

LBP-1760

SERVICE MANUAL

REVISION 0

Canon

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PREFACE

This Service Manual contains basic information required for after-sales service of the laser beam printer LBP-1760 (here after referred to as the "printer"). This information is vital to the service technician in maintaining the high print quality and performance of the printer.

The paper feeder, envelope feeder and duplexing unit, which are prepared for the printer as options, are described in this manual.

This manual consists of the following chapters:

Chapter 1: Product information

Features, specifications and installation

Chapter 2: Operation and Timing

A description of the operating principles and timing sequences of the electrical and mechanical systems

Chapter 3: The Mechanical System

Explanation of mechanical operation, disassembly, reassembly and adjustment procedures

Chapter 4: Troubleshooting

Troubleshooting procedures, reference values and adjustments, maintenance and servicing, etc.

Appendix: General timing chart, general circuit diagram, etc.

Information in this manual is subject to change as the product is improved or redesigned. All relevant information in such cases will be supplied in the Service Information Bulletins.

A thorough understanding of this printer, based on information in this Manual and Service Information bulletins, is required for maintaining its performance and for locating and repairing the causes of malfunctions.

DTP system

This manual was produced on an Apple PowerMacintosh 9500/200 personal computer and output by an Apple LaserWriter 16/600 PS laser beam printer.

All graphics were produced with Macromedia FreeHand (J), and all documents and page layouts were created with QuarkXPress (E).

The video images were captured with SONY digital video camcorder and MASS microsystems Quickimage 24 video capture board, and modified with Adobe Photoshop™ (J).

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CHAPTER 1

PRODUCT INFORMATION

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I. FEATURES

1. High speed printing

Equipped with the Intel 960HD-50 processor, this printer is compact in size and capable of printing a maximum of 17 pages/min. (LTR).

2. Excellent image quality

Resolution of 1200/600DPI, super fine particle toner, and automatic image refinement provide excellent image.

3. Various paper source in option

The three kinds of optional paper source, paper feeder, envelope feeder, and duplexing unit, will meet various requirements for a user.

In addition to the standard equipped multi-purpose tray and built-in cassette, installation of the optional paper feeder and envelope feeder provide a user the four-way paper pick-up sources. Installation of the duplexing unit enables duplex printing.

4. Memory saving technology

Memory Reduction Technology enables A4/LTR size single-side printing (1200 × 1200DPI resolution) with only 4MB of memory.

5. Energy saving

Employment of on-demand fixing method and energy saving function that automatically reduces power consumption when the printer is idle for the specified period of time offers lower power consumption.

6. Reduction in toner consumption

Toner consumption can be reduced by selecting the economy mode and printing rough image with lesser toner.

7. Automatic PDL switch

This printer supports the Hewlett-Packard PCL6 printer language. It can also support the Adobe PostScript 3 by installing the optional Canon Adobe PostScript 3 Module A5. It automatically switches PDL between PCL and PostScript according to the received data.

8. Features of interface

This printer supports automatic interface switch between all active ports. The printer is equipped with the IEEE 1284 compliant parallel interface that supports bi-directional communication between the printer and the computer. The network board is available as an option, and the printer is equipped with the I/O slots that allow the printer to be connected to the Ethernet network and the Token Ring network environments. As a result, the printer can be connected to multiple computers simultaneously.

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II. SPECIFICATIONS

A. Printer

1. Printer Engine

- | | |
|---------------------------------------|---|
| 1) Type | Desk-top page printer |
| 2) Printing method | Electrophotography |
| 3) Printing speed (Note 1) | About 17.1 pages/min. (Letter, 600 DPI), about 8.5 pages/min. (Letter, 1200 DPI)
About 16.2 pages/min. (A4, 600 DPI), about 8.1 pages/min. (A4, 1200 DPI) |
| 4) First print time (Note 2) | 15.2 sec. or less (A4, 600 DPI, face-down)
14.1 sec. or less (A4, 600 DPI, face-up) |
| 5) Wait time | 25 sec. or less |
| 6) Scanning pitch | |
| Horizontal | 600/1200 DPI |
| Vertical | 600/1200 DPI |
| 7) Image formation system | |
| Laser | Semiconductor laser |
| Scanning system | Rotating six-faced prism mirror (Scanning mirror) |
| Photosensitive drum | OPC |
| Charging | Roller charging |
| Exposure | Laser scanning |
| Toner | Magnetic single-component dry toner |
| Development | Toner projection development |
| Toner supply | By EP-52 cartridge replacement (about 10,000 A4-sized prints: with image density set in the middle, and 4% dot density ratio) |
| Transfer | Roller transfer |
| Separation | Curvature |
| Cleaning | Blade |
| Fixing | On-demand method |
| 8) Feeding | Multi-purpose tray
Cassette
Paper feeder (option)
Envelope feeder (option) |
| Print paper | Plain paper, recycled paper, colored paper, labels, OHT, envelopes |
| Paper sizes | |
| Multi-purpose tray | W. 98.4mm × L. 190mm (min.) ~ W. 216mm × L. 356mm (max.) size plain paper (60g/m ² ~ 128g/m ² recommended paper), above-mentioned paper |
| Cassette | Letter, Legal, and A4-sized plain paper (60g/m ² ~ 105g/m ² recommended paper), recycled paper, colored paper |
| Multi-purpose tray capacity | 10mm stack (about 100 sheets of 80g/m ² paper) |
| Cassette capacity | 56mm stack (about 500 sheets of 80g/m ² paper) |
| Cassette types | Universal (Letter, Legal, A4 sizes) |
| 9) Print delivery | Face-down/face-up |
| Face-down tray capacity | About 250 sheets (80g/m ² paper) |
| Face-up tray capacity | About 50 sheets (80g/m ² paper) |
| 10) Duplexing | |
| Auto-duplexing | When duplexing unit (option) is installed, Letter, Legal, Executive, A4, and B5 size plain paper only (60g/m ² ~ 105g/m ² recommend- |

	ed paper).
Manual duplexing (Note 3)	Plain paper (60g/m ² ~ 105g/m ² recommended paper) on multi-purpose tray only
11) Environment	
Temperature	7.5 ~ 32.5°C
Humidity	5 ~ 90%RH
Air pressure	747 ~ 1013hPa (560 ~ 760mmHg/equivalent to 0 ~ 2,600m above the sea level)
12) Power consumption	1100W or less (20°C room temperature, with rated voltage input)
13) Noise level (Officially announced level based on ISO 9296)	
	Sound power level (1B=10dB) 6.6B or less (600dpi, printing) 4.4B or less (standby)
	Sound pressure level 53dB or less (600dpi, printing) (Bystander position) 33dB or less (standby)
	The above figures are the values measured when all the options are installed.
14) Dimensions	400 (W) × 507 (D) × 346 (H) mm
15) Weight	About 18kg (printer with cassette) About 1.5kg (EP-52 cartridge)
16) Line voltage requirements	100-127V (-10%, +6%) 50-60Hz (±2Hz) 200-240V (-10%, +6%) 50-60Hz (±2Hz)
17) Options	Paper feeder, duplexing unit, envelope feeder

-
- Notes:**
1. At the room temperature of 20°C with rated voltage input.
 2. When the printer is in READY state at a room temperature of 20°C, the time from reception of the PRINT signal from the video controller until an A4-sized print is delivered to the face-down or face-up tray.
 3. When manual duplexing, correct the curl of the print delivered in the face-down tray before setting it in the multi-purpose tray.
-

2. Video Controller

1) CPU	RISC processor: Intel 960HD-50
2) RAM	Standard: 4MB Maximum: 36MB
3) ROM	4MB
4) ROM DIMM socket	3
5) RAM DIMM socket	2
6) Host interface	Standard: IEEE 1284 parallel interface Option: expansion interface (Ethernet, Token Ring)
7) Language	Standard: PCL 6, PCL 5e plus PCL-XL Option: Adobe PostScript Level 3
8) Resident fonts	45 Scalable fonts (MicroType fonts), 8 Bitmap font
9) Optional fonts	136 fonts
10) Scalar	UFST

Specifications are subject to change with product modification.

B. Options**1. Paper feeder**

- | | |
|-----------------|--|
| 1) Paper source | Letter, Legal, Executive, A4, B5-JIS, B5-ISO, and Custom-sized plain paper (60g/m ² ~ 105g/m ² recommended paper), recycled paper, colored paper |
| 2) Capacity | 56mm stack (about 500 sheets of 80g/m ² paper) |
| 3) Dimensions | 390 (W) × 493 (D) × 129 (H) mm |
| 4) Weight | About 7kg |
| 5) Power supply | DC24V (supplied from printer) |

2. Duplexing unit

- | | |
|-----------------|---|
| 1) Feed paper | Letter, Legal, Executive, A4, and B5-JIS-sized plain paper (60g/m ² ~ 105g/m ² recommended paper) |
| 2) Dimensions | 319 (W) × 360 (D) × 141 (H) mm |
| 3) Weight | About 3.5kg |
| 4) Power supply | DC24V (supplied from printer) |

3. Envelope feeder

- | | |
|-------------------|--|
| 1) Feeding speed | 12 prints/min., 9 prints/min., 6 prints/min. (variable according to the number of envelopes to be printed or the initial temperature of the fixing unit) |
| 2) Envelope types | Monarch, COM-10, DL, B5, C5 recommended envelopes |
| 3) Envelope sizes | W. 98.4mm × L. 190mm (min.) ~ W. 216mm × L. 356mm (max.) size |
| 4) Capacity | 55mm stack or 75 envelopes, whichever is less. |
| 5) Dimensions | 326 (W) × 242 (D) × 115 (H) mm |
| 6) Weight | About 1.5kg |
| 7) Power supply | DC24V (supplied from printer) |

Specifications are subject to change with product modification.

III. SAFETY INFORMATION

A. Laser Safety

An invisible laser beam is irradiated within the laser/scanner unit.

Since the laser beam can injure your eye, be sure not to disassemble the laser/scanner unit. Also, it cannot be adjusted in the field.

The label shown below is attached to the laser/scanner unit cover.



Figure 1-3-1

B. Toner Safety

Composed of minute, plastic, colored components, toner is a non-poisonous substance.

If toner adheres to your skin or clothes, remove as much of it as possible with dry tissue paper, then wash with cold water. If you use hot water, the toner will gel and become difficult to remove.

As toner easily breaks down vinyl materials, avoid letting toner come into contact with vinyl.

C. Ozone safety

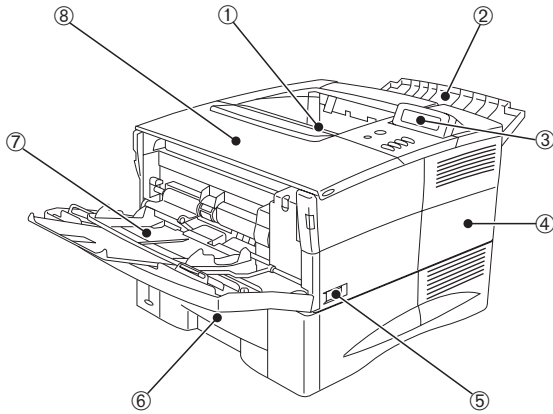
An infinitesimal amount of ozone gas (O₃) is generated during corona discharge from the charging roller used in this printer. The ozone gas is emitted only when the printer is operating.

This printer meets the ozone emission reference value set by Underwriters Laboratory (UL) at the time it is shipped from the factory.

IV. PARTS OF THE PRINTER

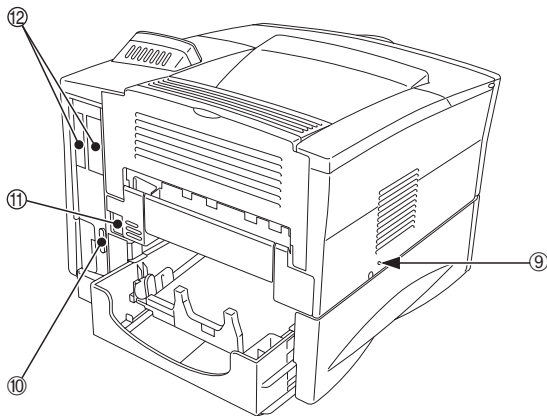
A. External Views

1. Printer



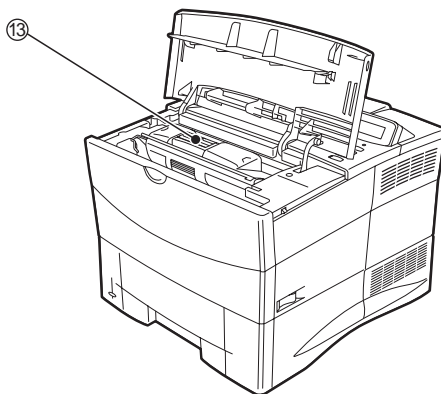
- 1: Face-down tray
- 2: Face-up tray
- 3: Operation panel
- 4: Right rear cover
- 5: Power switch
- 6: Cassette
- 7: Multi-purpose tray
- 8: Top cover

Figure 1-4-1



- 9: Test print switch
- 10: Parallel interface connector
- 11: Power receptacle
- 12: Expansion I/O slots

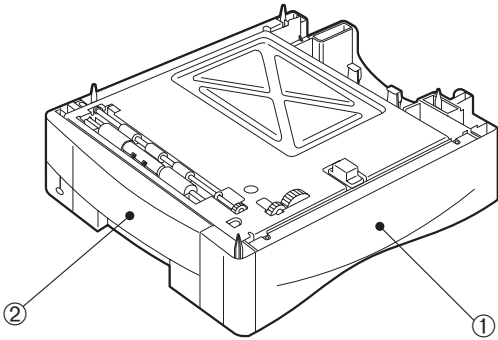
Figure 1-4-2



- 13: EP-52 cartridge

Figure 1-4-3

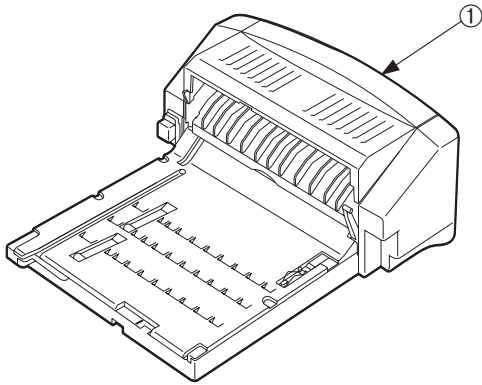
2. Paper feeder



- 1: Paper feeder
- 2: 500-sheet cassette

Figure 1-4-4

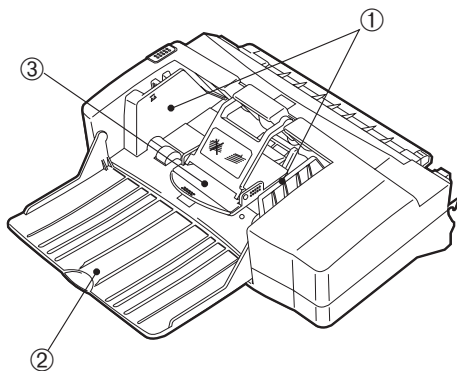
3. Duplexing unit



- 1: Duplexing unit jam release cover

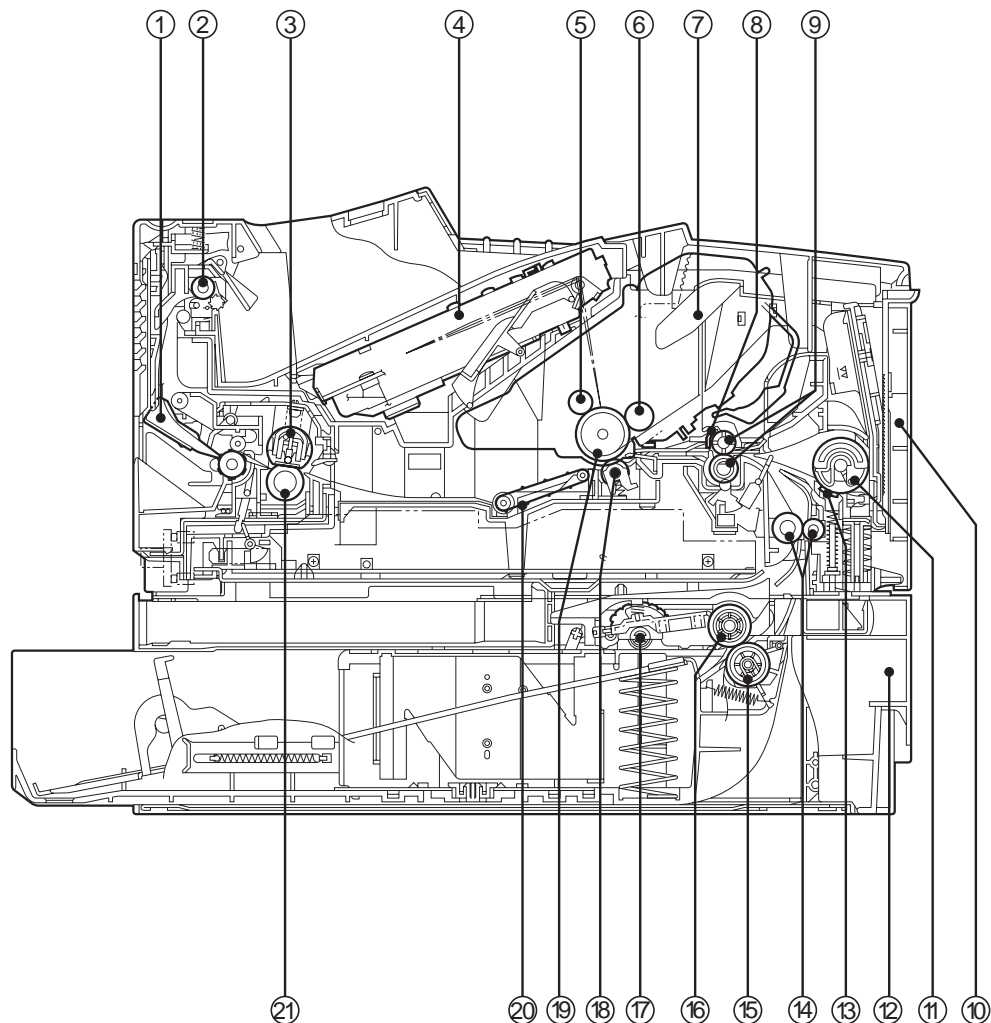
Figure 1-4-5

4. Envelope feeder



- 1: Envelope guide
- 2: Extension tray
- 3: Weight

Figure 1-4-6

B. Cross-sectional Views**1. Printer****Figure 1-4-7**

- | | |
|---------------------------------------|--------------------------------|
| 1: Face-up deflector | 12: Cassette |
| 2: Face-down delivery roller | 13: Separation pad |
| 3: Fixing film unit | 14: Feed rollers |
| 4: Laser/scanner unit | 15: Cassette separation roller |
| 5: Primary charging roller | 16: Cassette feed roller |
| 6: Developing cylinder | 17: Cassette pick-up rollers |
| 7: EP-52 cartridge | 18: Transfer charging roller |
| 8: Registration arm | 19: Photosensitive drum |
| 9: Pre-transfer rollers | 20: Feed belt |
| 10: Multi-purpose tray | 21: Pressure roller |
| 11: Multi-purpose tray pick-up roller | |

2. Paper feeder

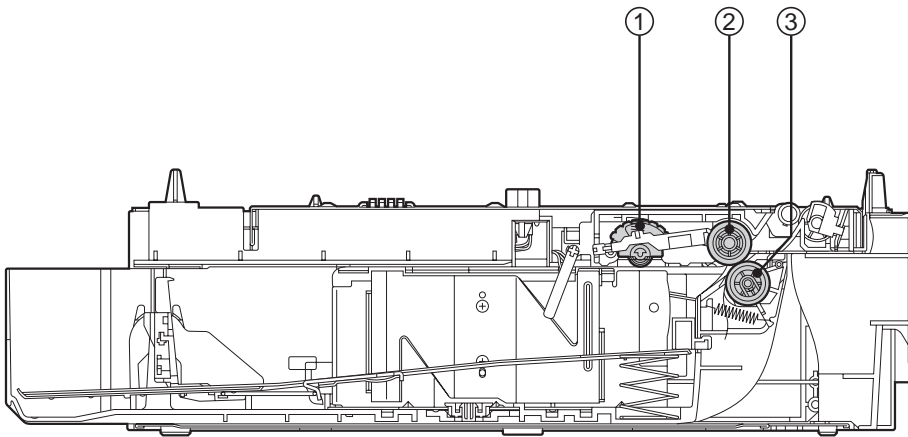


Figure 1-4-8

- 1: Pick-up roller
- 2: Feed roller
- 3: Separation roller

3. Duplexing unit

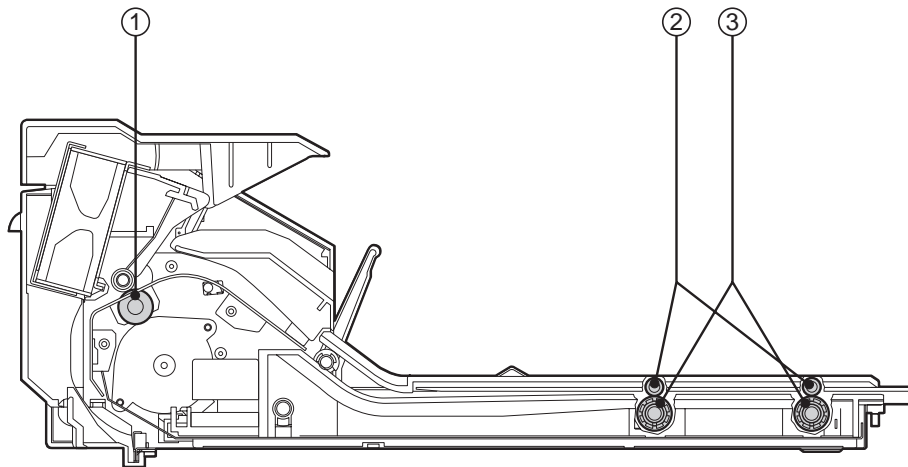


Figure 1-4-9

- 1: Reversing roller
- 2: Oblique rollers
- 3: Duplexing unit pick-up rollers

4. Envelope feeder

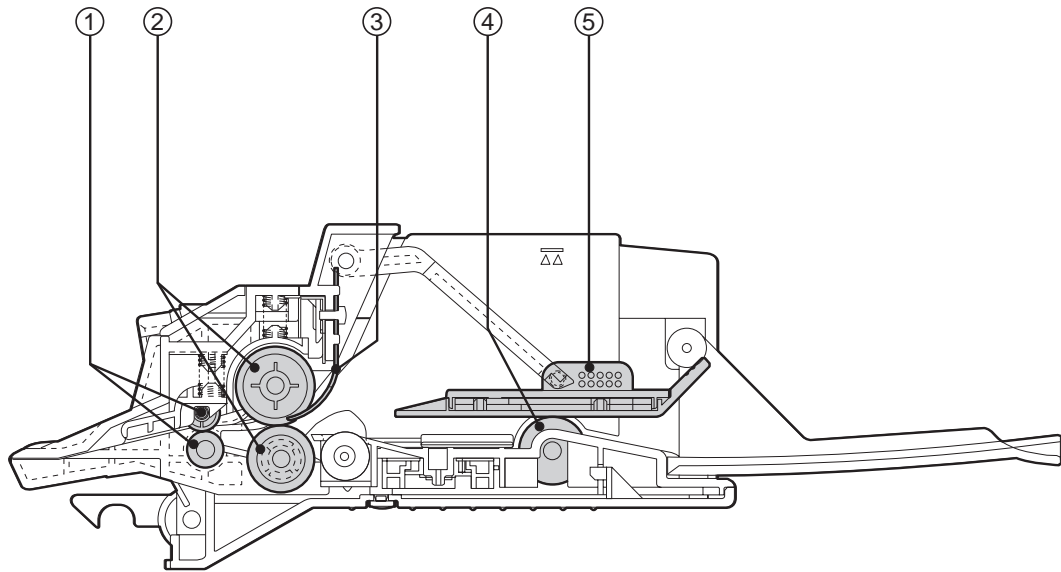


Figure 1-4-10

- 1: Feed rollers
- 2: Separation rollers
- 3: Separation guide
- 4: Pick-up rollers
- 5: Weight

V. INSTALLATION

A. Outline

This printer is packaged and shipped from the factory after careful adjustments and rigorous inspections.

When installing the printer, it is important to demonstrate its performance in the same way as when it passed the factory inspection.

The service engineer must sufficiently understand the performance of the printer, install it correctly in a location with an appropriate environment, and conduct sufficient checks of the unit.

B. Location Selection

Before taking the printer to the customer's premises, you should confirm the following installation conditions.

1. Power supply

Use the following power supplies:

- Line voltage (AC): -10%, +6% rated voltage
- Power frequency: 50/60 Hz±2 Hz

2. Operating environment

Install in a location that meets the following conditions:

- Level, flat surface
- Temperature, humidity within the following ranges:
Surrounding temperature: 7.5 ~ 32.5°C
Surrounding humidity: 5 ~ 90%RH (relative humidity)
- Cool, well-ventilated space

Do not install in the following locations:

- Exposed to direct sunlight
If you cannot avoid such a location, hang heavy curtains, etc. to shut out the direct sunlight.
- Near magnets and devices that emit a magnetic field
- Areas with vibration
- Dusty places
- Near fire or water

3. Installation space

Install the printer at a suitable distance from the walls, leaving enough room to operate it (see Figure 1-5-1).

When installing the printer on a desk, be sure that it is large enough to accommodate the printer's feet (rubber pads) and strong enough to stand its weight.

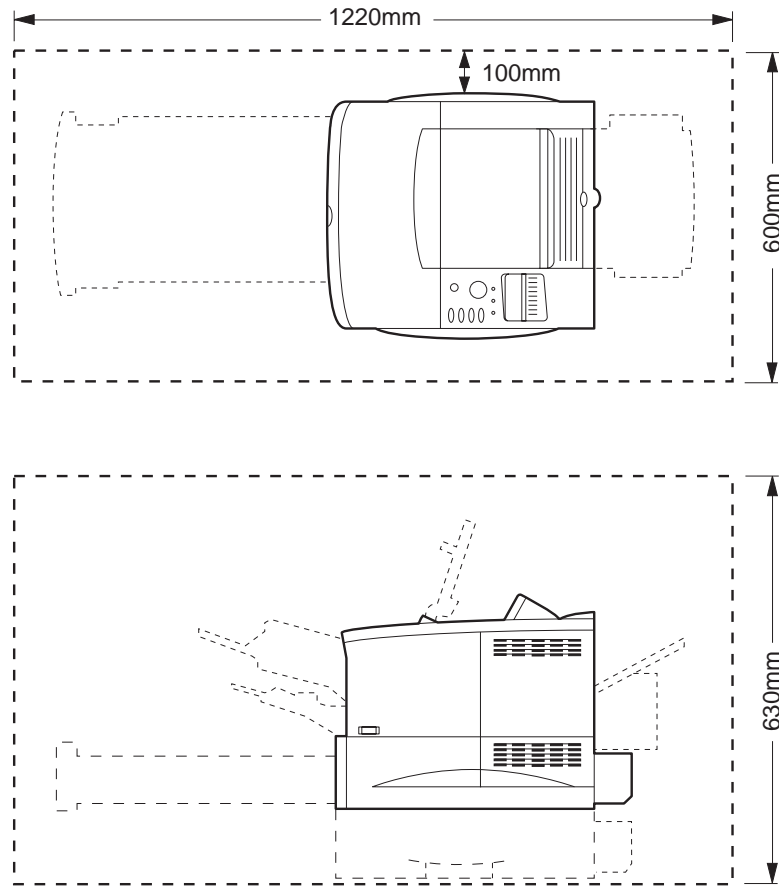


Figure 1-5-1

C. Unpacking and Installation

Condensation appear on metal surfaces in the printer when brought from a cold area into a warm area. Also, since the condensation can cause various troubles including print defects, in such a case, leave it in the carton at room temperature for at least an hour so that it is acclimatized to room temperature.

When installing the options, be sure that the printer is powered OFF.

1. Printer

- 1) Open the printer packaging.
- 2) Take out the accessories. Confirm that the power cord, cartridge, CD-ROM, and manuals are included.
- 3) Take the plastic bag off the printer and peel the tape off each part. Confirm that none of the covers were scratched or deformed during shipment.
- 4) Open the top cover and remove the tape and packing materials from inside the printer.
- 5) Remove the tape and spacer from the face-down tray.
- 6) Take out the cassette from the printer, and remove the packing materials from the cassette.

2. Cartridge

- 1) Open the bag holding the cartridge and take out the cartridge.
- 2) Hold the cartridge as shown in figure 1-5-2 and slowly rock it to right and left 5 to 6 times so that the toner is evenly distributed.
- 3) Place the cartridge on a flat surface. While holding down on the top of the cartridge with one hand, grasp the tab with the other hand and gently pull out the sealing tape.
- 4) Open the top cover of the printer and load the cartridge in the printer. Make sure to insert the cartridge until it firmly contacts with the back of the slot.

3. Paper feeder

- 1) Open the paper feeder packaging.
- 2) Take out the paper feeder with the front and rear pads from the package.
- 3) Take the plastic bag off the paper feeder and peel the tape off each part. Confirm that none of the covers were scratched or deformed during shipment.
- 4) Remove the packing materials from the paper feeder.
- 5) Place the paper feeder on a flat surface.
- 6) Lift the printer, and align the positioning pins of the paper feeder with the positioning holes of the printer.

4. Envelope feeder

- 1) Open the envelope feeder packaging.
- 2) Take off the plastic bag and peel the tape off. Confirm that none of the covers were scratched or deformed during shipment.
- 3) Remove the packing materials from the envelope feeder.
- 4) Open the multi-purpose tray of the printer, remove the envelope entrance cover, and open the envelope feeder gear cover.
- 5) Holding the envelope feeder with both hands, install it into the printer.

5. Duplexing unit

- 1) Open the duplexing unit packaging.
- 2) Take off the plastic bag and peel the tape off. Confirm that none of the covers were scratched or deformed during shipment.
- 3) Remove the packing materials from the duplexing unit.
- 4) Remove the 2 duplexing unit slot covers from the printer.
- 5) Holding the duplexing unit with both hands, install in into the printer.

6. Operation confirmation

- 1) Load paper in the cassette.
- 2) Plug the power cord into the printer and outlet, and turn the power switch ON. Be sure to use the enclosed power cord.
- 3) After the printer enters the STANDBY mode, press the test print switch to make a test print. Check if the density of the output image is correct.
- 4) Keep clean around the printer and ensure that it is ready for use at anytime.

D. Storing, Handling the EP-52 Cartridge

Whether the cartridge is still sealed in its box or installed in the printer, the effect of the natural environment will change it over time regardless of the number of prints. As the progression of this natural change depends on the storage or installation environment, take sufficient care in storing and handling the cartridges.

a. Before unsealing the box

When the cartridge is stored in a warehouse, workshop, etc., be sure to keep it within the ranges shown in Table 1-5-1. Note the following points:

- 1) Avoid locations in direct sunlight.
- 2) Do not leave in areas exposed to strong vibration.
- 3) Do not bump or drop.

Table 1-5-1 Environmental conditions

Temperature	Normal (total storage time × 9/10)		0 to 35°C
	Severe (total storage time × 1/10)	High	35 to 40°C
		Low	-20 to 0°C
Temperature change (within 3 minutes or so)			40°C→15°C -20°C→25°C
Relative humidity	Normal (total storage time × 9/10)		35 to 85% RH
	Severe (total storage time 1/10)	High	85 to 95% RH
		Low	10 to 35% RH
Air pressure			345 to 1013 hPa (460 to 760 mmHg)

Note: Total storage time is the valid time span following the manufacture date displayed on the cartridge box.

b. Storing unsealed parts

As an organic photoconductor (OPC) is used in the photosensitive drum, it will deteriorate if exposed to strong light. As there is also toner in the cartridge, be sure to explain to the customer the need to be careful in handling and storing unsealed cartridges.

1. Storage environment

- 1) Be sure to store in the protective bag.
- 2) Avoid locations exposed to direct sunlight, near windows, etc. Do not leave the cartridge in cars for any extended period of time as heat can damage it.
- 3) Avoid high, low, and changeable temperature/humidity locations.
- 4) Avoid sites with corrosive gases (pesticides) or salt in the air.
- 5) Store the cartridge within a range of 0 to 35°C.
- 6) Do not place the cartridge near CRT displays, disk drives, or floppy disks.
- 7) Store the cartridges out of reach of children.

2. Effective life

Cartridges are effective for 2.5 years following the date of manufacture, which is displayed in an abbreviated form on the cartridge. The cartridge life span is also displayed (month and year) on the cartridge box as 2.5 years from the date of manufacture. Cartridges should be used within their life spans, as image quality will deteriorate after the expiry date.

c. Handling

- 1) When loading a new cartridge into the printer, or when blank spots appear on output images due to uneven distribution of the toner during use, hold the cartridge at each end as shown in the figure below. Slowly rock it 5 to 6 times at a 45-degree angle to evenly distribute the toner, and reload it into the printer. Do not shake the cartridge in any other ways, as toner may leak from the developing cylinder or the cleaning unit.

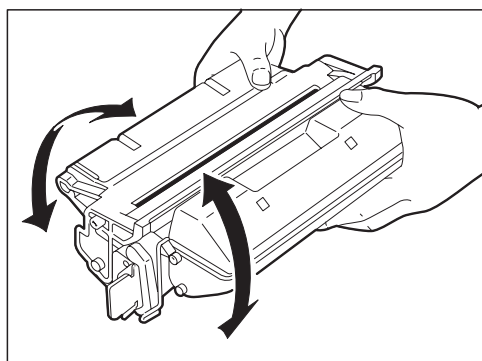


Figure 1-5-2

- After loading the cartridge in the printer, print 3 to 5 sheets of test patterns and check for toner leakage to prevent output image from dirt.
- 2) Remove the cartridge from the printer before transporting it. During transportation, the cartridge must be kept in the protective bag or thick cloth to prevent direct exposure to light.
 - 3) Avoid placing the cartridge near CRT displays, disk drives or floppy disks, as the magnetism generated by the cartridge may destroy the data.
 - 4) As the photosensitive drum is sensitive to strong light, do not expose the cartridge to direct sunlight or strong light. If it is exposed to strong light, blank spots or black lines may appear on images. In such cases, stop the printer for a while. However, these problems may still remain if the drum has been exposed to strong light for an extended period of time.
 - 5) Do not open the photosensitive drum protective shutter by hand nor touch the drum surface. Do not clean the drum.
 - 6) Do not stand the cartridge nor upside down. Always place it so that the label side faces upward.
 - 7) Do not disassemble the cartridge.

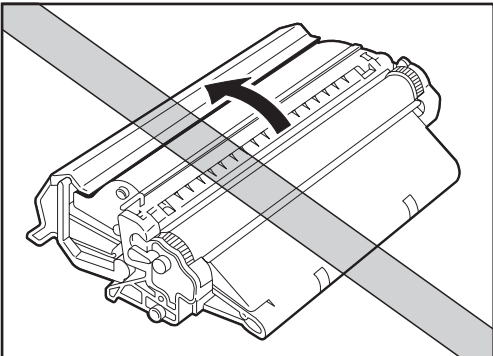
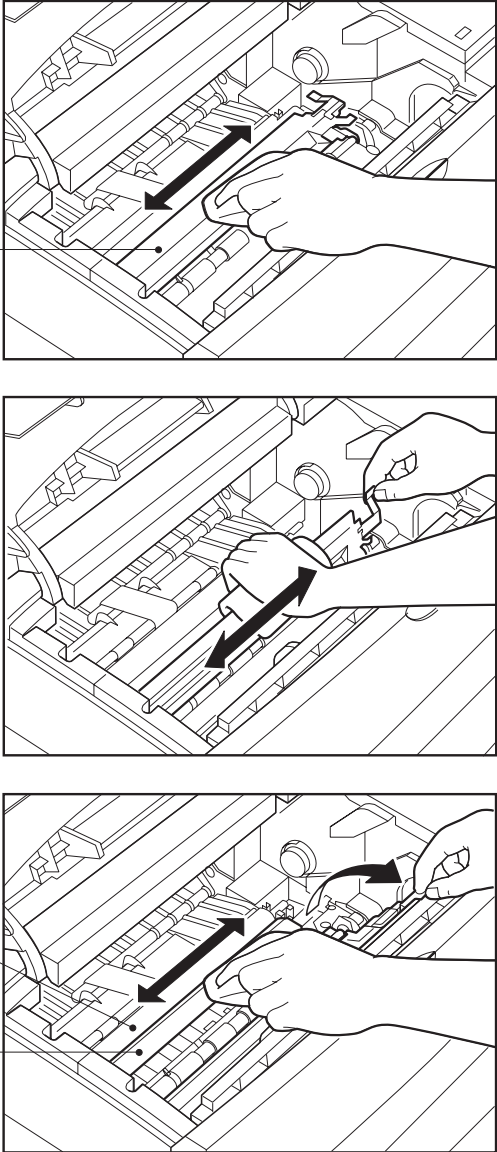


Figure 1-5-3

VI. MAINTENANCE AND SERVICING BY THE CUSTOMER

Table 1-6-1 shows the maintenance the customer should conduct to ensure optimum machine performance at all times.

Table 1-6-1

Item	Customer maintenance
Cartridge	Rock the cartridge or replace it, if necessary.
Transfer guide	<p>Clean the transfer guide when replacing the cartridge.</p>  <p>The diagrams illustrate the cleaning process for three components: <ul style="list-style-type: none"> Upper transfer guide: A hand is shown moving a brush back and forth across the upper guide, as indicated by a double-headed arrow. Transfer charging roller: A hand is shown cleaning the roller with a brush, also indicated by a double-headed arrow. Lower transfer guide: A hand is shown cleaning the lower guide with a brush, indicated by a double-headed arrow. </p>

VII. OPERATION

A. The Operation Panel

The operation panel is used to perform basic printer operations, make printer configuration changes that software applications cannot control, identify available typefaces, and check the status of the printer.

The operation panel consists of the status indication display, three indicator lights, and six menu and operation keys.

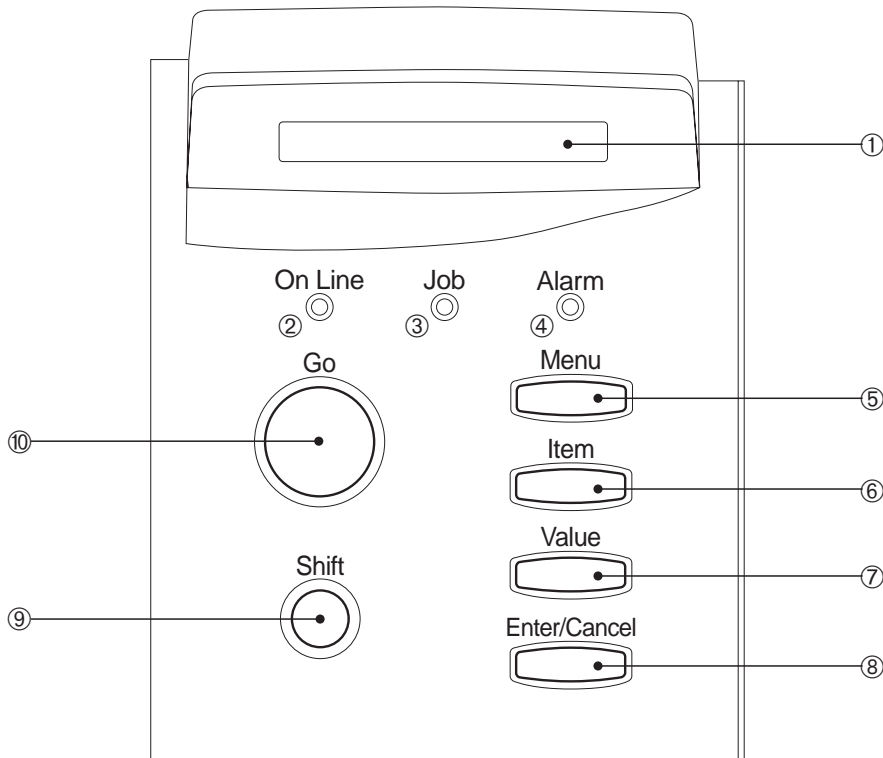


Figure 1-7-1

- **Status indication display (2-line, 16-segment LCD): 1**
Indicates the printer status and menu setting, and displays messages.
- **On Line indicator: 2**
ON:
The printer is on-line.
Blinking:
The printer is processing or printing.
OFF:
The printer is off-line.
- **Job indicator: 3**
ON:
A page buffer has been composed and is currently stored in printer memory.
Blinking:

The printer is processing a print job.

OFF:

There is no data stored in printer memory.

- **Alarm indicator: 4**

ON:

An error has occurred and printing has stop.

OFF:

Operation in normal and there is no error.

- **Menu key: 5**

With the printer off-line, press the Menu key to scroll through the menu names and return to the first menu name. To scroll back through the menu names in the opposite direction, press the Shift and Menu keys.

Depending on what options have been installed, some menu names may not appear.

- **Item key: 6**

With a menu name displayed, press the Item key to scroll through all the items on the menu and return to the first item. To scroll back through the items in the opposite direction, press the Shift and Item keys.

Depending on what options you have installed, some items may not appear.

- **Value key: 7**

With an item name displayed, press Value to step through the item's values. Press Shift and Value keys to step through the values in reverse order. Some items have a large range of numbers from which to choose a value.

- **Enter/Cancel key: 8**

Save a value you selected for an item in the menu. An asterisk (*) marks the value designated as the current default.

Press Shift and Enter/Cancel keys to exit the current mode and access the RESET MENU. Choose RESET=PRINTER and press Enter to clear all resources in the printer memory but leave the menu settings unaffected. If there are other jobs in the print que, these will be printed after the printer has been reset. If you choose RESET=MENU the factory default values are restored for most menu items.

- **Shift key: 9**

Press the Shift and another key to access the alternate function. Allows you to execute the alternate function of dual function keys. The two functions on the dual function keys are separated by a slash in the key name on the control panel.

- **Go: 10**

Takes the printer off-line and back on-line. When the On Line indicator is on, the printer is ready to receive data and print. When the On Line indicator is off, the printer is off-line and the other keys on the operation panel can be used to view and change settings.

Resumes printing after the printer display a message and stops printing. For most situations, after you press Go key, the message clears and printing resumes.

To perform a form feed and print any date remaining in the form printer, press Go twice in succession.

To reset the printer settings to their default values, hold down this key while turning ON the printer. This resets all setting except the PAGE COUNT field on the TEST PRINT page.

B. Operation Panel Menus

You can access the following menus through the operation panel:

- PCL MENU
- FEEDER MENU
- CONFIG MENU
- MEMCONFIG MENU
- PARALLEL MENU
- ETHERNET MENU
- TOKEN RING MENU
- TEST MENU
- LANGUAGE MENU
- RESET MENU

1. Accessing and selecting menu items

Follow these steps to access the menus and make selections:

- 1) Check the operation panel and be sure the Job indicator is OFF.
- 2) Press the Go key to set the printer off-line. The On Line indicator goes OFF and PAUSED is displayed in the top line.
- 3) Press the Menu key to display the name of the first menu. Press the Menu key until you see the menu.
- 4) Press the Item key to display the name of the first item on the menu. Press the Item key until you see the item.
- 5) Press the Value key until you display the values you want to change.
- 6) If you want to change the setting, press the Value key until the value you want is displayed. Then press the Enter key.
- 7) Press the Go key to set the printer on-line.

Figure 1-7-2 list the Menu Operation Flow.

2. Confirming menu selections

There are two ways the selections made through the operation panel can be reviewed:

- Scroll through the menu items to check all selections marked with an asterisk.
- Make a Test Print. The printed output lists all settings that are in effect. See the Printing the Test Print section for more information.

3. Restoring the default settings

Types of default settings are as follows:

- Factory default settings are those set for each menu item at the factory. The printer uses these settings changed.
- Temporary default settings are those set by the application software for the current print job.
- Permanent default settings are those set through the operation panel. These selections remain in effect even when the printer is turned OFF, or send a different request through the application.

4. Resetting the default values

The printer can be reset in three ways:

- The reset printer function (RESET=PRINTER) clears the memory of all fonts, macros or page information and does not affect the menu settings.
- The reset menu function (RESET=MENU) clears the memory of all fonts, macros, and page information and restores most of the menu settings to their factory defaults.
- A cold reset clears the memory and restores all menu settings to their factory default settings, with the exception of the page count value.

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Menus Operation Flow

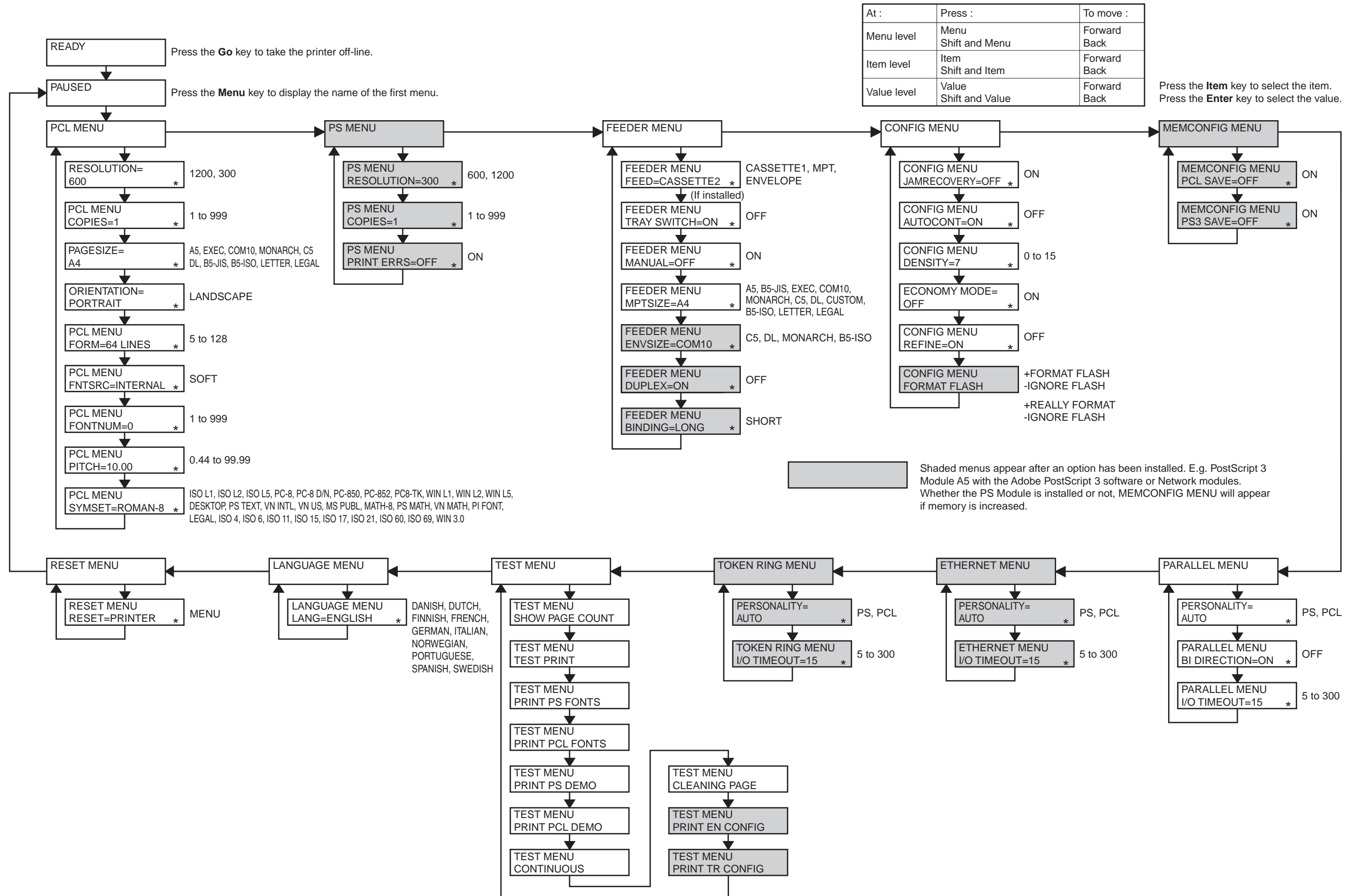





Figure 1-7-2

CHAPTER 2

OPERATION AND TIMING

1. This chapter describes the printer functions, the relationships between mechanisms and circuits, and the timing of operations. Mechanical linkages are indicated by black and white lines (), the flow of control signals by solid arrows (), and the flow of groups of signals by outline arrows ().
2. An active-high signal is indicated by "H" or by a signal name without a slash in front of it, such as "PSNS." An active-low signal is indicated by "L" or by a signal name with a slash in front of, such as "/SCNON."

A signal that is "H" or has a name without a slash is active at the supply voltage level (indicating that the signal is being output), and inactive at ground level (indicating that the signal is not being output).

A signal that is "L" or has a slash in front of its name is active at ground level, and inactive at the supply voltage level.

There is a microcomputer in this printer. But as the internal operation of the microcomputer cannot be checked, an explanation of the operation of the microcomputer has been left out.

As it is assumed that no repair will be made to customer circuit boards, the explanation of board circuits is limited to an outline using block diagrams. So there are two types of circuit explanations; (1) everything from the sensor to the input sections of the major circuit boards, (2) everything from the output sections of the major circuit boards to the loads. These are explained with block diagrams according to the function.

I. BASIC OPERATION.....	2-1	VI. VIDEO CONTROL SYSTEM.....	2-50
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V. PICK-UP/FEED SYSTEM.....	2-38		

I. BASIC OPERATION

A. Functions

Printer functions can be divided into five groups: the engine control system, laser/scanner system, the image formation system, paper pick-up/feed system, and the video control system.

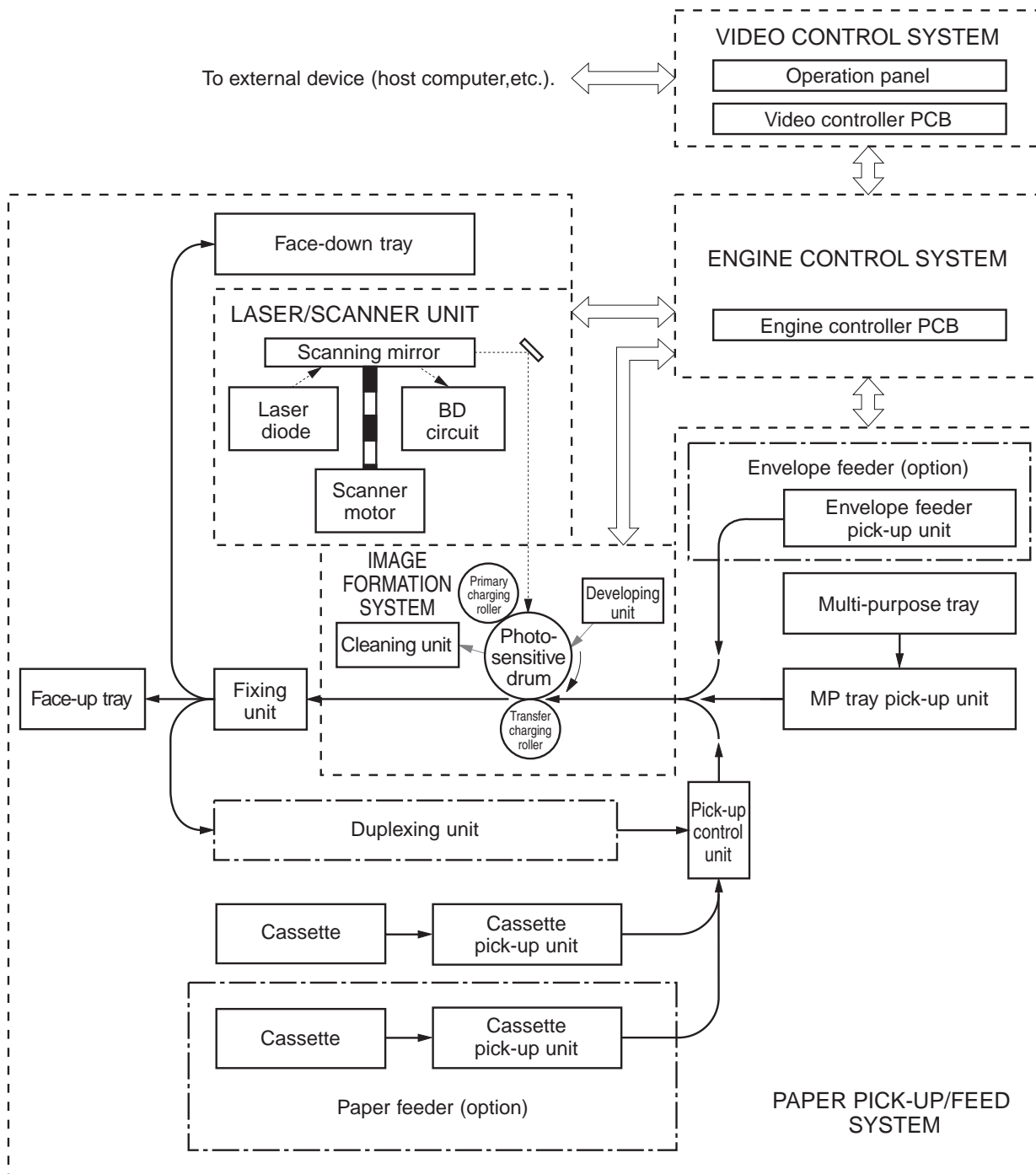


Figure 2-1-1

B. Basic Operation Sequences

The operation sequences of this printer are controlled by the microprocessor on the engine controller PCB. The purposes of periods from power ON until the main motor stops after the completion of printing are described below. See the appendix for timing chart.

Table 2-1-1

Periods		Purposes	Remarks
WAIT (WAIT period)	From power ON until the main motor completes the initial drive.	Clears the drum surface potential and cleans the transfer charging roller.	During this period, the printer checks the toner level and whether the cartridge is installed or not.
STBY (STANDBY)	From the end of the WAIT period until the /PRNT signal is input from the video controller, or from the end of the LSTR period until the /PRNT signal is input from the video controller or until the power is switched OFF.	Maintains printer in ready mode.	
INTR (INITIAL ROTATION period)	After the /PRNT signal is input from the video controller until the engine controller outputs the /TOP signal.	Stabilizes the sensitivity of the photosensitive drum in preparation for printing.	
PRINT (Print)	From the end of the INTR period until the top of page sensor detects the trailing edge of the paper.	Forms an image on the photosensitive drum according to the /VDO signal input from the video controller, and transfers the image to paper.	During this period, the printer checks the toner level.
LSTR (LAST ROTATION period)	After the primary DC voltage turns OFF until the main motor stops.	Delivers the final page and cleans the transfer charging roller.	As soon as the /PRNT signal is input from the video controller, the printer enters the INITIAL ROTATION period.

C. Power ON Sequence

The sequence from power ON until the engine controller enters the STBY mode is shown below.

- 1) Power ON
- 2) CPU initialization
- 3) Fan motor drive
- 4) Pick-up unit configuration detection
- 5) Video interface communication start
Outputs /PPRDY signal. When /CPRDY signal becomes "L," the engine controller stands by for the video interface communication.
- 6) Initial drive of main motor
Detects the paper detection condition of each sensor in the printer when the main motor starts, and assesses a paper jam if residual paper is detected.
- 7) High-voltage control
Checks whether there is cartridge or not and the toner level, and cleans the transfer charging roller after the developing AC bias is turned ON.
- 8) Failure/abnormality check
In this period, the printer checks for door open, emergency stop command (EC18) reception condition, fan motor failure, main motor failure, and fixing unit failure as required.
- 9) Residual paper check in the printer.
Turns ON the feed roller clutch and starts the detection of the residual paper in the printer again when the main motor becomes ready. When residual paper is detected, the engine controller detects the jam, waits for automatic delivery command (EC19) or delivers the residual paper automatically according to the situation.

II. ENGINE CONTROL SYSTEM

A. Engine Controller PCB

1. Outline

The operation sequences of this printer are controlled by the CPU of this circuit. When the power switch of the printer is turned ON and the printer enters the STANDBY mode, the CPU outputs the signals to drive the loads such as laser diode, motors, and solenoids, based on the print commands and the image data input from the external device.

Figure 2-2-1 shows the block diagram of this circuit.

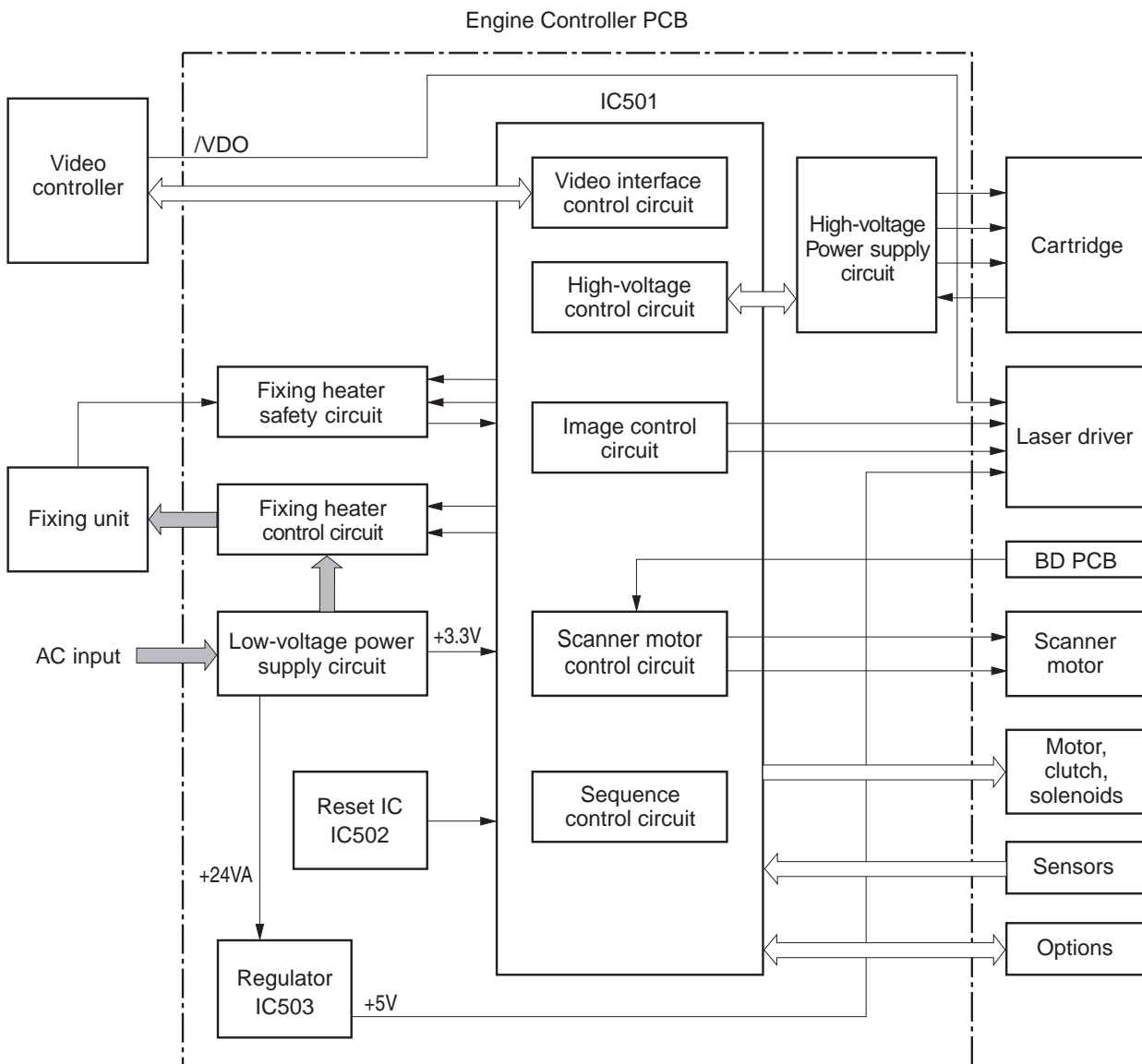


Figure 2-2-1

2. Operation of each block**a. CPU (IC501)**

The CPU is a 8-bit 1-chip microprocessor. It is a 1-chip type CPU with built-in ROM and RAM. According to the control programs stored in the ROM, it controls the following operations of the printer.

- 1) Printer sequences
- 2) Video interface
- 3) High-voltage power supply circuit
- 4) Laser/scanner
- 5) Sensors
- 6) Loads such as motor, clutch and solenoids
- 7) Communication with options

b. Reset IC (IC502)

IC502 monitors +3.3V and resets the CPU when the power ON.

c. Regulator (IC503)

IC503 generates +5V from +24V supplied from the low-voltage power supply circuit. This +5V is supplied to the laser driver and video controller.

d. Fixing heater control circuit/fixing heater safety circuit

See "B. Fixing Control" in this chapter for details.

e. High-voltage power supply circuit

See "C. High-Voltage Power Supply Circuit" in this chapter for details.

f. Low-voltage power supply circuit

See "D. Low-Voltage Power Supply Circuit" in this chapter for details.

