



FS-1020D

SERVICE MANUAL

Published in Oct. '03



Safety precautions

This booklet provides safety warnings and precautions for our service personnel to ensure the safety of their customers, their machines as well as themselves during maintenance activities. Service personnel are advised to read this booklet carefully to familiarize themselves with the warnings and precautions described here before engaging in maintenance activities.

Safety warnings and precautions

Various symbols are used to protect our service personnel and customers from physical danger and to prevent damage to their property. These symbols are described below:

⚠ DANGER: High risk of serious bodily injury or death may result from insufficient attention to or incorrect compliance with warning messages using this symbol.

⚠ WARNING: Serious bodily injury or death may result from insufficient attention to or incorrect compliance with warning messages using this symbol.

⚠ CAUTION: Bodily injury or damage to property may result from insufficient attention to or incorrect compliance with warning messages using this symbol.

Symbols

The triangle (△) symbol indicates a warning including danger and caution. The specific point of attention is shown inside the symbol.



General warning.



Warning of risk of electric shock.



Warning of high temperature.

⊘ indicates a prohibited action. The specific prohibition is shown inside the symbol.



General prohibited action.



Disassembly prohibited.

● indicates that action is required. The specific action required is shown inside the symbol.



General action required.



Remove the power plug from the wall outlet.



Always ground the copier.

1. Installation Precautions

WARNING

• Do not use a power supply with a voltage other than that specified. Avoid multiple connections to one outlet: they may cause fire or electric shock. When using an extension cable, always check that it is adequate for the rated current.



• Connect the ground wire to a suitable grounding point. Not grounding the copier may cause fire or electric shock. Connecting the earth wire to an object not approved for the purpose may cause explosion or electric shock. Never connect the ground cable to any of the following: gas pipes, lightning rods, ground cables for telephone lines and water pipes or faucets not approved by the proper authorities.



CAUTION:

• Do not place the copier on an infirm or angled surface: the copier may tip over, causing injury.



• Do not install the copier in a humid or dusty place. This may cause fire or electric shock.



• Do not install the copier near a radiator, heater, other heat source or near flammable material. This may cause fire.



• Allow sufficient space around the copier to allow the ventilation grills to keep the machine as cool as possible. Insufficient ventilation may cause heat buildup and poor copying performance.



• Always handle the machine by the correct locations when moving it.



• Always use anti-toppling and locking devices on copiers so equipped. Failure to do this may cause the copier to move unexpectedly or topple, leading to injury.



• Avoid inhaling toner or developer excessively. Protect the eyes. If toner or developer is accidentally ingested, drink a lot of water to dilute it in the stomach and obtain medical attention immediately. If it gets into the eyes, rinse immediately with copious amounts of water and obtain medical attention.













• Advise customers that they must always follow the safety warnings and precautions in the copier's instruction handbook.








2. Precautions for Maintenance

WARNING

- Always remove the power plug from the wall outlet before starting machine disassembly. 
- Always follow the procedures for maintenance described in the service manual and other related brochures. 
- Under no circumstances attempt to bypass or disable safety features including safety mechanisms and protective circuits. 
- Always use parts having the correct specifications. 
- Always use the thermostat or thermal fuse specified in the service manual or other related brochure when replacing them. Using a piece of wire, for example, could lead to fire or other serious accident. 
- When the service manual or other serious brochure specifies a distance or gap for installation of a part, always use the correct scale and measure carefully. 
- Always check that the copier is correctly connected to an outlet with a ground connection. 
- Check that the power cable covering is free of damage. Check that the power plug is dust-free. If it is dirty, clean it to remove the risk of fire or electric shock. 
- Never attempt to disassemble the optical unit in machines using lasers. Leaking laser light may damage eyesight. 
- Handle the charger sections with care. They are charged to high potentials and may cause electric shock if handled improperly. 

CAUTION

- Wear safe clothing. If wearing loose clothing or accessories such as ties, make sure they are safely secured so they will not be caught in rotating sections. 
- Use utmost caution when working on a powered machine. Keep away from chains and belts. 
- Handle the fixing section with care to avoid burns as it can be extremely hot. 
- Check that the fixing unit thermistor, heat and press rollers are clean. Dirt on them can cause abnormally high temperatures. 
- Do not remove the ozone filter, if any, from the copier except for routine replacement. 

• Do not pull on the AC power cord or connector wires on high-voltage components when removing them; always hold the plug itself.



• Do not route the power cable where it may be stood on or trapped. If necessary, protect it with a cable cover or other appropriate item.



• Treat the ends of the wire carefully when installing a new charger wire to avoid electric leaks.



• Remove toner completely from electronic components.



• Run wire harnesses carefully so that wires will not be trapped or damaged.



• After maintenance, always check that all the parts, screws, connectors and wires that were removed, have been refitted correctly. Special attention should be paid to any forgotten connector, trapped wire and missing screws.



• Check that all the caution labels that should be present on the machine according to the instruction handbook are clean and not peeling. Replace with new ones if necessary.



• Handle greases and solvents with care by following the instructions below:



- Use only a small amount of solvent at a time, being careful not to spill. Wipe spills off completely.
- Ventilate the room well while using grease or solvents.
- Allow applied solvents to evaporate completely before refitting the covers or turning the main switch on.
- Always wash hands afterwards.

• Never dispose of toner or toner bottles in fire. Toner may cause sparks when exposed directly to fire in a furnace, etc.



• Should smoke be seen coming from the copier, remove the power plug from the wall outlet immediately.



3. Miscellaneous

WARNING

• Never attempt to heat the drum or expose it to any organic solvents such as alcohol, other than the specified refiner; it may generate toxic gas.



1-1-1 Specifications

Type	Desktop
Printing system	Indirect electrostatic system
Paper type	Cassette: Plain paper (60 - 90 g/m ² [thick paper mode: 90 - 105 g/m ²]) MP tray: Plain paper (60 - 90 g/m ² [thick paper mode: 90 - 163 g/m ²]) Special paper: Transparencies, letterhead, colored paper, recycled paper Note: Use the MP tray for special paper
Paper size	A4 (210 - 297 mm) B5 (182 - 257 mm) A5 (148 - 210 mm) Letter (8 ¹ / ₂ " - 11") Legal (8 ¹ / ₂ " - 14") Folio (210 - 330 mm) Oficio II (216 - 330 mm) Non-standard size (148 to 210 mm × 210 to 297 mm: cassette), (70 to 216 mm × 148 to 297 mm: MP tray)
Printing speed	Simplex printing: 20 pages//min. (A4, plain), 21 pages//min. (Letter, plain) Duplex printing: 10 pages//min. (A4/Letter, plain) Note: When printing multiple copies of the same page
First print	Within 10 s (A4/Letter), depends on input data
Warm-up time	Within 15 s (room temperature 23°C/73.4°F, humidity 50% RH)
Paper feed system	One universal cassette and one MP tray
Paper loading capacity	Cassette: 250 sheets (80 g/m ² , 0.11 μm) MP tray: 50 sheets (80 g/m ² , 0.11 μm)
Paper eject system	Face down: 250 sheets (80 g/m ² , 0.11 μm)
Standard memory	16 MB, expandable up to 272 MB
Additional memory	1 slot (16/32/64/128 MB DIMM)
Resolution	Fast 1200 mode 600 × 600 dpi, with KIR (Kyocera Image Refinement) 300 × 300 dpi, with KIR (Kyocera Image Refinement)
Photoconductor	OPC (drum diameter 30 mm)
Charging system	Single positive corona charging
Developing system	Single element reversing process
Transfer system	Transfer roller
Fixing system	Heat roller Heat source: halogen heaters (750 W) Control temperature: 180°C/356°F (at normal ambient temperature) Abnormally high temperature protection device: thermal cutout
Charge erasing system	Exposure by eraser lamp (LED array)
Cleaning system	Cleaning blade
Controller hardware	CPU: Power PC405 (266 MHz) System ROM: 4 MB Font ROM: 2 MB (16 Mbit × 1) Main RAM: 16 MB standard (on-board); expanding up to 272 MB (standard 16 MB +256 MB) at the maximum by adding optional expansion memory Optional expansion RAM (DIMM): 1 slot

2FM

Controller software	a) Emulation PCL6 (PCL5e+PCLXL) KPD3 (PostScript 3 compatible) b) Fonts: Bitmap font: 1 Line Printer bitmap font Outline fonts: 35 PCL6 (PCL5e/PCL-XL) fonts 45 KPD2 fonts: c) Graphic: (1) Raster graphic: 75, 100, 150, 200*, 300, 600* dpi (*200 dpi is supported when the resolution is 600 dpi.) (2) Vector graphic: Line, Box, Circle, Arc, Fill pattern etc. (3) Bar code: One-dimensional bar code: 45 types Two-dimensional bar code: 1 type (PDF-417) d) Connectivity Plug & play, Windows 95/98/Me/NT4.0/2000/XP
Interface	Parallel: High-speed (bi-directional), IEEE 1284 Nibble/ECP mode USB: Full-Speed USB2.0 Optional interface (KUIO-LV) × 1: Network interface card IB-20 (10 Base-TX/100 Base-TX/10 Base-2), IB-21E (10 Base-TX/100 Base-TX), wireless LAN card IB-22 must be installed. Optional serial interface: RS-232C (Max. 115.2 Kbps), Serial interface board IB-11 must be installed.
Dimensions	378 (W) × 235 (D) × 375 (H) mm 14 ⁷ / ₈ " (W) × 9 ¹ / ₄ " (D) × 14 ³ / ₄ " (H)
Weight	Approx. 10.5 kg/23 ¹ / ₈ lbs
Floor requirements	496 (W) × 740 (D) mm 19 ⁹ / ₁₆ " (W) × 29 ³ / ₁₆ " (D)
Power source	120 V AC, 60 Hz, 7.1 A 220 - 240 V AC, 50/60 Hz, 3.8 A
Power consumption	Max.: 819 W During sleep mode: 4.5 W (120 V AC), 4.2 W (220 - 240 V AC)
Noise	Printing: 55 dB(A) Ready: 32 dB(A)
Options	Paper feeder, Additional memory (DIMM), Memory card, Network interface card IB20/IB21E/IB-22, Serial interface board IB-11

1-1-2 Name of parts

(1) Overall

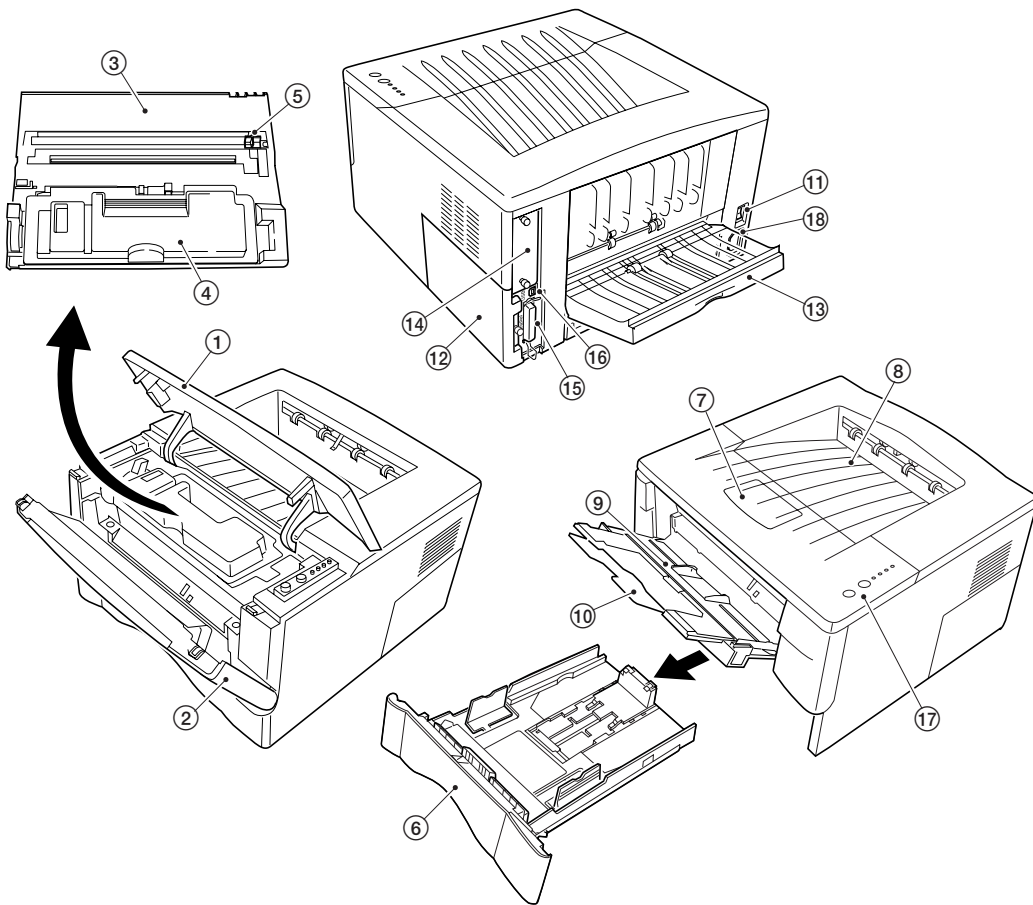


Figure 1-1-1

- | | |
|-------------------------|--------------------------------|
| ① Front top cover | ⑩ Extension tray |
| ② Front cover | ⑪ Power switch |
| ③ Process unit | ⑫ Memory cover |
| ④ Toner container | ⑬ Rear cover |
| ⑤ Main charger cleaner | ⑭ Optional interface slot |
| ⑥ Cassette | ⑮ Parallel interface connector |
| ⑦ Paper stopper | ⑯ USB interface connector |
| ⑧ Face-down output tray | ⑰ Operator panel |
| ⑨ MP tray | ⑱ AC inlet |

(2) Operator panel

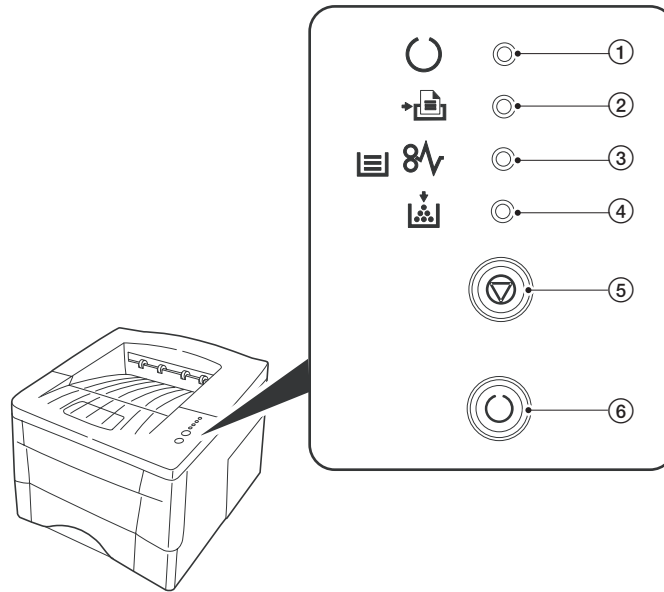


Figure 1-1-2

- ① Ready indicator (Green)
- ② Data indicator (Green)
- ③ Attention indicator (Red)
- ④ Toner indicator (Red)
- ⑤ CANCEL key
- ⑥ GO key

(2) Cross section view

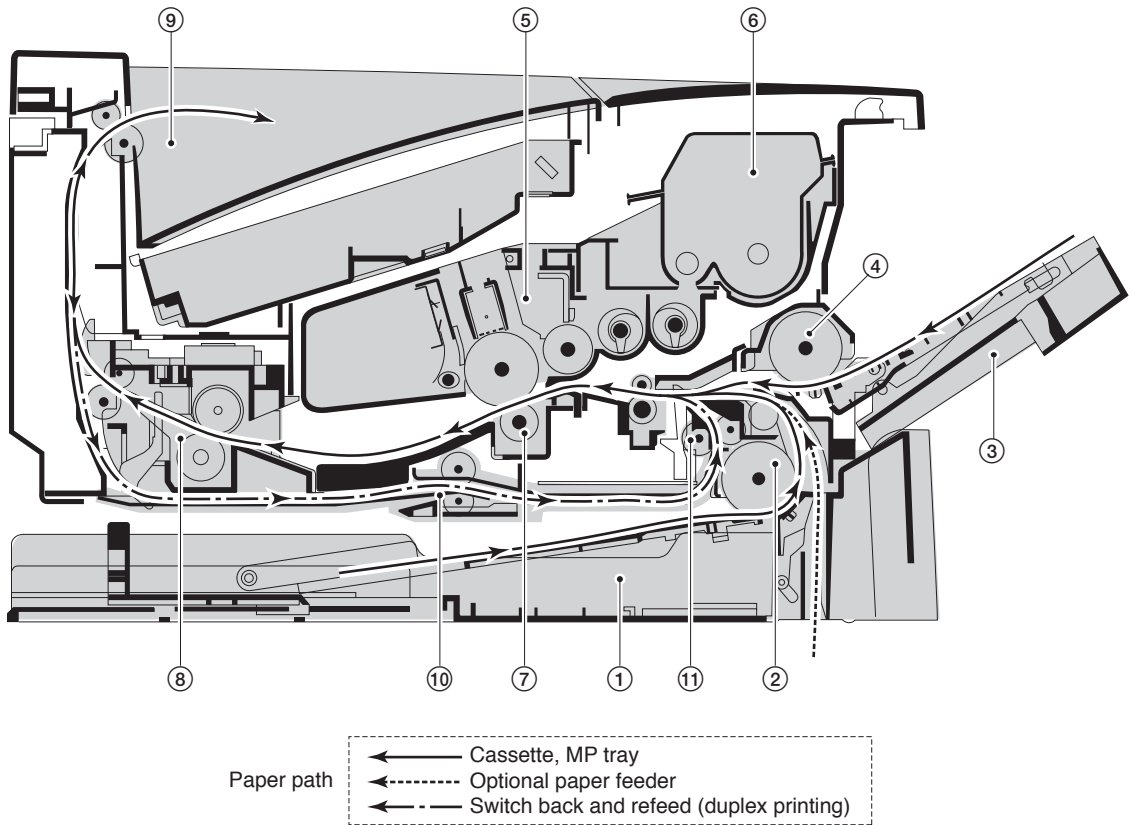


Figure 1-1-2

- | | |
|---------------------------|---------------------------------|
| ① Cassette | ⑦ Transfer section |
| ② Paper feed unit | ⑧ Fuser unit |
| ③ MP tray | ⑨ Face-down output tray |
| ④ MP tray paper feed unit | ⑩ Switch back/conveying section |
| ⑤ Process unit | ⑪ Refeed unit |
| ⑥ Toner container | |

1-2-1 Process unit (drum)

Note the following when handling or storing the drum.

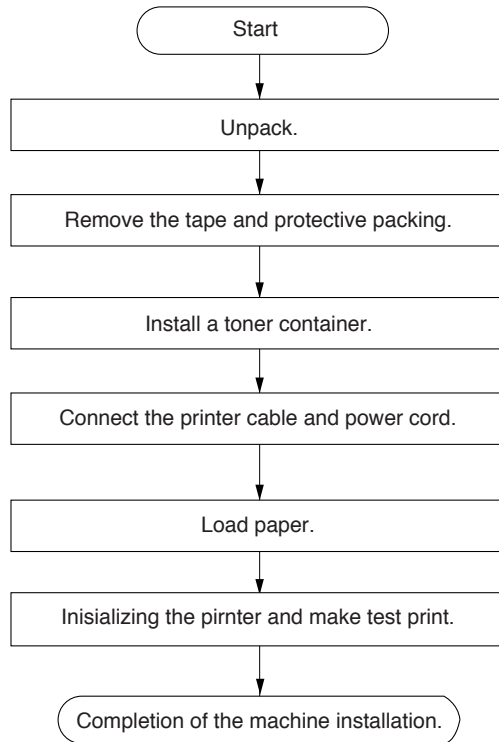
- When removing the process unit, never expose the drum surface to strong direct light.
- Keep the drum at an ambient temperature between 10°C/50°F and 32.5°C/90.5°F and at a relative humidity not higher than 80% RH. Avoid abrupt changes in temperature and humidity.
- Avoid exposure to any substance which is harmful to or may affect the quality of the drum.
- Do not touch the drum surface with any object. Should it be touched by hands or stained with oil, clean it.

1-2-2 Installation environment

1. Temperature: 10 - 32.5°C/50 - 90.5°F
2. Humidity: 20 - 80%RH
3. Power supply: 120 V AC, 7.1 A
220 - 240 V AC, 3.8 A
4. Power source frequency: 50 Hz ±0.3%/60 Hz ±0.3%
5. Installation location
 - Avoid direct sunlight or bright lighting. Ensure that the photoconductor will not be exposed to direct sunlight or other strong light when removing paper jams.
 - Avoid extremes of temperature and humidity, abrupt ambient temperature changes, and hot or cold air directed onto the machine.
 - Avoid dust and vibration.
 - Choose a surface capable of supporting the weight of the machine.
 - Place the machine on a level surface (maximum allowance inclination: 1°).
 - Avoid air-borne substances that may adversely affect the machine or degrade the photoconductor, such as mercury, acidic or alkaline vapors, inorganic gasses, NOx, SOx gases and chlorine-based organic solvents.
 - Select a room with good ventilation.
6. Allow sufficient access for proper operation and maintenance of the machine.
 - Machine front: 50 mm/19¹¹/₁₆" Machine rear: 40 mm/15³/₄"
 - Machine right: 25 mm/9⁷/₈" Machine left: 25 mm/9⁷/₈"
 - Machine above: 30 mm/11¹³/₁₆"

1-3-1 Unpacking and installation

(1) Installation procedure



Unpack.

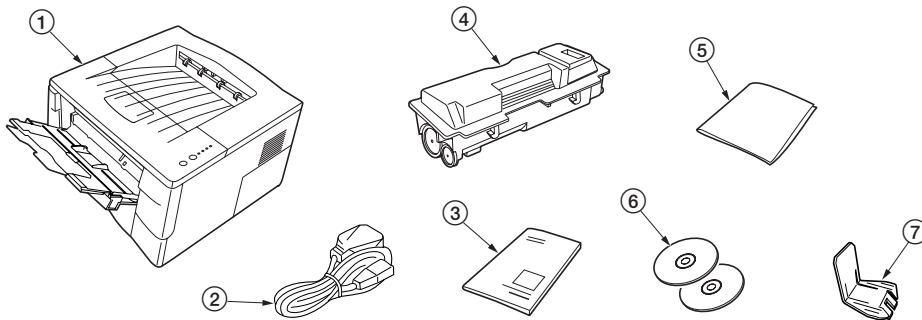
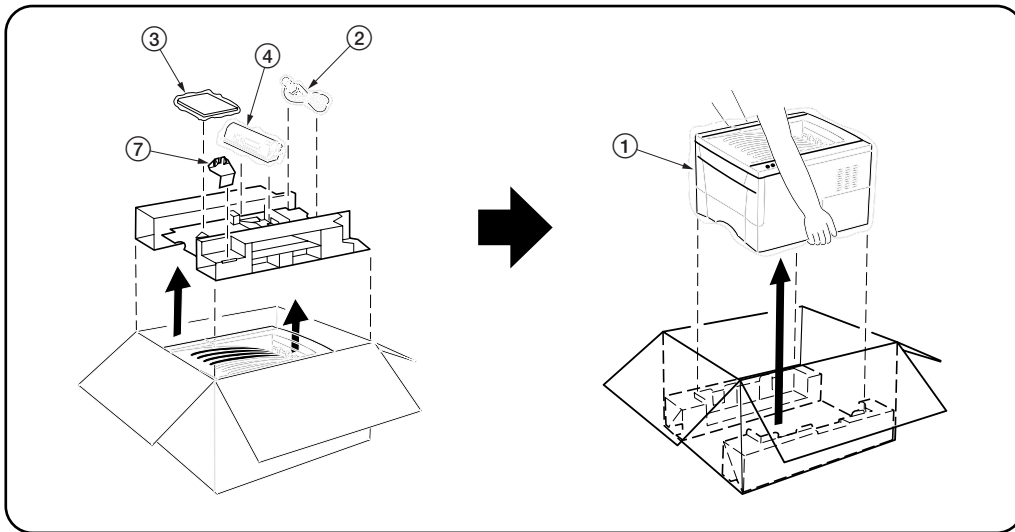


Figure 1-3-1 Unpacking

- ① Printer
- ② Power cord
- ③ Installation guide
- ④ Toner container
- ⑤ Cleaning cloth
- ⑥ CD-ROMs
- ⑦ Extension tray [For U.S.A only]

Remove the tape and protective packing

1. Remove the two tape.

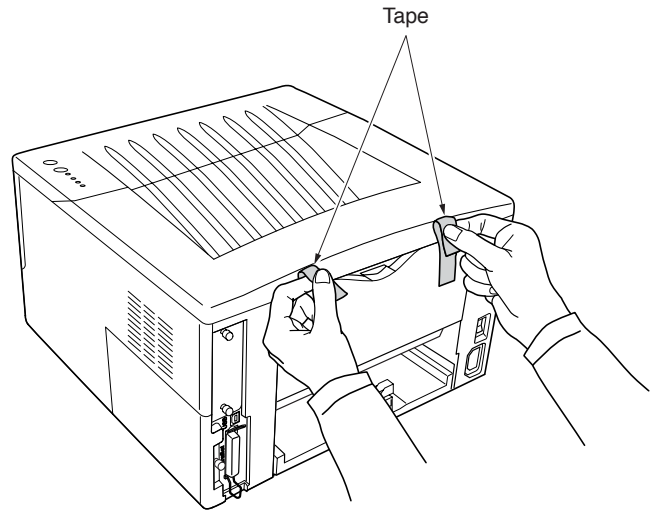


Figure 1-3-2

2. Pull the cassette out of the printer.
3. Remove the protective packing from inside the cassette.

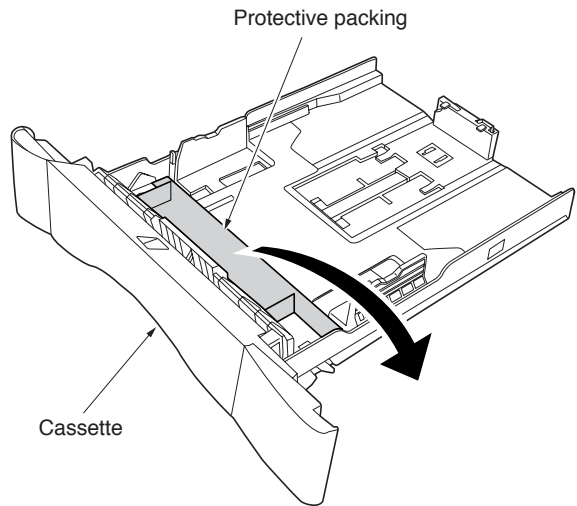


Figure 1-3-3

Install a toner container.

1. Open the front top cover.
2. Move the lock lever until it is in its unlocked position (marked "UNLOCK").

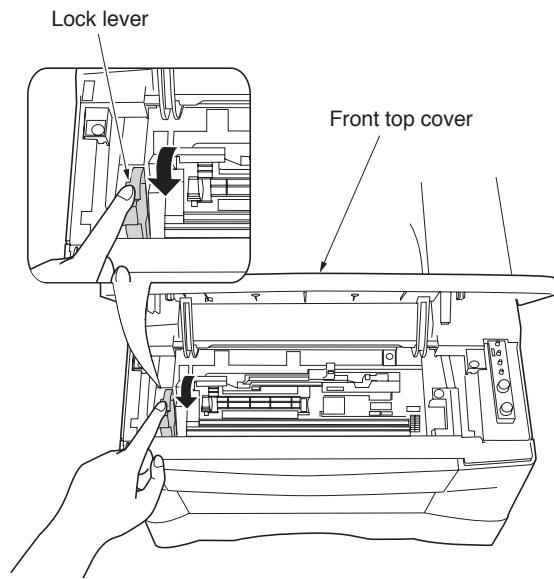


Figure 1-3-4

3. Shake the toner container horizontally back and forth five or six times so that the toner inside of it becomes evenly distributed.

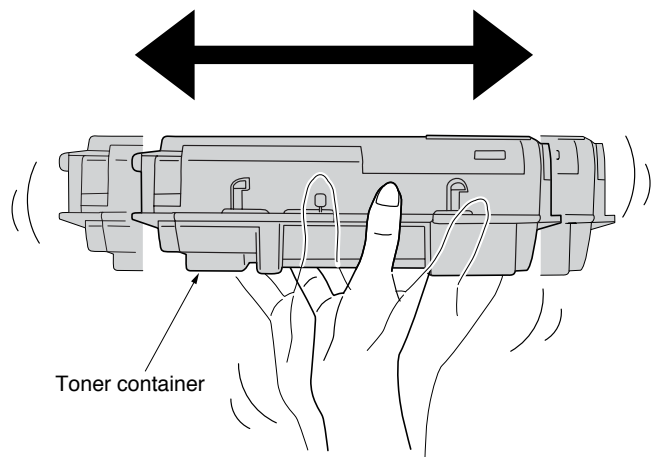


Figure 1-3-5

4. Remove the orange protective seal.

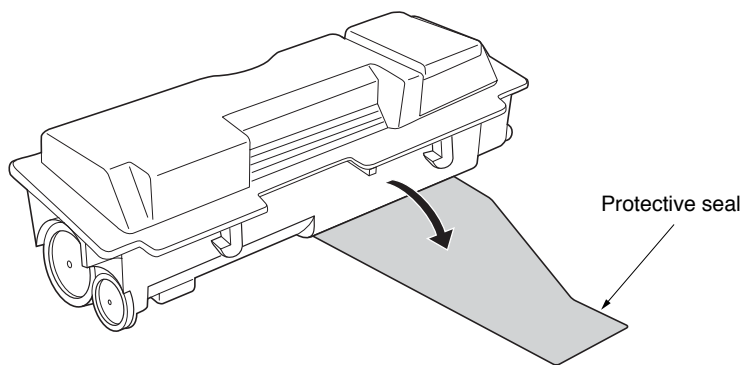


Figure 1-3-6

5. Set the toner container into the process unit.

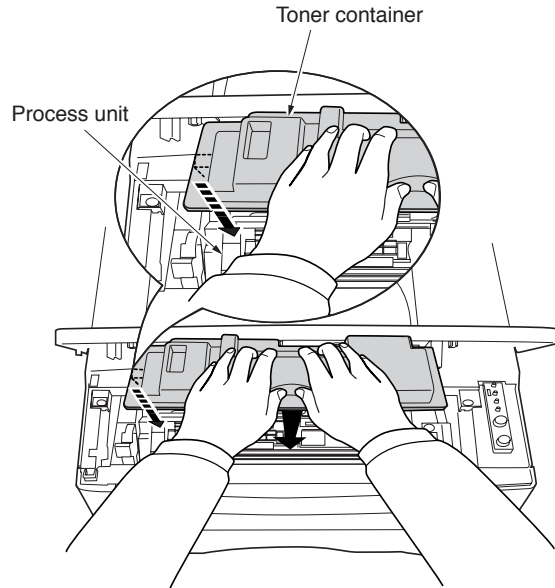


Figure 1-3-7

6. Push in on the areas of the toner container marked "PUSH HERE" until the container clicks into place in the process unit.

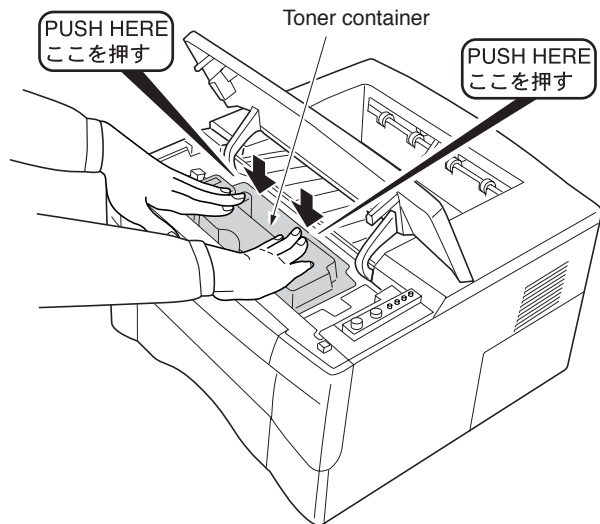


Figure 1-3-8

7. Push the lock lever back into its locked position.
8. Close the front top cover.

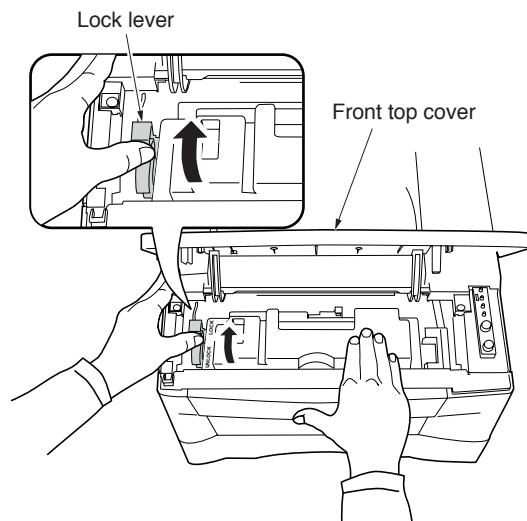


Figure 1-3-9

Connect the printer cable and power cord.

1. Connect the printer cable (parallel or USB).

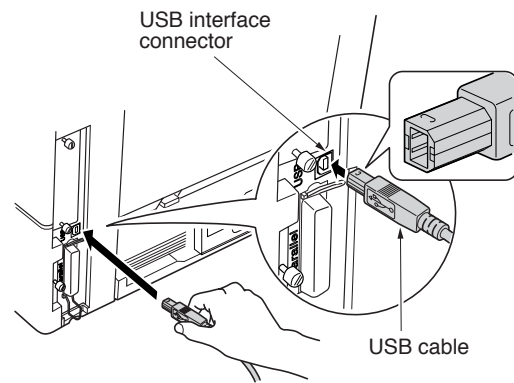
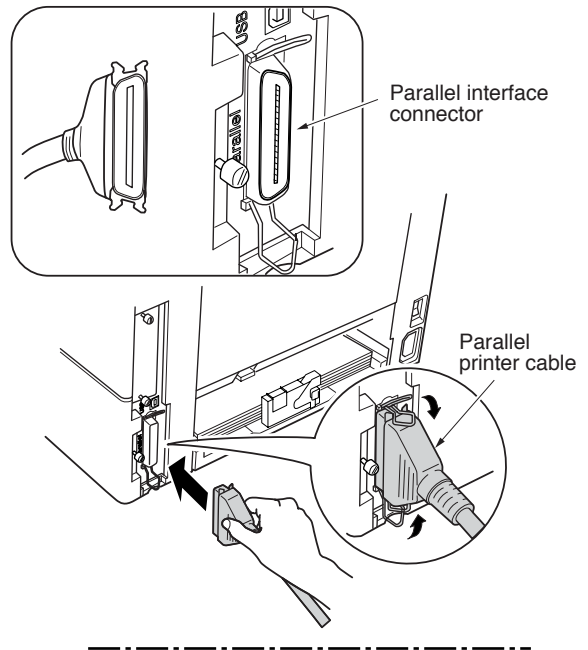


Figure 1-3-10

2. Connect the power cord.

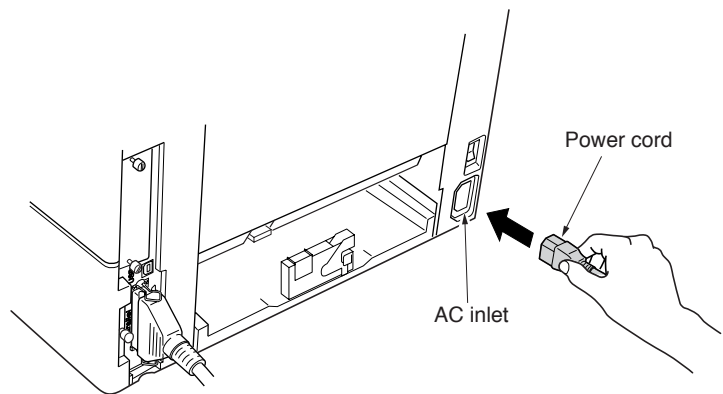


Figure 1-3-11

Load paper.

