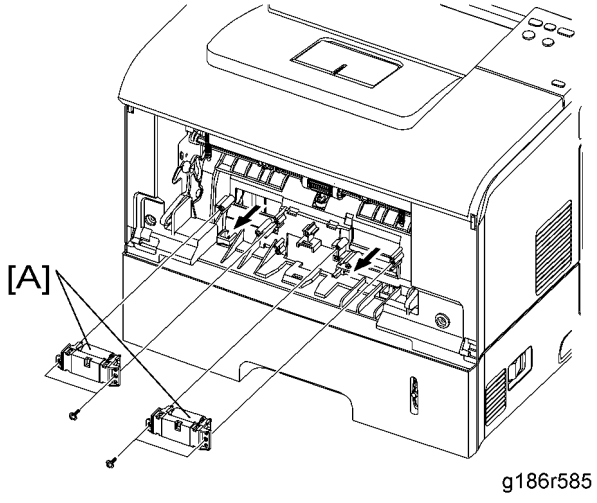


g186r584

2. Release the lock as shown and take out the stopper roller unit [A].

Idle Roller Unit

1. Before you remove the idle roller unit, you should remove :
   - Holder pad unit (☛ "Holder Pad Unit")

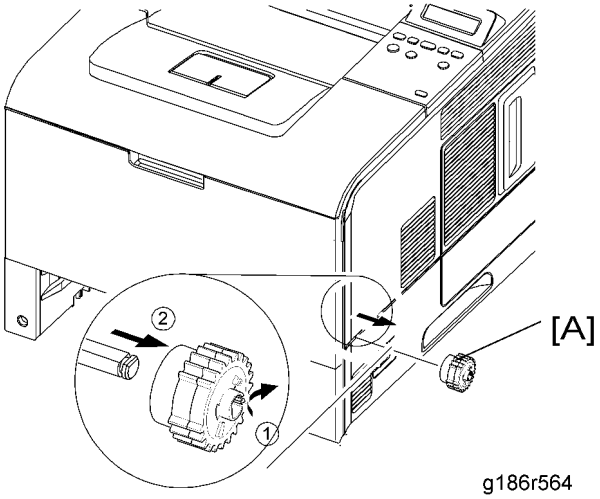


g186r585

2. Remove the four screws. Then lift out the idle roller units [A], as shown.

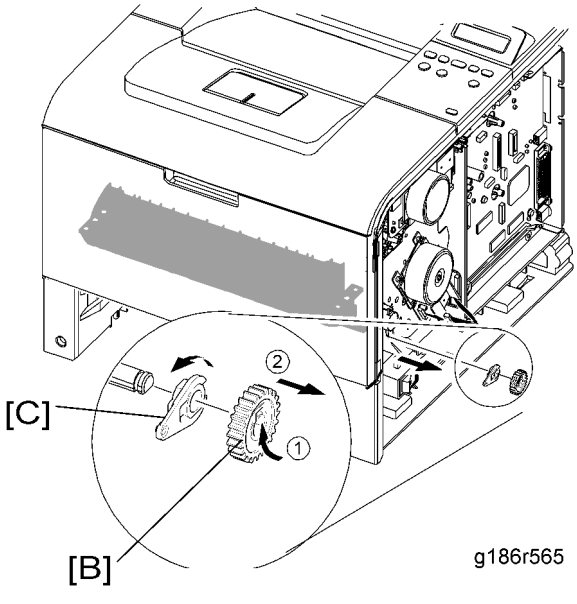
Pick Up and Registration Roller

1. Before you remove the pick up roller and registration roller, you should remove:
   - Main drive unit (☛ "Main Drive Unit")
   - Cover right (☛ "Cover Right")



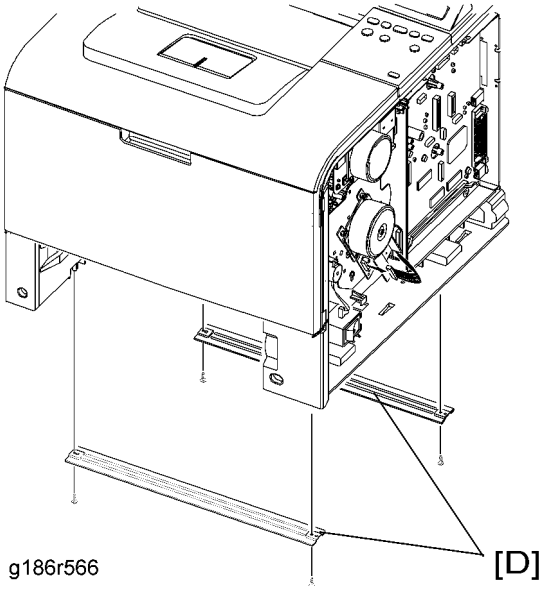
g186r564

2. Remove the pick-up roller cam [A], as shown.



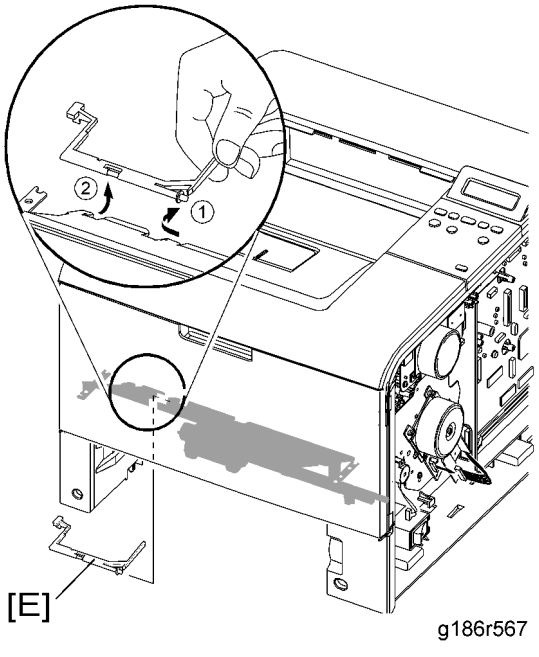
g186r565

3. Release the registration roller gear [B], and then rotate the bearing [C] in the direction of the arrow, as shown.



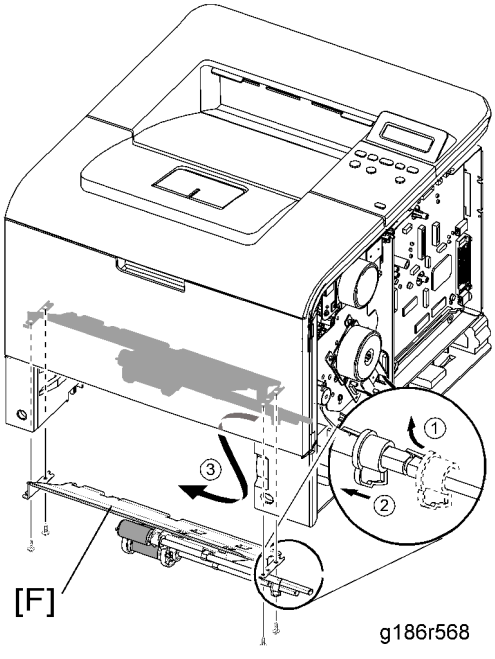
g186r566

4. Take out the four screws securing the bottom crossbars [D] and remove them.

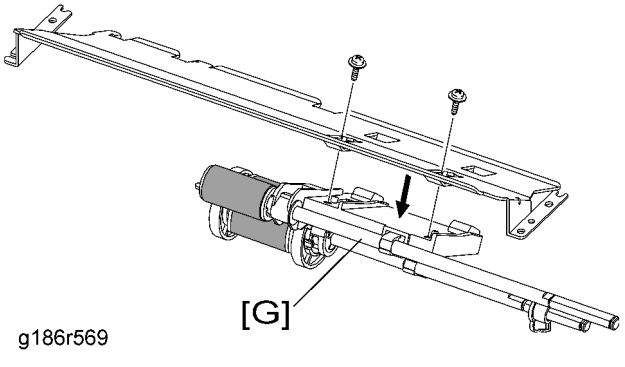


g186r567

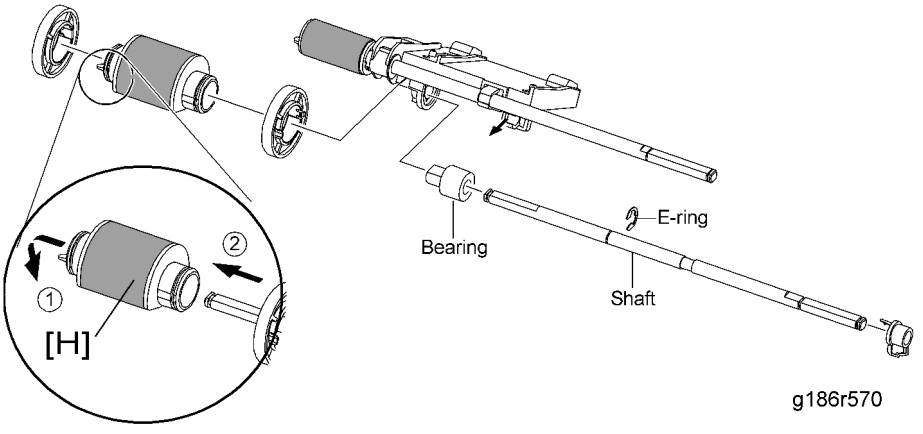
5. Remove the actuator [E] as shown.



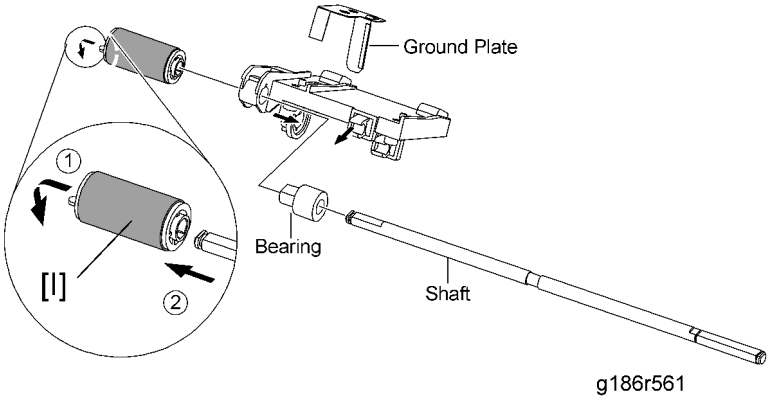
6. Remove the four screws securing the paper guide frame. Then take out the paper guide frame [F], as shown.



7. Remove the two screws securing the roller support unit [G] and then remove it.



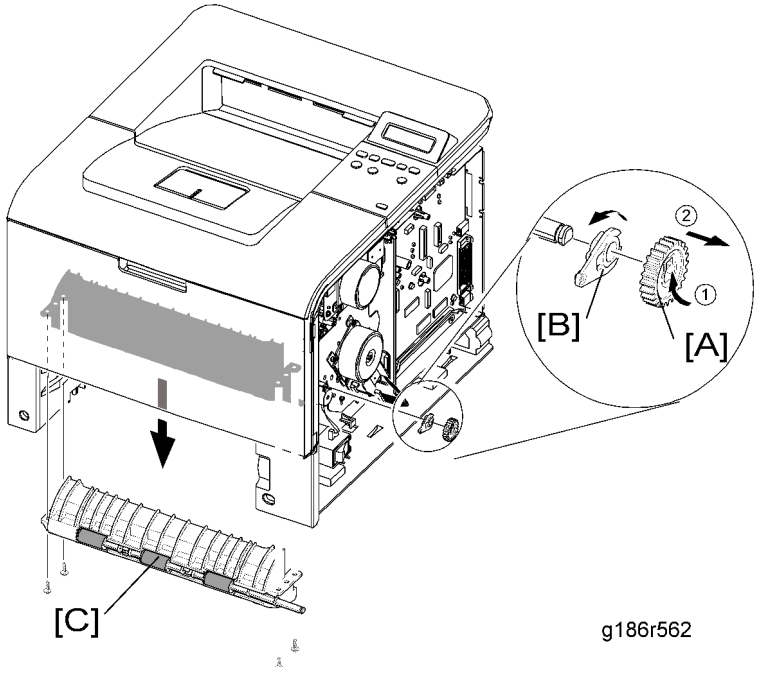
8. Remove the pick-up roller [H] as shown.



9. Remove the registration roller [I] as shown below.

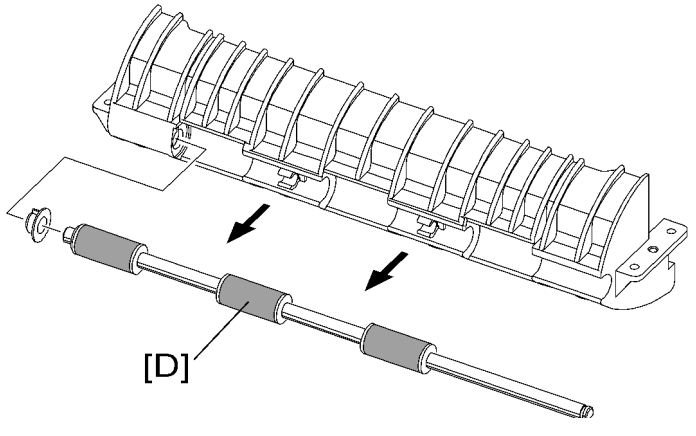
Feed Roller

1. Before you remove the feed roller, you should remove:
   - Main drive unit (☛ "Main Drive Unit")
   - Cover right (☛ "Cover Right")
   - Paper Guide Frame (☛ "Pick Up and Registration Roller")



g186r562

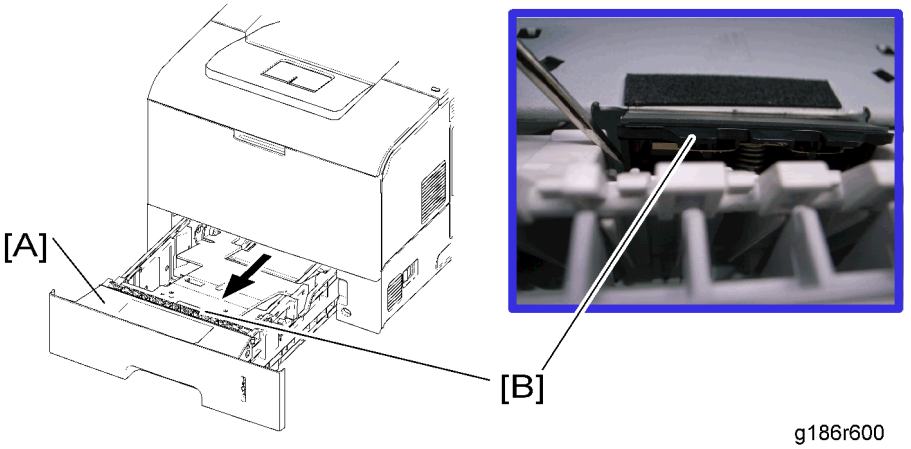
2. Release the feed roller gear [A], and then rotate the bearing [B] in the direction of the arrow, as shown.
3. Remove the four screws securing the feed roller unit [C] and then remove the unit, as shown.



g186r563

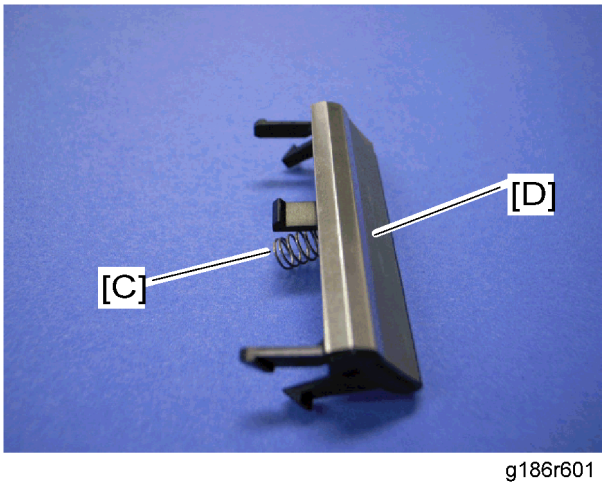
4. Remove the feed roller [D] as shown.

Rubber Pad



g186r600

1. Pull the cassette [A] out of the printer.
2. Remove the rubber pad with spring [B] (hook x 2).



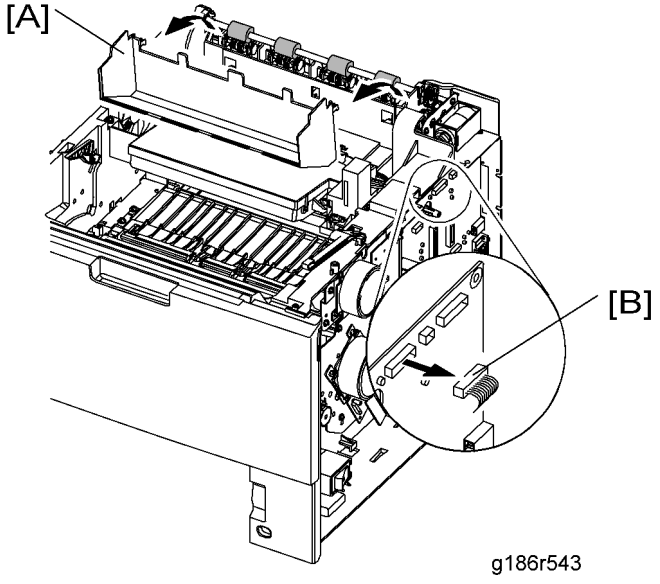
g186r601

3. Remove the spring [C].
4. Rubber pad [D].

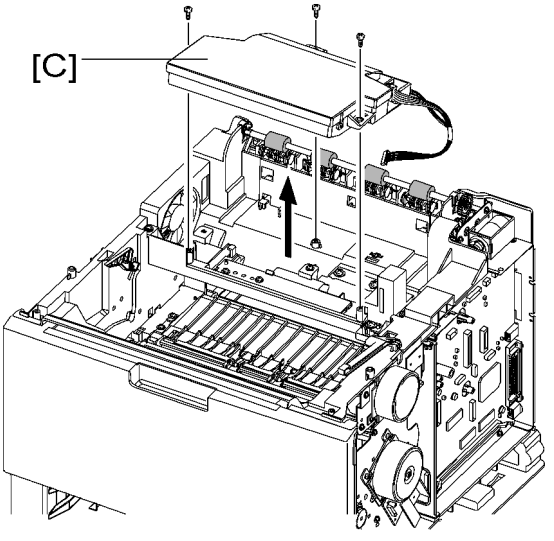
Laser Optics

LSU

1. Before you remove the LSU, you should remove:
    - Rear cover (☛ "Rear Cover")
    - Cover right (☛ "Cover Right")
    - Cover left (☛ "Cover Left")
    - Top cover (☛ " Top Cover ")



2. Remove the cover-frame exit [A] and unplug the connector [B] from the main PCB, as shown.

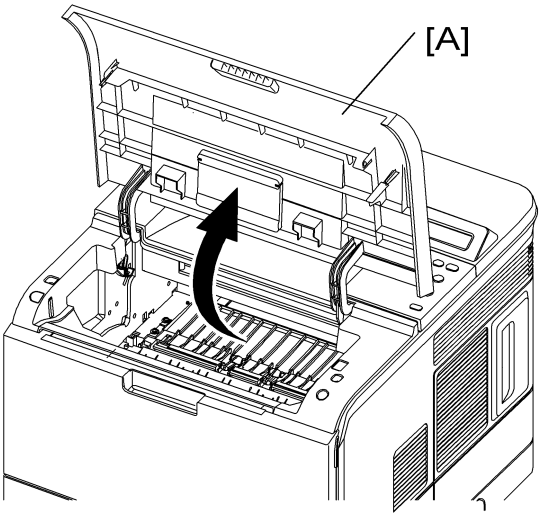


g186r544

3. Remove the three screws and take out the LSU [C].

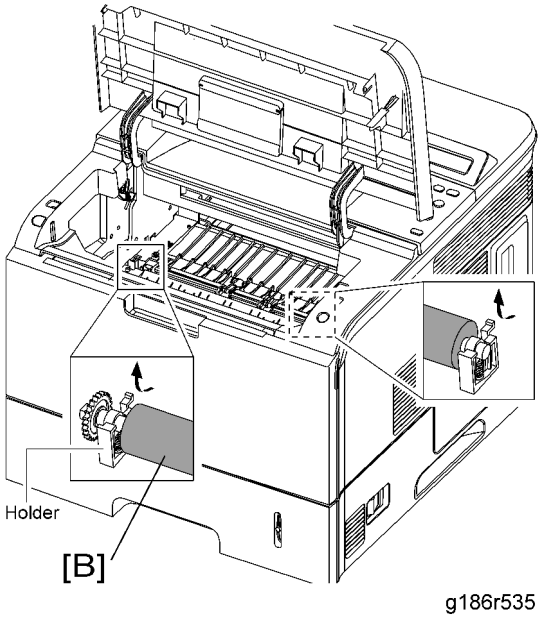
Image Transfer

Transfer Roller



g186r534

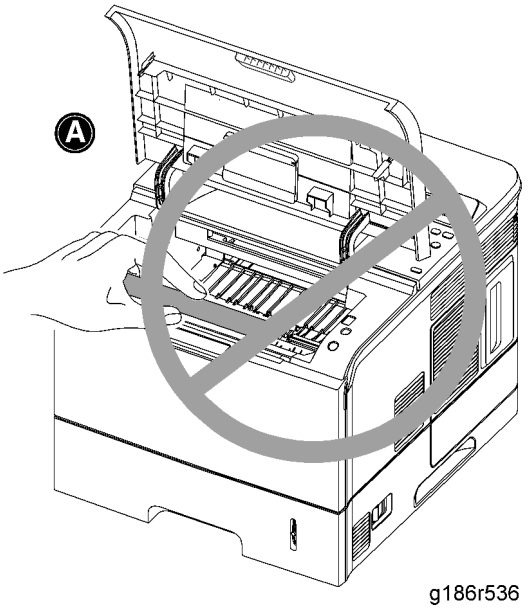
1. Open the cover [A].



g186r535

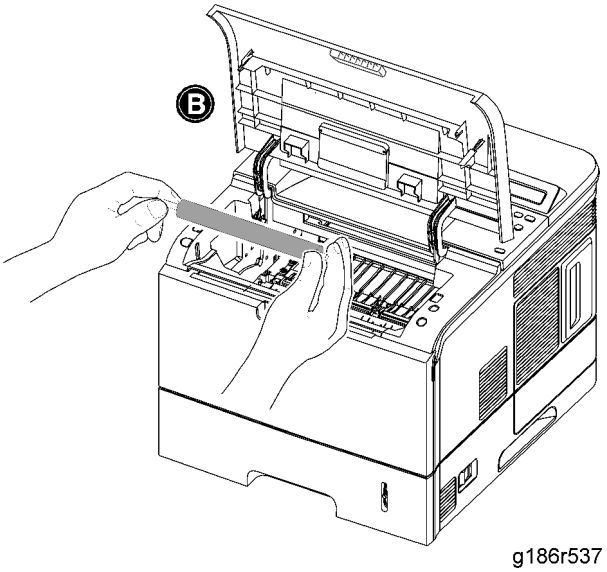
2. Hold the levers at both ends of the transfer roller, and then remove it [B].