3. Engine controller inputs/outputs

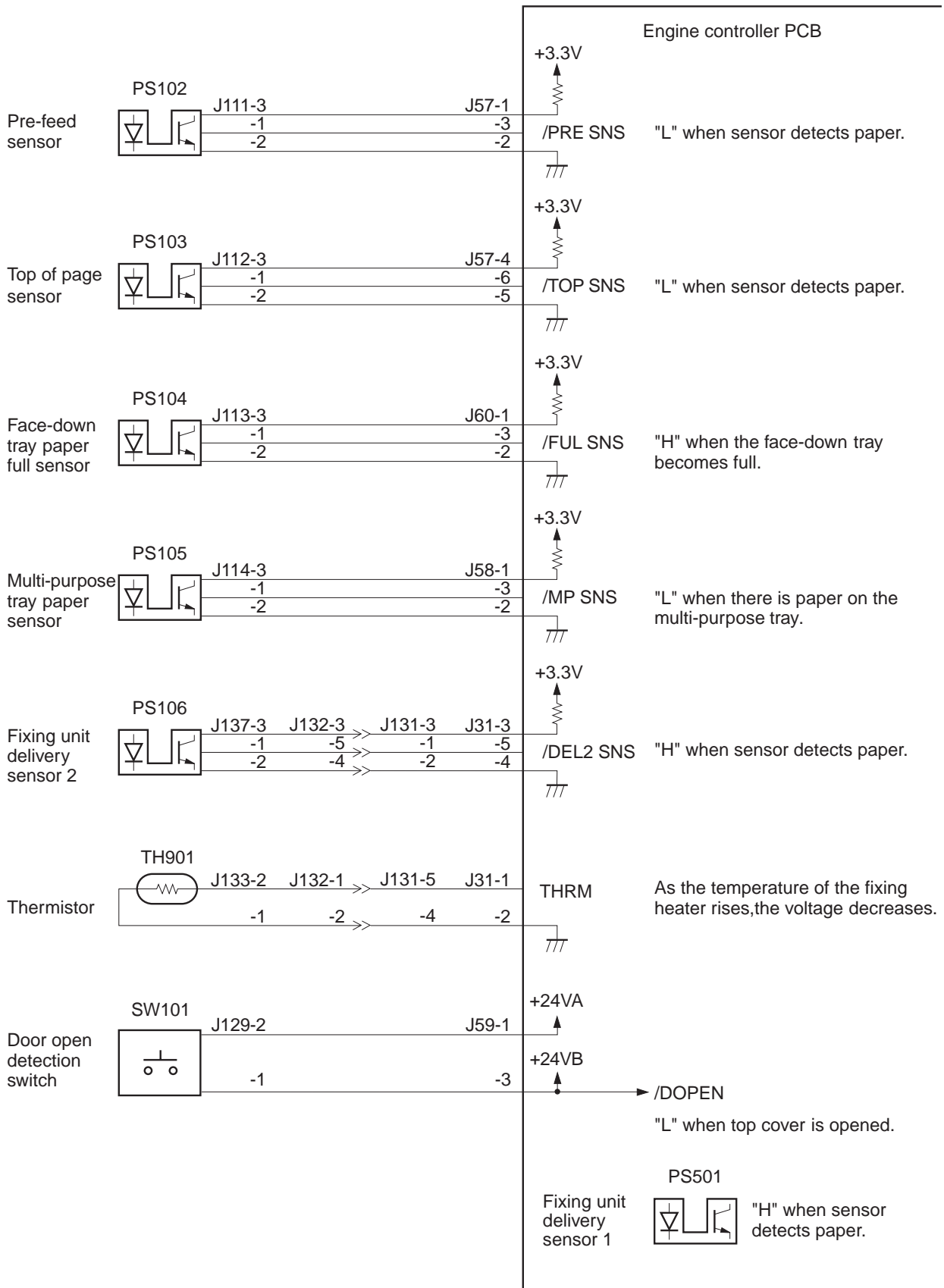


Figure 2-2-2

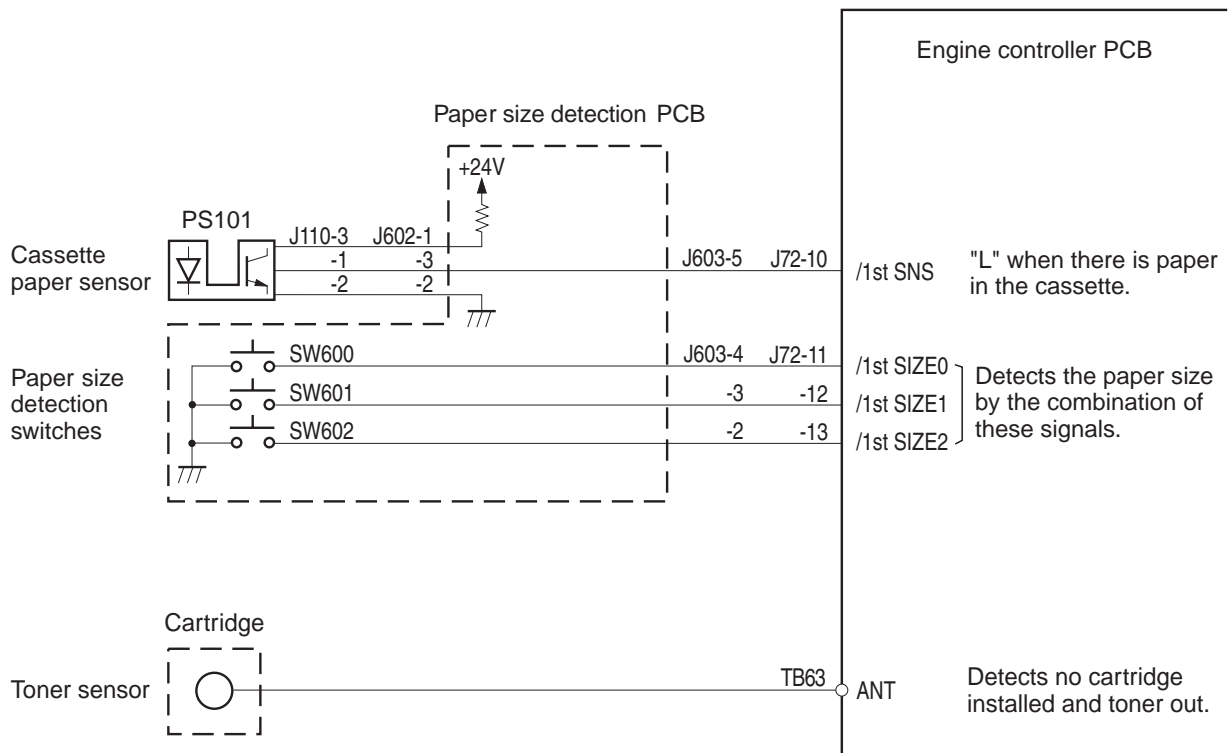


Figure 2-2-3

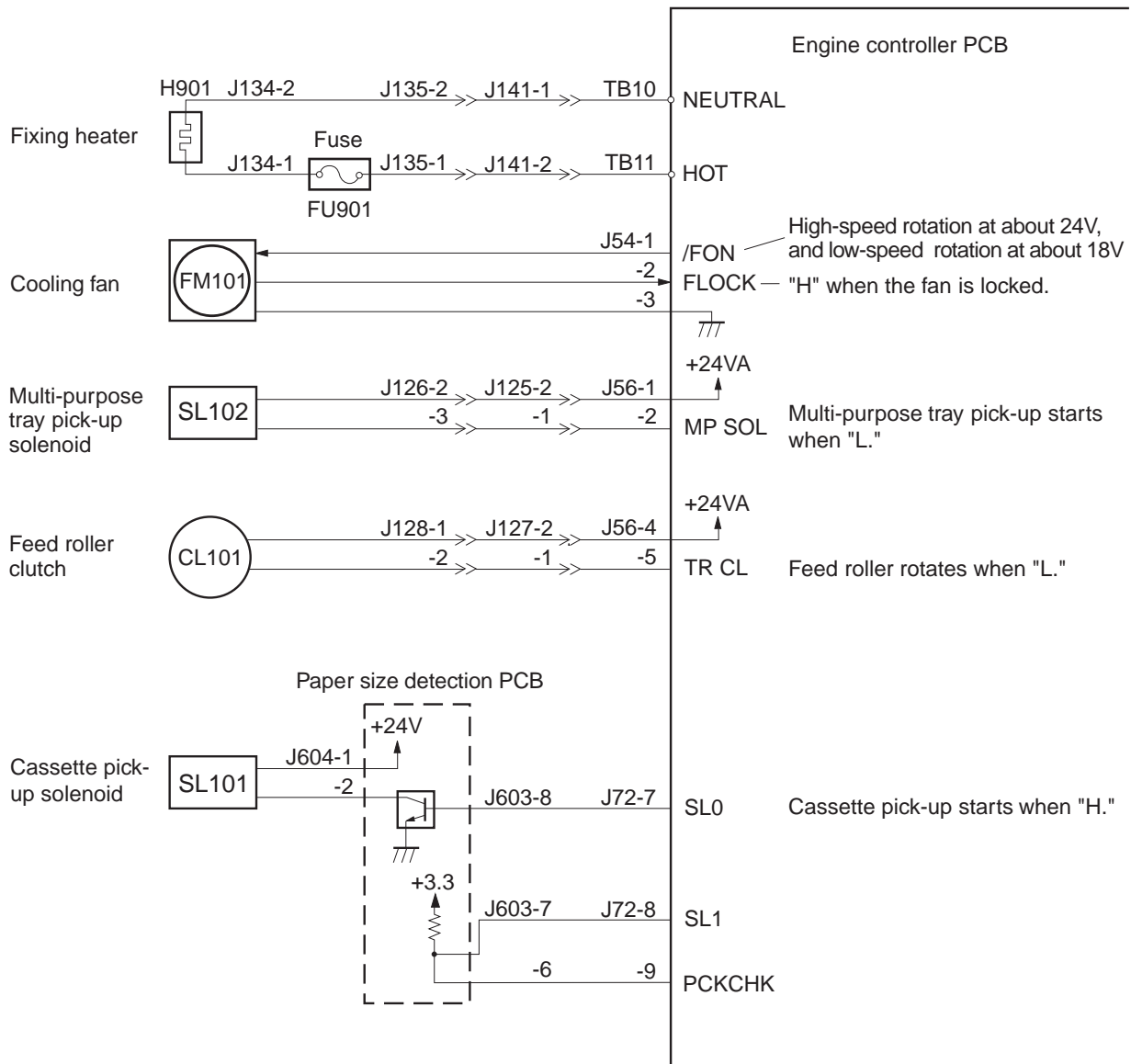


Figure 2-2-4

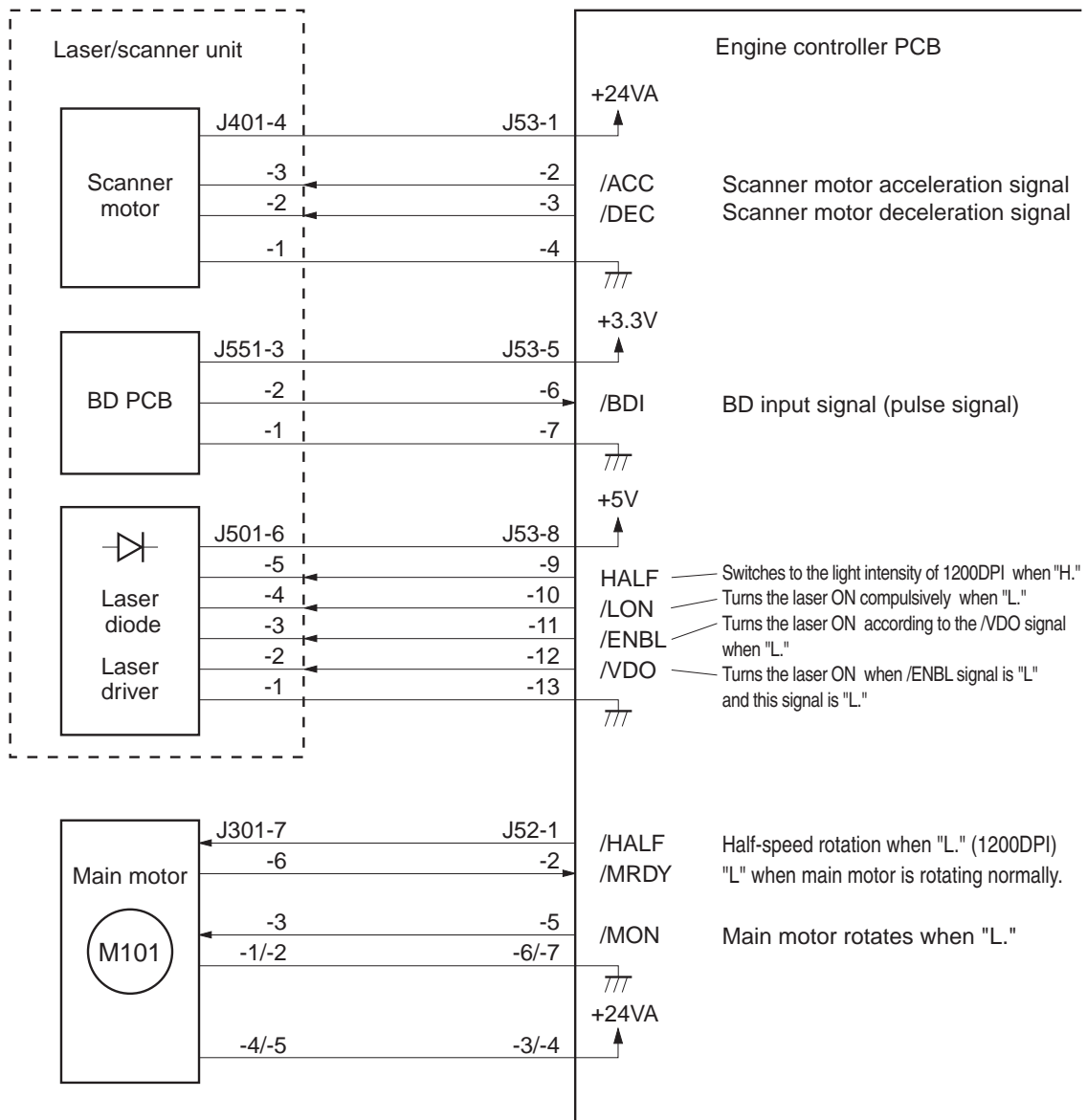


Figure 2-2-5

B. Fixing Control

1. Fixing temperature control

The fixing film unit contains a fixing heater of a flat stick shape, which heats the fixing film.

The temperature of the fixing heater is detected by the thermistor (TH901) on the fixing heater. When the surface temperature rises, the resistance of TH901 drops and the voltage of the FIXING HEATER TEMPERATURE DETECTION signal (FSRTH) drops.

Based on the voltage of this FSRTH signal, the CPU (IC501) on the engine controller controls the FIXING HEATER DRIVE signal (FSRDO) so that the fixing heater temperature becomes the specified value.

This FSRDO signal is generated based on the ZERO-CROSS signal (/ZEROX) output from the heater control circuit.

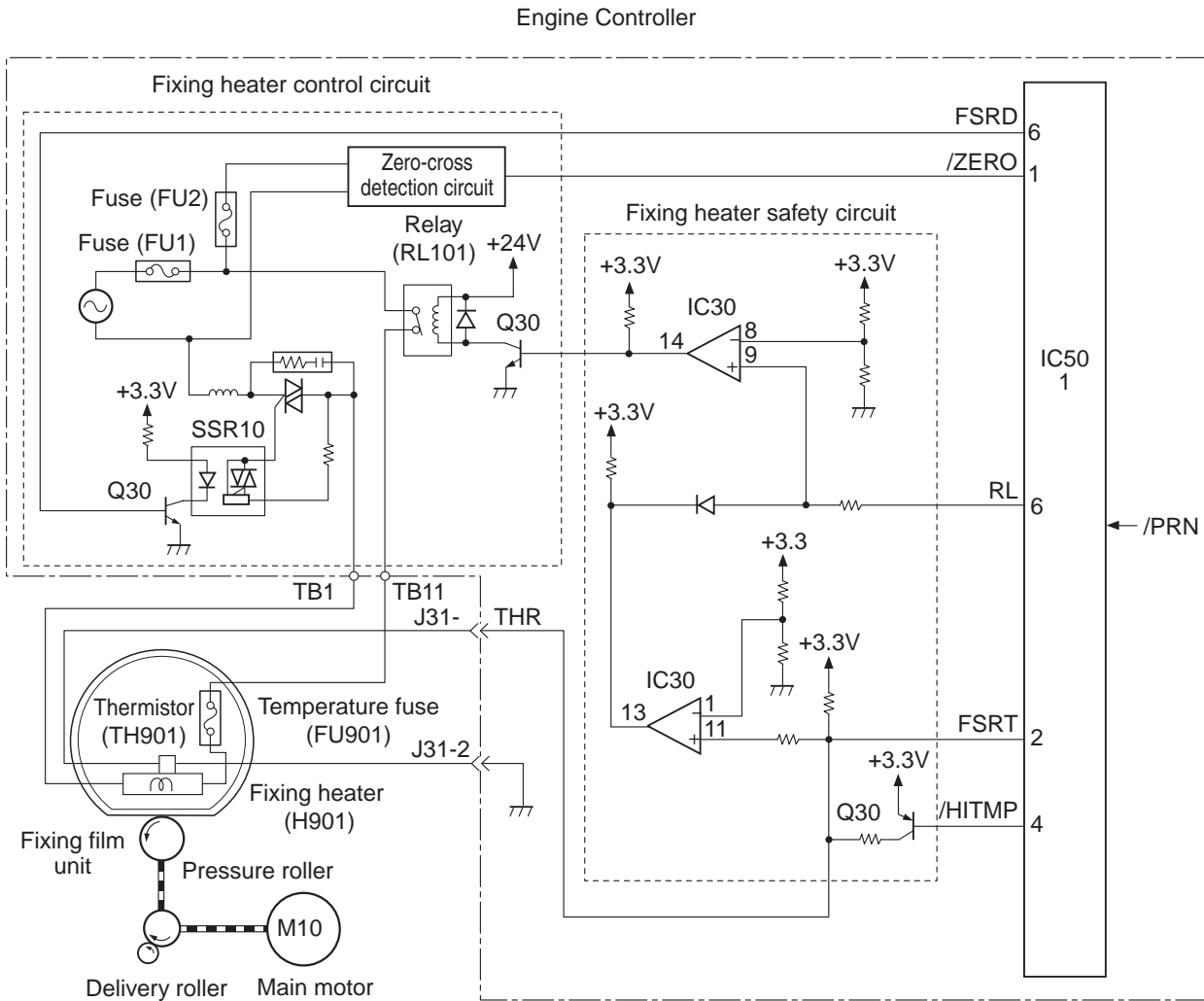


Figure 2-2-6

The printer does not supply power to the fixing heater in the STANDBY mode.

The CPU detects the temperature of thermistor based on the FSRTH signal when the /PRNT signal is input and right before the main motor is driven. If it is below the specified temperature, at the same time as the main motor rotation reaches the specified speed, the CPU rises the temperature to the specified value. The CPU sets the THERMISTOR SWITCHING signal (/HITMP) to “H” to change the sensitivity of the thermistor.

The printer sets the /HITMP signal to “H” when the temperature of the fixing heater is low (during warm-up) and to “L” when the temperature is high (normal temperature control), in order to increase the detection precision of the FSRTH.

The CPU starts controlling the temperature of the fixing heater to achieve the specified print temperature when the /TOP signal is output.

The target fixing temperature is set based on the following five conditions, and the temperature is controlled.

1. Initial temperature detected by the thermistor at the time of fixing unit warm-up
2. Print intervals (first print/intermittent print/continuous print)
3. Print paper size (A4, Letter, Legal/Other sizes)
4. Resolution (600DPI/1200DPI)
5. Print mode (See Note) (normal mode/rough paper mode/OHT mode/universal mode)

The print paper size, resolution and print modes have the correlations as shown in the table below.

Table 2-2-1

Resolution Paper size	600DPI	1200DPI
A4/Letter/Legal	Normal mode	Normal mode
	Rough paper mode	Rough paper mode
	OHT mode	
Other Sizes	Universal mode	Universal mode

When printing at 600DPI, target fixing temperature is higher compared to printing at 1200DPI as the feed speed is doubled. When printing in the universal mode at 600DPI, the throughput is decreased if more than the specified number of sheets are fed continuously. This prevents elevation of temperature caused by feeding of small size paper at the edges of the fixing unit.

Note: There are four print modes: normal mode, rough paper mode, OHT mode, and universal mode. The fuseability is improved when the rough paper mode uses Bond paper (90g/m²) and when the OHT mode uses OHT.

The engine controller judges the paper size based on the paper size information from the paper size detection switches when paper is picked up from the cassette, and from the video controller in case of multi-purpose tray pick-up. When the paper size is A4, Letter or Legal, normal mode, rough paper mode, and OHT mode are selectable as the fixing mode based on the command from the controller. When other paper sizes are used, the universal mode is selected automatically, and other modes cannot be selected.

2. Fixing heater safety circuit

This circuit is located on the engine controller PCB, and constantly monitors the abnormal rise of fixing temperature.

In case of abnormality, the output from this circuit turns OFF the relay (RL101) and interrupts the power to the fixing heater. The operations of this circuit are shown below.

If the output voltage from the thermistor becomes more than about 1.2V (240°C) due to temperature rise of the fixing heater, the output of No.13 pin of the comparator (IC301) becomes "L."

When No.14 pin becomes "L" and Q302 is turned OFF, the relay (RL101) is turned OFF.

3. Protective functions

To prevent the excursion of the fixing heater, the printer has the following three protective functions:

- The CPU monitors the voltage of TH901. If it is abnormal, the CPU assesses a fixing heater failure and turns OFF the relay (RL101). At the same time, it reports the fixing heater failure to the video controller.
- If the temperature of the fixing heater rises abnormally and the voltage of TH901 falls below about 1.2V (240°C), the fixing heater safety circuit interrupts the power to the fixing heater, regardless of CPU outputs.
- If the temperature of the fixing heater rises abnormally and the temperature of the thermal fuse exceeds about 230°C, the temperature fuse melts, which interrupts the power to the fixing heater.

4. Fixing unit failure detection

The CPU assesses a fixing unit failure in case of the conditions (a~d) shown below, and does the following:

- 1) Interrupts the power to the fixing heater.
- 2) Sets the RELAY DRIVE signal (RLD) to "L" and turns OFF the relay (RL101), as well as reporting the failure to the video controller.

a. Detection circuit failure

The printer detects the power supply frequency and voltage when the fixing heater is ON.

If the power supply cycle (about 30Hz ~ about 80Hz) is not detected within one second after power supply frequency detection starts, the CPU assesses a detection circuit failure.

b. Thermistor broken wire detection

The CPU detects thermistor broken wire in the following cases, and assesses warm-up error or abnormally low temperature.

- 1) The thermistor, in the low-temperature detection mode, does not exceed about 20°C within about 0.7 seconds after the heater is turned ON.
- 2) The thermistor, in the high-temperature detection mode, does not exceed about 50°C within about 5.0 seconds after the heater is turned ON.
- 3) The thermistor, in the high-temperature detection mode, detects over about 50°C after the heater is turned ON. Then the output voltage from the thermistor is more than about 3.4V for more than about 100ms continuously.

c. Heater broken wire detection

The CPU detects heater broken wire in the following cases and assesses warm-up error or abnormally low temperature.

- 1) The thermistor, in the low-temperature detection mode, does not rise +10°C from the initial temperature within about 2.5 seconds after the heater is turned ON.
- 2) The thermistor, in the low-temperature detection mode, does not rise +20°C from the initial temperature within about 2.5 seconds after rising +10°C from the initial temperature since the heater is turned ON.
- 3) The thermistor, in the high temperature detection mode, does not exceed about 160°C within about 20 seconds after rising +20°C from the initial temperature since the heater is turned ON.
- 4) When the thermistor is in the high temperature detection mode and the initial temperature is 85°C or below, the temperature does not exceed about 160°C within about 20 seconds after the heater is turned ON.
- 5) When the thermistor is in the high temperature detection mode and the initial temperature is 85°C or more, it does not exceed about 160°C (about 140°C in case of 1200DPI) within about 6 seconds after the heater is turned ON.
- 6) During print temperature control, the condition of below about 150°C (about 130°C in case of 1200DPI) lasts for more than about 1 second continuously.

d. Abnormally high temperature detection

The CPU assesses abnormally high temperature detection if the thermistor in the high temperature detection mode detects over about 220°C for more than about 100ms continuously, regardless of the heater operation condition.

C. High-Voltage Power Supply Circuit

1. Outline

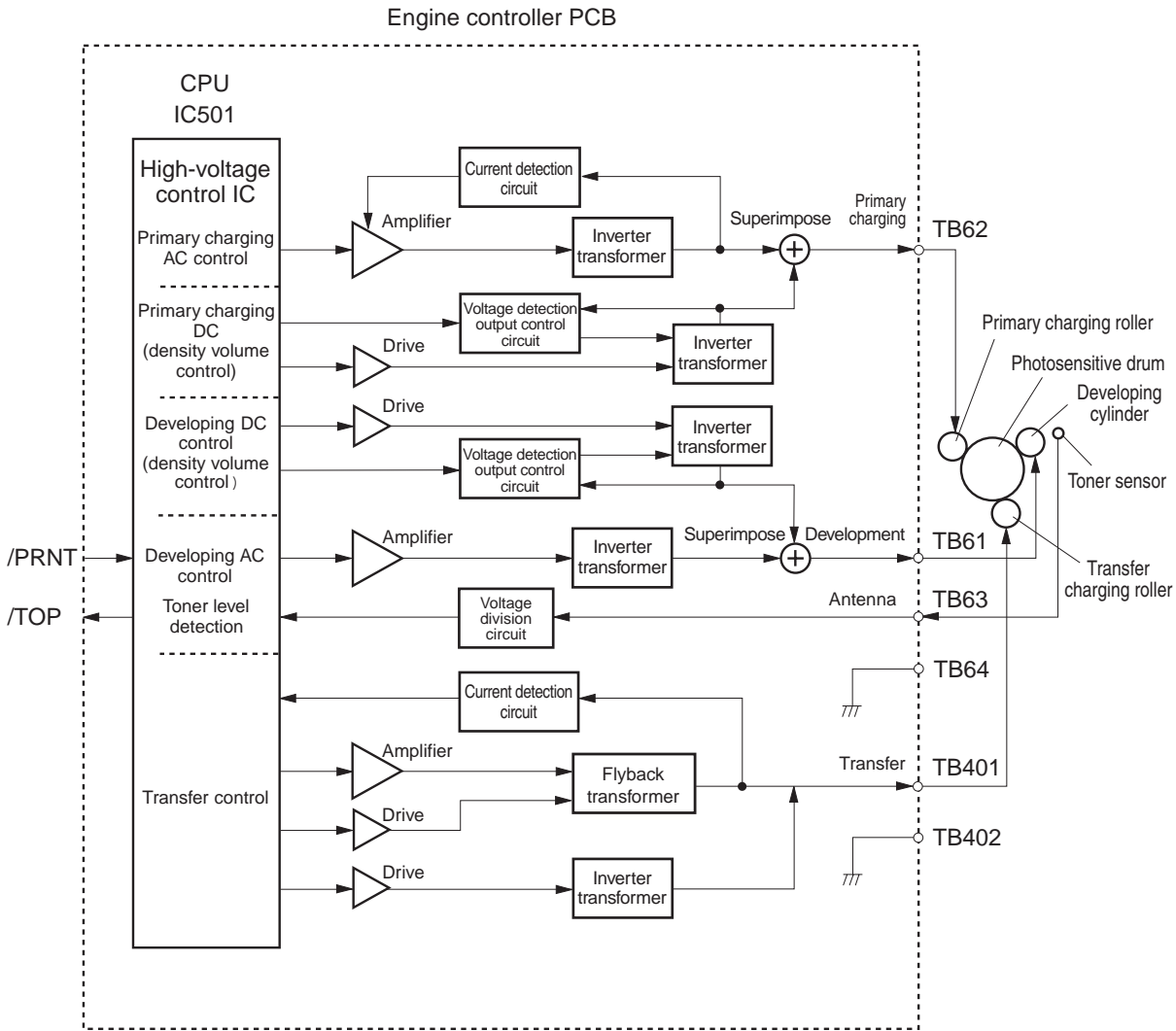


Figure 2-2-7

In response to the instructions from the microprocessor (CPU: IC1501) on the engine controller, this circuit applies the superimposed voltage of DC voltage and AC voltage to the primary charging roller and developing cylinder, and a positive or negative DC voltage to the transfer charging roller.

According to the image density information sent from the video controller, this circuit varies the primary DC bias and developing DC bias to adjust the image density.

2. Operation

a. Primary charging roller voltage generation

When the /PRNT signal sent from the video controller becomes “L,” initial rotation starts and the CPU outputs the PRIMARY AC BIAS FREQUENCY OUTPUT signal. The circuit then applies the primary AC bias to the primary charging roller. When the PRIMARY DC BIAS FREQUENCY OUTPUT signal is output after the specified period of time, the voltage superimposing primary DC bias onto primary AC bias is applied to the primary charging roller.

The primary DC bias changes with the developing DC bias according to the IMAGE DENSITY ADJUSTMENT signal sent from the CPU.

b. Developing bias generation

When the DEVELOPING DC BIAS FREQUENCY OUTPUT signal is output from the CPU, the circuit applies the developing DC bias to the developing cylinder.

Then, the CPU outputs the DEVELOPING AC BIAS FREQUENCY OUTPUT signal at the timing of image formation, and applies developing AC bias to the developing cylinder. Following that, the circuit applies superimposed voltage of developing AC bias onto developing DC bias to the developing cylinder.

The developing DC bias changes according to the IMAGE DENSITY ADJUSTMENT signal output from the CPU, and adjusts the image density.

c. Transfer charging roller voltage generation

The negative, between-page, or print bias is applied to the transfer charging roller according to the print sequence.

The negative bias (voltage negative) is applied to the transfer charging roller at an appropriate timing to move the toner attached to the transfer charging roller onto the photosensitive drum to clean the roller.

The between-page bias (positive low voltage) is applied to the transfer charging roller at an appropriate timing so that the residual toner on the photosensitive drum is not attracted to the transfer charging roller.

The print bias (positive voltage) is applied to the transfer charging roller in order to transfer the toner on the photosensitive drum surface to the paper.

When the /PRNT signal sent from the video controller becomes "L," initial rotation starts and negative bias is applied to the roller for a certain period of time to clean the transfer charging roller. Between-page bias is then applied, and print bias is applied to the transfer charging roller after the prescribed time has elapsed after the CPU outputs the /TOP signal.

A print bias is applied during the print sequence to transfer the toner onto the paper. A between-page bias is applied between pages.

After the completion of printing, a between-page bias and a negative bias are applied again to clean the transfer charging roller.

d. Toner level detection/cartridge detection

The EP-52 cartridge has a toner sensor.

The circuit compares the output value of the developing AC bias and the output value (ANT) from the antenna inside the cartridge, and outputs the TONER DETECTION signal.

The CPU detects the toner level and whether the cartridge is installed or not when the developing AC bias is applied to the developing cylinder. The toner level is always detected when the developing AC bias is applied, and the cartridge is detected only when the developing AC bias is applied during the initial rotation.

D. Low-Voltage Power Supply Circuit

1. Outline

AC power is supplied to the low-voltage power supply circuit in the engine controller when the power switch (SW101) is turned ON. The low-voltage power supply circuit supplies +24VDC and +3.3VDC required for the printer.

+24VDC is supplied to drive the main motor, scanner motor, and fan and to the high-voltage power supply. +3.3VDC is used for the sensors and ICs on the engine controller PCB. +24VDC is divided into, +24VA, which is normally supplied from the low-voltage power circuit and, +24VB, which is interrupted when the door switch (SW101) is turned OFF by opening the upper cover.

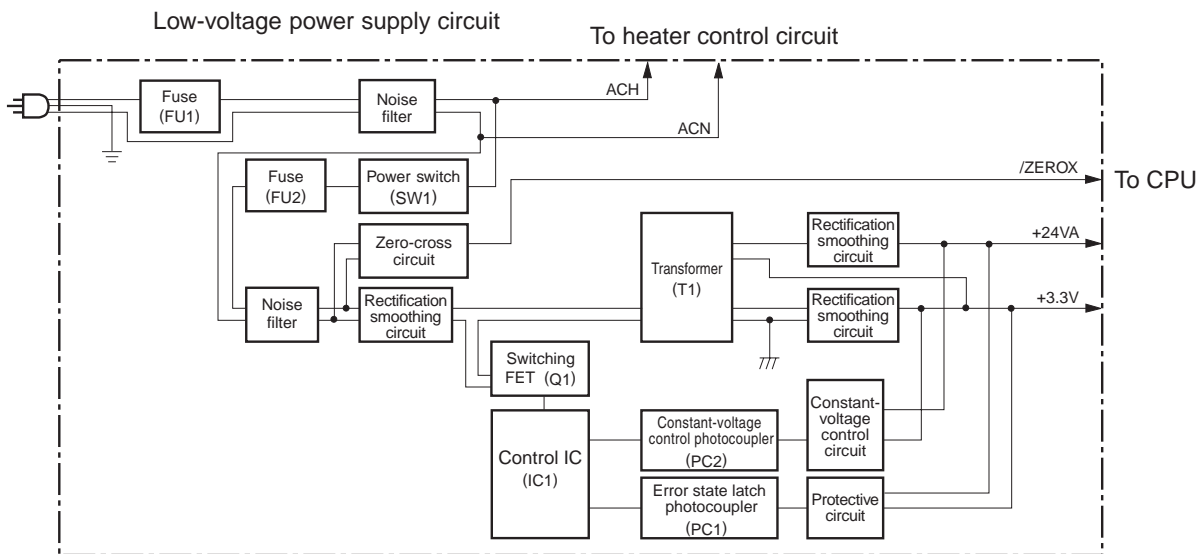


Figure 2-2-8

2. Protective functions

If a shortcircuit or other problems on the load side cause an excessive current flow from the +24VDC or +3.3VDC power supplies or generate abnormal voltage, the excess-current protection system and excess-voltage protection system automatically shut off the output voltage to protect the power supply circuit.

If excess-current or excess-voltage protection system is activated and the power supply circuit does not output DC voltage, it is necessary to turn the power OFF, correct the problem in the faulty load, then power the printer ON again.

The circuit has two fuses which break and cut off the output voltage if excess-current flows through the AC line.

E. Video Interface Control

1. Outline

To connect the printer to an external device, such as a host computer, a video controller PCB is needed.

This section explains the kinds of interface signals exchanged between the engine controller and the video controller, and gives information concerning the sequence of printer operation making use of the interface signals.

a. System block diagram

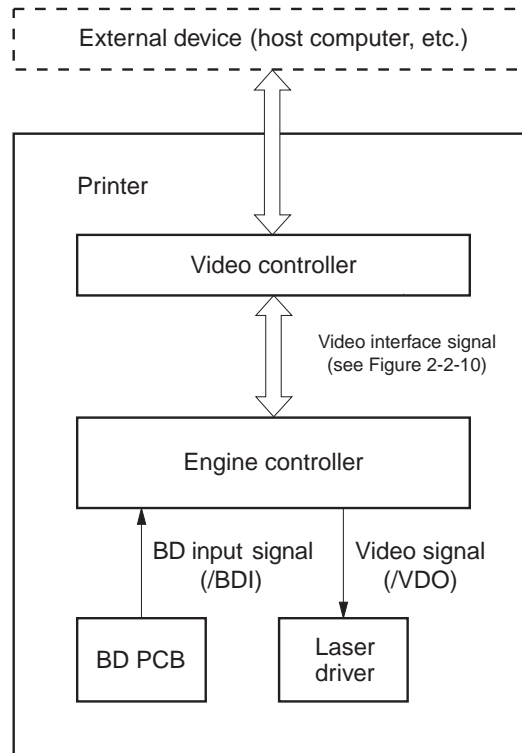


Figure 2-2-9

b. Video interface signal

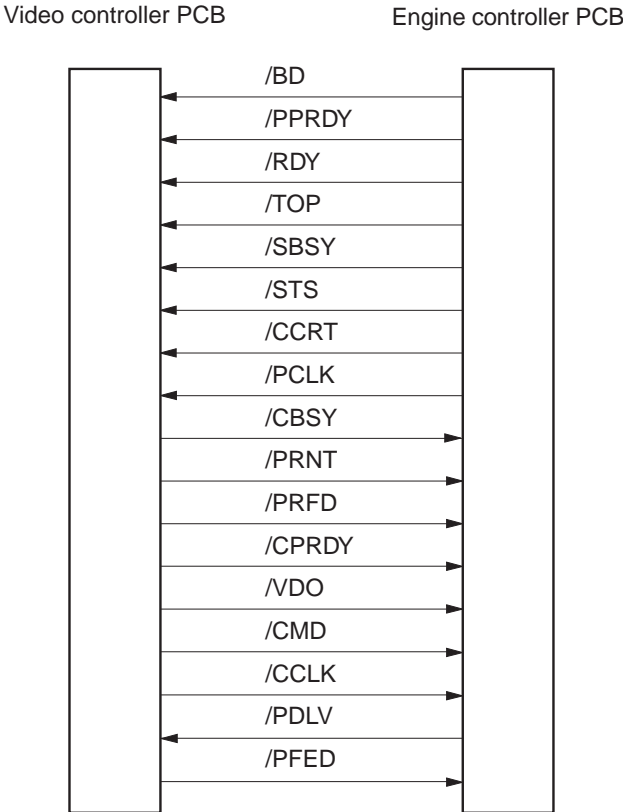


Figure 2-2-10

2. Operation

When the power is switched ON, the printer enters the WAIT mode.

At the end of the WAIT mode, the engine controller sends the READY signal (/RDY) to the video controller to inform that printer is ready to print.

When the /RDY signal is "L" and data for a page is prepared, the video controller sends the PRINT signal (/PRNT) to the engine controller.

When the engine controller receives the /PRNT signal, it starts the operation of the INITIAL ROTATION (INTR) period.

At the end of the INTR period, the engine controller sends the VERTICAL SYNC signal (/TOP) to the video controller.

When the HORIZONTAL SYNC signal (/BD) from the engine controller is received, the video controller sends the VIDEO signal (/VDO) synchronized to the /BD signal and the /TOP signal to the laser driver through the engine controller.

In response to the /VDO signal, the laser driver switches the laser diode ON and OFF.

The laser beam emitted from the laser diode by the /VDO signal is scanned across the photosensitive drum with the scanning mirror to form the latent electrostatic image.

The latent electrostatic image on the photosensitive drum is developed and transferred onto the paper by the electro-photographic process, and the paper is delivered to the face-down or face-up tray.

While a page is printed, the engine controller checks if another /PRNT signal is being sent from the video controller.

If no signal is received, the engine controller completes the PRINT period and starts the LAST ROTATION period (LSTR). At the end of this period, the printer enters STANDBY (STBY) mode.

If the PRINT signal is being sent, continues the print sequence. Then, the last rotation operation is performed, and the printer enters the STANDBY mode again.

F. Other Controls

1. Main motor control

Figure 2-2-11 shows the main motor control circuit.

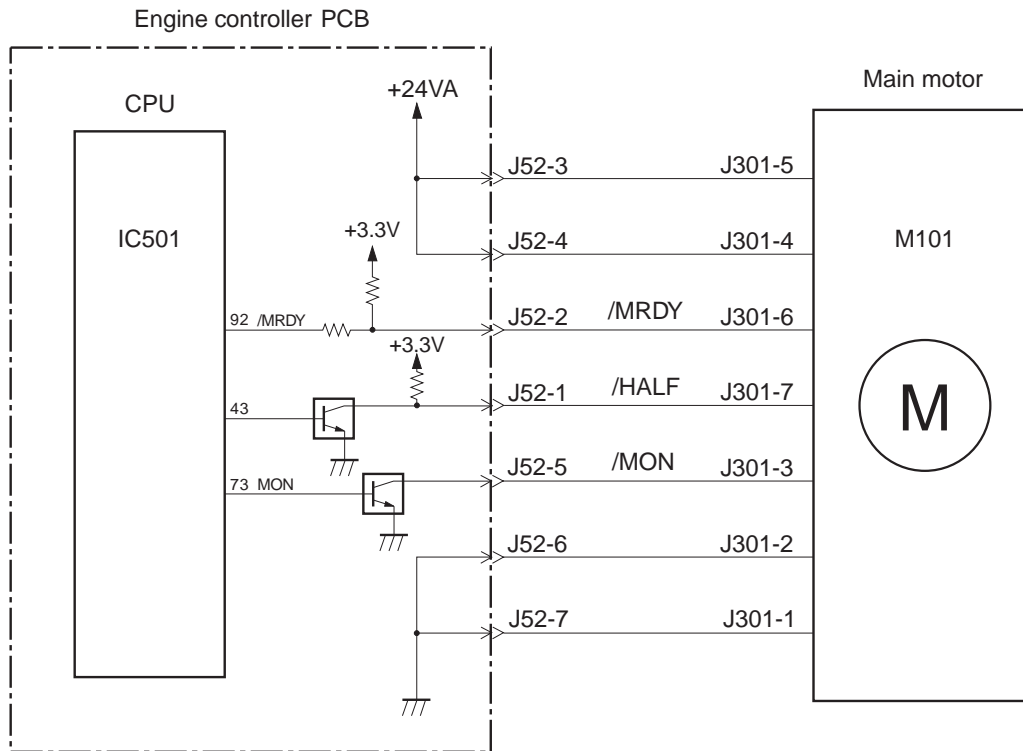


Figure 2-2-11

The main motor is a DC brushless motor with hall elements, and is unified with the motor drive circuit.

The CPU (IC501) sets the MAIN MOTOR DRIVE signal (/MON) to “L” and rotates the main motor. When printing at 1200DPI, the CPU sets the MAIN MOTOR ROTATION SWITCHING signal (/HALF) to “L” and decreases the rotation speed of the main motor to half.

When the main motor rotates and reaches its prescribed speed, it sets the MAIN MOTOR READY signal (/MRDY) to “L.”

The CPU notifies the video controller of a main motor failure in the following cases:

- 1) The /MRDY signal does not become “L” after 700ms from the main motor rotation start.
- 2) The /MRDY signal becomes “L” once, but goes “H” for more than 0.1 second continuously during normal rotation.

2. Fan motor control

The printer has a fan motor as a cooling (air inlet) fan.

Figure 2-2-12 shows the fan motor control circuit.

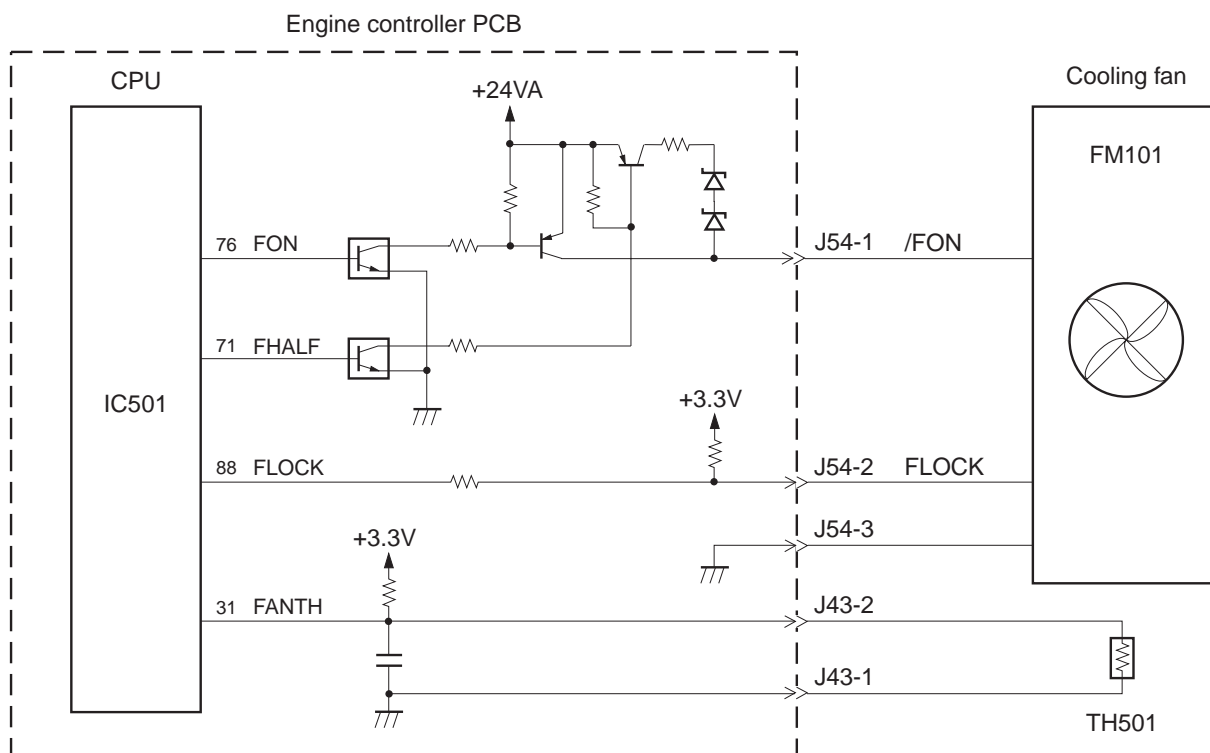


Figure 2-2-12

The fan motor is a DC brushless motor with hall elements, and is unified with the motor drive circuit.

At the same time as start of fixing temperature control, the CPU (IC501) sets the FON of No. 76 pin to “L” and rotates the fan motor at its full speed by setting the FAN DRIVE signal (/FON) to the voltage level of full speed rotation.

At the same time as completion of fixing temperature control, the CPU sets FHALF of No. 71 pin to “L” and switches the fan motor drive from full-speed rotation to half-speed rotation by reducing the /FON signal to the voltage level of half-speed rotation. 30 seconds later, by setting the FON to “H,” the voltage is not supplied to the /FON signal and the fan motor stops.

During the fan motor rotation, if the FAN LOCK signal (FLOCK) becomes “H” for more than 2 seconds continuously, the CPU reports the fan motor failure to the video controller.

This printer also measures the temperature inside the printer. If it gets high, it automatically rotates the fan motor to lower the temperature.

During the standby mode, the CPU measures the temperature inside the printer with TH501. If it is higher than the prescribed temperature, it rotates the fan motor for about 4 seconds at full speed and then for about 20 minutes at half speed to lower the temperature.

III. LASER/SCANNER SYSTEM

A. Outline

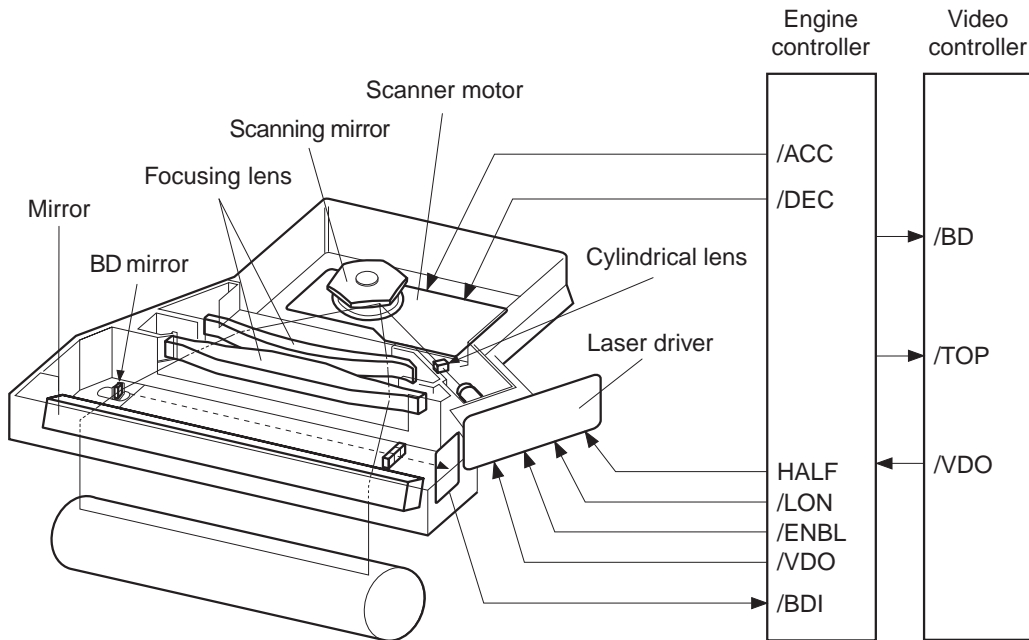


Figure 2-3-1

The VIDEO signal (/VDO) is sent from the video controller to the laser driver of the laser/scanner unit through the engine controller.

The laser driver turns the laser diode ON and OFF according to the /VDO signal and generates the modulated laser beam only when the VIDEO DATA ENABLE (/ENBL) signal from the engine controller is "L."

The modulated laser beam is aligned by a collimator lens and a cylindrical lens into a parallel beam. It then strikes the scanning mirror which is rotating at a constant speed.

The beam reflected from the scanning mirror is brought to a point of focus on the photosensitive drum by the focusing lens and mirror.

As the scanning mirror rotates at a constant speed, the beam is scanned across the drum at a constant speed.

The photosensitive drum also rotates at a constant speed allowing the laser beam to form an image on the drum surface.

B. Laser Control Circuit

1. Outline

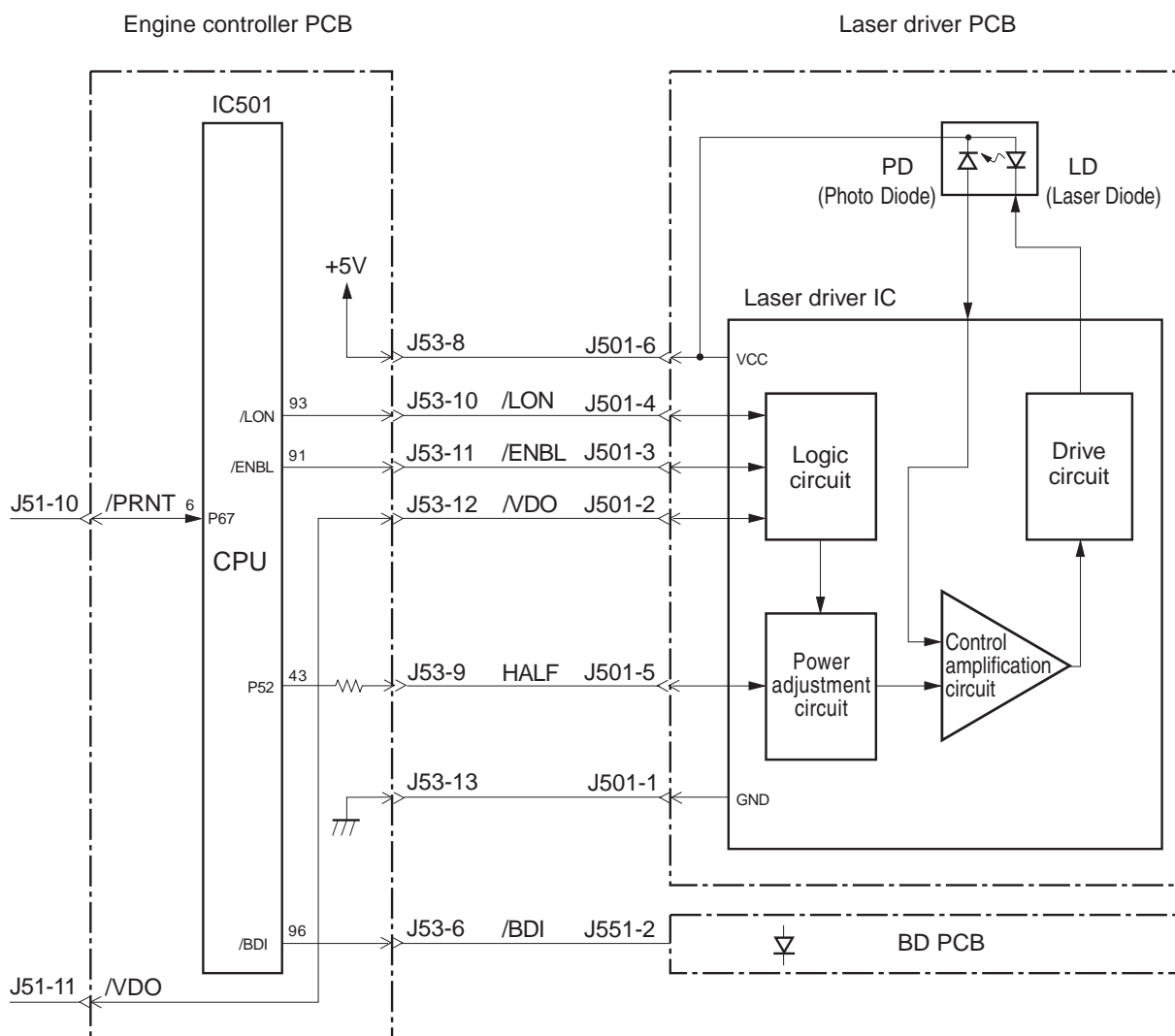


Figure 2-3-2

This circuit switches the laser diode ON and OFF at a constant intensity in response to the /VDO signal sent from the video controller.

The /VDO signal sent from the video controller to the engine controller is sent as is to the logic circuit in the laser driver IC.

When the VIDEO DATA ENABLE signal (/ENBL) sent from the microprocessor (CPU: IC501) is "L," the laser driver circuit turns the laser diode ON and OFF according to the /VDO signal.

As the beam intensity set value differs between 1200DPI and 600DPI, the LASER BEAM INTENSITY SWITCHING signal (HALF) is set to "H" for 1200DPI and to "L" for 600DPI. The power adjustment circuit in the laser driver IC switches the beam intensity.

2. Automatic power control of laser diode

The laser driver IC conducts the automatic power control (APC) of the laser diode so that the laser diode emits a beam of constant intensity.

When the FORCED LASER ON signal (/LON) becomes "L," or the VIDEO DATA ENABLE signal (/ENBL) and /VDO signal become "L," the laser diode emits light according to the standard voltage of laser driver PCB. The photo diode in the laser diode detects the beam intensity and feeds back the corresponding current value to the control amplification circuit. It is then compared with the current value set by the power adjustment circuit, and the intensity of the current to the laser diode is controlled.

The APC of this printer does not go through the CPU like the conventional APC does. Instead, it uses the APC method that constantly the beam intensity detection and control for each dot while the laser driver is emitting laser.

While in the conventional method, the beam intensity was measured by emitting laser for a certain period of time between pages or during unblanking, this method controls the laser output, by detecting the intensity of the laser which is actually forming an image. Therefore, the APC of this printer has higher reliability of control over the conventional APC.

3. Horizontal synchronization control

The CPU generates an unblanking signal inside the IC501 based on the BD INPUT signal (/BDI) sent from the BD PCB of the laser/scanner unit.

IC501 sets the FORCED LASER ON signal (/LON) to "L" during unblanking period. The laser driver turns the laser diode ON when the /LON signal is "L."

The laser beam turned on by the /LON signal is reflected at the small fixed BD mirror located in the light path where the laser beam scanning starts, and is input to the BD PCB in the laser/scanner unit.

The BD PCB detects the laser beam, generates a BD INPUT signal (/BDI), and sends it to the CPU. The CPU generates the HORIZONTAL SYNC signal (/BD) according to the /BDI signal and sends it to the video controller.

4. Laser diode emission control

Based on the paper size data, the CPU generates the VIDEO DATA ENABLE signal (/ENBL) and sends it to the logic circuit of the laser driver IC. The /VDO signal is masked by the /ENBL signal in the logic circuit, which controls the emission period of the laser diode.

The paper size data is supplied to the CPU by the cassette paper size detection switches for cassette pick-up or by the paper size specification command from the video controller for multi-purpose tray pick-up.

The CPU generates the IMAGE TOP ERASE AND BOTTOM ERASE signal (TOPE) and the HORIZONTAL IMAGE MASK signal (MSK) according to the paper size data. (TOPE and MSK are used inside the CPU and are not output externally.)

To inhibit the laser beam from writing on non-image area during the non-unblanking period, the CPU sets the VIDEO DATA ENABLE signal (/ENBL) to "L" only when the TOPE and MSK signals are "L." The laser driver turns the laser diode ON when the /ENBL signal and /VDO signals are "L."

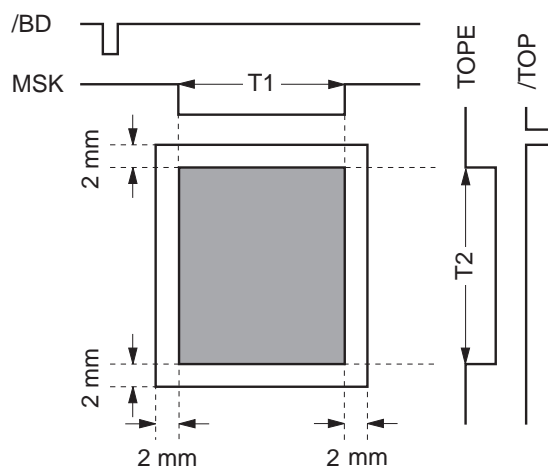


Figure 2-3-3

-
- Notes:**
- 1.** The shaded area indicates the area where the laser beam writes on the drum.
 - 2.** The time T1 and T2 vary according to the paper size.
If no paper size is specified by the paper size specification command from the video controller for multi-purpose tray pick-up, the printer does not recognize the paper width. Therefore, the T1 and T2 values are assumed to be the universal size (the maximum paper size for the printer: 216mm × 356mm).
 - 3.** The CPU detects the duration of time that the paper passes through the top of page sensor (PS103) and determines the size of the loaded paper. The image is then masked according to the detected paper size.
-

C. Scanner System

Figure 2-3-4 is the scanner motor control circuit.

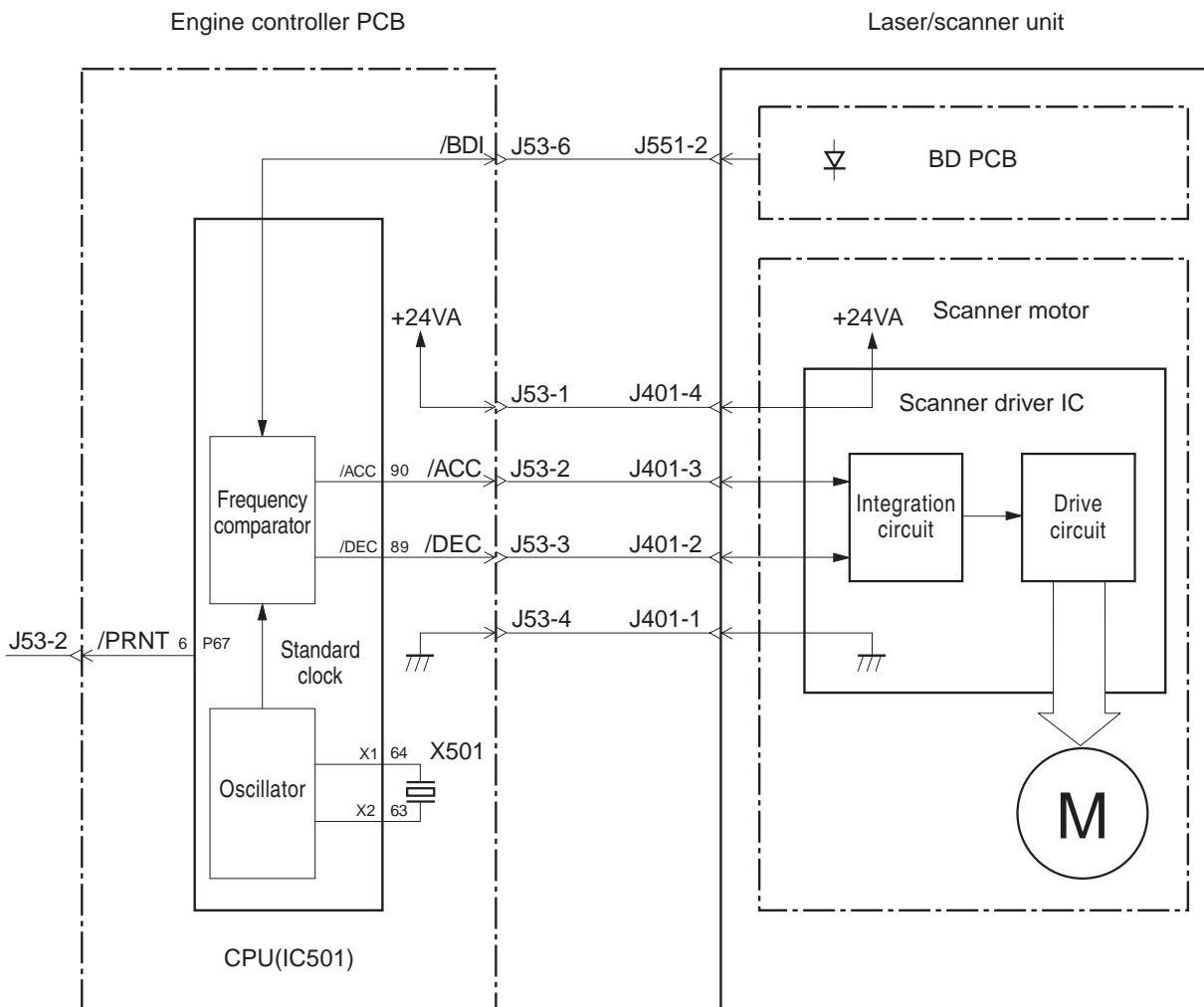


Figure 2-3-4

The scanner motor is a three-phase, eight-pole DC brushless motor with hall elements, and is unified with the drive circuit.

When the printer is turned ON, the CPU (IC501) on the engine controller divides the oscillation frequency of the crystal oscillator (X501) and generates standard clock.

When the /PRNT signal sent to the CPU becomes “L,” the CPU sets the SCANNER MOTOR ACCELERATION signal (/ACC) to “L.” The scanner driver IC rotates the scanner motor when the /ACC signal is “L” and accelerates while the /ACC signal is “L.”

While the scanner motor is rotating, the CPU forces laser emission, and the /BDI signal is sent from the BD PCB. The CPU compares the /BDI signal cycle with the standard clock in the frequency comparator of the CPU and controls the rotation speed of the scanner motor by controlling the /ACC signal until the the scanner motor reaches the prescribed speed.

When stopping the scanner, the CPU decelerates the scanner rotation by setting the SCANNER MOTOR DECELERATION signal (/DEC) to “L.”

The CPU monitors the /BDI signal sent from the BD PCB to judge whether the scanner motor

is rotating at the prescribed speed or not.

The CPU notifies the scanner failure to the video controller in the following cases:

- 1) The /BDI signal is not input for about 100ms continuously at the scanner motor start or stop.
- 2) The period in which the /BDI signal cycles deviate vertically from the specified cycle is about 10mm (print distance equivalent) during masking or non-masking in the normal rotation.

During non-masking in the normal rotation, if any /BDI signal cycle deviates from the specified cycle, the CPU assesses a /BD error.

IV. IMAGE FORMATION SYSTEM

A. Outline

The image formation system is the central hub of the printer, and consists of the photosensitive drum, developing unit, charging rollers, etc.

When the PRINT signal (/PRNT) is sent from the video controller to the engine controller, the engine controller drives the main motor to rotate the photosensitive drum, developing cylinder, primary charging roller, and transfer charging roller.

The primary charging roller uniformly applies negative charges on the surface of the photosensitive drum. To form a latent image on the photosensitive drum, the laser beam modulated by the /VDO signal is exposed onto the photosensitive drum surface.

The latent image formed on the photosensitive drum is changed to a visible image by the toner on the developing cylinder, then transferred onto paper by the transfer charging roller. Residual toner on the photosensitive drum surface is scraped off by the cleaning blade. The potential on the drum is made uniform by the primary charging roller in preparation for the next latent image.

The cartridge has a toner sensor that detects the toner level and no cartridge. If the toner in the cartridge becomes lower than the prescribed level or there is no cartridge installed in the printer, the CPU notifies such information to the video controller.

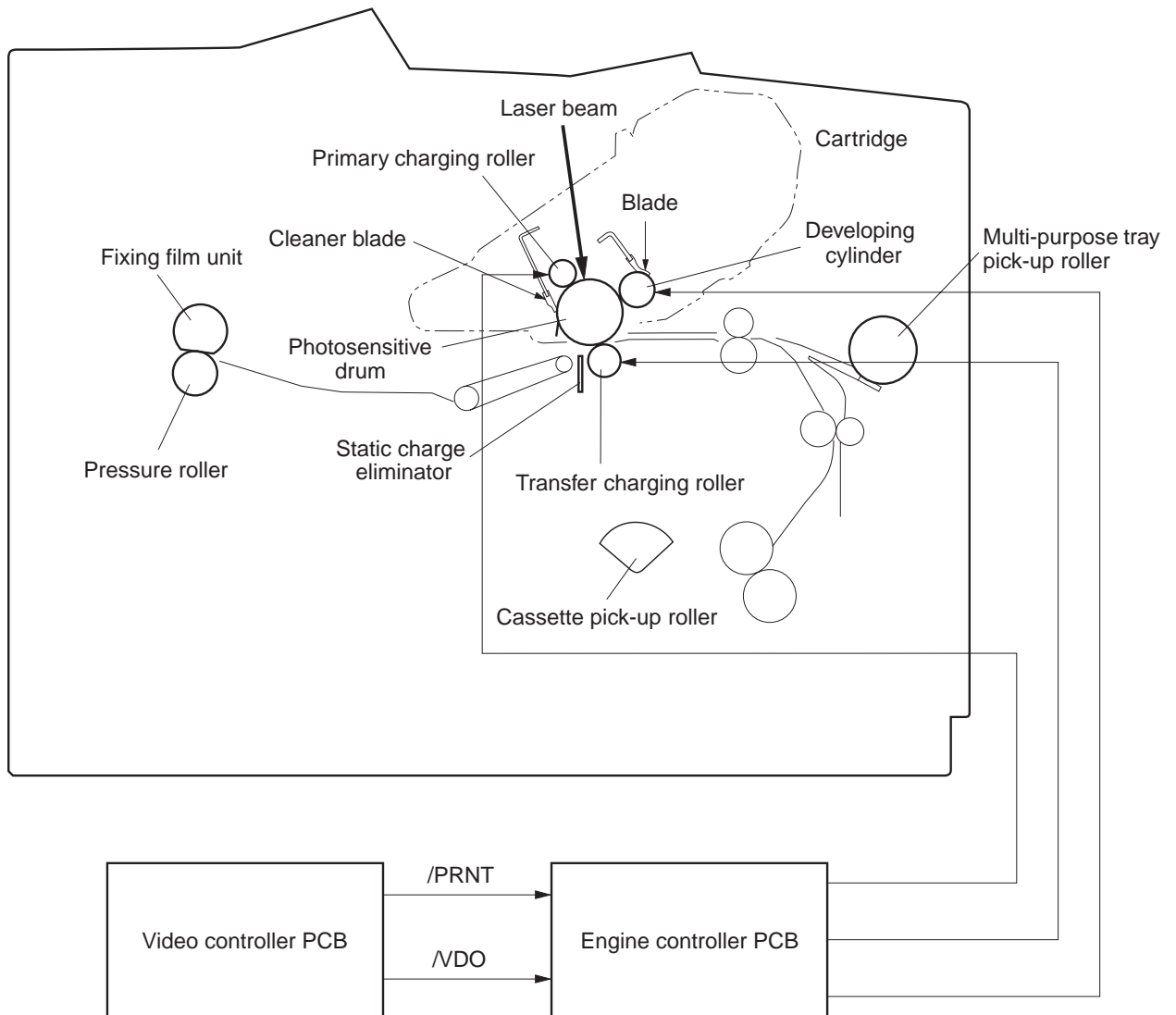


Figure 2-4-1

B. Printing Process

A major portion of the image formation system is contained in the cartridge as shown in Figure 2-4-2.