1. Pull the cassette out of the copier.
2. Set the paper in the cassette.

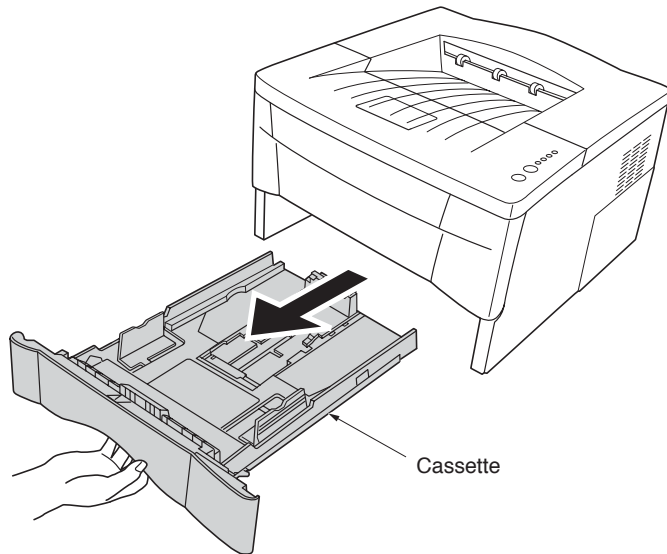


Figure 1-3-12

Initializing the printer and make test print.

1. Turn on the printer's power switch. Upon turning on the power, the printer's 4 indicators flash in sequence until printer initialization is complete, then the indicator ([on line]) lights steadily.
2. The printer can print two different types of status page standard and service-purpose. A service-purpose status page contains more detailed information about printer settings than a standard status page.

- To print a standard status page, press the GO key for at least 3 seconds and the indicators light in sequence from top to bottom.
- To print a service-purpose status page, press the GO key for more than 10 seconds and the indicators light in sequence twice from top to bottom.

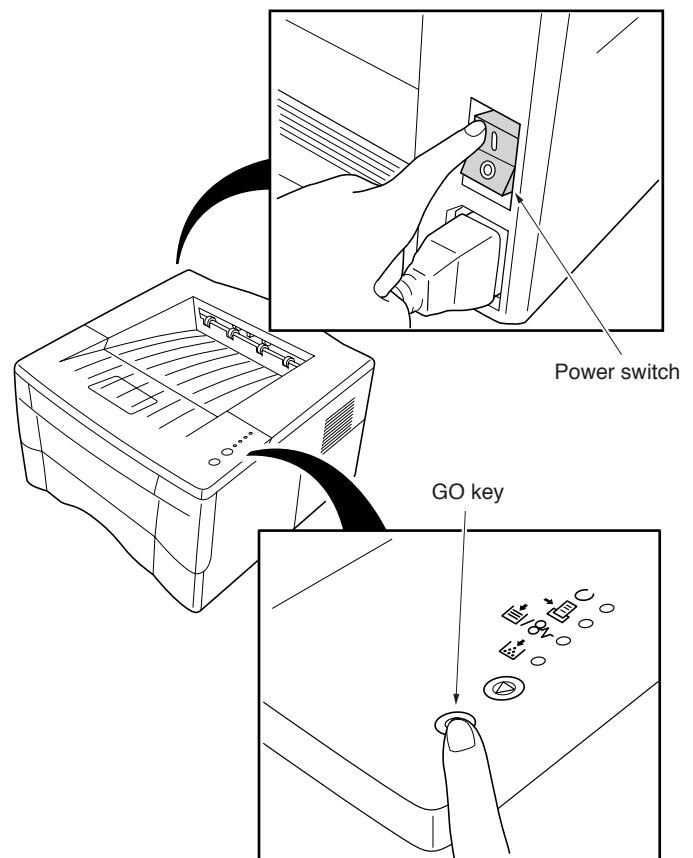


Figure 1-3-13

Completion of machine installation.

1-3-2 Installing the expanding memory (option)

The main board of the printer is equipped with one socket for memory expansion. Expansion memory is available in the form of DIMM (Dual In-line Memory Module).

CAUTION

Take precautions that no foreign substances such as metal chips or liquid get inside the printer during the installation process. Operation of the printer during the presence of a foreign substance may lead to fire or electric shock.

WARNING

Turn the printer's power switch off. Unplug the printer's power cable.

Procedure

1. Remove the one screw and then remove the memory cover.
2. Open the clips on both ends of the DIMM socket.
3. Insert the DIMM into the DIMM socket so that the notches on the DIMM align with the corresponding protrusions in the slot.
4. Close the clips on the DIMM slot to secure the DIMM.

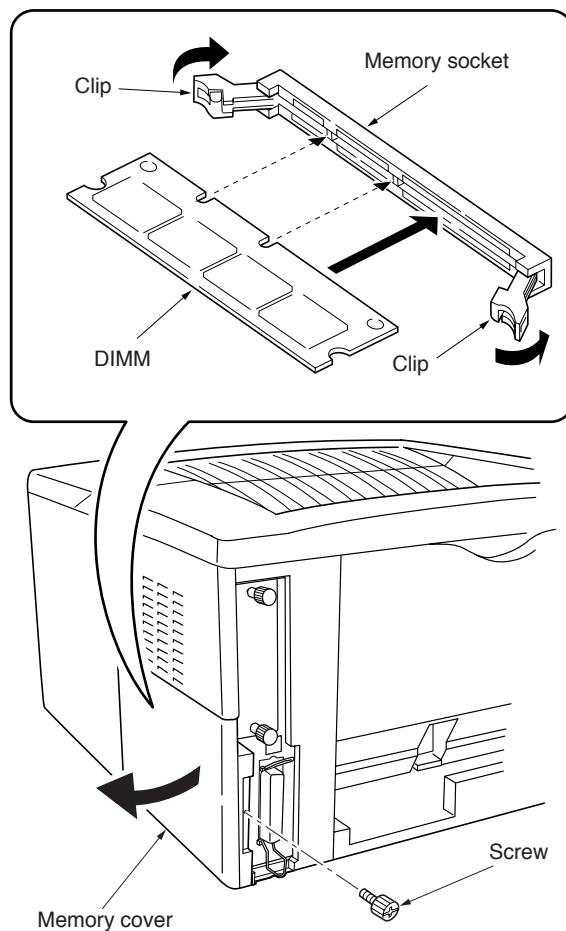


Figure 1-3-14 Inserting the DIMM

1-3-3 Installing the memory card (option)

The main board of the printer is equipped with one slot for memory card.

CAUTION

Take precautions that no foreign substances such as metal chips or liquid get inside the printer during the installation process. Operation of the printer during the presence of a foreign substance may lead to fire or electric shock.

WARNING

Turn the printer's power switch off. Unplug the printer's power cable and disconnect the printer from the computer or the network. Never insert or remove a memory card while the printer power is ON.

Failure to turn the power switch OFF will immediately halt the printer with a [Memory card err20] message (this message may not always appear). It also could result in any damage to the printer's electronic parts or the memory card. Turn the power switch ON again to restart the printer.

Procedure

1. Remove the two screws and then remove the option interface slot cover (or network interface card/serial interface board).
2. Insert the memory card in the slot. Push it in all the way.
3. Secure the option interface slot cover (or network interface card/serial interface board) by using two screws.

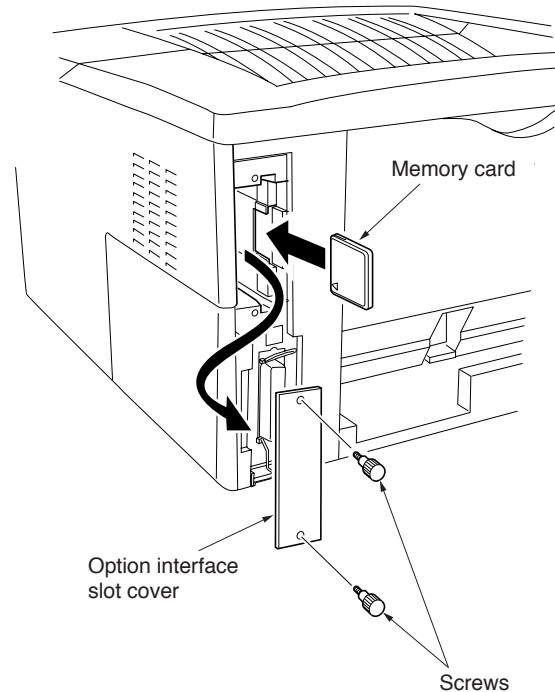


Figure 1-3-15 Inserting the memory card

1-3-4 Installing the network interface card (option)

If the serial interface board kit is installed, remove it to use the network interface card.

CAUTION

Take precautions that no foreign substances such as metal chips or liquid get inside the printer during the installation process. Operation of the printer during the presence of a foreign substance may lead to fire or electric shock.

WARNING

Turn the printer's power switch off. Unplug the printer's power cable.

Procedure

1. Remove the two screws and then remove the option interface slot cover (or the serial interface board).
2. Insert the network interface card in the slot. Push it in all the way.
3. Secure the network interface card by using two screws.

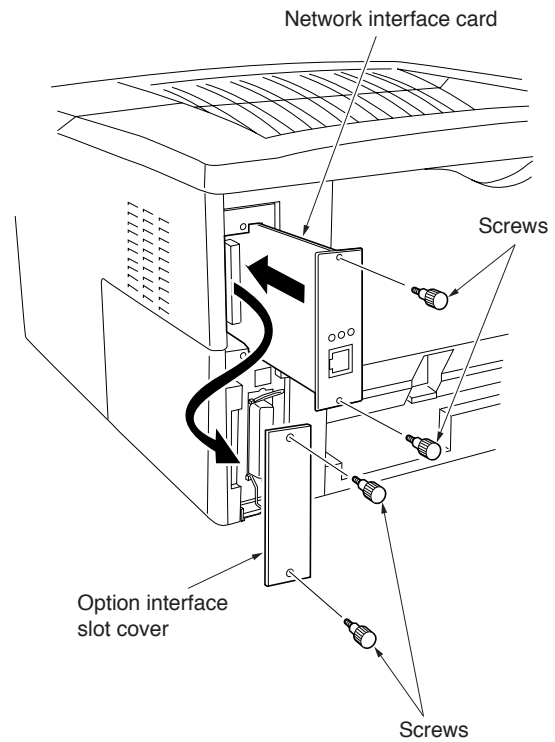


Figure 1-3-16 Inserting the network interface card

1-4-1 Paper misfeed detection

(1) Paper misfeed indication

If a paper jam occurs while printing, the printer notifies it by the following combination of the four indicators. Remove the jammed paper as described below. After removal, open and close the top cover once to initialize the jam sensing.

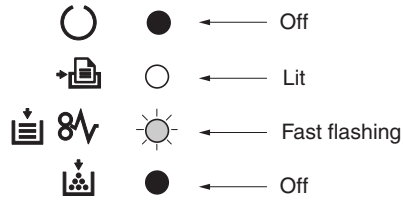


Figure 1-4-1 Paper misfeed indication

(2) Paper misfeed detection

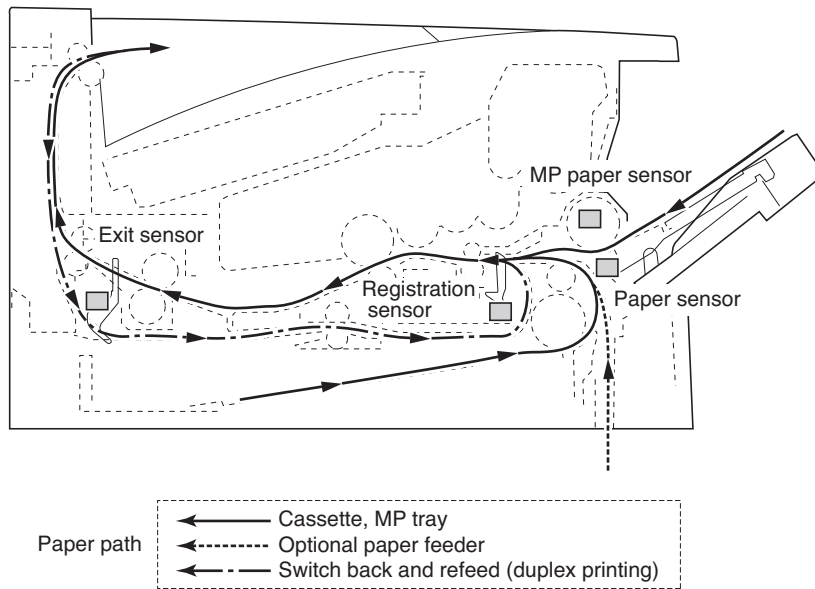


Figure 1-4-2

1-4-2 Self-diagnosis

(1) Self-diagnostic function

Service errors are represented by the alternating flashing of the indicators (LEDs). Each error is represented by the notation of four digits code and can be monitored on the Remote Operation Panel utility. e.g. Call service 2000 is for the main motor error.

(2) Self diagnostic inidication

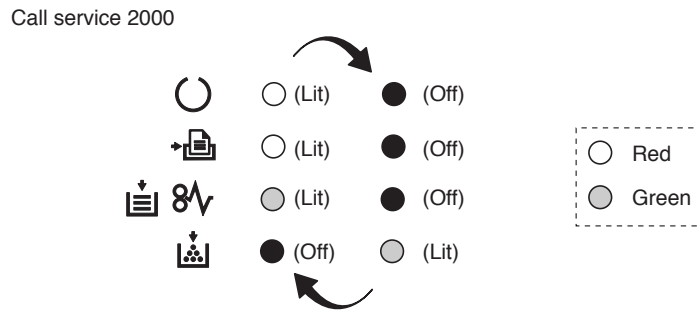
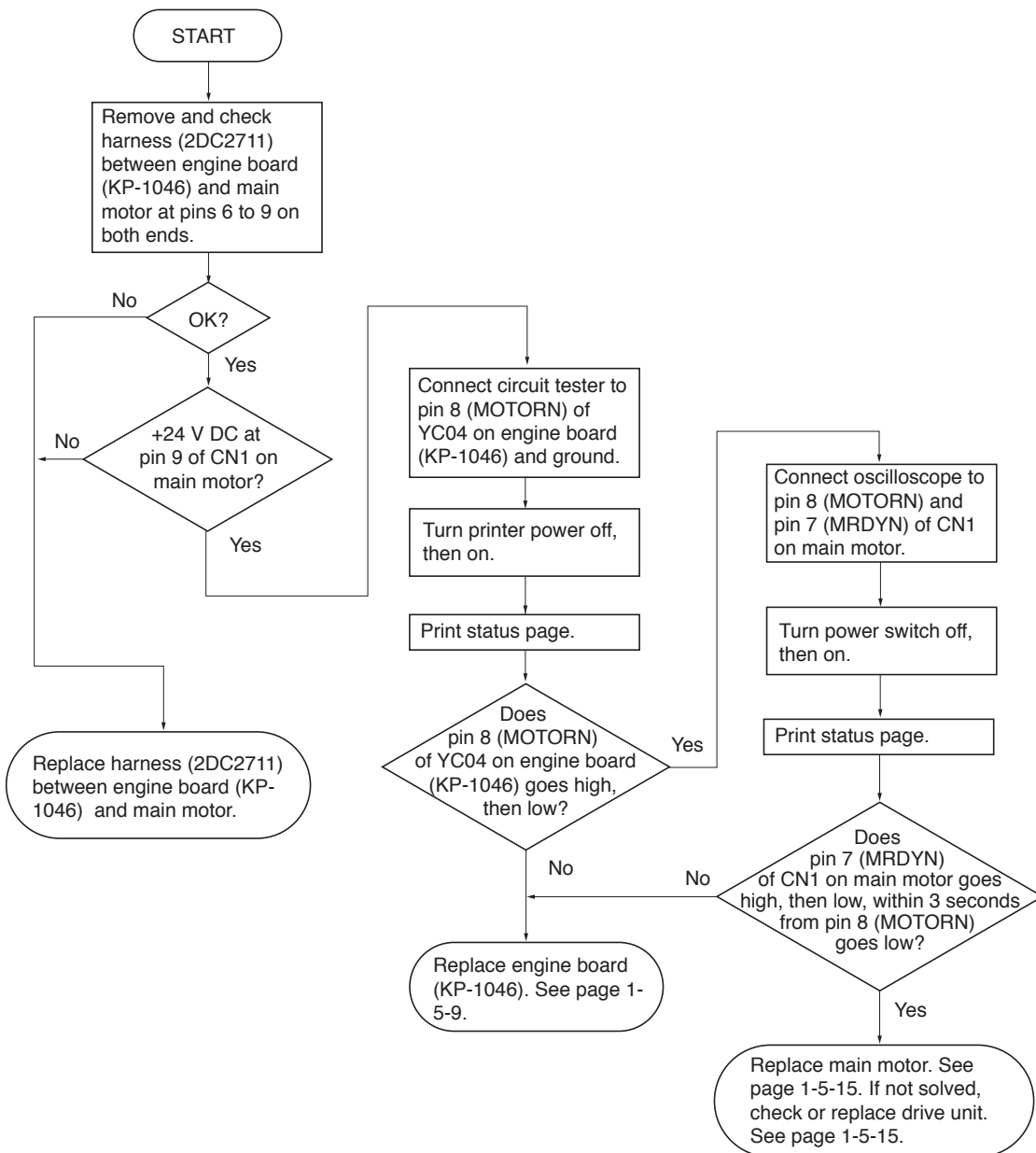
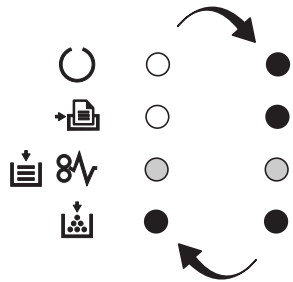


Figure 1-4-1 Self diagnostic inidication

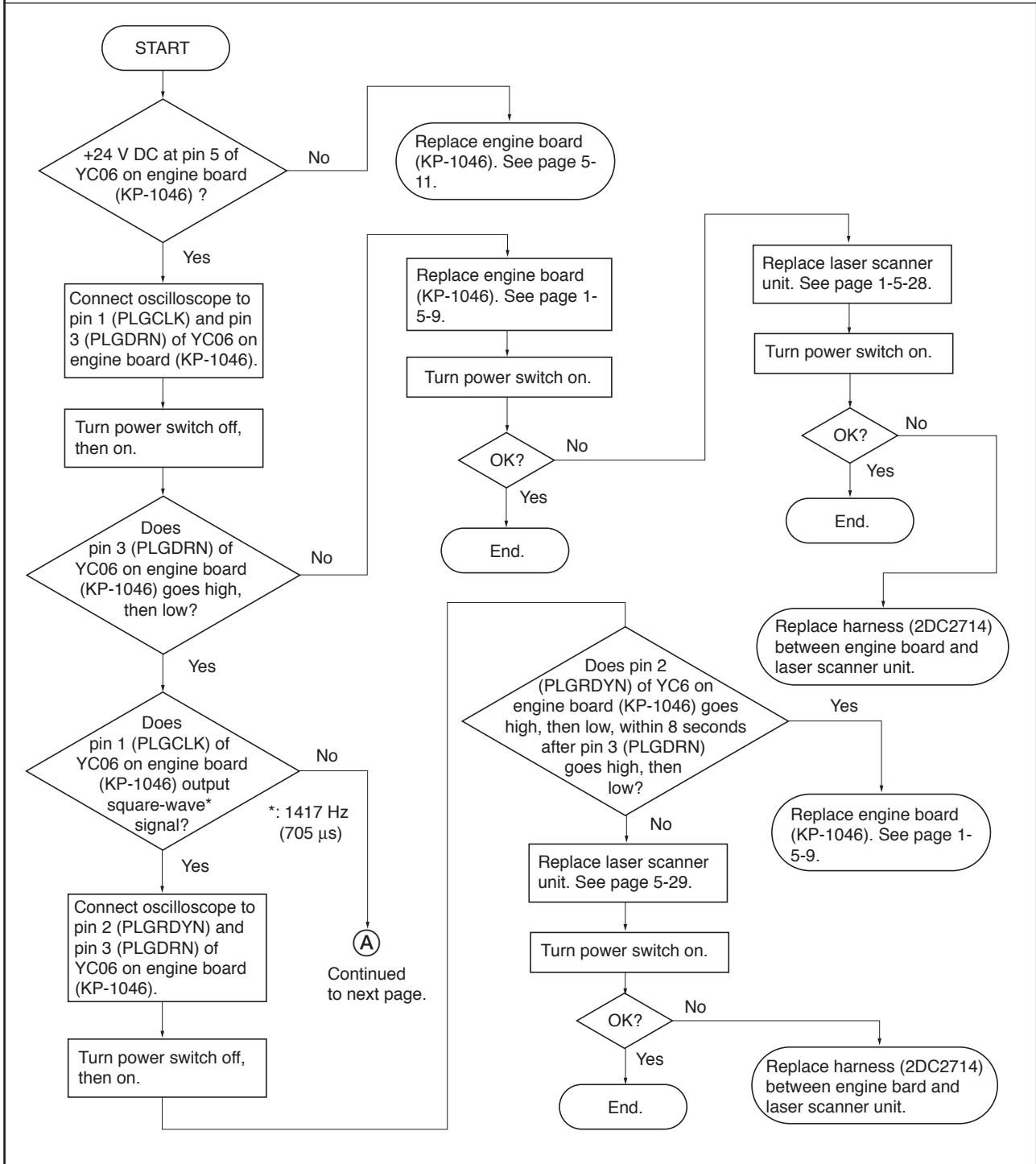
Code	Error indications	Contents
2000		Main motor error

Check procedures/corrective measures

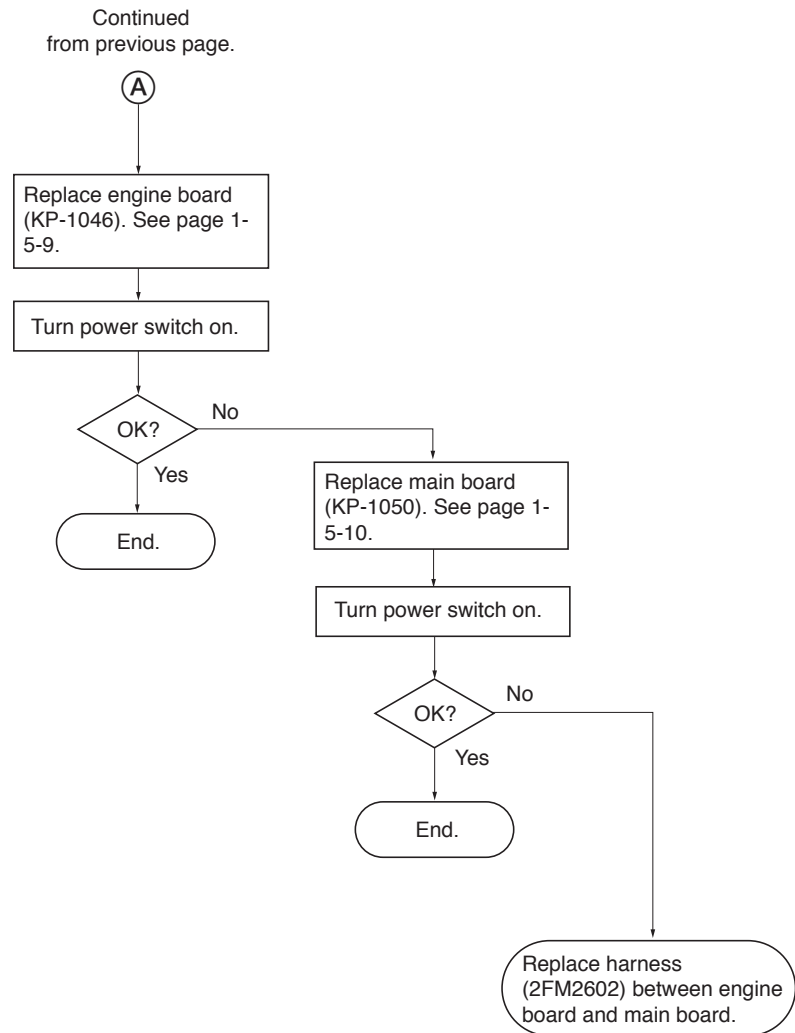


Code	Error indications	Contents
4000		Laser scanner unit [Polygon motor] error

Check procedures/corrective measures

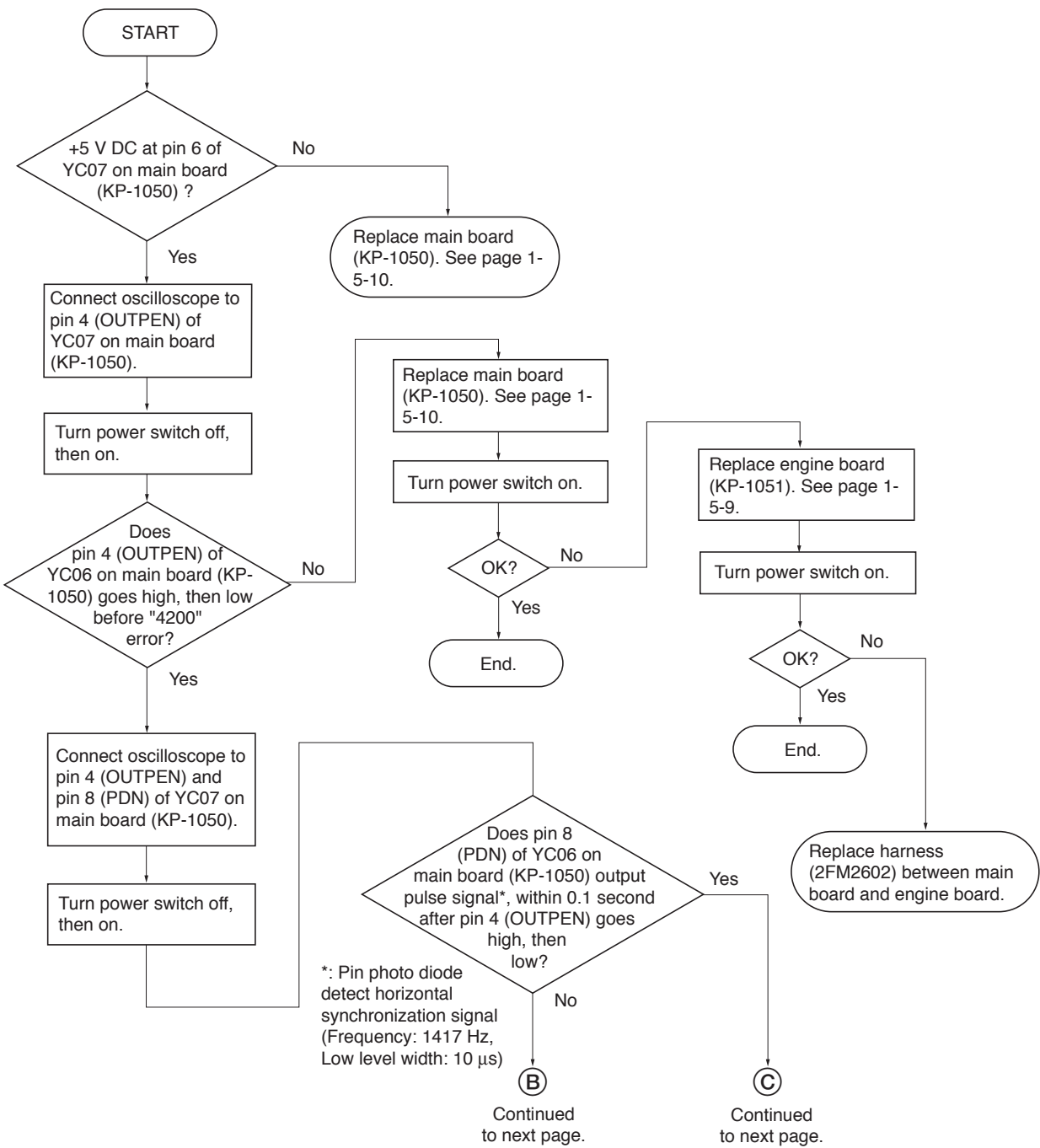


Check procedures/corrective measures



Code	Error indications	Contents
4200		Laser scanner unit [Pin photo diode] error

Check procedures/corrective measures



Check procedures/corrective measures

Continued
from previous page.

Ⓑ

Replace laser scanner
unit. See page 1-5-28.Replace main board
(KP-1050). See page 1-
5-10.

Turn power switch on.

OK?
No
YesReplace engine board
(KP-1046). See page 1-
5-9.

Turn power switch on.

OK?
Yes
No

End.

Continued
from previous page.

Ⓒ

Replace main board
(KP-1050). See page 1-
5-10.

Turn power switch on.

OK?
No
Yes

End.

Replace engine board
(KP-1046). See page 1-
5-9.OK?
No
Yes

End.

Replace harness
(2FM2602) between main
board and engine board.Replace harness
(2FM2602) between main
board and engine board.Replace harness
(2DC2714) between
engine board and laser
scanner unit.

Turn power switch on.

OK?
Yes
NoReplace harness
(2DC2714) between
main board and laser
scanner unit.

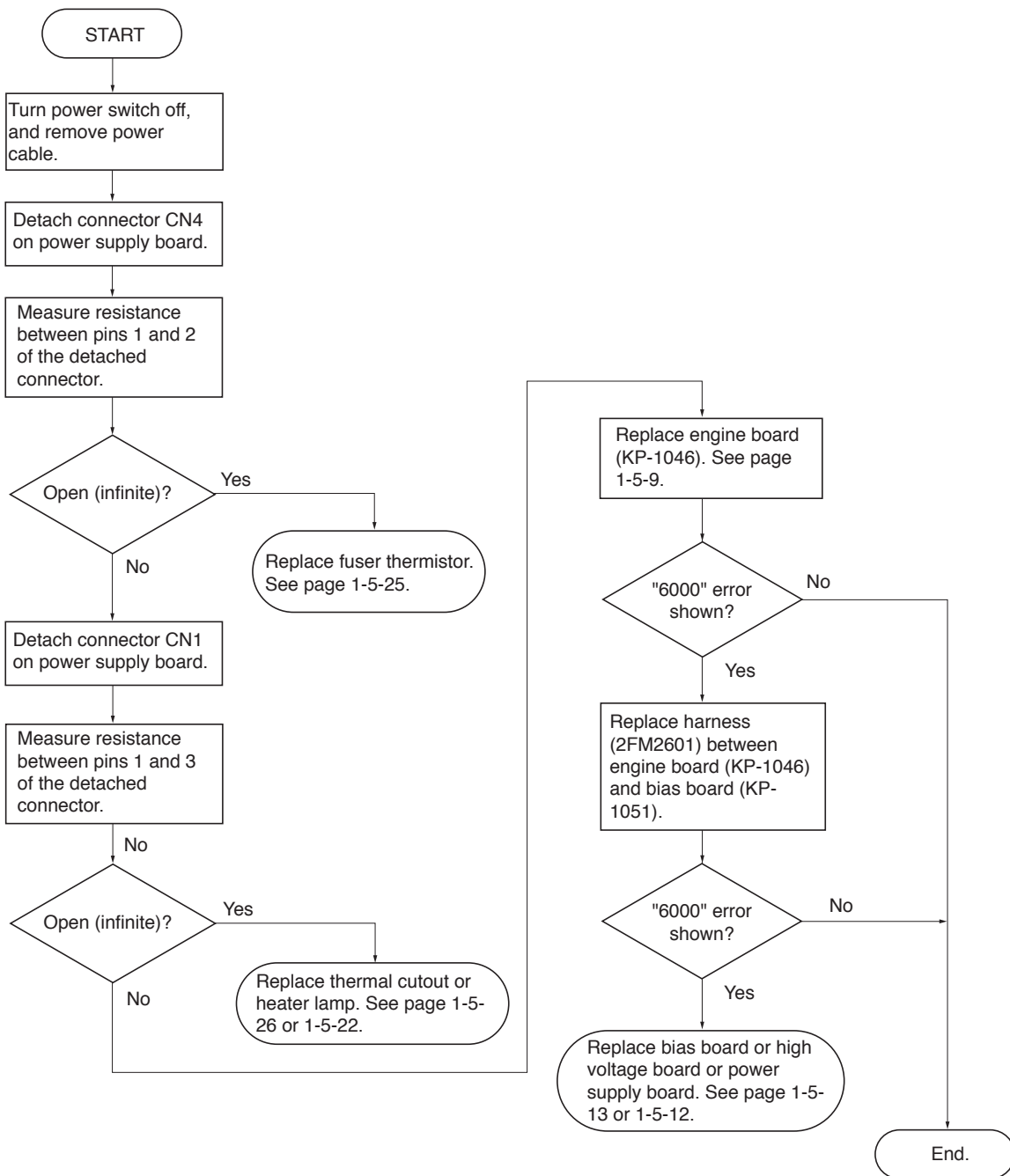
Turn power switch on.

OK?
Yes
No

End.

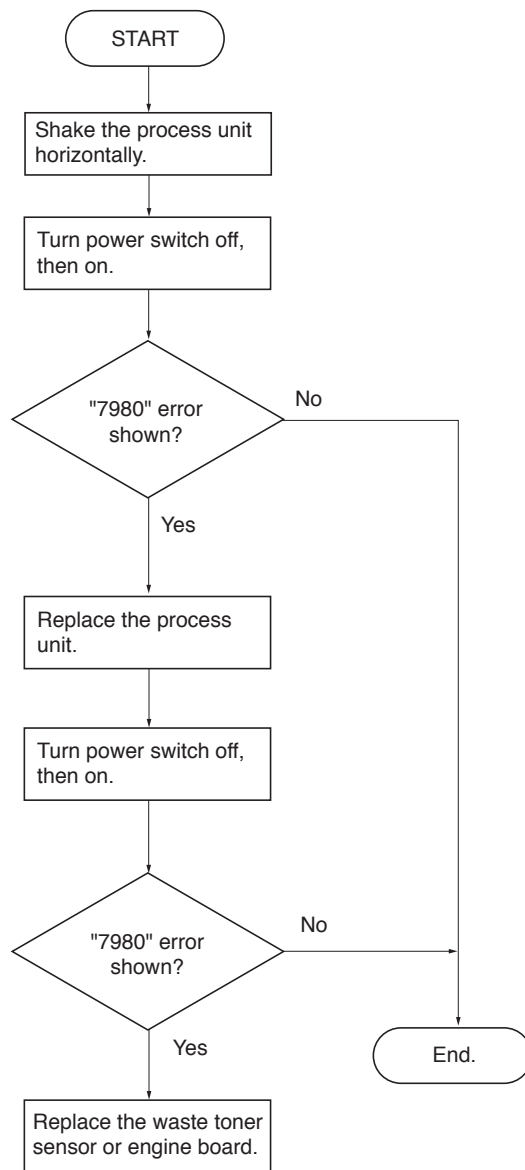
Code	Error indications	Contents
6000		Fuser unit error

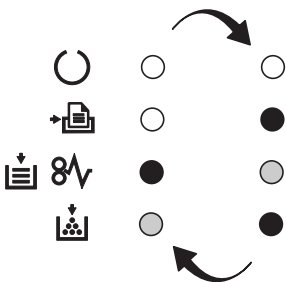
Check procedures/corrective measures



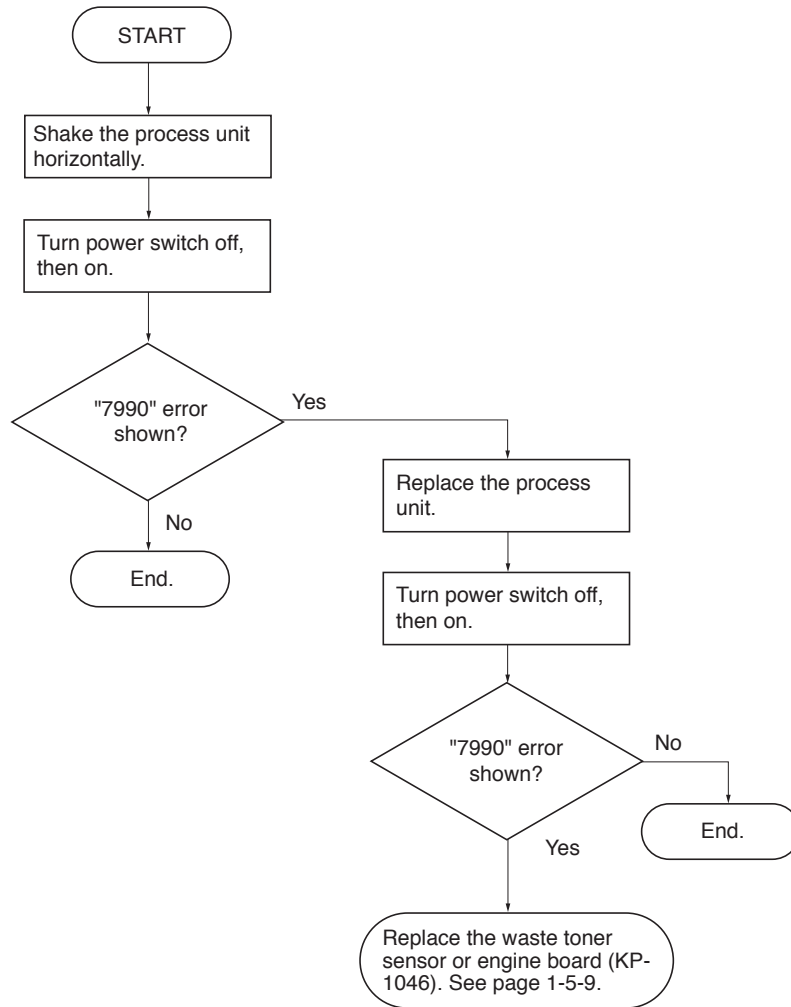
Code	Error indications	Contents
7980		Waste toner full [Total page count less than 100,000 pages of printing]

Check procedures/corrective measures



Code	Error indications	Contents
7990		Waste toner full [Total page count more than 100,000 pages of printing]

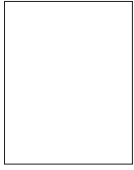
Check procedures/corrective measures



Code	Error indications	Contents	Check procedures/corrective measures
F010		<p>Controller checksum error</p>	<p>Turn power switch off, then on. If not solved, replace main board (See page 1-5-10).</p>
F020		<p>Controller RAM read/write error</p>	<p>Remove the expansion memory (DIMM). Turn power switch off, then on. If not solved, replace main board. If solved, replace the expanding memory (See pages 1-5-10 and 1-3-8).</p>
F030		<p>Controller system error</p>	<p>Turn power switch off, then on. If not solved, replace main board (See page 1-5-10).</p>
F040		<p>Communication error</p>	<p>Turn power switch off, then on. If not solved, replace engine board (See page 1-5-9) or main board (See page 1-5-10).</p>
F050		<p>Engine ROM checksum error</p>	<p>Turn power switch off, then on. If not solved, replace engine board (See page 5-12).</p>

1-4-3 Image formation problems

(1) No image appears (entirely white).



