



Laser printer

FS-1010



SERVICE MANUAL

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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 (\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 printer.

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 printer 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 printer on an infirm or angled surface: the printer may tip over, causing injury.



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



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



• Allow sufficient space around the printer 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 printers so equipped. Failure to do this may cause the printer 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 printer'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 printer 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 printer 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 printer, 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.



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Chapter 1 **Product Information**

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1-1 Printer specifications

1-1-1 Specifications

(1) Engine

| Item | Specification |
|--|--|
| Print method | Electrophotography laser scan |
| Print speed (when printing multiple pages) | 14 pages/min. (A4) 15 pages/min. (Letter) |
| Resolution (dpi) | Fast 1200 mode (1800 horizontal/600 vertical) 600 horizontal/600 vertical |
| Smoothing | KIR (Kyocera Image Refinement) |
| First print (A4 or letter, 23 °C), depends on input data | 22 seconds or less |
| Warm-up time at 23 °C | 10 seconds or less (from sleep mode) |
| Maximum duty cycle (A4) | 15 seconds or less (from power on) |
| Process unit life expectancy | 100,000 pages of printing or 3 years, whichever reached first |
| Developing | Mono component developer |
| Laser diode | Visible laser |
| Main charger | Scorotron positive charging |
| Transferring | Negative charger roller |
| Separation | Curvature separation |
| Drum cleaning | Blade |
| Drum discharging | Eraser lamp (LED array) |
| Fuser | Heat roller and press roller |
| Paper | Plain paper: Legal to A5 |
| Capacity of paper feed trays (80 g/m ² [0.11 mm thickness]) | Cassette: 250 sheets, MP tray: 50 sheets |
| Capacity of output trays (80 g/m ² [0.11 mm thickness]) | Face-up: 30 sheets, Face-down: 150 sheets |

(2) Controller

| Item | Specification |
|--------------------------------|--|
| CPU | PowerPC405/200MHz |
| System ROM | 4 MB Flash DIMM |
| Font ROM | 2 MB (16 M bit × 1) |
| Optional font ROM (Dip socket) | 1 MB (Optional KPDL2 Upgrade kit) |
| Main (Video) RAM | 16 MB (Standard-equipped on main board) |
| Expanding RAM (DIMM slot × 1) | Maximum 144 MB (Including the standard 16 MB main RAM) (Accepts any of 16/32/64/128 MB DIMM) |
| Host interface | Parallel: High-speed, bidirectional (IEEE1284) USB: Revision 1.1 standards Serial: Optional serial interface board, RS-232C/RS-422A, Max. speed: 115.2 Kbps KUIO-LV (3.3 V): Optional network interface card |
| Page description language | Prescribe 2e |
| Standard emulation modes | PCL6, Diablo 630, IBM proprinter X24E, Epson LQ850, Line printer, KPDL2 |

(3) Weight and dimensions

| Item | Specification |
|-------------------------------|---|
| Main unit (excl. protrusions) | Width: 378 mm (14 ⁷ / ₈ inches) |
| | Height: 222 mm (8 ³ / ₄ inches) |
| | Depth: 375 mm (14 ³ / ₄ inches) |
| | Weight: 9.5 Kg (20 ¹⁵ / ₁₆ lb.) |

(4) Power requirements

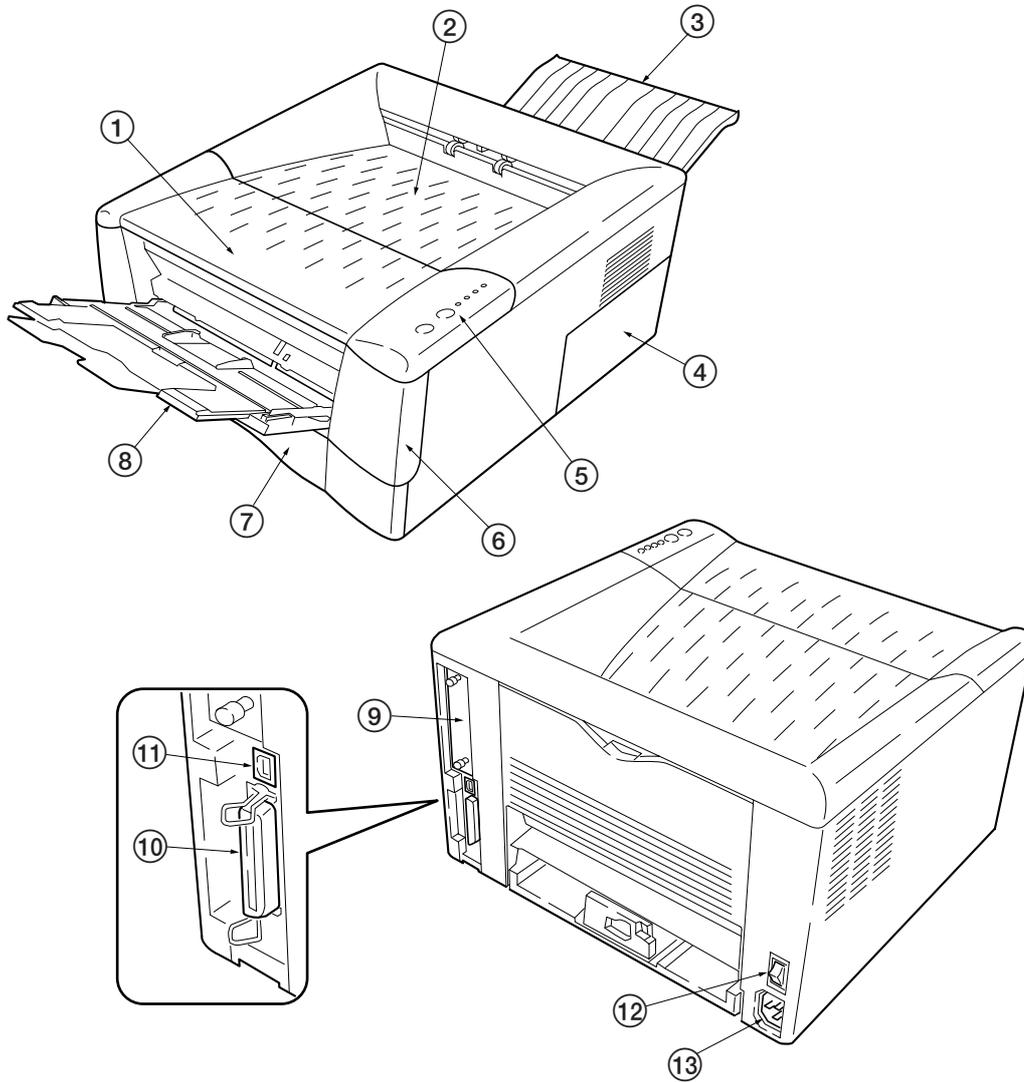
| Item | Specification |
|-----------------------------|--|
| Voltage/current requirement | 220 to 240 V AC $\pm 10\%$, 50/60 Hz $\pm 2\%$ /3.8 A (European countries) |
| | 120 V AC $\pm 10\%$, 60 Hz $\pm 2\%$ /7.1 A (U.S.A/Canada) |
| Watts | Normal operation: 265 W |
| | Maximum: 818 W |
| | Standby: 13 W |
| | Sleeping: 5 W (220 to 240 V model), 6 W (120 V model) |

(5) Environmental requirements

| Item | Specification |
|--|---|
| Operating temperature and humidity | 10 to 32.5 °C (50 to 90.5 °F), 20 to 80 %RH |
| Maximum altitude | 2,000 m (6,500 feet) |
| Noise emission (Excluding peaks, measured at 1 m from printer, as per ISO7779) | 50 dB (A) maximum/28 dB (A) at standby/unmeasureably low at sleeping) |

1-2 Names of parts

1-2-1 Name of parts



- ① Top cover
- ② Face-down output tray
- ③ Face-up output tray
- ④ Side cover
- ⑤ Operator panel
- ⑥ Front cover
- ⑦ Paper cassette
- ⑧ MP tray
- ⑨ Option interface slot cover
- ⑩ Parallel interface connector
- ⑪ USB interface connector
- ⑫ Power switch
- ⑬ AC inlet

Figure 1-2-1 Name of parts

1-3 Safety information

1-3-1 Safety information

(1) Laser safety

This printer is certified as a Class 1 laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to Radiation Control for Health and Safety Act of 1968. This means that the printer does not produce hazardous laser radiation. Since radiation emitted inside the printer is completely confined within protective housings and external covers, the laser beam cannot escape from the printer during any phase of user operation.

(2) Laser notice

This printer is certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter for Class I (1) laser products, and elsewhere is certified as a Class I laser product conforming to the requirements of IEC 825.

(3) Laser caution label on the scanner unit

The laser scanner unit has the following label affixed atop. Observe these cautionary statements and figures when handling the laser scanner unit.

WARNING



Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

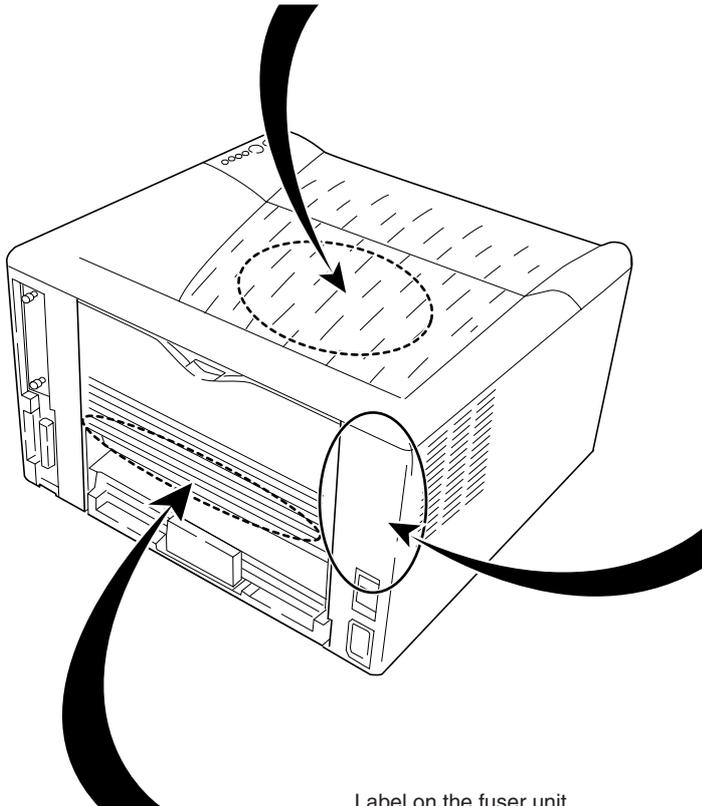
Label on the scanner unit (Inside the printer)

| | |
|--|--|
| | DANGER - INVISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM. |
| | ATTENTION - RAYONNEMENT LASER INVISIBLE EN CAS D'OUVERTURE. EXPOSITION DANGEREUSE AU FAISCEAU. |
| | VORSICHT - UNSICHTBARE LASERSTRAHLUNG, WENN ABEDECKUNG GEÖFFNET. NICHT DIREKT STRAHLEN AUSSETZEN. |
| | ATTENZIONE - RADIAZIONE LASER INVISIBILE IN CASO DI APERTURA. EVITARE L'ESPOSIZIONE AL FASCO. |
| | PRECAUCION - RADIAZIONE LASER INVISIBLE CUANDO SE ABRE. EVITAR EXPOSERSE AL RAYO. |
| | VAROJ - AAVATAESDA OLET ALTIMA NÄKYMÄTTÖMÄLLE LASERISÄTELYLLE. ÄLÄ KATSO SUOJEESEN. |
| | 警告 - このカバーの内側では不可視レーザー光が放射されています。 レーザー光を直射しないようにしてください。 |
| | 警告 - 开盖时, 可能有激光外泄! 应避免激光直接照射。 |
| | 警告 - 内部零件放射中, 请勿随意打开盖子。 |
| | 위험 - 레이저 광선을 직접 보지 마세요. |

Label on the left cover rear side

European countries

U.S.A/Canada



FS-1010
220 240V~ 50/60Hz 3.8A
KYOCERA CORPORATION
CLASS 1 LASER PRODUCT TO IEC825
LASER KLASSE 1 NACH IEC825
KLASSE 1 LASER PRODUKT I.H.T. IEC825
LUOKAN 1 LASERLAITE

ACN003852444

CAUTION
REMOVE POWER CORD BEFORE SERVICE AND FUSE REPLACEMENT.

VORSICHT
VOR WARTUNG UND SICHERUNGSWECHSEL NETZSTECKER ZIEHEN.

ATTENTION
POUR PRÉVENIR LES CHOCS ÉLECTRIQUES, COUPER L'ALIMENTATION AVANT DE REMPLACER LE FUSIBLE.

ATENCIÓN
DESENCHUFE EL CORDÓN DE ALIMENTACIÓN ANTES DEL SERVICIO Y DEL REEMPLAZO DEL FUSIBLE.

PRECAUZIONE
PRIMA DI CAMBIARE I RESIBILI O DI ESEGUIRE RIPARAZIONI, STACCATE IL CADO DI ALIMENTAZIONE.

DESIGNED IN JAPAN / ASSEMBLED IN CHINA

FS-1010
120V~ 60Hz 7.1A
KYOCERA CORPORATION
MIE PLANT TAMAKI BLOCK
704-19 NOJING, TAMAKI-TOWN
WATARAI-COUNTY, MIE-PREF. JAPAN
MANUFACTURED: C9

THIS LASER PRODUCT CONFORMS TO THE APPLICABLE REQUIREMENTS OF FEDERAL REGULATIONS 21 CFR CHAPTER 1, SUBCHAPTER J.

Tested To Comply With FCC Standards FOR HOME OR OFFICE USE

8468 UL 1950 US LISTED

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class B digital apparatus complies with Canadian ICES-005.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

CAUTION
REMOVE POWER CORD BEFORE SERVICE AND FUSE REPLACEMENT.

ATTENTION
POUR PRÉVENIR LES CHOCS ÉLECTRIQUES, COUPER L'ALIMENTATION AVANT DE REMPLACER LE FUSIBLE.

PRECAUZIONE
PRIMA DI CAMBIARE I RESIBILI O DI ESEGUIRE RIPARAZIONI, STACCATE IL CADO DI ALIMENTAZIONE.
YM

DESIGNED IN JAPAN / ASSEMBLED IN CHINA

Label on the fuser unit

| | | | | | | |
|--|--|---|--|---|---|-----------|
| | CAUTION HOT SURFACE AVOID CONTACT | ACHTUNG HEISSE OBERFLÄCHE NICHT BERÜHREN | ATTENTION TEMPÉRATURE ÉLEVÉE NE PAS TOUCHER | ATENCIÓN EXTERIOR CALIENTE EVITE EL CONTACTO | ATTENZIONE SUPERFICIE CHE SCOTTA NON TOCCARE | 고온주의 高温注意 |
|--|--|---|--|---|---|-----------|

Figure 1-3-1 Caution labels

(4) CDRH regulations (U.S.A.)

The Center of Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured after August 1, 1976. Compliance is mandatory for products marketed in the United States. A label indicating compliance with the CDRH regulations must be attached to laser products marketed in the United States.

(5) Ozone concentration

The printers generate ozone gas (O₃) which may concentrate in the place of installation and cause an unpleasant smell. To minimize concentration of ozone gas to less than 0.1 ppm, we recommend you not to install the printer in a confined area where ventilation is blocked.

(6) Optional equipment

The printer may be optionally installed with the following units:

- PF-17 Paper feeder (250 sheets)
- Serial interface board
- Network interface card
- Memory card

(7) Important note on the interface connectors

Be sure to turn off printer power before connecting or disconnecting an interface cable to the printer. For protection against static discharge which may be applied to the printer's internal electronics through the interface connector(s), keep any interface connector which is not in use capped using the protective cap supplied.

1-4 Environmental requirements

1-4-1 Environmental conditions

The *Environmental requirements* section on page 1-5 should be observed to ensure the optimum operation of the printer. The use of the printer in a location which does not satisfy the requirements may result in troubles and risk shortening its service life.

The printer will work best if it is installed in a location that is:

- Level and well supported (Place the printer on a table or desk.)
- Not exposed to sunlight or other bright light (not next to an uncurtained window). Do not place the printer on an unstable cart, stand or table.
- Near an AC wall outlet, preferably one that can be used for the printer alone. The outlet should have a ground slot, or an adapter should be used. If you use an extension cord, the total length of the power cord plus extension cord should be 17 feet or 5 meters or less.
- Well ventilated, not too hot or cold, and not too damp or dry (See section *Environmental requirements* on page 1-5). If you install the printer where the temperature or humidity is outside the requirements in section Environmental requirements in chapter 1, the best print quality may not be expected and there will be an increased chance of paper jams.
- Provide a sufficient clearances around the printer to ensure ventilation and ease of access. (See section *Clearance* on next page).

(1) Clearance

Allow the necessary minimum clearance on all sides of the printer as diagrammed below.

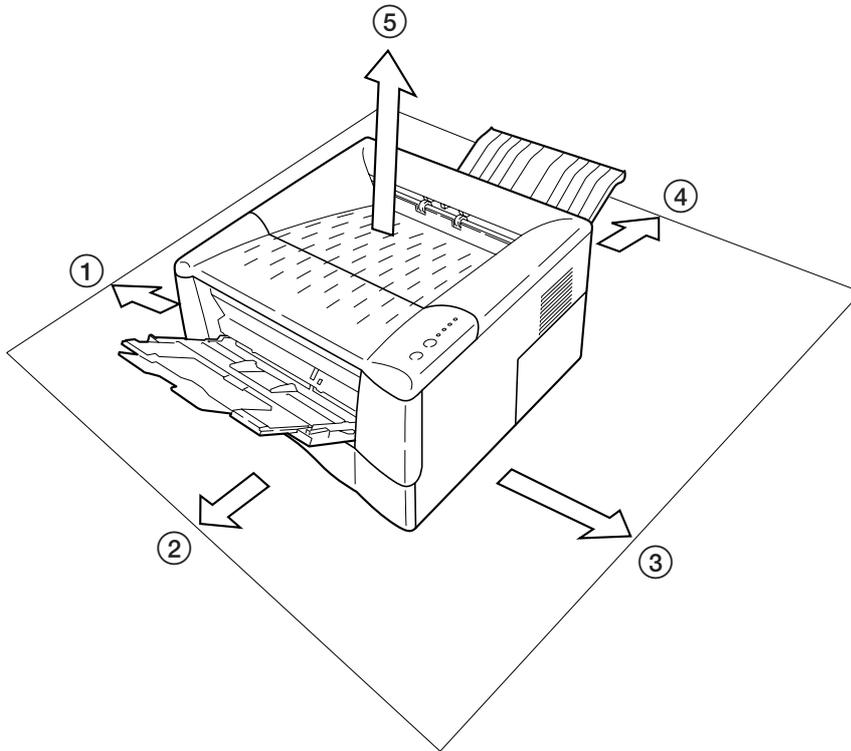


Figure 1-4-2 Clearances

| Ref. | Clearance | Dimensions |
|------|-----------|-------------------------|
| ① | Left | 25 cm (9-7/8 inches) |
| ② | Front | 50 cm (19-11/16 inches) |
| ③ | Right | 25 cm (9-7/8 inches) |
| ④ | Back | 40 cm (15-3/4 inches) |
| ⑤ | Above | 30 cm (11-13/16 inches) |

(2) Places to avoid

Avoid installing the printer in locations exposed to:

- Direct drafts of hot or cold air.
- Direct drafts of outside air. (Avoid locations next to outside doors.)
- Sudden temperature or humidity changes.
- Any source of high heat, such as a radiator or stove.
- Excessive dust. Dust and smoke may cause contamination on the laser scanner window, causing print quality problem.
- Vibration.
- Ammonia fumes or other harmful fumes. (In case of fumigating the room or saturate it with insecticide, remove the printer first.)
- Avoid greenhouse-like rooms. (Because of sunlight and humidity.)
- Avoid enclosed spaces that block ventilation.
- Avoid sites more than 6,500 feet or 2,000 meters above sea level.

(3) Note on power

Use only the power source voltage conforming to the printer's rated power voltage. Do not use other power sources.

- Disconnect the printer from the power source before attempting removal or replacement of an electrical component or a printed-circuit board.
- The printer should not be connected to a power source until the instruction is given to do so when performing tests described in this manual.
- In connecting the printer power, exercise an extreme care in handling the power supply or any other electric parts which may give an electric shock.
- Before performing maintenance or repair, power from both the power source and the associated peripheral devices (computer, sorter, etc.) should be disconnected, unless otherwise specified.
- To avoid possible electrical shock, extreme caution must be exercised in handling the power cord and any other electrical part.
- An easily accessible socket outlet must be provided near the equipment.

WARNING



As the disconnect device is not incorporated in the printer's AC primary circuit, an easily accessible socket outlet must be provided near the equipment.

(4) Removing the printer

Observe the following precautions in removal and transportation of the printer.

- Be sure to repack the printer in its original carton.
- Do not leave the printer, toner container, process unit and other printer modules inside a vehicle if the outdoor temperature is more than 25 °C. As unexpectedly high temperature may develop inside when a vehicle is parked for a long period of time, the drum, toner container, process unit and the supplies should be removed from the vehicle. The vehicle during transportation should be parked in the shade or with the window open to allow minimum air circulation or the adequate air conditioning should be made.
- Should the printer be left in a vehicle, it may not be exposed to the temperature change of more than 7 °C within 30 minutes.
- Before removing the printer to a warm place, wrap it in a blanket, etc., before crating it. Allow approximately two to three hours after having moved after uncrated. Failure to observe the above may result in moisture condensation which will affect the performance of the printer.

1-5 About the toner container

1-5-1 Toner container

The printer should use a TK-17 toner kit. To ensure the high print quality and long service life, the following handling precautions should apply.

CAUTION



As the Ecosys printers are designed to ensure the optimum print quality when used with Kyocera's proprietary toner, Kyocera do not recommend to use any refilled toner containers that may be available commercially. This is because Kyocera have no means of control over how such refilled toner could affect the print quality and the reliability of the printer.

(1) Toner container handling

To loosen and mix the toner inside before use, with the label side down, thoroughly shake the toner container ① horizontally at least five times.

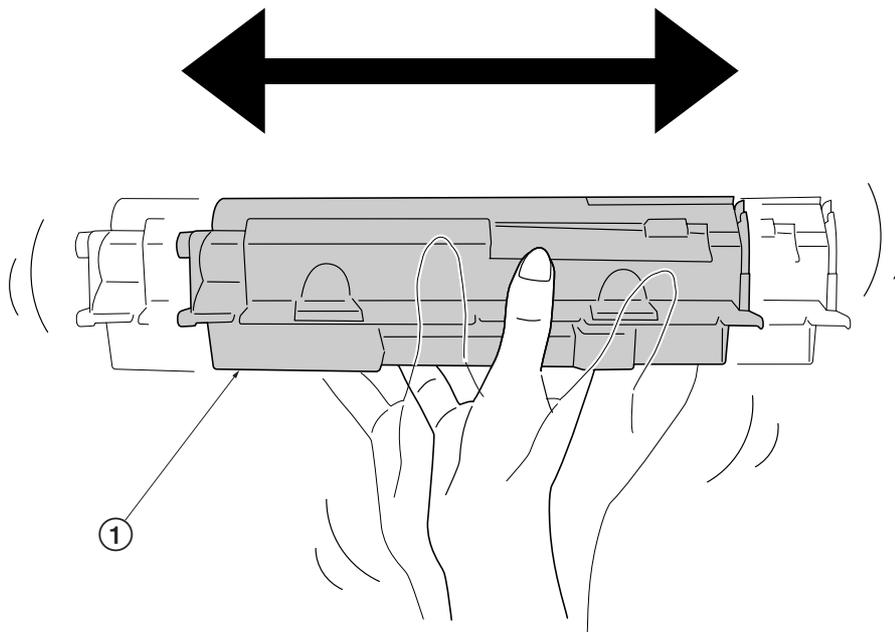


Figure 1-5-1 Toner container handling

CAUTION



Do not attempt to disassemble or refill the toner container.

(2) Toner container storage

The toner contained in the container is susceptible to temperature and humidity. To ensure the high print quality, store the toner container in a place that satisfies the following environmental conditions:

Temperature: -20 to 40 °C (-4 to 104 °F)

Humidity: 15 to 90 % RH

NOTE

If the toner container is removed from the printer's developer unit, put it in a protective bag and keep it in a dark place.

CAUTION



If the printer is shipped for return, etc., do not ship it with the toner container installed. Otherwise, toner may leak and contamination may result in the printer.

Chapter 2 Installation/Operation

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2-1 Unpacking

2-1-1 Unpacking and inspection

The package should contain the printer and the accessories as shown in the figure below. Remove the printer and all the accessories from the package. For unpacking, place the box containing the printer on a flat, stable surface. Remove the manuals, toner kit, and other items located on top of the spacer and remove the spacer. Carefully remove the printer.

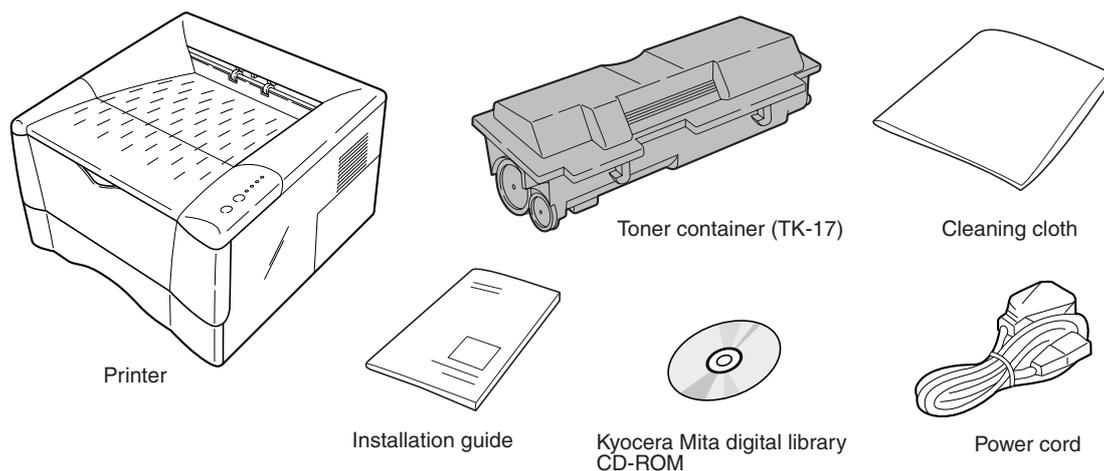


Figure 2-1-1 Unpacking (1)

Remove the tape on the rear side of the printer, and remove the two spacers and the printed notice from the paper cassette.

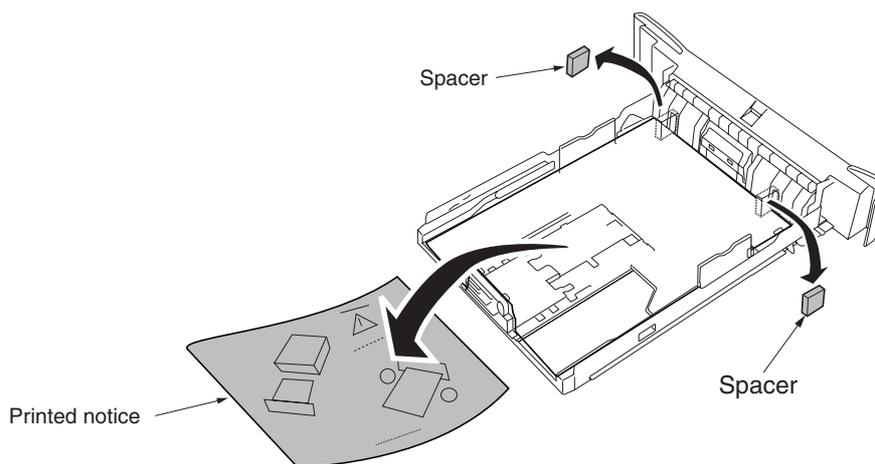


Figure 2-1-2 Unpacking (2)

2-2 Installing the printer

Installing the printer requires several steps. Proceed as follows in sequence. If the option paper feeder is used with the printer, begin installation with connecting the printer and the paper feeder. For details, refer to the *optional Paper feeder's Service Manual*.

2-2-1 Installing the toner container

1. Open the top cover all the way.
2. Confirm that the lock lever #1 ① is in the release (forward) position. If not, pull it forward until it is in the release position.

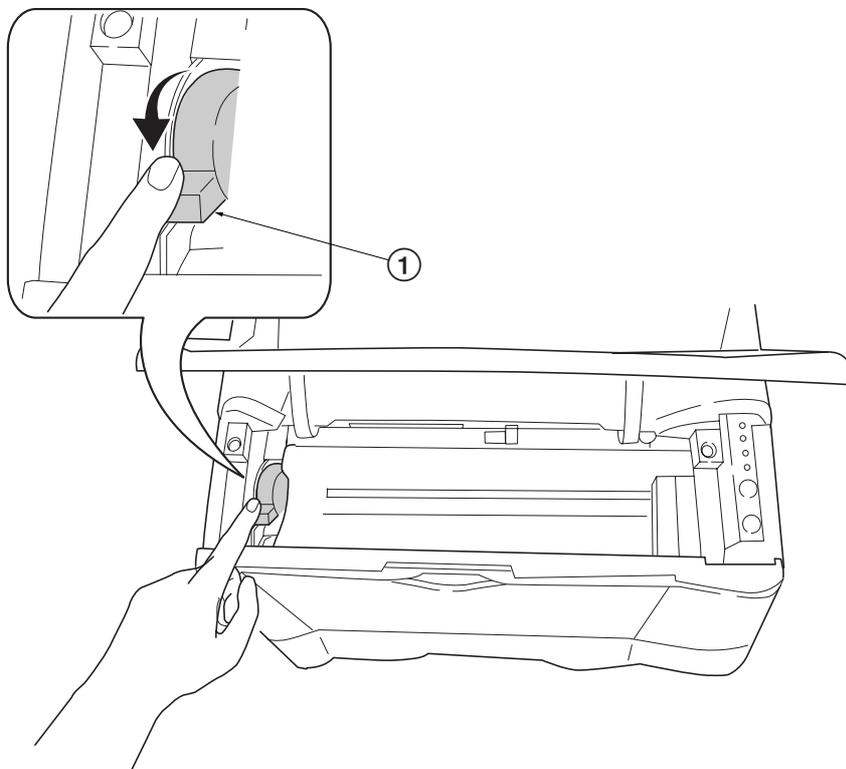


Figure 2-2-1 Confirming the lock lever #1

3. Take the toner container ② from the bag. Hold it with the protective seal ③ (orange-colored) facing up. Shake the toner container ② horizontally at least five times. This ensures that the toner is evenly distributed inside.

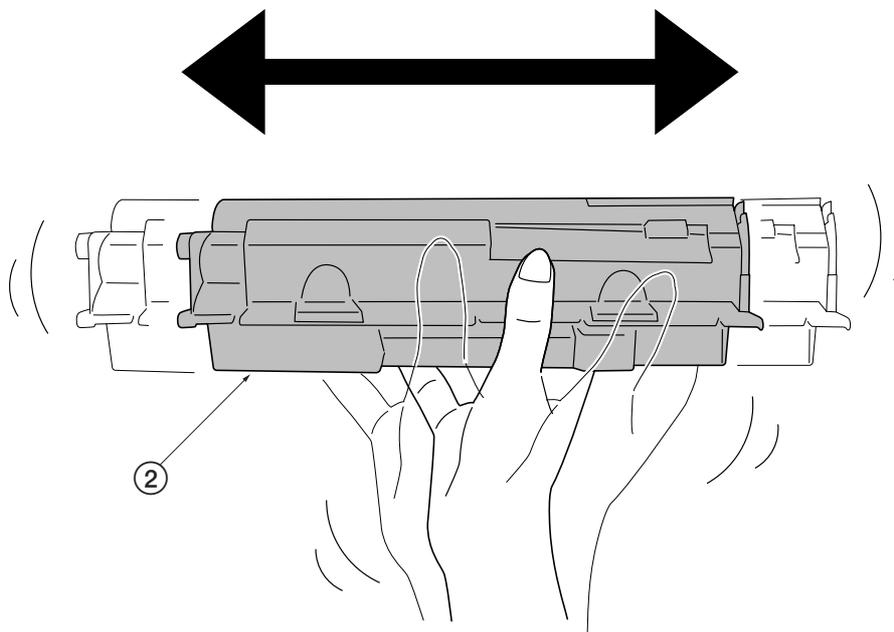


Figure 2-2-2 Shaking the toner container

4. Carefully remove the protective seal ③.

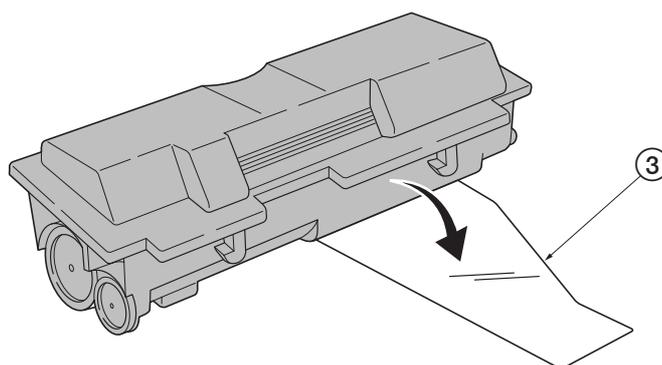


Figure 2-2-3 Removing the protective seal

5. Install the toner container ② into the printer.
6. Push firmly on the top of the toner container ② at the positions marked [PUSH HERE].

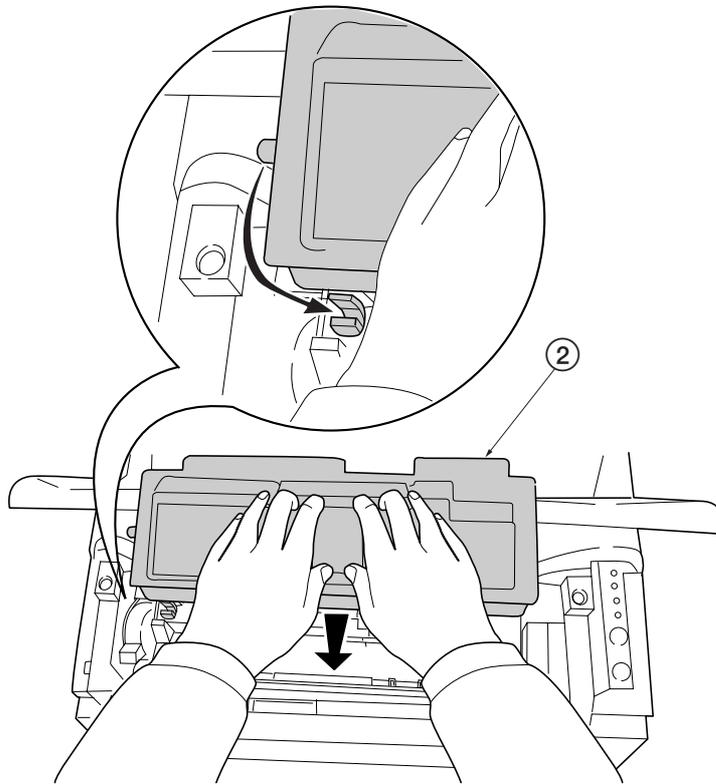


Figure 2-2-4 Installing the toner container

7. Push the lock lever #1 ① to the lock position.
8. Close the top cover ④.

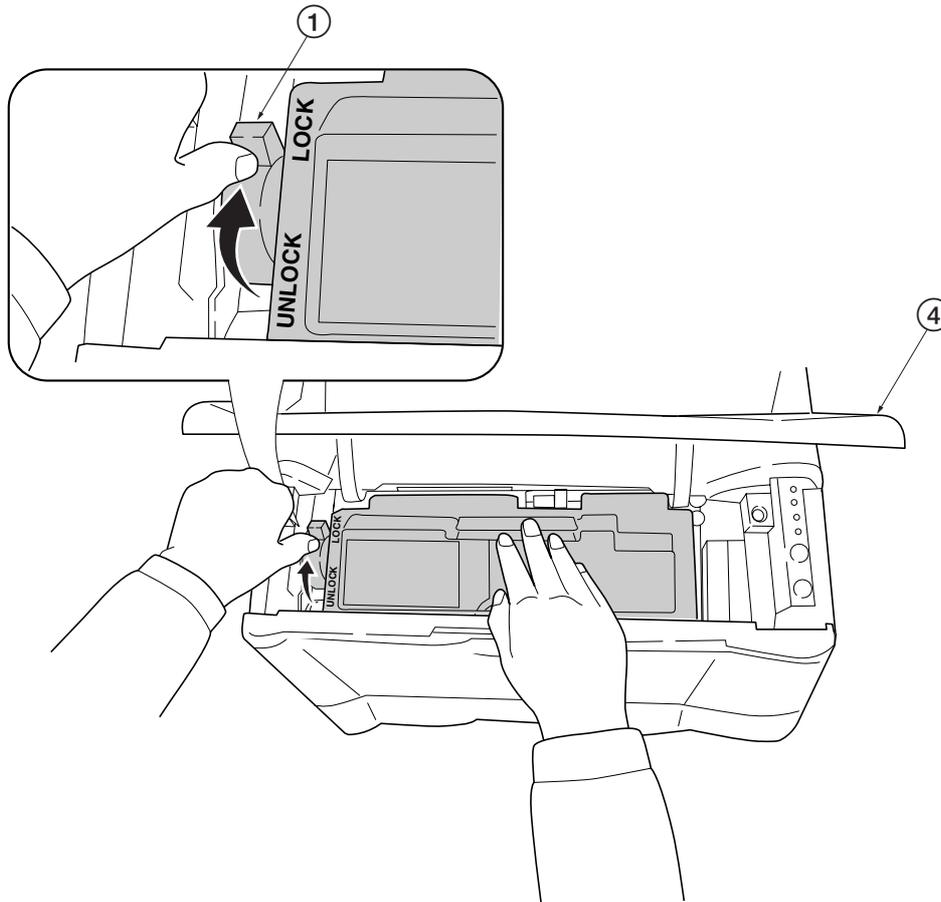


Figure- 2-2-5 Locking the toner container

NOTE

The printer is shipped from the factory with no toner supplied in its developer (Process unit). When the printer is first switched on after the toner container is installed in the manner above, there will be a delay of several minutes before the printer gets ready to print a job.

This delay is necessary for the printer to fill the developer reservoir with a sufficient amount of toner to continuously support a print job. The period of time is approximately 15 minutes.

If the toner low or replace toner indication does not go off after installing the new toner container, take the toner container out once, shake it well, then install again.

2-2-2 Expanding memory

The FS-1010 printer comes standard equipped with 16 MB of main memory on the main board. Printer memory can be expanded to up to the maximum 144 MB (16 + 128 MB).

(1) Minimum memory requirements

Refer to the table below for minimum memory requirements in various environments.

| Printing environment (Emulation) | Resolution | |
|---|------------|---------|
| | 300 dpi | 600 dpi |
| HP LaserJet 5P (factory setting) | 2 MB | 2 MB |
| HP LaserJet 5P with resource protection | - | 10 MB |

(2) DIMM specifications

| | |
|-------------------|--------------------|
| Memory size in MB | 16, 32, 64, 128 MB |
| Number of pins | 100 pins |
| Access speed | 66 MHz |
| Parity | None |
| Bus width | 32 bits |

(3) Notes on handling DIMM

Before proceeding to install DIMM, read the following notes for handling the main board and DIMMs:

- Protect the electronics by taking these precautions:
- Before touching a DIMM, touch a water pipe or other large metal object to discharge yourself of static electricity. While doing the work, it is recommended that you wear an antistatic wrist strap.
- Touch the main board and DIMM only by the edges, not in the middle.

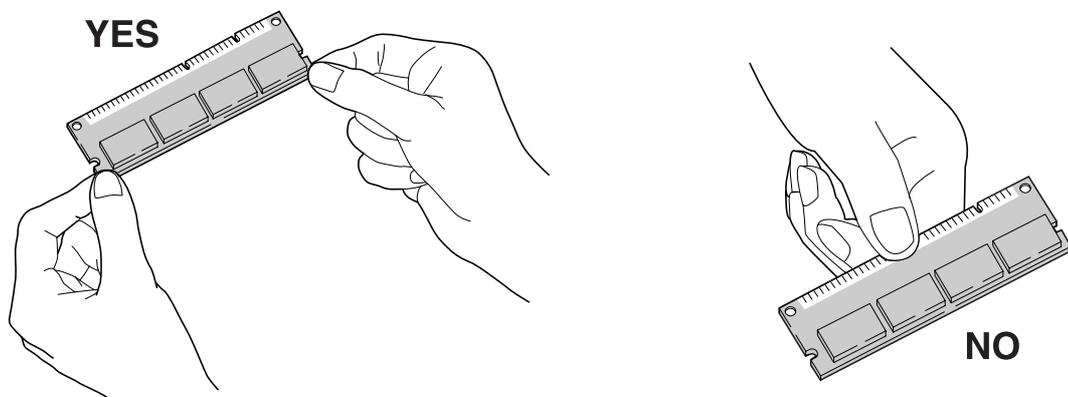


Figure 2-2-6 Handling DIMM

(4) Installing the DIMM

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 and disconnect the printer from the computer or the network.

Remove the side cover ① as shown in the figure below.

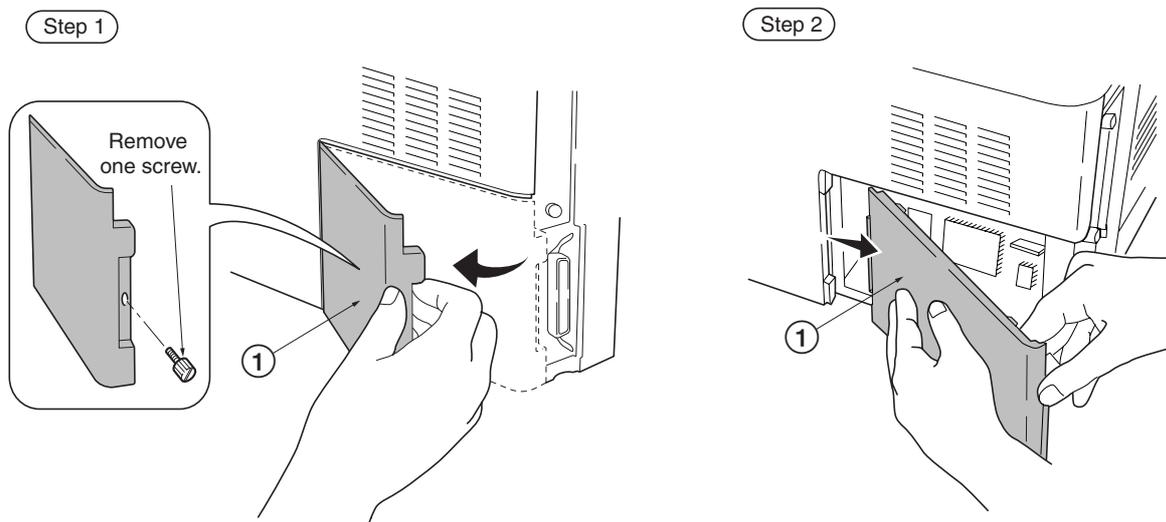


Figure 2-2-7 Removing side cover

Open the clips ② on both ends of the DIMM socket ③. Insert the DIMM ④ into the DIMM socket ③ so that the notches on the DIMM align with the corresponding protrusions in the slot. Close the clips ⑤ on the DIMM slot to secure the DIMM.

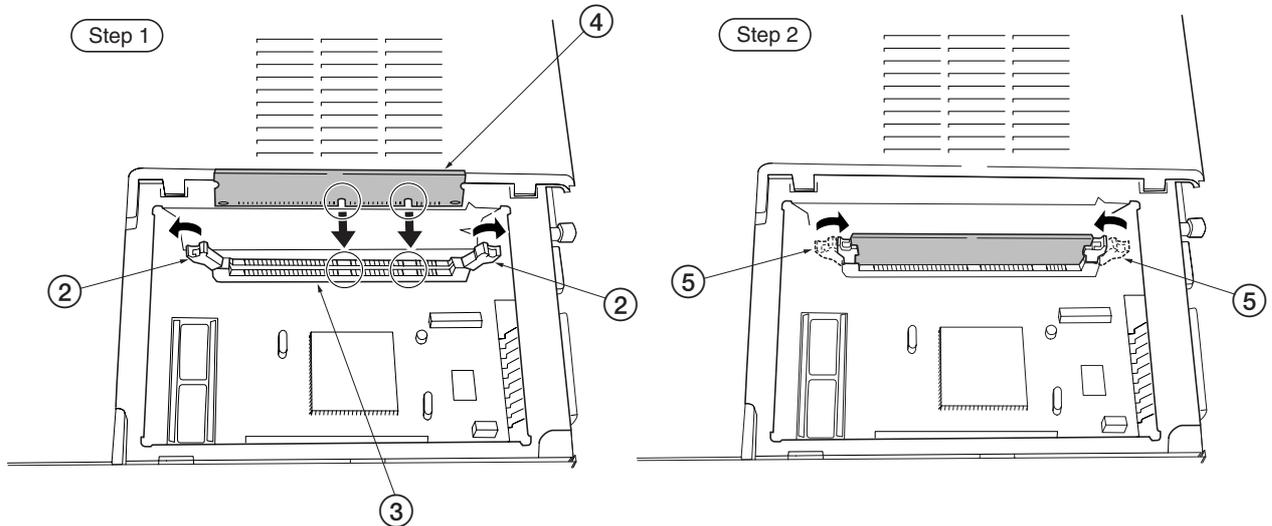


Figure 2-2-8 Inserting the DIMM

(5) Testing the expansion memory

After installing DIMM in the printer, test the printer to see if the installation has been successful. To test the expansion memory, turn printer power on and print a status page. If the installation has been successful, the Available Memory item of the status page will show the expanded memory size corresponding to the amount of memory added.