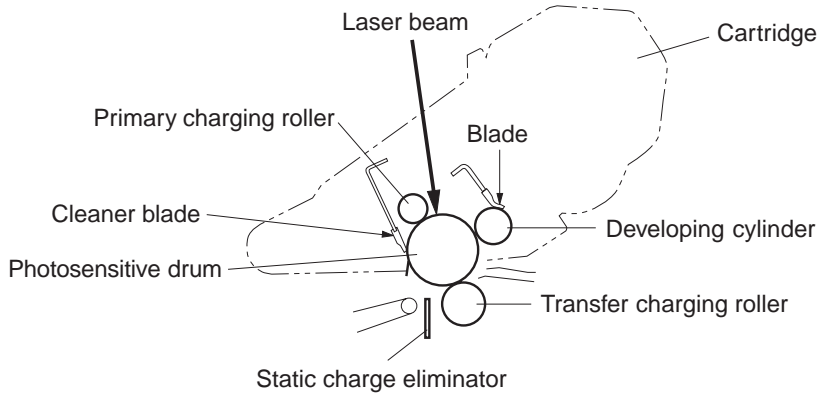


Figure 2-4-2

This printer's cartridge has a seamless drum of a double-layer construction as shown in Figure 2-4-3.

The outer layer of the drum consists of an organic photoconductor (OPC) and the base is made of aluminum.

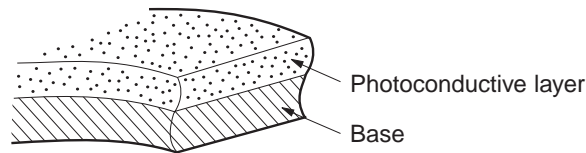


Figure 2-4-3

The printing process can be divided into five major blocks.

1. Electrostatic latent image formation block

- Step 1: Primary charging (-)
- Step 2: Laser beam exposure

2. Developing block

- Step 3: Developing

3. Transfer block

- Step 4: Transfer (+)
- Step 5: Separation

4. Fixing block

- Step 6: Fixing

5. Drum cleaning block

Step 7: Drum cleaning

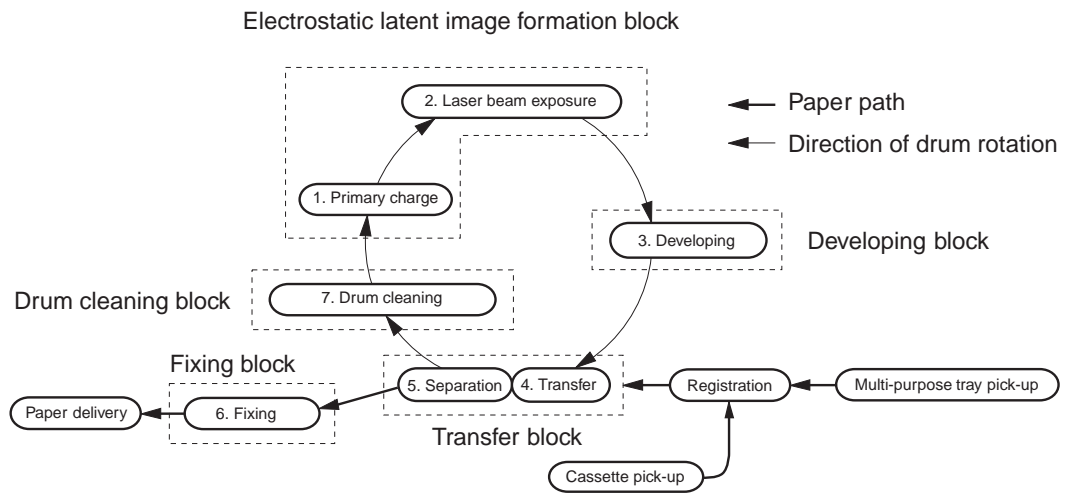


Figure 2-4-4

1. Electrostatic latent image formation block

This block follows two steps to produce an electrostatic latent image on the photosensitive drum. When Step 2 of this block is completed, negative charge remains in the unexposed “dark” areas; however, those in the exposed “light” areas are eliminated.

This image of negative charges on the drum is invisible to the human eye, so it is called an “electrostatic latent image.”

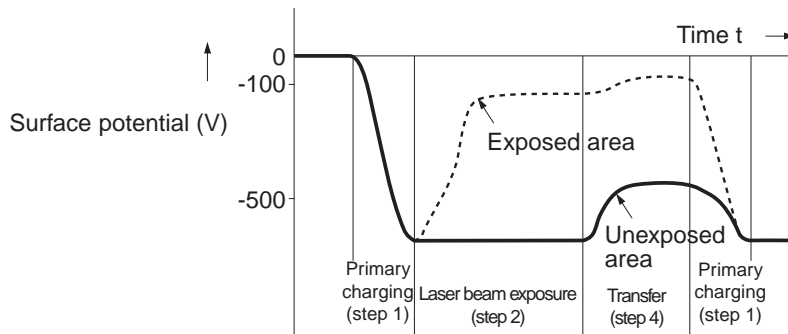


Figure 2-4-5

Step 1: Primary charging

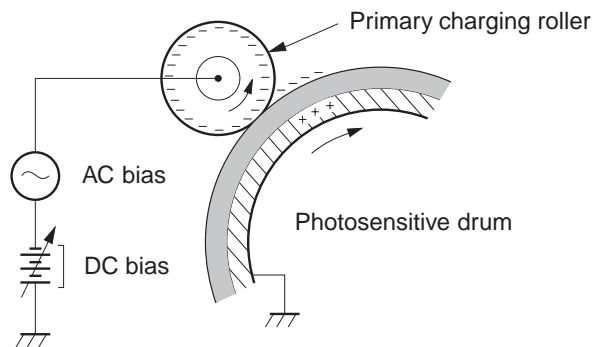
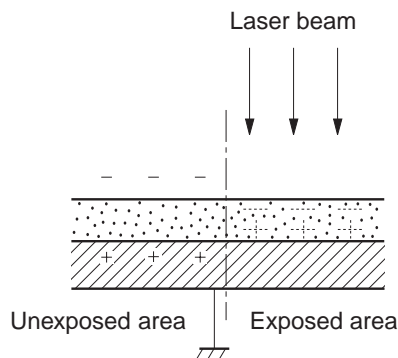


Figure 2-4-6

In preparation for the latent image formation, a uniform negative potential is applied to the photosensitive drum surface. For primary charging, the printer uses the charging method, which directly charges the drum.

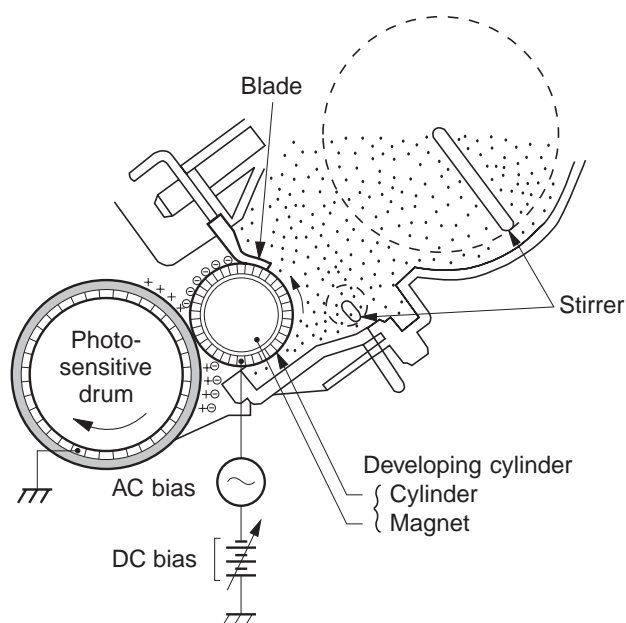
The primary charging roller is made of conductive rubber. In addition to DC bias, AC bias is also applied to the primary charging roller to keep the potential on the drum surface uniform. The DC bias changes with the developing DC bias.

Step 2: Laser beam exposure**Figure 2-4-7**

When the laser beam scans the drum surface, it causes the charges in the areas struck by the laser beam to be neutralized. These areas on the drum surface form the electrostatic latent image.

2. Developing block

Particles of toner are placed onto the electrostatic latent image on the surface of the drum to form a visible image. This printer uses the toner projection development method with a single-component toner.

Step 3: Developing**Figure 2-4-8**

Note: Charges in the exposed areas of the photosensitive drum are shown as positive in this figure, even though they are actually negative. It means that the photosensitive drum potential is higher as compared with that of cylinder.

As shown in Figure 2-4-8, the developing unit consists of a fixed magnet, a developing cylinder and a rubber blade. The developing cylinder rotates around the fixed magnet.

The single-component toner consists of magnetite and a resin binder, and is held to the cylinder by magnetic attraction. The toner functions as an insulator, and is charged negative by the friction with the rotating cylinder.

The areas on the drum that were exposed to the laser beam have a higher potential than the negatively charged toner particles on the developing cylinder. When these areas approach the toner layer of the cylinder (with negative charges), the potential difference (higher on the drum) projects the toner particles to them.

This is called toner projection, which makes the latent image on the drum visible.

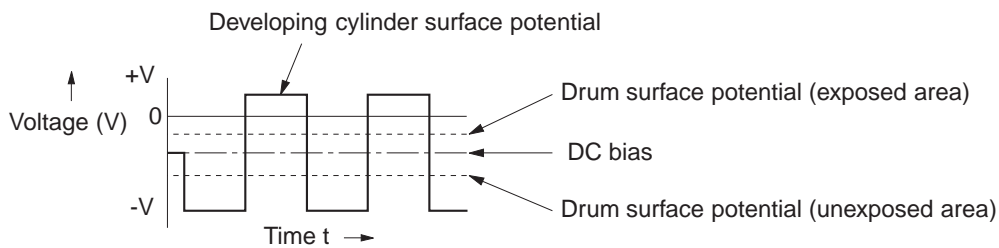


Figure 2-4-9

An AC bias is applied to the developing cylinder to help project the toner particles to the drum surface and improve the contrast of the printed image. The center voltage of the AC bias (1600 Vp-p) varies with the DC bias voltage. The changes in the DC bias change the potential difference between the cylinder and drum so that the density of the print can be adjusted. The adjustment is made through a command from an external device.

This printer has a stirring mechanism in the cartridge to ensure that the toner is applied smoothly to the cylinder.

3. Transfer block

In this block, the toner image is transferred from the drum surface to the paper.

Step 4: Transfer

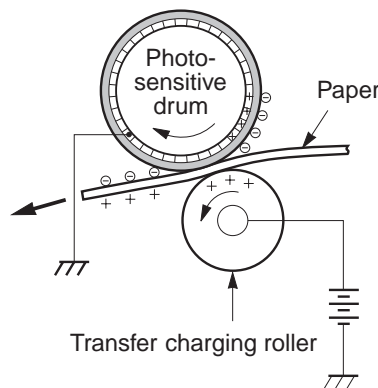


Figure 2-4-10

Positive charges are applied to the back of the paper to attract the negatively charged toner particles to the paper.

Roller transfer method is applied to stabilize the paper feed and to reduce ozone generation.

Step 5: Separation

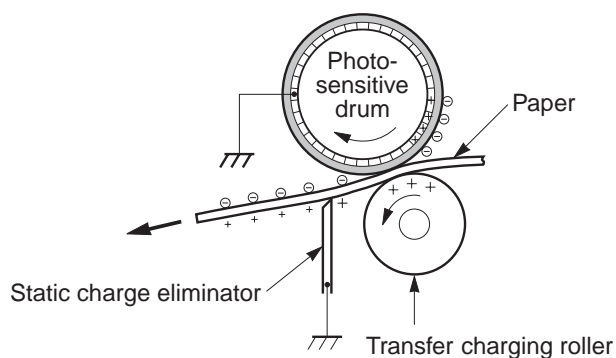


Figure 2-4-11

The elasticity of the paper causes it to separate from the drum.

To stabilize the paper feed system and to prevent droplets on the printed image at low temperature and low humidity, the charge on the back of the paper is reduced by the static charge eliminator.

4. Fixing block

As the toner image transferred onto the paper in the transfer block is only adhered by electrostatic attraction, even a light touch will smear the image.

In the fixing block, the toner image is fixed by applying heat and pressure to the paper and the toner. This fuses the toner particles onto the paper to create permanent image.

Step 6: Fixing

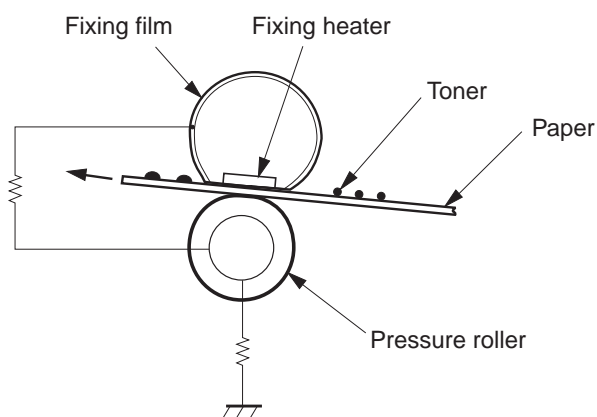


Figure 2-4-12

This printer utilizes an on-demand method which uses fixing film with small heat capacity. This

method has fast temperature rising time and it is not necessary to supply power to the fixing heater during the standby mode. Wait time is shortened and energy conservation is made possible by this method.

Fixing film is cylindrical film of polyimide. Its surface is coated with fluorine to prevent off-set.

5. Drum cleaning block

In the transfer block, not all the toner is transferred to the paper, but some remains on the photosensitive drum.

In this block, the residual toner is cleaned so that the next print image will be clear and distinct.

Step 7: Drum cleaning

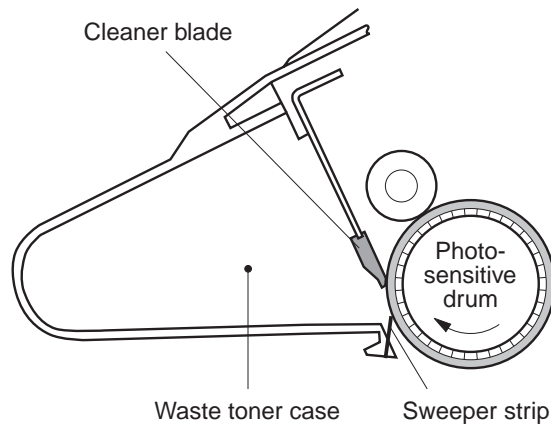


Figure 2-4-13

The residual toner on the drum surface is scraped away with the cleaner blade to clean the drum surface in preparation for the next print. The removed waste toner is collected into the waste toner case.

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V. PICK-UP/FEED SYSTEM

A. Outline

Presence of paper in the multi-purpose tray is detected by the multi-purpose tray paper sensor (PS105). Presence of paper in the cassette is detected by the cassette paper sensor (PS101).

The paper size in the cassette and whether the cassette is installed are detected by the three switches (SW600, 601, 602) on the paper size detection PCB.

In case of paper pick-up from the cassette, while the main motor rotates, the pick-up solenoid (SL101) and feed roller clutch (CL101) are turned ON. Then, cassette pick-up roller, cassette feed roller, separation roller and feed rollers rotate, and a sheet of paper is fed into the printer.

In case of paper pick-up from the multi-purpose tray, while the main motor rotates, the multi-purpose tray pick-up solenoid (SL102) is turned ON. Then, the multi-purpose pick-up roller rotates, and a sheet of paper is fed into the printer.

When the paper reaches the pre-transfer roller after passing through the pre-feed sensor (PS102), its skew is adjusted by hitting the registration arm.

In the prescribed period of time after the top of page sensor (PS103) detects the leading edge of the paper, the VERTICAL SYNC signal (/TOP) is sent from the engine controller to the video controller.

As the paper is fed during this time, the leading edge of the image on the drum matches the leading edge of the paper by sending the /VDO signal in a certain period of time after the video controller receives the /TOP signal. The paper goes through transfer, separation, fixing, and delivery unit and is delivered onto the face-up or face-down tray.

There are four photointerrupters (PS102, PS103, PS106, PS501) on the paper path for detecting arrival or passing of the paper.

If the paper does not reach or pass these sensors within the prescribed period of time, the microprocessor on the engine controller assesses a paper jam and notifies the video controller of the jam occurrence.

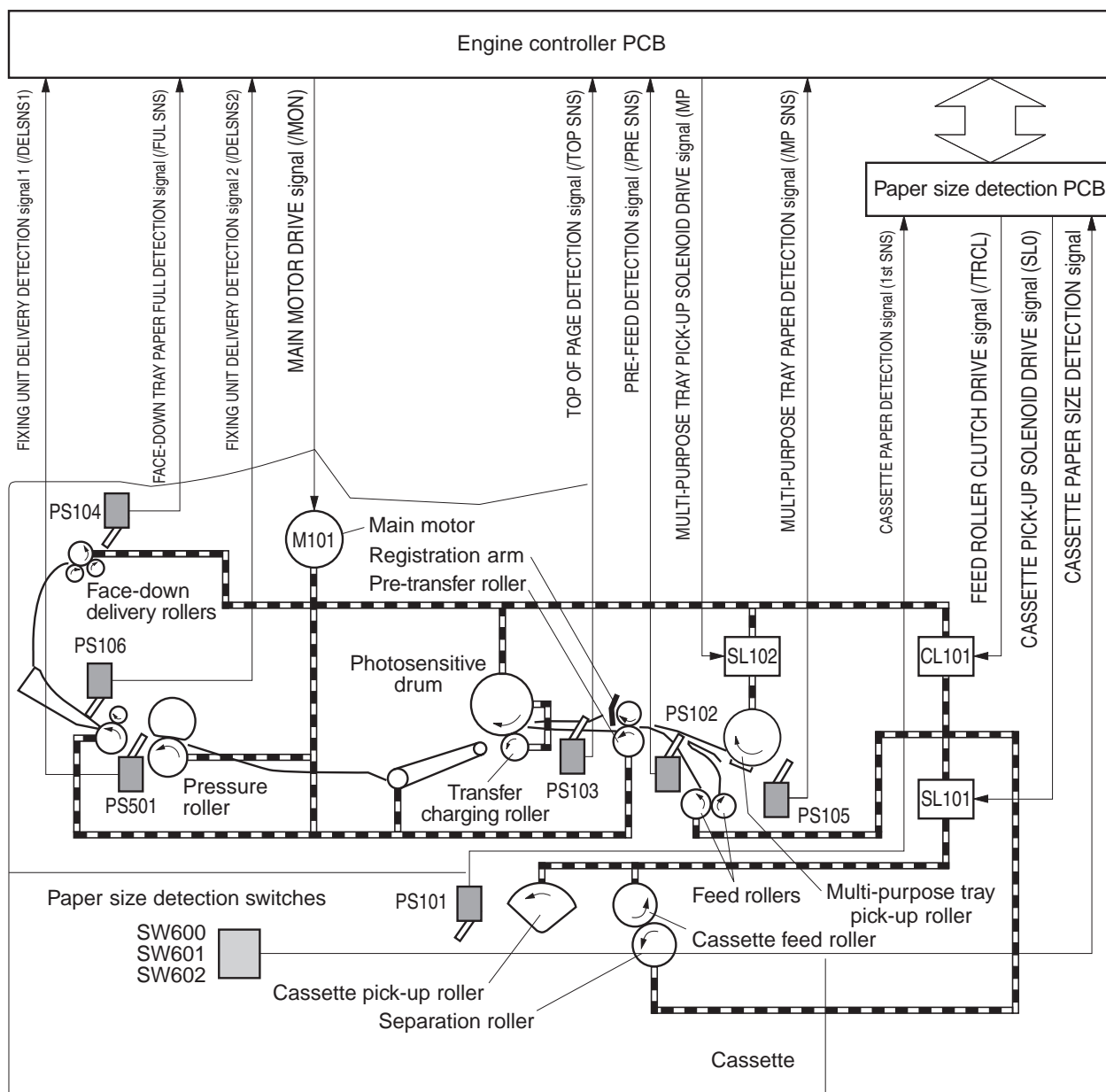


Figure 2-5-1

- PS101: Cassette paper sensor
- PS102: Pre-feed sensor
- PS103: Top of page sensor
- PS104: Face-down tray paper full sensor
- PS105: Multi-purpose tray paper sensor
- PS106: Fixing unit delivery sensor 2
- PS501: Fixing unit delivery sensor 1
- SL101: Cassette pick-up solenoid
- SL102: Multi-purpose tray pick-up solenoid
- CL101: Feed roller clutch

B. Paper Size Detection

By setting the cassette in the printer or the optional paper feeder, the specified switches are actuated. The combinations of actuated switches (Table 2-4-1) detect the paper size and whether there is a cassette or not.

Table 2-4-1

Paper size	Paper size detectionswitch		
	SW600/801	SW601/802	SW602/803
No cassette	OFF	OFF	OFF
Legal	OFF	OFF	ON
Executive	OFF	ON	OFF
Letter	OFF	ON	ON
OTHER	ON	OFF	OFF
CUSTOM	ON	OFF	ON
B5	ON	ON	OFF
A4	ON	ON	ON

As there is no detection mechanism for paper size on the multi-purpose tray, the size of the paper set on the tray cannot be detected. The paper size in the cassette can be detected by the switches above. However, when using the universal cassette, the paper size is set by the user. If the setting made by the user is incorrect, it results in an incorrect detection.

Therefore, this printer has the top of page sensor (PS103) which detects the paper size by measuring the time from the leading edge passes the sensor until the trailing edge passes the sensor. If the detected size differs from that specified by the video controller or by the combination of the switches, the CPU assesses paper size mismatch and reports it to the video controller.

C. Cassette Pick-up

a. Outline

When the video controller inputs the /PRNT signal to the engine controller, the main motor (M1) starts rotation. When the main motor reaches its prescribed speed, the feed roller clutch (CL101) and cassette pick-up solenoid (SL101) are turned ON. As a result, the cassette pick-up roller, cassette feed roller, separation roller and feed rollers are driven by the main motor rotation.

The cassette pick-up roller makes one rotation with the pick-up solenoid ON, and picks up the paper in the cassette. Then, the unnecessary sheets are removed by the separation roller and the picked up paper is fed to the pre-feed sensor (PS102).

The CPU detects the condition of the PS102 for a prescribed period of time. If the PS102 does not detect no paper within a prescribed time, the CPU turns OFF the feed roller clutch (CL101) and stops feeding the paper in the prescribed period of time after the top of page sensor (PS103) detects the paper present condition of the preceding paper. When the top of page sensor (PS103) detects the trailing edge of the preceding paper, the CPU resumes feeding the stopped paper. By this, the between-page distance appropriate for the continuous printing is achieved.

The paper then reaches the registration arm where its skew is corrected, goes through trans-fer, separation, fixing and delivery unit and is delivered to the tray.

- Cassette pick-up timing

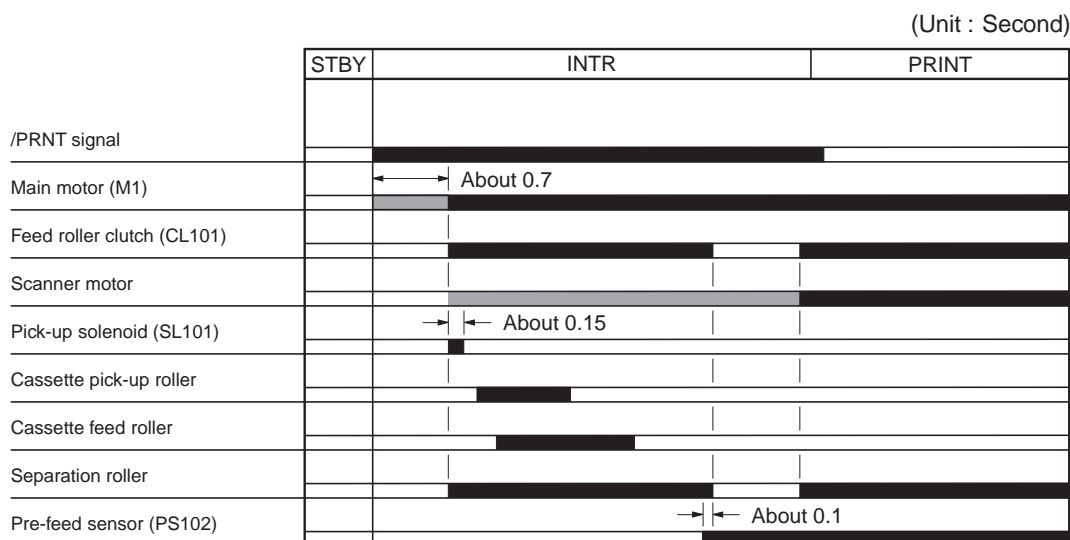


Figure 2-5-2

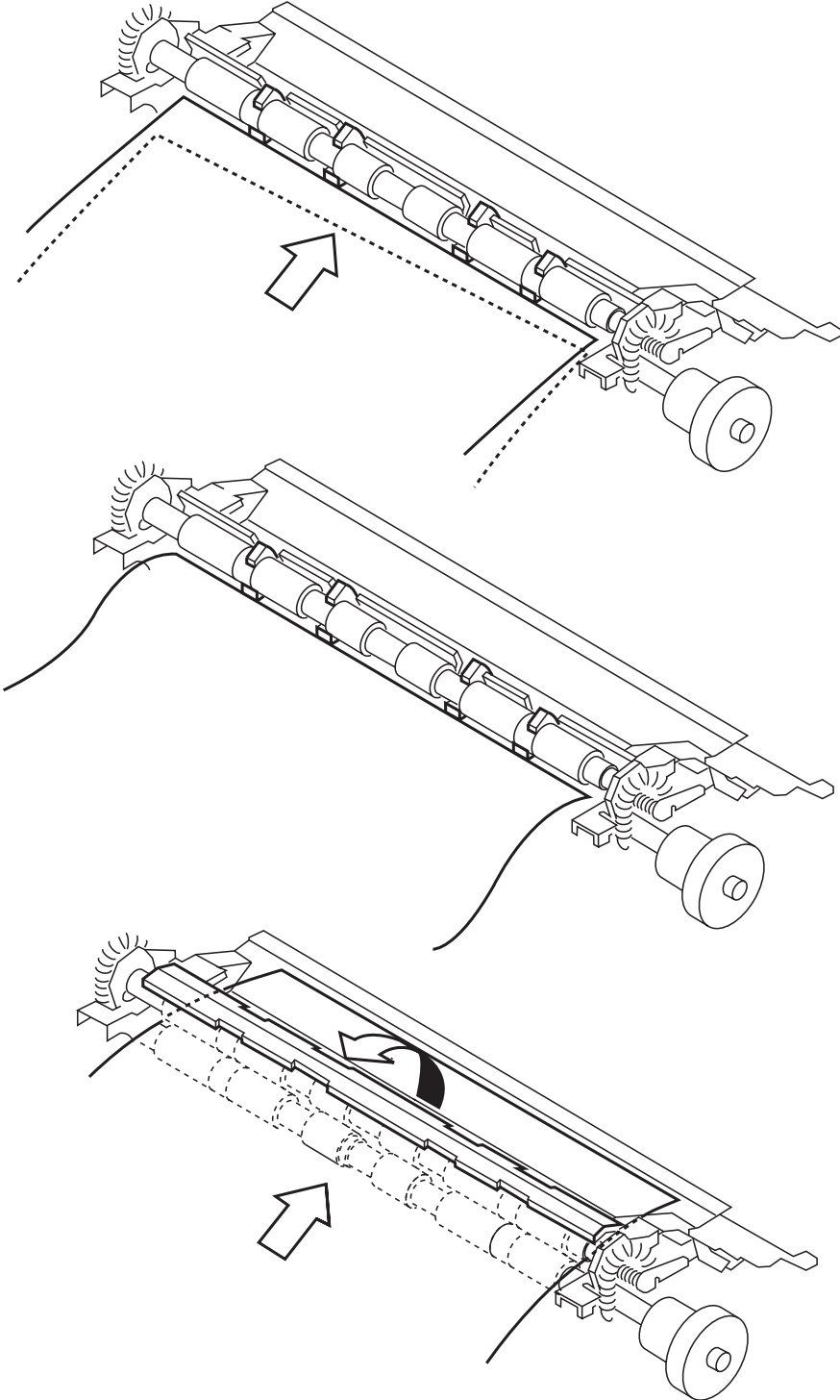


Figure 2-5-3

b. Multi-feed prevention mechanism

When picking up the paper from the cassette, the printer uses the separation roller to prevent multi-feeding. Normally, the separation roller is imparted with a rotational force in the same direction as that of the feed roller. However, since the separation roller is equipped with a torque limiter, it rotates with feed roller by transmission of its rotational force via the transported paper. On the other hand, if multiple sheets of paper are picked up, the low friction force between the sheets of paper results in a weak rotational force being transmitted to the separation roller from feed roller. Consequently, the separation roller's own rotational force separates the extra sheet.

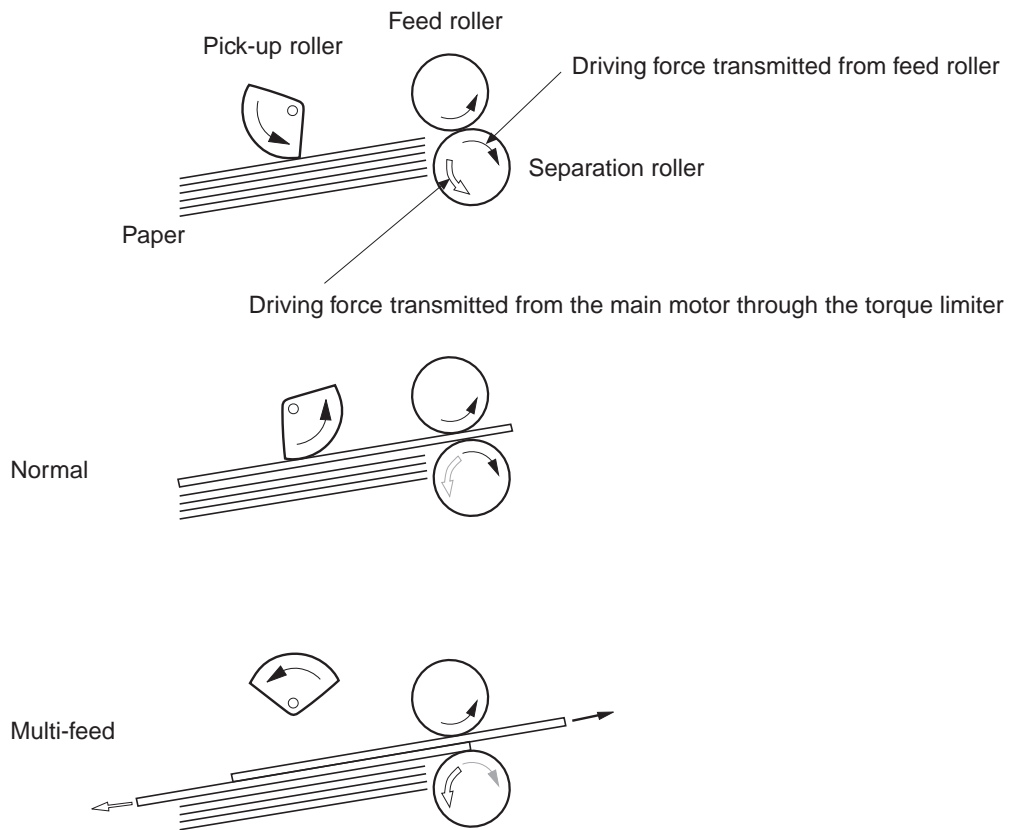


Figure 2-5-4

D. Multi-purpose Tray Pick-up

The presence of paper on the multi-purpose tray is detected by the multi-purpose tray paper sensor (PS105).

When the engine controller receives the /PRNT signal from the video controller, the printer starts the initial rotation. When the initial rotation ends (main motor warm-up, scanner motor warm-up, high-voltage control sequence, and fixing unit warm-up are completed), the multi-purpose tray pick-up solenoid (SL102) is turned ON.

As a result, the cam rotates, the lifter that paper is loaded is lifted, and the paper comes in contact with the multi-purpose tray pick-up roller. At the same time, the multi-purpose tray pick-up roller makes one rotation and a sheet of paper on the multi-purpose tray is picked up. The separation pad removes the unnecessary sheets, and the picked up paper is fed to the top of page sensor (PS103) when SL102 is turned back ON again.

The paper then reaches the registration arm where its skew is corrected, goes through transfer, separation, fixing, and delivery unit, and is delivered to the tray.

- Multi-purpose tray pick-up timing

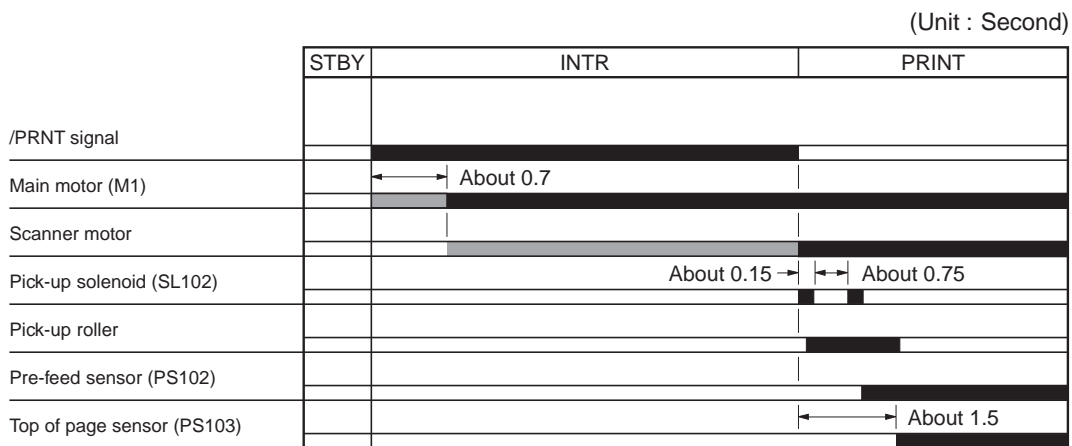


Figure 2-5-5

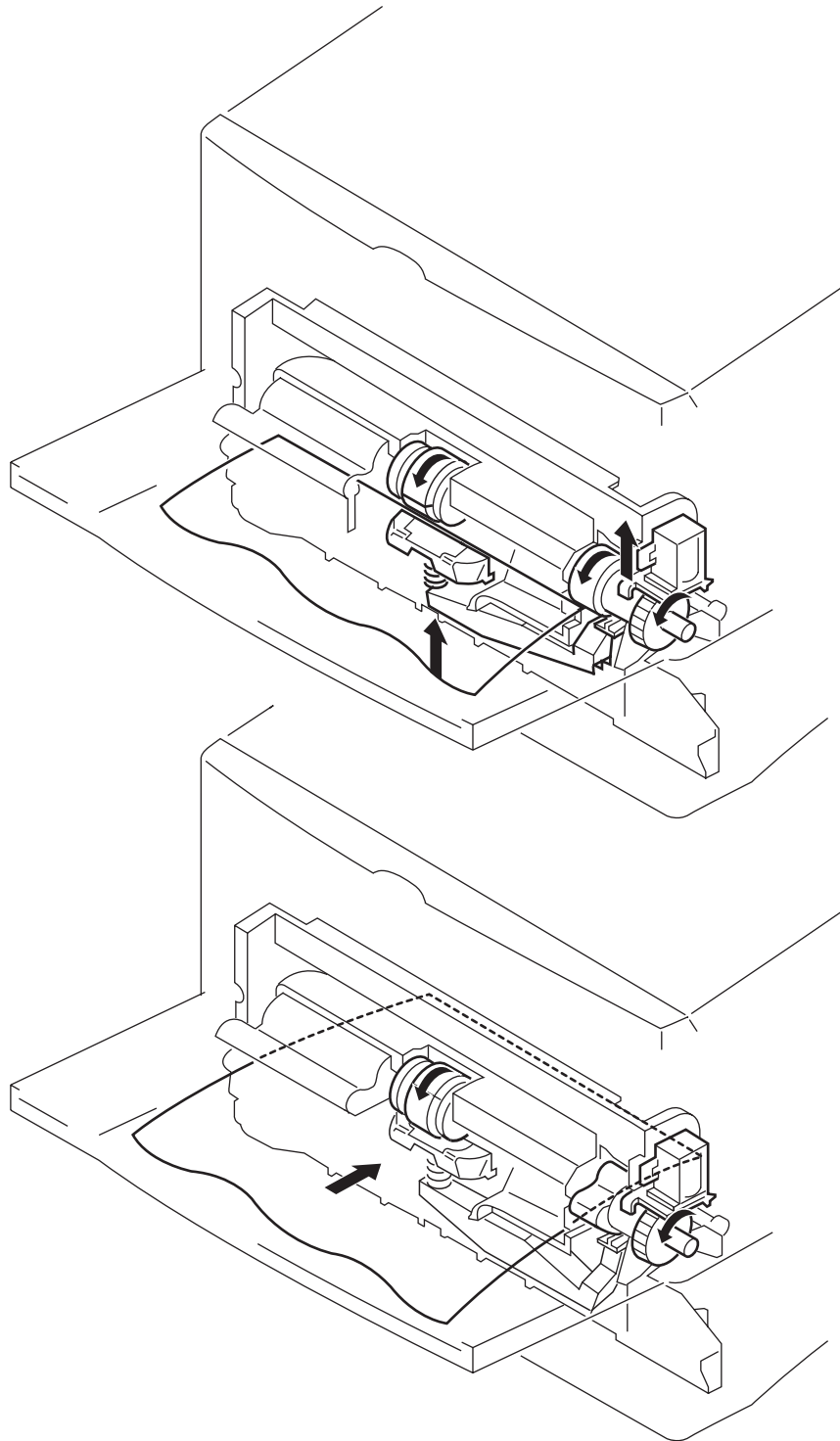


Figure 2-5-6

E. Fixing and Delivery Unit

The pressure roller and delivery roller in the fixing unit are driven by the main motor (M1).

The paper separated from the photosensitive drum is fed into the fixing unit by the feed belt. The toner is fused onto the paper by the fixing film and the pressure roller, and the paper is delivered from the fixing unit.

The delivered paper is detected by the fixing unit delivery sensors 1 (PS501) and 2 (PS106).

The printer switches between face-up and face-down tray delivery. The paper is usually delivered to the face-down tray, but it changes to face-up tray when the user opens the face-up tray. When the face-down tray becomes full, it is detected by the face-down tray paper full sensor (PS104).

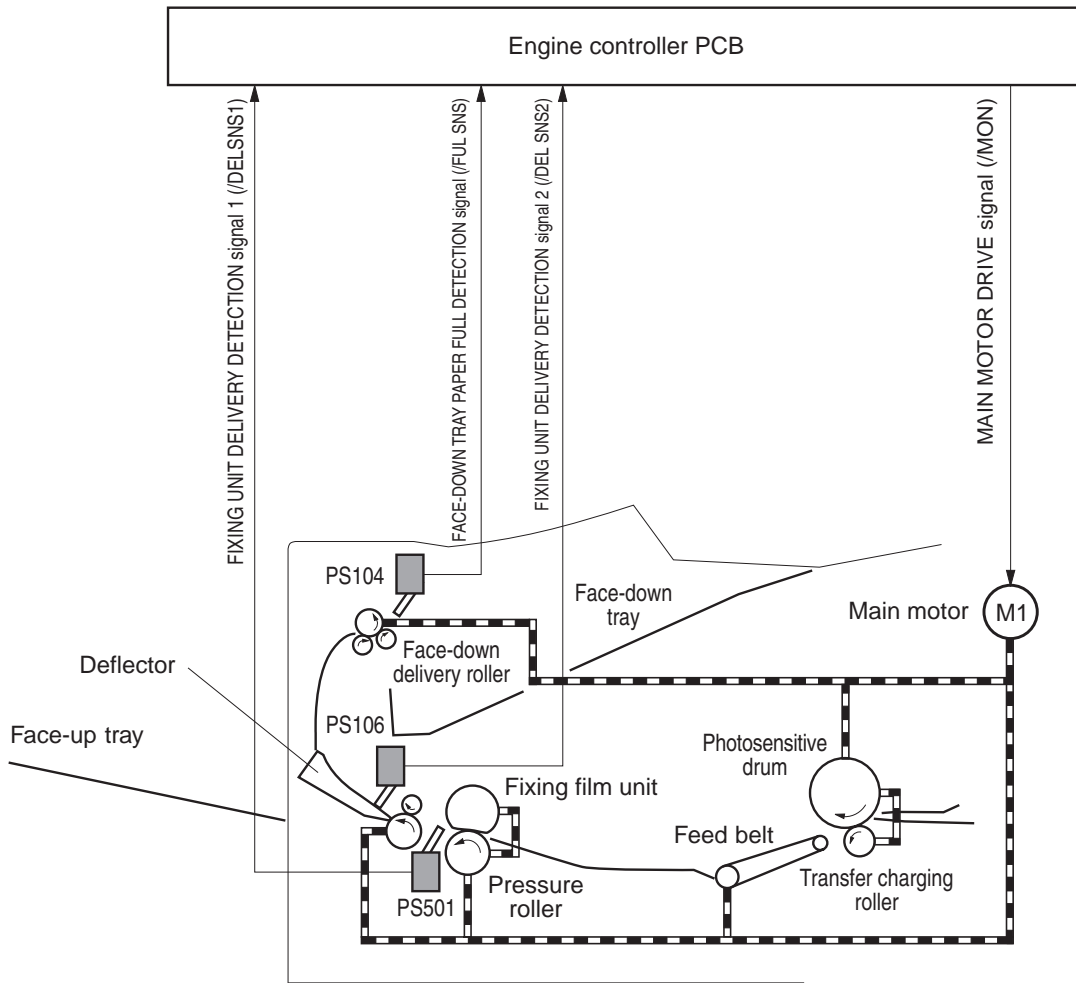


Figure 2-5-7

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F. Paper Jam Detection

The following paper sensors are installed to detect whether the paper is present or not and whether the paper is fed normally or not.

- Pre-feed sensor (PS102)
- Top of page sensor (PS103)
- Fixing unit delivery sensor 1 (PS501)
- Fixing unit delivery sensor 2 (PS106)
- Envelope multiple feed sensor (PS902 in optional envelope feeder)

The microprocessor (CPU) determines whether paper is jammed or not by checking whether paper is present or absent at the sensors at check timing stored in the memory.

If the CPU determines that a jam has occurred, it stops print operation and notifies the jam to the video controller.

1. Pick-up delay jam

a. When picking up paper from the cassette

The CPU assesses a pick-up delay jam if the pre-feed sensor (PS102) does not detect the leading edge of the paper within the prescribed period of time (T) after the paper was picked up, or if the top of page sensor (PS103) does not detect the leading edge of the paper within the prescribed period of time after re-feeding.

- In case the paper is picked up from the cassette: T= about 3.2 sec.
- In case the paper is picked up from the paper feeder: T= about 4.6 sec.

b. When picking up paper from the multi-purpose tray or the envelope feeder

The CPU assesses a pick-up delay jam if the top of page sensor (PS103) does not detect the leading edge of the paper within the prescribed period of time (T) after the paper was picked up.

- In case the paper is picked up from the multi-purpose tray: T= about 7.5 sec.
- In case the paper is picked up from the envelope feeder: T= about 5 sec.

2. Pick-up stationary jam

a. When picking up paper from the envelope feeder

The CPU assesses a pick-up stationary jam if the envelope multiple feed sensor (PS902) detects multiple envelopes after the envelope pick-up operation.

b. During paper feeding

The CPU assesses a pick-up stationary jam if the top of page sensor (PS103) does not detect the trailing edge of the paper within the prescribed period of time (about 4.4 sec.) after detecting the leading edge.

c. During paper feeding

When feeding a regular sized paper (A4, Letter, Legal, B5, Executive), the CPU assesses a paper stationary jam if the paper length in the vertical scan direction detected by the top of page sensor (PS103) is 250 mm or less.

d. When WAIT period starts

The CPU assesses a pick-up stationary jam if the top of page sensor (PS103) detects paper when the WAIT period starts.

3. Delivery delay jam

a. During paper feeding

The CPU assesses a delivery delay jam if the fixing unit delivery sensor 1 (PS501) does not detect the leading edge of the paper within the specified period of time (T) after the top of page sensor (PS103) detects the leading edge of the paper.

- For paper 200mm or more: T= about 3.2 sec.
- For paper less than 200mm: T= about 5.7 sec.

b. During paper feeding

The CPU assesses a delivery delay jam if the fixing unit delivery sensor 2 (PS106) does not detect the leading edge of the paper within the prescribed period of time (about 0.47 sec.) after the PS501 detects the leading edge.

c. When having detected the paper wrapped around the pressure roller

When the length of the paper detected by the top of page sensor (PS103) is 200 mm or longer, the CPU assesses a delivery delay jam if the fixing delivery sensor 1 (PS501) detects the no paper condition within the specified period of time (about 1.5 sec.) after PS103 detects the trailing edge of the paper.

4. Delivery stationary jam**a. During paper feeding**

The CPU assesses a delivery stationary jam if the fixing unit delivery sensor 1 (PS501) does not detect the trailing edge of the paper within the prescribed period of time (about 3.5 sec.) after the top of page sensor (PS103) detects the trailing edge or if the fixing unit delivery sensor 2 (PS106) does not detect the no paper condition within the prescribed period of time (about 4.7 sec.) after the fixing unit delivery sensor 1 (PS501) detects the leading edge of the paper.

b. When WAIT period starts

The CPU assesses a delivery stationary jam if the fixing unit delivery sensor 1 (PS501) detects paper when the WAIT period starts, if PS501 detects paper within about 2 sec. after the WAIT period starts, or if the fixing unit delivery sensor 2 (PS106) detects paper during the WAIT period.

5. Retry control

Retry control is a method which redresses the pick-up delay jam due to pick-up error. It conducts pick-up operation twice and is applied to all the pick-up entrances except the duplexing unit. Retry control for each pick-up entrance is described below. Jam detection time at the retry is the same as that at the first try.

a. Standard cassette

The printer conducts the same pick-up operation as the 1st try if the pre-feed sensor (PS102) does not detect the leading edge of the paper within the prescribed time after the pick-up starts.

b. Multi-purpose tray

The CPU rotates the pick-up roller once again if the top of page sensor (PS103) does not detect the leading edge of the paper within the prescribed time after the pick-up starts. Then, the CPU rotates the pick-up roller one more time if the PS103 does not detect the paper within the prescribed time.

c. Optional paper feeder cassette

The CPU sends retry instructions to the paper feeder if the pre-feed sensor (PS102) does not detect the leading edge of the paper within the prescribed time after the pick-up starts.

d. Envelope feeder

The CPU sends retry instructions to the envelope feeder if the top of page sensor (PS103) does not detect the leading edge of the envelope within the prescribed time after the pick-up starts.

VI. VIDEO CONTROL SYSTEM

A. Video Controller Circuit

1. Outline

Video controller circuit receives print data consisting of code or image data from external device (such as host computer) via interface cable.

The circuit analyzes and processes the print data including the data specified by the operation panel, and then converts them to the dot data. The dot data are sent to the engine controller circuit to control the laser diode emission.

The layout of the main ICs on this circuit is in Figure 2-6-1, and the block diagram in Figure 2-6-2.

2. Operation

a. CPU (IC1)

A 32-bit RISC microprocessor (FC80960HD) made by Intel co. is used for the CPU in the printer, and its operation frequency is 50MHz. The CPU controls the operation of the video controller circuit according to the control program stored in the ROM.

b. ASIC (IC2)

The ASIC is graphic co-processor and has the following functions.

- 1) DRAM control
- 2) ROM control
- 3) Video interface control
- 4) IEEE 1284 parallel port interface control
- 5) I/O bass interface support

c. ASIC (AIR, IC3)

The ASCII has smoothing control circuit and SRAM.

Its main functions are as follows.

- 1) Smoothing control of image
- 2) EEPROM control
- 3) Operation panel interface control

d. DRAM

4-Mbyte DRAM is installed on the video controller PCB.

72pin-DIMM of 4-, 8-, or 16-Mbyte can be installed to the two slots on the PCB.

e. ROM

A 4 Mbyte ROM is installed on the video controller PCB. In some cases, the 4 Mbyte ROM is installed on the firmware ROM DIMM. In those cases, this ROM DIMM is installed in the connector (J6) on the video controller PCB.

Of the three connectors, the two connectors, one in the middle (J7) and the other one at the bottom (J8), can be used by the user to install 4 Mbyte or 8 Mbyte ROM DIMM. The connector at the top (J6) is exclusively for the Firmware ROM DIMM.

f. EEPROM (IC10)

EEPROM is 4-Kbytes, and is used for storing the factory default value and the user set value defined on the operation panel.

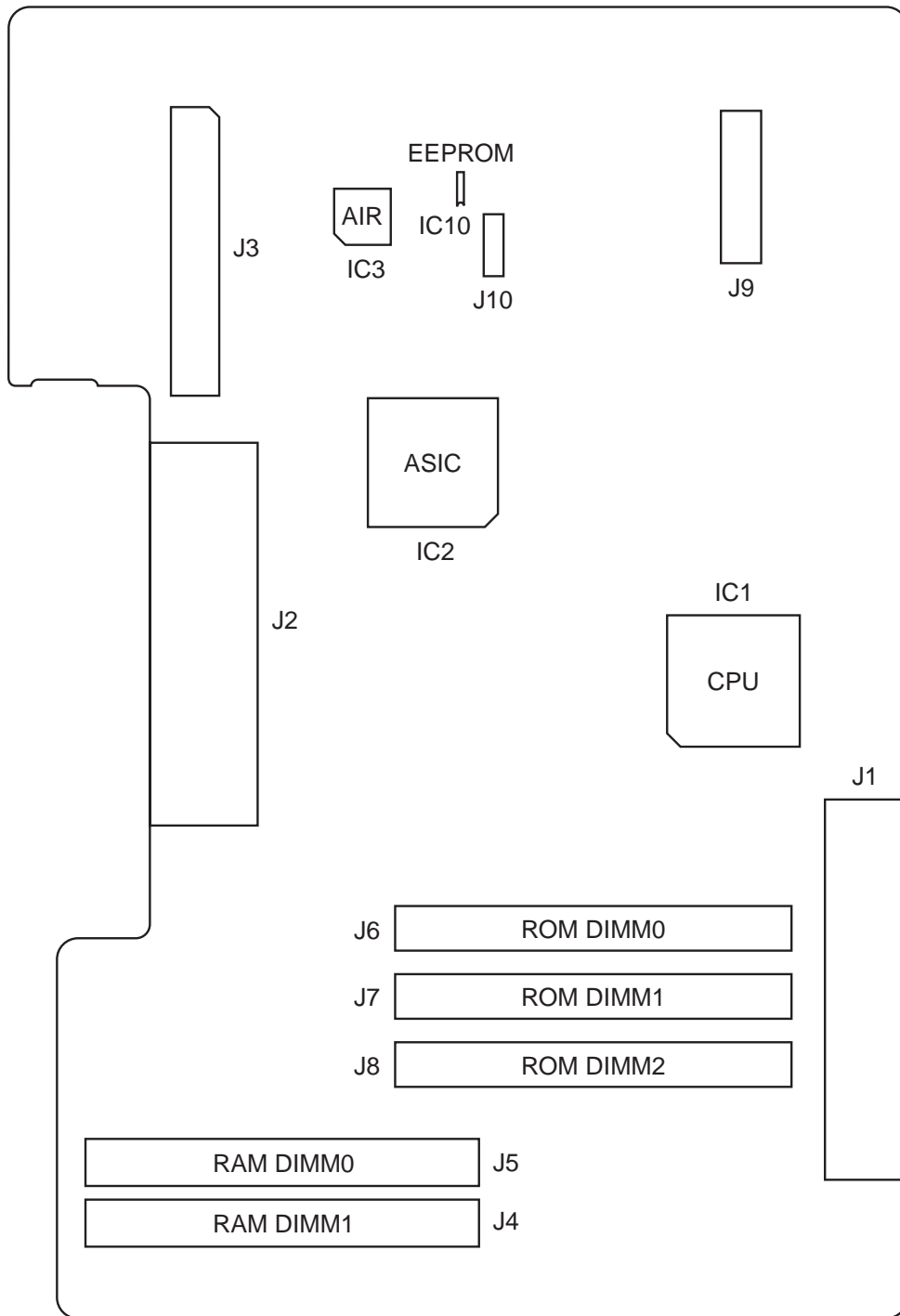


Figure 2-6-1

B. Adapter Circuit

This circuit consists of three connectors and connects the video controller PCB with the network board (option).

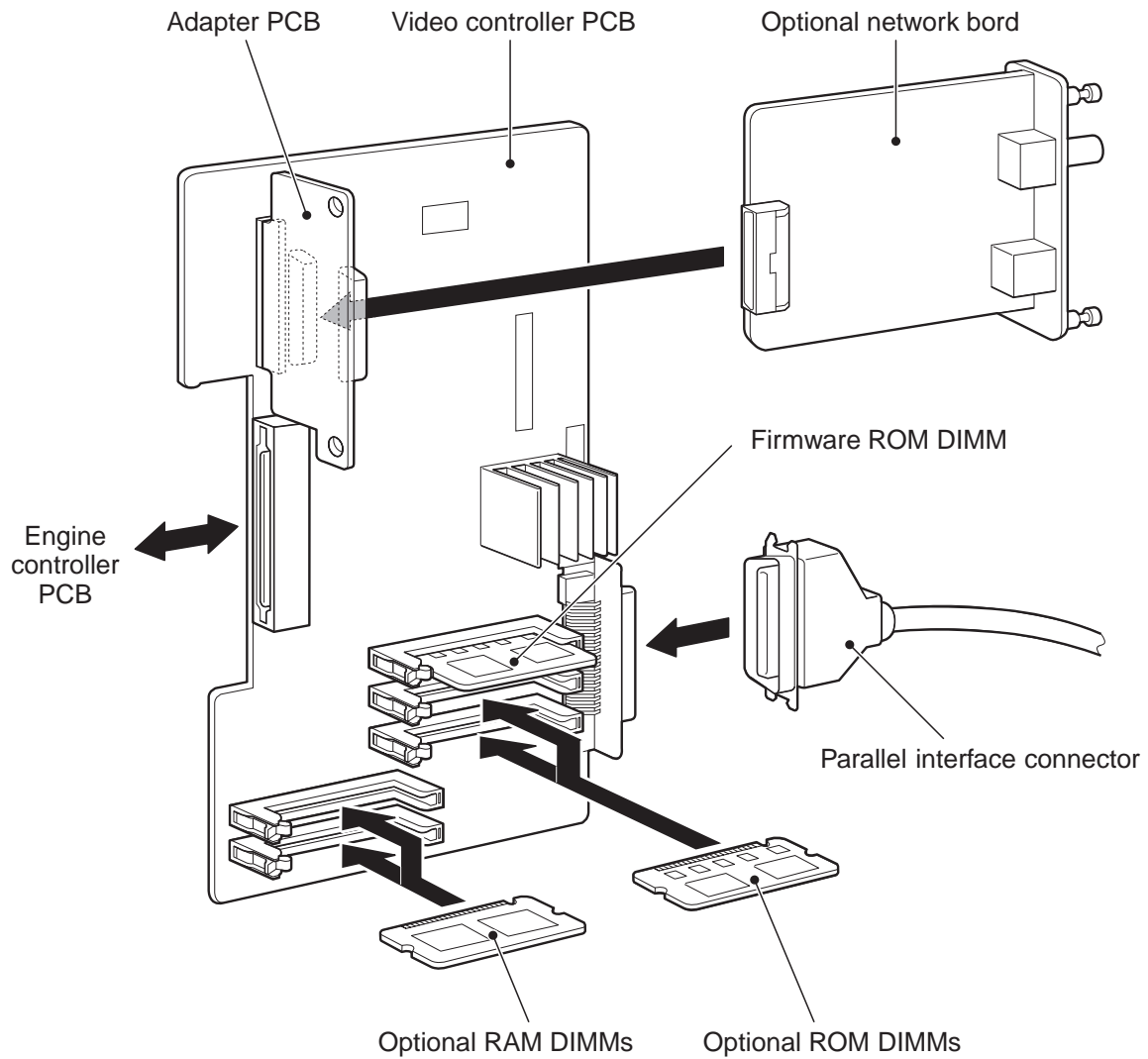


Figure 2-6-2

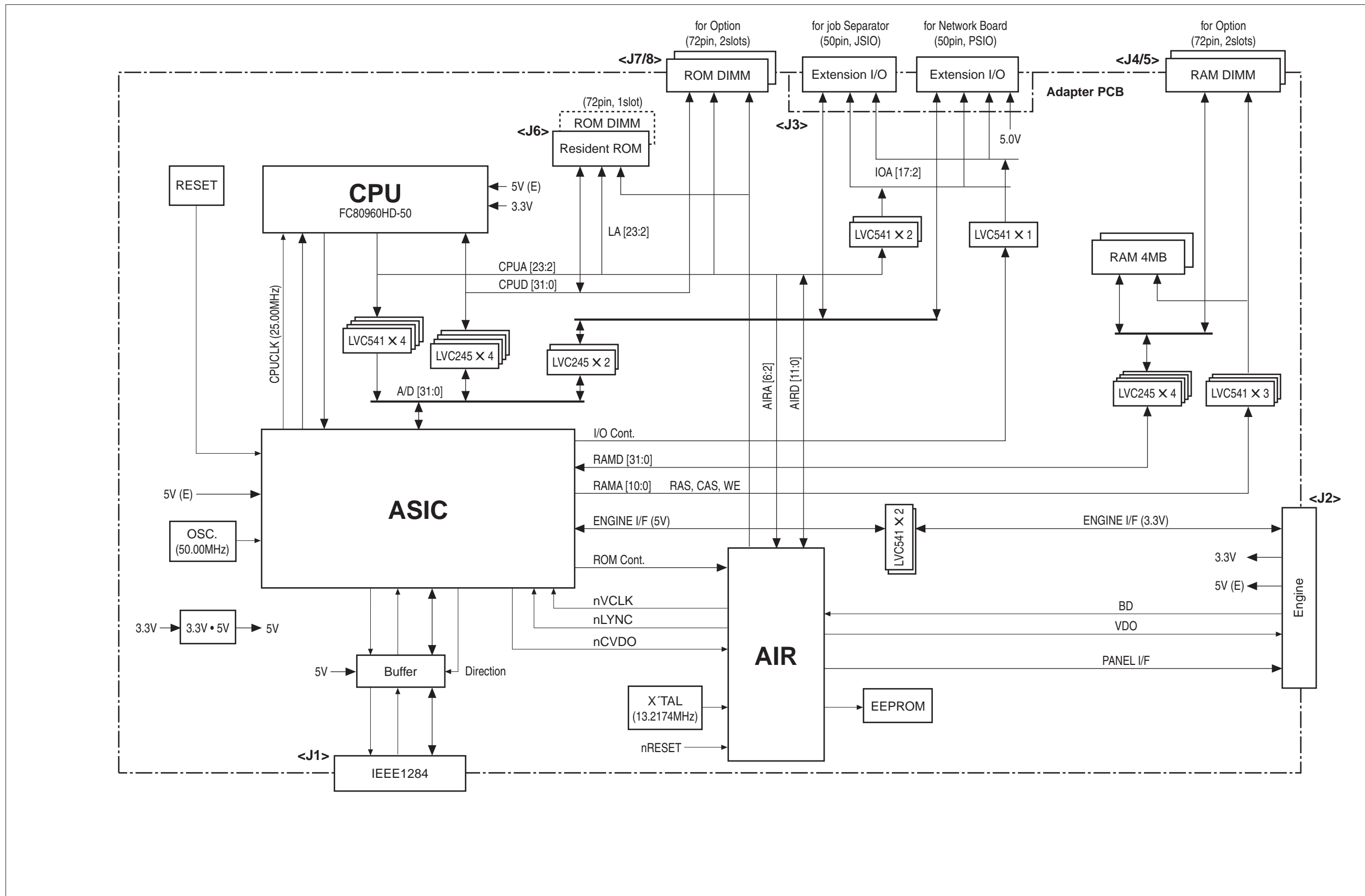


Figure 2-6-3

C. Operation Panel

1. Outline

The operation panel has one LCD with 16 characters by 2 lines, six switches, and three LEDs.

The operation panel is connected with the video controller PCB and has the following functions.

- a. Displays status and error message on the LCD.
- b. Displays condition of the operation on the LED.
- c. Changes menu to activate and the set values with the switches.

2. Operation

The LCD and LEDs on the operation panel are controlled by the signal output from the video controller. Any signals indicated by the switches on the operation panel are input to the video controller.

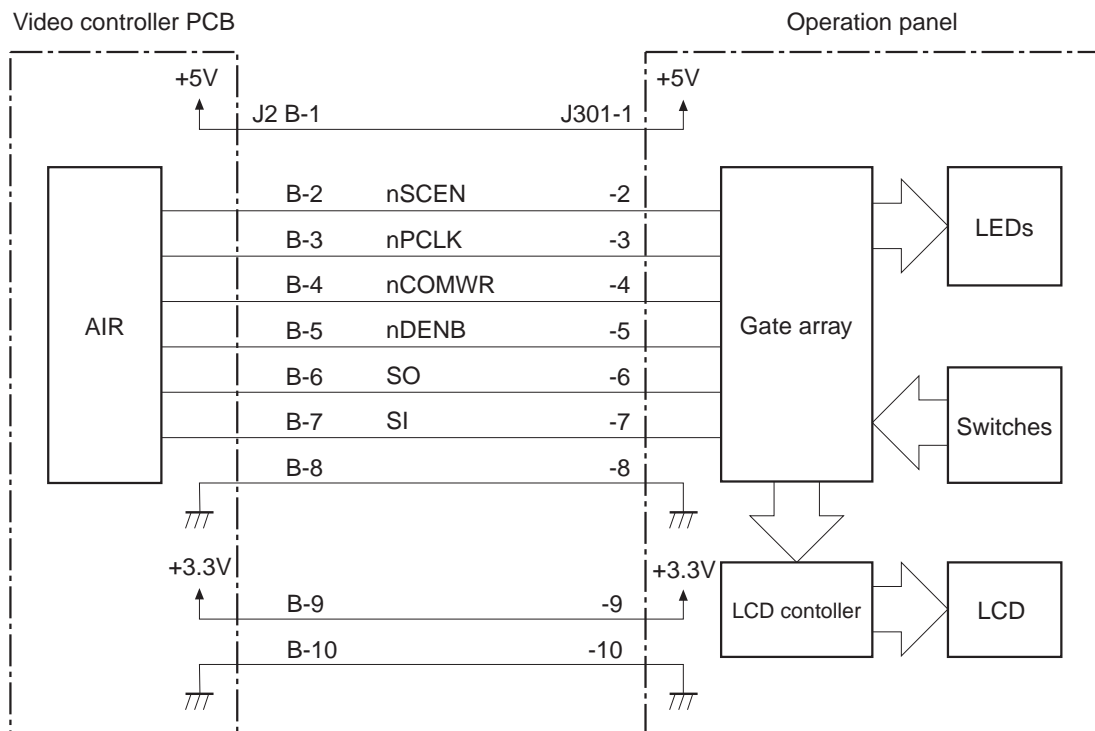


Figure 2-6-4

D. Self Test

The printer has the function to check the condition of the video controller by executing the self diagnosis program of the video controller. This is called "self-test". Self-test has two kinds of test; power ON self test and power ON key sequence.