CAUTIONS When Replacing a Transfer Roller



g186r536

1. Do not grab the transfer roller (as shown in picture [A]), since fingerprints, etc. could cause a malfunction.



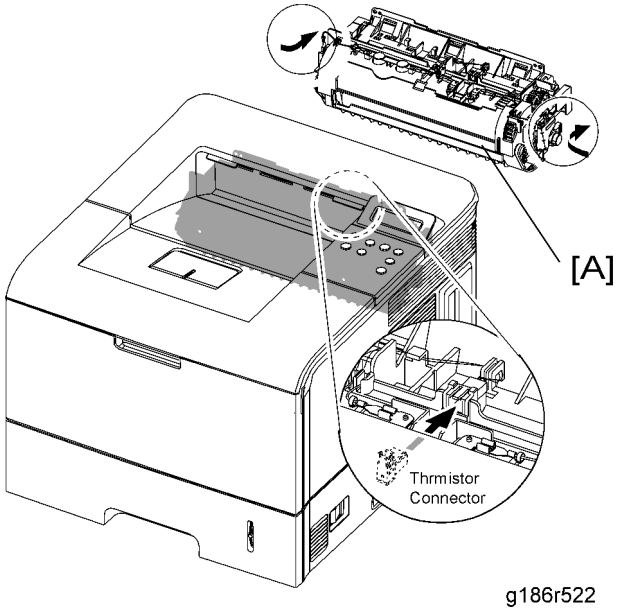
g186r537

2. Hold both ends of the transfer roller (as shown in picture [B]) when replacing it.

Fusing

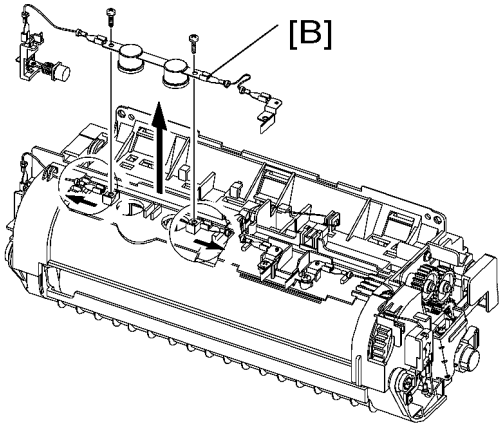
Fuser Unit

1. Before removing the fuser unit, first remove:
    - Rear cover (☛ "Rear Cover")



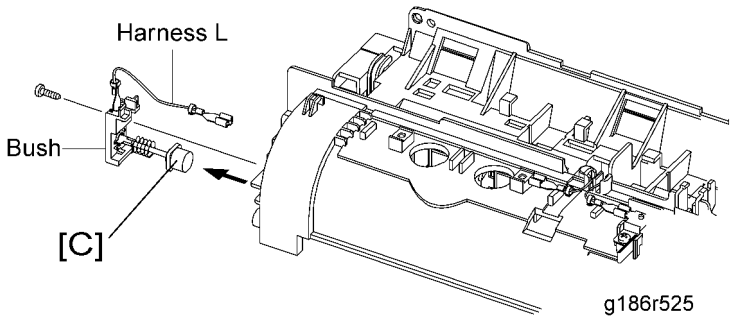
g186r522

2. Pull the locking lever. Then take out the fuser unit [A], as shown.

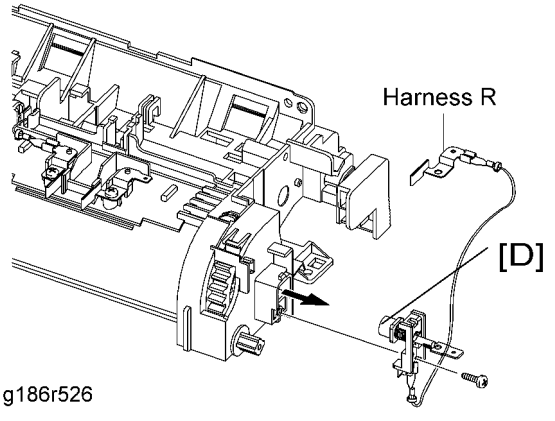


g186r523

3. Remove the two screws and take the thermostat [B] out of the fuser unit.

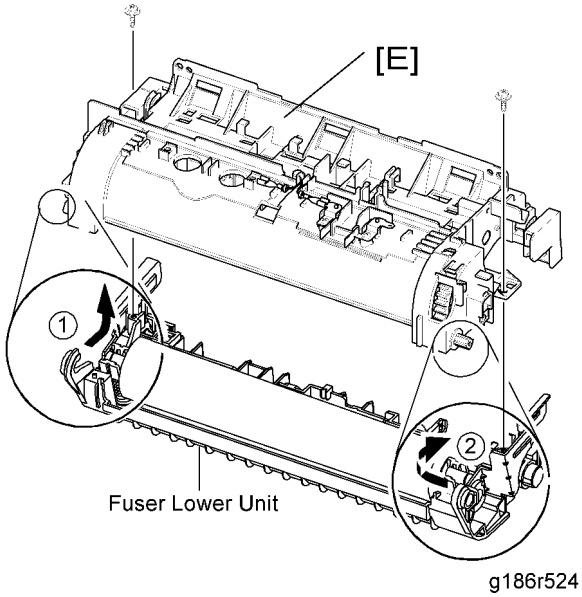


g186r525



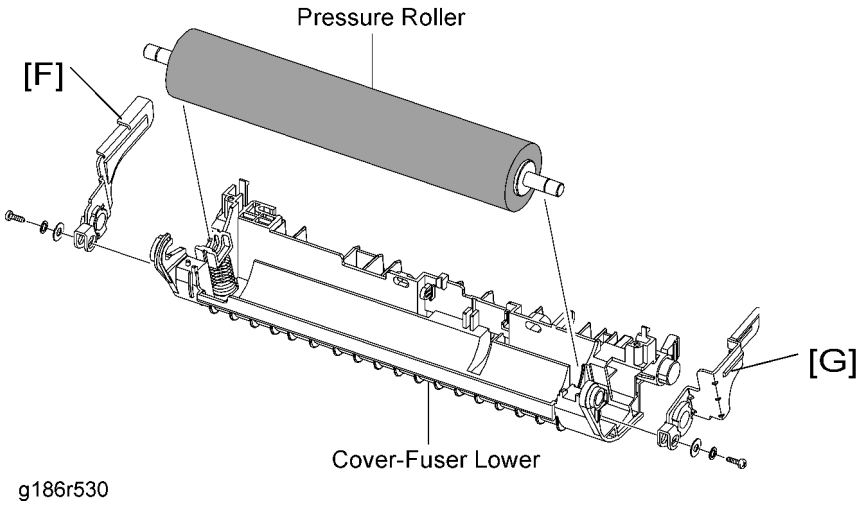
g186r526

4. Remove the two screws securing the electrode L [C], R [D] and remove them, as shown.



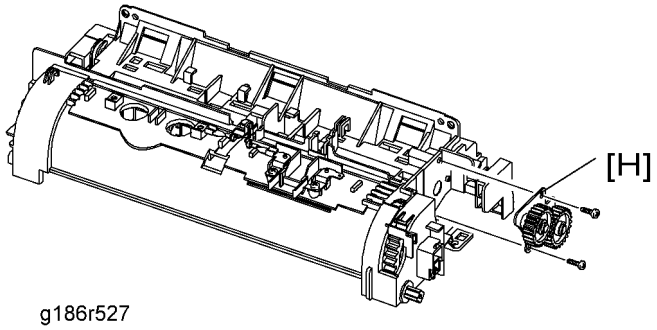
g186r524

5. Remove the two screws securing the fuser upper unit [E] and remove it, as shown.



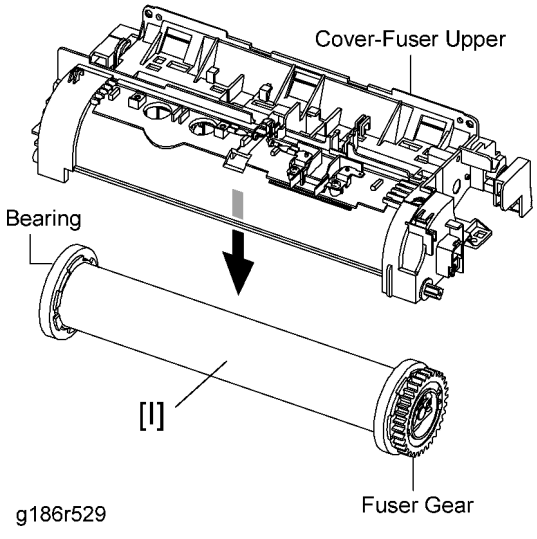
g186r530

6. Remove the two screws securing the release lever L [F], R [G] and remove it, as shown.



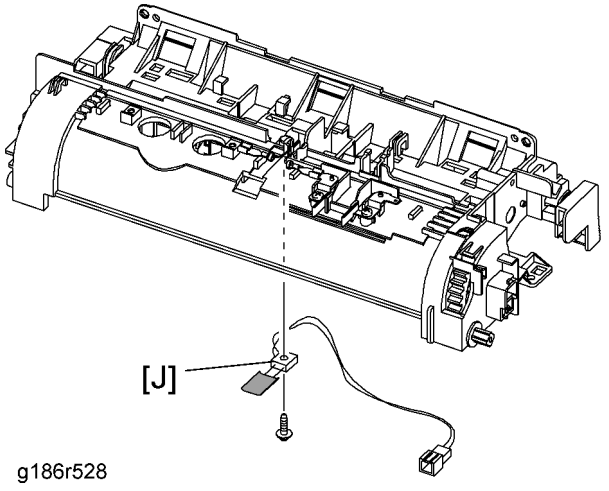
g186r527

7. Remove the two screws and take out the gear bracket [H].



g186r529

8. Take out the heat roller unit [I], as shown.

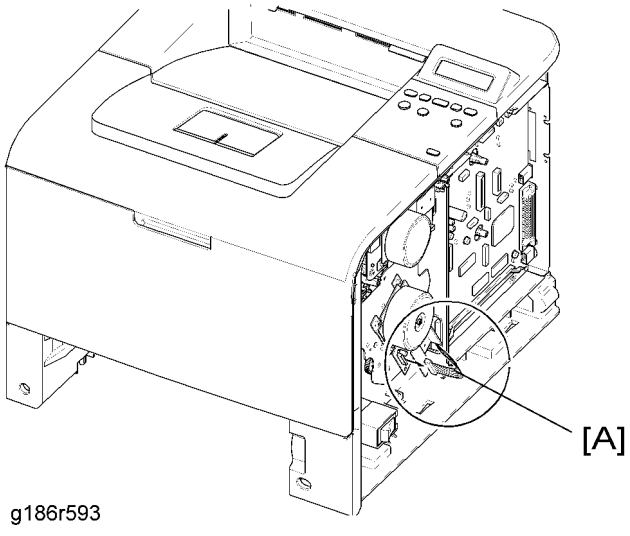


9. Remove the screw securing the thermistor [J] and remove it, as shown.

Drive

Main Drive Unit

1. Before you remove the main drive unit, you should remove:
    - Cover right (☛ "Cover Right")

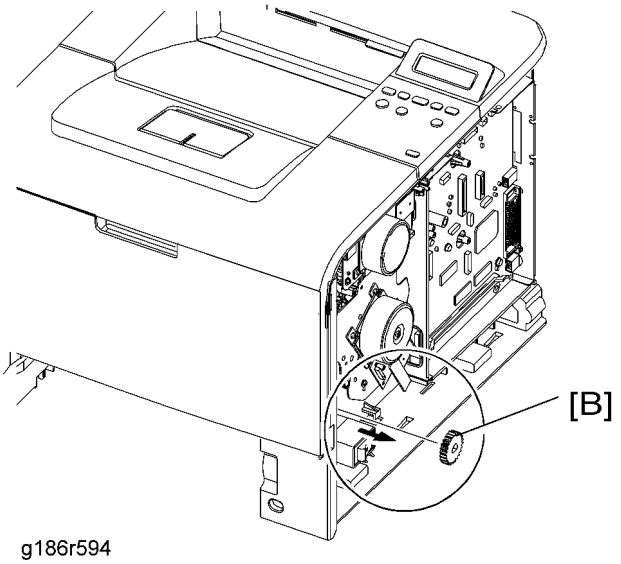


g186r593

2. Unplug the connector [A] from the main motor unit, as shown.

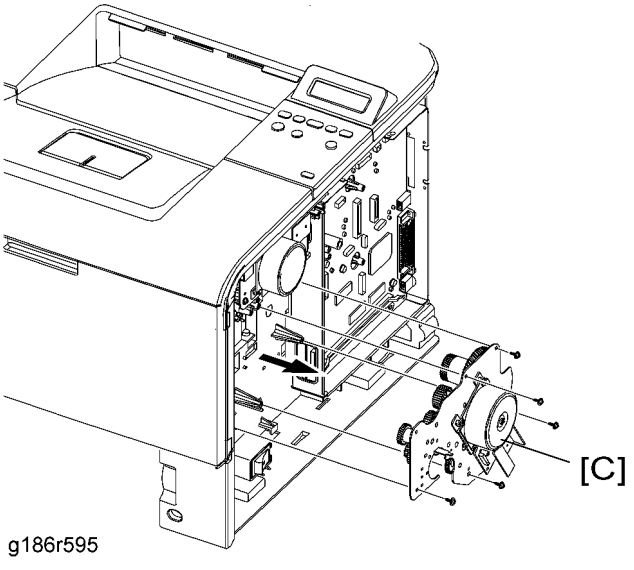
Note

- Make sure the power switch is turned off before disassembling the motor connector.



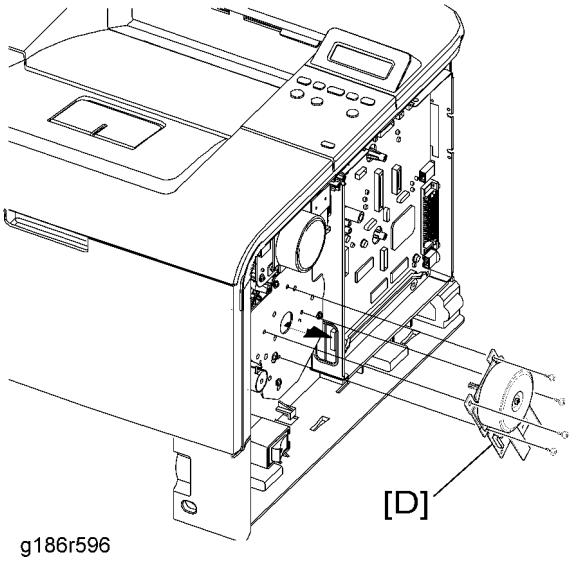
g186r594

3. Remove the registration roller gear [B], as shown.



g186r595

4. Remove the five screws and take out the main drive unit [C].

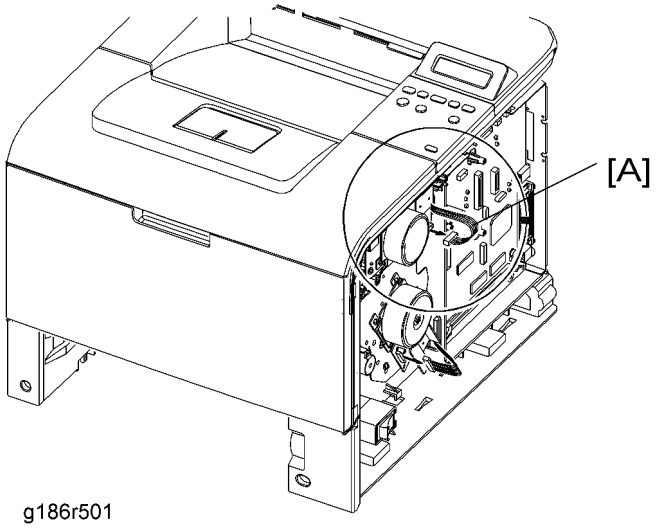


g186r596

5. When separating the main motor [D], disconnect the connector from the main motor unit, remove the four screws, and then remove the main motor [D].

Development Drive Unit

1. Before you remove the development drive unit, you should remove:
   - Cover right (☛ "Cover Right")

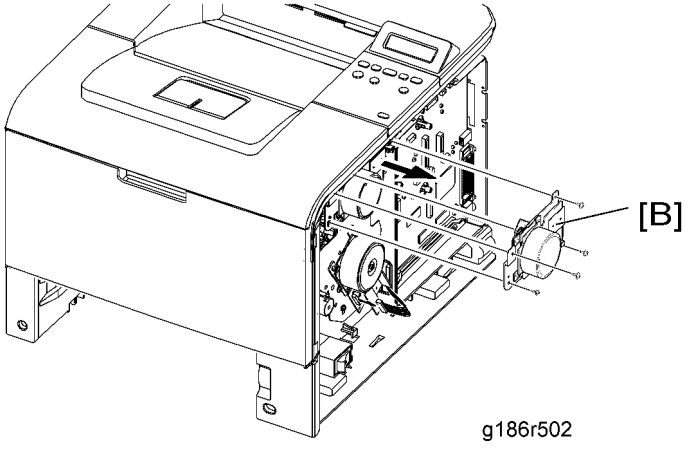


g186r501

2. Unplug the connector [A] from the development drive unit, as shown.

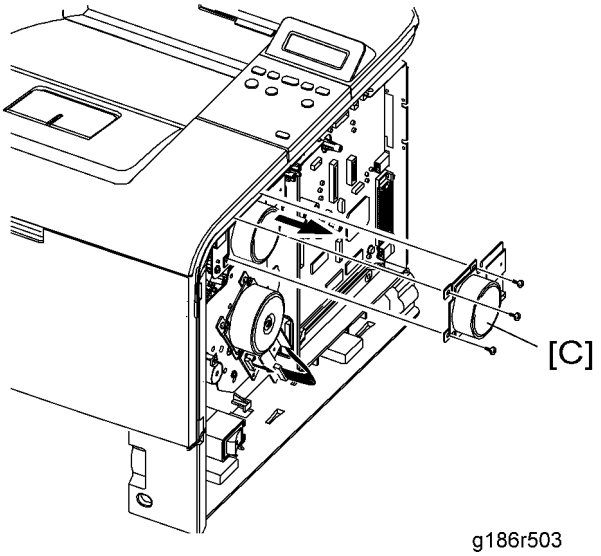
Note

- Make sure the power switch is turned off before disassembling the motor connector.



g186r502

3. Remove the four screws and take out the development drive unit [B].



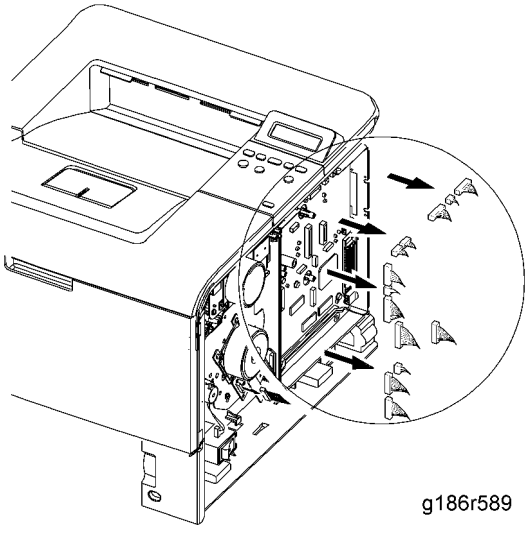
g186r503

4. When separating the development drive motor [C], disconnect the connector from the development drive unit, remove the three screws, and then remove the development drive motor [C]

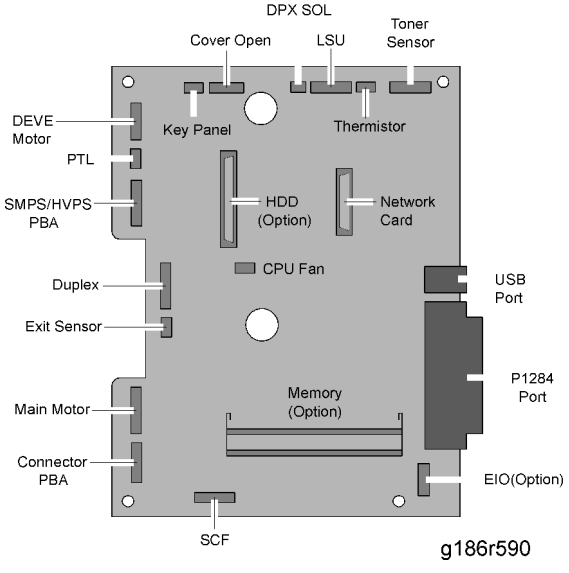
Others

Main PCB

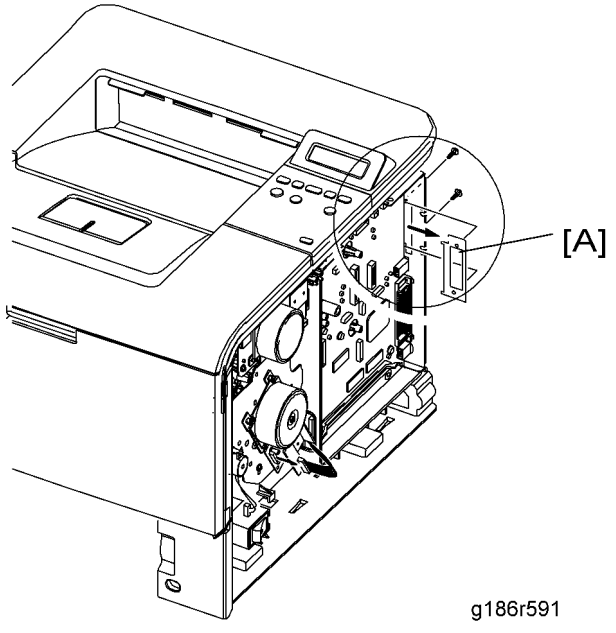
1. Before you remove the main PCB, you should remove:
   - Cover right (☛ "Cover Right")



2. Unplug all the connectors, as shown.

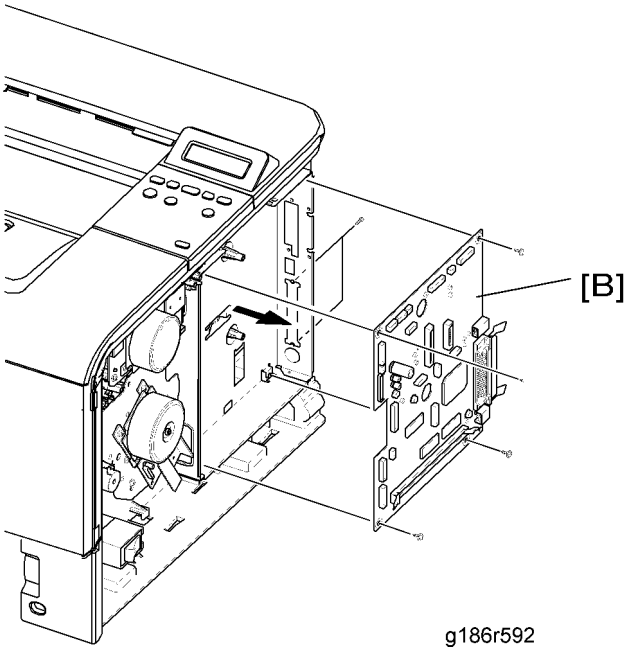


3. The connectors are located as shown.



g186r591

4. Remove the two screws and take out the dummy bracket [A].

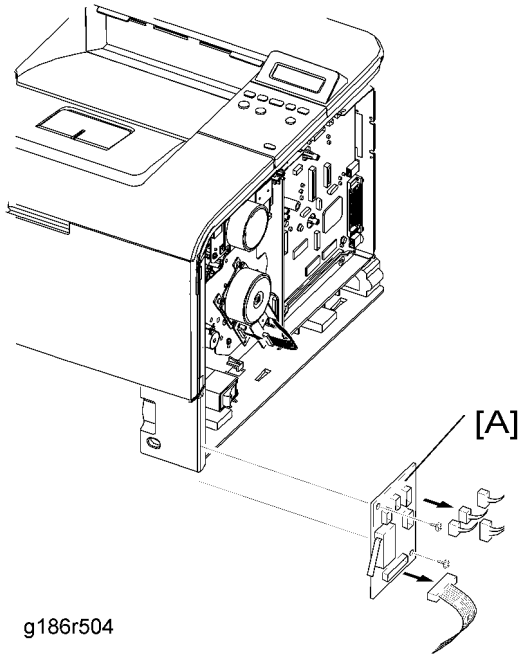


g186r592

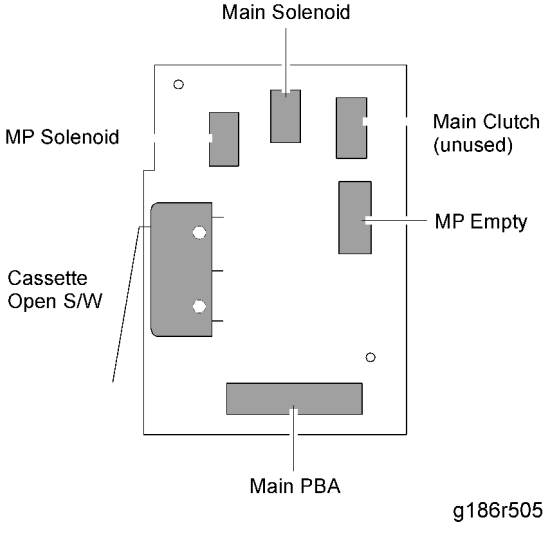
5. Remove the six screws and take out the main PCB [B].