See page 1-4-13

(2) No image appears (entirely black).



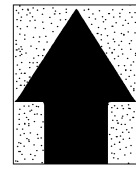
See page 1-4-13

(3) Image is too light.



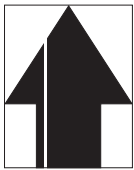
See page 1-4-13

(4) Background is visible.



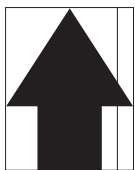
See page 1-4-14

(5) A white line appears longitudinally.



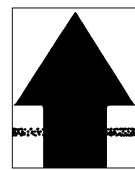
See page 1-4-14

(6) A black line appears longitudinally.



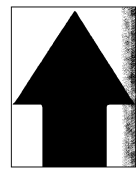
See page 1-4-15

(7) A black line appears laterally.



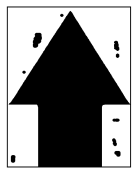
See page 1-4-15

(8) One side of the copy image is darker than the other.



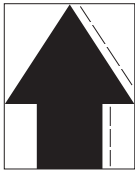
See page 1-4-15

(9) Black dots appear on the image.



See page 1-4-16

(10) Image is blurred.



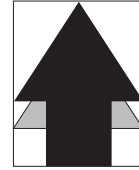
See page 1-4-16

(11) Paper creases.



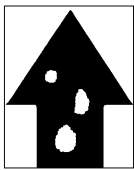
See page 1-4-16

(12) Offset occurs.



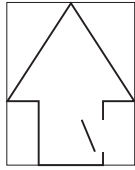
See page 1-4-17

(13) Image is partly missing.



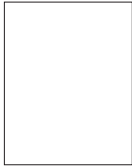
See page 1-4-17

(14) Fixing is poor.



See page 1-4-17

(1) No image appears
(entirely white).



Causes

1. Defective process unit installation.
2. No transfer charging.
3. Defective laser scanner unit.

Causes	Check procedures/corrective measures
1. Defective process unit installation.	Check that the process unit is inserted correctly.
2. No transfer charging.	Check the transfer bias output on the high voltage board. This requires removal of the left cover and the test equipment. Replace the high voltage board if high voltage potential is not available on the board (See page 1-5-12).
3. Defective laser scanner unit.	The scanner components within the scanner may be disordered. Replace the laser scanner unit if necessary (See page 1-5-28).

(2) No image appears
(entirely black).



Causes

1. No main charging.

Causes	Check procedures/corrective measures
1. No main charging.	
A. Broken main charger wire.	Replace the process unit.
B. Leaking main charger housing.	Replace the process unit.
C. The connector terminals of the high voltage board make poor contact.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
D. Defective engine board (KP-1046).	Replace the engine board (KP-1046) and check for correct operation.
E. Defective high voltage board.	Replace the high voltage board and check for correct operation.

(3) Image is too
light.

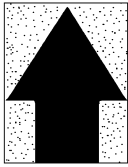


Causes

1. Insufficient toner.
2. Deteriorated developer.
3. Dirty or deteriorated drum.

Causes	Check procedures/corrective measures
1. Insufficient toner.	If the add toner indicator lights, replace the toner container.
2. Deteriorated developer.	Replace the process unit.
3. Dirty or deteriorated drum.	Replace the process unit.

(4) Background is visible.



Causes

1. Diccative print density setting.
2. Diccative surface potential of the drum.
3. Defective developing roller.

Causes	Check procedures/corrective measures
1. Diccative print density setting.	Open the printer top cover and check that the process unit is correctly seated. Poor contact main charger terminal between the process unit and the printer main unit.
2. Diccative surface potential of the drum.	The drum potential should be approximately 400 V. This may vary depending on production lots. Measurement is possible only by using the jig and tool specifically designed for this purpose. The drum unit will have to be replaced if it bears values far out of the allowable range.
3. Defective developing roller.	If a process unit which is known to work normally is available for check, replace the current process unit in the printer with the normal one. If the symptom disappears, replace the process unit with a new one.

(5) A white line appears longitudinally.

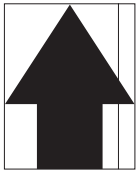


Causes

1. Dirty or flawed main charger wire.
2. Foreign matter in the developing section.
3. Flawed drum.

Causes	Check procedures/corrective measures
1. Dirty or flawed main charger wire.	Replace the process unit.
2. Foreign matter in the developing section.	Replace the process unit.
3. Flawed drum.	Replace the process unit.

(6) A black line appears longitudinally.

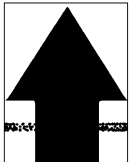


Causes

1. Contaminated main charger wire.
2. Dirty or flawed drum.
3. Deformed or worn cleaning blade.
4. Deceptive magnet roller (in the process unit).

Causes	Check procedures/corrective measures
1. Contaminated main charger wire.	Clean the main charger wire by pulling the green colored cleaning knob in and out several times.
2. Dirty or flawed drum.	Replace the process unit.
3. Deformed or worn cleaning blade.	Replace the process unit.
4. Deceptive magnet roller (in the process unit).	Replace the process unit.

(7) A black line appears laterally.

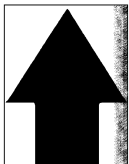


Causes

1. Defective process unit's grounding
2. Flawed drum.
3. Dirty developing section.
4. Leaking main charger housing.

Causes	Check procedures/corrective measures
1. Defective process unit's grounding.	The drum axle in the process unit and its counter part, the grounding tab in the printer, must be in a good contact. If necessary, apply a small amount of electro-conductive grease onto the tab.
2. Flawed drum.	Replace the process unit.
3. Dirty developing section.	Replace the process unit.
4. Leaking main charger housing.	Replace the process unit.

(8) One side of the copy image is darker than the other.

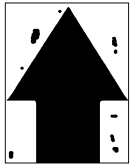


Causes

1. Dirty main charger wire.

Causes	Check procedures/corrective measures
1. Dirty main charger wire.	Replace the process unit.

(9) Black dots appear on the image.

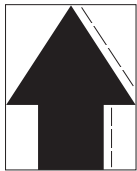


Causes

1. Dirty or flawed drum.
2. Dirty contact glass.
3. Deformed or worn cleaning blade.

Causes	Check procedures/corrective measures
1. Dirty or flawed drum.	Replace the process unit.
2. Dirty contact glass.	Clean the contact glass.
3. Deformed or worn cleaning blade.	Replace the process unit.

(10) Image is blurred.

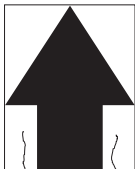


Causes

1. Deformed press roller.
2. Paper conveying section drive problem.

Causes	Check procedures/corrective measures
1. Deformed press roller.	Replace the press roller (see page 1-6-26).
2. Paper conveying section drive problem.	Check the gears and belts and, if necessary, grease them.

(11) Paper creases.

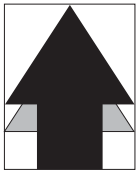


Causes

1. Paper curled.
2. Paper damp.

Causes	Check procedures/corrective measures
1. Paper curled.	Check the paper storage conditions.
2. Paper damp.	Check the paper storage conditions.

(12) Offset occurs.

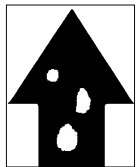


Causes

1. Defective cleaning blade.

Causes	Check procedures/corrective measures
1. Defective cleaning blade.	Replace the process unit.

(13) Image is partly missing.

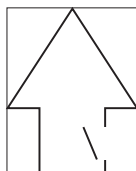


Causes

1. Paper damp.
2. Paper creased.
3. Flawed drum.

Causes	Check procedures/corrective measures
1. Paper damp.	Check the paper storage conditions.
2. Paper creased.	Replace the paper.
3. Flawed drum.	Replace the process unit.

(14) Fixing is poor.



Causes

1. Wrong paper.
2. Flawed press roller.

Causes	Check procedures/corrective measures
1. Wrong paper.	Check if the paper meets specifications.
2. Flawed press roller.	Replace the press roller (see page 1-6-26).

1-4-4 Electrical problems

Problem	Causes	Check procedures/corrective measures
(1) The machine does not operate when the power switch is turned on.	No electricity at the power outlet.	Measure the input voltage.
	The power cord is not plugged in properly.	Check the contact between the power plug and the outlet.
	The front cover is not closed completely.	Check the front cover.
	Broken power cord.	Check for continuity. If none, replace the cord.
	Defective power switch.	Check for continuity across the contacts. If none, replace the power switch.
	Blown fuse in the power supply board.	Check for continuity. If none, remove the cause of blowing and replace the fuse.
	Defective interlock switch.	Check for continuity across the contacts of switch. If none, replace the switch.
	Defective power supply board.	With AC present, check for 24 V DC at CN2-12, 2-13 and 5 V DC at CN2-1, 2-2 on the power supply board. If none, replace the power supply board.
(2) The main motor does not operate.	Poor contact in the main motor connector terminals.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
	Broken main motor gear.	Check visually and replace the main motor if necessary.
	Defective main motor.	Run maintenance item U030 and check if the main motor operates and replace the main motor if necessary.
	Defective engine board (KP-1046).	Replace the engine board (KP-1046).
(3) Cooling fan does not operate.	Broken Cooling fan coil.	Check for continuity across the coil. If none, replace Cooling fan.
	Poor contact in the Cooling fan connector terminals.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
(4) The feed clutch does not operate.	Broken feed clutch coil.	Check for continuity across the coil. If none, replace the feed clutch.
	Poor contact in the feed clutch connector terminals.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
	Defective engine board (KP-1046).	Replace the engine board (KP-1046).
(5) The MP feed clutch does not operate.	Broken MP feed clutch coil.	Check for continuity across the coil. If none, replace the MP feed clutch.
	Poor contact in the MP feed clutch connector terminals.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
	Defective engine board (KP-1046).	Replace the engine board (KP-1046).

Problem	Causes	Check procedures/corrective measures
(6) The registration clutch does not operate.	Broken registration clutch coil.	Check for continuity across the coil. If none, replace the registration clutch.
	Poor contact in the registration clutch connector terminals.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
	Defective engine board (KP-1046).	Replace the engine board (KP-1046).
(7) The eraser lamp does not turn on.	Poor contact in the eraser lamp connector terminals.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
	Defective eraser lamp.	Check for continuity. If none, replace the eraser lamp.
	Defective engine board (KP-1046).	If the eraser lamp turns on when YC14-2 on the engine board (KP-1046) is held low, replace the engine board (KP-1046).
(8) The heater lamp does not turn on.	Broken wire in heater lamp.	Check for continuity across heater lamp. If none, replace the heater lamp.
	Thermal cutout triggered.	Check for continuity across thermal cutout. If none, remove the cause and replace the thermal cutout.
(9) The heater lamp does not turn off.	Broken heater lamp wire.	Measure the resistance. If it is $\infty\Omega$, replace the thermistor.
	Dirty sensor part of the thermistor.	Check visually and clean the thermistor sensor parts.
(10) Main charging is not performed.	Broken main charger wire.	See page 1-4-14.
	Leaking main charger housing.	
	Poor contact in the high voltage board connector terminals.	
	Defective engine board (KP-1046).	
	Defective high voltage board.	
(11) Transfer charging is not performed.	Poor contact in the high voltage board connector terminals.	See page 1-4-14.
	Defective engine board (KP-1046).	
	Defective high voltage board.	
(12) A paper jam in the paper feed or exit section is indicated when the power switch is turned on.	A piece of paper torn from copy paper is caught around registration sensor or exit sensor.	Check and remove if any.
	Defective registration sensor.	Replace registration sensor if indication of the corresponding sensor is not light.
	Defective exit sensor.	Replace exit sensor if indication of the corresponding sensor is not light.

Problem	Causes	Check procedures/corrective measures
(13) The LED indicator requesting cover to be closed is displayed when the front cover is closed.	Poor contact in the connector terminals of interlock switch.	Reinsert the connector. Also check for continuity within the connector cable. If none, remedy or replace the cable.
	Defective interlock switch.	Check for continuity across switch. If there is no continuity when the switch is on, replace it.
(14) Others.	Wiring is broken, shorted or makes poor contact.	Check for continuity. If none, repair.
	Noise.	Locate the source of noise and remove.

1-4-5 Mechanical problems

Problem	Causes/check procedures	Corrective measures
(1) No primary paper feed.	Check if the surfaces of the feed roller and MP feed roller are dirty with paper powder.	Clean with isopropyl alcohol.
	Check if the feed roller and MP feed roller are deformed.	Check visually and replace any deformed rollers (see page 1-5-5, 1-5-6).
	Electrical problem with the feed clutch and MP feed clutch.	See pages 1-4-18.
(2) No secondary paper feed.	Check if the surfaces of the upper and lower registration rollers are dirty with paper powder.	Clean with isopropyl alcohol.
	Electrical problem with the registration clutch.	See page 1-4-19.
(3) Skewed paper feed.	Deformed feed roller or MP feed roller.	Repair or replace if necessary .
(4) Multiple sheets of paper are fed at one time.	Defective feed roller, MP feed roller or friction plate.	Check the drawer claw visually and correct or replace if necessary.
(5) Paper jams.	Check if the paper is curled.	Change the paper.
	Deformed guides along the paper conveying path.	Check visually and replace any deformed guides.
	Check if the contact between the upper and lower registration rollers is correct.	Check visually and remedy if necessary.
	Check if the press roller is extremely dirty or deformed.	Clean or replace the press roller.
	Check if the contact between the heat roller and its separation claws is correct.	Repair if any springs are off the separation claws.
(6) Abnormal noise is heard.	Check if the rollers and gears operate smoothly.	Grease the bearings and gears.
	Check if the following electromagnetic clutches are installed correctly: feed clutch, MP feed clutch and registration clutch.	Correct.

1-5-1 Precautions for assembly and disassembly

(1) Precautions

- Be sure to turn the power switch off and disconnect the power plug before starting disassembly.
- When handling PWBs (printed wiring boards), do not touch parts with bare hands. The PWBs are susceptible to static charge.
- Do not touch any PWB containing ICs with bare hands or any object prone to static charge.
- Use only the specified parts to replace the fixing unit thermal cutout. Never substitute electric wires, as the printer may be seriously damaged.
- Use the following circuit testers when measuring voltages:

Hioki 3200

Sanwa MD-180C

Sanwa YX-360TR

Beckman TECH300

Beckman DM45

Beckman 330*

Beckman 3030*

Beckman DM850*

Fluke 8060A*

Arlec DMM1050

Arlec YF1030C

* Capable of measuring RMS values.

1-5-2 Removing the process unit

1. Open the front top cover.
2. Open the front cover.
3. Lift the process unit together with the toner container out of the printer.

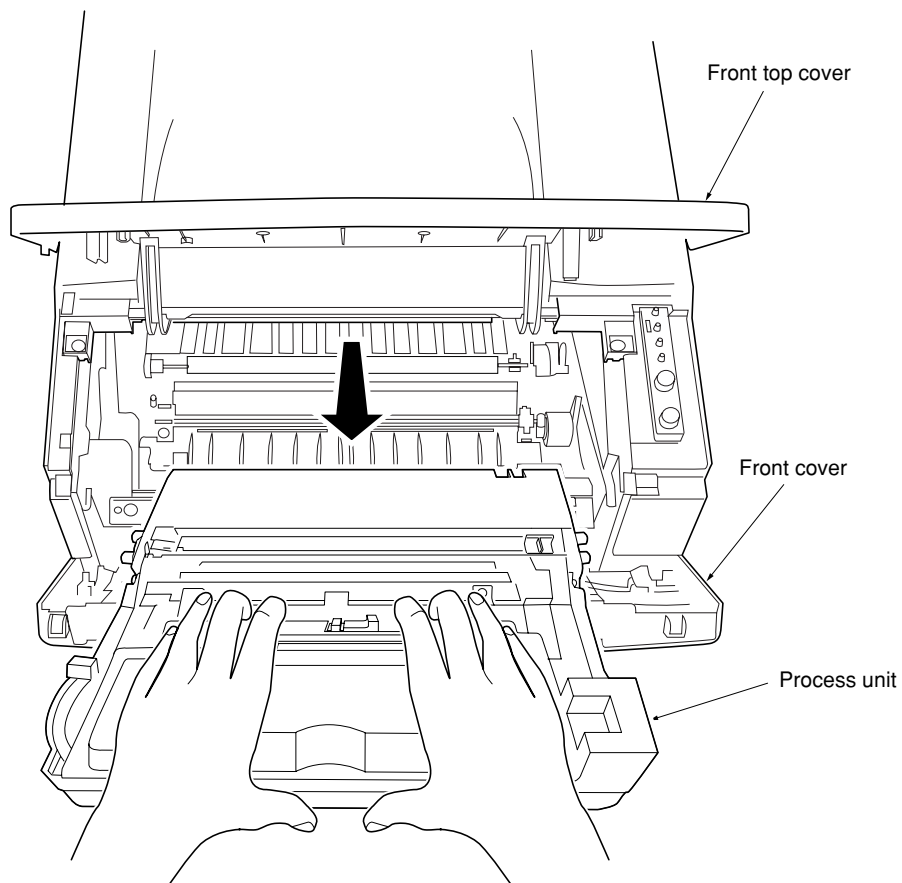


Figure 1-5-1 Removing the process unit

CAUTIONS

- After removing the process unit, seal it in the protective bag and place it on flat surface. Do not place the process unit in a dusty area.
- Do not give impact to the process unit.
- Do not place floppy disks near the process unit.

1-5-3 Removing the principal outer covers

(1) Removing the front top cover/face-down output tray

1. Open the front top cover.
2. Remove two screws.
3. Remove the top cover/face-down output tray.

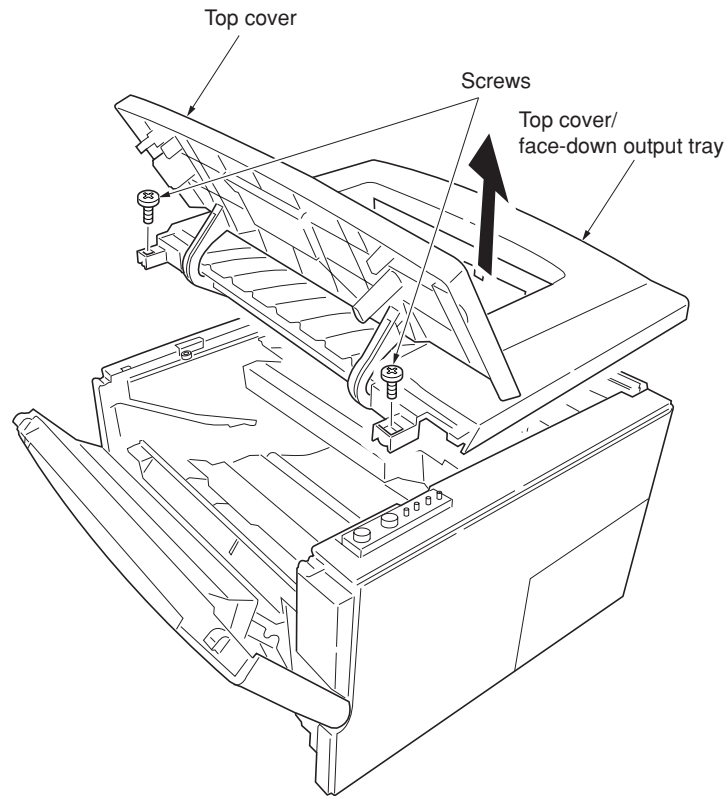


Figure 1-5-2 Removing the top cover/face-down output tray

(2) Removing the right cover

1. Remove one screw.
2. Remove the side cover.
3. Unlatch the six snaps and one hook hole on the chassis, remove the right cover.

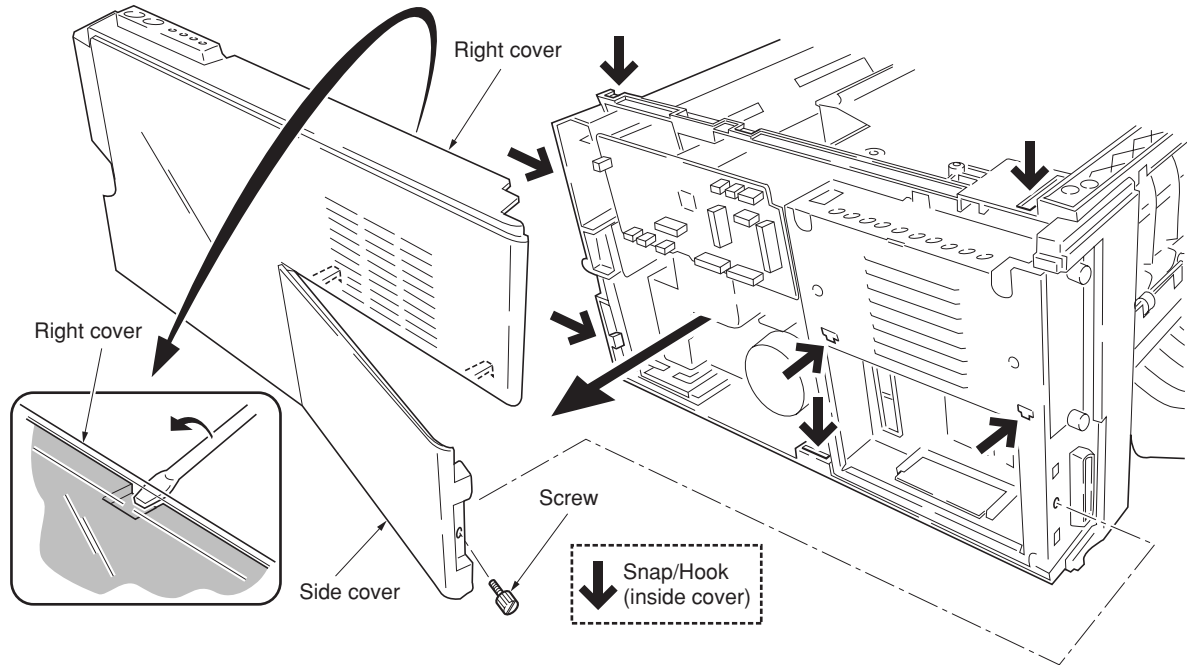


Figure 5-2-3 Removing the right cover

(3) Removing the left cover

1. Unlatch the six snaps and two hook holes on the chassis, remove the left cover.

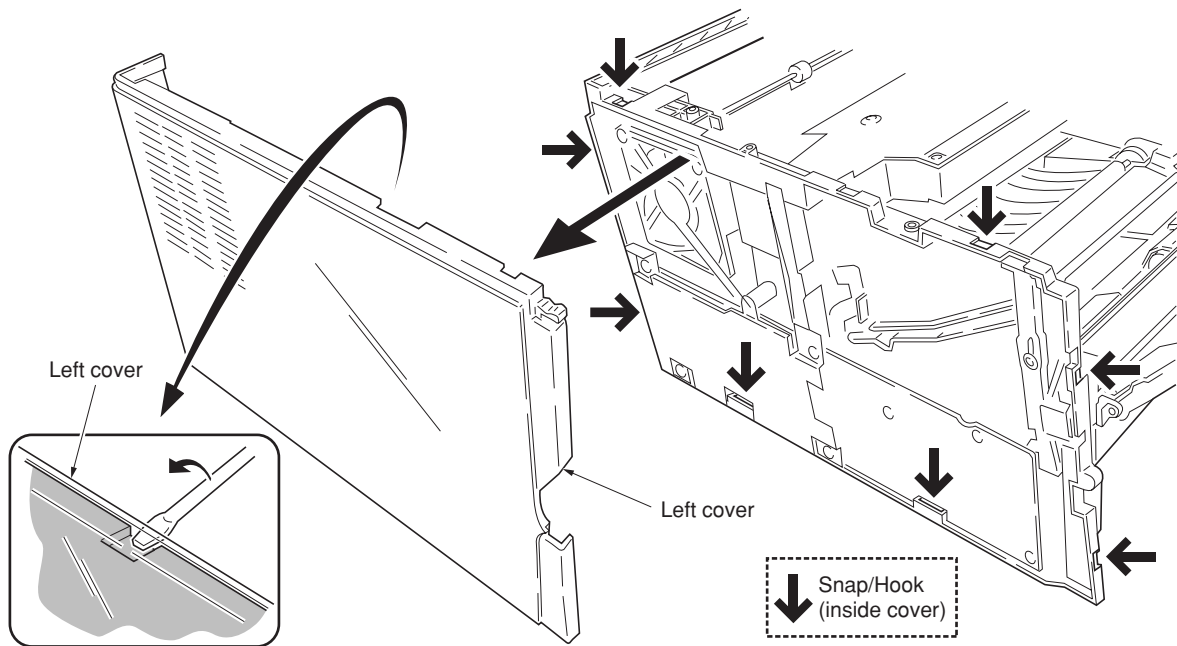


Figure 1-5-4 Removing the right cover

1-5-4 Removing the feed roller

CAUTION

When refit the feed roller, fit the D-cut shaft into the D-shape hole of the feed roller.

1. Remove the paper cassette and the process unit. (See page 1-5-2)
2. Stand the machine the front side up.
3. Move the feed roller in the direction (A) and remove the feed roller.

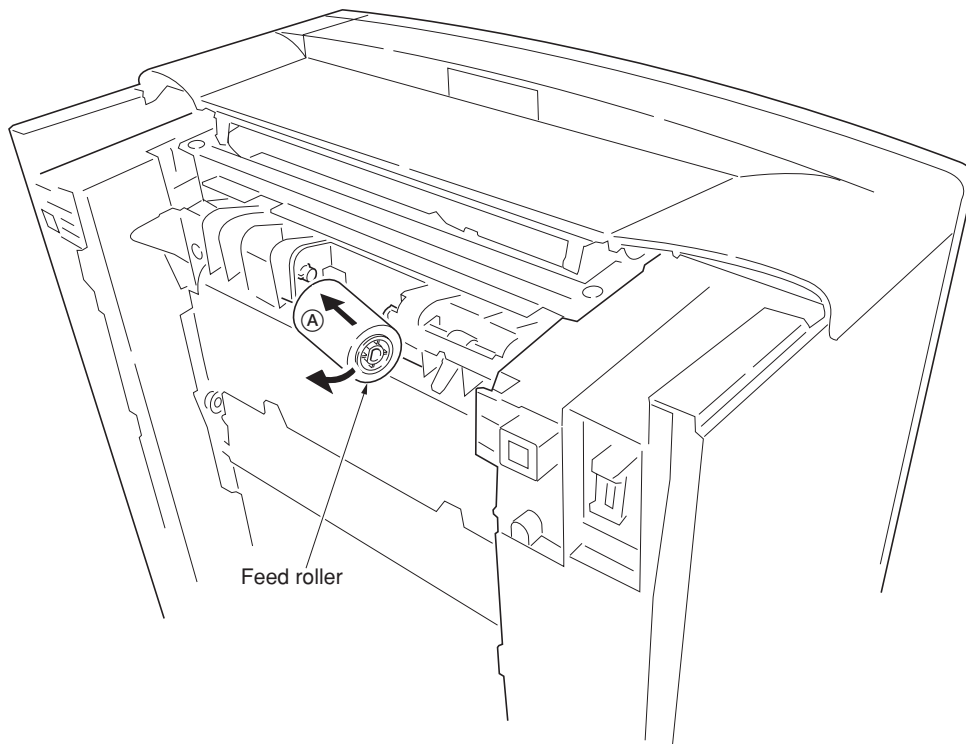


Figure 1-5-5 Removing the feed roller

1-5-5 Removing the MP feed roller

1. Remove the engine board (See page 1-5-9).
2. Remove one screw.
3. Remove the grounding plate.
4. Remove one stop ring.
5. Remove the MP feed clutch.

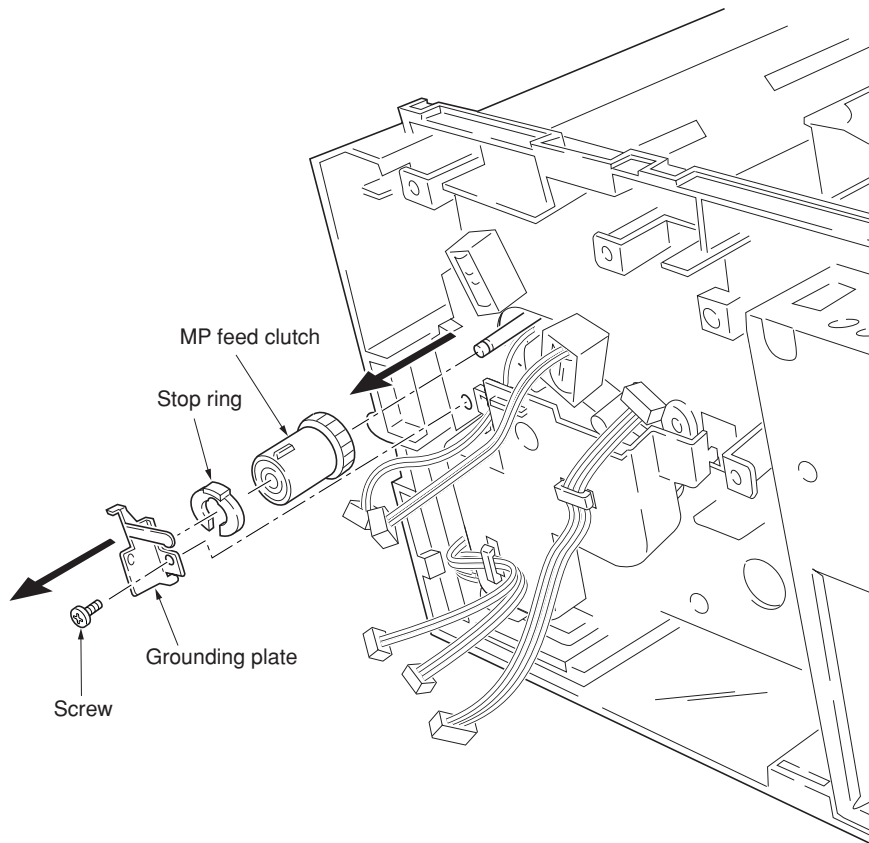


Figure 1-5-6 Removing the MP feed clutch

6. Remove one screw.
7. Remove the toner sensor and spring.
8. While pressing the latch by using the driver and then remove the paper guide.
9. Remove two screws and then remove the MP feed unit.

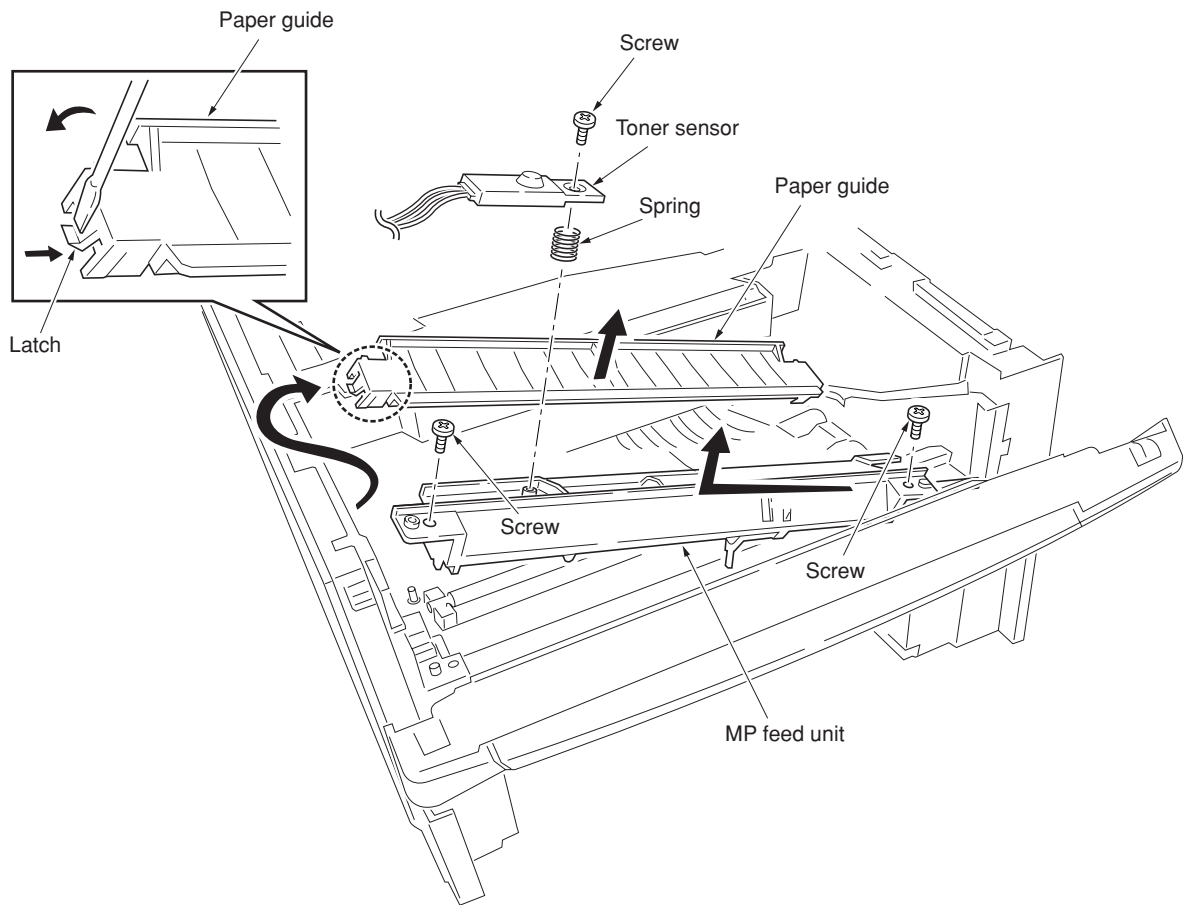


Figure 1-5-7 Removing the MP feed unit

10. Remove one stop ring and then remove the MP feed roller.

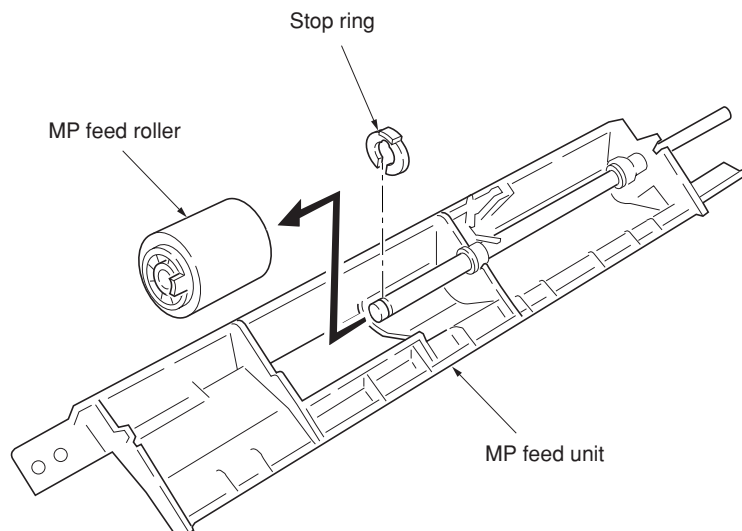


Figure 1-5-8 Removing the MP feed roller

1-5-6 Removing the transfer roller

CAUTION

Do not touch the transfer roller (sponge) surface. Oil and dust (particles of paper, etc.) on the transfer roller can significantly deteriorate the print quality (white spots, etc.).