1. Power ON self test

The power ON self test is executed following the procedures stated below every time the printer is switched ON.

- 1) Tests all DRAMs on the video controller. "Service call" is displayed on the LCD if any error occurred.
- 2) Tests all program ROM, font ROM, and option ROM. "Service call" is displayed to LCD if any error occurred.
- 3) Tests inside of the CPU. "Service call" is displayed on the LCD if any error occurred.
- 4) Ends the self-test. The error is displayed on the operation panel if it is notified from the engine controller.
- 5) After the completion of the self-test, "READY" message is displayed on the operation panel, then PCL demo-page is printed automatically.

2. Power ON key sequence

By pressing the specified keys simultaneously when turning the power switch ON, the specific function can be executed. Only the "Cold Reset" sequence stated below is for user.

a. Cold Reset

Turn the power switch ON while pressing the GO key (PPG Check Sum) or GO and Value keys simultaneously (PS Check Sum).

This function resets all the printer settings to the factory default settings.

b. Check Sum Functions

Turn the power switch ON while pressing the GO and Shift keys simultaneously.

The printer performs the check sum on the requested ROM bank with this function. The calculated Check Sum is displayed on the LCD.

c. Factory Reset Function (A4/LTR)

To reset the paper size default to A4, turn the power switch ON while pressing the Menu, Item, and Value keys simultaneously.

To reset the paper size default to Letter, turn the power switch ON while pressing the Item, Value, and Enter keys simultaneously.

The printer sets the default to the selected paper size (A4/LTR) with the function, resets the page count to zero, and then executes the "Cold Reset". Future Cold Resets retain the paper size default selected here.

d. Panel Check Function

The printer executes the operation panel diagnosis and the test sequence with the panel check function. The Function has following sequences.

- 1) The printer is powered ON with Go and Enter keys both pressed, causing the "PANEL CHECK" message to be displayed on the LCD.
- 2) Steps 3 through 8 below may be invoked in any order and/or multiple times.
- 3) If the Go key is pressed, the OnLine LED is lit and the "OPERATION CHECK" message is displayed. Releasing the key clears the LED and the message.
- 4) If the Shift key is pressed, the Job LED is lit and the "OPERATION CHECK" message is displayed. Releasing the key clears the LED and the message.
- 5) If the Menu key is pressed, the Alarm LED is lit and the "OPERATION CHECK" message is

displayed. Releasing the key clears the LED and the message.

- 6) If the Item key is pressed, all the LEDs are lit and the left half of the LCD (8 columns/both rows) is illuminated. Releasing the key clears the LEDs and the display.
- 7) If the Value key is pressed, all the LEDs are lit and the right half of the LCD (8 columns/both rows) is illuminated. Releasing the key clears the LEDs and the display.
- 8) If the Enter key is pressed, all the LEDs are lit and all the columns of the LCD are illuminated (i.e. all the columns are blacked). Releasing the key clears the LEDs and the display.
- 9) When all the keys have been tested, "PANEL CHECK DONE" message is displayed and all the LEDs are kept blinking. This state persists until the printer is turned OFF.

e. Update flash

Turn the power switch ON while pressing the Menu and Item keys simultaneously. This function supplies the Flash Menu to control and download the firmware.

VII. PAPER FEEDER

A. Outline

The operation sequences of the paper feeder are controlled by the paper feeder driver. A 4-bit microprocessor is used in the paper feeder driver, which controls the sequences of the paper feeder and the serial communication with the engine controller of the printer.

The engine controller outputs the pick-up command to the paper feeder driver at the necessary timing. The paper feeder driver drives the solenoid in response to the command. The paper feeder driver also sends back the status of the paper feeder to the engine controller.

The printer supplies +24VDC to the paper feeder. The paper feeder driver generates +3.3V for the ICs based on this +24V.

The flow of input/output signals to/from the paper feeder driver PCB is as shown below.

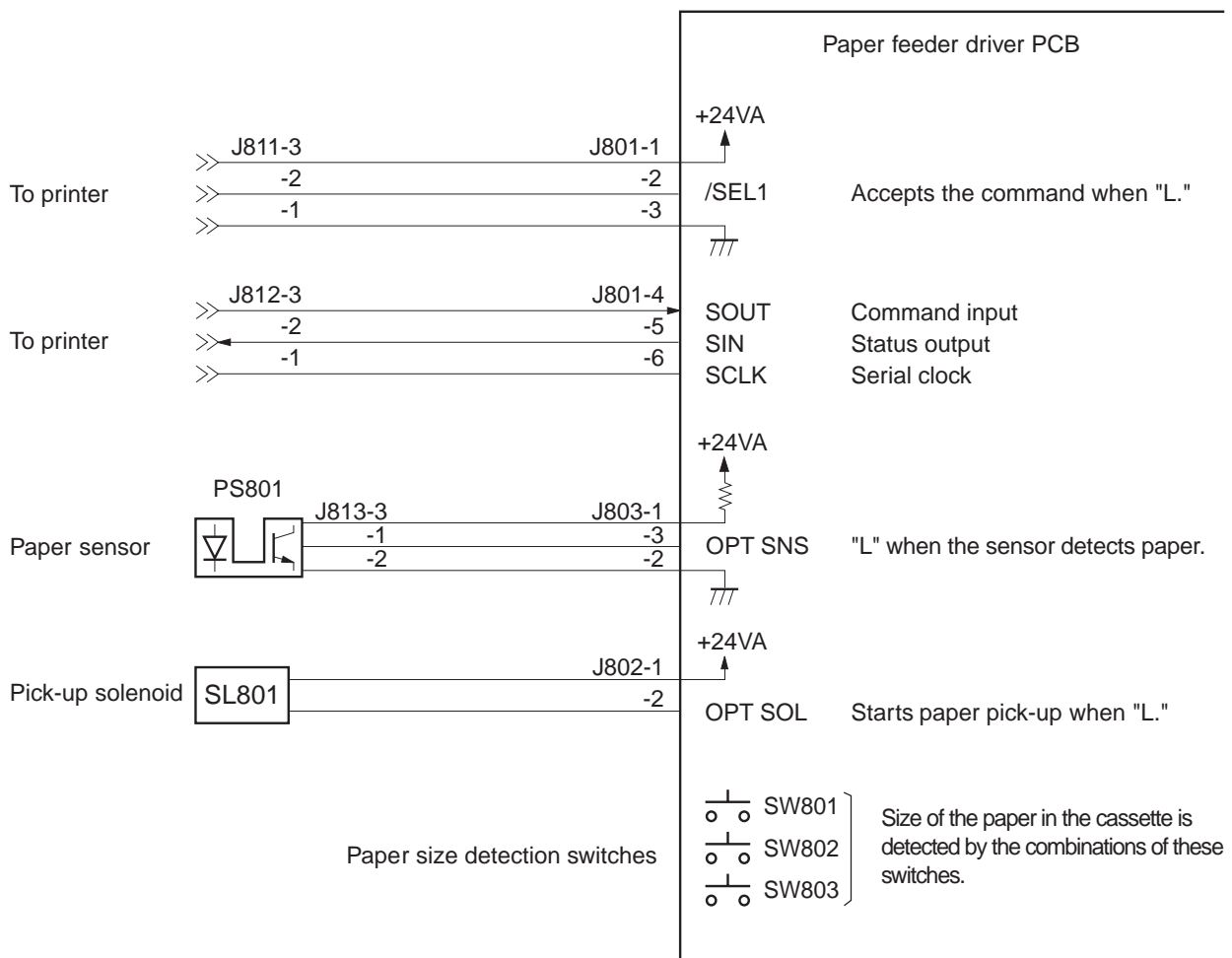


Figure 2-7-1

B. Pick-up and Feeding

The paper feeder picks up the paper from the cassette installed in the paper feeder and feeds the paper to the printer. The flow of the paper is as shown below.

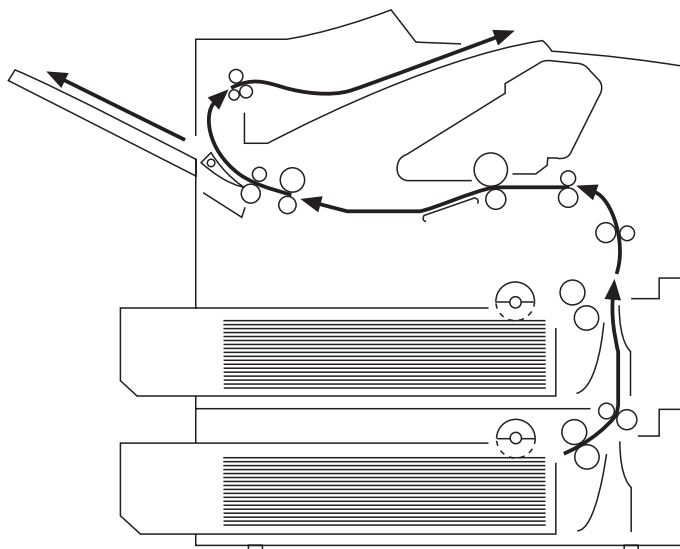


Figure 2-7-2

The paper size and the presence of the cassette are detected by the three switches (SW801, 802, 803) on the paper feeder driver PCB. The relationship between the switch combinations and the paper sizes is the same as that of the printer.

The paper feeder is driven by the main motor (M101) of the printer via the gear.

When the /PRNT signal is sent to the engine controller from the video controller, the main motor (M101) of the printer starts rotation. When the main motor reaches its prescribed speed, the paper feeder driver PCB receives the pick-up command from the engine controller, and the paper feeder pick-up solenoid (SL801) is turned ON. As a result, the pick-up roller, feed roller, and separation roller are driven by the main motor rotation.

The pick-up roller makes one rotation by the solenoid and picks up the paper inside the cassette. Then, the unnecessary sheets are removed by the separation roller and the picked up paper is fed to the pre-feed sensor (PS102) of the printer.

The CPU on the engine controller PCB detects the conditions of the PS102 for a prescribed period of time after the pick-up starts. If the PS102 does not detect no paper within the prescribed time, the CPU turns OFF the feed roller clutch (CL101) to stop the paper in the prescribed time after the top of page sensor (PS103) detects the paper present condition of the preceding paper. When the top of page sensor (PS103) detects the trailing edge of the preceding paper, the CPU resumes feeding the stopped paper. By this, the between-page distance appropriate for the continuous printing is achieved.

The paper then reaches the registration arm where its skew is corrected, goes through transfer, separation, fixing and delivery unit and is delivered to the tray.

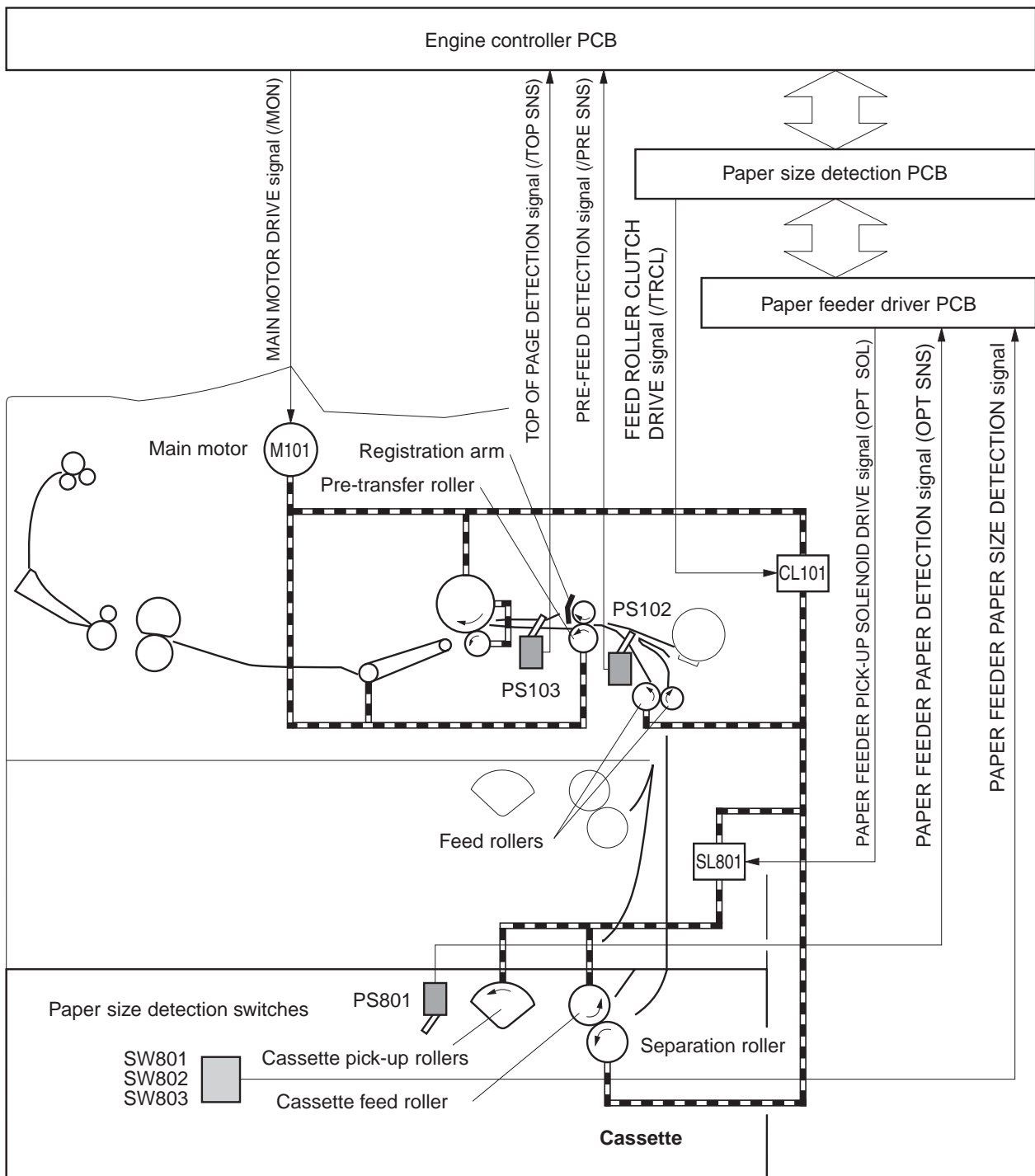


Figure 2-7-3

- PS102: Pre-feed sensor (printer)
- PS103: Top of page sensor (printer)
- PS801: Paper feeder paper sensor
- CL101: Feed roller clutch (printer)
- SL801: Paper feeder pick-up solenoid

- Paper feeder pick-up timing

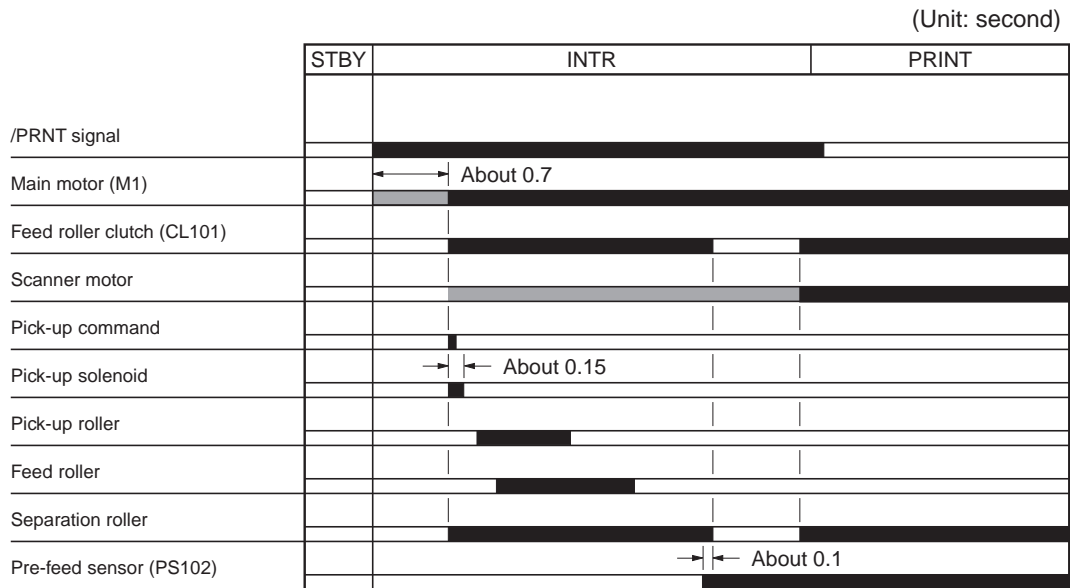


Figure 2-7-4

C. Paper Jam Detection

The paper jam detection when the paper is picked up from the paper feeder and fed to the printer is the same as that of the printer.

See page 2-48 for details.

VIII. ENVELOPE FEEDER

A. Outline

The operation sequences of the envelope feeder are controlled by the envelope feeder driver. A 4-bit microprocessor is used in the envelope feeder driver, which controls the sequences of the envelope feeder and the serial communication with the engine controller of the printer.

The engine controller outputs the pick-up command to the paper feeder driver at the necessary timing. The envelope feeder driver drives the solenoid in response to the command. The envelope feeder driver also sends back the status of the envelope feeder to the engine controller.

The printer supplies +24VDC to the envelope feeder. The envelope feeder driver generates +3.3V for the ICs based on this +24V.

The flow of input/output signals to/from the envelope feeder driver PCB is as shown below.

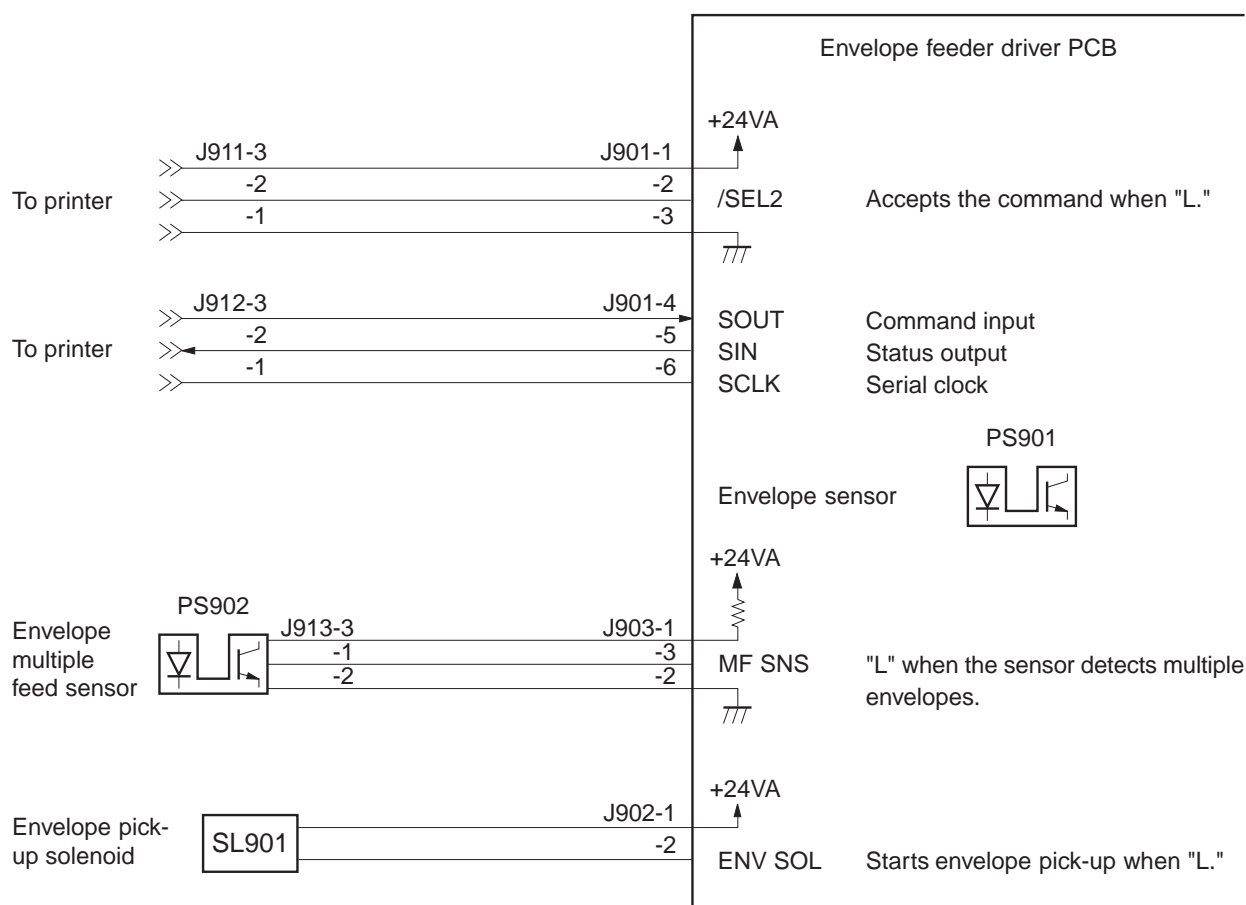


Figure 2-8-1

B. Pick-up and Feeding

The envelope feeder picks up the envelope from the envelope feeder and feeds it to the printer. The flow of the envelope is as shown below.

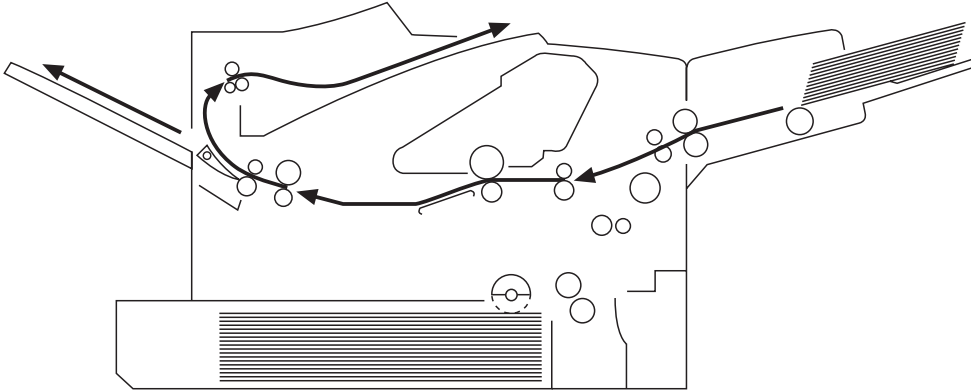


Figure 2-8-2

The envelope feeder is driven by the main motor (M101) of the printer via the gear.

When the /PRNT is sent to the engine controller from the video controller, the printer starts the initial rotation. When the initial rotation is completed (completion of main motor start-up, scanner motor start-up, high-voltage control sequence, and of fixing unit start-up), the envelope feeder driver receives the pick-up command from the engine controller and turns ON the envelope pick-up solenoid (SL901).

As a result, the pick-up roller, feed roller, and separation roller are rotated sequentially by the main motor rotation, and an envelope is picked up. Then, the unnecessary envelopes are removed by the separation roller and the picked up envelope is fed to the printer.

The envelope then reaches the registration arm where its skew is corrected, goes through transfer, separation, fixing and delivery unit, and is delivered to the tray.

- Envelope feeder pick-up timing

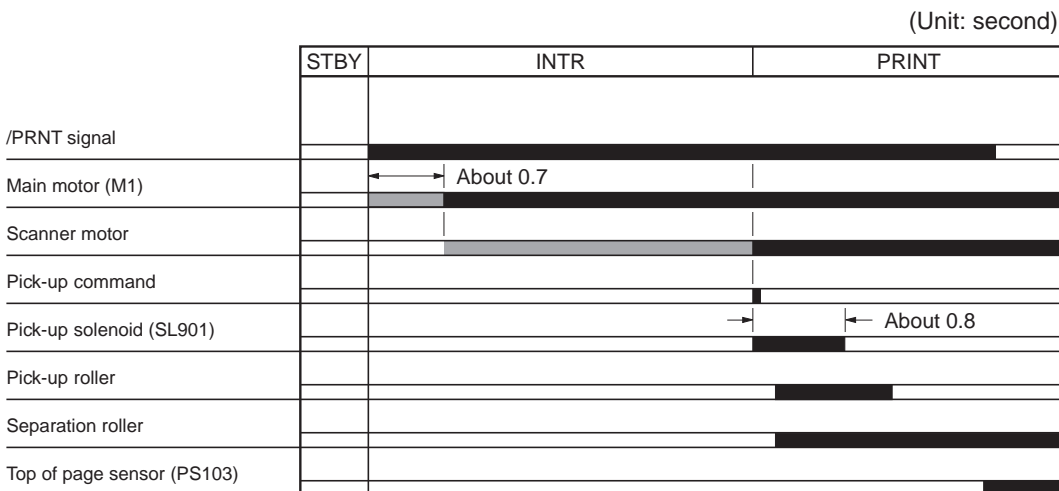


Figure 2-8-3

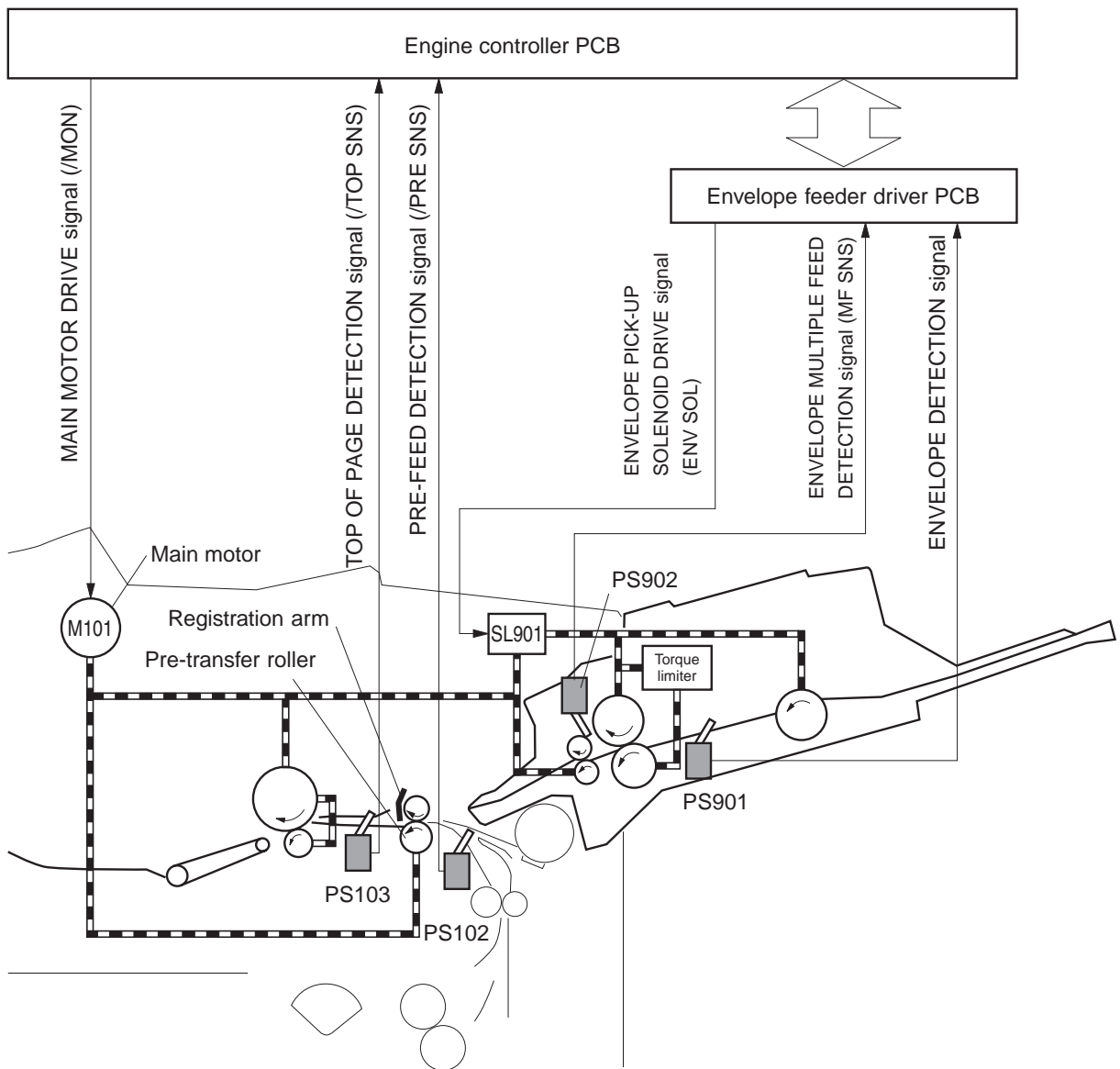


Figure 2-8-4

- PS102: Pre-feed sensor (printer)
- PS103: Top of page sensor (printer)
- PS901: Envelope sensor
- PS902: Envelope multiple feed sensor
- SL901: Envelope pick-up solenoid

The upper separation roller is driven via the torque limiter.

Normally, the upper separation roller is imparted with a rotational force in the same direction as that of the pick-up roller and the lower separation roller (white arrow in the top figure in Figure 2-8-5). However, since the upper separation roller, envelope and lower separation roller contact one another, the upper separation roller rotates with the lower separation roller by transmission of its rotational force via the transported envelope (arrow in the middle figure in Figure 2-8-5).

On the other hand, if multiple envelopes are picked up, the low friction force between the envelopes results in a weak rotational force being transmitted to the upper separation roller from the lower separation roller. Consequently, the upper separation roller rotates in the direction of its own rotational force, which is the opposite direction of the feeding direction (white arrow in the bottom figure in Figure 2-8-5), and separates the extra envelope.

By this, the multi-fed envelope is returned to the envelope feeder and is not fed to the printer.

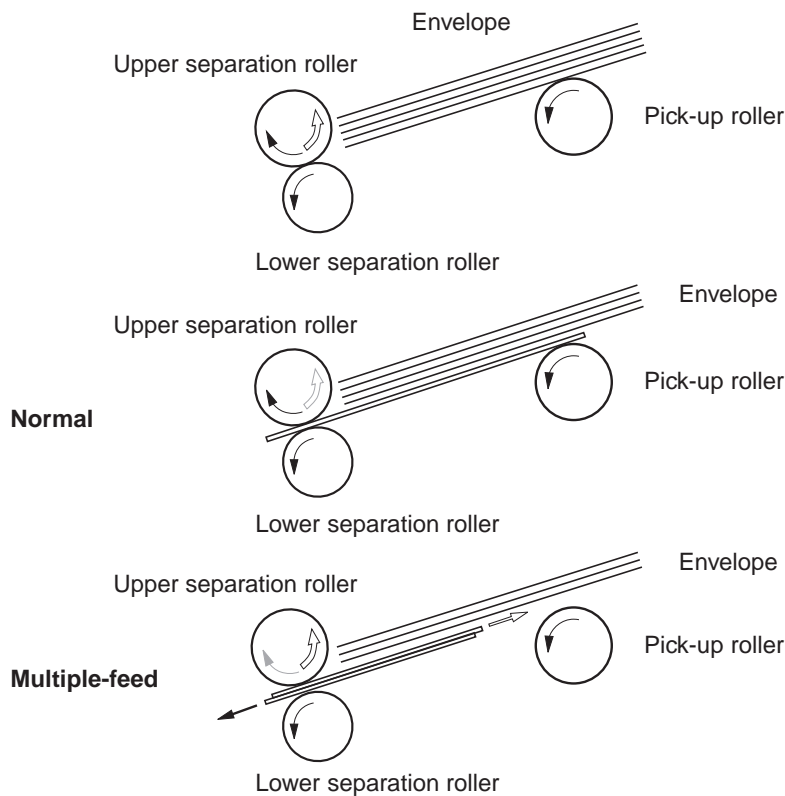


Figure 2-8-5

The envelope feeder has function to detect multiple envelopes feed by sensing the up and down motion of the upper feed roller.

If the multiple envelopes are fed between upper and lower feed rollers, and the upper feed roller is lifted about 0.7mm (equal the thickness of four envelopes), the multiple envelopes feed sensor (PS902) detects the rise of the upper feed roller.

The envelope feeder driver detects the multiple envelopes feed with the PS902 and notifies the jam to the engine controller.

C. Paper Jam Detection

The paper jam detection when the envelope is picked up from the envelope feeder and fed to the printer is the same as that of the printer.

See page 2-48 for details.

IX. DUPLEXING UNIT

A. Outline

The operation sequences of the duplexing unit are controlled by the duplexing unit driver. A 4-bit microprocessor is used in the duplexing unit driver, which controls the sequences of the duplexing unit and the serial communication with the engine controller of the printer.

The duplexing unit driver drives the solenoid, motors, and fan according to the duplexing unit command and the duplexing unit pick-up command sent from the engine controller. The duplexing unit also sends back the status of the duplexing unit to the engine controller.

The printer supplies +24VDC to the duplexing unit. The duplexing unit driver generates +5V for the ICs based on this +24V.

The flow of input/output signals to/from the duplexing unit driver PCB is as shown figure 2-8-1.

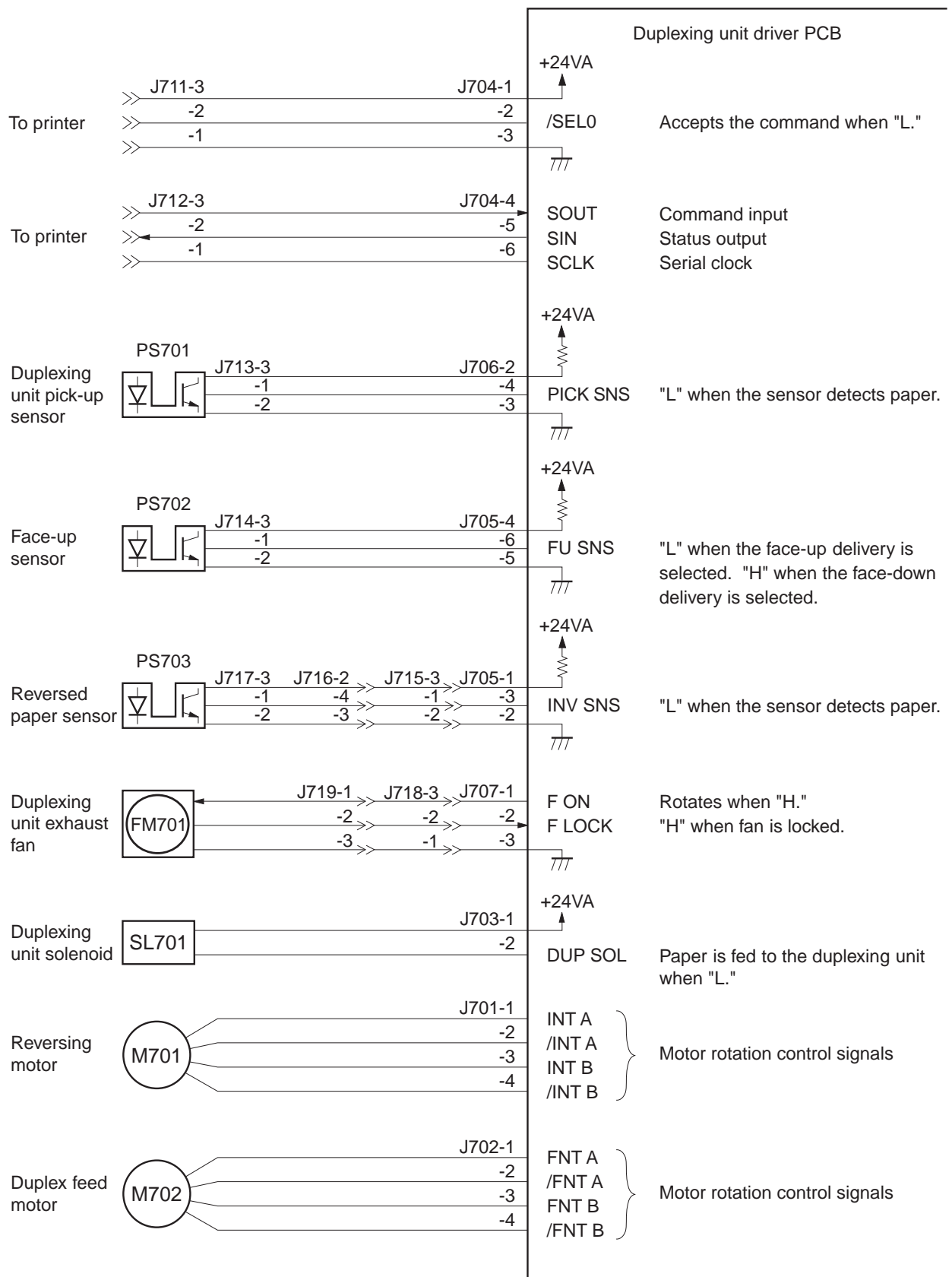


Figure 2-9-1

B. Reversing and Duplexing unit Pick-up

1. Outline

The paper is led to the duplexing unit by the face-up deflector. This face-up deflector moves in conjunction with the face-up tray, however, it moves by the duplexing unit solenoid (SL701) when the face-up tray is closed.

The reversing roller changes the feeding direction of the paper fed to the duplexing unit. The paper is then transported by the oblique roller and feed roller so that its edge contacts with the left panel to correct its skew, and is sent to the printer.

The duplexing unit has two motors; reversing motor (M701) and duplex feed motor (M702). They are stepping motors. The rotating directions (clockwise and counterclockwise) of the motors are controlled by the duplexing unit driver.

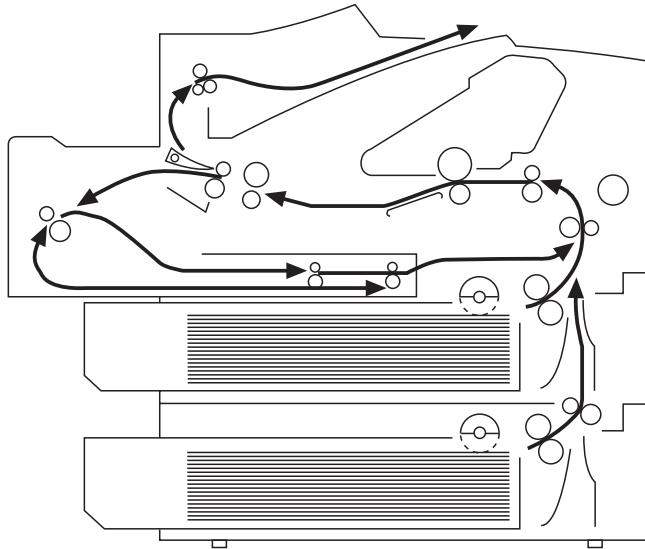
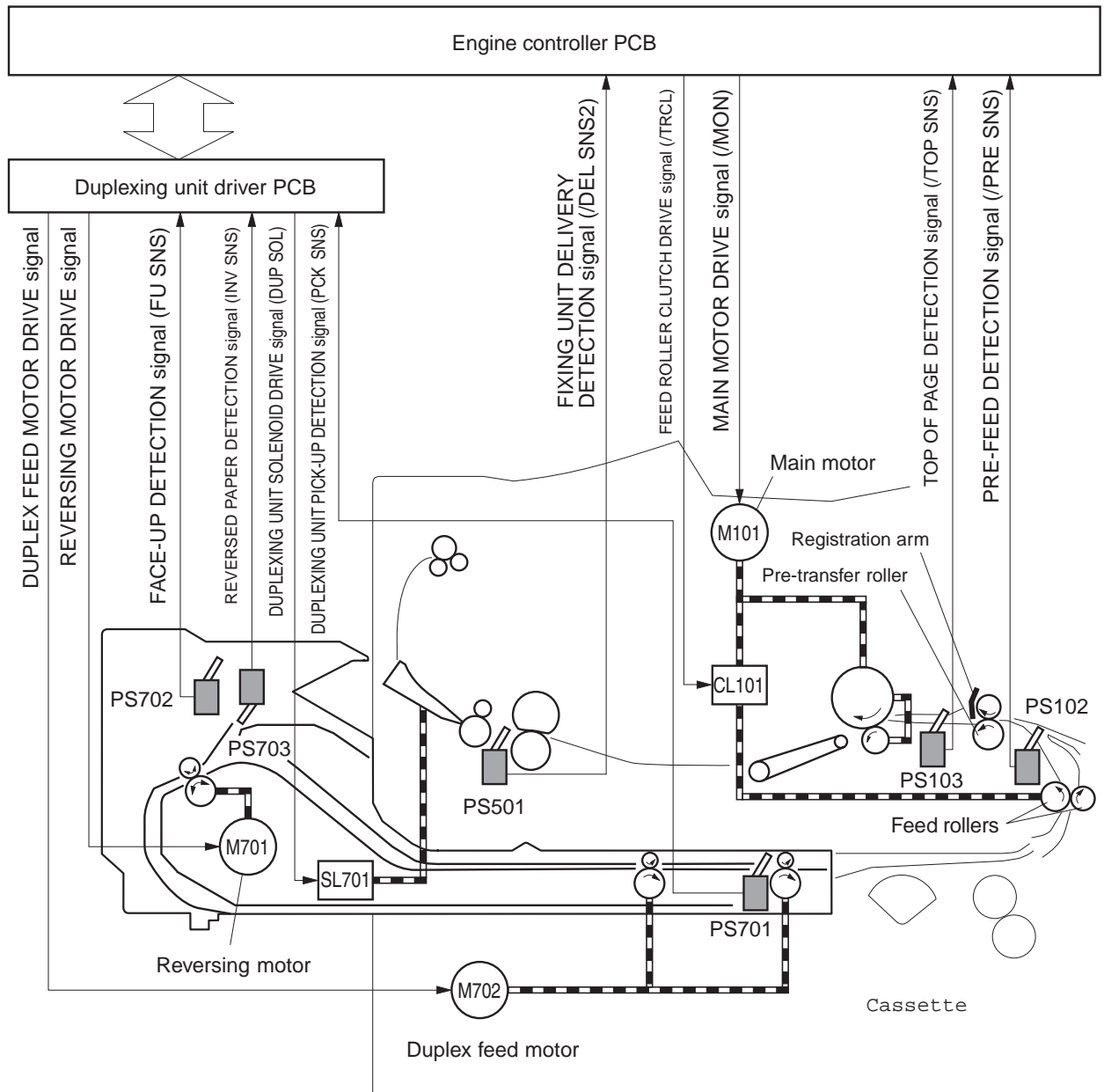


Figure 2-9-2



- PS102: Pre-feed sensor (printer)
- PS103: Top of page sensor (printer)
- PS701: Duplexing unit pick-up sensor
- PS702: Face-up sensor
- PS703: Reversed paper sensor
- CL101: Feed roller clutch (printer)
- SL701: Duplexing unit solenoid
- M701: Reversing motor
- M702: Duplex feed motor

Figure 2-9-3

2. Reversing

When the duplexing unit receives the duplexing unit command from the printer, it turns ON the duplexing unit solenoid (SL701), moves the face-up deflector and feeds the paper to the duplexing unit. It also rotates the reversing motor (M701) in the reverse direction (CCW) for about 1 second, and feeds the paper remaining in the reversing unit to the duplexing unit pick-up sensor (PS701).

About 0.3 seconds (about 0.5 seconds for 1200dpi print) after the paper reaches the reversed paper sensor (PS703), the duplexing unit driver rotates the reversing motor in the normal direction (CW), and feeds the paper to the reversing wait position (where the paper reaches about 0.2 seconds after the leading edge of the paper passes the reversed paper sensor).

If the duplexing unit pick-up sensor (PS701) does not detect the preceding paper, the duplexing unit driver rotates the reversing motor in the reverse direction (CCW) and the duplex feed motor (M702) in the normal direction (CW) in order to feed the paper to the duplex pick-up wait position (where the paper reaches about 0.4 seconds after the leading edge of the paper passes the duplexing unit pick-up sensor) at high speed.

If the PS701 detects the preceding paper, the duplexing unit holds the paper at the duplexing unit pick-up wait position until the preceding paper passes the sensor.

- Reversing timing

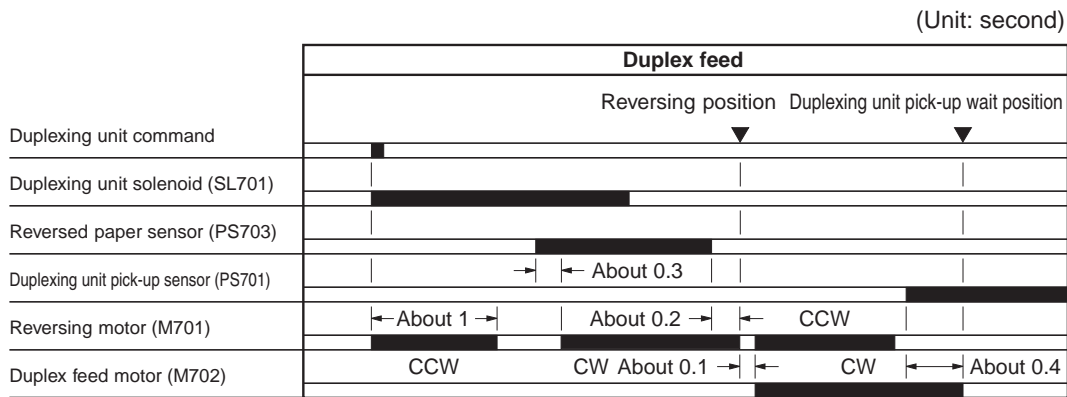


Figure 2-9-4

3. Duplexing unit pick-up

When the /PRNT signal is sent to the engine controller from the video controller, the main motor (M1) of the printer starts rotation. When the main motor rotation reaches its prescribed speed, the engine controller turns ON the feed roller clutch (CL101) of the printer and sends the duplexing unit pick-up command to the duplexing unit driver.

When the duplexing unit driver receives the duplexing unit pick-up command from the printer, it rotates the duplex feed motor (M702) in the reverse direction (CCW) to feed the paper from the duplexing unit pick-up wait position to the pre-feeder sensor (PS102) of the printer at the same speed as the print speed of the printer.

The engine controller detects the conditions of the PS102 for a prescribed period of time after the duplexing unit pick-up starts. If the PS102 does not detect no paper within the prescribed period of time, the engine controller turns OFF the feed roller clutch (CL101) and sends the feed stop command to the duplexing unit driver to stop feeding the paper in the prescribed period of time after the top of page sensor (PS103) detects the paper present condition of the preceding paper. When the top of page sensor (PS103) detects the trailing edge of the preceding paper, the CPU resumes feeding the stopped paper. By this, the between-page distance appropriate for the continuous printing is achieved.

The paper then reaches the registration arm where its skew is corrected, goes through transfer, separation, fixing and delivery unit and is delivered to the tray.

- Duplexing unit pick-up timing

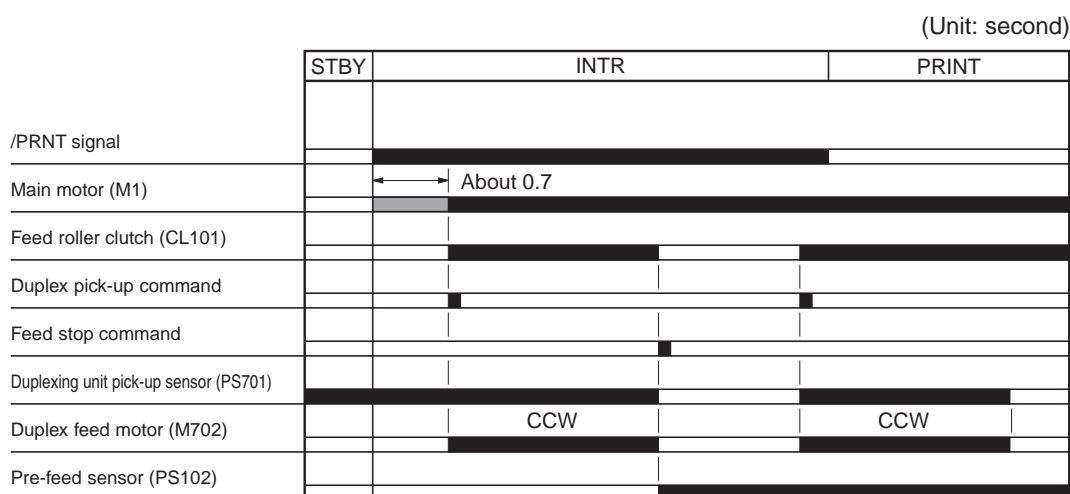


Figure 2-9-5

C. Paper Jam Detection

The following paper sensors are installed to detect whether the paper is present or not and whether the paper is fed normally or not.

- Reversed paper sensor (PS703)
- Duplexing unit pick-up sensor (PS701)

The microprocessor (CPU) determines whether paper is jammed or not by checking whether paper is present or absent at the sensors at check timing stored in the memory.

If the CPU determines that a jam has occurred, it stops duplex feeding and notifies the jam occurrence to the engine controller.

1. Pick-up delay jam

The CPU assesses a pick-up delay jam if the pre-feed sensor (PS102) does not detect the leading edge of the paper within the prescribed period of time (about 2 sec.) after the paper was picked up, or if the top of page sensor (PS103) does not detect the leading edge of the paper within the prescribed period of time after the start of duplex pick-up.

2. Reverse delay jam

The CPU assesses a reverse delay jam if the reversed paper sensor (PS703) does not detect the leading edge of the paper within the prescribe time (about 2.2 sec.) after the fixing unit delivery sensor 1 (PS501) detects the leading edge of the paper.

3. Reverse stationary jam

The CPU assesses a reverse stationary jam if the reversed paper sensor (PS703) does not detect the trailing edge of the reversed paper within the prescribed period of time (about 4.2 sec.) after detecting the leading edge.

4. Duplexing unit pick-up delay jam

The CPU assesses a duplex pick-up delay jam if the duplexing unit pick-up sensor (PS701) does not detect the leading edge of the paper within the prescribed period of time (about 1.5 sec.) after the reversing is completed.

5. Duplexing unit pick-up stationary jam

The CPU assesses a duplex pick-up stationary jam if the duplexing unit pick-up sensor (PS701) does not detect the trailing edge of the paper within the prescribed period of time (about 4.3 sec.) after the duplexing unit pick-up starts.

CHAPTER 3

THE MECHANICAL SYSTEM

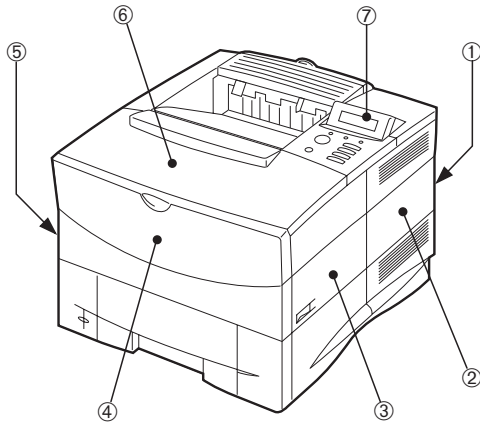
This chapter describes mechanical operation as well as disassembly and reassembly procedures of the printer. Note the following precautions during disassembly or reassembly.

1. When you remove the EP-52 cartridge, cover the cartridge with a cloth or put it in a dark place to prevent light from affecting the drum inside the cartridge.
2. Remove the cartridge from the printer before disassembling or transporting the printer.
3. **▲ CAUTION:** Before servicing the printer, disconnect its power cord from the electrical outlet.
4. Assembly is the reverse of disassembly unless otherwise specified.
5. Note the lengths, diameters, and locations of screws as you remove them. When reassembling the printer, be sure to use them in their original locations.
6. Do not operate the printer with any parts removed.
7. Discharge electrical static from your body by touching the metal frame of the printer prior to installing the PCB in order to avoid causing damage by the difference in static charge at that time.

I. EXTERNALS	3-1	SYSTEM	3-20
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		X. DUPLEXING UNIT	3-39

I. EXTERNALS

A. External Covers

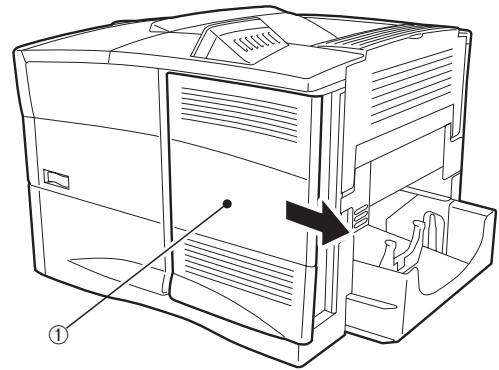


- ① Face-up tray ② Right rear cover
- ③ Right cover ④ Front cover
- ⑤ Left cover ⑥ Top cover unit
- ⑦ Operation panel

Figure 3-1-1

1. Right rear cover

- 1) Hold the right rear cover and slide it in the direction of the arrow to remove it.

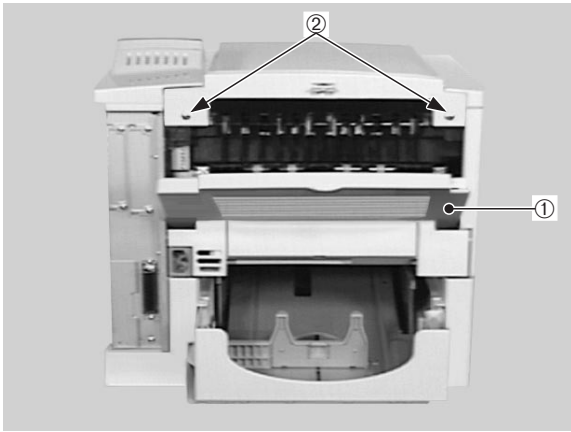


- ① Right rear cover

Figure 3-1-2

2. Top cover unit

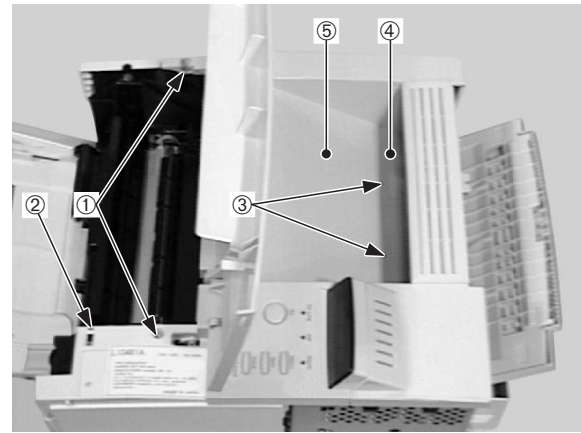
- 1) Open the front cover.
- 2) Remove the right rear cover
- 3) Open the face-up tray and remove the 2 screws.



- ① Face-up tray ② Screws

Figure 3-1-3

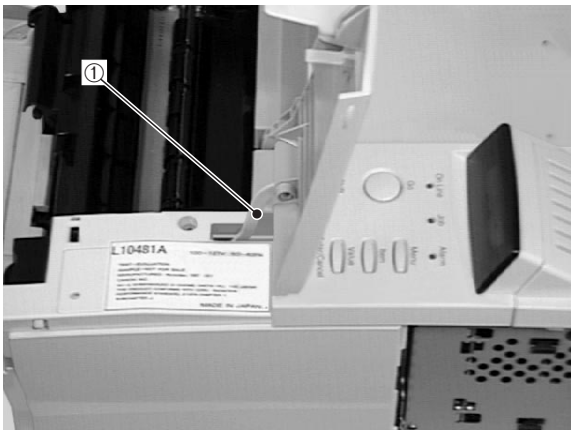
- 6) Remove the 2 screws.
- 7) Unhook the claw on the right front side of the top cover.
- 8) While pressing down the delivery unit, release the 3 claws and remove the top cover unit.



- ① Screws ② Claw
③ Claws ④ Delivery unit
⑤ Top cover unit

Figure 3-1-5

- 4) Open the top cover.
- 5) Unhook the claw to remove the rod from the top cover unit.



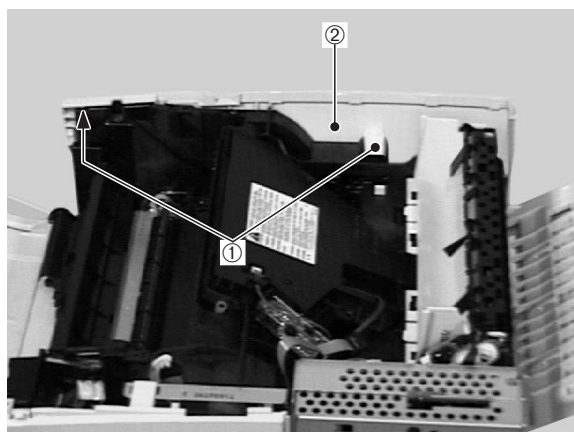
- ① Rod

Figure 3-1-4

- 9) Disconnect the connector from the operation panel and remove the top cover.

3. Left cover

- 1) Remove the top cover unit.
- 2) Unhook the 2 claws and remove the left cover.

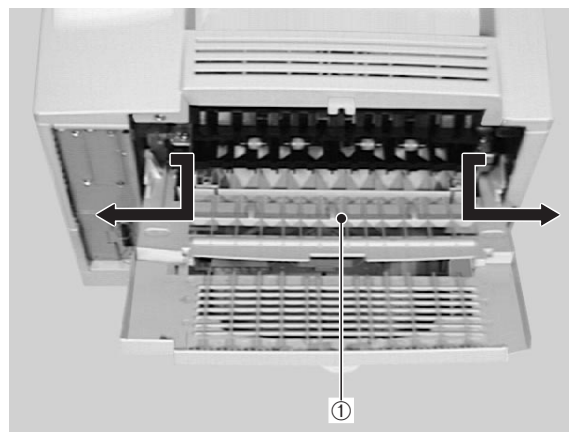


① Claws ② Left cover

Figure 3-1-6

4. Face-up tray

- 1) Open the face-up tray.
- 2) After pulling out the expansion tray, press the shaft on one side of the face-up tray to remove the face-up tray.

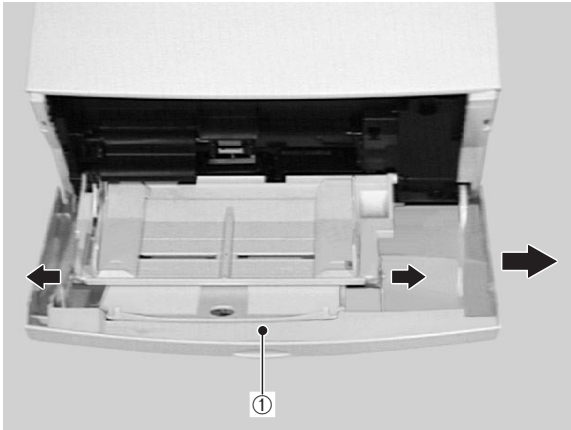


① Face-up tray

Figure 3-1-7

5. Multi-purpose tray

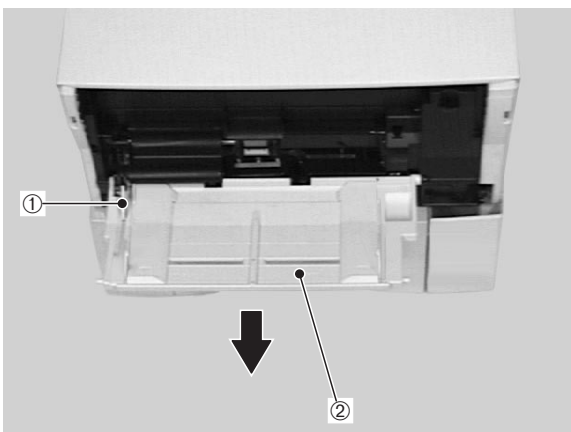
- 1) Open the front cover.
- 2) Spread the sides of the front cover slightly to the outside and remove the multi-purpose tray from the front cover. Then slide the front cover to the right to remove it.



① Front cover

Figure 3-1-8

- 3) Remove the stopper from the multi-purpose tray.
- 4) Pull down the left side of the multi-purpose tray, then slide it to the left side to remove.

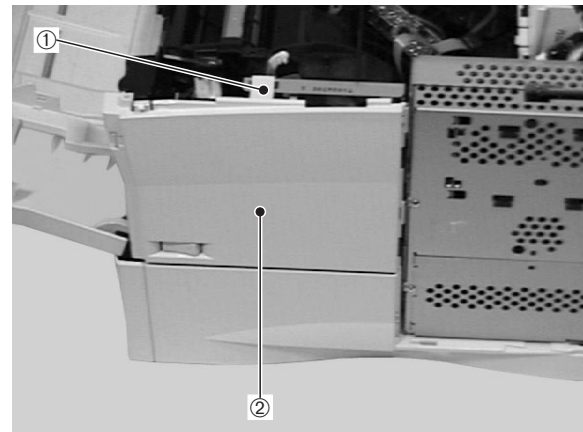


① Stopper ② Multi-purpose tray

Figure 3-1-9

6. Right cover

- 1) Remove the right rear cover and top cover unit.
- 2) Unhook the claw and remove the right cover.

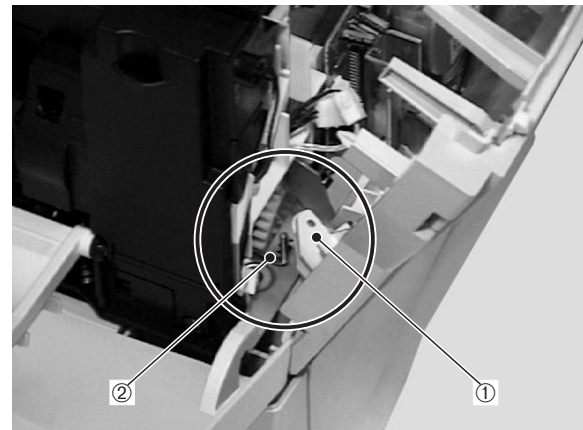


① Claw ② Right cover

Figure 3-1-10

<Precautions on reassembly>

Be sure to attach the rod to the hole of the switch button on the right cover when installing the right cover.



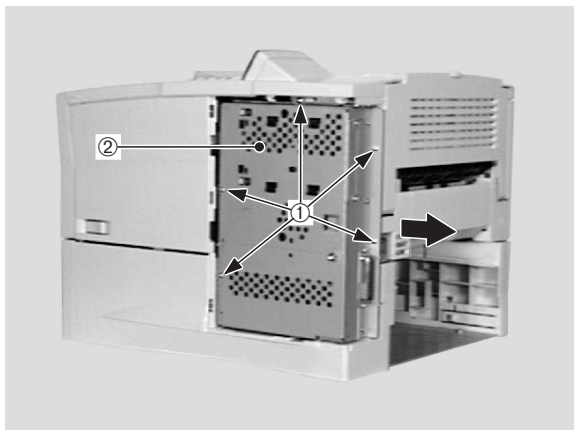
① Switch button ② Rod

Figure 3-1-11

B. Pick-up Module

1. Removal from the printer

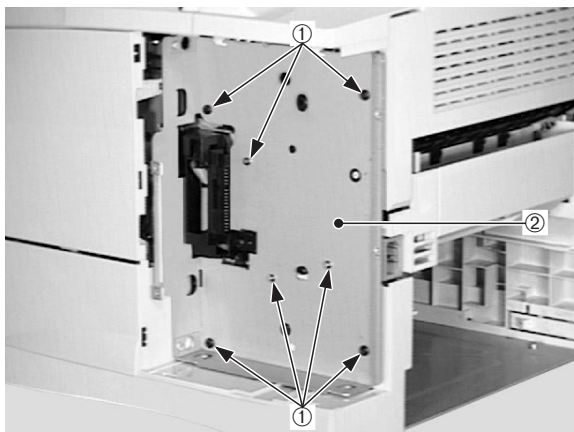
- 1) Remove the cassette.
- 2) Remove the right rear cover.
- 3) Remove the 5 screws.
- 4) Slide the video controller unit in the direction of the arrow to remove it.



① Screws ② Video controller unit

Figure 3-1-12

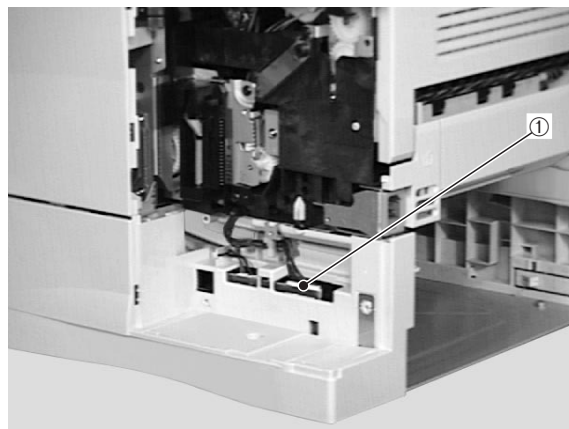
- 5) Disconnect the 2 connectors.
- 6) Remove the 7 screws, then the cover.