Connector PCB

1. Before you remove the connector PCB, you should remove:
   - Cover right (☛ "Cover Right")



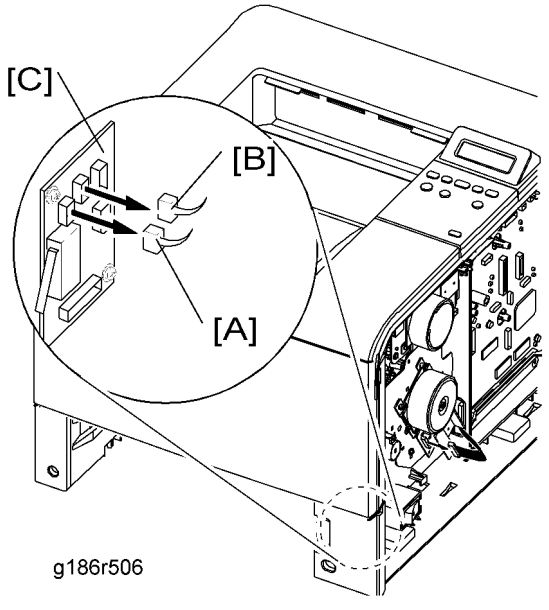
2. Unplug all the connectors from the PCB connector [A] and take it out.



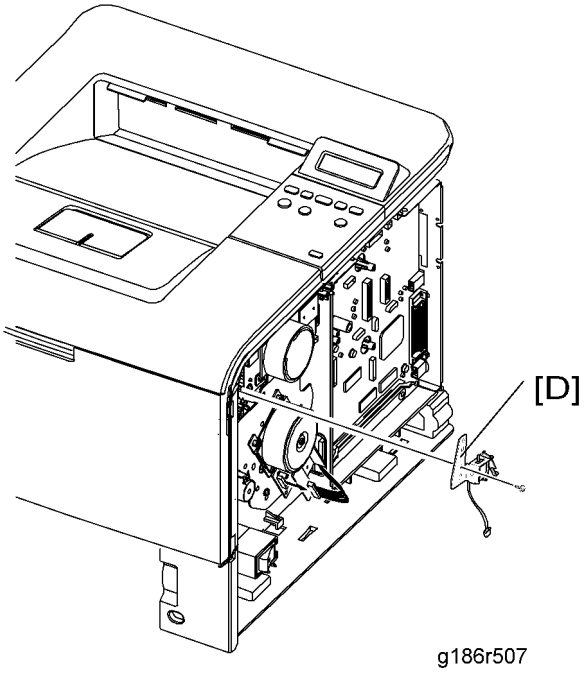
3. The connectors are located, as shown.

Solenoids

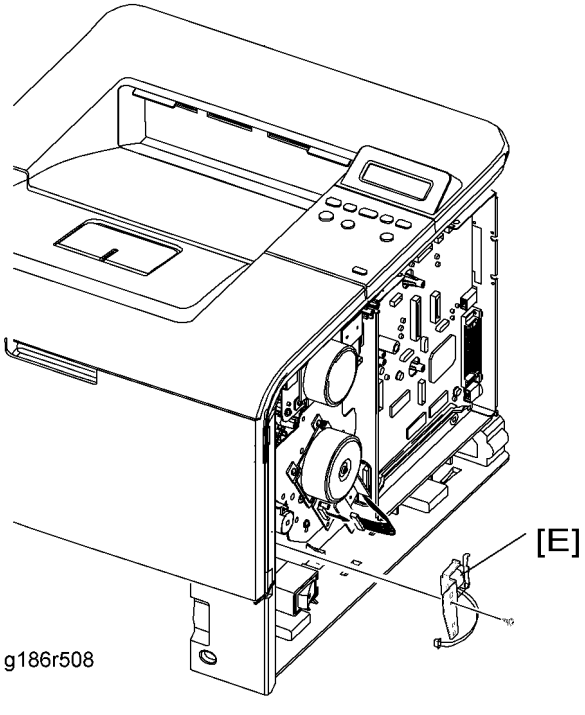
1. Before you remove the Solenoid, you should remove:
    - Cover right (☛ "Cover Right")
    - Main drive unit (☛ "Main Drive Unit")



2. Unplug the by-pass solenoid harness [A] and the main solenoid harness [B] from the connector PCB [C].



3. Remove the screw (one) and take out the by-pass solenoid [D].



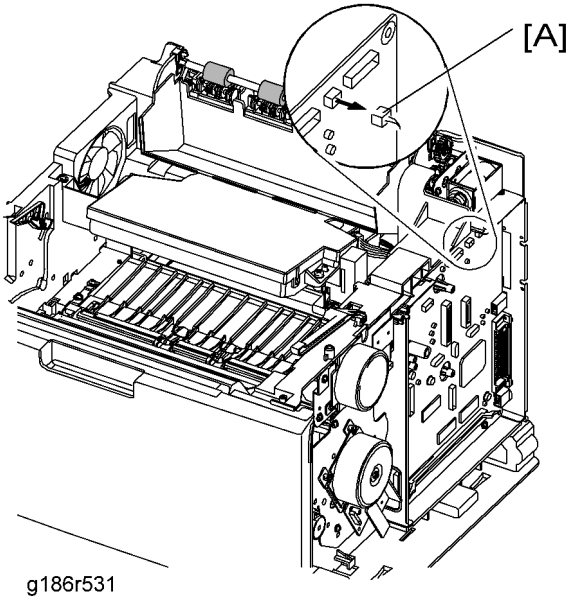
4. Remove the screw (one) and take out the main solenoid [E].

Note

- It is not necessary to disassemble the main drive unit to remove the by-pass solenoid.

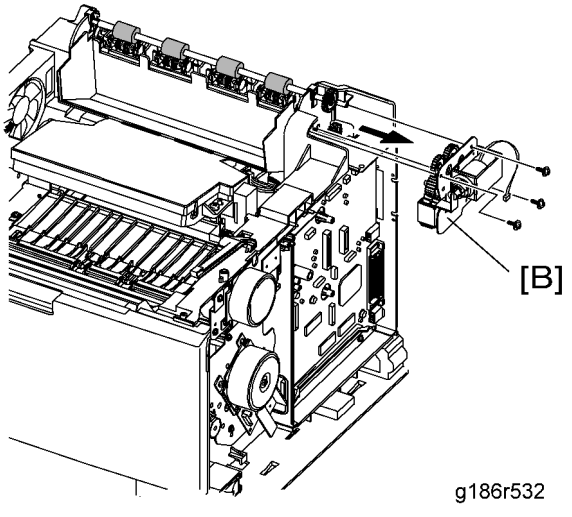
Duplex Solenoid

1. Before you remove the duplex solenoid unit, you should remove:
    - Top cover (☛ "Top Cover")



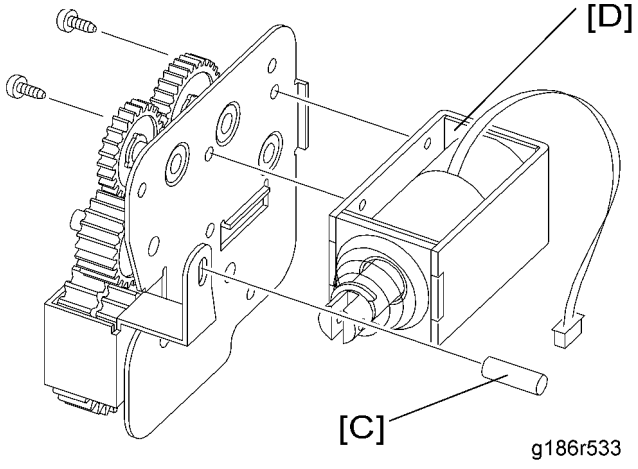
g186r531

2. Unplug the duplex solenoid harness [A] from the main PCB.



g186r532

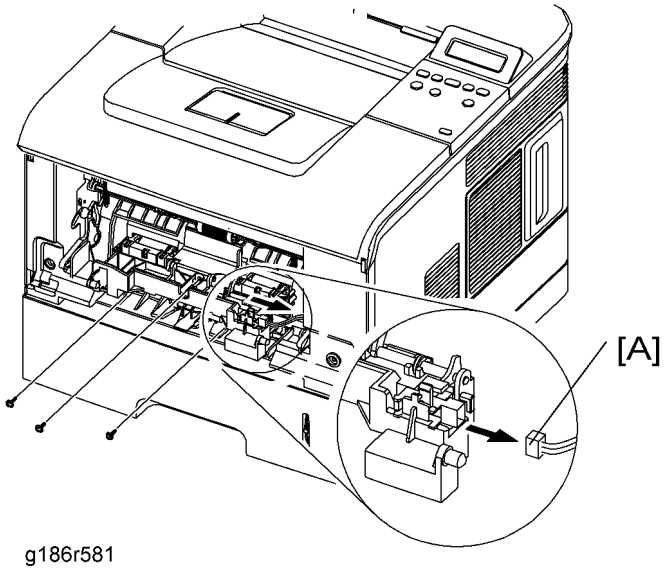
3. Remove the three screws and take out the duplex solenoid unit [B].



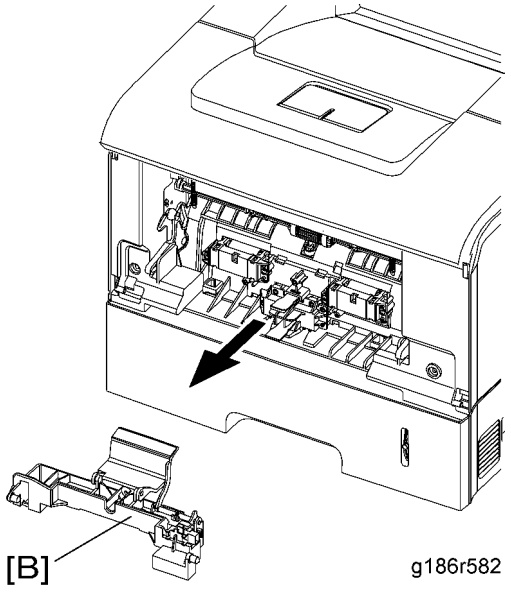
4. Remove spring pin [C] and two screws and take out the duplex solenoid [D].

Holder Pad Unit

1. Before you remove the holder pad unit, you should remove
   - Knock up plate unit (☛ "By-pass Tray")



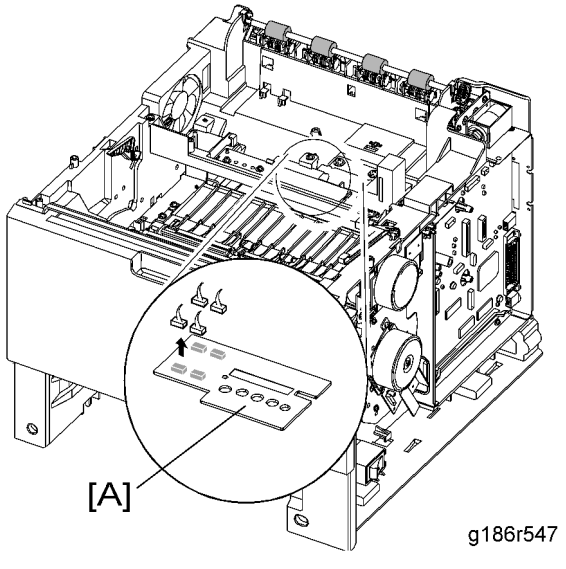
2. Unplug the connector [A] and remove the three screws, as shown.



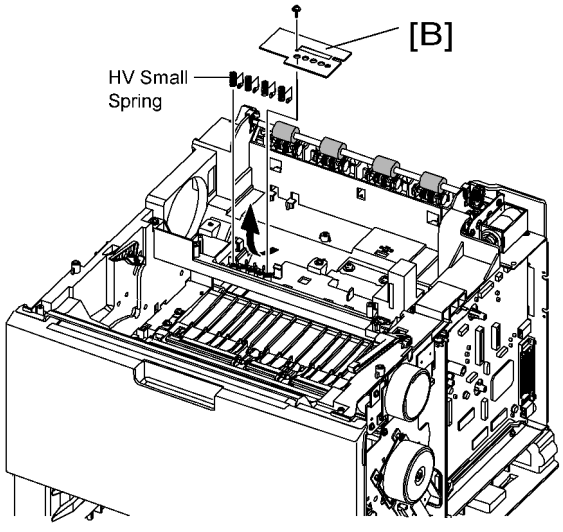
3. Remove the holder pad unit [B], as shown.

Toner Sensor PCB

1. Before you remove the LSU, you should remove:
   - Top cover (☛ "Top Cover")
   - LSU (☛ "LSU")

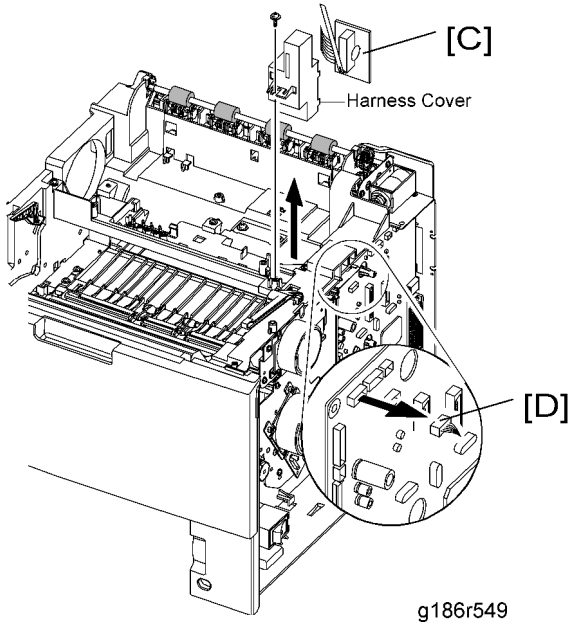


2. Unplug all the connectors from the toner sensor PCB [A].



g186r548

3. Remove the two screws and take out the toner sensor PCB [B].

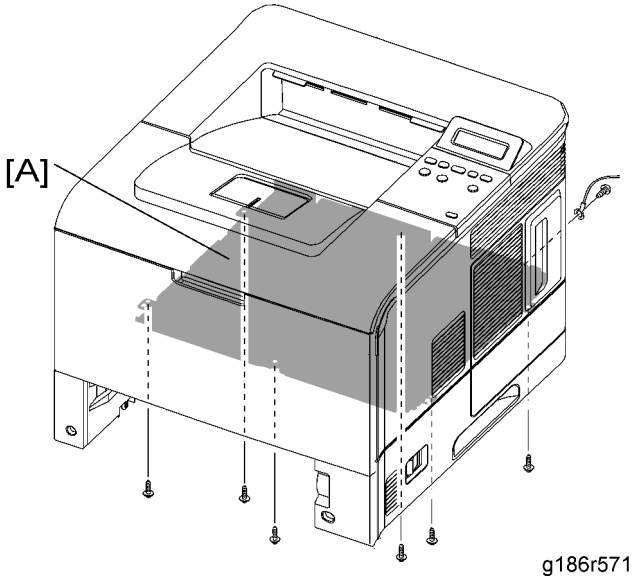


g186r549

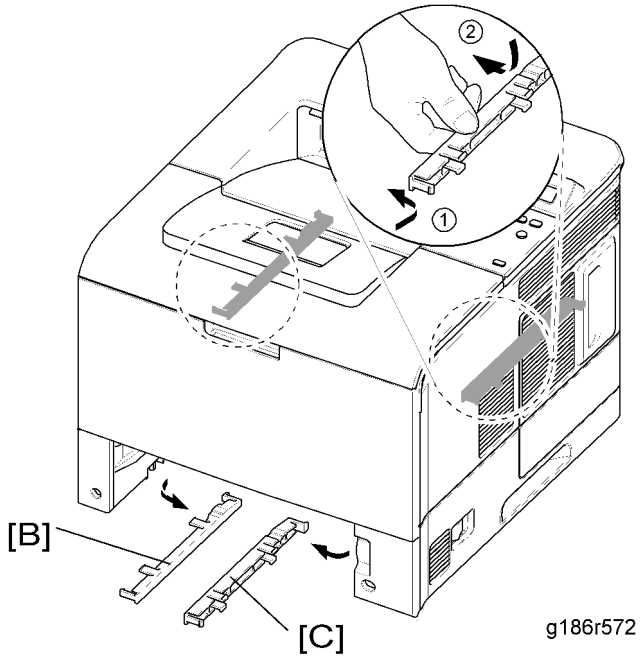
4. Remove the screw securing the cover open PCB [C] and remove it. Then unplug the connector [D] from the main PCB, as shown.

Engine PCB

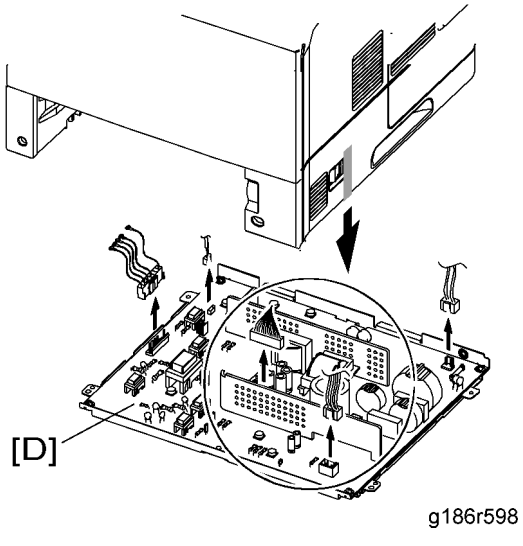
1. Before you remove the Engine PCB, you should remove:
    - Paper cassette
    - Paper guide frame (☛ "Pick Up and Registration Roller")



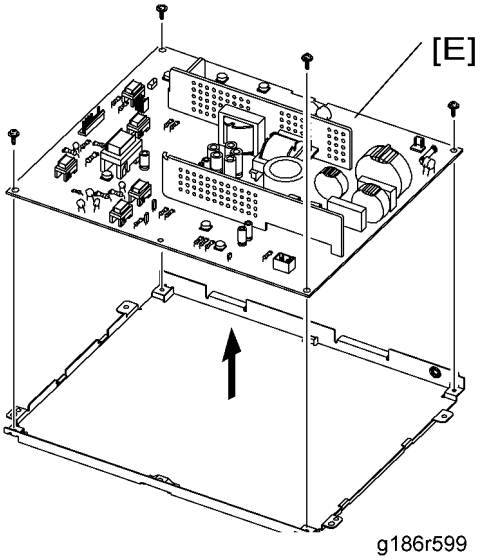
2. Remove the six screws and slightly lift the engine shield [A], as shown.



3. Remove the duplex guide L [B] and R [C], as shown.



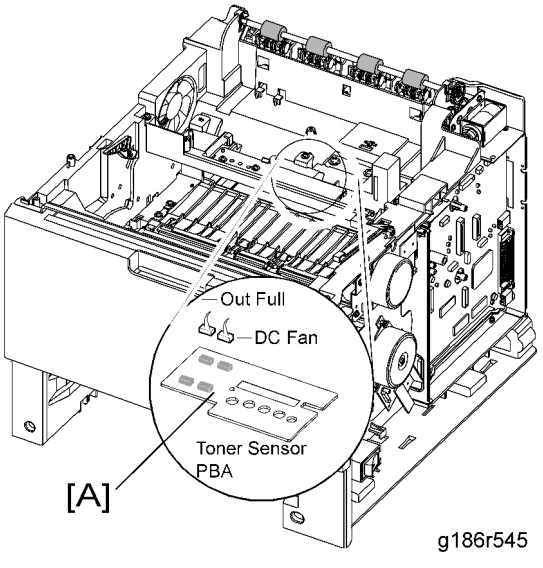
4. Unplug all connectors from the engine PCB. Then take out the engine shield plate [D].