(6) Installing the memory card (CompactFlash)

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.

Remove the two screws ① from the option interface slot cover ② and remove the option interface slot cover (or network interface card ③ or the serial Interface board).

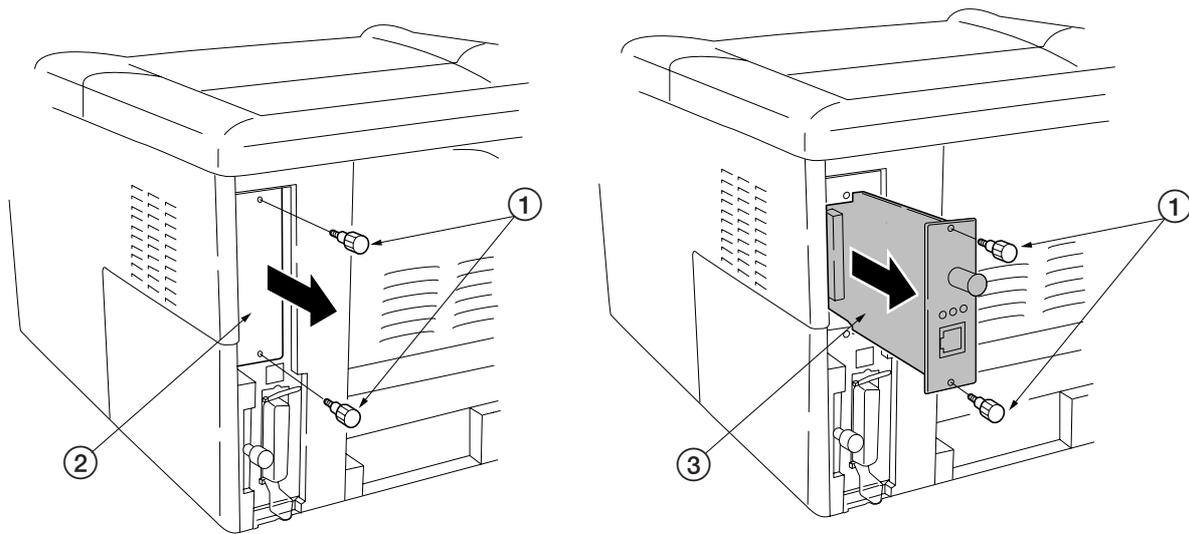


Figure 2-2-9 Removing the option interface slot cover

Insert the memory card ④ in the slot. Insert as shown in the figure. Push it in all the way. Close and secure the option interface slot cover (or network interface card or the serial Interface board) .

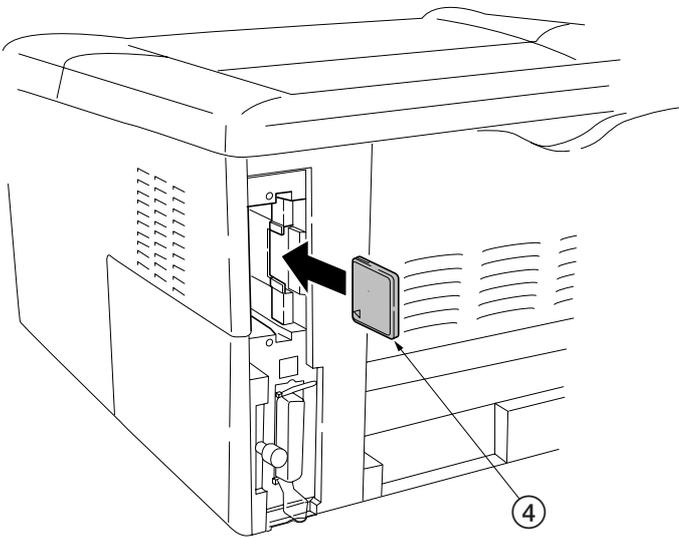


Figure 2-2-10 installing the memory card

(7) Installing the network interface card

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 and disconnect the printer from the computer or the network. Never insert or remove a network interface card while the printer power is ON.

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

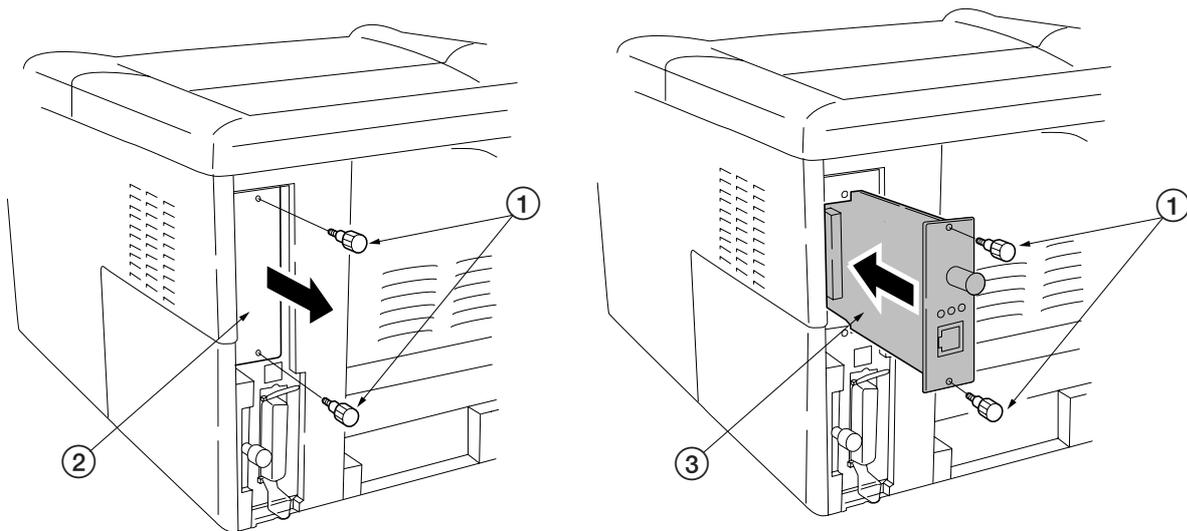


Figure 2-2-11 installing the memory card

2-3 Using the operator panel

This section provides explanation on how to use the printer's operator panel for basic operation. For details, refer to the printer's *User's Manual*.

2-3-1 Operator panel

The printer's operation panel has the following LED indicators and keys. Note that adjustments to the printer parameters made using these keys may be overridden by those made from within the application software.

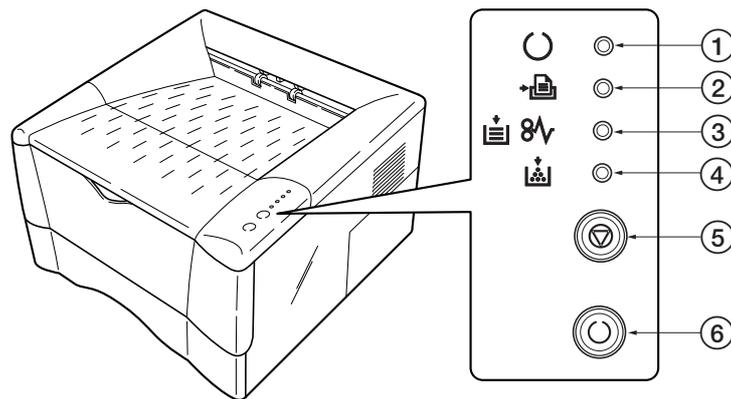


Figure 2-3-1 Operator panel

Table 2-3-1 Operator panel function

| No. | Name | Function |
|-----|-------------------------------------|--|
| ① | On line indicator | Indicates whether the printer is on-line or off-line. |
| ② | Data indicator | Indicates that the printer is receiving data. |
| ③ | Paper empty/ Paper jam indicator | Indicates whether the paper cassette is empty or a paper jam has occurred. |
| ④ | Toner indicator | Flashes when toner is low, and light when toner is exhausted. |
| ⑤ | Cancel key | Stops printing when pressed. |
| ⑥ | Go key | <ul style="list-style-type: none"> • Switches the printer mode between on-line and off-line when pressed. If you continued to press the key for 10 or more seconds, service status page is printed. • Switches between the MP tray and paper cassette when the paper runs out. • Prints out any unprinted page. |

2-3-2 Remote operation panel

The remote operation panel is a utility that allows you to make basic printer settings from the computer connected to the printer or the network. For details on installation and usage, see the printer's *User's Manual* contained as an electronic file in the CD-ROM supplied with the printer.

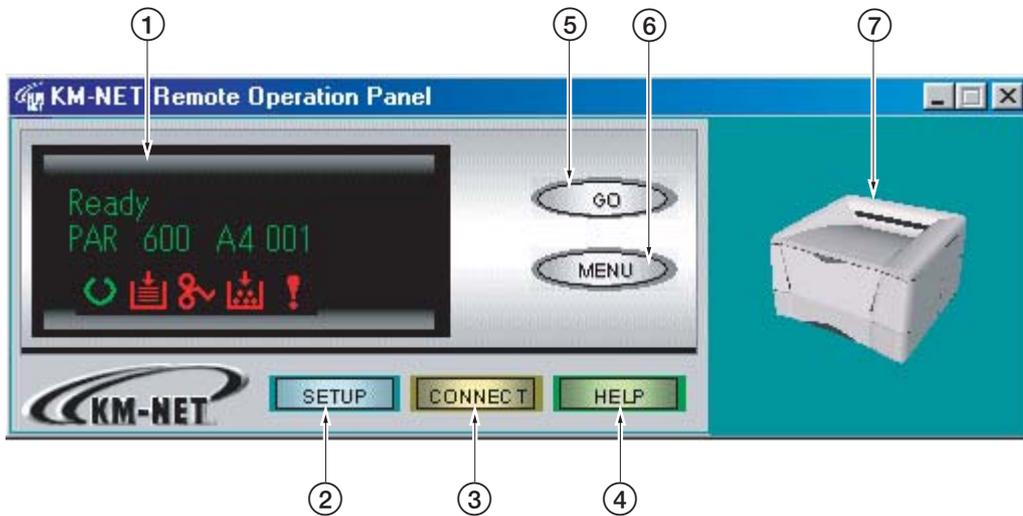


Figure 2-3-2 Remote operation panel

Table 2-3-2 Remote operation panel function

| No. | Name | Function |
|-----|-----------------|--|
| ① | Message display | Indicates printer status, the interface currently active, the resolution, the paper size, the number of copies set in the current interface, and error messages. |
| ② | SETUP button | Makes connection settings and operation settings between the printer and the computer. |
| ③ | CONNECT button | Makes connection settings for new printers. |
| ④ | HELP button | Displays help message. |
| ⑤ | GO button | Performs the same function as the printer's Go key. Not displayed with non-network connection. |
| ⑥ | MENU button | Displays printer settings and confirmation items. Changes the printer 3D image in real time according to the printer's |
| ⑦ | Monitor window | status. For example, if you open the printer's top cover, the top cover on the 3D image else open. |

Chapter 3 Maintenance/Adjustments

Chapter 3 Contents

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3-1 Maintenance/Adjustments

3-1-1 Life expectancy of modules

The table below shows the nominal life expectancy for modules. Detailed part information for each module (except toner container) can be found in *Parts Catalog*.

Table 3-1-1 Life expectancy of modules

| Kit | Module | Nominal life (pages) | Remarks |
|-------|-----------------|----------------------|------------------|
| TK-17 | Toner container | 6,000 | User-replaceable |
| PU-42 | Process unit | 100,000 | User-replaceable |

3-1-2 Toner container

Assuming an average toner coverage of 5 % with *EcoPrint* mode turned off, the toner container will need replacing approximately once every 6,000 printed pages.

Table 3-1-2 Toner container

| Kit | Life in pages |
|-------|---------------|
| TK-17 | 6,000 |

Based on letter or A4 size paper; average print density of 5 %.

NOTE In the case of a new printer in which a toner kit has been installed for the first time, the number of copies that can be printed will be approximately 3,000.

(1) When to replace the toner container

When the printer runs low on toner, the Toner indicator flashes on the operation panel. Be sure to promptly replace the toner container and clean the inside of the printer when this message appears. If the printer stops printing while the Toner indicator is lit, replace the toner container to continue printing.

(2) Notes on changing toner container

Observe the following cautions when replacing the toner container:

- Do not attempt to disassemble the old toner container and reuse the waste toner inside.
- Keep magnetic media such as floppy disks away from the toner container.
- Be sure to clean the parts as instructed in this section at the same timing of replacing toner container.
- Use of the toner kit TK-17 is highly recommended for the optimum operation of the printer.

(3) Toner container replacement

To replace the toner container, open the top cover. Pull lock lever #1 ① to the release [UNLOCK] position, then pull lock lever #2 ② to the release (right) position.

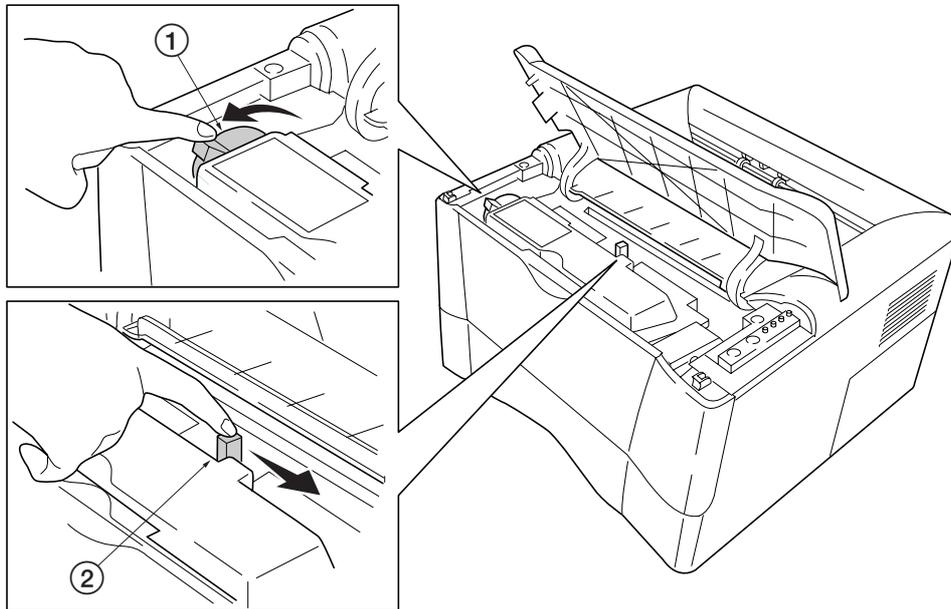


Figure 3-1-1 Releasing Lock levers #1 and #2

Gently remove the old toner container ③.

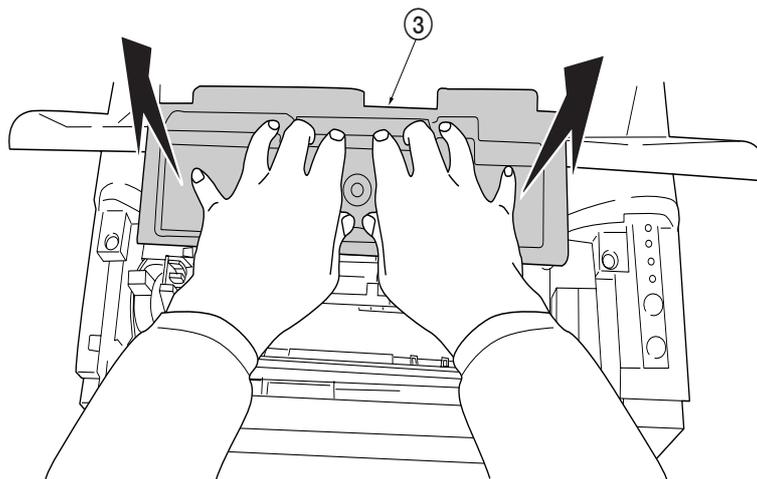


Figure 3-1-2 Removing the old toner container

Put it in the supplied plastic bag ④ and dispose of it.

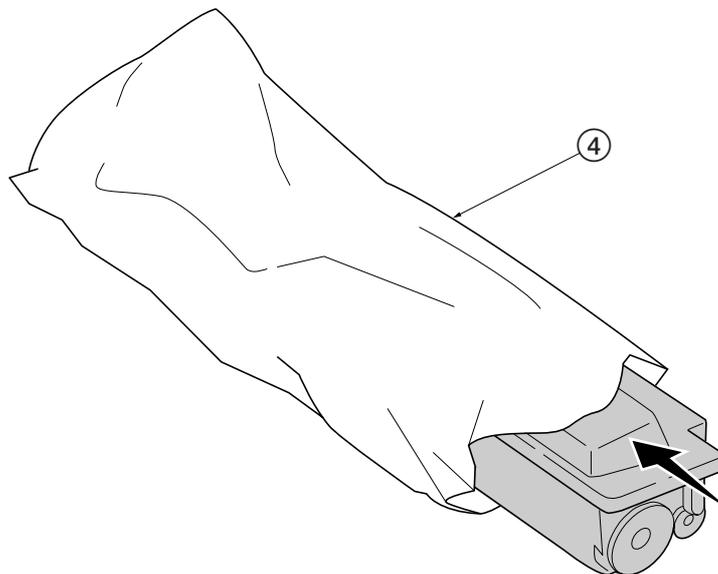


Figure 3-1-3 Disposal of the old toner container

NOTE Although the toner container is made from non-harmful, flammable material, be sure to dispose of it according to laws and regulations.

Proceed with the instructions provided in chapter 2, *Installing the toner container* on page 2-4 to complete installation of the new toner container.

(4) Toner saver mode (*EcoPrint*)

The *EcoPrint* enables to reduce the amount of toner consumed on the page so as to save printing costs by drastically extending the toner container life. *EcoPrint* mode is factory-set to off and turned on by using the *Remote Operation Panel (MENU)* utility. For details refer to the printer's *User's Manual*.

3-1-3 Cleaning the printer

To avoid print quality problems, the following printer parts must be cleaned with every toner container replacement.

To clean the printer, first, remove the process unit from the printer.

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

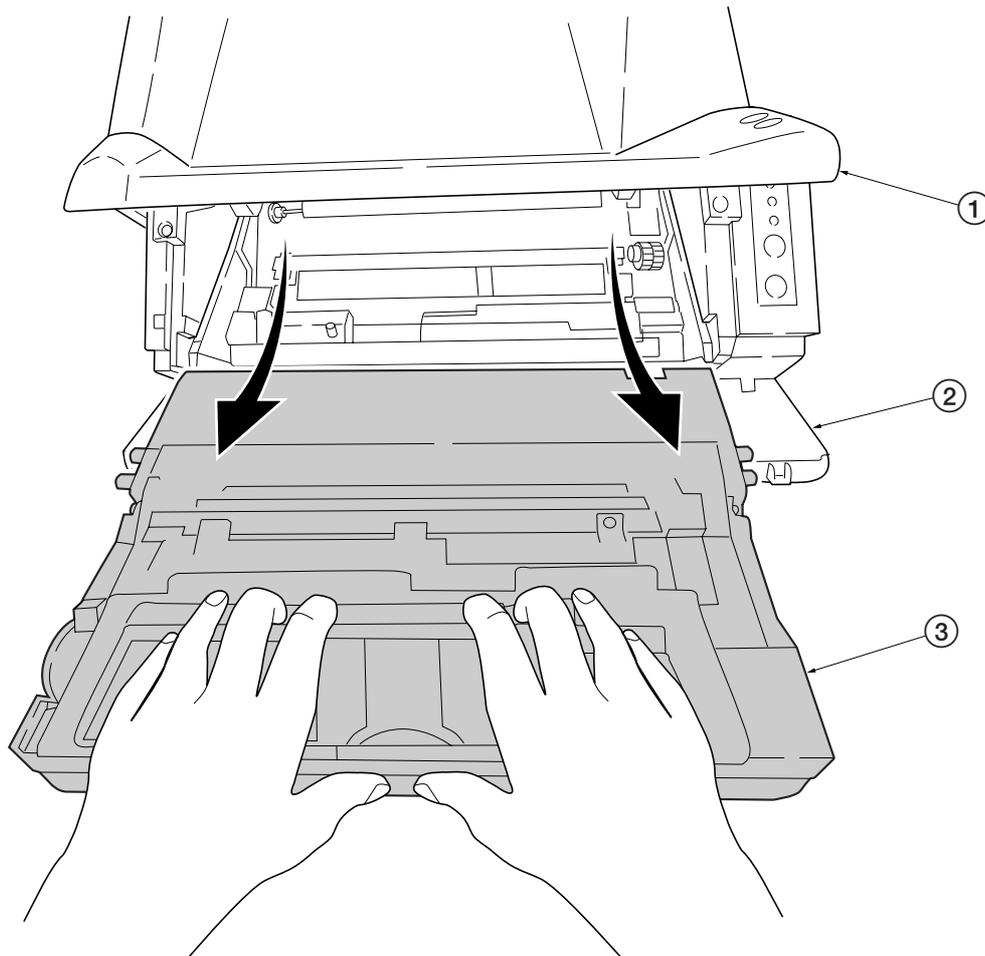


Figure 3-1-4 Removing the process unit

NOTE

The drum in the process unit is sensitive to light. Never expose the drum even to normal office lighting (500 lux) for more than five minutes.

(1) Cleaning the registration roller

Use the supplied wiper cloth ① to clean dust and dirt away from the registration roller ② (metal).

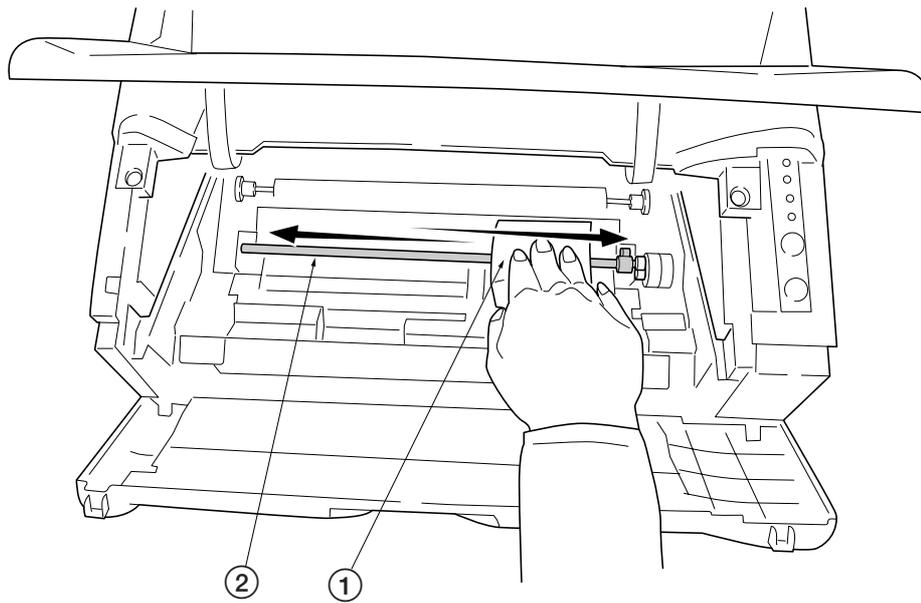


Figure 3-1-5 Cleaning the registration roller

(2) Cleaning the main charger wire

Slide the charger cleaner knob (green colored) back and forth 2 to 3 times, then return it to its [CLEANER HOME POSITION].

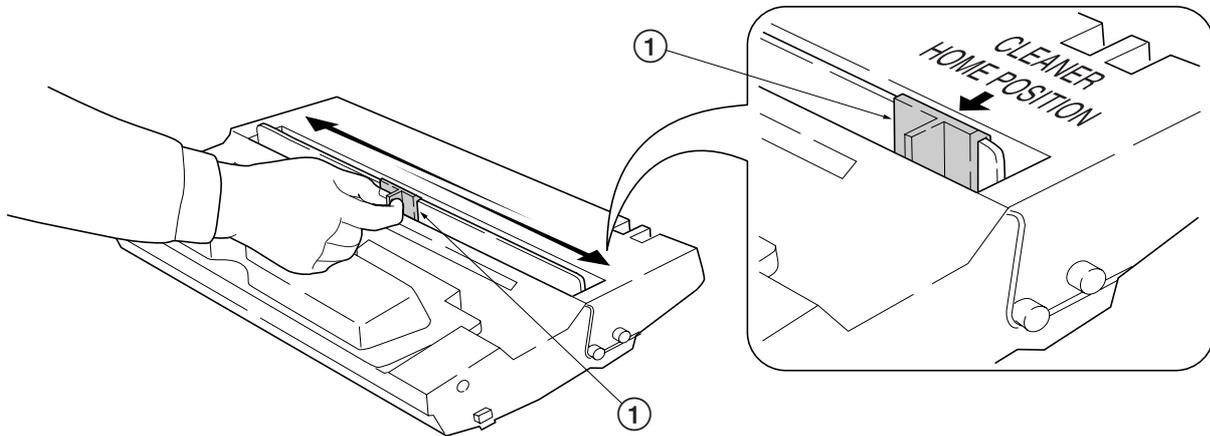


Figure 3-1-6 Cleaning the main charger wire

After cleaning is done, install the process unit in the printer, using the reverse manner as above. Close the front cover and top cover.

3-1-4 Updating the firmware

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 [board KP-893] (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 (CompactFlash).

(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

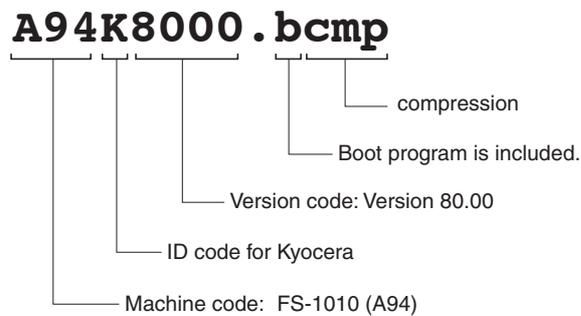


Figure 3-1-9 Firmware program data format

(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.

- 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
DOS COPY (/b) the data from the host computer to the printer.
- ③ Confirm that downloading was finished normally by the LED indicator. (See the table below.)
- 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* on page B-4). If downloading fails, the printer indicates an error display using the LED indicators. To identify error, refer to the table on page 3-12.

(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

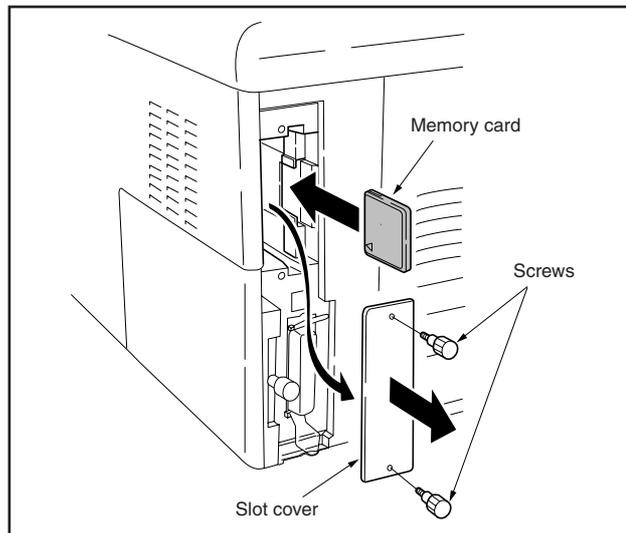


Downloading firmware takes several minutes. Do not turn power off during downloading. If downloading is interrupted by an accidental power failure, etc., the system DIMM may have to be replaced.

NOTE

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

- 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 printer starts and finishes downloading automatically.
- ⑤ Confirm that downloading was finished normally by the LED indicator. (See the table below.)
- 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.

Confirm the status page shows the new firmware version (See *Service information on the status page* on page B-4). If downloading fails, the printer indicates an error display using the LED indicators. To identify error, refer to the table on page 3-12.

(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 | |
|  |  | |  | | | |
|  |  | |  | 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 | |
|  |  |  | | | | |
|  |  |  | | | | |

| Convention | | |
|---|---|---------------|
| Red | Green | Meaning |
|  |  | Slow flashing |
|  |  | Fast flashing |
|  |  | Lit |
|  |  | Off |

If the corrective action above does not solve the problem, replace engine board (KP-882). See page 5-11.

Chapter 4 Operation Overview

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4-1 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 printer’s electrophotography system.

4-1-1 Electrophotographic cycle

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

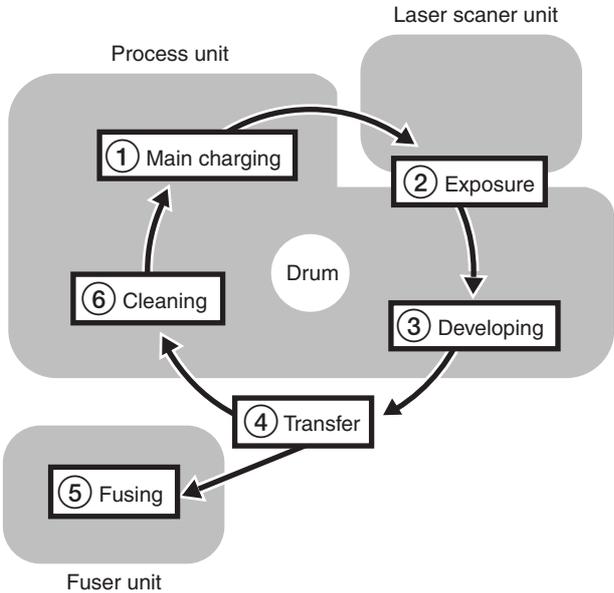
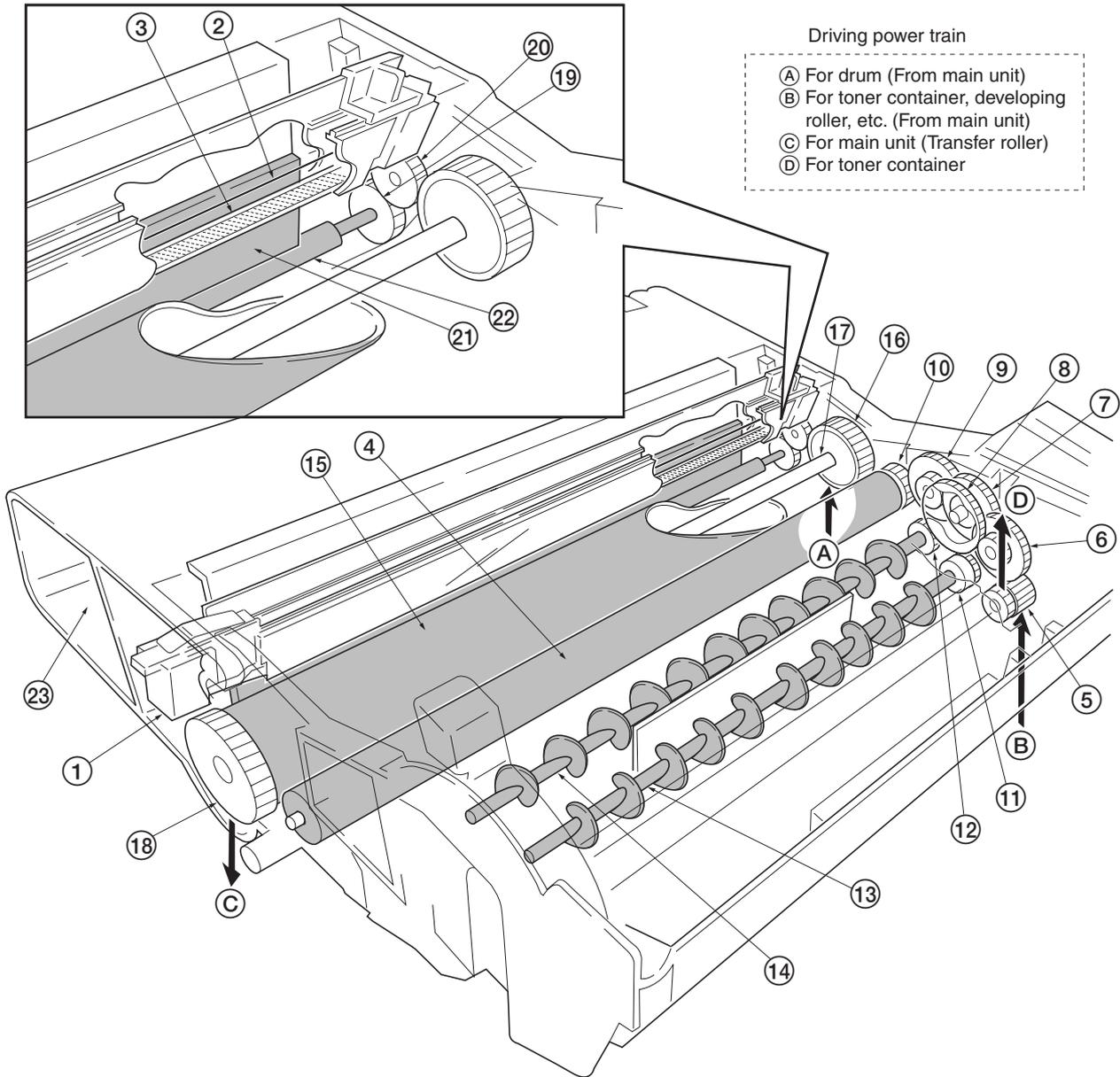


Figure 4-1-1 Electrophotographic cycle

The sections for main charging, exposure (drum), developing, and cleaning are modularized in one Process unit PU-42.

Process unit mechanism



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

Figure 4-1-2 Process unit mechanism

(1) Main charging

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 form the printer, it should be stored in a cool, dark place.

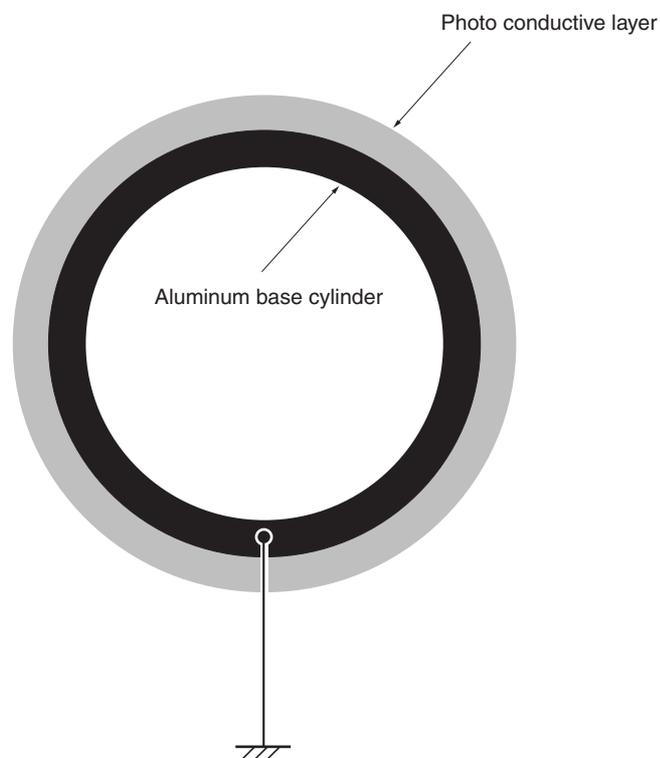


Figure 4-1-3 Photo conductive drum

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).

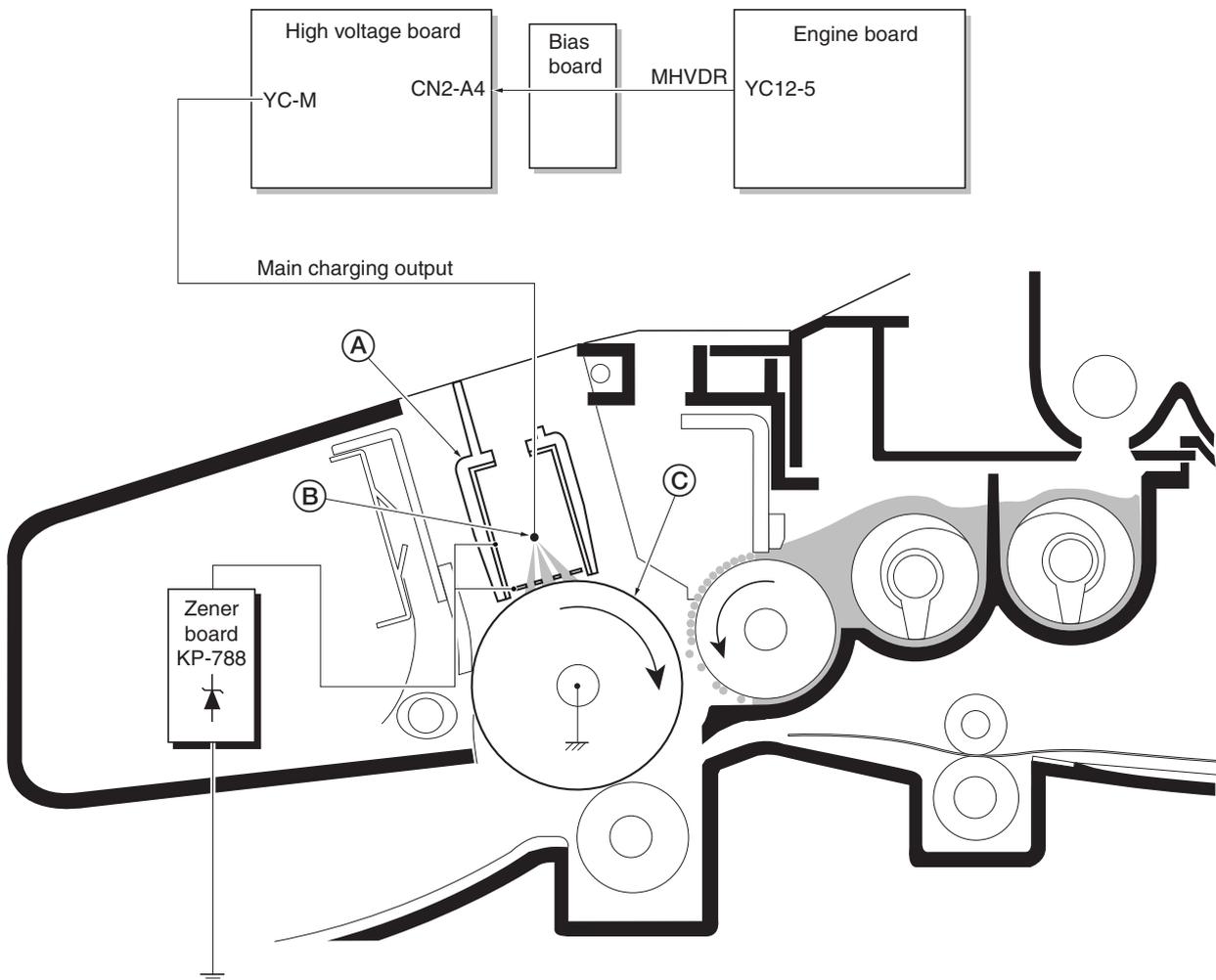


Figure 4-1-4 Charging the drum

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 using the method explained in chapter 3. Cleaning the charging wire prevents print quality problems such as black streaks.

(2) Exposure

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

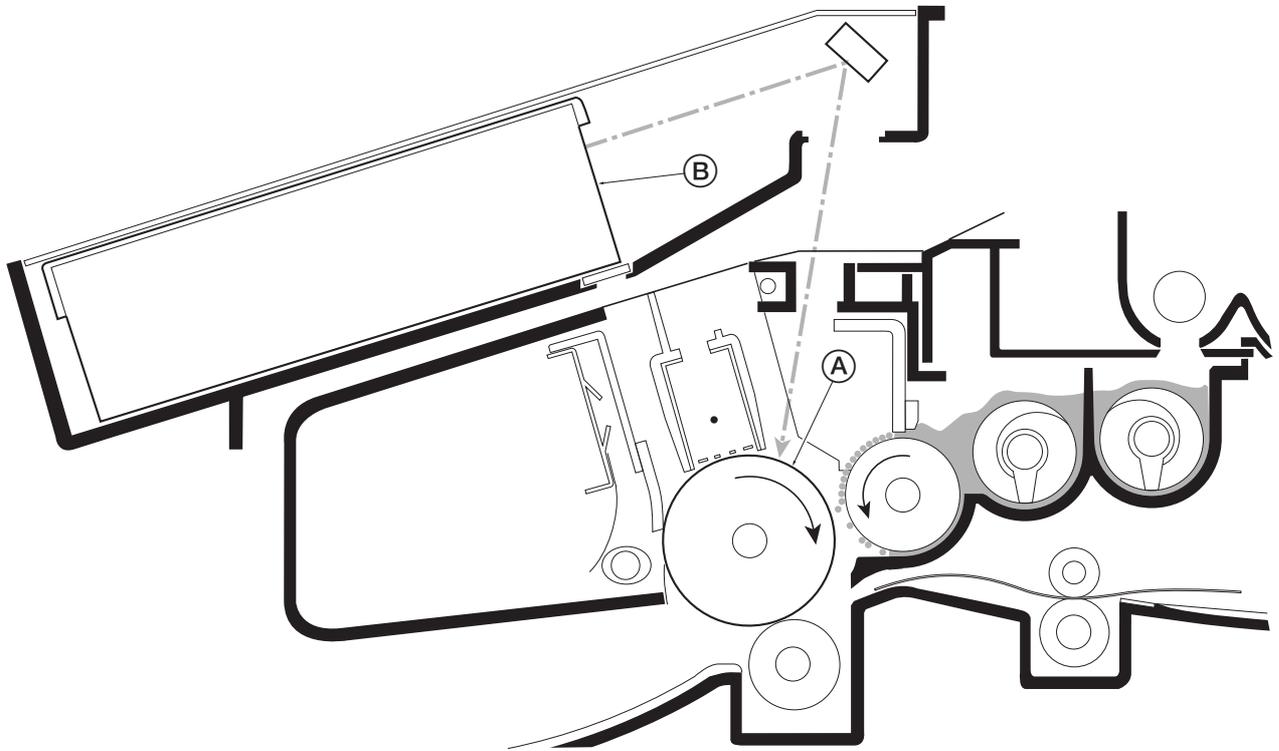


Figure 4-1-5 Exposure

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.

Laser scanner unit

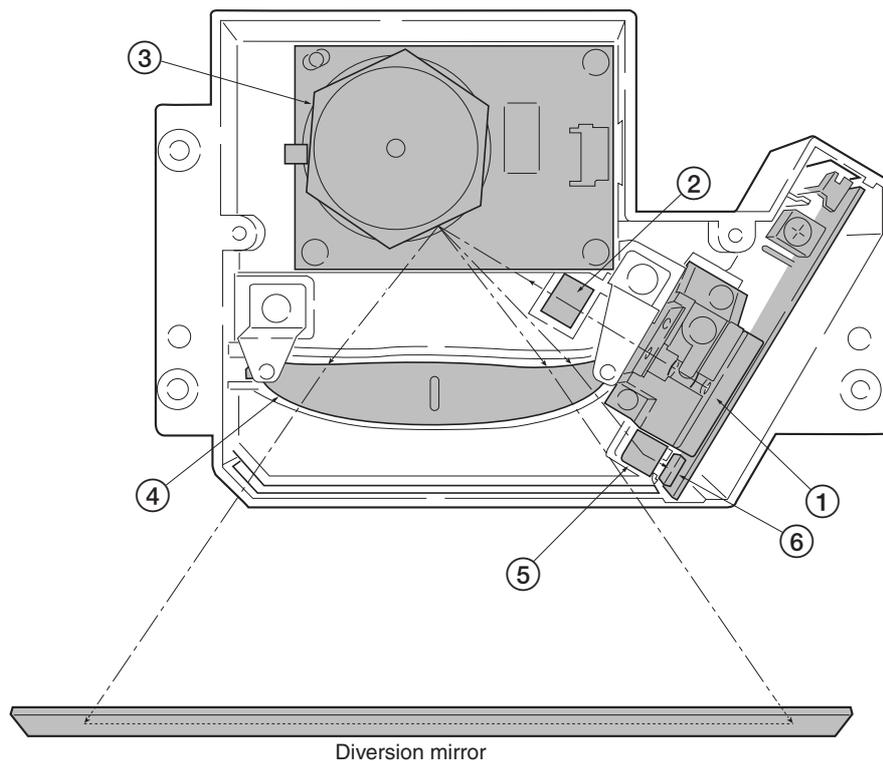


Figure 4-1-6 Laser scanner unit

| Name | Description |
|--------------------------|---|
| 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. |

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.