① Screws ② Cover

Figure 3-1-13

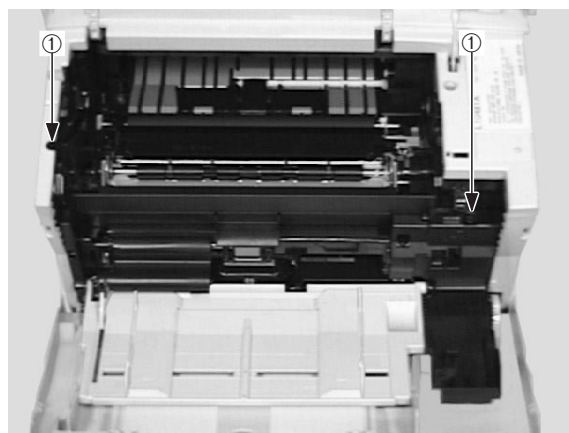
- 7) Disconnect the connector.



① Connector

Figure 3-1-14

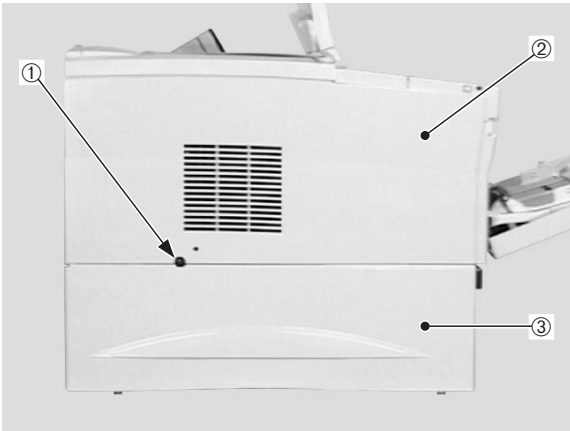
- 8) Open the top cover.
- 9) Open the front cover.
- 10) Open the envelope feeder gear cover.
- 11) Remove the 2 screws.



① Screws

Figure 3-1-15

12) Remove the screw and then the engine module.



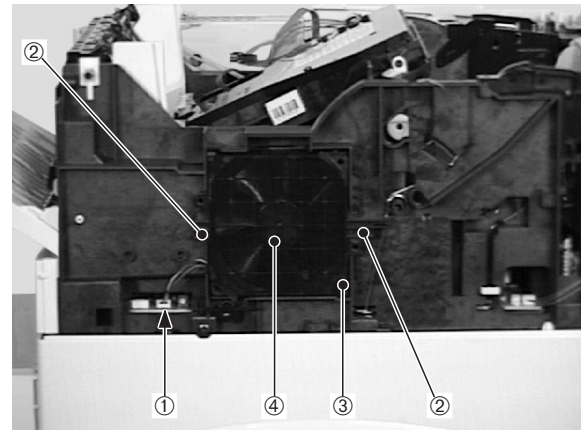
- ① Screw
- ② Engine module
- ③ Pick-up module

Figure 3-1-16

C. Cooling Fan

1. Removal from the printer

- 1) Remove the top cover unit and the left cover.
- 2) Disconnect the connector.
- 3) Unhook the 2 claws and remove the fan filter and cooling fan.



- ① Connector
- ② Claws
- ③ Fan filter
- ④ Cooling fan

Figure 3-1-17

<Precautions on reassembly>

Install the fan so that the surface with label faces inside and that the cable comes to the left bottom, as shown below.

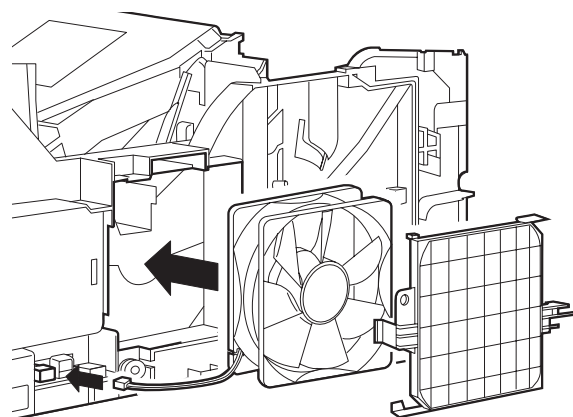
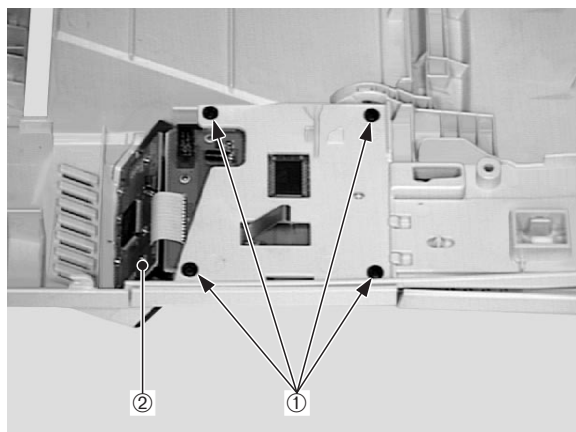


Figure 3-1-18

D. Operation panel**1. Removal from the printer**

- 1) Remove the top cover unit.
- 2) Remove the 4 screws, and then the operation panel.



① Screws

② Operation panel

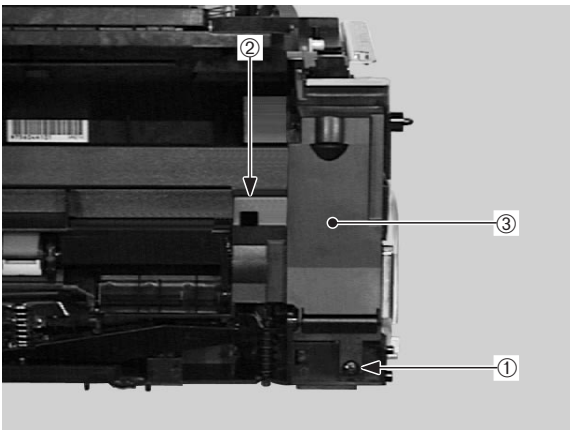
Figure 3-1-19

II. DRIVE SYSTEM

A. Drive Unit

1. Removal from the printer

- 1) Remove the pick-up module.
- 2) Remove the top cover unit and right cover.
- 3) Remove the multi-purpose tray.
- 4) Remove the screw and the claw, then take out the envelope feeder gear cover.

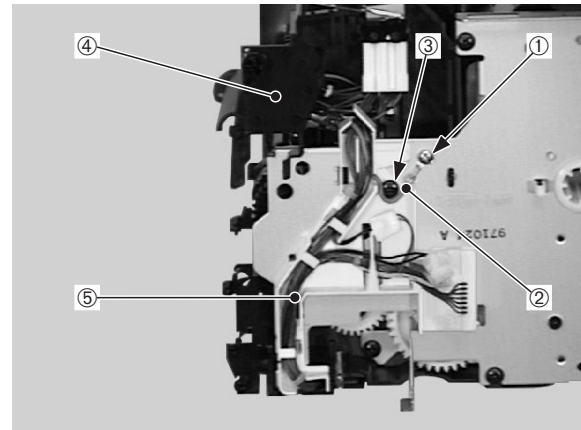


- ① Screw
- ② Claw
- ③ Envelope feeder gear cover

Figure 3-2-1

- 5) Remove the main motor according to the steps 1) through 3) in the main motor removal procedures on page 3-9.

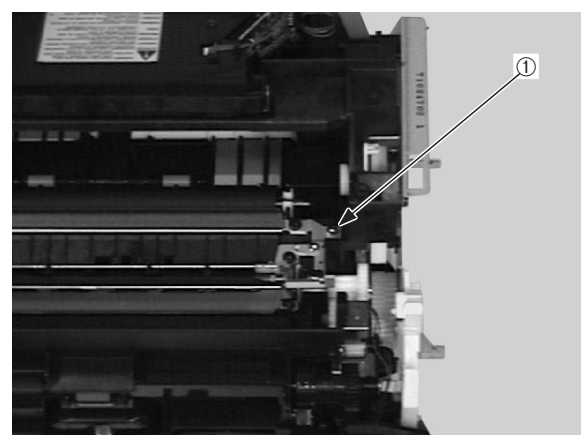
- 6) Remove the screw and release the ground line from the cable guide.
- 7) Remove the screw and then the front inner cover.
- 8) Disconnect all cables from the cable guide.



- ① Screw
- ② Ground line
- ③ Screw
- ④ Front inner cover
- ⑤ Cables

Figure 3-2-2

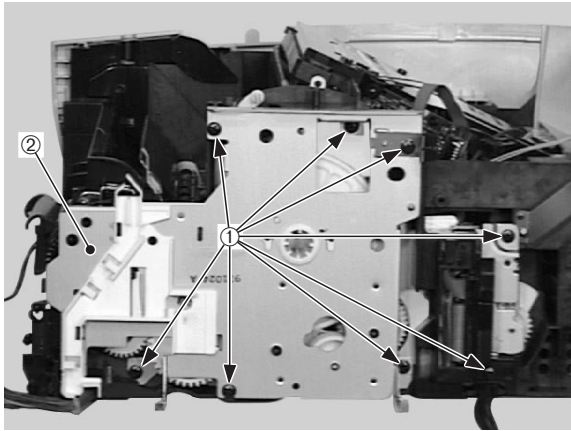
- 9) Remove the fixing unit according to the steps 1) through 5) on page 3-23.
- 10) Open the transfer guide, and remove the screw.



- ① Screw

Figure 3-2-3

11) Remove the 8 screws, then take out the drive unit.



① Screws

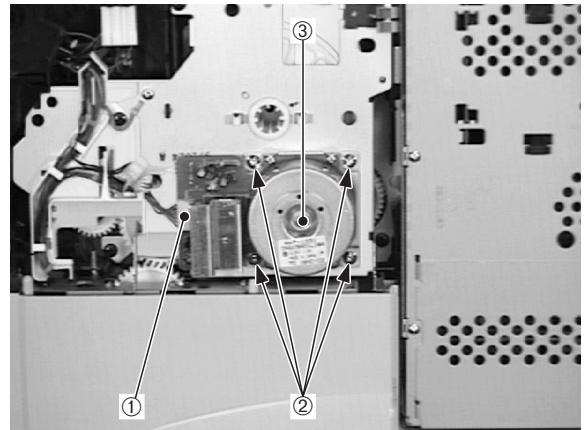
② Drive unit

Figure 3-2-4

B. Main Motor

1. Removal from the printer

- 1) Remove the right rear cover, top cover unit, and right cover.
- 2) Disconnect the connector.
- 3) Remove the 4 screws, then take out the main motor.



① Connector

② Screws

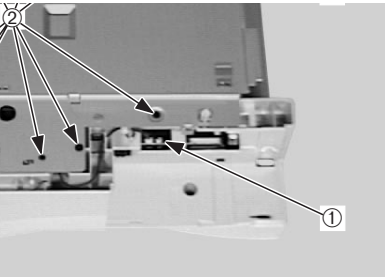
③ Main motor

Figure 3-2-5

C. Pick-up Drive Unit

1. Removal from the printer

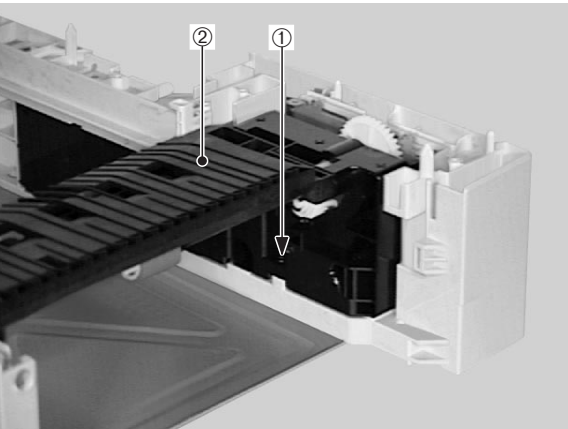
- 1) Remove the pick-up module according to the steps 1) through 12) on page 3-5.
- 2) Disconnect the connector of the solenoid cable.
- 3) Remove the 9 screws and then the cover.



- ① Connector ② Screws
③ Cover

Figure 3-2-6

- 4) Remove the screw, then take out the pick-up drive unit.



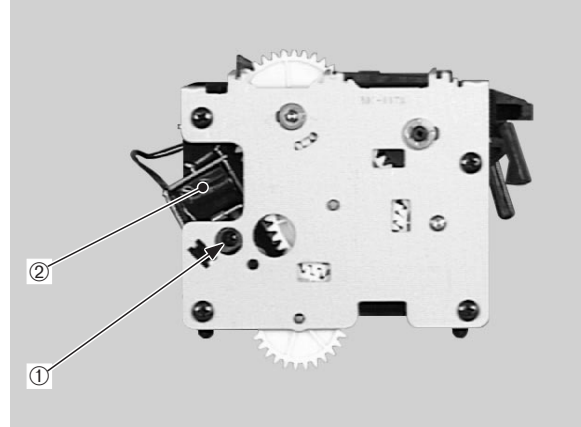
- ① Screw ② Pick-up drive unit

Figure 3-2-7

2. Disassembly and reassembly

a. Cassette pick-up solenoid

- 1) Remove the screw, then take out the cassette pick-up solenoid.



- ① Screw
② Cassette pick-up solenoid

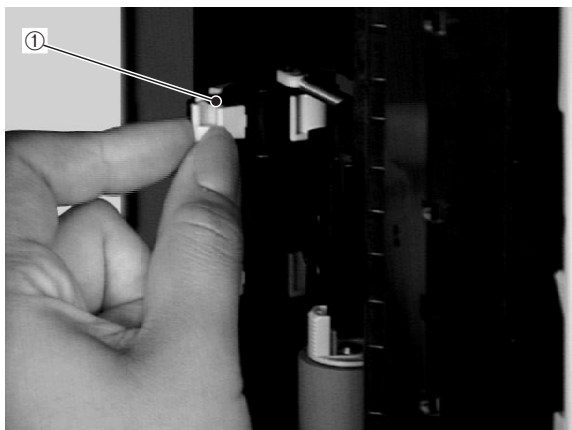
Figure 3-2-8

III. PAPER TRANSPORT SYSTEM

A. Cassette Pick-up Roller

1. Removal from the printer

- 1) Remove the cassette.
- 2) Stand the printer with left side down.
- 3) Hold the knob on the cassette pick-up roller and remove the roller.



① Cassette pick-up roller

Figure 3-3-1

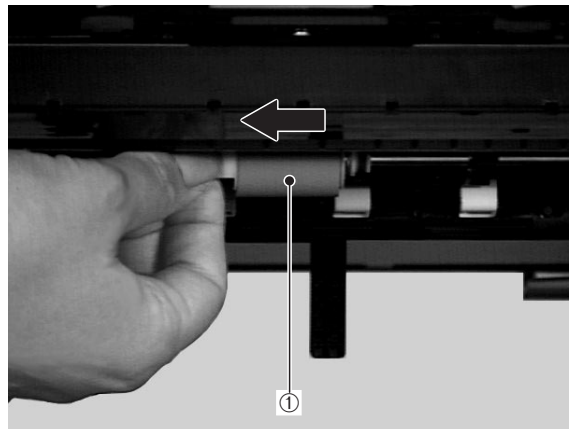
<Precautions on reassembly>

Be sure to install the spring if you remove the spring.

B. Cassette Feed Roller

1. Removal from the printer

- 1) Remove the cassette.
- 2) Hold the knob on the cassette feed roller and pull out the roller.



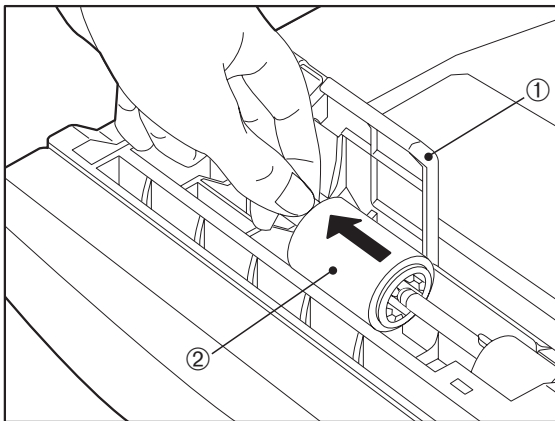
① Cassette feed roller

Figure 3-3-2

C. Separation Roller

1. Removal from the printer

- 1) Remove the cassette.
- 2) Open the cover. Hold the knob on the separation roller and pull out the roller.



① Cover ② Separation roller

Figure 3-3-3

<Precautions on reassembly>

After installing the separation roller, be sure to close the cover.

D. Multi-purpose Tray Pick-up Roller

1. Removal from the printer

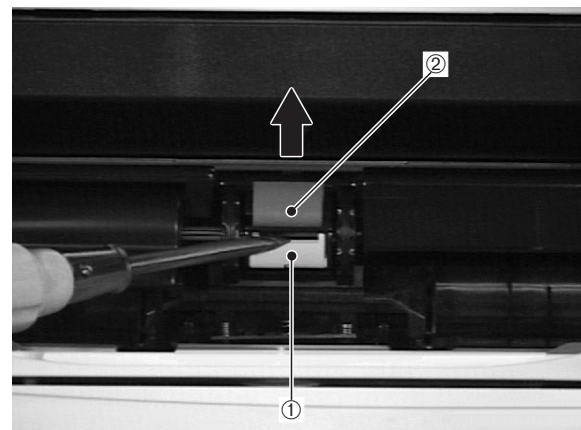
- 1) Open the front cover.
- 2) Remove the envelope entrance cover.



① Envelope entrance cover

Figure 3-3-4

- 3) Remove the blue roller snap with a flat driver.
- 4) Take out the multi-purpose tray pick-up roller by lifting it.



① Roller snap
② Multi-purpose tray pick-up roller

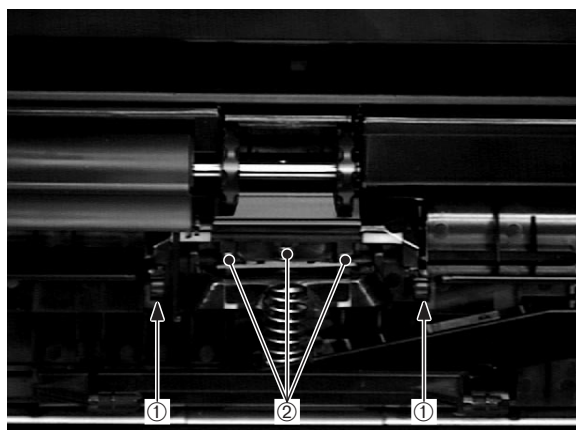
Figure 3-3-5

E. Separation Pad**1. Removal from the printer**

- 1) Open the front cover.
- 2) Remove the multi-purpose tray.
- 3) Remove the envelope entrance cover.
- 4) Remove the multi-purpose tray pick-up roller.
- 5) Disengage the 2 hooks of the separation pad, then remove the 3 springs.

<Precautions on reassembly>

Be sure that the 3 springs are properly set when installing the separation pad.

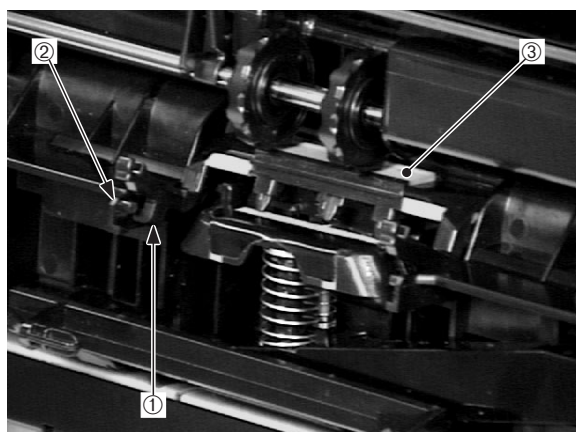


① Hooks

② Springs

Figure 3-3-6

- 6) Pull out the separation pad with its claw passing under the frame boss.



① Claw

② Boss

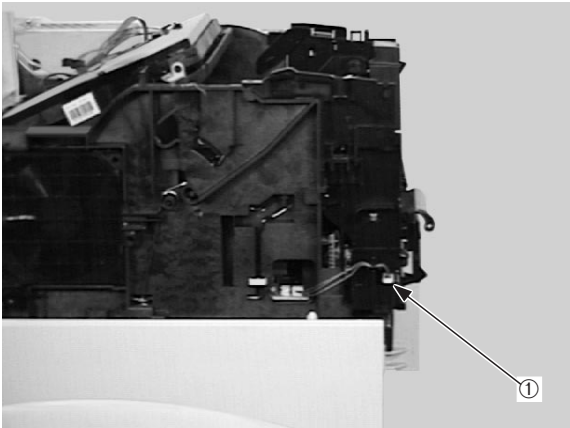
③ Separation pad

Figure 3-3-7

F. Multi-purpose Tray Unit

1. Removal from the printer

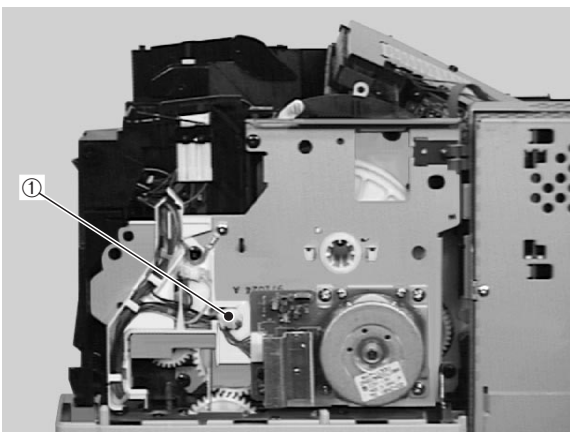
- 1) Remove the top cover unit, right cover, and left cover.
- 2) Take out the cassette.
- 3) Remove the multi-purpose tray.
- 4) Disconnect the connector from the sensor.



① Connector

Figure 3-3-8

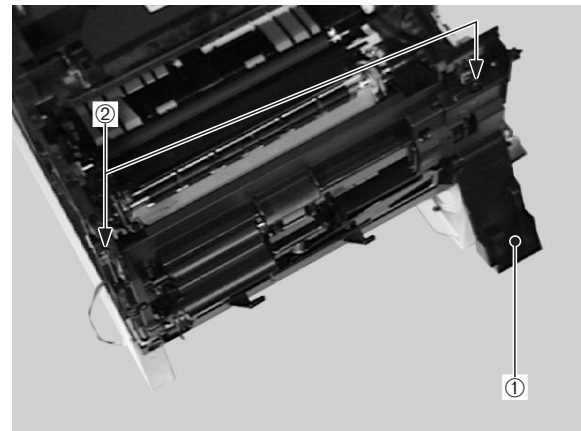
- 5) Disconnect the connector of the solenoid cable.



① Connector

Figure 3-3-9

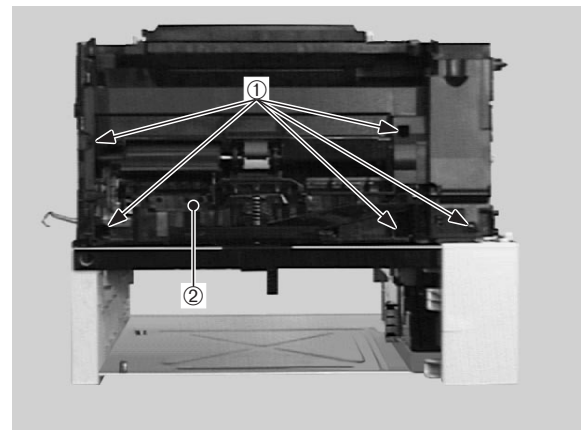
- 6) Open the envelope feeder gear cover.
- 7) Remove the 2 screws holding the pick-up module and engine module.



① Envelope feeder gear cover
② Screws

Figure 3-3-10

- 8) Close the envelope feeder gear cover.
- 9) Remove the 5 screws, then pull the multi-purpose tray pick-up unit toward you to remove.



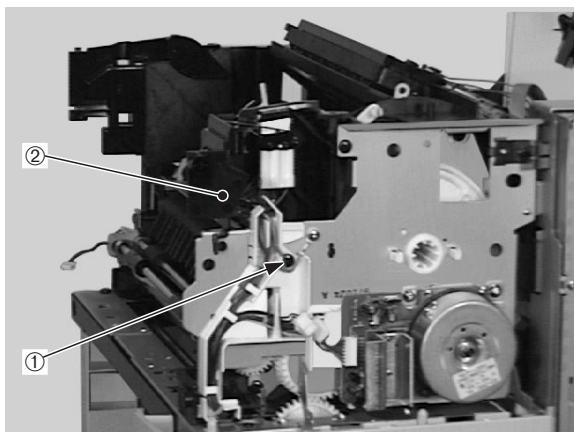
① Screws
② Multi-purpose tray pick-up unit

Figure 3-3-11

G. Registration Unit

1. Removal from the printer

- 1) Remove the multi-purpose tray unit according to the steps 1) through 9) on page 3-14.
- 2) Remove the screw, and move the front inner cover aside.



① Screw ② Front inner cover

Figure 3-3-12

- 3) Remove the 6 screws and then the registration unit.



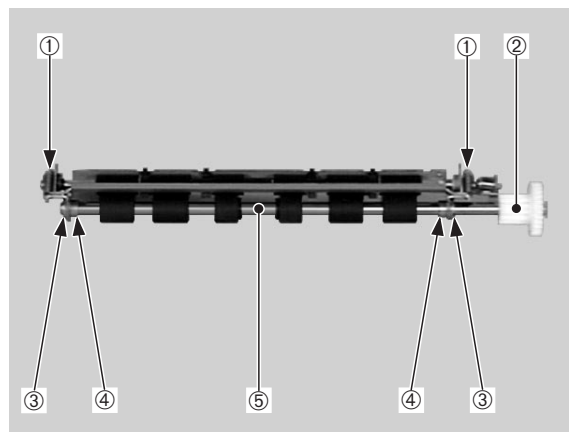
① Screws ② Registration unit

Figure 3-3-13

2. Disassembly and reassembly

a. Pre-transfer roller

- 1) Remove the 2 springs, gear, 2 E-rings, the and 2 bushings, then take out the pre-transfer roller.

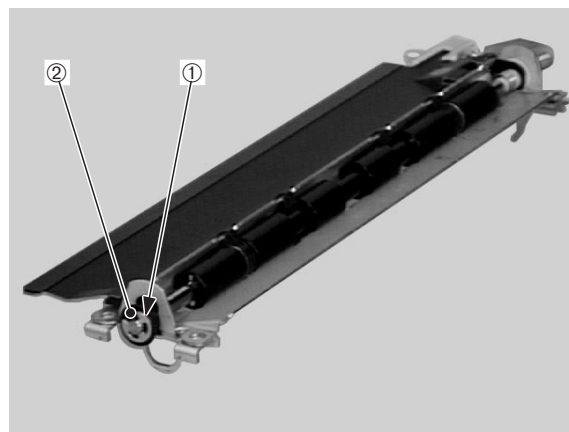


① Springs ② Gear
 ③ E-rings ④ Bushings
 ⑤ Pre-transfer roller

Figure 3-3-14

b. Registration arm

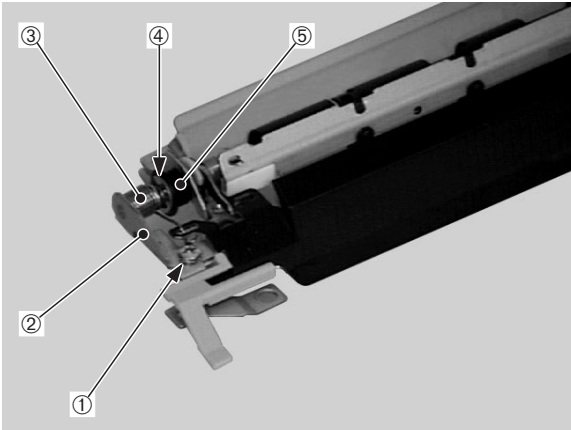
- 1) Remove the pre-transfer roller.
- 2) Remove the E-ring and then the bushing.



① E-ring ② Bushing

Figure 3-3-15

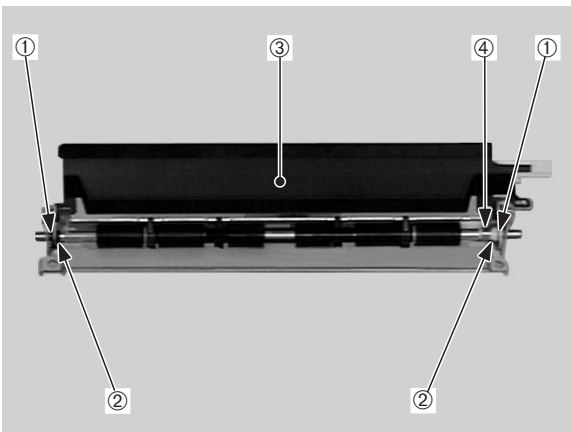
- 3) Undo the screw, and then remove the ground plate and the spring.
- 4) Remove the E-ring and then the bushing.



- | | |
|-----------|----------------|
| ① Screw | ② Ground plate |
| ③ Spring | ④ E-ring |
| ⑤ Bushing | |

Figure 3-3-16

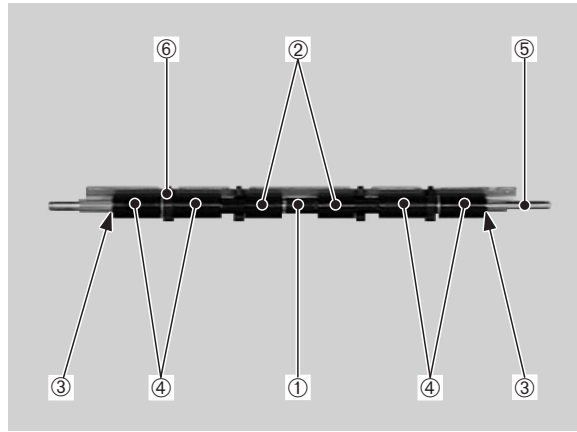
- 5) Remove the 2 bushings and then the 2 lifters.
- 6) Take off the guide plate and undo the spring.



- | | |
|---------------|-----------|
| ① Bushings | ② Lifters |
| ③ Guide plate | ④ Spring |

Figure 3-3-17

- 7) Remove the thrust roller, then move the rollers on both sides toward inside.
- 8) Undo the 2 parallel pins, then remove the rollers and shaft from the registration arm.



- | | |
|-----------------|--------------------|
| ① Thrust roller | ② Rollers |
| ③ Parallel pins | ④ Rollers |
| ⑤ Shaft | ⑥ Registration arm |

Figure 3-3-18

<Precautions on reassembly>

Reassemble the registration arm as shown below.

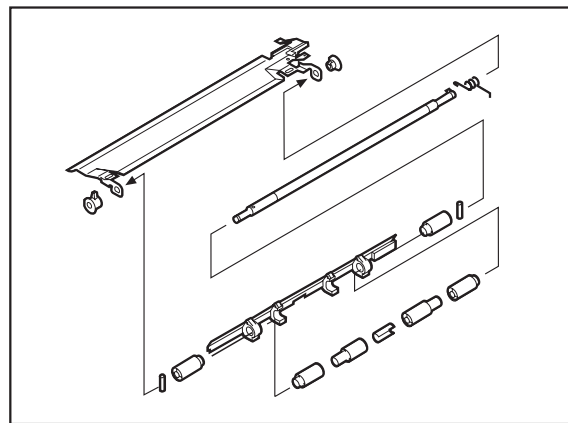
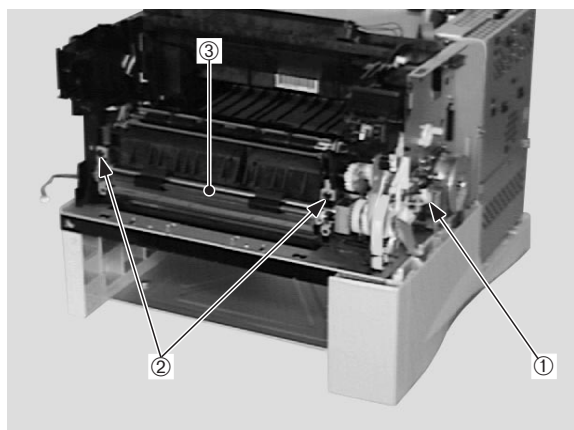


Figure 3-3-19

H. Feed Roller Unit**1. Removal from the printer**

- 1) Remove the multi-purpose tray unit according to the steps 1) through 9) on page 3-14.
- 2) Disconnect the connector of the feed roller clutch cable.
- 3) Remove the 2 screws and then the feed roller unit.



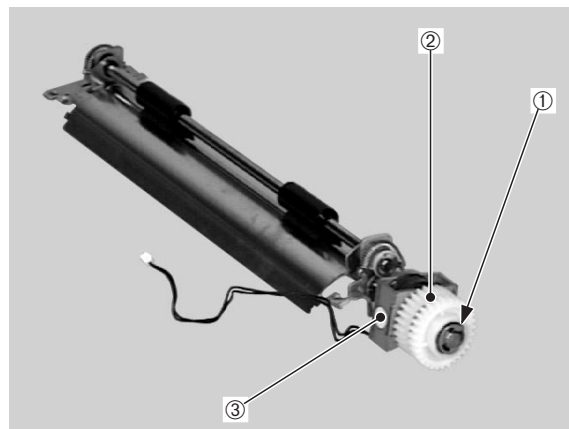
- ① Connector ② Screws
③ Feed roller unit

Figure 3-3-20**<Precautions on reassembly>**

When reassembling the feed roller unit, wire the clutch correctly so that the clutch wire does not touch the gears.

2. Disassembly and reassembly**a. Feed roller clutch**

- 1) Release the E-ring, remove the gear, then take out the feed roller clutch.



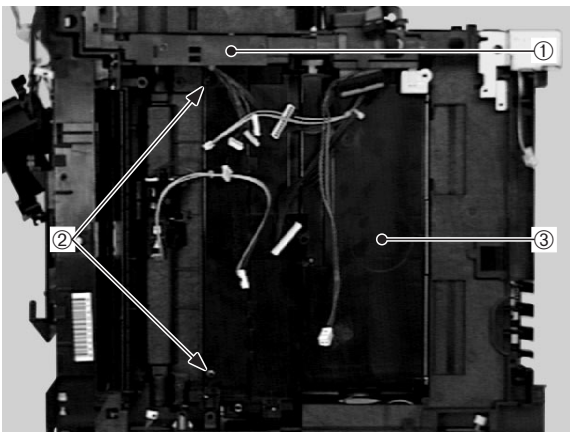
- ① E-ring ② Gear
③ Feed roller clutch

Figure 3-3-21

I. Feed Guide Unit

1. Removal from the printer

- 1) Remove the drive unit according to the steps 1) through 11) on page 3-8.
- 2) Take off the engine controller PCB according to the steps 2) through 9) on page 3-27.
- 3) Remove the cable holder.
- 4) Undo the 2 screws, then slide the feed guide unit in the direction of the arrow to remove it.

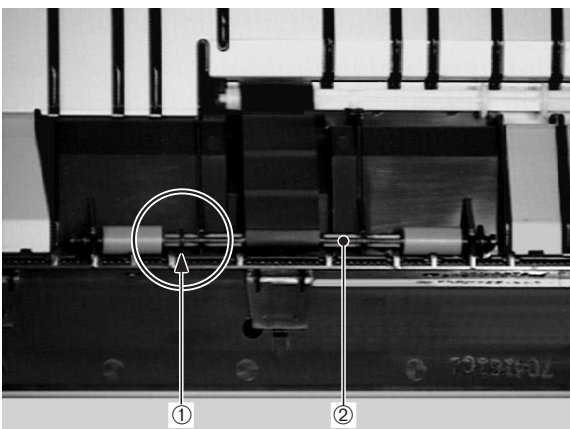


- ① Cable holder ② Screws
- ③ Feed guide unit

Figure 3-3-22

<Precautions on reassembly>

Install the feed roller as shown below so that the rib comes to the left.



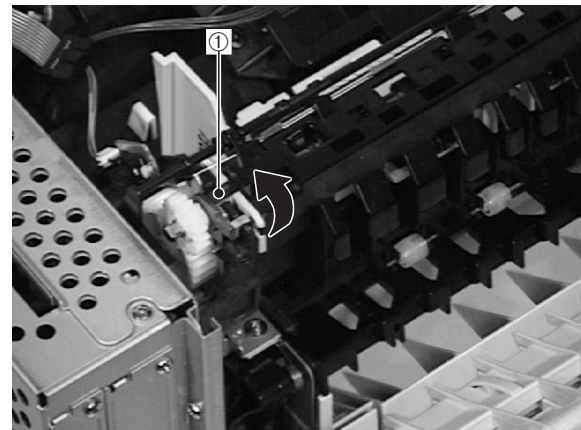
- ① Rib ② Feed roller

Figure 3-3-23

J. Delivery Unit

1. Removal from the printer

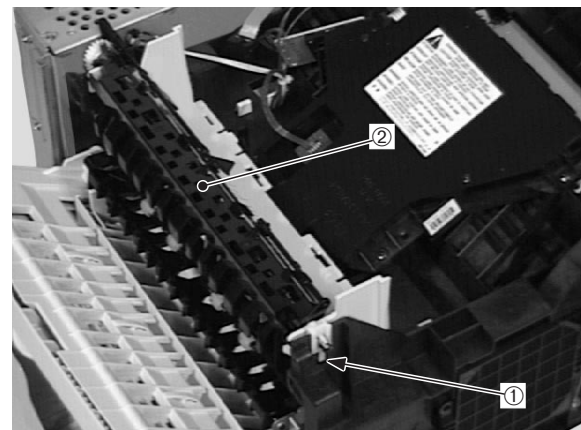
- 1) Remove the top cover unit and left cover.
- 2) Turn the bushing in the direction of the arrow so that the projection part faces upward.



- ① Bushing

Figure 3-3-24

- 3) Unhook the claw of the bushing, then lift the delivery unit to remove it.



- ① Claw ② Delivery unit

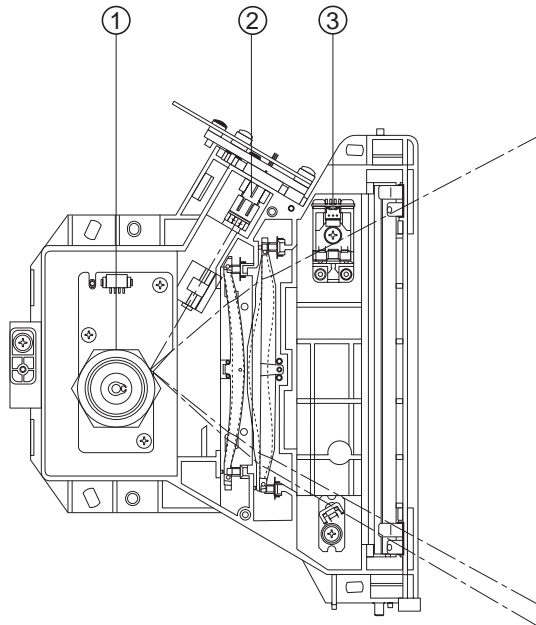
Figure 3-3-25

IV. EXPOSURE SYSTEM

A. Laser/Scanner Unit

1. Configuration

The laser/scanner unit scans the laser beam across the photosensitive drum. The configuration of the laser/scanner unit is in the figure below.

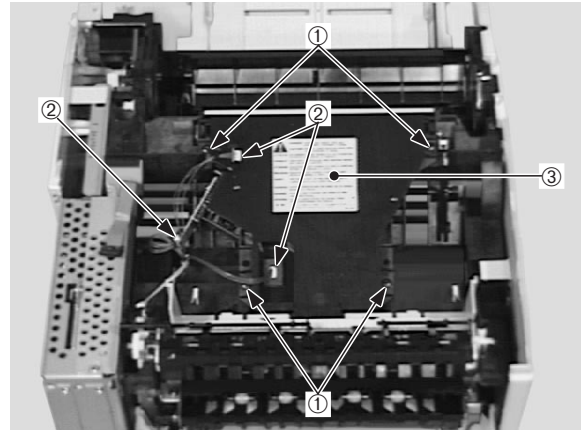


- ① Scanner unit
- ② Laser unit
- ③ BD PCB

Figure 3-4-1

2. Removal from the printer

- 1) Remove the cartridge.
- 2) Remove the top cover unit.
- 3) Undo the 4 screws, disconnect the 3 connectors, and then take out the laser/scanner unit.



- ① Screws
- ② Connectors
- ③ Laser/scanner unit

Figure 3-4-2

Note: Never disassemble the laser/scanner unit as it cannot be adjusted in the field.

V. ELECTROSTATIC IMAGING/DEVELOPING/CLEANING SYSTEM

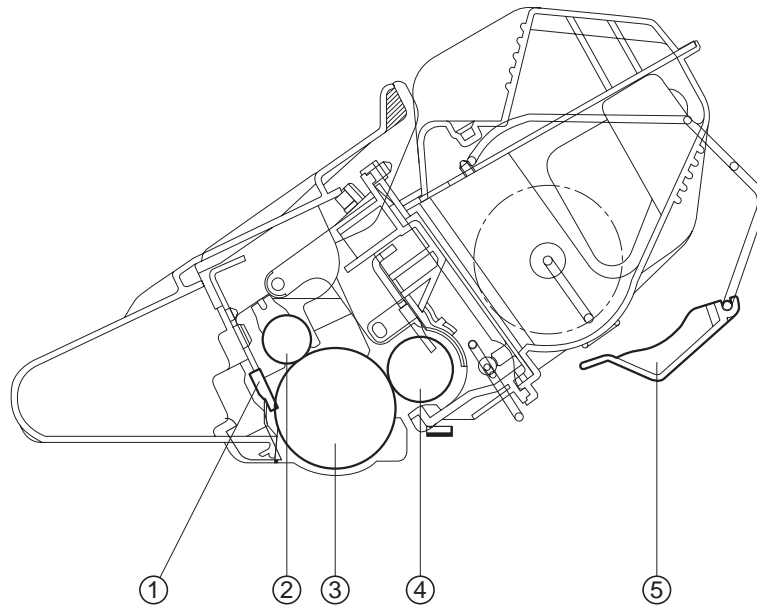
A. EP-52 Cartridge

1. Configuration

The EP-52 cartridge consists of a photosensitive drum, a primary charging roller, a developing unit, a cleaning unit, etc.

While the photosensitive drum rotates in the cartridge, a visible image is formed on its surface based on the print data according to the print process.

The cartridge has been designed in such a way that it cannot be disassembled.



- ① Cleaner blade
- ② Primary charging roller
- ③ Photosensitive drum
- ④ Developing cylinder
- ⑤ Drum protective shutter

Figure 3-5-1

a. Drum protective shutter

Since blank spots and black lines can appear on prints as a result of strong light striking the photosensitive drum, it is covered with a protective shutter. Do not open the protective shutter unless necessary. (The protective shutter opens automatically when the cartridge is installed in the printer.)

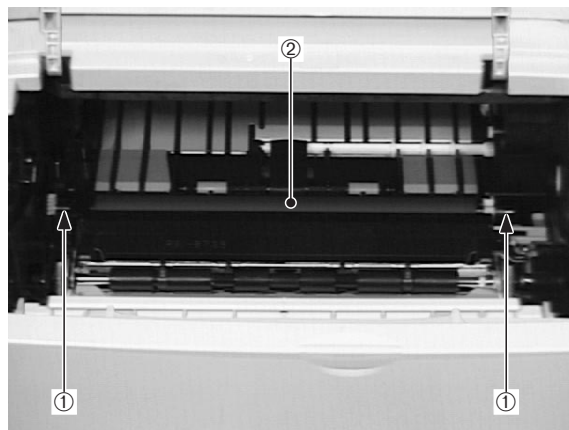
2. Photosensitive drum

Do not touch the photosensitive drum nor clean it.

B. Transfer Charging Roller

1. Removal from the printer

- 1) Open the top cover.
- 2) Slightly lift the left shaft of the transfer charging roller with the hook, then lift the right shaft with the hook to remove the transfer charging roller.



① Shafts

② Transfer charging roller

Figure 3-5-2

<Precautions on reassembly>

When installing the transfer charging roller, hold the shaft and the bushing of the transfer charging roller, not the rubber portion.

The bushing on the left should be pushing the spring when installed.

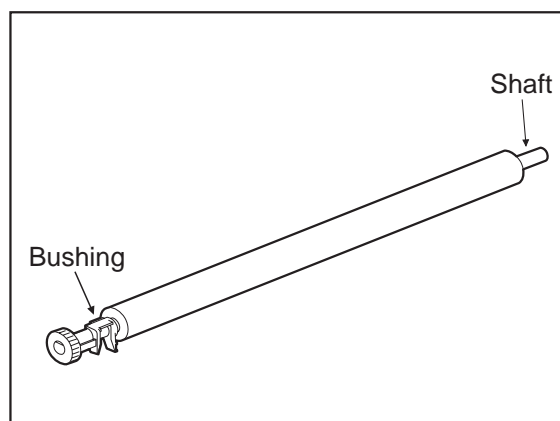


Figure 3-5-3

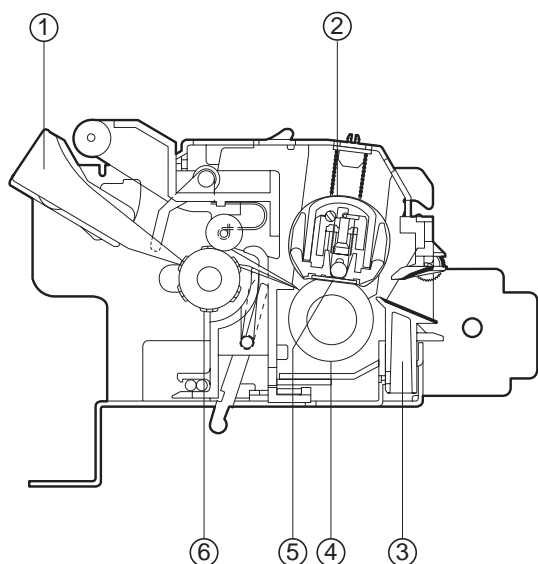
-
- Notes:**
1. When cleaning, be careful not to touch the roller or get solvents or oil on it. Clean it with dry lint-free paper (that does not produce paper dust). Do not use water or solvents.
 2. Replace the transfer charging roller when you cannot remove the paper dust, toner, etc. with the lint-free paper or when it is deformed.
-

VI. FIXING SYSTEM

A. Fixing Unit

1. Configuration

A cross-section of the fixing unit, the apparatus that fuses the toner to the print paper, is shown below.

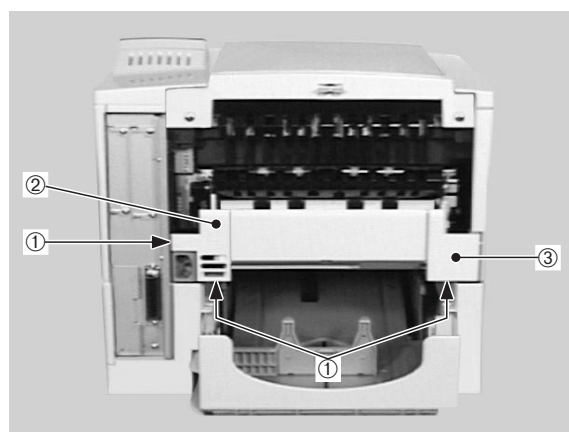


- ① Deflector
- ② Fixing film unit
- ③ Fixing unit entrance guide
- ④ Fixing heater
- ⑤ Pressure roller
- ⑥ Fixing unit delivery roller

Figure 3-6-1

2. Removal from the printer

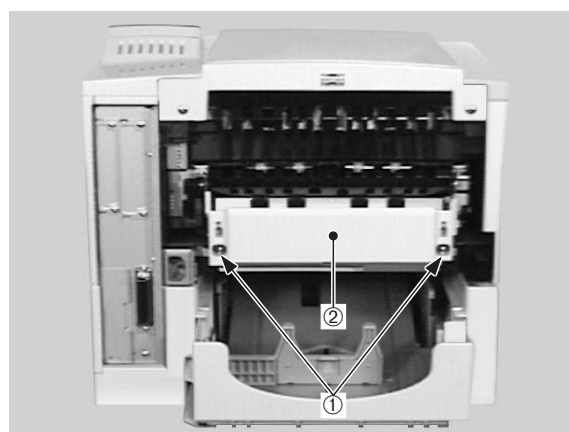
- 1) Turn the power OFF, then unplug the power cord.
- 2) Remove the face-up tray.
- 3) Unhook the claw and then remove the right bottom cover.
- 4) Unhook the claw and then remove the left bottom cover.



- ① Claw
- ② Right bottom cover
- ③ Left bottom cover

Figure 3-6-2

- 5) Remove the 2 screws and pull out the fixing unit.



- ① Screws
- ② Fixing unit

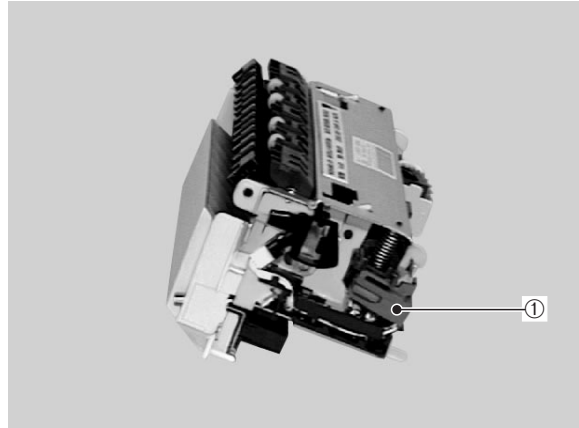
Figure 3-6-3

Note: Be sure to turn the power OFF and unplug the power cord before replacing the fixing unit.
As the fixing unit is hot, let it stand for a while after turning the power OFF. Remove it after it is cooled.

3. Disassembly and reassembly

a. Fixing film unit

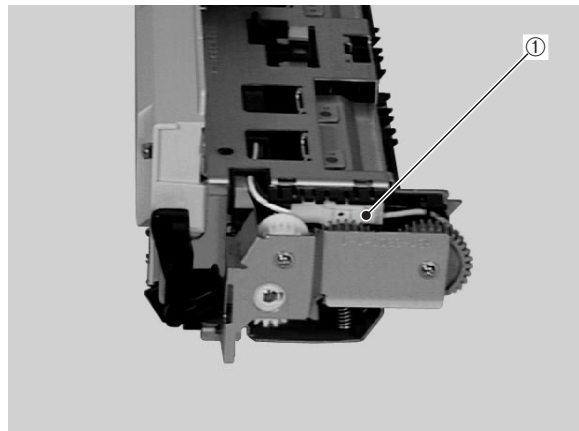
- 1) Disconnect the connector.



① Connector

Figure 3-6-4

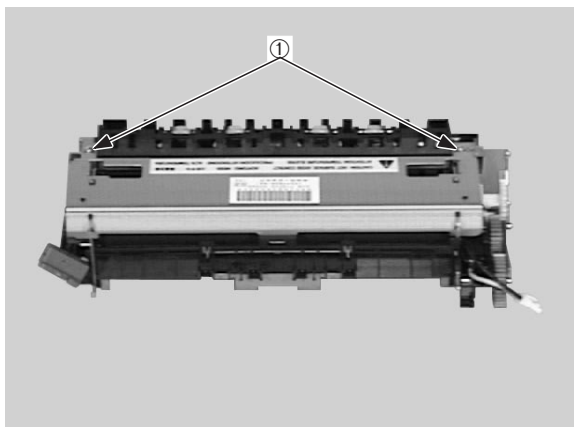
- 2) Disconnect the connector.



① Connector

Figure 3-6-5

3) Remove the 2 screws.

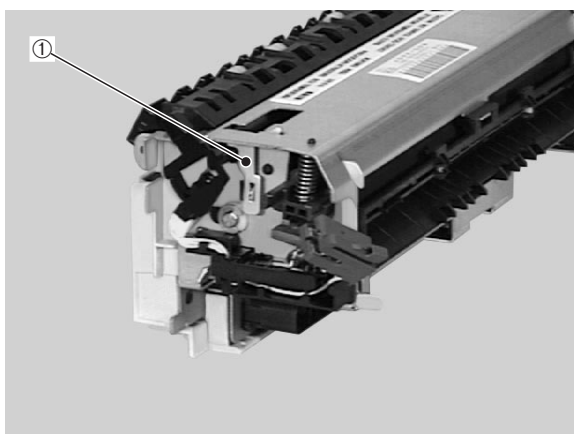


① Screws

Figure 3-6-6

Note: When unhooking the claws in steps 4) and 5), be aware that the cover jumps up due to the spring force.

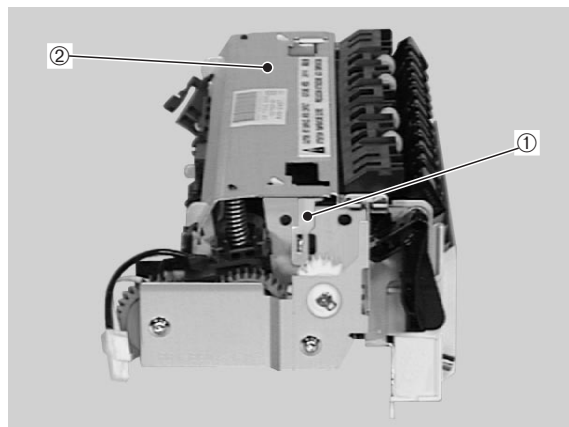
4) Unhook the claw.



① Claw

Figure 3-6-7

5) Unhook the claw and remove the cover.

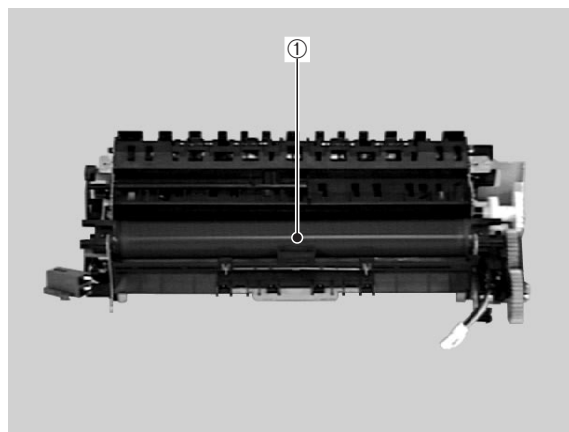


① Claw

② Cover

Figure 3-6-8

6) Lift the fixing film unit to remove it.



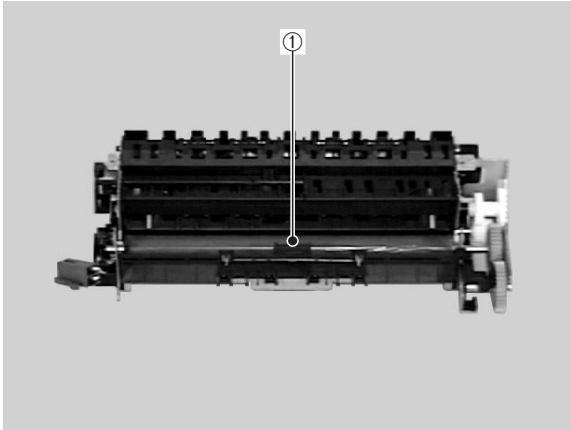
① Fixing film unit

Figure 3-6-9

Note: Do not touch the fixing film when replacing the unit. Also, be careful not to scratch the AC cable with the edges of sheet metal.

b. Pressure roller

- 1) Remove the fixing film unit according to the steps 1) through 6) on page 3-24.
- 2) Lift the pressure roller to remove it.



① Pressure roller

Figure 3-6-10

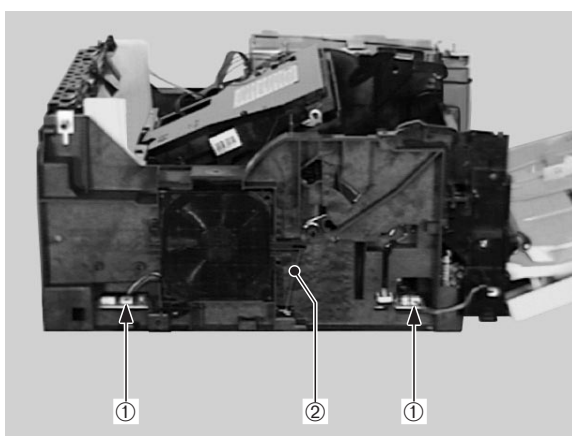
Note: When lifting the pressure roller, be careful not to deform the leaf spring attached on the side without gear.

VII. PRINTED CIRCUIT BOARDS

A. Engine controller PCB

1. Removal from the printer

- 1) Remove the pick-up module according to the steps 1) through 12) on page 3-5.
- 2) Remove the top cover unit, right cover, and left cover.
- 3) Remove the fixing unit according to the steps 1) through 5) on page 3-23.
- 4) Disconnect the 2 connectors and remove the ground spring from the left side of the printer.

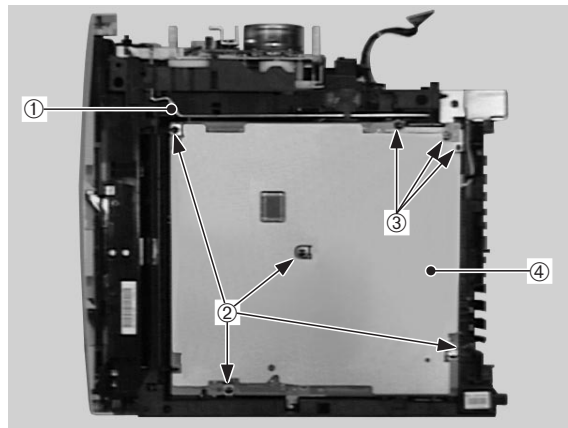


① Connectors ② Ground spring

Figure 3-7-1

- 5) Place the printer with left side down.

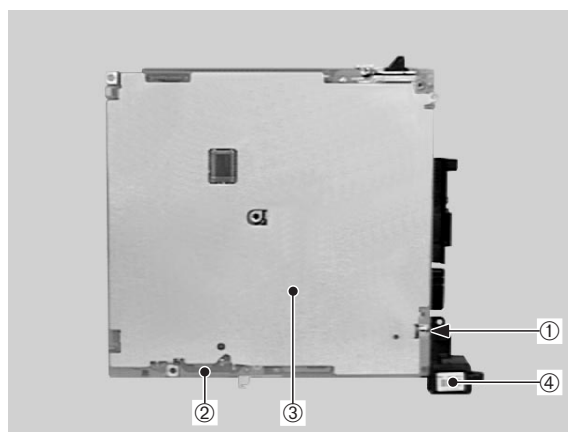
- 6) Remove the rod from the engine controller PCB.
- 7) Remove the 4 M4 screws and the 3 M3 screws, and pull out the engine controller PCB.



① Rod
② Screws (M4)
③ Screws (M3)
④ Engine controller PCB

Figure 3-7-2

- 8) Disconnect the 11 connectors from the engine controller PCB.
- 9) Undo the screw, and then take out the cover and the sheet from the engine controller PCB.

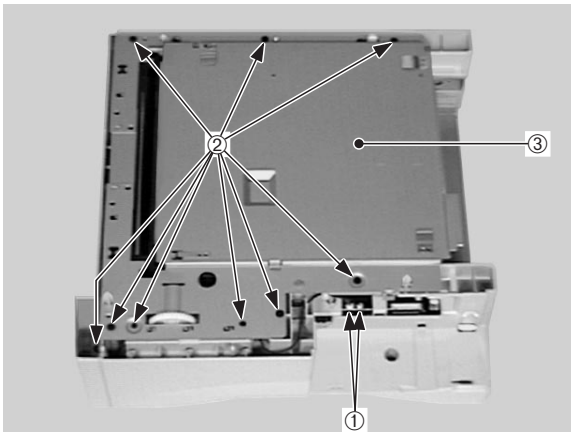


① Screw
② Cover
③ Sheet
④ Engine controller PCB

Figure 3-7-3

B. Paper Size Detection PCB

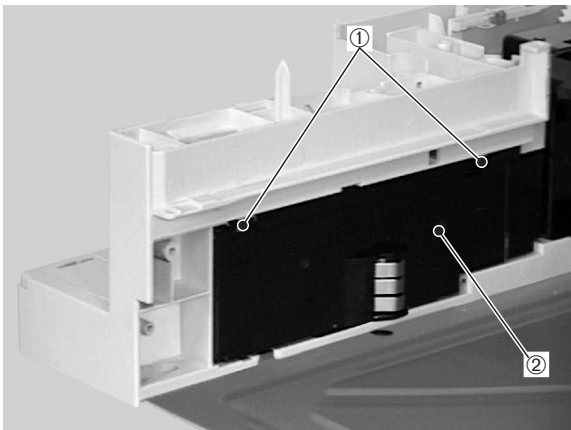
- 1) Remove the pick-up module according to the steps 1) through 12) on page 3-5.
- 2) Disconnect the 2 connectors.
- 3) Remove the 9 screws and then the cover.



- ① Connectors ② Screws
③ Cover

Figure 3-7-4

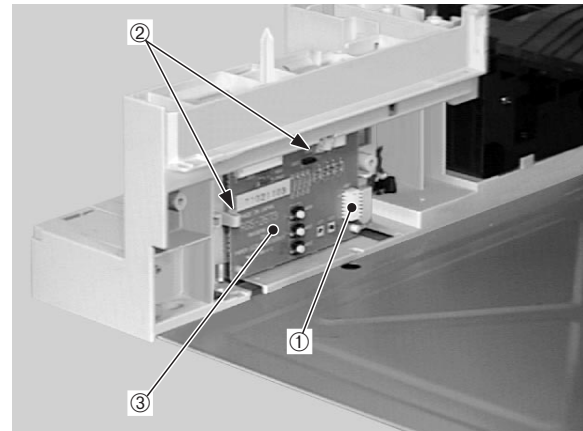
- 4) Unhook the 2 claws, and then remove the cover.



- ① Claws ② Cover

Figure 3-7-5

- 5) Disconnect the connector.
- 6) Unhook the 2 claws and take out the paper size detection PCB.



- ① Connector
② Claws
③ Paper size detection PCB

Figure 3-7-6

C. Video Controller PCB

- 1) Remove the right rear cover.
- 2) Remove the 5 screws and slide the shield case in the direction of the arrow to remove it.

keys pressed simultaneously after replacing the 200V model video controller PCB.

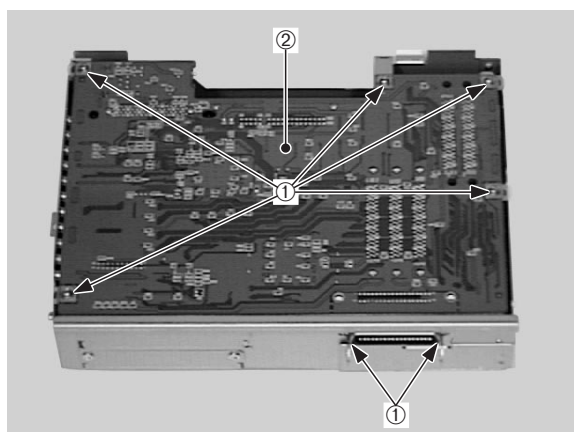


① Screws

② Shield case

Figure 3-7-7

- 3) Remove the 7 screws, and then the video controller PCB.