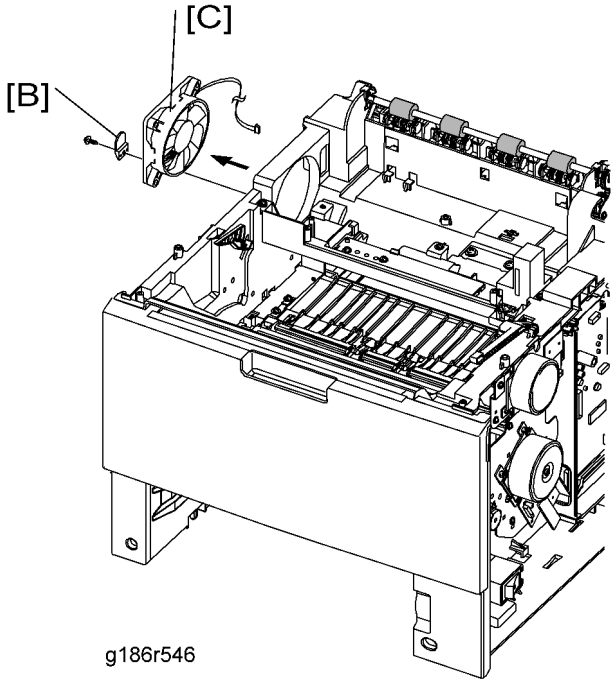
5. Remove the four screws and take out the engine PCB [E] out of the engine shield.

DC Fan

1. Before you remove the DC fan, you should remove:
   - Cover left (☛ "Cover Left")
   - Top cover (☛ "Top Cover ")
   - LSU (☛ "LSU")



2. Unplug the two connectors from the toner sensor PCB [A].

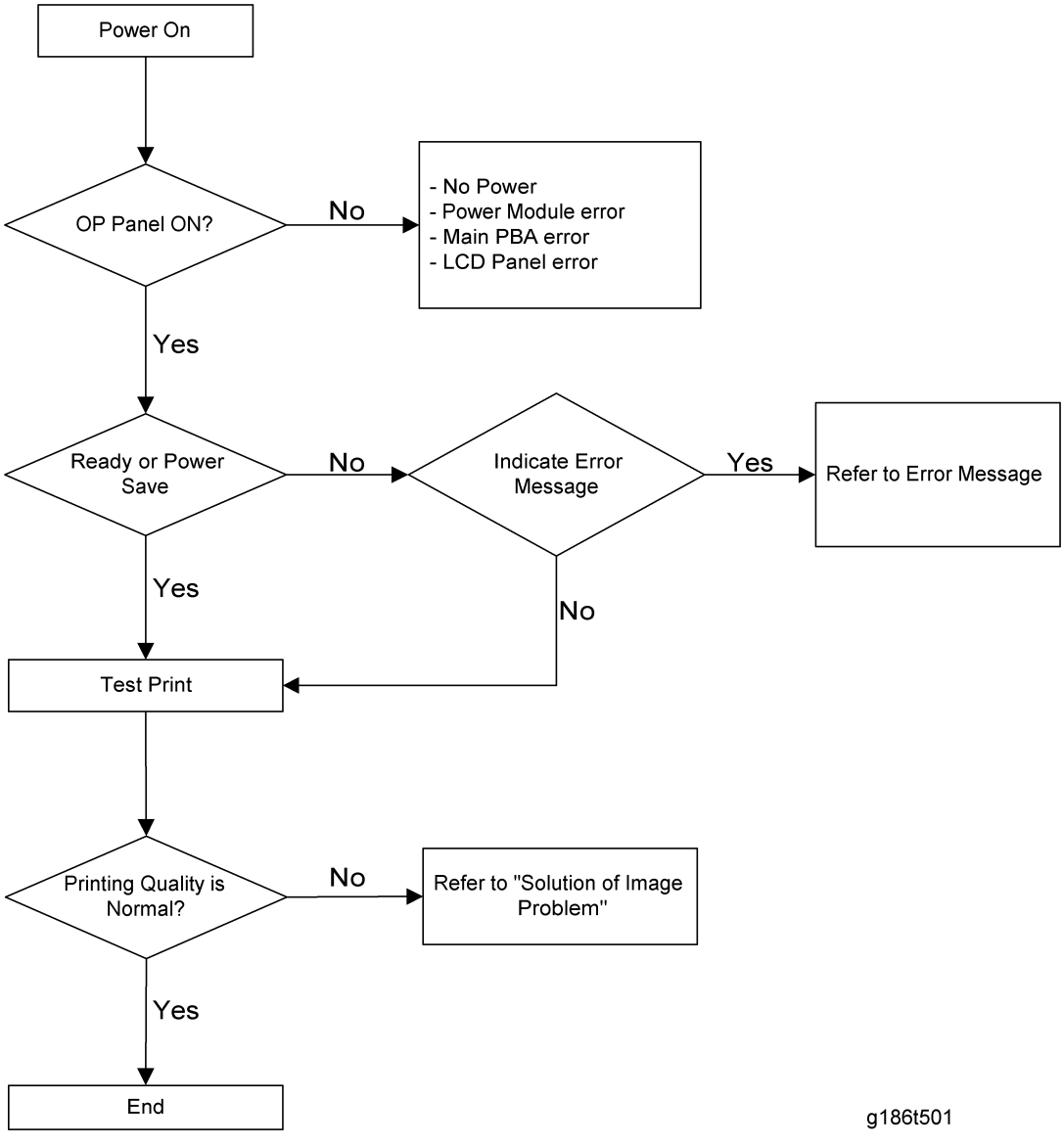


3. Remove the screw for taking out the stopper [B], and then take out the DC fan [C].

4. Troubleshooting

Procedure of Checking Symptoms

Before attempting to repair the printer, first obtain a detailed description from the customer of the problem.



g186t501

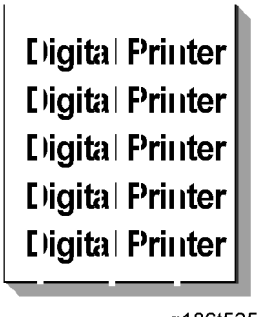
The causes and solutions of Bad images

Vertical Black Line and Band

g186t534

Description:	
1. Straight thin black vertical lines occur in the printing. 2. Dark black vertical band occurs in the printing.	
Check and Cause	**Solution**
1. Deformed Doctor-blade or cleaning-blade, in print cartridge 2. Scratched surface of the charge roller in the print cartridge. 3. Partial depression or deformation on the surface of the transfer roller.	1. If causes one or two occur in the print cartridge, replace the print cartridge and try to print. 2. Replace the transfer roller if this occurs as No. three.

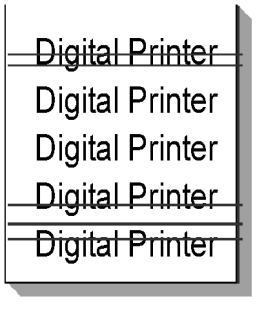
Vertical White Line



g186t535

Description: White vertical voids in the image.	
Check and Cause	**Solution**
1. Foreign matter stuck onto the window of internal lenses of LSU mirror. 2. Foreign matter or toner particles between the print cartridge roller and blade. (In case the life of the print cartridge has expired, white lines or light image may occur in front of the image.) 3. Burr and foreign substances are on the window of the print cartridge frame. 4. If the fuser is defective, voids occur periodically at the top of a black image. 5. Foreign substances are on the OPC Drum. 6. Partly depressed or deformed surface of the transfer roller	1. Foreign matter stuck onto the window: Clean the LSU window with recommended cleaner (IPA) Clean the window with a clean cotton swab. 2. Replace the print cartridge. 3. No 3: Remove the foreign matter and burr of the exposure window. (print cartridge) 4. No. 4: Open the front cover and check ribs that correspond to the position of the voids. Remove if found. 5. If the problems are not solved, replace the print cartridge. 6. Replace the transfer roller if occurred as No. 6

Horizontal Black Band

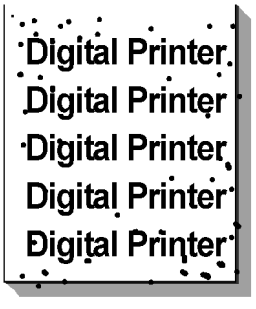


g186t521

Description: Dark or blurry horizontal stripes occur in the printing periodically. (They may not occur periodically.)	
Check and Cause	**Solution**
1. Bad contacts of voltage terminals to print cartridge.	1. Clean each voltage terminal of the Charge, Supply, Develop and Transfer roller. (Remove the toner particles and paper particles.)

2. The rollers of the print cartridge may be stained. Charge roller = 38mm Develop roller = 45mm Transfer roller = 55mm OPC Drum = 95mm	2. Clean the right Gear that has relatively small gap of the teeth in the OPC. 3. If the malfunction persists, replace the print cartridge.

Black/White Spot



g186t522

Description:

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

Check and Cause	Solution
1. If dark or blurry black spots occur periodically, the rollers in the print cartridge may be contaminated with foreign matter or paper particles. (Charge roller : 38 mm interval OPC drum : 95 mm interval) 2. If faded areas or voids occur in a black image at intervals of 95 mm, or black spots occur elsewhere, the OPC drum surface is probably damaged. 3. If a black image is partially broken, the transfer voltage is abnormal or the transfer roller's life has expired.	1. Run OPC cleaning Mode Print and run the Self-test 2 or 3 times. 2. In case of 95 mm interval unremovable in 1, cleanly remove foreign substances stuck on the OPC location equivalent to black spots and white spots with a dry duster. 3. The transfer roller guarantees 150,000 sheets printing in a normal environment. If the roller's life is expired, replace it. 4. The roller's life is expired, replace it. 5. In case of 38 mm interval irremovable in 1, take measures as to replace the print cartridge and try to print out.

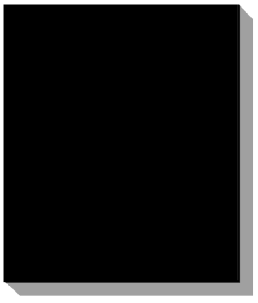
	6. Clean the inside of the set against the paper particles and foreign matter in order not to cause the problem.

Light Image

g186t523

Description: The printed image is light, with no ghost.	
Check and Cause	**Solution**
1. Develop roller is stained when the print cartridge toner is almost consumed. 2. Ambient temperature is below 10°C. 3. Bad contact caused by toner stains between high voltage terminal in the HVPS and the one in the set. 4. Abnormal output from HVPS. (Run self-test and check 1 to 4) 5. Check warranty out.	1. Check if the Toner Save mode is off. Check if the density light is lit. 2. No 1: Replace the print cartridge and try to print out. 3. No 2: Wait 30 minutes after printer is powered on before you start printing. 4. No3: Clean up the area contaminated with toner. 5. Replace the HVPS if the problems are not solved by the above four instructions. 6. Replace print cartridge.

Dark Image or Black Page



g186t524

4

Description:
The printed image is light, with no ghost.

Check and Cause	Solution
1. No charge voltage in the engine board. 2. Charge voltage is not turned on due to bad contacts between power supply in the side of the print cartridge and charge terminal of HVPS. 3. VD0 signal of the Main PBA is Low state. 4. Case back side the cleaning blade of print cartridge.	1. Check the condition of the connector which connects the engine board and HVPS. 2. Clean the high voltage charge terminal. 3. Replace the HVPS if not solved by steps 1 and 2 above. 4. Replace the LSU Unit or Main PBA. 5. Replace print cartridge.

Uneven Density

g186t525

Description:

Print density is uneven between left and right.	
Check and Cause	**Solution**
1. The pressure force on the left and right springs of the transfer roller is not even; the springs are damaged; the transfer roller is improperly installed; or the transfer roller bushing or holder is damaged. 2. The life of the print cartridge has expired. 3. The toner level is not even on the print cartridge roller due to a bad blade.	1. Replace both the left and right Spring Holder. 2. Gently shake the print cartridge. 3. Replace the print cartridge and run print test.

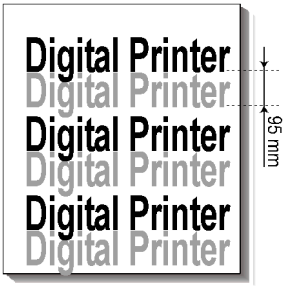
Background

g186t526

Description: Light dark background appears across entire printed page.	
Check and Cause	**Solution**
1. Is the text less than 2% coverage per a page, and has the machine been out of operation for a long time? (see the configuration sheet) 2. Is a recycled print cartridge being used? 3. Has the life span of the print cartridge expired? 4. Is the movement (Up and Down) of the transfer roller smooth? 5. Is the HVPS normal?	1. The print cartridge is basically designed to print 20,000 pages with 5% coverage. If it prints more than 23,000 pages with 2% coverage, a background can occur. 2. The A/S is not guaranteed if using a recycled print cartridge. 3. Replace the print cartridge when the life span of it has expired. 4. Clean the bushing part of the transfer roller.

	5. If the problem is still not solved, replace the print cartridge.

Ghost (1)



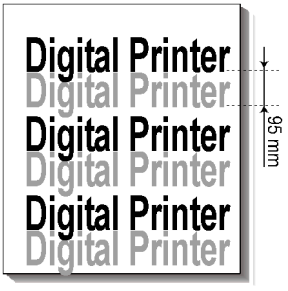
g186t527

Description:

Ghost occurs at 95 mm intervals of the OPC drum across entire printed page.

Check and Cause	Solution
1. Bad contacts caused by contamination from toner particles between the high voltage terminal in the main body and the electrode of the print cartridge. 2. Bad contacts caused by contamination from toner particles between high voltage terminal of the main body and the one in the HVPS board. 3. The life of print cartridge has expired. 4. Transfer roller lifetime (150,000 sheets) has been exceeded. 5. Abnormal, low temperature (below 10°C). 6. Damaged cleaning blade in the print cartridge.	1. Clean the terminals when contaminated by toner particles. 2. For the print cartridge, replace the print cartridge and try to print out. 3. Replace the engine board if not solved by steps 1 and 2 above. 4. If not solved by the step 3, check the transfer roller lifetime and replace it. 5. Wait about 1 hour after power on before using printer. 6. For the print cartridge, replace the print cartridge and try to print out.

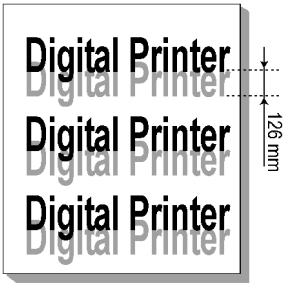
Ghost (2)



g186t527

Description:	
Ghost occurs at 95 mm intervals of the OPC drum on all pages of print jobs. (When printing on card stock or transparencies using manual feeder)	
Check and Cause	**Solution**
When printing on card stock thicker than normal paper or transparencies such as OHP, higher transfer voltage is required.	Select Card stock or OHP Film on paper type menu from the software application setting. After using, it is recommended that the mode should be returned to the original setting.

Ghost (3): Fuser



g186t528

Description:	
Ghost occurs at 126 mm intervals.	
Check and Cause	**Solution**

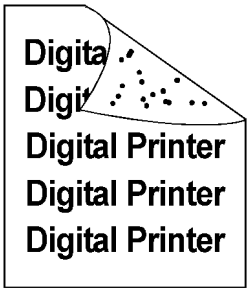
The temperature of the fuser is maintained at a high temperature.	Disassemble the fuser and remove the contaminated toner particles on the roller, and clean out the foreign matter between the thermistor and heat roller. (Caution: can be deformed)

Stains on the Face of Page

g186t529

Description: The background on the face of the printed page is stained.	
Check and Cause	**Solution**
1. Toner leakage due to improperly sealed print cartridge. 2. If the transfer roller is contaminated, stains on the face of a page may occur.	1. Replace the print cartridge, and clean off all toner powder from machine. 2. If the transfer roller is contaminated, run OPC Cleaning Mode Print 2 or 3 times. And perform Self-Test 2 or 3 times to remove contamination.

Stains on the Back of Page

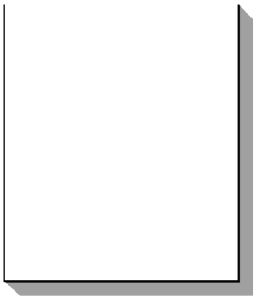


g186t530

Description:
The back of the page is stained at 55 or 126 mm intervals.

Check and Cause	Solution
1. 55mm: Transfer roller is contaminated. 2. 126mm: Pressure roller is contaminated.	1. Perform the OPC Cleaning Mode Print 2 or 3 times. Run self-test to remove the contamination of the transfer roller. 2. Replace the transfer roller if contaminated severely. 3. Perform the fuser cleaning mode print 2 or 3 times. 4. Disassemble the fuser and clean the H/R (Heat Roller) and P/R (Pressure Roller). Also check the area between H/R and Thermistor. If contaminated, clean the area, taking caution not to cause deformation of roller.

Blank Page Print out (1)



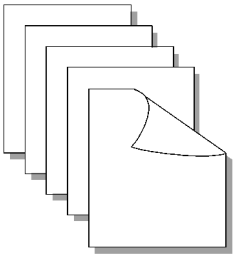
g186t531

4

Description:
Blank page is printed.

Check and Cause	Solution
Bad ground contacts in OPC and/or print cartridge.	1. Check if the Ground-OPC is defective (set inside left side). 2. Remove contamination from the terminals of the print cartridge and the unit.

Blank Page Print out (2)



g186t532

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

Check and Cause	Solution

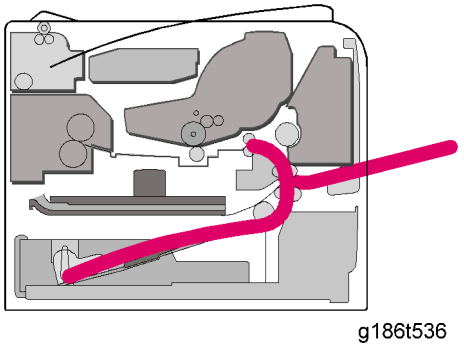
1. Bad ground contacts in OPC and/or print cartridge. 2. Abnormal solenoid.	1. Remove contamination of the terminals of the print cartridge. 2. Perform the engine self test using EDC Mode to check if the Solenoid is normal. 3. If not solved by steps 1 and 2 above, replace the engine board. 4. Turn the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

The Causes and Solutions of Bad Discharge

Wrong Print Position

Description: Printing begins at the wrong position on the paper.	
Check and Cause	**Solution**
Wrong sensing time caused by defective feed sensor actuator.	Replace the defective feed sensor actuator.

JAM 0

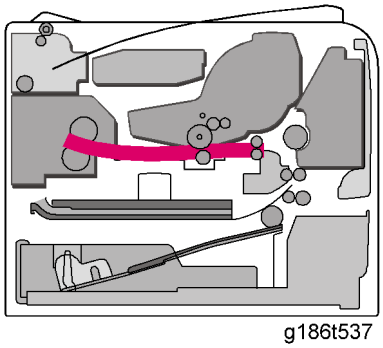


g186t536

Description: 1. Paper does not exit the cassette. 2. Jam-0 occurs if the paper feeds into the printer.	
Check and Cause	**Solution**
1. Check the Main clutch by using EDC Mode. 2. Check if the pad is loose due to bad sealing of the side-pad. 3. Check the surface of the roller-pickup for foreign matter. 4. If continuous clusters occur, check whether the assembly slot between shaft-pickup and housing-pickup opens or is broken away.	1. Replace the Main clutch. 2. Replace the side-pad Assembly L or R, if necessary. 3. Clean with soft cloth dampened with IPA (Isopropyl Alcohol) or water. 4. Replace the Main PBA and/or Sensor.

5. If the paper feeds into the printer and Jam 0 occurs, perform EDC Mode to check the feed-sensor of the engine board.	

JAM 1



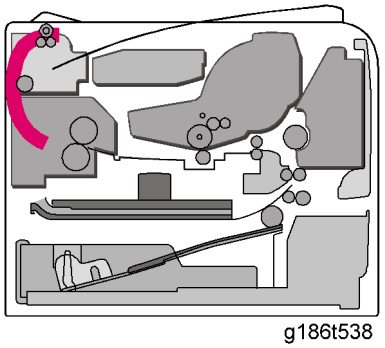
g186t537

Description:

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

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

JAM 2



g186t538

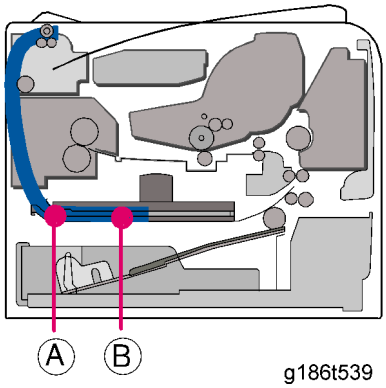
4

Description:

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

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

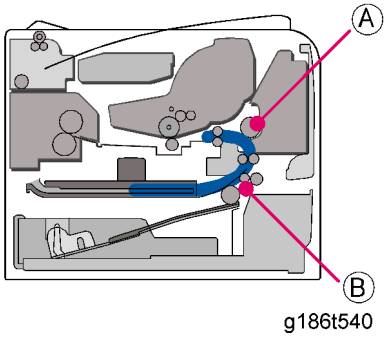
Duplex Jam 1



g186t539

Description:	
A message 'Duplex Jam 1' is displayed in a LCD window.	
Check and Cause	**Solution**
1. When paper cannot trigger the duplex sensor. 2. When paper cannot reach the duplex sensor due to a paper jam on a duplex path.	1. Replace the SMPS or main PBA 2. When a paper jam occurs on (A) after it is reversed: replace the 2nd exit roller after checking its operation. 3. When a paper jam occurs on (B) after it is reversed: replace the duplex roller after checking its operation

Duplex Jam 0



g186t540

Description:

A message 'Duplex Jam 2' is displayed in a LCD window.	
Check and Cause	**Solution**
1. When paper cannot pass the duplex sensor. 2. When paper cannot reach to the registration sensor after it has passed the duplex sensor.	1. Replace a SMPS or main PBA. 2. When a leading edge of paper is jammed on (A) check the operation of a guide front. If it is worn or defective, replace it. 3. Check the operation of the feed roller and the registration roller. If they are worn or defective, replace them.

Multi-Feeding

Description: Multiple sheets of paper are fed at once.	
Check and Cause	**Solution**
1. Check the Guide side L/R or Guide Rear in the Cassette, if the position is correct. 2. Solenoid malfunction (the solenoid does not work properly): Perform EDC Mode. 3. Pad-Friction is contaminated with foreign matter (oil...) 4. The face of the paper is bent.	1. Replace the solenoid if necessary. 2. Replace the Main PBA. 3. Clean the pad friction with soft cloth dampened with IPA (Isopropyl Alcohol). 4. Use smooth paper.