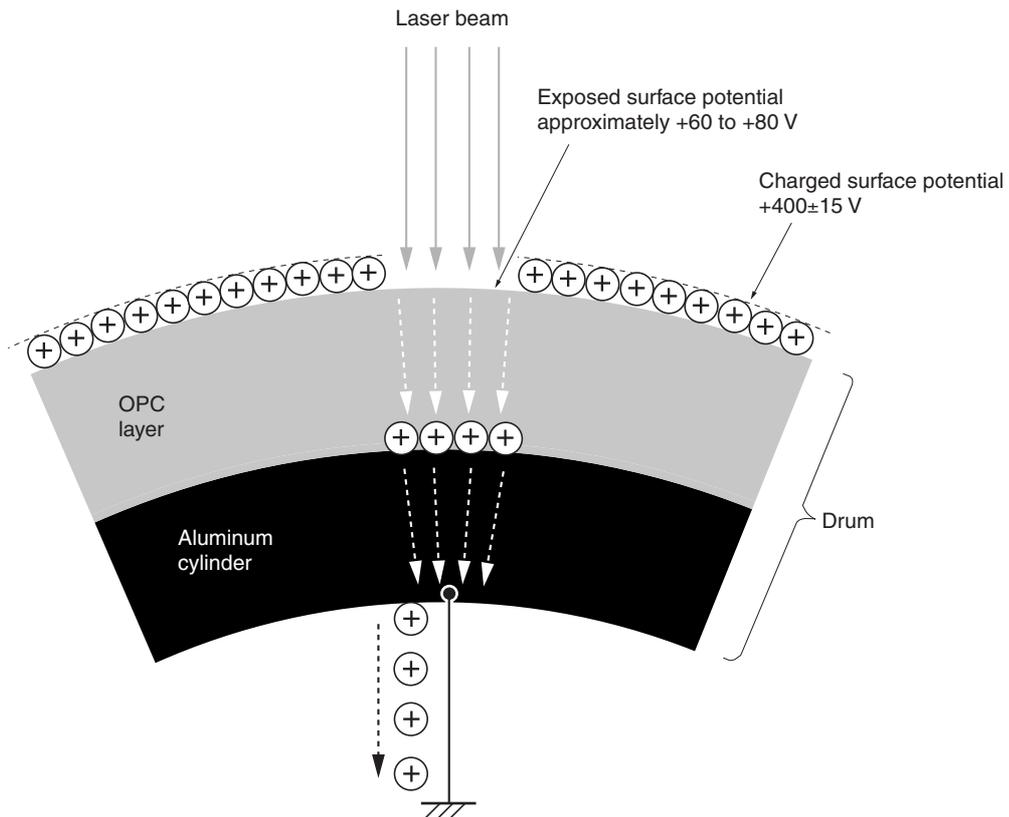


Figure 4-1-7 Drum surface potential

(3) 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.

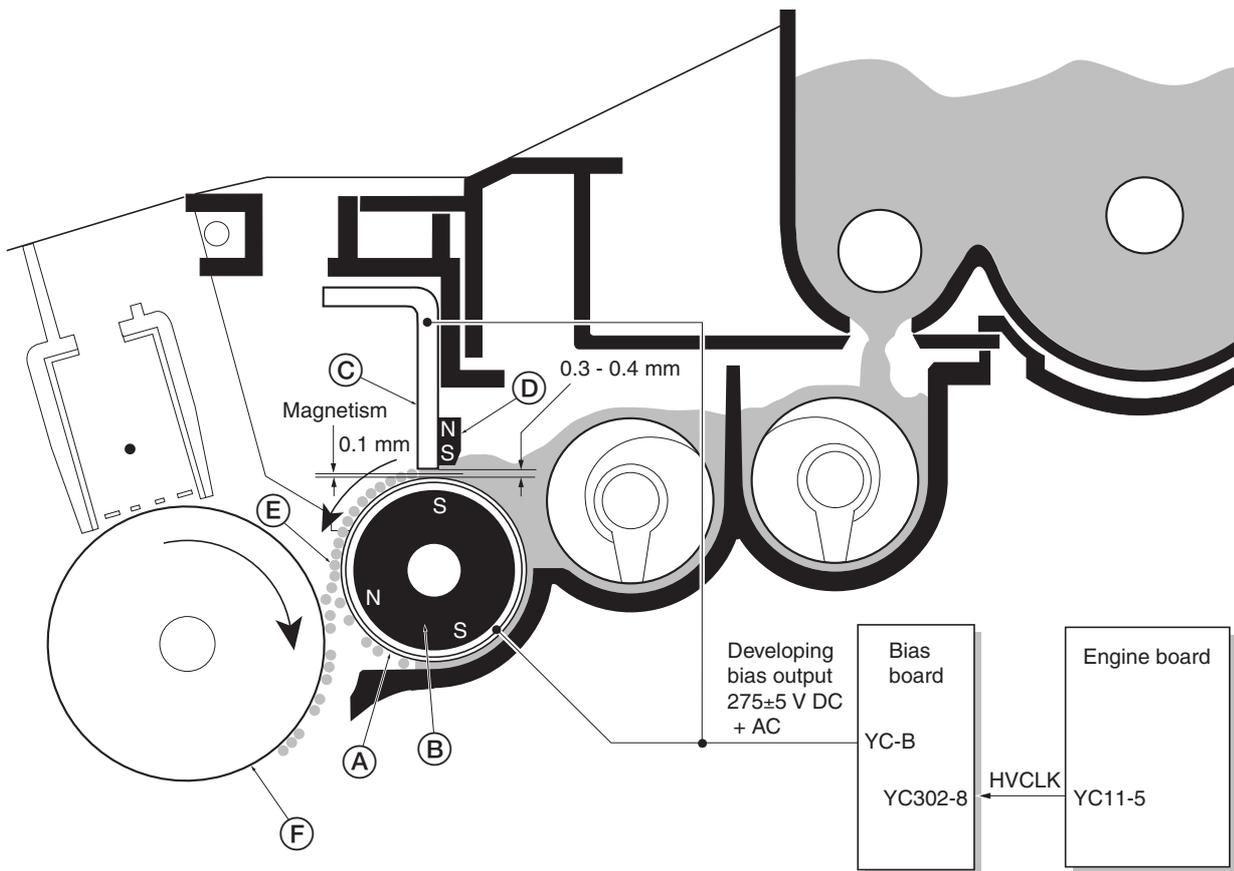


Figure 4-1-8 Development

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.

(4) 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.

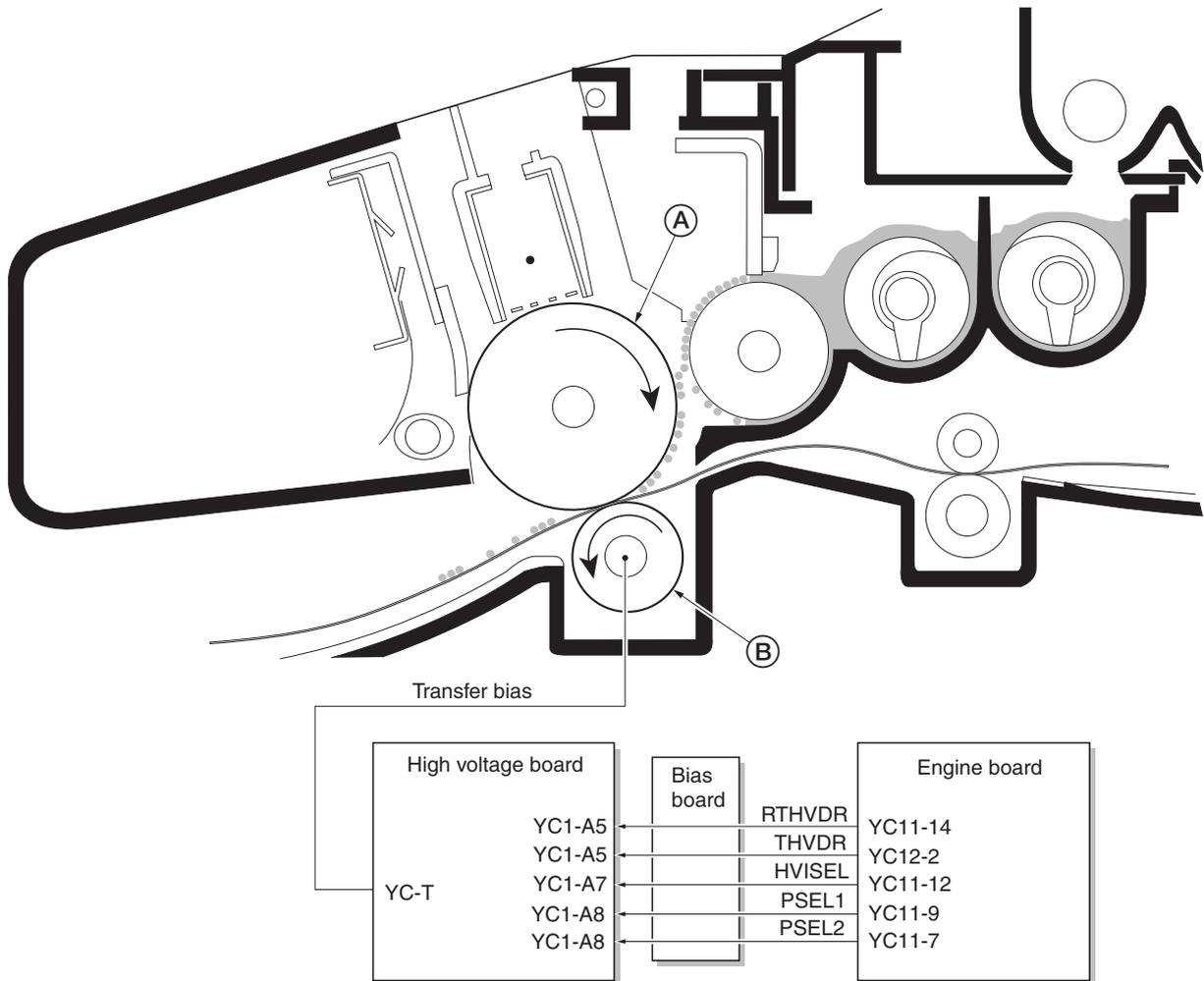


Figure 4-1-9 Transfer

The nominal transfer bias is set to approximately -1.8 kV (limit) with the -6 μ A 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 μ A for thicker paper. On the other hand, the bias current is reduced to -1.8 kV/-6 μ A for thin paper.

(5) 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.

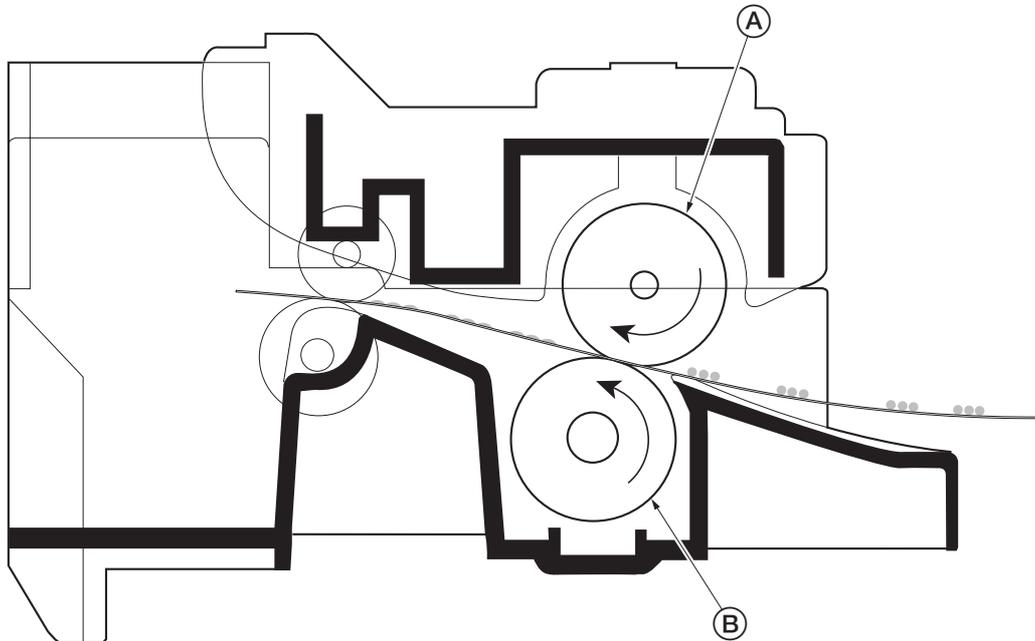


Figure 4-1-10 Fusing

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 temperature is approximately 160 °C while the printer is idle; approximately 175 °C (Normal paper) and 185 °C (Thick paper) while printing.

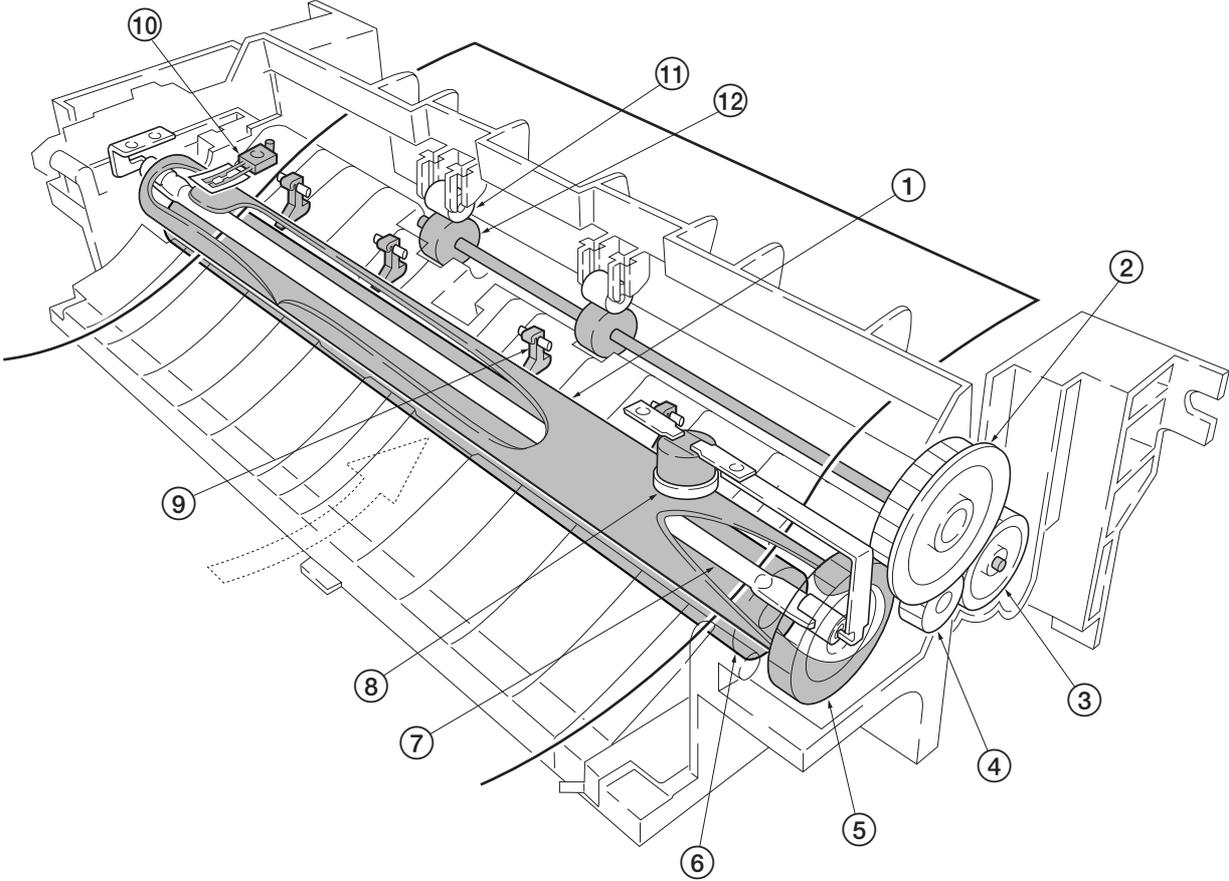
The heat roller is resin coated by fluorin to prevent toner from accumulating on the roller after a long run. Care must be taken while handling the heat roller not to scratch the roller surface as doing so may result in print problems.

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.

Fuser unit mechanism



- ① Heat roller
- ② Idle gear Z34
- ③ Exit gear Z23
- ④ Idle gear Z18
- ⑤ Heat gear Z33
- ⑥ Press roller
- ⑦ Heater lamp [500±25 W]
- ⑧ Thermal cutout
- ⑨ Separator(s)
- ⑩ Thermistor
- ⑪ Exit pulley(s)
- ⑫ Lower exit roller

Figure 4-1-11 Fuser unit mechanism

(6) 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).

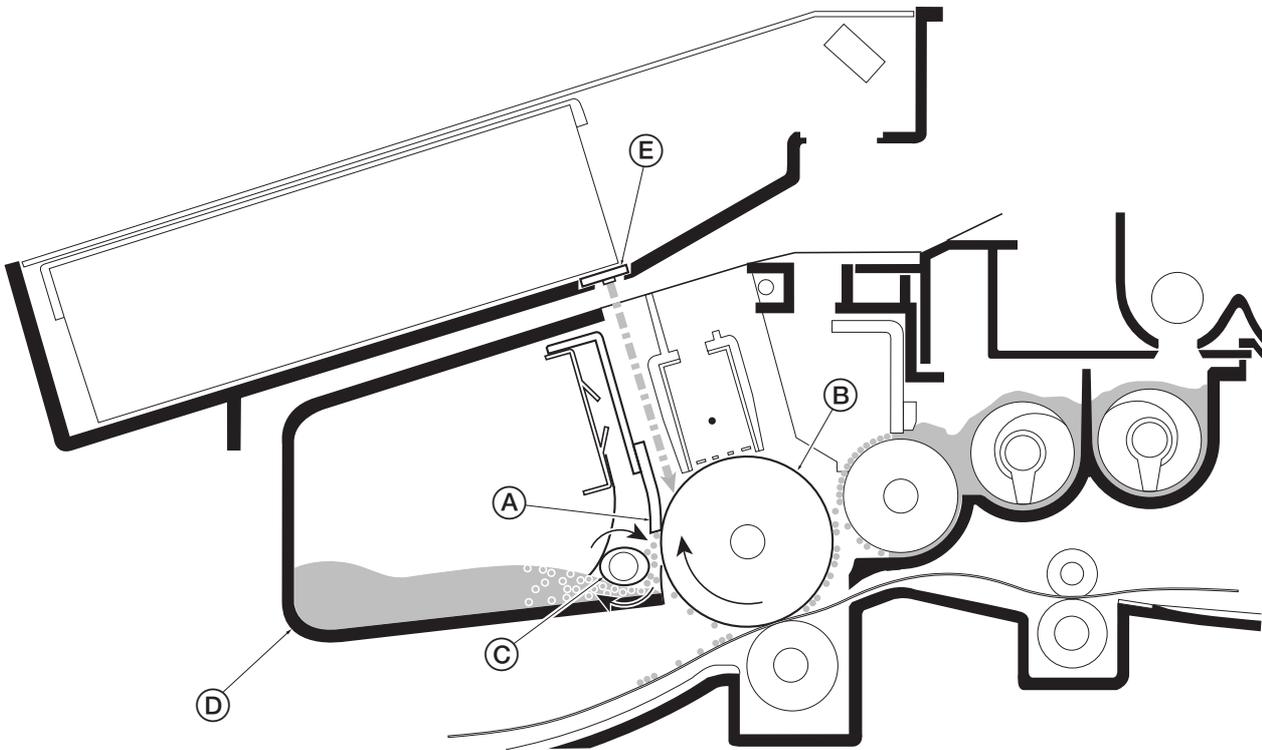


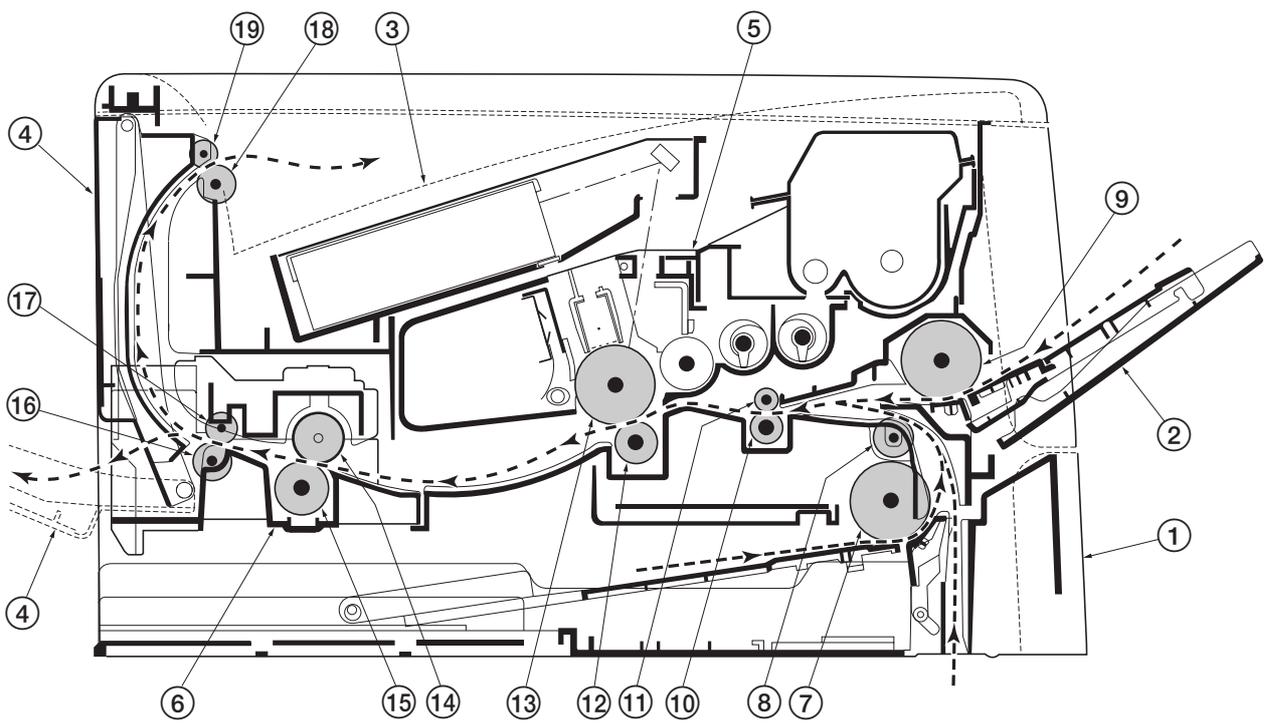
Figure 4-1-12 Drum cleaning and erasing static charge

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.

4-2 Paper feeding system

The paper feeding system picks up paper from the cassette, MP tray, or if installed, the paper feeder PF-17, feeds it in the printer, 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.



- | | | |
|-------------------------|-----------------------------|---------------------|
| ① Cassette | ⑧ Feed pulley | ⑮ Press roller |
| ② MP tray | ⑨ MP feed roller | ⑯ Lower exit roller |
| ③ Face-down output tray | ⑩ Lower registration roller | ⑰ Exit pulley |
| ④ Face-up output tray | ⑪ Upper registration roller | ⑱ Upper exit roller |
| ⑤ Process unit | ⑫ Transfer roller | ⑲ Exit pulley |
| ⑥ Fuser unit | ⑬ Drum | |
| ⑦ Feed roller | ⑭ Heat roller | |

Figure 4-2-1 Paper feeding path

4-2-1 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.

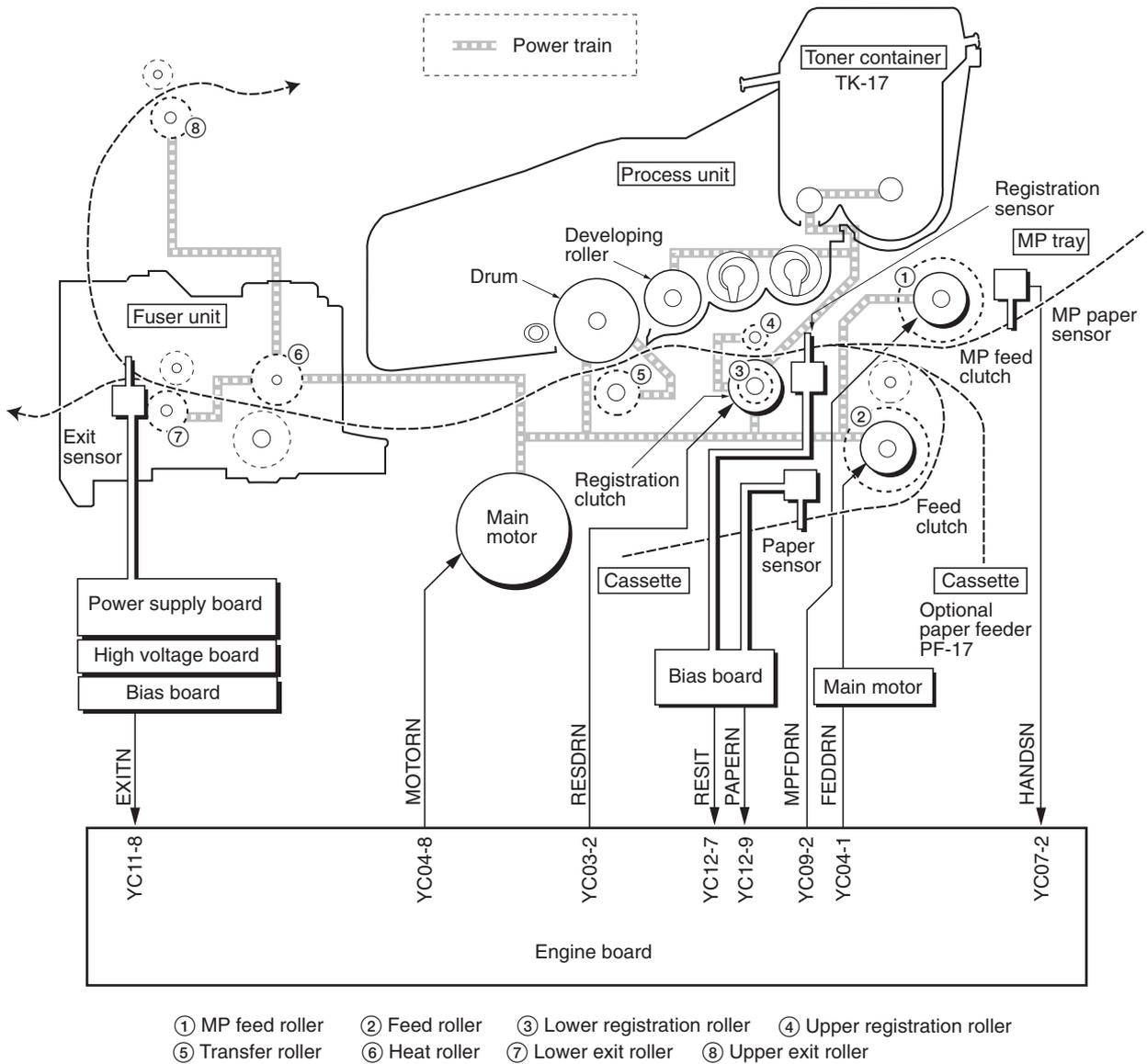


Figure 4-2-2 Paper feed control

Paper feeding mechanism

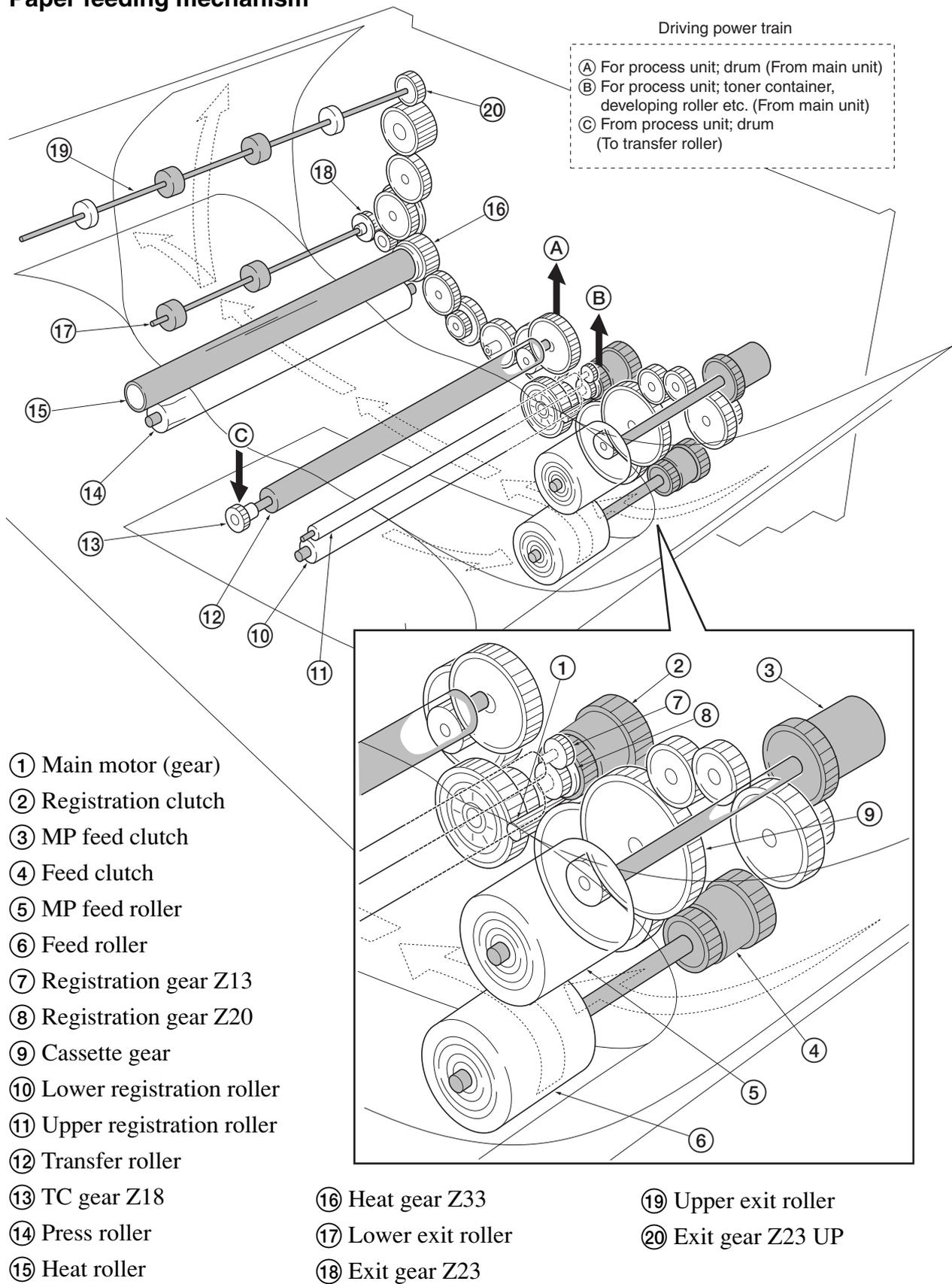


Figure 4-2-3 Paper feeding mechanism

4-3 Electrical control system

4-3-1 Electrical parts layout

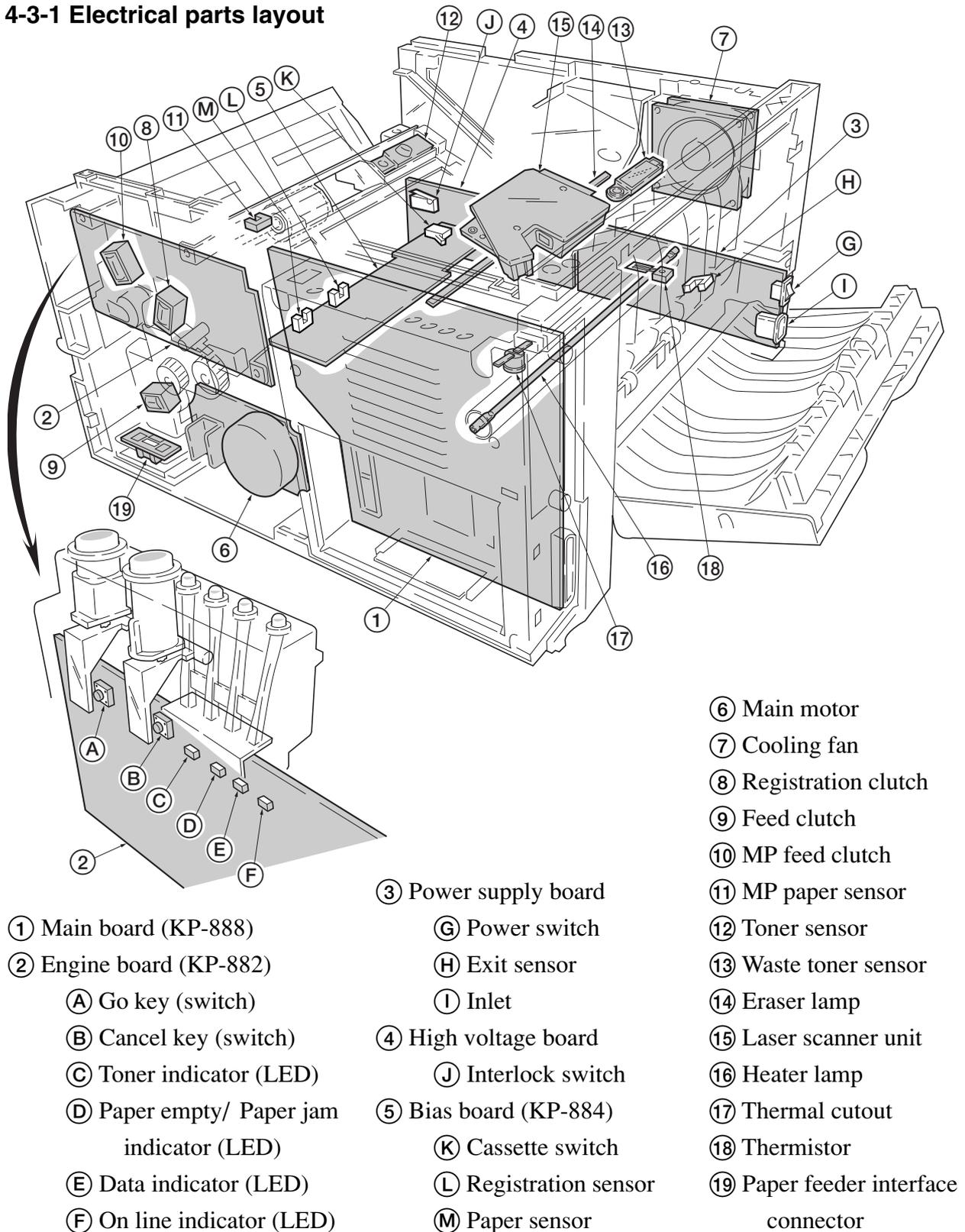


Figure 4-3-1 Electrical parts layout

Eraser lamp control circuit

The CPU (U01) turns pin #23 (ERASERN) of U01 to H level, transistors (Q16 and Q14) turns on consequently, and the 24 V DC given at pin #1 of connector YC05 applies to the eraser lamps. The eraser lamps thus illuminate as the current flows through the eraser lamp, the pin #2 of connector YC05, resistors (R75/R76, and R77/R78), and the ground.

Pin #27 (ERRDYN) of the CPU (U01) is wired to the crossing of resistors (R75/R26 and R77/R78) via resistor (R74). The U01 turns pin #23 (ERASERN) to H level and monitors the input level after one second. If the eraser lamp is normal, the current flowing through R74 also flows the zener diode (DZ01), making the voltage at pin #27 to be approximately 3.7 V. On the contrary, if the level at pin #27 (ERRDYN) is less than 1 V for more than 2 seconds, despite the U01 turns pin #23 (ERASERN) to H level and applying the 24 V DC to pin #1 of connector YC05, the U01 recognizes that the current is not flowing through the eraser lamp. The LED indicator “Call service 5300” error is then displayed.

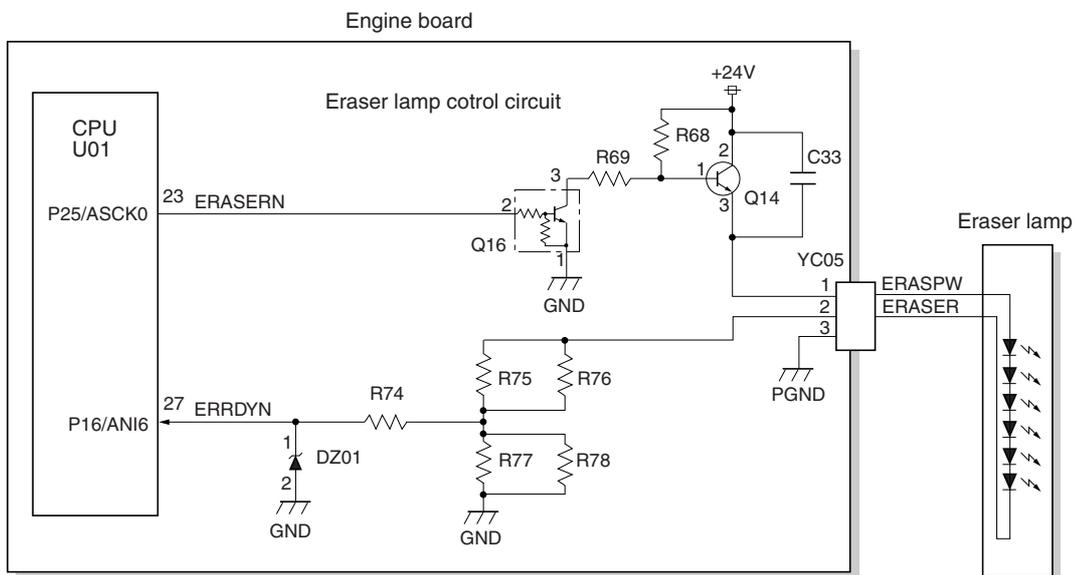


Figure 4-3-4 Eraser lamp control circuit

Heater lamp control circuit

Activation of the heater lamp is dominated by the HEAT signal which is derived by the engine CPU (U01) at its pin #1. When its level is high, transistor QA03-a turns on, photo-triac PC2 and triac TRC1 turn on simultaneously, and the heater lamp is applied with the primary AC voltage in turn.

Switching of triac TRC1, 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 (U01). Since abrupt change in the current flow can be significantly avoided by synchronizing triac TRC1 with the zero-cross signal, the possibility of noise due to the primary AC supply is greatly reduced.

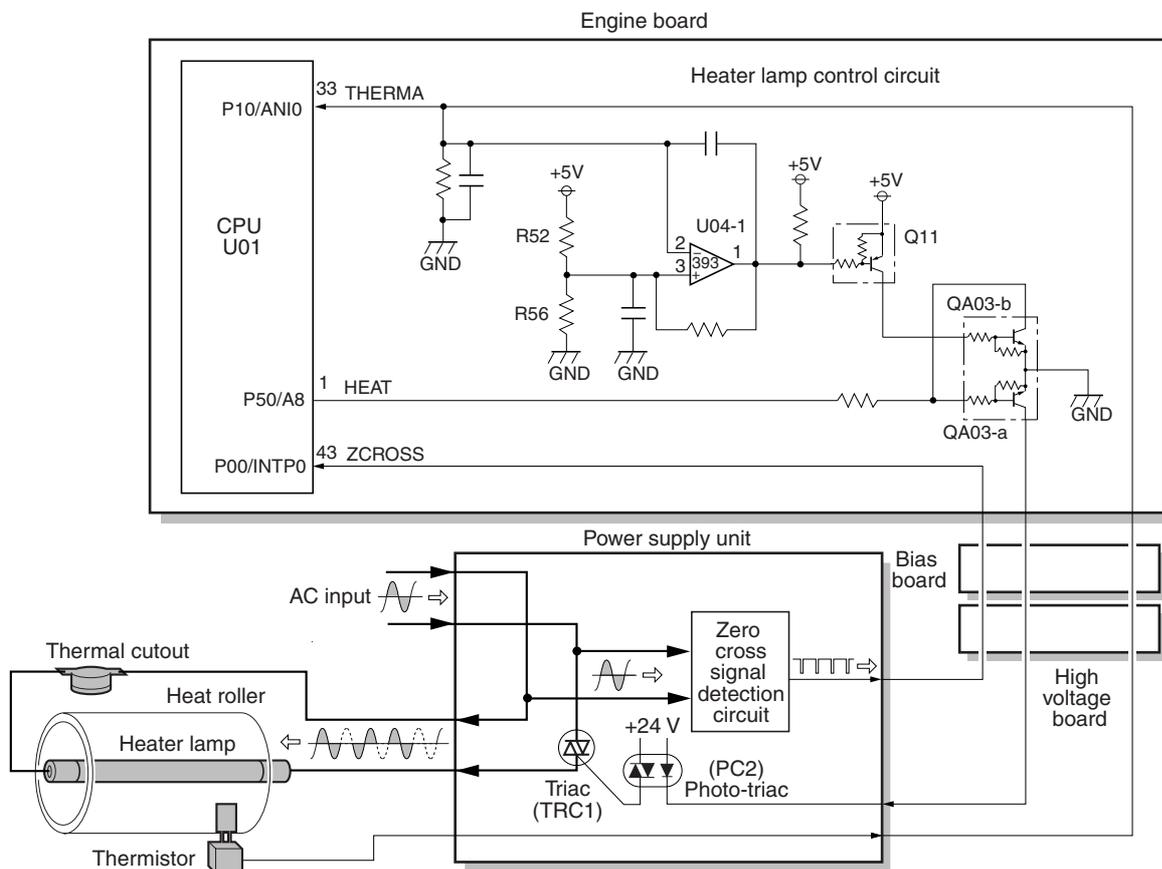


Figure 4-3-5 heater lamp control circuit

The AC power for the heater is applied in one of the five variations of the zero cross switchings as shown in Figure 4-3-6. Each variation is constituted with the unit of ten positive and negative envelopes in five cycles, as obtained by varying the duration during which TRC1 turns on. The heater lamp is energized while TRC1 is kept on; the heater lamp is turned off while TRC1 is kept off. For example, the duty cycle (the period of a cycle during which the heater lamp is turned on) is maximum for variation No.1 as the heater lamp is energized for the whole envelopes. The duty cycle is 60 % for variation No.3 as the heater lamp is energized for the 6 positive and negative envelopes out of 10. The duty cycle is 0 since the heater lamp is kept turned off for the whole envelopes.

CPU (U01) selectively switches among those variations for applying voltages to the heater lamp according to the THERMA signal which appears at pin #33 as feedback.

A fraction of THERMA is applied to pin #2 of comparator U04-1. 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 R52 and R56). Should the voltage at pin #2 exceed that at pin #3, the level at pin #1 becomes low. Since pin #1 is wired to the output line for the HEAT signal, the HEAT signal is enforced to be low regardless the behavior of CPU (U01), thus preventing possible heat overrun. The LED indicator “Call service 6110” error is then displayed.

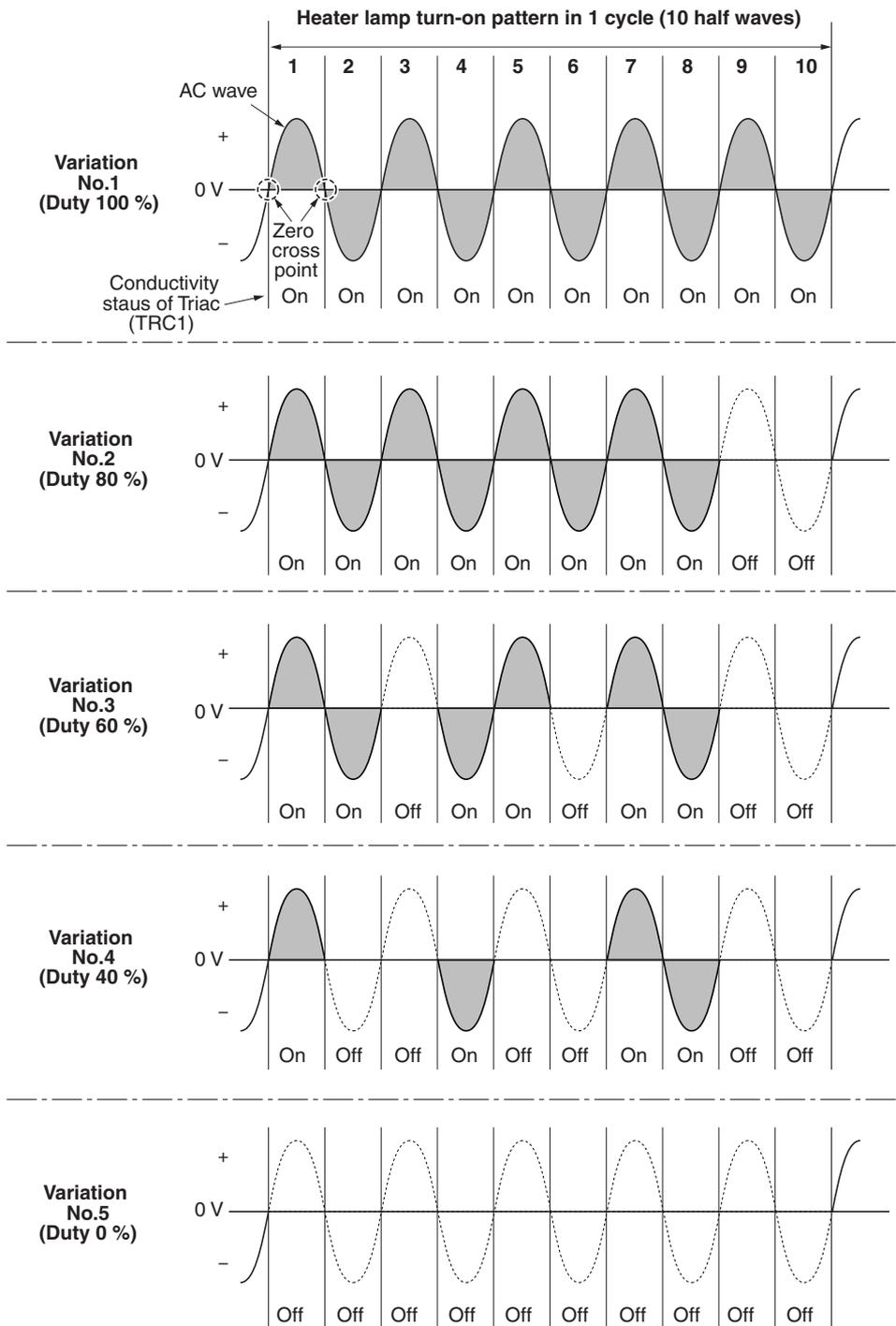


Figure 4-3-6 heater lamp turn-on variations

Polygon motor control circuit

The main controller board supplies the 1700.8 Hz clock pulse (PLGCLK) via the engine board to the PLL control IC (IC1) for the polygon motor. To begin printing, the engine CPU U01 turns PLGDR to H level, the PLL control IC (IC1) starts to revolve the polygon motor so that the revolution is 17,008 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, the LED indicator “Call service 4000” error is then displayed.