① Screws

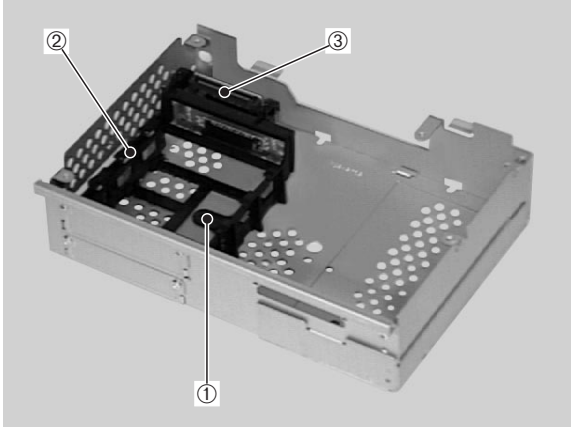
② Video controller PCB

Figure 3-7-8

Note: The paper size default of the service part video controller PCB is Letter. Therefore, make sure to change it to A4 by turning ON the printer with the Menu, Item, and Value

D. Adapter PCB

- 1) Remove the video controller PCB.
- 2) Lift the claw and remove the guide.
- 3) Remove the adapter PCB.



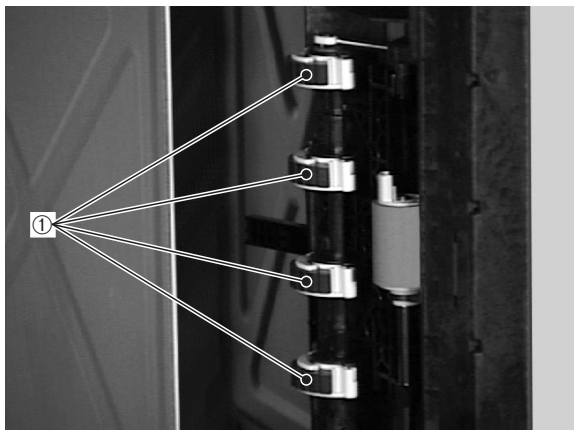
- ① Claw ② Guide
③ Adapter PCB

Figure 3-7-9

VIII. PAPER FEEDER

1. Removal of the pick-up roller

- 1) Remove the cassette.
- 2) Stand the paper feeder.
- 3) Hold the knob on the pick-up roller and remove the roller.



① Pick-up roller

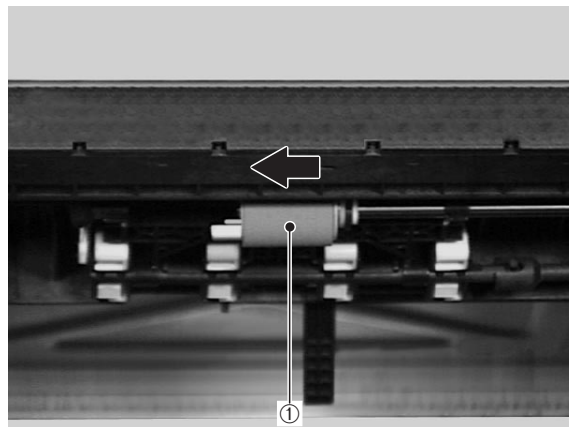
Figure 3-8-1

<Precautions on reassembly>

Be sure to install the spring if you remove the spring.

2. Removal of the feed roller

- 1) Remove the cassette.
- 2) Hold the knob of the cassette feed roller and pull out the roller.

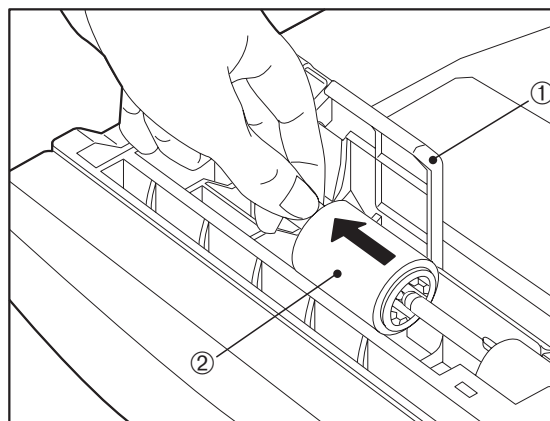


① Cassette feed roller

Figure 3-8-2

3. Removal of the separation roller

- 1) Remove the cassette
- 2) Open the cover, then hold the knob of the separation roller and pull out the roller.



① Cover

② Separation roller

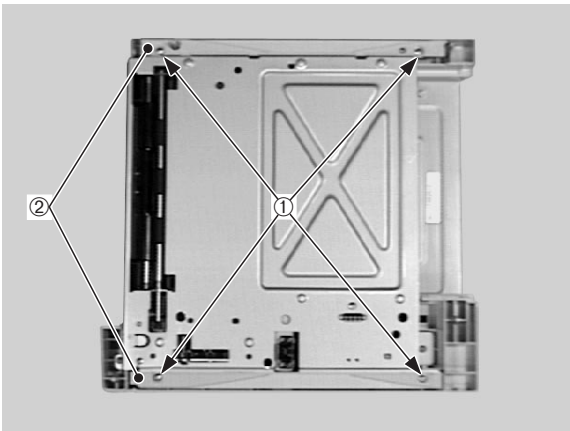
Figure 3-8-3

<Precautions on reassembly>

Be sure to close the cover after installing the separation roller.

4. Removal of the pick-up drive unit

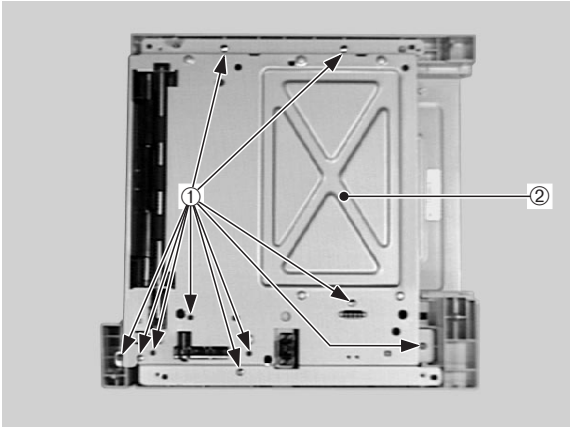
- 1) Remove the 4 screws and then the 2 covers.



① Screws ② Covers

Figure 3-8-4

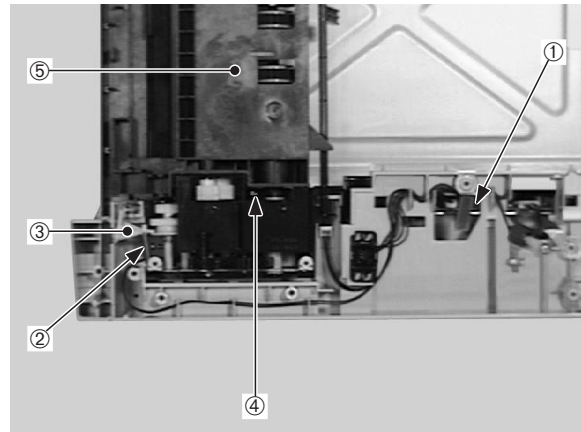
- 2) Remove the 10 screws and then the cover.



① Screws ② Cover

Figure 3-8-5

- 3) Disconnect the connector of the solenoid cable.
- 4) Remove the spring and then the lever.
- 5) Remove the screw, then take out the pick-up drive unit.

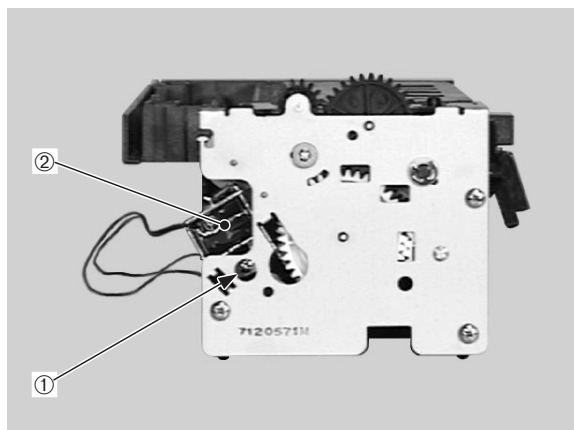


① Connector
 ② Spring
 ③ Lever
 ④ Screw
 ⑤ Pick-up drive unit

Figure 3-8-6

5. Removal of cassette pick-up solenoid

- 1) Remove the pick-up drive unit.
- 2) Remove the screw, then take out the cassette pick-up solenoid.

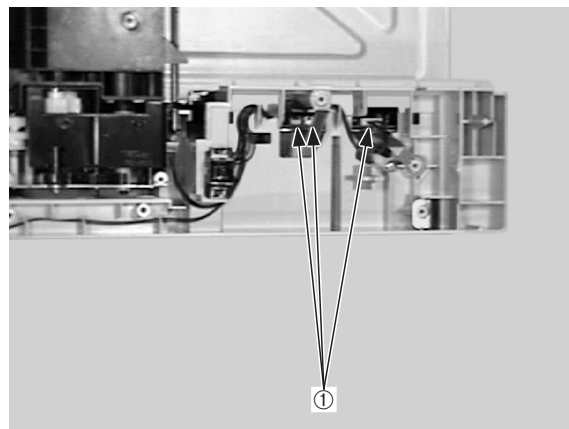


- ① Screw
- ② Cassette pick-up solenoid

Figure 3-8-7

6. Removal of paper feeder driver PCB

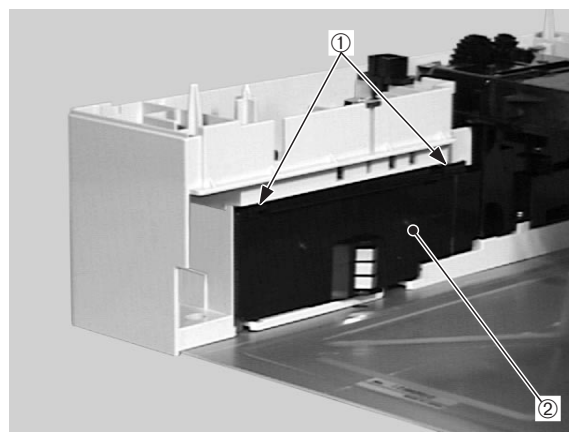
- 1) Remove the cover according to the steps 1) and 2) on page 3-32.
- 2) Disconnect the 3 connectors.



- ① Connectors

Figure 3-8-8

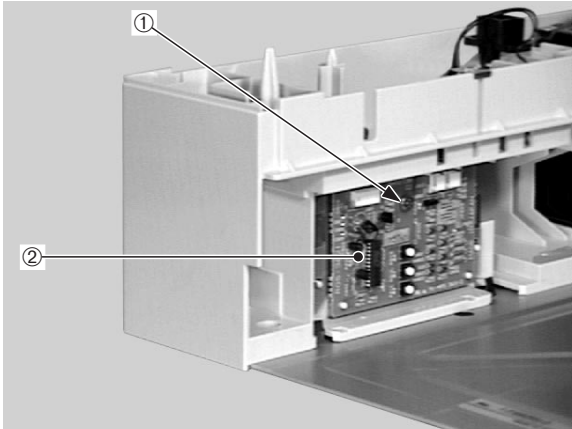
- 3) Unhook the 2 claws and remove the cover.



- ① Claws
- ② Cover

Figure 3-8-9

- 4) Remove the screw, then take out the paper feeder driver PCB.



- ① Screw
- ② Paper feeder driver PCB

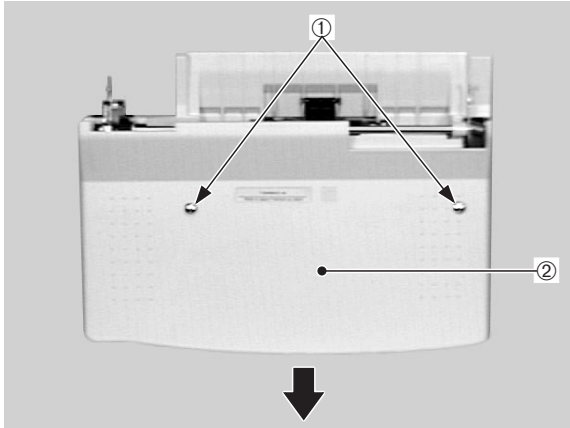
Figure 3-8-10

IX. ENVELOPE FEEDER

1. Removal of external covers

a. Bottom cover

- 1) Remove the 2 screws, then slide the bottom cover in the direction of the arrow to remove it.



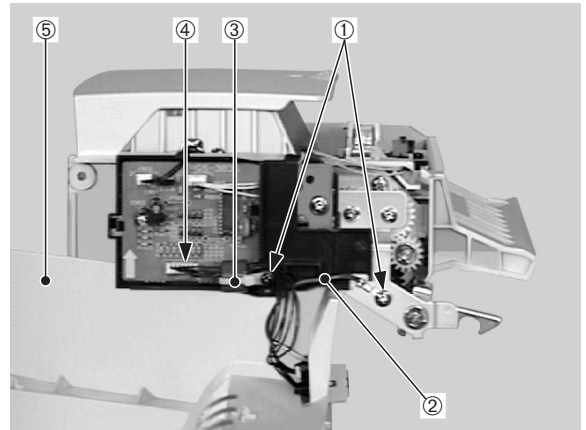
① Screws

② Bottom cover

Figure 3-9-1

b. Top cover unit

- 1) Remove the bottom cover.
- 2) Undo the snaps on both sides and remove the weight.
- 3) Unhook the 2 claws and then lift the top cover unit to remove it from the frame.
- 4) Remove the 2 screws and then the ground wire and cable holder.
- 5) Disconnect the connector on the PCB and separate the top cover unit.



① Screws

② Ground wire

③ Cable holder

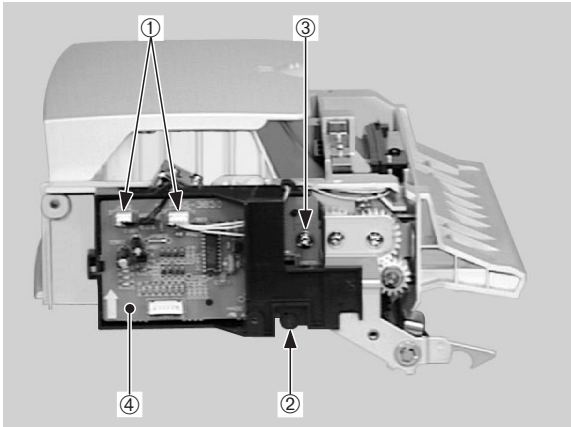
④ Connector

⑤ Top cover unit

Figure 3-9-2

2. Removal of the envelope feeder driver PCB

- 1) Remove the bottom cover and the top cover unit.
- 2) Disconnect the 2 connectors.
- 3) Detach the sensor lever at the front end, leaving the rear end attached.
- 4) Remove the screw and the claw, and take out the envelope feeder driver PCB.

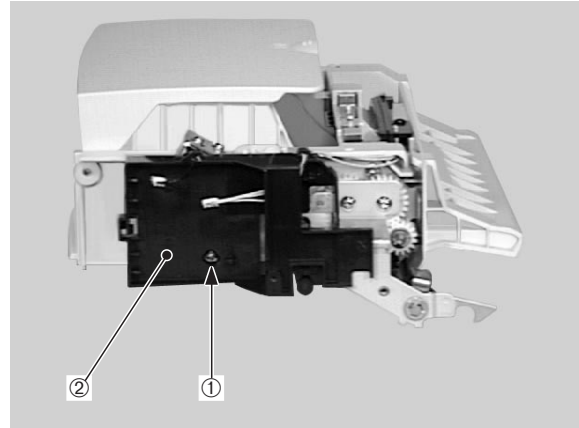


- ① Connectors
- ② Sensor lever
- ③ Screw
- ④ Envelope feeder driver PCB

Figure 3-9-3

3. Removal of envelope pick-up solenoid

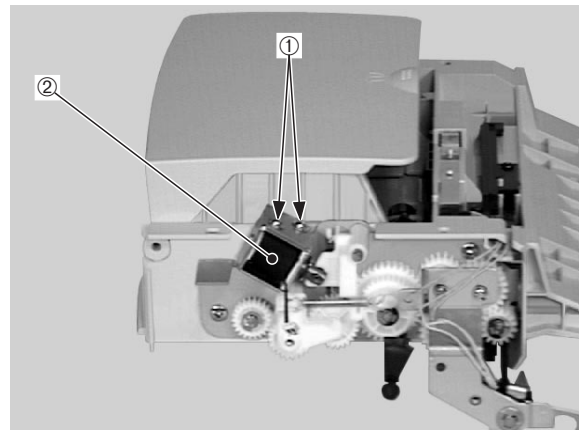
- 1) Remove the envelope feeder driver PCB.
- 2) Remove the screw and then the cover.



- ① Screw
- ② Cover

Figure 3-9-4

- 3) Undo the 2 screws, then take out the envelope pick-up solenoid.

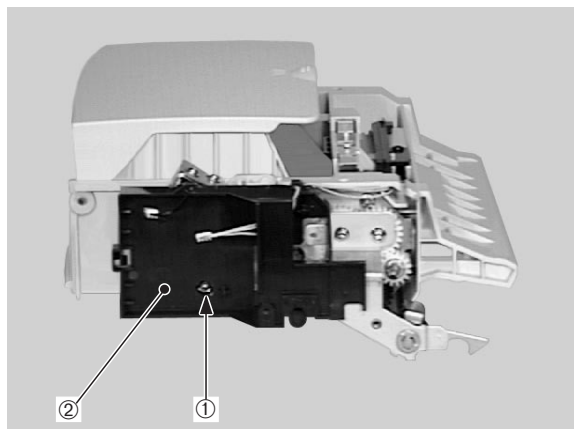


- ① Screws
- ② Envelope pick-up solenoid

Figure 3-9-5

4. Removal of the envelope pick-up roller

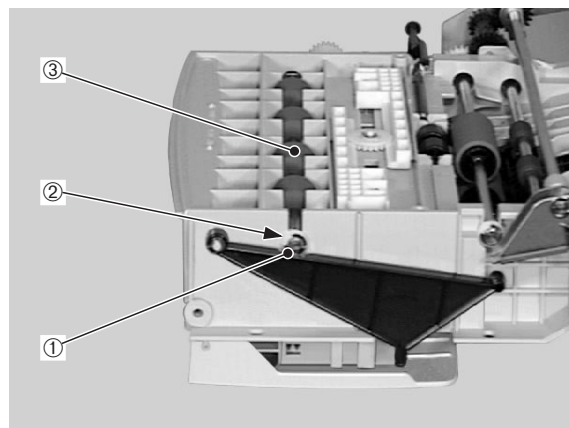
- 1) Remove the envelope feeder driver PCB.
- 2) Remove the screw and then the cover.



① Screw ② Cover

Figure 3-9-6

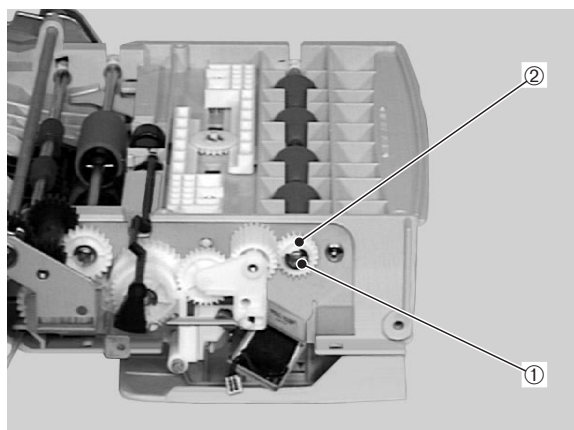
- 4) Remove the E-ring, the bushing, then take out the envelope pick-up roller.



① E-ring
② Bushing
③ Envelope pick-up roller

Figure 3-9-8

- 3) Remove the E-ring, the gear, then the bushing.

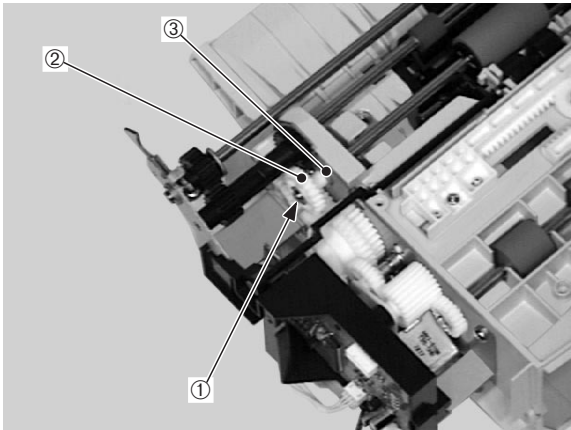


① E-ring ② Gear

Figure 3-9-7

5. Removal of the lower separation roller, upper separation roller and torque limiter

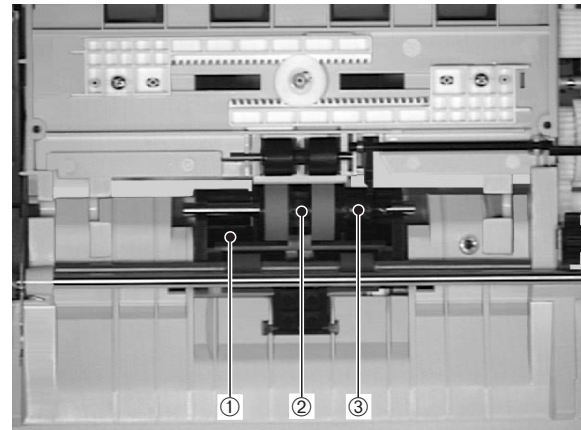
- 1) Remove the lower cover and top cover units.
- 2) Remove the E-ring, the gear, then the bushing.



- ① E-ring
- ② Gear
- ③ Bushing

Figure 3-9-9

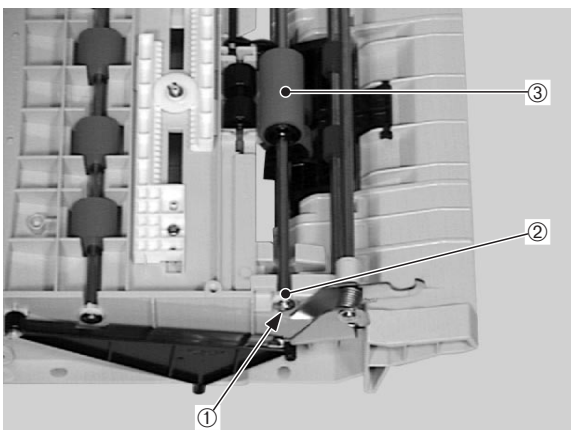
- 4) Unhook the claw, move the separation roller, and remove the parallel pin. Then remove the lower separation roller.
- 5) Take out the upper separation roller and the torque limiter from the guide.



- ① Guide
- ② Upper separation roller
- ③ Torque limiter

Figure 3-9-11

- 3) Remove the E-ring, the bushing, then remove the lower separation roller and the shaft together.



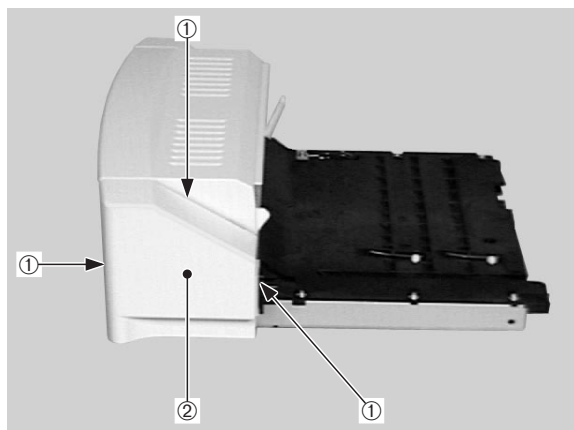
- ① E-ring
- ② Bushing
- ③ Lower separation roller

Figure 3-9-10

X. DUPLEXING UNIT

1. Removal of the right cover

- 1) Unhook the 3 claws and slide the right cover downward to remove it.



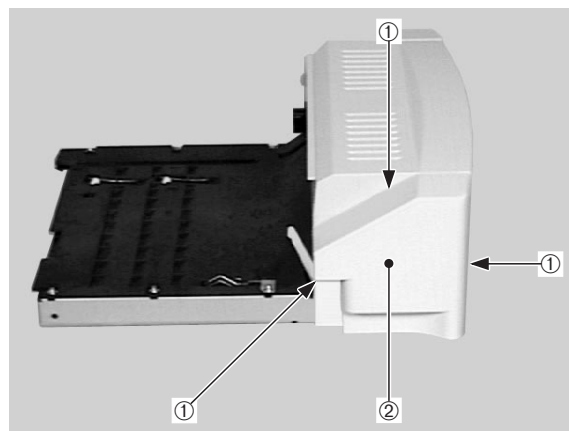
① Claws

② Right cover

Figure 3-10-1

2. Removal of the left cover

- 1) Unhook the 3 claws and slide the left cover downward to remove it.



① Claws

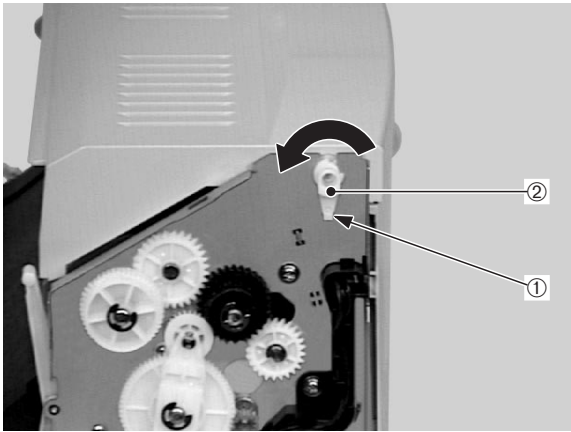
② Left cover

Figure 3-10-2

- 2) Disconnect the 2 connectors on the left cover.

3. Removal of the top cover

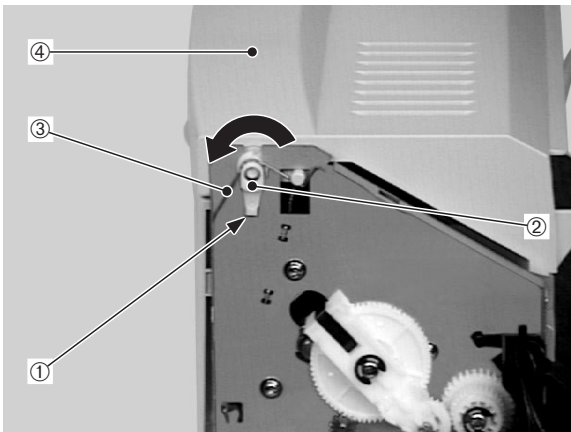
- 1) Remove the right cover and left cover.
- 2) Unhook the claw and turn the bushing in the direction of the arrow to remove it.



① Claw ② Bushing

Figure 3-10-3

- 3) Unhook the claw and turn the bushing in the direction of the arrow to remove it with the spring.
- 4) Remove the top cover.

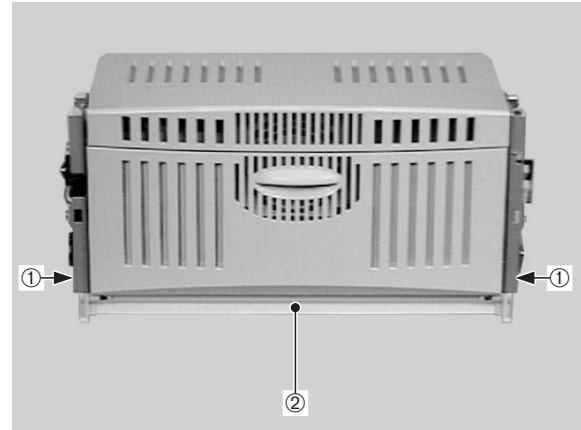


① Claw ② Bushing
③ Spring ④ Top cover

Figure 3-10-4

4. Removal of the rear cover

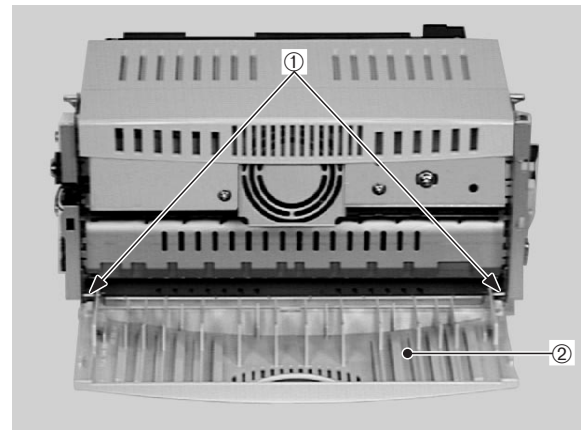
- 1) Remove the right cover and left cover.
- 2) Unhook the 2 claws and remove the delivery guide.



① Claws ② Delivery guide

Figure 3-10-5

- 3) Remove the 2 springs, then take out the rear cover from the shaft.

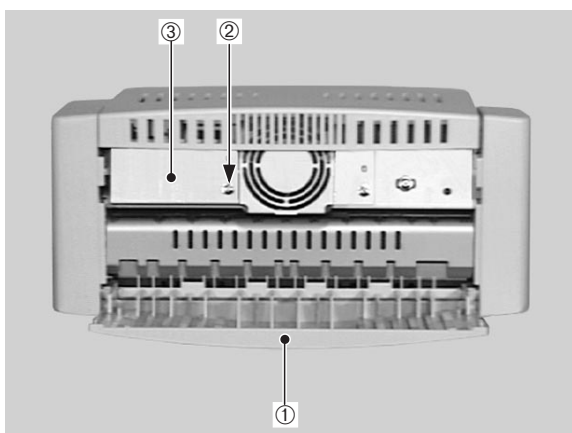


① Springs ② Rear cover

Figure 3-10-6

5. Removal of the exhaust fan (FM701)

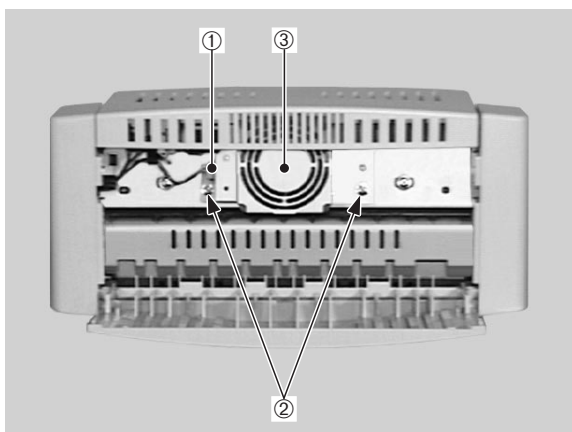
- 1) Open the rear cover, remove the screw and then the connector cover.



- ① Rear cover ② Screw
- ③ Connector cover

Figure 3-10-7

- 2) Open the rear cover, disconnect the connector, remove the 2 screws, then remove the exhaust fan with the fan cover.



- ① Connector ② Screws
- ③ Fan cover

Figure 3-10-8

- 3) Disconnect the connector and take out the exhaust fan from the fan cover.

<Precautions on reassembly>

When installing the fan, be sure that the arrow on the fan cover and that on the fan point the same direction as shown below.

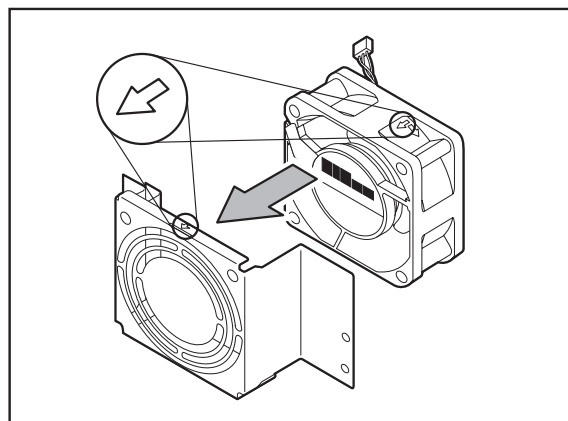
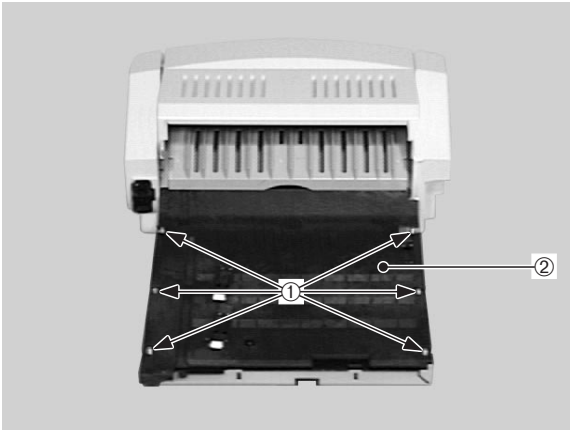


Figure 3-10-9

6. Removal of the duplexing unit driver PCB

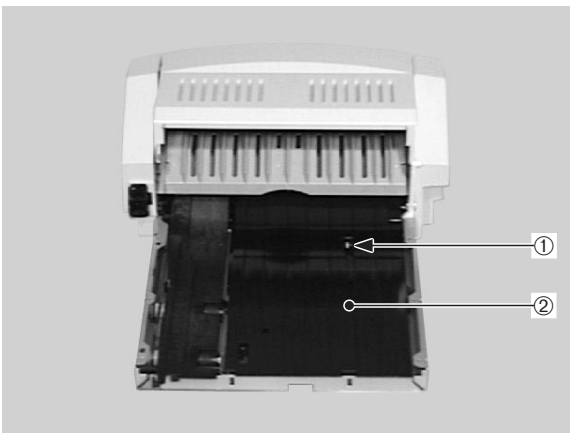
- 1) Remove the 6 screws and then the upper feed guide.



- ① Screws ② Upper feed guide

Figure 3-10-10

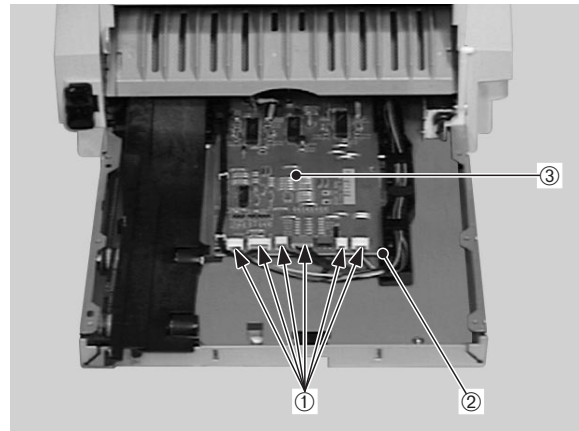
- 2) Remove the screw and then lower feed guide, then disconnect the connector on the PCB.



- ① Screw ② Lower feed guide

Figure 3-10-11

- 3) Disconnect the 6 connectors.
- 4) Unhook the claw and pull out the duplexing unit driver PCB.

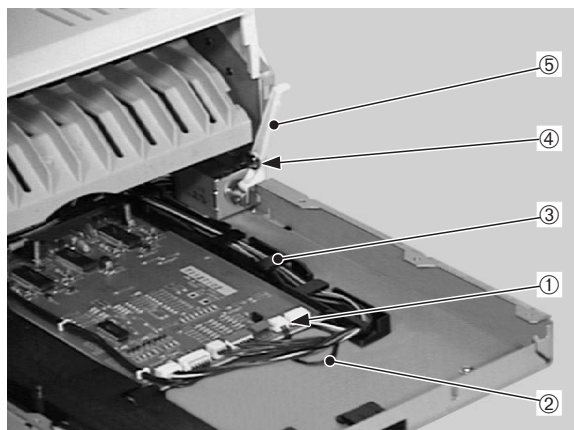


- ① Connectors
② Claw
③ Duplexing unit driver PCB

Figure 3-10-12

7. Removal of the duplexing unit solenoid

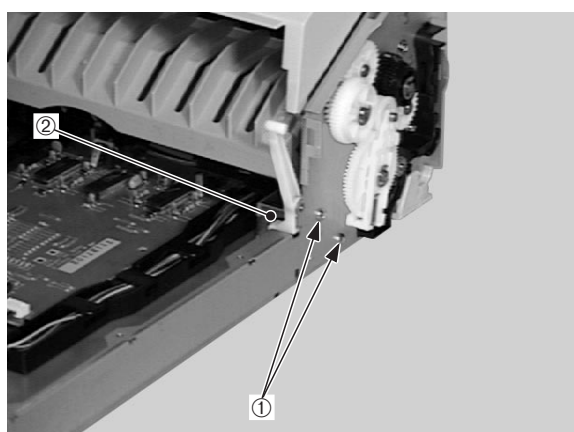
- 1) Remove the left cover.
- 2) Follow the steps 1) and 2) in the duplexing unit driver PCB removal procedures to remove the upper feed guide and the lower feed guide.
- 3) Disconnect the connector, then disengage the cable from the cable guide.
- 4) Remove the E-ring and then the lever.



- | | |
|---------------|----------|
| ① Connector | ② Cable |
| ③ Cable guide | ④ E-ring |
| ⑤ Lever | |

Figure 3-10-13

- 5) Remove the 2 screws, then take out the duplexing unit solenoid.

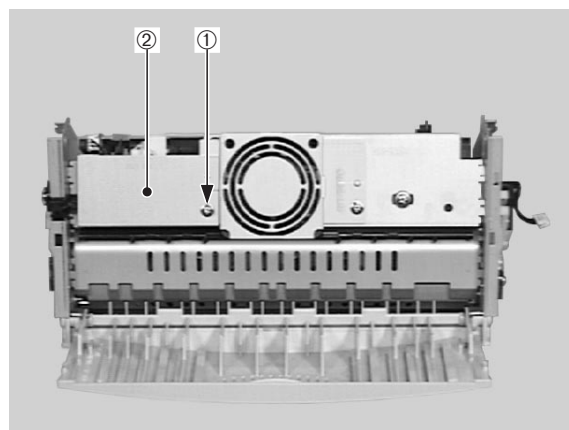


- | |
|---------------------------|
| ① Screws |
| ② Duplexing unit solenoid |

Figure 3-10-14

8. Removal of the duplex feed motor

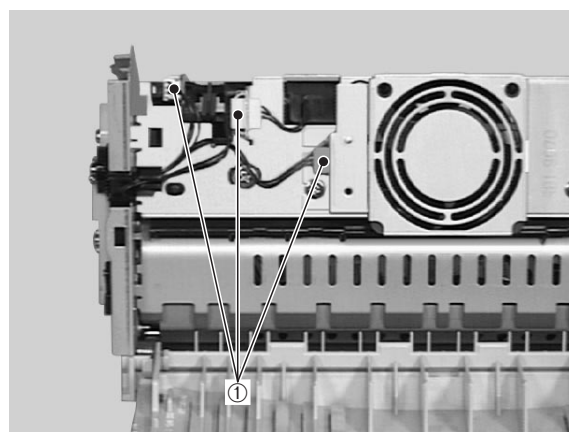
- 1) Remove the right cover, left cover and top cover.
- 2) Follow the steps 1) and 2) in the duplexing unit driver PCB removal procedures to remove the upper feed guide and the lower feed guide.
- 3) Open the rear cover, remove the screw, then the connector cover.



- | | |
|---------|-------------------|
| ① Screw | ② Connector cover |
|---------|-------------------|

Figure 3-10-15

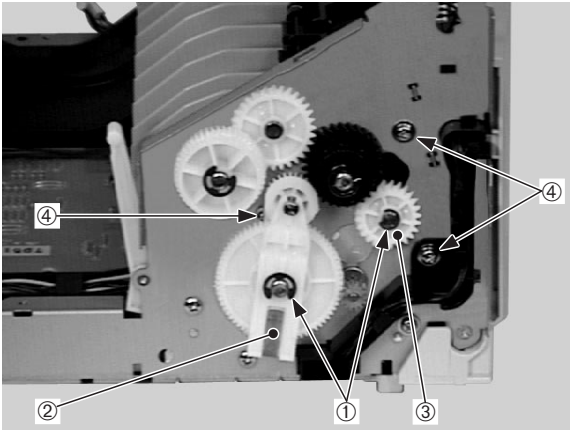
- 4) Open the rear cover, and then disconnect the 3 connectors.



- | |
|--------------|
| ① Connectors |
|--------------|

Figure 3-10-16

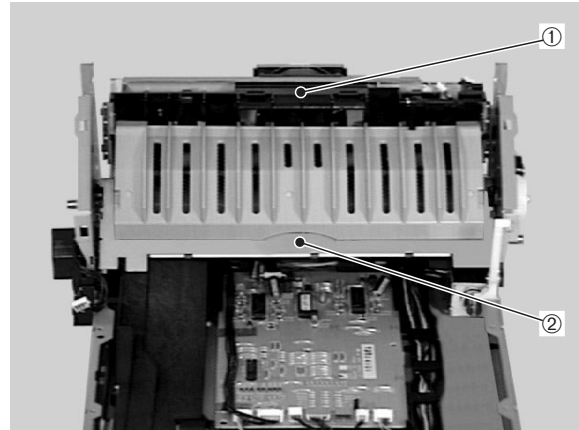
- 5) Undo the 2 E-rings, then remove the swing gear and the gear in the reversing drive unit.
- 6) Remove the 3 screws.



- ① E-rings
- ② Swing gear
- ③ Gear
- ④ Screws

Figure 3-10-17

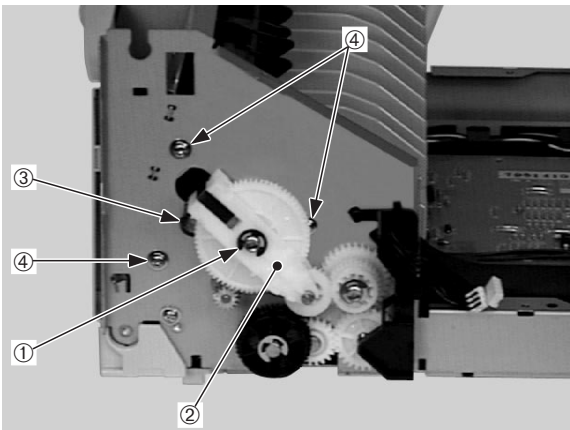
- 9) Lightly press the both side panels outward to unhook the claws, then remove the fan unit.
- 10) Remove the lower reversing guide.



- ① Fan unit
- ② Lower reversing guide

Figure 3-10-19

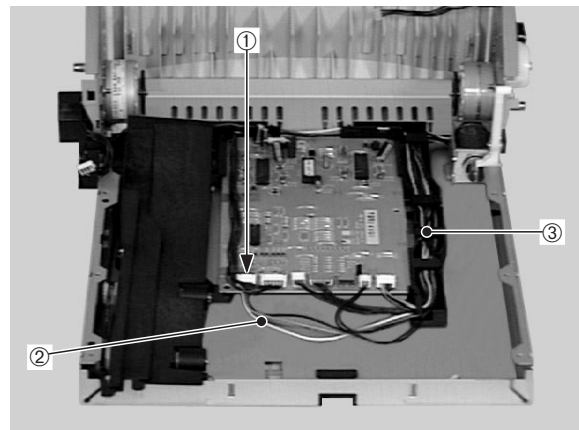
- 7) Remove the E-ring and then the swing gear in the duplexing unit drive unit.
- 8) Remove the E-ring and then the 3 screws.



- ① E-ring
- ② Swing gear
- ③ E-ring
- ④ Screws

Figure 3-10-18

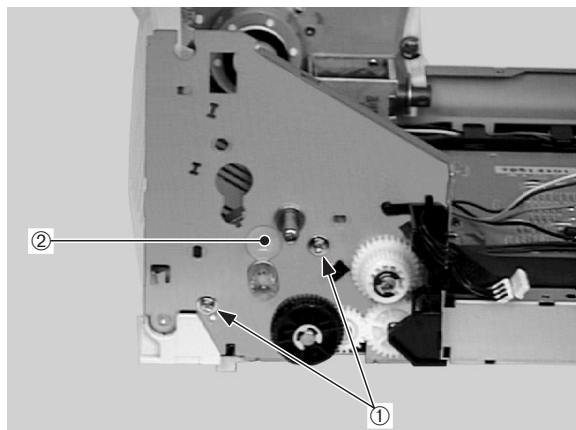
- 11) Disconnect the connector and then disengage the cable from the cable guide.



- ① Connector
- ② Cable
- ③ Cable guide

Figure 3-10-20

12) Remove the 2 screws, then take out the duplex feed motor from the inside.

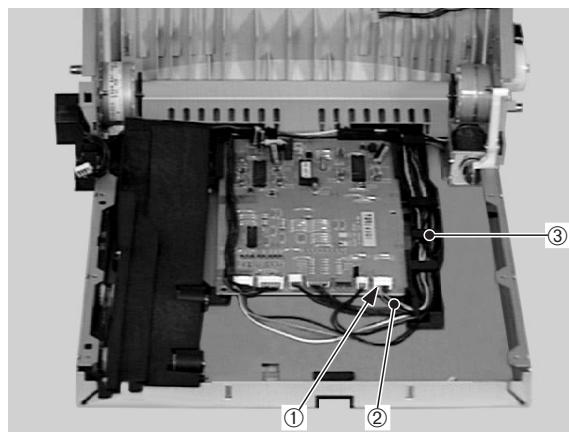


- ① Screws
- ② Duplex feed motor

Figure 3-10-21

9. Removal of the reversing motor

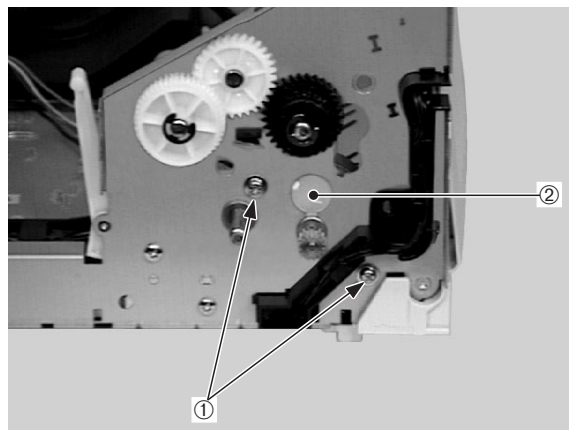
- 1) Follow the steps 1) through 10) in the duplex feed motor removal procedures to remove the lower reversing guide.
- 2) Disconnect the connector and then disengage the cable from the cable guide.



- ① Connector
- ② Cable
- ③ Cable guide

Figure 3-10-22

3) Remove the 2 screws, then take out the reversing motor from the inside.



- ① Screws
- ② Reversing motor

Figure 3-10-23

CHAPTER 4

TROUBLESHOOTING

I. PREFACE	4-1	VI. MALFUNCTION STATUS	
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IV PAPER TRANSPORT		VIII. MAINTENANCE AND	
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I. PREFACE

A. Malfunction Diagnosis Flowchart

The malfunctions that occur in the printer fall into six main factors; "image defects," "paper jams," "paper transport troubleshooting," "power supply failure," "malfunction troubleshooting," and "malfunction status troubleshooting."

If a malfunction occurred in the printer, a service technician is to recognize the causes and to clear the problem according to the troubleshooting procedure for each malfunction.

Make sure the following points at the execution of troubleshooting.

- Be sure that the connector has no poor contact when measuring the voltage at the specified terminal of the connector.
- Before handling PCBs, be sure to touch a metal part of the printer to discharge static electricity, as it can cause damage to the PCBs.
- The laser/scanner unit cannot be adjusted in the field, so do not attempt to disassemble it.

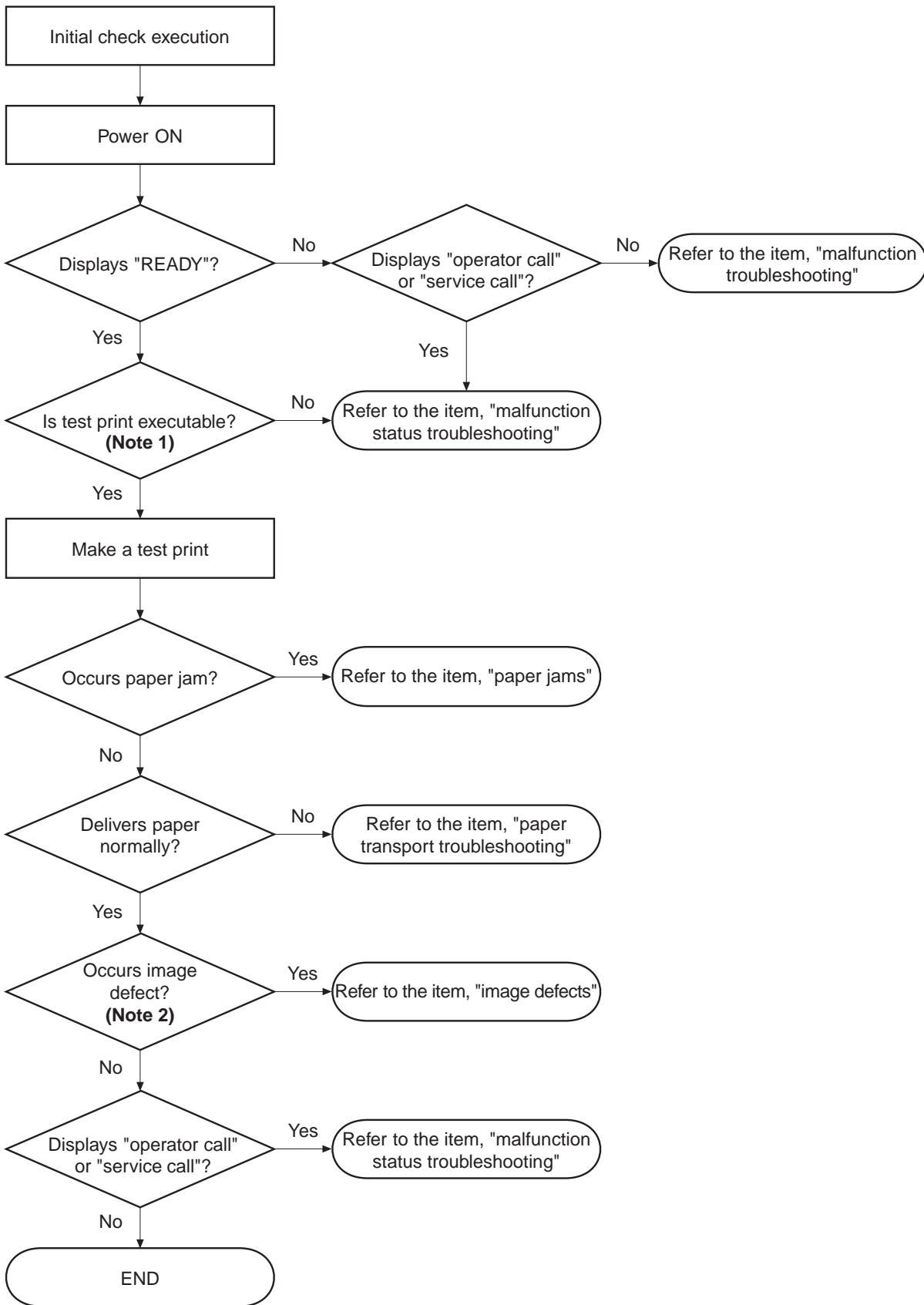


Figure 4-1-1

Note : **1.** Before executing a test print, make sure to select the same pick-up source and delivery source that were used when the malfunction occurred according to the information given by the user.

If the information is not available, make test prints with all feasible combination of paper source and delivery source in the printer, and find out the factor.

2. The image defect occurred at the user side might not re-occur on its test print.

In this case, make a print from external device and infer the factor by the output image. Then, find the factor according to the item, "image defects."

B. Initial Check

Check the following items before you diagnose malfunction. If any failure is found, the service technician is to clear the problem and to give the instruction to the user.

1. Installation environment

Make sure that the requirements stated below meet when installing printer:

- a. The power supply voltage is from -10% to +6% of the rated voltage.
- b. The printer is securely installed on a level surface.
- c. The room temperature is kept between 7.5°C and 32.5°C, and the relative humidity, between 5% and 90%.
- d. Avoid sites generating ammonia gas, high temperature or high humidity (near water faucet, kettle, humidifier), cold places, open flames and dusty areas.
- e. Avoid sites exposed to direct sunlight. If unavoidable, advise the customer to hang curtains.
- f. A well-ventilated place.
- g. Make sure that the power supply plug is inserted to the printer and the outlet.

2. Paper checks

- a. The recommended paper for this printer is used.
- b. The paper is not damp.

3. Paper sets

- a. The paper is set to the paper source within the specified volume.
- b. The paper is set to the selected paper source correctly.

4. EP-52 cartridge sets

The cartridge is set correctly.

5. Condensation

During winter, particularly when moving the printer into a warm room from a cold location such as a warehouse, various problems can occur due to condensation in the printer.

Example)

- a. Condensation in the optical system (six-faced mirror, mirror, lens, etc.) will result in the light print images.
- b. As the photosensitive drum is cold, the resistance of the photoconductive layer will be high. This will lead to incorrect contrast.

If condensation appears, either wipe the parts with dry cloth, or leave the printer ON for 10 to 20 minutes.

If an EP-52 cartridge is opened soon after being moved from a cold room to a warm room, condensation may appear inside the cartridge and may cause various image defects.

Be sure to instruct the customer that it is necessary to leave the cartridge sealed for one to two hours at room temperature to allow it to acclimatise.

C. Test Print

The test print is divided into two types: engine test print and controller test print.

If a malfunction occurs in this printer, make a test print and assess the abnormality of the printer.

1. Engine test print

Execution of a test print prints the test print pattern (vertical lines) shown in Figure 4-1-2.

A test pattern can be printed by pressing the test print switch on the back of the printer (refer to Figure 1-4-2) once when the photosensitive drum is stationary and the printer is in the STANDBY mode. Test pattern can be printed continuously as long as the switch is held down. The paper can be picked-up only from the built-in cassette and the option cannot be used when making a test print.

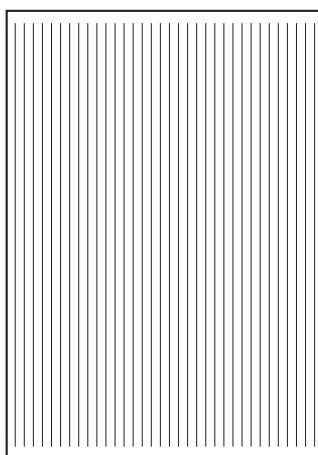


Figure 4-1-2

2. Controller test print

The following items can be printed by selecting and executing a TEST MENU:

- **SHOW PAGE COUNT**
Displays the total number of pages printed. The total page number is only shown briefly on the display but does not print. The page count prints in the TEST PRINT.
- **TEST PRINT**
Make a Test Print. The Test Print lists the printing environment settings and also displays the graphic and text printing capabilities.
- **PRINT PS FONTS**
Available only after the Translator Module A5 for Adobe PostScript Level 3 module has been installed. Prints the PS Font List.
- **PRINT PCL FONTS**
Prints the PCL Font List.
- **PRINT PS DEMO**
Available only after the Translator Module A5 for Adobe PostScript Level 3 module has been installed. Prints the PS demonstration page.
- **PRINT PCL DEMO**
Prints the PCL demonstration page.
- **CONTINUOUS TEST**
Make continuous Test Prints.
- **CLEANING PAGE**
See following page.

Follow these steps to make a Test Print:

- 1) Press the Go key to set the printer off-line. The On line indicator should be OFF and PAUSED appears in display.
- 2) Press the Menu key until you see TEST MENU in the top line.
- 3) Press the Item key until you see TEST PRINT in the bottom line.
- 4) Press the Enter key to start printing a Test Print.
- 5) After the pages are printed, press the Go key to put the printer on-line.

Use the Test Print to verify the operation panel selections, system configurations (memory and options), and print quality.

Canon Inc., LBP-1760 Printer Configuration Page



PCL MENU

RESOLUTION = 600
COPIES = 1
PAGESIZE = A4
ORIENTATION = PORTRAIT
FORM = 64LINES
FNTRSRC = INTERNAL
FONTNUM = 0
PT.SIZE = 12.00
PITCH = 10.00
SYMSET = ROMAN-8

PS MENU

RESOLUTION = 300
COPIES = 1
PRINT ERRS = OFF

FEEDER MENU

FEED = CASSETTE1
TRAY SWITCH = ON
MANUAL = OFF
MPTSIZE = A4

CONFIG MENU

JAMRECOVERY = OFF
AUTOCONT = ON
DENSITY = 7
ECONOMY MODE = OFF
REFINE = ON
FORMAT FLASH

PARALLEL MENU

PERSONALITY = AUTO
BIDIRECTION = ON
I/O TIMEOUT = 15

TEST MENU

SHOW PAGE COUNT
TEST PRINT
PRINT PS FONTS
PRINT PCL FONTS
PRINT PS DEMO
PRINT PCL DEMO
CONTINUOUS TEST
CLEANING PAGE

LANGUAGE MENU

LANG = ENGLISH

RESET MENU

RESET = PRINTER
RESET = MENU

INSTALLED OPTIONS

PS
FLASH 4 MB

TOTAL MEMORY = 4 MB

AUTOSENSED PAPER

CASSETTE1 = A4

PRINTER DETAILS

CODE LEVELS
CTL 1.25 03/05/98
PCL 1.4.8
PCLXL 1.1.8 98/01/30
PS 1.05
PAGE COUNT = 40

Canon, the Canon logo and LBP are trademarks of Canon Inc.
PCL and PCLXL are trademarks of Hewlett-Packard Company.
Adobe, PostScript, the Adobe logo and the PostScript logo are the trademarks
of Adobe Systems Incorporated.

Figure 4-1-3

3. Cleaning Page

When the dirty fixing unit is the cause of image defect, the fixing unit can be cleaned by the user.

The toner on the upper pressure roller can be removed by printing the cleaning pattern in figure 4-1-4 and re-feeding the paper (cleaning page). The procedure is as shown below.



Figure 4-1-4

- 1) Go to the "CLEANING PAGE" item in the TEST MENU.
- 2) Press the Enter/Cancel key.
- 3) The message "LOAD <size> IN MANUAL" is displayed (Because the data requests Manual feed mode.) **[Note]**
- 4) Load a paper requested in the multi-purpose tray.
- 5) Press the Go key.
- 6) CLEANING PAGE is created at 600dpi.
- 7) The message "LOAD CLEANING PAGE IN MANUAL" is displayed after delivering paper.

- 8) Load the sheet (CLEANING PAGE), the printed side down, in the multi-purpose tray.
- 9) Press the Go key.
- 10) Print blank page onto cleaning page at 1200dpi.

Note: The paper size requested by 'cleaning page' is page size item value in PCL MENU.

II. IMAGE DEFECTS

If the factor of the malfunction is identified as "image defect" by the malfunction diagnosis flow-chart (Figure 4-1-1), find out the defective phenomenon and clear it according to the table shown below.

Table 4-2-1

• I-1	Light:	Output very light image
• I-2	Dark:	Output very dark image
• I-3	Completely Blank:	Output no image
• I-4	All Black:	Output all black paper
• I-5	Dots in Vertical Lines :	Output white dots on the paper
• I-6	Dirt on Back of Paper:	Output dirt on the back of the paper
• I-7	Vertical Lines:	Output vertical lines on the paper
• I-8	Black Horizontal Lines:	Output horizontal lines on the paper
• I-9	Dirt:	Output dirt on surface of the paper
• I-10	Blank Spots:	Output image with blank spots
• I-11	White Vertical Lines:	Output white vertical lines on the paper
• I-12	White Horizontal Lines:	Output white horizontal lines on the paper
• I-13	Poor Fixing:	Output the image with poorly fixed toner
• I-14	Image Distortion:	Output distorted image
• I-15	Sharp Black Horizontal Lines:	Output sharp black horizontal lines

I-1. Light

<Possible causes>

- The image density is not adjusted correctly.
Action: Adjust the image density by operating the external device.
- Open the top cover and remove the EP-52 cartridge while printing. Open the drum protective shield of the cartridge and check the toner image on the photosensitive drum surface. If the toner image has not been transferred to the paper properly, go to step 3). If the toner image on the drum is faint, go to step 6).
Do not open the drum protective shield for more than 10 seconds.
- Deformation or deterioration of the transfer charging roller
Action: Replace the transfer charging roller.
- Poor contact between the engine controller PCB transfer charging roller and its shaft
Action: Clean the contacts if dirty. If the problem still remains after cleaning, or parts are deformed or damaged, replace them.
- Defective engine controller PCB
Action: Replace the engine controller PCB.
- Defective laser/scanner unit
Action: Replace the laser/scanner unit.
- Defective engine controller PCB
Action: Replace the engine controller PCB.

I-2. Dark**<Possible causes>**

1. The image density is not adjusted correctly.
Action: Adjust the image density by operating the external device.
2. Poor contact between the engine controller PCB drum grounding contact and the cartridge contact
Action: Clean the contacts if dirty. If the problem still remains after cleaning, or parts are deformed or damaged, replace them.
3. Poor contact between the engine controller PCB primary bias contact and the cartridge contact
Action: Clean the contacts if dirty. If the problem still remains after cleaning, or parts are deformed or damaged, replace them.
4. Defective laser/scanner unit
Action: Replace the laser/scanner unit.
5. Defective engine controller PCB
Action: Replace the engine controller PCB.

I-3. Completely blank**<Possible causes>**

1. Damaged laser shutter open/close projection of the EP-52 cartridge
Action: Replace the cartridge.
2. Laser shutter arm and laser shutter are malfunctioning or damaged.
Action: If they are not moving smoothly, or parts are damaged, replace the faulty parts.
3. Poor contact between the engine controller PCB developing bias contact and the cartridge contact
Action: Clean the contacts if dirty. If the problem still remains after cleaning, or parts are deformed or damaged, replace them.
4. Defective engine controller PCB
Action: Replace the engine controller PCB.

I-4. All black**<Possible causes>**

1. Poor contact between the engine controller PCB primary bias contact and the cartridge contact
Action: Clean the contacts if dirty. If the problem still remains after cleaning, or parts are deformed or damaged, replace them.
2. Defective primary charging roller
Action: Replace the cartridge.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

I-5. Dots in vertical line

<Possible causes>

1. Dirty static charge eliminator
Action: Clean the eliminator with brush.
2. Poor contact between the engine controller PCB static charge eliminator contact and the eliminator
Action: Clean the contacts if dirty. If the problem still remains after cleaning, or parts are deformed or damaged, replace them.
3. Deformation or deterioration of the transfer charging roller
Action: Replace the transfer charging roller.
4. Poor contact between the engine controller PCB transfer charging roller and its shaft
Action: Clean the contacts if dirty. If the problem still remains after cleaning, or parts are deformed or damaged, replace them.
5. Defective engine controller PCB
Action: Replace the engine controller PCB.

I-6. Dirt on back of paper

<Possible causes>

1. Dirty paper
Action: Replace the paper to new one. At the same time, instruct the appropriate way to store paper to the user.
2. Periodic dirt (cassette feed roller, feed roller, pre-transfer roller, transfer charging roller, pressure roller)
Action: Identify and clean the dirty roller according to Table 4-2-1 on page 4-???. If dirt cannot be removed, replace the dirty roller.
3. Dirty feed belt, feed guide or fixing unit entrance guide
Action: Clean the dirty areas.

I-7. Vertical lines

<Possible causes>

1. Circumferential scars on the photosensitive drum
Action: Replace the cartridge.
2. Dirty fixing unit entrance guide
Action: Clean the guide.
3. Scar(s) on fixing film unit
Action: Remove the cause of the scar(s) and replace the unit.

I-8. Black horizontal lines

<Possible causes>

1. Horizontal scar(s) on the photosensitive drum
Action: Replace the cartridge.

2. Dirty, deformed or worn fixing film unit
Action: Replace the fixing film unit.

I-9. Dirt

<Possible causes>

1. Dirty paper
Action: Replace the paper. Advise the customer on how to store paper.
2. Periodic dirt (cassette separation roller, feed roller, pre-transfer roller, fixing film unit, EP-52 cartridge)
Action: Identify and clean the dirty part according to Table 4-2-1 on page 4-??. If dirt cannot be removed, replace the dirty parts.

I-10. Blank spots

<Possible causes>

1. Dirty or deformed transfer charging roller
Action: Replace the transfer charging roller.
2. Poor contact between the engine controller PCB toner sensor contact and toner cartridge contact
Action: Clean the contact(s) if dirty. If the problem still remains after cleaning, or the contact(s) is/are deformed or damaged, replace the contact(s).
3. Defective photosensitive drum, developing cylinder, or toner sensor
Action: Replace the cartridge.
4. Defective engine controller PCB
Action: Replace the engine controller PCB.