When refitting the bushes and springs, make sure to refit the black colored bush and spring on the left side. Also, observe the correct direction to which the bush is fit in reference to the paper passing direction.

1. Remove the process unit (See page 1-5-2).
2. Remove the transfer roller from the both bushes.

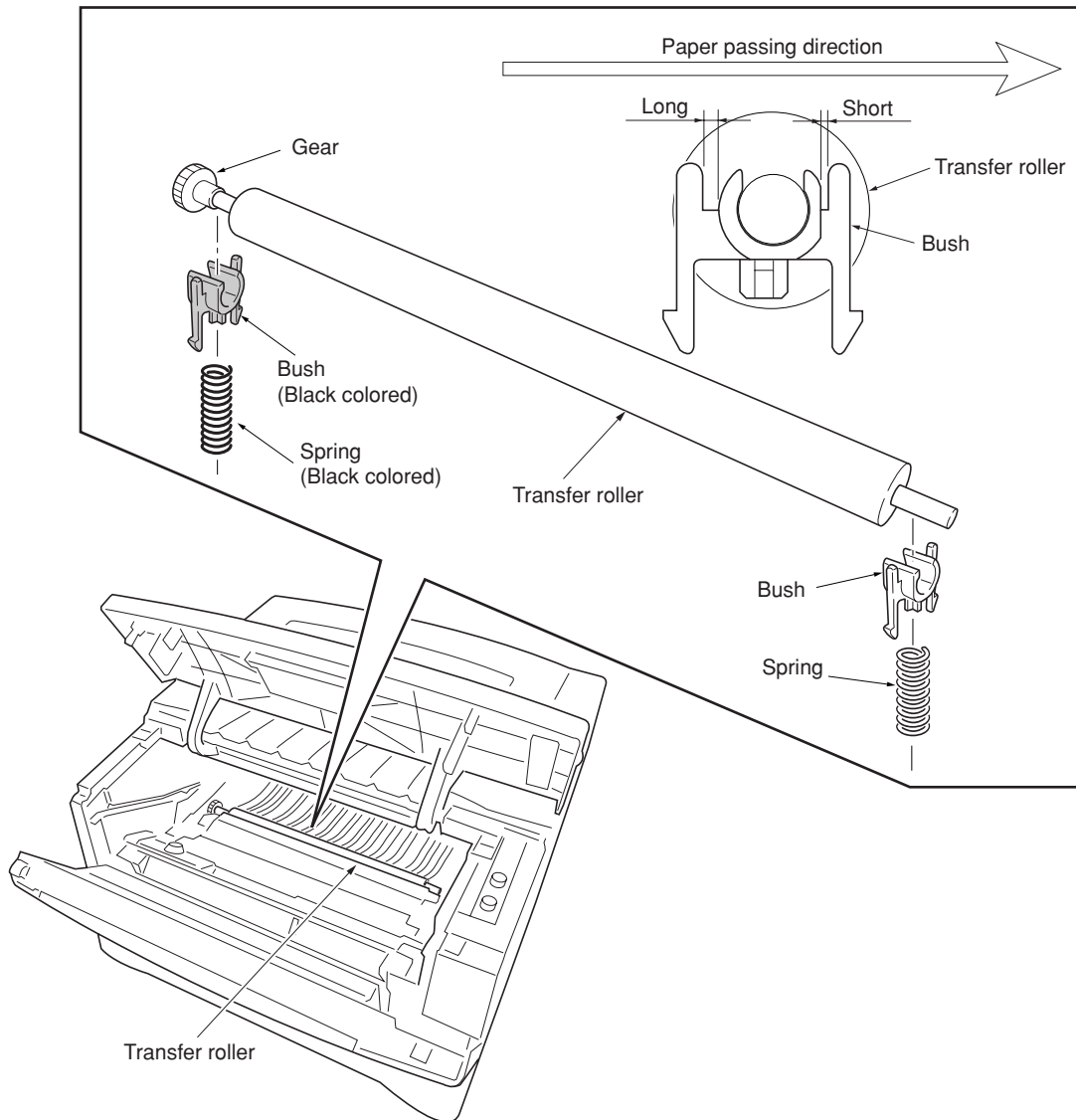


Figure 1-5-9 Removing the transfer roller

1-5-7 Removing the principal circuit boards

(1) Removing the engine board

1. Remove the right cover (See page 1-5-4).
2. Remove all (twelve) connectors from the engine board.
3. Remove three screws.
4. Remove the engine board.

* When replacing the board with a new board, remove the EEPROM (U2) from the old board and mount it to the new board.

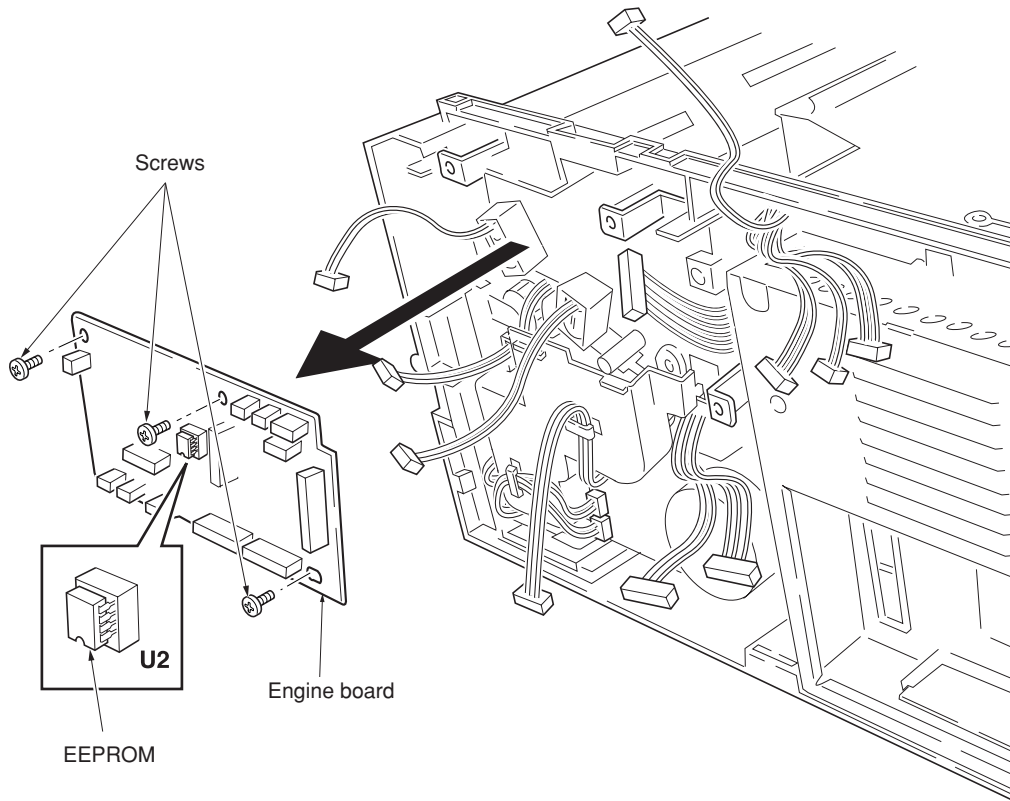


Figure 1-5-10 Removing the engine board

(2) Removing the main board

1. Remove the process unit (See page 1-5-2).
2. Remove the top/face-down output tray and right cover (See pages 1-5-2 and 1-5-3).
3. Remove two connectors from main board.
4. Remove six screws.
5. Remove the controller box (with main board).

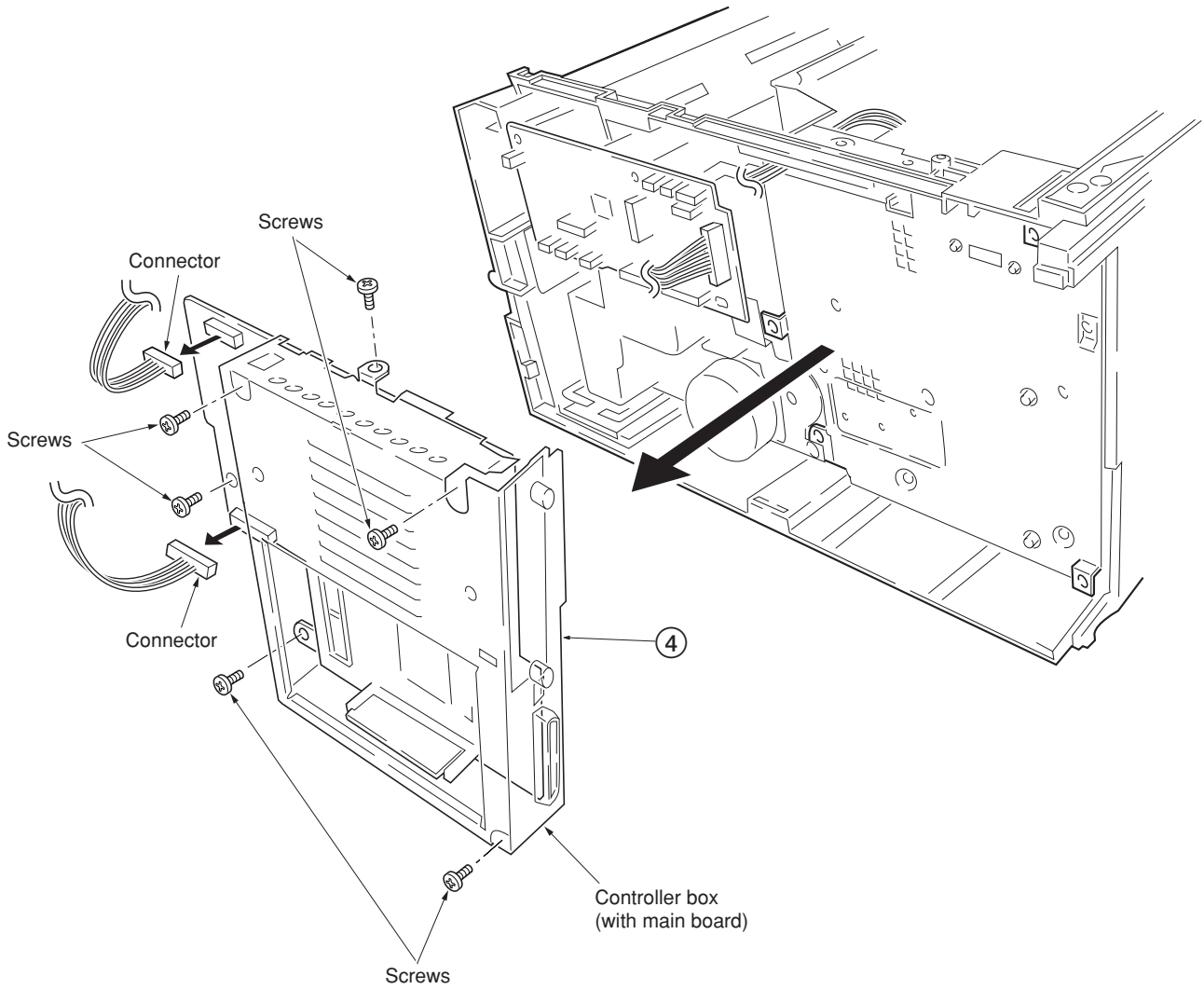


Figure 1-5-11 Removing the controller box (with main board)

6. Remove two screws at the back of the main board.
7. Remove three screws from the parallel interface connector and USB connector.
8. Remove the main board.

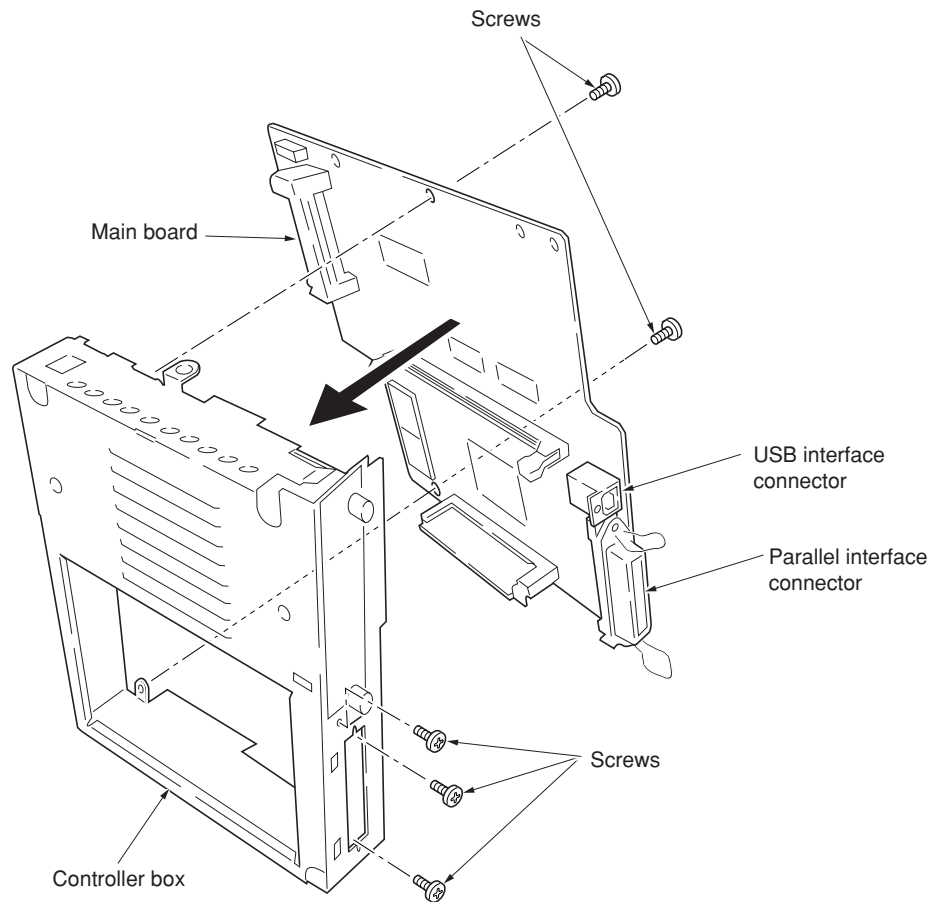
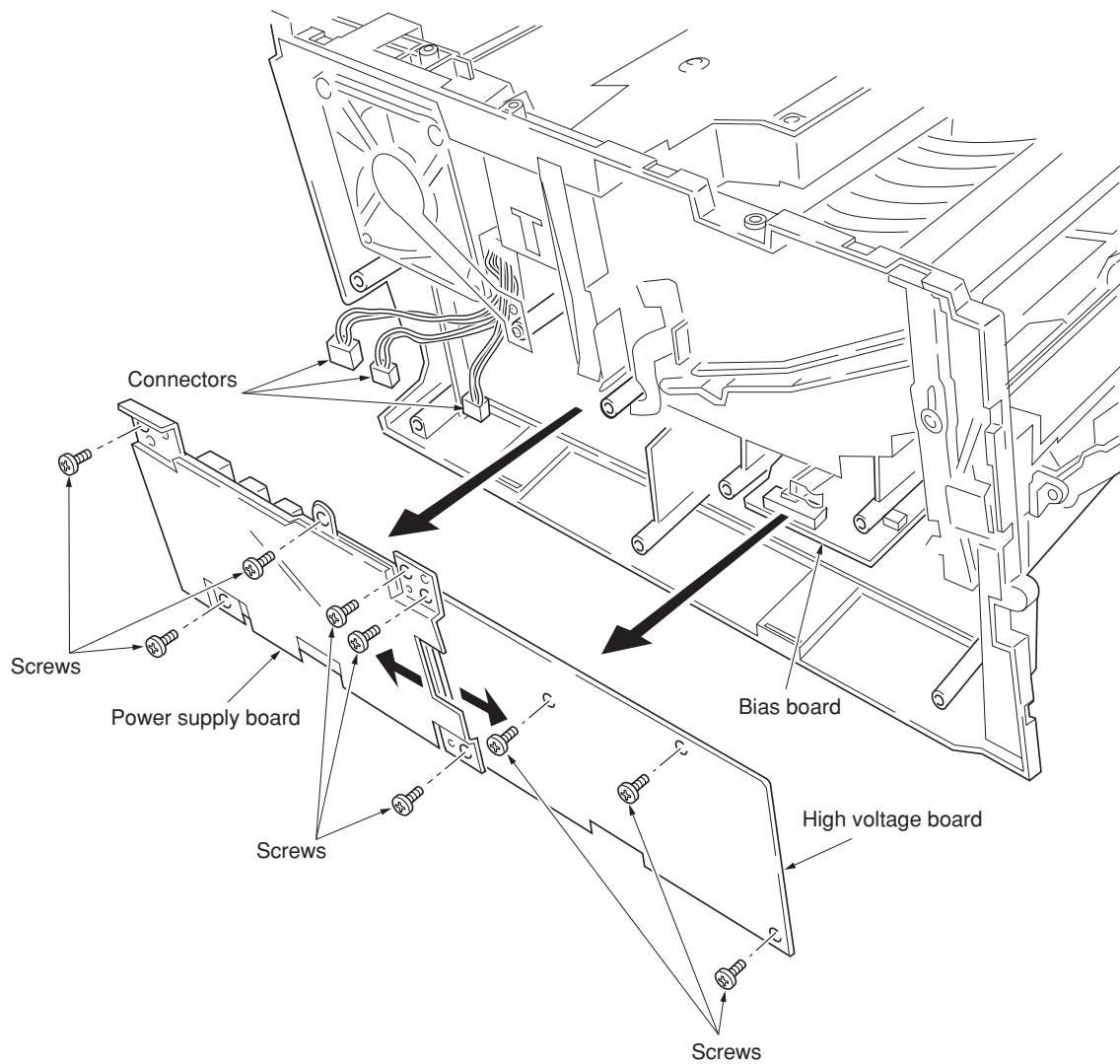


Figure 1-5-12 Removing the main board

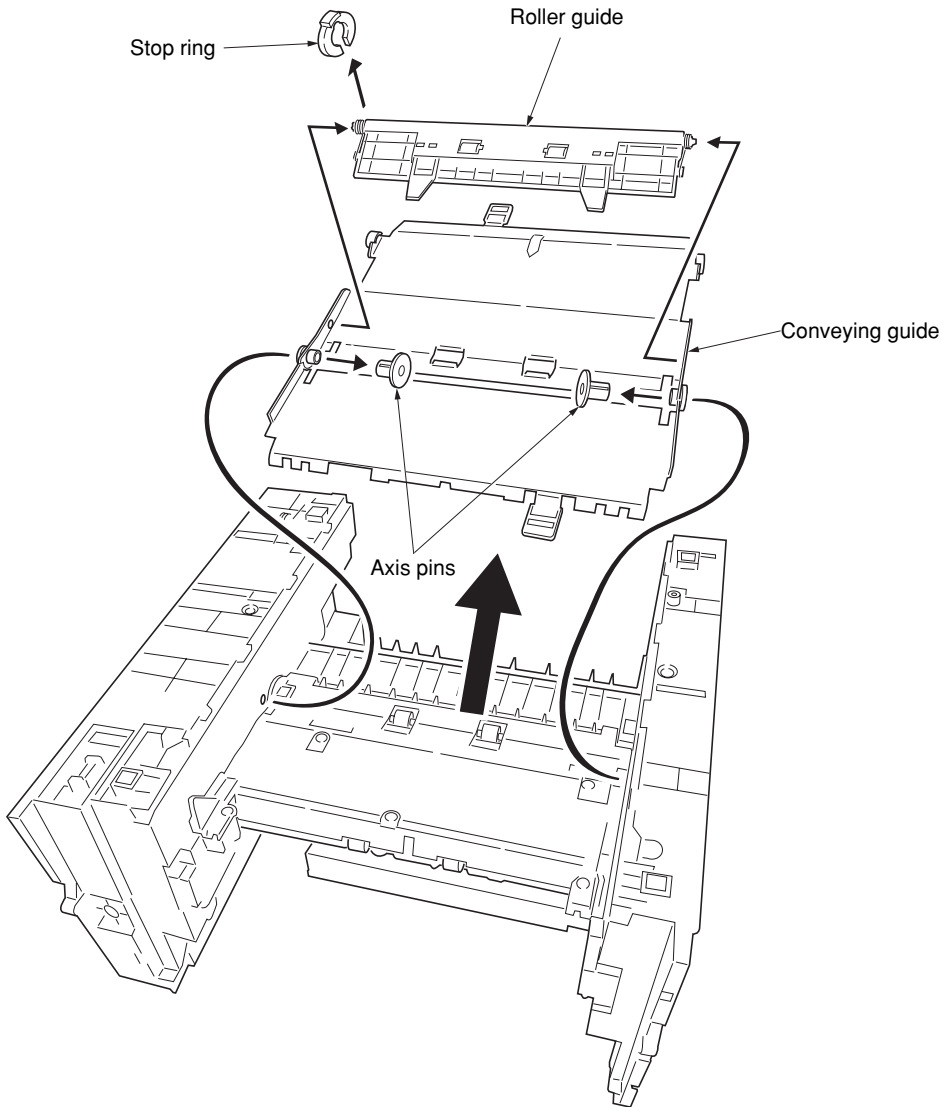
(3) Removing the power supply board and high voltage board

1. Remove the process unit (See page 1-5-2).
2. Remove the left cover (See page 1-5-4).
3. Remove three connectors from the power supply board.
4. Remove nine screws.
5. Remove the power supply board and high voltage board. (Note: The high voltage board is directly connected to the bias board.)
6. Separate the high voltage board from the power supply board.

**Figure 1-5-13 Removing the power supply board and high voltage board**

(4) Removing the bias board

1. Remove the cassette and process unit (See page 1-5-2).
2. Remove the left cover (See page 1-5-4).
3. Remove the power supply board and high voltage board (See the previous page).
4. Turn the machine with the bottom side up.
5. Remove the one stop ring and then remove the roller guide.
6. Remove two axis pins and then remove the conveying guide.

**Figure 1-5-14 Removing the conveying guide**

2FM

7. Remove five screws.
8. Remove the bottom cover.
9. Remove the three connectors from the bias board.
10. Remove the bias board.

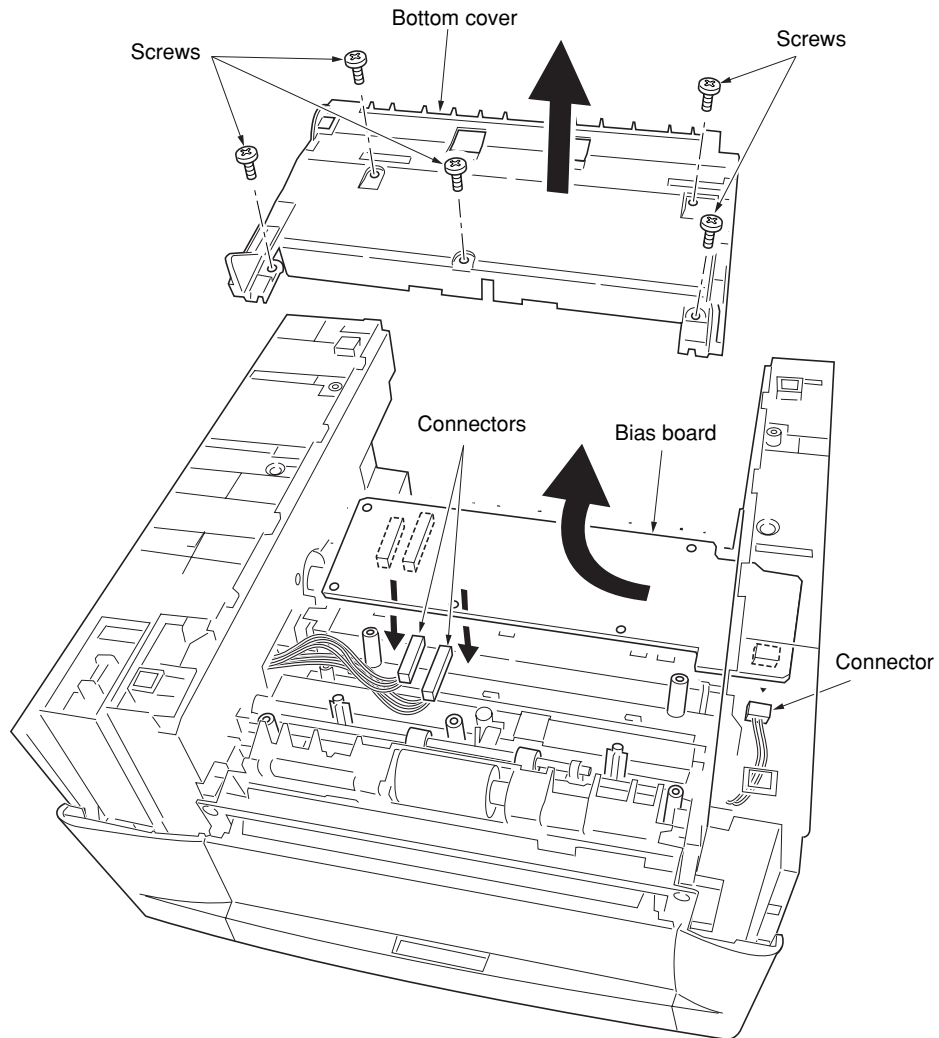


Figure 1-5-15 Removing the bias board

1-5-8 Removing the main motor and drive unit

1. Remove the cassette and process unit (See page 1-5-2).
2. Remove the right cover (See page 1-5-4).
3. Remove three connectors from the main motor.
4. Remove four screws.
5. Remove main motor.

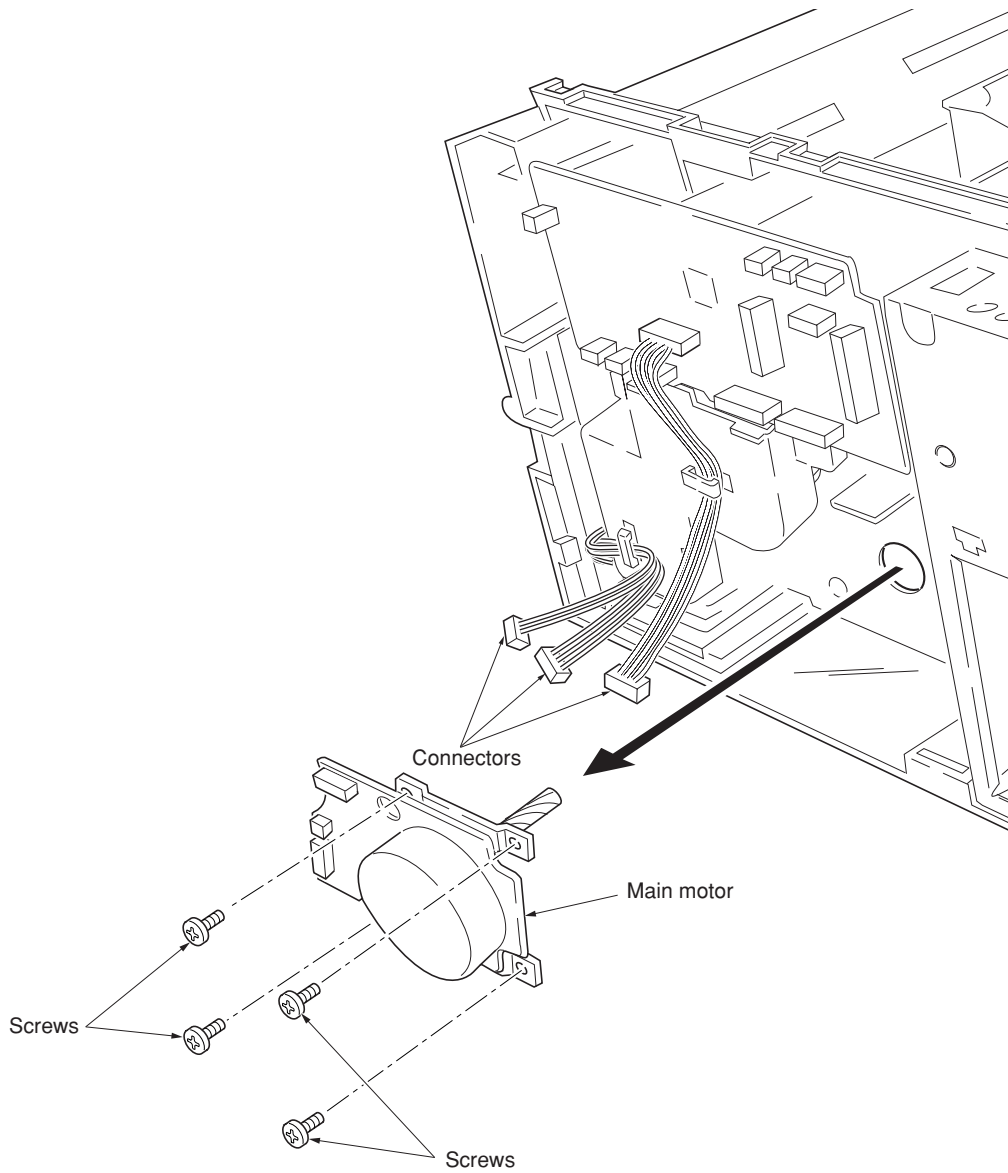


Figure 1-5-16 Removing the main motor

2FM

6. Remove the engine board (See page 1-5-9).
7. Remove wires from wire saddles on the cord cover.
8. Remove one screw.
9. Remove the cord cover.

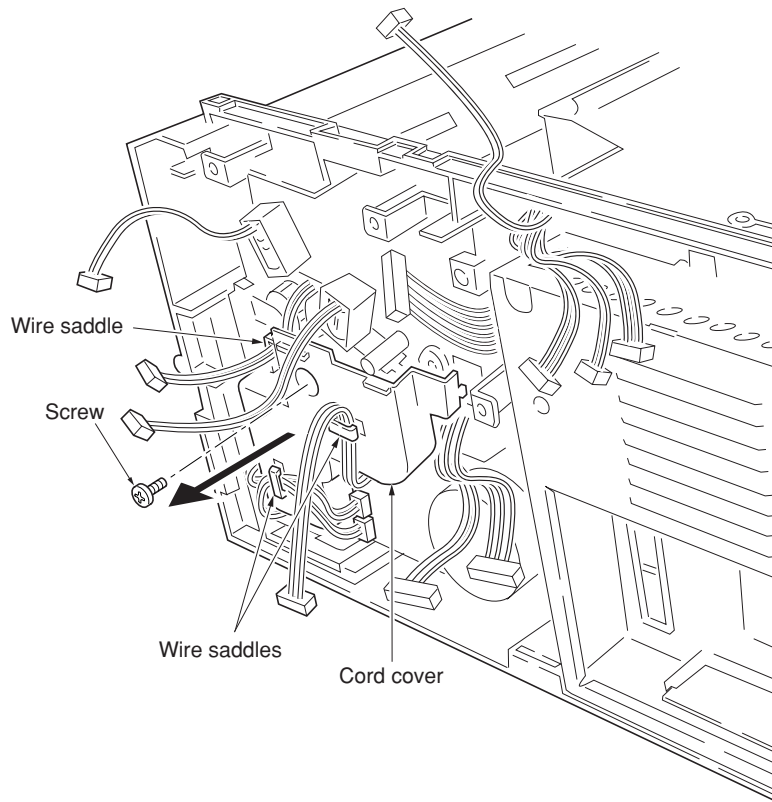


Figure 1-5-17 Removing the cord cover

10. Remove the main board (See page 1-5-10).
11. Remove one screw and then remove the grounding plate.
12. Remove one screw and then remove the feed clutch.
13. Remove three stop rings.
14. Remove MP feed clutch (gear), feed clutch (gear), and registration clutch (gear).

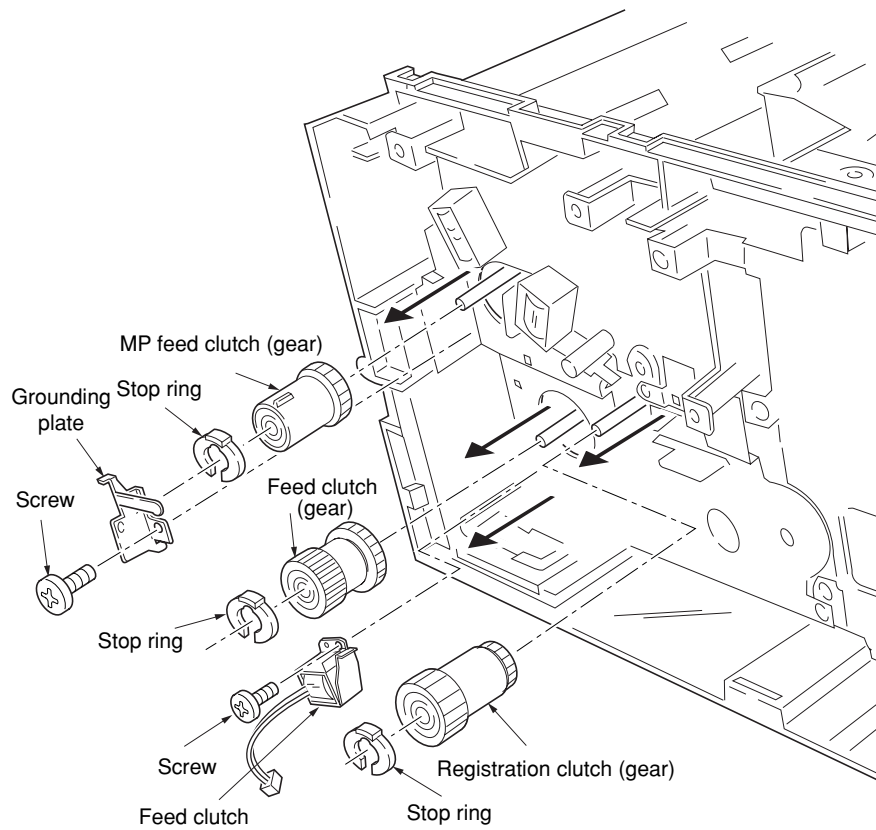


Figure 1-5-18 Removing the clutches

- 15. Remove the four screws.
- 16. Remove the drive unit.

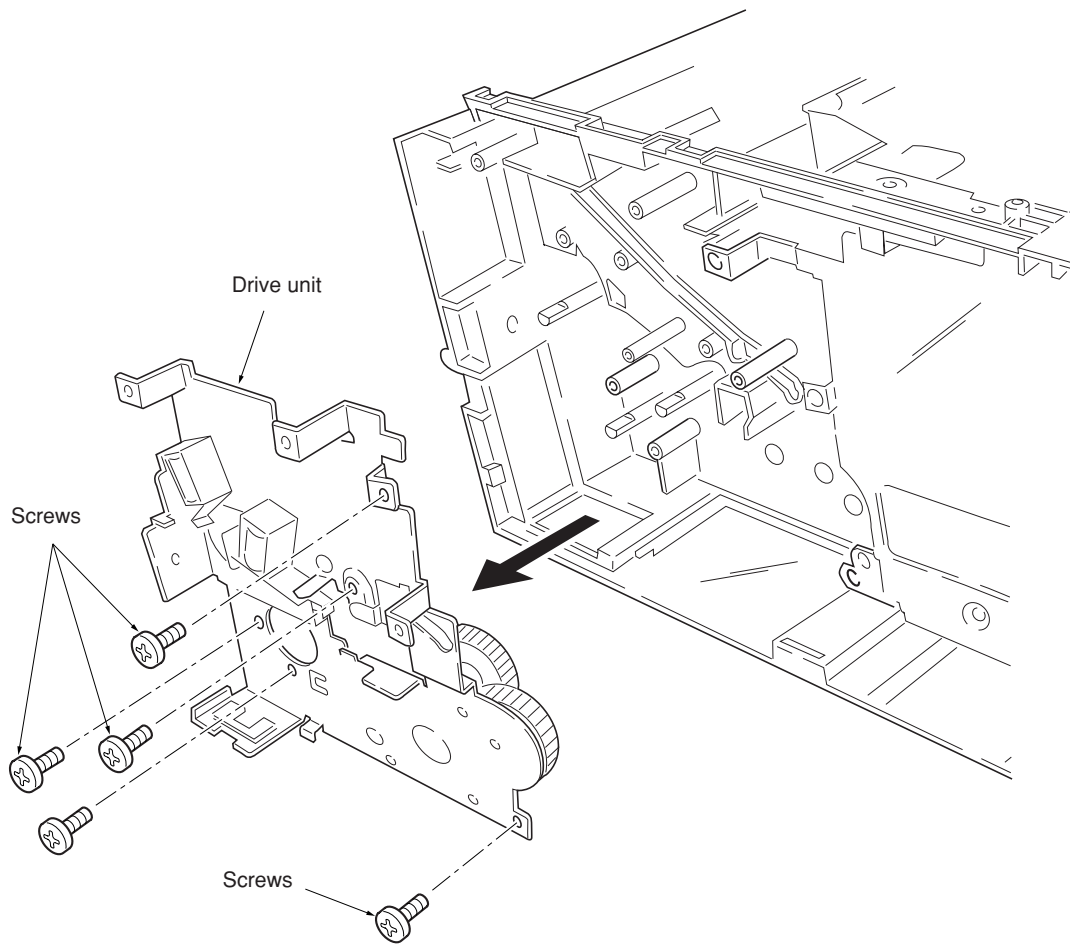


Figure 1-5-17 Removing the drive unit

1-5-9 Removing and splitting the fuser unit

WARNING

- The fuser unit is hot after the printer was running. Wait until it cools down.