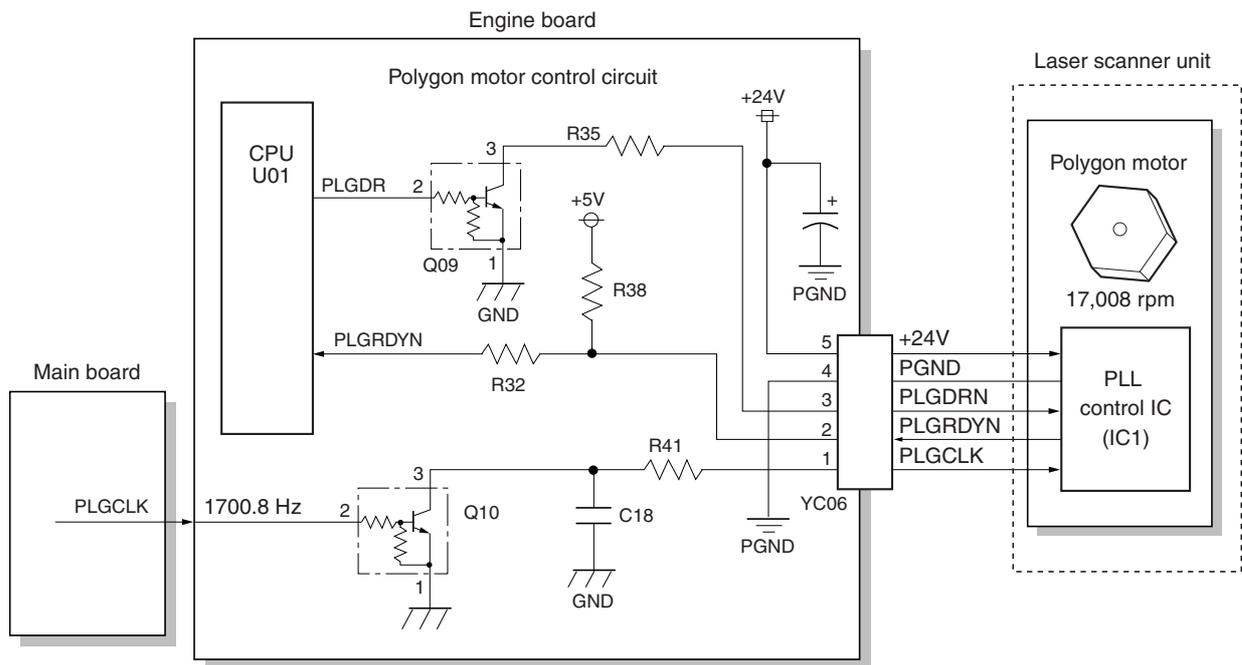


Figure 4-3-7 Polygon motor control circuit

(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.

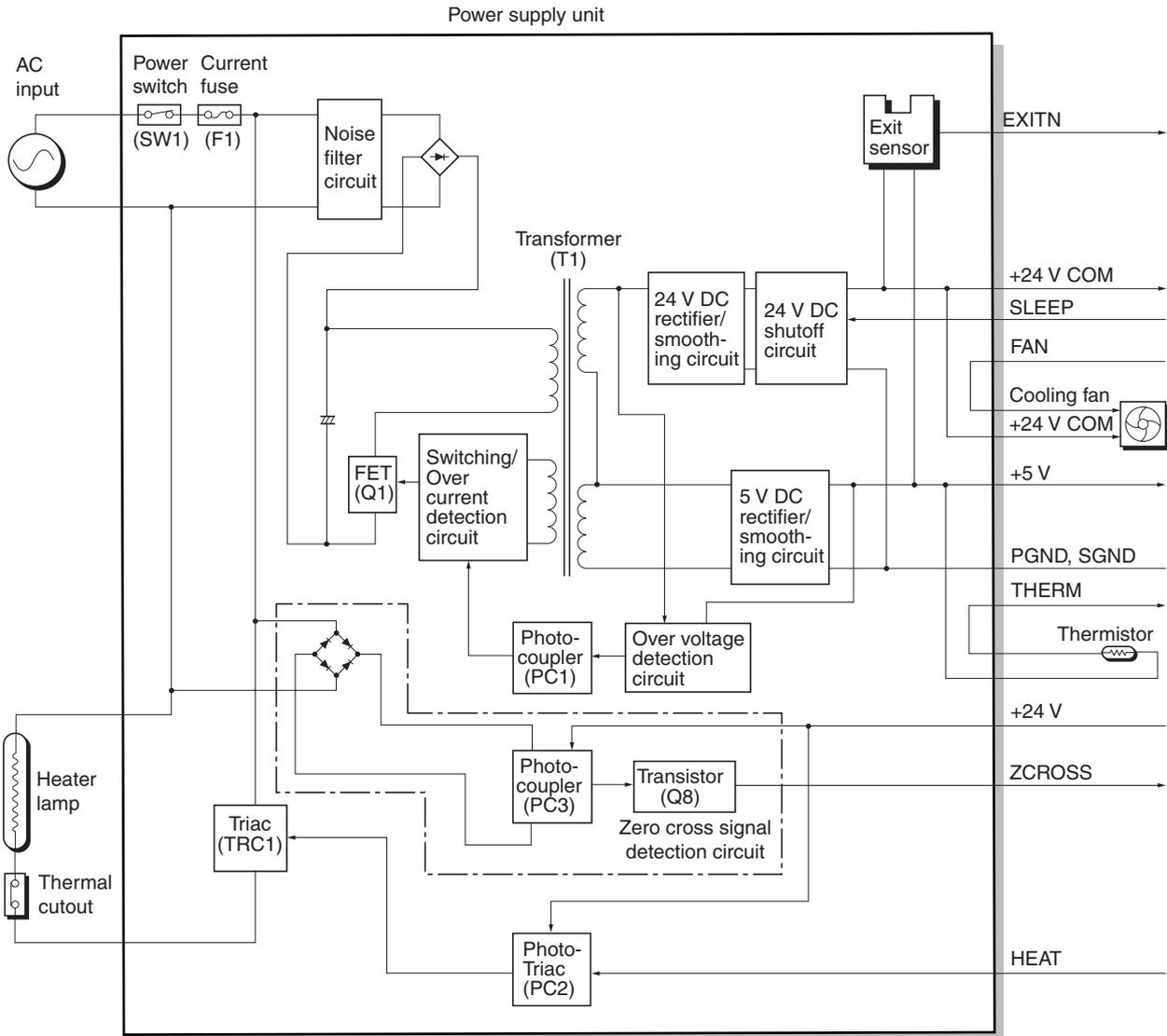


Figure 4-3-8 Power supply board circuit block diagram

(4) Bias board

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

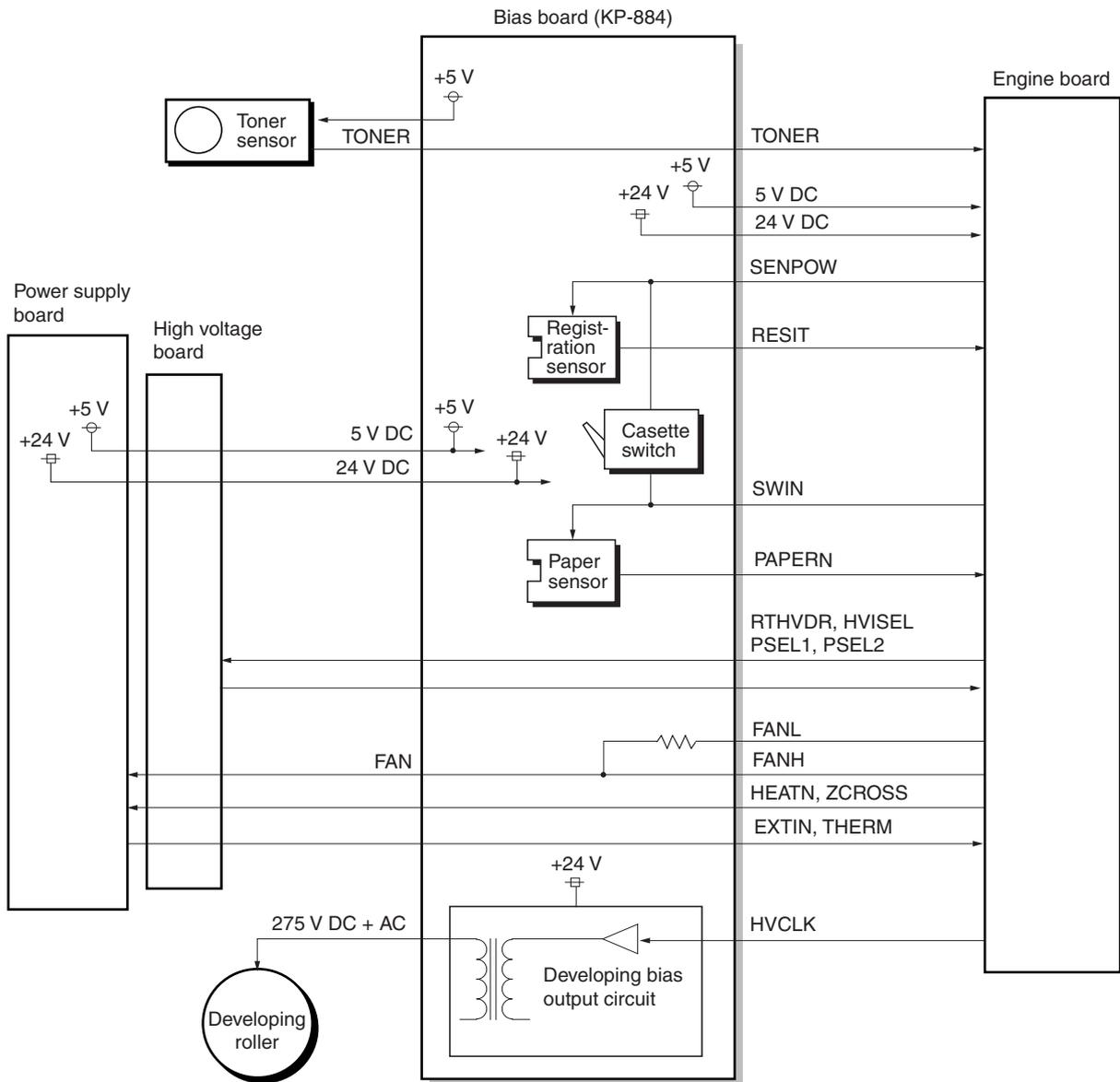


Figure 4-3-9 Bias board circuit block diagram

(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.

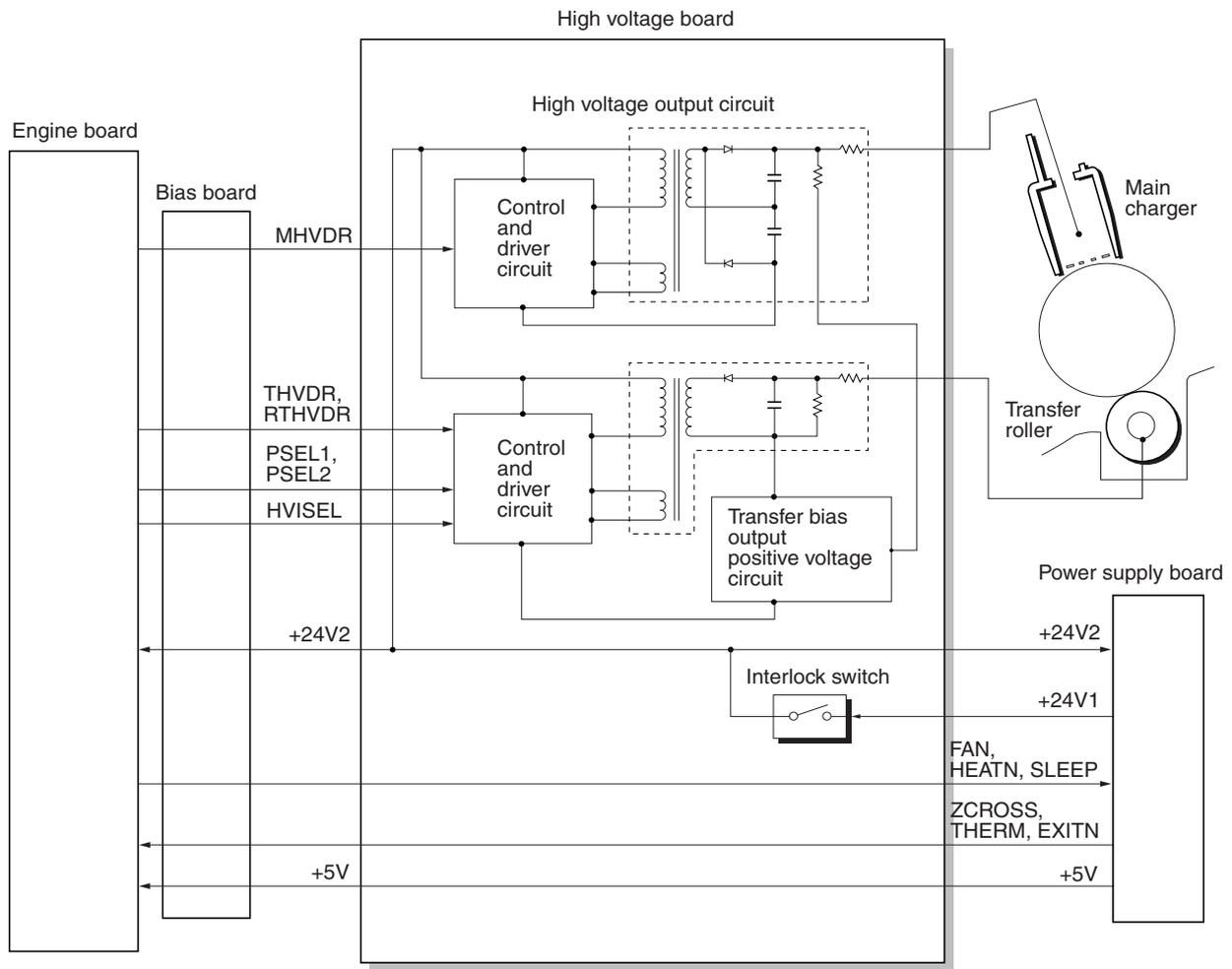


Figure 4-3-10 High voltage board circuit block diagram

Interlock switch

The interlock switch is located on the high voltage board and opened and closed in conjunction with the front cover or the top cover via the interlock lever. This switch connects and disconnects the +24 V DC power supply line. If the front cover or the 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.

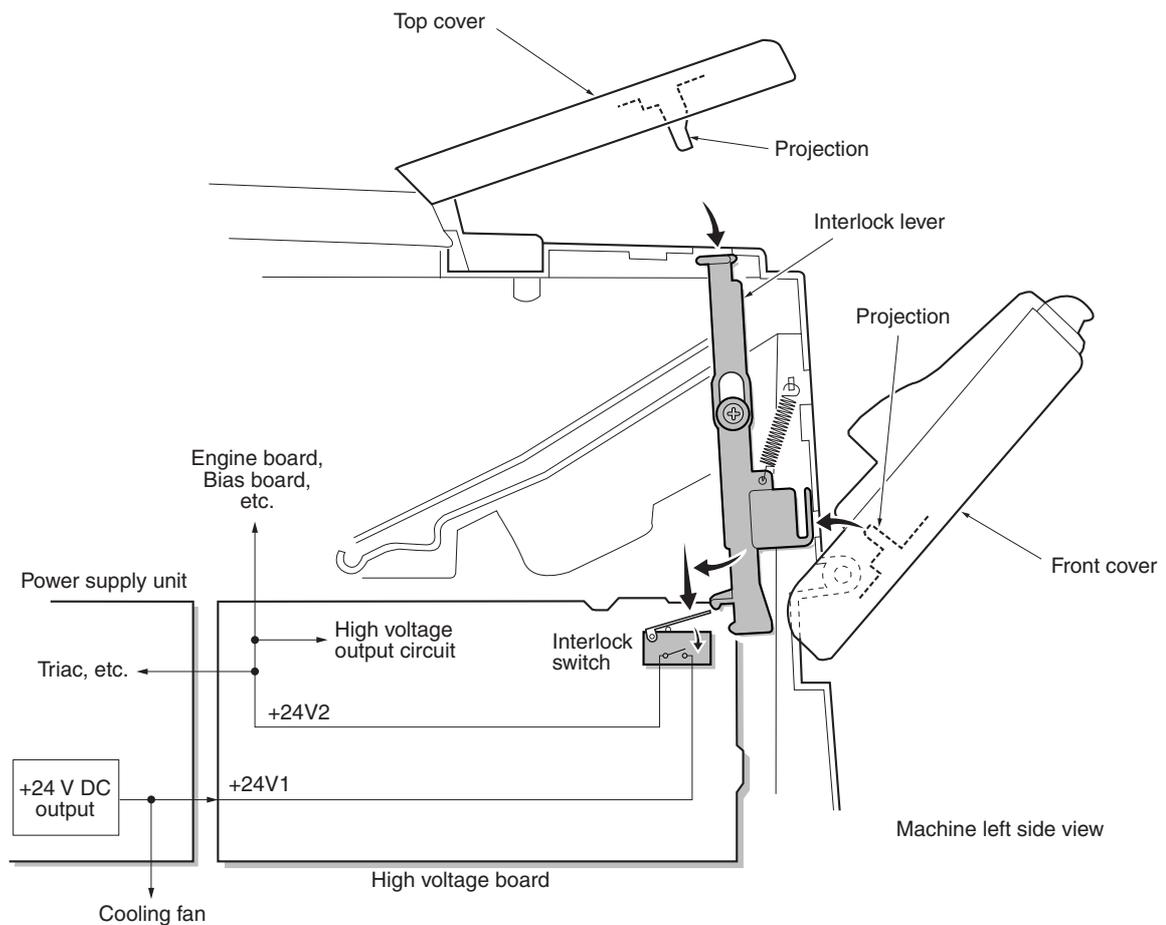


Figure 4-3-11 Interlock switch

Chapter 5 D i s a s s e m b l y

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5-1 General instructions

This chapter provides procedures for removal and replacement of the field replacement components. For other components not explained in this chapter, the diagrams in the *Parts Catalog* attached with this manual will help locate the component.

When replacing of a component, reverse the procedure for the removal procedure explained in this chapter.

WARNING



To avoid injury to human bodies, make sure that AC power is removed and the power cord is unplugged from both the power line and the printer.

5-1-1 Screw/hardware

Screws and hardware used in the printer are listed in the *Ecosys Screw catalog*. These screw symbol numbers are universal to most Ecosys printers.

CAUTION



When securing a self-tapping screws, align it with the thread carefully. First turn it counterclockwise, then slowly clockwise. Do not overtighten. In case the self-tapped thread is damaged, the affected part must be replaced with a new part.

5-1-2 Before starting disassembly

Before proceeding, unplug the power cord from the printer and the power supply.

WARNING



Never attempt to operate the printer with a component removed.

CAUTION



The printer use electrostatic sensitive parts inside (on circuit boards, Laser scanner unit, etc.). Provide an antistatic (discharging) device, such as a wrist strap, that can effectively discharge your body before touching the circuit boards, the laser scanner unit, etc.

5-2 Disassembly

Before proceeding, remove the paper cassette and the optional paper feeder, if installed.

5-2-1 Removing the process unit

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

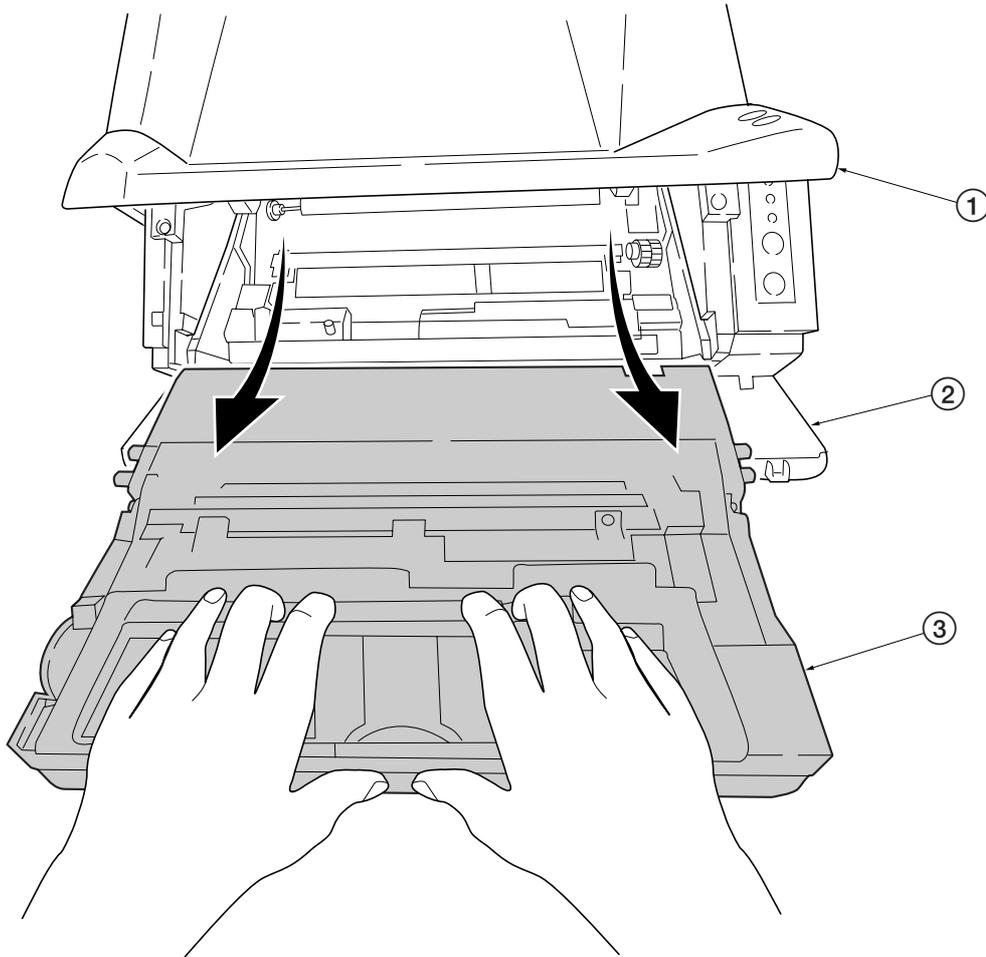


Figure 5-2-1 Removing the process unit

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.

5-2-2 Removing the principal outer covers

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

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

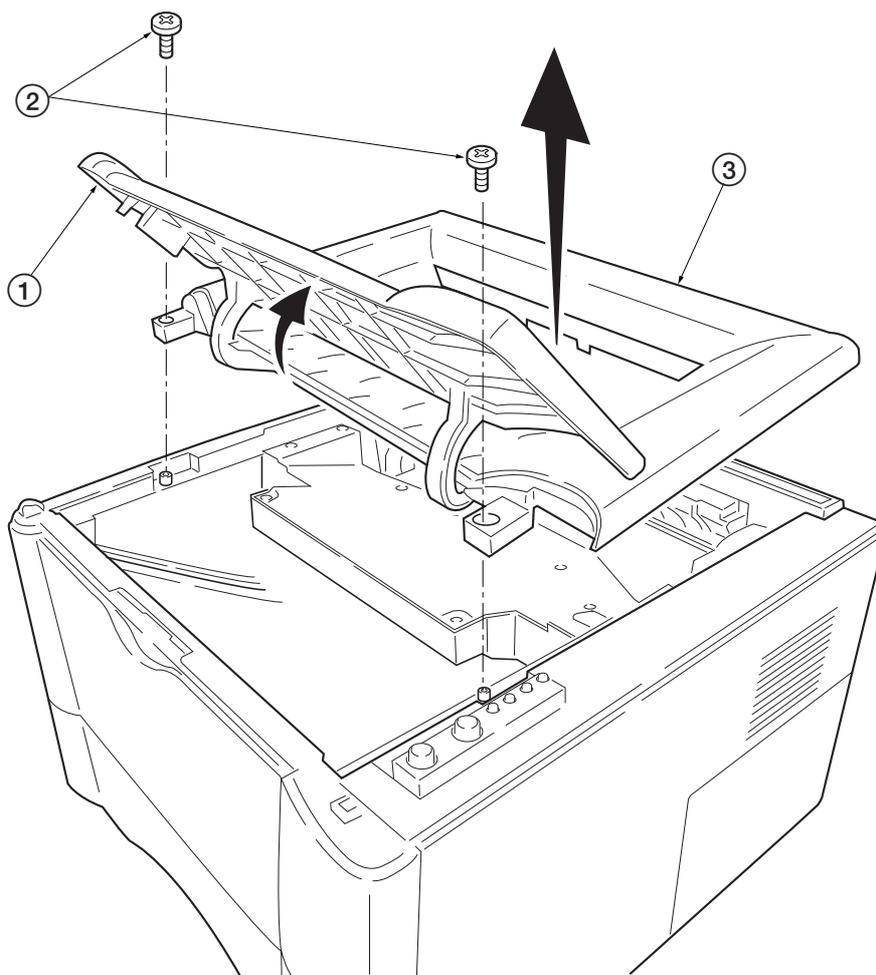


Figure 5-2-2 Removing the top cover/face-down output tray

(2) Removing the right cover

1. Remove one screw (1).
2. Remove the side cover (2).
3. Unlatch the six snaps (3) and one hook hole (4) on the chassis, remove the right cover (5).

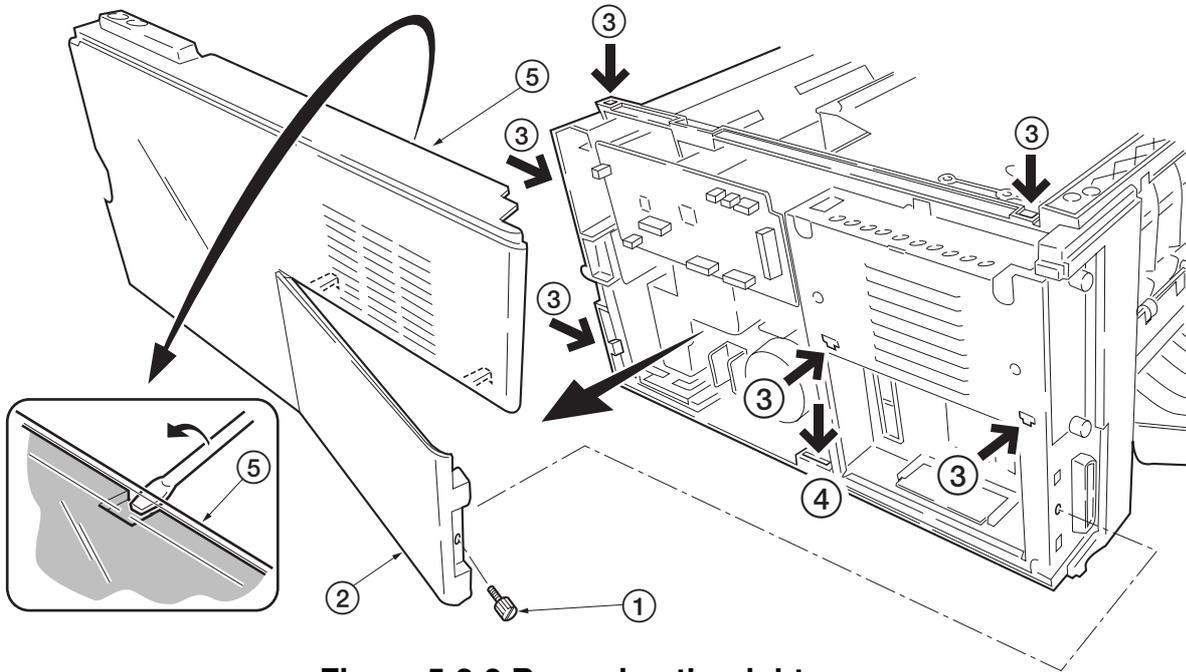


Figure 5-2-3 Removing the right cover

(3) Removing the left cover

1. Unlatch the six snaps (1) and two hook holes (2) on the chassis, remove the left cover (3).

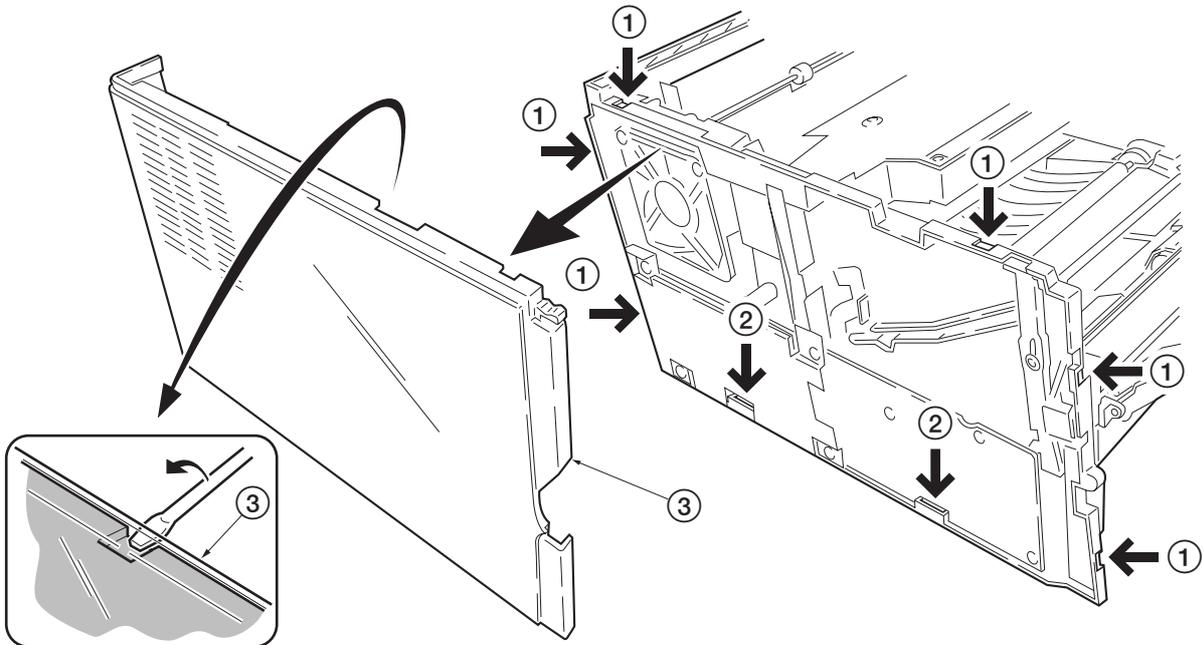


Figure 5-2-4 Removing the left cover

5-2-3 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 5-4)
2. Stand the machine the front side up.
3. Move the feed roller in the direction (A), and remove the feed roller (1).

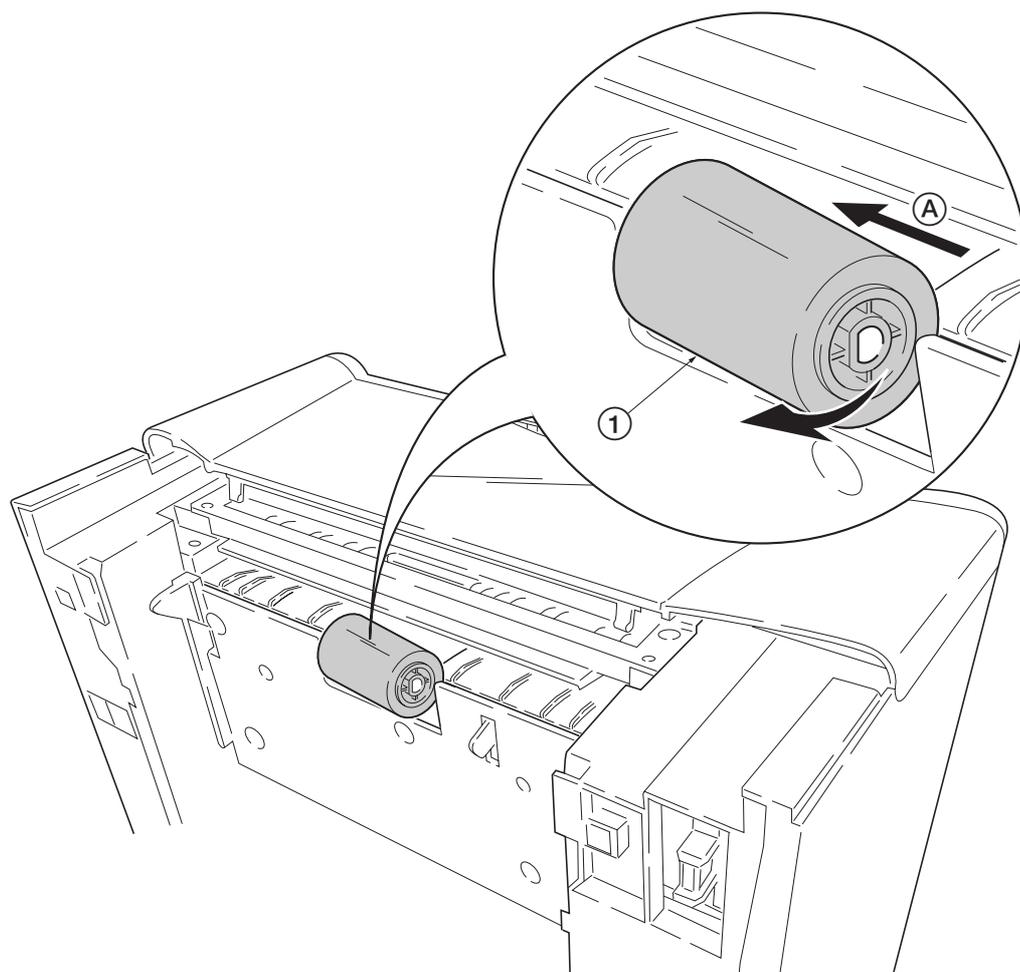


Figure 5-2-5 Removing the feed roller

5-2-4 Removing the MP tray feed roller

1. Remove the engine board. (See page 5-11)
2. Remove one screw ①.
3. Remove the grounding plate ②.
4. Remove one stop ring ③.
5. Remove the MP feed clutch ④.

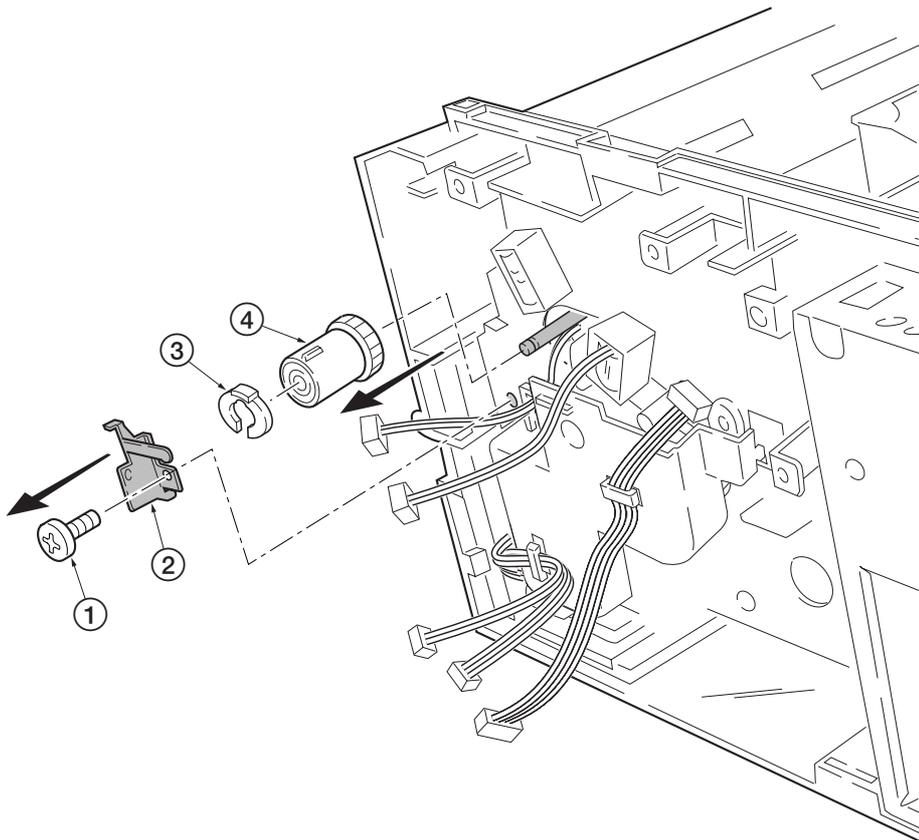


Figure 5-2-6 Removing the MP feed clutch

6. Remove one screw (5).
7. Remove the toner sensor (6) and spring (7).
8. Remove two screws (8).
9. While pressing the latch (9) by using the driver and then remove the MP feed unit (10).

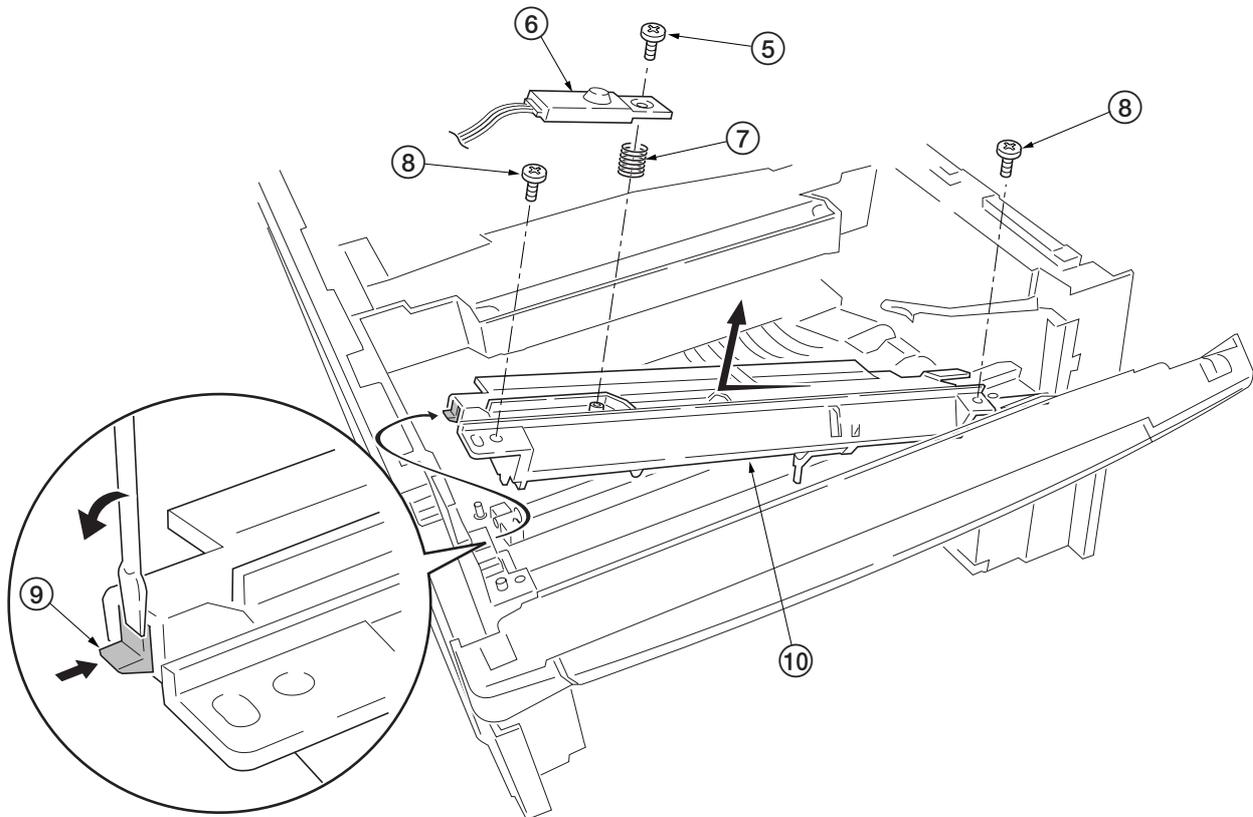


Figure 5-2-7 Removing the MP feed unit

10. Remove the stop ring (11) and then remove the MP feed roller (12).

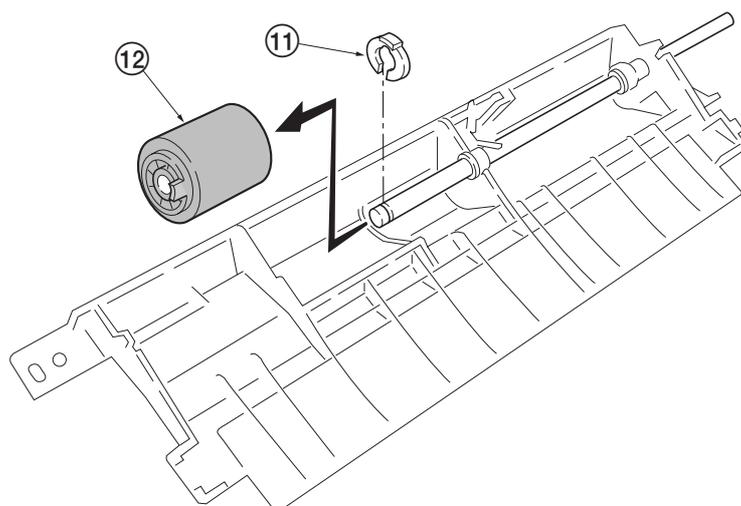


Figure 5-2-8 Removing the MP feed roller

5-2-5 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 5-4)
2. Remove the transfer roller ① from the both bushes.

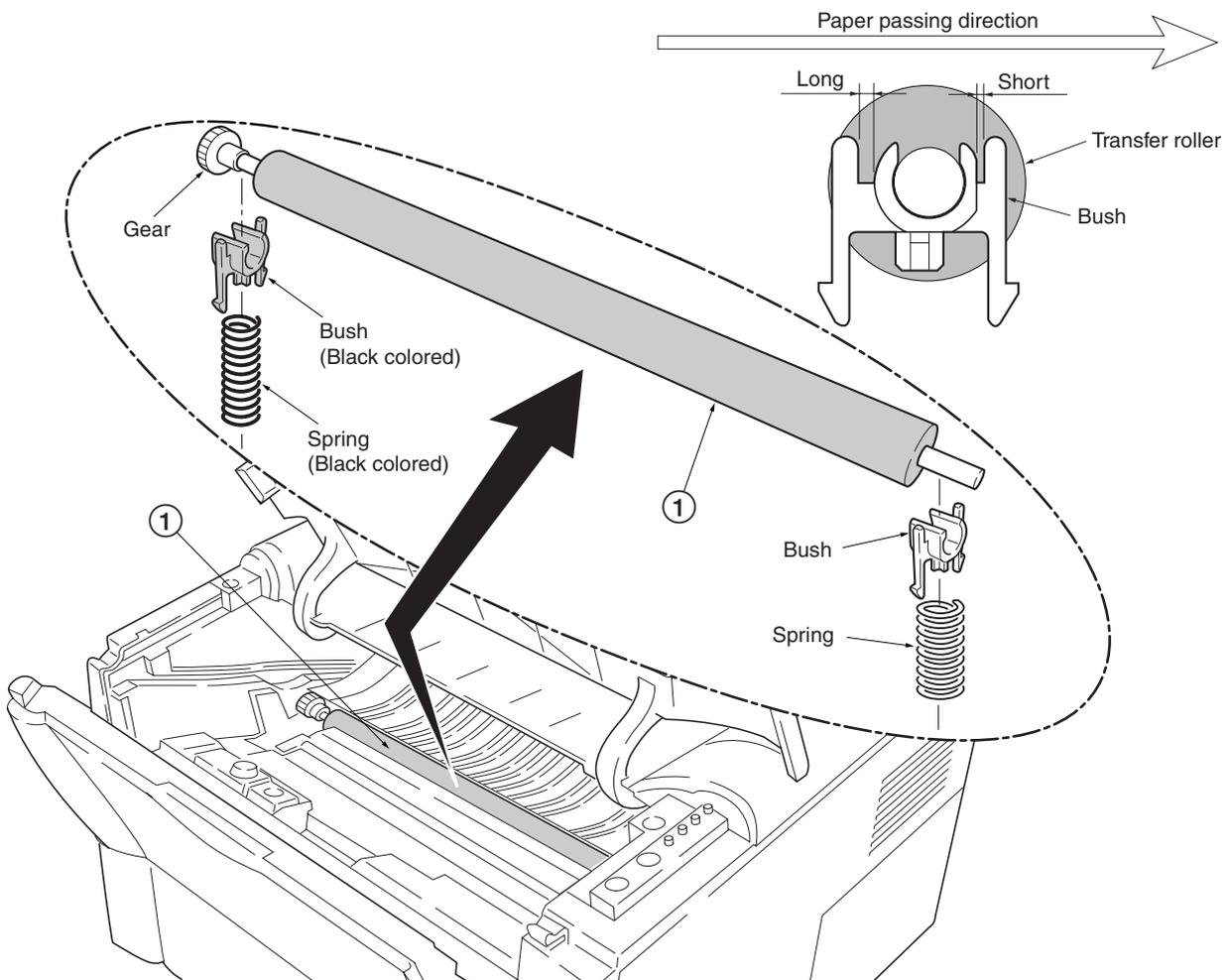


Figure 5-2-9 Removing the transfer roller

5-2-6 Removing the principal circuit boards

(1) Removing the engine board

1. Remove the top cover/face-down output tray and right cover (See pages 5-5 and 5-6).
2. Remove all (ten) connectors from the engine board ①.
3. Remove three screws ②.
4. Remove the engine board ①.