I-11. White vertical lines

<Possible causes>

1. Circumferential scars on the photosensitive drum
Action: Replace the cartridge.
2. Defective developing cylinder
Action: Replace the cartridge.
3. Foreign materials are deposited on the laser outlet of the printer or the laser inlet of the cartridge.
Action: Remove the foreign materials.
4. Dirt or foreign materials on the fixing unit entrance guide.
Action: Clean the fixing unit entrance guide.
5. Scars or foreign materials on the fixing film unit surface.
Action: Replace the fixing film unit.
6. Dirty mirror in the laser/scanner unit.

Action: Replace the laser/scanner unit.

I-12. White horizontal lines

<Possible causes>

1. Horizontal scar(s) on the photosensitive drum

Action: Replace the cartridge.

2. Defective fixing film unit

Action: Replace the fixing film unit.

I-13. Poor fixing

<Possible causes>

1. The nip width of the fixing unit is not within the specification.

Action: Replace the fixing unit.

2. Dirty pressure roller

Action: Clean the pressure roller. If the dirt cannot be removed, replace the pressure roller.

3. Scars or dents on the pressure roller surface.

Action: Replace the pressure roller.

4. Scars or foreign materials on the fixing film unit surface.

Action: Replace the fixing film unit.

5. Deterioration of thermistor

Action: Replace the fixing film unit.

I-14. Image distortion

<Possible causes>

1. Poor contact in the connector on the laser/scanner unit

Action: Reconnect J401, J551, and J201 correctly.

2. Poor connection of connector on the engine controller PCB

Action: Reconnect J53 correctly.

3. Defective laser/scanner unit

Action: Replace the laser/scanner unit.

4. Defective engine controller PCB

Action: Replace the engine controller PCB.

Table 4-2-1

Periods of appearance of dirt, blank spots on images

Problem location	Diameter (mm)	Period on image (mm)	Phenomenon			
			Dirt	Blank spots	Dirt on back of paper	Poor fixing
Cassette feed roller	24	About 75			○	
Separation roller	24	About 75	○			
Feed roller	15.8	About 50	○		○	
Pre-transfer roller	15.8	About 50	○		○	
Primary charging roller	12	About 38	○	○		
Photosensitive drum	30	About 94	○	○		
Developing cylinder	16	About 50	○	○		
Transfer charging roller	14.9	About 47		○	○	
Fixing film unit	24	About 75	○	○		○
Pressure roller	20	About 63			○	○

III. PAPER JAMS TROUBLESHOOTING

Paper passes through seven major sections of the printer.

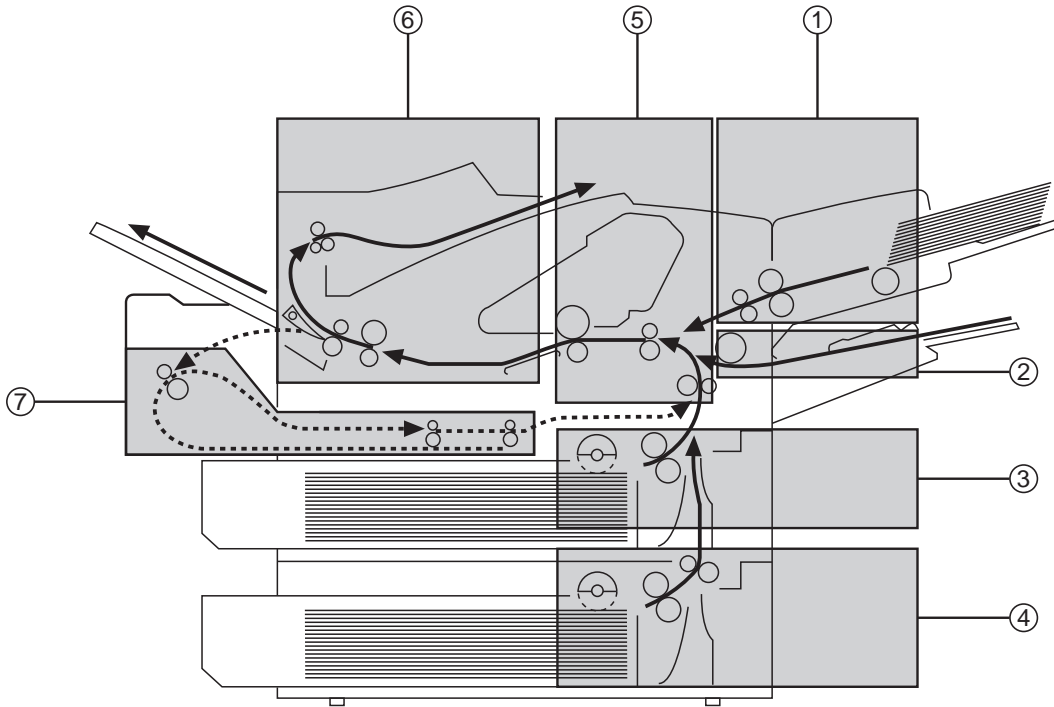


Figure 4-3-1

- J-1: Envelope feeder pick-up block
- J-2: Multi-purpose tray pick-up block
- J-3: Cassette pick-up block
- J-4: Paper feeder pick-up block
- J-5: Transfer and feed block
- J-6: Fixing and delivery block
- J-7: Duplexing feed block

If the factor of the malfunction is identified as "paper jams" by the malfunction diagnosis flow-chart (Figure 4-1-1), check the block in which the paper jam occurred, and find out the defective part.

J-1. Envelope feeder pick-up block**<Possible causes>**

1. Warped or twisted envelope
Action: Straighten the warped or twisted envelope, and then instruct the user.
2. Defective video controller PCB
Action: Make a test print from the envelope feeder. If the envelope is picked up correctly, replace the video controller PCB.
3. Dirty, worn or deformed envelope pick-up roller
Action: Clean the pick-up roller if dirty. Replace it if worn or deformed.
4. Damaged gears
Action: Check the gears of envelope feeder, and replace any damaged gears.
5. Defective envelope pick-up solenoid
Action: Disconnect the envelope pick-up solenoid connector J901 from the envelope feeder driver PCB. Measure the resistance between cable side connector J902-1 and J902-2. If it is not about 129 , replace the envelope pick-up solenoid.
6. Defective envelope feeder driver PCB
Action: Replace the envelope feeder driver PCB.
7. Defective engine controller PCB
Action: Replace the engine controller PCB.

J-2. Multi-purpose tray pick-up block**<Possible causes>**

1. Curled paper
Action: Straighten the paper, and then instruct the user.
2. Defective video controller PCB
Action: Make a test print from the multi-purpose tray. If the paper is picked up correctly, replace the video controller PCB.
3. Dirty, worn, or deformed multi-purpose tray pick-up roller
Action: Clean the pick-up roller if dirty. Replace it if worn or deformed.
4. Damaged gears
Action: Check the gears of multi-purpose tray pick-up unit, and replace any damaged gears.
5. Defective multi-purpose tray pick-up solenoid
Action: Disconnect the mutil-purpose tray pick-up solenoid connector J126. Measure the resistance between cable side connector J126-2 and J126-3. If it is not about 110 , replace the multi-purpose tray pick-up solenoid.
6. Defective engine controller PCB
Action: Replace the engine controller PCB.

J-3. Cassette pick-up block

<Possible causes>

1. Defective video controller PCB
Action: Make a test print from the cassette. If the paper is picked up correctly, replace the video controller PCB.
2. Dirty, worn, or deformed cassette pick-up roller, cassette separation roller, and cassette feed roller
Action: Clean the roller(s) if dirty. Replace it if worn or deformed. The cassette separation roller and the cassette feed roller are to be replaced together.
3. Deformed cassette claw
Action: Replace the cassette claw if deformed.
4. Damaged parts in the pick-up module drive unit
Action: Remove the pick-up module and replace any damaged parts.
5. Defective cassette pick-up solenoid
Action: Disconnect the cassette pick-up solenoid connector J604 from the paper size detection PCB, with the pick-up module removed. Measure the resistance between cable side connector J604-1 and J604-2. If it is not about 110 Ω , replace the cassette pick-up solenoid.
6. Defective paper size detection PCB
Action: Replace the paper size detection PCB.
7. Defective engine controller PCB
Action: Replace the engine controller PCB.

J-4. Paper feeder pick-up block

<Possible causes>

1. Defective video controller PCB
Action: Make a test print from the paper feeder. If the paper is picked up correctly, replace the video controller PCB.
2. Dirty, worn, or deformed pick-up roller, cassette separation roller, and cassette feed roller
Action: Clean the roller(s) if dirty. Replace it if worn or deformed. The cassette separation roller and the cassette feed roller are to be replaced together.
3. Deformed cassette claw
Action: Replace the cassette claw if deformed.
4. Damaged gears
Action: Check the gears of printer and paper feeder, and replace any damaged gears.
5. Defective paper feeder pick-up solenoid
Action: Disconnect the paper feeder pick-up solenoid connector J802 from the paper feeder driver PCB. Measure the resistance between cable side connector J802-1 and J802-2. If it is not about 110 Ω , replace the paper feeder pick-up solenoid.

6. Defective paper feeder driver PCB
Action: Replace the paper feeder driver PCB.
7. Defective engine controller PCB
Action: Replace the engine controller PCB.

J-5. Transfer and feed block

<Possible causes>

1. Paper is curled downward
Action: When a paper 180mm or less in length is jammed before reaching the fixing roller, examine whether the paper is curled downward. If it is, straighten the paper, and then instruct the user.
2. If the paper does not reach the registration arm, perform step 10 and thereafter.
3. Dirty, worn, or deformed pre-transfer roller
Action: Clean the pre-transfer roller if dirty. Replace it if worn or deformed.
4. Dirty or worn registration arm
Action: Clean the registration arm if dirty. Replace it if worn.
5. Registration arm does not move smoothly, or the spring is out of place.
Action: Adjust the arm so that it move smoothly. If the spring is out of place, attach it or replace it.
6. Top of page sensor lever does not move smoothly, or is damaged.
Action: Adjust the lever so that it moves smoothly. Replace it if damaged.
7. Transfer charging roller does not move smoothly.
Action: Replace the busing. Replace the gear if worn.
8. Damaged feed belt
Action: Replace the belt.
9. Damaged feed belt drive gear
Action: Replace the gear.
10. Dirty, worn, or deformed feed roller
Action: Clean the feed roller if dirty. Replace it if worn or deformed.
11. Damaged gears
Action: Remove the multi-purpose tray pick-up unit, and replace any damaged gears.
12. Defective feed roller clutch
Action: Disconnect the feed roller clutch connector J128. Measure the resistance between cable side connector J128-1 and J128-2. If it is not about 145 Ω , replace the feed clutch.
13. Defective engine controller PCB
Action: Replace the engine controller PCB.

J-6. Fixing and delivery block

<Possible causes>

1. Pressure roller does not rotate smoothly.
Action: Check the gears and replace if any worn or fractured gear is found.
2. Fixing unit entrance guide has projections due to dirt, scars or toner.
Action: Clean the fixing unit entrance guide.
3. Fixing film unit or pressure roller has projections due to dirt, scars or toner.
Action: Clean the dirty part(s).
4. Fixing film unit or pressure roller is deformed or scarred.
Action: Replace the deformed or scarred part(s).
5. Nip width is not within the specification.
Action: Replace the fixing unit.
6. Fixing unit delivery sensor lever does not move smoothly, or is damaged.
Action: Adjust the lever so that it moves smoothly. Replace it if damaged.
7. Worn fixing unit delivery roller
Action: Replace the fixing unit delivery roller.
8. Fixing unit delivery roller does not rotate smoothly.
Action: Check the gears and replace any worn or fractured gears.
9. Deflector has projections due to dirt, scars or toner.
Action: Clean the deflector.
10. Worn face-down delivery roller
Action: Replace the face-down delivery roller.
11. Face-down delivery roller does not rotate smoothly.
Action: Check the gears and replace any worn or fractured gears.
12. Face-down tray paper full sensor lever does not move smoothly, or is damaged.
Action: Adjust the lever so that it moves smoothly. Replace it if damaged.
13. Poor linkage between the delivery sensor lever on the fixing unit and the arm on the engine controller.
Action: Rejoin the fixing unit with the engine controller properly.
14. Defective engine controller PCB
Action: Replace the engine controller PCB.

J-7. Duplexing feed block

<Possible causes>

1. Paper is curled due to having been left for a long time.
Action: Straighten the paper, and then instruct the user.

2. Paper not suitable for duplex printing was used.
Action: Instruct the user to use the paper suitable for duplex printing.
3. Foreign materials or burrs are present on the feed guide.
Action: Remove the foreign materials. Replace the guide if it has burrs.
4. Worn or deformed rollers
Action: Replace worn or deformed rollers.
5. Paper dust or dirt on the rollers.
Action: Remove the paper dust and dirt.
6. Duplexing unit solenoid lever does not move smoothly, or is damaged.
Action: Adjust the lever so that it moves smoothly. Replace it if damaged.
7. Damaged or worn gears
Action: Replace any damaged or worn gear(s).
8. Sensor levers do not move smoothly, or are damaged.
Action: Adjust the levers so that they move smoothly. Replace them if damaged.
9. Defective motor
Action: Replace the motor.
10. Defective duplexing unit driver PCB
Action: Replace the duplexing unit driver PCB.
11. Defective engine controller PCB
Action: Replace the engine controller PCB.

IV. PAPER TRANSPORT TROUBLESHOOTING

If the factor of the malfunction is identified as "paper transport troubleshooting" by the malfunction diagnosis flowchart (Figure 4-1-1), execute the followings and mend the defect.

T-1. Multiple feed

<Possible causes>

1. If jams occur in the multi-purpose tray, perform step 7 and thereafter.
2. Incorrectly set paper
Action: Set the paper caught by the claw of the cassette.
3. Deformed cassette claw
Action: Replace the cassette claw if deformed.
4. Worn or deformed cassette separation roller
Action: Replace the separation roller. The cassette feed roller is to be replaced together with the separation roller.
5. Spring pushing the separation roller is defective.
Action: Replace the spring which is pushing the separation roller.
6. Defective torque limiter
Action: Replace the torque limiter.
7. Worn separation pad surface
Action: Replace the separation pad.
8. Spring pushing the separation pad is defective.
Action: Replace the spring which is pushing the separation pad.

T-2. Wrinkles/folded leading edge

<Possible causes>

1. Paper is curled
Action: Straighten the paper, and then instruct the user.
2. Open the top cover after the paper is picked up before it enters the fixing unit. If the paper is wrinkled or folded at its leading edge at this point, perform step 5 and thereafter.
3. Dirty fixing unit entrance guide
Action: Clean the fixing unit entrance guide.
4. Dirty pressure roller
Action: Clean the pressure roller.
5. Fixing film unit is scarred or deformed.
Action: Replace the unit if scarred or deformed.
6. Dirty or worn registration arm
Action: Clean the registration arm if dirty. Replace it if worn.

7. Paper dust or dirt is accumulated in the feed roller, pre-transfer roller and feed guide.
Action: Remove the paper dust or dirt.
8. Paper guide is worn or deformed.
Action: Check the paper path, and replace the guide if scarred or deformed.

T-3. Skew

<Possible causes>

1. The cassette feed roller and the cassette separation roller are worn unevenly.
Action: Replace the cassette feed roller and the cassette separation roller together.
2. The cassette separation claw does not move smoothly or is deformed.
Action: Replace the side guide plate.
3. Dirty or worn registration arm
Action: Clean the registration arm if dirty. Replace it if worn.
4. Registration arm does not move smoothly, or the spring is out of place.
Action: Adjust the arm so that it move smoothly. If the spring is out of place, attach it or replace it.

V. MALFUNCTION TROUBLESHOOTING

If the factor of the malfunction is identified as “malfunction troubleshooting” by the malfunction diagnosis flowchart (Figure 4-1-1), execute the followings and mend the malfunction.

E-1. No AC power

<Possible causes>

1. Blown fuse (FU1)

Action: Replace the fuse (FU1) on the engine controller PCB.

2. Defective engine controller PCB

Action: Replace the engine controller PCB.

E-2. No DC power

<Possible causes>

1. No AC power is supplied.

Action: Check the AC power supply according to “E-1. No AC power.”

2. The overcurrent/overvoltage detection circuit activated

Action: If the problem is not rectified after the power switch is turned OFF and ON again, find the cause of activation of the overcurrent/overvoltage detection circuit in the engine controller PCB. Wait for two minutes or more before turning the power back ON.

3. Blown fuse (FU2)

Action: Replace the fuse (FU2) on the engine controller PCB.

4. Defective wiring, DC load and engine controller PCB

Action: Turn the power OFF. Check the wiring ahead of the engine controller PCB and the DC loads. If problem is found, replace the relevant part. If no problem is found with the wiring and DC loads, replace the engine controller PCB.

VI. MALFUNCTION STATUS TROUBLESHOOTING

If the factor of the malfunction is identified as "malfunction status troubleshooting" by the malfunction diagnosis flowchart (Figure 4-1-1), execute the followings and mend the malfunction.

M-1. "5F-50 ERROR" (fixing unit malfunction)

<Possible causes>

1. Broken or short-circuited thermistor
Action: Turn the power OFF and remove the fixing unit. Measure the resistance between the fixing unit connector J132-1 (THRM) and J132-2 (GND). If the resistance is not in the range of 300k to 500k (standard temperature), replace the fixing film unit.
2. Broken heater wire/blown thermal fuses
Action: If there is no continuity between the fixing unit connectors J143F (NEUTRAL) and J142F (HOT) with the fixing unit removed, replace the fixing film unit.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-2. "5F-52 ERROR" (Scanner unit malfunction)

<Possible causes>

1. Poor contact in laser/scanner unit connectors
Action: Reconnect the BD PCB connector J551, laser driver PCB connector J501 and scanner motor connector J401.
2. Poor contact in engine controller PCB connector
Action: Reconnect the engine controller PCB connector J53 correctly.
3. Defective laser/scanner unit
Action: Replace the laser/scanner unit.
4. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-3. "5F-54 ERROR" (Main motor malfunction)

<Possible causes>

1. Poor contact in the MAIN MOTOR DRIVE signal line connectors
Action: Reconnect the main motor connector J301 and engine controller PCB connector J52 correctly.
2. Defective main motor
Action: Replace the main motor.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-4. "5F-56 ERROR" (Duplexing unit exhaust fan (FM701) malfunction)

<Possible causes>

1. Poor contact in the connectors of the FM701 drive signal line
Action: Reconnect the intermediate connectors J718 and J719, then the duplexing unit driver PCB connector J707.
2. Defective fan motor
Action: Replace the exhaust fan.
3. Defective duplexing unit driver PCB
Action: Replace the duplexing unit driver PCB.

M-5. "5F-59 ERROR" (Cooling fan (FM101) malfunction)

<Possible causes>

1. Poor contact in the connector of the FM101 drive signal line
Action: Reconnect the engine controller PCB connector J54.
2. Defective fan motor
Action: Disconnect the engine controller PCB connector J54. Turn the power ON, then measure the voltage between engine controller PCB connector J54-1 (/FON) and J54-3 (GND). If the voltage changes from 0V to about 24V, replace the cooling fan.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-6. "5F-60 ERROR" (Duplex Option error)

<Possible causes>

1. Defective duplexing unit connector
Action: Remove the duplexing unit from the printer and check the connector. Replace the connector if any failure is found.
2. Defective printer connector
Action: Check the connector. Replace the connector if any failure is found.
3. Defective duplexing unit driver PCB
Action: Replace the duplexing unit driver PCB.
4. Defective engine controller PCB
Action: Replace the engine controller PCB

M-7. "5F-61 ERROR" (Envelope Option error)

<Possible causes>

1. Defective envelope feeder connector
Action: Remove the envelope feeder from the printer and check the connector. Replace the connector if any failure is found.
2. Defective printer connector
Action: Check the connector. Replace the connector if any failure is found.

3. Defective envelope feeder driver PCB
Action: Replace the envelope feeder driver PCB.
4. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-8. "5F-62 ERROR" (Feeder Option error)**<Possible causes>**

1. Defective paper feeder connector
Action: Remove the paper feeder and check the connector. If any failure is found, replace it.
2. Defective printer connector
Action: Check the connector. If any failure is found, replace it.
3. Defective paper feeder driver PCB
Action: Replace the paper feeder driver PCB.
4. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-9. "6F-61 ERROR" (Resident ROM checksum error)**<Possible causes>**

1. Defective firmware ROM DIMM
Action: Replace the firmware ROM DIMM.
2. Defective video controller PCB
Action: Replace the video controller PCB.

M-10. "6F-63 EEROR" (Resident DRAM checksum error)**<Possible causes>**

1. Defective video controller PCB
Action: Replace the video controller PCB.

M-11. "6F-68 EEROR" (NVRAM (EEPROM) error)**<Possible causes>**

1. Defective video controller PCB
Action: Replace the video controller PCB.

M-12. "6F-7A EEROR" (SRAM in AIR chip error)**<Possible causes>**

1. Defective video controller PCB
Action: Replace the video controller PCB.

M-13. "NETWORK OPTION ERROR"

<Possible causes>

1. Defective optional network option board
Action: Replace the network option board
2. Defective video controller PCB
Action: Replace the video controller PCB.

M-14. "PS OPTION ERROR"

<Possible causes>

1. Defective optional PS ROM DIMM
Action: Replace the PS ROM DIMM.
2. Defective video controller PCB
Action: Replace the video controller PCB.

M-15. "PARALLEL INTERFACE ERROR"

<Possible causes>

1. Defective video controller PCB
Action: Replace the video controller PCB.

M-16. "ETHERNET OPTION ERROR"

<Possible causes>

1. Defective optional ethernet board
Action: Replace the ethernet board.
2. Defective video controller PCB
Action: Replace the video controller PCB.

M-17. "TOKEN RING OPTION ERROR"

<Possible causes>

1. Defective optional token ring board
Action: Replace the token ring board.
2. Defective video controller PCB
Action: Replace the video controller PCB.

M-18. "OPTION RAM ERROR"

<Possible causes>

1. Defective optional RAM DIMM
Action: Replace the RAM DIMM.
2. Defective video controller PCB
Action: Replace the video controller PCB.

M-19. "OPTION ROM ERROR"**<Possible causes>**

1. Defective optional ROM DIMM
Action: Replace the ROM DIMM.
2. Defective video controller PCB
Action: Replace the video controller PCB.

M-20. "TONER CARTRIDGE MISSING" message appears when it is installed**<Possible causes>**

1. Poor contact between the printer contact and the cartridge contact
Action: Clean the contacts if dirty. Replace the part(s) if deformed or damaged, or the problem still remains after cleaning.
2. Defective cartridge
Action: Replace the cartridge.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-21. "CASSETTE 1 MISSING" message appears when it is installed**<Possible causes>**

1. Damaged cassette size lever in the cassette
Action: Replace the lever.
2. Defective paper size detection PCB
Action: Replace the paper size detection PCB.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-22. "PRINTER OPEN" message appears when the cover is closed**<Possible causes>**

1. Damaged cartridge door lever
Action: Replace the cartridge door.
2. Defective door open detection switch
Action: Replace the door open detection switch.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-23. "TOP BIN FULL" message appears when the actual paper level is not full**<Possible causes>**

1. Locked or damaged delivery paper full sensor lever
Action: Set the lever to move smoothly. Replace it if damaged.

2. Defective delivery paper full sensor

Action: Replace the sensor.

3. Defective engine controller PCB

Action: Replace the engine controller PCB.

M-24. "LOAD <SIZE> IN CASSETTE 1" message appears when the specified sized paper is in the cassette

<Possible causes>

1. Damaged paper detection lever

Action: Replace the lever.

2. Defective cassette paper sensor

Action: Replace the sensor.

3. Defective paper size detection PCB

Action: Replace the paper size detection PCB.

4. Defective engine controller PCB

Action: Replace the engine controller PCB.

M-25. "LOAD <SIZE> IN MPT" message appears when the specified sized paper is in the multi-purpose tray

<Possible causes>

1. Damaged paper detection lever

Action: Replace the lever.

2. Defective multi-purpose tray paper sensor

Action: Replace the sensor.

3. Defective engine controller PCB

Action: Replace the engine controller PCB.

M-26. "LOAD <SIZE> IN CASSETTE 2" message appears when the specified sized paper is in the paper feeder

<Possible causes>

1. Damaged paper detection lever

Action: Replace the lever.

2. Defective paper feeder paper sensor

Action: Replace the sensor.

3. Defective paper feeder driver PCB

Action: Replace the paper feeder driver PCB.

4. Defective paper size detection PCB

Action: Replace the paper size detection PCB.

5. Defective engine controller PCB.

Action: Replace the engine controller PCB.

M-27. "LOAD <SIZE> IN ENV." message appears when the specified sized envelope is in the envelope feeder.

<Possible causes>

1. Damaged envelope detection lever
Action: Replace the lever.
2. Defective envelope feeder driver PCB
Action: Replace the envelope feeder driver PCB.
3. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-28. "CLOSE FACE-UP TRAY" message appears when the face-up tray is closed at the time of using duplexing unit

<Possible causes>

1. Spring is out of position
Action: Remove the right cover of the duplexing unit and check the spring. If the spring is out of position, set it in the correct position.
2. Damaged top cover sensor lever of the duplexing unit
Action: Replace the top cover.
3. Defective face-up tray paper sensor
Action: Replace the sensor.
4. Defective duplexing unit driver PCB
Action: Replace the duplexing unit driver PCB.

M-29. "PAPER JAM" message appears when the paper jam has not occurred, and the printer cannot be in READY mode.

<Possible causes>

1. Top of page sensor lever does not move smoothly or is damaged.
Action: Set the lever to move smoothly. Replace it if damaged.
2. Fixing unit delivery sensor lever does not move smoothly or is damaged.
Action: Set the lever to move smoothly. Replace it if damaged.
3. Defective top of page sensor
Action: Replace the sensor.
4. Defective fixing unit delivery paper sensor 1
Action: Replace the sensor.
5. Defective engine controller PCB
Action: Replace the engine controller PCB.

M-30. "DUPLEX JAM" message appears when the paper jam has not occurred; so, the printer cannot be in READY mode.

<Possible causes>

1. Reversing paper sensor lever does not move smoothly, or is damaged.
Action: Set the lever to move smoothly. Replace it if damaged.
2. Duplexing unit pick-up paper sensor lever does not move smoothly, or is damaged.
Action: Set the lever to move smoothly. Replace it if damaged.
3. Defective reversing paper sensor
Action: Replace the sensor.
4. Defective duplexing unit pick-up paper sensor 1
Action: Replace the sensor.
5. Defective duplexing unit driver PCB
Action: Replace the duplexing unit driver PCB.
6. Defective engine controller PCB
Action: Replace the engine controller PCB.

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VII. MEASUREMENT AND ADJUSTMENT

A. Mechanical Adjustment

1. Checking the nip width of the pressure roller

The fixing unit is not designed to allow adjustment of the pressure (nip width); however, the incorrect nip width can cause fixing problems.

Follow the procedures below to check the nip width:

- 1) Make an all-black print of A4 size using an EP-52 cartridge, and take the print to the customer's site.
- 2) Place the all-black print in the cassette of the printer, with the printed side facing down.
- 3) Select face-up delivery.
- 4) Press the test print switch.
- 5) When the leading edge of the print emerges at the face-up tray, turn OFF the printer. Open the top cover and take out the print from the printer about 10 seconds later.
- 6) Measure the width of the glossy band across the paper and check that it meets the requirements as shown in Figure 4-7-1.;
 - Center (a): 6mm to 8.1mm
 - Right and left (b, c): 6.3mm to 8.3mm
 - Difference between right side and left side ($|b-c|$): 1.0mm or less
 - Difference between right/left sides and center (b-a, c-a): -0.3mm or more

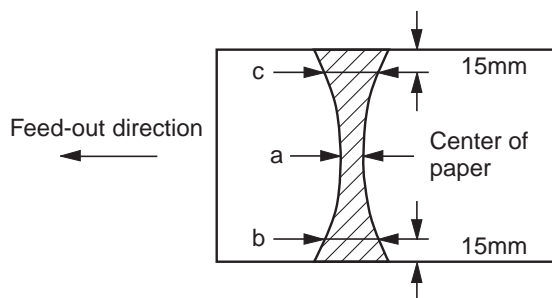


Figure 4-7-1

2. Adjusting the installation position of separation guide of envelope feeder (adjustment of gap between separation guide and lower separation roller)

Normally, the separation guide and the top cover must be removed as one. However, if only the separation guide has been removed for unavoidable reason, or it needs to be replaced due to deformation, make the adjustment as shown below.

When installing the separation guide, insert the 1.6mm thickness gauge (RY9-0123) between the separation guide and the lower separation roller, and fix the separation guide with 1.6mm gap between the separation guide and the lower separation roller.

<Cross sectional view of the envelope feeder>

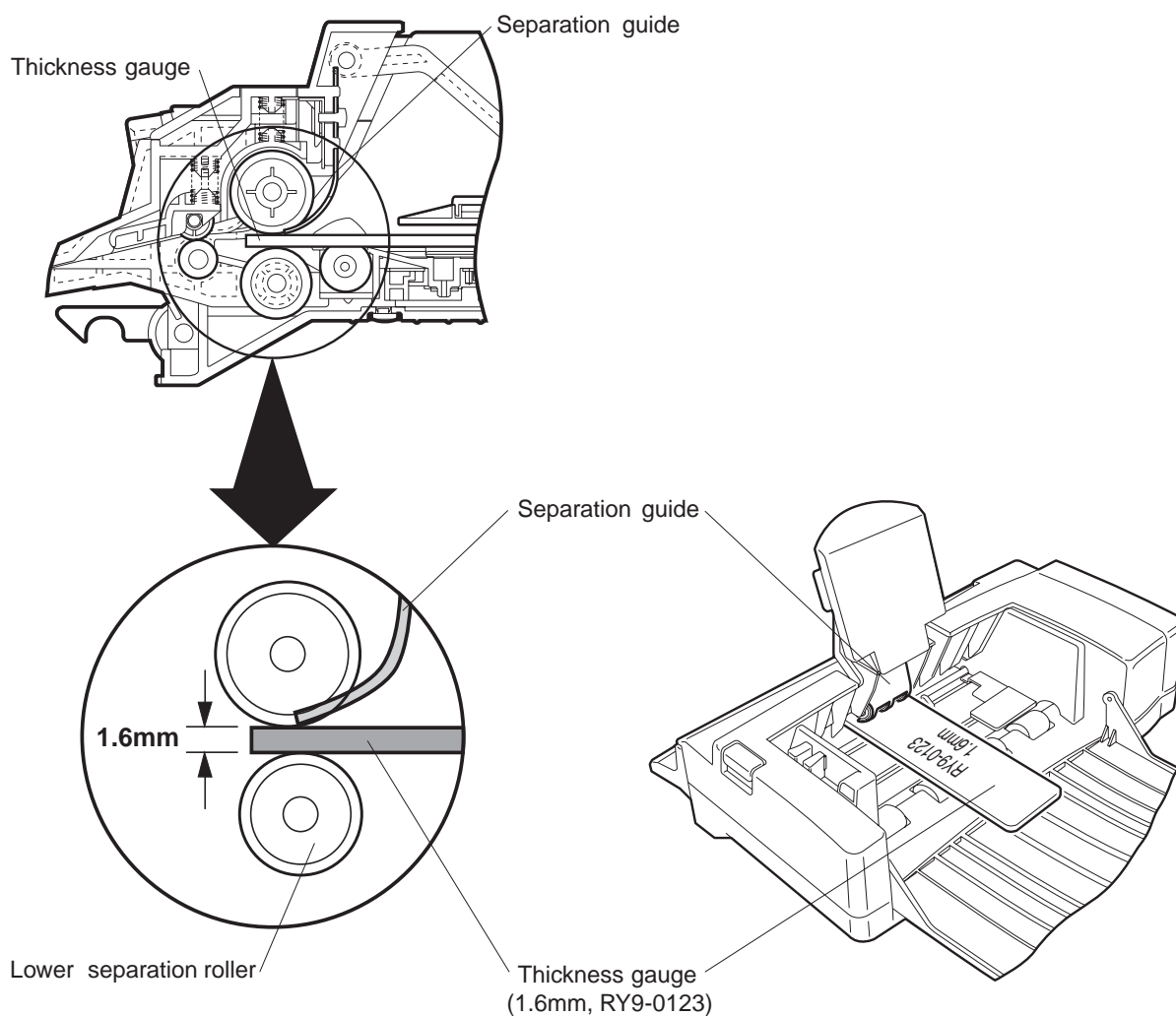


Figure 4-7-2

3. Adjusting the installation position of envelope multiple feed sensor

The installation position of envelope multiple feed sensor is normally adjusted at the factory. However, if the screw which hold the sensor is removed or accidentally loosened for replacement of the sensor or its peripheral parts, the installation position of envelope multiple feed sensor must be adjusted correctly.

The adjustment procedures are shown below.

- 1) Prepare the printer driver tester (RY9-0124) and the thickness gauge (RY9-0122).
- 2) Remove the top cover of the envelop feeder.
- 3) Connect the two connectors of the printer driver tester with the printer and the envelop multiple feed sensor connector as shown in Figure 4-7-3.
- 4) Insert the 0.7mm thickness gauge (RY9-0122) between the upper and lower feed rollers of the envelope feeder from the side where the envelope is to be set.
- 5) Turn ON the printer.
- 6) The Sensor Test LED of the printer driver tester lights up.
- 7) Tighten the screw that holds the sensor until the LED goes off.

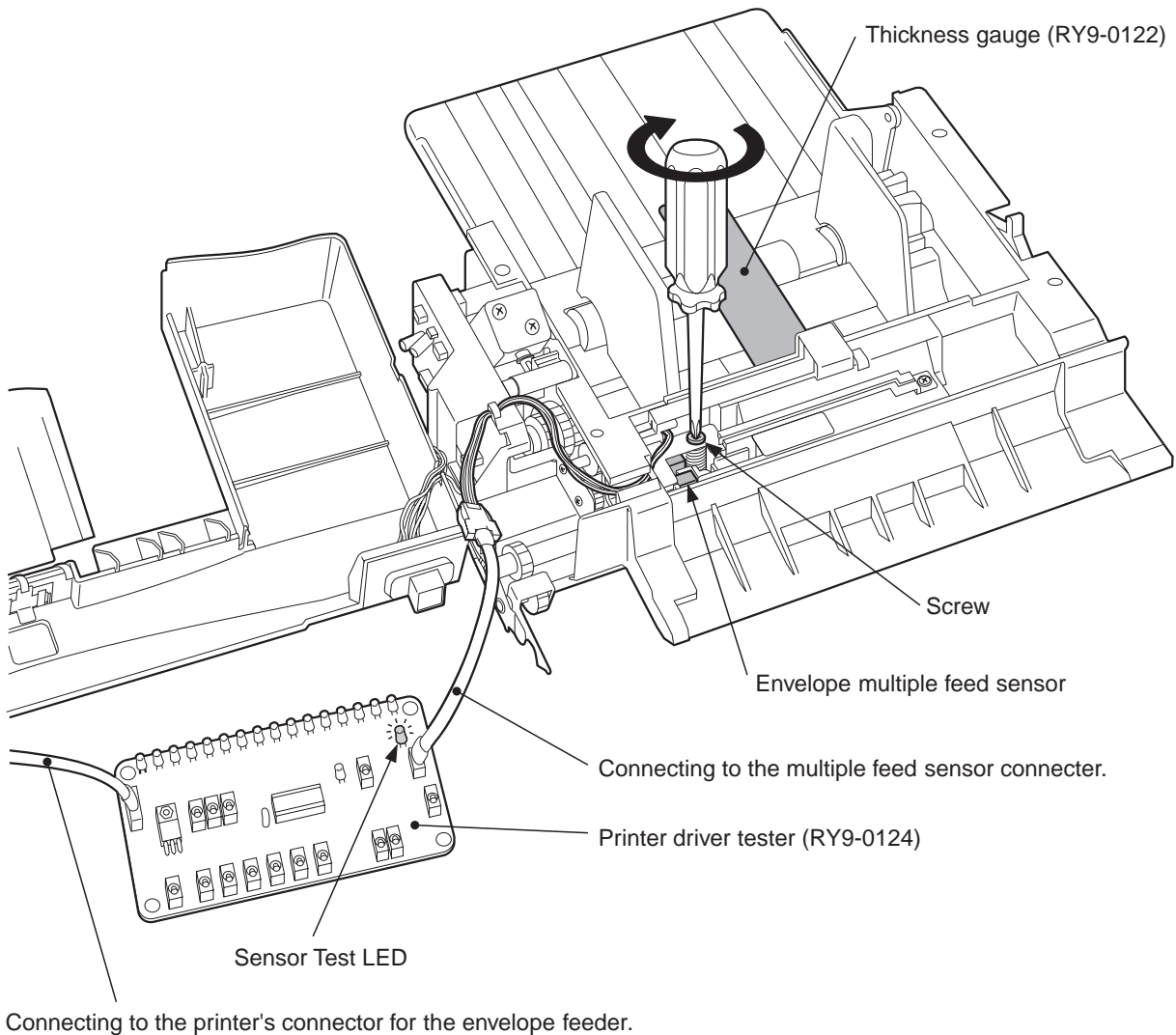


Figure 4-7-3

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B. Electrical Adjustment

1. Top margin adjustment

As VR501 on the engine controller PCB is adjusted at the factory, its adjustment at the time of installation is not required.

However, when the engine controller PCB is replaced in the field, the top margin needs to be re-adjusted. Also, if the top margin of test prints made after laser/scanner unit replacement is not 2.0mm, this adjustment is necessary. The adjustment procedures are shown below.

- 1) After setting the VR501 to the center position (± 0) on the engine controller PCB, set the paper in the cassette. Press the test print switch to make several test prints.
- 2) Measure the length from the leading edge to the print pattern ("a" in Figure 4-7-4). Measure all the test prints and calculate their average.
- 3) Adjust VR501 so that the calculated value in step 2) becomes 2.0mm.

The pattern image shifts in the "+" direction in Figure 4-7-4 if VR501 is turned clockwise, and in the "-" direction, counterclockwise. Turning the VR501 one scale shifts the pattern about 0.6mm.

For instance, if the average value calculated in step 2) is 1.4mm, the difference is 0.6mm. Therefore, turn VR501 clockwise for one scale. (See Figure 4-7-5.)

- 4) Make several test prints again, and perform step 2). Check that the top margin is 2.0mm. If the value is incorrect, repeat steps 1) to 4).

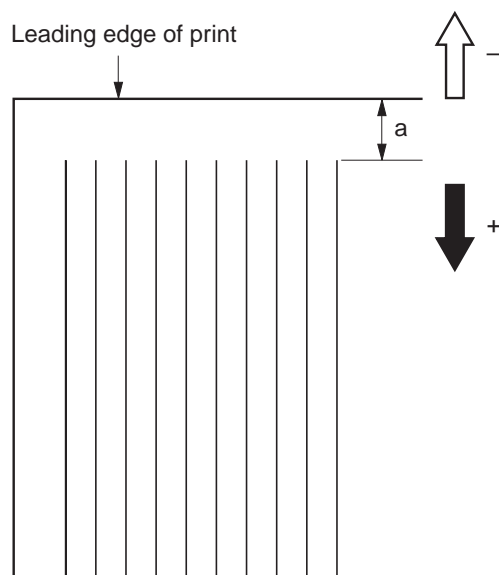


Figure 4-7-4

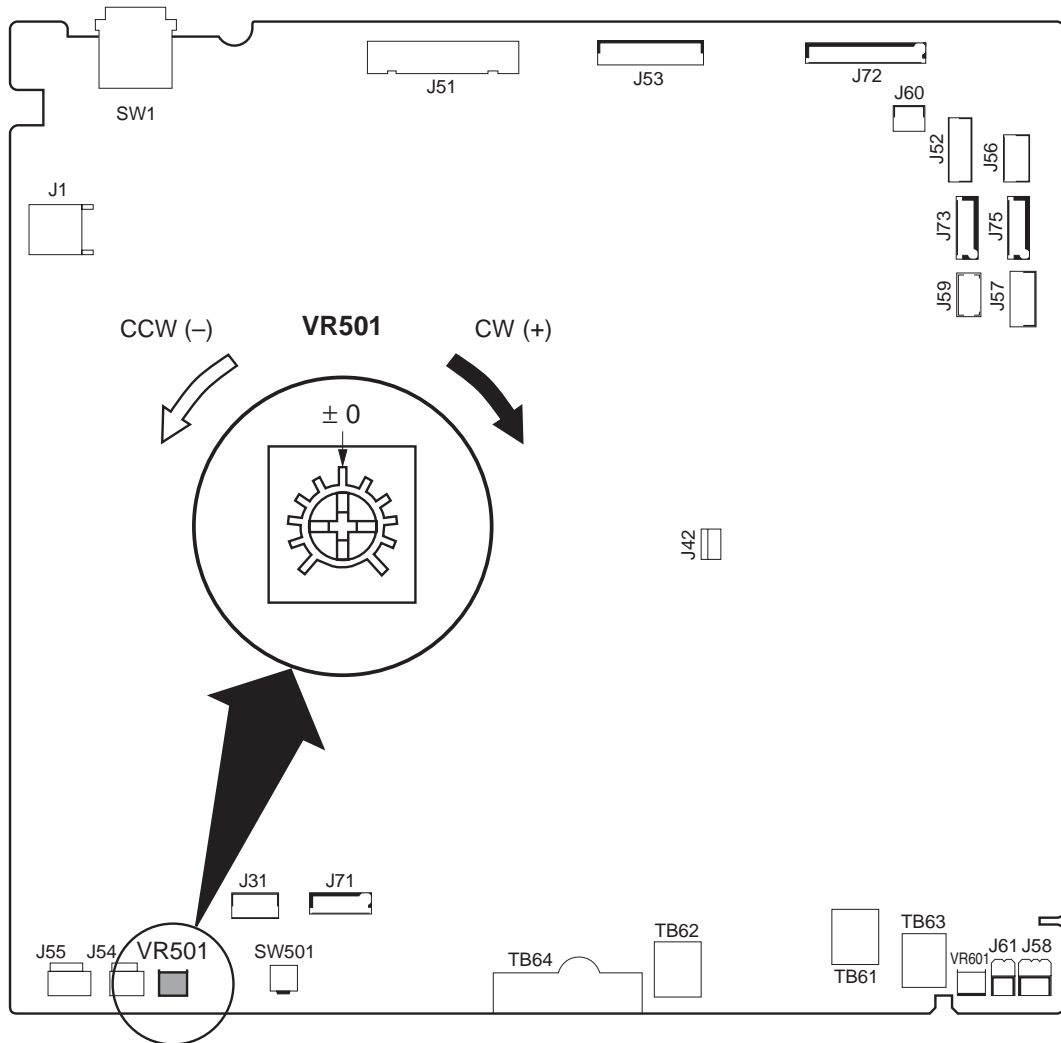




Figure 4-7-5

C. Variable Resistors, LEDs, Test Pins, Jumpers and Switches on PCBs

Only the variable resistors, LEDs, test pins, jumpers, and switches which may require after-sales service are listed below.

All other variable resistors, LEDs, test pins, etc. are adjusted only at the factory. These require special tools and measuring instruments and must be set with high precision. Do not touch them during after-sales service.

- Notes:**
1. Some LEDs receive leakage current during normal operation, thus glow dimly even when they should be OFF.
 2. Variable resistors which may be adjusted in after-sales service are marked 
 - Variable resistors which may not be adjusted in after-sales service are marked ... 

1. Engine Controller PCB

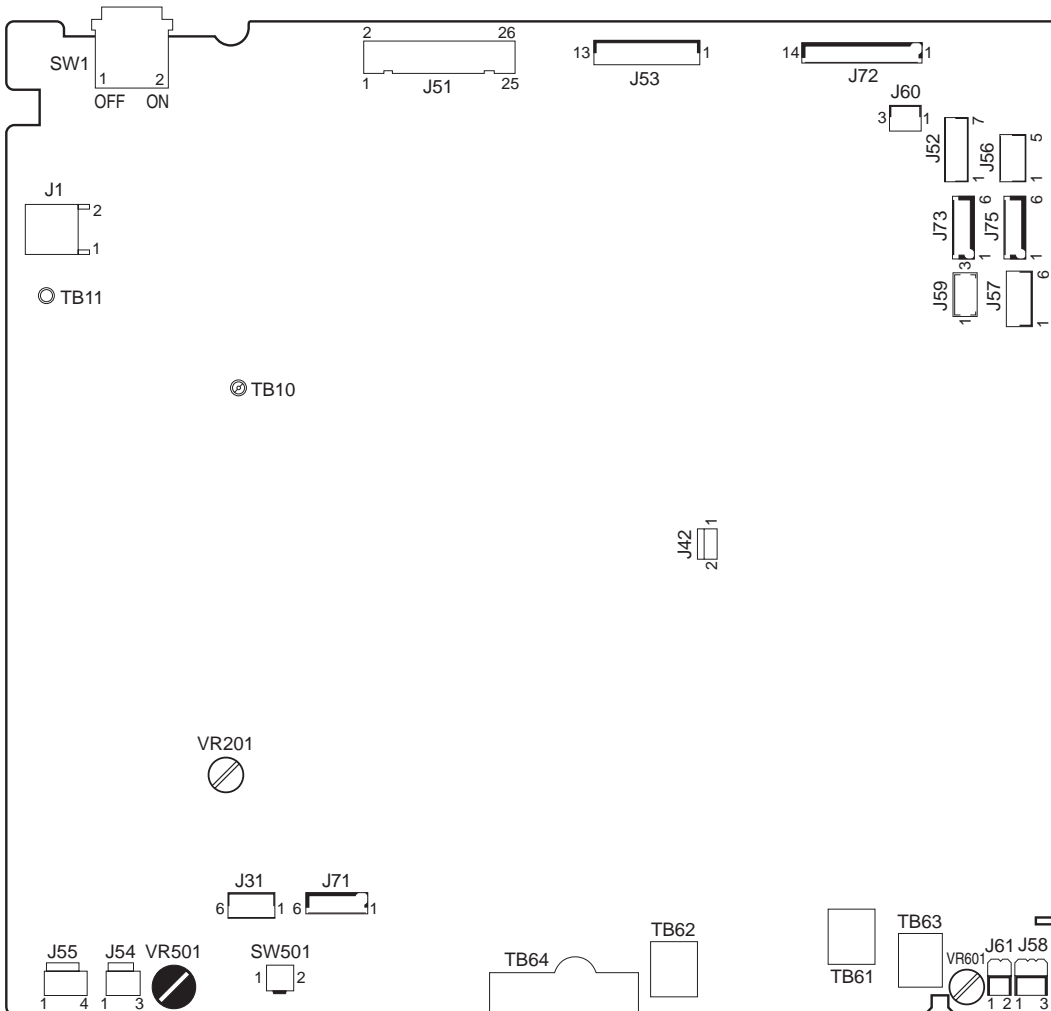


Figure 4-7-6

Table 4-7-1

SW No.	Function
SW1	Power switch
SW501	Test print switch

VR No.	Function
VR201	Adjusted at factory
VR501	Top of page adjustment
VR601	Adjusted at factory

2. Paper Size detection PCB

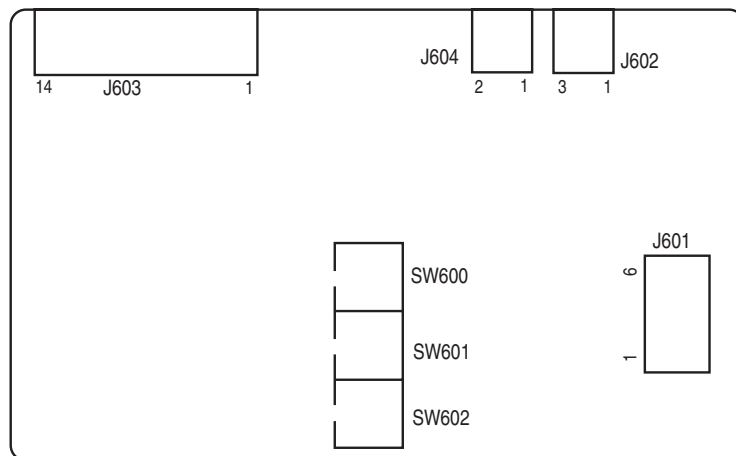


Figure 4-7-7

Table 4-7-2

SW No.	Function
SW600	Paper size detection switches (see page 2-40)
SW601	
SW602	

3. Paper Feeder Driver PCB

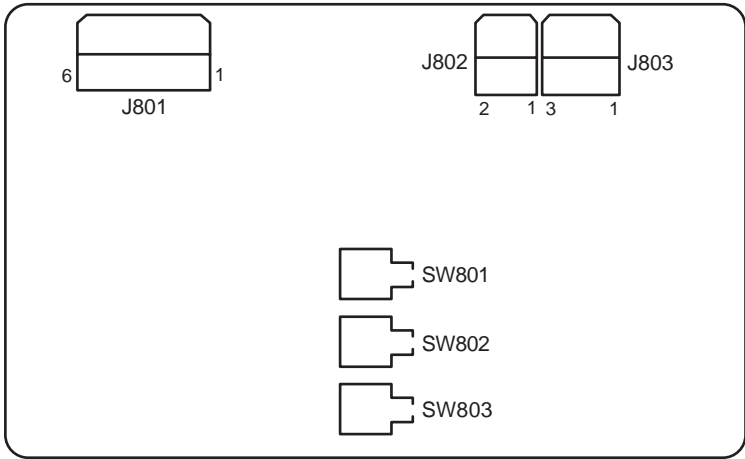


Figure 4-7-8

Table 4-7-3

SW No.	Function
SW801	Paper feeder paper size detection switch (see page 2-40)
SW802	
SW803	

VIII. MAINTENANCE AND SERVICING

A. Periodic Replacement Parts

- There are no parts which require periodic replacement in this printer.

Note: Periodic replacement parts are the parts that must be replaced at regular intervals, even if they are functioning properly and show no signs of wear. (Failure of these parts can seriously affect the performance.) These parts should be replaced during a regular service visit closest to the end of the parts expected life.

B. Expected Service Life of Consumable Parts

Consumable parts are expected to require replacement at least once during the warranty period of the printer, due to deterioration or damage. The life span of consumable parts is expressed in terms of hours or number of prints processed. Replace them when the parts are proven faulty. Table 4-8-1 shows the expected life of consumable parts.

Table 4-8-1

As of April, 1998

No.	Part name	Part No.	Qty	Expected life	Remarks
1	Multi-purpose tray pick-up roller	RG5-3718-000	1	100,000 sheets	
2	Separation pad	RB1-8773-000	1	200,000 sheets	
3	Cassette feed roller	RF5-2490-000	1	200,000 sheets	Replace the cassette feed roller , the separation roller, and torque limiter together.
4	Cassette separation roller	RF5-2490-000	1	200,000 sheets	
5	Torque limiter	RB1-8974-000	1	200,000 sheets	
6	Multi-purpose pick-up clutch	RB1-8765-000	1	200,000 sheets	
7	Fixing unit	RG5-2661-050	1	200,000 pages	100-127V
		RG5-2662-050	1	200,000 pages	220-240V
8	Transfer charging roller	RG5-4283-000	1	200,000 pages	
9	Cooling fan	RH7-1334-000	1	25,000 hours	When the fans are not stopped during the standby condition.
10	Duplexing unit exhaust fan	RH7-1361-000	1	25,000 hours	

Note: 1. The above values are only estimates and subject to change due to future data.
2. 2 pages are counted as 1 sheet in case of duplexing.

C. Periodic Service

- The printer has no parts that require periodic servicing.

D. Cleaning Points for Servicing

1. Multi-purpose tray pick-up roller, cassette pick-up roller, separation roller, and feed roller

Clean with dry lint-free paper.

2. Separation pad

Clean with lint-free paper.

3. Pre-transfer roller/registration arm unit

Clean with lint-free paper.

4. Transfer guide unit

Clean with soft, dry flannel cloth.

5. Feed belt/feed guide unit

Clean with lint-free paper.

6. Fixing unit

- Fixing unit entrance guide

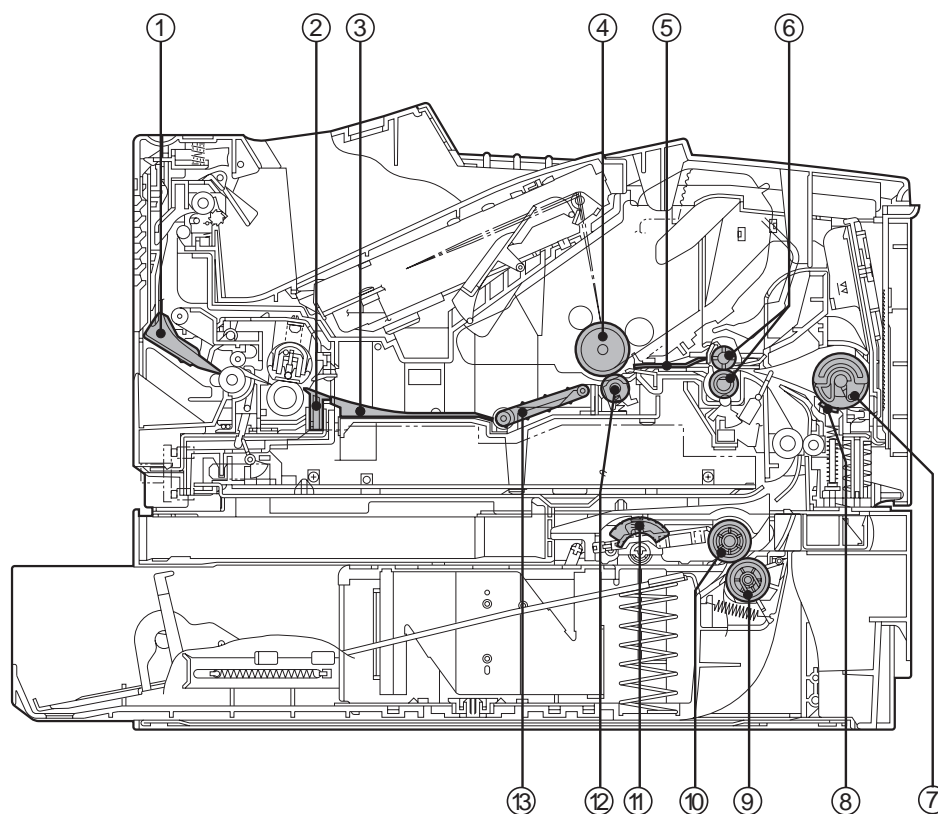
Clean with cloth moistened with MEK.

7. Face-up deflector

Clean with soft, dry flannel cloth.

As a rule, the following parts cannot be cleaned. For details, see Chapter 3.

- **Photosensitive drum**
- **Transfer charging roller**

**Figure 4-8-1**

- | | |
|--------------------------------------|--------------------------------|
| 1: Face-up deflector | 8: Separation pad |
| 2: Fixing unit entrance guide | 9: Cassette separation rollers |
| 3: Feed guide | 10: Cassette feed rollers |
| 4: Photosensitive drum | 11: Cassette pick-up rollers |
| 5: Transfer guide unit | 12: Transfer charging roller |
| 6: Pre-transfer roller unit | 13: Feed belt |
| 7: Multi-purpose tray pick-up roller | |

E. Standard Tools

The standard tools required for servicing the printer are listed below.

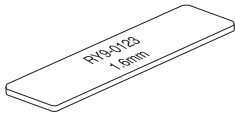
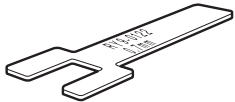
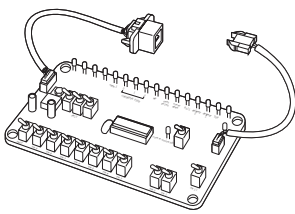
Table 4-8-2

No.	Tool name	Tool No.	Remarks
1	Tool case	TKN-0001	
2	Jumper wire	TKN-0069	With clips
3	Thickness gauge	CK-0057	0.02 mm to 0.3 mm
4	Compression spring scale	CK-0058	For checking cassette spring strength (0-600 g)
5	Phillips screwdriver	CK-0101	M4, M5 length: 363mm
6	Phillips screwdriver	CK-0104	M3, M4 length: 155mm
7	Phillips screwdriver	CK-0105	M4, M5 length: 191mm
8	Phillips screwdriver	CK-0106	M4, M5 length: 85mm
9	Flat-blade screwdriver	CK-0111	
10	Precision flat-blade screwdriver set	CK-0114	Set of 6
11	Allen wrench set	CK-0151	Set of 5
12	File, fine	CK-0161	
13	Allen (hex) screwdriver	CK-0170	M4 length: 107mm
14	Diagonal cutting pliers	CK-0201	
15	Needle-nose pliers	CK-0202	
16	Pliers	CK-0203	
17	Retaining ring pliers	CK-0205	For shaft rings
18	Crimper	CK-0218	
19	Tweezers	CK-0302	
20	Ruler	CK-0303	150 mm (for measuring)
21	Soldering iron	CK-0309	100 V, 30 W
22	Mallet, plastic head	CK-0314	
23	Brush	CK-0315	
24	Penlight	CK-0327	
25	Plastic bottle	CK-0328	100cc
26	Solder	CK-0329	ø1.5 (mm) ~ 1 (m)
27	Desoldering wick	CK-0330	1.5 mm
28	Lint-free paper	CK-0336	500 SH/PKG
29	Soldering iron	CK-0348	240 V, 30 W
30	Oiler	CK-0349	30cc
31	Plastic jar	CK-0351	30cc
32	Digital multimeter	FY9-2032	

F. Special Tools

In addition to the standard tools, the following special tools are required for servicing the printer.

Table 4-8-3

No.	Tool name	Tool No.	Shape	RANK	Application/remarks
1	Thickness gauge	RY9-0123		A	Used for installing the separation guide of the optional envelope feeder.
2	Thickness gauge	RY9-0122		C	The thickness gauge is used with the printer driver tester to adjust installation position of the envelope multiple feed sensor of the envelope feeder.
3	Printer driver tester	RY9-0124		C	The printer driver tester is also used independently to check operation of the printer and options.

Note: Ranks

A: Tools used for part replacement or adjustment on site.

B: Tools used on site or in regions.

These tools include tools used for failure analysis, and tools which are difficult to carry around.

C: Tools used in the workshop.

These tools include the tools used for PCB and unit repairs.

G. Printer driver tester

1. Outline

Printer driver tester is a special tool that operates the printer to check printer operations. It is also used with the thickness gauge to adjust installation position of the envelope multiple feed sensor of the envelope feeder. Its four main functions are as follow.

- 1) Operates the printer to print all-black, vertical lines, horizontal lines, or all-white images.
- 2) Monitors the state of the sensors in the printer and operates the printer.
- 3) Displays error status sent from the engine controller to the video controller with the LEDs on the tester when a malfunction occurs in the printer.
- 4) Adjusts installation position of the envelope multiple feed sensor with a special tool, thickness gauge. (See “VII. Measurement and Adjustment” for details.)

2. LED/switches

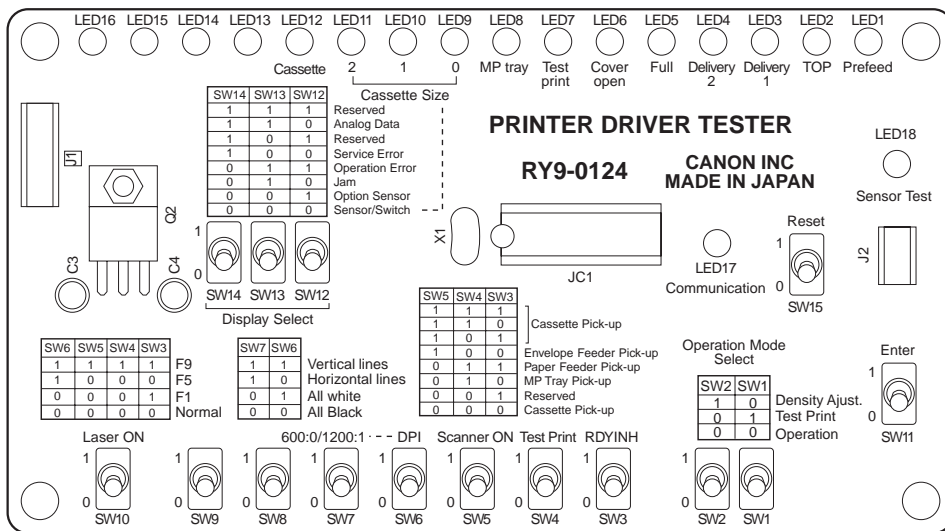


Figure 4-8-2

LED1 to LED16

Monitors the state of the sensors and various status sent from the printer with the 16 LEDs.

LED17 (Communication)

Lights up when communicating with the printer.

LED18 (Sensor Test)

Used to adjust position of the envelope multiple feed sensor.

SW1 and SW2 (Operation Mode Select)

Set operation mode.

SW3 to SW9

Set various data sent to the printer.

SW10 (Laser ON)

Emits laser from the laser diode.

SW11 (Enter)

Enters the data set by SW3 to SW9.

SW12 to SW14 (Display Select)

Set display mode.

SW15 (Reset)

Resets the printer driver tester.

3. Operation**a. Connecting to the printer**

Note: Before handling the printer driver tester, make sure to touch metallic parts of the printer to discharge electrical static as it may cause malfunctions or failures in the printer and the tester.

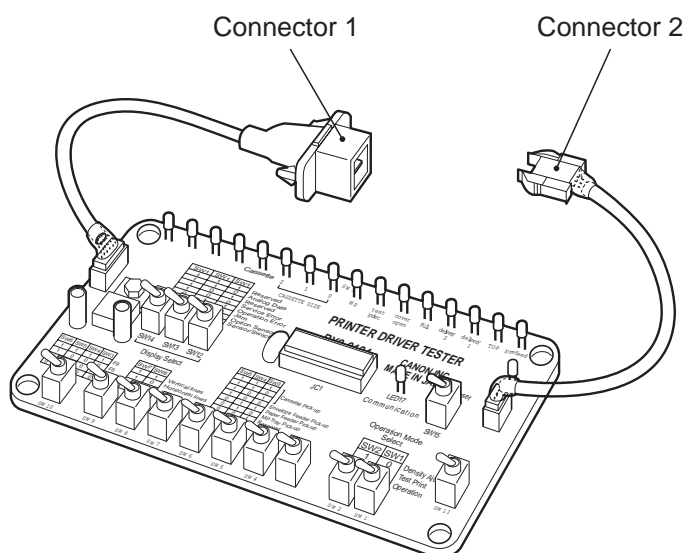


Figure 4-8-3

- 1) Turn OFF the printer.
- 2) Connect the connector 1 of the tester to the envelope feeder connector in the printer. The seal on the connector 1 should be facing up when connected to the envelope feeder connector. Connect it to the duplexing unit connector on the back to check the envelope feeder operation. The seal on the connector 1 should be facing right (the left cover side) when connected to the duplexing unit connector.
- 3) Turn ON the printer and operate the tester when the printer enters the standby mode.

Note: Note that the connector of the tester fits into the connector on the wrong side. If the LEDs on the tester do not light up when conducting the step 3, reconnect the connector the other way around.

b. Setting the printer operations

Table 4-8-4 shows printer operations that can be set by combinations of switches on the printer driver tester.

Set the operation mode with SW1 and SW2 and various data with SW3 to SW9 according to the table 4-8-4. Contents set by SW3 to SW9 are sent to the printer by turning ON SW11, and the printer executes the set operations. Once SW11 has been turned ON, the set contents remain until canceled. If multiple settings are to be made, set them one by one turning ON SW11 each time.

To cancel the setting, set the corresponding switch back to "0" and then turn ON SW11 or turn OFF the power switch of the printer.

For instance, a test print is executed when turning ON SW11 with SW1 and SW2 set to "0" and SW4 to "1." The test print is continued until the setting is canceled by turning ON SW11 with SW4 set to "0."