CAUTION

- When refitting the fuser unit, make sure the fuser unit gear and the copier's drive gear are properly meshed with each other. For this, rotate the main motor several turns before fixing screws.

1. Remove the rear side cover.
2. Remove the right and left cover (See page 1-5-4).
3. Remove the two connectors.
4. Remove two screws.
5. Remove the fuser unit.

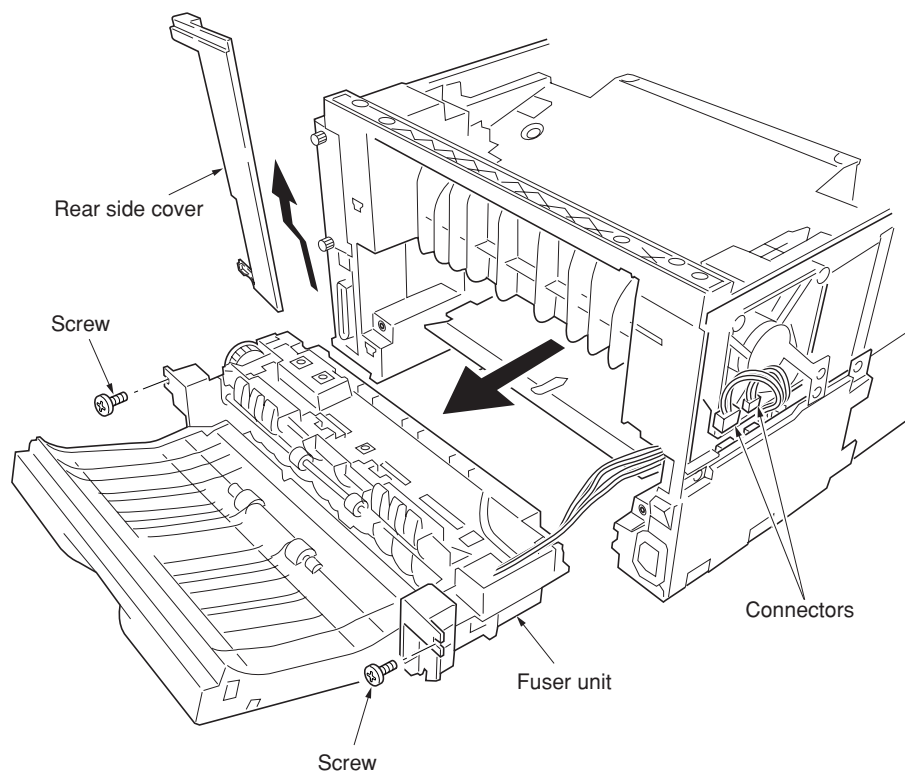


Figure 1-5-19 Removing the fuser unit

2FM

6. Remove two screws.
7. Open and split the fuser unit.

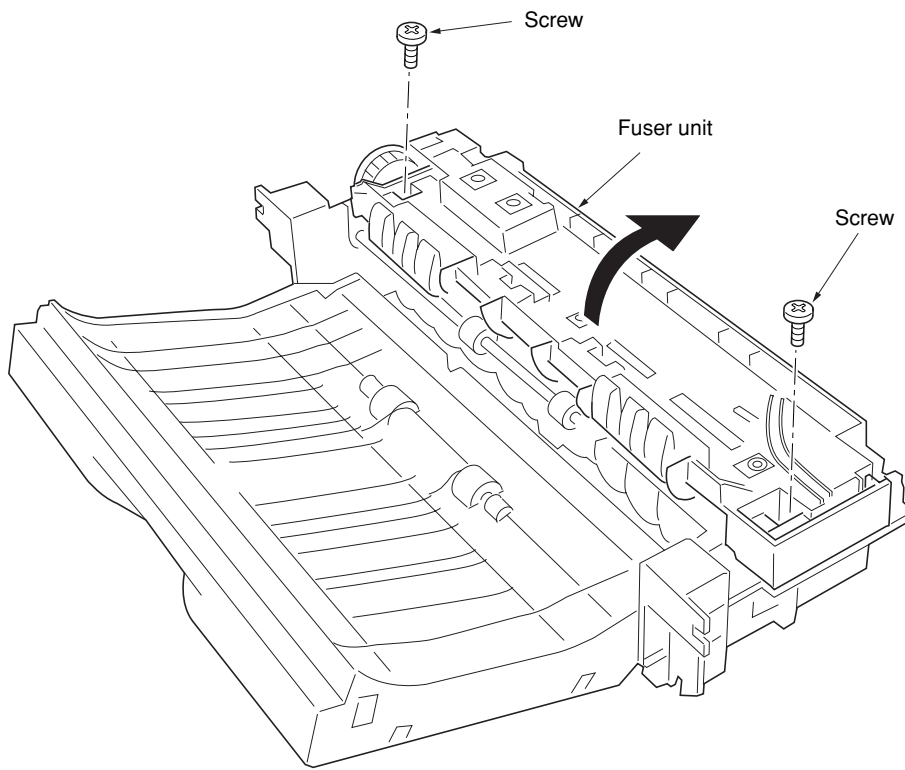


Figure 1-5-20 Splitting the fuser unit

(1) Removing the separation claws**WARNING**

The separation claws are extremely hot immediately after the printer was running. Allow substantial period of time until it cools down.

1. Remove and split the fuser unit (See page 1-5-19).
2. Loosen the stopper screws.
3. Hold the separation claw upright, and remove the separation claw and separation claw springs.

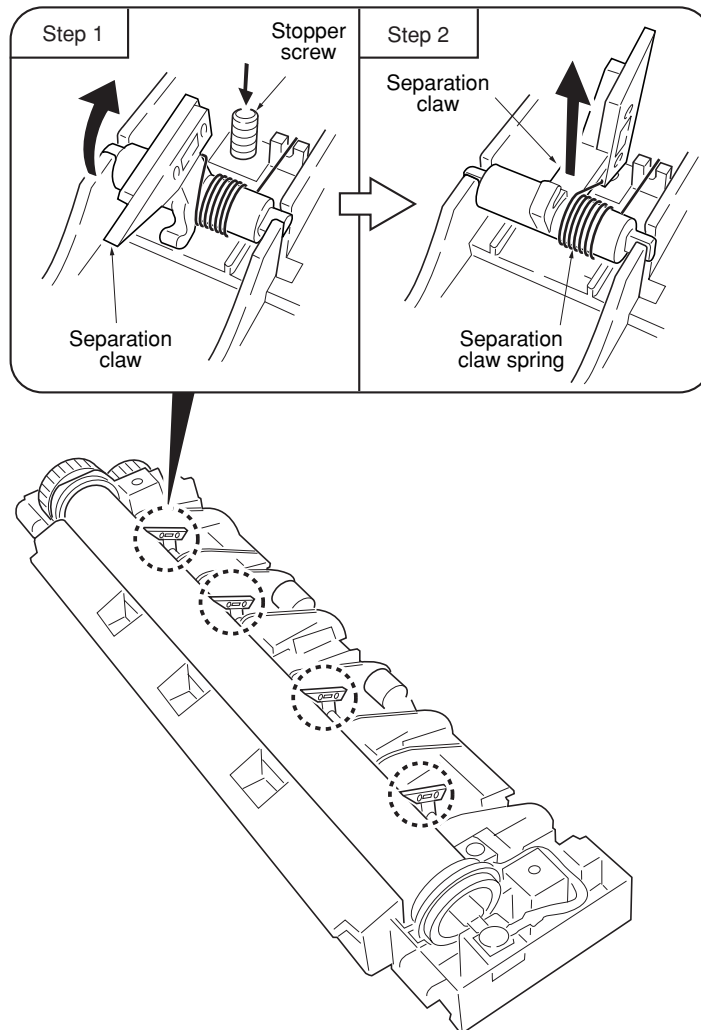


Figure 1-5-21 Removing the separation claws

(2) Removing the heater lamp

WARNING

- The heater lamp is extremely hot immediately after the printer was running.
- Allow substantial period of time until it cools down. Also, the heater lamp is fragile: Handle it with great care.

CAUTION

- The heater lamps are fragile. Use extreme care when handling not to drop or break.
- Do not directly touch on the heater lamp. Finger prints on the heater lamp's outer surface can prevent proper fusing of toner on paper. When holding
- When refitting the heater lamp, direct the short distance side from the projection in the middle of the lamp facing the machine's left side.

1. Remove and split the fuser unit (See page 1-5-19).
2. Remove all (four) separation claws (See previous page).
3. Remove two screws.
4. Remove the heater lamp from the heat roller.

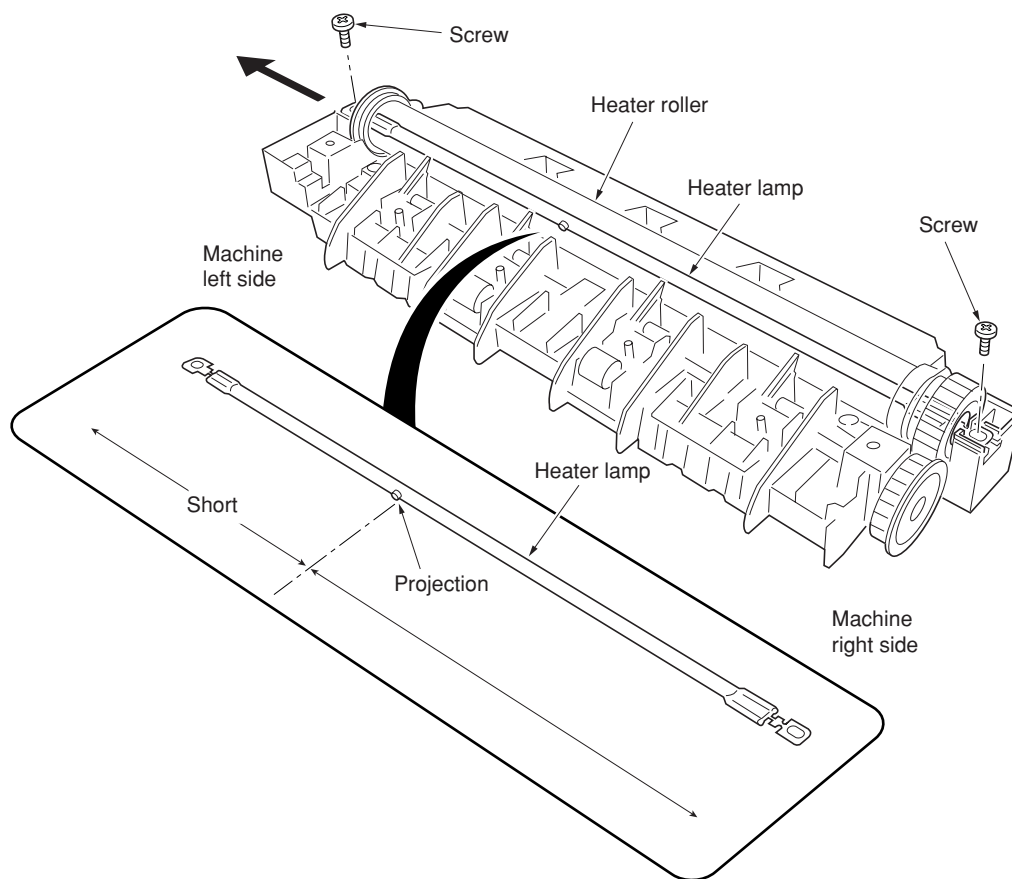


Figure 1-5-23 Removing the heater lamp

(3) Removing the heat roller

WARNING

• The heat roller is extremely hot immediately after the printer was running. Allow substantial period of time until it cools down.

1. Remove and split the fuser unit (See page 1-5-19).
2. Remove the heater lamp (See previous page).
3. Press the lamp A holder away from the heat roller. Pull up both heat R bush and heat L bush at the same time.

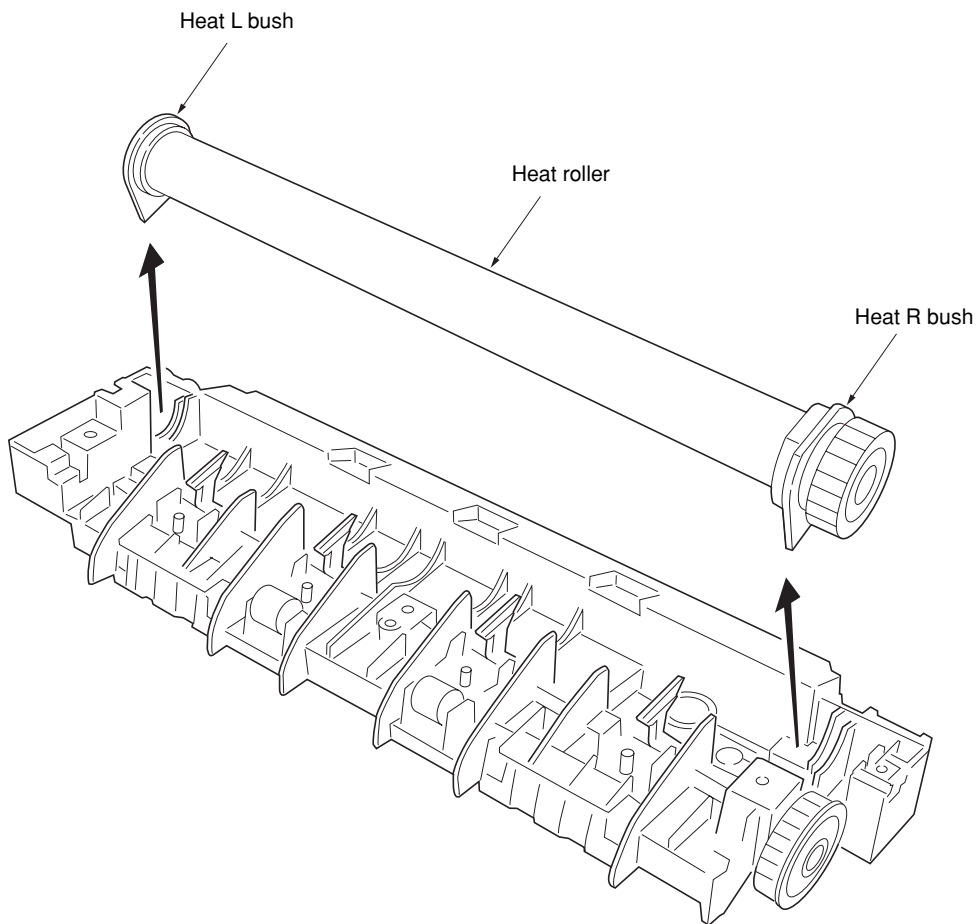


Figure 1-5-24 Removing the heat R bush and heat L bush

4. Remove the heat gear Z33, heat R bush, and heat L bush from the heat roller.

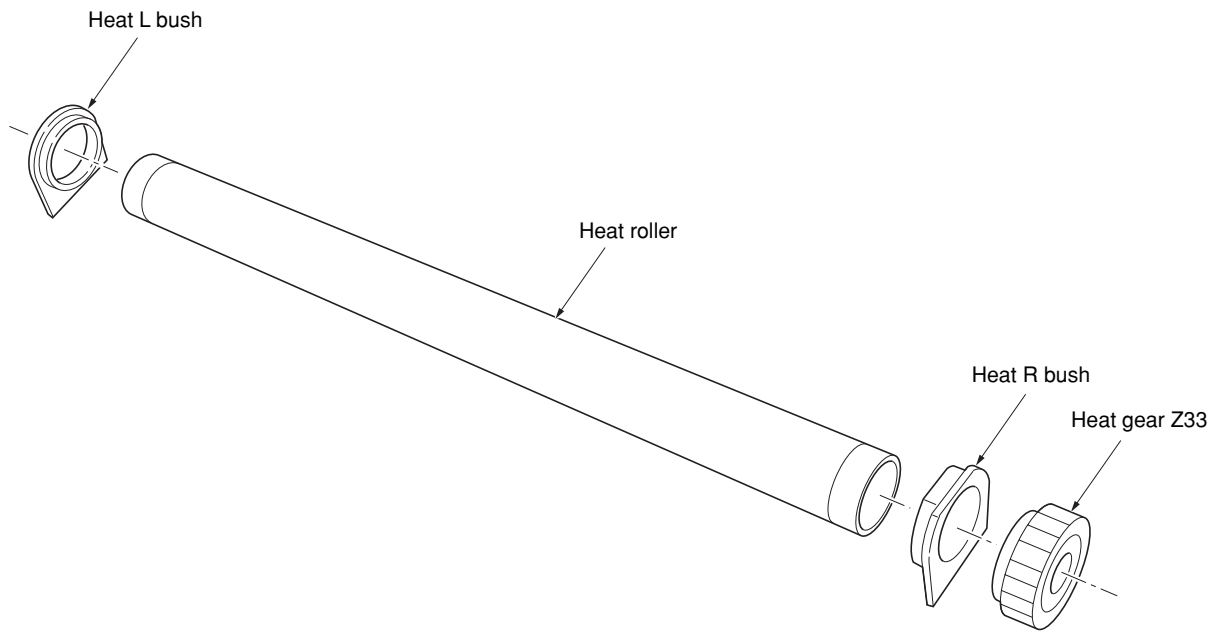
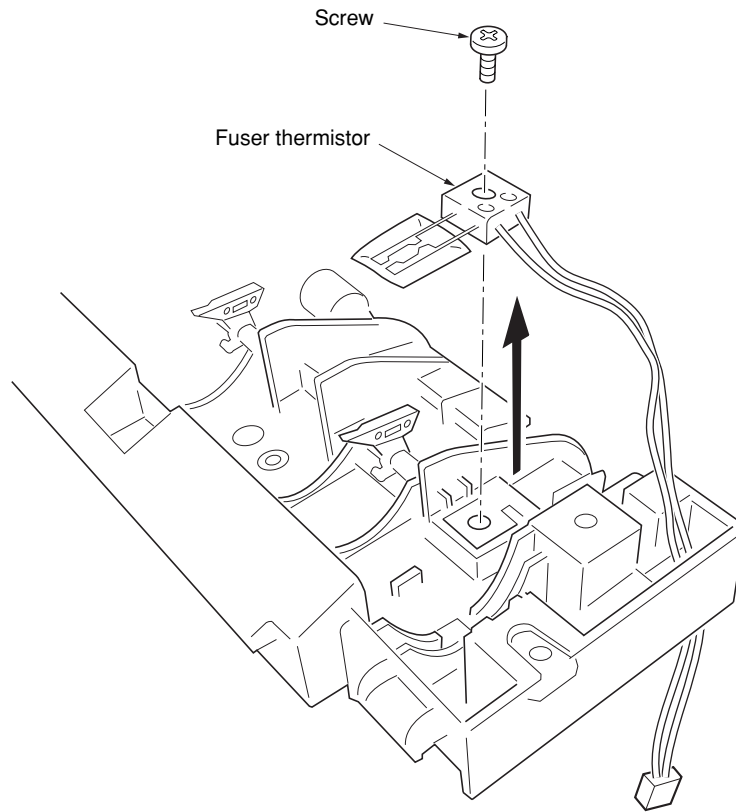


Figure 1-5-25 Removing the heat roller

(4) Removing the fuser thermistor

1. Remove and split the fuser unit (See page 1-5-19).
2. Remove the heater lamp (See page 1-5-22).
3. Remove the heat roller (See page 1-5-23).
4. Remove one screw.
5. Remove the fuser thermistor.

**Figure 1-5-26 Removing the fuser thermistor**

(5) Removing the thermal cutout

CAUTION

• Do not bend the terminals of the thermal cutout.

1. Remove and split the fuser unit (See page 1-5-19).
2. Remove the heater lamp (See page 1-5-22).
3. Remove the heat roller (See page 1-5-23).
4. Remove the two screws.
5. Remove the thermal cutout.

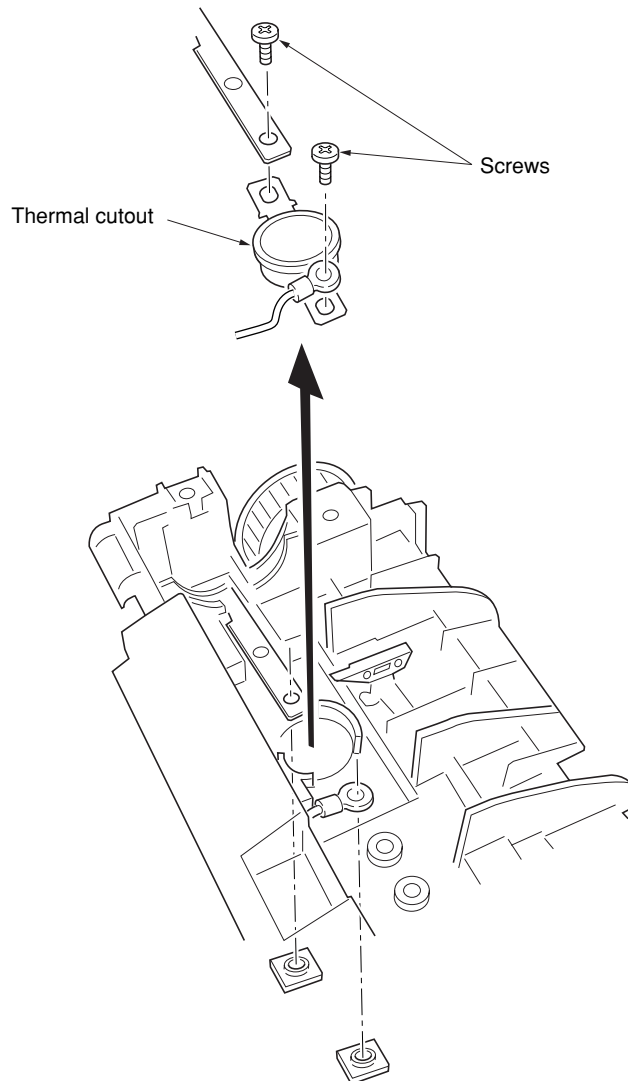


Figure 1-5-27 Removing the thermal cutout

(6) Removing the press roller**WARNING**

• The press roller is extremely hot immediately after the printer was running. Allow substantial period of time until it cools down.

1. Remove and split the fuser unit (See page 1-5-19).
2. Remove the press roller from the fuser unit.

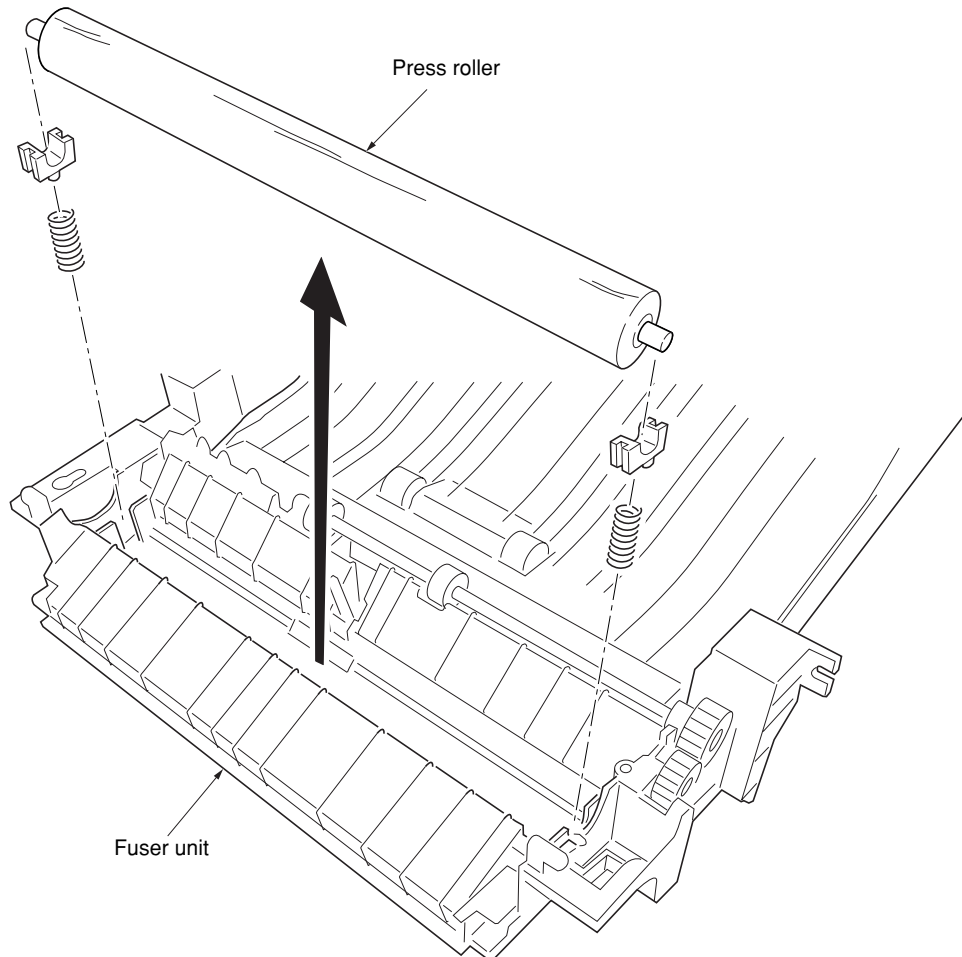


Figure 1-5-28 Removing the press roller

1-5-10 Removing the laser scanner unit and the eraser lamp

1. Remove the right cover and left cover (See page 1-5-4).
2. Remove four connectors.
3. Remove six screws and then remove the LSU shield.

* When refitting the LSU shield, tighten a screw in order of ④ from ①.

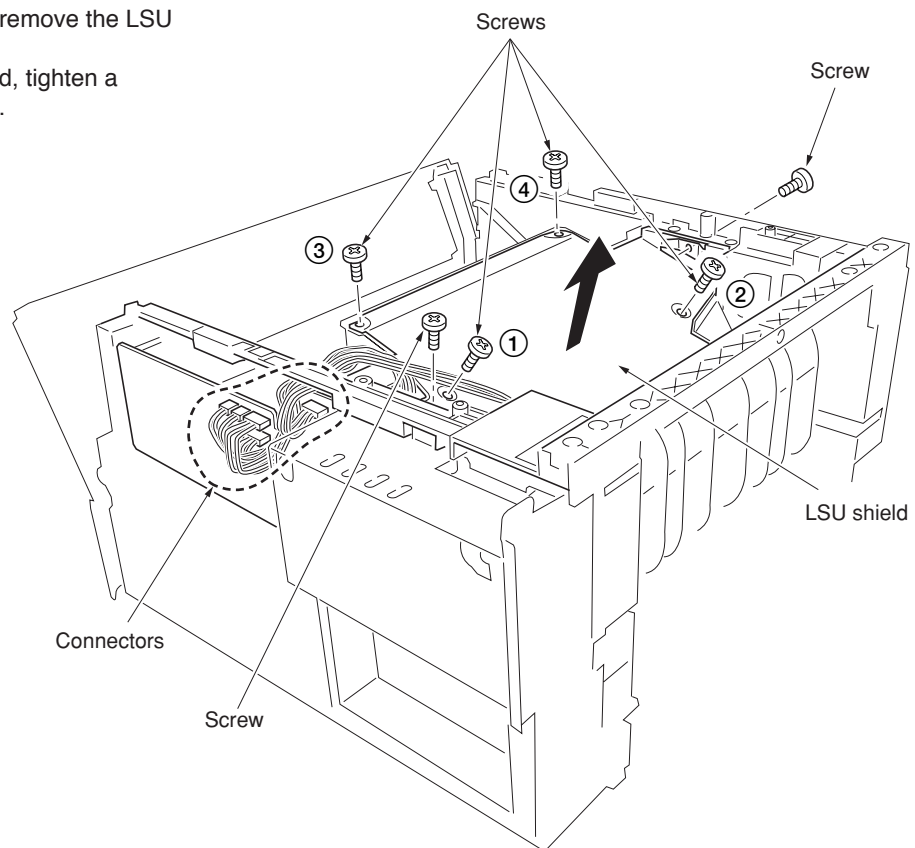


Figure 1-5-29 Removing the LSU shield

4. Remove three screws.
 5. Remove two connectors from the laser scanner unit.
 6. Remove the laser scanner unit.
- * When refitting the laser scanner unit, tighten a screw in order of ③ from ①.

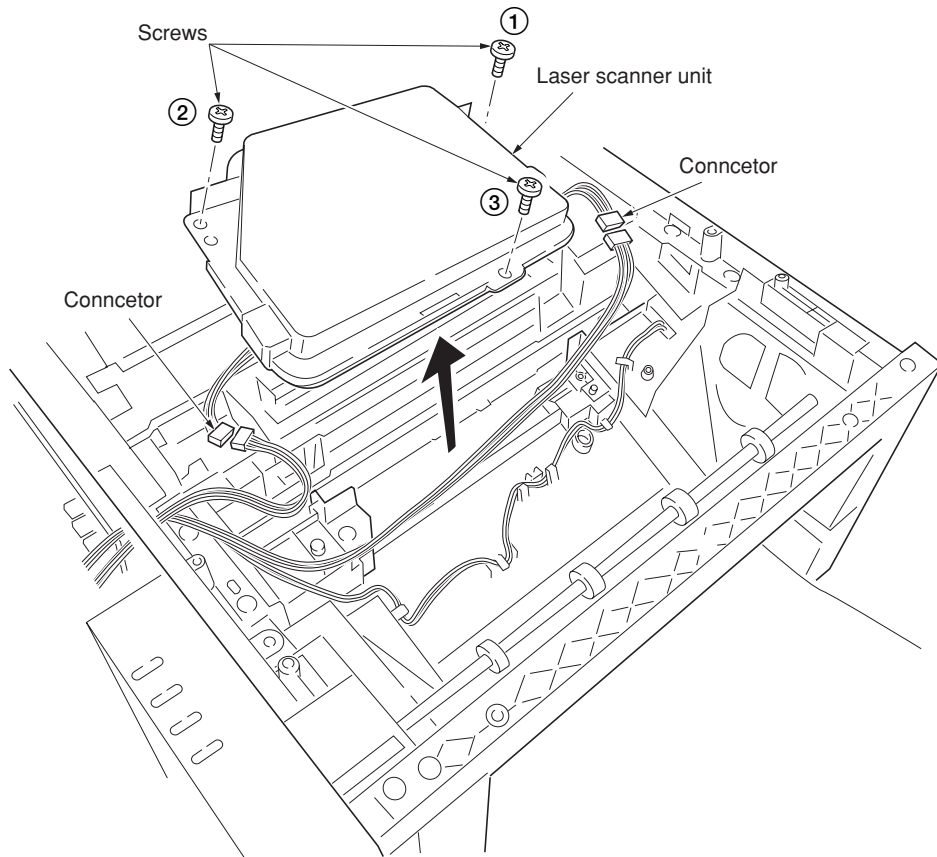
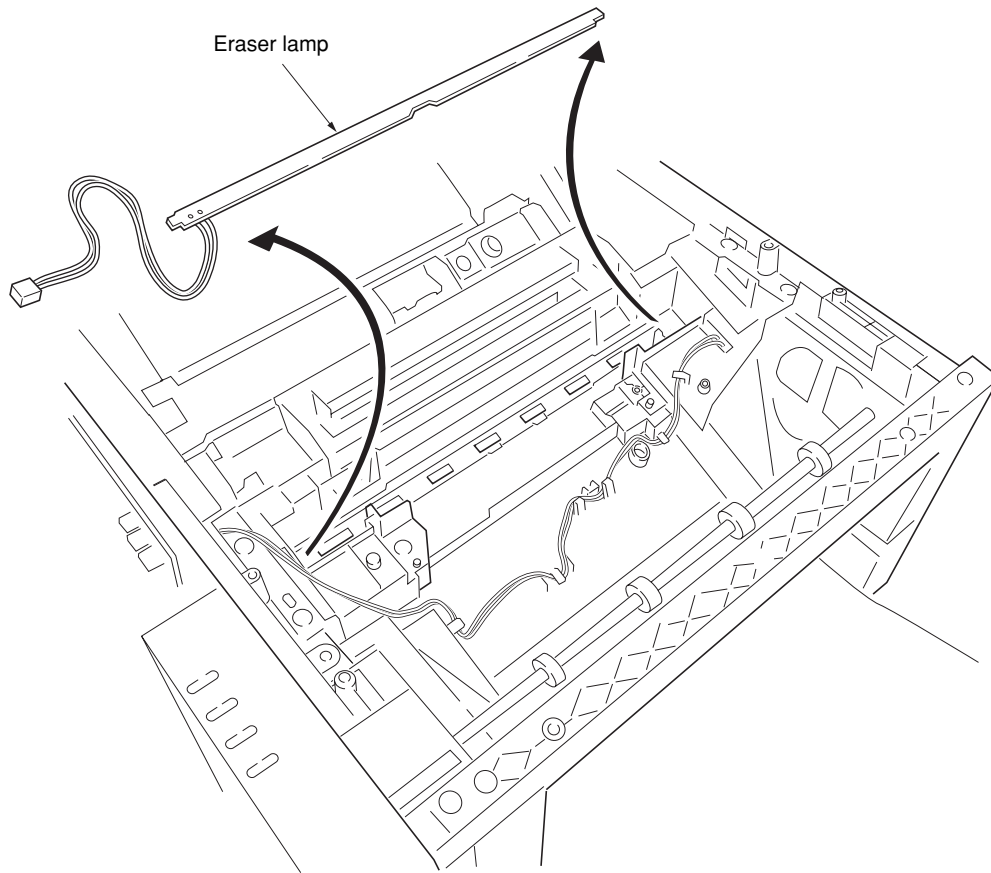


Figure 1-5-30 Removing the laser scanner unit

2FM

7. Remove the eraser lamp.



1-5-31 Removing the eraser lamp

1-5-11 Removing the main charger unit

1. Remove the process unit from the printer (See page 1-5-2).
2. Unlatch the three snaps, and remove the main charger cap.
3. Draw the main charger unit in the direction of arrow (A), then pull it out in the direction of arrow (B).

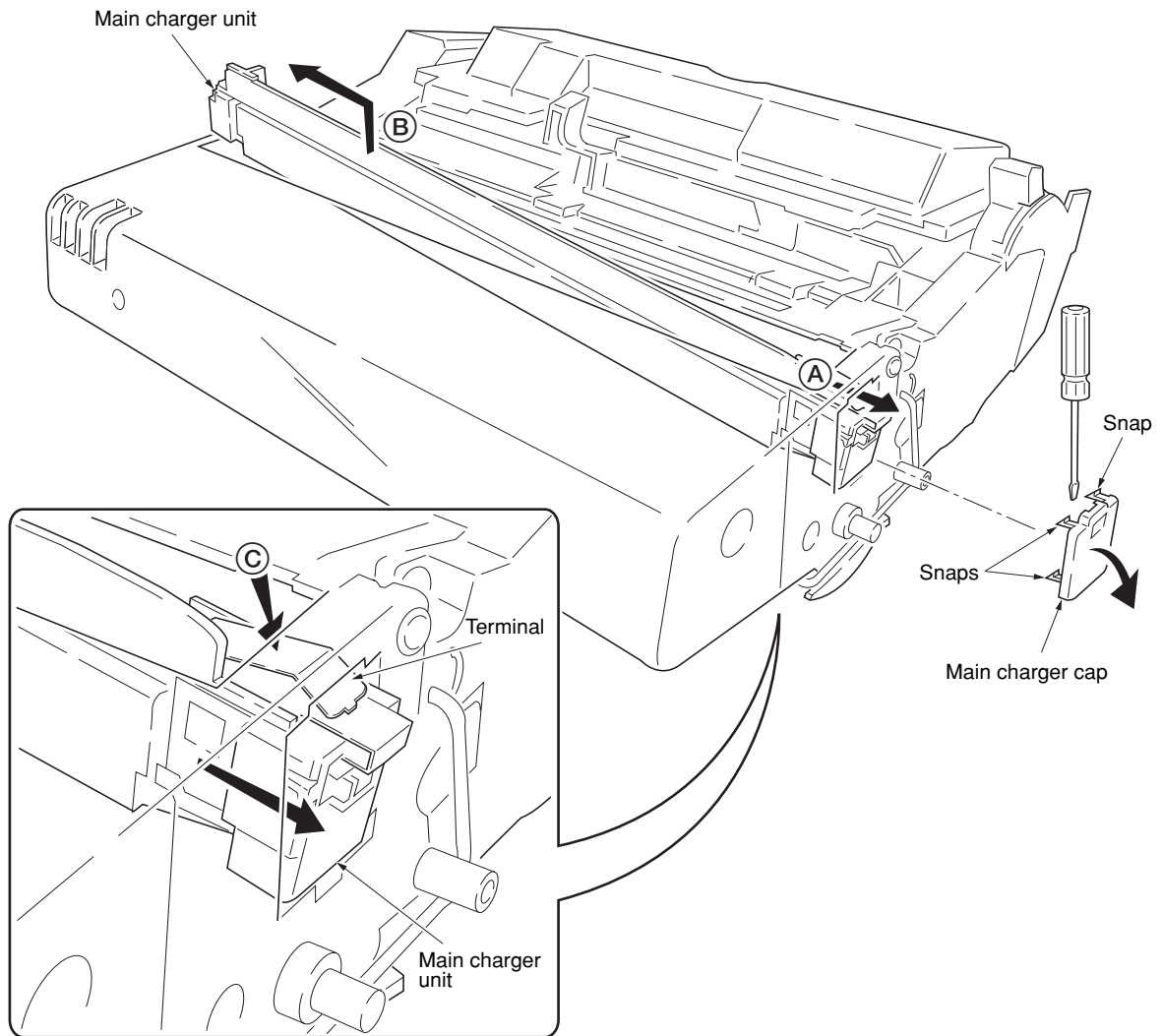


Figure 1-5-32 Removing the main charger unit

CAUTION

- When refitting the main charger unit, hold terminal down (C), then push frontwards. Use care not to deform the terminal.