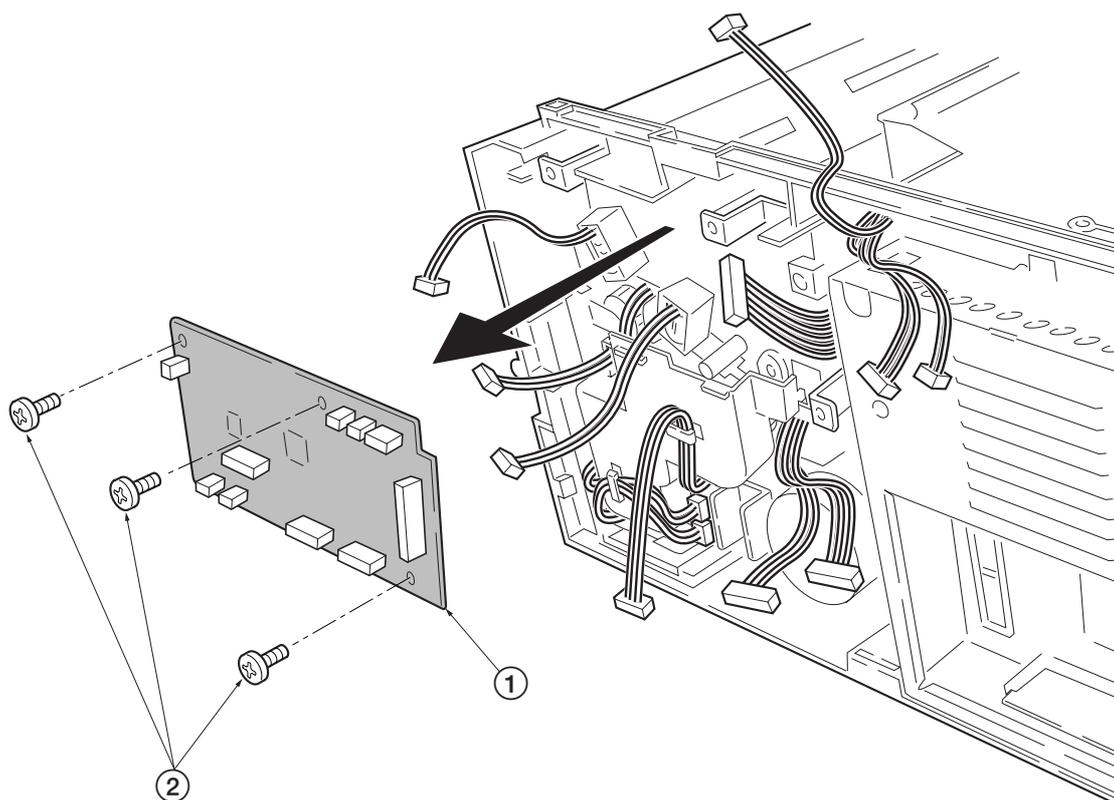


Figure 5-2-10 Removing the engine board

(2) Removing the main board

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

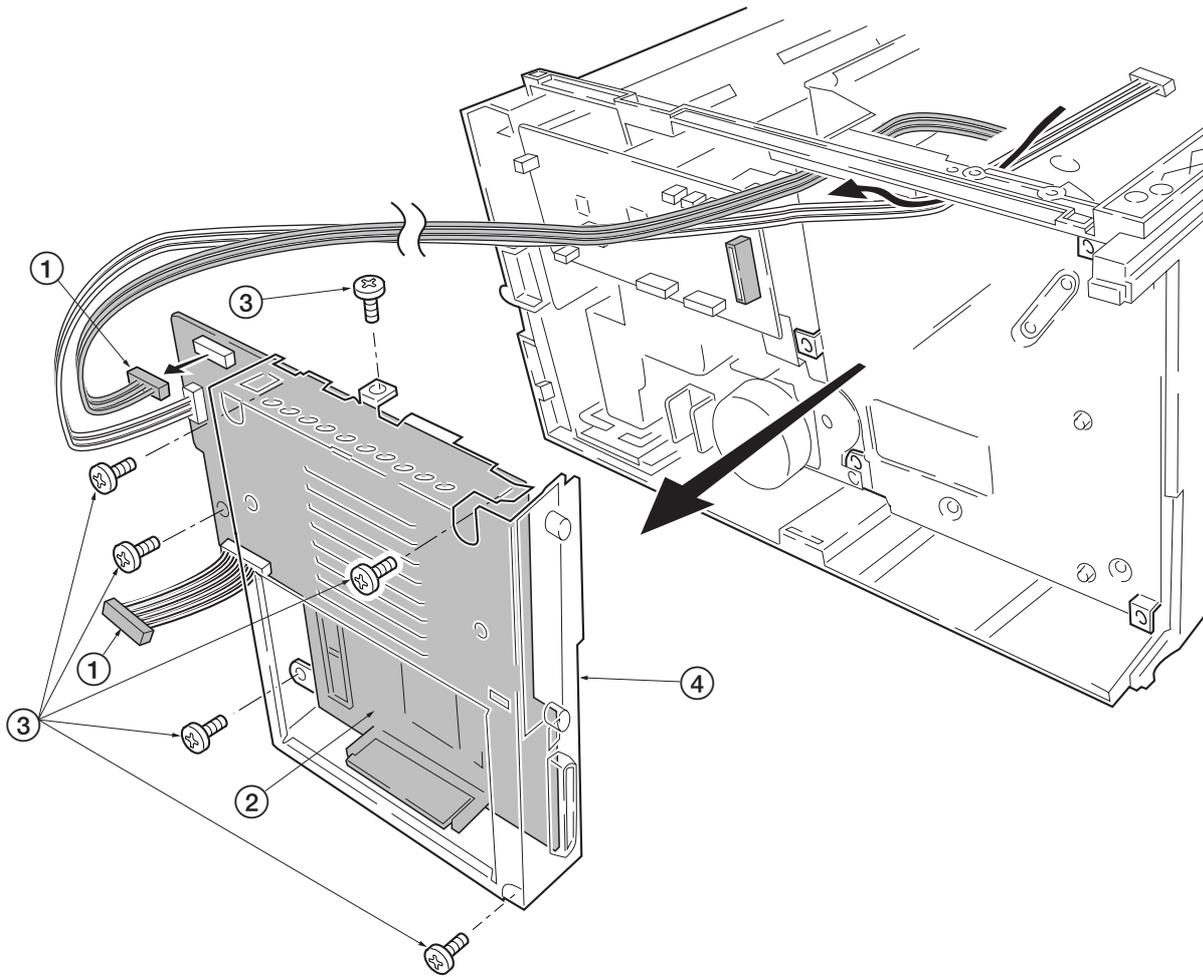


Figure 5-2-11 Removing the controller box (with main board)

6. Remove two screws (5) at the back of the main board (2).
7. Remove three screws (6) from the parallel interface connector (7) and USB connector (8).
8. Remove the main board (2).

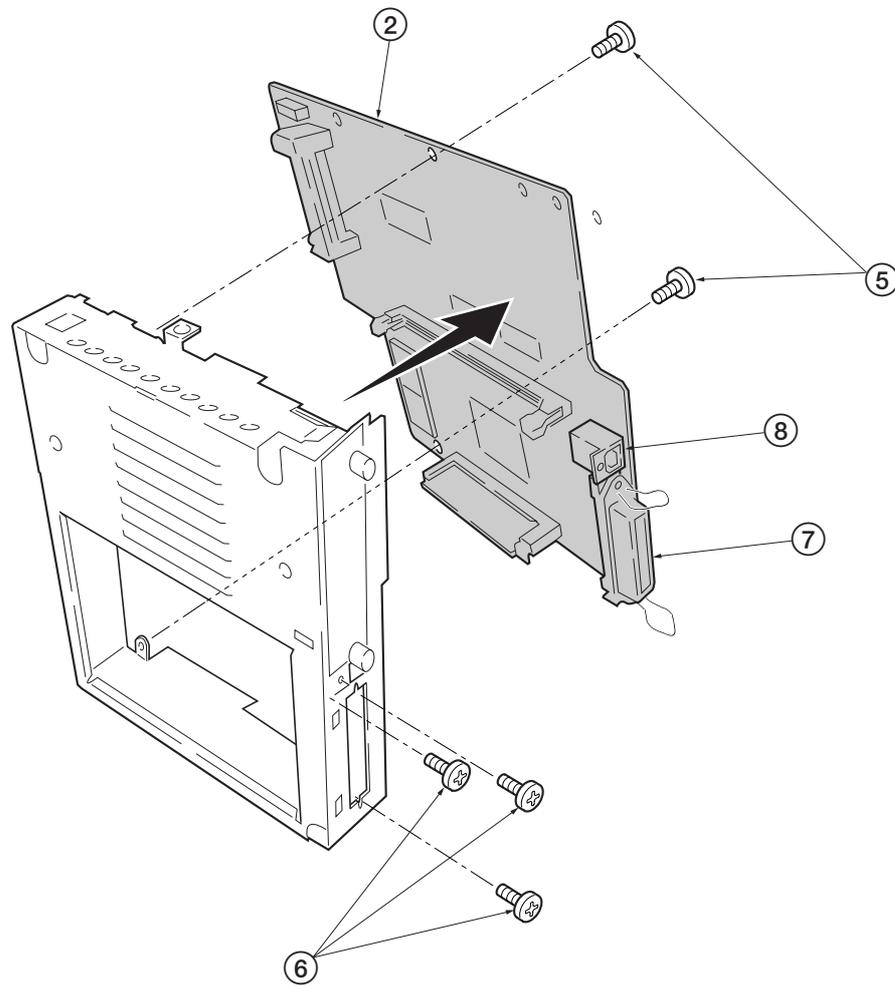


Figure 5-2-12 Removing the main board

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

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

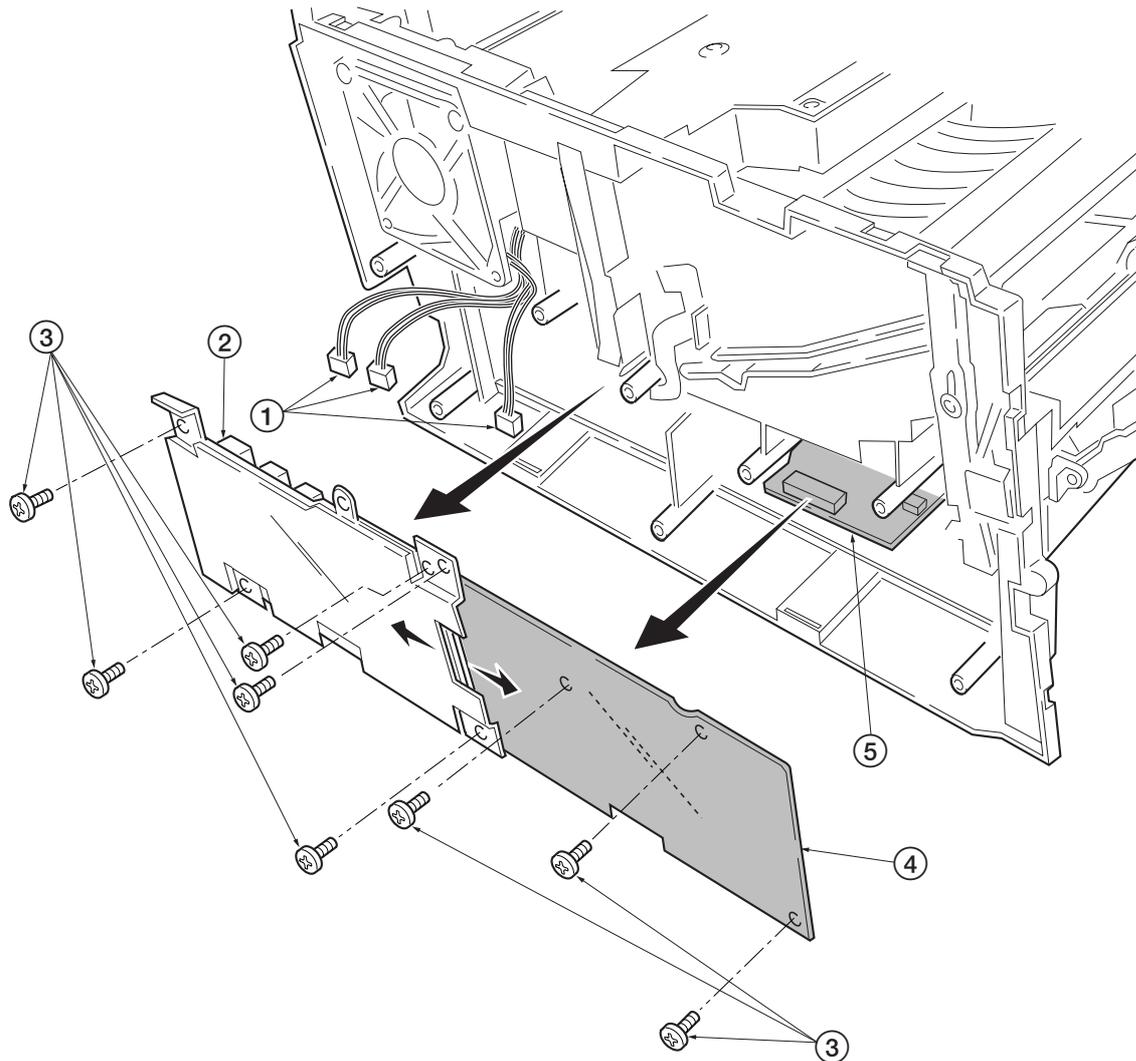


Figure 5-2-13 Removing the power supply board and high voltage board

(4) Removing the bias board

1. Remove the cassette and process unit (See page 5-4).
2. Remove the top cover/face-down output tray and left cover (See pages 5-5 and 5-6).
3. Remove the power supply board and high voltage board (See the previous page).
4. Stand the machine with the front side up.
5. Remove one connector ① from the bias board ②.
6. Remove five screws ③.
7. Remove the bottom cover ④.
8. Remove the two connectors ⑤ from the bias board ②.
9. Remove the bias board ②.

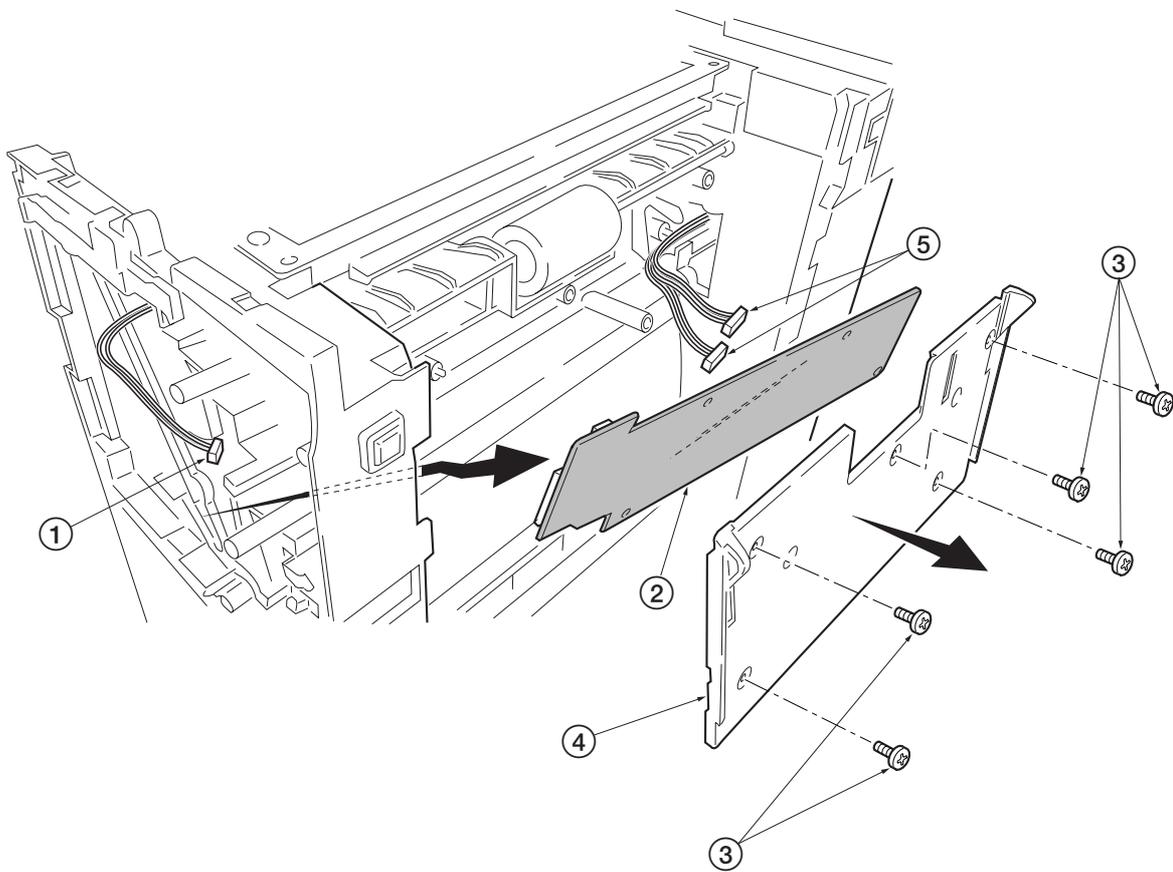


Figure 5-2-14 Removing the bias board

5-2-7 Removing the main motor and drive unit

1. Remove the cassette and process unit (See page 5-4).
2. Remove the top cover/face-down output tray and right cover (See pages 5-5 and 5-6).
3. Remove three connectors ① from the main motor ②.
4. Remove four screws ③.
5. Remove main motor ②.

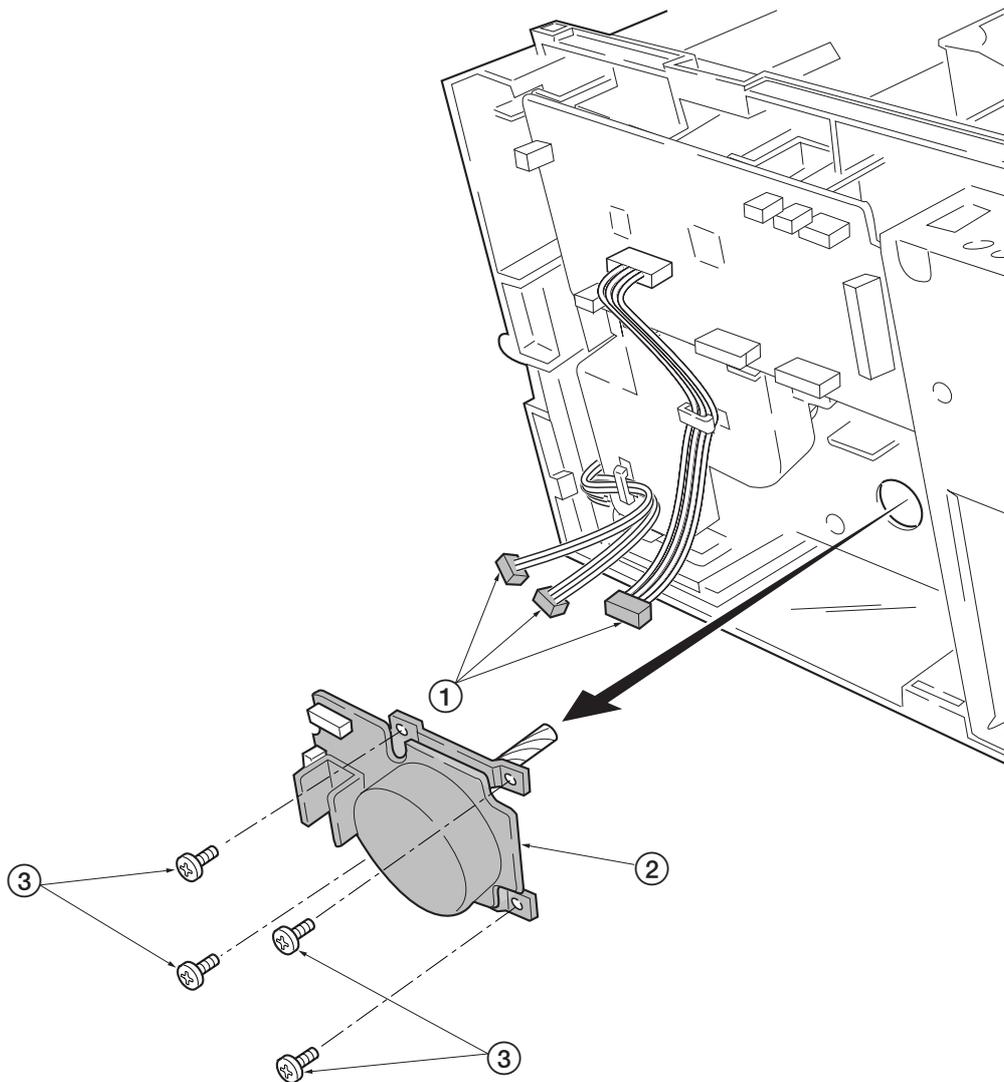
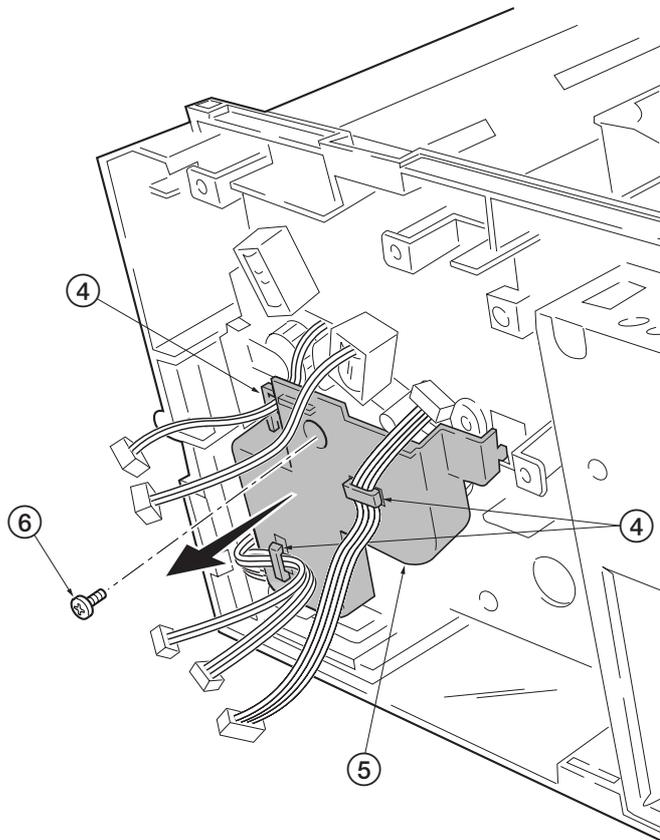


Figure 5-2-15 Removing the main motor

6. Remove the engine board (See page 5-11).
7. Remove wires from wire saddles (4) on the cord cover (5).
8. Remove one screw (6).
9. Remove the cord cover (5).



5-2-16 Removing the cord cover

10. Remove one screw ⑥.
11. Remove the grounding plate ⑦.
12. Remove three stop rings ⑧.
13. Remove MP feed clutch ⑨, feed clutch ⑩, and registration clutch ⑪.

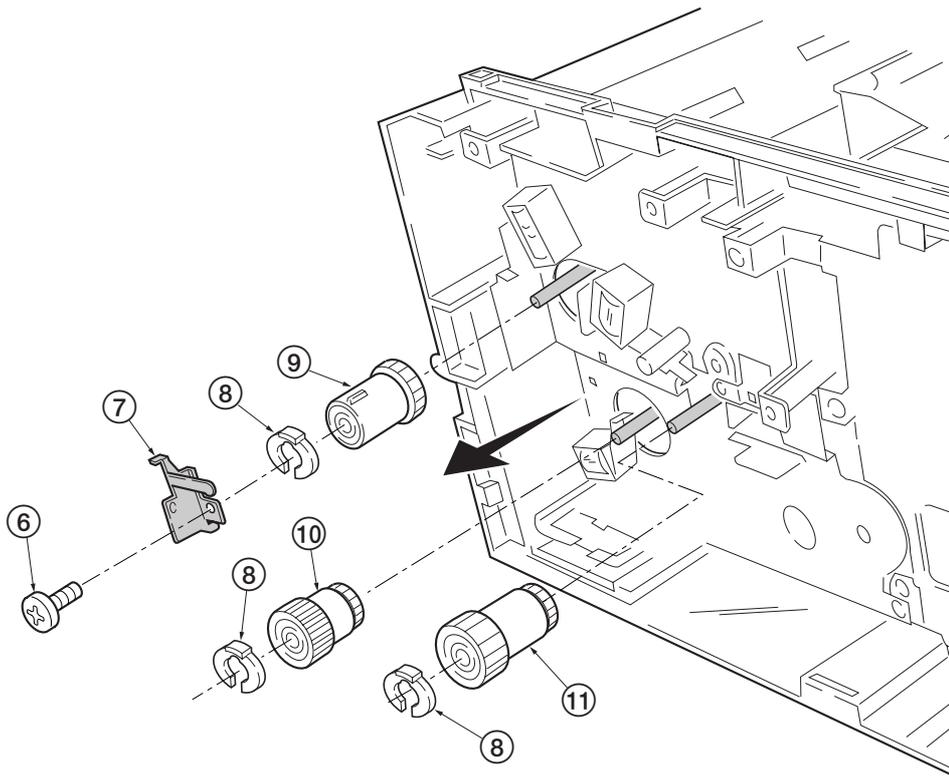


Figure 5-2-17 Removing the clutches

14. Remove the four screws (12).

15. Remove the drive unit (13).

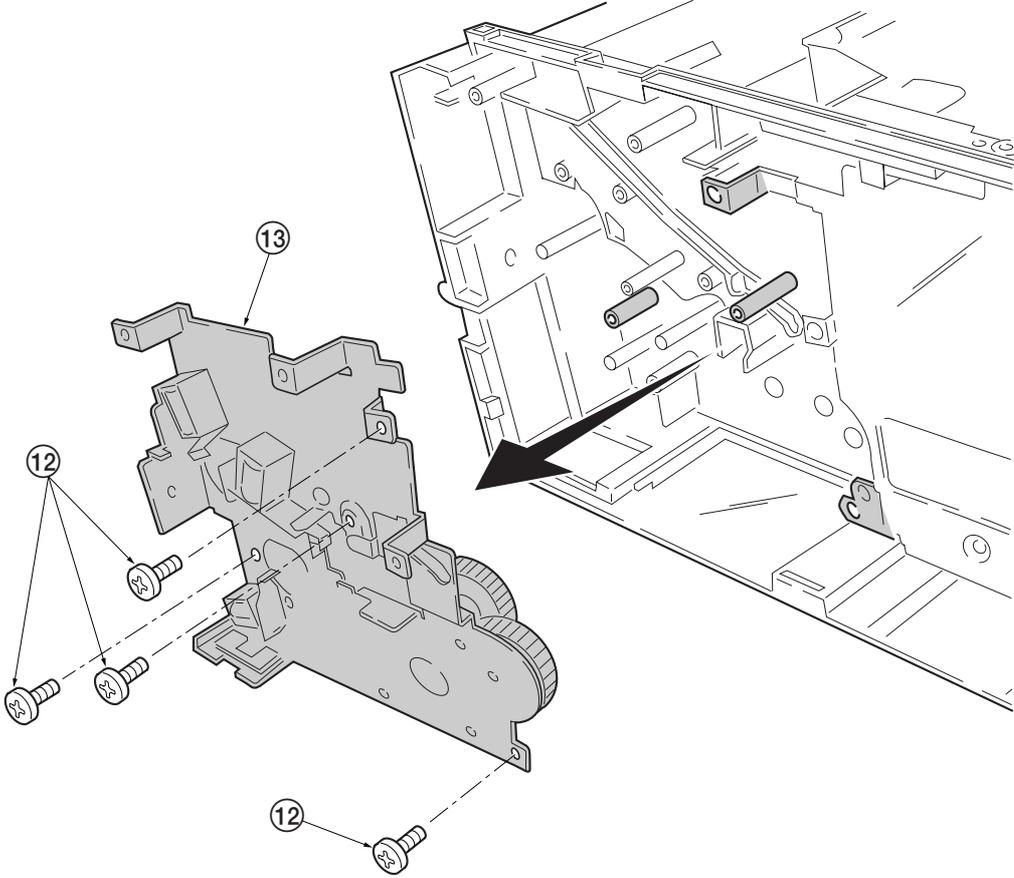


Figure 5-2-18 Removing the drive unit

5-2-8 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 printer's drive gear are properly meshed with each other. For this, rotate the main motor several turns before fixing screws.



1. Remove the process unit. (See page 5-4)
2. Remove the top cover/face-down output tray, right and left covers. (See page 5-5, 5-6)
3. Remove the rear side cover (1).
4. Remove the two connectors (2).
5. Remove two screws (3).
6. Remove the fuser unit (4).

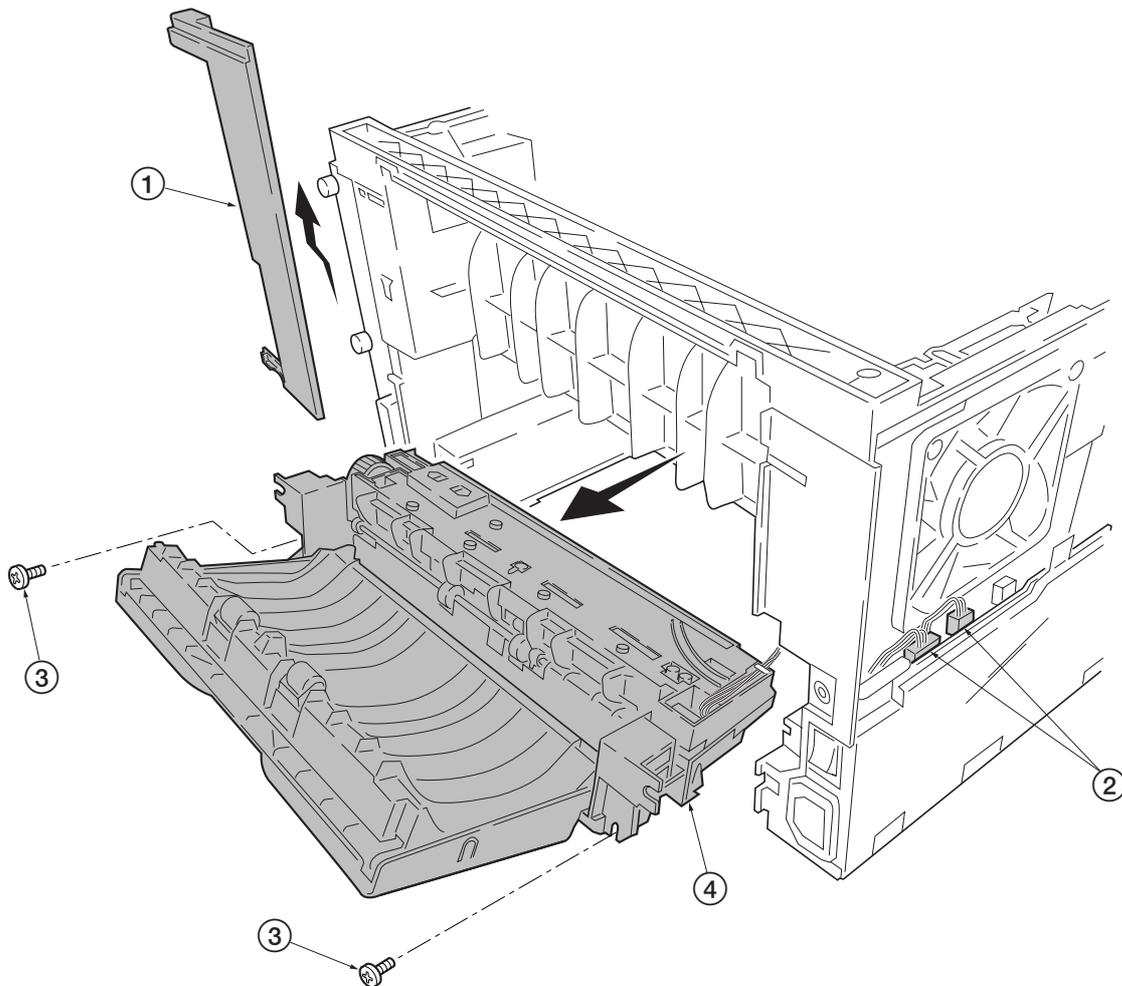


Figure 5-2-19 Removing the fuser unit

7. Remove two screws (5).
8. Open and split the fuser unit (4).

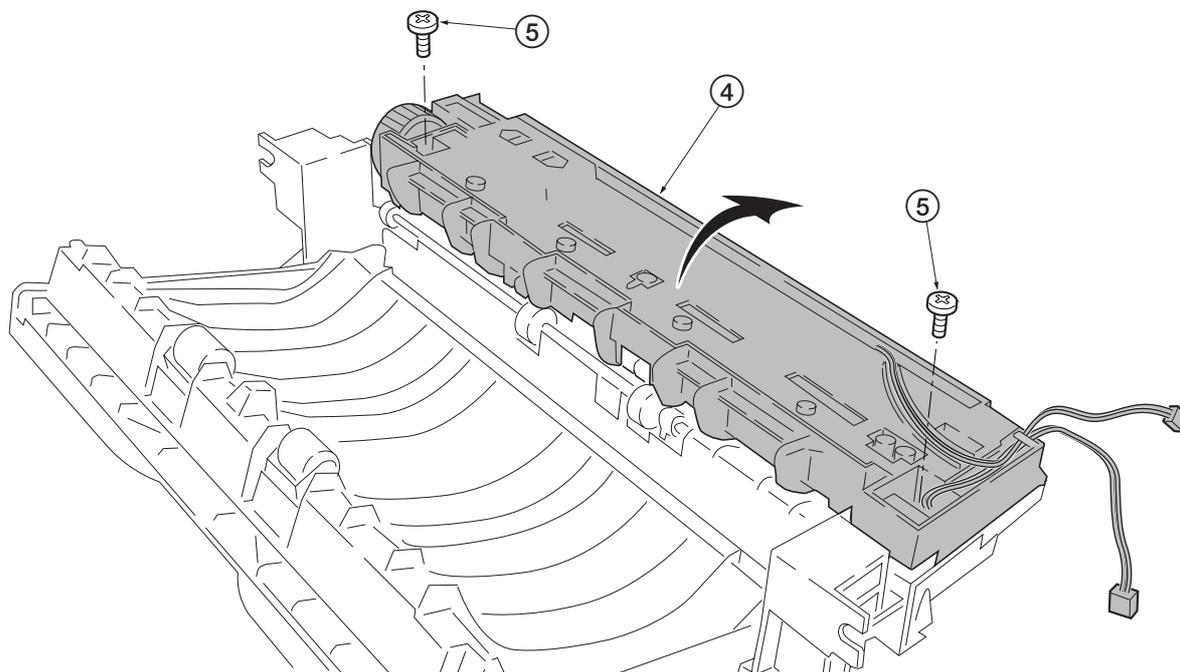


Figure 5-2-20 Splitting the fuser unit

(1) Removing the separators

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 5-20).
2. Loosen the stopper screws ①.
3. Hold the separators ② upright, and remove the separators ② and separator springs ③.

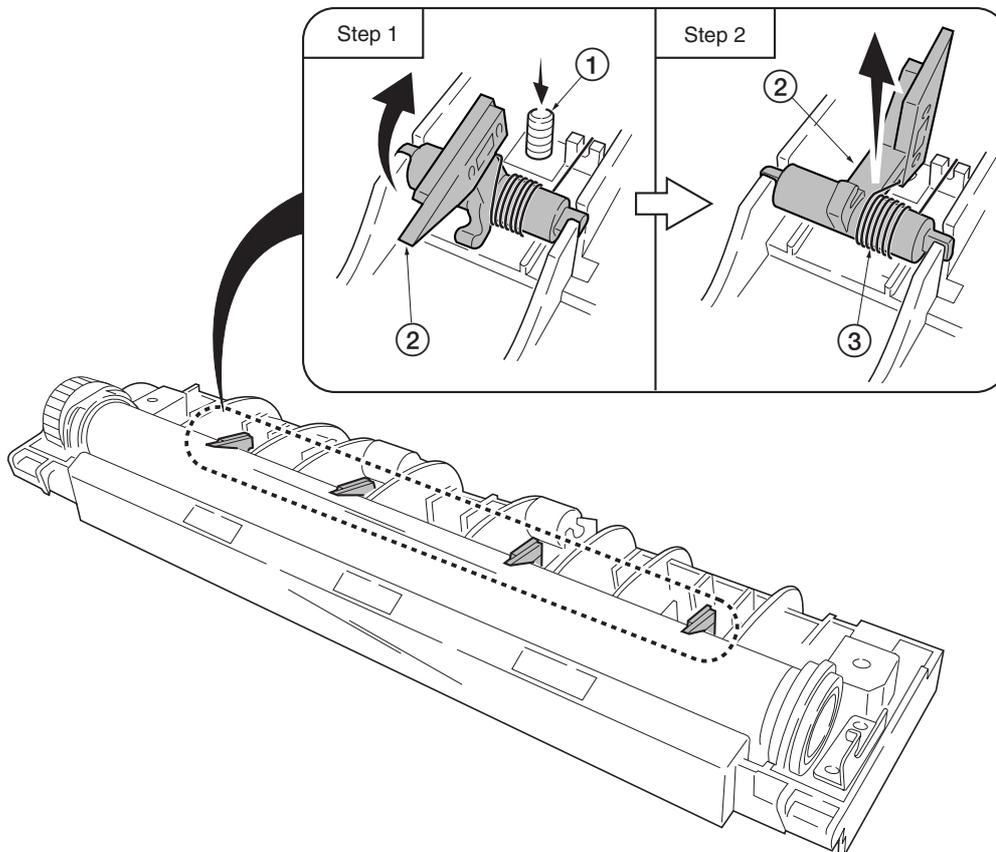


Figure 5-2-21 Removing the separators

(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 the heater lamp, hold the ceramic parts of heater lamp at both ends.

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 5-20).
2. Remove all (four) separators (See previous page).
3. Remove one screw (1), release the tension of lamp A holder (2).
4. Remove the heater lamp (3) from the lamp B holder (4).
5. Remove the heater lamp (3) from the heat roller (5).

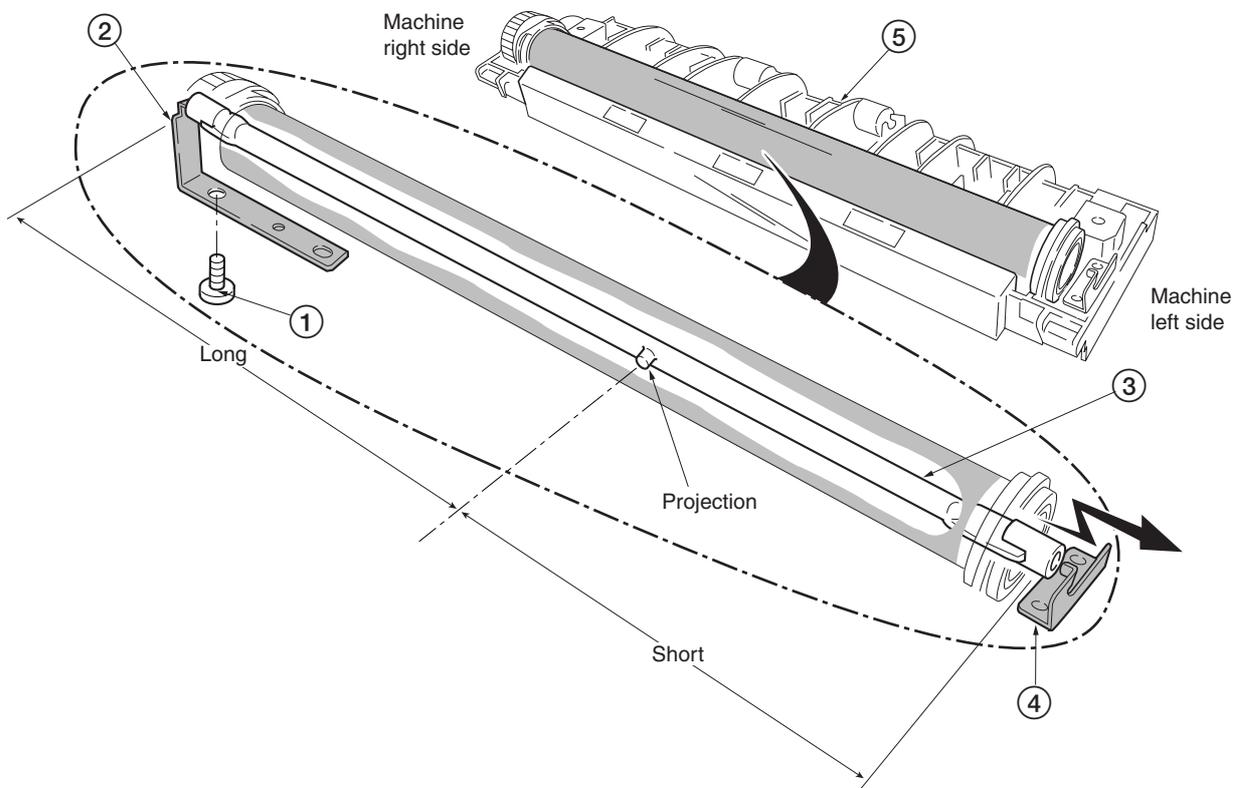


Figure 5-2-22 Removing the heater lamp

(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 5-20).
2. Remove the heater lamp (See previous page).
3. Press the lamp A holder ① away from the heat roller. Pull up both heat R bush ② and heat L bush ③ at the same time.