Paper Rolled in the Fuser

Description: If contaminated at intervals of 57mm on the back of a paper.	
Check and Cause	**Solution**
1. Contamination of the pressure roller or heat roller (Background, Hot off set). 2. Check the claws of the fuser for deformities.	1. After disassembling the fuser, clean contamination between the heat roller and the thermistor and remove the contamination of the pressure roller. 2. If there is a heavy background, repair it with the background troubleshooting method.

	3. Clean the surface of the heat roller with IPA or water 4. Check the warp or separation of the print claw and the holder plate claw, and then manage it.

Paper Rolled on the OPC Drum

Description: Paper is rolled up in the OPC.	
Check and Cause	**Solution**
1. Paper is too thin. 2. The paper is curled.	1. Use of normal paper is recommended. 2. How to remove rolled paper from the OPC. • Remove the paper while turning the OPC against the ongoing direction. • Clean fingerprints on the OPC gently with damp soft cloth.

Malfunction Causes and Solutions

Fuser Error

Description: A message “Engine Fuser Low Heat Error/Engine Fuser Over Heat Error” is displayed in the LCD panel.	
Check for...	**Solutions**
1. Check whether thermostat is open or not. 2. Check whether thermistor is open or not. 3. Heat lamp ON/OFF test 4. Operation is impossible due to a gear of a fuser being melted.	1. Replace the fuser if the thermostat is open. 2. Replace the fuser if a thermistor sensor is located deep inside of a sponge. 3. Check whether the overheat mode circuit is operating normally or not. 4. Replace the fuser.

LSU (Laser Scanning Unit) Error

Description: A message “Engine Hsyne Error” is displayed in the LCD panel.	
Check for...	**Solutions**
1. Check whether the LSU (Laser Scanning Unit) connector is disconnected or not. 2. Check whether the LSU motor is rotating or not. 3. Check the HSYNC signal.	1. Connect the LSU harness properly. 2. Replace the LSU. 3. Replace the main board if the same error occurs again after replacing the LSU.

Malfunction of the Gear of the Fuser due to Melting

Description: The motor breaks away from its place due to gear melting away.	
Check for...	**Solutions**
Check the Fuser Unit.	1. Replace the Fuser.

	2. Replace the Main PBA. 3. Replace the SMPS.

Paper Empty

Description: The status LED on the operation panel is on even when paper is loaded in the cassette.	
Check for...	**Solutions**
1. Bending or deformation of the actuator of the paper sensor. 2. The engine board is defective 3. Check the connector and harness.	1. Replace the defective actuator. 2. Replace the empty sensor PBA.

Paper Empty without Indication

Description: A message "Paper Empty" is displayed on the LCD panel. The paper lamp on the operation panel does not come on when the paper cassette is empty.	
Check for...	**Solutions**
1. Bending or deformation of the actuator of the paper sensor. 2. Check the Main board. 3. Check the empty sensor board. 4. Check the toner sensor board.	1. Replace the defective actuator. 2. Replace the defective board.

Cover Open

Description: A message "Close Top Cover" is displayed on the LCD panel. The ERROR lamp is on even when the print cover is closed.	
Check for...	**Solutions**

1. The hook lever in the top cover may be defective. 2. Check the main board 3. Check the cover open board. 4. Check the harnesses and connections.	1. Replace the hook lever, if defective. 2. Check the insertion of the cover open S/W connector. 3. Replace the main board or cover open board.

No Error Message when the Cover Is Open

Description:

An ERROR message does not come on even when the printer cover is open

Check for...	Solutions
1. Check the cover open circuit on the main board. 2. Check the cover open board.	1. Check the insertion of the cover open S/W connector. 2. Replace the main control board or cover open board.

Defective Motor Operation

Description:

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

Check for...	Solutions
1. The motor harness or motor PCB may be defective. 2. Check the motor operation in the EDC mode.	1. Replace the motor unit. 2. Replace the main PBA.

No Power

Description:

When system power is turned on, all lamps on the operation panel do not come on.

Check for...	Solutions
1. Check if the power input and SMPS output are normal.	1. Replace the SMPS.

2. Check for functionality of the LED-Panel or LCD window on the front-cover if the operation panel does not show anything after warming-up.	2. Replace the control board.

Curved Vertical Line

Description: When printing, vertical lines become curved.	
Check for...	**Solutions**
1. If the supply of +24v is unstable in the main control board linking with LSU, check drive by EDC mode: LSU check. 2. Check the DEVE PBA in the print cartridge.	1. Replace LSU. 2. Replace the toner sensor PBA. 3. Replace the main PBA.

Causes and Solutions of Software Errors

The printer is not working (1)

Description:

While main power is turned on, the printer is not working in the printing mode.

Check and Cause	Solution
1. Run Self-Test Mode: Turn the power on while pressing the test printing button for 2 or 3 seconds before printing works. 2. Check if the PC and the printer is properly connected and the print cartridge installed. 3. Printing is not working on the computer side. 4. Check if the printer cable is directly connected to peripheral devices.	1. Check the power of the printer and perform the Self-Test. Successful test printing indicates that there are no problems in the printer itself. Unsuccessful test printing indicates that the problem is with the printer, and is not due to a software issue. 2. Replace the printer cable. If the problem is not solved even after the cable is replaced, check the amount of the remaining toner. 3. Check if the connection between the PC and printer port is proper. If you use MS-Windows, check if the printer driver in the controller is set up. If the printer driver is properly set up, check which program printing is not working for. The best way to find out is to open Memo Pad to check printer functionality. If it is not working in a certain program, adjust the setup the program requires. Sometimes a simple adjustment will produce a normal printout within basic MS-Windows basic programs, but it may still fail to work with a particular program. In such cases, install the new driver again. If not working in basic MS-Windows programs, then check to see if the CMOS port is on ECP. Also check the address of IRQ 7 and 378. 4. If the scanner needs to be connected to the printer, first remove the scanner from the PC to see if the printer is properly working alone.

The printer is not working (2)

Description:

After receiving a printing order, response is slow or nonexistent due to wrong setup rather than a malfunction of the printer itself.

Check and Cause	Solution
1. Secure more space of the hard disk. 2. Printing error occurs even if there is enough space on the hard disk. 3. Check parallel-port-related items in the CMOS Setup. 4. Reboot the system to print.	1. Not working with the message 'insufficient printer memory' indicates an HDD space problem rather than a RAM problem. In this case, provide more space on the hard disk. Secure more space using disk utilities, etc. 2. The connection of the cable and printer port is not proper. Check if the connection is properly done and if the parallel port in CMOS is properly set up. 3. As a printer port, Select ECP or SPP out of SPP (Normal), ECP, and EPP modes. SPP normal mode supports 8-bit data transfer, while ECP Mode transfers 12-bit data. 4. If regular fonts are not printing, the cable or the printer driver may be defective. 5. Turn the PC and printer off, and reboot the system to print again. If this doesn't solve the problem, double-click the printer icon in My Computer If regular fonts are not printed taking this step, then the cable may be defective so try replacing the cable with new one.

Abnormal Printing

Description:

The printer is not working properly even when the cable has been verified to be good (after replacing the cable, etc.).

If the printer won't work at all or the strange fonts are repeated, the printer driver may be defective or wrongly set up in the CMOS Setup.

Check and Cause	Solution
1. Set up the parallel port in the CMOS SETUP. 2. Printer Driver Error. 3. Error message from insufficient memory. 4. (The printing job sometimes stops due to insufficient virtual memory, but it actually comes from insufficient space on the hard disk.)	1. Select SPP (Normal) or ECP LPT Port (among ECP, EPP or SPP) in the CMOS Setup. 2. Check the printer in My Computer. (To see if the printer driver is compatible with the present driver. Delete old driver, if defective, and reinstall new one.) 3. Delete unnecessary files to open up enough space of the hard disk and start printing job again.

Spool Error

Description:

To spool: (SPOOL - Simultaneous Peripheral Operations OnLine" a computer document or task list (or "job") is to read it in and store it, usually on a hard disk or larger storage medium so that it can be printed or otherwise processed at a more convenient time (for example, when a printer is finished printing its current document).

Check and Cause	Solution
1. Insufficient space on the hard disk in the directory assigned for the basic spool. 2. If the previous printing error remains. 3. When expected to interfere with other program. 4. When an application program or the printer driver is damaged. 5. When some files related to OS are damaged or virus infected. 6. Actual memory is less than suggested.	1. Delete unnecessary files to provide more space to start printing job. 2. If there are some files with the extension name of ****.jnl, delete them and reboot Windows to restart the printing job. 3. Shut down all other programs except the current one, if possible. 4. Delete the printer driver completely and reinstall it. 5. After rebooting the computer, check for viruses, restore the damaged files and reinstall the program to do the printing job. 6. Install additional memory in the PC.

Note

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

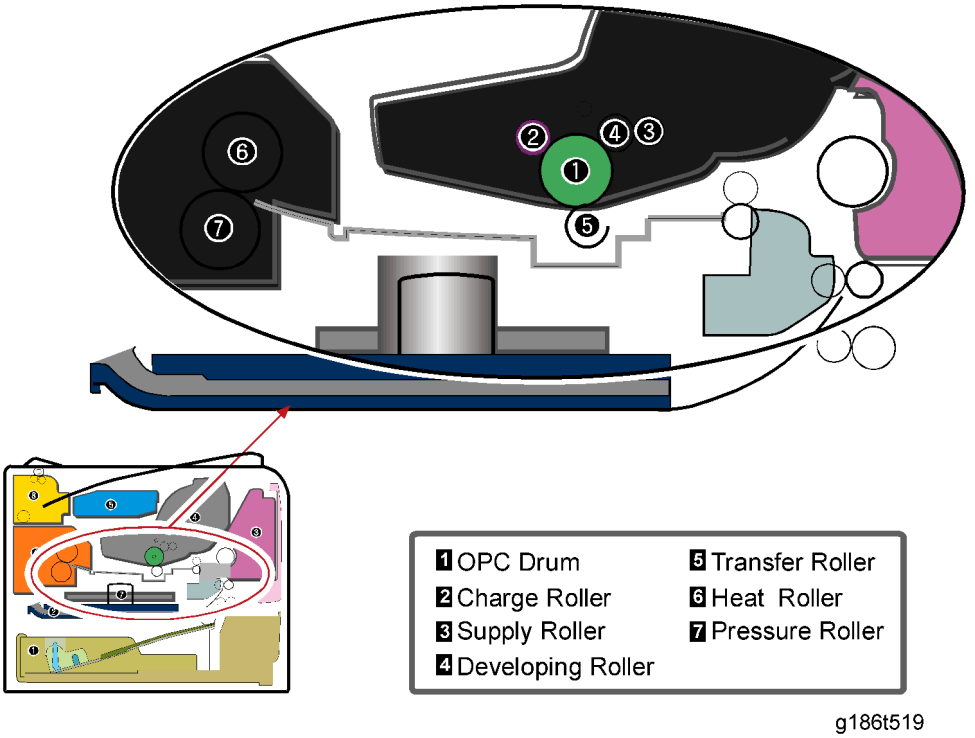
- If you intend to delete the current document being printed, the data being transferred to the printer will be stopped and then the document removed. Before choosing the document, the menu is still inactive.
- Or remove the document from the list and repeat the routine as outlined above or else finish the spool manager.

Periodic Defective Image

If defective images regularly occur in print-outs, it may be due to a defective or damaged roller.

Refer to the table below and check the condition of the roller.

No	Roller	Defective image	Typical defect
1	OPC Drum	95 mm	White spot on black image or black spot, image ghost
2	Charge Roller	38 mm	Black spot
3	Supply Roller	45 mm	Light or dark horizontal image band
4	Developing Roller	43 mm	Horizontal image band, image ghost
5	Transfer Roller	55 mm	Image ghost
6	Heat Roller	126 mm	Black spot and image ghost
7	Pressure Roller	126 mm	Black spot on the backside



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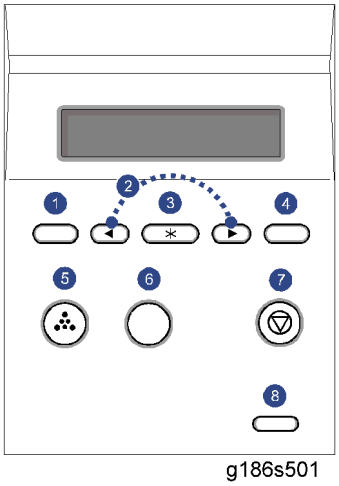
5. Service Tables

Overview

This chapter describes the main functions for service, such as the product maintenance method, the test output related to maintenance and repair, correct DCU (Diagnostic Control Unit) usage method, Jam removing method, etc.

Key Operation



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1	Menu: Enters menu mode and enables scrolling through the available menu.
2	Scroll buttons: Scrolls through the options available in the selected menu, and increases or decreases values.
3	OK: Confirms the selection on the display.
4	Back: Returns to the upper menu level.
5	Toner Save: Allows the printer to save on toner by using less toner in printing.
6	Demo: Prints a demo page.
7	Stop: Stops an operation at any time.
8	Status: Indicates the status of the printer.

EDC (Engine Diagnostic Control) Mode

EDC Setup

EDC (Engine Diagnostic Control) is utilized to test and check whether each of the functions of the machine and hardware modules are normal or not. All of the test functions are controllable via the keys and LCD window on the panel.

Entering EDC

In order to enter the EDC mode, the access method should be guarded because this mode is only used for engineers (or similarly qualified people), and is not for end users.

- Entering the mode, the message, "COMPONENT TEST/Press Menu Key" is displayed.
- In this mode, a service engineer should press the "Menu Key" to search for each function.

Usage

1. Check that the printer is turned on.
2. Wait until the printer reaches ready mode.
3. Press "Menu" -> "Stop" -> "Left" -> "Back" -> "Ok" -> Right in order.

   Important

   - **Press the six buttons above within approximately one second.**
4. Confirm that the message "COMPONENT TEST/Press Menu Key" is displayed.
5. Press "Menu" key.
6. Follow the usage instructions displayed for each function.

Note

- The procedure and content above may vary, depending on the situation.

Cover Open/Close Status

This function is to check the status of the cover or door open/close.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 1.Cover Status" message is displayed on the panel.

2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" to return to the previous step.

Function

Function Name	Description	Display (LCD)
Top Cover	"Open" shows when cover is open. "Closed" shows when cover is closed.	Top Cover [Closed]/ [Open]
Tray1 Cassette	"Open" shows when tray 1 is open. "Closed" shows when tray 1 is closed.	Tray1 Cassette [Closed]/[Open]
Tray2 Cassette	"Open" shows when tray 2 is open. "Closed" shows when tray 2 is closed.	Tray2 Cassette [Closed]/[Open]
Tray3 Cassette	"Open" shows when tray 3 is open. "Closed" shows when tray 3 is closed.	Tray3 Cassette [Closed]/[Open]
Tray4 Cassette	"Open" shows when tray 4 is open. "Closed" shows when tray 4 is closed.	Tray4 Cassette [Closed]/[Open]
Fuser Door	"Open" shows when fuser door is open. "Closed" shows when fuser door is closed.	Fuser Door [Closed]/ [Open]

Note

- The procedure and content above may vary, depending on the situation.

Sensor Status

These Functions are to check a current state (normal or not) of each Sensor.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 2.Sensor Status" message is displayed on the panel.
2. Press the "OK" key.

3. Press the arrow keys to find a desired function. (Refer to the table below)
4. Press the "OK" key.
5. Touch a sensor you would like to test.
6. Check the message on the LCD.

Function

Sensor	Description	Display (LCD)	
		Before touching	After touching
RegiSensor	Check the message on the LCD.	Regi. Sensor [Without Paper]	Regi. Sensor [With Paper]
T1 FeedSensor		T1 Feed Sensor [Without Paper]	T1 Feed Sensor [With Paper]
T2 FeedSensor		T2 Feed Sensor [Without Paper]	T2 Feed Sensor [With Paper]
T3 FeedSensor		T3 Feed Sensor [Without Paper]	T3 Feed Sensor [With Paper]
T4 FeedSensor		T4 Feed Sensor [Without Paper]	T4 Feed Sensor [With Paper]
ExitSensor		Exit Sensor [Without Paper]	Exit Sensor [With Paper]
DJam1Sensor		DJam1 Sensor [Without Paper]	Djam1 Sensor [With Paper]
Out Bin Sensor		OutBin. Sensor [Normal]	OutBin Sensor [Full]
Bypass Empty		Bypass Empty [Empty]	Bypass Empty [Present]
T1 Paper Empty		T1 Paper Empty [Empty]	T1 Paper Empty [Present]
T2 Paper Empty		T2 Paper Empty	T2 Paper Empty

		[Empty]	[Present]
T3 Paper Empty		T3 Paper Empty [Empty]	T3 Paper Empty [Present]
T4 Paper Empty		T4 Paper Empty [Empty]	T4 Paper Empty [Present]
T1 PSize0 Sen.		T1 Psize0 Sen. [Low]	T1 Psize0 Sen. [High]
T1 PSize1 Sen.		T1 Psize1 Sen. [Low]	T1 Psize1 Sen. [High]
T1 PSize2 Sen.		T1 Psize2 Sen. [Low]	T1 Psize2 Sen. [High]
T2 PSize0 Sen.		T2 Psize0 Sen. [Low]	T2 Psize0 Sen. [High]
T2 PSize1 Sen.		T2 Psize1 Sen. [Low]	T2 Psize1 Sen. [High]
T2 PSize2 Sen.		T2 Psize2 Sen. [Low]	T2 Psize2 Sen. [High]
T3 PSize0 Sen.		T3 Psize0 Sen. [Low]	T3 Psize0 Sen. [High]
T3 PSize1 Sen.		T3 Psize1 Sen. [Low]	T3 Psize1 Sen. [High]
T3 PSize2 Sen.		T3 Psize2 Sen. [Low]	T3 Psize2 Sen. [High]
T4 PSize0 Sen.		T4 Psize0 Sen. [Low]	T4 Psize0 Sen. [High]
T4 PSize1 Sen.		T4 Psize1 Sen. [Low]	T4 Psize1 Sen. [High]
T4 PSize2 Sen.		T4 Psize2 Sen. [Low]	T4 Psize2 Sen. [High]

TOP Margin Sen		TOP Margin Sen. [Without Paper]	TOP Margin Sen. [With Paper]
DPX Detect Sen		DPX Detect Sen. [Low]	DPX Detect Sen. [High]

Note

- The procedure and content above may vary, depending on the situation.

Motor Test

These functions are to check the current status.

5

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 3.Motor Test" message is displayed on the panel.
2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" key to return to the previous step.

Function Name	Description	Display (LCD)
Main Mtr Fwd.	The motor will run in the forward direction or stop.	Main Mtr Fwd. [ON] / [OFF]
Main Mtr Bwd.	The motor will run in the backward direction or stop.	Main Mtr Bwd. [ON] / [OFF]
Main Mtr Slow.	The motor will run in the forwarding direction by half speed.	Main Mtr Slow. [ON] / [OFF]
Dev Mtr Nor.	The motor will run in the forwarding direction by normal speed.	Dev Mtr Slow. [ON] / [OFF]
Dev Mtr Slow.	The motor will run in the forwarding direction by half speed.	Dev Mtr Slow. [ON] / [OFF]

Function Name	Description	Display (LCD)
Duplex Mtr Fwd.	The motor will run in the forwarding direction.	Duplex Mtr Fwd. [ON] / [OFF]
T2 Feed Motor	The motor will run in the forward direction or stop.	T2 Feed Motor [ON] / [OFF]
T3 Feed Motor	The motor will run in the forward direction or stop.	T3 Feed Motor [ON] / [OFF]
T4 Feed Motor	The tray2 motor will run in the forward direction or stop.	T Feed Motor [ON] / [OFF]

Note

- The procedure and content above may vary, depending on the situation.

Fan Test

These functions are to check the current status of all fans.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 4.Fan Test" message is displayed on the panel.
2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" to return to the previous step.

Function

Function Name	Description	Display (LCD)
Fuser Fan	The fan will run or stop.	Fuser Fan [ON] / [OFF]
Fuser Fan Rdy	Check whether the fan is in locked state.	Fuser Fan Rdy. [Ready] / [Not Ready]
SMPS Fan	The fan will run or stop.	SMPS Fan [ON] / [OFF]

Function Name	Description	Display (LCD)
SMPS Fan Rdy	Check whether the fan is in locked state.	SMPS Fan Rdy. [Ready] / [Not Ready]
Duplex Fan	The fan will run or stop.	Duplex Fan [ON] / [OFF]

Note

- The procedure and content above may vary, depending on the situation.

Clutch/ Solenoid

These functions are to check a current state (normal or not) of the solenoids and clutches.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 5.Clutch/Sol Test" message is displayed on the panel.
2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" key to return to the previous step.

Function

Function Name	Description	Display (LCD)
T1 P-up Clutch	The clutch will run or stop.	T1 P-up Clutch [ON] / [OFF]
T2 P-up Clutch	The clutch will run or stop.	T2 P-up Clutch [ON] / [OFF]
T3 P-up Clutch	The clutch will run or stop.	T3 P-up Clutch [ON] / [OFF]
T4 P-up Clutch	The clutch will run or stop.	T4 P-up Clutch [ON] / [OFF]

Function Name	Description	Display (LCD)
Bypass Clutch	The clutch will run or stop.	Bypass Clutch [ON] / [OFF]
Duplex Sol.	The solenoid will run or stop.	Duplex Sol. [ON] / [OFF]

Note

- The procedure and content above may vary, depending on the situation.

Fuser Control

This function is to check a current state (normal or not) of the fuser unit.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 6.Fuser Ctrl" message is displayed on the panel.
2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" key to return to the previous step.

Function Name	Description	Display (LCD)	Remarks
Fuser Bias	The bias will have the saved value previously.	Fuser Bias [ON] / [OFF]	
Temp Control	The fuser unit will control the power for fixing and display the current temperature on the panel. The target temperature is 160°C.	Temp Control [OFF] / [ON] [xxx]	[xxx] is a current temperature.
Fuser Temp	The ADC will be displayed on the panel.	Fuser Temp [xxx]	[xxx] is it's ADC.
Inner Temp	The ADC will be displayed on the panel.	Inner Temp [xxx]	[xxx] is it's ADC.

Note

- The procedure and content above may vary, depending on the situation.

LSU

These functions are to check a current state (normal or not) of the Laser Scanning Unit.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 7.LSU Control" message is displayed on the panel.
2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" key to return to the previous step.

Function Name	Description	Display (LCD)
LD Power 1&2	The LD will have the previously saved value.	LD Power 1&2 [ON] / [OFF]
Laser Motor	The motor will run or stop.	Laser Motor [ON] / [OFF]
Laser Ready	When Laser Scanning Unit is ready to print (Laser diode on, Stable polygon motor speed) the message, "Normal" is displayed. On the other case "Fault"	Laser Ready [Normal] / [Fault]

Note

- The procedure and content above may vary, depending on the situation.

Bias Control

These functions are to check whether the control for HVPS is normal or not.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 8.Deve Control" message is displayed on the panel.