1-6-1 Upgrading the firmware on the main board

Updating the system (controller) firmware is possible by downloading the firmware through the parallel interface or through the memory card (CompactFlash). These firmware programs are directly overwritten in the system DIMM [KP-1050] (Flash ROM type only) on the main board. The operator panel message in different languages can also be downloaded through the parallel interface or through the memory card.

(1) Firmware program data format

Kyocera supplies the following types of data for updating firmware of the different purposes:

- System firmware

The data to be downloaded are supplied in the following format:

System firmware file name example

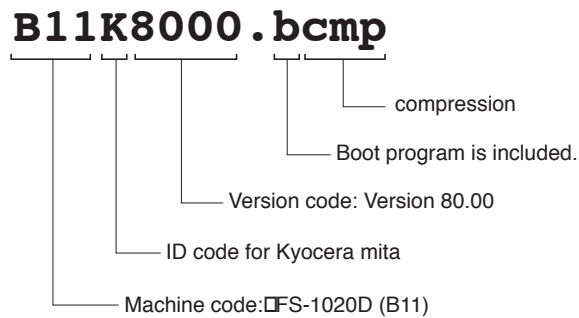


Figure 1-6-1 Firmware program data format

(2) Downloading the firmware from the parallel interface

This section explains how to download firmware data from the parallel interface. The printer system can automatically recognize whether the data to be overwritten is for controller firmware.

CAUTION

Downloading the firmware takes several minutes. Do not turn power off during downloading.

NOTE

MS-DOS is required for a downloading from the parallel interface. The computer must be connected to the printer with a parallel cable.

Procedure

1. Turn printer power on. Make sure the printer is ready.
2. At the DOS prompt, send the following command to the printer:

```
echo !R! UPGR "SYS";EXIT;>prn
```

3. Confirm that downloading was finished normally by the LED indicator. (See page 1-6-4)
4. Turn power off.
5. Turn power on again. Check the printer gets ready.

Confirm the status page shows the new firmware version (See service information on the status page). If downloading fails, the printer indicates an error display using the LED indicators. To identify error, refer to the table on page 1-6-4.

(3) Downloading the firmware from the memory card

To download data written in a memory card (CompactFlash) to the printer, proceed as explained in this section.

CAUTION

Downloading firmware takes several minutes. Do not turn power off during downloading. If downloading is interrupted by an accidental power failure, etc., the system DIMM may have to be replaced.

NOTE

The firmware program data must be stored to the root directory of the memory card.

Procedure

1. Turn power switch off.
2. Remove the two screws and then remove the slot cover. Insert the memory card in the printer's memory card slot.
3. Turn power switch on.
4. The printers starts and finishes downloading automatically.
5. Confirm that downloading was finished normally by the LED indicator. (See page 1-6-4)
6. Turn power off.
7. Remove the memory card and then secure the slot cover by using two screws.
8. Turn power on again. Check the printer gets ready.
9. Turn power on again. Check the printer gets ready.

Confirm the status page shows the new firmware version (See service information on the statuspage). If downloading fails, the printer indicates an error display using the LED indicators. To identify error, refer to the table on page 1-6-4.

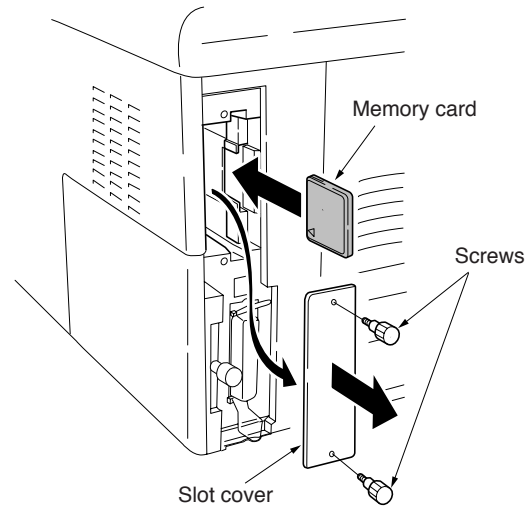


Figure 1-6-1

(4) Downloading errors

The following downloading errors are indicated on LED indicators when an error occurred during downloading the firmware data.

Download finished normally			Download errors			
LED indicators			LED indicators	Description	Cause	Corrective action
				Download data error	Deficit of a file header	Obtain normal firmware.
			Deficit of a data header			
			File checksum error			
			File header version error			
		Data header version error				
				System download error	Incompatibility of firmware and system DIMM board	Confirm whether the firmware conforms to this printer.
			Defective system DIMM board		Replace the system DIMM board.	
				Download receiving error	Improper connection of parallel cable between PC and printer	Check the contact between PC and printer's interface connector.
					Defective parallel cable	Replace parallel cable.

Convention		
Red	Green	Meaning
		Slow flashing
		Fast flashing
		Lit
		Off

If the corrective action above does not solve the problem, replace engine board (KP-1046). See page 1-5-9.

2-1-1 Paper feeding system

The paper feeding system picks up paper from the cassette, MP tray, or if installed, the paper feeder, feeds it in the copier, and delivers in the output tray. Paper is fed at the precise timing in synchronization with data processing. The paper feeding system finally delivers the printed page to either the face-down or face-up tray as manipulated by the user.

The figure below shows the components in the paper feeding system and the paths through which the paper travels. The sensors, clutches, etc., are described in the following pages.

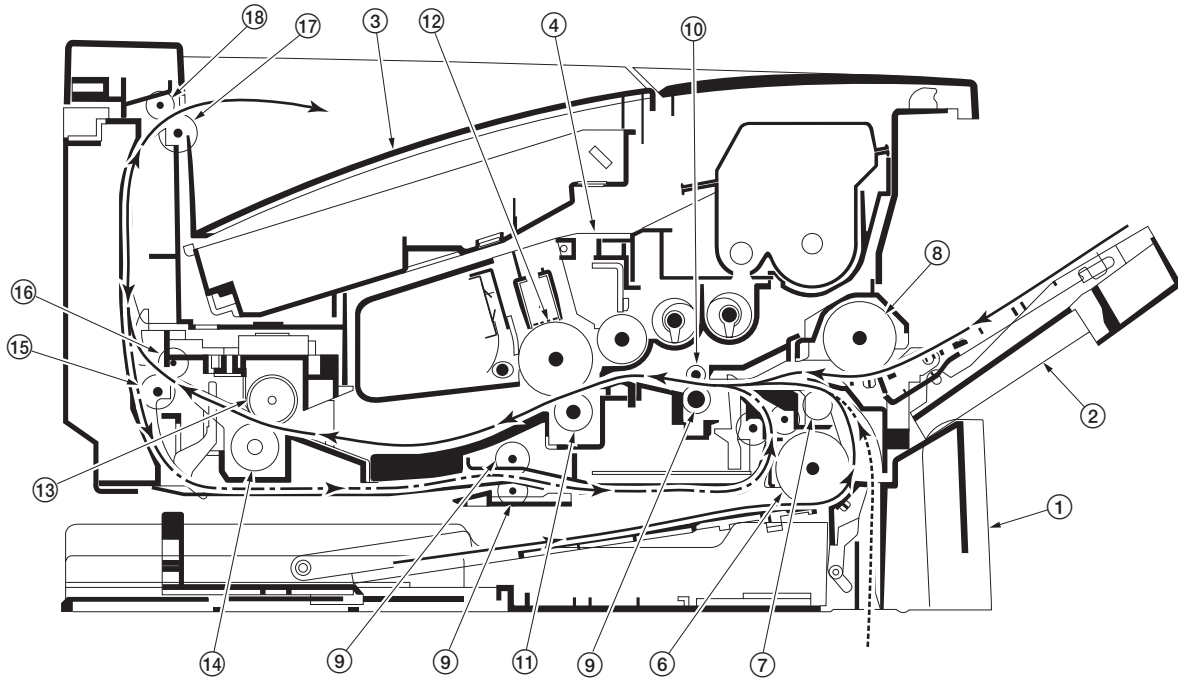


Figure 2-1-1 Paper feeding path

- | | |
|-----------------------------|-----------------------------|
| ① Cassette | ⑩ Upper registration roller |
| ② MP tray | ⑪ Transfer roller |
| ③ Face-down output tray | ⑫ Drum |
| ④ Process unit | ⑬ Heat roller |
| ⑤ Fuser unit | ⑭ Press roller |
| ⑥ Feed roller | ⑮ Lower exit roller |
| ⑦ Feed pulley | ⑯ Exit pulley |
| ⑧ MP feed roller | ⑰ Upper exit roller |
| ⑨ Lower registration roller | ⑱ Exit pulley |

(1) Paper feed control

The following diagram shows interconnectivity of the feeding system components including the sensors and rollers. The engine board provides the signals in conjunction with the electrophotography process that is driven by the main board.

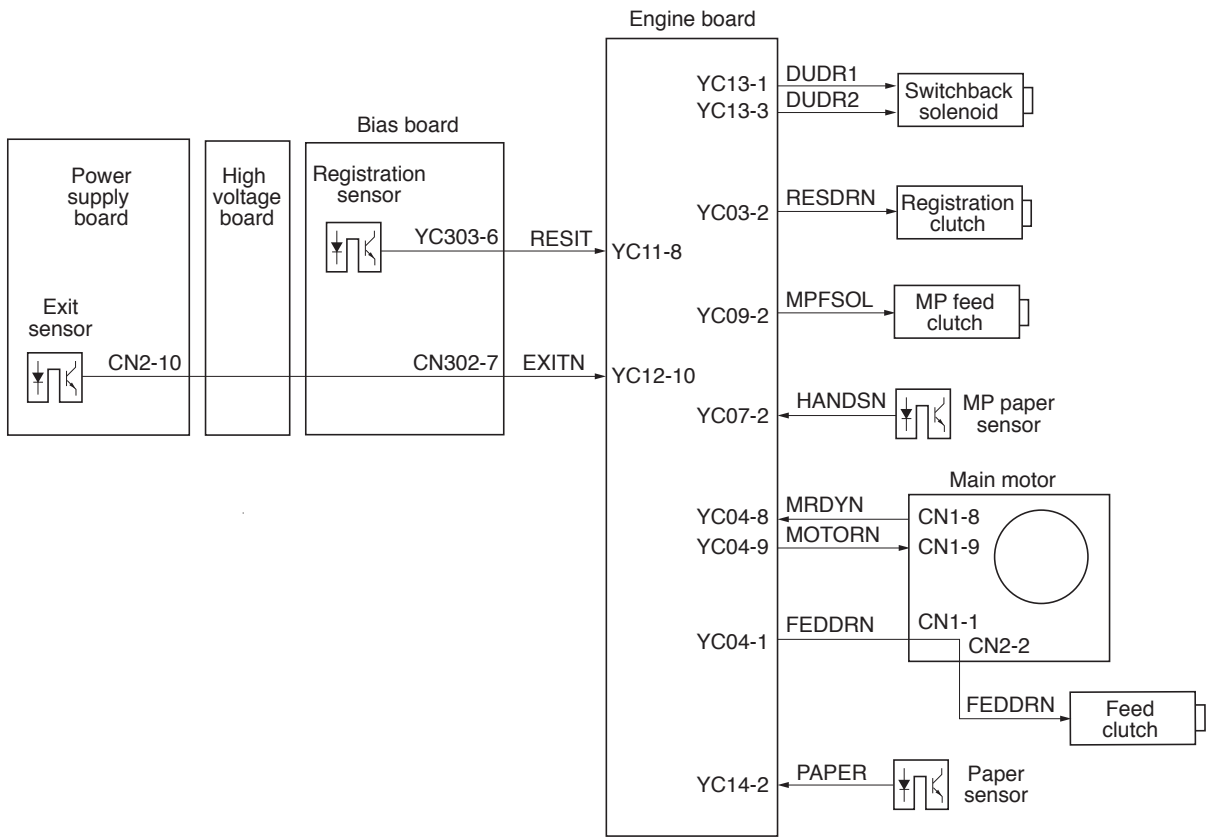


Figure 2-1-2 Paper feed control

(2) Paper feeding mechanism

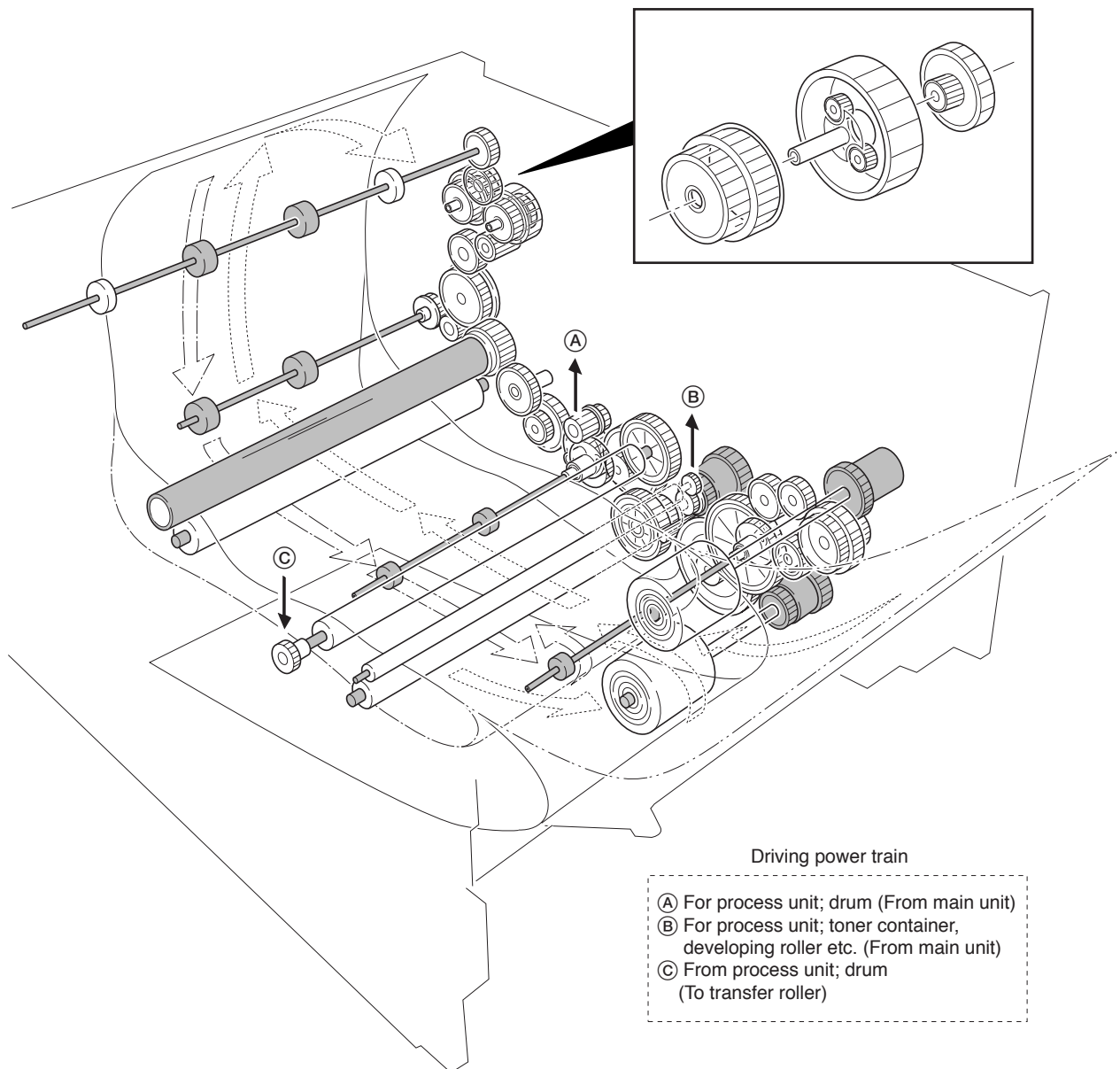


Figure 2-1-3 Paper feeding mechanism

2-1-3 Electrophotographic system

Electrophotography is the technology used in laser printing which transfer data representing texts or graphics objects into a visible image which is developed on the photosensitive drum, finally fusing on paper, using light beam generated by a laser diode.

This section provides technical details on the copier's electrophotography system.

(1) Electrophotographic cycle

The electrophotography system of the copier performs a cyclic action made of six steps as follows. Each step is technically explained in the following sections.

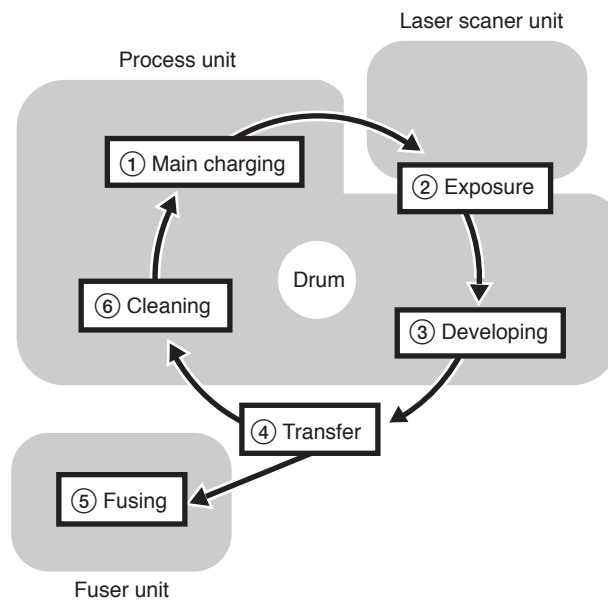
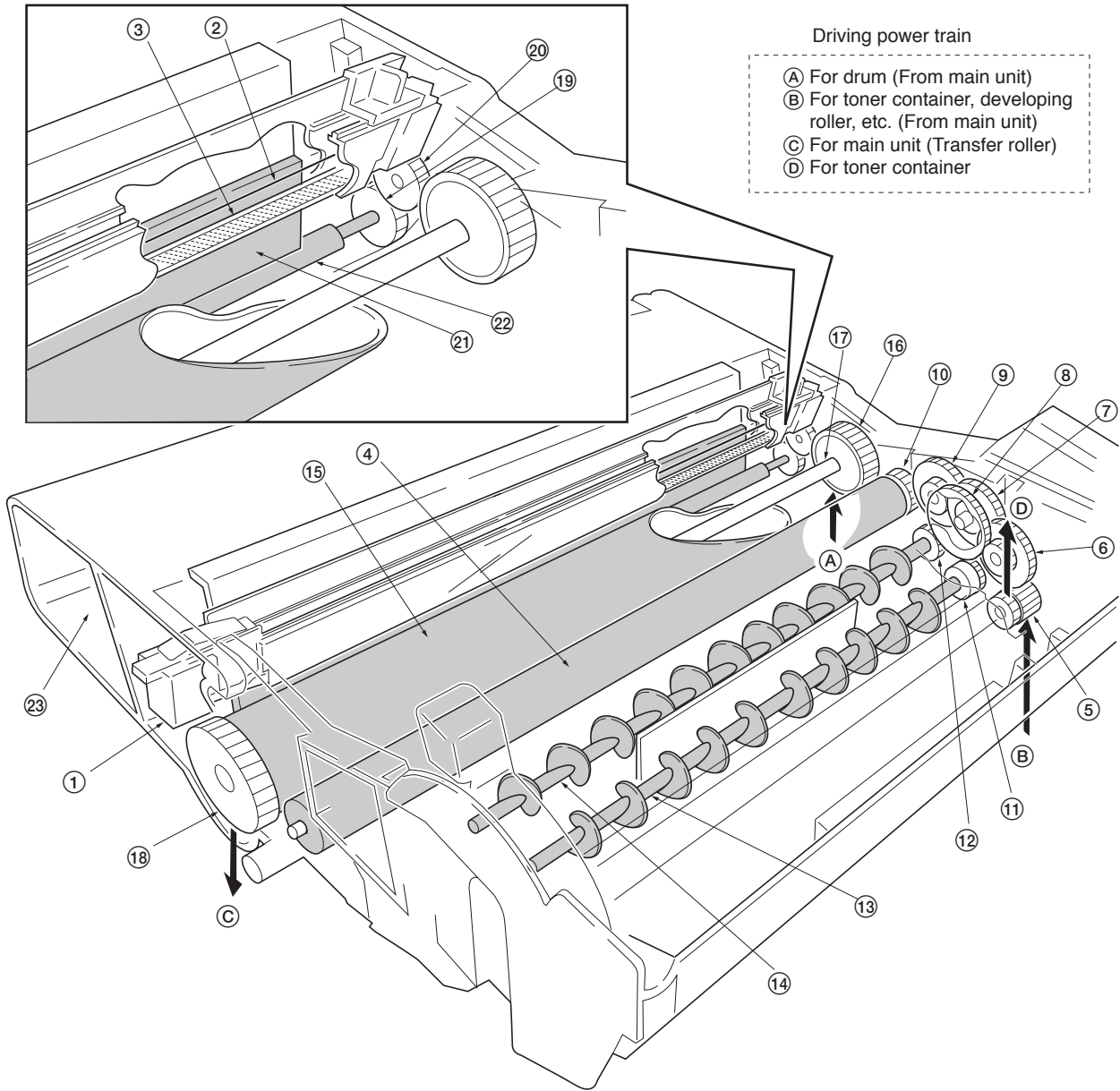


Figure 2-1-4 Electrophotographic cycle

The sections for main charging, exposure (drum), developing, and cleaning are modularized in one Process unit.

(1-1) Process unit mechanism



Driving power train

- Ⓐ For drum (From main unit)
- Ⓑ For toner container, developing roller, etc. (From main unit)
- Ⓒ For main unit (Transfer roller)
- Ⓓ For toner container

Figure 2-1-5 Process unit mechanism

- | | |
|---------------------|-------------------------|
| ① Main charger unit | ⑬ DLP screw B |
| ② Charger wire | ⑭ DLP screw A |
| ③ Grid | ⑮ Drum |
| ④ Developing roller | ⑯ Drum gear Z35H |
| ⑤ Gear Z14-Z18 | ⑰ Drum shaft |
| ⑥ Gear Z14-Z36 | ⑱ Drum gear Z36 |
| ⑦ Gear Z18-Z36 | ⑲ Sweep gear Z13 |
| ⑧ Free gear Z40 | ⑳ Idle gear 18H |
| ⑨ Gear Z18-Z35H | ㉑ Cleaning blade |
| ⑩ MAG gear Z24H | ㉒ Sweep roller |
| ⑪ Mixer gear Z20 B | ㉓ Waste toner reservoir |
| ⑫ Mixer gear Z20 A | |

(2) Main charging

(2-1) Photo conductive drum

The durable layer of organic photoconductor (OPC) is coated over the aluminum cylinder base. The OPC tend to reduce its own electrical conductance when exposed to light. After a cyclic process of charging, exposure, and development, the electrostatic image is constituted over the OPC layer.

Since the OPC is materialized by resin, it is susceptible to damage caused by sharp edges such as a screwdriver, etc., resulting in a print quality problem. Also, finger prints can cause deterioration of the OPC layer, therefore, the drum (in the process unit) must be handled with care. Substances like water, alcohol, organic solvent, etc., should be strictly avoided.

As with all other OPC drums, the exposure to a strong light source for a prolonged period can cause a print quality problem. The limit is approximately 500 lux for less than five minutes. If the drum (process unit) remains removed from the copier, it should be stored in a cool, dark place.

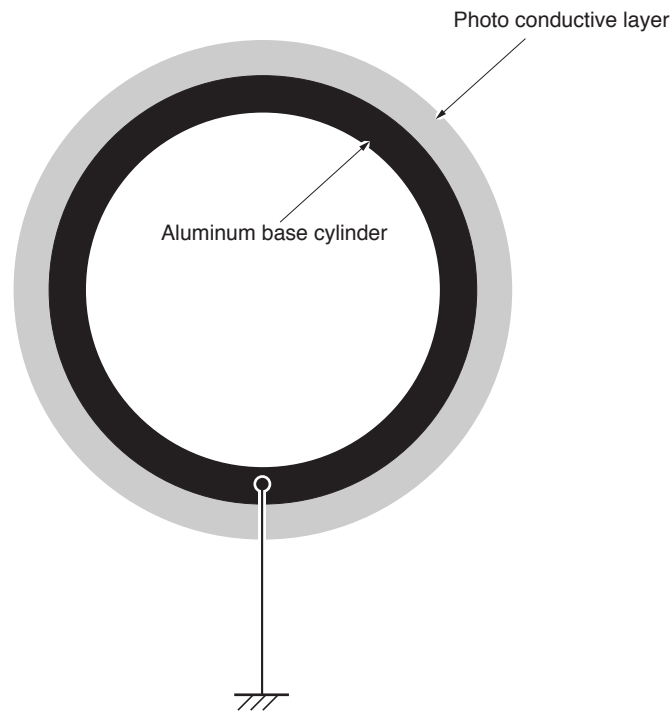


Figure 2-1-6 Photo conductive drum

(2-2) Charging the drum

The following shows a simplified diagram of the electrophotographic components in relation to the engine system. Charging the drum is done by the main charger unit (A).

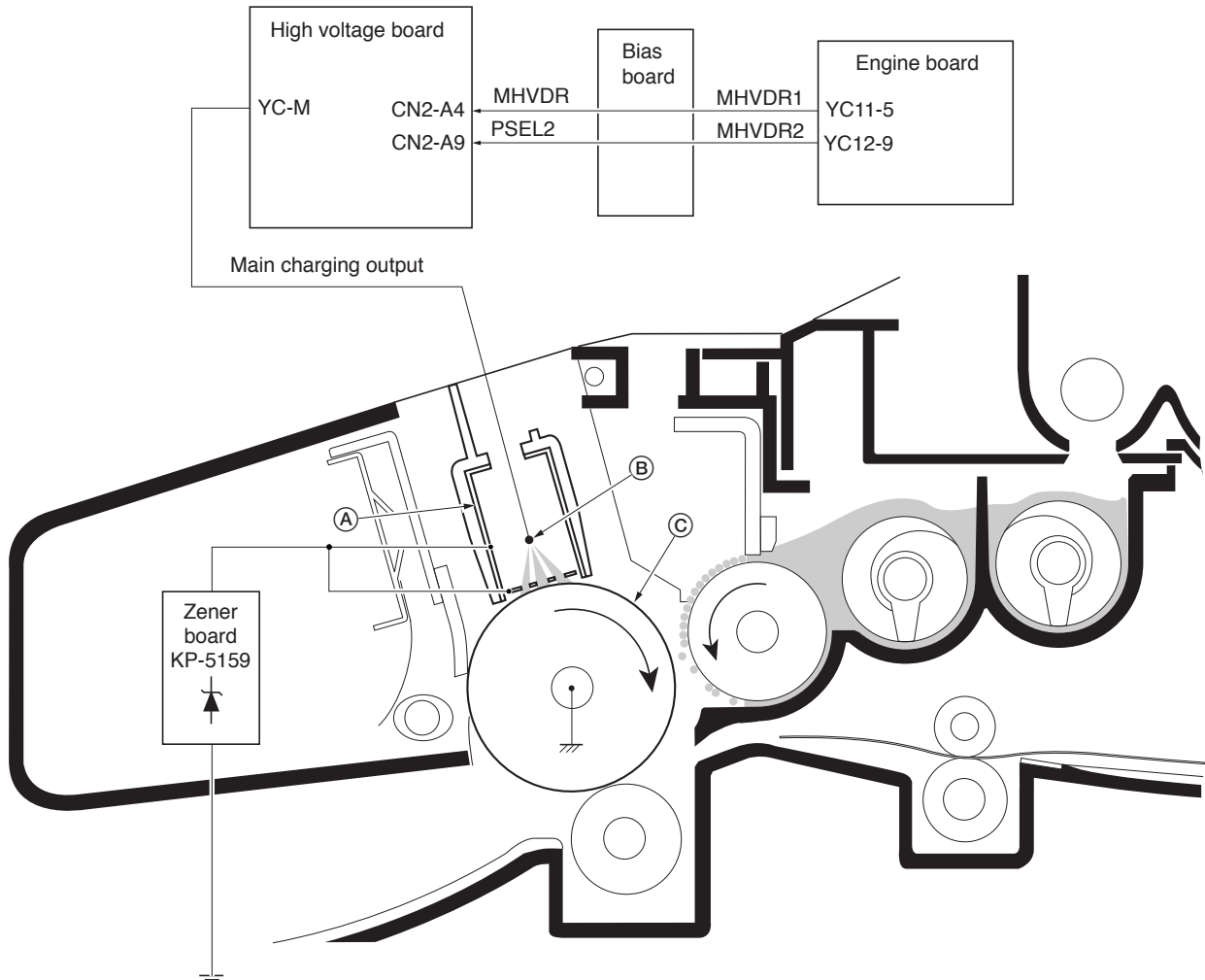


Figure 2-1-7 Charging the drum

As the drum (C) rotates in a "clean (neutral)" state, its photoconductive layer is given a uniform, positive (+) corona charge dispersed by the main charger wire (B).

Due to high-voltage scorotron charging, the charging wire can get contaminated by oxidization after a long run. Therefore, it must be cleaned periodically from time to time. Cleaning the charging wire prevents print quality problems such as black streaks.

(3) Exposure

The charged surface of the drum (A) is then scanned by the laser beam from the laser scanner unit (B).

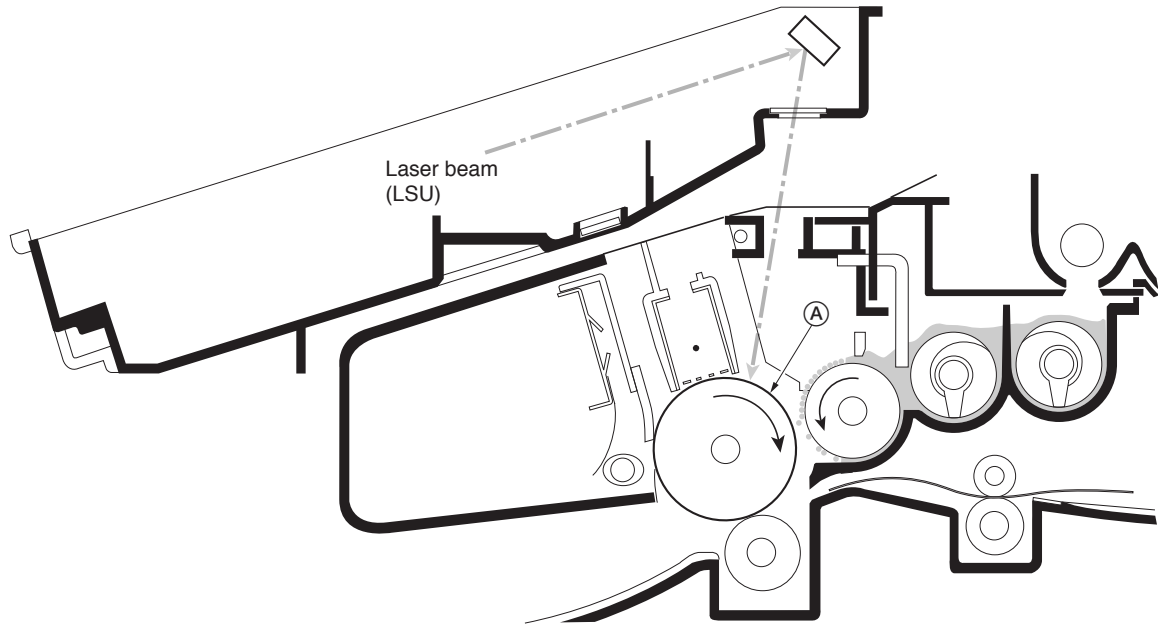


Figure 2-1-8 Exposure

The laser beam (780 nm wavelength) beam is dispersed as the polygon motor (polygon mirrors) revolves to reflect the laser beam over the drum. Various lenses and mirror are housed in the scanner unit, adjust the diameter of the laser beam, and focalize it at the drum surface.

(3-1) Laser scanner unit

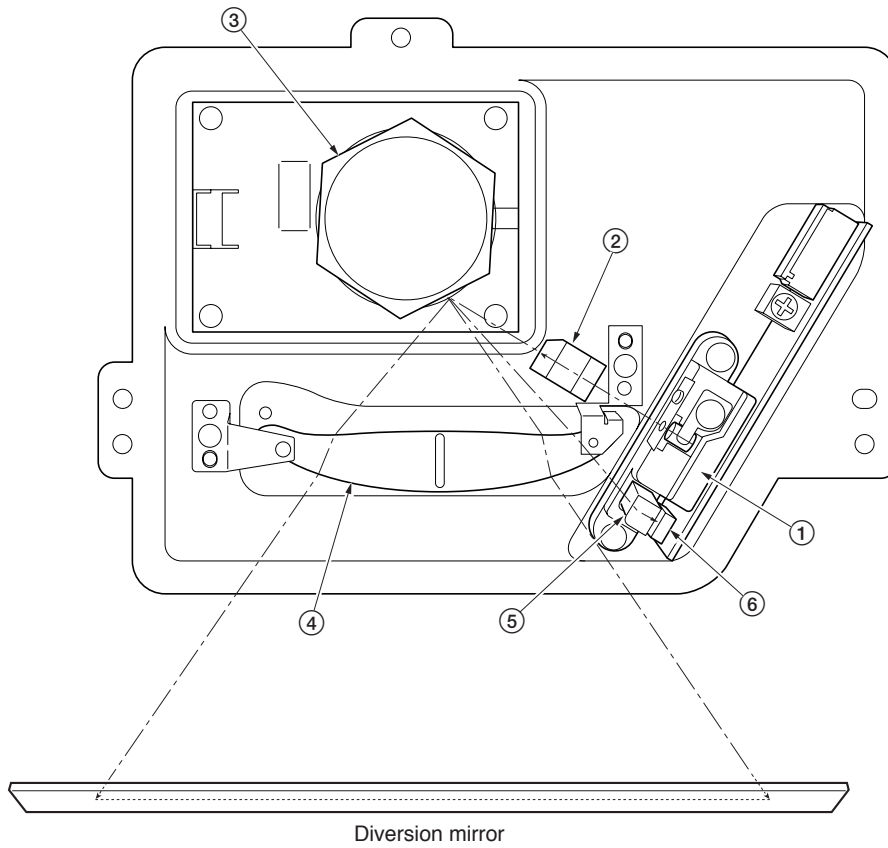


Figure 2-1-9 Laser scanner unit

- ① Laser diode Emits diffused, visible laser.
- ② Cylindrical lens Compensates the vertical angle at which the laser beam hits a polygon mirror segment.
- ③ Polygon mirror (motor) Has six mirror segments around its hexagonal circumference; each mirror corresponding to one scanned line width on the drum when laser beam scans on it.
- ④ F-theta lens The f-theta lens equalizes focusing distortion on the far ends of the drum.
- ⑤ Sensor mirror Bends the very first shot of a laser scan towards the beam detection sensor (⑥).
- ⑥ Pin photo sensor When shone by the sensor mirror above, this photo-sensor generates a trigger signal for the engine controller to start activating the paper feeding system.