Table 4-8-4

	Operation selection	Test print selection				Density selection				
SW1	0	1				0				
SW2	0	0				1				
SW3	Ready inhibit (Note)	SW5	SW4	SW3	Paper pick-up source	SW6	SW5	SW4	SW3	Density
		0	0	0	Cassette	0	0	0	0	Normal mode
		0	0	1	—					
SW4	Test print	0	1	0	Multi-purpose tray	0	0	0	1	F1
		0	1	1	Paper feeder					
		1	0	0	Envelope feeder					
SW5	Scanner motor ON	1	0	1	Cassette	1	0	0	0	F5
		1	1	0	Cassette					
		1	1	1	Cassette	1	1	1	1	F9
		1	1	1	Cassette					
SW6	Switch resolution 600dpi: "0" 1200dpi: "1"	SW7	SW6	Test pattern		Change density directly with the above 4 bit data.				
		0	0	Vertical lines						
		0	1	Horizontal lines						
SW7	—	1	0	All-white		—				
		1	1	All-black						
SW8	—	Duplex test print				—				
SW9	—	—				—				

Note: To set the printer to enter ready inhibit mode at power-ON, set the mode using the switches and then turn ON the printer while holding SW11 to "1."

c. Monitoring the printer condition

Select items to monitor from the table 4-8-5 and 4-8-6. Make settings with SW12 to SW14 and monitor the printer condition with LED1 to LED16.

Table 4-8-5

	Sensor/switch information (Printer)	Sensor/switch information (Option)	Jam display
SW12	0	1	0
SW13	0	0	1
SW14	0	0	0
LED1	Pre-feed sensor Paper present	Paper feeder connected	Pick-up delay jam
LED2	Top of page sensor Paper present	Paper size detection switch (Lower) ON	Pick-up stationary jam
LED3	Fixing unit paper delivery sensor 1 Paper present	Paper size detection switch (Middle) ON	Delivery delay jam
LED4	Fixing unit paper delivery sensor 2 Paper present	Paper size detection switch (Upper) ON	Delivery stationary jam
LED5	Face-down tray paper full sensor Paper present	Paper feeder Paper present	Revere delay jam
LED6	Door open detection switch ON	Envelope feeder connected	Revere stationary jam
LED7	Test print switch ON	Envelope feeder Envelope present	Duplexing unit pick-up delay jam
LED8	Multi-purpose tray paper sensor Paper present	—	—
LED9	Paper size detection switch (Lower) ON	Duplexing unit connected	—
LED10	Paper size detection switch (Middle) ON	Reversed paper sensor Paper present	—
LED11	Paper size detection switch (Upper) ON	Duplexing unit pick-up sensor Paper present	—
LED12	Cassette Paper present	Face-up sensor	—
LED13	—	—	—
LED14	—	—	—
LED15	—	—	—
LED16	—	—	—

Table 4-8-6

	Status information 1	Status information 2	Analog data
SW12	1	0	0
SW13	1	0	1
SW14	0	1	1
LED1	No paper in the specified pick-up source	Scanner failure	A/D data of VR501 (Note 7) bit 0 (LSB)
LED2	No toner cartridge	Main motor failure	A/D data of VR501 bit 1
LED3	Test print	Fan motor failure	A/D data of VR501 bit 2
LED4	Door open	Duplex fan motor failure	A/D data of VR501 bit 3
LED5	Paper jam	Fixing unit failure (Warm-up error)	A/D data of VR501 bit 4
LED6	Sleep	Fixing unit failure (Abnormally low temperature)	A/D data of VR501 bit 5
LED7	Wait	Fixing unit failure (Abnormally high temperature)	A/D data of VR501 bit 6
LED8	—	Fixing unit failure (Detection circuit failure)	A/D data of VR501 bit 7 (MSB)
LED9	No toner warning	Thermistor open on the engine controlle	—
LED10	Face-down tray paper full warning	—	—
LED11	BD error	Pick-up unit illegal operation (Note 1)	—
LED12	Paper size mismatch	Delivery unit illegal operation (Note 2)	—
LED13	Paper feed failure	Cassette illegal operation (Note 3)	—
LED14	—	Duplexing unit illegal connection (Note 4)	—
LED15	—	Paper feeder illegal connection (Note 5)	—
LED16	Multiple envelopes fed from envelope feeder	Envelope feeder illegal connection (Note 6)	—

- Note:**
1. The specified pick-up source was eliminated from the pick-up unit configuration.
 2. Any of the following four has taken a place.
 - The specified delivery unit was eliminated from the delivery unit configuration.
 - Face-up tray was opened when the duplex delivery has been selected.
 - Two sheets of paper are fed to the duplexing unit when the duplex delivery has been selected.
 - The duplexing unit was eliminated from the delivery unit configuration when the option delivery slot has been selected.

3. The cassette is not set in the printer when the paper feeder is selected as the paper pick-up source.
 4. The duplexing unit is not connected correctly.
 5. The paper feeder is not connected correctly.
 6. The envelope feeder is not connected correctly.
 7. Monitored value set by VR501 on the engine controller. The value is expressed by 8 bit data (256 steps).
The value of the data becomes +40 (-40) when the start position of the laser is moved backward (forward) by 1 mm via VR501.
-

H. Solvents and Oil List

Table 4-8-7

No.	Material name	Components	Use	Remarks
1	Alcohol: ethyl (pure or denatured) or isopropyl (pure or denatured)	C_2H_5OH , $(CH_3)_2CHOH$	Cleaning: plastic, rubber, external parts	<ul style="list-style-type: none"> • Purchase locally • Flammable: keep away from flame
2	MEK (methyl ethyl ketone)	$CH_3CO-C_2H_5$	Cleaning: oil and toner stains	<ul style="list-style-type: none"> • Purchase locally • Highly flammable: keep away from flame
3	Lubricating oil	Petroleum mineral oil	Apply between gear and shaft	<ul style="list-style-type: none"> • Tool No. CK-8003 (100 ml bottle) • Tellus Oil 68 (Shell)
4	Lubricating agent	Special oil Special solid lubricating material Lithium soap	Apply to gears	<ul style="list-style-type: none"> • Tool No. HY9-0007 (20 g tube) • Molycoat EM-50L (Dow Coning)

IX. LOCATION OF ELECTRICAL PARTS

A. Switches

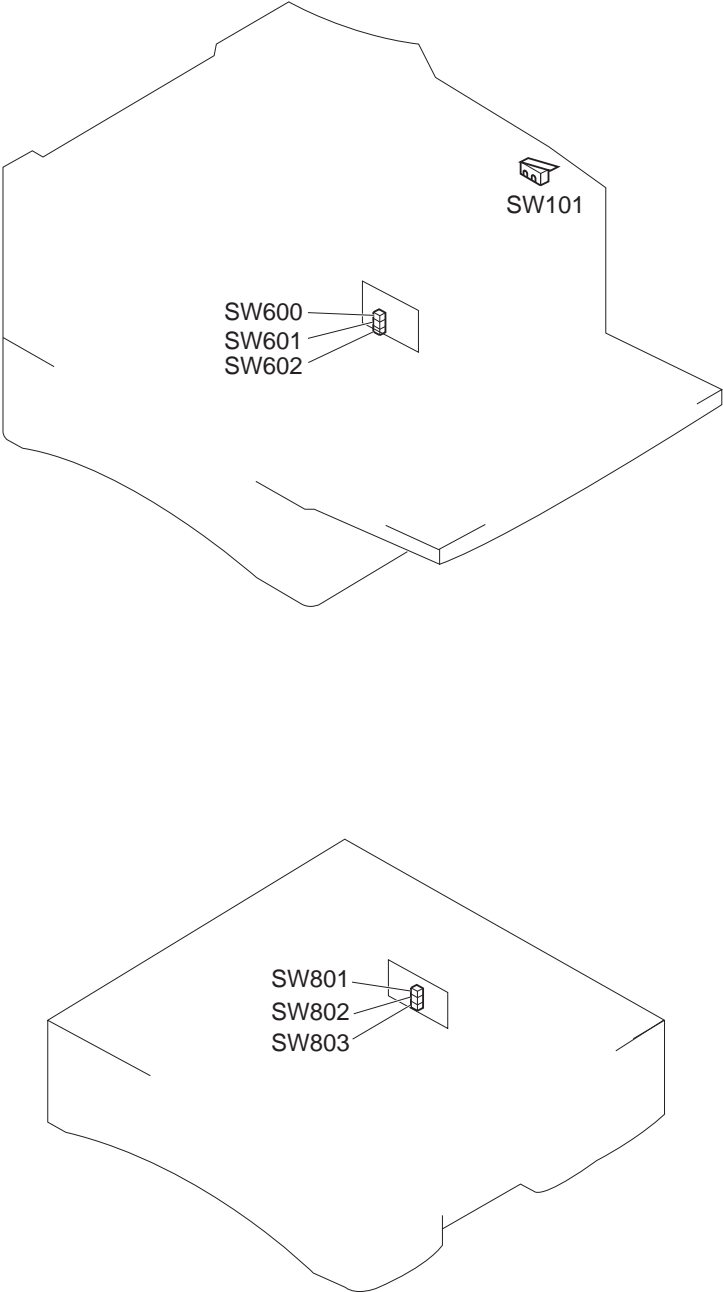
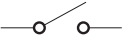


Figure 4-9-1

Table 4-9-1

Symbol	Name of Symbol	Code	Name
	Switch	SW101	Door open detection switch
		SW600	Paper size detection switch
		SW601	Paper size detection switch
		SW602	Paper size detection switch
		SW801	Paper feeder paper size detection switch
		SW802	Paper feeder paper size detection switch
		SW803	Paper feeder paper size detection switch

B. Sensors

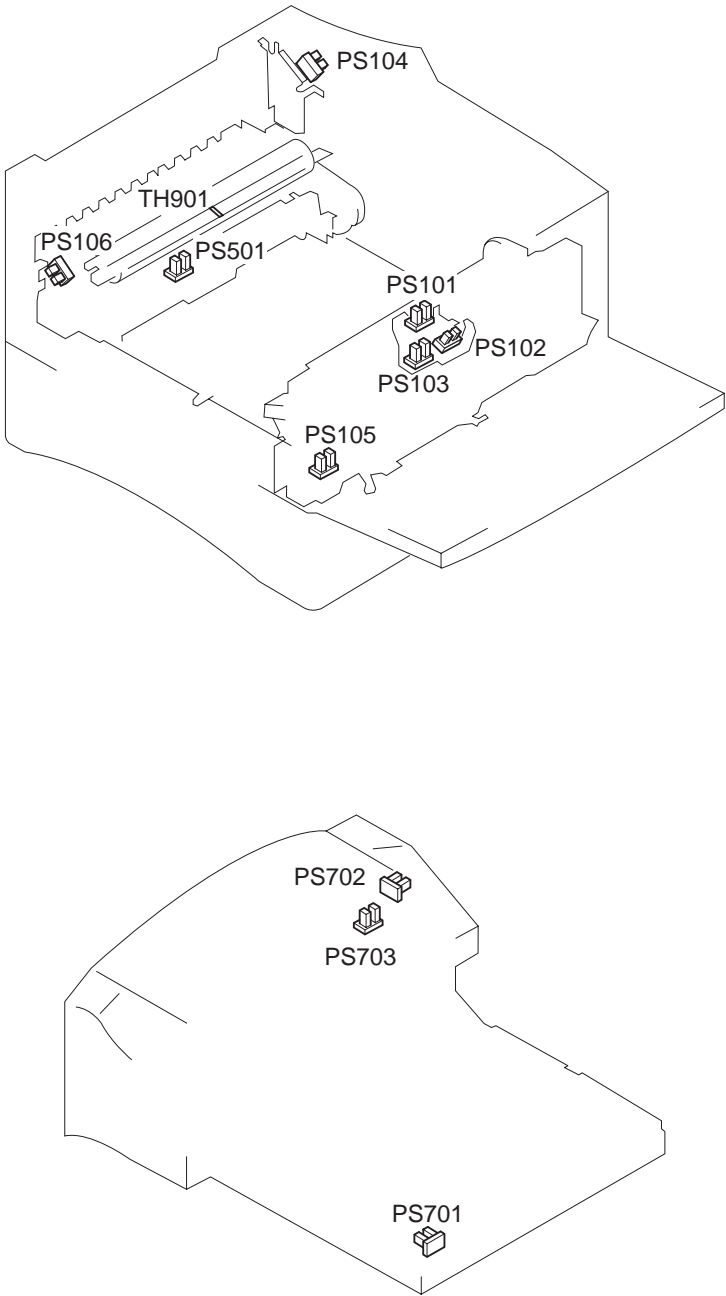


Figure 4-9-2

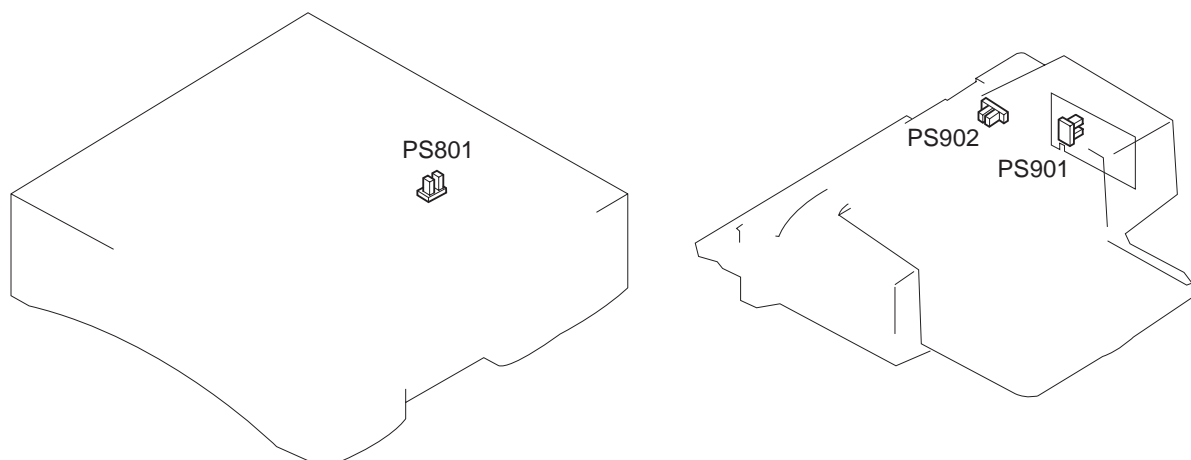




Figure 4-9-3

Table 4-9-2

Symbol	Name of Symbol	Code	Name
	Photointerrupter	PS101	Cassette paper sensor
		PS102	Pre-feed sensor
		PS103	Top of page sensor
		PS104	Face-down tray paper full sensor
		PS105	Multi-purpose tray paper sensor
		PS106	Fixing unit paper delivery sensor 2
		PS501	Fixing unit paper delivery sensor 1
		PS701	Duplex pick-up paper sensor (duplexing unit)
		PS702	Face-up sensor (duplexing unit)
		PS703	Reversed paper sensor (duplexing unit)
		PS801	Paper feeder paper sensor (paper feeder)
		PS901	Envelope sensor (envelope feeder)
		PS902	Envelope multiple feed sensor (envelope feeder)
	Thermistor	TH901	Fixing film surface temperature sensor

C. Clutches/Solenoids

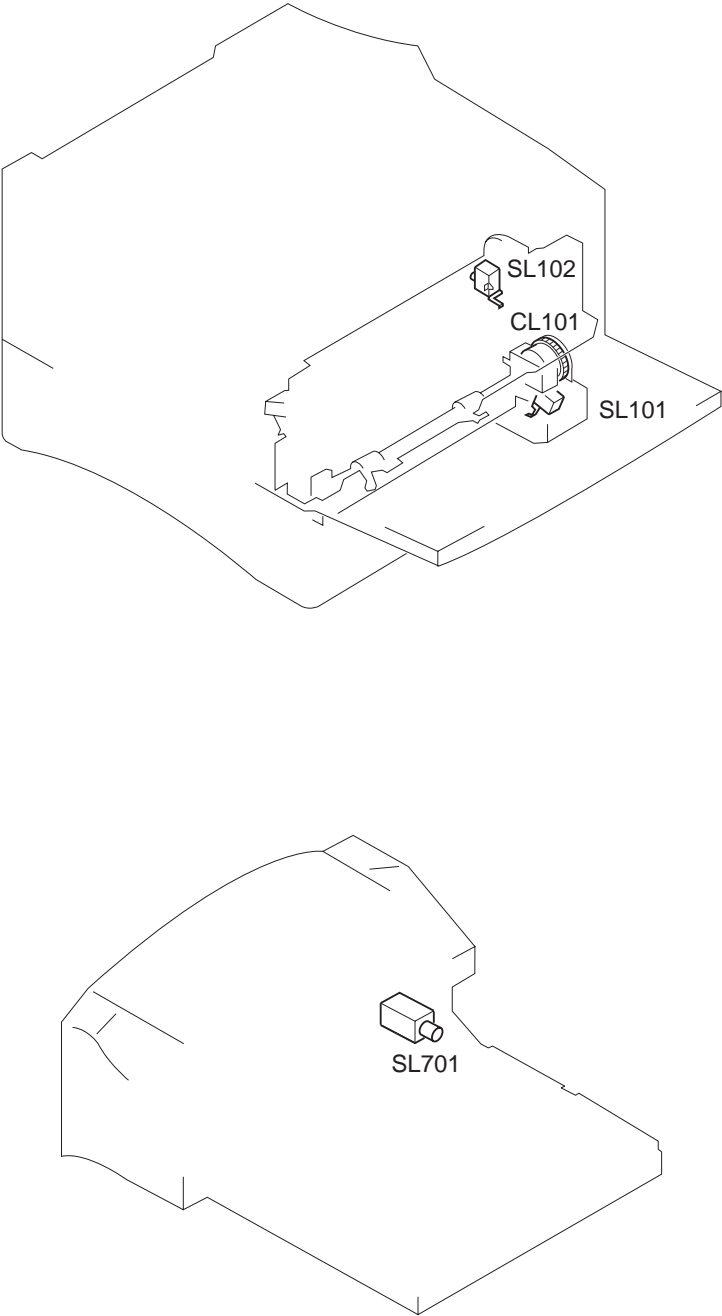


Figure 4-9-4

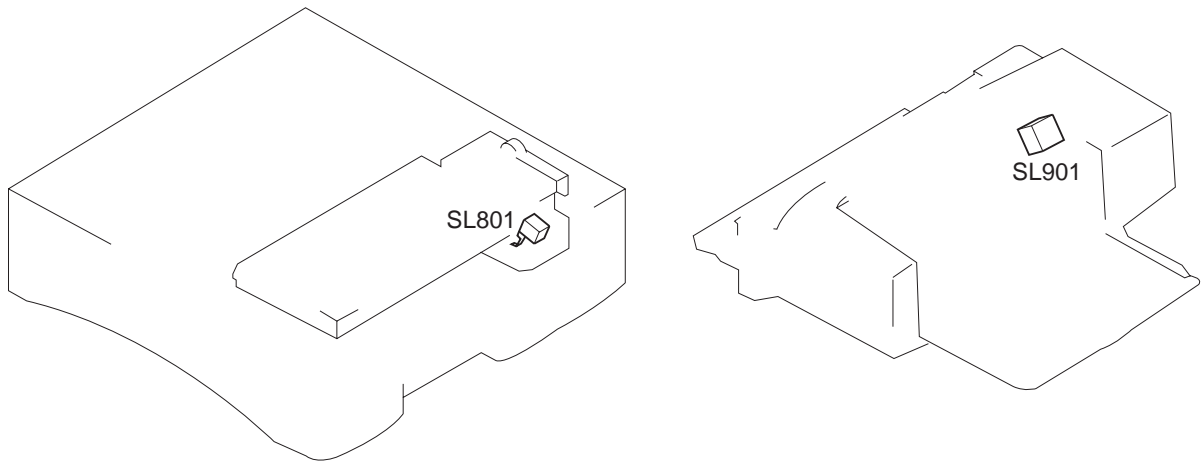




Figure 4-9-5

Table 4-9-3

Symbol	Name of Symbol	Code	Name
	Clutch	CL101	Feed roller clutch
	Solenoid	SL101	Cassette pick-up solenoid
		SL102	Multi-purpose tray pick-up solenoid
		SL701	Duplexing unit solenoid (duplexing unit)
		SL801	Paper feeder pick-up solenoid (paper feeder)
		SL901	Envelope pick-up solenoid (envelope feeder)

D. Motors/Others

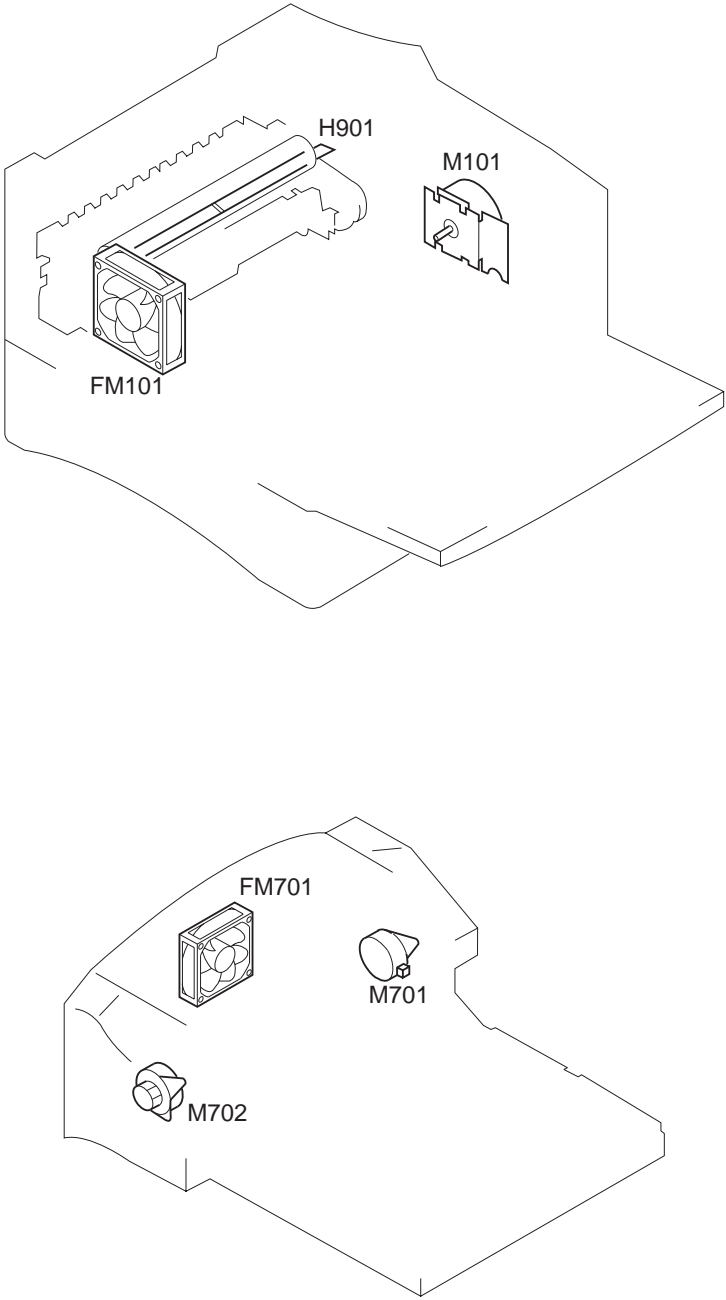





Figure 4-9-6

Table 4-9-4

Symbol	Name of Symbol	Code	Name
	Motor	M101 M701 M702	Main motor Reversing motor (duplexing unit) Duplex feed motor (duplexing unit)
	Fan motor	FM101 FM701	Cooling fan Duplexing unit exhaust fan (duplexing unit)
	Fixing heater	H901	Fixing heater

E. PCBs

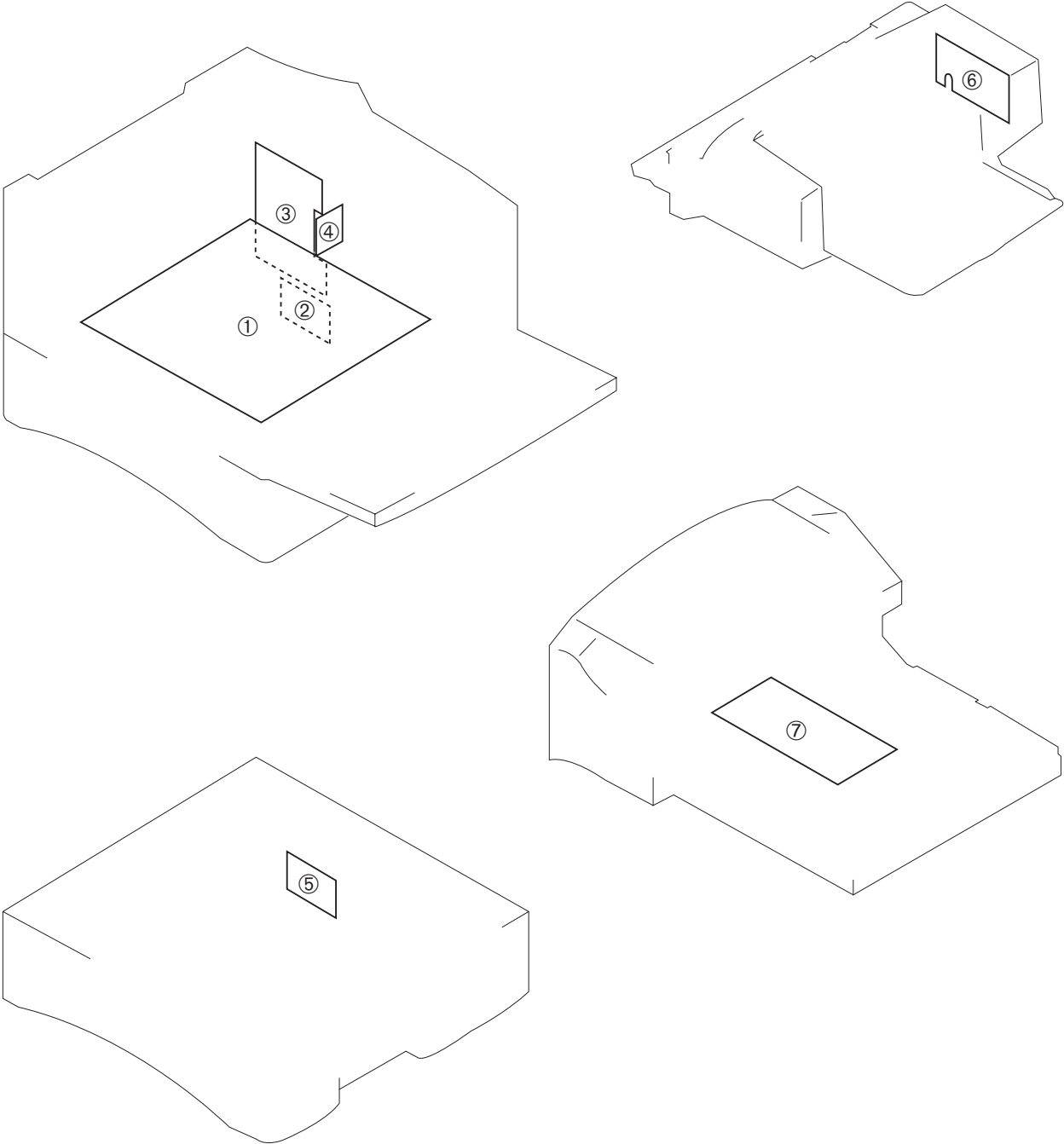


Figure 4-9-7

Table 4-9-5

No.	Name	Function
1	Engine controller PCB	Sequence control, high-voltage output, DC output and heater drive
2	Paper size detection PCB	Relay between sensors/solenoids and engine controller PCB, and paper size detection
3	Video controller PCB	Input/output process between the printer and the external device and management of various data.
4	Adapter PCB	Relay between the video controller PCB and the network board (option).
5	Paper feeder driver PCB	Control of solenoids in the paper feeder and performance of various kinds of detection.
6	Envelope feeder driver PCB	Control of solenoids in the envelope feeder and performance of various kinds of detection.
7	Duplexing unit driver PCB	Control of loads in the duplexing unit and performance of various kinds of detection.

F. Connectors

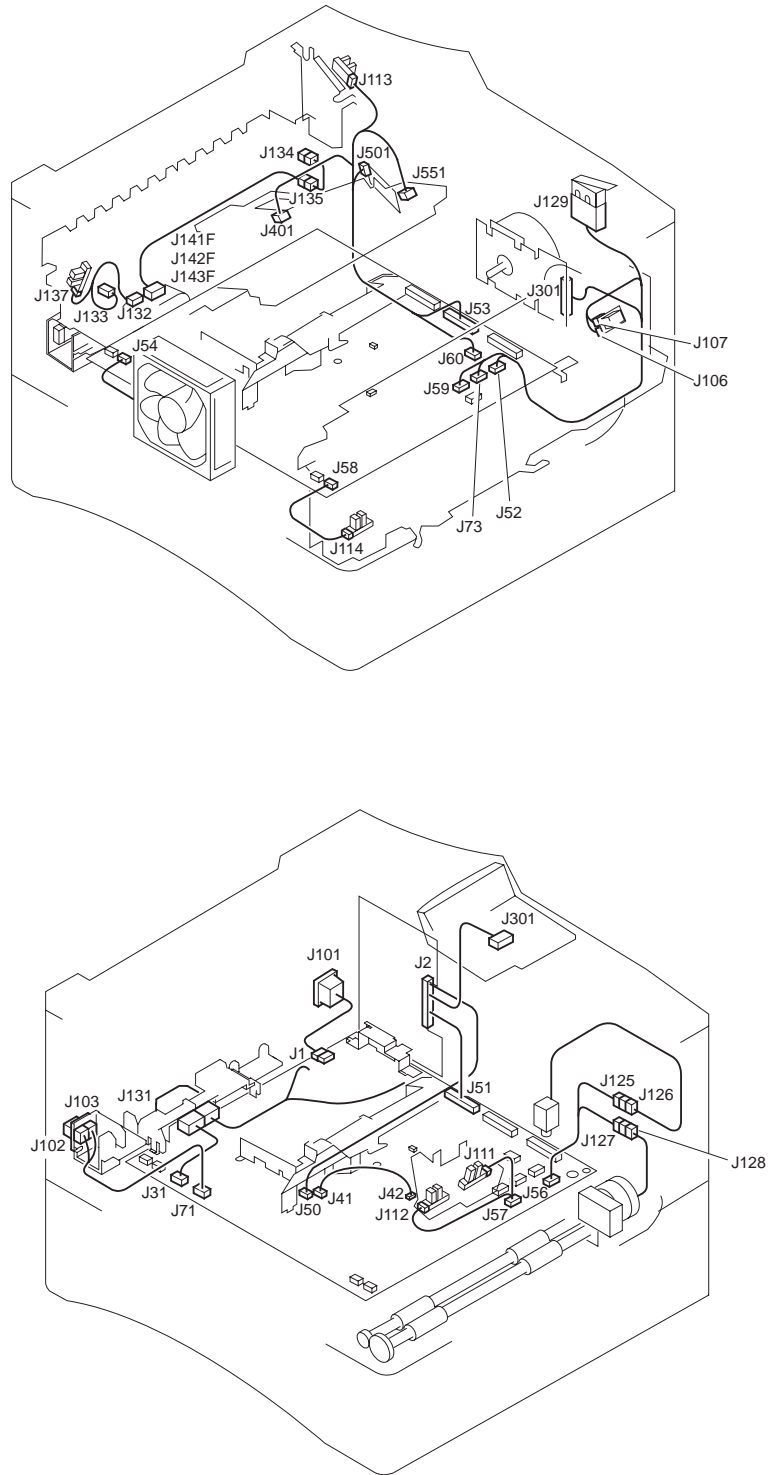


Figure 4-9-8

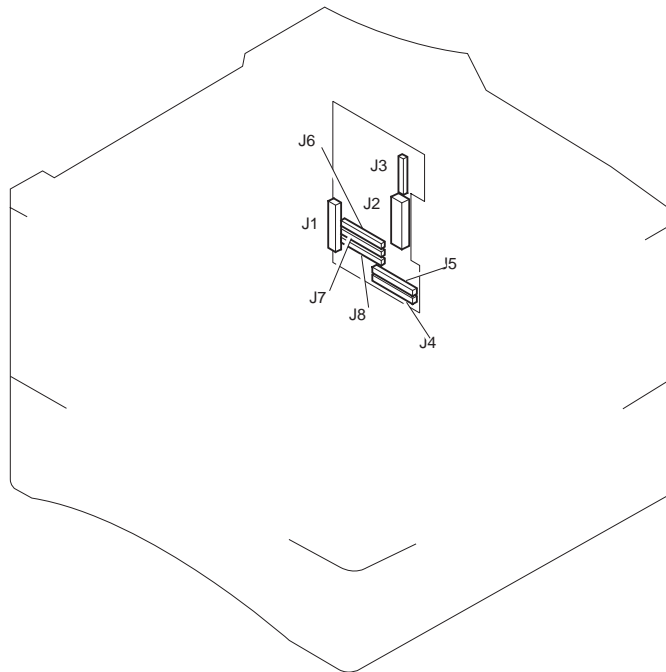
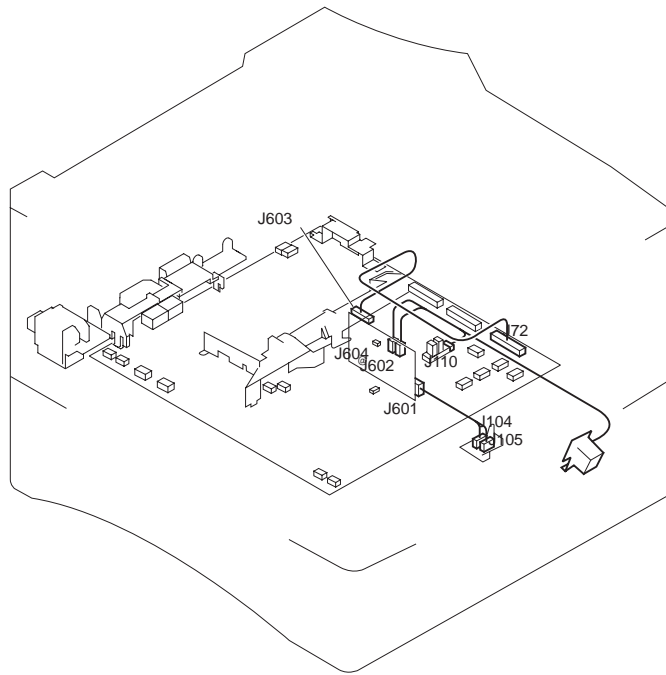


Figure 4-9-9

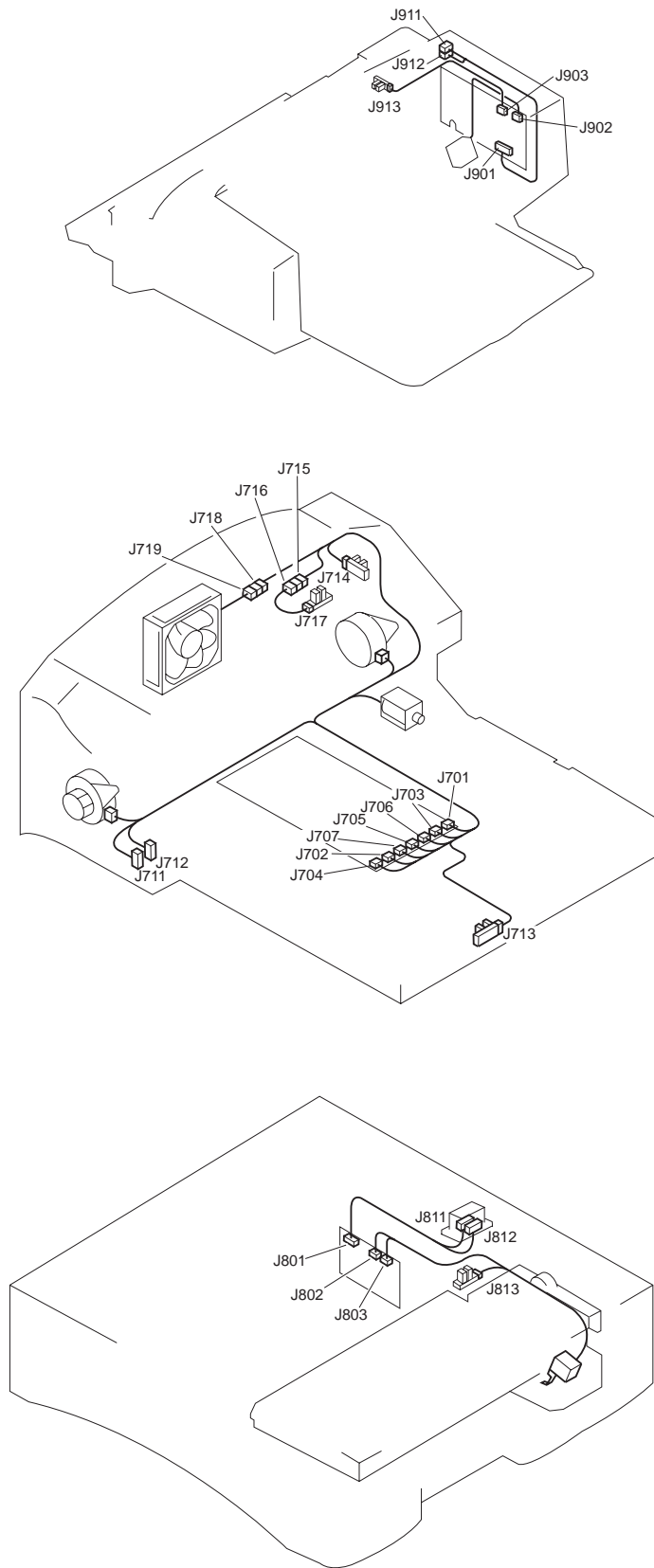


Figure 4-9-10

APPENDIX

I. GENERAL TIMING CHART	A-1
II. GENERAL CIRCUIT DIAGRAM	A-3

III. LIST OF SIGNALS	A-5
IV. MESSAGE TABLE	A-11

I. GENERAL TIMING CHART

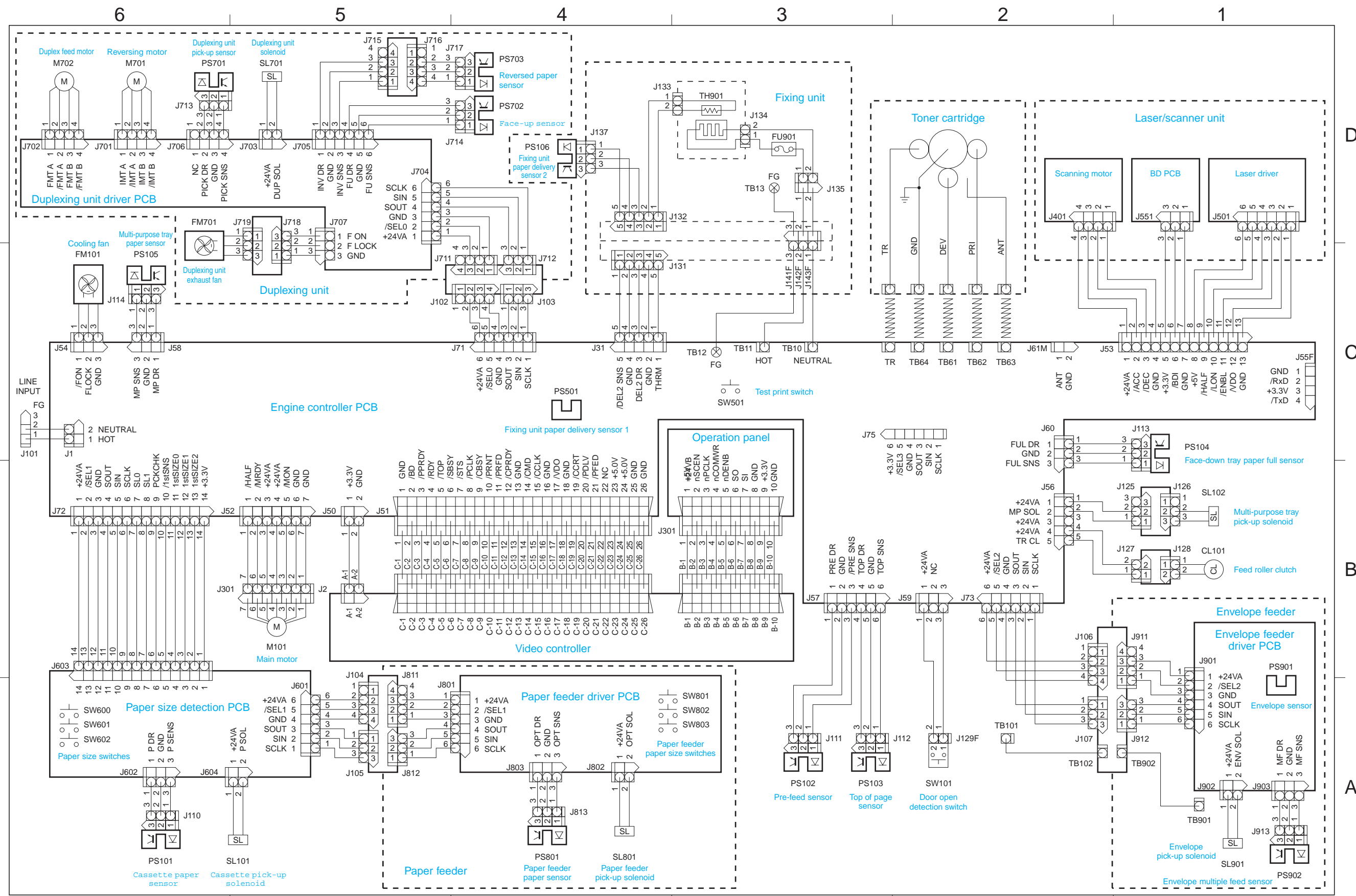
• Timing chart for two consecutive prints on A4 paper (Cassette feed)

Power switch ON

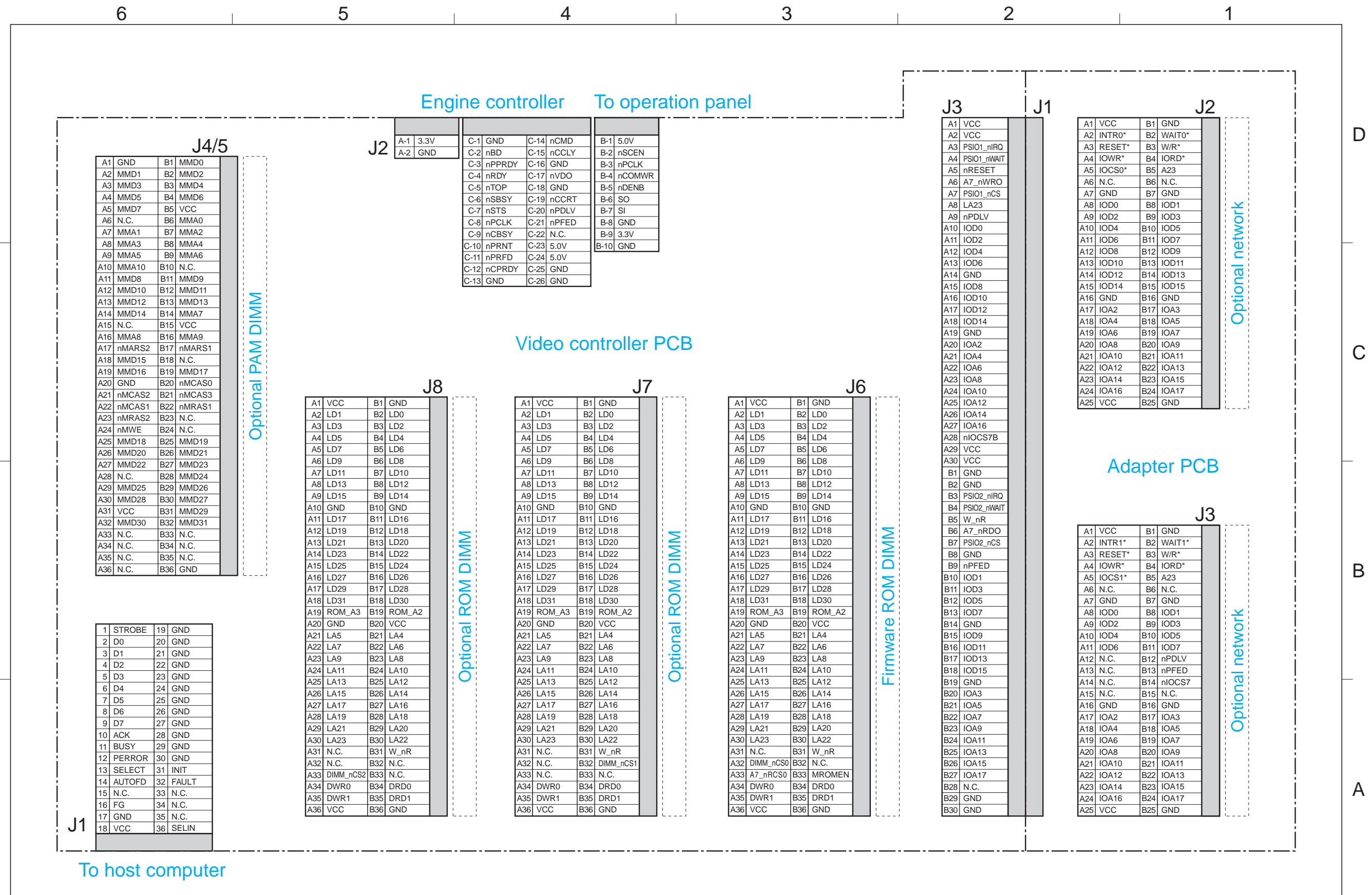
(Unit: Seconds)

Operation	WAIT	STBY	INTR	PRINT	LSTR	STBY
1 /PRNT signal						
2 /TOP signal						
3 /VDO signal	← About 0.75					
4 Main motor (M101)	← About 0.1					
5 Feed roller clutch (CL101)	← About 0.25		← About 0.7			
6 Scanner motor	→ ← About 0.7		← About 0.1 → ←			
7 Cooling fan (FM101)	← About 4			High-speed rotation	Low-speed rotation	
8 Cassette pick-up solenoid (SL101 or SL103)			→ ← About 0.15	← About 0.18	← About 8.8	← 30 →
9 Pre-feed sensor (PS102)				SL103 SL101		
10 Top of page sensor (PS103)				← About 2.7 →		
11 Fixing unit paper delivery sensor 1 (PS501)				→ ← About 0.25		
12 Fixing unit paper delivery sensor 2 (PS106)				← About 1.5		
13 Face-down tray paper full sensor (PS104)						
14 HVAC	→ ← 0.5		← 0.5 to 2		← About 2.2 →	← About 1.0
15 HVDC					← About 0.52	
16 DBAC	→ ← About 0.27			→ ← About 0.12	→ ← About 0.3	→ ← About 0.24
17 DBDC	← About 1.2		→ ← About 0.31		→ ← About 0.24	
18 HVT (+)			→ ← About 0.31	→ ← About 0.3	→ ← About 0.26	
19 HVT (-)	← About 0.27 → ← About 2.2 →				← About 1.5	
20 Fixing heater						
21						

II. GENERAL CIRCUIT DIAGRAM-1/2



II. GENERAL CIRCUIT DIAGRAM-2/2



III. LIST OF SIGNALS

A. Input/output signals to/from engine controller PCB

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J1	1	HOT	I		AC power input
J1	2	NEUTRAL	I		AC power input
J31	1	THRM	I	Analog	Thermistor signal
J31	2	GND			
J31	3	DEL2 DR			
J31	4	GND			
J31	5	/DELSNS2	I	H	Fixing unit delivery detection signal 2
J50	1	+3.3V			
J50	2	GND			
J51	1	GND			
J51	2	/BD	O	Pulse	Beam detection signal (horizontal sync signal)
J51	3	/PPRDY	I	L	Printer power ready signal
J51	4	/RDY	O	L	Ready signal
J51	5	/TOP	O	L	Top of page signal (vertical sync signal)
J51	6	/SBSY	O	L	Status busy signal
J51	7	/STS	O	L	Status signal
J51	8	/PCLK	O	Pulse	Printer clock signal
J51	9	/CBSY	I	L	Command busy signal
J51	10	/PRINT	I	L	Print signal
J51	11	/PRFD	I	L	Pre-feed signal
J51	12	/CPRDY	I	L	Controller power ready signal
J51	13	GND			
J51	14	/CMD	I	L	Command signal
J51	15	/CCLK	I	Pulse	Controller clock signal
J51	16	GND			
J51	17	/VDO	I	H	Video signal
J51	18	GND			
J51	19	/CCRT	O	L	Condition change report signal
J51	20	/PDLV	O	L	Paper delivery signal
J51	21	/PFED	O	L	Paper feed signal
J51	22	N.C.			
J51	23	+5V	O		
J51	24	+5V	O		
J51	25	GND			
J51	26	GND			
J52	1	/HALF	O		Main motor speed switching signal
J52	2	/MRDY	I	L	Main motor ready signal
J52	3	+24VA	O		
J52	4	+24VA	O		
J52	5	/MON	O	L	Main motor drive signal
J52	6	GND			
J52	7	GND			
J53	1	+24VA	O		
J53	2	/ACC	O		Scanner motor acceleration signal

APPENDIX

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J53	3	/DEC	O		Scanner motor deceleration signal
J53	4	GND			
J53	5	+3.3V	O		
J53	6	/BDI	I	L	BD input signal
J53	7	GND			
J53	8	+5V	O		
J53	9	HALF	O		Laser intensity switching signal
J53	10	/LON	O	L	Laser forced emission signal
J53	11	/ENBL	O	L	Video data enable signal
J53	12	/VDO	O	L	Video signal
J53	13	GND			
J54	1	/FON	O		Fan drive signal
J54	2	FLOCK	I	H	Fan lock detection signal
J54	3	GND			
J55F	1	GND			
J55F	2	RxD	I	L	Receiving data
J55F	3	+3.3V	O		
J55F	4	TxD	O		Transmitting data
J56	1	+24VA	O		
J56	2	MP SOL	O	L	Multi-purpose tray pick-up solenoid drive signal
J56	3	+24VA	O		
J56	4	+24VA	O		
J56	5	TRCL	O	L	Feed roller clutch drive signal
J57	1	PRE DR	O		
J57	2	GND			
J57	3	/PRE SNS	I	L	Pre-feed detection signal
J57	4	TOP DR	O		
J57	5	GND			
J57	6	/TOP SNS	I	L	Top of page detection signal
J58	1	MP DR	O		
J58	2	GND			
J58	3	/MP SNS	I	H	Multi-purpose tray paper detection signal
J59	1	+24VA	O		
J59	2	N.C.			
J59	3	+24VB	I	L	+24VB supply and door open detection signal
J60	1	FUL DR	O		
J60	2	GND			
J60	3	/FUL SNS	I	H	Face-down tray paper full detection signal
J61M	1	ANT	I	Analog	Toner level detection signal
J61M	2	GND			
J71	1	SCLK	O	Pulse	Serial clock signal
J71	2	SIN	O		Serial data signal
J71	3	SOUT	I		Serial data signal
J71	4	GND			
J71	5	/SELO	O	L	Duplexing unit select signal
J71	6	+24VA	O		
J72	1	+24VA	O		
J72	2	/SEL1	O	L	Paper feeder select signal

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J72	3	GND			
J72	4	SOUT	O		Serial output data
J72	5	SIN	I		Serial input data
J72	6	SCLK	O	Pulse	Serial clock signal
J72	7	SLO	O	H	Upper cassette pick-up solenoid drive signal
J72	8	SL1	O		Pick-up module identification signal 1
			O	H	Lower cassette pick-up solenoid drive signal
J72	9	PCKCHK	O		Pick-up module identification signal 2
			O		Upper/lower cassette selection signal
J72	10	/1st SNS	I	L	Cassette paper detection signal
J72	11	1st SIZE 0	I	L	Cassette paper size detection signal
J72	12	1st SIZE 1	I	L	Cassette paper size detection signal
J72	13	1st SIZE 2	I	L	Cassette paper size detection signal
J72	14	+3.3V	O		
J73	1	SCLK	O	Pulse	Serial clock signal
J73	2	SIN	I		Serial input data
J73	3	SOUT	O		Serial output data
J73	4	GND			
J73	5	/SEL2	O	L	Envelope feeder select signal
J73	6	+24VA	O		
J75	1	SCLK			N.C.
J75	2	SIN			N.C.
J75	3	SOUT			N.C.
J75	4	GND			N.C.
J75	5	/SEL 3			N.C.
J75	6	+3.3V			N.C.

B. Input/output signals to/from duplexing unit driver PCB

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J701	1	FMT A	O		Reversing motor drive signal
J701	2	/FMT A	O		Reversing motor drive signal
J701	3	FMT B	O		Reversing motor drive signal
J701	4	/FMT B	O		Reversing motor drive signal
J702	1	IMT A	O		Duplex feed motor drive signal
J702	2	/IMT A	O		Duplex feed motor drive signal
J702	3	IMT B	O		Duplex feed motor drive signal
J702	4	/IMT B	O		Duplex feed motor drive signal
J703	1	+24V	O		
J703	2	DUP SOL	O	L	Duplexing unit solenoid drive signal
J704	1	+24V	O		
J704	2	/SELO	I	L	Duplexing unit select signal
J704	3	GNO			
J704	4	SOUT	I		Serial input data
J704	5	SIN	O		Serial output data
J704	6	SCLK	I	Pulse	Serial clock signal
J705	1	FU DR	O		
J705	2	GND			
J705	3	INV SNS	I	L	Reversed paper detection signal
J705	4	INV DR	O		
J705	5	GND			
J705	6	FU SNS	I		Face-up detection signal
J706	1	N.C.			
J706	2	PICK DR	O		
J706	3	GND			
J706	4	PICK SNS	I	L	Duplex pick-up detection signal
J707	1	F ON	O	H	Duplexing unit fan drive signal
J707	2	F LOCK	I	H	Duplexing unit fan lock detection signal
J707	3	GND			

C. Input/output signals to/from paper feeder driver PCB

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J801	1	+24V	O		
J801	2	/SEL1	I	L	Paper feeder select signal
J801	3	GND			
J801	4	SOUT	I		Serial input data
J801	5	SIN	O		Serial output data
J801	6	SCLK	I	Pulse	Serial clock signal
J802	1	+24V	O		
J802	2	OPT SOL	O	L	Paper feeder pick-up solenoid drive signal
J803	1	OPT DR	O		
J803	2	GND			
J803	3	OPT SNS	I	L	Paper feeder paper detection signal

D. Input/output signals to/from envelope feeder driver PCB

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J901	1	+24V	O		
J901	2	/SEL2	I	L	Envelope feeder select signal
J901	3	GND			
J901	4	SOUT	I		Serial input data
J901	5	SIN	O		Serial output data
J901	6	SCLK	I	Pulse	Serial clock signal
J902	1	+24V	O		
J902	2	ENV SOL	O	L	Envelope pick-up solenoid drive signal
J903	1	MF DR	O		
J903	2	GND			
J903	3	MF SNS	I	L	Envelope multiple feed detection signal

IV. MESSAGES TABLE

Message	Meaning	Action
READY	The printer is ready to receive data and print.	No action required.
PAUSED	The printer is off-line.	Press Go key.
RESET TO SAVE	RESET verification prompt. This message appears momentarily and then PAUSED. When a menu item was changed before the printer releases the port on which the last job was processed, such as in the middle of a job, or before the port timed out.	Two options are available: 1. Press Shift+Enter key to enter the RESET menu and save the information immediately. This will terminate the current job, deleting temporary fonts, macros and buffered data. 2. Press Go key and the current job will resume where it left off. The menu items changed will not take effect until the next end of job.
I/O INITIALIZING	One of the network cards is establishing its connection.	No action required.
MEMORY OVERFLOW	A memory overflow has occurred. The printer received more data than it can hold in the available memory on the printer. This can occur if too many soft fonts, macros, or complex graphics are sent to the printer.	The job will resume after 10 seconds if AUTOCONT is ON. Otherwise press the Go key to resume printing. Check the page that ejects since the page could not be processed as requested. Also simplify the job or add additional memory.
TOP BIN FULL	The top output bin (face-down tray) is full.	Remove papers from the face-down tray
CLOSE FACE-UP TRAY	The face-up tray is open when the printer is attempting to print a duplex job.	Close the face-up tray.
+ FORMAT FLASH - IGNORE FLASH	The FORMAT FLASH item is selected to format the optional Flash ROM.	Select + (press Value key) to format the Flash ROM. Select - (press Shift and Value keys) to cancel the operation. For new/unformatted Flash ROM: the printer will automatically format the Flash ROM without any message display when the printer is warming up.
+ REALLY FORMAT - IGNORE FLASH	The operator is being asked to verify the Flash ROM formatting is really wanted. This is in response to the foregoing message.	Select + (press Value key) to verify that the Flash ROM is to be formatted. Select - (press Shift and Value keys) to cancel the operation.
PRINTING...	Usually displayed when printing an item from the TEST MENU, or when attempting to go off-line while the printer is busy.	No action required.
FLASH OVERFLOW	A memory overflow has occurred in the optional Flash ROM	Press the Go key to take the printer back on-line. Format the Flash

Message	Meaning	Action
	The printer has received more font and macro data than it can hold in the available memory of the Flash ROM. The printer goes off-line when this message is displayed.	ROM or delete Font and macro data to create more space.
FLASH ERROR	An error has occurred when trying to format, or read or write data to the optional Flash ROM.	Replace the Flash ROM.
FLASH FORMAT RESTART	The optional Flash ROM has been formatted using the FORMAT FLASH item. The printer will restart.	No action required.
FLASH FORMATTING...	The optional Flash ROM is being formatted.	No action required.
READY FLUSHING...	A Cancel job is performed while the printer is receiving data or while the printer is in the middle of printing a job.	The printer is flushing the job.
5F-50 ERROR CALL FOR SERVICE	Fixing unit malfunction	Perform the troubleshooting procedure described in Section VI of Chapter 4.
5F-52 ERROR CALL FOR SERVICE	Scanner unit malfunction	
5F-54 ERROR CALL FOR SERVICE	Main motor malfunction	
5F-56 ERROR CALL FOR SERVICE	Duplex unit exhaust fan malfunction	
5F-59 ERROR CALL FOR SERVICE	Cooling fan malfunction	
5F-60 ERROR CALL FOR SERVICE	Duplex Option error	
5F-61 ERROR CALL FOR SERVICE	Envelope Option error	
5F-62 ERROR CALL FOR SERVICE	Feeder Option error	
6F-61 ERROR CALL FOR SERVICE	Resident ROM checksum error	
6F-63 ERROR CALL FOR SERVICE	Resident DRAM error	
6F-68 ERROR CALL FOR SERVICE	NVRAM (EEPROM) error	
6F-7A ERROR CALL FOR SERVICE	SRAM in AIR chip error	
COLD RESET	Displays when the COLD RESET Power-On sequence is selected.	
COLD RESET A4	Displays when factory RESET - A4 Power-On sequence is selected.	No action required.
COLD RESET LTR	Displays when factory RESET - LTR Power-On sequence is selected.	No action required.
CONTEXT SAVE ADJUSTED	The context saving item (PCL SAVE or PS3 SAVE) in the MEMCONFIG MENU have been adjusted automatically by the printer operat-	Press Go key to continue.

Message	Meaning	Action
	ing system. This message is displayed when printer has been turned ON with context saving feature enabled, but due to manual changes to the operation panel, there is not enough memory to support the setup.	
CONTEXT SAVE CHANGE	The user has pressed Go key to go on-line after adjusting the context saving feature. The printer is allocating enough memory for the context saving feature.	Press Go key to enable the new setting and resume operation.
DUPLEX JAM	A paper jam has occurred in the duplexing unit.	Remove the jammed paper from the paper path. The top cover must be opened and closed to resume printing.
CASSETTE1 MISSING	The cassette is not in the printer or is not correctly positioned.	Install the cassette in the printer.
NETWORK OPTION ERROR	An incompatible network card has been installed in the printer.	Perform the troubleshooting procedure described in Section VI of Chapter 4.
PS OPTION ERROR	An optional ROM DIMM diagnostic error.	
PARALLEL INTERFACE ERROR	The parallel port is not communicating with the controller.	
ETHERNET OPTION ERROR	The Ethernet card is not communicating with the controller.	
TOKEN RING OPTION ERROR	The Token Ring card is not communicating with the controller.	
LOAD <SIZE> IN <TRAY>	<p>Load the specified tray with paper size.</p> <p><paper source></p> <p>CASSETTE1: The 500-sheet internal cassette</p> <p>CASSETTE2: The optional paper feeder</p> <p>MPT: The multi-purpose tray</p> <p>ENV.: the optional envelope feeder</p> <p>ANY TRAY: Any tray that support Letter-, Legal-, or A4-size paper.</p> <p><size></p> <p>LETTER: Letter size paper</p> <p>LEGAL: Legal size paper</p> <p>A4: A4 size paper</p> <p>EXEC: Executive size paper</p> <p>COM10: Commercial #10 envelope</p> <p>MONARCH: Monarch envelope</p> <p>DL: DL envelope</p> <p>C5: C5 envelope</p> <p>B5-JIS: B5-JIS envelope</p> <p>B5-ISO: B5-ISO envelope</p> <p>CUSTOM: Paper loaded from the MPT or Manual Feed</p> <p>Any: Unknown paper size</p>	<p>The specified paper source must be loaded with the requested paper size. To continue the print job, you may have to press Go key.</p> <p>If the paper source runs out of paper during printing, reloading the paper source will allow the printer to continue printing.</p> <p>For manual feed, you need to press Go key to continue printing.</p>
LOAD <size> IN MANUAL	Load multi-purpose tray with the specified paper.	Press the Go key to resume printing.

Message	Meaning	Action
MEM ALLOC ERROR	There is not enough memory available to process the data and print the page. If AUTOCONT is ON (CONFIG MENU), the print job will resume after 10 seconds.	If AUTOCONT is OFF, you must press the Go key to resume printing. Check the printed page to ensure that it is complete.
RESTORING DEFAULTS	This message is displayed when the RESET=MENU is selected in the RESET MENU.	No action required.
MRT COMPRES-SION	The printer is using MRT Compression, with the possibility of print quality deration (lossy compression)	No action required.
READY TONER LOW	Toner is low.	Replace the toner cartridge. The printer will continue to operate, but the images will degrade.
TONER CART MISSING	No toner cartridge is installed in the printer, or the cartridge is not installed correctly.	Replace the toner cartridge or, if cartridge is installed, remove it and insert it again.
OPERATION CHECK	This is the Control Panel Diagnostic Mode.	For detail, see Chapter 2.
PANEL CHECK	Displays during a panel check function.	
PANEL CHECK DONE	Displays when panel check function is complete	
OPTION RAM ERROR	Option DRAM DIMM diagnostic error. An option DRAM DIMM has failed the startup diagnostic check.	Perform the troubleshooting procedure described in Section VI of Chapter 4.
OPTION ROM ERROR	Option DRAM DIMM diagnostic error. An option ROM DIMM has failed its startup diagnostic check.	
PAGES: ####	This message is displayed when SHOW PAGE COUNT is selected in the TEST MENU, where #### is the total number of pages.	No action required.
PAPER JAM	A paper jam has occurred somewhere in the paper path.	Remove the jammed paper. The top cover must be opened and closed to resume printing.
WRONG PAPER SIZE	A paper size mismatch has occurred. There is a mismatch between the physical paper size and the paper size requested by the job.	The top cover must be opened and closed to resume printing.
PRINTER OPEN	Printer is open.	Close the printer.
RESETTING PRINTER	This message is displayed when RESET=PRINTER is selected in the RESET MENU.	No action required.
START PAGE	This message is displayed when the printer is printing the Start Page.	No action required.
KEY NOT VALID	This message is displayed when a key that is not enabled in the current function is pressed.	Press the correct key to complete the current function.
WARMING UP...	The printer is warming up.	Wait until the printer has warmed up and displays READY.
LOAD CLEANING PAGE IN MANUAL	Load the MP tray with the Cleaning Page generated by the printer.	Press the Go key to feed the Cleaning Page through the printer to clean the fixing unit.

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