2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" key to return to the previous step.

Function

Function Name	Description	Display (LCD)	Remarks
THV Plus Bias	The bias will have the previously saved value.	THV Plus Bias [ON] / [OFF]	
THV Minus Bias	The bias will have the previously saved value.	THV Minus Bias [ON] / [OFF]	
DEV Bias	The bias will have the previously saved value.	DEV Bias [ON] / [OFF]	
DEV AC Bias	The bias will have the previously saved value.	DEV AC Bias [ON] / [OFF]	
DEV Vpp Bias	The bias will have the previously saved value.	DEV Vpp Bias [ON] / [OFF]	
MHV Bias	The bias will have the previously saved value.	MHV Bias [ON] / [OFF]	
PTL	The lamp will be lighted or not.	PTL [ON] / [OFF]	
Erase Lamp	The lamp will be lighted or not.	Erase Lamp [ON] / [OFF]	
THV Read	The Adc will be displayed on the panel.	THV Read [xxx]	[xxx] is it's ADC.
MHV Read	The Adc will be displayed on the panel.	MHV Read [xxx]	[xxx] is it's ADC.

Note

- The procedure and content above may vary, depending on the situation.

Print Test and Option Version

These functions are to check a total print process state and the option s version.

Usage

1. Press the arrow keys "◀/▶" until "Component Test / 10.Print Test" message is displayed on the panel.
2. Press the "OK" key.
3. Press the arrow keys "◀/▶" to find a desired function (Refer to the table below).
4. Press the "OK" key.
5. Press the "OK" key to execute the function or the "Back" key to return to the previous step.

Function

Function Name	Description	Display (LCD)	Remarks
Pattern Print	The printer can print the previously saved mode (Simplex or Duplex / Copy/ pattern kind).	Pattern Print [ON]	
T2 Version	This is the version for Tray2.	T2 Version [x.xx]	"x.xx" is version.
T3 Version	This is the version for Tray3.	T3 Version [x.xx]	"x.xx" is version.
T4 Version	This is the version for Tray4.	T4 Version [x.xx]	"x.xx" is version.
Duplex Version	This is the version for Duplex	Duplex Version [x.xx]	"x.xx" is version.

Note

- The procedure and content above may vary, depending on the situation.

Firmware Download

Download Procedure

There are two ways to upgrade the machine firmware.

1. Command Prompt
2. WIM (Web Image Monitor)

Connect the machine to a PC with the USB “Command Prompt” or through the network for “WIM” 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 can be upgraded by connecting to a PC via a USB cable. 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 "usbprns.exe" file and firmware to the PC.
3. Connect the PC and the machine with a USB cable.
4. Turn on the main power of the machine.
5. Open the DOS command window.
6. Enter the directly where you have already downloaded the firmware.
7. Run the "usbprns.exe" and firmware.
    - In Command prompt, type "usbprns.exe XXX" and press enter key. XXX indicates the firmware name.
8. Some messages ("Erase" or "Program") show on the LCD of the machine.
9. The machine automatically reboots after completing the firmware upgrading.

Note

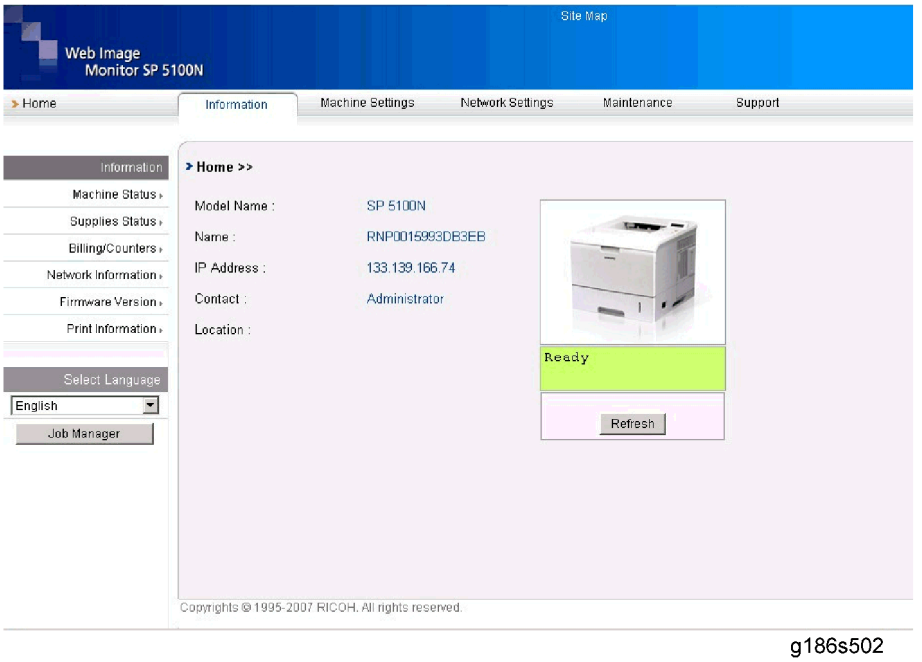
- Do not turn off the machine during the firmware upgrading.

WIM (Web Image Monitor) mode

Program (firmware) for this machine can be upgraded by connecting to a PC through 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.



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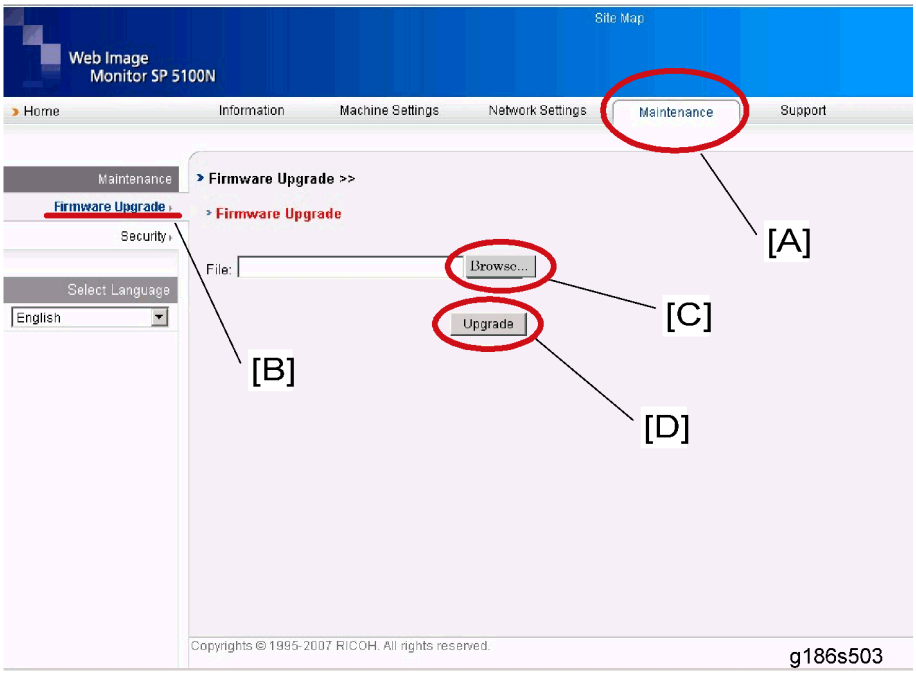
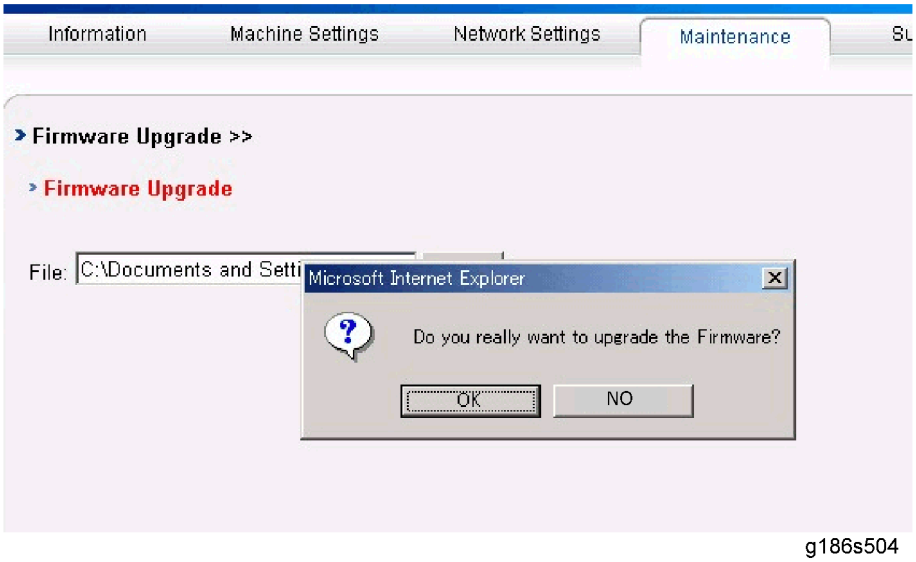
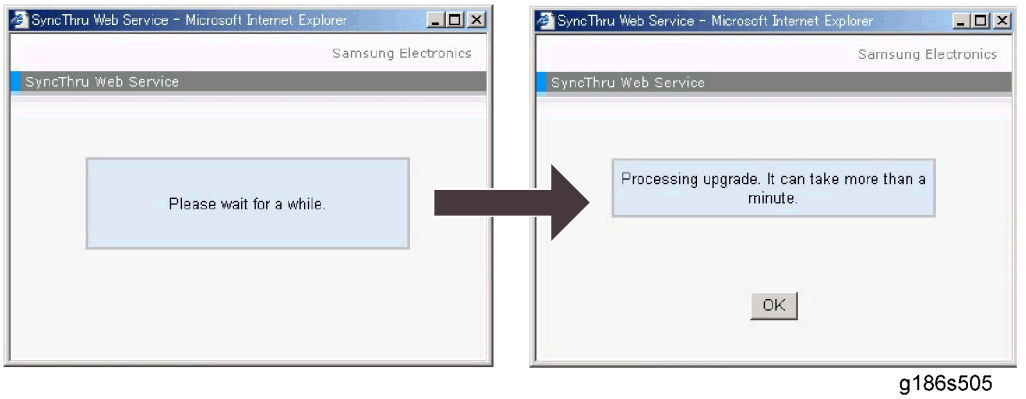
3. Access the “WIM” with the correct IP address.



4. Select "Maintenance" [A] as shown above.
5. Make sure that "Firmware Upgrade" [B] is selected as shown above. If not, select it.
6. Click the "Browse" button [C] and select the Printer Firmware file you have saved in the PC.
7. Click the "Upgrade" button [D].



8. Press "OK" button.



g186s505

9. Press "OK" button to start processing upgrade.
10. Make sure that the firmware has been completely updated.

Note

- Do not turn off the power while updating the Firmware.

Firmware Recovery Procedure

The machine will not operate if the upgrade 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.

Sample Pattern

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

Information Pages

This printer comes with a set of information pages that help you solve printing problems and obtain the best results from the printer. You can access these pages from the printer's front panel.

To print information pages:

1. On the printer's front panel, press the "Menu" key, then press the "OK" key to enter "Information".
2. Press "◀▶" key to select an appropriate information page.
3. Press "OK" key, and then the confirmation message is displayed.
4. Press "◀▶" key to select "Yes".
5. Press "OK" key to print.

Note

- Print the "Menu Map" to see other information pages available for printing.

Demo Pages

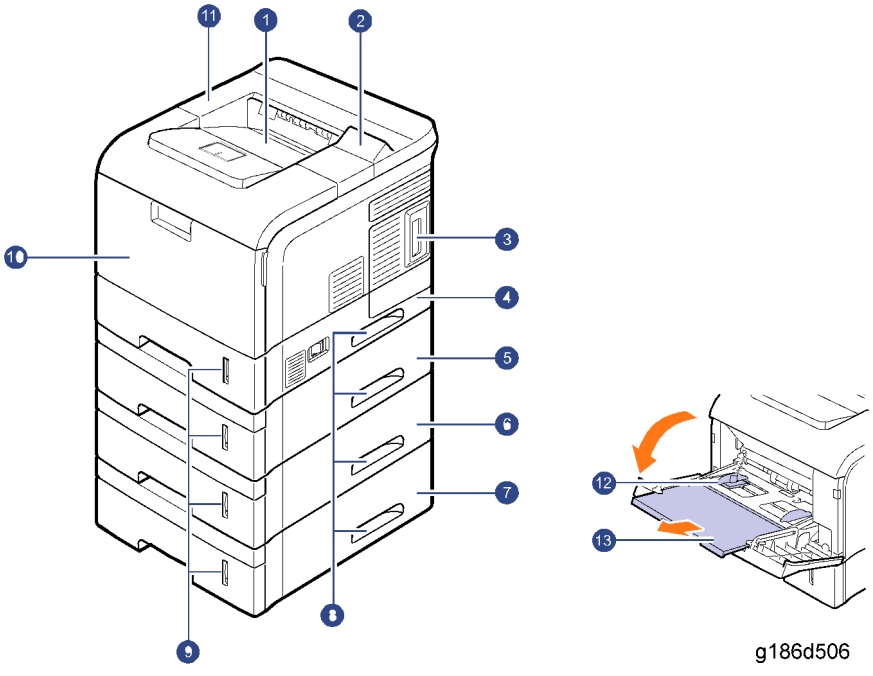
This printer comes with a set of sample pages which demonstrate different functions.

1. On the printer's front panel, press the "Menu" key, then press the "OK" key to enter "Information".
2. Press "◀▶" key to select "Demo Page".
3. Press "OK" key, and then the confirmation message is displayed.
4. Press "◀▶" key to select "Yes".
5. Press "OK" key to print.

6. Detailed Section Descriptions

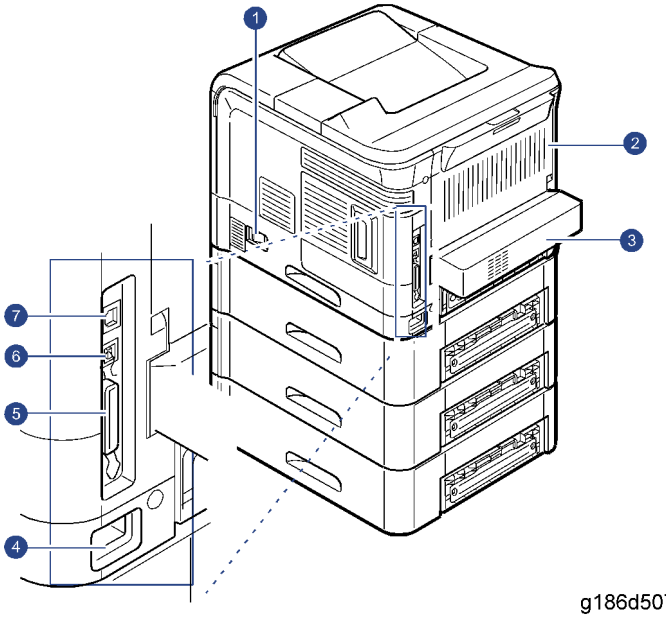
Printer Components

Front View



1. Output tray	8. Handle
2. Control panel	9. Paper level indicator
3. Control board cover	10. By-pass tray
4. Tray 1	11. Top cover
5. Optional tray 2	12. By-pass tray paper width guides
6. Optional tray 3	13. By-pass tray extension
7. Optional tray 4	

Rear View



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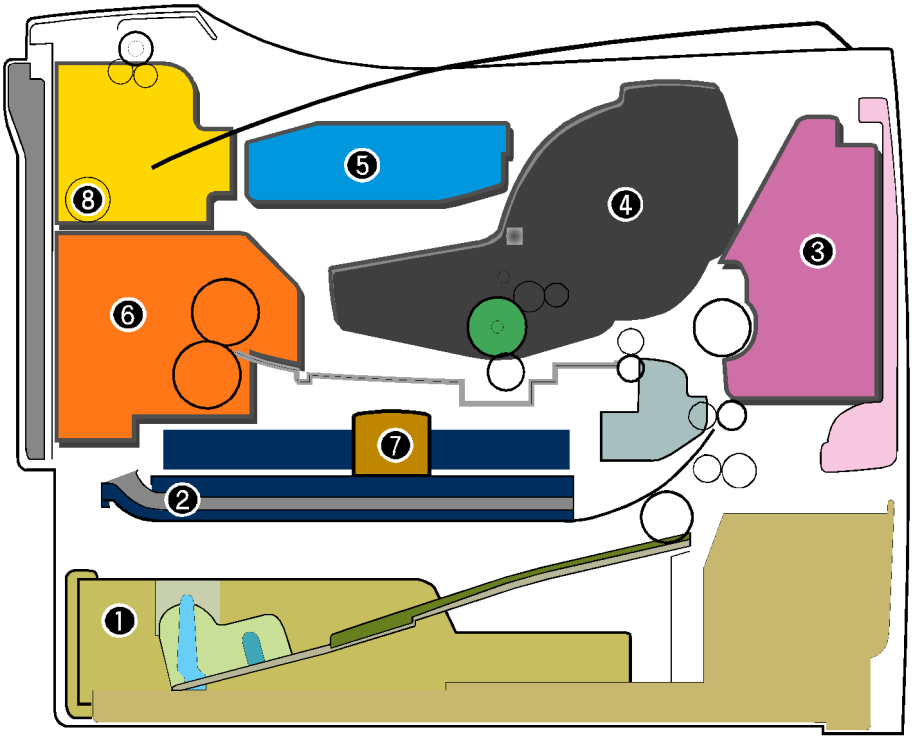
1. Power switch 2. Rear cover 3. Duplex unit 4. Power receptacle	5. Parallel port 6. USB port 7. Network port 1

System Layout



g186d502

1. Cassette	5. LSU
2. Duplex	6. Fuser
3. MPF	7. SMPS and HVPS Board
4. Print Cartridge	8. Duplex Solenoid

Feeding

Paper feeding consists of a basic cassette, an MP tray for supplying different types of media (envelopes, labels, and special paper), duplex unit, and various paper transfer parts.

Separation method

Separation is achieved by a friction pad mounted in the center of the cassette and stopper roller that uses a spring clutch. A feed roller uses an electronic clutch to control driving power.

Basic cassette

Center loading method utilized with friction pad separation. Paper size detection based upon first sheet size detected by printer controller. Both the side guide and the rear guide can be adjusted for various types of paper from A5 to legal size paper. Paper sensing; (capacity: 500 sheets of general paper); paper arranging; SCF paper path; and remaining paper display functions. Remaining paper indicator located on front of machine on right side of paper drawer.

Pick-up roller

Paper pickup; driving control, paper feeding; and electronic static removal.

Stopper roller

Arrangement method utilizing a stopper roller and a weight without electric actuator. Paper separation, driving control; and multi-feeding prevention functionality.

Registration roller

Paper arranging; paper transferring; paper detecting; jam removal, and other functions.

By-pass tray

Paper arranging; paper transferring; jam removal; and other functions. Rubbing pad method enabling feed of 100 sheets of general paper or ten envelops. By-pass extends to 300mm to accommodate legal size paper.

Duplex unit

Paper transferring; paper guide; jam removing; paper sensing; and main board supporting functions. Basic attachment ready; duplex feeding utilizes side feeding method. Usable paper sizes are A4, letter, and legal size paper.

For jam clearing at front of machine, design facilitates accessibility. Jam clearing at back of machine via rear cover. (Note that if the upper tray is open, the duplex option cannot be used.)

SCF (Second Cassette Feeder)

Common driving mechanism for both SCF and main cassette (which has a capacity of 500 sheets).

Transfer

Consisting of PTL (Pre-transfer Lamp) and transfer roller. A PTL throws light on the OPC drum, lowers the electric potential of the OPC drum's surface, and improves the efficiency of the transfer. A transfer roller transfers toner on an OPC drum to the paper.

Life span: Over 150,000 printed sheets (16 to 27°C)

Drive

The drive system consists of the main motor for feeding fuser and duplex reverse turn, and the development motor for the toner cartridge.

- Main Motor: DC 24V, 1604 rpm
- Development Motor: DC 24V, 1424 rpm

Fuser

The fuser consists of the heat lamp, heat roller, pressure roller, thermistor and thermostat. It bonds the toner to the paper with heat and pressure to complete the printing job.

- E-coil Heater: 1,300 W ± 50W

Thermostat

When heat lamp overheats, thermostat cuts off the main power to prevent overheating.

- Non-Contact type Thermostat

Heat roller

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

Pressure roller

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

Items for safety

Protecting devices from overheating

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

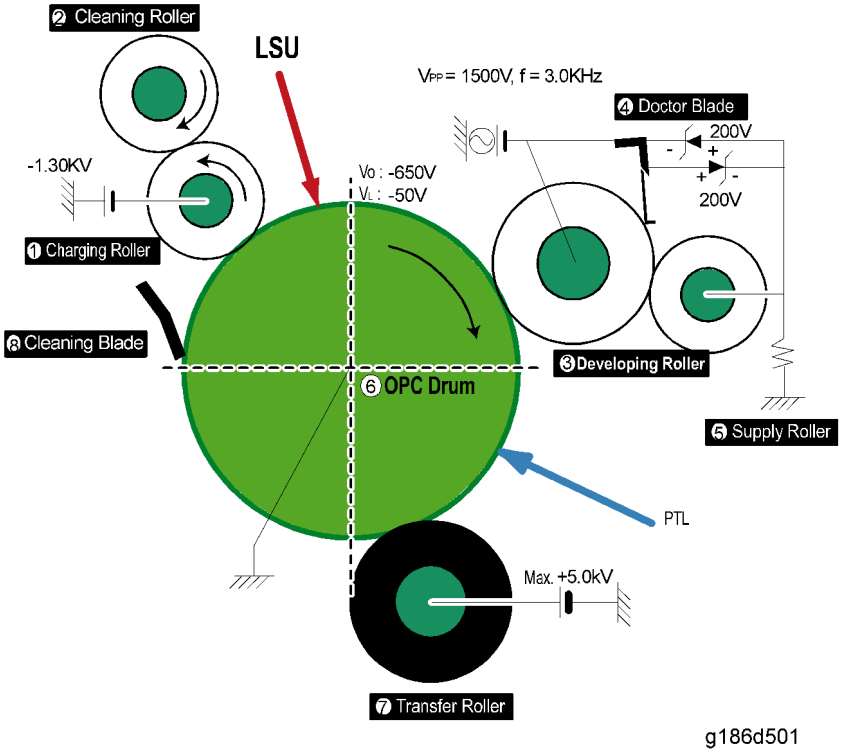
Safety device

- Fuser power is cut when the front cover is opened
- Exercise caution when servicing parts near the fusing unit - allow fuser cover surface to cool to under 80°C to avoid burns.