(3-2) Drum surface potential

The laser beam is continually switched on and off depending on the print data. It is on for a black (exposed) dot and off for a white (blank) dot. Since the drum surface is evenly charged, whenever it is illuminated by the laser beam, the electrical resistance of the photoconductor is reduced and the potential on the photoconductor is also lowered. Resulted on the drum surface is an electrostatic image which represents the data to print. Note that the area to be printed black has the low potential, constituting a "positively exposed" image.

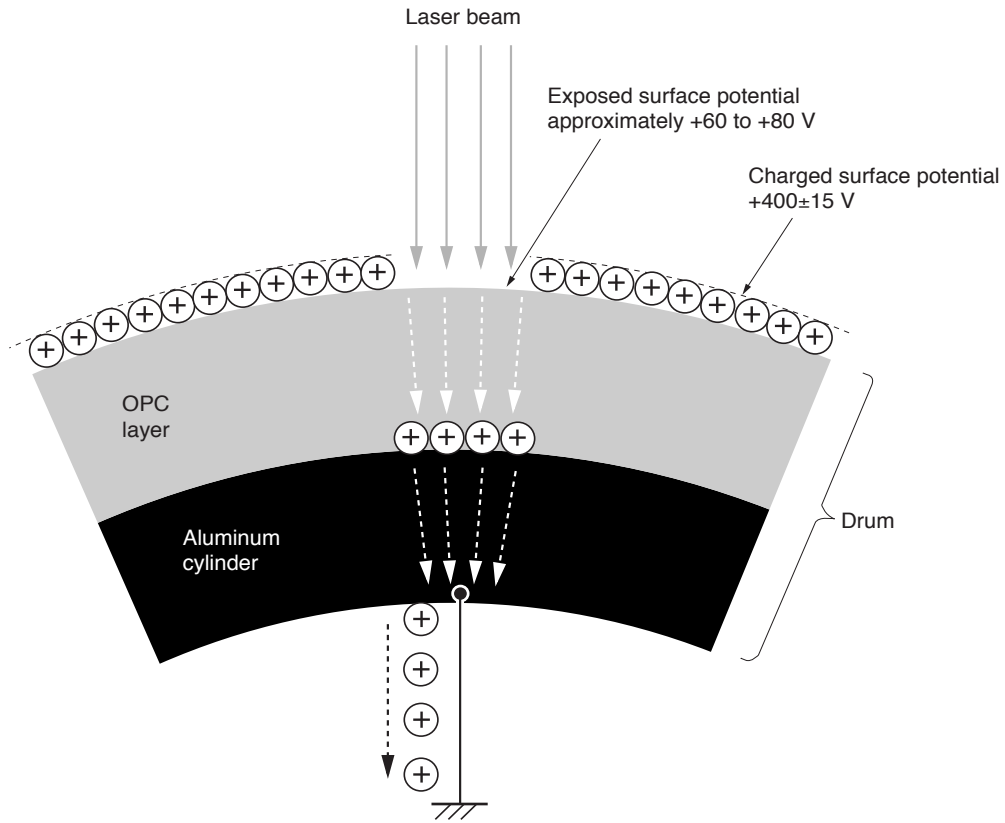


Figure 2-1-10 Drum surface potential

(4) Development

The latent image constituted on the drum is developed into a visible image. The developing roller (A) contains a 3-pole (S-N-S) magnet core (B) and an aluminum cylinder rotating around the magnet core (B). Toner attracts to the developing roller (A) since it is powdery ink made of black resin bound to iron particles. Doctor blade (C), magnetized by magnet (D), is positioned approximately 0.3 mm above the developing roller (A) to constitute a smooth layer of toner in accordance with the roller revolution.

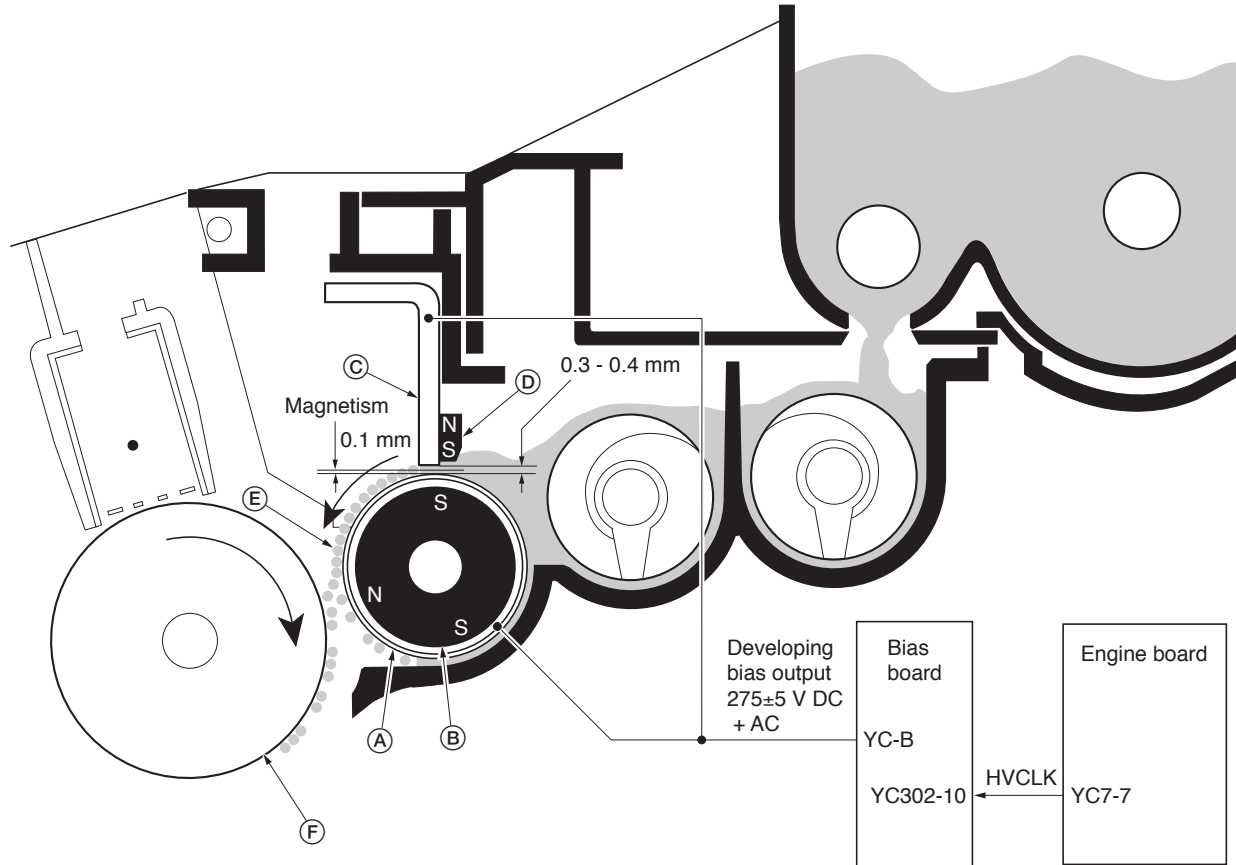


Figure 2-1-11 Development

The developing roller (A) is applied with the AC-weighted, positive DC power source. Toner (E) on the developing roller (A) is given a positive charge. The positively charged toner (E) is then attracted to the areas of the drum (F) which was exposed to the laser light. (The gap between the drum (F) and the developing roller (A) is approximately 0.3 mm.) The non-exposed areas of the drum (F) repel the positively charged toner as these areas maintain the positive charge. The developing roller (A) is also AC-biased to ensure contrast in yielding by compensating the toner's attraction and repelling action during development.

(5) Transfer

The image developed by toner on the drum (A) is transferred onto the paper because of the electrical attraction between the toner itself and the transfer roller (B). The transfer roller is negatively biased so that the positively charged toner is attracted onto the paper while it is pinched by the drum and the transfer roller.

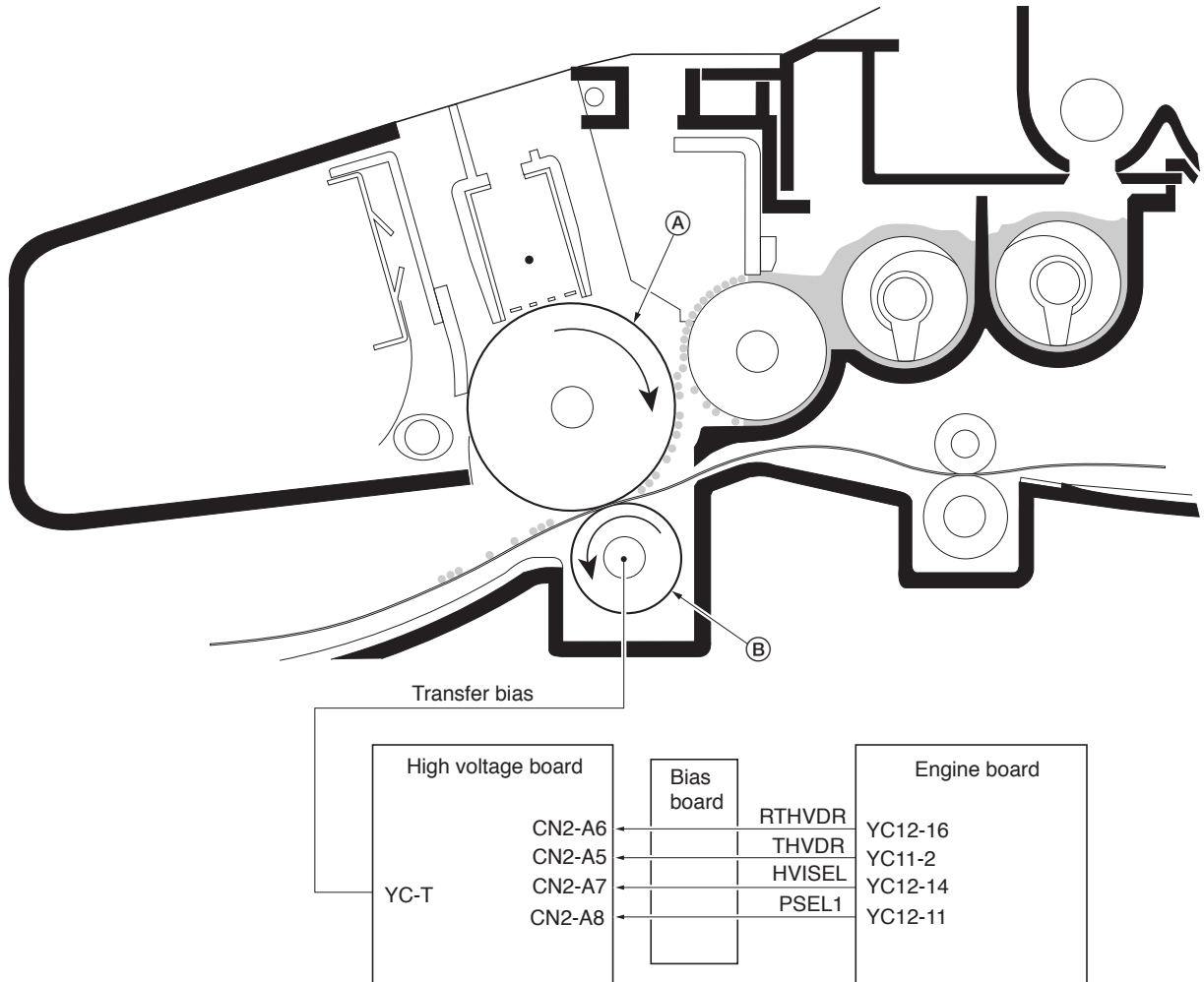


Figure 2-1-12 Transfer

The nominal transfer bias is set to approximately -1.8 kV (limit) with the -6 mA current. Since the ideal potential of the transfer bias depends on the thickness of paper, the bias is raised to approximately -2.5 kV/-6 mA for thicker paper. On the other hand, the bias current is reduced to -1.8 kV/-6 mA for thin paper.

(6) Fusing

The toner on the paper is molten and pressed into the paper as it passes between the heat roller (A) and the press roller (B) in the fuser unit.

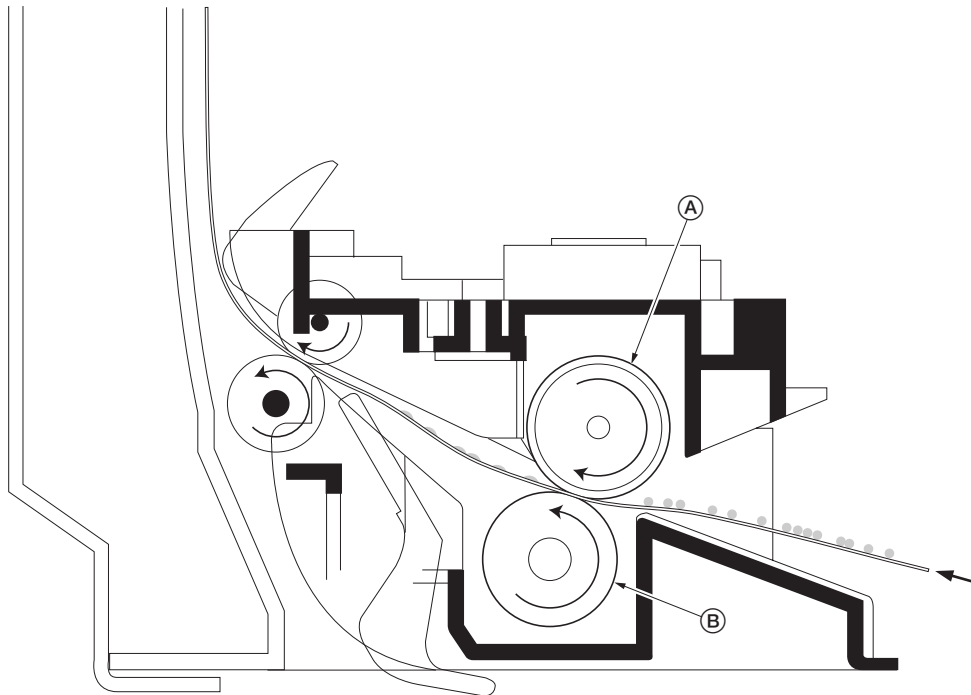


Figure 2-1-13 Fusing

The heat roller has a halogen lamp inside which continuously turns on and off by the thermistor to maintain the constant temperature onto the heat roller surface.

The heat roller is resin coated by fluorin to prevent toner from accumulating on the roller after a long run. Care must be taken while handling the heat roller not to scratch the roller surface as doing so may result in print problems.

The heat roller has four claws which are continuously in contact with its surface. These claws prevent the paper on which toner has been fused from being wound around the heat roller causing paper jam.

The pressure roller is made of the heat-resistant silicon rubber. This roller is used to strongly press the paper towards the heat roller by means of coil springs.

The temperature of the heat roller is constantly monitored by the engine board using the thermistor and triac. Should the temperature of the heat roller exceed the predetermined value, the thermal cutout is activated to effectively disconnect the heater (halogen) lamp from power.

(6-1) Fuser unit mechanism

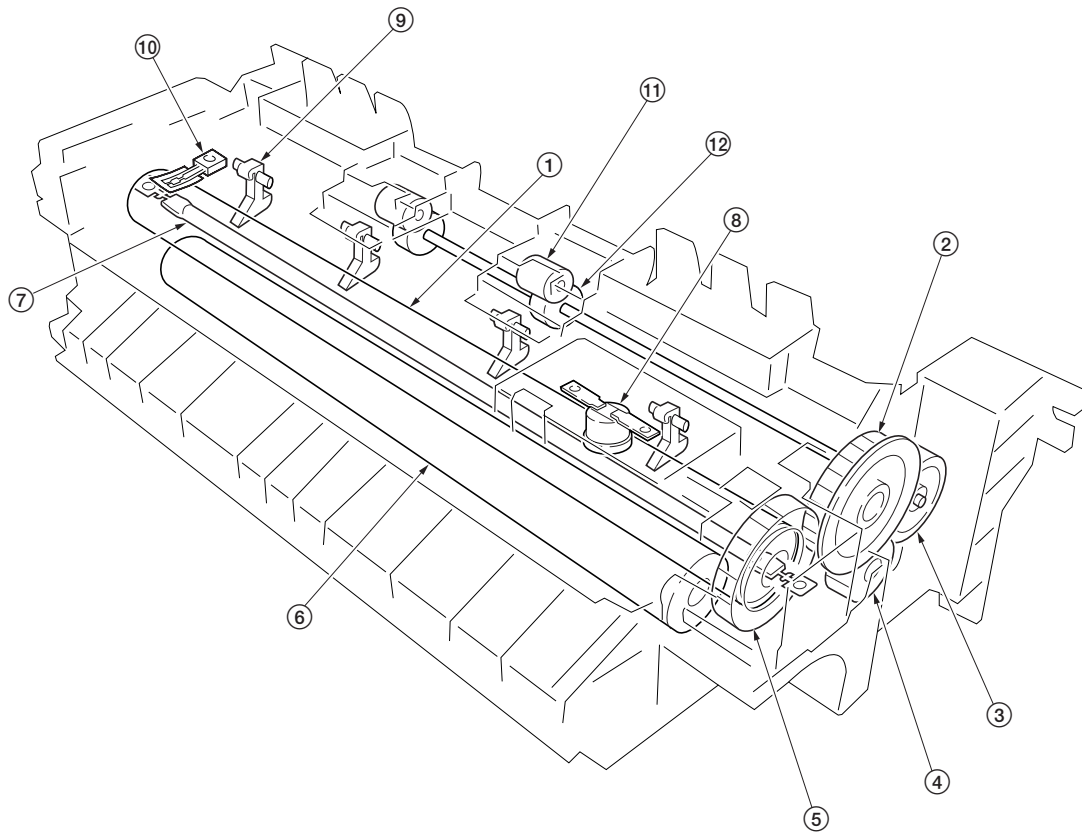


Figure 2-1-14 Fuser unit mechanism

- | | |
|-----------------|---------------------|
| ① Heat roller | ⑦ Heater lamp |
| ② Idle gear Z34 | ⑧ Thermal cutout |
| ③ Exit gear Z23 | ⑨ Separator(s) |
| ④ Idle gear Z18 | ⑩ Thermistor |
| ⑤ Heat gear Z33 | ⑪ Exit pulley(s) |
| ⑥ Press roller | ⑫ Lower exit roller |

(7) Cleaning

After the transferring process, the drum needs to be physically cleaned of toner which is residual after the development process. The cleaning blade (A) is constantly pressed against the drum (B) and scrapes the residual toner off to the sweep roller (C). The waste toner is collected at the output end of the sweep roller (C) and sent back to the toner container, into the waste toner reservoir (D).

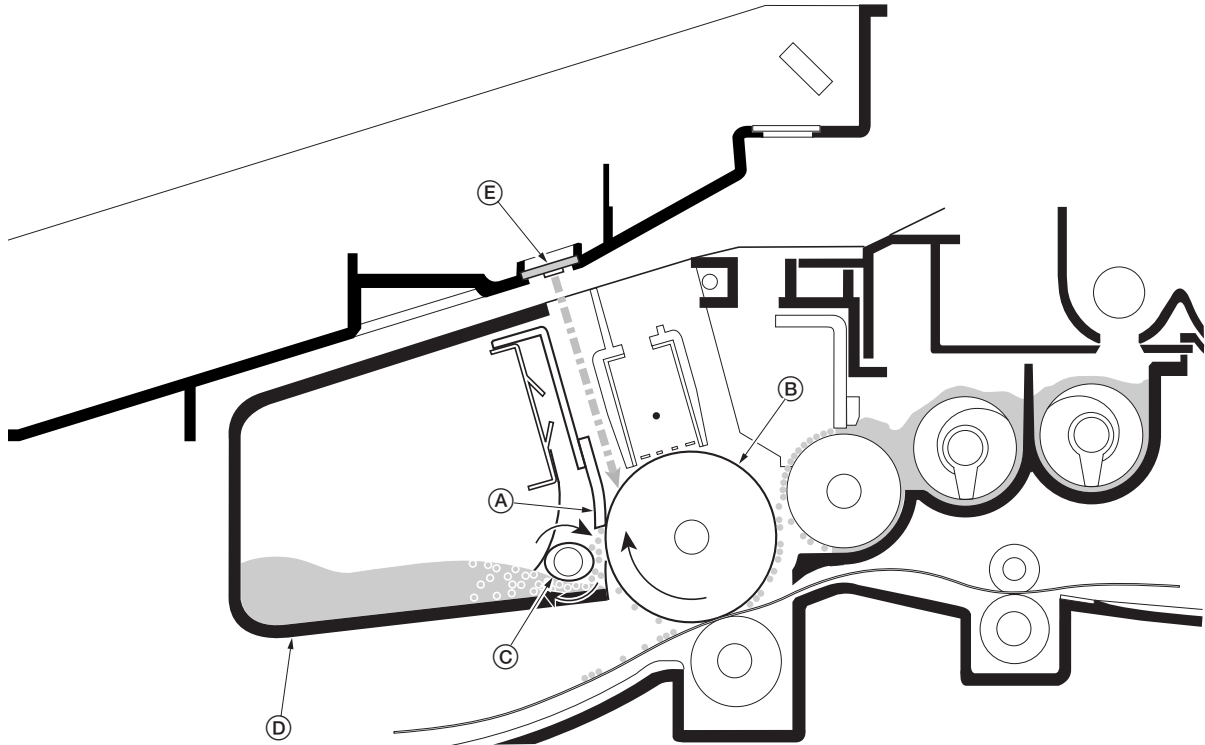


Figure 2-1-15 Drum cleaning and erasing static charge

After the drum (B) is physically cleaned, it then must be cleaned to the electrically neutral state. This is necessary to erase any residual positive charge, ready to accept the uniform charge for the next print process. The residual charge is canceled by exposing the drum (B) to the light emitted from the eraser lamp (E). This lowers the electrical conductivity of the drum surface making the residual charge on the drum surface escape to the ground.

2-2-1 Electrical parts layout

(1) Electrical parts layout

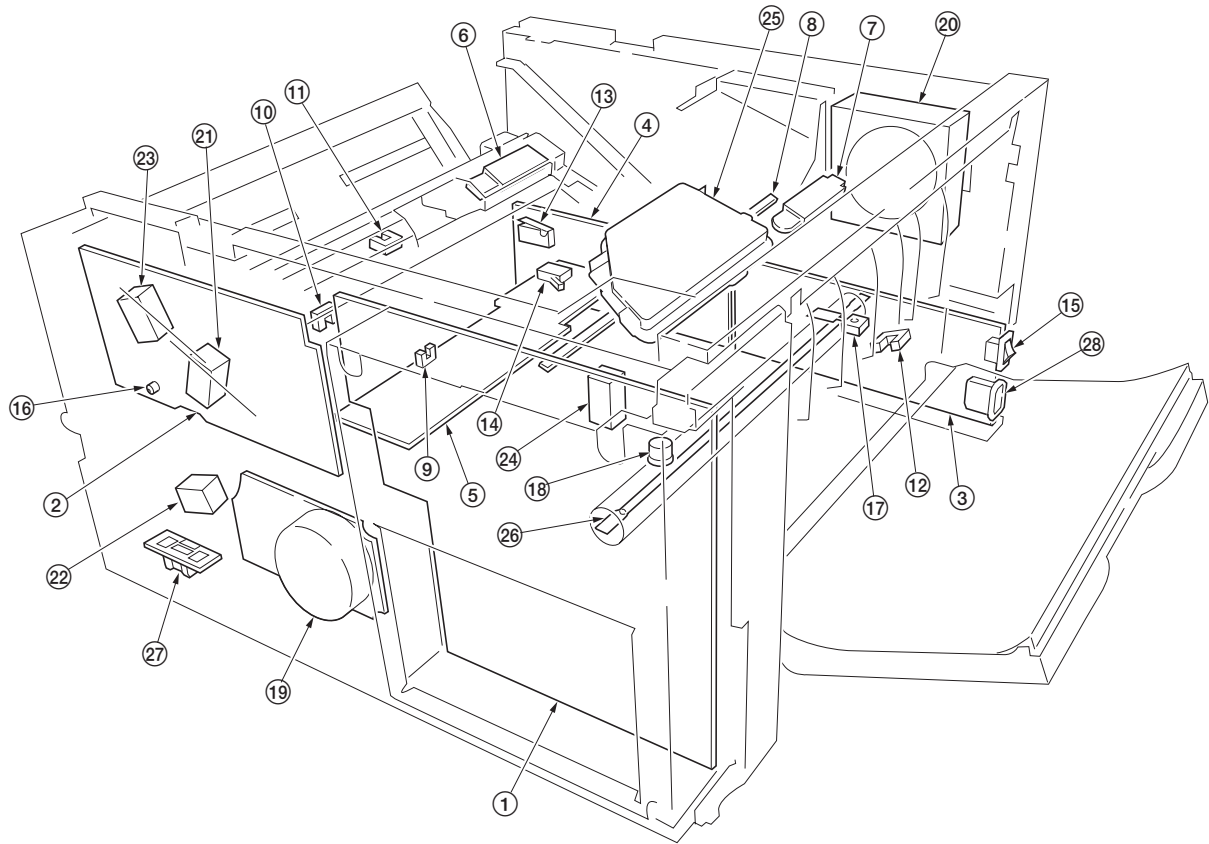


Figure 2-2-1 Electrical parts layout

- | | |
|--------------------------------------|------------------------------------|
| ① Main board (KP-1050) | ⑮ Power switch |
| ② Engine board (KP-1046) | ⑯ Temperature thermistor |
| ③ Power supply board | ⑰ Fuser thermistor |
| ④ High voltage board | ⑱ Thermal cutout |
| ⑤ Bias board (KP-1051) | ⑲ Main motor |
| ⑥ Toner sensor [PWB] (KP-5055) | ⑳ Cooling fan |
| ⑦ Waste toner sensor [PWB] (KP-5155) | ㉑ Registration clutch |
| ⑧ Eraser lamp [PWB] (KP-5157) | ㉒ Feed clutch |
| ⑨ Registration sensor | ㉓ MP feed clutch |
| ⑩ Paper sensor | ㉔ Switchback solenoid |
| ⑪ MP paper sensor | ㉕ Laser scanner unit |
| ⑫ Exit sensor | ㉖ Heater lamp |
| ⑬ Interlock switch | ㉗ Paper feeder interface connector |
| ⑭ Cassette switch | ㉘ AC Inlet |

2-3-1 Main board

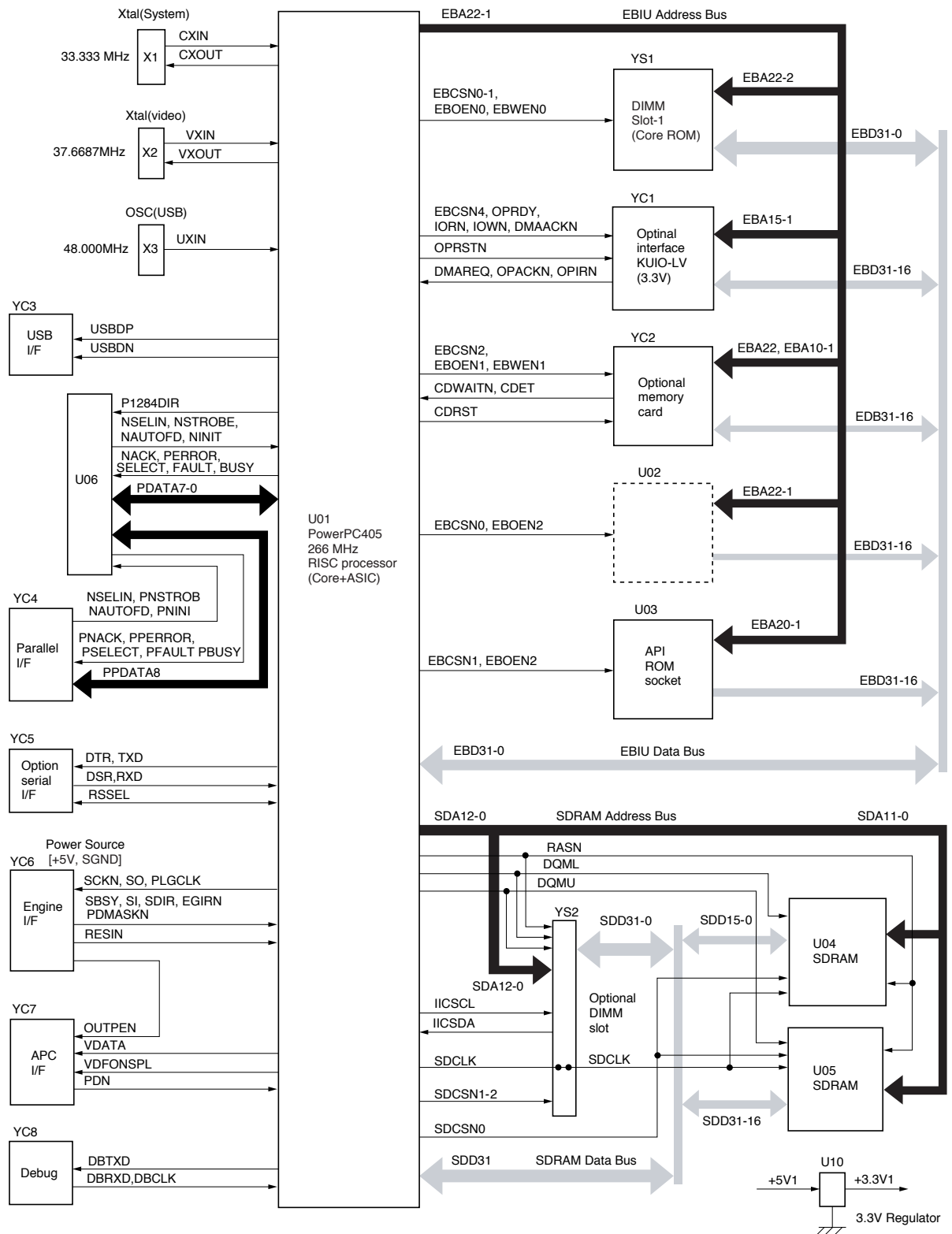


Figure 2-3-1 Main board circuit block diagram

2-3-2 Engine board

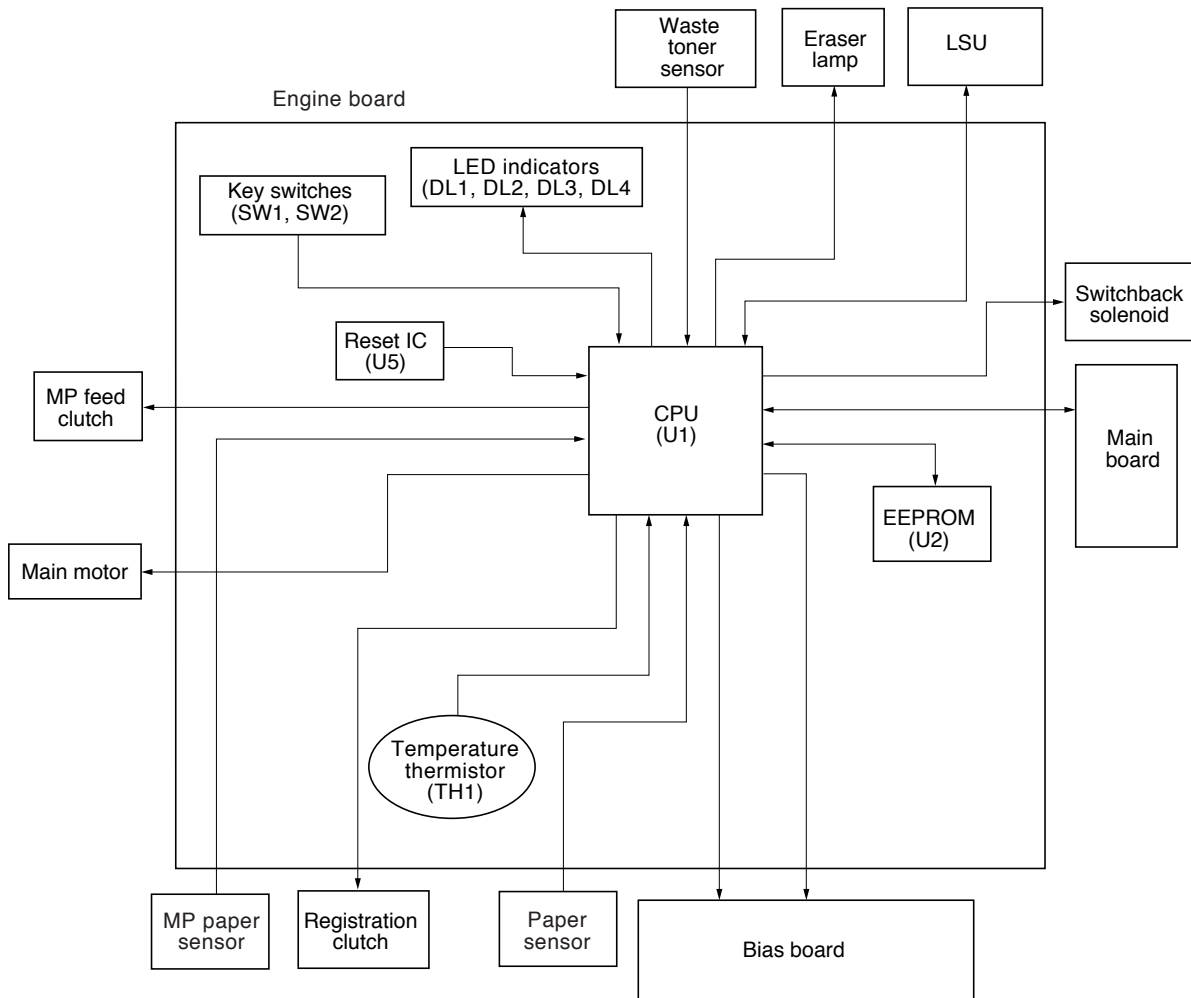


Figure 2-3-2 Engine board circuit block diagram

(1) Eraser lamp control circuit

The CPU (U1) turns pin #23 (ERASER) of U1 to H level, transistors (Q14) turns on consequently, and the 24 V DC given at pin #1 of connector YC5 applies to the eraser lamps. The eraser lamps thus illuminate as the current flows through the resistors (R109, R110, and R111), eraser lamp, the pin #2 of connector YC5, transistor Q14 and the ground.

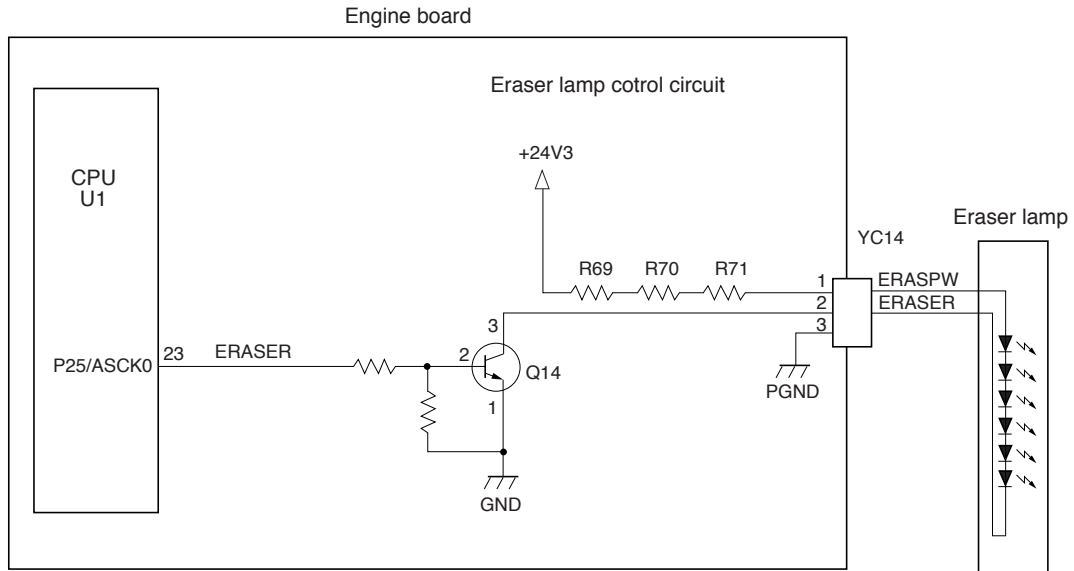


Figure 2-3-3 Eraser lamp control circuit

(2) Heater lamp control circuit

Activation of the heater lamp is dominated by the HEAT signal which is derived by the engine CPU (U1) at its pin #1. When its level is high, transistor Q10 turns on, photo-triac PC2 and triac TRA1 turn on simultaneously, and the heater lamp is applied with the primary AC voltage in turn.