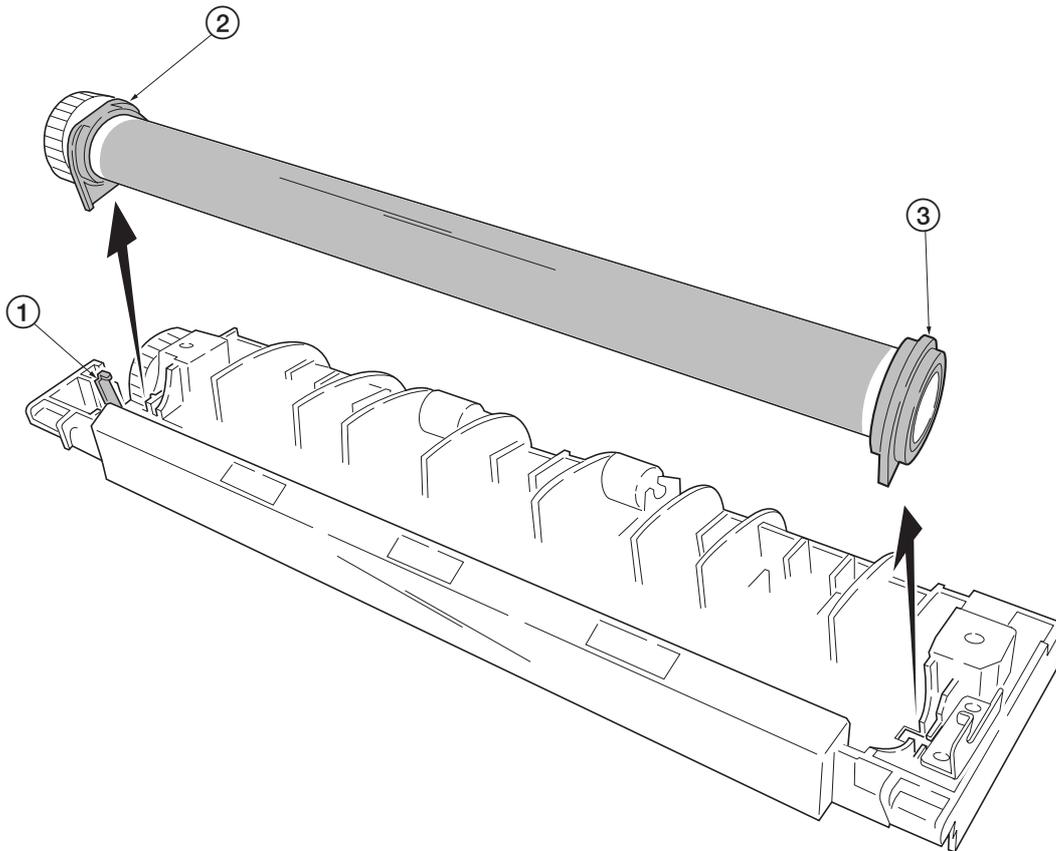


Figure 5-2-23 Removing the heat R bush and heat L bush

3. Remove the heat gear Z33 (4), heat R bush (2), and heat L bush (3) from the heat roller (5).

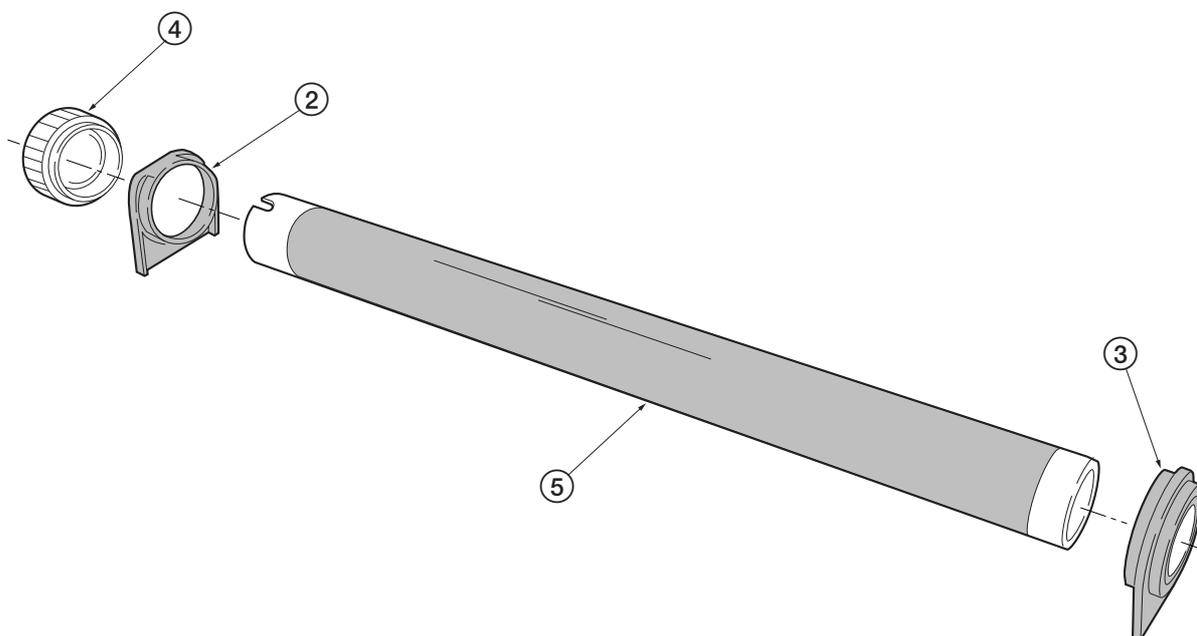


Figure 5-2-24 Removing the heat roller

(4) Removing the thermistor

1. Remove and split the fuser unit (See page 5-20).
2. Remove the heater lamp (See page 5-23).
3. Remove the heat roller (See page 5-24).
4. Remove one screw ①.
5. Remove the thermistor ②.

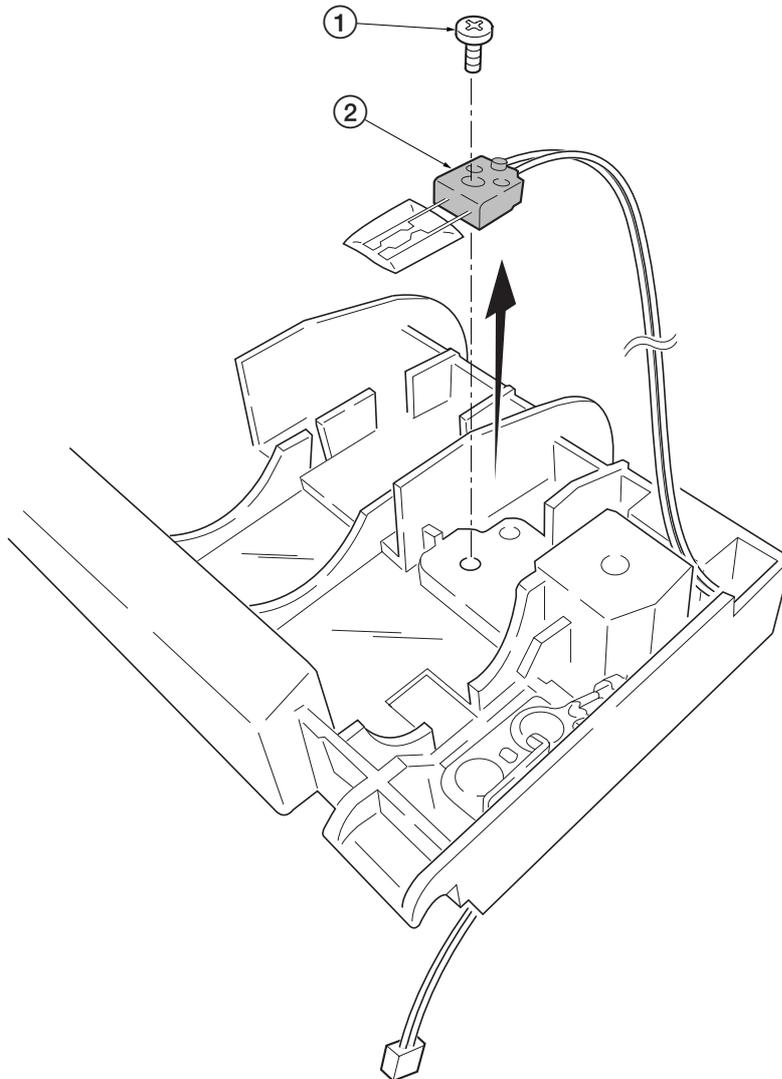


Figure 5-2-25 Removing the thermistor

(5) Removing the thermal cutout

CAUTION Do not bend the terminals of the thermal cutout.



1. Remove and split the fuser unit (See page 5-20).
2. Remove the heater lamp (See page 5-23).
3. Remove the heat roller (See page 5-24).
4. Remove the two screws ①.
5. Remove the thermal cutout ②.

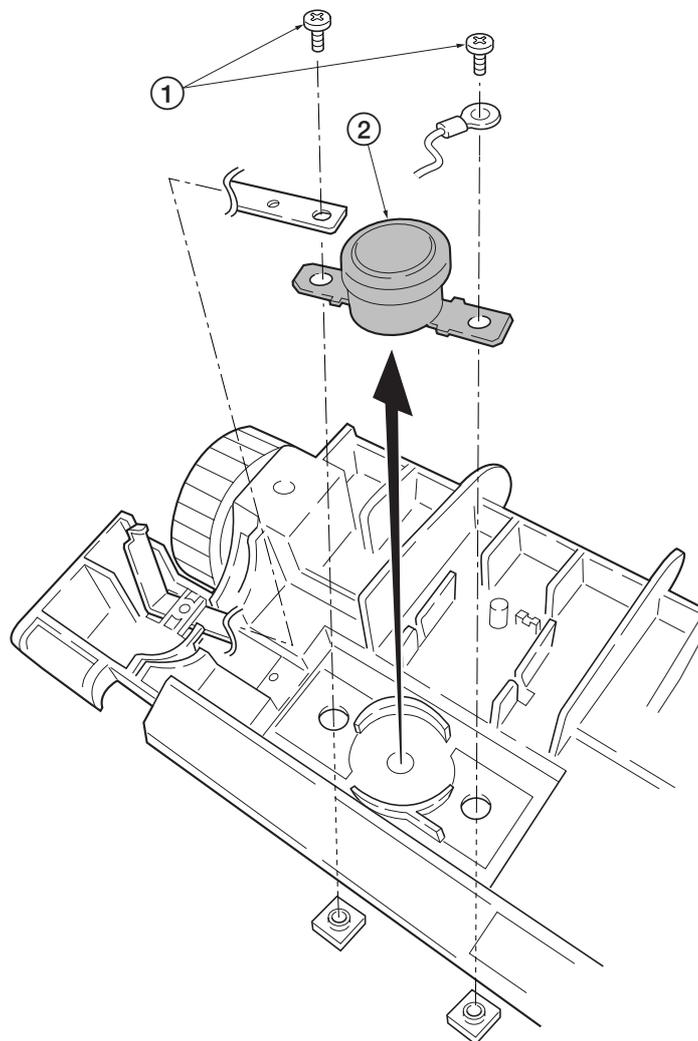


Figure 5-2-26 Removing the thermal cutout

(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 5-20).
2. Remove the press roller ① from the fuser unit ②.

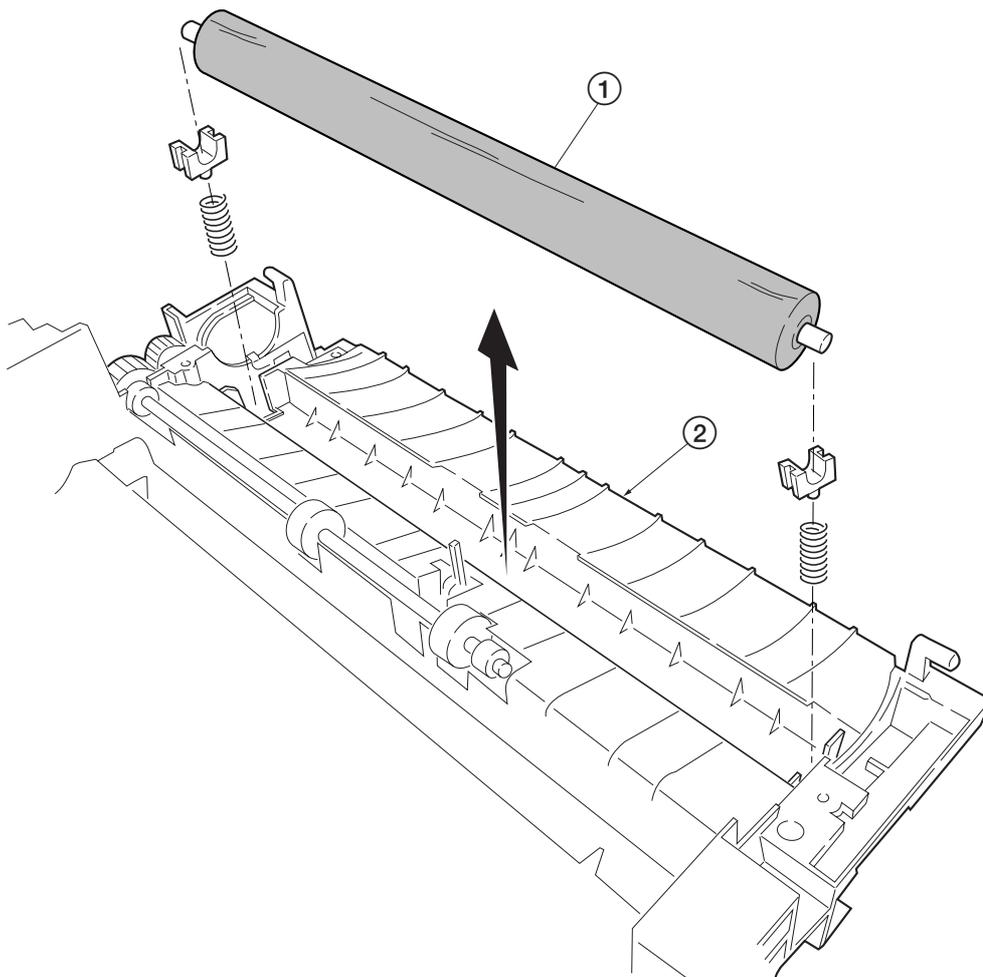


Figure 5-2-27 Removing the press roller

5-2-9 Removing the laser scanner unit and the eraser lamp

- 1. Remove the process unit (See page 5-4).
- 2. Remove the top cover/face-down output tray, right cover, and the left cover (See pages 5-5 and 5-6).
- 3. Remove four connectors (1).
- 4. Remove five screws (2) and four screws (3).
- 5. While keeping the ground joint plate (4) away from the LSU plate (5), remove the LSU plate.

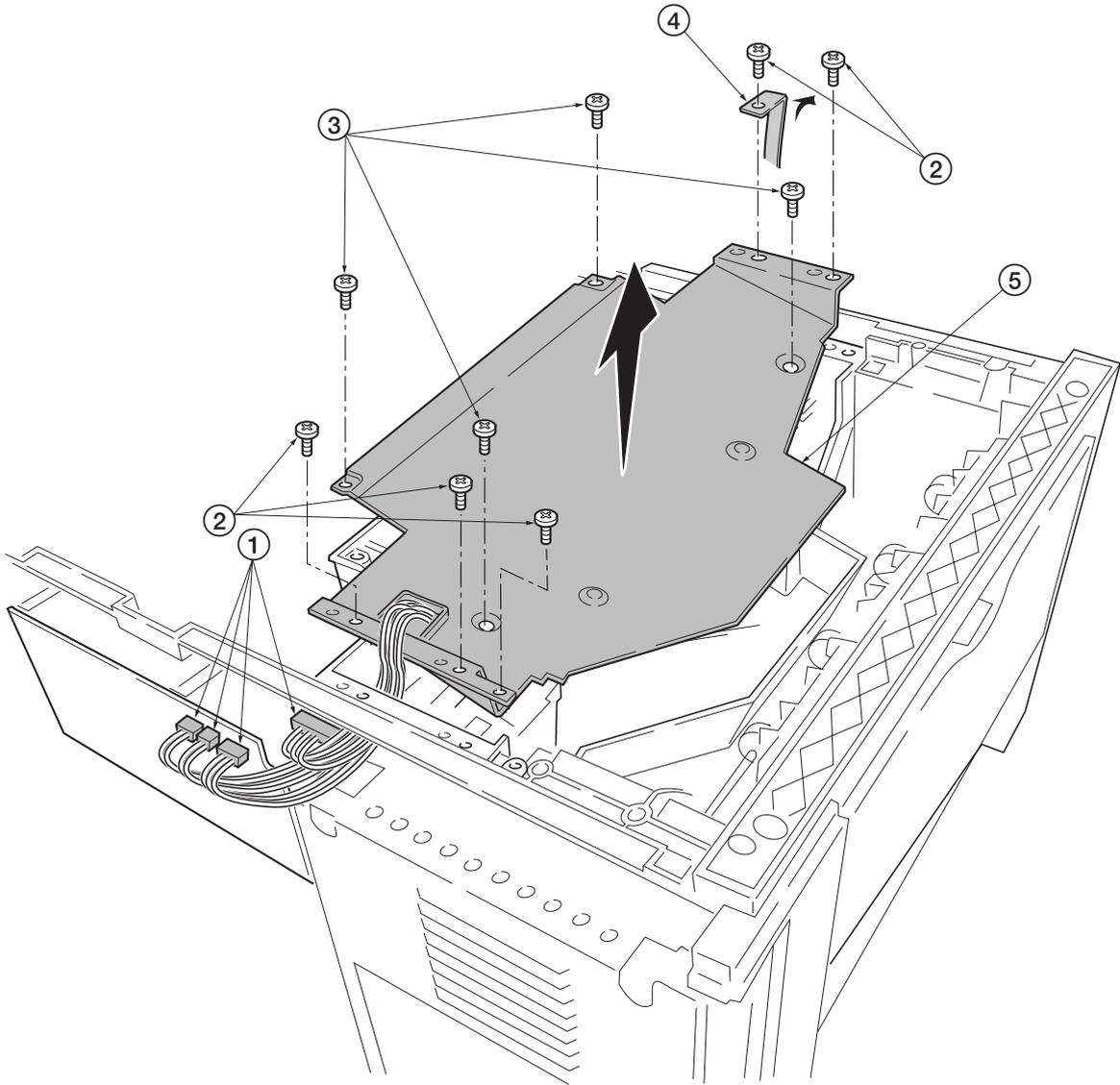


Figure 5-2-28 Removing the LSU plate

5. Remove three screws (6).
6. Remove one connector (7) from the laser scanner unit (8).
7. Remove the laser scanner unit (8).

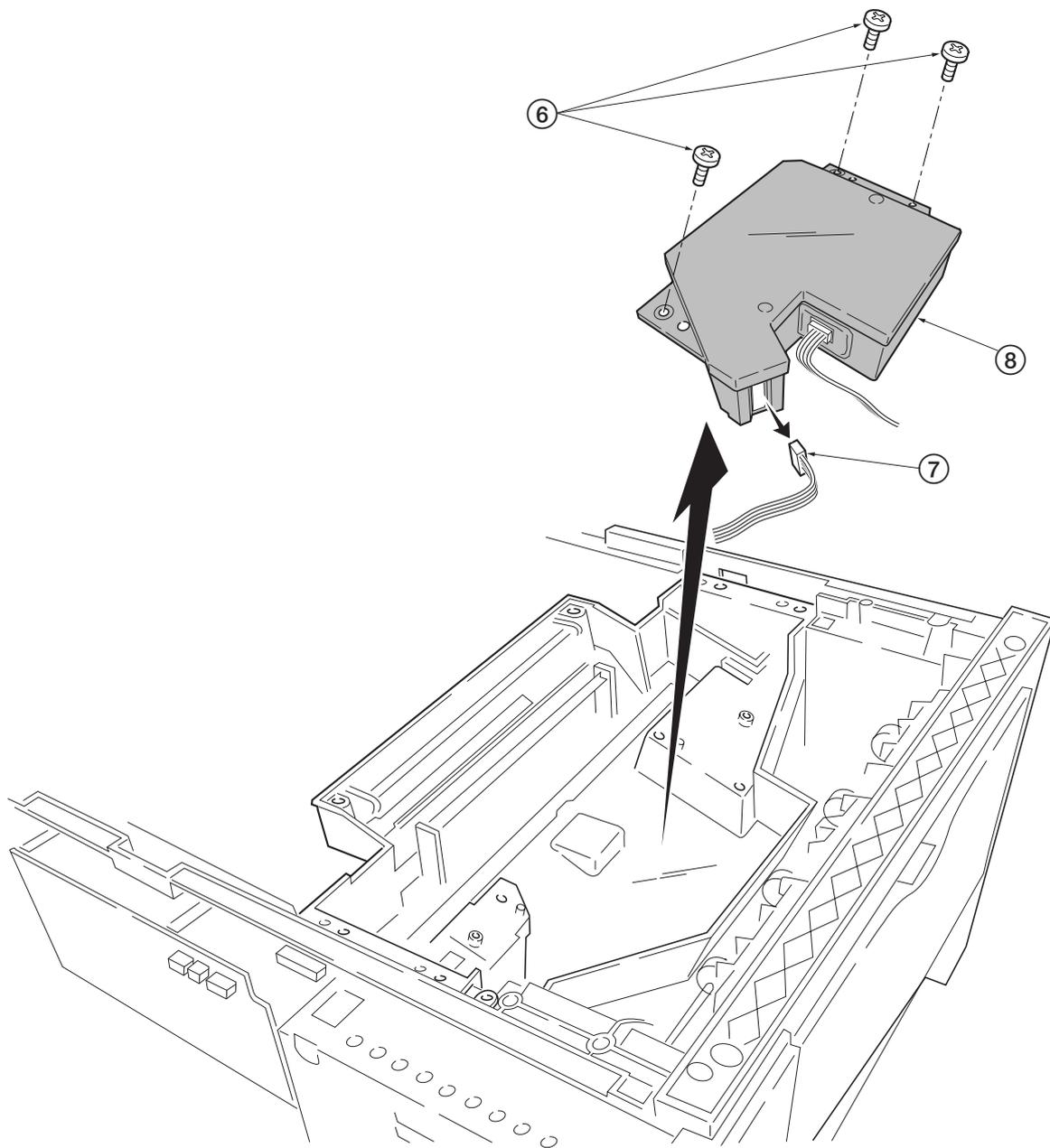
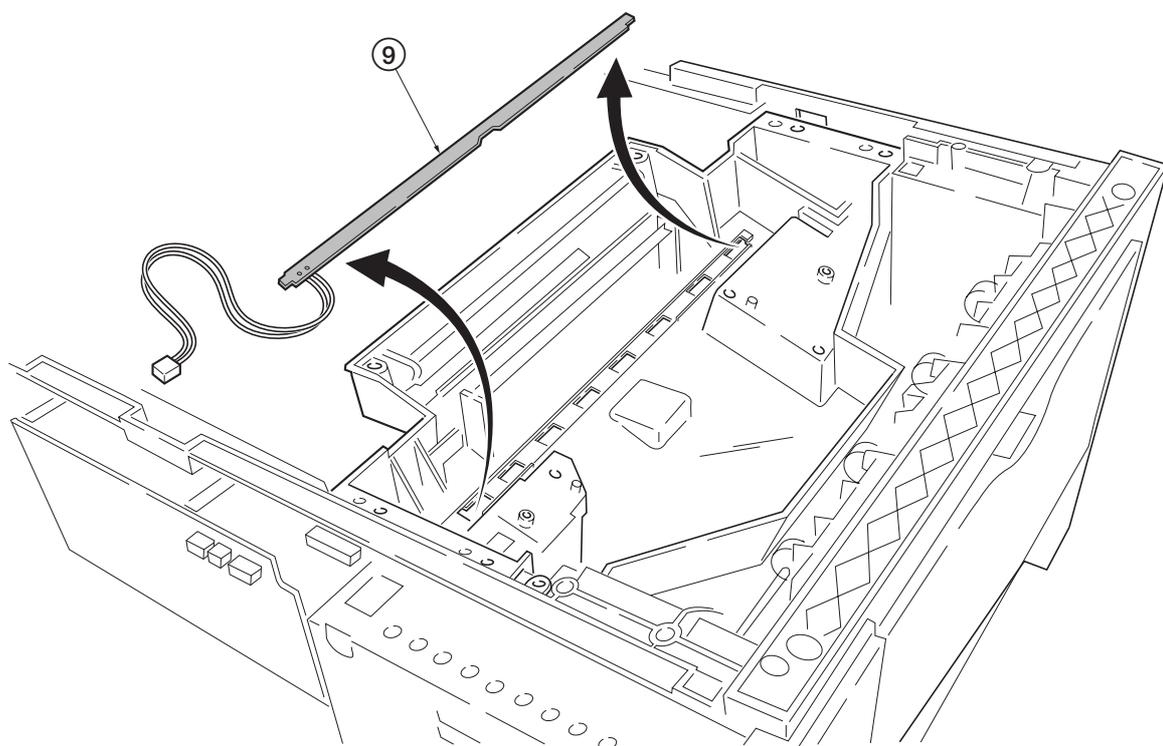


Figure 5-2-27 Removing the laser scanner unit

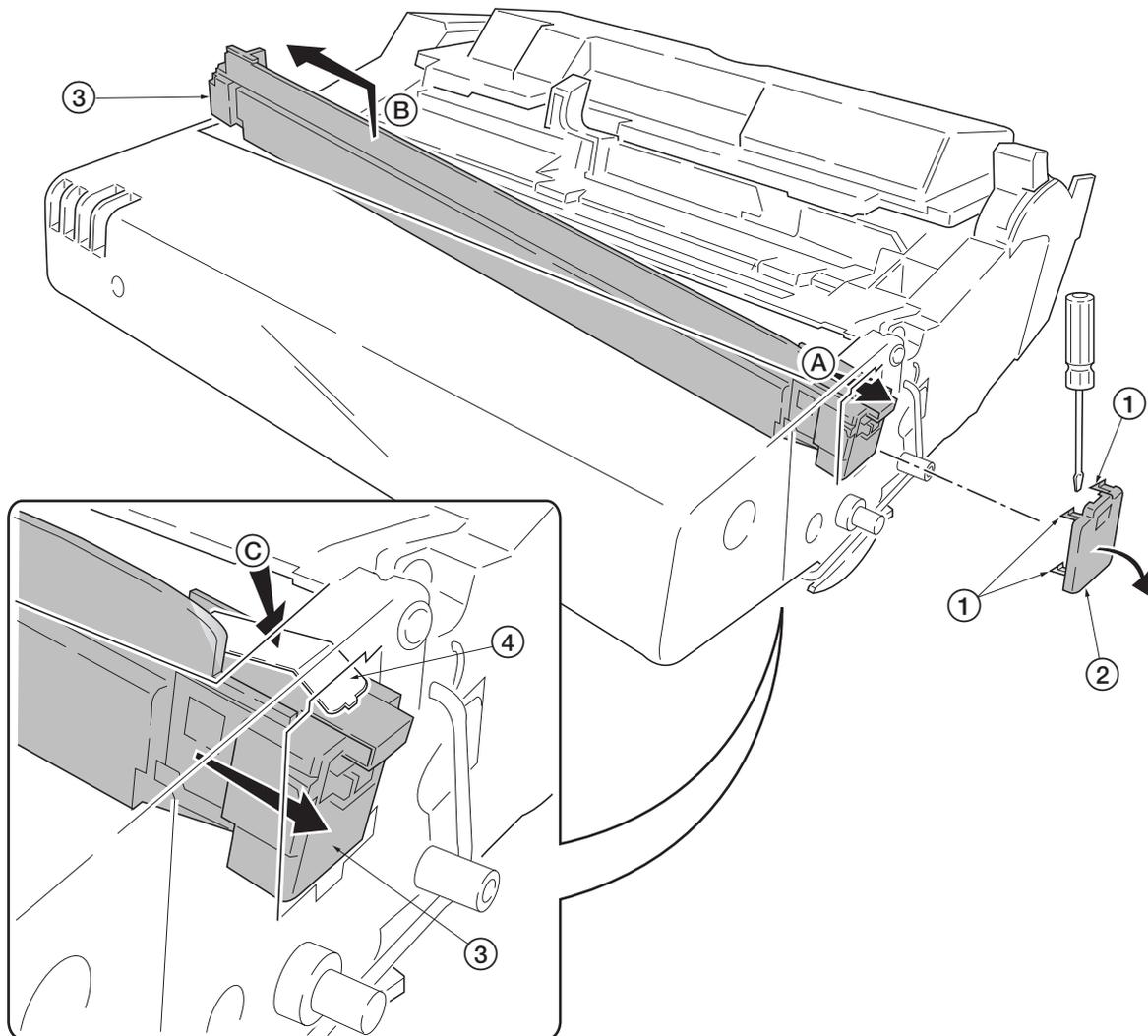
8. Remove the eraser lamp ⑨.



5-2-28 Removing the eraser lamp

5-2-10 Removing the main charger unit

1. Remove the process unit from the printer (See page 5-4).
2. Unlatch the three snaps (1), and remove the main charger cap (2).
3. Draw the main charger unit (3) in the direction of arrow (A), then pull it out in the direction of arrow (B).



5-2-29 Removing the main charger unit

CAUTION



When refitting the main charger unit (3), hold terminal (4) down (C), then push frontwards. Use care not to deform the terminal (4).

Chapter 6 T r o u b l e s h o o t i n g

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6-1 Troubleshooting

This chapter explains procedures for identifying and correcting problems. Topics covered are:

6-1-1 Error messages

The printer indicates various messages using the LED indicators at its top. The indicators are lit, fast flashing, slow flashing, and off in combination to describe a specific message. The following diagram depicts these indicators and the control keys.

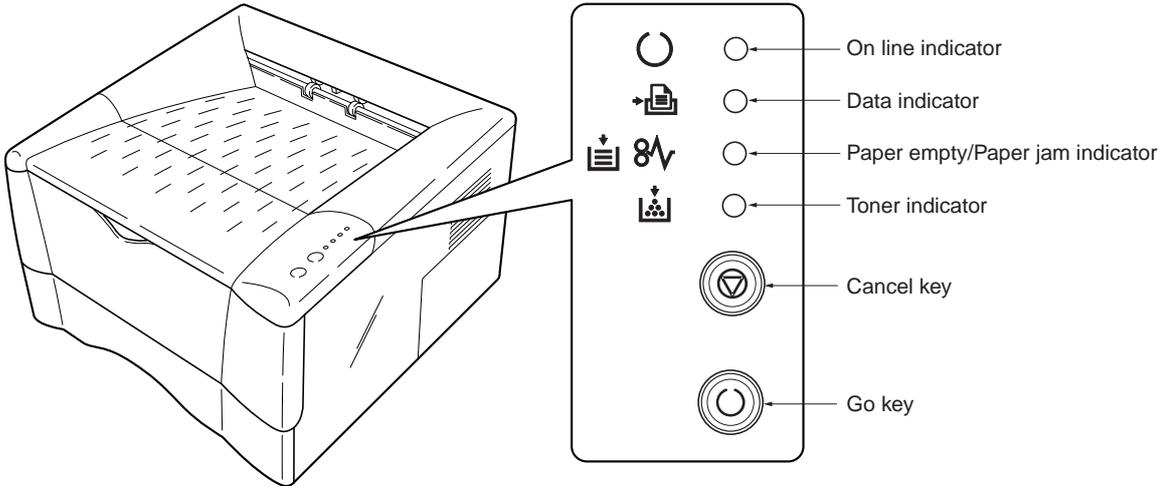


Figure 6-1-1 Indicators and control keys

For explanation on the basic function of the indicators and the keys, refer to pages 2-14.

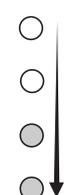
(1) Messages

In the explanation that follows, the following diagrams are used to describe whether the indicator is lit, fast flashing, slow flashing or off.

| | Fast flashing | Slow flashing | Lit | Off |
|-------|---|---|---|---|
| Red |  |  |  |  |
| Green |  |  |  |  |

By using the *Remote Operation Panel* utility to monitor the printer's status from the computer, the error message can be displayed on the computer's screen when an error occurs.

Normal messages

| Indicator | <i>Remote Operation Panel</i> display | Description |
|---|---------------------------------------|---|
|   | Cancelling data | <p>Data inside the printer is being canceled.</p> <p>The indicators light in sequence from the top, then go off in sequence from the bottom. This process is repeated twice.</p> <p>When the printer is switched on for the first time after the toner container is installed, (Adding toner) also appears.</p> |
|   | Please wait | <p>The printer is warming up and is not ready to print. The indicators light in sequence twice from top to bottom.</p> <p>When the printer is switched on for the first time after the toner container is installed, (Adding toner) also appears.</p> |
|   | Processing | The printer is receiving data. |
|   | Processing | The printer is processing data. |
| | Waiting | The printer is waiting for the end-of-job command before printing the last page. Pressing the Cancel key allows you to obtain the last page immediately. |
| | Form Feed Timeout | The printer is printing the last page after a waiting period. |
|   | Ready | The printer is ready to print. |
|   | | The printer is offline. The printer stores but does not print received data. |
|         | Sleeping | <p>The printer is in sleep mode. The indicator flashes at 5-second intervals and all other indicators go off. The printer wakes from Sleep mode whenever a key on the operator panel is pressed, the cover is opened or closed, or data is received. The printer then warms up and goes online. (You can set the amount of time before the printer enters sleep mode from the <i>Remote Operation Panel</i> utility.)</p> |

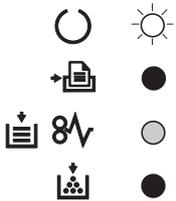
Maintenance messages

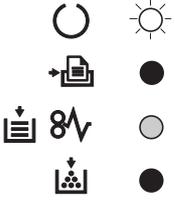
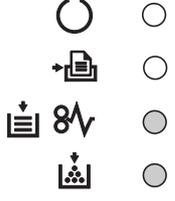
| Indicator | <i>Remote Operation Panel</i> display | Description |
|---|---|---|
|      | Add paper <paper source> | <p>The paper has run out. Add paper to the paper cassette (1 or 2) or MP tray. The paper source is displayed in the <i>Remote Operation Panel</i> utility.</p> <hr/> <p>The paper cassette is not closed securely. Close the paper cassette properly.</p> |
|         | Close top cover | <p>The top or front cover is open. Close the cover properly.</p> |
|         | Load Cassette # <paper size><paper type> | <p>There is data for printing that matches with a paper cassette setting (paper size, paper type), but there is no paper in the paper cassette.</p> <p>Set paper of the size and type specified in the print data into the cassette (1 or 2) to resume printing.</p> <p>When you want to feed from a other paper source, press the Go key to switch the paper source. The printer prints on the paper size and type set in that particular paper source.</p> |
|         | Load MP tray <paper size><paper type> | <p>The cassette paper size and data paper size are not the same.</p> <p>The printer feeds from the MP Tray when the page in the paper cassette is a different size and type than that specified in the print data. Set paper of the size and type specified in the print data into the MP tray, then press the Go key to resume printing.</p> <p>When you want to feed from a source other than the MP tray, make sure there is no paper in the MP tray, then press the Go key to switch the paper source. The printer prints on the paper size set in that particular paper source.</p> <p>Note: Feeding the paper having a paper size which does not match the current paper size from the MP tray can cause paper jam.</p> |

| Indicator | Remote Operation Panel display | Description |
|------------------------------------|--------------------------------|---|
| | Paper jam ##### | Open the printer and clear the paper jam. The location of the paper jam is also indicated in place of #'s. For details on how to clear paper jams, see page 6-31. |
| | Paper path error | There is no cassette in the feeder, or the cassette is not inserted properly. After reinserting the paper cassette, you should be able to print. |
| | Replace toner TK-17 | There is no more toner in the toner container. The printer has stopped because there is no more toner. Replace with a new toner kit. After replacing, be sure to clean the printer. (See page 3-4) |
| | Set paper Press GO | There is no paper in the MP tray. Add paper to the tray. Press the Go key to resume printing. Note: Feeding the paper having a paper size which does not match the current paper size from the MP tray can cause paper jam. |
| | Toner low TK-17 | There is not enough toner inside the toner container. Promptly replace with a new toner as the printer will stop printing before long. Clean the printer after replacement. (See page 3-4) (No indication patterns available) |
| (No indication patterns available) | Warning image adapt | The print job cannot be done at current resolution because there is not enough internal memory. Try adding memory or changing resolution. (No indication patterns available) |

| Indicator | <i>Remote Operation Panel</i> display | Description |
|---|---------------------------------------|---|
| (No indication patterns available) | Warning low memory | The printer's memory is running low because of the number of downloaded fonts and macros. Print a status page to see how much user memory is left and try deleting unnecessary fonts and macros. |
|  | Warning waste toner box | The waste toner reservoir is almost full. The waste toner reservoir will become full and the printer will stop printing. |

Error messages

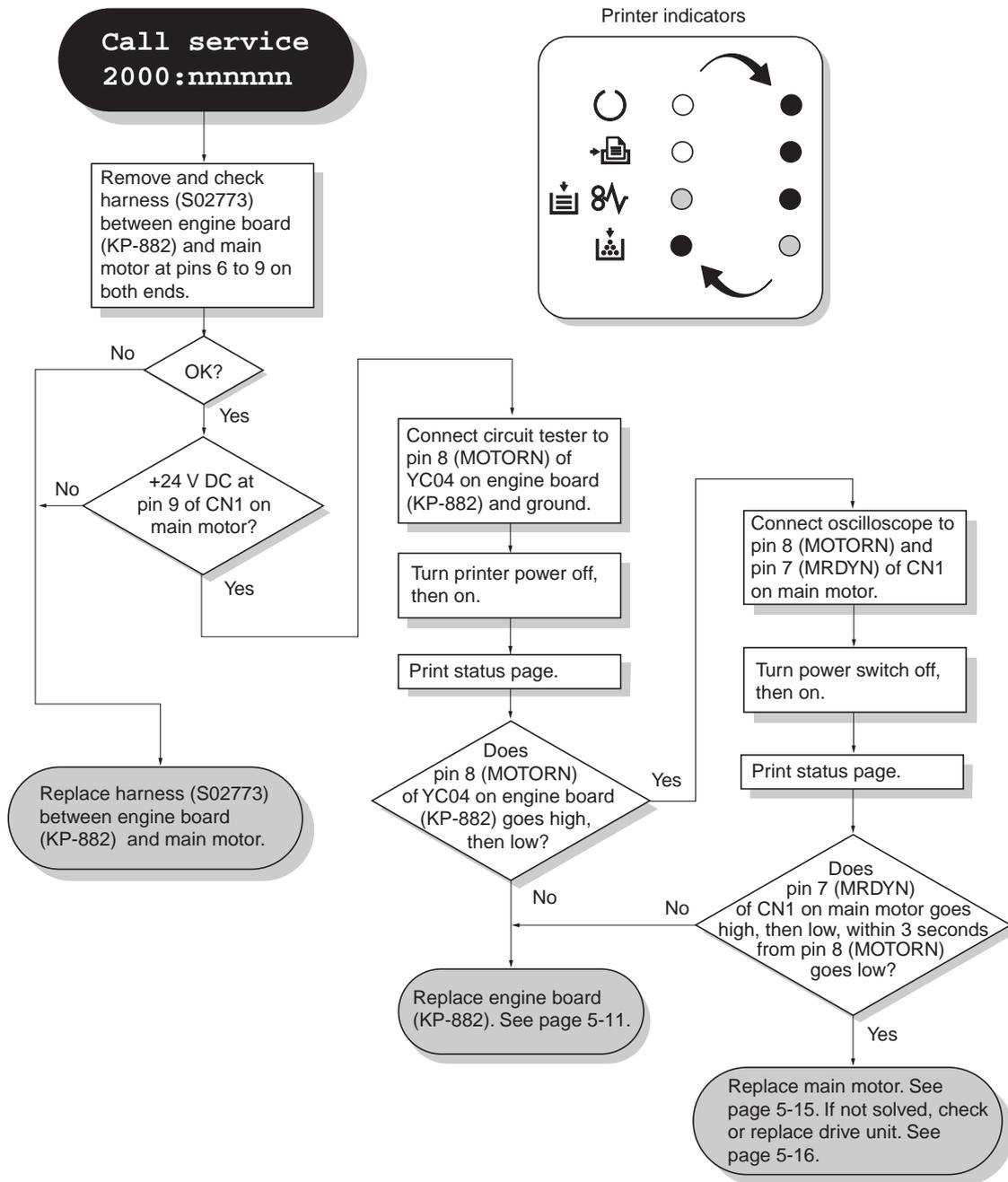
| Indicator | <i>Remote Operation Panel</i> display | Description |
|---|---------------------------------------|---|
|  | File not found Press GO | The specified file is not found. Press the Go key to resume printing. You can abandon printing by pressing the Cancel key. |
|  | KPDL Error Press GO | Current print processing cannot continue. Press the Go key to resume printing. You can abandon printing by pressing the Cancel key. |
|  | MemoryCard err## Press GO | An error has occurred during access to the memory card using the PRESCRIBE RWER command or from the <i>Remote Operation Panel</i> utility. Look at the error code given in place of ## and refer to the corresponding description given below. 04: The capacity of the memory card is insufficient. Clean up files. 05: Specified file not on memory card. 06: No memory for use by memory card. Expand printer memory. Press the Go key to resume printing. You can abandon printing by pressing the Cancel key. |
|  | Memory overflow Press GO | Printing cannot continue because there is not enough memory. Try adding more memory. Press the Go key to resume printing. You can abandon printing by pressing the Cancel key. |

| Indicator | <i>Remote Operation Panel</i> display | Description |
|---|---------------------------------------|--|
|  | Print overrun Press GO | Current print processing cannot continue due to complex data. The data transferred to the printer was too complex to print on a page. Press the Go key to print data as far as it was stored. You can abandon printing by the Cancel key. Note: To release the page protect mode, send the following command to the printer from the <i>Remote Operation Panel</i> utility after this error occurs: !R! FRPO R5, 1; EXIT; |
| | MemoryCard err## Press GO | Check the error code displayed in ## and refer to the appropriate description below. 01: Abnormal format. Try turning the power off and on again. 02: RAM disk mode is Off. Turn RAM disk mode On. 04: No disk space. Clean up files. 05: Specified file is not on disk. 06: No memory for use by disk system. Expand printer memory. (Continued on next page) |
|  | MemoryCard err20 | The printer has halted because you attempted to insert/remove a memory card into/from the printer slot while the printer power is on. Turn the power switch off and then on to restart the printer. Note: Make sure to turn the printer power off before inserting/removing a memory card. (No indication patterns available) |
| (No indication patterns available) | Format error MemoryCard | This message appears when the printer is in the ready state and the memory card is not formatted, and therefore cannot be read or written. Format the memory card. |

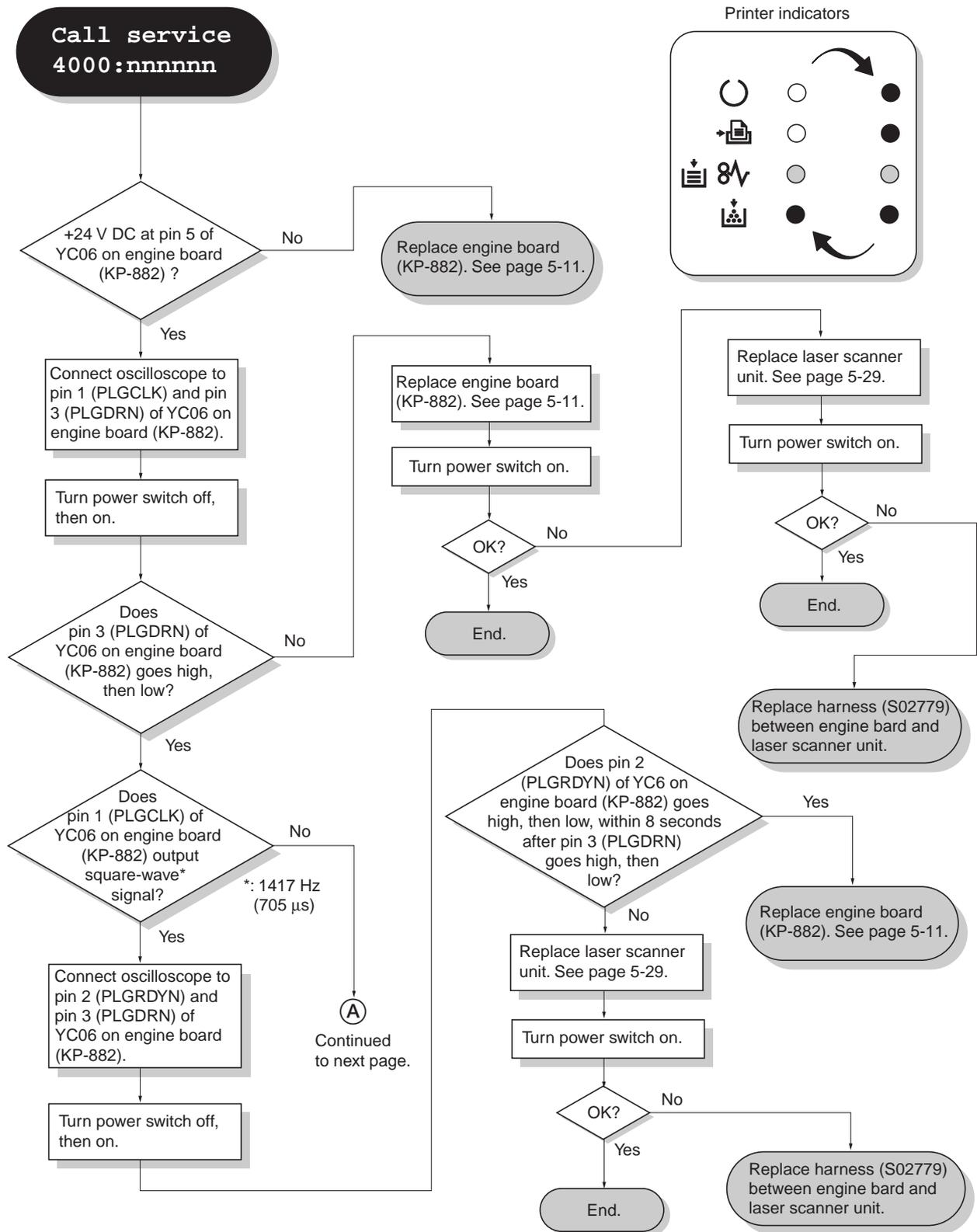
6-1-2 Service error indications

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.