LSU (Laser Scanner Unit)

The LSU is the core part of this laser beam printer which switches from the video data received to the controller to the electrostatic latent image on the OPC drum by controlling the laser beam, exposing the OPC drum, and the turning principle of the polygon mirror. The OPC drum is turned at the same speed as the paper feed speed. The /HSYNC signal is created when the laser beam from LSU (Laser Scanning Unit) reaches the end of the polygon mirror, and the signal is sent to the controller. The controller detects the /HSYNC signal to adjust the vertical line of the image on paper. In other words, after the /HSYNC signal is detected, the image data is sent to the LSU to adjust the left margin on the paper. One side of the polygon mirror is one line for scanning.

Print Cartridge

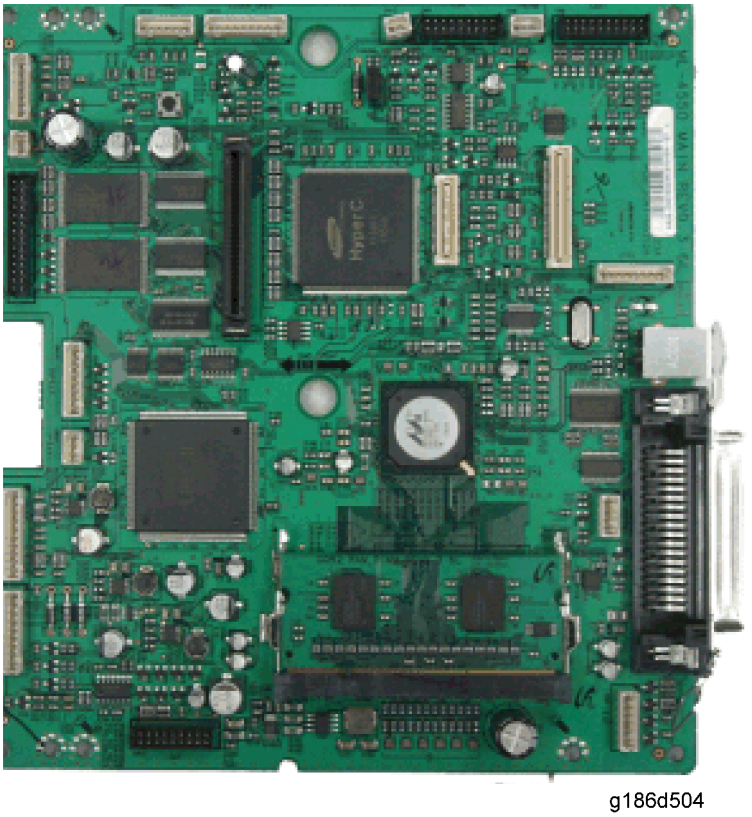


The electronic photo process creates a visual image. In the print cartridge, the OPC unit and the toner cartridge unit are in a unit. The OPC unit consists of the OPC drum and charging roller, and the toner cartridge unit consists of the toner, supply roller, developing roller, and blade.

- Developing Method: Non-contact method
- Toner: Non magnetic, one component pulverized type toner
- Toner life span: 150 K (LSA Pattern/A4 standard)
- Remaining Toner Sensor: Yes
- OPC Cleaning: Cleaning blade type
- Management of waste toner: Toner collection by Cleaning Blade
- OPC Drum protecting Shutter: Yes
- Classifying device for toner cartridge: ID is classified by CRUM.

Engine Hardware Specifications

Main Board



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The Engine and Controller circuitry are on one integrated board, consisting of CPU and printing functions. The CPU handles bus control, O/O handling, drivers, and PC interface. The main board sends the Current Image by Video data to the LSU and controls the Electrophotography for printing. It consists of the circuits of the motor (paper feed, pass) driving, clutch driving, pre-transfer lamp driving, current driving, and fan driving. The signals from the paper feed jam sensor and paper empty sensor are directly input to the main board.

Asic (ORION 2)

- Marvell Feroceon 2850 ARM Compatible (I-Cache: 32KB, D-Cache-32KB)
- 64-bit RISC embedded processor core
- Dual bus architecture for bus traffic distribution

- AMBA High performance Bus (AHB)
- System Bus with SDRAM
- 64-bit Mbus Crossbar extension Interface with Flash and Device port

- SDRAMC
  - 32 Bits Dual mode DDR-II, 200MHz
  - 4 Banks (Up to 256MB per Bank)
- Device Controller
  - Boot Flash 1 Bank (Up to 128MB)
  - Device/NOR Flash 3 Banks (Up to 128MB per Bank)
- No Graphic Execution Unit and Image processor
- No Codec (Encoding / Decoding)
- Printer Video Controller Interface for LBP engines
  - Hyper-C: Printer Video Controller with RET algorithm (Line Memory & Lookup Table Memory: 512 x 8, 4096 x 16)
- Dual / Single Beam, LVDS Pad (VDO, HSYNC)
- PCI Controller
  - 32Bits, 66MHz (PCI) / 133MHz (PCI-X)
  - PCI Local Bus Specification rev. 2.2 compliant
  - PCI Express Specification beta 1.0a compliant
  - Host /Agent Mode (Support 3+4 Express Devices in Host Mode)
- Engine Controller (LPEC1)
  - LSU Interface unit
  - Step Motor: 2 Channels
  - PWM: 8 Channels
  - ADC: 6 Channels
- USB 2.0 Interface with Embedded USB 2.0 PHY
- Gigabit Ethernet Controller
  - IEEE 802.3 compliant with 10/100/1000 Mbps full-duplex GbE port
  - Support GMII, MII and RGMII interface with external PHY/SERDES device
- Package: 496pins PBGA
- Power: 1.2V (Core), 3.3V(IO) power operation
- Speed: 600MHz core (ARM9 Compatible) operation, 200MHz bus operation

Memory

NOR Flash Memory: It stores System Program and downloads the System Program through PC Interface, and in case of export models, it compresses the PCL font, then stores it.

- Capacity: 128M Byte

- Access Time: 70 nsec

DDR SDRAM: It is used as Swath Buffer, System Working Memory Area, etc. when printing. It stores Font List, compressed into Flash memory, on DRAM and uses it as PCL fonts in case of export models.

- Capacity: 128 Byte(Basic), up to 512Mbyte (User Option)

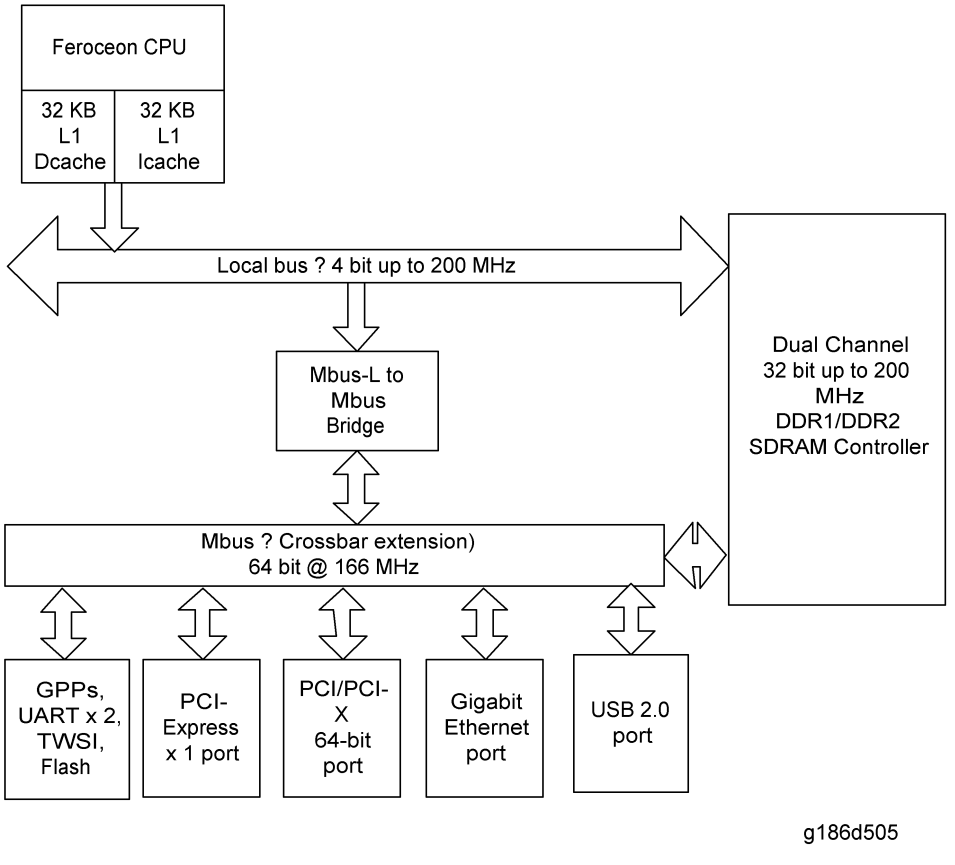
- Type: DDR-II SDRAM 200 MHz, 32bit

Others

The Option PBA can be mounted for supporting the serial communication.

6

Internal Block Diagram



Sensor Input Circuit

Paper Empty Sensing

The Paper empty sensor (Photo Interrupter) on the engine board transmits a “paper drawer empty” signal to the CPU when there is no paper, triggered by the actuator. The empty condition - read from the D0 part of the CPU - is then indicated by the second LED (yellow) on the operation panel.

Paper Sensing on the By-pass Tray

By operation of the actuator on the by-pass tray, by-pass tray sensor (Photo interrupter) on the engine board transmits paper set information to the CPU. It reads the D0 Bit of CPU for recognizing paper in by-pass tray, and paper is fed from by-pass tray if there is paper.

Paper Feeding/ Width Toner Cartridge Sensing

When paper passes the actuator (feed sensor part), it detects the signal of the photo interrupter, conveys the paper feeding state to the CPU, and then sprays the image data after a certain amount of time.

If the feed sensor isn't detected within 1sec. after paper is fed, the paper Jam0 (CPU #_) occurs (Red and Yellow LEDs on the operation panel will be turns on), and the fact whether the developer is inserted or not is detected with the same principle. After the developer is mounted, the actuator is operated. The signal from the photo interrupter is detected when it is passing the actuator of the sensor part. That is the developer ID sensing.

Paper Exit Sensing

The exit sensor and actuator at the paper exit unit detect whether paper exits the machine. Detection of the on/off time of the exit sensor is read by the D2 Bit of the CPU. JAM2 is indicated by red and yellow LED's on the operation panel.

Cover Open Sensing

The Cover open sensor is located on the front cover. After the front cover is opened, +24V (supplied to DC fan, Solenoid, Main Motor, Polygon motor part of LSU and HVPS), is cut off. Cover-open detection is operated by the D0 bit of the CPU, and the developer ID sensing is operated by the D7 bit of CPU.

A red LED on the operation panel indicates the condition to the user.

DC Fan/ Solenoid Driving

DC Fan is controlled by the D6 bit of CPU.

When it is high, the fan is driven by turning on the TR, and it is off when the sleep mode is selected.

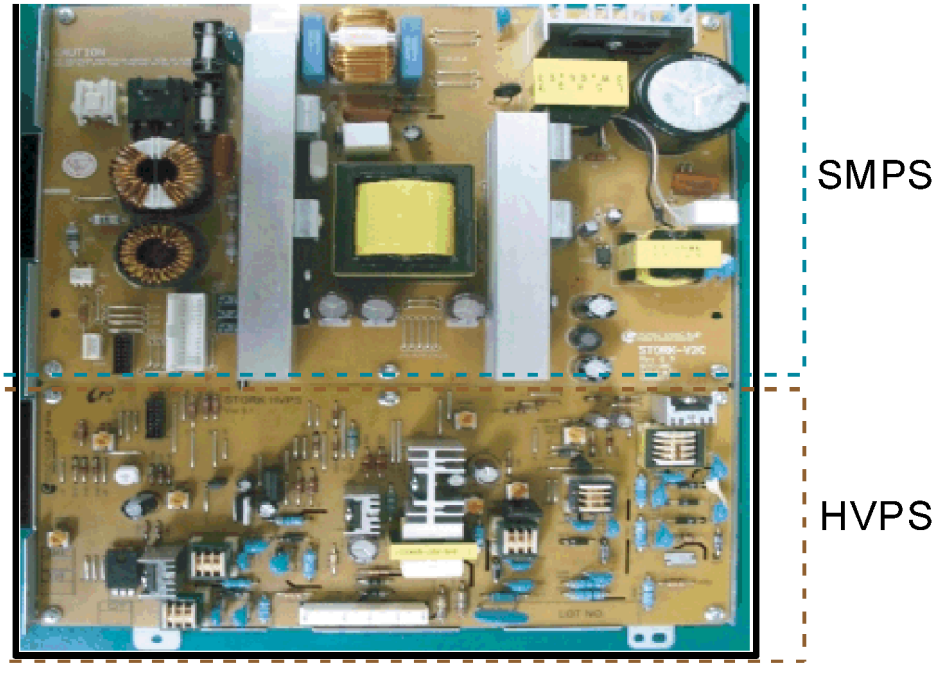
There are two solenoids, and they are driven by paper pick-up and by-pass tray signals, turning on or off by the D4 bit of the CPU, and the driving time is 300 ms. The diode protects the driving TR from noise pulses, which can occur when the solenoid is de-energizing.

Motor Driving

The motor driving circuit is formed when the Driver IC is selected in the first place. The A3977 Motor Driver IC is used in this case. But the resistance Rs value of sensing and the voltage value of the V reference can be changed by motor driving voltage value. The motor driving voltage is calculated with the following formula.

I = Vref / Rs, wherein Vref is (R1x 5V) / (R1+R2).

SMPS & HVPS Board



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Outputs 5V, 24V to supply the power to the main board and Optional Board (SCF, Duplex) (Not ADF Board)

HVPS (High Voltage Power Supply)

- Transfer High Voltage (THV+)

  - Input Voltage: 24 V DC 15%

  - Output Voltage: MAX +5.0KV 5 %, (Duty Variable, no loading)

  -1.2KV 15% (when cleaning, 200)

  - Output Voltage Trigger: 6.5

  - Input contrast of the Voltage stability degree: under 5 % (fluctuating input 21.6V to 26.4V), Loading contrast: 5 % or less

  - Output Voltage Rising Time: 100 ms Max

  - Output Voltage Falling Time: 100 ms Max

  - Fluctuating transfer voltage with environmental various: +650 V(Duty 10%) to 5 KV (Duty 90%)

  - Environment Recognition Control Method: The THV-PWM ACTIVE is the transfer active signal. It detects the resistance by recognizing the voltage value, F/B, while permitting environmental recognition voltage.

  - Output Voltage Control Method: Transfer Output Voltage is outputted and controlled by changing Duty of THVPWM

  Signal. 10% Duty: +650V, 90%

  Duty: +5KV 5%

- Fuser Voltage

  - Input Voltage: 24 V DC 15%

  - Output Voltage: 30V to 1000V DC 30V

  - Output Voltage Rising Time: 50 ms Max

  - Output Voltage Falling Time: 50 ms Max

  - Output Loading range: 30 M to 1000 M

  - Output Control Signal (MHV-PWM) : CPU is HV output when PWM is Low.

- Cleaning Voltage (THV-)

  - The (+) Transfer Voltage is not outputted because the THV PWM is controlled with high.

  - The (-) Transfer Voltage is outputted because the THV-Enable Signal is controlled with low

  - The output fluctuation range is large because there is no Feedback control.

- Developing Voltage (DEV)

  - Input Voltage: 24 V DC 15%

  - Output Voltage: -200V to -600V DC 20V

  - Output Voltage Fluctuation range: PWM Control

  - Input contrast of the output stability degree: 5 % or less, Loading contrast : 5 % or less

- Output Voltage Rising Time: 50 ms Max
- Output Voltage Falling Time: 50 ms Max
- Output Loading range: 10M to 1000 M
- Output Control Signal (BIAS-PWM) : the CPU output is HV output when PWM is low.

• Supply

- Output Voltage: -400V to -800V DC 50V(ZENER using, DEV)
- Input contrast of the output stability degree: under 5 %, Loading contrast : 5 % or less
- Output Voltage Rising Time: 50 ms Max
- Output Voltage Falling Time: 50 ms Max
- Output Loading range: 10 M to 1000 M
- Output Control Signal (BIAS-PWM): the CPU is HV output when PWM is low.

SMPS (Switching Mode Power Supply)

The SMPS is the power source of the entire system. It is assembled by an independent module, so it is possible to use for common use.

It is mounted at the bottom of the machine.

It 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 the fuser. SMPS has two output channels. Which are 3.3V and +24V.

• AC Input

- Input Rated Voltage: AC 220V to 240V AC 120V / AC 220V (EXP version)
- Input Voltage fluctuating range: AC 198V to 264V AC 90V to 135V / AC 198V to 264V (EXP version)
- Rated Frequency: 50/60 Hz
- Frequency fluctuation range: 47 to 63 Hz
- Input Current: Under 4.0Arms / 2.0Arms (But, the status when the lamp is off or rated voltage is inputted/ outputted.)

• Rated Output Power

NO	ITEM	CH1	CH2
1	CHANNEL NAME	+5 V	+24 V1 and +24 V2
2	CONNECTOR PIN	CON 21 5 V PIN: 12, 14, 16, 18 GND PIN: 20, 22, 24	CON 21 24 V PIN: 2, 4, 6, 8 GND PIN: 26, 27, 28

NO	ITEM	CH1	CH2
3	Rated Output	+5 V ±5% (+4.75 V to +5.25 V)	+24.0 V ±5% (+21.6 V to +26.4 V)
4	Max. Output Current	4.0 A	7.5 A
5	Peak Loading Current	4.4 A	8.0 A
6	ROPPLE NOISE Voltage	Under 100 mVp-P	Under 100 mVp-P
7	Maximum output	16.0 W	127.2 W
8	Peak output	20.0 W	180.0 W
9	Protection for loading shortage and overflowing current	-	-

- Power Consumption

NO	ITEM	CH1 (+3.3 V)	CH2 (+5 V)	CH3 (+24 V)	System
1	Stand-By	1.0 A	0.07 A	0.4 A	AVG: 55 Wh
2	PRINTING	1.0 A	0.14 A	2.0 A	AVG: 280 Wh
3	Sleep-Mode	0.8 A	0.01 A	0.4 A	AVG: 10 Wh

- Length of Power Cord: 1830 50mm
- Power Switch: Use
- Feature
  - Insulating Resistance: 50 or more (at DC 500V)
  - Insulating revisiting pressure: Must be no problem within 1 min. (at 1500Vac, 10mA)
  - Leaking Current: under 3.5mA
  - Running Current: under 40A PEAK (AT 25, COLD START) under 60A PEAK (In other conditions)
  - Rising Time: within 2Sec
  - Falling Time: over 20ms
  - Surge: Ring Wave 6KV-500A (Normal, Common)
- Environment Condition
  - Operating temperature range: 0°C to 40°C
  - Maintaining temperature range: -25°C to 85°C

- Preserving Humidity Condition: 30% to 90% RH

Fuser AC Power Control

Fuser (HEAT LAMP) gets heat from AC power. The AV power controls the switch with the Triac, a semiconductor switch. The ON/OFF control is operated when the gate of the Triac is turned on/off by Photo triac (insulting part).

In other words, the AC control part is a passive circuit, so it turns the heater on/off by taking signal from engine control part.

When the HEATER ON signal is turned on at engine, the LED of PC1 (Photo Triac) takes the voltage and flashes. From the flashing light, the Triac part (light receiving part) takes the voltage, and the voltage is supplied to the gate of Triac and flows into the Triac. As a result, the AC current flows in the heat lamp, and heat occurs.

On the other hand, when the signal is off, the PC1 is off, the voltage is cut off at the gate of Triac, the Triac becomes off, and then the heat lamp is turned off.

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

-Phototriac Coupler (PC3)

Turn On If Current: 15mA 50mA(Design :16mA)

High Repetitive Peak Off State Voltage: Min 600V

Engine Firmware

Control Algorithm

If feeding from a cassette, the drive of the pickup roller is controlled by controlling the solenoid. The on/off of the solenoid is controlled by controlling the general output port or the external output port. Jam occurrences are categorized as follows.

ITEM	Description
JAM 0	JAM 0 • After picking up, paper is not fed from the paper cassette. • After picking up, paper has been fed but it does not reach the feed sensor for a certain time due to slip, etc. • After picking up, the feed sensor does not turn on, and then retries to pick up. After the second pick up, the feed sensor does not turn on for a certain time, it is considered to be JAM 0. *This status means that the leading edge of the paper doesn't pass the feed sensor.

ITEM	Description
	• Even though the paper reaches the feed sensor, the feed sensor does not turn on. *This status means that the leading edge of the paper has already passed the feed sensor.
JAM 1	• After the leading edge of the paper has passed the feed sensor, the trailing edge of the paper does not pass the feed sensor for a certain time. (The feed sensor cannot be OFF) • After the leading edge of the paper has passed the feed sensor, the paper does not reach the exit sensor for a certain time. (The exit sensor does not turn on.) *This status means that the paper exists between the feed sensor and the exit sensor.
JAM 2	• After the trailing edge of the paper has passed the feed sensor, the paper does not pass the exit sensor for a certain time.
DUPLEX JAM 1	• After the trailing edge of the paper has passed the exit sensor, the leading edge of the paper does not reach the duplex sensor for a certain time.
DUPLEX JAM 0	• After the leading edge of the paper has passed the duplex sensor, the leading edge of the paper does not reach the feed sensor for a certain time.

Driver

By gearing, the main motor drives the rollers such as the feed roller, developing roller, fuser roller, and exit roller.

The step motor is controlled for such acceleration section and steady section. In the initial stage of the motor run, appoint the acceleration section to prevent the step-out of the motor. It is controlled by the A 3977 motor driver IC. The step signal and the enable signal are sent to make the phase for driving the motor in CPU.

Transfer

The charging voltage, developing voltage and the transfer voltage are controlled by PWM (Pulse Width Modulation). Each output voltage is changeable due to the PWM duty. The transfer voltage set when the paper has passed the transfer roller is decided by the conditions of the environment in which the machine is operating. The resistance value of the transfer roller changes in accordance with the surrounding environment, and the voltage value, which changes in accordance with the operating environment, is controlled with the AD converter. The voltage value for impressing to the transfer roller is decided by the changed value.

Fusing

The temperature change of the heat roller's surface changes according to the resistance value through the thermistor. By converting the voltage value, which is impressed to the resistance, to the digital value through the AD converter, the temperature is decided. The AC power is controlled by comparing the target temperature to the value from the thermistor. If the value from the thermistor is out of controlling range while controlling the fusing, the error stated in the below table occurs.

Error	Description	LCD Display
OPEN HEAT ERROR	• When warming up, it has been lower than 60° C over 35 seconds.	"ENGINE FUSER ERROR"
LOW HEAT ERROR	• Standby - It has been lower than 130°C over 10 seconds. • Printing Up to 2 consecutive pages : It has been lower than 155°C over 7 seconds. From 3 consecutive pages : It has been 25°C lower than the fixed fusing temperature over 7 seconds.	"ENGINE LOW HEAT ERROR"
OVER HEAT ERROR	It has been higher than 230°C over 10 seconds.	"ENGINE OVERHEAT ERROR"

Note

- This can be changed in the future.