Switching of triac TRA1, as affected by the HEAT signal is made in synchronization with the zero-cross signal ZCROSS which is generated by the power supply unit. The zero-cross signal detector watches the transition of alternating plus and negative current and detects the zero crosses. This detector derives the resultant ZCROSS signal at its pin #43 of the engine CPU (U1). Since abrupt change in the current flow can be significantly avoided by synchronizing triac TRCA with the zero-cross signal, the possibility of noise due to the primary AC supply is greatly reduced.

CPU (U1) selectively switches among those variations for applying voltages to the heater lamp according to the THERM signal which appears at pin #33 as feedback.

A fraction of THERM is applied to pin #2 of comparator U4-1. The comparator maintains comparison of the potential at pin #2 and pin #3 which gives a reference for the possible anomaly in the heater temperature (bred by resistors R44 and R40). Should the voltage at pin #2 exceed that at pin #3, the level at pin #1 becomes low. Since pin #1 is wired (via transistor array QA4) to the output line for the HEAT signal, the HEAT signal is enforced to be low regardless the behavior of CPU (U1), thus preventing possible heat overrun.

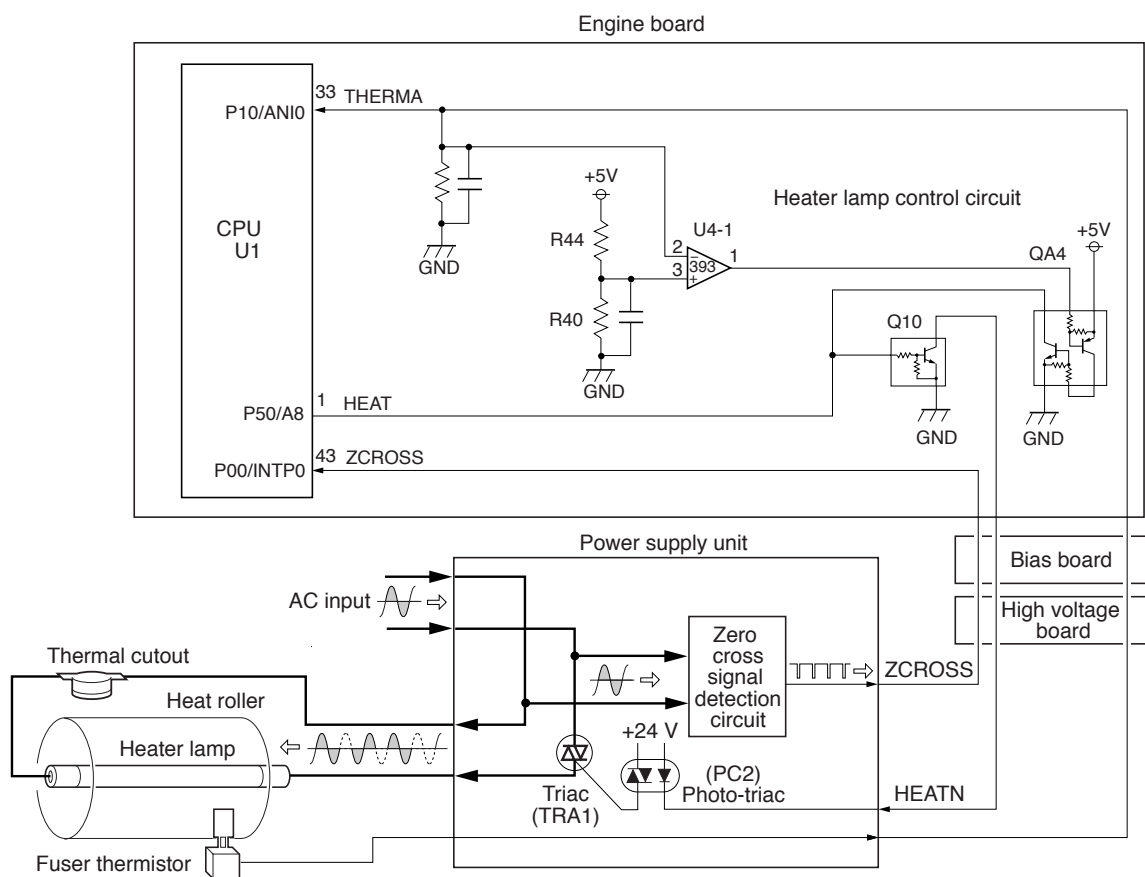


Figure 2-3-4 Heater lamp control circuit

(3) Polygon motor control circuit

The main board supplies the 2598.4 Hz clock pulse (PLGCLK) via the engine board to the PLL control IC (IC1) for the polygon motor. To begin printing, the engine CPU U1 turns PLGDR to H level, the PLL control IC (IC1) starts to revolve the polygon motor so that the revolution is 25,984 rpm which depends on the PLGCLK clock pulse. When PLL control IC (IC1) finds that the polygon motor is revolving at the rated speed, turns PLGDRN to L level to acknowledge the engine CPU that the rated speed has been achieved.

On the contrary, if PLGRDYN does not turn to L level within 8 seconds since PLGDRN has been L level.

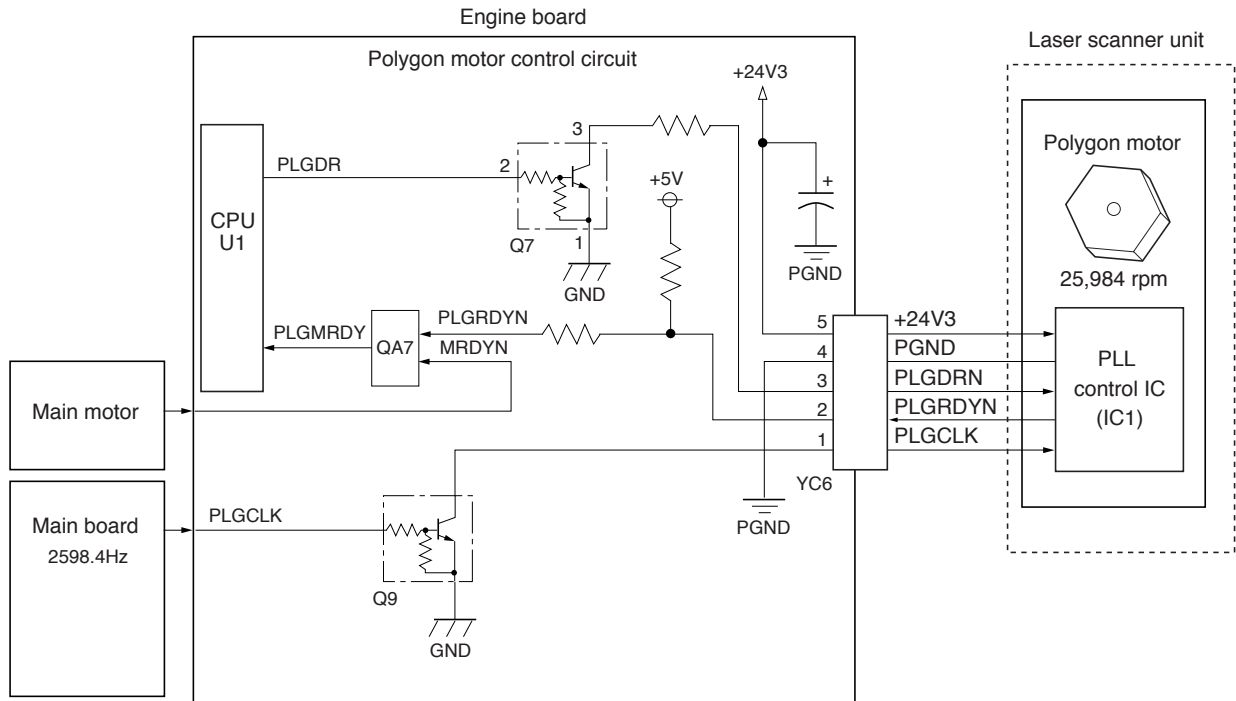


Figure 2-3-5 Polygon motor control circuit

2-3-3 Power supply board

The power supply board provides the AC power input and DC power and outputs. The high voltage bias generator circuit is mounted on a separate board. A simplified schematic diagram is shown below.

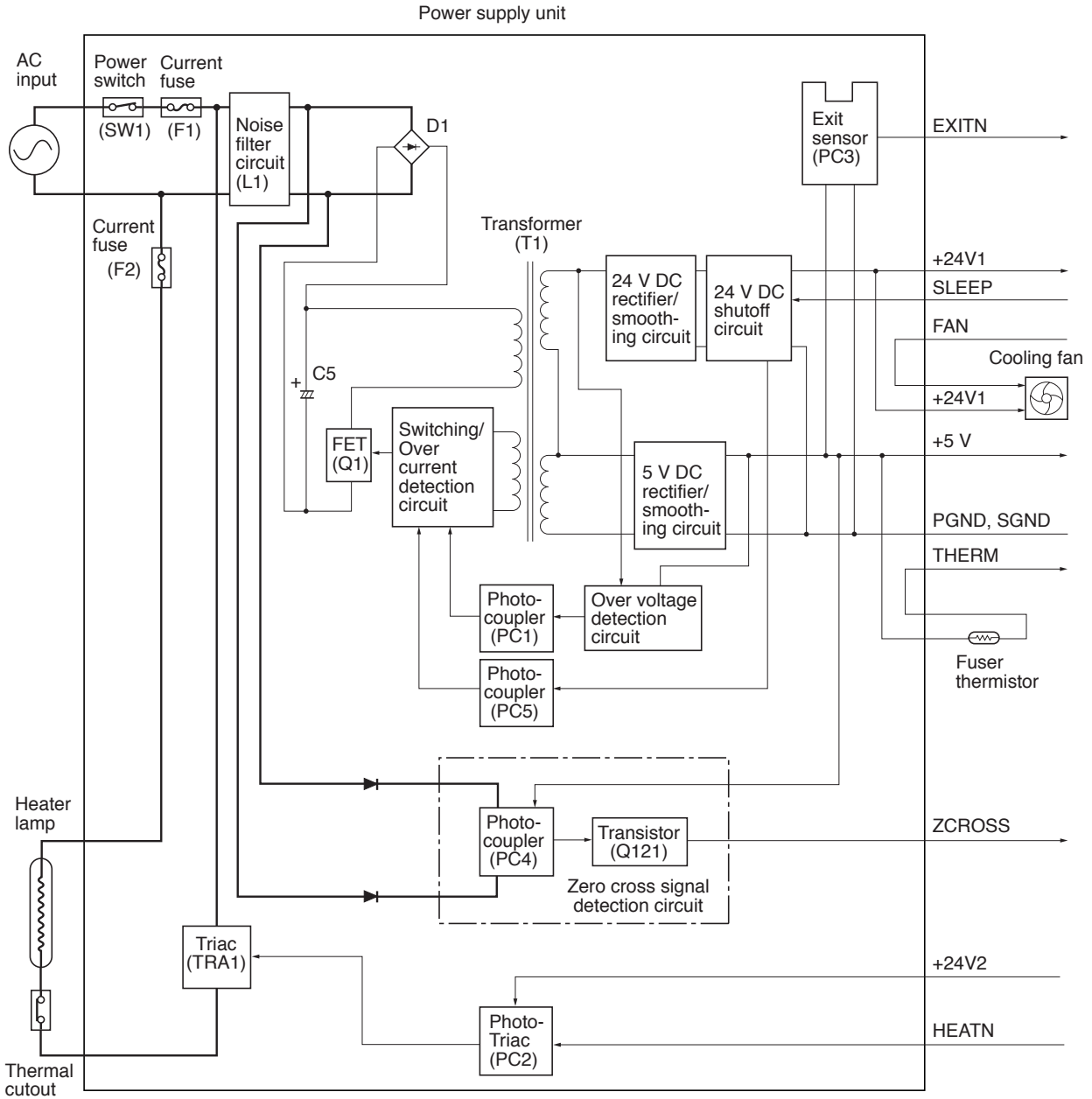


Figure 2-3-6 Power supply board circuit block diagram

2-3-4 Bias board

The bias board contains the developing bias output circuit, registration sensor, and the cassette switch. It also provides a liaison connection to the high voltage board, power supply, and the toner sensor.

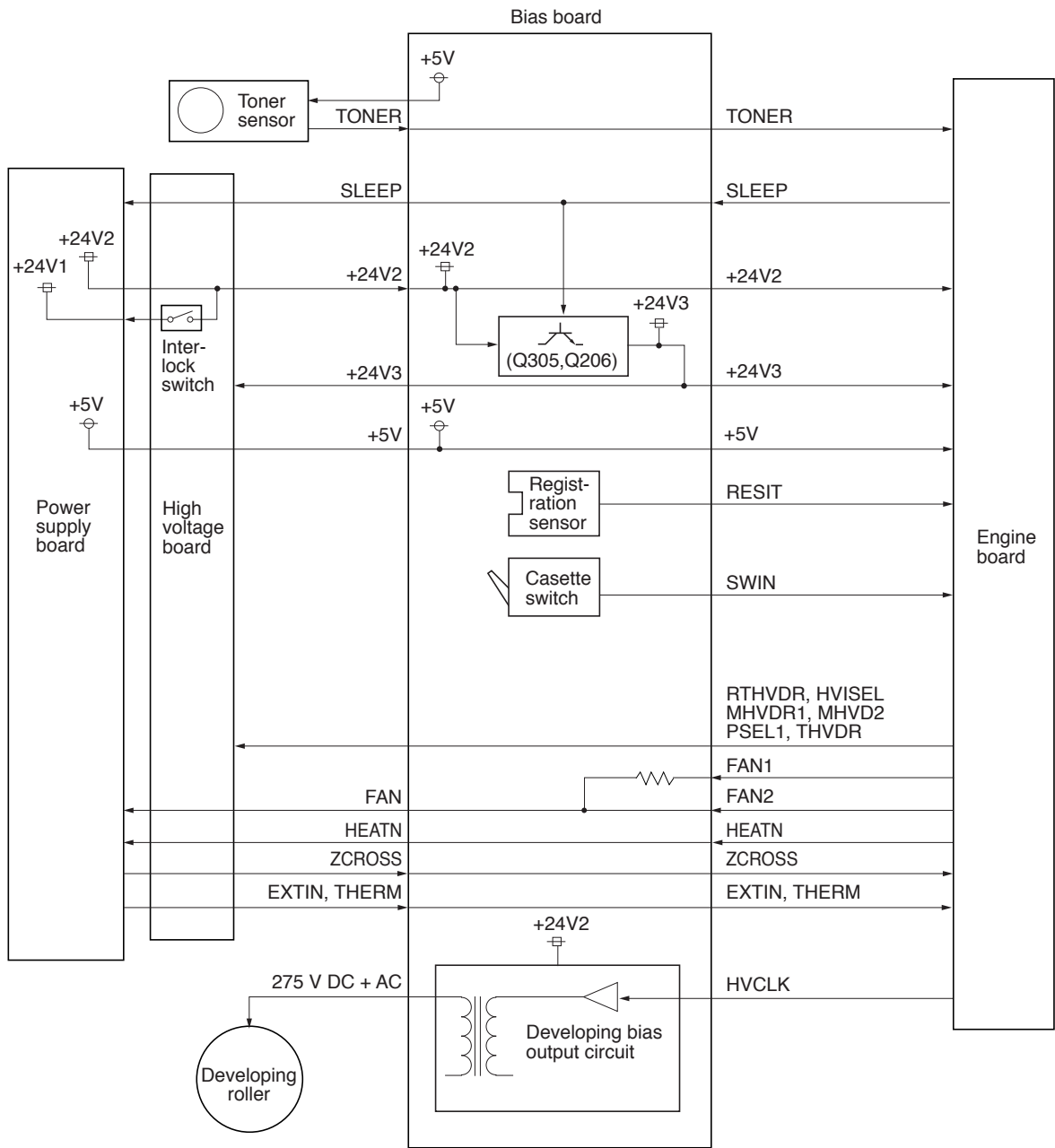


Figure 2-3-7 Bias board circuit block diagram

2-3-5 High voltage board

The high voltage board contains the high voltage output circuit, interlock switch circuit as well as providing a liaison connection with the power supply board, bias board, and the engine board.

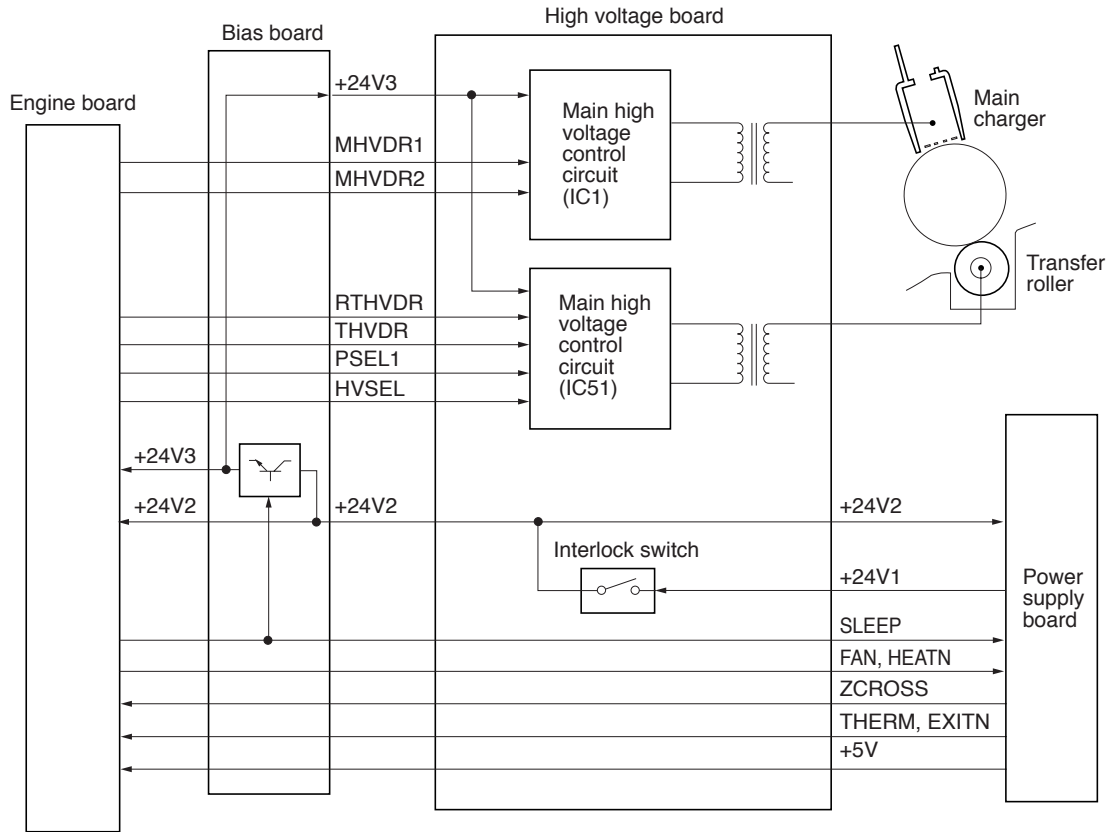


Figure 2-3-8 High voltage board circuit block diagram

(1) Interlock switch

The interlock switch is located on the high voltage board and opened and closed in conjunction with the front cover or the front top cover via the interlock lever. This switch connects and disconnects the +24 V DC power supply line. If the front cover or the front top cover is open, the interlock switch is open, and the +24 V DC to the high voltage output circuit, bias board, engine board, and the power supply board is disconnected, deactivating the high voltage output, laser output, main motor output for safety. The cooling fan is an exception: Since the cooling fan is directly fed with +24 V DC from the power supply unit at the primary side (+24V1) of the interlock switch, the cooling fan is not deactivated even the cover is open.

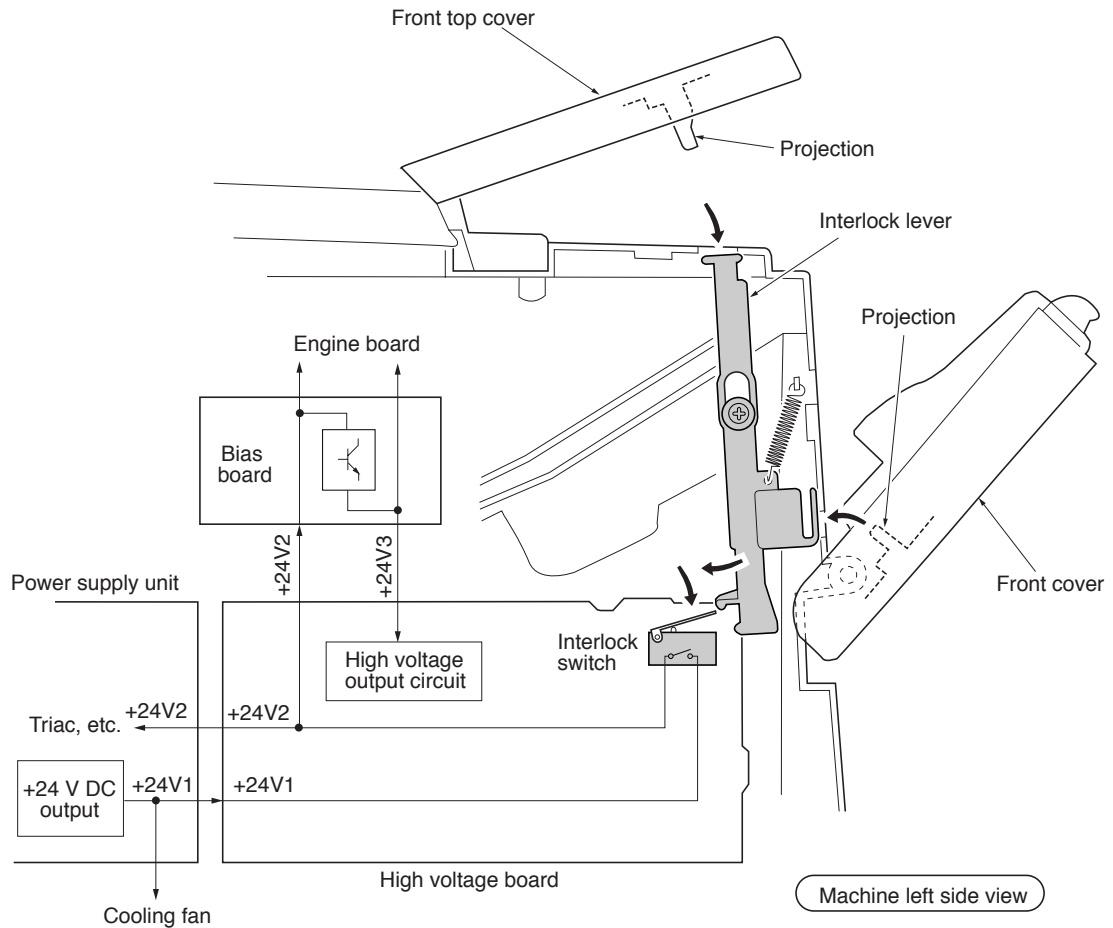
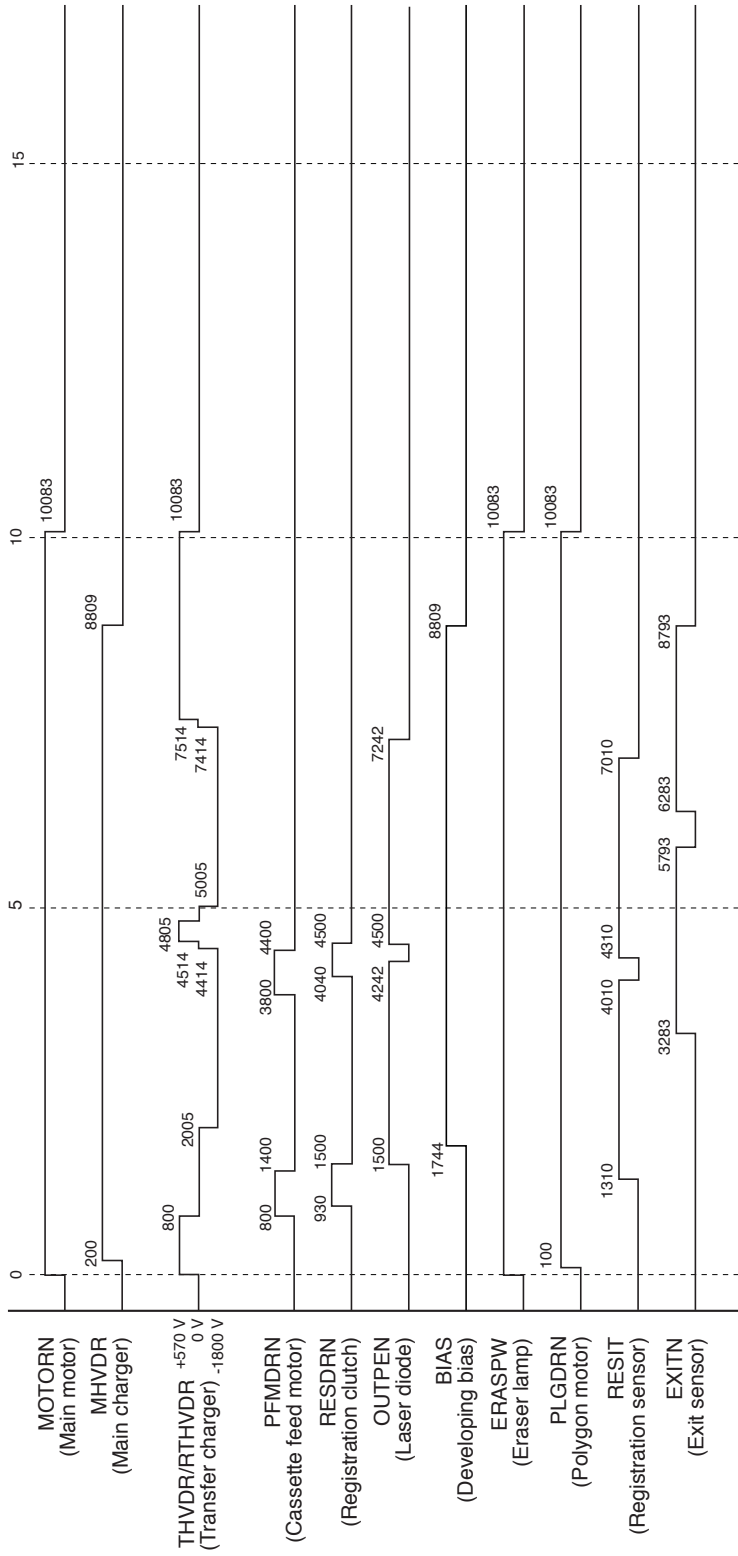


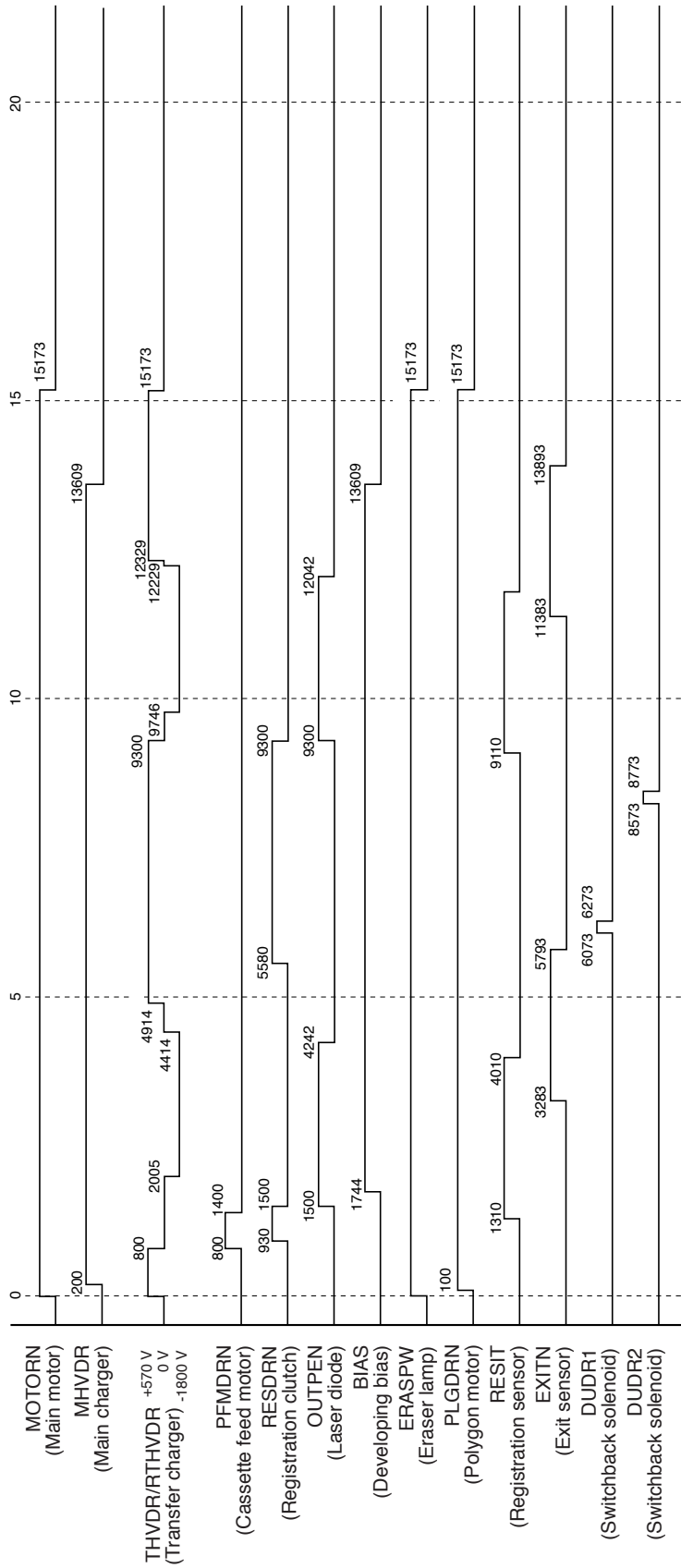
Figure 2-3-9 Interlock switch

Timing chart No. 1 Paper cassette feeding, A4/81/2" × 11" paper, simplex printing



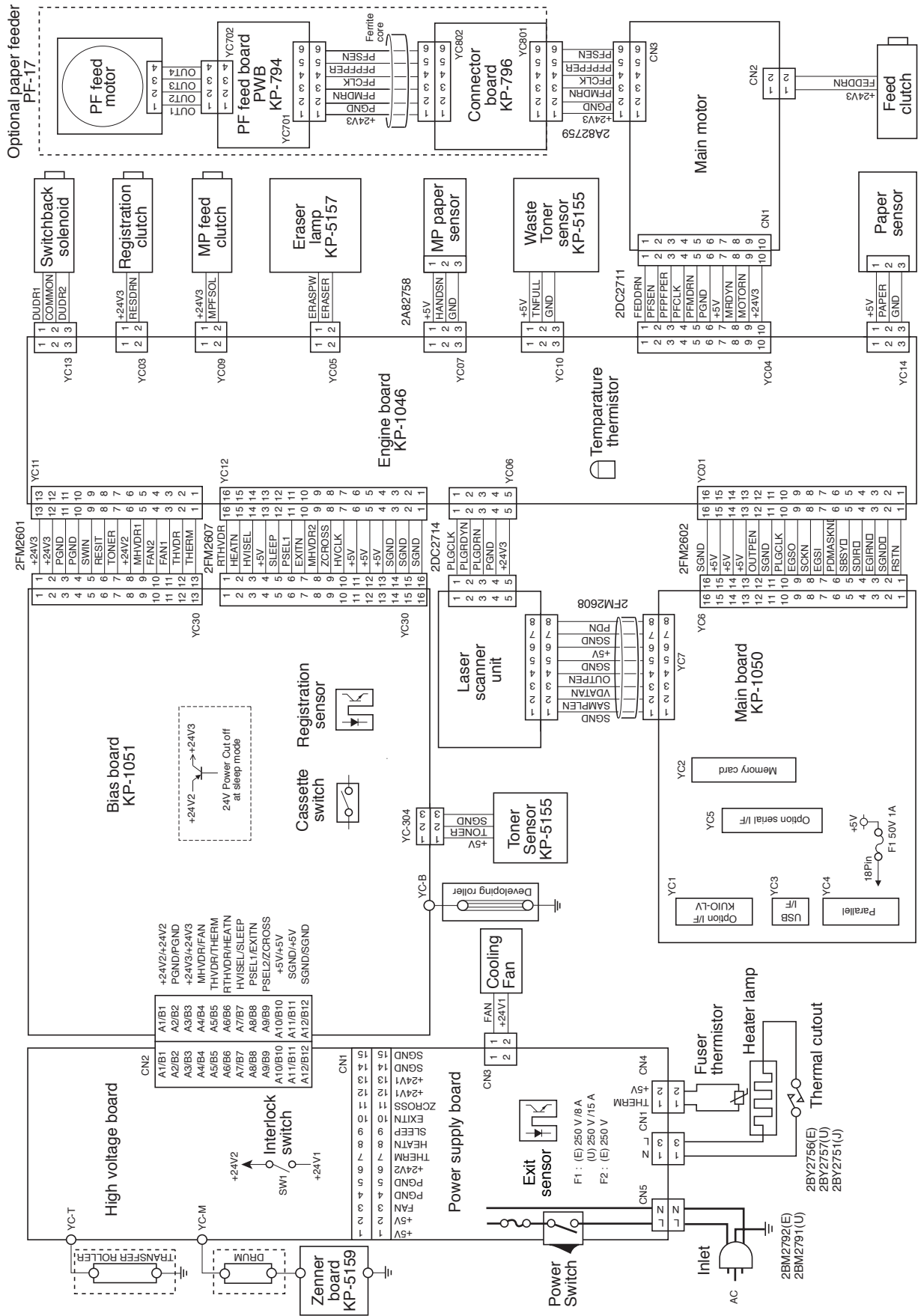
Drum speed: 117.90 mm/s
 Paper feeding speed: 197.00 mm/s
 Printing speed: 20.00 ppm

Timing chart No. 2 Paper cassette feeding, A4/81/2" x 11" paper, duplex printing

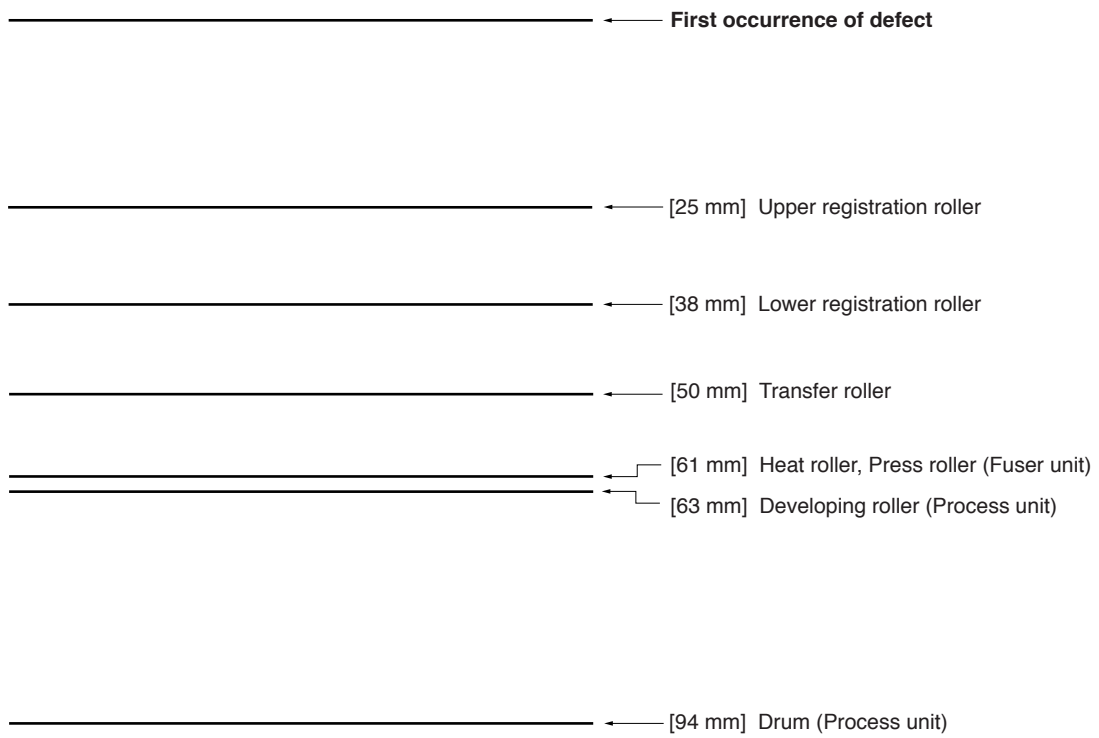


Drum speed: 117.90 mm/s
 Paper feeding speed: 197.00 mm/s
 Printing speed: 10:30 ppm

Wiring diagram



Repetitive defects gauge



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