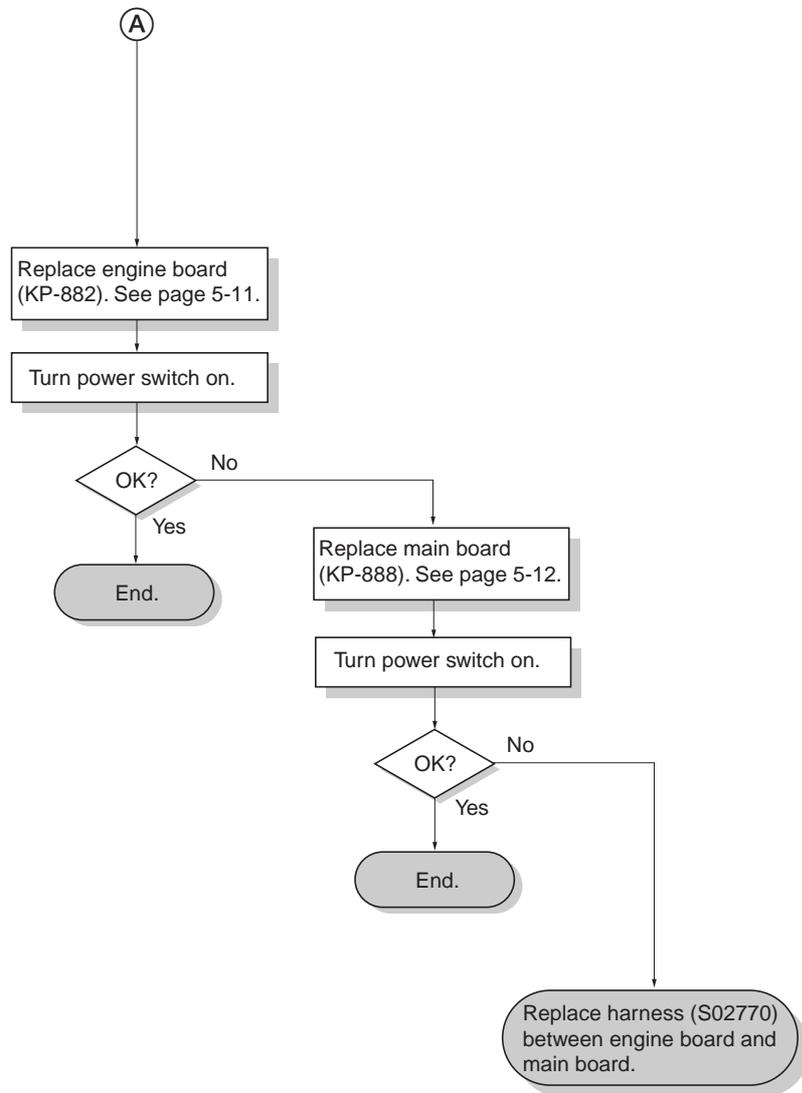
(1) 2000 - Main motor error



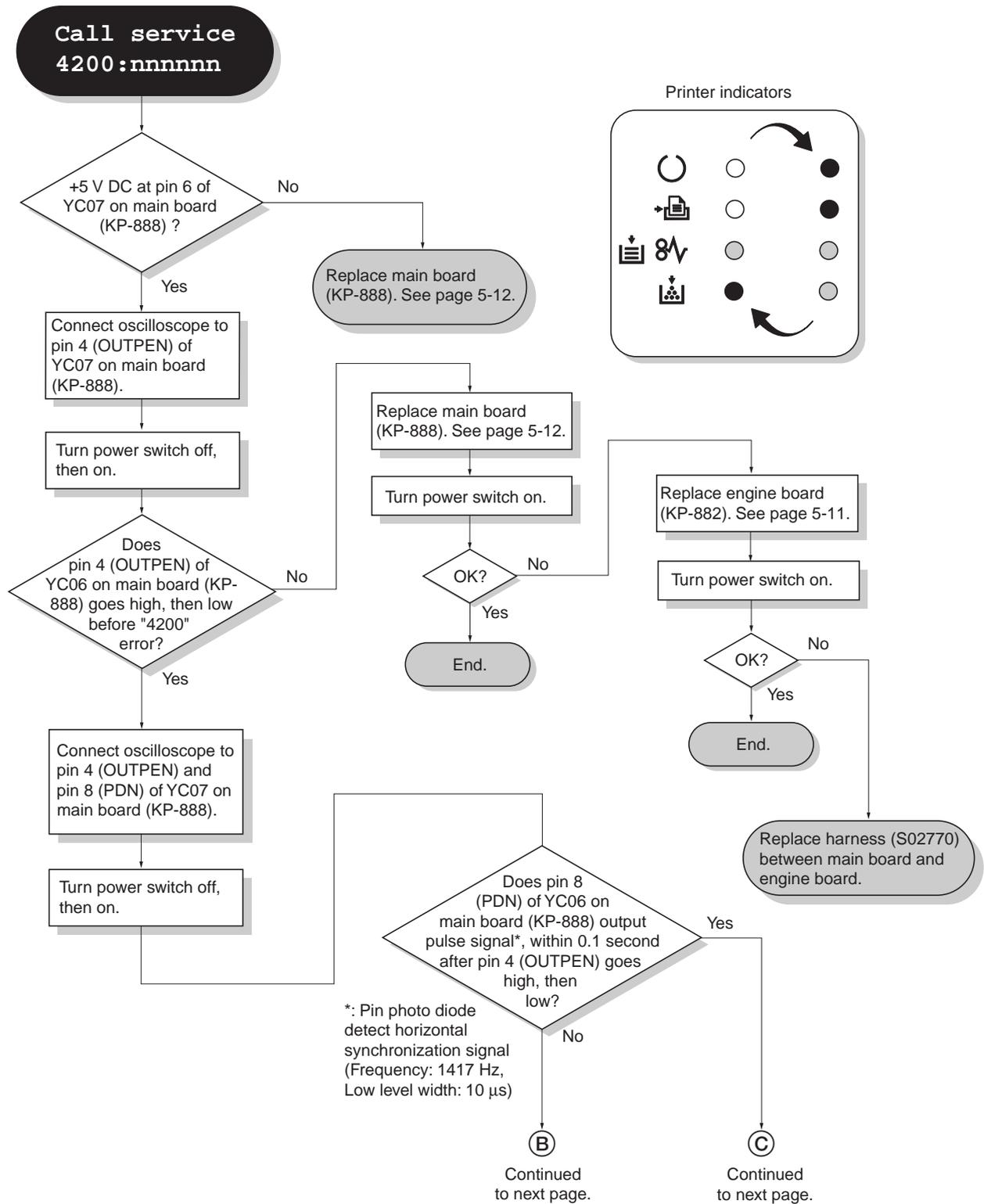
(2) 4000 - Laser scanner unit [Polygon motor] error



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from previous page.

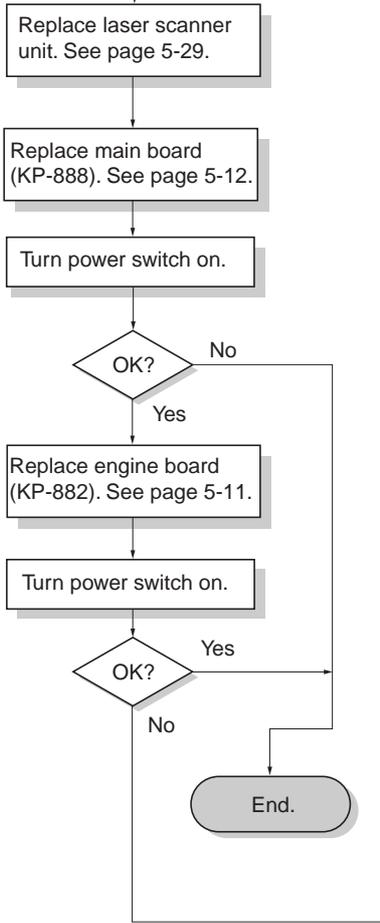


(3) 4200 - Laser scanner unit [Pin photo diode] error



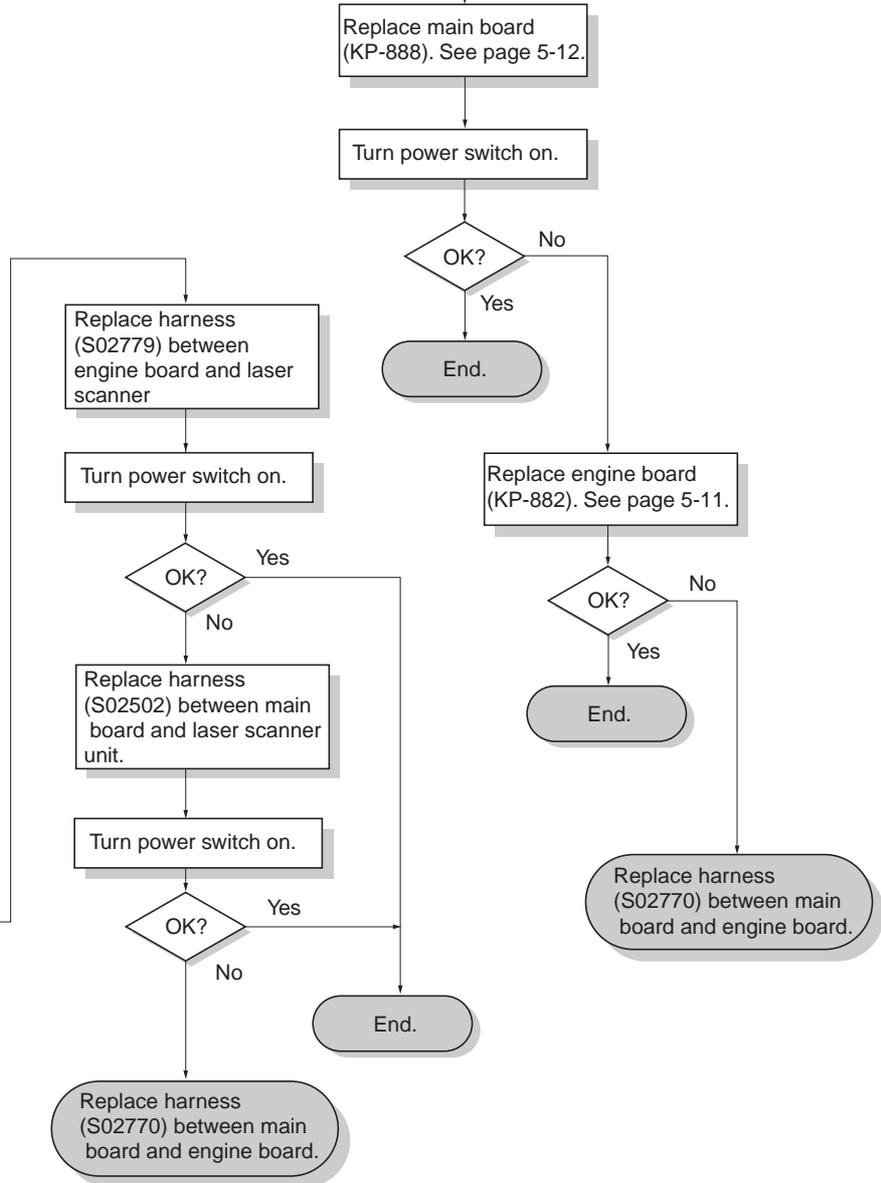
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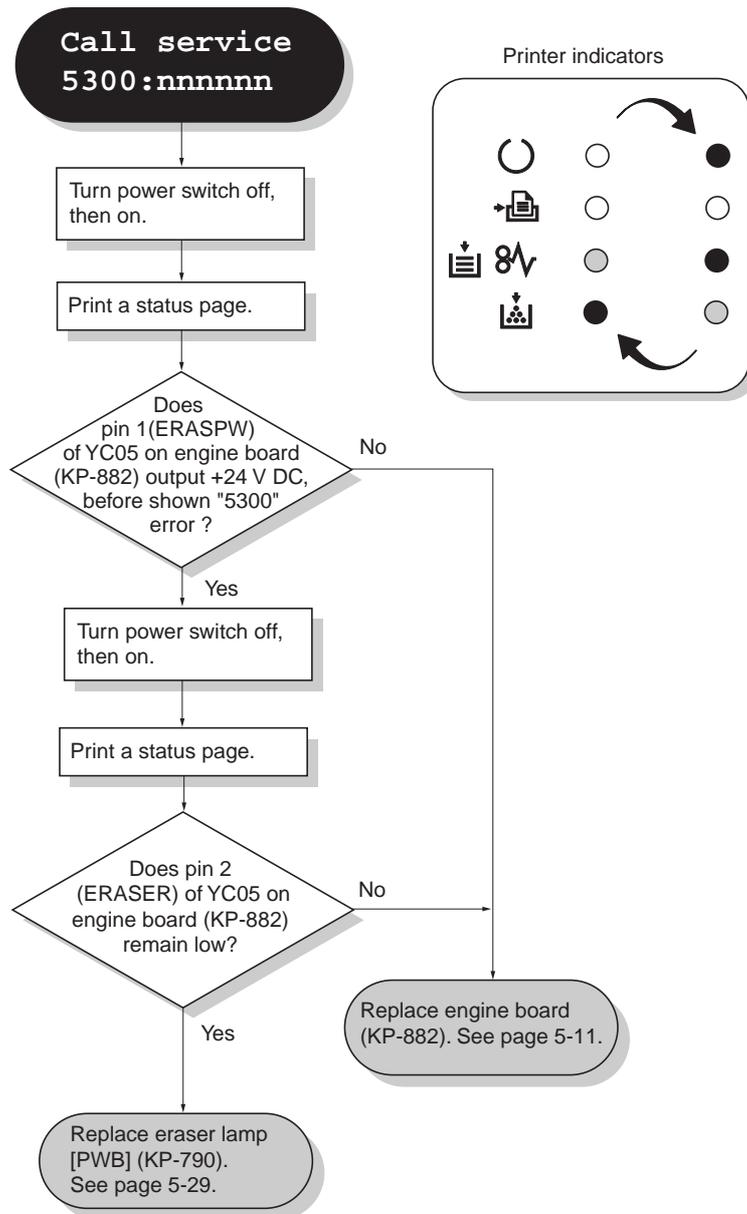


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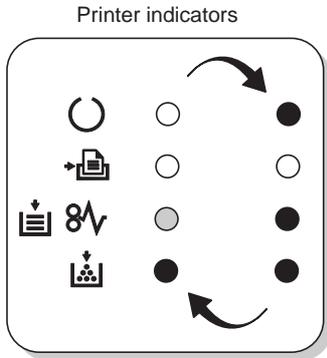
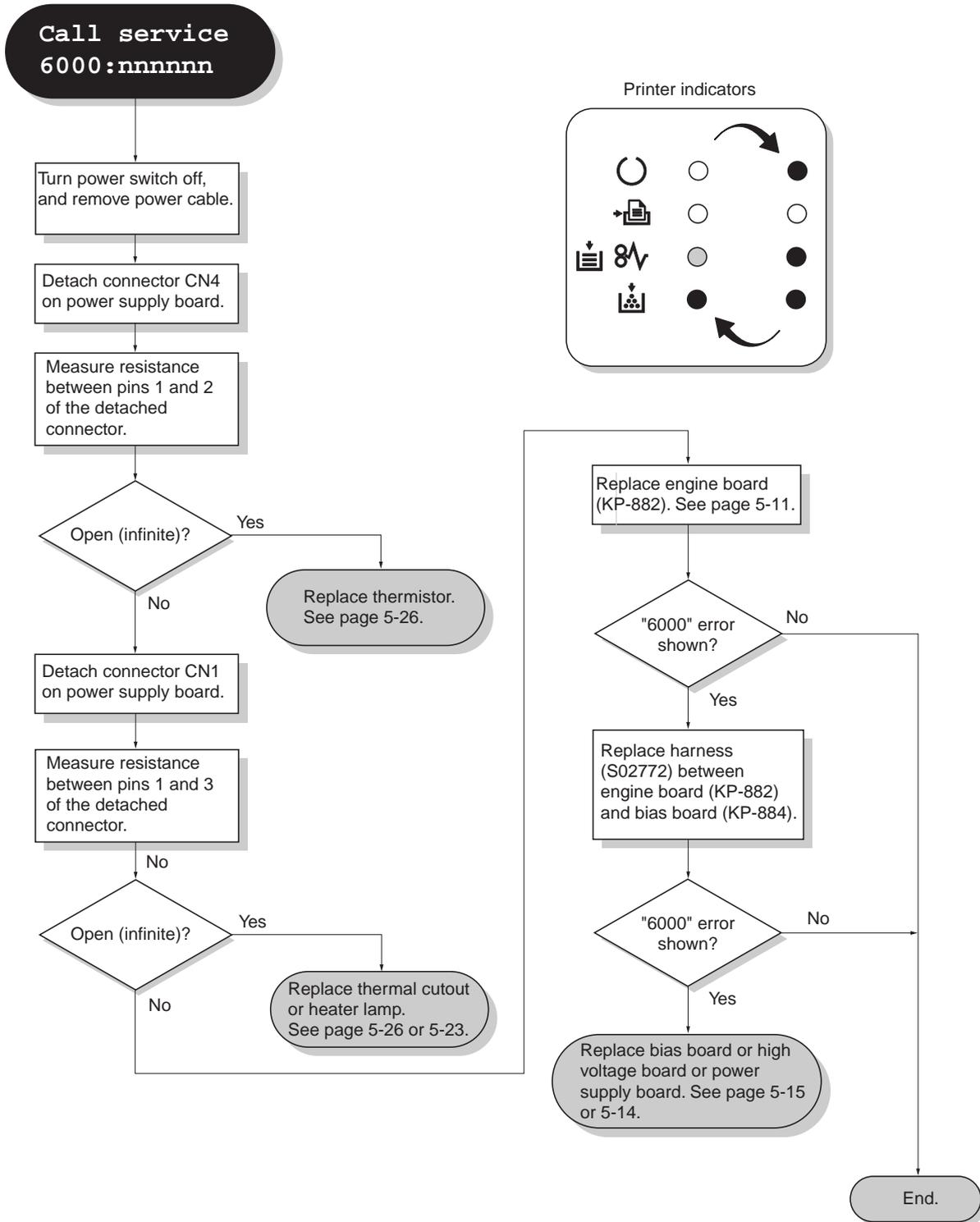
Ⓒ



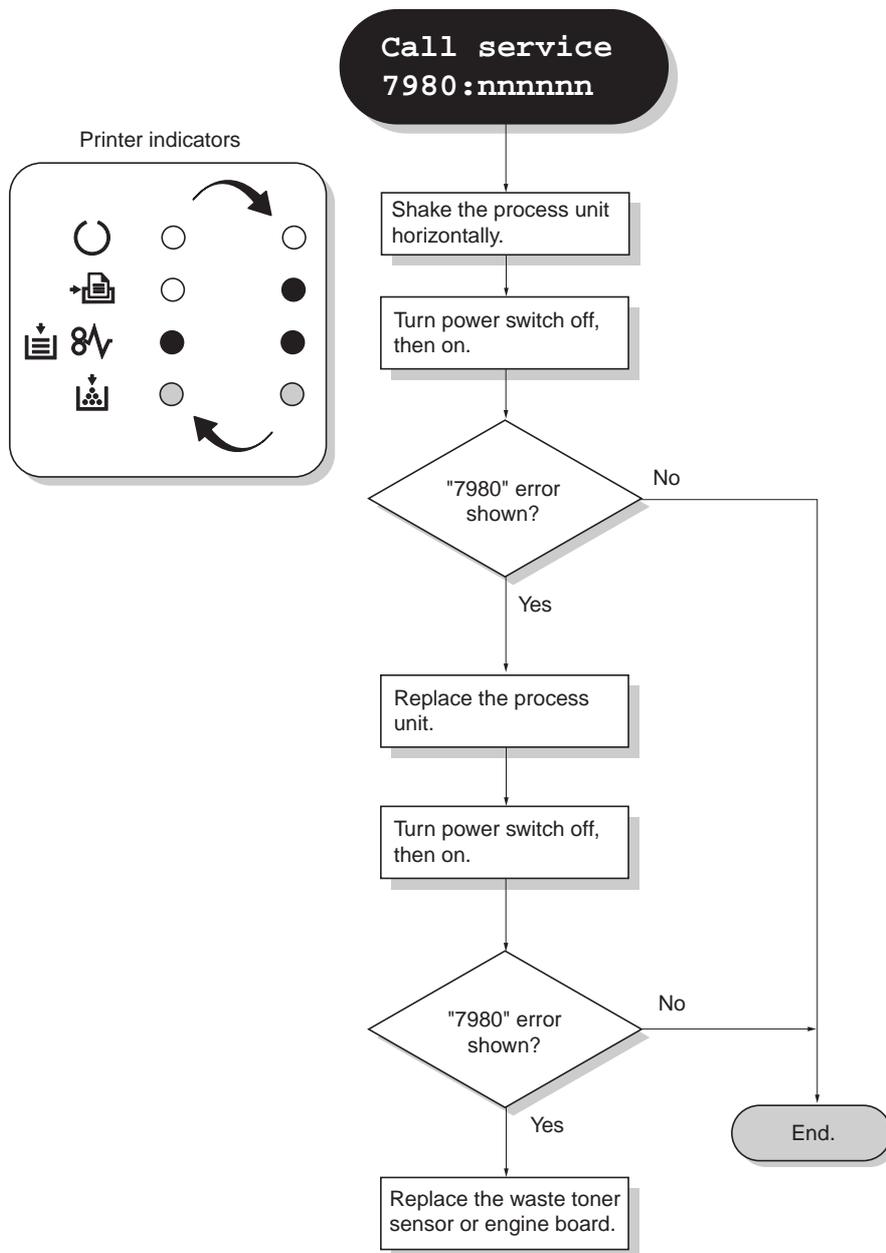
(4) 5300 - Eraser lamp error



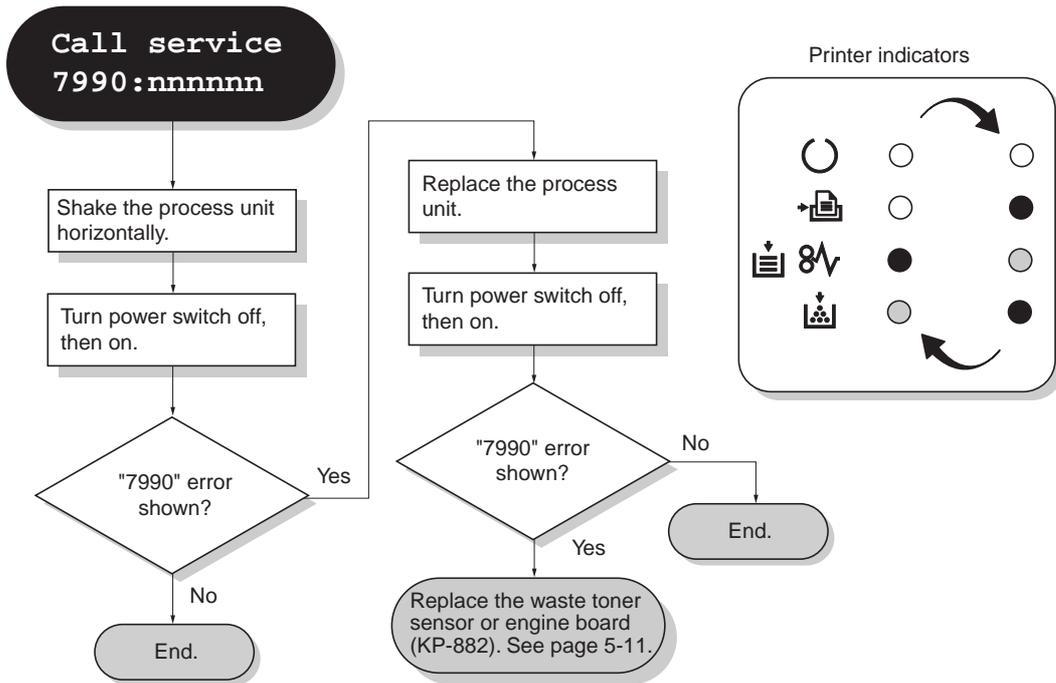
(5) 6000 - Fuser unit error



(6) 7980 - Waste toner full [Total page count less than 100,000 pages of printing]

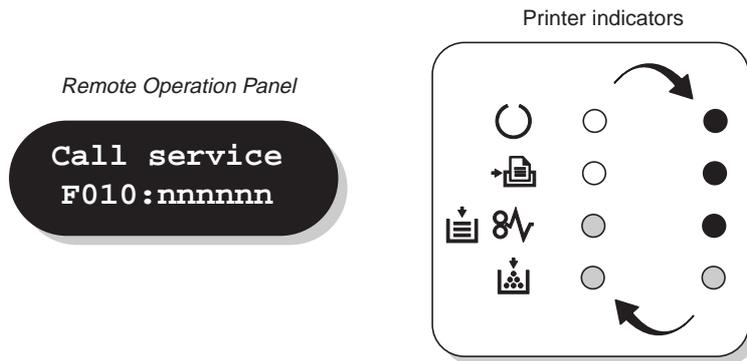


(7) 7990 - Waste toner full [Total page count more than 100,000 pages of printing]



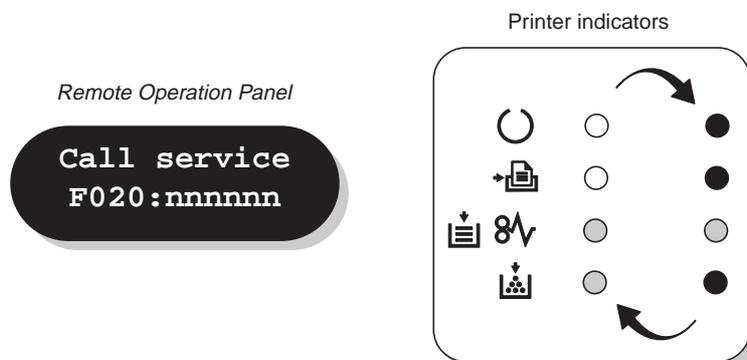
(8) F010 - Controller checksum error

Turn power switch off, then on. If not solved, replace main board (See page 5-12).



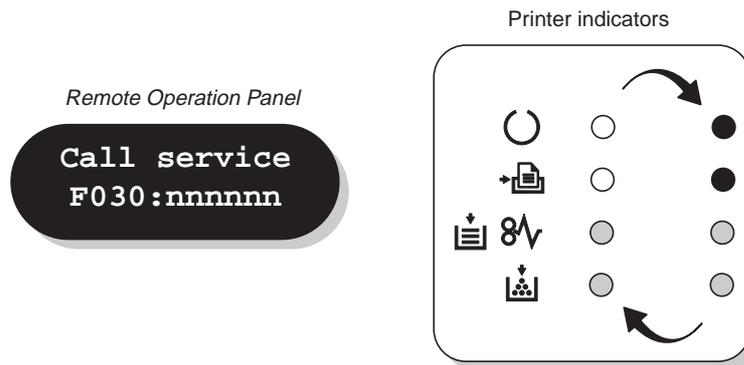
(9) F020 - Controller RAM read/write error

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 2-8 and 5-12).



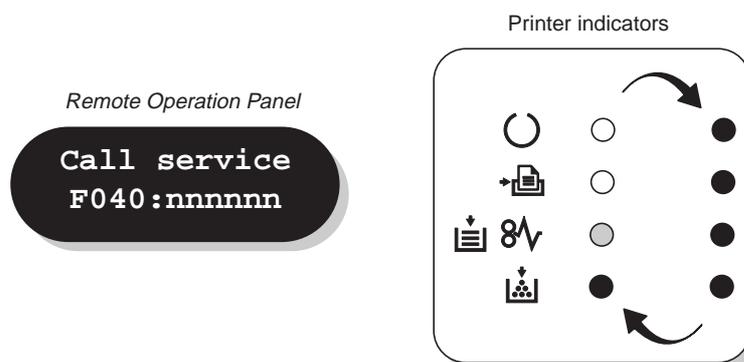
(10) F030 - Controller system error

Turn power switch off, then on. If not solved, replace main board (See page 5-12).



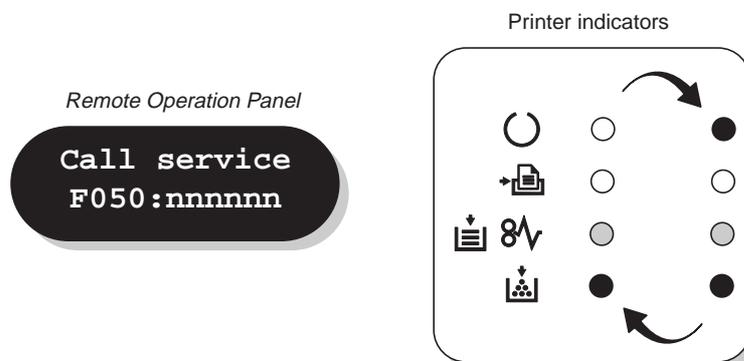
(11) F040 - Communication error

Turn power switch off, then on. If not solved, replace engine board (See page 5-12) or main board (See page 5-12).



(12) F050 - Engine ROM checksum error

Turn power switch off, then on. If not solved, replace engine board (See page 5-12).

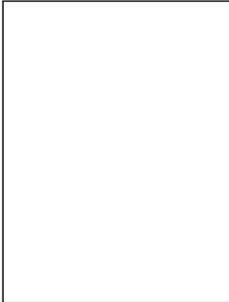


6-1-3 Print quality problems

Print quality problems range from uneven tone to completely blank output. The troubleshooting procedure for each type of problem is given below.

(1) Completely blank printout

See page 6-21.



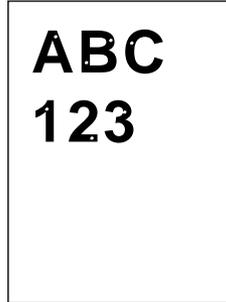
(2) All-black printout

See page 6-22.



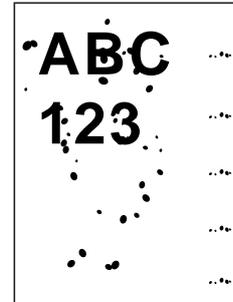
(3) Dropouts

See page 6-23.



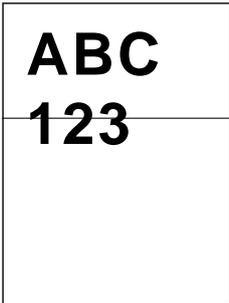
(4) Black dots

See page 6-24.



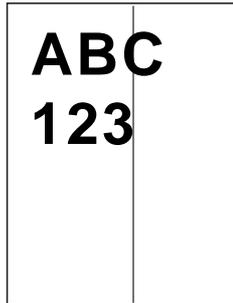
(5) Black horizontal streaks

See page 6-24.



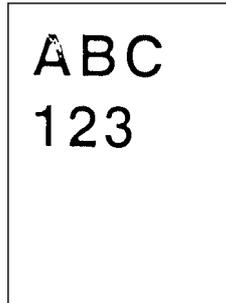
(6) Black vertical streaks

See page 6-25.



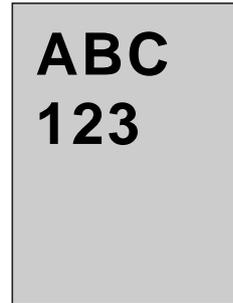
(7) Unsharpness

See page 6-26.



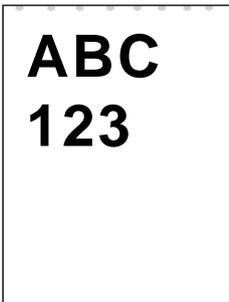
(8) Gray background

See page 6-27.

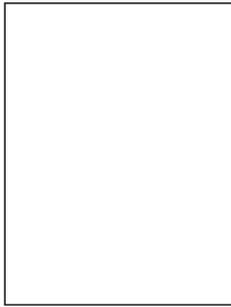


(9) Dirt on the top edge or back of the paper

See page 6-28.



(1) Completely blank printout



Check the process unit.

- Check that the process unit is inserted correctly.

Check the transfer bias potential.

- 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 5-14).

Check the laser scanner unit.

- The scanner components within the scanner may be disordered. Replace the laser scanner unit if necessary (See page 5-29).

(2) All-black printout



Check the main charger.

- 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.

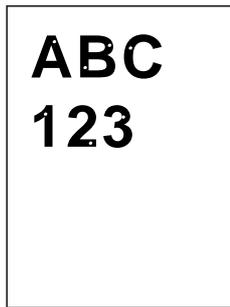
Check the drum bias.

- Make sure the bias from the high voltage board correctly arrives at the process unit.

Check high voltage potential at the high voltage board.

- Check the high voltage output on the high voltage board. Replace the high voltage board if high voltage potential is not available on the board.

(3) Dropouts



Note the spacing of the defects. Refer to *Repetitive defects gauge* (See page 6-29).

- If the defects occur at regular intervals of 63 mm, the problem may be the damaged developing roller (in the process unit). Replace the process unit.
- If the defects occur at regular intervals of 94 mm, the problem may be the damaged drum (in the process unit). Replace the process unit.
- If the defects occur at regular intervals of 61 mm, the problem may be the damaged fuser unit. Replace the press roller or heat roller (See page 5-28 or 5-14).

Check paper for property.

- Paper with rugged surface or dump tends to cause dropouts. Replace paper with the one that satisfies the paper specifications.

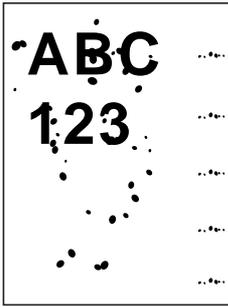
Check the transfer roller installation.

- The transfer roller must be supported by the bushes at the both ends. Clean the bush to remove oil and debris. Replace the transfer roller if necessary (See page 5-10).

Check the transfer bias potential.

- 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 5-10).

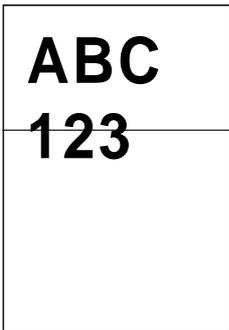
(4) Black dots



Note the spacing of the defects. Use the *Repetitive defects gauge* (See page 6-28).

- If the defects occur at regular intervals of 94 mm, the problem may be the damaged drum (in the process unit). Replace the process unit.
- If the defects occur at random intervals, the toner may be leaking from the process unit. Replace the process unit.

(5) Black horizontal streaks



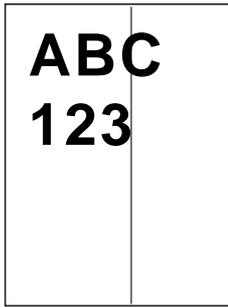
Check the process unit's ground of the process unit.

- 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.

The drum may be defective.

- Replace the process unit.

(6) Black vertical streaks



Contaminated main charger wire.

- Clean the main charger wire by pulling the green colored cleaning knob in and out several times.

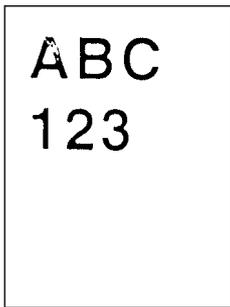
Check the drum surface for a streak of toner laying lengthwise.

- A streak of toner remaining on drum after printing means that the cleaning blade (in the process unit) is not working properly. Replace the process unit.

Defective magnet roller (in the process unit).

- Replace the process unit.

(7) Unsharpness



Check paper for property.

- Paper with rugged surface or dump tends to cause unsharp printing. Replace paper with the one that satisfies the paper specifications.

Check the transfer roller installation.

- The transfer roller must be supported by the bushes at the both ends. Clean the bush to remove oil and debris. Replace the transfer roller if necessary (See page 5-10).

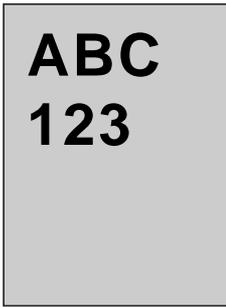
Check the transfer bias potential.

- 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 5-14).

Check *EcoPrint* setting.

- The *EcoPrint* mode can provides faint, unsharp printing because it acts to conserve toner for draft printing purpose. For normal printing, turn the *EcoPrint* mode off by using the *Remote operation panel*. For details refer to the printer's *User's Manual*.

(8) Gray background



Check the print density setting.

- The print density may be set too high. Try adjusting the print density using the *Remote operation panel* utility. For details refer to the printer's *User's Manual*.

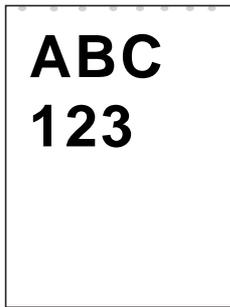
Check the surface potential of the drum (in the process unit).

- 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.

The developing roller (in the process unit) may be defective.

- 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.

(9) Dirt on the top edge or back of the paper



Check toner contamination in various parts.

- Dirty edges and back of the paper can be caused by toner accumulated on such parts as the paper chute, paper transportation paths, the bottom of the process unit, and the fuser unit inlet. Clean these areas and parts to remove toner.

Check the transfer roller.

- If the transfer roller is contaminated with toner, clean the transfer roller using a vacuum cleaner; or by continuously printing a low-density page until the symptom has faded away.

Repetitive defects gauge

Use the following measurements for checking repetitive occurrences on the printed page. See the above section for details.

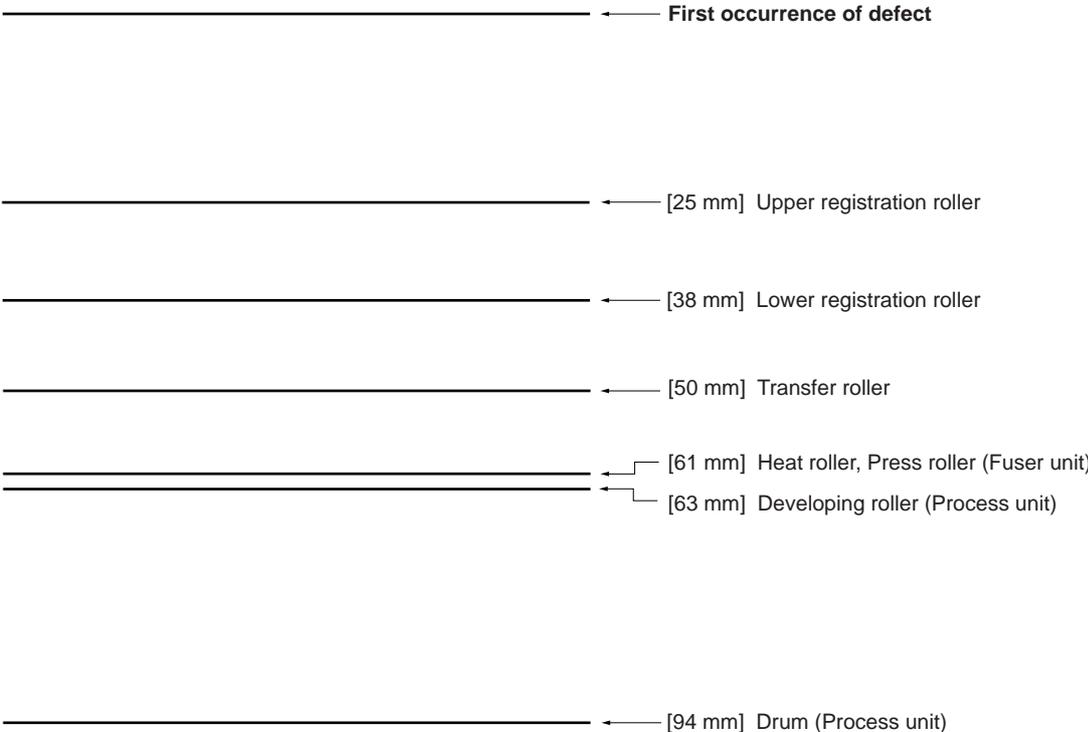


Figure 6-1-2 Repetitive defects gauge

6-1-4 Correcting a paper jam

If a paper jam occurs while you are printing, remove the jammed paper as described below. After you have removed the jammed paper, open and close the top cover once.

(1) Jam at the face-down and face-up trays

1. Open the face-up tray and remove the jammed paper as shown in the figure.

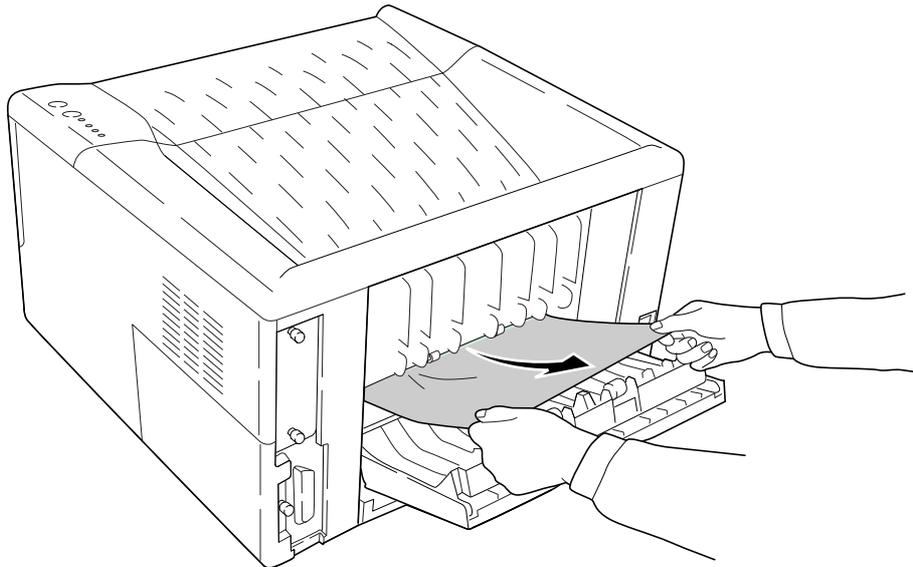


Figure 6-1-3 Jam at the face-down and face-up trays

(2) Jam at the paper cassette

1. Pull out the paper cassette and remove the jammed paper.

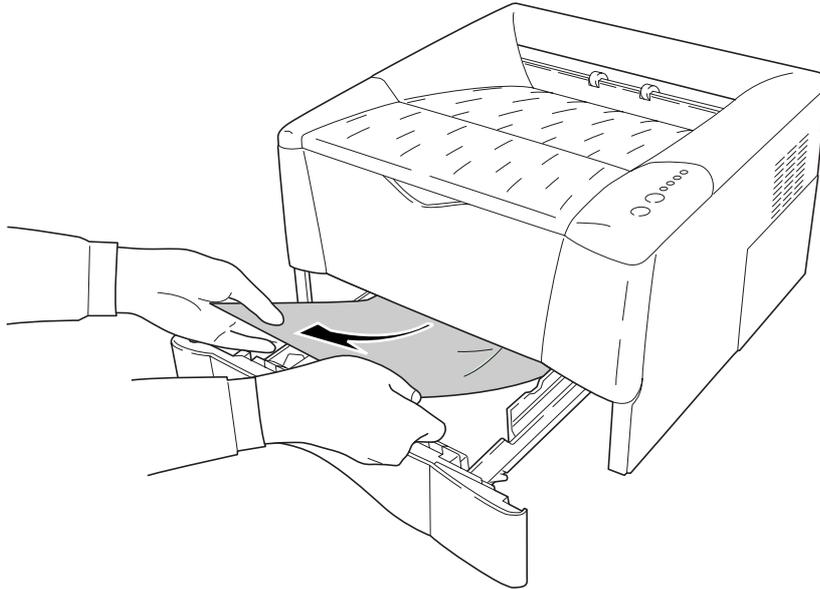


Figure 6-1-4 Jam at the paper cassette

(3) Jam inside the printer

1. Open the top cover and front cover.
2. Take the process unit together with the toner container out of the printer.
3. Remove the jammed paper.