LSU

The LSU consists of the LD (Laser Diode) and the polygon motor control. When the printing signal occurs, it turns on the LD and drives the polygon motor. When the detector detects the beam, Hsync occurs. Error messages are as follows:

Error	Description	LCD Display
Polygon Motor Error	• When the polygon motor speed does not become steady.	"LSU NOT READY"
LOW HEAT ERROR	• The polygon motor speed is steady but Hsync is not generated.	"HSYNC ERROR"

7. Specifications

General Specifications

Printer

Configuration	Desktop	
Paper size	A4/LT	
Print Resolution	Maximum	1200 x 1200 dpi
	Default	600 x 600 dpi
Print Speed	A4-43 ppm	
	Letter-45 ppm	
Duplex Print Speed (Optional)	A4-29 ipm	
	Letter-30 ipm	
First Print Speed	Ready: 8.5 seconds	
	Idle mode: 43.5 seconds	
Copy Paper Weight	Paper Tray	60-105 g/m² (16-28 lb.)
	By-pass tray	60-176 g/m² (16-43 lb.)
	Optional paper tray	60-105 g/m² (16-28 lb.)
	Duplex	75-90 g/m² (20-24 lb.)
Warm-up Time	45 seconds from Power-on boot	
Power Rating	110 - 127 VAC or 220 - 240 VAC	
Power Consumption	Average: Less than 650 W Power save mode: Less than 13 W	
Noise Level	Standard mode: Less than 35 dBA Printing mode: Less than 57 dBA	
Paper Input Size	Standard tray	A4/LT – A6

	By-pass tray	A4/LT – A6
	Optional duplex unit	A4/LT
	Optional paper tray unit Up to three units can be installed.	A4/LT – A6
Paper Input Capacity	Standard/Optional paper trays	500 sheets each (75 g/m², 20 lb.)
	By-pass tray	Normal paper: 100 sheets (75 g/m², 20 lb.)
		Special paper: 10 sheets
Output Capacity (Maximum 250 sheets)	250 sheets (face down)	
	100 sheet (face up)	
Environmental Standard	Energy Star Tier 1	
Power Saver Mode	Selectable 5/15/**30**/60/120 minutes	
Supply	20 K AIO toner supply cartridge	
Dimension (W x D x H)	396 X 453 X 353 mm (15.6" X 17.8" X 13.9")	
Weight	17.8 Kg (39.2 lb); including consumables	

Option

Item	
Memory	512MB (maximum - accepts 128MB & 256MB boards)
Optional Tray	500 sheet Cassette Tray
Hard Disk	40GB
Duplex Unit	Available

Controller

CPU	Marvell 500 MHz	
Memory (2 slots)	Standard/Max	128 MB/ 512 MB (256 MB + 256 MB)
	Type	SDRAM
Printer Languages	Standard	PostScript3, PCL6, PDF Direct (only HDD installed)
Font	45 scalable, 1 bitmap, 136 PostScript 3 fonts, OCR Fonts	
Driver	Default Driver	**PCL6:** Win 95/98/NT4.0/2000/Me/XP(32/64bits)/2003 Server(32/64bits) **PS:** Linux and Mac
	Supporting OS	Windows 95/98/NT4.0/2000/Me/XP(32/62bits)/ 2003 Server(32/62bits)
	WHQL	Windows 2000, XP, 2003 Server
Network	Protocol	SPX/IPX, TCP/IP, SNMP, HTTP 1.1, AppleTalk
	Supporting OS	Windows 98/ME/NT4.0/2000/XP(32/64bits)/2003 Server(32/64bits) Netware 4.x, 5.x, 6.x Mac OS 8.6~9.2, 10.1~10.4 Various Linux OS including Red Hat 8.0 to 9.2, Fedora Core 1~3, Mandrake 9.2~10.1 and SuSE 8.2~9.2
Interface	IEEE 1284, High Speed USB 2.0, 10/100 Base TX	

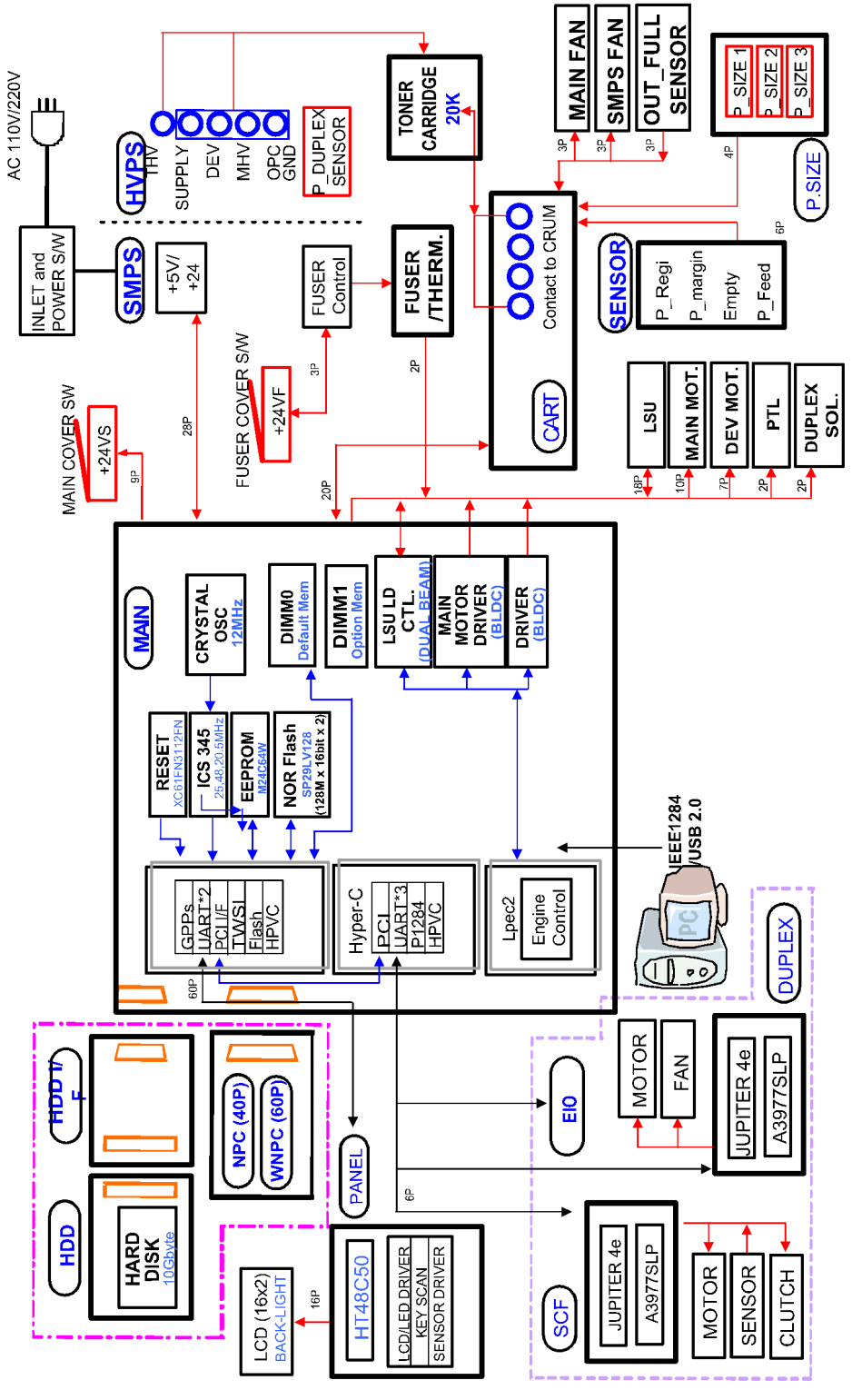
Handling Paper

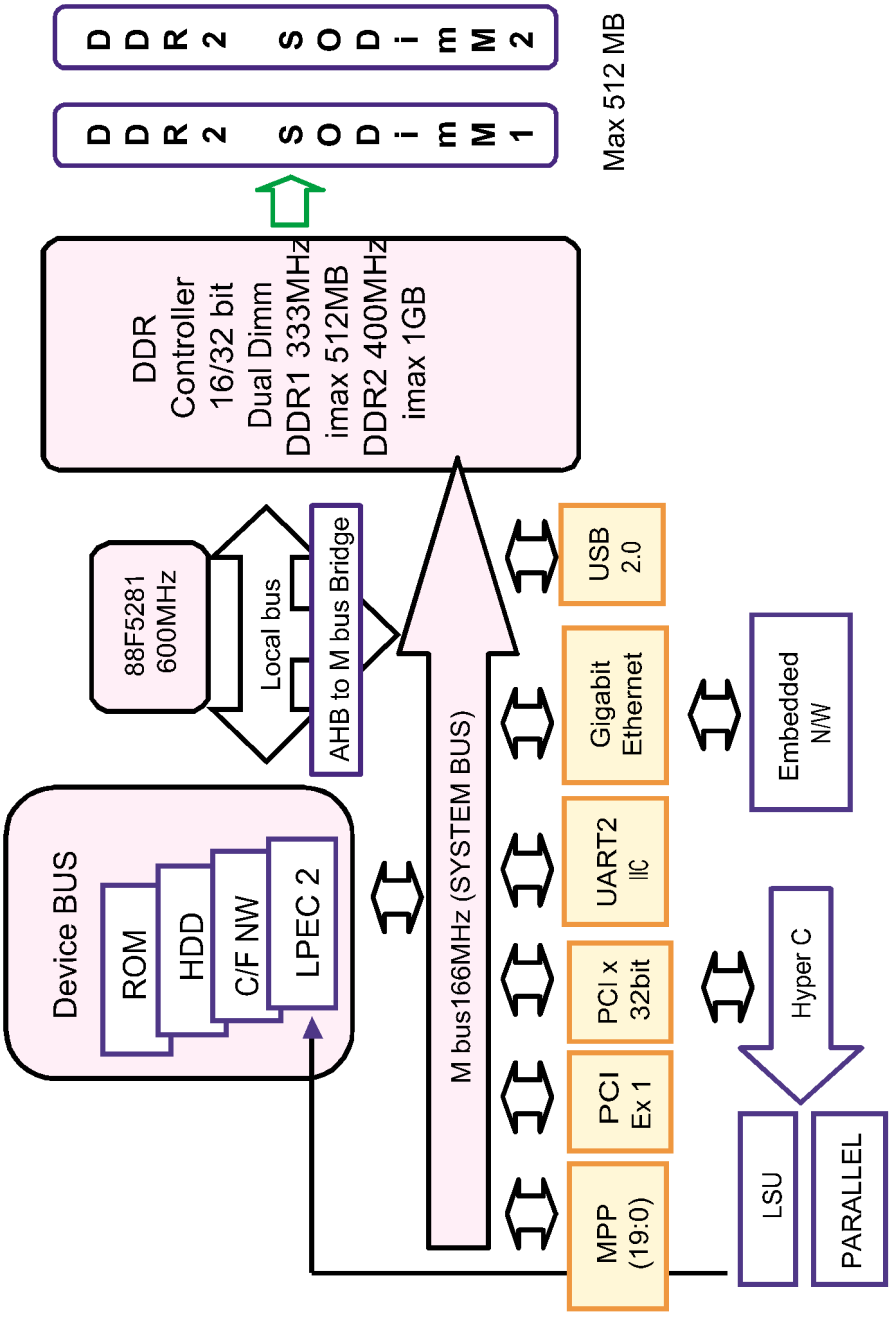
Tray		
Standard Cassette Tray	Capacity	500 sheets @ 75 g/m^2
	Media sizes	A4, A5, Letter, Legal, Executive, Folio, Oficio, ISO B5, JIS B5
	Media types	Plain Paper
	Media weight	16 to 28 lb (60 to 105 g/m^2)
	Sensing	Paper empty sensor, Paper Size Sensor
By-pass Tray	Capacity	100 sheets @75 g/m^2
	Media sizes	A4, A5, A6, Letter, Legal, Oficio, Folio, Executive, ISO B5, JIS B5, 3"x5", Monarch, No.10, DL, C5, C6
	Media types	Transparencies, Envelopes, Labels, Card stock
	Media weight	16 to 43 lb (60 to176 g/m^2)
	Sensing	Paper empty sensor
Optional Cassette Tray	Capacity	500 sheets @ 75 g/m^2
	Media sizes	A4, A5, Letter, Legal, Executive, Folio, Oficio, ISO B5, JIS B5
	Media types	Plain Paper
	Media weight	16 to 28 lb (60 to 105 g/m^2)
	Sensing	Paper empty sensor, Paper Size Sensor
Optional Duplex	Media sizes	A4, Letter, Legal, Folio, Oficio
	Media types	Plain Paper
	Media weight	20 to 24lb (75 to 90 g/m^2)

8. Appendix

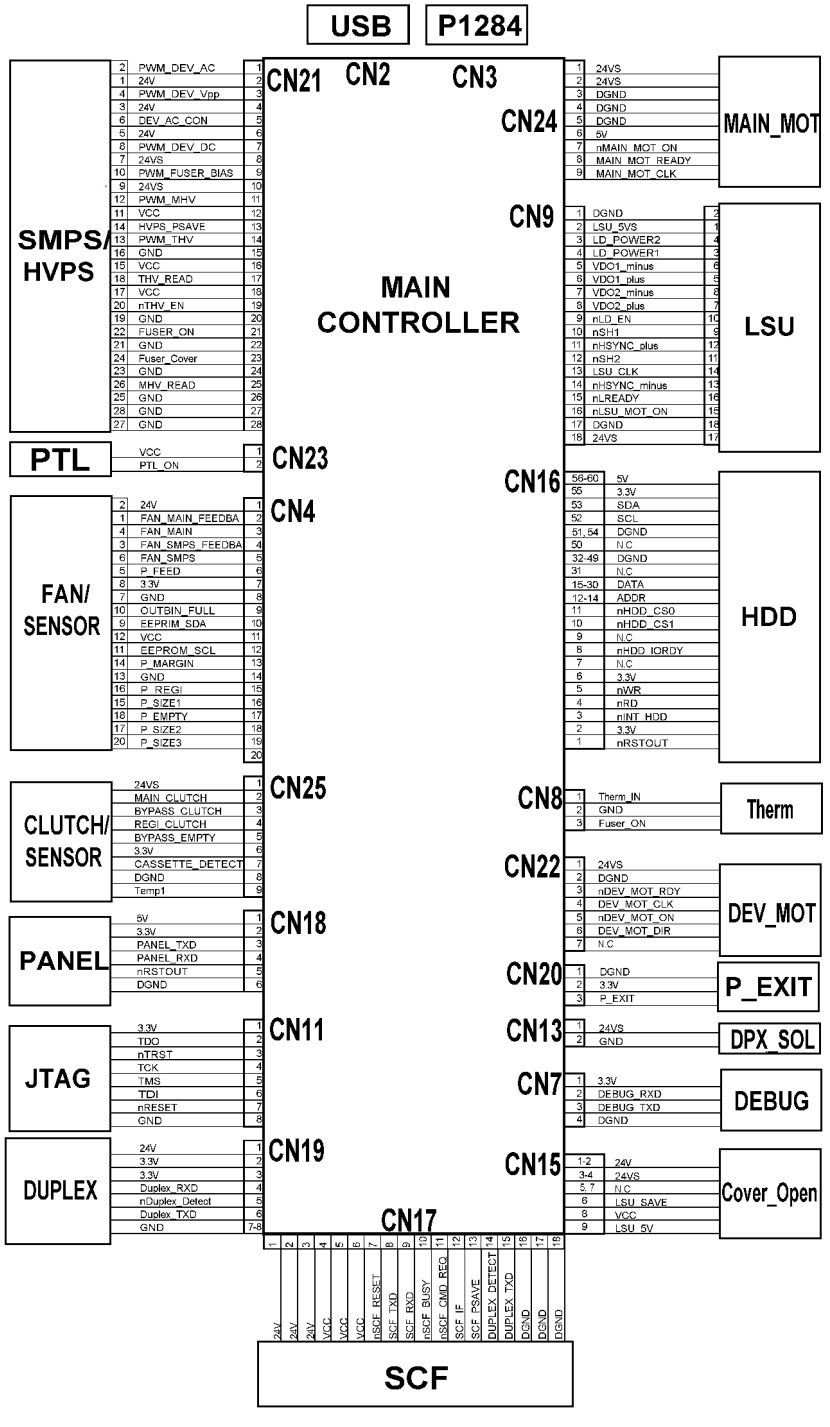
Block Diagram

System Block Diagram




DDR2 SODIMM 1
DDR2 SODIMM 2
Max 512 MB
DDR Controller 16/32 bit Dual Dimm DDR1 333MHz imax 512MB DDR2 400MHz imax 1GB
88F5281 600MHz
Local bus
AHB to M bus Bridge
M bus166MHz (SYSTEM BUS)
Device BUS
ROM
HDD
C/F NW
LPEC 2
MPP (19:0)
PCI Ex 1
PCI x 32bit
UART2 IIC
Gigabit Ethernet
USB 2.0
Hyper C
LSU
PARALLEL
Embedded N/W

Connection Diagram



Signal Description Table

CN18 [POWER] Main ↔ SMPS/HVPS

Pin	Signal Name	Pin	Signal Name
1	DEVE_AC-PWM	2	←
2	24V	1	←
3	DEVE_AC_Vpp	4	←
4	24V	3	←
5	DEVE_AC_CON	6	←
6	24V	5	←
7	DEVE_VDC-PWM	8	←
8	24VS	7	←
9	FUSER_BIAS_PWM	10	←
10	3.3V	9	←
11	MHV_PWM	12	←
12	3.3V	11	←
13	FAN_SMPS	14	←
14	3.3V	13	←
15	THV_PWM	16	←
16	VCC	15	←
17	THV_READ	18	←
18	VCC	17	←
19	nTHV_EN	20	←
20	FAN_FEEDBACK	19	←
21	FUSER COVER	22	←

22	GND	21	←
23	GND	24	←
24	GND	23	←
25	FUSER_ON	26	←
26	GND	25	←
27	GND	28	←
28	GND	27	←

CN19 [DUPLEX] MAIN ↔ DUPLEX B'D

Pin	Signal Name	Pin	Signal Name
1	24VS	1	←
2	3.3V	2	←
3	3.3V	3	←
4	DUPLEX_RXD	4	←
5	DUPLEX_DETECT	5	GND (DETECT)
6	DUPLEX_TXD	6	←
7	GND	7	←
8	GND	8	←
9	GND		←

CN20 [EXIT SENSOR] MAIN ↔ EXIT SENSOR

Pin	Signal Name	Pin	Signal Name
1	GND	2	←
2	3.3V	1	←
3	P_EXIT	4	←

CN24 [DC_MOT] MAIN ↔ MAIN MOTOR

Pin	Signal Name	Pin	Signal Name
1	24VS	1	←
2	24VS	2	←
3	GND	3	←
4	GND	4	←
5	GND	5	←
6	VCC	6	←
7	nMAIN_MOT	7	←
8	MAIN_MOT_READY	8	←
9	MAIN_MOTCLK	9	←
10	NC		

CN25 [JOINT] MAIN ↔ JOINT B'D

Pin	Signal Name	Pin	Signal Name
1	24VS	1	←
2	MAIN_CLUTCH	2	←
3	BYPASS_CLUTCH	3	←
4	REGI_CLUTCH	4	←
5	BYPASS_EMPTY	5	←
6	3.3V	6	←
7	CASSETTE_DETECT	7	←
8	GND	8	←
9	TEMP1	9	←

CN22 [DEV_MOT] MAIN ↔ DEVE MOTOR

Pin	Signal Name	Pin	Signal Name
1	24VS	1	←
2	GND	2	←
3	nDEV_MOT_READY	3	←
4	nDEV_MOT_CLK	4	←
5	nDEV_MOT_ON	5	←
6	nDEV_MOT_DIR	6	←
7	NC		

CN23 [PTL] MAIN ↔ PTL

Pin	Signal Name	Pin	Signal Name
1	VCC	1	←
2	PTL_ON	2	←

CN18 [PANEL] MAIN ↔ PANEL

Pin	Signal Name	Pin	Signal Name
1	VCC	1	←
2	3.3V	2	←
3	PANEL_TXD	3	←
4	PANEL_RXD	4	←
5	nRSTOUT	5	←
6	GND	6	←

CN15 [COVER OPEN] MAIN ↔ COVER OPEN

Pin	Signal Name	Pin	Signal Name
1	24V	1	←
2	24V	2	←
3	24VS	3	←
4	24VS	4	←
5	NC	5	←
6	COVE_OPEN	6	←
7	NC	7	←
8	VCC	8	←
9	LSU_5V	9	←

CN13 [DPX_SOL] MAIN ↔ DUPLEX SOLENOID

Pin	Signal Name	Pin	Signal Name
1	DUPLEX_SOL	1	←
2	24VS	2	←

CN9 [LSU] MAIN ↔ LSU

Pin	Signal Name	Pin	Signal Name
1	GND	2	←(LD DRIVER)
2	LSU_5V	1	←
3	LD_POWER2	4	←
4	LD_POWER1	3	←
5	VDO1_minus	6	←
6	VDO1_plus	5	←

7	VDO2_minus	8	←
8	VDO2_plus	7	←
9	nLD_EN	10	←
10	nSH1	9	←
11	nHSTNC_plus	12	←
12	nSH2	11	←
13	nHSTNC_minus	14	←
14	LSU_CLK	13	←(P-MOTOR)
15	nREADY	16	←
16	LSU_MOT_ON	15	←
17	GND	18	←
18	GND	17	←

CN4 [CART] MAIN ↔ TONER SENSOR

Pin	Signal Name	Pin	Signal Name
1	24V	2	←
2	P_SIZE3	1	←
3	FAN_SMPS	4	←
4	P_SIZE2	3	←
5	FAN_MAIN	6	←
6	P_SIZE1	5	←
7	GND	8	←
8	3.3V	7	←
9	OUTBIN_FULL	10	←
10	CART_CLK	9	←

11	P_REGI	12	←
12	CART_DOUT/CART_DIN	11	←
13	P_EMPTY	14	←
14	LSU_CLKGND	13	←(P-MOTOR)

CN17 [SCF] MAIN ↔ SCF B'D

Pin	Signal Name	Pin	Signal Name
1	24V	1	←
2	3.3V	2	←
3	SCF_EMPTY	3	3.3V
4	SCF_RXD	4	←
5	SCF_DETECT	5	←
6	SCF_TXD	6	←
7	GND	7	←
8	GND	8	←
9	GND	9	←
10	GND	10	←
11	GND		←

CN8 [THERM] MAIN ↔ FUSER

Pin	Signal Name	Pin	Signal Name
1	THERM_IN	1	←
2	FUSER_ON	2	GND
3	FUSER_EN	3	FUSER_ON

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