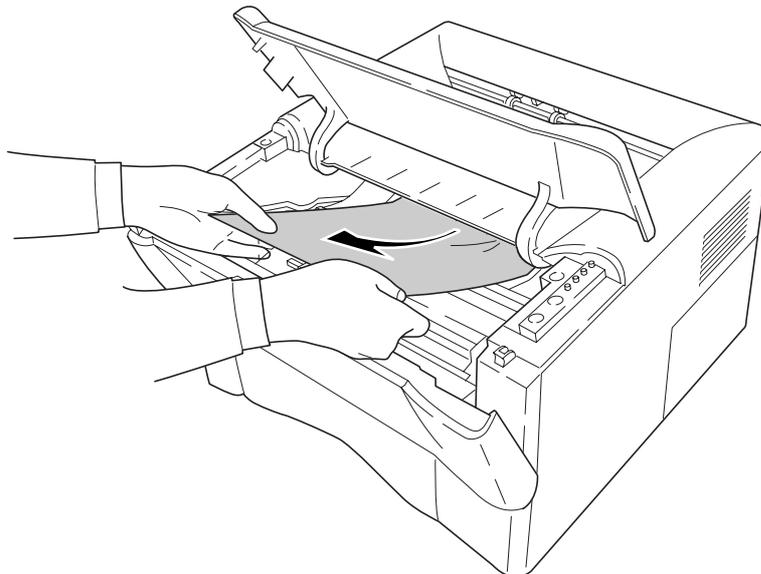


Figure 6-1-5 Jam inside the printer

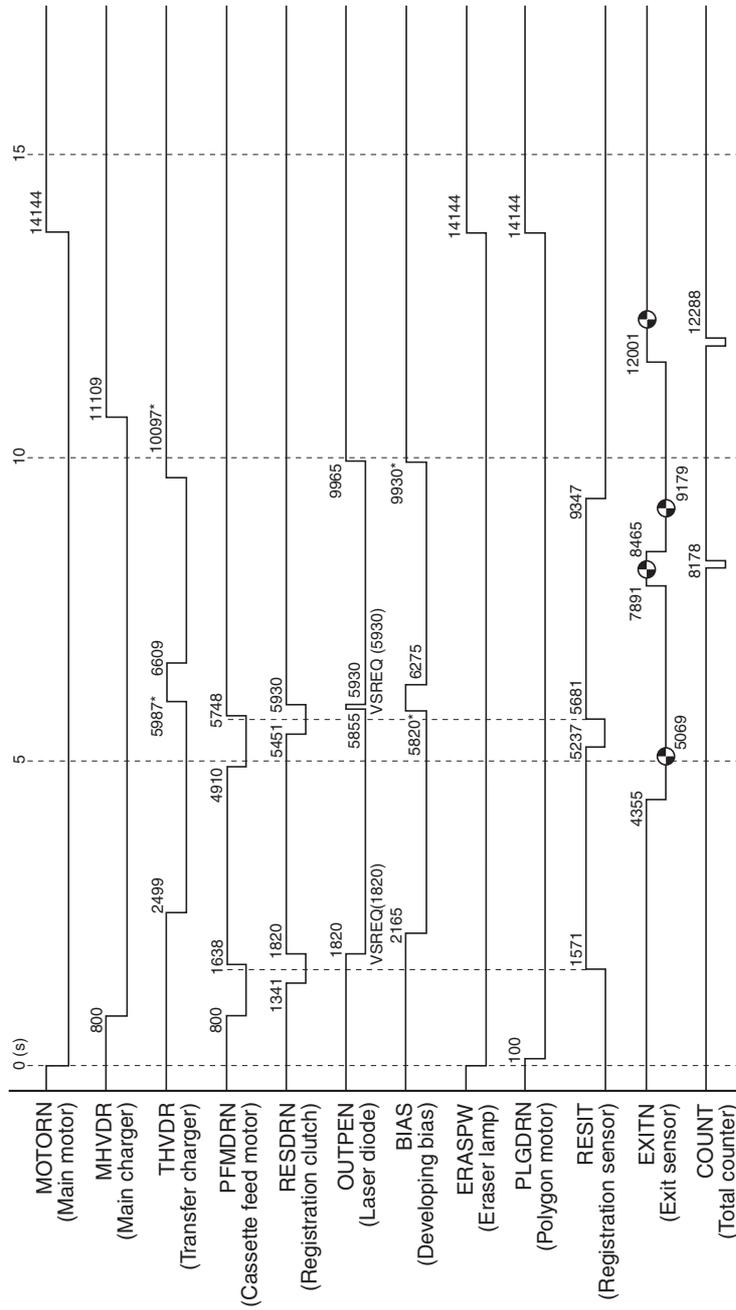
Appendix A D i a g r a m s

Appendix A Contents

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| 5. MP tray feeding, two legal size papers | A-7 |
| 6. MP tray feeding, two letter size papers | A-8 |
| Wiring diagram | A-9 |

Timing charts

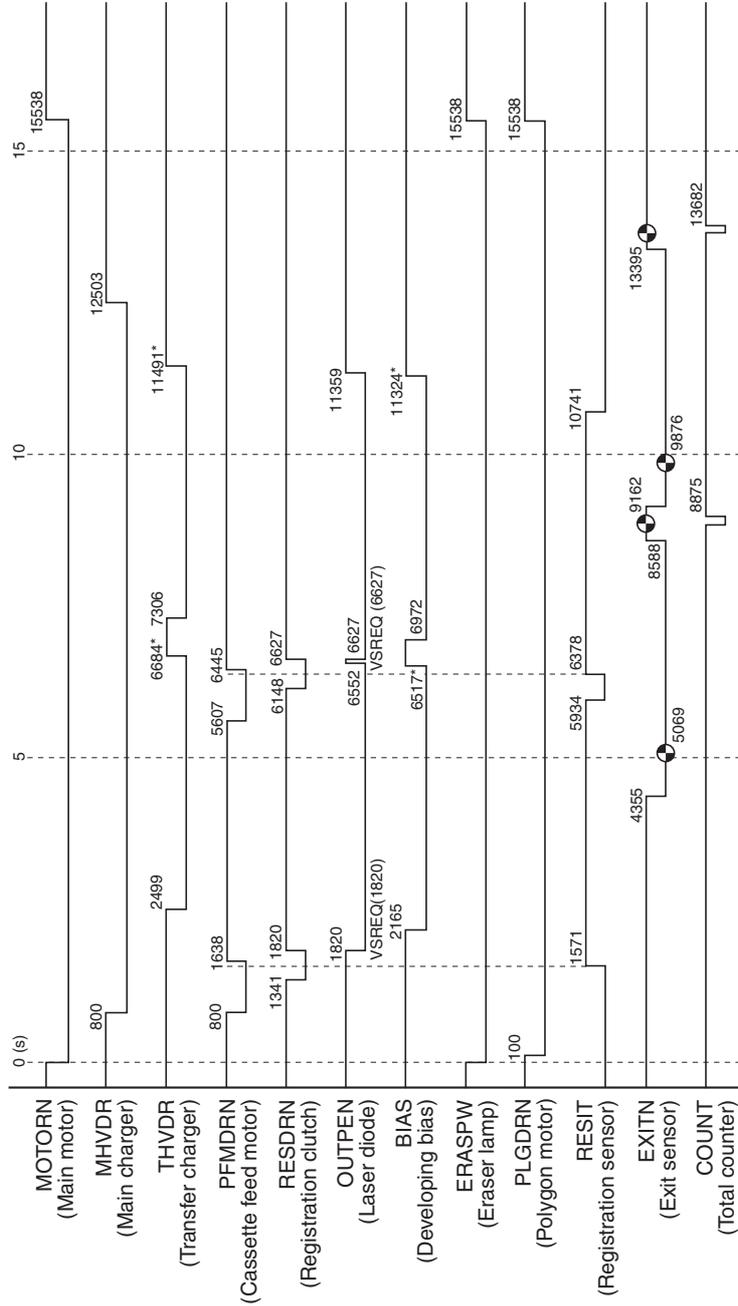
1. Option paper cassette feeding, two A4 size papers



Drum speed: 84.00 mm/s
 Paper feeding speed: 240.00 mm/s
 Printing speed: 14.30 ppm

*: Varies depending on paper size.
 ●: Jam detection timing

2. Option paper cassette feeding, two legal size papers

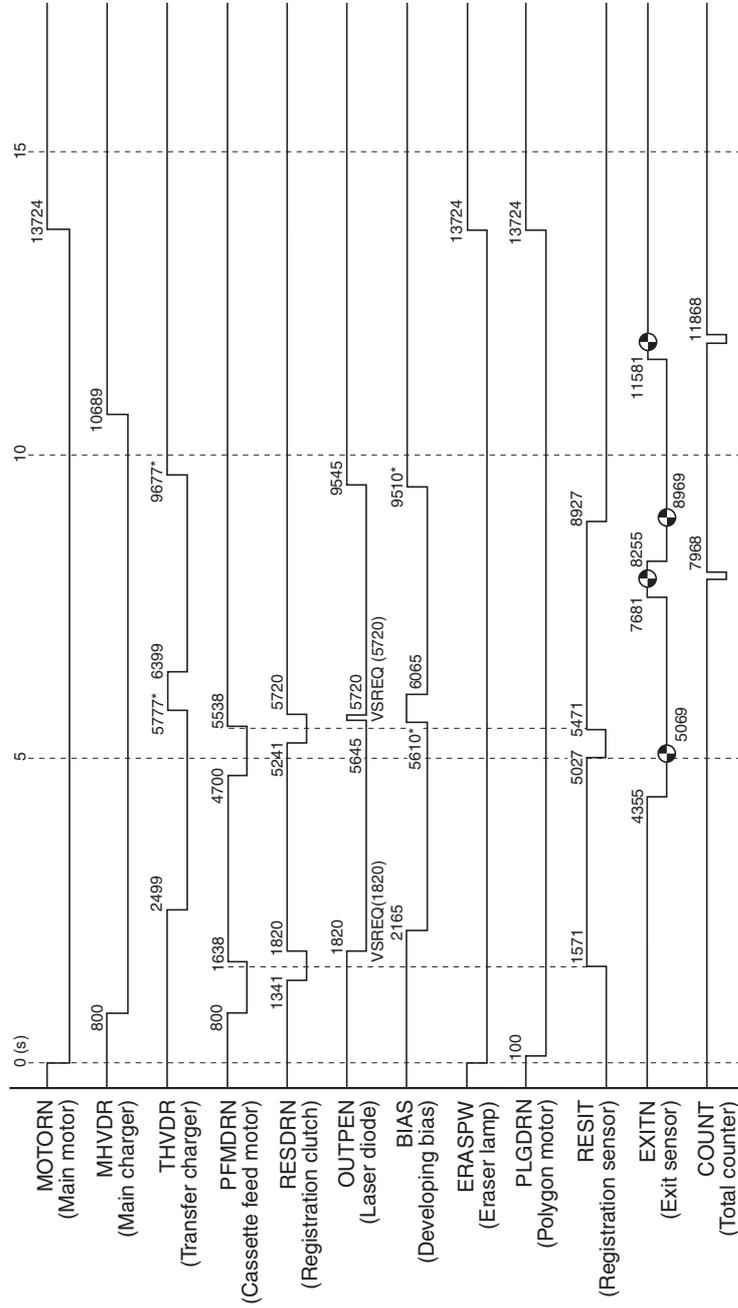


Drum speed: 84.00 mm/s
 Paper feeding speed: 240.00 mm/s
 Printing speed: 12.14 ppm

*: Varies depending on paper size.

●: Jam detection timing

3. Option paper cassette feeding, two letter size papers

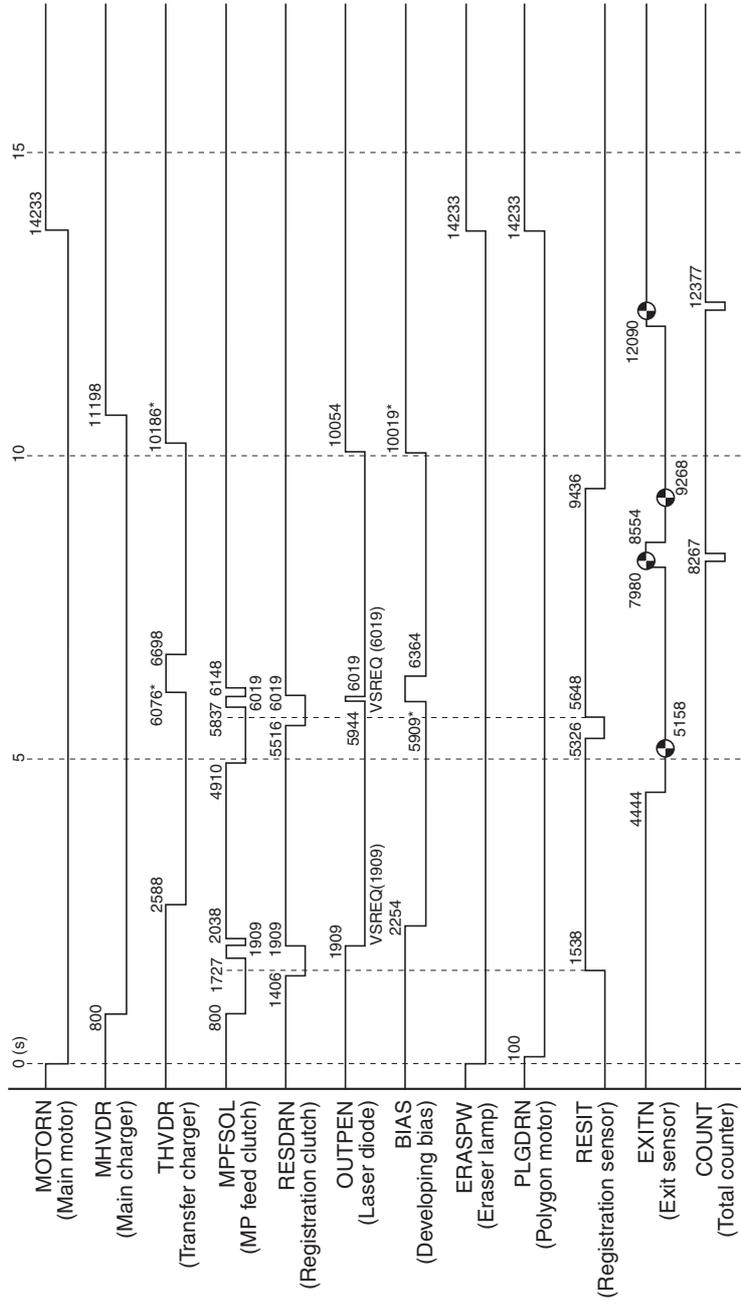


Drum speed: 84.00 mm/s
 Paper feeding speed: 240.00 mm/s
 Printing speed: 14.81 ppm

*: Varies depending on paper size.

●: Jam detection timing

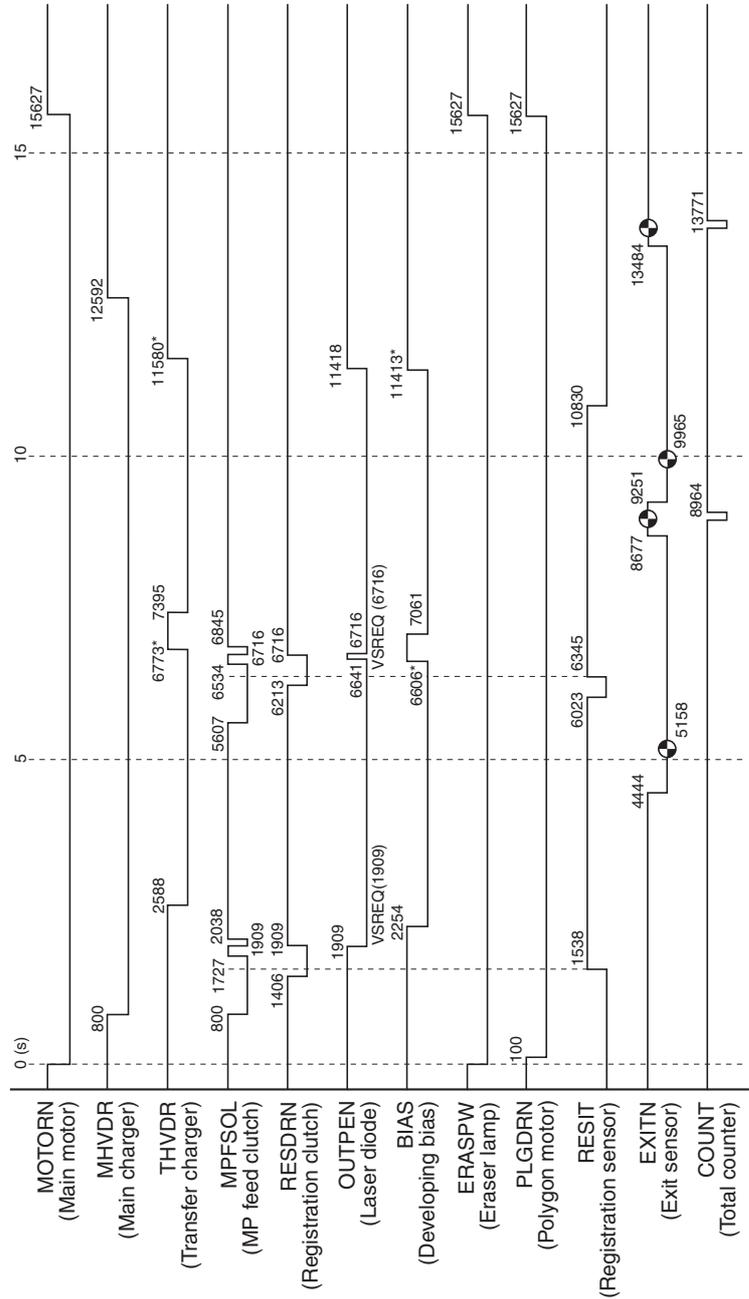
4. MP tray feeding, two A4 size papers



Drum speed: 84.00 mm/s
 Paper feeding speed: 84.00 mm/s
 Printing speed: 14.27 ppm

*: Varies depending on paper size.
 ●: Jam detection timing

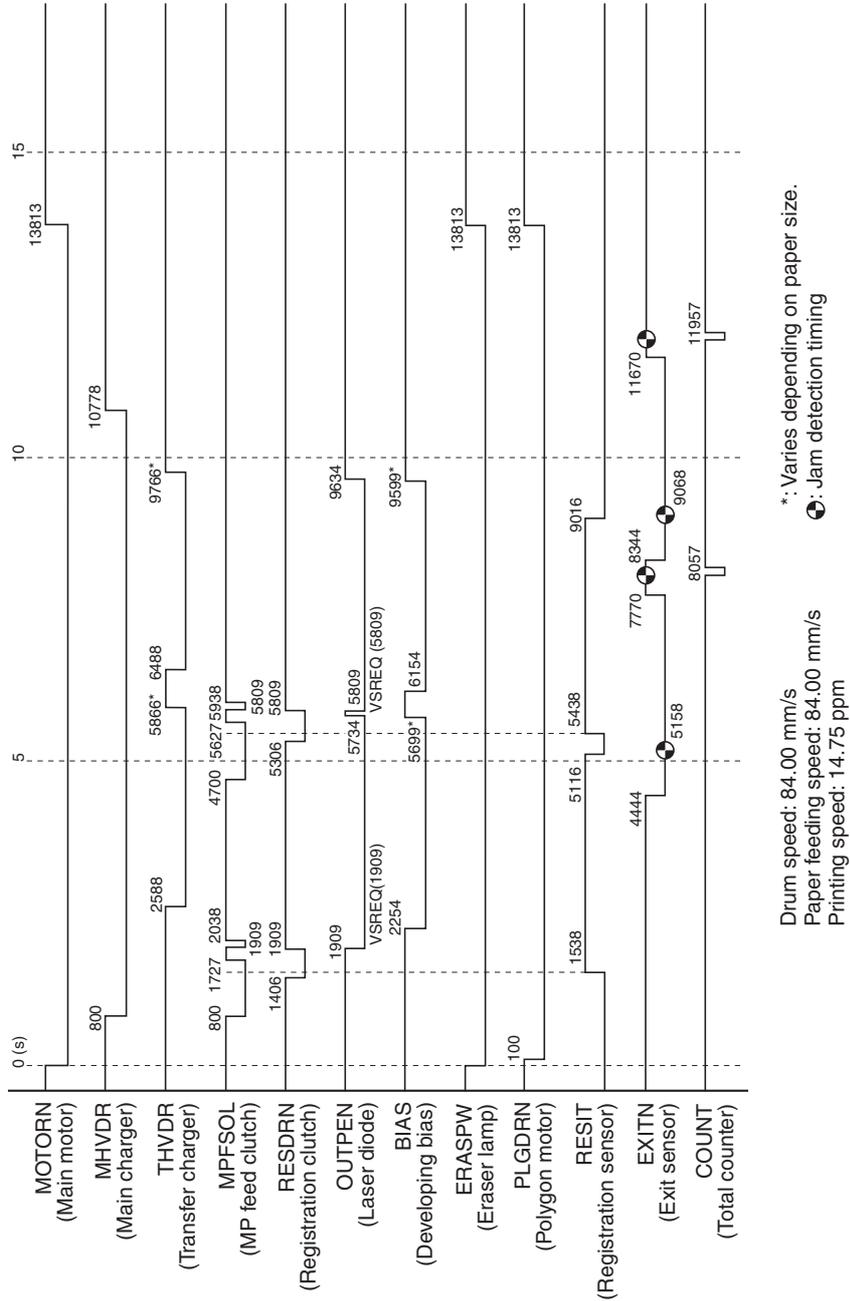
5. MP tray feeding, two legal size papers



Drum speed: 84.00 mm/s
 Paper feeding speed: 84.00 mm/s
 Printing speed: 12.14 ppm

*: Varies depending on paper size.
 ●: Jam detection timing

6. MP tray feeding, two letter size papers



Appendix B S t a t u s P a g e

Appendix B Contents

Status page B-3
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 Details of service information B-4

Status page

The printer can print different types of the status page—the user (normal) status page and the service status page. This section exclusively describes information obtainable with the service status page. For information on the user (normal) status page, refer to the printer's *User's Manual*.

Information on the service page include various settings for the printer, service statistics, etc. To print a service status page, proceed as follows:

Printing the service status page

To print a service status page, using the Go key on the operator panel. Or, have a PC running MS-DOS and proceed as follows:

Go key

[Prints a user status page]

Press the Go key for 3 seconds or more and less than 10 seconds.

[Prints a service status page]

Press the Go key for 10 seconds or more.

PC

- ① Connect the printer to the PC via the parallel interface.
- ② Ensure that the printer is ready to print.
- ③ At the DOS prompt, type:

```
echo !R! STAT 1; EXIT; >lpt1:
```

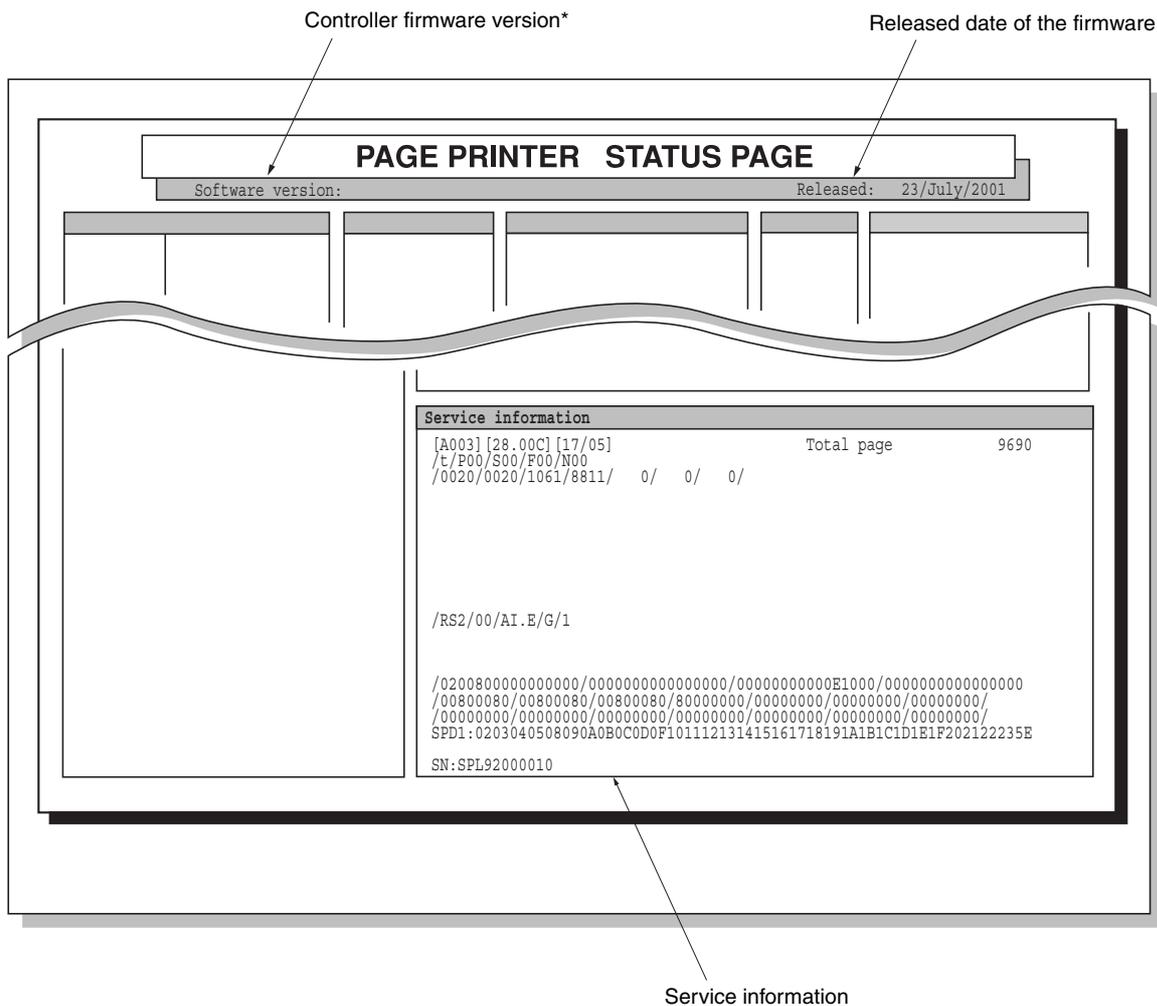
The service status page is printed. (If you omit '1,' a user status page is printed.)

Service information on the status page

An example of the service status page is shown below. (Note the details born by the status page may differ from a firmware version to another.) Most of the service information are located under *Service information*.

Most of these service information on the status page are alphanumerically-coded. Each item is explained on the next page.

Details of service information



| Service information | |
|---|-----------------|
| [A003] [28.00C] [17/05] | Total page 9690 |
| ① ② ③ | ④ |
| /t/P00/S00/F00/N00 | |
| ⑤ ⑥ ⑦ ⑧ ⑨ | |
| /0020/0020/1061/8811/ 0/ 0/ 0/ | |
| ⑩ ⑪ ⑫ ⑬ ⑭ | |
| | |
| /RS2/00/AI.E/G/1 | |
| ⑮ ⑯ ⑰ ⑱ ⑲ | |
| | |
| /0200800000000000/0000000000000000/00000000000E1000/0000000000000000 | ⑳ |
| /00800080/00800080/00800080/80000000/00000000/00000000/00000000/ | ㉑ |
| /00000000/00000000/00000000/00000000/00000000/00000000/00000000/ | ㉒ |
| SPD1:0203040508090A0B0C0D0F101112131415161718191A1B1C1D1E1F202122235E | ㉓ |
| SN:SPL92000010 | ㉔ |

| Example | Meaning | Description |
|-------------------|--------------------|-------------|
| ① [A003] | Engine ROM version | - |
| ② [28.00C] | Boot ROM version | - |
| ③ [17/05] | Internal use | - |
| ④ Total page 9690 | Total count page | - |
| ⑤ /t | Internal use | - |

| Example | Meaning | Description |
|--------------|---|---|
| ⑥ P00/ | Parallel interface mode | bit 7= 0: No error with bidirectional communication, 1: Error with bidirectional communication bit 6= 0: No ECP communication, 1: ECP communication had occurred, at least once. bit 0 to 5= History of printer parallel port directional communication. 05= Nibble (High-speed), 07= ECP |
| ⑦ S00/ | Serial interface error | 00= Normal, bit 0= Framing error bit 1= Overrun, bit 2= Parity error |
| ⑧ F00/ | Operator panel lock (Shown only during locking) | 01= Partially locked 02= Fully locked |
| ⑨ N00/ | NVRAM error (Shown only if error has occurred) | 01= ID error, 02= Version error, 03= Checksum error, 04= NVRAM error |
| ⑩ /0020 | Top margin | Inches+ ¹ / ₁₀₀ inches (FRPO L1/L2) |
| ⑪ /0020 | Left margin | Inches+ ¹ / ₁₀₀ inches (FRPO L2/L3) |
| ⑫ /1061 | Page length | Inches+ ¹ / ₁₀₀ inches (FRPO L4/L5) |
| ⑬ /0811 | Page width | Inches+ ¹ / ₁₀₀ inches (FRPO L6/L7) |
| ⑭ / 0/ 0/ 0/ | Left margin offset for paper source (MP tray/Printer's cassette/Optional paper feeder's cassette) | In + ¹ / ₆₀₀ inch |
| ⑮ RS2 | Serial interface mode (Shown only optional serial interface board is installed) Average print coverage (total) | RS2= RS-232C, RS4= RS422A |
| ⑯ /00 | Calibration table setting | Hexadecimal (FRPO I4) |

| Example | Meaning | Description |
|--------------------|---|--|
| ⑰ /AI.E | Average print coverage (sum total) | Two digits for integer part; one digit for decimal; unit is in percent |
| ⑱ /G | Average print coverage (most recent 20 pages) | B= Level 1 (Less than 0.5 %) C= Level 2 (0.6 to 1.0 %) D= Level 3 (1.1 to 2.0 %) E= Level 4 (2.1 to 3.0 %) F= Level 5 (3.1 to 4.0 %) G= Level 6 (4.1 to 5.0 %) H= Level 7 (5.1 to 10.0 %) I= Level 8 (More than 10.0 %) |
| ⑲ /1 | Operator panel message language | PMSG command setting (decimal) |
| ⑳ /020080000000... | Engine parameter setting | Hexadecimal, 32 bytes (64 digits) |
| ㉑ /00800080/... | Media type attribute setting | Media type 1 to 28 (Reserved: 12 to 20) Fuser temperature, paper weight, and duplex print setting value |
| ㉒ /00000000/... | Media type attribute setting | Media type 1 to 28 (Reserved: 12 to 20) For print density setting value |
| ㉓ SPD1:02030405... | DRAM SPD (slot 1) | - |
| ㉔ SN:SPL9200010 | Serial number for the printer | - |

Appendix C I n t e r f a c e

Appendix C Contents

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Parallel interface

The printer uses a bidirectional parallel interface for high-speed data transmission for the host computer. This interface includes the buffers which are compatible with the IEEE 1284 standards. The parallel interface provides support for the ECP and nibble modes in this standards. The parallel interface mode can be changed by commanding Prescribe commands on a PC.

Selecting the parallel interface mode

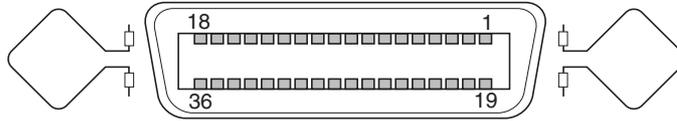
To change the parallel interface mode, a PC running MS-DOS is needed. Connect the printer to the PC via the parallel interface. Then, at the DOS prompt, type a FRPO O0 (the letter O and the number zero) command as follows depending on the desired parallel mode:

| To set the parallel interface mode... | Type at the DOS prompt... |
|---------------------------------------|--|
| Normal | <code>echo !R! FPRO 00, 0; EXIT; lpt1:</code> |
| High-speed | <code>echo !R! FPRO 00, 1; EXIT; lpt1:</code> |
| Nibble | <code>echo !R! FPRO 00, 5; EXIT; lpt1:</code> |
| Automatic* | <code>echo !R! FPRO 00, 70; EXIT; lpt1:</code> |

*: Factory-set default.

Parallel interface pin assignment

The pins of the parallel interface connector carry the signals listed below. The function for each signal is detailed on the following page.



| No. | Terminal | Signal | No. | Terminal | Signal |
|-----|----------------|-------------|-----|-------------|---------------|
| 1 | nStrobe | (STBIN1/2*) | 19 | Ground | GND |
| 2 | Data1 | (PAD0) | 20 | Ground | GND |
| 3 | Data2 | (PAD1) | 21 | Ground | GND |
| 4 | Data3 | (PAD2) | 22 | Ground | GND |
| 5 | Data4 | (PAD3) | 23 | Ground | GND |
| 6 | Data5 | (PAD4) | 24 | Ground | GND |
| 7 | Data6 | (PAD5) | 25 | Ground | GND |
| 8 | Data7 | (PAD6) | 26 | Ground | GND |
| 9 | Data8 | (PAD7) | 27 | Ground | GND |
| 10 | nAck | (ACKOUT) | 28 | Ground | GND |
| 11 | Busy | (BUSYOUT) | 29 | Ground | GND |
| 12 | PError | (PERROR) | 30 | Ground | GND |
| 13 | Select | (SELECT) | 31 | nInit | (INIT*) |
| 14 | nAutoFd | (AUTOFD*) | 32 | nFault | (FAULT*) |
| 15 | Not defined | NC | 33 | Not defined | Pull-up (1kΩ) |
| 16 | Logic ground | GND | 34 | Not defined | NC |
| 17 | Chassis ground | GND | 35 | Not defined | Pull-up (1kΩ) |
| 18 | Peri-logic H | (VCC) | 36 | nSelect In | (SELECTI*) |

Maximum rated current for pin 18 is 400 mA (fused).

Parallel interface signals

The following table provides details for the signals used on the printer's parallel interface. Note descriptions in [] are for high-speed mode of the parallel interface.

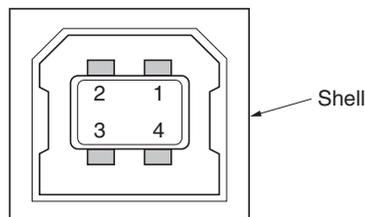
| Signal | Meaning |
|---|---|
| Strobe* [nStrobe] (Pin 1) | A negative-going Strobe* pulse causes the printer to read and latch the data on the Data 0 [1] to Data 7 [8] signal lines. |
| Data 0 [1] to Data 7 [8] (Pins 2 to 9) | These eight signals form the data byte sent from the host computer to the printer. Data 7 [8] is the most significant bit and Data 0 [1] is the least significant bit. |
| Acknowledge* [nAck] (Pin 10) | This signal is returned to the host computer. This negative-going pulse acknowledges the previous character received by the printer. Acknowledge* pulses are sent only when Busy is low. |
| Busy [Busy] (Pin 11) | This signal is returned to the host computer. This signal is high when the printer is busy and low when it is able to accept more data. Every high-to-low transition is followed by an Acknowledge* pulse. |
| Paper Empty [PError] (Pin 12) | This signal is returned to the host computer. This signal goes high when the printer runs out of paper. |
| On-Line [Select] (Pin 13) | This signal is returned to the host computer. This signal is high when the printer is on-line and low when the printer is off-line. It goes low when the upper unit is raised, or when the Go key is pressed to set the printer off-line. Note: The Paper Empty and On-Line signals are not used unless enabled by the FRPO command (O2 parameter). |
| Auto-Feed [nAutoFd] (Pin 14) | This signal is used in the Epson version of the Centronics interface to receive a carriage return. In high-speed mode, it is used as an interrupt. |
| +5 V DC (pin 18) | This line is connected to the printer's +5 V DC line (+5 V \pm 0.5 V, 400 mA maximum, fused). |
| Prime [nInit] (Pin 31) | This signal is used in the standard Centronics interface to enable the computer to reset the printer. It is ignored by the printer. |
| Error* [nFault] (Pin 32) | When the high-speed parallel line control is on (FRPO O2 = 2), this line returns error status to the host computer. |
| Auxiliary output 1 (Pin 33) | This signal line is not used. |
| Power Ready (Pin 35) | This signal is high when the printer's power is on. |
| Select In [NSelectIn] | This signal is used in some versions of the Centronics interface to enable the computer to force the printer on-line. In high-speed mode, it is used as an interrupt. |

USB interface

This printer supports the USB (Universal Serial Bus) Revision 1.1 standards. USB interface specifications and interface signals are as follows:

| Item | Specifications |
|---------------------|--|
| Basic specification | Complies with the USB Revision 1.1 standards. |
| Connectors | Printer: B-type receptacle (female) with upstream port Cable: B-type plug (male) |
| Cable | Use shielded cable that complies with the USB Revision 1.1 standards and not longer than 5 meters (16 feet). |
| Transfer mode | Full speed (max. 12 Mbps) |
| Power control | Self-power device |

USB interface pin assignment



| No. | Signal | Description |
|-----|--------|----------------------------|
| 1 | Vbus | Power supply (+5 V) |
| 2 | D- | Data transmission |
| 3 | D+ | Data transmission |
| 4 | GND | Signal ground Shell Shield |

Shell: Shield

Serial interface (Optional)

The printer is equipped with an optional slot for adding a serial port. To add a serial port, the serial interface board is equipped.

The device responsible for controlling the serial interface is integrated in the gate array in the controller system. The serial interface supports both protocols of RS-232C and RS-422A.

Toggling the protocol between RS-232C and RS-422A is made by a shorting jumper socket that is accessible on the main board. (The jumper wire arrangement, that used to be provided for the succeeding models to switch the DTR polarity is not used with these models.) To change the serial interface protocol, refer to *Changing the serial interface configuration* section which follows.

A 25-pin D-sub connector is used for the serial interface. The extra signals used for RS-422A are assigned to these pins that are not used for RS-232C according to the IBM pin assignment scheme.

Changing the serial interface configuration

To change the serial interface protocol from RS-232C to RS-422A, or vice versa, the IB-10E board must be taken out from the printer. Protect the electronics by taking these precautions:

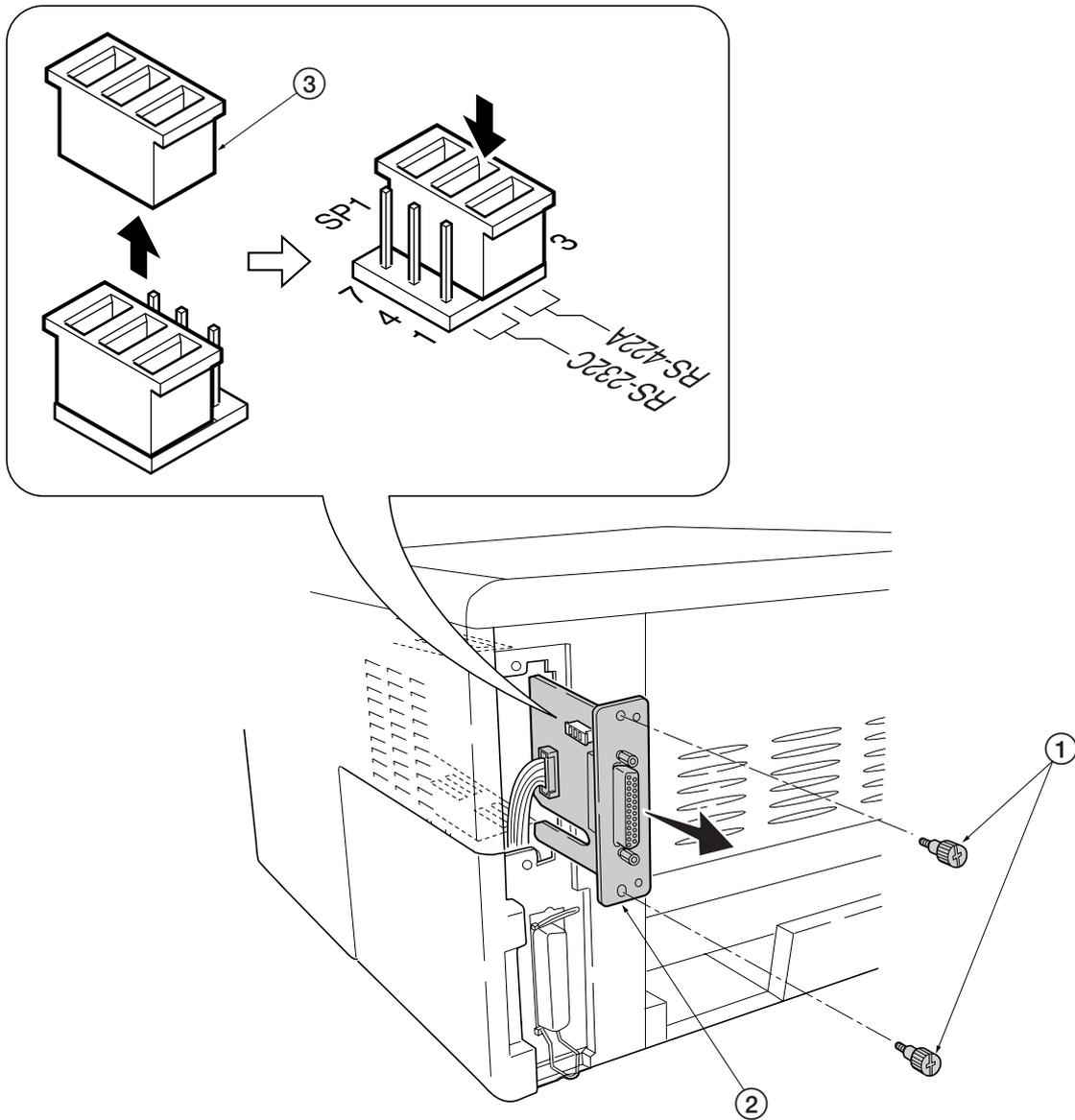
CAUTION



Before touching the main board, touch a water pipe or other large metal object to discharge yourself of static electricity. While doing the work, it is recommended that you wear an antistatic wrist strap.

Touch the main board only by the edge.

Remove two thumb screws ① then draw the serial interface board ②. To change the serial protocol from RS-232C to RS-422A, for example, carefully remove the jumper connector ③ on the serial interface board ②. Reconnect to the pin position as shown in the diagram. Replace the serial interface board ② back into the printer. Secure the board by the thumb screws.



Serial interface signals

The following table provides details for the signals used on the serial interface board.

| Signal | Meaning |
|-----------------|---|
| FG (Pin 1) | This pin is connected directly to the printer frame. |
| TxD (Pin 2) | RS-232C only: This output carries asynchronous data sent by the printer to the computer. It is used mainly in handshaking protocols. |
| RxD/RDA (Pin 3) | This input carries serial asynchronous data sent by the computer to the printer. In RS-422A, this carries the inverted differential data (RDA). |
| RTS (Pin 4) | This output is always held high (above 3 V). |
| CTS (Pin 5) | Unused. |
| DSR (Pin 6) | Unused. |
| SG (Pin 7) | All signals can transmit between the printer and the host computer to send each signals with a signal ground. |
| SDA (Pin 8, 9) | This output transmits asynchronous inverted form of differential data from the printer to the computer. |
| SDB (Pin 8, 10) | This output carries asynchronous non-inverted form of differential data from the computer to the printer. |
| DTR (Pin 20) | This output is used as a buffer nearly-full handshake line. It is held high (above 3 V) when the buffer can accept more data. |

RS-232C interface voltage levels

The voltage levels of the RS-232C signals conform to EIA RS-232C specifications. FALSE is from 3 volts to 15 volts. TRUE is from -3 volts to -15 volts. Voltages between -3 volts and 3 volts are undefined. The voltage levels of the RS-422A signals are equivalent to those of the RS-232C signals except the signals used for transmission and reception.

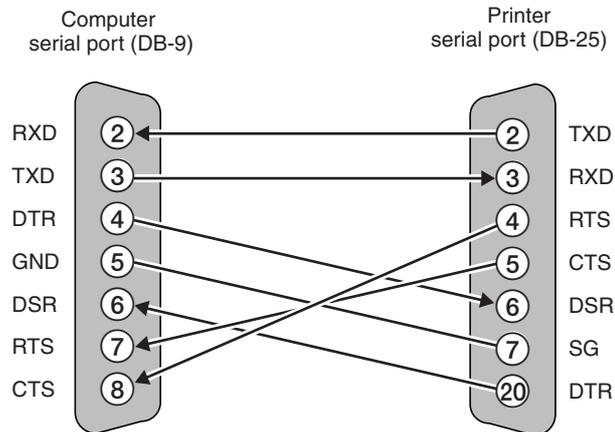
RS-422A interface voltage levels

The interface signal voltage levels for RS-422A conforms with the EIA RS-422A standards. The differential voltage ranges is from 200 mV to 6 V.

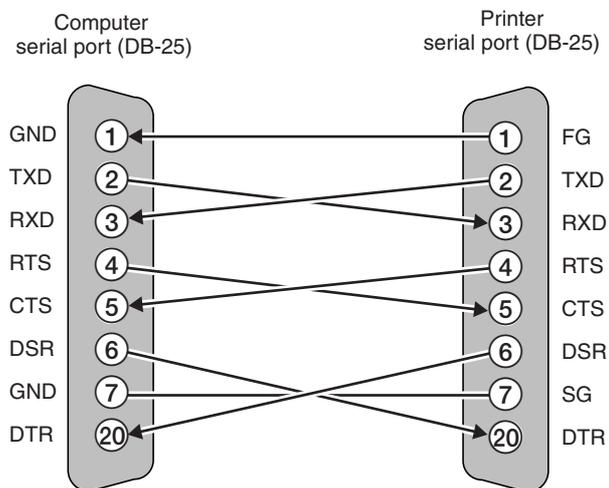
Connector configurations

The printer uses a DB-25 connector for the serial interface. Depending on the computer configurations for serial interface, use either of the appropriate configurations. A special cable must be prepared or obtained for the RS-422A configuration by referring to the diagram (last) below.

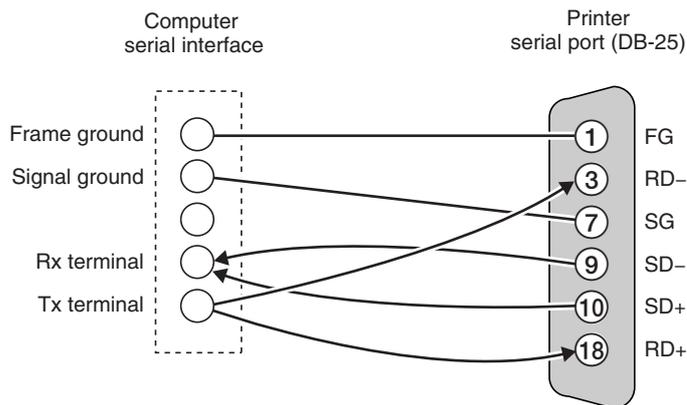
RS-232C - For computers with a DB-9 connector



RS-232C - For computers with a DB-25 connector



RS-422A



On the computer serial port, investigate pin assignments depends on the computer manufacture's instruction. Since the RS-422A configuration does not employ control lines except for data transmission/reception, select a mode in which signals such as DTR are not used.

Protocol

The serial interface supports the full baud rate of: 1200, 2400, 4800, 9600, and 19200, 38400, 57600 and 115.2 k (bps). For adjusting serial interface parameters including baud rate, parity, etc., refer to optional *Serial interface board User's Manual*.

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